Post-Construction Avian and Bat Fatality Monitoring Study

for the High Winds Wind Power Project

Solano County, California: Two Year Report

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EXECUTIVE SUMMARY

The High Winds Project Area is situated on roughly a 10 square mile area in the Montezuma Hills, about 3.5 miles west of Rio Vista in Solano County, California. FPL Energy developed the project through its subsidiary High Winds LLC. The project consists of 90 wind turbines rated at 1.8 MW each for a total capacity of up to 162 MW. Eighty one turbines went on-line by the end of July 2003, followed by 9 more turbines in December.

During this two-year project, carcass surveys were conducted twice per month at every wind turbine tower between August 4, 2003 and July 30, 2005, for a total of 48 total surveys (or rounds).

A post-construction survey protocol was developed to determine avian presence (species composition and abundance) and use (behavior and seasonal presence) within and adjacent to the project area. Avian Abundance and Behavior observations were made in conjunction with the Prey Monitoring/Raptor Abundance and Use Surveys. This prey monitoring and raptor survey was developed to determine the presence and abundance of raptor prey species (e.g. California ground squirrel and black-tailed jackrabbit) within the project area. The purpose of these observations was to determine whether the numbers of these prey species was affected by construction disturbance and, if so, whether that would serve as an attraction to Golden Eagles and other large avian predators.

Raptor nesting surveys were conducted in the spring of each year of the two year project, between the months of March and July of 2004 and April and June of 2005. Searches were done via automobile, on foot and through regular avian survey observations.

A total of 163 avian incidents were recorded by searchers during standardized surveys, representing 35 species. Of the 35 species, 7 were raptor species including American Kestrel, Red-tailed Hawk, Ferruginous Hawk, Rough-legged Hawk, White-tailed Kite, Golden Eagle, and Barn Owl. There were a total of 71 raptor incidents, 60 songbird incidents involving 17 species and 22 incidents involving a mix of 11 avian species found during this two year study.

Remains of one hundred sixteen bats were found by searchers during standardized surveys, representing 4 different species including Hoary Bat, Mexican Free-tailed Bat, Western Red Bat, and Silver-haired Bat. The greatest number of bat incidents occurred during the fall migration period, with 52 (78%) bat carcasses found between August and October 2003, and 37 (80%) between August and October 2004.

A total of 374 observations of prey species were recorded during this two year study. Potential prey items were seen throughout the year in both years of this study with a slight peak in unidentified mouse species in January 2004, which was not observed in January of 2005. It appears from the preliminary data that raptor fatalities occur more often in areas with high abundances of prey species than in areas of low prey abundance.

A total of 86,143 observations of 43 avian species including 2473 unidentified birds were recorded at eight observation points. No federally endangered or threatened species were observed during this study period.

Overall avian activity (non species specific) was fairly evenly dispersed throughout the project site and the adjacent Hamilton property control site. With respect to specific raptor species, American Kestrels and Red-tailed Hawks were observed in moderate numbers at all sites. Red-tailed Hawk observations were greatest in number in November and in general through the late fall and the winter months during migration (November through February). American Kestrels were observed most often between August and February (fall through winter). Golden Eagle and Northern Harrier numbers were steady throughout the year, with slight increase in the number of observations of harriers in November and February. White-tailed Kites were observed in the greatest numbers in the February (winter).

Perch behaviors were categorized by perch location/structure, Red-tailed Hawks were observed perching more often than all other raptor species combined.

Flight behaviors were categorized and a total of 573 observations of raptor flight behaviors were recorded. Of these, 64% were hunting flights, 33% were general flights, and 3% were territorial flights. Besides the large number of observations made of general hunting, the most common general flight behavior observed in raptors was soaring. Red-tailed Hawks accounted for 73% of all of the kiting observations.

A total of 573 raptor flight observations were made with flight heights recorded. Of these, about 49% were 0 to <10 meters above ground level (AGL), 33% were 10 to < 30 meters, 15% were 30 to 100 meters (the dimensions of the rotor sweep area), and about 3% were above 100 meters. We also examined the relationship between the ratio of time that raptors were observed at blade height versus non-blade height, and the number of raptor fatalities, by species. However, we found no evidence of such a correlation.

In our surveys of all the gravel roads in the project area, we observed no increase in the number of ground squirrels, or in the number of ground squirrel or other rodent species burrows along access roads during this two year study.

The number of raptor observations made during Prey Monitoring Surveys at the 7 observation points within the project area was compared with Carcass Survey avian incidents (standardized data only) located within those same areas for both years of this study. In general, the data appears to show a correlation between abundance of certain raptor species and the number of incidents of those same species at those sites. However, the abundance of Red-tailed Hawks and American Kestrels within each site area did not seem to correlate to number of incidents involving those species in those areas.

Eight different species of raptors were observed nesting in and/or adjacent to the wind power project area in 2004. A total of 38 confirmed raptor nests, 24 probable nests, and 4 possible nests were observed. In 2005, a total of 26 raptor nests were designated confirmed, 10 as probable and 3 possible. There appeared to be a decline in the number of raptors nesting

within/adjacent to the project site in 2005, when compared to the previous year's data. This could be attributed to the severe weather that occurred in the area in the second year spring. Many of the nests that were active in 2004 had been blown out of the trees in the spring of 2005. There were also fewer raptors observed during avian behavior and abundance surveys in the second year.

This report details the first fatality study of the newer turbine technology installed in the Collinsville Montezuma Hills Wind Resource Area (CMHWRA). These turbines are arrayed on similar landscape and habitat as that in which approximately 600 turbines of the older technology are deployed. Projects using the taller turbines require FAA warning lights on some of the turbines for aircraft navigational guidance and safety.

For both bats and birds, there is no evidence that FAA lighting in the form of L-864 and L-810 flashing red lights attracted birds to towers and that the presence of those lights cause large scale fatality events at wind turbines.

Raptor use estimates for the High Winds project area are higher than several other areas that have been studied. For specific raptor groups, only the Altamont has higher estimates of use by Golden Eagles. In contrast to the Altamont the number of Red-tailed Hawks and American Kestrels is substantially higher in the High Winds project.

It is recognized that the number of carcasses found under the towers is lower than the total number of birds and bats likely to have been killed. There are at least two factors that need to be accounted for. The first is the possibility that the searchers will miss carcasses. A second possibility is that the carcasses are removed prior to the time the searchers arrive on location after the collision event occurred. A scavenger removal and searcher efficiency study has estimated the proportion of carcasses missed by the searchers and the proportion removed by scavengers within the 14 day search cycle.

By dividing the estimated number of birds/bats by the number of turbines searched in each year, a rate of kills/turbine can be calculated, allowing comparisons between wind farms of different sizes (different numbers of towers). The estimates are as follows: 2.92 birds/turbine and 4.52 bats/turbine in the first year, and 1.98 birds/turbine and 2.73 bats/turbine were estimated killed in the second year. The average rate over the two years is 2.45 birds/turbine/year and 3.63 bats/turbine/year. When calculated as birds per Megawatt instead of per turbine, the numbers are as follows: 1.62 birds/Mw and 2.51 bats/Mw in the first year, and 1.10 birds/Mw and 1.52 bats/Mw were estimated killed in the second year. The average rate over the two years is 1.36 birds/Mw/year and 2.02 bats/Mw/year.

In comparison, the High Winds Wind Power Project does not differ greatly in mortality, with other studied wind power projects.

1.0 INTRODUCTION

The High Winds Project Area is situated on roughly a 10 square mile area in the Montezuma Hills, about 3.5 miles west of Rio Vista in Solano County, California. FPL Energy developed the project through its subsidiary High Winds LLC. The project consists of 90 wind turbines rated at 1.8 MW each for a total capacity of up to 162 MW. The turbines are three-bladed upwind machines on tubular towers, standing 329 feet (100 m) to the tip of the blade in the 12 o'clock position. The hub height is 197 feet (60 m) above the ground, the rotor diameter is 262 feet (80 m), and the distance from the rotor tip (when in the 6 o'clock position) to the ground is 89 feet (27 m). Eighty one turbines (numbered 1 through 81) went on-line by the end of July 2003, followed by 9 more turbines (82-90) in December.

Infrastructure to support the project consists of approximately 25 linear miles (40 km) of access roads, roughly the equivalent of 50 acres, and an additional five acres of construction staging areas, underground electrical collection systems, a substation, operations and maintenance building, and meteorological towers.

The landscape consists of rolling hills ranging mostly between 150 and 300 feet (61-91 m) in elevation above sea level. Turbines are situated on the highest ground and are not located in low-lying valleys. The project is dissected by Birds Landing Road, Montezuma Hills Road, Emigh Road, Currie Road, and Anderson Road. Highway 12 is a short distance north of the project site. These roads are bounded by narrow weedy (mostly grasses) strips and a few homesteads complete with houses, yards, barns, driveways, and other structures necessary for farming. The land is privately owned and is largely agricultural. Where turbines and project roads are located the land use is entirely tilled agriculture. Crops include wheat, barley, hay and fallow fields. A multi-year rotation is the norm with wheat, fallow, and grazing alternating being the regime used most often. There are some isolated wetlands (mostly cattail marsh) within the project boundaries, but these are not within the project footprint.

The Sacramento River Deep Water Ship Channel is about 1.6 miles (2.6 km) to the south-southeast of the southernmost location where turbines are located and most turbines are more than 2 miles (3.2 km) from this waterway. The Suisun Marsh is a minimum of 3.5 miles (5.6 km) from where the nearest turbine is located, with most turbines being located more than 4 miles (6.4 km) from these wetlands.

Treed areas within the project are limited to the areas close to homes and in a few valleys. No trees were removed to construct the project. Many of the trees are non-native eucalyptus, olive, and other species, although some native oaks and junipers are present near homes. There is a large olive grove north of the project area. These treed habitats provide havens and nesting substrate for birds that do not use farmland and other birds that forage in tilled fields.

The High Winds project was approved by the Solano County Planning Commission on September 19, 2002. The approval included certification and adoption of an Environmental Impact Report and approval of a Use Permit for up to 150 MW of installed capacity,

accompanied by findings of fact regarding the potential environmental effects, mitigation measures, alternatives, and overriding considerations. The Use Permit conditions of approval included, by reference, the Mitigation Monitoring Program prepared as part of the Final EIR. A Minor Revision to the Use Permit to add two properties totaling 480 acres and add up to eleven turbine sites allowing a total of up to 162 MW of installed capacity was approved by the Planning Commission on May 15, 2003. An EIR Addendum was prepared for that project modification, which concluded that the additional turbines and construction disturbance would be within the parameters of the worst-case analysis presented in the Final EIR, and that the incremental impacts would be adequately addressed by the originally-adopted mitigation measures.

The Solano County Use Permit, U-01-18, Mitigation Monitoring Program included the following requirements related to raptor species:

> **BIO-7a:** After the Project begins operation, the project developer shall participate in research to determine avian mortality rates and the causes of mortality on the site itself. This research will contribute to and utilize the Wildlife Response and Reporting System (WRRS) database.
>
> **BIO-7b:** The project developer shall hire an independent biologist to report annually on avian mortality at the site, and these reports shall contain sufficient information (e.g. the location of dead birds relative to turbine location; the availability of raptor prey species) to allow evaluation of turbine design characteristics and location effects that contribute to mortality. This monitoring shall follow standardized guidelines outlined by the National Wind Coordinating Committee (Anderson et al, 1999) for a minimum of two years following the first delivery of power.

The report that follows covers two years of activities implementing the studies designed to fulfill the requirements of permit conditions BIO – 7a and BIO – 7b.

2.0 METHODS

2.1 Carcass Surveys

2.1.1 Clean Sweep Surveys

Prior to the start of the carcass surveys, a "clean sweep" was conducted at all newly installed and operational wind turbine towers to remove all carcasses and remains of carcasses from the survey area. The sweep was adopted to increase the likelihood that all carcasses found during the subsequent surveys would be associated with incidents that occurred during the course of the systematic surveys. Clean sweeps were conducted using the same protocol as used in the standardized carcass surveys (see below). The clean sweep for towers 1 to 81 was executed July 2 through 25, 2003, for towers 82 to 90, on December 21, 2003, and for tower 14 which went out of operation mid November of 2004, a clean sweep was conducted on April 20, 2005 after it was back in operation. Standardized surveys of those towers started during the round of surveys following their respective clean sweeps.

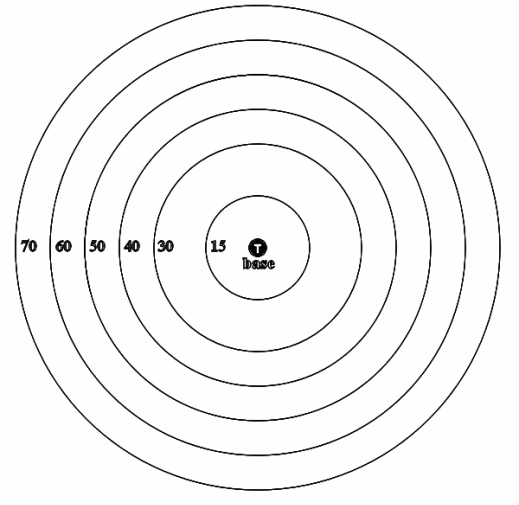
2.1.2 Standardized Surveys

During this two-year project, carcass surveys were conducted twice per month at every wind turbine tower between August 4, 2003 and July 30, 2005, for a total of 48 total surveys (or rounds). Eighty one towers were surveyed in 2003 (August – December), and 90 towers in January through mid November 2004. Eighty-nine towers were surveyed mid November 2004 through mid April 2005 because one wind turbine (Tower 14) was non-operational during this period. After that tower was repaired, 90 towers were then surveyed mid April through July 2005 until the end of the survey. During the first round every tower was surveyed between the 1st and the 15th of the month, and surveyed for round 2 between the 16th and the end of the month. In order to avoid having the towers continually surveyed during the same time of day, each round started 4 towers beyond where the previous round was started.

The survey consisted of searchers walking in concentric circles around the tower's base at distances of 15, 30, 40, 50, 60, and 70 meters (49, 98, 131, 164, 197, and 230 feet). While walking around each ring, the searcher used the unaided eye, alternately scanning an area that extended for 5m in either side of his track (7-1/2 m [25 feet] on one side of the 15 and 30-meter circles [49-98 feet]; Figure 1). The surveyors used range finders to initially establish and periodically check the distance of each circular route from the tower. Data recorded at the beginning of the surveys included meteorological data (cloud cover, temperature, wind velocity); ground cover information (crop type and height). In addition, the start and finish times were recorded for each tower searched (see Appendix A). Observations of potential prey species such as mammals and reptiles (not birds) were recorded, and included identification to species, when possible. The distance from and direction relative to the tower were recorded for each observation. Data on potential scavenge items such as mammals, reptiles, and livestock were also recorded, including identification to species (or smallest possible taxonomic group), distance, and, bearing from the tower. Small finds were buried or removed from the survey area to prevent duplicate counts of animals on following surveys. With respect to birds, any feathers or clumps of feathers with flesh attached were recorded as a fatality. Loose feathers were not considered fatalities unless there were several primary or tail feathers that would be more than

could be lost during molting. When unattached single loose feathers were found their location was recorded and the feathers were removed and retained but not recorded as a fatality. Small feathers such as down feathers were also not recorded, since these most likely were lost as a result of normal preening. In any event, this type of remains were too scant to assign cause of death. However, if they were in proximity to a turbine they were considered a turbine related fatality although some species could have been killed by a predator or in some other manner.

Figure 1. Carcass Survey Search Pattern



When a carcass or injured bird or bat was found, the searchers performed a thorough investigation and documentation of the incident using the protocols listed in the Wildlife Response and Reporting System (WRRS). An incident report number was assigned and an incident report form filled out for each find (Appendix B). A GPS was used to determine geographic coordinates, and a range finder and compass were used to determine distance and bearing from the tower. The carcass was photographed in the position in which it was found using a digital camera. After identifying the animal by species (including age and sex when possible), an examination was performed to determine the nature and extent of any injuries, and whether any scavenging or insect infestation had occurred. The time since death was estimated and recorded. In case of dismemberment, the surveyors searched the vicinity to locate all body parts. All loose feathers were collected in order to avoid identifying the feathers as an additional kill during the next survey of the tower. The carcass was then placed in a plastic bag labeled with date, species, tower number, and incident report number, and taken to a freezer to be stored in accordance with the U.S. Fish and Wildlife Service (FWS) permit requirements. When carcasses were found at times and locations outside of one of the standardized surveys conducted as part of this study, such as avian or prey surveys, the carcass was processed as above but it was classified as an "incidental" find.

When an injured animal was found, the searchers recorded the same data collected for a carcass, noting however, that it was an injury and not a fatality. The searchers then captured and restrained the animal in a manner to avoid either further injury to the animal or injury to the survey crew. Once the animal was secured it was transported to a wildlife rehabilitator or

veterinarian. The hospital accession number and the final disposition of the animal was recorded on the report form.

Only in those cases where the injury to the animal could be linked to a specific turbine was a turbine number recorded as the location in the report. When no corroborating information that the injury was linked to a tower was available, the animal was simply recorded as having been found "ON SITE". For instance, if a bird was found with a broken wing, it would not be associated with a specific wind turbine tower if it were observed to be mobile.

If the carcass or injured animal found was listed as a threatened or endangered species, or a species of concern, the Avian Respondent, listed in the WRRS, was notified immediately by telephone, and collection of the dead animal was delayed until specific direction for proceeding was received from the FWS.

2.1.3 Searcher Efficiency and Scavenger Removal

It is recognized that the number of carcasses found under the towers is lower than the total number of birds and bats likely to have been killed. There are at least two factors that need to be accounted for. The first is the possibility that the searchers will miss carcasses due to the amount of ground cover or the size and coloration of the species making it difficult to spot them. A second possibility is that the carcasses are removed prior to the time the searchers arrive on location after the collision event occurred. A preliminary scavenger removal and searcher efficiency study conducted in December, 2005 has estimated the proportion of carcasses missed by the searchers and the proportion removed by scavengers within the 14 day search cycle.

We made the following adjustments to extrapolate the mortality counts to estimated mortality for the entire wind farm. We adjusted the number of carcasses found (*C*) for scavenger efficiency (*Sc*) and search efficiency (*Se*)

a) Proportion of test carcasses left by scavengers within the search period (*Sc*). Scavenger efficiency (*Sc*) was measured December 10-11, 2004 by placing 48 bird/bat carcasses of three sizes, small (American Pipit, European Starling, Horned Lark, Red-winged Blackbird, Bats), medium (American Kestrel,Ring-necked Pheasant chicks, Rock Pigeon), and large (Mallard, Red-tailed Hawk,Ring-Necked Gull), on mortality transects in the Collinsville Montezuma Hills Wind Resource Area (CMHWRA). We monitored carcasses, daily for 8 days and then once after two weeks, for evidence of scavenging. The status of each carcass was reported as intact, scavenged or completely removed, and the extent of scavenging was described. The probability of a collision event is equally distributed over all 14 days of the search cycle. Thus, the overall duration between carcass fall and search is half the search cycle (7 days). The scavenge rate was calculated for the number of test carcasses that were not visible (body of carcass removed/severely scavenged) after 7 days. On December 24, 2005 after the two-week period, all remaining carcasses were collected.
b) Proportion of carcasses missed by observers in the search efficiency trials (*Se*). Search efficiency trials were conducted for each observer by having an independent technician place carcasses of three sizes, small, medium and large, under towers in the (CMHWRA), without the knowledge of the searcher. The searchers recorded all carcasses that they discovered,

including carcasses planted by the independent wildlife technician. Planted evidence of collisions was later removed from the database and a mean search efficiency rate (*Se*) was calculated.

Thus, $\hat{C} = \frac{C}{Sc \times Se}$

Where $\hat{C}$ = Adjusted total number of kills estimated at the windfarm.

The variance of the number of kills found was first calculated per tower using standard methods. Then, we calculated the variance due to the correction factors *Sc* and Se, using the variance of a product formula (Goodman, 1960). The variance of the product of *R*, *E* and *P* is:

$$\mathrm{Var}(\hat{C}) = \hat{C}^2 \times \left[\frac{\mathrm{var\,C}}{\mathrm{C}^2} + \frac{\mathrm{var}(Sc \times Se)}{(Sc \times Se)^2} \right]$$

2.2 Avian Abundance and Behavior

A post-construction survey protocol was developed to determine avian presence (species composition and abundance) and use (behavior and seasonal presence) within and adjacent to the project area. Seven sampling points (termed observation points or OPs), and one control area were selected for observing birds within the area (Figure 2). The OP was located at the center point of a circle with a radius of 0.75 of a mile (1.2 km). The observer scanned the area by slowly rotating 360° around the center point. There was slight overlap among observation sites. These OPs covered a vast majority of the area (93.3% of all turbine locations) where turbines have been installed and the area immediately surrounding all turbines sites. The pre-construction survey points are shown in Figure 3. A discussion of the findings of the two surveys is discussed later in this report (see page 40).

Observations were generally made from higher elevation vantage locations within the project area. Observations at a control site were made from the road (Birds Landing Road). This control area was positioned adjacent to the project site where turbines have been installed. Two rounds of surveys were conducted each month at each observation point (referenced here as Round 1 and Round 2). A total of 48 rounds of surveys were conducted in the two years between August 2003 and July 2005. Round 1 was conducted within the first 2 weeks of each month. Round 2 was conducted within the last 2 weeks of each month. The order in which the OPs were surveyed rotated on a regular basis. For example, during the first round of surveys, the control site observation was conducted first and Site 7 was conducted last. During the second round of surveys Site 3 was conducted first and Site 2 was the last site to be surveyed. By rotating in a regular fashion all sites were given approximately equal coverage during different times of the day, thereby reducing the potential for sampling bias.

Avian Abundance and Behavior observations from OPs were made in conjunction with the Prey Monitoring/Raptor Abundance and Use Surveys (see below). Observations commenced, on average, at 0830 hours and continued until about 1630 hours, corresponding to the time raptors are most likely to be active. Observation periods were 20 minutes in duration and all 8 sites

were sampled on the same day. A full survey consisted of 2 hours and 40 minutes of observations from observation points per day.

The following information was collected for each observation period: species identity; number of individuals observed; time the sighting commenced and ended; additional sightings of the same bird(s); the type of activity (perching, flapping flight, soaring, etc.,); perch structure, if perched; direction of the sighting; and, flight height above the ground, if in flight. Flight heights above ground level were categorized relative to the arc of the rotor swept area: 1 = < 10 m above ground level, completely below the rotor swept area; 2 = 10m to < 30 m above the ground, which is at the lower point of the arc of the rotor swept area; 3 = 30 to 100 m above ground, the arc of the rotor swept area; and, 4 = > 100 m, above the rotor swept area (Appendix C). Unusual or interesting behaviors were also recorded as field notes but not incorporated into the statistical data. In addition, standard weather information was collected at the beginning of each observation period including: temperature; wind direction; wind speed; cloud cover; precipitation; and, whether visibility is sufficient for the observer to see the entire observation area.

Figure 2. Avian Abundance and Behavior Survey Observation Point Areas

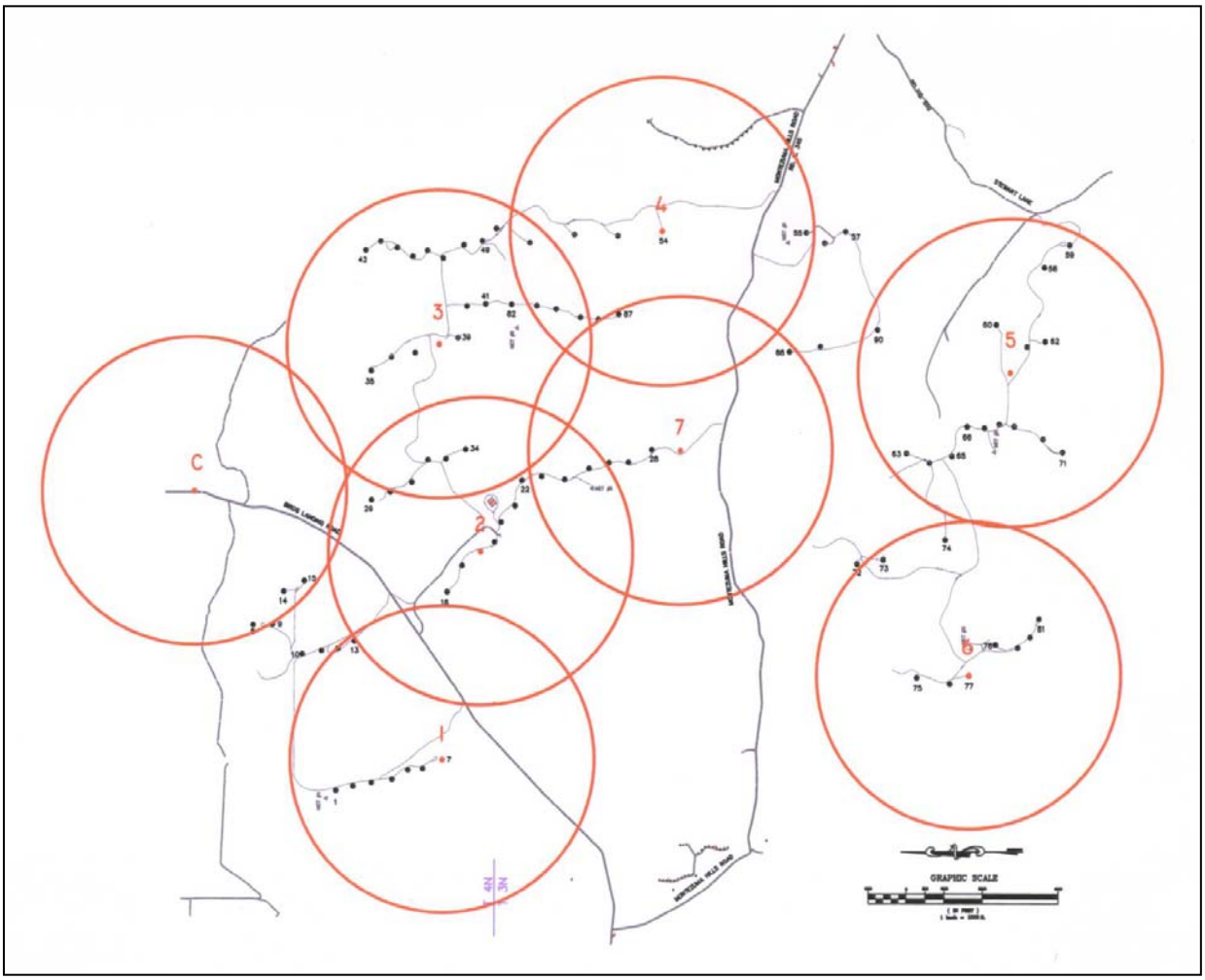
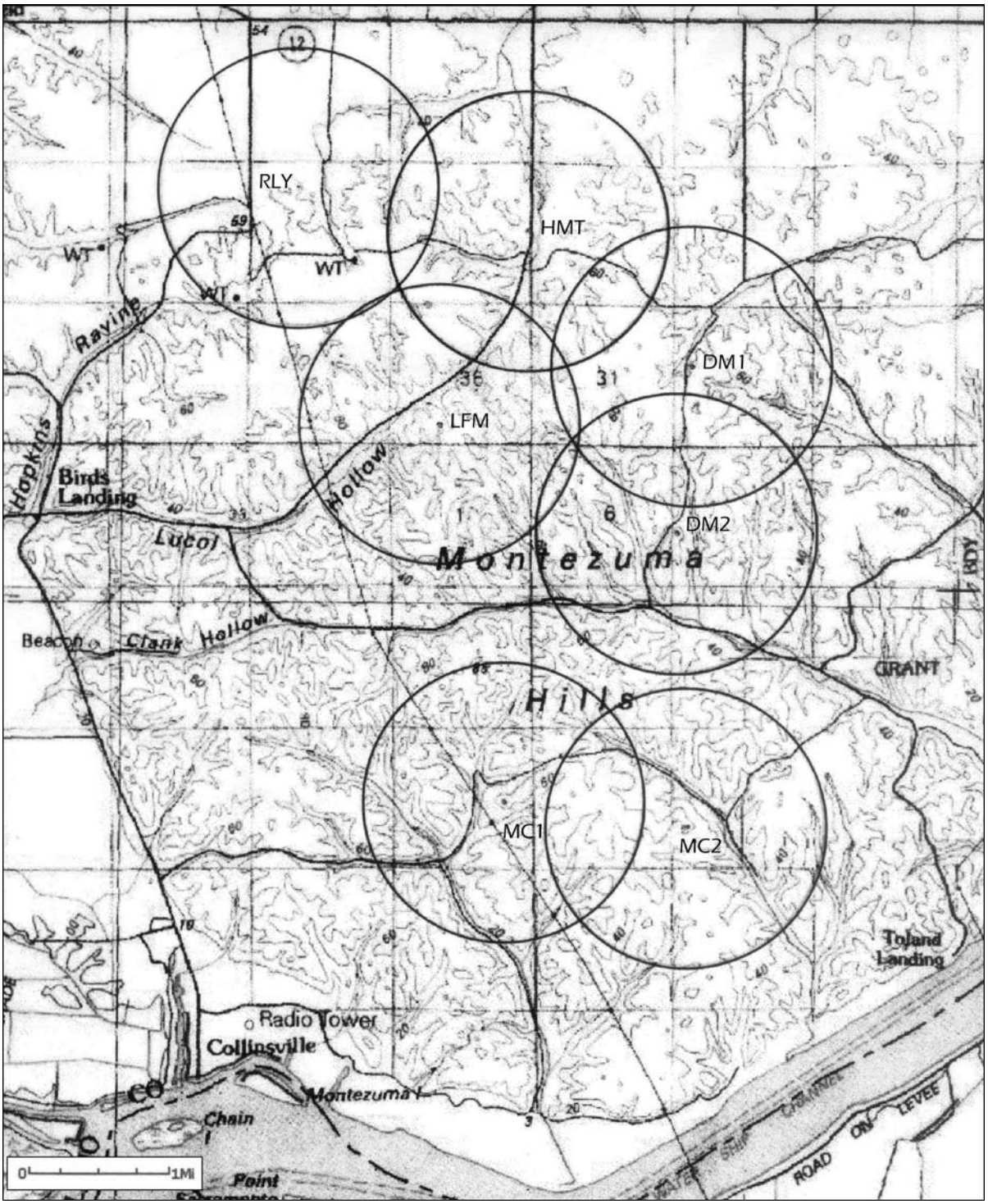


Figure 3. Observation Points and Bird Monitoring Areas August 17, 2000-August 16, 2001, at the High Winds Wind Power Development Site

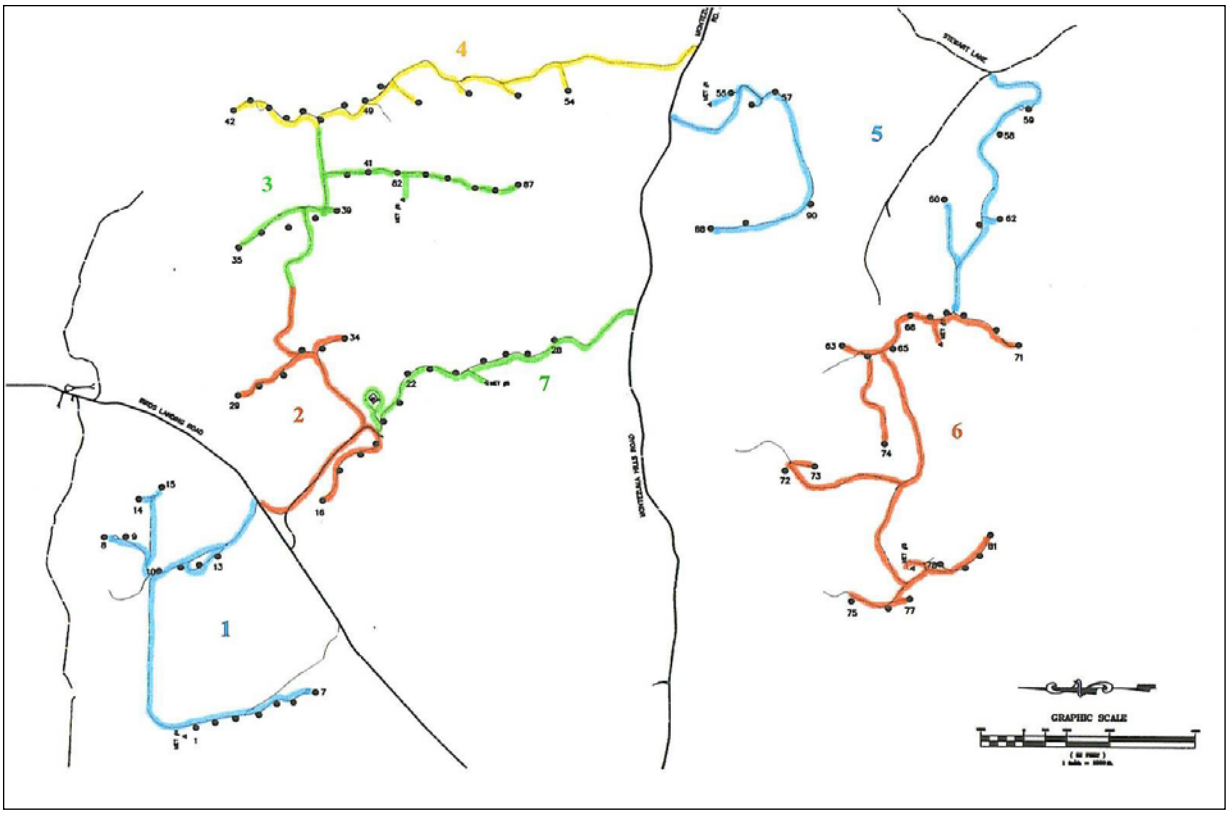


RLY = Riley (property owner), HMT = Hamilton, LFM = Leutholtz-Farnsworth-Meyer, DM1 = Dexter Mayhood Site 1, DM2 = Dexter Mayhood Site 2, MC1 = McCormack Site 1, and MC2 = McCormack Site 2.

2.3 Prey Monitoring/Raptor Abundance and Use

A Prey Monitoring and Raptor survey was conducted in addition to, and in conjunction with, the Avian Abundance and Behavior surveys (Figure 4). This prey monitoring and raptor survey was developed to determine the presence and abundance of raptor prey species (e.g. California ground squirrel and black-tailed jackrabbit) within the project area. The purpose of these observations was to determine whether the numbers of these prey species was affected by construction disturbance and, if so, whether that would serve as an attraction to Golden Eagles and other large avian predators.

Figure 4. Prey Monitoring Survey/Raptor Abundance and Use Survey



Seven driving survey routes within the wind farm were established for observing prey and raptor usage. In the prey survey, there was no overlap among areas. This survey covered 100% of the gravel access roads (25 linear miles [40 km]) within the wind farm and the bases of each turbine. The attention on road edges and turbine foundations was in response to issues raised in two California Energy Commission studies. Orloff and Flannery (1992) stated that soil disturbance associated with road construction increased the level of ground squirrel burrowing activity. Smallwood and Thelander (2004) noted that turbine foundations were an area of active gopher and ground squirrel burrowing activity. Accordingly, each of these routes was surveyed twice a month to monitor the level, if any, of prey activity.

Observations were made from the constructed gravel roads of the wind farm from a vehicle traveling < 10 mph. The order in which each of the 7 routes was surveyed rotated on a regular basis. For example, during the first Round of surveys, Site 1 was conducted first and Site 7

conducted last. In Round 2, Site 4 was conducted first and Site 3 is conducted last. By rotating in a regular fashion all sites were given approximately equal coverage during different times of the day, thereby reducing the potential for sampling bias.

A total of 48 rounds of surveys were conducted during this two-year project, between August 2003 and July 2005.

Observations commenced, on average, at 0830 hours and continued until about 1630 hours, corresponding to the time ground squirrels and jackrabbits are active. The amount of time each area was surveyed depended upon the number of access roads there were within each site. Each survey-round averaged 2.6 hours. For further details see pages 41-42 below.

The following information was collected for each observation: species identity (of prey and/or raptor using the area); number of individuals; location of sighting; survey duration (time survey began and time survey was finished for each area); and the date.

2.4 Raptor Nesting

Raptor nesting surveys were conducted in the spring of each year of the two year project, between the months of March and July of 2004 and April and June of 2005. Searches were conducted via automobile, on foot, and through regular avian survey observations.

Nesting studies conducted in the general area by Howell and DiDonato (1988), Orloff and Flannery (1992), and by Curry and Kerlinger (2002) for earlier wind power developments were used to identify search areas. These studies mapped existing historical nest sites, along with potential nesting sites, and were readily comparable. Nest sites identified in those studies were observed. Most nest searches began with observing a potential nest area from a distance. An area was selected for observation if it had been identified as an historical nesting location, or if raptors were seen exhibiting territorial behavior in the vicinity. In addition to these observations, most groves of trees were considered potential nesting sites and were also observed.

These areas were observed for a minimum of 2 hours unless a nest site could be confirmed in less time. If a searcher observed an activity of a raptor (or raptors) at a potential nest area during the 2 hours of observation, a second observation at that site was often conducted, time permitting. Observations commenced in the morning hours, and continued during most daylight hours. Information collected during observations included: date; start/end time; species; age; number of adults; and, behavior. Potential nest sites were assigned to one of the three categories according to the following criteria: nesting activity was regarded as being *confirmed* if there was observed raptor activity at a nest; nesting activity was deemed *probable* if nesting or territorial behavior was observed; and nesting activity was regarded as *possible* if an adult pair was observed using the area in the vicinity of a potential nest site. If a nest was confirmed, the following additional data was collected: tree height; tree species; nest height; nest material; and, evidence and number of chicks/fledglings. If a Golden Eagle nest was observed to be active, more than one observation was made to determine if chicks were not only present but survived until they fledged. Appendix F and G list nest locations for the 2004 and 2005 nest surveys, respectively.

3.0 RESULTS

3.1 Carcass Surveys

3.1.1 Summary of Search Effort

A total of 48 complete rounds of standardized searches were conducted between August 4, 2003 and July 30, 2005 (Table 1) on 301 days, for a total of 4220 turbine searches. In the first year of this study (August 2003 through July 2004), 24 rounds were conducted at an average of 86.3 wind turbines on 128 days for a total of 2070 individual turbine searches; clean sweeps were conducted at 81 towers on 6 different days between July 2 and 25, prior to the commencement of standardized surveys and at the newly installed 9 towers on December 21, 2003. The number of wind turbines varied (see Table 1) over time as new turbines were added by mid December 2003 and when one turbine went out of operation in mid November 2004 through mid April 2005. In the second year of this study (August 2004 through July 2005), 24 rounds were conducted at an average of 89.6 wind turbines on 173 days, for a total of 2150 individual turbine searches. A clean sweep was conducted at the tower that had been out of operation since mid November on April 20, 2005, and surveys at 90 turbine towers commenced in the second round of April. The average number of days between successive searches for each tower was 15.25 days (Standard Deviation = 3.63).

Table 1. Summary of Rounds of Fatality Searches during Clean Sweeps in July and December 2003, and Carcass Surveys August 2003 through July 2005.

81 Wind Turbine Towers

Clean Sweep of first 81 towers (#1-81)

2003	Complete Round	July 2, 5, 10, 13, 15, 25

Carcass Surveys

2003	Round 1	August 4, 7, 9, 13, 14
	Round 2	August 17, 20, 23, 26
	Round 3	September 3, 7, 11, 16
	Round 4	September 19, 23, 26, 27, 28, 30
	Round 5	October 5, 9, 10, 11, 12
	Round 6	October 17, 18, 21, 28, 29, 30
	Round 7	November 2, 4, 5, 6, 13, 14
	Round 8	November 16, 17, 18, 19, 23, 25
	Round 9	December 3, 4, 7, 8, 15
	Round 10	December 17, 18, 21, 22, 26, 30

90 Wind Turbine Towers

Clean Sweep of 9 newly installed towers (#82-90)

2003	Complete Round	December 21*

Carcass Surveys

2004	Round 11	January 3, 4, 5, 6, 13

	Round 12	January 16, 18, 20, 21, 23, 26
	Round 13	February 4, 5, 8, 11, 13
	Round 14	February 19, 20, 21, 23, 24, 28
	Round 15	March 2, 3, 5, 7, 8, 12
	Round 16	March 17, 19, 22, 25, 28, 29
	Round 17	April 4, 6, 7, 12
	Round 18	April 16, 18, 19, 25, 26, 27
	Round 19	May 5, 6, 7, 10, 11
	Round 20	May 25, 26, 27, 28, 31
	Round 21	June 2, 3, 7, 8, 10, 11
	Round 22	June 16, 17, 22, 24, 28
	Round 23	July 1, 2, 6, 13, 14
	Round 24	July 16, 19, 21, 28, 29
	Round 25	August 4, 5, 10, 11, 12, 13
	Round 26	August 20, 24, 25, 27, 28, 30, 31
	Round 27	September 6, 8, 9, 10, 13, 14, 15
	Round 28	September 17, 20, 21, 22, 24, 28, 30
	Round 29	October 4, 5, 6, 11, 12, 14, 15
	Round 30	October 21, 22, 25, 26, 28, 29, 31
	Round 31	November 5, 7, 8, 9, 12, 15

89 Wind Turbine Towers

2004	Round 32	November 18, 19, 22, 24, 26, 28, 29, 30
	Round 33	December 2, 3, 6, 9, 10, 14, 15
	Round 34	December 17, 20, 21, 22, 23, 28, 29
2005	Round 35	January 5, 6, 12, 13, 14, 16
	Round 36	January 19, 20, 21, 24, 27, 31
	Round 37	February 2, 3, 8, 9, 10, 11
	Round 38	February 17, 22, 23, 24, 25, 26, 28
	Round 39	March 3, 7, 8, 9, 11, 12, 13, 14
	Round 40	March 23, 24, 25, 26, 29, 30, 31
	Round 41	April 5, 6, 7, 11, 12, 13, 14

Clean Sweep of 1 previously non-operational tower (#14)

2005	Single turbine search	April 20*

90 Wind Turbine Towers

2005	Round 42	April 20, 21, 25, 26, 27, 29, 30
	Round 43	May 3, 6, 10, 11, 12, 13, 14
	Round 44	May 16, 17, 18, 20, 24, 25, 26, 31
	Round 45	June 3, 7, 9, 10, 11, 12, 13, 14
	Round 46	June 18, 19, 20, 24, 25, 28, 29, 30
	Round 47	July 3, 4, 9, 10, 11, 12, 13, 14, 15
	Round 48	July 18, 20, 21, 22, 23, 26, 27, 28, 29, 30

Surveys were conducted on 301 separate days (41% of the days during the year)
10 total rounds of surveys of 81 wind turbine towers
28 total rounds of surveys of 90 wind turbine towers

10 total rounds of surveys of 89 wind turbine towers
4220 total number of wind turbine carcass surveys
2.4 average number of searchers per field day
17.6 average number of minutes spent per carcass survey
1237 total hours of carcass surveys (does not include time spent recording survey conditions data, and collecting carcasses and recording incident data)
21 average number of minutes spent per clean sweep turbine survey
91 total number of clean sweep turbine surveys
31.5 total hours of clean sweep turbine surveys (does not include time spent recording survey conditions data, and collecting carcasses and recording incident data)

* The Clean Sweep surveys in December of the 9 newly installed wind turbine towers were conducted on a day when Carcass Surveys were also being conducted. They were not conducted on additional field days.

3.1.2 Clean Sweep Surveys

No avian or bat carcasses were found during the clean sweep surveys conducted in July and December 2003, or in April 2005 (see Table One for listing of search dates).

3.1.3 Standardized Surveys

During this study, a total of 301 incidents were recorded: 279 incidents were found during standardized surveys, and an additional 22 were found in between surveys, or "incidentally", and all of these were classified as "incidental" finds (Appendix D and E, respectively). Of the total of 183 avian fatalities/injuries found during this study, 20 were found incidentally, and of 118 total bat fatalities, two were found incidentally. In Table 2, the incidental finds are listed in a separate column by species but are not included in either the totals or calculations.

The term "incident" is used here to refer to either a fatality or injury of a bird or bat found within the wind project area and does not necessarily indicate that the cause of death or injury was wind turbine related. This term is not to be confused with the term defined earlier, "incidental find", which refers to incidents found other than during standardized surveys.

A total of 163 avian incidents were recorded by searchers during standardized surveys, representing 35 species (including one unidentified species of *Empidonax* flycatcher which was considered a separate species) and 10 unidentified birds (4 of these were songbirds not identified to species, 6 were bird remains not identifiable to a taxonomic group; Table 2). Of the 35 species, 7 were raptor species including American Kestrel, Red-tailed Hawk, Ferruginous Hawk, Rough-legged Hawk, White-tailed Kite, Golden Eagle, and Barn Owl. Owls were included as "raptors" in our analyses because they are predatory birds in behavior, and therefore may be vulnerable to turbine strikes similarly to hawks and other raptor species. There were a total of 71 raptor incidents found during this two year study. There were 60 incidents of songbirds identified to 17 different species plus unidentified species (3 warblers, 1 blackbird). Other avian species found included a mixed group of vultures, pheasants, doves, rails, flickers, swifts and one cormorant (Table 2), comprising 11 species and 22 incidents.

Of all 163 (excluding 20 incidental finds) avian incidents registered, 31 were night migrating birds representing species, including 19 passerines (12 species; 1 individual found incidentally),

and 11 non-passerines (rails, moorhen, coot and Northern Flicker. Eight specimens were European Starlings and Rock Doves, neither of which is a protected species. In other words, 16.9% of all carcasses located at the High Winds project were night migrants and only 9.4% were night migrating passerines.

An additional 3 species of avian incidents were found incidentally (not during standardized surveys), including one Canada Goose, one Snow Goose, and one Mallard. One of these incidents, a Snow Goose, was found incidentally 160 meters (525 feet) from Tower 40, and was not considered associated with a wind turbine. The Snow Goose was heavily scavenged and mostly consisted of bones and feathers scattered over a project road, therefore its injuries were difficult to associate with a specific source. The term "incident" is used here to refer to either a fatality or injury of a bird or bat found within the wind project area and does not necessarily indicate that the cause of death or injury was wind turbine related. This term is not to be confused with the term defined earlier, "incidental find", which refers to incidents found other than during standardized surveys. Twenty of the 183 avian fatalities/injuries were found incidentally.

All but five of the incidents found during this study were fatalities. Four were injured Red-tailed Hawks, 2 adults and 2 juveniles, and one was an injured Canada Goose.

1. July 13, 2004. An injured juvenile Red-tailed Hawk was found during standardized surveys near Tower #53. It was captured and taken to the Lindsay Wildlife Hospital (LWH) in Walnut Creek, where it was determined to have a head injury and was blind in both eyes.

2. August 30, 2004. An adult Red-tailed Hawk was found during standardized surveys 100 meters from Tower 76. It appeared to be having difficulty flying, could fly only 10 meters at a time. At the LWH it was determined to have an open fracture of the left metacarpal.

3. September 22, 2004. A juvenile Red-tailed Hawk missing its left wing was found perching on the steps of Tower 54. It appeared alert, active and defensive. The left wing of this bird was found 46 meters from Tower 53, which was considered to be the location of the incident.

4. November 24, 2004. The fourth Red-tailed hawk, an adult, was found incidentally lying on the ground 28 meters from Tower 68. It had trouble balancing and held its head and wings low, and was recorded as being suspected of having an injured right leg. This bird flew away when approached and due to its mobility, was not able to be recovered.

5. March 12, 2005. An injured Canada Goose was found incidentally, walking between turbine rows near a gate west of tower #38. The bird was very mobile and was heading towards Birds Landing Road. After capture, it was observed to have a clipped wing, indicating it was a resident of the Hansen property pond on Birds Landing Road. The primaries were cut off to the bone on the right wing, and it was

assessed to be in good health in general by the field crew other than being flightless, therefore this goose was returned to the Hansen pond.

Six of the 301 incidents were not assigned to a tower number but were considered to be found on "SITE". These included one Barn Owl, one Snow Goose, one Canada Goose, and three of the four injured Red-tailed Hawks (the one exception being the one where the dismembered wing placed it at Tower 53, see above). The detailed observations of each of these incidents other than the owl have been previously mentioned. The Barn Owl carcass was found incidentally along side a road between wind turbine rows, approximately 300 meters west of Tower 38. The Snow Goose, was found incidentally 160 meters (525 feet) from Tower 40, and was not considered associated with a wind turbine. The Snow Goose was heavily scavenged and mostly consisted of bones and feathers scattered over a project road, therefore its injuries were difficult to associate with a specific source.

Table 2. Number of Incidents per Species per Year and per Total Installed Megawatt Capacity at the *Montezuma Hills WRA* High Winds Company, August 2003 – July 2005, found during Standardized Surveys (Incidental finds are noted separately)

Species Name	YEAR ONE (Ave. 86.3 Turbines)	YEAR TWO (Ave. 89.6 Turbines)	Total	# Incidents per Mw/Year	# Incidents per Turbine/Year	Incidental**
Birds (163)						
American Kestrel	29	16	45	0.1422	0.25591	7
Red-tailed Hawk *	10	8	18	0.0569	0.10237	2
White-tailed Kite	2	1	3	0.0095	0.01706	
Ferruginous Hawk ***	1		1	0.0032	0.00569	
Rough-legged Hawk		1	1	0.0032	0.00569	
Golden Eagle ***	1		1	0.0032	0.00569	1
Turkey Vulture	1	1	2	0.0063	0.01137	2
Double-crested Cormorant	1		1	0.0032	0.00569	
Ring-necked Pheasant	2		2	0.0063	0.01137	1
Canada Goose*						1
Snow Goose*						1
Mallard						1
Common Moorhen	1		1	0.0032	0.00569	
American Coot	1	1	2	0.0063	0.01137	1
Virginia Rail	1	2	3	0.0095	0.01706	
Sora	1	2	3	0.0095	0.01706	
Mourning Dove	2		2	0.0063	0.01137	
Rock Dove		2	2	0.0063	0.01137	
Barn Owl *		2	2	0.0063	0.01137	2
White-throated Swift	2		2	0.0063	0.01137	
Northern Flicker	1	1	2	0.0063	0.01137	
Western Wood-Pewee	1		1	0.0032	0.00569	
Empidonax species	1		1	0.0032	0.00569	
Warbling Vireo	1	1	2	0.0063	0.01137	
Horned Lark	10	7	17	0.0537	0.09668	
Tree Swallow		1	1	0.0032	0.00569	
Ruby-crowned Kinglet	2		2	0.0063	0.01137	

Species Name	YEAR ONE (Ave. 86.3 Turbines)	YEAR TWO (Ave. 89.6 Turbines)	Total	# Incidents per Mw/Year	# Incidents per Turbine/Year	Incidental**
European Starling	4	2	6	0.0190	0.03412	
American Pipit		2	2	0.0063	0.01137	
Orange-crowned Warbler	1		1	0.0032	0.00569	
Yellow Warbler ***	1	1	2	0.0063	0.01137	
Townsend's Warbler	2	1	3	0.0095	0.01706	
Wilson's Warbler		1	1	0.0032	0.00569	
Common Yellowthroat ***	1		1	0.0032	0.00569	1
Unidentified Warbler	2	1	3	0.0095	0.01706	
Lincoln's Sparrow	1		1	0.0032	0.00569	
Western Meadowlark	2	1	3	0.0095	0.01706	
Red-winged Blackbird	2	12	14	0.0442	0.07962	
Brewer's Blackbird	2		2	0.0063	0.01137	
Unidentified Blackbird	1		1	0.0032	0.00569	
Unidentified Bird	6		6	0.0190	0.03412	
Total Birds	96	67	163	0.5167	0.9301	20
Bats (116)						
Hoary Bat	45	17	62	0.1959	0.35259	1
Mexican Free-tailed Bat	22	26	48	0.1517	0.27298	1
Western Red Bat	3	1	4	0.0126	0.02275	
Silver-haired Bat		2	2	0.0063	0.01137	
Total Bats	70	46	116	0.3679	0.6623	2
Grand Total	166	113	279	0.8815	1.58667	22

The average number of wind turbines searched per year is given under the date ranges. A total installed megawatt capacity of 158.3 MW was calculated by multiplying individual turbine MW of 1.8 by the average number of wind turbine towers surveyed throughout the two year survey of 87.92

*One or more of the individuals of this species was found on "SITE" and was not associated with a wind turbine tower

**Number of individuals found incidentally and not during standardized surveys. NOT included in the Total for that species

***Denotes California Species of Special Concern (CSC)

The number of incidents found during standardized surveys was calculated per month for each species grouping. The estimated month of death or injury was determined by subtracting the estimated number of days since death or injury from the report date. Only incidents which were considered to be associated with a specific wind turbine tower were included in these analyses, and of the 279 total incidents found during standardized surveys, 277 of these were considered associated with wind turbines. The estimated month of death or injury could not be calculated for 36 of the 277 incidents because the number of days since death could not be accurately determined from the condition of those carcasses. Those carcasses were either scavenged at a faster rate than the other carcasses, or were missed during one or more round of searches. These carcasses with unknown estimated months of death were also excluded from our analyses. See Appendices D and E for those incidents with unknown number of days since death or injury.

Twenty-five (62.5%) raptor carcasses (American Kestrels and Red-tailed Hawks) were found between October and December 2003, while the peak number of raptor incidents in the following year was 12 (63%), between September and November (Table 3), perhaps indicating a slightly earlier fall migration for Red-tailed Hawks and American Kestrels in the second year of this

study. Passerine incidents were slightly greater in number in the spring seasons of both years than during other seasons, with a high of 11 incidents (41% of the year's passerine incidents) between April and June 2004 and 13 incidents (54%) the following spring. The number of incidents of "other birds", which included all non-raptor and non-passerine species, did not vary greatly between months as a group, however, strikingly, none were found during the months of January through July of 2005.

For purpose of this analysis, "raptors" included all eagles, hawks, kites, falcons, harriers, and owls (predatory birds). Turkey Vultures were included with "other birds". Non-protected non-native species including the Rock Dove and European Starling were included in analyses, fatality maps or data tables.

Table 3. Number of Incidents per Species Grouping (Raptors, Passerines, Other Birds, Bats) per Month*

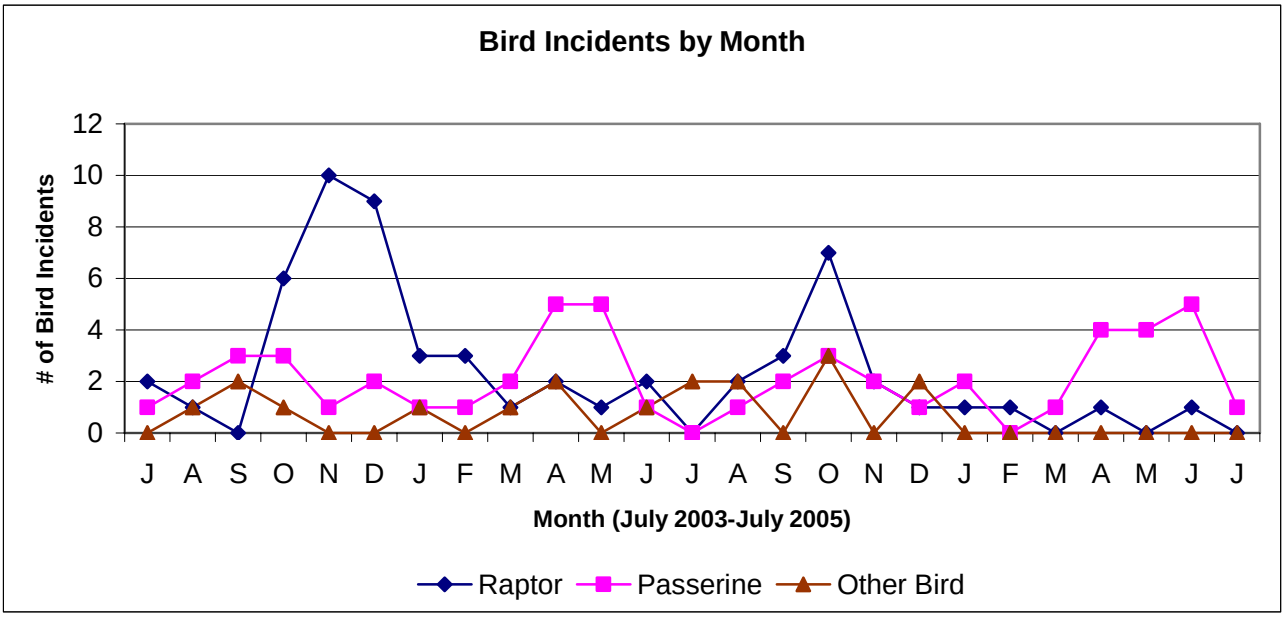
YEAR ONE			2003							2004				
Species Group	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	**Total**
Raptor	2	1		6	10	9	3	3	1	2	1	2		40
Passerine	1	2	3	3	1	2	1	1	2	5	5	1		27
Other Bird		1	2	1			1		1	2		1	2	11
Bat		7	31	14	3			1	7	3		1		67
Total	3	11	36	24	14	11	5	5	11	12	6	5	2	145

YEAR TWO		2004							2005				
Species Group	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	**Total**
Raptor	2	3	7	2	1	1	1		1		1		19
Passerine	1	2	3	2	1	2		1	4	4	5	1	24
Other Bird	2		3		2								7
Bat	6	20	11				1	4	2		1	1	46
Total	11	25	24	4	4	3	2	5	7	4	5	2	96

2-YEAR														
Total	3	22	61	48	18	15	8	7	16	19	10	10	4	241

*Estimated month of death or injury, calculated by subtracting estimated number of days since death or injury from the report date. These numbers include incidents with known estimated month of death or injury, which were associated with turbine towers and found during standardized surveys only.

Figure 5. Number of Incidents per Species Grouping (Raptors, Passerines, Other Birds) per Month for Both Years of the Project



There were a total of 69 raptor incidents found during standardized surveys considered to be associated with wind turbine towers. The estimated month of death could be calculated for 59 of these 69 incidents (Table 4). None of these were recorded in September 2003. The greatest number of raptor incidents occurred during the fall migration period in 2003 and to a lesser extent in 2004.

Nineteen of 36 (52.8%) kestrel fatalities were found during the autumn migration period, September through November, whereas 8 of 16 (50%) of Red-tailed Hawk fatalities were found during this period. If December is included for Red-tailed Hawks, which are later season migrants, 12 (75%) of year-round fatalities were registered. By chance, only 13 kestrels (4.33 per month) would be expected to be found in September through November, whereas 5 Red-tailed Hawks would have been found during this period (1.66 per month). A chi-square analysis reveals that there are disproportionately more kestrel fatalities during August through November than would be expected by chance ($X^2 = 10.25$, df = 1, $p<0.01$). A similar analysis for the same period for Red-tailed Hawks did not reveal a significant difference, but for the period September through November there is a barely or marginally significant relationship ($X^2 = 4.28$, df = 1, $p<0.05$). For both species, it seems that a disproportionately greater number of fatalities occur during autumn as birds migrate into the Montezuma Hills.

With the exception of a few, all other raptor species incidents occurred after the fall migration: 1 Golden Eagle incident in the month of June, near the end of the nesting season; 3 White-tailed Kite incidents found in the winter months of February, March, and December 2004; one Ferruginous Hawk in May 2004; one Rough-legged Hawk in November 2004; and 1 Barn Owl in the fall of 2004.

Table 4. Number of Raptor Incidents per Month

YEAR ONE			2003							2004				
Species Group	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	**Total**
Golden Eagle												1		1
Red-tailed Hawk				1	2	4		1		1				9
Ferruginous Hawk											1			1
American Kestrel	2	1		5	8	5	3	1		1		1		27
White-tailed Kite								1	1					2
Total	2	1	0	6	10	9	3	3	1	2	1	2	0	40

YEAR TWO		2004							2005					
Species Group	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	**Total**
Golden Eagle													0
Red-tailed Hawk		1	4				1				1		7
Rough-legged Hawk				1									1
American Kestrel	1	2	3	1		1			1				9
White-tailed Kite					1								1
Barn Owl	1												1
Total	2	3	7	2	1	1	1	0	1	0	1	0	19

2-YEAR														
Total	2	3	3	13	12	10	4	4	1	3	1	3	0	59

*Estimated month of death or injury, calculated by subtracting estimated number of days since death or injury from the report date. These numbers include incidents with known estimated month of death or injury, which were associated with turbine towers and found during standardized surveys only.

The majority of raptor incidents which could be identified to age were adults (Table 5), however approximately 13% of American Kestrels were not identified to age because of missing feathers or body parts. Of those that were identifiable, 29 were adults and 10 were first year birds. Of 18 Red-tailed Hawk incidents, 44.4% were adults and 55.6% were first year birds.

Table 5. Age Classes of Raptor Incidents

Species	Adult	First Year	Unknown	Total
American Kestrel	29	10	6	45
Red-tailed Hawk	8	10		18
Ferruginous Hawk		1		1
Rough-legged Hawk	1			1
Golden Eagle	1			1
White-tailed Kite	2	1		3
Barn Owl	1		1	2
Total	42	22	7	71

* Numbers include incidents collected during Standardized Surveys only.

None of the carcasses or injured birds found is listed as federally or state threatened or endangered. Ten fatalities were California Species of Special Concern, including 2 Golden

Eagles, a Double-crested Cormorant, 3 Soras, 2 Yellow Warblers and 2 Common Yellowthroats. There were three White-tailed Kite incidents, a Fully Protected species.

3.1.4 Spatial Distribution of Incidents at the High Winds Project Site

3.1.4.1 Raptors. Raptor incidents were distributed widely throughout the project area with a seemingly disproportionately greater number of American Kestrel fatalities recorded in year one and Red-tailed Hawk fatalities recorded in both years north of Montezuma Hills Road rather than south (Table 6). If the incidents were randomly spread throughout the area, the number of incidents would be proportionate to the number of wind turbines in the area.
There are approximately 60 (59 when tower 14 went out of operation mid November 2004 through mid April 2005) wind turbines north of Montezuma Hills Road, and 30 in the south, all of which were searched virtually an equal number of times, therefore the number of incidents would be expected reflect a 2:1 ratio in these two regions. The addition of 9 wind turbines in December 2003 (6 towers north of Montezuma Hills Road, and 3towers south), maintained the same 2:1 ratio and thus the two regions can be compared easily because they were surveyed an equal number of times.

Table 6. Comparison of raptor incident distribution to wind turbine tower distribution in the first and second years of the study, August 2003 through July 2005*

YEAR ONE	Number			Ratio	
	North	South	Total	North	South
Number of Turbines	~60	30	~90	2	1
Incidents					
American Kestrel	24	5	29	4.8	1
Red-tailed Hawk	7	2	9	3.5	1
Other Raptors	0	4	4	0	4
Total All Raptor Species	31	11	42	2.8	1

YEAR TWO	Number			Ratio	
	North	South	Total	North	South
Number of Turbines	~60	30	~90	2	1
Incidents					
American Kestrel	9	7	16	1.3	1
Red-tailed Hawk	6	1	7	6	1
Other Raptors (non-owls)	1	1	2	1	1
Barn Owls	2	0	2	2	0
Total All Raptor Species	18	9	27	2	1

TOTAL BOTH YEARS	49	20	69	2.5	1

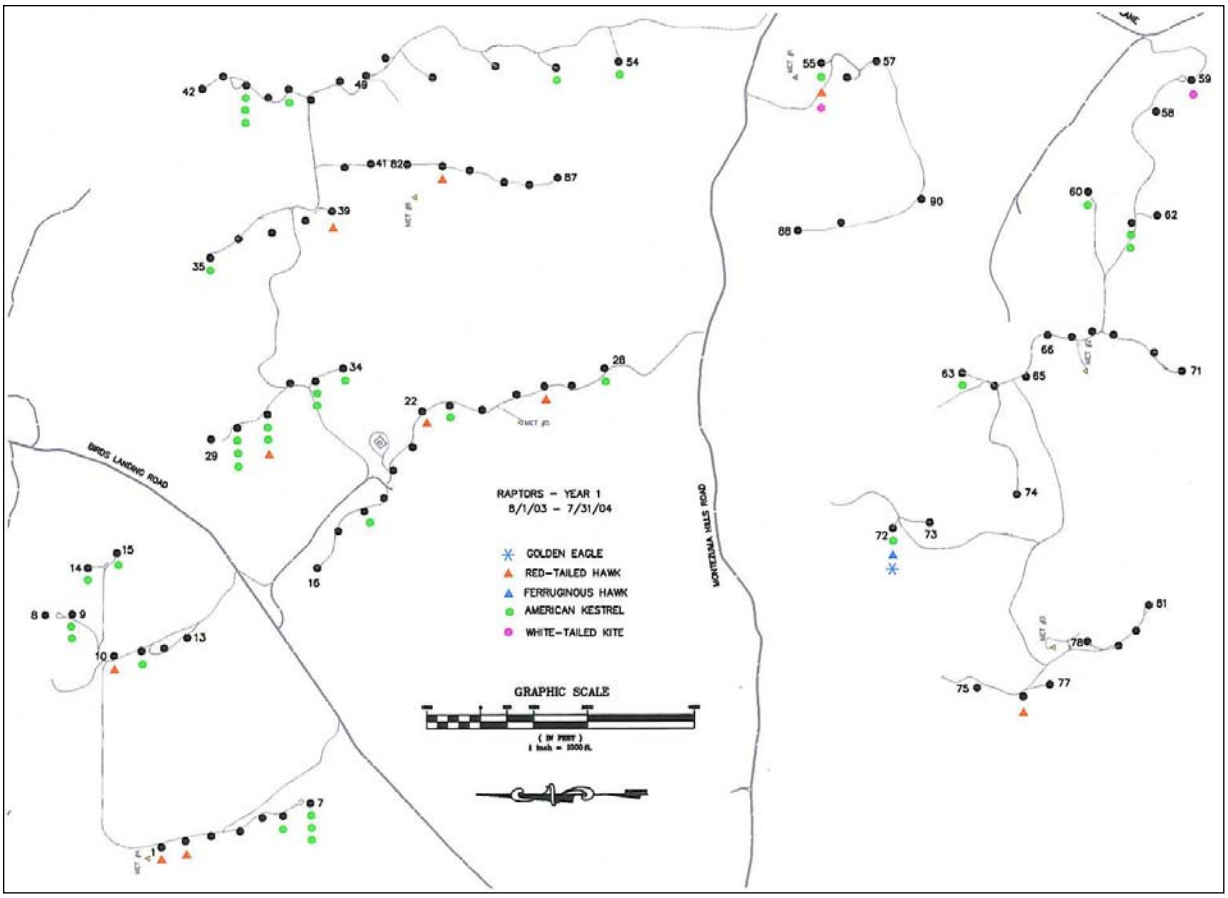
*Project area divided into two regions, North and South of Montezuma Hills Road. Note: Includes data from standardized surveys only.

In year one of this study, (using only standardized survey incident data) proportionately more incidents of all raptor species were located north of Montezuma Hills Road than would be

expected in a random distribution (Table 6). In year two, no incidents were found at the towers with multiple fatalities in the prior year (Towers 55 and 72), possibly indicating a different usage of the wind resource area by raptors between the two years. Pooling all raptor species together, there were twice as many raptor incidents found on the north side than the south, as would be expected based on the number of surveys conducted at those towers (Table 6).

Figures 6 and 7 show the location of all incidents (from both the standardized surveys and incidental finds) in the first and second year of the study respectively. Looking at kestrel incidents on turbine strings most proximal to Birds Landing Road, there appeared to be clusters of incidents towards the ends of turbine strings (Figure 6).

Figure 6. Locations of Raptor Incidents in Year One of this Study (found during Standardized Surveys and Incidentally) in the High Winds Project Site, August 2003 through July 2004

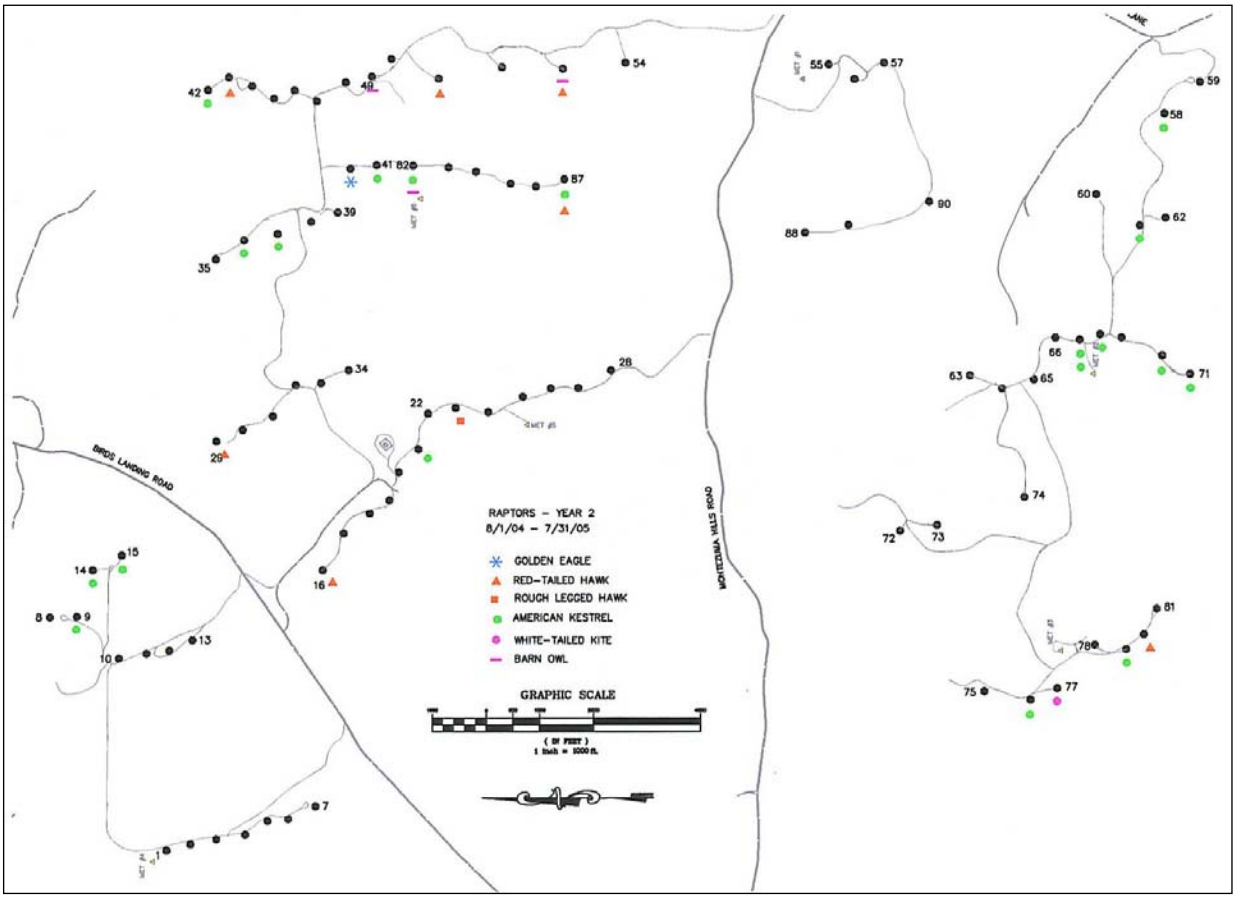


Note: Includes incidents considered to be associated with a wind turbine only, and not those found on "SITE".

The same trend was not observed the second year in kestrels (Figure 7), when slightly fewer kestrel incidents were found north than south than would be expected (1.3 to 1 north to south compared to 4.8 to 1 the previous year), and more than one kestrel incident occurring at only one particular turbine tower (T#67, south side). Red-tailed Hawk incidents were more spread out in distribution than those of American Kestrels, however they were in much greater number proportionately north of Montezuma Hills Road than south in both years than expected based on

turbine numbers, with ratios of 3.5 to 1 and 6 to 1 in years one and two respectively. In year one, other raptor species' incidents (Golden Eagle, Ferruginous Hawk and 2 White-tailed Kites) were all located on the south side, while 75% (n=8) of the fatalities found on the south side that year occurred at only three towers (Figure 6). In the second year, other raptor species' incidents were found mostly on the north side: the 2 Barn Owls and Rough-legged Hawk incidents were on the north side. All of the White-tailed Kite incidents during the two years were located on the south side (Figures 6, 7).

Figure 7. Locations of Raptor Incidents in Year Two of this study (found during Standardized Surveys and Incidentally) in the High Winds Project Site, August 2004 through July 2005

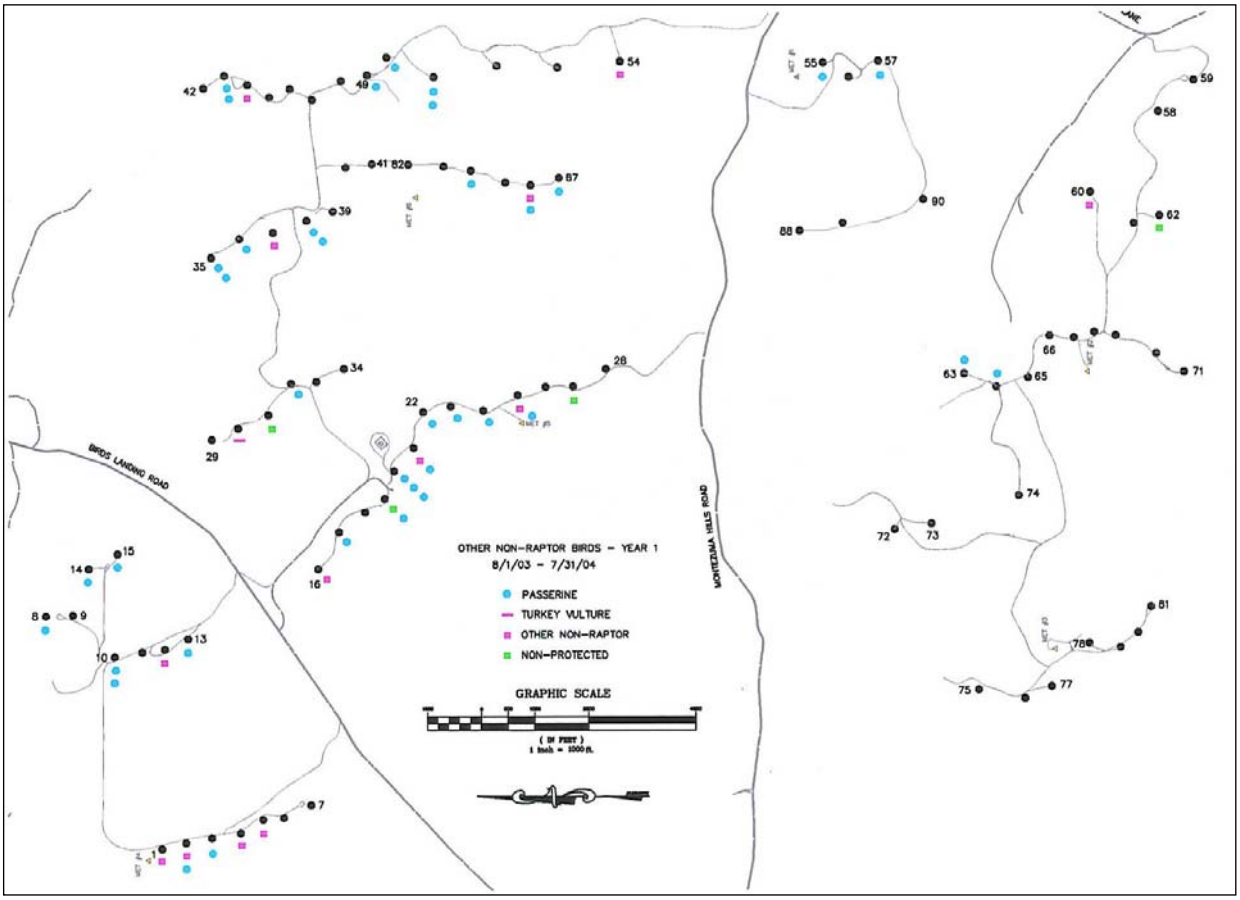


Note: Includes incidents considered to be associated with a wind turbine only, and not those found on "SITE".

There were several (6) wind turbine towers with multiple (3) raptor incidents in year one, and also portions of wind turbine rows in which no incidents were found. There were far fewer raptor incidents in year two of this study and no wind turbine towers with over two raptor incidents.

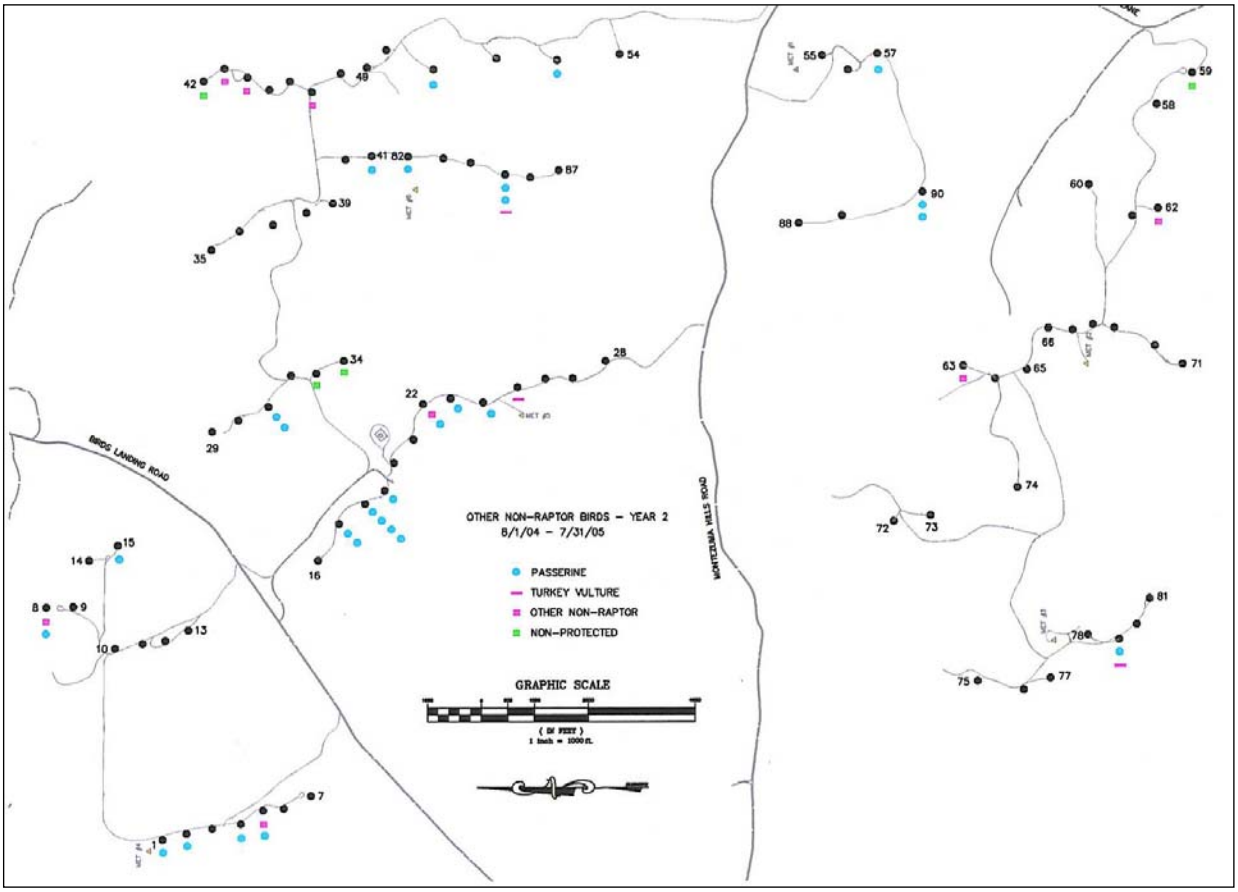
3.1.4.2 Non-Raptors. Incidents of non-raptor species appeared to be concentrated in the northern region of the project area (Figures 8 and 9).

Figure 8. Locations of Non-Raptor Avian Incidents in Year One of this study (found during Standardized Surveys and Incidentally) in the High Winds Project Site, August 2003 through July 2004



Note: Includes incidents considered to be associated with a wind turbine only, and not those found on "SITE".

Figure 9. Locations of Non-Raptor Avian Incidents in Year Two of this Study (found during Standardized Surveys and Incidentally) in the High Winds Project Site, August 2004 through July 2005



Note: Includes incidents considered to be associated with a wind turbine only, and not those found on "SITE".

Only incidents recorded in the standardized surveys are calculated in the generation of Table 7. In the two years combined, there were 6 times greater non-raptor avian fatalities in the north than the south, including 6 times as many passerines in the north than the south, 3.5 times greater species of rallids (coots, rails), and 12 times as many other grouped species (vultures, doves, pheasants, swifts, and woodpeckers) were located in the north (Table 7). The ratio of non-raptor avian species between the north and south regions was nearly 8:1 the first year and 4.6 to 1 the second, indicating a very significant difference in avian fatality rates between these two areas than would be predicted based on numbers of wind turbine towers.

Table 7. Comparison of Non-Raptor Avian Incident Distribution (by Species Group) to Wind Turbine Tower Distribution in the First and Second Years of this Study, August 2003 through July 2005*

YEAR ONE	Number			Ratio	
	North	South	Total	North	South
Number of Turbines	~60	30	~90	2	1
Incidents					
Passeriformes (songbirds)	35	5	40	7	1
Rallidae species (coot, moorhen, rail)	3	1	4	3	1
Other (vulture, dove, pheasant, swift, flicker)	9	0	9	9	0
Total Non-Raptor Avian Species	47	6	53	7.8	1

YEAR TWO	Number			Ratio	
	North	South	Total	North	South
Number of Turbines	~60	30	~90	2	1
Incidents					
Passeriformes (songbirds)	25	5	30	5	1
Rallidae species (coot, moorhen, rail)	4	1	5	4	1
Other (vulture, dove, pheasant, swift, flicker)	3	1	4	3	1
Total Non-Raptor Avian Species	32	7	39	4.6	1
TOTAL BOTH YEARS	79	13	92	6.1	1

*Project area divided into two regions, North and South of Montezuma Hills Road. Note: Includes data from standardized surveys only.

Table 8 shows the number of avian incidents associated with specific wind turbines found during standardized surveys only. The data is pooled from both years of the survey (August 2003 through July 2005) and is sorted by the total number of incidents assigned to each tower by the survey team in descending order. Of seventy-three (73) turbines with which incidents were associated, eighteen (18) are located south of Montezuma Hills Road. Those turbine numbers are highlighted in bold. Towers on which FAA lighting is affixed are designated with an asterisk.

Table 8. Number of Avian Incidents at each Wind Turbine by Species Group

Structure	Other Bird	Passerine	Raptor	Grand Total
31		3	3	6
18		4	1	5
44	2		3	5
2	1	2	1	4
15		2	2	4
23		2	2	4
30	1		3	4
43	1	2	1	4
51*		3	1	4
55*		1	3	4
5	2	1		3
8*	1	2		3
9			3	3
17		3		3
19		3		3
20*		3		3
21	1	1	1	3
22		2	1	3
33	1		2	3
35*		2	1	3
53		1	2	3
63*	1	1	1	3
85	1	2		3
87*		1	2	3
1*		1	1	2
4	1	1		2
7*			2	2
14		1	1	2
16*	1		1	2
24*		2		2
25	1	1		2
34*	1		1	2
36		1	1	2
37	1		1	2
38		2		2
41		1	1	2
42*		1	1	2
49		1	1	2
54*	1		1	2
57		2		2
59*		1	1	2
60	1		1	2
61			2	2
62	1	1		2
67*			2	2
72*			2	2
76			2	2
82		1	1	2

Structure	Other Bird	Passerine	Raptor	Grand Total
86	1	1		2
90*		2		2
3		1		1
6			1	1
10		1		1
11			1	1
12	1			1
13*		1		1
26			1	1
27		1		1
28*			1	1
29			1	1
32		1		1
39*			1	1
50		1		1
58			1	1
64		1		1
68			1	1
70			1	1
71*			1	1
77			1	1
79		1		1
80			1	1
83			1	1
84		1		1
Grand Total	22	70	69	161

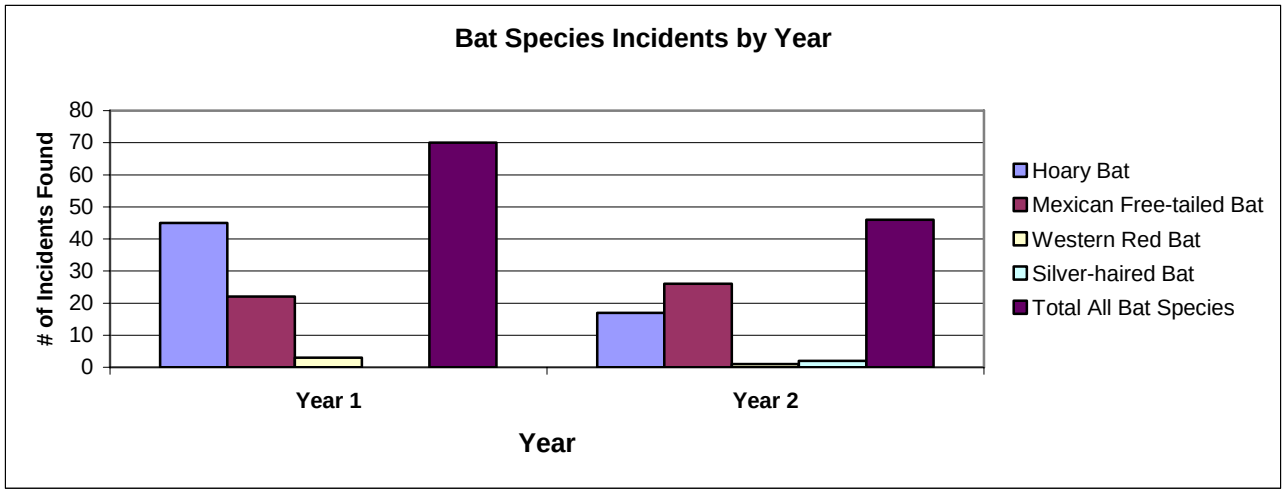
Data from Two Years of Surveys (pooled) August 2003-July 2005.

Sorted by grand total number of avian fatalities (descending order).

Includes incidents associated with wind turbines found during standardized surveys only.

3.1.4.3 Bats. Remains of one hundred sixteen bats were found by searchers during standardized surveys, representing 4 different species including Hoary Bat, Mexican Free-tailed Bat, Western Red Bat, and Silver-haired Bat. Together Hoary (53.4%) and Mexican Free-tailed Bats (41.4%) accounted for 94.8% (N = 110) of the 116 bats found. Western Red Bats and Silver-haired Bats accounted for 3.4% and 1.7% of all bats found, respectively. In addition to the 116 fatalities found during standardized surveys, two were found incidentally.

Figure 10. Distribution of Bat Incidents by Species, over Both Years of the Project



The greatest number of bat incidents (see Figure 11) occurred during the fall migration period, with 52 (78%) bat carcasses found between August and October 2003, and 37 (80%) between August and October 2004 (Figure 11.). Several other studies have documented a similar spike in bat fatalities in the Fall, summarized in Erickson et al. (2002). The number of carcasses expected by chance for each month is about 9.8. This means that only 39.4 fatalities would have been registered in August through November if carcasses are distributed evenly or randomly throughout the year. Instead, 42.1% more carcasses were found during August through November than expected and fewer than expected were found during the other 8 months of the year. A chi-square analysis reveals that this difference in frequencies was not by chance (X^2 = 10.5, df = p <0.01).

Figure 11. Number of Bat Incidents per Month for Both Years of the Project

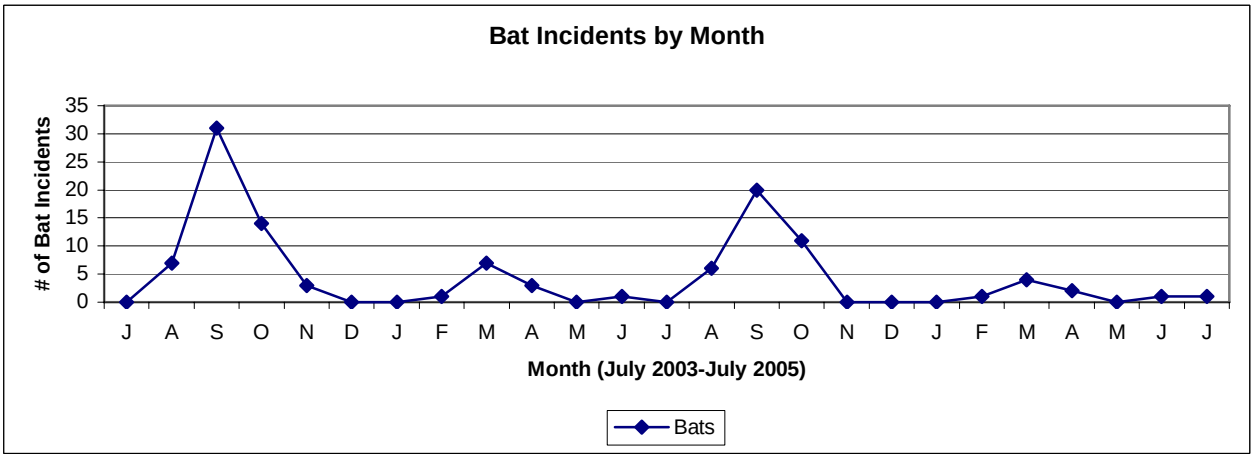


Table 9 shows the number of bat incidents associated with specific wind turbines found during standardized surveys only. The data is pooled from both years of the survey (August 2003 – July 2005) and is sorted by the total number of incidents associated with each tower in descending order. Of the fifty-six (56) towers with which incidents are associated, twenty-one (21) are south

of Montezuma Hills Road and the turbine numbers are highlighted in bold. A bold asterisk notes the eight (8) turbines south of Montezuma Hills Road at which one or more bat fatalities occurred and on which FAA recommended lighting is affixed.

Table 9. Wind Turbine Locations of Bat Incidents by Species

Structure	Hoary Bat	Mexican Free-tailed Bat	Silver-haired Bat	Western Red Bat	Grand Total
57	2	4			6
34*	2	3			5
67*	2	3			5
24*	1	3			4
18	2	1			3
21	3				3
26	3				3
31	1	2			3
37	1	1		1	3
50	2			1	3
51*	1	2			3
58	2	1			3
61	3				3
63*	3				3
79	1	1	1		3
81*	1	2			3
86	2	1			3
2	1	1			2
3		2			2
4	2				2
7*	1			1	2
9	1	1			2
10	1	1			2
33	1	1			2
42*		2			2
44	2				2
46	2				2
47*	1	1			2
48	2				2
60		2			2
62	2				2
64		2			2
65	1		1		2
87*	1	1			2
88	1	1			2
5	1				1
15	1				1
19	1				1
20*		1			1
23				1	1
27		1			1
30	1				1
38		1			1

Structure	Hoary Bat	Mexican Free-tailed Bat	Silver-haired Bat	Western Red Bat	Grand Total
39*	1				1
41	1				1
45		1			1
55*	1				1
56		1			1
59*		1			1
70		1			1
71*		1			1
74*	1				1
75*	1				1
77	1				1
78	1				1
85		1			1
Grand Total	62	48	2	4	116

Data from Two Years of Surveys August 2003-July 2005.

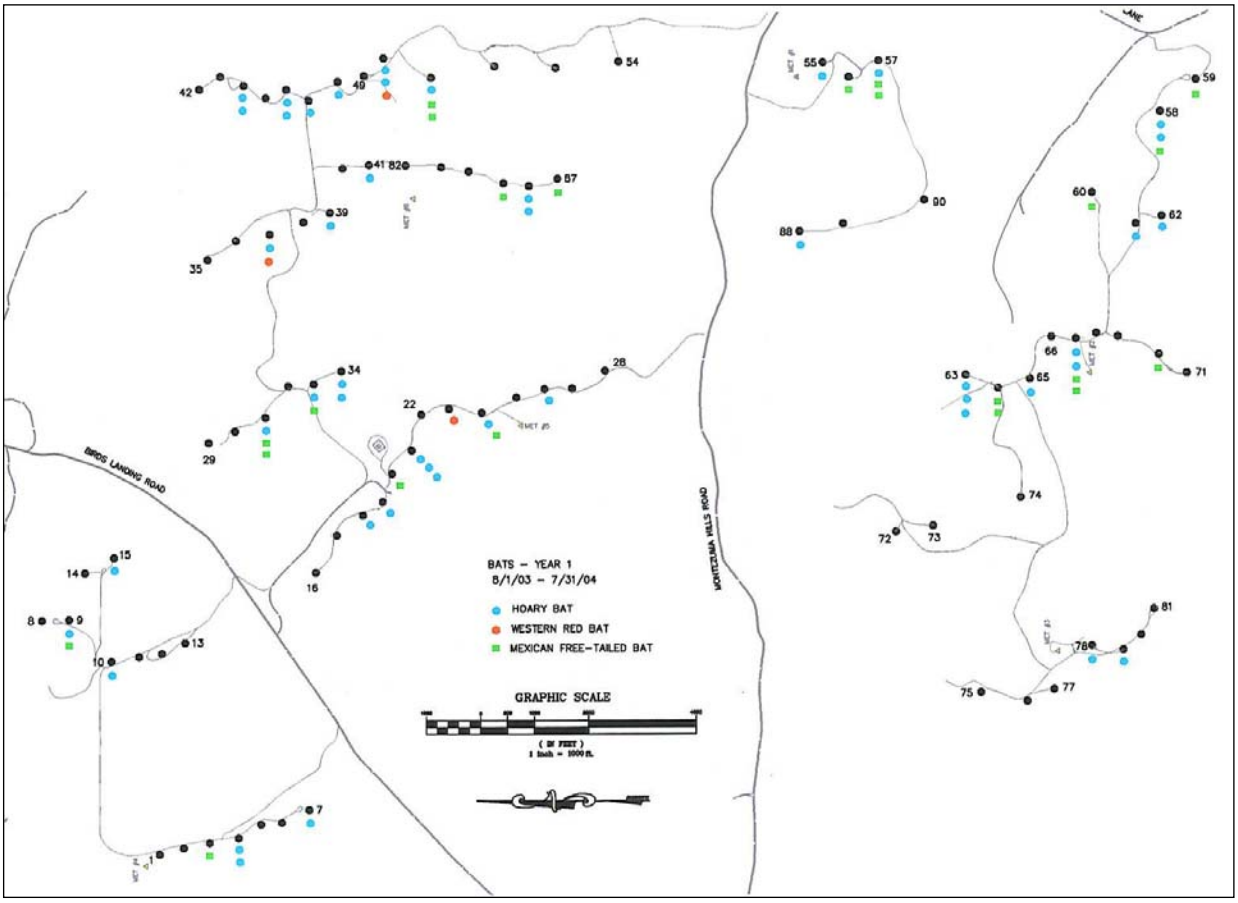
Sorted by number of fatalities (descending order).

Includes incidents associated with wind turbines found during standardized surveys only.

Certain towers had multiple fatalities whereas other towers had none (Table 9), suggesting other influences such as topographic features, presence of roosting trees or structures, or possibly light sources which could have influenced the presence or absence of bats in those areas.

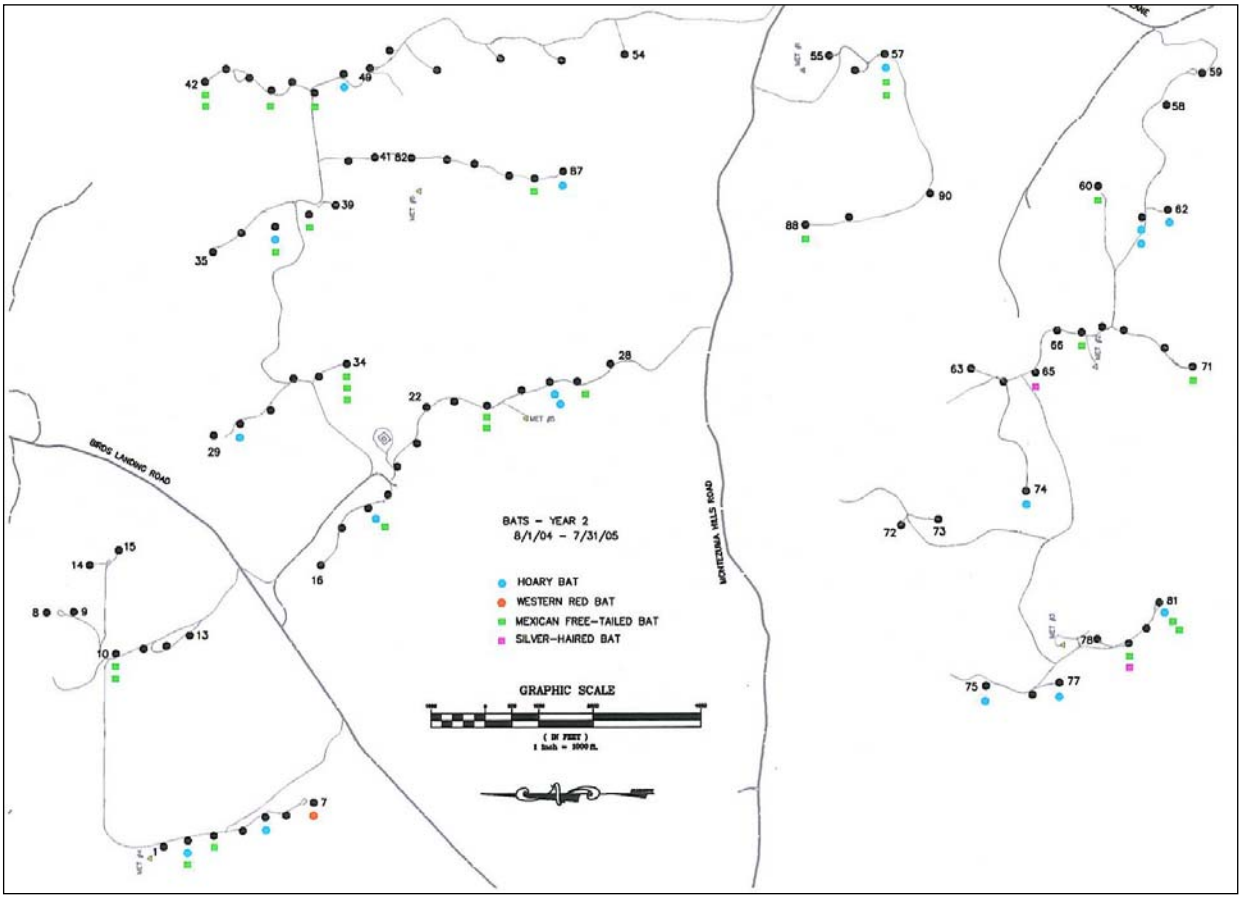
Figures 12 and 13 show the location of all incidents (from both the standardized surveys and incidental finds) in the first and second year of the study respectively.

Figure 12. Locations of Bat Incidents in Year One of this Study (found during Standardized Surveys and Incidentally) in the High Winds Project Site, August 2003 through July 2004



Note: Includes incidents considered to be associated with a wind turbine only, and not those found on "SITE".

Figure 13. Locations of Bat Incidents in Year Two of this Study (found during Standardized Surveys and Incidentally) in the High Winds Project Site, August 2004 through July 2005



Note: Includes incidents considered to be associated with a wind turbine only, and not those found on "SITE".

Table 10. Comparison of Bat Incident Distribution to Wind Turbine Tower Distribution in the First and Second Years of this Study, August 2003 through July 2005*

YEAR ONE	Number			Ratio	
	North	South	Total	North	South
Number of Turbines	~60	30	~90	2	1
Incidents					
Hoary Bat	31	14	45	2.2	1
Western Red Bat	3	0	3	3	0
Mexican Free-tailed Bat	11	11	22	1	1
Total All Bat Species	45	25	70	1.8	1

YEAR TWO	Number			Ratio	
	North	South	Total	North	South
Number of Turbines	~60	30	~90	2	1
Incidents					
Hoary Bat	9	8	17	1.1	1
Mexican Free-tailed Bat	18	8	26	2.3	1
Western Red Bat	1	0	1	1	0
Silver-haired Bat	0	2	2	0	2
Total All Bat Species	28	18	46	1.6	1
TOTAL BOTH YEARS	73	43	116	1.7	1

*Project area divided into two regions, North and South of Montezuma Hills Road. Note: Includes data from standardized surveys only.

The number of bat incidents north and south of Montezuma Hills Road were distributed roughly the same as expected during this two year study based on numbers of towers in a 1.7 to 1 ratio (compared to 2:1 ratio of towers) (Table 11).

3.1.5 Carcass Locations – Distance and Direction from Turbine Bases

Species were combined into size groupings (Table 12) to determine if surveying a 75 m radius area is an effective method for finding the majority of carcasses. The number of incidents of species (found during standardized surveys only) falling into each size grouping were then tabulated based on distance (range) from the base of wind turbines (Table 13).

Table 11. Species Size Groupings used in Analyses

Category	Description
Small Bird	$\leq$ 8" length (most smaller passerines, swifts)
Medium Bird	8" < X $\leq$ 14" length (kestrels, flickers, starlings, blackbirds, doves, rails)
Large Bird	> 14" length (most raptors, vultures, coots, moorhens, pheasants)
Bats	$\leq$ 6" length (some bats may be as small as 2")

Distances were recorded for 277 of 279 incidents found during standardized surveys (Table 13). The incidents for which no distance was recorded was considered on "SITE" (both injured Red-

tailed Hawks) and therefore not associated with a tower number. Of the 277 incidents found during standardized surveys, 86% were located within 60 meters of a wind turbine (Table 13). Ninety-six percent were found within 70 meters. Carcasses that were found beyond the 75 meters radius during the course of the standardized surveys were found because either they were large and thus obvious, or previous visual obstacles were no longer obscuring the view, such as tall standing wheat or barley which was harvested. The smaller sized carcasses tended to be located somewhat evenly over a larger distance range than larger carcasses, which tended to be located slightly closer to the towers.

Scavengers may move carcasses, affecting carcass distance analyses. Our previous analysis of the location of birds found at projects using the newest turbine technology (Erickson, et al., 2001, Erickson, et al, 2003), and the Orloff and Flannery (1992) experience searching under older turbine technology supported the judgment that 90% of the carcasses would be located within a circle having a 65 meter radius therefore we expected a 75 meter radius to be sufficient for finding nearly 100% of all carcasses. Based on the results of our first year of carcass searches, it is possible that up to four percent of carcasses were present and missed beyond the 75 meter search radius.

One instance of Common Yellowthroat (found incidentally on June 3, 2004 at 112 meters from tower #10) indicated that small species can be carried by momentum and high velocity winds to over 100 meters from a tower. This warbler's injuries and direction downwind of the tower suggested that it was a wind turbine related incident. To determine the extent of missed incidents which are located outside of the 75 meter search pattern radius, a new methodology incorporating greater search areas would need to be put in place.

Bat carcasses were found closer to the towers than bird carcasses. A greater percentage of bat carcasses (35.3%) were found within 20 m as compared to small (23.9%), medium (20.5%) and large (18.8%) birds. There is an obvious decline in the number of birds and bats found beyond 60 m of the tower base.

Table 12. Number of Incidents per Size Grouping versus Distance from Wind Turbine Tower, August 2003 through July 2005

Species	**Distance Range (m)**										
Size Group	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	Total
Small	8	3	3	7	7	9	7	2			46
Medium	7	10	11	22	10	12	9	2			83
Large	2	4	5	5	6	1	4	3	1	1	32
Bat	11	30	19	19	16	12	6	3			116
Total	28	47	38	53	39	34	26	10	1	1	277*

*Of a total of 279 incidents recorded during standardized surveys, the distance from the tower was only recorded for 277 of them. Two large bird incidents (Red-tailed Hawk injuries) were considered on "SITE" and were not assigned a distance from a specific tower.

3.1.6 Vegetative Cover

The land within the High Winds wind farm is hilly, ranging in slope from almost flat to quite steep. The northern extent of the facility is relatively flat, and increasingly steep and higher in elevation toward the south. The watersheds within the facility are all intermittent streams, with only two low lying areas which have standing water through the rainy season. Few trees occur within the wind farm with the exception of a few small groves of Blue Gum (Eucalyptus globulus) and willows (Salix sp.) in some valleys.

The area within the High Winds wind farm is agricultural land. Due to the lack of irrigation water, the agricultural use of the land is limited to grain crops and grazing. The primary crops are wheat, barley, and hay. The fields are used for grazing between crops, primarily sheep with one field used for cattle.

When grains are to be planted the field will be disked in the late spring when the soil is still moist enough to be turned over. The fields will be disked 2 or 3 times more through the summer and early fall resulting in smaller clump sizes. In the final preparation for planting, the soil is fertilized with ammonia then seeding occurs in the late fall or early winter before the winter rains start. The wheat and barley crops are harvested in mid summer. By the time the grain crops are harvested it is too late to disc the field for the next year's planting, so a field that is used for a grain crop one year will become fallow the next year. The fields will also periodically be left fallow for several years.

Fallow or hay fields generally consist of mixed grasses and volunteer crop plants along with Mallow, Mustard, as well as Yellow Star and Milk Thistles. Hay fields are generally cut and baled in the late spring.

The predominant vegetation cover was recorded in the course of carcass surveys, and the percentages are shown in Table 13 below. The "other" category includes mowed hay and dual usage within the survey area.

Table 13. Distribution of Bird and Bat Incidents Relative to Ground Cover

Cover	Cover as percentage of total	Total Incidents, %	Bat Incidents, %	Bird Incidents, %
Barley	8.3	6	1.7	8.7
Wheat	17.4	18.6	21.2	16.9
Fallow	45.1	44.5	42.4	45.9
Till	24.2	28.6	33.1	25.7
Other	5	1.9	1.6	2.6

A chi-square analysis comparing the number of incidents in each bird/bat group between cover types revealed significant differences for raptors ($X^2 = 63.97$, df = 4, $p<0.01$), passerines ($X^2 = 33.03$, df = 3, $p<0.01$) and bats ($X^2 = 72.73$, df = 4, $p<0.01$), but not for other birds ($X^2 = 1.30$, df = 3, $p>0.73$). However, in order to accurately compare the number of incidents in each bird/bat group between cover types, it is necessary to account for the amount of each cover type that was searched. Thus, we weighted the number of incidents in each cover type by the percentage of total cover (Table 14). This resulted in greater differences between weighted numbers of

incidents by cover type. Fallow land experienced the greatest frequency of incidents for raptors, passerines and bats. The higher weighted numbers of incidents in Fallow fields may indicate a greater use of habitat where farming is least intensive.

This same pattern of variability may not be evident in the 'Other bird' category due to the low number of incidents and the broad biological grouping that constitutes this category. The "Other Bird" categories include species of shorebirds, pigeons and doves, swifts, and waterfowl: ducks and geese

Table 14. Non-weighted and Weighted Numbers of Incidents by Cover Type

Cover	Species class	Number of Incidents	Cover as percentage of total	Weighted Incidents (# incidents / cover %)
Barley	Bats	2	8.3	24
Fallow	Bats	47	45.1	270
Till	Bats	36	24.2	80
Wheat	Bats	25	17.4	103
Other	Bats	2	5	40
Barley	Other birds	7	8.3	84
Fallow	Other birds	6	45.1	34
Till	Other birds	9	24.2	20
Wheat	Other birds	5	17.4	21
Other	Other birds	0	5	0
Barley	Passerines	2	8.3	24
Fallow	Passerines	32	45.1	183
Till	Passerines	22	24.2	49
Wheat	Passerines	9	17.4	37
Other	Passerines	0	5	0
Barley	Raptors	3	8.3	36
Fallow	Raptors	40	45.1	229
Till	Raptors	12	24.2	27
Wheat	Raptors	14	17.4	57
Other	Raptors	3	5	60

In Table 15, most of the incidents are close to the expected distribution based on ground cover as discussed above. However, there are a few exceptions. Bat fatalities, for example, are low in barley fields, yet higher in wheat fields. The largest deviation in bat incidents occurs on tilled fields, which could simply be the result of greater visibility and searcher efficiency in finding bat carcasses in un-vegetated areas.

Table 15. Distribution of Bird Type Incidents Relative to Ground Cover

Cover	Cover as percentage of total	Raptor Incidents, %	Songbird Incidents, %	Other Bird Incidents, %
Barley	8.3	9.2	8.7	7.4
Wheat	17.4	19.5	13	18.5
Fallow	45.1	49.4	43.5	40.7
Till	24.2	17.2	33.3	33.3
Other	5	4.6	1.4	0

Looking at bird incidents by group (Table 15) also shows some interesting results. The raptor incidents are higher than expected in the grain crop fields and lower in the tilled fields without vegetative cover. This is likely due to higher prey availability in the vegetated fields than in the tilled fields due to the level of soil disturbance activity. The songbird and "other" incidents are higher in the tilled fields, which could be the result of increased foraging on the exposed grass and seed material remaining in the tilled areas. Comparing the northern region to the southern region gives results that are less clear (Table 16).

Table 16. Distribution of Bird and Bat Incidents Relative to Ground Cover by Region

Cover	Northern Region				Southern Region			
	Cover as percentage of total	Total incidents, %	Bat Incidents, %	Bird Incidents, %	Cover as percentage of total	Total incidents, %	Bat Incidents, %	Bird Incidents, %
Barley	6.8	6.2	3	7.9	11.4	5.6	0	10.7
Wheat	20.2	18	14.9	19.7	11.8	19.6	29.4	10.7
Fallow	41.4	35.6	31.3	37.8	52.7	60.7	56.9	64.3
Till	30.6	39.7	50.7	33.8	11.4	8.4	9.8	7.1
Other	1	0.5	0	0.8	12.6	5.6	3.9	7.1

In the northern region bat mortality is lower than what would be expected from random distribution in the barley, wheat, and fallow fields, yet higher in the tilled fields. As suggested above, this could be the result of increased carcass visibility in tilled fields. Bird incidents are highest in the southern fallow fields. Breaking down the north/south mortality shows that songbird mortality is much higher than expected in the southern region's fallow fields. This could be related to the higher number of Red-winged Blackbird nests found in that area.

Table 17. Distribution of Incidents by of Avian Species Relative to Ground Cover by Region

Cover	Northern Region				Southern Region			
	Cover as percentage of total	Raptor Incidents, %	Songbird Incidents, %	Other Bird Incidents, %	Cover as percentage of total	Raptor Incidents, %	Songbird Incidents, %	Other Bird Incidents, %
Barley	6.8	3.8	11.3	9.5	11.4	17.6	0	0
Wheat	20.2	28.3	13.2	14.3	11.8	5.9	12.5	33.3
Fallow	41.4	43.4	32.1	38.1	52.7	58.8	81.2	50
Till	30.6	24.5	41.5	38.1	11.4	5.9	6.2	16.7
Other	1	0	1.9	0	12.6	11.8	0	0

3.1.7 Prey Locations

Potential prey species, such as rodents, rabbits, other larger mammals, reptiles and amphibians, were recorded when seen during carcass searches. These individuals were within the range of visibility of the carcass survey and included individuals at distances of up to 200 meters from a wind turbine; however 95% were located within 80 meters.

A total of 374 observations were recorded (Table 18) during this two year study. Of this number, 203 were live sightings, and 171 were carcasses. The most common species groupings seen were rodents and rabbits, which comprised 67% of all potential prey species observations. Of this subgroup of rodents and rabbits, jackrabbits were the most abundant species group seen (50.4%, n=127), followed by various species of mice and voles (44.8%, n=113), ground squirrels (2.8%, n=7) and gophers (2%, n=5). The most common rodent observed and identified to species was the California Meadow Vole, seen on 29 occasions. Unidentified mice were likely deer mice, harvest mice, house mice or voles. Identification of live mice was difficult, as they were usually seen running into burrows.

Larger mammals were also recorded, as they may provide a prey base for larger raptors such as Golden Eagles and Great Horned Owls or other scavengers. A total of 85 observations of larger mammals were recorded, 23% of the total number of potential prey observations. Seventy-four (74) dead or dying sheep were observed during carcass searches along with the afterbirth of four sheep. Other mammals recorded included two Domestic Cats, four Striped Skunks, and one unidentified mustellid, possibly a weasel.

Reptiles comprised 9.9% of all potential prey individuals observed. Lizard species observed included alligator lizards (n=17) and fence lizards (n=6). Thirteen snakes were recorded, eight of these were gopher snakes, three were yellow-bellied racers, and two were unidentified species. One live Pacific Tree Frog was observed in January of 2005.

Table 18. Number of Observations of Non-Avian Prey Species Observed during Carcass Searches during the Two Years of this Study, August 2003 – July 2005

	YEAR ONE			YEAR TWO			BOTH YEARS		
Species	Alive	Dead	**Total**	Alive	Dead	**Total**	Alive	Dead	**Total**
Rodents/Lagomorphs (252)									
Black-tailed Jackrabbit	49	6	**55**	59	13	**72**	108	19	**127**
California Ground Squirrel	3		**3**	4		**4**	7		**7**
Botta's Pocket Gopher		1	**1**	1	3	**4**	1	4	**5**
California Meadow Vole	9	9	**18**	1	10	**11**	10	19	**29**
Deer Mouse	2		**2**				2		**2**
Peromyscus spp.	2	4	**6**	2	10	**12**	4	14	**18**
Western Harvest Mouse	1	5	**6**		6	**6**	1	11	**12**
House Mouse		2	**2**					2	**2**
Unidentified Mouse spp.	32	10	**42**	3	5	**8**	35	15	**50**
Other Mammals(85)									
Sheep*	1	30	**31**	2	41	**43**	3	71	**74**
Sheep afterbirth					4	**4**		4	**4**
Domestic Cat	1		**1**	1		**1**	2		**2**
Striped Skunk	1	3	**4**				1	3	**4**
Unidentified Mustellid		1	**1**					1	**1**
Reptiles (37)									
Alligator Lizard spp.	4	2	**6**	8	3	**11**	12	5	**17**
Western Fence Lizard	4		**4**	2		**2**	6		**6**
Pacific Gopher Snake	2	1	**3**	3	2	**5**	5	3	**8**
Yellow-bellied Racer	3		**3**				3		**3**
Unidentified Snake spp.				2		**2**	2		**2**
Pacific Tree Frog				1		**1**	1		**1**
Total	114	74	**188**	89	97	**186**	203	171	**374**

* Dead or dying sheep only.

Potential prey items were seen throughout the year (Table 19) in both years of this study with a slight peak in unidentified mouse species in January 2004, which was not observed in January of 2005. Black-tailed Jackrabbits were present all year with a high observed in April through July 2004 and November 2004 through June 2005. Their numbers were observed to be 3.5 times greater in November 2004 through January 2005 (n=28) than during the same months in the previous year (n=8). Dead (and dying) sheep were seen slightly more often in the winter (December through March) than other times of year, and striped skunks were observed in the fall and spring months of the first year only. Reptiles were observed in small numbers in all seasons except the winter.

Table 19. Number of Observations of Non-Avian Prey Species observed per Month during Carcass Searches during Year One and Year Two of this Study, August 2003 – July 2005.

YEAR ONE	2003							2004					
Species	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	**Total**
Rodents/Lagomorphs (135)													
Black-tailed Jackrabbit	2	3	3	1	2	5	5	5	8	6	5	10	**55**
California Ground Squirrel				1							1	1	**3**
Botta's Pocket Gopher										1			**1**
California Meadow Vole	2	5	2			1		2			2	4	**18**
Deer Mouse						1	1						**2**
Peromyscus spp.						3		1		2			**6**
Western Harvest Mouse		2		1				2			1		**6**
House Mouse						1			1				**2**
Unidentified Mouse spp.	1		3	4	5	18	3	3	3	1		1	**42**
Other Mammals (37)													
Sheep*	2	2		1	11	4	6	1	3			1	**31**
Domestic Cat							1						**1**
Striped Skunk		1		1					1	1			**4**
Unidentified Mustellid			1										**1**
Reptiles/Amphibians (16)													
Alligator Lizard spp.								1	1	2	2		**6**
Western Fence Lizard		1	1							1	1		**4**
Pacific Gopher Snake	1								2				**3**
Yellow-bellied Racer				1						2			**3**
Total	**8**	**14**	**10**	**10**	**18**	**33**	**16**	**15**	**19**	**16**	**12**	**17**	**188**

YEAR TWO	2004							2005					
Species	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	**Total**
Rodents/Lagomorphs (117)													
Black-tailed Jackrabbit	5	2	5	6	9	13	2	8	4	7	11		**72**
California Ground Squirrel	1	1	1	1									**4**
Botta's Pocket Gopher									2		1	1	**4**
California Meadow Vole	5	4	2										**11**
Peromyscus spp.	4		2	2	1			1	2				**12**
Western Harvest Mouse	1		3	2									**6**
Unidentified Mouse spp.	2		1	2							1	2	**8**
Other Mammals (48)													
Sheep*	2	5	2	2	2	5	14	8	3				**43**
Sheep Afterbirth							4						**4**
Domestic Cat									1				**1**
Reptiles/Amphibians (21)													
Alligator Lizard spp.	1		1	1					1	4	3		**11**
Western Fence Lizard	1									1			**2**
Pacific Gopher Snake										4	1		**5**

YEAR TWO	2004					2005							
Species	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	Total
Unidentified Snake spp.										2			**2**
Pacific Tree Frog						1							**1**
Total	**22**	**12**	**17**	**16**	**12**	**19**	**20**	**17**	**13**	**18**	**17**	**3**	**186**

*Dead or dying sheep only

To see if prey species were more abundant in certain regions of the project area than others, the same division of the project site between land "North" and "South" of Montezuma Hills Road was used (see Tables 6, 7, 10, 16 and 17). There were approximately twice as many towers searched on the north side than the south, so if there were equal number of prey observations in both regions proportional to the number of surveys conducted in each region, the number of observations would be equal to a 2 to 1 ratio.

Rodents and rabbits grouped together were present in a 3 to 1 ratio in the first year and 2.4 to 1 in the second year, with a slightly greater number than expected in the north (Table 20). California Meadow Voles were observed almost exclusively north of Montezuma Hills Road in a ratio of 28 to 1 both years combined. *Peromyscus* species (including deer mice) were also more abundant on the north side, with a ratio of 3 to1 in both years. California Ground Squirrels were not seen in great numbers either year of the study, with a total count of 7 for both years combined. Another potential prey source, dead and/or dying domestic sheep and their afterbirth, were observed nearly nine times in greater abundance north of Montezuma Hills Road than south. Reptiles and amphibians were observed in slightly greater numbers on the south side than the north, with a ratio of observations equaling 1 to 1.7 the first year, and 1.3 to 1 the second year (compared to 2 to 1 expected based on number of towers surveyed). It appears from the preliminary data that raptor fatalities occur more often in areas with high abundances of prey species than in areas of low prey abundance. It has been suggested that cattle pats around the turbines which could be a source of insects such as grasshoppers which are a prey item for kestrels and a possible attractant to those specific turbines. The association of cattle pats was suggested by Smallwood and Thelander (2004). We did not look at this methodically. Nevertheless, in the field, we did not observe any increased kestrel activity around sheep (or cattle) pats or any indication that kestrels ever hunted the small yellow flies that appear to forage on this food source most abundantly.

Table 20. Number of Observations of Non-Avian Prey Species observed during Carcass Searches in the North and South* Regions of the Project Area in Year One and Year Two of this study, August 2003 – July 2005

YEAR ONE					
Species	**North**	**South**	**Total**	**Ratio**	
Rodents/Lagomorphs					
Black-tailed Jackrabbit	39	16	55	2.4	1
California Ground Squirrel	1	2	3	1	2
Botta's Pocket Gopher	1		1	1	0
California Meadow Vole	18		18	18	0
Deer Mouse	1	1	2	1	1
Peromyscus spp.	5	1	6	5	1
Western Harvest Mouse	4	2	6	2	1
House Mouse	1	1	2	1	1
Unidentified Mouse spp.	31	11	42	2.8	1
Rodents/Lagomorphs Sub-Total	101	34	135	3	1
Other Mammals					
Sheep**	26	5	31	5.2	1
Domestic Cat	1		1	1	0
Striped Skunk	1	3	4	1	3
Unidentified Mustellid	1		1	1	0
Other Mammals Sub-Total	29	8	37	3.6	1
Reptiles					
Alligator Lizard spp.	3	3	6	1	1
Western Fence Lizard	1	3	4	1	3
Pacific Gopher Snake	2	1	3	2	1
Yellow-bellied Racer		3	3	0	3
Reptiles Sub-Total	6	10	16	1	1.7
Total	**136**	**52**	**188**	**2.6**	**1**

YEAR TWO					
Species	**North**	**South**	**Total**	**Ratio**	
Rodents/Lagomorphs					
Black-tailed Jackrabbit	46	26	72	1.8	1
California Ground Squirrel	3	1	4	3	1
Botta's Pocket Gopher	4		4	4	0
California Meadow Vole	10	1	11	10	1
Peromyscus spp.	9	3	12	3	1
Western Harvest Mouse	4	2	6	2	1
Unidentified Mouse spp.	7	1	8	7	1
Rodents/Lagomorphs Sub-Total	83	34	117	2.4	1

YEAR TWO Species	North	South	Total	Ratio	
Other Mammals					
Sheep**	40	3	43	13.3	1
Sheep Afterbirth	4		4	4	0
Domestic Cat	1		1	1	0
Other Mammals Sub-Total	45	3	48	15	1
Reptiles					
Alligator Lizard spp.	7	4	11	1.8	1
Western Fence Lizard	1	1	2	1	1
Pacific Gopher Snake	3	2	5	1.5	1
Unidentified Snake spp.		2	2	0	2
Pacific Tree Frog	1		1	1	0
Reptiles Sub-Total	12	9	21	1.3	1
Total	**140**	**46**	**186**	**3**	**1**

* North and South of Montezuma Hills Road

** Dead or dying sheep only.

3.2 Avian Abundance and Behavior

A total of 48 complete rounds of avian surveys were conducted between August 14, 2003 and July 27, 2005 (Table 21) on 48 days for a total of 384 20-minute observations from eight observation points.

Table 21. Summary of Rounds of Avian Abundance and Behavior Surveys conducted August 2003 through July 2005

Year	Round	Date Completed
2003	Round 1	August 14
	Round 2	August 28
	Round 3	September 6
	Round 4	September 27
	Round 5	October 15
	Round 6	October 28
	Round 7	November 18
	Round 8	November 26
	Round 9	December 16
	Round 10	December 28
2004	Round 11	January 8
	Round 12	January 28
	Round 13	February 14
	Round 14	February 27
	Round 15	March 10
	Round 16	March 31
	Round 17	April 10
	Round 18	April 23
	Round 19	May 7
	Round 20	May 23

Year	Round	Date Completed
	Round 21	June 14
	Round 22	June 29
	Round 23	July 15
	Round 24	July 23
	Round 25	August 8
	Round 26	August 21
	Round 27	September 11
	Round 28	September 19
	Round 29	October 8
	Round 30	October 30
	Round 31	November 14
	Round 32	November 27
	Round 33	December 15
	Round 34	December 26
2005	Round 35	January 15
	Round 36	January 31
	Round 37	February 12
	Round 38	February 26
	Round 39	March 12
	Round 40	March 23
	Round 41	April 2
	Round 42	April 20
	Round 43	May 15
	Round 44	May 30
	Round 45	June 6
	Round 46	June 24
	Round 47	July 13
	Round 48	July 27

Notes: Surveys were conducted on 48 separate days
48 total rounds of surveys of 8 sites
1 observer
20 minute observation times
384 total number of site surveys (48 days x 8 sites)
112 total hours at 7 observation points within High Winds Project Site
16 total hours at the Control Site (Hamilton) observation point
128 total hours in the field

A total of 86,143 observations of 43 avian species including 2473 unidentified birds were recorded at eight observation points (Table 22). The most common avian species group observed were small songbirds (passerines not including corvid species), which accounted for 97.1% of all observed birds (n=83,670). Of these small songbirds, blackbird species (mostly Red-winged Blackbirds and Brewer's Blackbirds) comprised 97.5% (n=81,620), and made up 94.7% of the total number of avian observations. Removing blackbird observations from the total, small songbirds then comprised 45.3%, raptors (including owls) 20.0%, corvids 7.1%, waterfowl (ducks and geese) 2.9%, other water birds (plovers, herons, egrets, pelicans) 1.6%, and other birds 23.1% (vultures, doves, swifts, pheasants, etc.)

Table 22. Post-Construction Observations of Avian Species recorded per Year at High Winds Project Site, CA, August 2003 – July 2005

	YEAR ONE		YEAR TWO		GRAND TOTAL	
Species	Number of Observations	% Species Composition	Number of Observations	% Species Composition	Number of Observations	% Species Composition
American Crow	7	0.011	13	0.053	20	0.023
American Kestrel	116	0.189	80	0.325	196	0.228
American Pipit	500	0.813	134	0.544	634	0.736
American White Pelican	7	0.011	17	0.069	24	0.028
Barn Swallow	71	0.115	90	0.365	161	0.187
Brewer's Blackbird	348	0.566	18	0.073	366	0.425
Burrowing Owl	1	0.002	2	0.008	3	0.003
Canada Goose	75	0.122	20	0.081	95	0.110
Cliff Swallow	6	0.010	9	0.037	15	0.017
Common Raven	151	0.246	142	0.576	293	0.340
European Starling	154	0.250	34	0.138	188	0.218
Ferruginous Hawk	1	0.002	1	0.004	2	0.002
Golden Eagle	14	0.023	14	0.057	28	0.033
Golden-crowned Sparrow	5	0.008			5	0.006
Grasshopper Sparrow			2	0.008	2	0.002
Great Blue Heron	1	0.002			1	0.001
Great Egret	2	0.003			2	0.002
Horned Lark	144	0.234	133	0.540	277	0.322
House Finch	3	0.005	3	0.012	6	0.007
Killdeer	33	0.054	14	0.057	47	0.055
Loggerhead Shrike	32	0.052	18	0.073	50	0.058
Mallard	3	0.005	7	0.028	10	0.012
Merlin	1	0.002			1	0.001
Mourning Dove	54	0.088	28	0.114	82	0.095
Northern Harrier	52	0.085	32	0.130	84	0.098
Northern Mockingbird	3	0.005	2	0.008	5	0.006
Northern Rough-winged Swallow	1	0.002			1	0.001
Red-tailed Hawk	390	0.634	128	0.519	518	0.601
Red-winged Blackbird	3532	5.744	716	2.905	4248	4.931
Ring-necked Pheasant	1	0.002			1	0.001
Rock Dove	221	0.359	247	1.002	468	0.543
Savannah Sparrow	22	0.036	7	0.028	29	0.034
Say's Phoebe			5	0.020	5	0.006
Swainson's Hawk	1	0.002			1	0.001
Tree Swallow	13	0.021	28	0.114	41	0.048
Turkey Vulture	253	0.411	232	0.941	485	0.563
Unidentified Hawk	33	0.054	6	0.024	39	0.045
Unidentified Non-Raptor*	55001	89.440	22335	90.616	77336	89.776
Violet-green Swallow	23	0.037			23	0.027

	YEAR ONE		YEAR TWO		GRAND TOTAL	
Species	Number of Observations	% Species Composition	Number of Observations	% Species Composition	Number of Observations	% Species Composition
Western Kingbird	3	0.005	7	0.028	10	0.012
Western Meadowlark	196	0.319	109	0.442	305	0.354
White-crowned Sparrow			1	0.004	1	0.001
White-tailed Kite	17	0.028	14	0.057	31	0.036
White-throated Swift	3	0.005			3	0.003
Yellow-billed Magpie	1	0.002			1	0.001
Total	61495	100	24648	100	86143	100

* Unidentified Non-Raptors were predominantly blackbird species (99.6%)

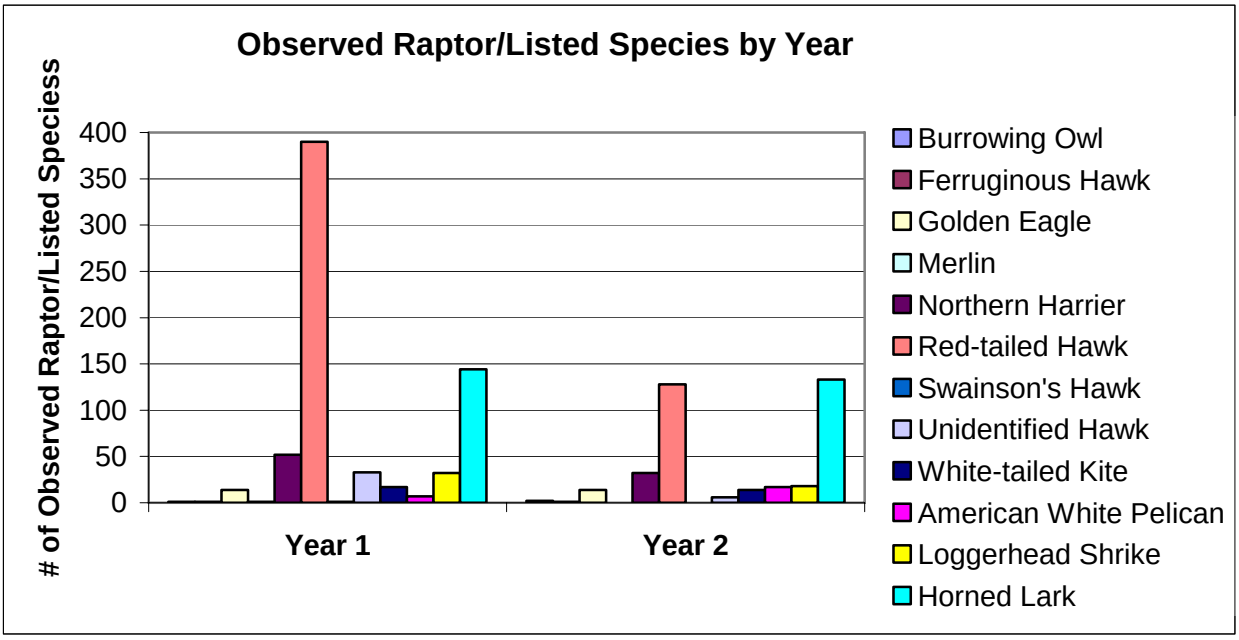
One hundred ninety-one observations were made of California threatened species and species of special concern (Table 23). Northern Harriers were the most observed California listed species of concern with 44% (n=84) of listed species observations, followed by Loggerhead Shrike with 26.2% (n=50), and Golden Eagles, 14.7% (n=28). The only California threatened species observed was the lone Swainson's Hawk. They comprised 0.5% (n=1) of 191 listed species observations. Listed species observations comprised 0.22% of all avian observations, and about 4.2% of avian observations with blackbird species not included. No federally endangered or threatened species were observed during this study period.

Table 23. Number of Observations of California Threatened Species and California Species of Special Concern, August 2003 – July 2005

Species	Number of Observations	Listing Status
American White Pelican	24	CSC
Burrowing Owl	3	CSC
Golden Eagle	28	CSC
Loggerhead Shrike	50	CSC
Merlin	1	CSC
Northern Harrier	84	CSC
Swainson's Hawk	1	CA-threatened
Total	191	

Figure 14 shows the number of Post-Construction observations of raptors as well as listed species (American White Pelican, Loggerhead Shrike and Horned Lark taken from Table 22. Red–tailed Hawks and Horned Larks were the most commonly observed bird species. Both species were the source of mortality incidents. The American Kestrel, one of the primary raptor species involved in mortality incidents, was not noted during avian observations.

Figure 14. Post-Construction Observations of Selected Avian Species recorded per Year at the High Winds Project Site, CA, August 2003 – July 2005



3.2.1 Spatial Distribution of Species in the High Winds Project Site. With two exceptions, overall avian activity (non species specific) was fairly evenly dispersed throughout the project site and the adjacent Hamilton property control site (Table 24). Most of the focused activity was recorded at OP #7 and to a lesser extent OP #4, but 98.6% and 95.1% of the observations respectively at these two sites were flocks of mixed species of Blackbirds. With respect to specific raptor species, American Kestrels and Red-tailed Hawks were observed in moderate numbers at all sites. Golden Eagles were observed 28 times, 15 (54%) of these observations were made at OP sites 3 (n=9) and 1 (n=6). The Golden Eagle incident was found at OP site #6 (Tower 72, see Figures 5). Thirty-one observations were recorded of White-tailed Kites, 12 (39%) of these were located at OP #4, and 9 (29%) were located at OP #5, which views areas adjacent to and including two of the three towers where fatality incidents of this species were recorded (Towers #55 and 59, see Figure 5).

Table 24. Number of Observations of Avian Species at each Observation Point August 2003 – July 2005.

	Observation Point								
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Control**	**Total**
American Crow							4	16	20
American Kestrel	17	29	22	30	34	20	24	20	196
American Pipit	15	218	163	36	127	60	7	8	634
American White Pelican			4		3	17			24
Barn Swallow	15	7	11		13		59	56	161
Brewer's Blackbird	10	5	19	3	2	3	41	283	366
Burrowing Owl	3								3
Canada Goose	4			72	2	2	2	13	95
Cliff Swallow			2					13	15

	Observation Point								
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Control**	**Total**
Common Raven	27	13	29	25	22	29	56	92	293
European Starling	5	41	5	30	13	2	41	51	188
Ferruginous Hawk							1	1	2
Golden Eagle	6		9	4	1	3	2	3	28
Golden-crowned Sparrow								5	5
Grasshopper Sparrow							2		2
Great Blue Heron			1						1
Great Egret			1				1		2
Horned Lark	73	32	46	26	29	41	21	9	277
House Finch		3						3	6
Killdeer	3	3		2			1	38	47
Loggerhead Shrike	5	4	1	4	3	1	22	10	50
Mallard				1			2	7	10
Merlin			1						1
Mourning Dove	9	1	3		15	9	11	34	82
Northern Harrier	8	8	20	17	7	8	1	15	84
Northern Mockingbird							4	1	5
Northern Rough-winged Swallow			1						1
Red-tailed Hawk	53	49	69	94	65	62	81	45	518
Red-winged Blackbird	415	660	473	277	21	84	1206	1112	4248
Ring-necked Pheasant								1	1
Rock Dove	6	35	17	1	4		26	379	468
Savannah Sparrow	21			6			2		29
Say's Phoebe	1			1	1		2		5
Swainson's Hawk								1	1
Tree Swallow	6	1		4			2	28	41
Turkey Vulture	35	37	42	118	27	91	58	77	485
Unidentified Hawk	4	6	11	4	5	2	4	3	39
Unidentified Non-Raptor*	2865	9372	1791	11784	3176	6073	31182	11093	77336
Violet-green Swallow				15	8				23
Western Kingbird	2						3	5	10
Western Meadowlark	46	6	17	17	97	35	20	67	305
White-crowned Sparrow								1	1
White-tailed Kite	2		2	12	9	3	3		31
White-throated Swift		3							3
Yellow-billed Magpie								1	1
Total	3656	10533	2760	12583	3684	6545	32891	13491	86143

* Unidentified Non-Raptors were predominantly blackbird species (99.6%)

3.2.2 Temporal Distribution of Species at the Project Site. In the first year of this study, 58% of all avian observations were recorded in November (Table 25), with peak numbers of American Pipits, European Starlings, Western Meadowlarks and blackbird species (mixed flocks of Brewer's and Red-winged Blackbirds). Red-tailed Hawk observations were also greatest in number in November and in general through the late fall and the winter months during migration

(November through February). American Kestrels were observed most often between August and February (fall through winter). Golden Eagle and Northern Harrier numbers were steady throughout the year, with slight increase in the number of observations of harriers in November and February. White-tailed Kites were observed in the greatest numbers in the February (winter).

Table 25. Avian species composition per month at High Winds for the First Year, August 2003 – July 2004

			2003							2004				
Species	**# Observations**	**# Observation Points**	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
American Crow	7	2		1		3			1		2			
American Kestrel	116	8	14	13	9	13	22	11	18	5	5	1	1	4
American Pipit	500	8			35	154	84	99	1	73	16		16	22
American White Pelican	7	2								3			4	
Barn Swallow	71	5	10	11						2	8	12	21	7
Brewer's Blackbird	348	7		7	47	178	91		13	2	2			8
Burrowing Owl	1	1							1					
Canada Goose	75	4		2			72		1					
Cliff Swallow	6	1										6		
Common Raven	151	8	1	8	4	18	45	35	12	5	8	8	4	3
European Starling	154	7			7	76	47	1	13		2	8		
Ferruginous Hawk	1	1		1										
Golden Eagle	14	6	1			3	1	1		3	1	2	2	
Golden-crowned Sparrow	5	1			5									
Grasshopper Sparrow		0												
Great Blue Heron	1	1					1							
Great Egret	2	2									1	1		
Horned Lark	144	8	12	7	20	5	24	5	7	5	13	3	41	2
House Finch	3	1									2	1		
Killdeer	33	4	3	2	3		9	3	3	7	3			
Loggerhead Shrike	32	6	1	2	2	2		5	5	4	2	7		2
Mallard	3	2								1	2			
Merlin	1	1											1	
Mourning Dove	54	6	13	2				12			4	3	16	4
Northern Harrier	52	7	2	6	2	8	1	3	13	3	5	1	5	3
Northern Mockingbird	3	2								1			1	1
Northern Rough-winged Swallow	1	1	1											
Red-tailed Hawk	390	8	6	22	27	82	81	74	59	18	12	6		3
Red-winged Blackbird	3532	8					15	5	52	1104	2176	180		
Ring-necked Pheasant	1	1									1			
Rock Dove	221	7	23	17	1	1	29	25	21	58	10	2	12	22
Savannah Sparrow	22	3					7	7	6		2			
Say's Phoebe		0												
Swainson's Hawk	1	1										1		
Tree Swallow	13	4	4	1	2						2		3	1

Species	# Observations	# Observation Points	2003 AUG	SEP	OCT	NOV	DEC	2004 JAN	FEB	MAR	APR	MAY	JUN	JUL
Turkey Vulture	253	8	12	77	20	35	7	3	26	5	6	14	6	42
Unidentified Hawk	33	8	2			5	2	11	4	2	6		1	
Unidentified Non-Raptor*	55001	8	149	81	1258	35235	6018	5901	5233	1090	0	5	30	1
Violet-green Swallow	23	2	23											
Western Kingbird	3	2										1	2	
Western Meadowlark	196	8	26	9	8	48	8	26	15	14	7	13	15	7
White-tailed Kite	17	5			1	1	2	3	8	2				
White-throated Swift	3	1										3		
Yellow-billed Magpie	1	1										1		
Grand Total	61495		303	269	1451	35867	6566	6230	5512	2407	2298	279	181	132

* Unidentified Non-Raptors were predominantly blackbird species (99.6%)

In the second year of the study (August 2004 - July 2005), peak avian numbers were observed in October (Table 26). Approximately 3.5 times more bird observations were recorded during this peak fall month in 2003 (n=35867) than that of 2004 (n=10064), and 2.5 times more bird observations in the first year (n=61495) than in the following year (n=24648). Larger mixed flocks of blackbird species accounted for the majority of these differences. Other notable increases in numbers were recorded in Barn Swallows in August, Turkey Vulture in September (in both 2003 and 2004), in Red-tailed Hawks in October and December 2004, in American Pipits and Horned Larks in November, Common Ravens December through February, and American Kestrels and Rock Doves in December. However, it should be noted that in year one of the study 75% (n=390) of the 518 Red-tailed Hawk observations were made as contrasted with 25% (n=128) in year two (see Figure 16).

Table 26: Avian Species Composition per Month at High Winds for the Second Year of this Study, August 2004 – July 2005

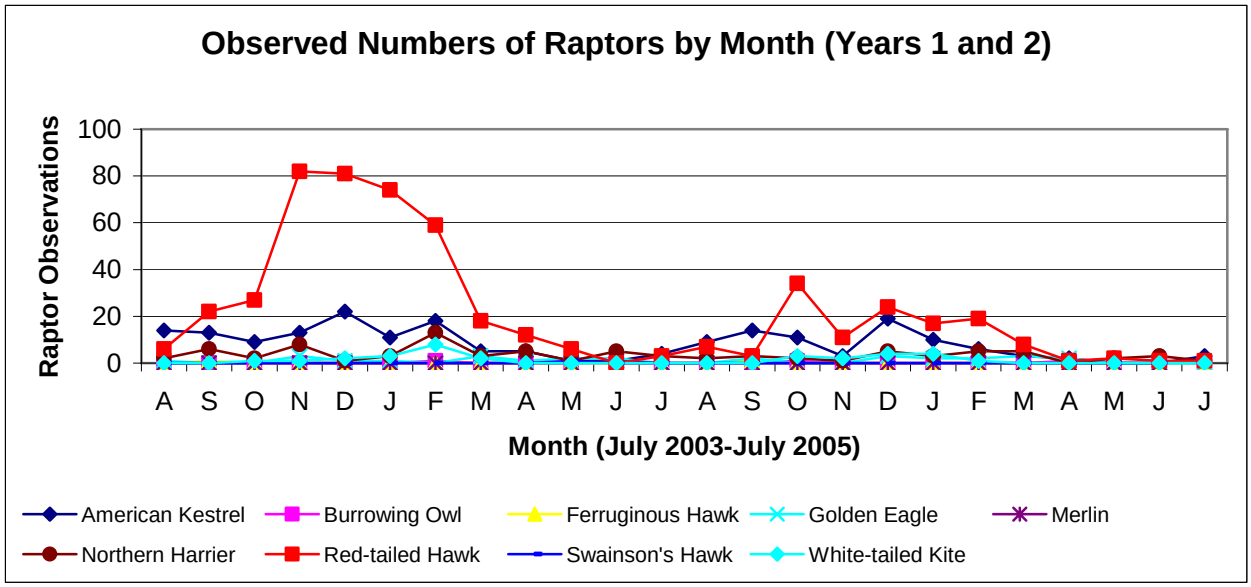
Species	# Observations	# Observation Points	2004 AUG	SEP	OCT	NOV	DEC	2005 JAN	FEB	MAR	APR	MAY	JUN	JUL
American Crow	13	1		1				10			2			
American Kestrel	80	8	9	14	11	3	19	10	6	3	2			3
American Pipit	134	7	24			36	31	19	2	11	11			
American White Pelican	17	1												17
Barn Swallow	90	5	31	3						9	8	8	15	16
Brewer's Blackbird	18	5	1		9	2	1		1	3	1			
Burrowing Owl	2	1			1						1			
Canada Goose	20	4				8		4		8				
Cliff Swallow	9	2								9				
Common Raven	142	8	5	2	12	8	24	23	41	12	5	5		5
European Starling	34	5					4	20	7		3			
Ferruginous Hawk	1	1		1										
Golden Eagle	14	5		2			3	2	2	3	2			
Grasshopper Sparrow	2	1			2									
Horned Lark	133	8	3	20		39			2	16	24	6	4	19

			2004								2005			
Species	**# Observations**	**# Observation Points**	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
House Finch	3	1											3	
Killdeer	14	4		7		3				2			2	
Loggerhead Shrike	18	7	3	5			4	2	1		1	1	1	
Mallard	7	2								4	3			
Mourning Dove	28	6	7	2						1		6	7	5
Northern Harrier	32	8	2	3	2	1	5	3	5	5		2	3	1
Northern Mockingbird	2	1										1		1
Red-tailed Hawk	128	8	7	3	34	11	24	17	19	8	1	2	1	1
Red-winged Blackbird	716	8		10	2		1	51	196	107	278	6	65	
Rock Dove	247	5	14	16	13	23	90	4	28		12	4	23	20
Savannah Sparrow	7	1				7								
Say's Phoebe	5	4	1				3		1					
Tree Swallow	28	3								24			4	
Turkey Vulture	232	8	32	77	25	8	7	2	26	3	8	6	23	15
Unidentified Hawk	6	5			1	1	1				2			1
Unidentified Non-Raptor*	22335	8	24	63	9940	1214	4380	2011	3428	584	274	133	221	63
Western Kingbird	7	4										5	2	
Western Meadowlark	109	8	4	6	9	11	4	31	10	9	7	5	11	2
White-crowned Sparrow	1	1									1			
White-tailed Kite	14	4			3	2	4	4	1					
Total	24648		167	235	10064	1377	4605	2213	3776	821	646	190	385	169

*Unidentified Non-Raptors were predominantly blackbird species (99.6%)

The monthly distribution of raptor observations is graphically presented below in Figure 15. The three Burrowing Owl observations were made in February, ’04, October ’04 and April ’05, the two Ferruginous Hawk observations were made in September ’03 and ’04 and the single Swainson’s Hawk and Merlin observations occurred in May and June of ’04 respectively.

Figure 15. Raptor Species Composition per Month at High Winds August 2003 – July 2005



3.2.3 Comparison with Pre-Construction Avian Abundance and Behavior Study. Avian abundance was compared between the August 2003 to July 2004 post-construction study and a pre-construction study conducted August 17, 2000 to August 16, 2001 (Table 27). Methodologies were similar with regards to the type of data collected and the general locations of the majority of observation points. However a couple of shifts in locations and other subtle differences in methodologies between the two studies may account for most of the differences in species composition between years.

In the pre-construction study, a total of 94 rounds of 30 minute surveys at 7 observation points were conducted for a total of 658 observation periods totaling 329 hours. These observation points were located close to pre-existing roads during that time, which in most cases meant a greater view of residential areas at some sites, including the Leutholtz property on Birds Landing Road, and the Riley Property off of Olsen Road. The Riley property observation point was located to the northwest and was not used in the 2003-2004 study because the High Winds project area did not extend that far. The terrain in this area was flatter than the more eastern regions which dominate the 2003-2004 survey areas, and the agricultural use of the Riley site during the 2000-2001 year was different (safflower) than any fields observed in the post-construction study.

A total of 48 rounds of 20 minute surveys at 8 observation points were conducted in the two years of the post-construction study, for a total of 384 observation periods totaling 128 hours of surveys (24 rounds for a total of 192 observation periods totaling 64 hours per year). The point counts were conducted as part of the road survey of prey activity and the time of the observation was reduced to twenty minutes per survey to assure that all the observation points could be completed in each round. In addition, the observation points of this study were deeper inside the wind project area as access was gained as new roads were put in, and therefore these observation points were slightly removed from busy roads and residences which tend to be attractants for many bird species.

To compare the pre-construction to post-construction results, for each of the two datasets, the total number of observations for each species was divided by the total number of hours of observations made during the surveys (329 hours for the pre-construction study and 64 hours for the post-construction study) to produce a rate of birds observed per hour. Percent composition was also calculated and can be readily compared between the two studies.

The total number of birds observed per hour was approximately 2.5 times greater in the first year of the post-construction study than in the second year and the pre-construction study (Table 27). A single large mixed flock of blackbird species accounted for the great difference between the years, as the number of observations per hour of "Unidentified Non-Raptors" (which were 99.6% blackbird species) was 2.5 times greater in the post-construction first year than the pre-construction study. Several species of raptors varied between the two study periods. Golden eagles were observed almost four times more often in the pre-construction surveys than post-construction, while the Prairie Falcon (n=9) and Rough-legged Hawk (n=95) were observed only in the pre-construction surveys. In year one of the post-construction surveys, Red-tailed Hawks were 2.6 times more abundant and Northern Harriers just slightly more abundant than in the pre-construction study, White-tailed Kites were nearly 20 times more abundant in post-construction versus pre-construction counts. Besides blackbirds, other species with notably different number of observations per hour between studies include the Canada Goose, American Pipit and European Starling, which were observed at a greater rate during the first year of post-construction surveys; and American Crow, Chipping Sparrow, Cliff Swallow, Long-billed Curlew, Horned Lark and Turkey Vulture, which all had notably larger rates of observation in pre-construction surveys than post-construction. When comparing two years of post-construction observations to the pre-construction observations, Red-tailed Hawks were 1.7 times more abundant per hour during the post-construction surveys, and the total numbers of avian observations recorded per hour were 1.7 times greater during the post-construction surveys.

Table 27. Comparison of the Number of each Species observed per hour during Avian Abundance and Behavior Surveys at the High Winds Project Site between One Year of Pre-Construction Study (Mid-August 2000- Mid-August 2001) and Two Years of the Post-Construction Study (August 2003- July 2005)

	Pre-Construction 2000 - 2001	Post-Construction Year 1	Post-Construction Year 2	Both Years
Species Name	Number per Hour	Number per Hour	Number per Hour	Number per Hour
American Crow	0.61	0.11	0.20	0.16
American Goldfinch	0.05	0	0	0
American Kestrel	2.27	1.81	1.25	1.53
American Pipit	3.77	7.81	2.09	4.95
American Robin	0.02	0	0	0
American White Pelican	0.2	0.11	0.27	0.19
Anna's Hummingbird	0.01	0	0	0
Bank Swallow	0	0	0	0
Barn Swallow	0.89	1.11	1.41	1.26
Black Phoebe	0.02	0	0	0
Brewer's Blackbird	2.06	5.44	0.28	2.86
Burrowing Owl	0	0.02	0.03	0.02

	Pre-Construction 2000 - 2001	Post-Construction Year 1	Post-Construction Year 2	Both Years
Species Name	Number per Hour	Number per Hour	Number per Hour	Number per Hour
California Quail	0	0	0	0
Canada Goose	0.22	1.17	0.31	0.74
Chipping Sparrow	0.22	0	0	0
Cinnamon Teal	0	0	0	0
Cliff Swallow	1.05	0.09	0.14	0.12
Common Raven	2.31	2.36	2.22	2.29
Cooper's Hawk	0	0	0	0
European Starling	0.39	2.41	0.53	1.47
Ferruginous Hawk	0.03	0.02	0.02	0.02
Golden Eagle	0.86	0.22	0.22	0.22
Golden-crowned Sparrow	0	0.08	0	0.04
Grasshopper Sparrow	0	0	0.03	0.02
Great Blue Heron	0	0.02	0	0.01
Great Egret	0.03	0.03	0	0.02
Horned Lark	8.29	2.25	2.08	2.16
House Finch	0.27	0.05	0.05	0.05
Killdeer	0.72	0.52	0.22	0.37
Lesser Yellowlegs	0.01	0	0	0
Loggerhead Shrike	0.43	0.5	0.28	0.39
Long-billed Curlew	0.42	0	0	0
Mallard	0.05	0.05	0.11	0.08
Merlin	0	0.02	0	0.01
Mourning Dove	0.59	0.84	0.44	0.64
Northern Flicker	0.07	0	0	0
Northern Harrier	0.52	0.81	0.50	0.66
Northern Mockingbird	0.11	0.05	0.03	0.04
Northern Rough-winged Swallow	0	0.02	0	0.01
Nuttall's Woodpecker	0.01	0	0	0
Peacock	0.02	0	0	0
Prairie Falcon	0.03	0	0	0
Red-tailed Hawk	2.34	6.09	2.00	4.05
Red-winged Blackbird	2.37	55.19	11.19	33.19
Ring-necked Pheasant	0.04	0.02	0	0.01
Rock Dove	1.24	3.45	3.86	3.66
Rough-legged Hawk	0.29	0	0	0
Savannah Sparrow	0.05	0.34	0.11	0.23
Say's Phoebe	0.12	0	0.08	0.04
Scrub Jay	0.29	0	0	0
Short-eared Owl	0.01	0	0	0
Snowy Egret	0.03	0	0	0
Song Sparrow	0.07	0	0	0
Swainson's Hawk	0.01	0.02	0	0.01
Tree Swallow	0.04	0.2	0.44	0.32
Tri-colored Blackbird	0.05	0	0	0
Turkey Vulture	5.44	3.95	3.63	3.79
Unidentified Hawk	0.63	0.52	0.09	0.3
Unidentified Non-Raptor*	345.59	859.39	348.98	604.19
Violet-green Swallow	0.16	0.36	0	0.18
Western Kingbird	0.07	0.05	0.11	0.08
Western Meadowlark	3.6	3.06	1.70	2.38

	Pre-Construction 2000 - 2001	Post-Construction Year 1	Post-Construction Year 2	Both Years
Species Name	Number per Hour	Number per Hour	Number per Hour	Number per Hour
Whimbrel	0.07	0	0	0
White-crowned Sparrow	0.14	0	0.02	0.01
White-tailed Kite	0.01	0.27	0.22	0.24
White-throated Swift	0	0.05	0	0.02
Willet	0	0	0	0
Yellow-billed Magpie	0	0.02	0	0.01
Yellow-rumped Warbler	0	0	0	0
Grand Total	389.23	960.86	385.13	672.99

* Unidentified Non-Raptors were predominantly blackbird species (99.6%)

3.2.4 Raptor Perching Observations. Perch behaviors were categorized by perch location/structure, such as the ground, a fence, tree, electrical wire, transmission tower, wind turbine, meteorological tower, sign post, or wood pile. A total of 328 raptor perching observations were recorded (Table 28). Of these, the most common perch structure of raptors observed were transmission towers, which accounted for 29% (n=96) of all raptor perching observations. Other perch structures frequently used by raptors during surveys included: the ground (21%); fences (21%), trees (13%); and, electrical wires (12%). All other perch structures, including wind turbines, meteorological towers, sign posts, low vegetation (non-trees), wood stacks, old windmills and farm equipment together comprised less than 4% of all raptor perching observations. Red-tailed Hawks were observed perching more often than all other raptor species combined. Red-tailed Hawks perched on transmission towers most frequently, comprising 72% (n=69) of all raptor perching observations on this type of perch structure, 31% of all Red-tailed Hawk perching observations, and 21% of all raptor perch observations. Besides transmission towers, they perched on the ground (24% of all Red-tailed Hawk perching observations), fences (20%), trees (12%), electrical wires (11%), meteorological towers (1.3%) and a telephone pole (0.4%). Transmission towers were also the most common perch site for American Kestrels, and along with trees, were a common perch site for Golden Eagles as well. The observations (n=2) of American Kestrels perching on a wind turbine were made at enXco turbines (KCS 56-100) with a lattice tower. Three observations of Red-tailed Hawks perching on meteorological towers were recorded; one was on an arm about one-quarter of the way up the pole, the second was perched on the top of the tower, and the third was on an arm near the top of the tower. All three met towers were permanent, and unguyed, and were constructed as part of the High Winds project.

Table 28. Perching Observations of Raptor Species made during Avian Abundance and Behavior Surveys at High Winds, August 2003 - July 2005

	Perch Structure										
Species	Ground	Fence	Tree	Pole	Electrical Wire	Transmission Tower	Wind Turbine*	Met Tower	Sign	Other**	**Total**
Golden Eagle	2	1	5			5		1			14
Red-tailed Hawk	54	46	27	1	24	69		3		2	226
American Kestrel	4	9	5		13	15	2	2	2	3	55
Merlin		1									1
Northern Harrier	6		1								7
White-tailed Kite		5	3								8
Unidentified Hawk		7	2		2	3					14
Burrowing Owl	3										3
Total	69	69	43	1	39	96	1	3	2	5	328

* On platform of an enXco wind turbine.

** Other perch structures included old windmills (non High Winds or enXco), wood piles, farm equipment and low vegetation.

3.2.5 Flight Activities and Related Behavior(s). Flight behaviors were categorized as: direct flight (uninterrupted directional flight across the viewing area), general flight (gliding, flapping, soaring); territorial flight (chasing, diving); and hunting flight (general hunting, diving, low/contour hunting, kiting, hovering, and slope soaring).

A total of 573 observations of raptor flight behaviors were recorded (Table 29). Of these, 64% were hunting flights (n=368), 33% were general flights (n=188), and 3% were territorial flights (n=17). Besides the large number of observations made of general hunting (n=180), a term to categorize hunting behaviors that did not fit into other more descriptive categories, the most common general flight behavior observed in raptors was soaring (n=120). This behavior was evident in 21% of all raptor flight behaviors observed. The most frequently observed soaring activity was the Red-tailed Hawk, with 90 recorded soaring flights. These constituted 75% of the total 120 soaring flights recorded. The next most common flight behaviors exhibited were kiting and hovering, constituting 11% and 10% of all recorded flights, respectively. Red-tailed Hawks (46) accounted for 73% of all of the kiting observations. Due to the hunting activity of Northern Harriers, low hunting was the next most observed flight behavior 9.5%. The low flight observations were predominantly of Northern Harriers (58%), and to a lesser extent, Red-tailed Hawks (18%) and American Kestrels (14.5%).

Table 29. Flight observations of raptor species made during Avian Behavior Surveys at High Winds, August 2003 - July 2005

	General Flights				Territorial		Hunting					
	Direct						General		Low			Grand
Species	Flight	Glide	Flap	Soar	Chase	Dive	Hunt	Dive	Hunt	Kite	Hover	**Total**
Golden Eagle		3		5		1	4		1			14
Red-tailed Hawk	6	37		90		11	85	4	10	46	2	291
Ferruginous Hawk							1		1			2
Swainson's Hawk				1								1
American Kestrel	2	5	4	2			53	4	8	11	51	140
Northern Harrier		2	1	9	1	4	24	3	32	1		77
White-tailed Kite	1						10		3	4	5	23
Unidentified Hawk	1	2	4	13			3			1	1	25
Total	10	49	9	120	1	16	180	11	55	63	59	573

3.2.6 Flight Height. A total of 573 raptor flight observations were made with flight heights recorded (Table 30). Of these, about 49% were 0 to <10 meters above ground level (AGL), 33% were 10 to < 30 meters, 15% were 30 to 100 meters (the dimensions of the rotor sweep area), and about 3% were above 100 meters. Of the 14 Golden Eagle flights observed, flight altitudes were fairly evenly distributed, with slightly more flights observed below 10 meters (43%) and between 30 to 100 (29%) than at the other two altitude ranges. A Swainson Hawk was seen once, flying between 30 to 100 meters AGL. Red-tailed Hawks were observed at the following AGL elevations: 42% at the 10 to < 30 meter zone, 35% at less than 10 meters, nearly 19% between 30 and 100 meters, and 4.5% over 100 meters. Ninety-five percent of American Kestrels flights

were below 30 meters AGL, and the remaining 5% were between 30 and 100 meters. Northern Harrier flights were predominantly below 30 meters AGL (88%), with 75% of these below 10 meters AGL.

Table 30. Flight Heights of Raptors observed at High Winds, August 2003 – July 2005

Species	Number of Flights Observed	% 0 to <10 m	% 10 to < 30 m	% 30 to 100 m	% > 100 m
Golden Eagle	14	42.9	14.3	28.6	14.3
Red-tailed Hawk	291	35.1	41.9	18.6	4.5
Ferruginous Hawk	2	100.0			
Swainson's Hawk	1			100.0	
American Kestrel	140	65.0	30.0	5.0	
Northern Harrier	77	75.3	13.0	10.4	1.3
White-tailed Kite	23	78.3	21.7		
Unidentified Hawk	25	16.0	32.0	52.0	
Total	573	49.0	33.0	15.2	2.8

To test whether raptors that were observed a greater proportion of time at blade height (30 – 100m) were at greater risk, we performed a simple linear regression of proportion of blade height observations versus total estimated carcasses. Due to inadequate sample size, we could only test for four species, Golden Eagles, Red-Tailed Hawks, Northern Harrier and American Kestrel. The results ($F = 5.66$, $df = 1$, $p = 0.14$) did not indicate a correlation between observed flight heights and fatalities, by species.

A total of 38,999 flight altitude observations were recorded of non-raptor avian species (Table 31). The majority of these flights (89.8%) were below 30 meters AGL. All 24 American White Pelican flights were recorded as within the 30 to 100 meters AGL elevation range. About ninety percent of 19 Loggerhead Shrike flights observed were below 10 meters AGL, and all were below 30 meters. The most abundant waterfowl species observed during surveys, Canada Goose flights, were seen predominantly above 100 meters AGL (92%).

Table 31. Flight Heights of Non-Raptor Bird Species observed at High Winds, August 2003 – July 2005

Species	Number of Flights Observed	% 0 to <10 m	% 10 to < 30 m	% 30 to 100 m	% > 100 m
American Crow	17	70.6	5.9	23.5	
American Pipit	351	65.2	34.8		
American White Pelican	24			100.0	
Barn Swallow	161	98.1	1.2	0.6	
Brewer's Blackbird	167	90.4	8.4	1.2	
Canada Goose	76	5.3	2.6		92.1
Cliff Swallow	15	100.0			
Common Raven	163	50.3	44.8	4.9	
European Starling	156	39.1	60.9		
Golden-crowned Sparrow	5	100.0			
Grasshopper Sparrow	2	100.0			
Great Blue Heron	1			100.0	
Great Egret	2		50.0	50.0	
Horned Lark	111	64.9	34.2	0.9	
House Finch	1	100.0			
Killdeer	12	91.7	8.3		
Loggerhead Shrike	19	89.5	10.5		
Mallard	6	16.7	66.7	16.7	
Mourning Dove	48	72.9	2.1	25.0	
Northern Mockingbird	2	100.0			
Northern Rough-winged Swallow	1			100.0	
Red-winged Blackbird	425	88.5	4.7	6.8	
Ring-necked Pheasant	1	100.0			
Rock Dove	102	78.4	18.6	2.9	
Savannah Sparrow	4	100.0			
Tree Swallow	41	90.2	9.8		
Turkey Vulture	459	22.4	35.5	37.9	4.1
Unidentified Non-Raptor*	36473	64.6	25.4	7.7	2.3
Violet-green Swallow	23	100.0			
Western Kingbird	2	100.0			
Western Meadowlark	126	98.4	1.6		
White-throated Swift	3			100.0	
Total	38999	64.6	25.2	7.9	2.3

* Flight observations of Unidentified Non-Raptors were predominantly of blackbird species (99.1%)

3.3 Prey Monitoring /Raptor Abundance and Use

A total of 48 complete rounds of prey monitoring surveys were conducted between August 14, 2003 and July 26, 2005 (Table 32) on 48 days, for a total of 336 surveys of seven different sites.

Table 32. Summary of Rounds of Prey Monitoring Surveys conducted August 2003 through July 2005

Year	Round	Date Completed
2003	Round 1	August 14
	Round 2	August 28
	Round 3	September 6
	Round 4	September 27
	Round 5	October 15
	Round 6	October 28
	Round 7	November 18
	Round 8	November 26
	Round 9	December 16
	Round 10	December 28
2004	Round 11	January 8
	Round 12	January 28
	Round 13	February 14
	Round 14	February 27
	Round 15	March 10
	Round 16	March 31
	Round 17	April 10
	Round 18	April 23
	Round 19	May 7
	Round 20	May 23
	Round 21	June 14
	Round 22	June 29
	Round 23	July 15
	Round 24	July 23
	Round 25	August 8
	Round 26	August 21
	Round 27	September 11
	Round 28	September 19
	Round 29	October 8
	Round 30	October 30
	Round 31	November 14
	Round 32	November 27
	Round 33	December 15
	Round 34	December 26
2005	Round 35	January 15
	Round 36	January 31
	Round 37	February 12
	Round 38	February 26
	Round 39	March 12
	Round 40	March 23
	Round 41	April 2
	Round 42	April 20
	Round 43	May 15
	Round 44	May 29
	Round 45	June 6
	Round 46	June 24
	Round 47	July 13

Year	Round	Date Completed
	Round 48	July 27

Note: Surveys were conducted on 48 separate days
48 total rounds of surveys of 7 sites
1 observer per survey
42.2 minutes average observation time
118.2 total hours in the field

3.3.1 Prey Monitoring/Road Surveys. In our surveys of all the gravel roads in the project area (Figure 4 at page 10), we observed no increase in the number of ground squirrels, or in the number of ground squirrel or other rodent species burrows along access roads during this two year study (Table 33). Most ground squirrels seen on or near gravel roads were recorded along one road in site 6, nearest Tower #68 and leading to a new meteorological tower. This road was along a fence line and was adjacent to a fallow field where burrows were left undisturbed.

Table 33. Number of Observations of Mammalian and Avian Species made during Prey Monitoring Surveys at High Winds, August 2003 – July 2005

	Year 1 Observation Point								Year 2 Observation Point								Two Year
Species	1	2	3	4	5	6	7	**Total**	1	2	3	4	5	6	7	**Total**	**Total**
Mammals																	
California Ground Squirrel	12	0	38	1	56	25	10	**142**	4	0	8	0	58	22	31	**123**	**265**
Black-tailed Jackrabbit	0	0	2	0	1	1	3	**7**	0	1	1	2	3	2	11	**20**	**27**
Meadow Vole*	1	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	**0**	**1**
Coyote	0	0	0	0	1	0	0	**1**	0	0	0	0	0	0	0	**0**	**1**
Total Mammal Observations	13	0	40	1	58	26	13	**151**	4	1	9	2	61	24	42	**143**	**294**
Raptors																	
Golden Eagle	0	0	0	1	1	2	0	**4**	2	3	3	5	6	1	0	**20**	**24**
Red-tailed Hawk	39	33	30	35	57	49	18	**261**	2	4	13	16	15	19	2	**71**	**332**
Ferruginous Hawk	0	1	0	1	1	0	0	**3**	0	0	0	0	0	0	0	**0**	**3**
Unidentified *Buteo* spp.	0	0	0	0	1	0	0	**1**	0	0	0	0	0	1	0	**1**	**2**
American Kestrel	30	23	18	21	36	24	14	**166**	17	14	12	16	16	38	12	**125**	**291**
Merlin	2	1	0	0	0	0	0	**3**	0	0	0	0	0	0	0	**0**	**3**
Prairie Falcon	0	0	0	1	0	0	0	**1**	1	0	0	0	1	1	0	**3**	**4**
Northern Harrier	17	3	10	14	13	5	4	**66**	4	8	12	15	15	8	2	**64**	**130**
White-tailed Kite	2	0	0	5	5	17	0	**29**	0	1	3	13	3	10	0	**30**	**59**
Burrowing Owl	0	0	1	0	0	0	0	**1**	0	0	2	0	0	0	0	**2**	**3**
Total Raptor Observations	90	61	59	78	114	97	36	**535**	26	30	45	65	56	78	16	**316**	**851**

* 1 *Microtus californicus* (meadow vole) was found dead on the road.

The number of ground squirrel observations varied month to month at each site, in some cases with an abrupt change between consecutive months (Table 34). When grouping 6 month periods during the 2 year study, there were greater numbers of ground squirrels observed between February and July 2004 (38.5%, n=102) than between August 2003 through January 2004 (15.1%, n=40) or August 2004 through January 2005 (23.4%, n=62), or February and July 2005 (23%, n=61). The highest counts were recorded in June, July and September of 2004, with 24.5% of all ground squirrel observations in those three months alone.

Table 34. Number of California Ground Squirrel Observations per Month per Site in Years One and Two of this Study

	2003					2004								
Site	August	September	October	November	December	January	February	March	April	May	June	July	**1st Year Total**	
1	1	0	1	2	0	0	0	1	1	1	2	3	12	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	2	2	1	3	2	0	9	3	5	7	3	1	38	
4	0	0	0	0	0	0	0	0	0	0	1	0	1	
5	0	12	1	0	3	5	7	6	6	1	5	10	56	
6	0	1	0	4	0	0	2	4	3	3	4	4	25	
7	0	0	0	0	0	0	0	0	0	0	6	4	10	
Total	3	15	3	9	5	5	18	14	15	12	21	22	142	

	2004					2005								
Site	August	September	October	November	December	January	February	March	April	May	June	July	**2nd Year Total**	**Grand Total**
1	2	0	0	0	0	0	0	0	0	0	0	2	4	16
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	2	0	1	0	5	0	0	0	8	46
4	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5	9	12	6	1	4	1	8	7	9	0	0	1	58	114
6	4	3	2	0	1	1	1	4	1	3	2	0	22	47
7	2	7	3	2	0	0	4	4	1	2	4	2	31	41
Total	17	22	11	3	7	2	14	15	16	5	6	5	123	265

3.3.2 Raptor Abundance Surveys. Sixty-six percent (60%) of all raptor observations made during the first year of Prey Monitoring surveys, and 41% of all observations made during the two year study, were recorded during four months of the first year, November 2003 through February 2004 (n=352)(Table 35). This trend was not repeated in the following year for the same months, when there were less than half as many raptor observations recorded (n=167). Forty-six percent of all raptors observed were recorded during the first 6 months of the study (n=395), while only 30% of observations were made during the same months of the following year (August 2004 through January 2005, n=256). Raptor counts recorded in the months of February through July of 2004 comprised about 17% of the total number recorded (n=140), greater than twice as many observed during the same months of 2005 (n=60), which comprised only 7% of the total observations in the two year study. In both years, peak observation numbers

were recorded in fall through winter during fall migration and over wintering periods, when birds are not primarily residing at their nesting territories. A steep drop off in numbers occurred in March of each year, but was most pronounced the first year of the study. These numbers correspond to the number of Red-tailed Hawk observations recorded during Avian Abundance and Behavior Surveys for these same months (see Tables 25 and 26 and Figure 16).

Table 35. Number of Raptor Observations per month per site (all raptor species lumped), in Years One and Two of this Study

	2003					2004								
Site	August	September	October	November	December	January	February	March	April	May	June	July	**1st Year Total**	
1	5	9	14	19	15	14	6	4	1	1	1	1	90	
2	2	6	3	21	7	5	7	0	1	2	1	6	61	
3	3	7	4	13	7	11	7	2	1	0	0	4	59	
4	0	4	10	15	15	8	9	5	0	0	1	11	78	
5	5	9	10	16	16	17	27	8	3	1	1	1	114	
6	1	10	4	24	9	26	14	5	2	1	0	1	97	
7	4	1	4	14	6	2	2	3	0	0	0	0	36	
Total	20	46	49	122	75	83	72	27	8	5	4	24	535	

	2004					2005								
Site	August	September	October	November	December	January	February	March	April	May	June	July	**2nd Year Total**	**Grand Total**
1	1	4	2	1	6	3	4	1	0	1	1	2	26	116
2	1	4	2	3	3	2	1	7	2	4	0	1	30	91
3	3	3	7	6	8	5	9	0	1	1	1	1	45	104
4	8	9	15	4	11	11	1	2	3	0	0	1	65	143
5	2	7	4	10	21	6	2	2	2	0	0	0	56	170
6	2	10	19	20	13	6	6	1	0	0	1	0	78	175
7	3	2	4	2	1	2	0	0	1	0	1	0	16	52
Total	20	39	53	46	63	35	23	13	9	6	4	5	316	851

The number of raptor observations made during Prey Monitoring Surveys at the 7 observation points within the project area (OP #1-7) was compared with Carcass Survey avian incidents (standardized data only) located within those same areas for both years of this study (Table 36). The seven Prey Monitoring observation sites were surveyed contemporaneously, covering the areas surrounding wind turbines and their airspace twice per month for the duration of the study, and therefore could be readily compared with Carcass Survey incident data (see Figure 2), as opposed to data recorded during Avian Abundance and Behavior Surveys, which surveyed areas which overlapped each other and therefore turbines and their surrounding areas were often observed from more than one OP site. The data appears to show a correlation between abundance of certain raptor species and the number of incidents of those same species at those sites. When comparing the total number of incidents to the total number of observations of each raptor species, certain species appear to be more susceptible to turbine strike than others (assuming 100% of these incidents are turbine related strikes). When looking at both years of

data combined, the avian species with the largest number of incidents, the American Kestrel (n=45), was observed 291 times, whereas Red-tailed Hawks were observed 332 times yet there were only 16 incidents of this species found during the two years of this project, indicating this species is not as susceptible to turbine strike as the American Kestrel. Northern Harriers were the third most commonly observed raptor species in the project area (n=130), yet there were zero incidents of this species, thus appear to be less susceptible or not susceptible to turbine strike. When comparing the first year to the second year within the same species, American Kestrels appeared slightly more susceptible to turbine strike the first year (166 observations, 29 incidents) than the second (125 observations, 16 incidents), while Red-tailed Hawks appeared much more susceptible to turbine strike in the second year (71 observations, 7 incidents) than the first (261 observations, 9 incidents). The abundance of Red-tailed Hawks and American Kestrels within each site area did not seem to correlate to number of incidents in those areas. Golden Eagles were observed very few times in the first year of Prey Monitoring surveys (n=4) when one incident of this species was observed in Site 6, where 2 of 4 observations were made. It should be pointed out that there were two Golden Eagle fatalities but only one was found during standardized surveys. For qualitative purposes, the second fatality was located in Site 3, where 3 of 20 Golden Eagles were recorded for the second year of Prey Monitoring surveys. With so few observations of Golden Eagles recorded, correlation between the abundance of this species and the location of fatalities are not clear at this point. White-tailed Kites, the species with the third most recorded incidents, were the fourth most common species observed during Prey Monitoring surveys. Two of those incidents were in Site 5, where only 5 of 29 total observations made (17%) in year one, indicating that abundance was not obviously correlated to incident locations.

Table 36. Site Comparison of Raptor Observations Made During Prey Monitoring Surveys with Incidents Recorded During Two Year Carcass Surveys

YEAR ONE	Site															
	1		2		3		4		5		6		7		Total	
Raptor Species	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	**Obs**	**Inc**
Golden Eagle							1		1		2	1			**4**	**1**
Red-tailed Hawk	39	2	33	1	30	2	35		57	1	49	1	18	2	**261**	**9**
Ferruginous Hawk			1				1		1			1			**3**	**1**
Rough-legged Hawk																
Unidentified *Buteo* spp.									1						**1**	
American Kestrel	30	8	23	9	18	1	21	4	36	4	24	1	14	2	**166**	**29**
Merlin	2		1												**3**	
Prairie Falcon							1								**1**	
Northern Harrier	17		3		10		14		13		5		4		**66**	
White-tailed Kite	2						5		5	2	17				**29**	**2**
Burrowing Owl					1										**1**	
Barn Owl																
Total	90	10	61	10	59	3	78	4	114	7	97	4	36	4	**535**	**42**

Table 36 continued.

YEAR TWO	Site															
	1		2		3		4		5		6		7		Total	
Raptor Species	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	**Obs**	**Inc**
Golden Eagle	2		3		3		5		6		1				**20**	
Red-tailed Hawk	2		4	2	13	1	16	3	15		19	1	2		**71**	**7**
Ferruginous Hawk														1		**1**
Rough-legged Hawk																
Unidentified *Buteo* spp.											1				**1**	
American Kestrel	17	2	14		12	5	16	1	16	1	38	6	12	1	**125**	**16**
Merlin																
Prairie Falcon	1								1		1				**3**	
Northern Harrier	4		8		12		15		15		8		2		**64**	
White-tailed Kite			1		3		13		3		10	1			**30**	**1**
Burrowing Owl					2										**2**	
Barn Owl								2								**2**
Total	26	2	30	2	45	6	65	6	56	1	78	8	16	2	**316**	**27**

BOTH YEARS	Site															
	1		2		3		4		5		6		7		Total	
Raptor Species	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	Obs	Inc	**Obs**	**Inc**
Golden Eagle	2		3		3	0	6		7		3	1			**24**	**1**
Red-tailed Hawk	41	2	37	3	43	3	51	3	72	1	68	2	20	2	**332**	**16**
Ferruginous Hawk			1				1		1			1			**3**	**1**
Rough-legged Hawk														1		**1**
Unidentified *Buteo* spp.									1		1				**2**	
American Kestrel	47	10	37	9	30	6	37	5	52	5	62	7	26	3	**291**	**45**
Merlin	2		1												**3**	
Prairie Falcon	1						1		1		1				**4**	
Northern Harrier	21		11		22		29		28		13		6		**130**	
White-tailed Kite	2		1		3		18		8	2	27	1			**59**	**3**
Burrowing Owl					3										**3**	
Barn Owl						0		2								**2**
Total	116	12	91	12	104	9	143	10	170	8	175	12	52	6	**851**	**69**

Obs = Observation made during Prey Monitoring Surveys

Inc = Incident (Fatality or Injury), includes data from Standardized Carcass Surveys only, of birds associated with a wind turbine

Standardized data only, excludes Incidentals and ON SITE fatalities/injuries

3.4 Raptor Nesting Study Results

3.4.1 2004 Nesting Study. Eight different species of raptors were observed nesting in and/or adjacent to the wind power project area (Table 37). A total of 38 confirmed raptor nests, 24 probable nests, and 4 possible nests were observed. The most common raptor species observed nesting was American Kestrels followed by Red-tailed Hawks, then Great Horned Owls. Figure 16 presents a map of raptor nests observed in the vicinity of the High Winds Project.

Two separate Golden Eagle nests were observed and appeared to be active. Based on observations, one of these active nests was eventually classified as a failure.

Table 37. Number of Raptor Nesting Sites per Species Observed In and Adjacent to the High Winds Power Project, Solano County, CA. March 10- July 8, 2004

Species	Confirmed*	Probable**	Possible***	Total
Golden Eagle	2			2
Red-tailed Hawk	13	2		15
Swainson's Hawk	2			2
Northern Harrier	1	4		5
American Kestrel	10	16	2	28
White-tailed Kite			1	1
Great Horned Owl	10			10
Barn Owl		2	1	3
Total	38	24	4	66

*Confirmed - Observed activity at a nest
**Probable - Observed nesting or territorial behavior in an area
***Possible - Observed adult pair using area

3.4.1.1 Currie/Emigh Road Intersection-Golden Eagle Nest

Golden Eagles were observed perching in *Eucalyptus* trees Southeast of the intersection of Currie and Emigh Roads. Copulating eagles were observed once on April 4th, 2004, next to this grove of eucalyptus trees. A Golden Eagle nest was confirmed on April 13th, 2004. The nest is located in a eucalyptus tree on Emigh Road, approximately 0.15 miles East of the Currie/Emigh Road intersection. The nest is approximately 80 feet above the ground and is about 2 ½ feet wide by 6 inches deep. Both adults were actively seen bringing in nest material. Nest material consisted of eucalyptus twigs, leaves and branches.

No Golden Eagles were observed on the nest after May 1, 2004. No eaglets were observed. We concluded based on the absence of eaglets that the nest was ultimately a failure.

3.4.1.2 Masson Property-Historical Golden Eagle Nest

One historical nest location was observed on the Masson property as well to determine if it would become active this season. This nest is located in a grove of *Eucalyptus* trees 1.3 miles South of Hwy. 12 on Olsen Road and 0.35 miles West of Olsen Road. Previous avian observations suggested that Golden Eagle behavior and presence in this area indicated a possible nest within the eucalyptus grove (Curry & Kerlinger 2001). A nest was located in the grove of trees on September 8, 2001 (Curry & Kerlinger 2001). It was concluded that active Golden Eagle nesting probably occurred in 2001 (Curry & Kerlinger 2001).

The grove of eucalyptus trees was initially observed on April 3rd, 2004, for 4 hours, April 12, 2004 for 3 hours, May 9th, 2004, for 4 hours and again on May 13th, 2004 for 5 hours. The nest structure consists of aged branches and twigs and is located approximately 70 feet above the ground and is 4 feet across by 2 feet deep. No Golden Eagles were observed perched in this grove of trees or on the transmission lines immediately surrounding the area. During nesting surveys no Golden Eagle activity was observed. One raven nest was located on the transmission

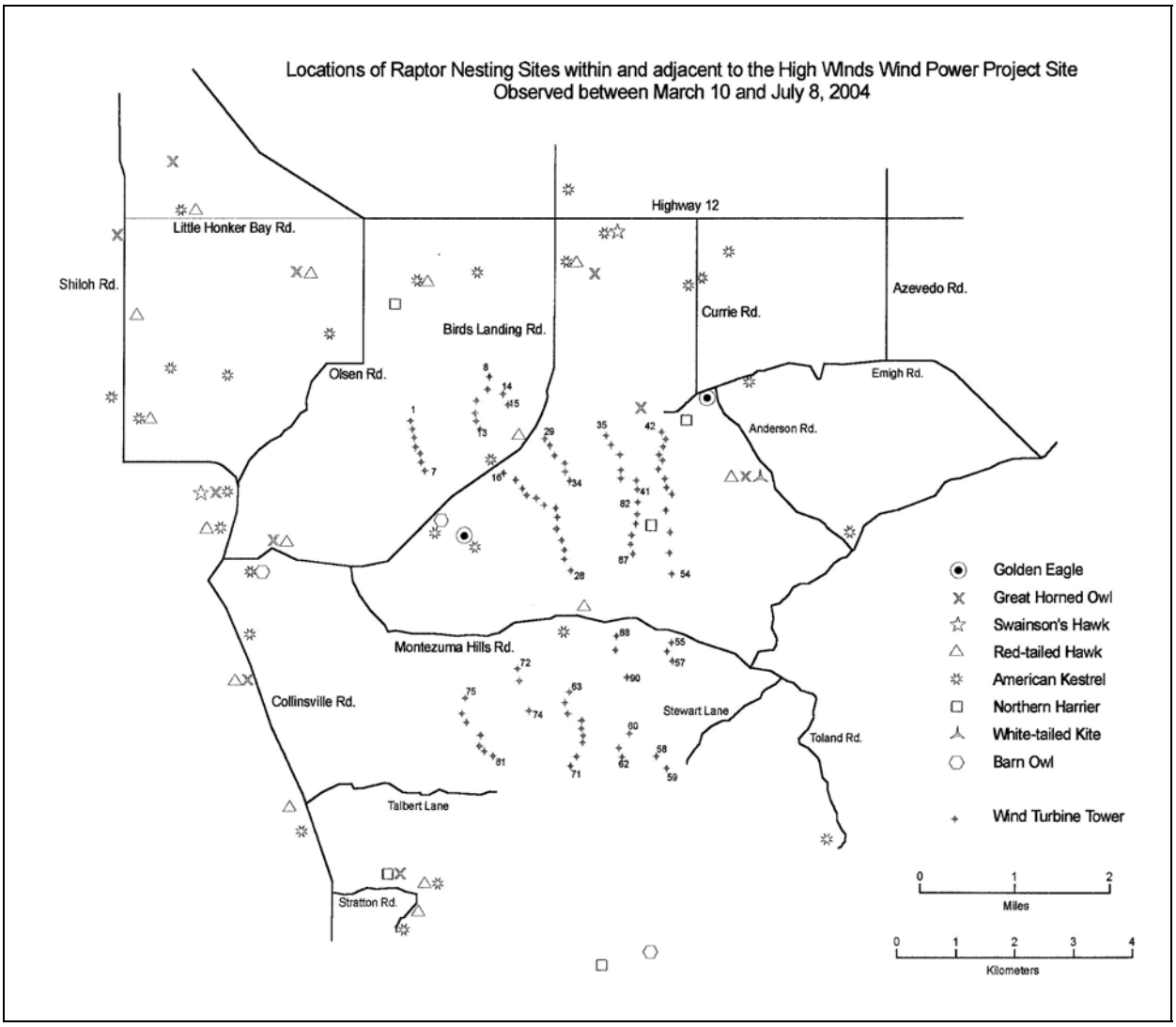
line next to the grove of eucalyptus trees. Based on the lack of any activity at this nest, it was determined that this historic nest was not active in 2004.

3.4.1.3 Callahan Property – Historical Golden Eagle Nest

The other active Golden Eagle nest was located on the Callahan property, approximately 2.55 miles east of the intersection of Birds Landing and Collinsville Roads, about 0.75 miles southeast of the road. This nest is located west of the High Winds Power Project.

This historical Golden Eagle nest site, identified by Orloff and Flannery (1992), though apparently not active in 2001, was observed to be active in 2004. Avian survey observations of adult eagles using the area indicated activity at this site. During 5 hours of nesting surveys on April 30th, 2004, two adults were seen using the area: one flew from the west end of the grove of trees and joined an adult perched on a nearby transmission tower. One other incidental observation was made of an adult eagle moving from one eucalyptus tree in the grove to a tree on the other end of the grove. On May 12th, two chicks were heard vocalizing in a nest in a tall *Eucalyptus* tree on the southeast end of the grove, the opposite end of the historical nest site where there was another nest structure, which was inactive in 2004. The nest tree was approximately 100 feet tall, and nest height was estimated at 75 feet. Nest material appeared to be eucalyptus twigs, leaves and branches. Photos were taken of one of the chicks in the nest, and its approximate age was determined to be 5 ½ to 6 weeks old (T. Hunt). On July 8th, a week or two after any potential fledglings would have fledged, the observer walked in to the site. The nest appeared empty and one juvenile was observed perched on the ground to the Northwest of the grove. It took a few steps to gain altitude and then flew into a eucalyptus tree. During 5 hours of observation of that site, no other activity was observed. Based on these observations, we concluded that this nest site was active in 2004, successfully fledging at least one of two juvenile eagles.

Figure 16. Map of 66 Raptor Nests observed in 2004 in the Vicinity of the High Winds Project



3.4.2 2005 Nesting Study. Six different species of raptors were observed in and/or adjacent to the project area (Table 38). A total of 26 raptor nests were designated confirmed, 10 as probable and 3 possible. The most common raptor species nesting were American Kestrels, followed by Red-tailed Hawks, and Great-Horned Owls. One California Threatened Species was observed nesting within the area surveyed, one pair of Swainson's Hawk. This pair successfully fledged one offspring. Figure 17 shows raptor nest locations observed in the vicinity of the High Winds Project.

There appeared to be a decline in the number of raptors nesting within/adjacent to the project site when compared to the previous year's data, which had 66 confirmed, probable and possible nests. This could be attributed to the severe weather that occurred in the area in the second year spring. Many of the nests that were active in 2004 had been blown out of the trees in the spring of 2005. There were also fewer raptors observed during avian behavior and abundance surveys

in the second year. Slight changes in some prey species and changes in land use from the Spring of 2004 to the Spring of 2005 could also be factors.

Table 38. Number of Raptor Nesting Sites per Species Observed In and Adjacent to the High Winds Power Project, Solano County, CA. April 18 - June 27, 2005

Species	Confirmed*	Probable**	Possible***	Grand Total
American Kestrel	12	6	2	20
Golden Eagle	2			2
Great Horned Owl	4			4
Northern Harrier	1	2		3
Red-tailed Hawk	6	1	1	8
Swainson's Hawk	1	1		2
Grand Total	26	10	3	39

*Confirmed - Observed activity at a nest
**Probable - Observed nesting or territorial behavior in an area
***Possible - Observed adult pair using area

3.4.2.1 Callahan Property – Historical Golden Eagle Nest

Based on observations, there were 2 active breeding pairs of Golden Eagles within the CMHWRA in 2005. The first nest was located on the Callahan property, approximately 2.55 miles East of Bird's Landing Road/Collinsville Road intersection and 0.75 Southeast of Bird's Landing Road, west of the High Winds Project area. This same nest was occupied by Golden Eagles in 2004 (Curry & Kerlinger). Golden Eagle courtship displays were observed around this area on February 15th. Undulating flight was first observed, and one hour later this Golden Eagle chased another Golden Eagle approximately 3 miles south and then returned to this area and performed undulating flight again. A pair of eagles was observed around this grove of Eucalyptus trees on March 2nd. An adult female was observed on March 5th sitting on the nest. The bird was being judicious in her movements within the nest, indicating she was presumably incubating eggs. The birds were observed foraging within and adjacent to active wind turbines, which include High Winds towers and older enXco lattice towers. The last recorded Golden Eagle activity on the nest was May 4th. Another visit was conducted on May 14th and no eagle activity was observed. Songbirds were actively moving within/around the nest. Subsequent visits yielded no Golden Eagle activity. A final observation was conducted on June 1st to make certain no eagles were on the nest and/or fledglings present. After consulting with Grainger and Terry Hunt, the nest was deemed a probable failure and they recommended a foot search, which was conducted on June 2nd under the nest. No fresh prey remains or white wash were present. Based on observations, behaviors, songbirds within the nest, ground searches and consulting with Grainger and Terry Hunt, this nest was concluded to be a failure.

3.4.2.2 Emigh Road -Golden Eagle Nest

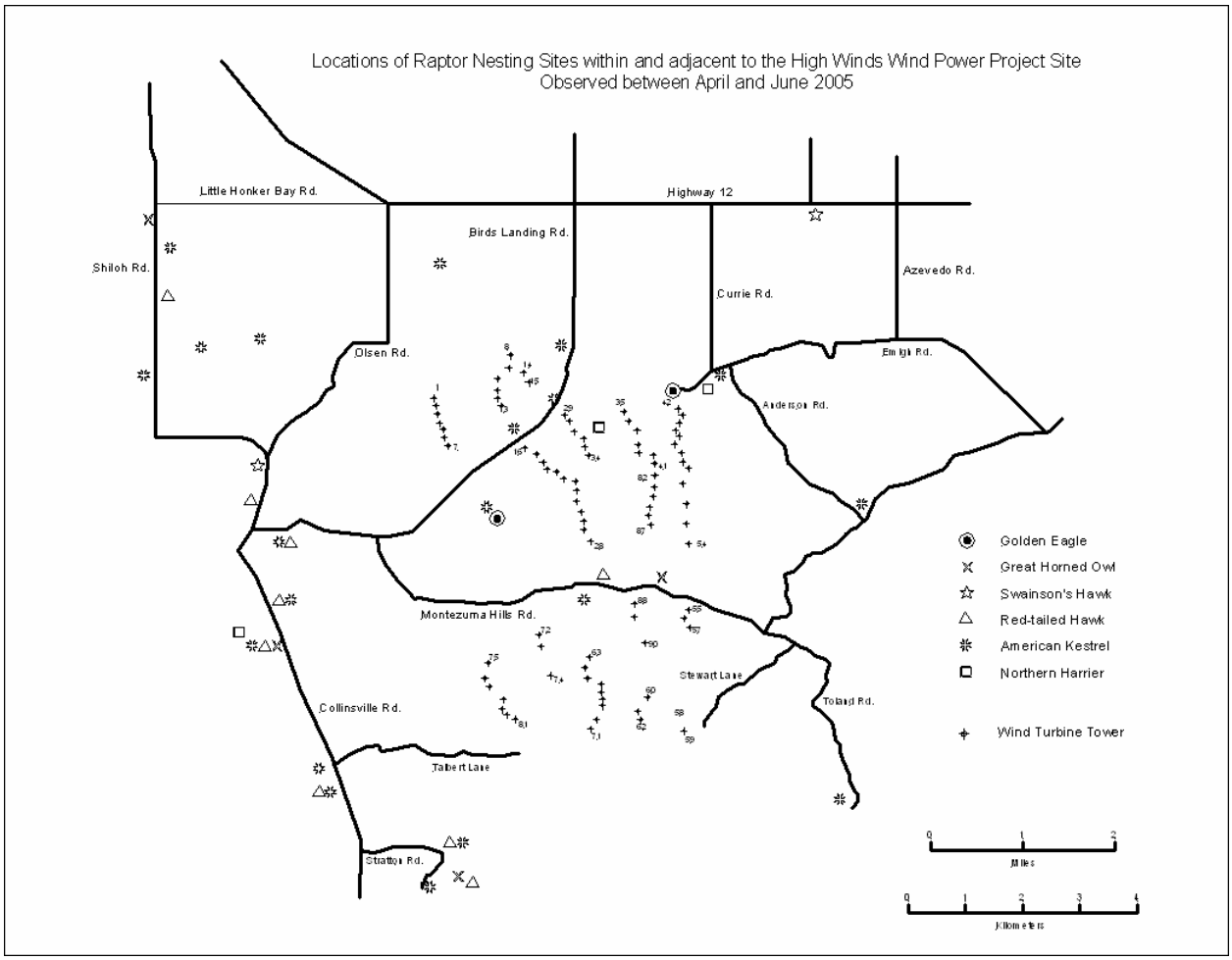
The second Golden Eagle nest was located on Emigh Road, located approximately 1/4 mile west of the Emigh/Currie road intersection. A pair of sub-adult Golden Eagles was observed in this area performing undulating flight on March 13th. Later that day, one sub-adult female and one

sub-adult male were observed copulating next to this grove of trees. Upon observing these trees, it was recorded that this pair of eagles were using a nest that was occupied by Great Horned Owl in 2004 (Curry & Kerlinger). On March 16th, a sub-adult female was observed on the nest. As observed with the female, the male was being very judicious in his movements, indicating there were probably eggs in the nest. These birds were observed actively foraging within FPL and SMUD wind farms. The last recorded eagle activity on the nest was observed on May 13th and the last recorded eagle observation in the area was made on May 17th. Numerous songbirds were observed moving in/around the nest. Subsequent visits yielded no Golden Eagle activity. A final observation was conducted on June 1st to make certain no eagles were on the nest and/or fledglings present. The nest was deemed a probable failure and a foot search was conducted on June 2nd under the nest. No fresh prey remains or fresh white wash were present. Based on observations, behaviors, songbirds within the nest, ground searches and consulting with Grainger and Terry Hunt, this nest was concluded to be a failure.

No Golden Eagle activity was observed at the historical nesting site (Masson property) along Olsen Road.

None of the active raptor nests that were located in these surveys were within 500 feet of any turbine location. The closest confirmed nests to wind turbines were 850 feet (260m) from Tower 84 to a Northern Harrier nest in 2004, and 980 feet (300m) from Tower 32 to a Northern Harrier nest in 2005. The closest Golden Eagle nests were 1050 feet (320m) from Tower 42 to the nest on Emigh Road in 2005 and 4090 feet (1246m) from Tower 19 at the Callahan nest in 2004 and 2005.

Figure 17. Map of 39 Raptor Nests observed in 2005 in the Vicinity of the High Winds Project



4.0 DISCUSSION

This report details the first fatality study of the newer turbine technology installed in the Collinsville Montezuma Hills Wind Resource Area (CMHWRA). These turbines are arrayed on similar landscape and habitat as that in which approximately 600 turbines of the older technology are deployed. The older turbine technology (Kenetech 56-100 turbines on lattice towers) in the CMHWRA is the same as that currently used in much of the Altamont Pass Wind Resource Area and has been studied repeatedly (Howell and DiDonato 1991; Orloff and Flannery 1992, 1996; Howell 1997; Kerlinger 1997; Thelander and Rugge (2000); Smallwood and Thelander 2004). Many of the new High Winds turbines are installed immediately adjacent to the older turbines. This will provide an opportunity to examine the effects of the change in turbine technology on the wildlife and habitat of the CMHWRA. Smallwood and Thelander (2004) recommend that in the Altamont Pass Wind Resource Area (APWRA) that the newer turbines be used as one of the mitigation measures for reducing avian fatalities in that area.

4.1 Night Migrant Fatalities

As with most other turbine facilities across the United States, the numbers of fatalities of night migrants was very low at the High Winds facility. The numbers were especially small in comparison with fatality rates of these birds at tall communication towers in the Midwestern and eastern United States where fatalities involving hundreds or even thousands of birds in a single night have been found dead in a single migration season. Those towers have two types of Federal Aviation Administration lighting (steady burning and flashing lights), multiple sets of guy wires, and are almost always in excess of 500 feet (152 m). An examination of the numbers of night migrating bird (songbirds, rails, common moorhen, and coots) and bat fatalities at turbines with FAA lights vs. turbines without such lights did not reveal a significant difference. Of the 31 night migrating birds (22 songbirds and 9 other birds), 32.25% were found dead at turbines with either L-864 or L-810 flashing red lights as opposed to 67.75% being found at turbines that did not have FAA lights. These percentages are roughly equal to the representation of the percentage of towers with and without FAA lights (28.9% had FAA lights and 71.1% did not have lights). A chi-square test revealed that there was not a significant deviation from the expected number of fatalities at lit turbines as opposed to unlit turbines ($\chi^2 = 0.181$,$df = 1$, P>0.10, ns). If the red flashing lights attracted birds to turbines, a disproportionately greater number of these fatalities would have been found at turbines with lights, which was not the case.

A similar examination of the numbers of bat fatalities at turbines with FAA lights vs. turbines without such lights reveals a similar relation. Of all bats found dead, 32.2% were found at turbines with FAA lights and 67.8% were found at turbines without such lights. These proportions do not deviate significantly from those expected if bats collided with towers randomly and irrespective of whether FAA lights were present ($\chi^2 = 0.674$, $df = 1$, P>0.10, ns).

For both bats and birds, there is no evidence that FAA lighting in the form of L-864 and L-810 flashing red lights attracted birds to towers and that the presence of those lights cause large scale fatality events at wind turbines.

As with most other sites in the western and Midwestern United States, the rates of night migrating songbirds (and ancillary species) appears to be lower than 1 bird per turbine per year.

The fact that the High Winds and most other western turbines are only 329 feet (100 m) in height, do not have guy wires, and have only flashing red strobe-like lights may explain the scarcity of night migrant fatalities at those turbines. Kerlinger (2004a, 2004b) has recently demonstrated that flashing red, strobe-like lights (L-864) of the type recommended by FAA and used most often on wind turbines do not appear to attract night migrants like the combination of the same lights in combination with L-810 steady burning red lights. In the High Winds project, the L-810 units were modified to be blinking lights. These results continue to suggest that wind turbines in the western United States, like communication towers, do not appear to kill large or significant numbers of night migrants. Determining the exact number of night migrants is difficult, however, as the birds involved may be resident breeders. However, Erickson 2001 attempts to summarize the range of night migrant incidents noted at several wind farm sites in the US.

4.2 Raptor Abundance and Use

One of the factors generally associated with risk at a wind facility is use (abundance and behavior) of a given species in that area. Orloff and Flannery (1992) first observed that for raptors it was not simply a matter of the numbers of a specific raptor species observed using the wind plant. They noted that raptor fatalities were disproportionate to their numbers using the Altamont and Solano Wind Resource Areas. This was certainly borne out in this study. The avian species with the largest number of recorded fatality incidents (45), the American Kestrel, was observed 196 times. The most abundant species were Red-winged Blackbirds who were observed (and identified to species) 4,248 times. There were fourteen (14) recorded Red-winged Blackbird fatalities during the post construction searches of this project area, indicating this species is not as susceptible to turbine strike as the American Kestrel. In fact there were fewer observations of Red-winged Blackbirds in the second year than the first, while fatalities of this species were six times greater in the second year. This species nests in wheat fields and was believed to be impacted by either wind turbine blades or harvesting equipment (cause of death was not assumed, thus when in question, they were recorded as collision incidents) more heavily in the second year because of possibly differences in nesting use of the project site.

In the Altamont Pass Wind Resource Area, Common Raven and Turkey Vulture were two non-raptor species frequently observed present and apparently at little risk at the time of the Orloff and Flannery studies (1992, 1996). In this project, Horned Lark (n=17) and Red-winged Blackbird (n=14) were the only non-raptor avian species to suffer a fatality rate that reached double digits in the two years of surveys of the High Wind project. In general, those non-raptor avian fatalities which have been recorded at wind plants have been distributed across a wide range of species, each involving very small numbers of individuals. This has been the case in post construction fatality searches conducted on wind projects across the country including areas that experience higher levels of seasonal migration such as the Appalachian Mountains in the east.

Because early studies in the Altamont reported disproportionate levels of raptor fatalities, the major focus of interest of many studies has been on these species. At the High Winds project, the greatest number of recorded fatalities in the two years after construction involved two raptor species, American Kestrel (n=45) and Red-tailed Hawk (n=18). Raptor use estimates for the High Winds project area are higher than several other areas that have been studied (Table 39).

The common metric in Table 39 is the number of observations of the species made per twenty minutes. For Buteos, the most commonly observed species is Red-tailed Hawk. Similarly the American Kestrel was the most commonly observed species in the small falcon group in the study areas listed below. With respect to these study areas, the High Winds site has the highest overall use estimates for the raptor groups being compared. For specific raptor groups, only the Altamont has higher estimates of use by Golden Eagles. In contrast to the Altamont the number of Red-tailed Hawks and American Kestrels is substantially higher in the High Winds project. In addition to answering the question how many birds are observed in an area, it is important to understand how the area is being used by the various species.

Table 39. Comparative Use Estimates for Four Wind Power Areas (estimated number observed per 20 minute survey).

	Wind Resource Area				
	High Winds, CA				
Raptor Group	Pre-Construction	Post-Construction	Altamont Pass, CA*	Foote Creek Rim, WY*	Columbia Hills, OR*
Buteos (RTHA)	0.78	1.35	0.644	0.211	0.248
Golden Eagle	0.28	0.07	0.333	0.234	0.091
Small Falcon (AMKE)	0.75	0.51	0.089	0.048	0.192
Northern Harrier	0.17	0.22	0.014	0.018	0.062

*Data from Erickson, et al, 2002 (Bonneville Power Administration report)

Within the High Winds project area there was a marked difference in use for some of the raptor species between pre- and post-construction surveys as noted in Table 27 (in which the observations were recorded per hour). Red-tailed Hawks were 1.7 times more abundant (2.34 [pre] and 4.05 [post]) and White-tailed Kites were many times more abundant (0.01 [pre] to 0.24 [post]) in 2003-2004 compared to 2000-2001. Northern Harrier observations per hour were up just slightly from 0.52 per hour to 0.66.

4.3. Flight Height and Avian Incidents

We also examined the relationship between the ratio of time that raptors were observed at blade height versus non-blade height, and the number of raptor fatalities, by species. However, we found no evidence of such a correlation. This may have been due to inadequate sample size, as we were only able to perform this test for four raptor species. Simply equating flight patterns over landscapes without wind turbines and projecting those flight patterns forward as a measure of risk once turbines are installed in the same location ignores avoidance behavior widely observed in a myriad of circumstances.

4.4. Use and the Prey Relationship

One of the important use activities is foraging. An important focus of both pre- and post-construction surveys of use is the type and abundance of prey species in the proposed and actual developed areas of a project. Hunt (2002) clearly established that the patterns of Golden Eagle use in the Altamont Pass WRA were related to the abundance of the California ground squirrel. This was confirmed by Hunt finding that the principal prey in Golden Eagle nests was the California Ground Squirrel (2002). Curry and Kerlinger confirmed Hunt's findings by documenting a reduction in Golden Eagles abundance and fatalities on properties where ranches were treated and ground squirrels were controlled as part of an Alameda County Agricultural program. This has been confirmed more recently by Smallwood and Thelander who documented that "Golden Eagles perched longer than expected by chance in areas treated with rodent poisons for only one year, and avoided perching in areas treated for at least five years (Table 11-12 Chi-square tests of association between time spent perching and independent variables expressing attributes of the nearest wind turbine)," (Smallwood and Thelander 2004, p.279). They further noted that "….golden eagles collided with wind turbines disproportionately less often in areas of intense rodent control, which is where they also perched more often and flew lower to the ground and closer to wind turbines" (ibid, p 326)

One explanation of the difference in numbers of certain raptor species reported in the pre- and post-construction surveys focuses on possible variations in the abundance and composition of the prey base. The White-tailed Kite is an indicator species of the presence of large populations (high density) of California meadow voles. Expansions of the vole population as well as mouse populations often occur cyclically. Direct observations by the biologists who conducted carcass surveys and avian use surveys confirm a significant level of mouse and vole activity in the first year of the survey. In addition, while conducting pre-development surveys on a proposed project area adjacent to High Winds, the biologist observed a high level of mouse activity during the same time period. In addition, White-tailed Kites an indicator species for the presence of a large population of meadow voles were observed on the adjacent tracts being surveyed. The increase of Red-tailed Hawk and Northern Harrier observations could also be associated with this population expansion of voles and mice. In addition to being the most abundant group of prey species observed, voles and several mouse species were present throughout the year with a peak in January 2004. They were also observed in high numbers north of Montezuma Hills Road.

Generally these prey observations corresponded closely to both the time of year and the location of recorded mouse eating raptor fatalities (kestrels and Red-tailed Hawks). The fact that the three White-tailed Kite fatalities were located on the south side of Montezuma Hills Road appears at first to contradict this hypothesis. However, with the exception of the California meadow vole, mice were observed in both areas albeit not in the numbers one would expect from a random distribution.

Twenty-nine percent (n=9) of the White-tailed Kite observations (n=31) were made at Observation Point (OP) # 5. The range of this OP includes areas adjacent to, and including, the two towers where both fatalities of this species were recorded (Towers # 55 and 59) in year one. Twenty-seven White-tailed Kite observations were made at OP #6 which included Tower #77, the location of a White-tailed Kite fatality in the second year of the study. Ground squirrel observations suggest that that species was disproportionately distributed on the south side of

Montezuma Hills Road where the one Golden Eagle fatality and the one Ferruginous Hawk fatality occurred (at Tower # 72). However, with only the Golden Eagle and Ferruginous Hawk fatalities, it is too early to establish definitive relationships and conclusions are deferred until after more research is completed in subsequent post construction surveys. Moreover, the prey observations reported in this study were made during the course of turbine searches for carcasses and from fixed points and road surveys as part of a protocol to look for burrowing activity along road edges and turbine foundations to detect increased California Ground Squirrel activity. A systematic grid search was not conducted.

4.5 Spatial Distribution of Incidents

4.5.1 Raptors. Raptor incidents were distributed widely throughout the project area with disproportionately greater numbers north of Montezuma Hills Road than south. Kestrel incidents appear to be clustered towards the ends of turbine strings most proximal to Bird's Landing Road. There were nine turbines in the first year at which more than one raptor fatality was recorded, four in the second year, and seventeen in the two years combined. In addition three turbines (#s 55, 61 and 72) that accounted for 39% (n=9) of the raptor fatalities (n=23) are located south of Montezuma Hills Road. At this point, those topographic features identified in 1998 by Curry and Kerlinger of the location of most of the recorded Altamont Golden Eagle and Red-tailed Hawk fatalities are not comparable to the topographic features associated with turbines locations of High Wind fatalities. Preventive actions were taken in the siting of these turbines in an attempt to avoid the types of risky topographic situations identified in the Altamont.

The position of the turbine in a string as is the case of the end of row turbines may be more important for determining fatalities. However, the spacing requirements of the current turbine technology results in turbine arrays which are simply not comparable to the deployment patterns of older technology turbines in the Altamont (or older turbines adjacent to the High Winds turbines).

4.5.2 Non-Raptors. The distribution of non-raptor fatalities north of Montezuma Hills Road was 6:1, as compared with the area south of that road. This differed significantly from the expected distribution of fatalities based on the 2:1 ratio of wind turbines north and south of that road.

4.6 Seasonal Distribution of Fatalities – Raptors

The greatest number of raptor fatalities occurred during the fall migration period, with slightly greater numbers in year one than year two. This pattern conforms to studies referenced in Erickson et. al (2002) and to the findings of Kerlinger and Curry (1998) in the Altamont. As noted earlier, preliminary data show voles and mice were observed more frequently in this time period. Due to the search intervals of turbines under these protocols (ca. 14 days) the determination of time of death was simpler and more definitive than search intervals in excess of 30 days. In the second fall migration, the seasonal pattern of raptor fatalities was not as pronounced, with only a slight peak in October 2004, followed by a drop off of fatalities in the winter months when numbers of fatalities in the previous year were still relatively high. In year two, the vole and mouse population cycle appeared to be on the decline, as numbers noted were half that of the first year. Larger mammalian prey items like jackrabbits and sheep carcasses were in greater abundance in year two than year one.

4.7 Adjusting Fatality Estimates

Our search protocols (see above) were designed to search all of the turbines in each round and to complete two rounds each month. The frequency (every 14-15 days) which the turbines were searched provides a better opportunity to more accurately determine both the turbine most likely to be the site of the fatality and the number of days since the fatality occurred. It is difficult after 30 days to make those determinations with a high level of confidence.

Of the 246 (of 248) carcasses found during standardized searches with distances recorded for them (thus were associated with a wind turbine), 86% were found within a 60 meter radius of the turbine and 96% were found within a 70 meter radius of the turbine.

The protocols for conducting the searches compare quite favorably with practices employed elsewhere. Table 40 shows the range of frequency of the search intervals employed in various studies and summarizes the searcher efficiency rates at other projects as well as the period of time that the carcasses tended to remain on the ground.

Table 40. Summary of Searcher Efficiency, Carcass Removal Rate, and Carcass Search Interval at Five Grassland/Agricultural Sites in the Western United States

Site	Searcher Efficiency (Small/Large)	Removal Rate (Mean)	Search Interval
Vansycle, OR[1]	50%, 88%	Large – 27 days; Small – 23.4 days	28 days
Nine Canyons, WA[2]	44%, 78%	Large – 33 days; Small – 11 days	14 days (except winter = 30 days)
Klondike, OR[3]	75%, 92%	Large – 20 days; Small – 14 days	28-30 days
Stateline, OR/WA[4]	43%, 80%	Large - 29-59 days; Small – 16-35 days	~23 days
Foote Creek Rim, WY[5]	59%, 92%	29 days	28 days

1. Erickson et al., 2000b
2. West, Inc. and Northwest Consultants, Inc., 2001c
3. Johnson (2002 pers. Communication)
4. West, Inc. and Northwest Wildlife Consultants, Inc., 2002
5. Young et al. (2001,2002)

Table 41 shows the results of the preliminary scavenger study as described in the Methods. The proportion of birds not Scavenged (Sc) within 7 days was used to adjust the number of incidents that were discovered by our searchers, in each size class (Small, Medium, Large and Bats).

Table 41. High Winds Scavenger Removal Study Data

Size Class	Number of Carcasses	Number scavenged	Proportion Not Scavenged (Sc)	Proportion Scavenged
Small	10	4	0.60	0.40
Medium	23	7	0.70	0.30
Large	7	4	0.43	0.57
Bats	8	5	0.38	0.62

Table 42 shows the results of the preliminary search efficiency study as described in the Methods. The proportion of birds found (Se) was used to adjust the number of incidents that were discovered by our searchers, in each size class (Small, Medium, Large and Bats). While we did not have bat carcasses readily available to test for search efficiency (due to the high rate of scavenging in one day perhaps due to possible corvid observation of setting up test), we substituted the small bird rate to act as surrogates for the size of bats.

Table 42. High Winds Searcher Efficiency Study Data

Size Class	Number of Carcass	Number Not Found	Proportion Found (Se)	Proportion not found
Small	6	3	0.50	0.50
Medium	9	0	1.00	0.00
Large	5	0	1.00	0.00
Bats*	no data	no data	0.50	0.50

*Because bat carcasses were not readily available, small birds were used to approximate search efficiency for bats.

Tables 43 and 44 are estimates of the number of bird and bat fatalities attributed to collisions with the wind turbines at the High Winds project in each of the two years of the study. They reflect search and scavenge rates as determined in tables 41 and 42, the number of birds/bats found during searches and the subsequent estimate adjustment made using the formula described in the Methods.

Table 43. First Year Estimates for Bird and Bat Collision Mortality under 90 Towers of the Solano County High Winds Project (without 22 incidents reported in Appendix E), Corrected for Searcher Efficiency and Scavenger Removal Rate

Year 1 – Correction Factors	Birds			Bats	Total Carcasses
	Small	Medium	Large		
Number Found	47	33	15	70	165
Search Efficiency	50%	100%	100%	50%	
% Not Scavenged	60%	70%	43%	38%	
Adjusted Total	**157 (± 16 - 95% CI)**	**47 (± 1 - 95% CI)**	**35 (± 3 - 95% CI)**	**373 (± 47 95% CI)**	**612**

Table 44. Second Year Estimates for Bird and Bat Collision Mortality under 90 Towers of the Solano County High Winds Project (without 22 incidents reported in Appendix E), corrected for Searcher Efficiency and Scavenger Removal Rate

Year 2 – Correction Factors	Birds				Total
	Small	Medium	Large	Bats	Carcasses
Number Found	35	19	14	46	114
Search Efficiency	50%	100%	100%	50%	
% Not Scavenged	60%	70%	43%	38%	
Adjusted Total	**117 (± 12 95% CI)**	**27 (± 1 95% CI)**	**33 (± 3 95% CI)**	**245 (± 31 95% CI)**	**422**

By dividing the estimated number (adjusted for searcher efficiency and scavenger losses)of birds/bats by the number of turbines searched in each year, a rate of kills/turbine can be calculated, allowing comparisons between wind farms of different sizes (different numbers of towers). The estimates are as follows: 2.92 birds/turbine and 4.52 bats/turbine in the first year, and 1.98 birds/turbine and 2.73 bats/turbine were estimated killed in the second year. The average rate over the two years is 2.45 birds/turbine/year and 3.63 bats/turbine/year. Erickson et al. (2001) described several avian mortality studies with estimated incidents ranging from 0 birds/turbine to 2.83 birds/turbine. However, a more recent study in Minnesota (Johnson et al. 2002) noted an mortality incident rate as high as 4.5 birds/turbine. In comparison, the High Winds Wind Power Project does not differ greatly in mortality, with other studied wind power projects. The range of bat mortality as studied at wind projects across the US, is much greater, from 0.07 bats/tower to 10 bats/tower (Erickson 2002). However, one study (Kerns and Kerlinger 2004) reported 47.5 bats/tower/year, an exceptionally high case of incidents. The High Winds Wind Power Project comes in at the lower part of the range described by Erickson 2002. Finally, when calculated as birds per installed Megawatt instead of per turbine, the numbers are as follows: 1.62 birds/Mw and 2.51 bats/Mw in the first year, and 1.10 birds/Mw and 1.52 bats/Mw were estimated killed in the second year. The average rate over the two years is 1.36 birds/Mw/year and 2.02 bats/Mw/year.

In estimates for both years, incidental finds (those carcasses not recovered during the course of the standardized searches) were not included. To use those carcasses would invalidate the process by adding fatalities that were essentially accounted for by the study design. In Table 2, (page 15) one golden eagle carcass was found during the standardized search. Utilizing the correction factors, the adjusted estimate would be 2 Golden Eagle fatalities. In year two a second Golden Eagle carcass was found by the team but not during the standardized searches. If that bird were to be included in the estimates then the two year adjusted total of Golden Eagle fatalities would be 5. It is highly unlikely that there were more than the two found Golden Eagle carcasses in the High Winds Project. Golden Eagle carcasses are the least likely avian species to be removed from the site by scavengers and have proven to be easily found by systematic and opportunistic searches

Table 45 shows the estimates per species, adjusted from Table 2, of the number of bird and bat fatalities attributed to collisions with the wind turbines at the High Winds project in each of the two years of the study.

Table 45. Number of Incidents per Species per Year and per Total Installed Megawatt Capacity at the *Montezuma Hills WRA* High Winds Company, August 2003 – July 2005, found during Standardized Surveys (incidental finds are noted separately)

Species Name	YEAR ONE (82.5 Turbines)	YEAR TWO (89.6 Turbines)	Total	# Incidents per MW	# Incidents per MW/Year	Incidental**	Adjusted Estimate (Scavenge and Search Efficiency) YEAR ONE	YEAR TWO	Total
Birds (163)									
American Kestrel	29	16	45	0.1422	0.25591	7	42	23	65
Red-tailed Hawk *	10	8	18	0.0569	0.10237	2	23	19	42
White-tailed Kite	2	1	3	0.0095	0.01706		5	2	7
Ferruginous Hawk ***	1		1	0.0032	0.00569		2	0	2
Rough-legged Hawk		1	1	0.0032	0.00569		0	2	2
Golden Eagle ***	1		1	0.0032	0.00569	1	2	0	2
Turkey Vulture	1	1	2	0.0063	0.01137	2	2	2	5
Double-crested Cormorant	1		1	0.0032	0.00569		2	0	2
Ring-necked Pheasant	2		2	0.0063	0.01137	1	3	0	3
Canada Goose*						1	0	0	0
Snow Goose*						1	0	0	0
Mallard						1	0	0	0
Common Moorhen	1		1	0.0032	0.00569		1	0	1
American Coot	1	1	2	0.0063	0.01137	1	1	1	3
Virginia Rail	1	2	3	0.0095	0.01706		3	7	10
Sora	1	2	3	0.0095	0.01706		3	7	10
Mourning Dove	2		2	0.0063	0.01137		7	0	7
Rock Dove		2	2	0.0063	0.01137		0	7	7
Barn Owl *		2	2	0.0063	0.01137	2	0	5	5
White-throated Swift	2		2	0.0063	0.01137		7	0	7
Northern Flicker	1	1	2	0.0063	0.01137		3	3	7
Western Wood-Pewee	1		1	0.0032	0.00569		3	0	3
Empidonax species	1		1	0.0032	0.00569		3	0	3
Warbling Vireo	1	1	2	0.0063	0.01137		3	3	7
Horned Lark	10	7	17	0.0537	0.09668		33	23	57
Tree Swallow		1	1	0.0032	0.00569		0	3	3
Ruby-crowned Kinglet	2		2	0.0063	0.01137		7	0	7
European Starling	4	2	6	0.019	0.03412		13	7	20

Species Name	YEAR ONE (82.5 Turbines)	YEAR TWO (89.6 Turbines)	Total	# Incidents per MW	# Incidents per MW/Year	Incidental**	Adjusted Estimate (Scavenge and Search Efficiency) YEAR ONE	YEAR TWO	Total
American Pipit		2	2	0.0063	0.01137		0	7	7
Orange-crowned Warbler	1		1	0.0032	0.00569		3	0	3
Yellow Warbler ***	1	1	2	0.0063	0.01137		3	3	7
Townsend's Warbler	2	1	3	0.0095	0.01706		7	3	10
Wilson's Warbler		1	1	0.0032	0.00569		0	3	3
Common Yellowthroat ***	1		1	0.0032	0.00569	1	3	0	3
Unidentified Warbler	2	1	3	0.0095	0.01706		7	3	10
Lincoln's Sparrow	1		1	0.0032	0.00569		3	0	3
Western Meadowlark	2	1	3	0.0095	0.01706		7	3	10
Red-winged Blackbird	2	12	14	0.0442	0.07962		7	40	47
Brewer's Blackbird	2		2	0.0063	0.01137		7	0	7
Unidentified Blackbird	1		1	0.0032	0.00569		3	0	3
Unidentified Bird	6		6	0.019	0.03412		20	0	20
					Total Birds	20	241	178	**419**
Bats (116)									
Hoary Bat	45	17	62	0.1959	0.35259	1	240	91	331
Mexican Free-tailed Bat	22	26	48	0.1517	0.27298	1	117	139	256
Western Red Bat	3	1	4	0.0126	0.02275		16	5	21
Silver-haired Bat		2	2	0.0063	0.01137		0	11	11
					Total Bats	2	373	245	**619**

The average number of wind turbines searched per year is given under the date ranges. A total installed megawatt capacity of 158.3 MW was calculated by multiplying individual turbine MW of 1.8 by the average number of wind turbine towers surveyed throughout the two year survey of 87.92

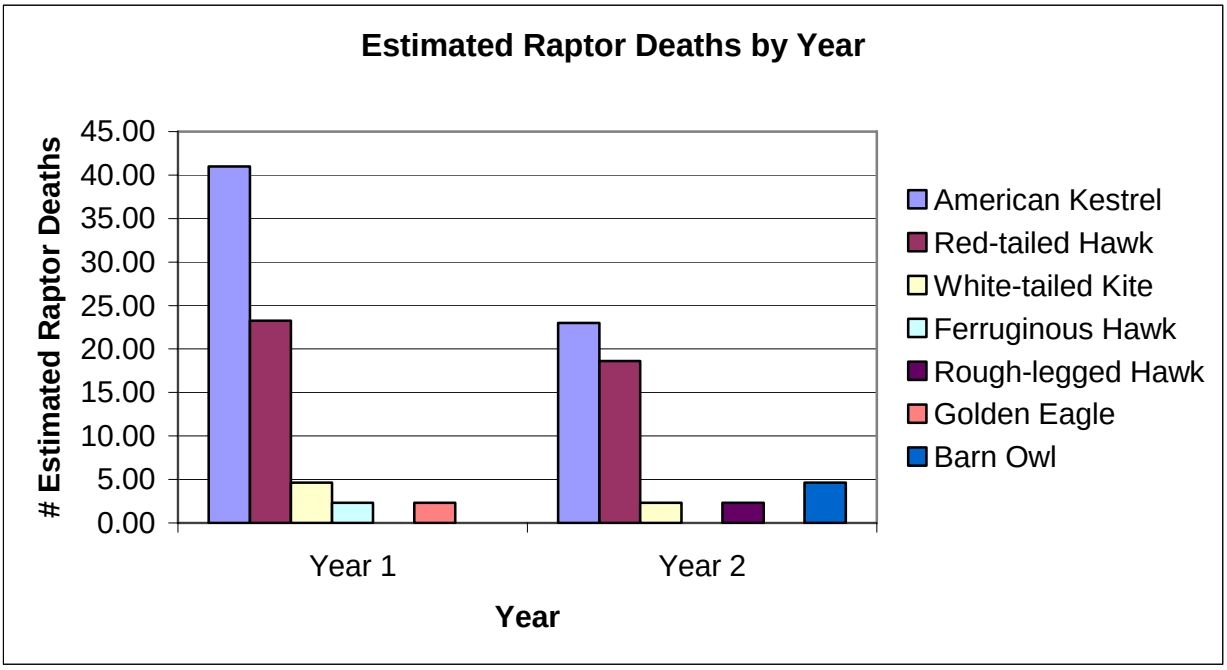
*One or more of the individuals of this species was found on "SITE" and was not associated with a wind turbine tower

**Number of individuals found incidentally and not during standardized surveys. NOT included in the Total for that species

***Denotes California Species of Special Concern (CSC)

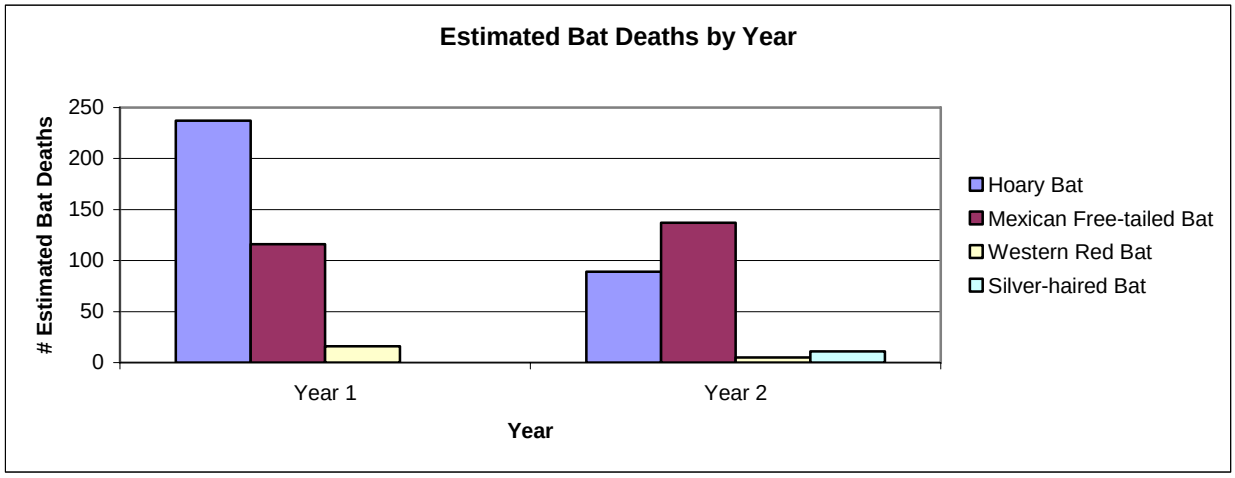
The following series of figures shows the distribution of mortality incidents after adjusting for scavenging and search efficiency corrections. Figure 18 shows the estimated raptor incidents in both years of the study. American Kestrels and Red-tailed Hawks were the two species most involved in mortality incidents. While Red-Tailed Hawk numbers reflect local populations (as compared to other species of hawks), American Kestrel numbers may have been higher due to hovering flight habits characteristic of the species. However, both species have been found to collide with turbines at other regional wind farms (Erickson et al. 2001, Thelander and Rugge 2000).

Figure 18. Estimated Numbers of Raptor Incidents in both Years of the Study, after Scavenger Removal and Searcher Efficiency Corrections



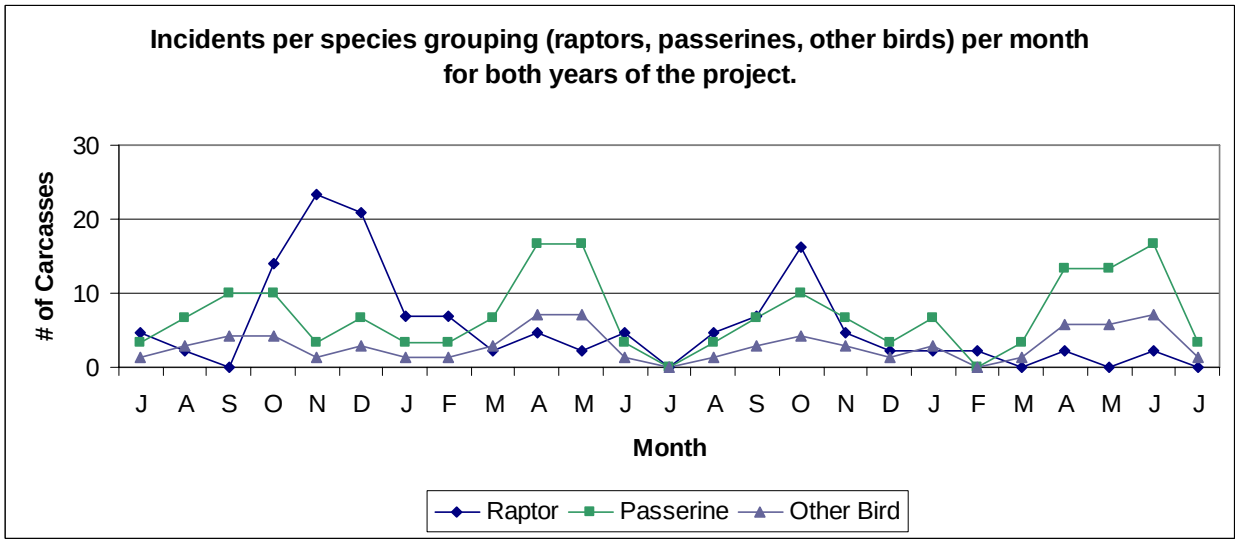
When Figure 19 is compared to Figure 10 the only difference to note is the difference in scale between total bat incidents (Figure 10) and estimated bat incidents after adjusting for scavenging and search efficiency (Figure 19). This is because the same search efficiency and scavenge rate was applied to all bats due to similarities in size and appearance.

Figure 19. Estimated Numbers of Bat Incidents in Both Years of the Study, after Scavenger Removal and Search Efficiency Corrections



When Figure 20 is compared to Figure 5 (unadjusted estimates of mortality incidents) the primary difference to note is the scale of the two figures, as well as the fact that 'passerine' and 'other bird' categories reflect differing scavenging and search efficiency rates, primarily due to bird size. Most passerines are small birds and thus reflect the 50% search efficiency.

Figure 20. Estimated Numbers of Bird Incidents per Species Grouping (Raptors, Passerines, Other Birds) per Month for Both Years of the Project



The reader is cautioned that these are preliminary estimates based on a single set of tests for searcher efficiency and scavenger removal in the Collinsville Montezuma Hills Wind Resource Area (CMHWRA). We expect to refine these estimates as we continue to monitor during post construction surveys at adjacent projects over the course of the next several years. Given the continuity of the land use and terrain features in the CMHWRA, we anticipate that many of the findings of continuous post construction studies will be readily transferable from one development site to those others that are adjacent.

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*Not all of the above references are cited specifically in the text. In some cases the references were consulted and information (or lack of information) was noted without citing the specific reference.

Appendix A. HIGH WINDS POWER PROJECT AVIAN CARCASS SURVEYS Data Sheet
Page ____ of ____

Date_____ Observers
_____

Notes:_____
_____

Loc	Time		Fatalities		Ground Cover/Crop Type (give % cover, ave. height, whether standing or cut crop)						Weather			
Turb #	Start	Finish	#	Brief Notes	Gravel	Tilled	Wheat	Barley	Saff.	Fallow	Temp F	Wind Speed	Dir	% Cloud

Appendix B. HIGH WINDS WILDLIFE INCIDENT REPORT DATA SHEET.

HIGH WINDS

Wildlife Incident Report

SECTION NO. 1 - DISCOVERY DATA

Report Date: _____ Recovery Date: _____ ID#: _____

Reporting Crew: _____ Injury / Fatality Complete / Dismembered / Feathers / Bones

SECTION NO. 2 - LOCATION OF FIND

Parts: Bearing and Distance from tower/pole: Structure: _____

List parts by size:	Distance	Degrees
Part 1: _____	_____	_____
Part 2: _____	_____	_____
Part 3: _____	_____	_____

Location Remarks: _____
_____

SECTION NO. 3 - WILDLIFE IDENTIFICATION

Species: _____ Field marks used: _____

Age: _____ Sex: _____ Band: No ___ Yes ___ Unknown ___ (Leg(s) missing)

SECTION NO. 4 - OBSERVATIONAL DATA

Describe the physical condition of the find at the time of discovery:
_____
_____
_____

Describe Scavenging Activity: _____
Estimated Time Since Death or Injury (days): <1, <4, <7, <14, <30, >30, UNK Photos: _____

Carcass Condition:
____ 1 - Fresh
____ 2 - Decomposing (early stage)
____ 3 - Decomposing (late stage)
____ 4 - Desiccated
____ 5 - N/A

Infestation Activity: ____ Yes ____ No
____ Fly Larvae (maggots)_____
____ Adult Flies _____
____ Beetles_____
____ Ants_____
____ Other_____

Eyes: __N/A __Round, Fluid Filled __Partially Dehydrated __Flat __Sunken __Amorphous/Empty

Other Field Notes: _____
_____

Appendix C. HIGH WINDS PROJECT AVIAN FIELD OBSERVATIONS Data Sheet

Page ____ of ____

Date_____ Observer _____ Site_____ Survey#_____ Time Begin_____ Time End_____
Weather: Temp.____ Wind: speed_____ direction_____ %CC_____ Visibility_____ Human Disturbance_____
Turbine Operation Status _____ Notes:
_____

ID#	Species	Age	Number	TimeIn	TimeOut	Behavior	Height	Direction	Notes

SITES: Dexter Mayhood N & S = DM1 & DM2; Hamilton = HMT; McCormick W & E = MC1 & MC2; Leutholtz Farnsworth Meyer = LFM; Riley (NW site) = RLY
Crop: Standing Crop, Cut Crop, Fallow Field, Sheep Grazed (specify whether it is Wheat or Safflower, or if something else, try to identify)
Behavior Codes:
PERCHING: "P-" Perched on structure specified by the 2nd letter: F = Fence post, T = Tree, G = Ground, W = Wind Turbine, X = Transmission Tower, I = Elec. Wire, P = Elec. Pole
FLIGHT: "F-" Flying, not obviously hunting FP = direct flight to a perch FD = diving flight, probably territorial FS = Soaring circling FG = Gliding, soaring gliding, if not in hunting flight, includes flight of birds that are not moving directly within the study area, lingering flight DF = direct flight, moving through the site in a direct fashion, no stopping or lingering
H- = Hunting HK = Kiting HO = Hovering (flapping wings, hunting in one spot) HL = Low, Contour hunting, low to ground coursing flight HS = Soaring looking down
HD = Hunting, diving HE = Eating HP = Prey Capture HF = Hunting feeding (like aerial insect hunting of swallows)
HEARD = Heard bird only, no visual observation
Height Ranges: 1 = <10m above ground; 2 = 10m to <30m above ground; 3 = 30-100m above ground; 4 = greater than 100m above ground

Appendix D. LIST OF 279 INCIDENTS FOUND DURING STANDARDIZED SURVEYS AT HIGH WINDS, AUGUST 2003- JULY 2005.

ID#	Report Date	YEAR*	Estimated Month of Death	Species Name	Fatality /Injury	Species Group	Tower	Dist (m)	Bearing (GN)**	Days Since Death
H04-050	06/02/04	1	JUN	American Kestrel	Fatality	Raptor	6	38	66	UNK
H03-001	08/04/03	1	JUL	American Kestrel	Fatality	Raptor	7	21	134	<30
H03-061	10/12/03	1	OCT	American Kestrel	Fatality	Raptor	7	26	3	<1
H03-088	11/13/03	1	NOV	American Kestrel	Fatality	Raptor	9	6	244	<14
H03-089	11/13/03	1	NOV	American Kestrel	Fatality	Raptor	9	39	94	<14
H05-005	02/24/05	2	FEB	American Kestrel	Fatality	Raptor	9	21	293	UNK
H03-062	10/12/03	1	OCT	American Kestrel	Fatality	Raptor	11	65	64	>30
H04-009	02/11/04	1	FEB	American Kestrel	Fatality	Raptor	14	40	79	<4
H03-005	08/17/03	1	AUG	American Kestrel	Fatality	Raptor	15	45	90	<1
H04-140	10/31/04	2	OCT	American Kestrel	Fatality	Raptor	15	7	54	<7
H03-077	10/30/03	1	OCT	American Kestrel	Fatality	Raptor	18	59	315	<30
H04-145	11/15/04	2	NOV	American Kestrel	Fatality	Raptor	21	31	269	<14
H03-103	12/15/03	1	DEC	American Kestrel	Fatality	Raptor	23	58	344	<14
H03-109	12/30/03	1	DEC	American Kestrel	Fatality	Raptor	28	33	204	<14
H03-079	11/02/03	1	OCT	American Kestrel	Fatality	Raptor	30	17	234	<14
H03-080	11/02/03	1	OCT	American Kestrel	Fatality	Raptor	30	35	352	<14
H04-052	06/07/04	1	JUN	American Kestrel	Fatality	Raptor	30	16	111	<4
H03-002	08/07/03	1	JUL	American Kestrel	Fatality	Raptor	31	55	124	<30
H04-002	01/13/04	1	JAN	American Kestrel	Fatality	Raptor	31	31	194	<4
H03-091	11/16/03	1	NOV	American Kestrel	Fatality	Raptor	33	54	4	<4
H04-040	05/07/04	1	APR	American Kestrel	Fatality	Raptor	33	27	131	<14
H04-006	01/26/04	1	JAN	American Kestrel	Fatality	Raptor	34	34	118	<1
H03-068	10/17/03	1	OCT	American Kestrel	Fatality	Raptor	35	17	97	<4
H04-132	10/22/04	2	OCT	American Kestrel	Fatality	Raptor	36	57	10	<7
H04-100	09/21/04	2	SEP	American Kestrel	Fatality	Raptor	37	33	73	<4
H04-088	09/08/04	2	SEP	American Kestrel	Fatality	Raptor	41	26	116	UNK
H04-090	09/09/04	2	SEP	American Kestrel	Fatality	Raptor	42	51	75	UNK
H03-092	11/16/03	1	NOV	American Kestrel	Fatality	Raptor	44	54	349	<14
H03-098	12/03/03	1	NOV	American Kestrel	Fatality	Raptor	44	36	245	<14
H03-105	12/17/03	1	DEC	American Kestrel	Fatality	Raptor	44	10	314	<14
H03-084	11/04/03	1	NOV	American Kestrel	Fatality	Raptor	54	26	337	<1
H04-003	01/16/04	1	JAN	American Kestrel	Fatality	Raptor	55	35	220	<4
H04-116	10/12/04	2	OCT	American Kestrel	Fatality	Raptor	58	52	24	UNK
H03-086	11/05/03	1	NOV	American Kestrel	Fatality	Raptor	60	35	44	<1
H03-094	11/18/03	1	NOV	American Kestrel	Fatality	Raptor	61	31	264	<4
H03-099	12/04/03	1	DEC	American Kestrel	Fatality	Raptor	61	54	64	<1
H03-100	12/04/03	1	DEC	American Kestrel	Fatality	Raptor	63	23	335	<1
H04-094	09/13/04	2	SEP	American Kestrel	Fatality	Raptor	67	29	110	UNK
H05-002	01/20/05	2	JAN	American Kestrel	Fatality	Raptor	67	11	358	<7
H04-122	10/12/04	2	OCT	American Kestrel	Fatality	Raptor	68	41	73	UNK
H04-138	10/28/04	2	OCT	American Kestrel	Fatality	Raptor	70	31	186	<1
H05-014	04/14/05	2	APR	American Kestrel	Fatality	Raptor	71	27	0	<4
H04-107	09/28/04	2	SEP	American Kestrel	Fatality	Raptor	76	10	140	<7

ID#	Report Date	YEAR*	Estimated Month of Death	Species Name	Fatality /Injury	Species Group	Tower	Dist (m)	Bearing (GN)**	Days Since Death
H04-112	10/05/04	2	OCT	American Kestrel	Fatality	Raptor	82	35	200	UNK
H04-071	08/24/04	2	AUG	American Kestrel	Fatality	Raptor	87	16	121	<14
H04-102	09/22/04	2	SEP	Barn Owl	Fatality	Raptor	49	72	207	UNK
H04-072	08/25/04	2	AUG	Barn Owl	Fatality	Raptor	53	54	38	<4
H04-045	05/25/04	1	MAY	Ferruginous Hawk	Fatality	Raptor	72	49	22	<30
H04-060	06/28/04	1	JUN	Golden Eagle	Fatality	Raptor	72	20	148	<4
H03-101	12/08/03	1	DEC	Red-tailed Hawk	Fatality	Raptor	1	39	154	<7
H03-102	12/08/03	1	DEC	Red-tailed Hawk	Fatality	Raptor	2	3	58	<1
H04-129	10/15/04	2	OCT	Red-tailed Hawk	Fatality	Raptor	16	64	4	<14
H03-108	12/30/03	1	DEC	Red-tailed Hawk	Fatality	Raptor	22	21	2	<1
H03-104	12/15/03	1	DEC	Red-tailed Hawk	Fatality	Raptor	26	21	4	<1
H04-131	10/21/04	2	OCT	Red-tailed Hawk	Fatality	Raptor	29	45	217	<14
H03-081	11/02/03	1	OCT	Red-tailed Hawk	Fatality	Raptor	31	26	144	<14
H03-082	11/02/03	1	NOV	Red-tailed Hawk	Fatality	Raptor	39	43	88	<1
H04-134	10/25/04	2	OCT	Red-tailed Hawk	Fatality	Raptor	43	17	350	<4
H04-143	11/07/04	2	OCT	Red-tailed Hawk	Fatality	Raptor	51	61	121	<14
H04-103	09/22/04	2	SEP	Red-tailed Hawk	Injury	Raptor	53	357	143	<1
H03-093	11/17/03	1	NOV	Red-tailed Hawk	Fatality	Raptor	55	31	82	<1
H04-028	04/04/04	1	APR	Red-tailed Hawk	Fatality	Raptor	76	38	349	<4
H05-031	06/18/05	2	JUN	Red-tailed Hawk	Fatality	Raptor	80	50	339	<7
H04-011	02/13/04	1	FEB	Red-tailed Hawk	Fatality	Raptor	83	38	356	<1
H05-004	02/11/05	2	FEB	Red-tailed Hawk	Fatality	Raptor	87	17	184	<1
H04-062	07/13/04	1	JUL	Red-tailed Hawk	Injury	Raptor	SITE	n/a	n/a	<1
H04-075	08/30/04	2	AUG	Red-tailed Hawk	Injury	Raptor	SITE	n/a	n/a	<1
H04-146	11/15/04	2	NOV	Rough-legged Hawk	Fatality	Raptor	23	29	313	<1
H04-022	03/17/04	1	MAR	White-tailed Kite	Fatality	Raptor	55	63	72	<7
H04-012	02/20/04	1	FEB	White-tailed Kite	Fatality	Raptor	59	78	182	<14
H04-151	12/09/04	2	DEC	White-tailed Kite	Fatality	Raptor	77	69	348	<1
H04-150	12/02/04	2	DEC	American Pipit	Fatality	Passerine	41	60	124	<1
H05-012	03/31/05	2	MAR	American Pipit	Fatality	Passerine	53	6	293	<4
H04-017	03/07/04	1	MAR	Brewer's Blackbird	Fatality	Passerine	15	59	342	UNK
H04-013	02/28/04	1	FEB	Brewer's Blackbird	Fatality	Passerine	43	64	297	<7
H03-056	10/10/03	1	OCT	Common Yellowthroat	Fatality	Passerine	63	66	62	<7
H03-097	11/25/03	1	NOV	European Starling	Fatality	Passerine	19	18	70	<4
H04-049	05/27/04	1	MAY	European Starling	Fatality	Passerine	27	29	313	UNK
H04-061	07/02/04	1	JUL	European Starling	Fatality	Passerine	31	11	353	UNK
H04-142	11/07/04	2	NOV	European Starling	Fatality	Passerine	42	1	289	<4
H04-137	10/26/04	2	OCT	European Starling	Fatality	Passerine	59	24	342	<4
H04-004	01/18/04	1	JAN	European Starling	Fatality	Passerine	62	17	32	<4
H04-055	06/16/04	1	JUN	Horned Lark	Fatality	Passerine	3	15	86	<14
H05-036	07/03/05	2	JUL	Horned Lark	Fatality	Passerine	4	3	22	<4

ID#	Report Date	YEAR*	Estimated Month of Death	Species Name	Fatality /Injury	Species Group	Tower	Dist (m)	Bearing (GN)**	Days Since Death
H04-127	10/14/04	2	OCT	Horned Lark	Fatality	Passerine	5	8	220	<4
H04-144	11/12/04	2	NOV	Horned Lark	Fatality	Passerine	8	27	111	<1
H04-034	04/19/04	1	APR	Horned Lark	Fatality	Passerine	10	43	20	<7
H04-039	05/06/04	1	APR	Horned Lark	Fatality	Passerine	17	30	62	<7
H05-037	07/09/05	2	JUN	Horned Lark	Fatality	Passerine	18	31	27	<14
H04-024	03/25/04	1	MAR	Horned Lark	Fatality	Passerine	20	6	251	<4
H04-029	04/07/04	1	APR	Horned Lark	Fatality	Passerine	24	12	224	<7
H04-111	10/05/04	2	SEP	Horned Lark	Fatality	Passerine	31	47	219	<30
H03-110	12/30/03	1	DEC	Horned Lark	Fatality	Passerine	32	34	282	<1
H04-037	04/26/04	1	APR	Horned Lark	Fatality	Passerine	38	1	82	<1
H03-106	12/17/03	1	DEC	Horned Lark	Fatality	Passerine	50	10	304	<1
H05-028	05/26/05	2	MAY	Horned Lark	Fatality	Passerine	57	71	27	UNK
H04-041	05/10/04	1	APR	Horned Lark	Fatality	Passerine	84	31	225	<14
H04-042	05/10/04	1	MAY	Horned Lark	Fatality	Passerine	86	15	198	<7
H05-018	04/30/05	2	APR	Horned Lark	Fatality	Passerine	90	5	23	<4
H03-046	10/05/03	1	OCT	Lincoln Sparrow	Fatality	Passerine	22	67	41	<1
H04-020	03/12/04	1	MAR	Orange-crowned Warbler	Fatality	Passerine	43	52	164	<4
H04-038	05/06/04	1	MAY	Red-winged Blackbird	Fatality	Passerine	2	33	263	UNK
H05-001	01/14/05	2	JAN	Red-winged Blackbird	Fatality	Passerine	17	15	138	<1
H05-020	05/10/05	2	APR	Red-winged Blackbird	Fatality	Passerine	17	41	323	<30
H05-021	05/10/05	2	MAY	Red-winged Blackbird	Fatality	Passerine	18	57	57	<7
H05-022	05/10/05	2	MAY	Red-winged Blackbird	Fatality	Passerine	18	71	43	UNK
H05-023	05/10/05	2	APR	Red-winged Blackbird	Fatality	Passerine	18	69	22	<14
H05-032	06/20/05	2	JUN	Red-winged Blackbird	Fatality	Passerine	22	66	334	UNK
H05-016	04/26/05	2	APR	Red-winged Blackbird	Fatality	Passerine	23	34	4	UNK
H05-033	06/20/05	2	JUN	Red-winged Blackbird	Fatality	Passerine	24	43	31	<14
H04-053	06/10/04	1	JUN	Red-winged Blackbird	Fatality	Passerine	49	70	53	UNK
H05-030	06/12/05	2	JUN	Red-winged Blackbird	Fatality	Passerine	51	43	352	<14
H05-029	06/03/05	2	JUN	Red-winged Blackbird	Fatality	Passerine	79	41	86	UNK
H05-017	04/29/05	2	APR	Red-winged Blackbird	Fatality	Passerine	85	1	71	<1
H05-025	05/13/05	2	MAY	Red-winged Blackbird	Fatality	Passerine	90	44	91	<4
H03-050	10/09/03	1	OCT	Ruby-crowned Kinglet	Fatality	Passerine	36	75	63	<1
H03-055	10/10/03	1	SEP	Ruby-crowned Kinglet	Fatality	Passerine	57	36	44	<14
H04-130	10/15/04	2	OCT	Townsend's Warbler	Fatality	Passerine	19	70	71	<14
H03-033	09/23/03	1	SEP	Townsend's Warbler	Fatality	Passerine	35	58	27	UNK
H04-043	05/11/04	1	MAY	Townsend's Warbler	Fatality	Passerine	51	7	5	<1
H04-076	08/31/04	2	AUG	Tree Swallow	Fatality	Passerine	1	61	7	<1
H04-010	02/11/04	1	FEB	Unidentified bird	Fatality	Passerine	25	49	344	UNK
H03-107	12/21/03	1	DEC	Unidentified	Fatality	Passerine	64	68	24	UNK

ID#	Report Date	YEAR*	Estimated Month of Death	Species Name	Fatality /Injury	Species Group	Tower	Dist (m)	Bearing (GN)**	Days Since Death
				black bird						
H03-008	09/03/03	1	SEP	Unidentified *Empidonax* Flycatcher	Fatality	Passerine	19	65	66	<4
H04-014	03/05/04	1	MAR	Unidentified Passerine	Fatality	Passerine	8	63	119	UNK
H03-029	09/19/03	1	AUG	Unidentified Passerine	Fatality	Passerine	23	59	14	<30
H03-052	10/09/03	1	OCT	Unidentified Passerine	Fatality	Passerine	38	54	20	UNK
H04-054	06/10/04	1	JUN	Unidentified Passerine	Fatality	Passerine	55	42	124	UNK
H04-059	06/22/04	1	JUN	Unidentified Passerine	Fatality	Passerine	87	25	45	UNK
H04-056	06/17/04	1	JUN	Unidentified Warbler	Fatality	Passerine	14	31	25	UNK
H03-035	09/26/03	1	SEP	Unidentified Warbler	Fatality	Passerine	51	59	7	<1
H04-082	09/06/04	2	SEP	Unidentified Warbler - probably Dendroica	Fatality	Passerine	31	59	48	UNK
H05-026	05/17/05	2	MAY	Warbling Vireo	Fatality	Passerine	2	49	3	<4
H04-047	05/27/04	1	MAY	Warbling Vireo	Fatality	Passerine	20	70	71	<4
H03-004	08/17/03	1	JUL	Western Meadowlark	Fatality	Passerine	13	49	194	<30
H03-012	09/07/03	1	AUG	Western Meadowlark	Fatality	Passerine	35	40	6	<14
H05-003	01/31/05	2	JAN	Western Meadowlark	Fatality	Passerine	85	39	166	<4
H04-046	05/27/04	1	MAY	Western Wood-Pewee	Fatality	Passerine	20	41	22	<1
H04-110	09/30/04	2	SEP	Wilson's Warbler	Fatality	Passerine	15	40	41	<4
H04-048	05/27/04	1	MAY	Yellow Warbler	Fatality	Passerine	21	57	55	<4
H05-027	05/24/05	2	MAY	Yellow Warbler	Fatality	Passerine	82	47	92	<4
H04-005	01/21/04	1	JAN	American Coot	Fatality	Other Bird	16	35	241	<1
H04-152	12/20/04	2	DEC	American Coot	Fatality	Other Bird	44	26	346	<1
H03-028	09/19/03	1	SEP	Common Moorhen	Fatality	Other Bird	21	73	27	<4
H04-067	08/13/04	1	JUL	Double-crested Cormorant	Fatality	Other Bird	4	99	246	<30
H04-033	04/18/04	1	JAN	Mourning Dove	Fatality	Other Bird	5	3	191	<1
H04-044	05/11/04	1	MAY	Mourning Dove	Fatality	Other Bird	54	72	117	UNK
H03-059	10/12/03	1	OCT	Northern Flicker	Fatality	Other Bird	2	36	12	<7
H04-118	10/12/04	2	OCT	Northern Flicker	Fatality	Other Bird	63	52	98	<1
H04-025	03/28/04	1	MAR	Ring-necked Pheasant	Fatality	Other Bird	25	48	157	<30
H04-030	04/07/04	1	APR	Ring-necked Pheasant	Fatality	Other Bird	37	3	173	<1
H04-069	08/20/04	2	AUG	Rock Dove	Fatality	Other Bird	33	35	95	UNK
H04-086	09/06/04	2	SEP	Rock Dove	Fatality	Other Bird	34	69	167	UNK
H04-153	12/23/04	2	DEC	Sora	Fatality	Other Bird	5	16	231	<4
H04-077	08/31/04	2	AUG	Sora	Fatality	Other Bird	8	34	87	<7
H03-041	09/26/03	1	SEP	Sora	Fatality	Other Bird	60	41	57	<1
H03-048	10/05/03	1	OCT	Turkey Vulture	Fatality	Other Bird	30	84	9	>30
H04-133	10/25/04	2	OCT	Turkey Vulture	Fatality	Other Bird	85	19	294	<4
H04-065	08/11/04	2	AUG	Virginia Rail	Fatality	Other Bird	43	67	153	<7
H04-117	10/12/04	2	OCT	Virginia Rail	Fatality	Other Bird	62	42	57	<14

ID#	Report Date	YEAR*	Estimated Month of Death	Species Name	Fatality /Injury	Species Group	Tower	Dist (m)	Bearing (GN)**	Days Since Death
H04-058	06/22/04	1	JUN	Virginia Rail	Fatality	Other Bird	86	63	78	<4
H04-063	07/16/04	1	JUL	White-throated Swift	Fatality	Other Bird	12	59	325	<7
H03-003	08/17/03	1	AUG	White-throated Swift	Fatality	Other Bird	44	33	2	<4
H04-097	09/15/04	2	SEP	Hoary Bat	Fatality	Bat	2	34	7	<1
H03-026	09/16/03	1	SEP	Hoary Bat	Fatality	Bat	4	14	34	<4
H03-087	11/13/03	1	NOV	Hoary Bat	Fatality	Bat	4	5	254	<4
H04-126	10/14/04	2	OCT	Hoary Bat	Fatality	Bat	5	53	37	<4
H03-060	10/12/03	1	OCT	Hoary Bat	Fatality	Bat	7	34	348	<1
H03-007	09/03/03	1	SEP	Hoary Bat	Fatality	Bat	9	76	67	<4
H04-016	03/05/04	1	MAR	Hoary Bat	Fatality	Bat	10	17	314	<4
H03-027	09/19/03	1	SEP	Hoary Bat	Fatality	Bat	15	37	13	<7
H04-035	04/19/04	1	MAR	Hoary Bat	Fatality	Bat	18	30	357	<30
H04-078	09/06/04	2	SEP	Hoary Bat	Fatality	Bat	18	15	88	<1
H03-078	10/30/03	1	OCT	Hoary Bat	Fatality	Bat	19	13	32	<30
H03-009	09/03/03	1	AUG	Hoary Bat	Fatality	Bat	21	59	6	<7
H03-065	10/17/03	1	OCT	Hoary Bat	Fatality	Bat	21	18	7	<4
H04-036	04/19/04	1	APR	Hoary Bat	Fatality	Bat	21	13	2	<14
H03-010	09/03/03	1	AUG	Hoary Bat	Fatality	Bat	24	35	89	<14
H04-057	06/17/04	1	JUN	Hoary Bat	Fatality	Bat	26	60	93	<4
H04-080	09/06/04	2	SEP	Hoary Bat	Fatality	Bat	26	48	351	<1
H04-081	09/06/04	2	SEP	Hoary Bat	Fatality	Bat	26	48	354	<1
H04-068	08/20/04	2	AUG	Hoary Bat	Fatality	Bat	30	18	69	<14
H03-049	10/05/03	1	SEP	Hoary Bat	Fatality	Bat	31	15	52	<30
H03-031	09/23/03	1	SEP	Hoary Bat	Fatality	Bat	33	17	334	<14
H03-011	09/03/03	1	SEP	Hoary Bat	Fatality	Bat	34	49	335	<4
H03-032	09/23/03	1	SEP	Hoary Bat	Fatality	Bat	34	63	32	<14
H05-038	07/22/05	2	JUL	Hoary Bat	Fatality	Bat	37	42	65	<7
H03-013	09/07/03	1	AUG	Hoary Bat	Fatality	Bat	39	59	22	<14
H03-014	09/07/03	1	SEP	Hoary Bat	Fatality	Bat	41	46	46	<1
H03-015	09/07/03	1	AUG	Hoary Bat	Fatality	Bat	44	40	25	<14
H03-069	10/18/03	1	OCT	Hoary Bat	Fatality	Bat	44	18	132	<7
H03-016	09/07/03	1	SEP	Hoary Bat	Fatality	Bat	46	44	4	<4
H03-070	10/18/03	1	OCT	Hoary Bat	Fatality	Bat	46	35	111	UNK
H03-034	09/23/03	1	SEP	Hoary Bat	Fatality	Bat	47	19	356	<7
H03-017	09/07/03	1	AUG	Hoary Bat	Fatality	Bat	48	39	20	<14
H04-101	09/22/04	2	SEP	Hoary Bat	Fatality	Bat	48	20	185	<1
H03-053	10/09/03	1	OCT	Hoary Bat	Fatality	Bat	50	35	69	<1
H03-054	10/09/03	1	SEP	Hoary Bat	Fatality	Bat	50	23	85	<30
H03-036	09/26/03	1	SEP	Hoary Bat	Fatality	Bat	51	58	15	<1
H03-073	10/18/03	1	SEP	Hoary Bat	Fatality	Bat	55	45	81	<30
H03-038	09/26/03	1	SEP	Hoary Bat	Fatality	Bat	57	26	235	<14
H04-114	10/11/04	2	OCT	Hoary Bat	Fatality	Bat	57	71	274	<1
H03-018	09/11/03	1	AUG	Hoary Bat	Fatality	Bat	58	62	61	<14
H03-040	09/26/03	1	SEP	Hoary Bat	Fatality	Bat	58	26	349	<7
H03-042	09/27/03	1	SEP	Hoary Bat	Fatality	Bat	61	31	157	<14

ID#	Report Date	YEAR*	Estimated Month of Death	Species Name	Fatality /Injury	Species Group	Tower	Dist (m)	Bearing (GN)**	Days Since Death
H04-073	08/27/04	2	AUG	Hoary Bat	Fatality	Bat	61	62	60	<4
H04-105	09/24/04	2	SEP	Hoary Bat	Fatality	Bat	61	1.5	281	<1
H03-095	11/18/03	1	OCT	Hoary Bat	Fatality	Bat	62	53	110	<30
H04-106	09/24/04	2	SEP	Hoary Bat	Fatality	Bat	62	30	111	<7
H03-021	09/11/03	1	SEP	Hoary Bat	Fatality	Bat	63	55	37	UNK
H03-057	10/10/03	1	OCT	Hoary Bat	Fatality	Bat	63	45	76	<4
H03-074	10/21/03	1	OCT	Hoary Bat	Fatality	Bat	63	63	94	<14
H03-043	09/27/03	1	SEP	Hoary Bat	Fatality	Bat	65	41	79	<14
H03-058	10/10/03	1	SEP	Hoary Bat	Fatality	Bat	67	17	38	<14
H03-075	10/21/03	1	OCT	Hoary Bat	Fatality	Bat	67	44	84	<4
H04-121	10/12/04	2	OCT	Hoary Bat	Fatality	Bat	74	38	239	<1
H04-095	09/14/04	2	SEP	Hoary Bat	Fatality	Bat	75	28	14	<14
H04-096	09/14/04	2	AUG	Hoary Bat	Fatality	Bat	77	73	53	<30
H03-025	09/16/03	1	SEP	Hoary Bat	Fatality	Bat	78	6	87	<14
H03-006	08/26/03	1	AUG	Hoary Bat	Fatality	Bat	79	18	70	<14
H04-108	09/28/04	2	SEP	Hoary Bat	Fatality	Bat	81	32	76	<4
H04-019	03/12/04	1	MAR	Hoary Bat	Fatality	Bat	86	7	348	<1
H04-032	04/12/04	1	APR	Hoary Bat	Fatality	Bat	86	26	67	<14
H04-091	09/10/04	2	SEP	Hoary Bat	Fatality	Bat	87	27	332	<4
H04-027	04/04/04	1	APR	Hoary Bat	Fatality	Bat	88	65	46	<1
H05-015	04/25/05	2	APR	Mexican Free-tailed Bat	Fatality	Bat	2	6	58	<14
H04-008	02/08/04	1	FEB	Mexican Free-tailed Bat	Fatality	Bat	3	17	94	<1
H04-125	10/14/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	3	21	344	<1
H04-015	03/05/04	1	MAR	Mexican Free-tailed Bat	Fatality	Bat	9	27	55	<1
H04-128	10/14/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	10	49	88	<1
H05-006	02/25/05	2	FEB	Mexican Free-tailed Bat	Fatality	Bat	18	18	9	<1
H03-064	10/17/03	1	OCT	Mexican Free-tailed Bat	Fatality	Bat	20	12	34	<1
H03-047	10/05/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	24	0	189	<14
H04-079	09/06/04	2	AUG	Mexican Free-tailed Bat	Fatality	Bat	24	4	146	<7
H04-098	09/17/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	24	5	95	<4
H05-024	05/10/05	2	APR	Mexican Free-tailed Bat	Fatality	Bat	27	33	23	<14
H03-067	10/17/03	1	OCT	Mexican Free-tailed Bat	Fatality	Bat	31	30	46	<1
H03-090	11/16/03	1	NOV	Mexican Free-tailed Bat	Fatality	Bat	31	22	37	<4
H03-030	09/23/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	33	20	322	<4
H04-083	09/06/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	34	58	310	<4
H04-084	09/06/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	34	5	306	<4
H04-085	09/06/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	34	19	69	<4
H05-009	03/13/05	2	MAR	Mexican Free-tailed Bat	Fatality	Bat	37	42	82	<14
H04-087	09/08/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	38	22	105	<7

ID#	Report Date	YEAR*	Estimated Month of Death	Species Name	Fatality /Injury	Species Group	Tower	Dist (m)	Bearing (GN)**	Days Since Death
H04-089	09/09/04	2	AUG	Mexican Free-tailed Bat	Fatality	Bat	42	38	158	<14
H05-010	03/14/05	2	MAR	Mexican Free-tailed Bat	Fatality	Bat	42	17	266	<4
H04-135	10/25/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	45	30	17	<4
H04-136	10/25/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	47	16	85	<4
H03-072	10/18/03	1	OCT	Mexican Free-tailed Bat	Fatality	Bat	51	18	44	<1
H03-083	11/04/03	1	OCT	Mexican Free-tailed Bat	Fatality	Bat	51	39	64	<14
H03-037	09/26/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	56	43	84	<30
H03-085	11/04/03	1	NOV	Mexican Free-tailed Bat	Fatality	Bat	57	30	194	<1
H04-023	03/17/04	1	MAR	Mexican Free-tailed Bat	Fatality	Bat	57	12	78	<7
H04-092	09/10/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	57	59	22	<4
H04-093	09/10/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	57	53	40	<4
H03-039	09/26/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	58	28	350	<14
H03-019	09/11/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	59	28	20	<1
H03-020	09/11/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	60	20	54	<1
H04-104	09/24/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	60	69	77	<30
H03-022	09/11/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	64	20	2	<1
H03-023	09/11/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	64	48	94	<1
H03-024	09/11/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	67	35	107	<1
H03-044	09/28/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	67	12	34	<4
H04-074	08/28/04	2	AUG	Mexican Free-tailed Bat	Fatality	Bat	67	55	53	<1
H03-045	09/28/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	70	0	303	<1
H04-120	10/12/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	71	28	228	<30
H05-013	04/06/05	2	MAR	Mexican Free-tailed Bat	Fatality	Bat	79	15	60	<14
H04-124	10/14/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	81	51	10	<1
H05-007	03/09/05	2	MAR	Mexican Free-tailed Bat	Fatality	Bat	81	31	282	<1
H04-018	03/12/04	1	MAR	Mexican Free-tailed Bat	Fatality	Bat	85	5	4	<7
H05-035	06/28/05	2	JUN	Mexican Free-tailed Bat	Fatality	Bat	86	33	41	<30
H04-026	03/29/04	1	MAR	Mexican Free-tailed Bat	Fatality	Bat	87	14	175	<1
H04-115	10/12/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	88	13	172	<1
H04-119	10/12/04	2	OCT	Silver-haired Bat	Fatality	Bat	65	13	99	<4
H04-123	10/14/04	2	OCT	Silver-haired Bat	Fatality	Bat	79	39	75	<4
H04-109	09/30/04	2	SEP	Western Red Bat	Fatality	Bat	7	23	2	<1
H03-066	10/17/03	1	OCT	Western Red Bat	Fatality	Bat	23	44	51	UNK
H03-051	10/09/03	1	SEP	Western Red Bat	Fatality	Bat	37	43	91	<30
H03-071	10/18/03	1	OCT	Western Red Bat	Fatality	Bat	50	40	2	<1

Appendix E. LIST OF 22 INCIDENTS FOUND INCIDENTALLY (NOT DURING STANDARDIZED SURVEYS) AT HIGH WINDS, AUGUST 2003- JULY 2005.

ID#	Report Date	YEAR*	Estimated Month of Death	Species Name	Fatality /Injury	Species Group	Tower	Dist (m)	Bearing (GN)**	Days Since Death
H03-096	11/18/03	1	NOV	American Kestrel	Fatality	Raptor	7	17	40	<4
H04-139	10/30/04	2	OCT	American Kestrel	Fatality	Raptor	14	24	347	<14
H04-001	01/08/04	1	JAN	American Kestrel	Fatality	Raptor	46	9	190	<1
H04-007	01/28/04	1	JAN	American Kestrel	Fatality	Raptor	53	3	98	<1
H04-149	11/27/04	2	NOV	American Kestrel	Fatality	Raptor	61	18	45	<4
H04-064	07/18/04	1	JUL	American Kestrel	Fatality	Raptor	72	38	88	<1
H04-099	09/19/04	2	SEP	American Kestrel	Fatality	Raptor	79	9	130	<4
H04-070	08/23/04	2	AUG	Barn Owl	Fatality	Raptor	82	17	351	<4
H04-021	03/12/04	1	MAR	Barn Owl	Fatality	Raptor	SITE	n/a	n/a	UNK
H05-034	06/24/05	2	JUN	Golden Eagle	Fatality	Raptor	40	128	32	<30
H03-063	10/15/03	1	OCT	Red-tailed Hawk	Fatality	Raptor	10	55	160	<4
H04-148	11/24/04	2	NOV	Red-tailed Hawk	Injury	Raptor	SITE	n/a	n/a	<1
H04-051	06/03/04	1	JUN	Common Yellowthroat	Fatality	Passerine	10	112	16	<1
H04-147	11/19/04	2	NOV	American Coot	Fatality	Other Bird	47	12	322	<4
H05-008	03/12/05	2	MAR	Canada Goose	Injury	Other Bird	SITE	n/a	n/a	<1
H05-019	05/02/05	2	MAY	Mallard	Fatality	Other Bird	22	5	251	<4
H04-031	04/10/04	1	APR	Ring-necked Pheasant	Fatality	Other Bird	1	6	192	<1
H04-141	11/05/04	2	NOV	Snow Goose	Fatality	Other Bird	SITE	n/a	n/a	<4
H04-066	08/11/04	2	AUG	Turkey Vulture	Fatality	Other Bird	25	20	321	<1
H04-113	10/08/04	2	OCT	Turkey Vulture	Fatality	Other Bird	79	19	71	<4
H03-076	10/28/03	1	OCT	Hoary Bat	Fatality	Bat	37	11	338	<14
H05-011	03/18/05	2	MAR	Mexican Free-tailed Bat	Fatality	Bat	10	7	242	<7

Appendix F. LIST AND LOCATION OF 66 RAPTOR NESTS FOUND IN THE COLLINSVILLE MONTEZUMA HILLS WIND RESOURCE AREA, YEAR ONE OF STUDY, MARCH 10 – JULY 8, 2004.

Species	Location
Confirmed	
Golden Eagle	Emigh Rd., 0.15 Miles ENE of Currie/Emigh intersection, south side of road
Golden Eagle	Birds Landing Rd., 2.55 mile east of Birds Landing/Collinsville Rd. intersection, 0.75 mile SE of road
Red-tailed Hawk	Birds Landing Rd., 2.45 miles south of Birds Landing/Hwy. 12 intersection, west side of road
Red-tailed Hawk	Birds Landing Rd., 0.50 mile east of Birds Landing/Collinsville Rd intersection, north side of road
Red-Tailed Hawk	Stratton Rd., 0.90 mile east of Stratton/Collinsville Rd. intersection, NW side of road
Red-Tailed Hawk	Shiloh Rd, 1.15 mile south of Shiloh/Little Honker Bay Rd. intersection, east side of road
Red-Tailed Hawk	Shiloh Rd, 2.00 mile south of Shiloh/Little Honker Bay Rd. intersection, west side of road
Red-Tailed Hawk	Collinsville Rd., 1.60 miles south of Collinsville/Birds Landing Rd. intersection, west side of road
Red-Tailed Hawk	Olsen Rd., 0.50 mile south of Olsen/Hwy. 12 intersection, 0.5 mile west of road
Red-Tailed Hawk	Little Honker Bay Rd., 0.65 mile east of Little Honker Bay/Shiloh intersection, north side of road
Red-tailed Hawk	Montezuma Hills Rd., 1.75 mi W of Montezuma Hills/Toland Rd. intersection, north side of road
Red-Tailed Hawk	Olsen Rd., 0.90 mile south of Olsen/Hwy. 12 intersection, 0.50 mile east of road
Red-Tailed Hawk	Shiloh Rd., 0.25 mile north of Shiloh/Birds Landing Rd. intersection, west side of road
Red-Tailed Hawk	Anderson Rd., 1.20 mile north of Anderson/Montezuma Hills intersection, 0.20 mile west of road
Red-Tailed Hawk	On private road, 0.30 mile fron intersection with Stratton Rd. (1.00 mile from Stratton/Collinsville Rd. intersection), south side of road
Swainson's Hawk	Shiloh Rd, 0.10 mile south of Shiloh/Olsen Rd. intersection, west side of road
Swainson's Hawk	Highway 12, 0.80 mile E of Hwy. 12/Birds Landing Rd. intersection, south side of road
Northern Harrier	East facing slope 0.25 mile west of Wind Tower # 52, High Winds Wind Resource Area, north of Montezuma Hills Road
American Kestrel	Emigh Rd., 0.65 Miles ENE of Currie/Emigh intersection, south side of road
American Kestrel	Currie Rd, 0.85 mile south of Currie/Hwy 12 intersection, west side of road
American Kestrel	Birds Landing Rd., 3.00 miles south of Birds Landing/Hwy. 12 intersection, west side of road
American Kestrel	Birds Landing Rd., 2.35 miles east of Birds Landing/Collinsville Rd. intersection, east side of road
American Kestrel	Olsen Rd., 0.90 mile south of Olsen/Hwy. 12 intersection, 0.50 mile east of road
American Kestrel	Birds Landing Rd., 0.70 mile south of Birds Landing/Hwy. 12 intersection, 0.9 mile west of road
American Kestrel	Anderson Rd at intersection of Montezuma Hills Road, east side of road
American Kestrel	Currie Rd., 0.35 mile south of Currie/Hwy 12 intersection, 0.25 mile east of road

Species	Location
American Kestrel	Collinsville Rd., 0.25 mile south of Collinsville/Talbert Lane intersection, west side of road
American Kestrel	Birds Landing Rd., 0.20 mile north of Birds Landing/Hwy. 12 intersection, east side of road
Great Horned Owl	Emigh Rd., SW end, 0.25 mile SW of Currie/Emigh intersection, south side of road
Great Horned Owl	Birds Landing Rd., 0.75 mile south ofBirds Landing/Hwy 12 intersection, 0.55 mile east of road
Great Horned Owl	Birds Landing Rd., 0.50 mile east of Birds Landing/Collinsville Rd intersection, north side of road
Great Horned Owl	Stratton Rd., 0.70 mile east of Stratton/Collinsville Rd. intersection, north side of road
Great Horned Owl	Shiloh Rd, 0.25 mile south of Shiloh/Little Honker Bay Rd. intersection, west side of road
Great Horned Owl	Shiloh Rd, 0.10 mile south of Shiloh/Olsen Rd. intersection, west side of road
Great Horned Owl	Collinsville Rd., 1.60 miles south of Collinsville/Birds Landing Rd. intersection, west side of road
Great Horned Owl	Olsen Rd., 0.50 mile south of Olsen/Hwy. 12 intersection, 0.5 mile west of road
Great Horned Owl	Shiloh Rd., 0.55 mile north of Shiloh/Little Honker Bay Rd., 0.5 mile east of road
Great Horned Owl	Anderson Rd., 1.20 mile north of Anderson/Montezuma Hills Rd. intersection, 0.20 mile west of road
Probable	
Red-Tailed Hawk	Birds Landing Rd., 0.60 mile south of Birds Landing/Hwy 12 intersection, 0.55 mile east of road
Red-Tailed Hawk	Collinsville Rd. at Talbert Lane intersection, west side of road
Northern Harrier	Stratton Rd., 0.70 mile east of Stratton/Collinsville Rd. intersection, north side of road
Northern Harrier	Near Sacramento River, 0.70 mile east of south end of private road running south from east end of Talbert Lane
Northern Harrier	Emigh Rd., 0.10 mile SW of Emigh/Currie Rd. intersection, east side of road
Northern Harrier	Olsen Rd., 1.40 mile south of Olsen/Hwy. 12 intersection, east side of road
American Kestrel	Olsen Rd., 1.30 mile south of Olsen/Hwy. 12 intersection, 0.3 mile west of road
American Kestrel	Currie Rd, 0.65 mile south of Currie/Hwy 12 intersection, east side of road
American Kestrel	Birds Landing Rd., 0.60 mile south of Birds Landing/Hwy 12 intersection, 0.55 mile east of road
American Kestrel	Collinsville Rd., 1.00 mile south of Birds Landing/Collinsville Rd. intersection, east side of road
American Kestrel	Stratton Rd., 0.90 mile east of Stratton/Collinsville Rd. intersection, NW side of road
American Kestrel	Shiloh Rd, 1.55 mile south of Shiloh/Little Honker Bay Rd. intersection, west side of road
American Kestrel	Shiloh Rd, 2.00 mile south of Shiloh/Little Honker Bay Rd. intersection, west side of road
American Kestrel	Shiloh Rd, 0.10 mile south of Shiloh/Olsen Rd. intersection, west side of road
American Kestrel	Little Honker Bay Rd., 0.65 mile east of Little Honker Bay/Shiloh intersection, north side of road
American Kestrel	Olsen Rd., 1.90 mile south of Olsen Hwy. 12 intersection, 0.70 mile west of E-W portion of Olsen Rd.

Species	Location
American Kestrel	Shiloh Rd., 0.50 mile north of west end of E-W portion of Shiloh Rd., 0.55 mile east of road
American Kestrel	Shiloh Rd., 0.25 mile north of Shiloh/Birds Landing Rd. intersection, west side of road
American Kestrel	Toland Rd, south end of road, near Sacramento River
American Kestrel	Birds Landing Rd., 0.25 mile east of Birds Landing/Collinsville Rd intersection, south side of road
American Kestrel	Montezuma Hills Rd., 1.80 mi W of Montezuma Hills/Toland Rd. intersection, south side of road (across Mont. Hills Rd. from High Winds access gate #3)
American Kestrel	Birds Landing Rd., 2.55 mile east of Birds Landing/Collinsville Rd. intersection, 0.75 mile SE of road
Barn Owl	Birds Landing Rd., 2.35 miles east of Birds Landing/Collinsville Rd. intersection, east side of road
Barn Owl	Birds Landing Rd., 0.25 mile east of Birds Landing/Collinsville Rd intersection, south side of road
Possible American Kestrel	Highway 12, 0.80 mile E of Hwy. 12/Birds Landing Rd. intersection, south side of road
American Kestrel	Stratton Rd. 1.50 mile east and south of Stratton/Collinsville Rd. intersection, north side of road
White-tailed Kite	Anderson Rd., 1.20 mile north of Anderson/Montezuma Hills intersection, 0.20 mile west of road
Barn Owl	Near Sacramento River, 1.20 mile east of south end of private road running south from east end of Talbert Lane

Appendix G. LIST AND LOCATION OF 39 RAPTOR NESTS FOUND IN THE COLLINSVILLE MONTEZUMA HILLS WIND RESOURCE AREA, YEAR TWO OF STUDY, APRIL 18 – JUNE 27, 2005.

Species	Location
Confirmed	
Golden Eagle	2 3/4 miles East of Birds Landing, 1/2 mile South of Birds Landing road
Golden Eagle	1/4 mile West of Emigh road/Currie road intersection
Red-Tailed Hawk	1 1/8 miles South of Shiloh Road/Little Honker Bay Road intersection, ~200 yards East of Shiloh Church
Red-Tailed Hawk	On Collinsville Rd., 1.60 miles south of Collinsville/Birds Landing Rd. intersection, west side of road
Red-tailed Hawk	1/8 mile West of the town of Birds Landing
Red-tailed Hawk	On Collinsville Rd. 0.15 mile south of the Talbert Lane/Collinsville Rd. intersection, west side of road
Red-Tailed Hawk	On Collinsville Rd., 1.00 miles south of Collinsville/Birds Landing Rd. intersection, east side of road
Red-Tailed Hawk	1 1/2 miles East Southeast on Stratton Road
Swainson's Hawk	1/8 miles SW of Olsen road/Shiloh road intersection
Northern Harrier	0.21 mile northeast of High Winds Wind Tower # 31
American Kestrel	3 miles South on Birds Landing road from Hwy 12 intersection, ~ 1/4 mile Southeast
American Kestrel	1/4 mile East of Currie road/Emigh road intersection
American Kestrel	1 1/2 miles South of Shiloh road/Little Honker Bay road intersection, 1/2 mile East
American Kestrel	1/2 mile South of Shiloh road/Little Honker Bay road intersection
American Kestrel	1 3/4 miles South of Shiloh road/Little Honker Bay road intersection, West side of road
American Kestrel	3/4 mile East on Stratton Road, 1/2 mile South of Stratton Road
American Kestrel	On Birds Landing Rd., 2.20 miles south of Birds Landing/Hwy. 12 intersection, west side of road
American Kestrel	On Birds Landing Rd., 2.70 miles south of Birds Landing/Hwy. 12 intersection, west side of road
American Kestrel	On Birds Landing Rd., 0.10 mile east of Birds Landing/Collinsville Rd intersection, south side of road
American Kestrel	On Montezuma Hills Road, 0.10 mile north of intersection of Anderson Road, northwest side of road
American Kestrel	On Montezuma Hills Rd., 1.80 mi W of Montezuma Hills/Toland Rd. intersection, south side of road (across Mont. Hills Rd. from High Winds access gate #3)
American Kestrel	On Collinsville Rd., 1.60 miles south of Collinsville/Birds Landing Rd. intersection, west side of road

Species	Location
Great Horned Owl	On Collinsville Rd., 1.60 miles south of Collinsville/Birds Landing Rd. intersection, west side of road
Great Horned Owl	On Montezuma Hills Rd., 1.25 miles east of Birds Landing Rd. intersection, north side of road
Great Horned Owl	1/4 mile South of Shiloh road/Little Honker Bay road intersection, West side of Shiloh road
Great Horned Owl	1 1/2 miles East Southeast on Stratton Road
Probable	
Red-tailed Hawk	1 mile East on Stratton Road, at 90 degree corner to the South
Swainson's Hawk	2 miles East of Birds Landing Road, intersection of McCloskey Road and Hwy 12
Northern Harrier	On Collinsville Rd., 0.90 miles south of Collinsville/Birds Landing Rd. intersection, to west of road, near levee
Northern Harrier	1/4 mile West of Emigh road/Currie road intersection
American Kestrel	1 1/2 miles South of Shiloh road/Little Honker Bay road intersection, 1 1/2 mile East
American Kestrel	1 mile South of Hwy 12, 1/2 mile East of Olsen road
American Kestrel	1 mile East on Stratton Road, at 90 degree corner to the South
American Kestrel	On Collinsville Rd., 0.10 mile south of Collinsville/Talbert Lane intersection, west side of road
American Kestrel	At the end of Toland Landing Road
American Kestrel	1/4 mile Northeast of the end of Stewart Lane, 1 ¼ miles South of Montezuma Hills Road
Possible	
Red-Tailed Hawk	On Montezuma Hills Rd., 1.75 mi W of Montezuma Hills/Toland Rd. intersection, north side of road
American Kestrel	On Collinsville Rd., 1.00 miles south of Collinsville/Birds Landing Rd. intersection
American Kestrel	On Birds Landing Rd., 1.70 miles south of Birds Landing/Hwy. 12 intersection, near Hamilton Ranch

Appendix H:

ADDITIONAL DATA DESCRIBING CARCASS LOCATION (BEARING) TO TOWERS.

1) Estimated Month of Fatality or Injury versus Compass Bearing of Bird Incidents for both years of this study.

Estimated Month of Fatality or Injury versus Compass Bearing of Bird Incidents* for both years of this study.

YEAR 1	2003								2004					
Compass Bearing	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	Year 1 Total	
N	2	1	3	2	2		1		1	1		1	14	
NNE	1	2	2		1	1			1	2	1		11	
NE		1	1	1						1	2		6	
ENE		2	3	1	2			1	1	1	2		13	
E	1		1	3			1		1		1		8	
ESE						1		1		1	1		4	
SE			1						1		1	2	5	
SSE					1			2			1		4	
S						1	1		1				3	
SSW					1	1				1		1	4	
SW			1			1			2				4	
WSW				2		1		1				1	5	
W				1						1			2	
WNW					1		1						2	
NW			1		2					1		1	5	
NNW				1	2		1	1					5	
Year 1 Total	4	6	13	11	12	6	5	6	8	9	9	6	95	

YEAR 2	2004								2005					
Compass Bearing	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	Year 2 Total	**Both Year Grand Total**
N	1		3			1			2	1	1		9	**23**
NNE			1						2	1	2	1	7	**18**
NE	1	2	1							1			5	**11**
ENE		2	3						1	1			7	**20**
E	2		1							2	1		6	**14**
ESE	1	2	1	1									5	**9**
SE		2			1	1							4	**9**
SSE	1	1				1							3	**7**
S			1				1						2	**5**
SSW		1	1										2	**6**
SW		1	2		1								4	**8**
WSW													0	**5**
W				1									1	**3**

WNW			1	1			1	1					4	**6**
NW				1					1				2	**7**
NNW			1		2						2		5	**10**
Year 2 Total	6	11	16	4	4	3	2	1	6	6	6	1	66	**161**
Grand Total	**10**	**17**	**29**	**15**	**16**	**9**	**7**	**7**	**14**	**15**	**15**	**7**	**161**	**161**

* These numbers include only incidents found during standardized surveys which were associated with wind turbines.

2) Estimated Month of Fatality versus Compass Bearing of Bat Incidents for both years of this study.

Estimated Month of Fatality versus Compass Bearing of Bat Incidents for both years of this study.

YEAR 1			2003						2004					
Compass Bearing	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	Year 1 Total	
N	1	5	2					2	1				11	
NNE	3	4	1										8	
NE		7	4	1				1	1				14	
ENE	2	1	3					1	1				8	
E	1	7	2				1				1		12	
ESE		1	2										3	
SE			1										1	
SSE		1											1	
S		1						1					2	
SSW				1									1	
SW		1											1	
WSW				1									1	
W													0	
WNW		1											1	
NW		1						1					2	
NNW		2	1					1					4	
Year 1 Total	7	32	16	3	0	0	1	7	3	0	1	0	70	

YEAR 2			2004						2005					
Compass Bearing	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	Year 2 Total	**Both Year Grand Total**
N		4	1				1						6	**17**
NNE		2	1						1				4	**12**
NE	2	1	1								1		5	**19**
ENE	2	3	1					1	1			1	9	**17**
E		2	3					1					6	**18**
ESE		2											2	**5**
SE	1												1	**2**
SSE	1												1	**2**
S		1	1										2	**4**

SSW													0	**1**
SW		1											1	**2**
WSW			1										1	**2**
W		1	1					1					3	**3**
WNW								1					1	**2**
NW		2											2	**4**
NNW		1	1										2	**6**
Year 2 Total	6	20	11	0	0	0	1	4	2	0	1	1	46	**116**
Grand Total	**13**	**52**	**27**	**3**	**0**	**0**	**2**	**11**	**5**	**0**	**2**	**1**	**116**	**116**

* These numbers include only incidents found during standardized surveys which were associated with wind turbines.

3) Number of Incidents versus Compass Bearing of Species Groups for both years of this study.

Number of Incidents* versus Compass Bearing of Species Groups for both years of this study.

	Species Group				
Compass Bearing	Raptor	Passerine	Other Bird	Bat	Grand Total
N	13	8	2	17	40
NNE	2	14	2	12	30
NE	3	8		19	30
ENE	8	9	3	17	37
E	6	5	3	18	32
ESE	6	2	1	5	14
SE	6	3		2	11
SSE	2	2	3	2	9
S	3		2	4	9
SSW	4	2		1	7
SW	3	4	1	2	10
WSW	2	1	2	2	7
W	2	1		3	6
WNW	1	4	1	2	8
NW	3	3	1	4	11
NNW	5	4	1	6	16
Grand Total	69	70	22	116	277

* These numbers include only incidents found during standardized surveys which were associated with wind turbines.

4) Number of Incidents versus Bearing (Geographic North) of Birds and Bats for both years of this study.

Number of Incidents* versus Bearing (Geographic North) of Birds and Bats for both years of this study.

Bearing (GN)	Bird	Bat	Grand Total
0	1		1
2	2	4	6
3	2		2

4	4	2	6
5	1		1
6	1	1	2
7	2	2	4
9	1	1	2
10	1	1	2
12	1		1
13		1	1
14	1	1	2
15		1	1
17		1	1
20	2	2	4
22	4	2	6
23	1	1	2
24	2		2
25	1	1	2
27	4		4
31	1		1
32	1	2	3
34		3	3
37		3	3
38	1	1	2
40		1	1
41	2	1	3
43	1		1
44	2	1	3
45	1		1
46		3	3
48	1		1
51		1	1
52		1	1
53	1	2	3
54	1	1	2
55	1	1	2
57	3		3
58	1	1	2
60		2	2
61		1	1
62	2		2
63	1		1
64	2	1	3
65		1	1
66	2		2
67		2	2
69		3	3
70	1	1	2
71	3		3
72	1		1
73	2		2
75	1	1	2
76		2	2

77		1	1
78	1	1	2
79	1	1	2
81		1	1
82	2	1	3
84		2	2
85		2	2
86	2		2
87	1	1	2
88	1	2	3
89		1	1
90	1		1
91	1	1	2
92	1		1
93		1	1
94	1	3	4
95	1	1	2
97	1		1
98	1		1
99		1	1
105		1	1
107		1	1
110	1	1	2
111	2	2	4
116	1		1
117	1		1
118	1		1
119	1		1
121	2		2
124	3		3
131	1		1
132		1	1
134	1		1
138	1		1
140	1		1
143	1		1
144	1		1
146		1	1
148	1		1
153	1		1
154	1		1
157	1	1	2
158		1	1
164	1		1
166	1		1
167	1		1
172		1	1
173	1		1
175		1	1
182	1		1
184	1		1

185		1	1
186	1		1
189		1	1
191	1		1
194	2	1	3
198	1		1
200	1		1
204	1		1
207	1		1
217	1		1
219	1		1
220	2		2
224	1		1
225	1		1
228		1	1
231	1		1
234	1		1
235		1	1
239		1	1
241	1		1
244	1		1
245	1		1
246	1		1
251	1		1
254		1	1
263	1		1
264	1		1
266		1	1
269	1		1
274		1	1
281		1	1
282	1	1	2
289	1		1
293	2		2
294	1		1
297	1		1
303		1	1
304	1		1
306		1	1
310		1	1
313	2		2
314	1	1	2
315	1		1
322		1	1
323	1		1
325	1		1
332		1	1
334	1	1	2
335	1	1	2
337	1		1
339	1		1

342	2		2
344	2	1	3
346	1		1
348	1	2	3
349	2	1	3
350	1	1	2
351		1	1
352	2		2
353	1		1
354		1	1
356	1	1	2
357		1	1
358	1		1
Grand Total	161	116	277

* These numbers include only incidents found during standardized surveys which were associated with wind turbines.

5) Raw Data of Incidents versus Bearing (Geographic North) of Birds and Bats for both years of this study.

ID#	Report Date	Year 1-2	Month (Est.)	Species Name	Fatality Injury	Bat/ Bird	Species Group	Tower	Dist (m)	Bearing (GN)	Bearing	Days Since Death	Data Type	Bearing (Mag. North)
H04-036	04/19/04	1	APR	Hoary Bat	Fatality	Bat	Bat	21	13	2	N	<14	Stand.	18
H03-071	10/18/03	1	OCT	Western Red Bat	Fatality	Bat	Bat	50	40	2	N	<1	Stand.	18
H03-022	09/11/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	64	20	2	N	<1	Stand.	18
H03-016	09/07/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	46	44	4	N	<4	Stand.	20
H04-018	03/12/04	1	MAR	Mexican Free-tailed Bat	Fatality	Bat	Bat	85	5	4	N	<7	Stand.	20
H03-009	09/03/03	1	AUG	Hoary Bat	Fatality	Bat	Bat	21	59	6	N	<7	Stand.	22
H03-065	10/17/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	21	18	7	N	<4	Stand.	23
H03-027	09/19/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	15	37	13	NNE	<7	Stand.	29
H03-036	09/26/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	51*	58	15	NNE	<1	Stand.	31
H03-017	09/07/03	1	AUG	Mexican Free-tailed Bat	Fatality	Bat	Bat	48	39	20	NNE	<14	Stand.	36
H03-019	09/11/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	59*	28	20	NNE	<1	Stand.	36
H03-013	09/07/03	1	AUG	Hoary Bat	Fatality	Bat	Bat	39*	59	22	NNE	<14	Stand.	38
H03-015	09/07/03	1	AUG	Hoary Bat	Fatality	Bat	Bat	44	40	25	NNE	<14	Stand.	41
H03-078	10/30/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	19	13	32	NNE	<30	Stand.	48
H03-032	09/23/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	34*	63	32	NNE	<14	Stand.	48
H03-026	09/16/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	4	14	34	NE	<4	Stand.	50
H03-064	10/17/03	1	OCT	Mexican Free-	Fatality	Bat	Bat	20*	12	34	NE	<1	Stand.	50

				tailed Bat										
H03-044	09/28/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	67*	12	34	NE	<4	Stand.	50
H03-090	11/16/03	1	NOV	Hoary Bat	Fatality	Bat	Bat	31*	22	37	NE	<4	Stand.	53
H03-021	09/11/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	63*	55	37	NE	UNK	Stand.	53
H03-058	10/10/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	67*	17	38	NE	<14	Stand.	54
H03-072	10/18/03	1	OCT	Mexican Free-tailed Bat	Fatality	Bat	Bat	51*	18	44	NE	<1	Stand.	60
H03-067	10/17/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	31	30	46	NE	<1	Stand.	62
H03-014	09/07/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	41	46	46	NE	<1	Stand.	62
H04-027	04/04/04	1	APR	Hoary Bat	Fatality	Bat	Bat	88	65	46	NE	<1	Stand.	62
H03-066	10/17/03	1	OCT	Western Red Bat	Fatality	Bat	Bat	23	44	51	NE	UNK	Stand.	67
H03-049	10/05/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	31	15	52	NE	<30	Stand.	68
H03-020	09/11/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	60	20	54	NE	<1	Stand.	70
H04-015	03/05/04	1	MAR	Hoary Bat	Fatality	Bat	Bat	9	27	55	NE	<1	Stand.	71
H03-018	09/11/03	1	AUG	Mexican Free-tailed Bat	Fatality	Bat	Bat	58	62	61	ENE	<14	Stand.	77
H03-083	11/04/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	51*	39	64	ENE	<14	Stand.	80
H03-007	09/03/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	9	76	67	ENE	<4	Stand.	83
H04-032	04/12/04	1	APR	Hoary Bat	Fatality	Bat	Bat	86	26	67	ENE	<14	Stand.	83
H03-053	10/09/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	50	35	69	ENE	<1	Stand.	85
H03-006	08/26/03	1	AUG	Hoary Bat	Fatality	Bat	Bat	79	18	70	ENE	<14	Stand.	86
H03-057	10/10/03	1	OCT	Mexican Free-tailed Bat	Fatality	Bat	Bat	63*	45	76	ENE	<4	Stand.	92
H04-023	03/17/04	1	MAR	Hoary Bat	Fatality	Bat	Bat	57	12	78	ENE	<7	Stand.	94
H03-043	09/27/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	65	41	79	E	<14	Stand.	95
H03-073	10/18/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	55*	45	81	E	<30	Stand.	97
H03-037	09/26/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	56	43	84	E	<30	Stand.	100
H03-075	10/21/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	67*	44	84	E	<4	Stand.	100
H03-054	10/09/03	1	SEP	Bat	Fatality	Bat	Bat	50	23	85	E	<30	Stand.	101

H03-025	09/16/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	78	6	87	E	<14	Stand.	103
H03-010	09/03/03	1	AUG	Hoary Bat	Fatality	Bat	Bat	24*	35	89	E	<14	Stand.	105
H03-051	10/09/03	1	SEP	Western Red Bat	Fatality	Bat	Bat	37	43	91	E	<30	Stand.	107
H04-057	06/17/04	1	JUN	Hoary Bat	Fatality	Bat	Bat	26	60	93	E	<4	Stand.	109
H04-008	02/08/04	1	FEB	Mexican Free-tailed Bat	Fatality	Bat	Bat	3	17	94	E	<1	Stand.	110
H03-074	10/21/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	63*	63	94	E	<14	Stand.	110
H03-023	09/11/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	64	48	94	E	<1	Stand.	110
H03-024	09/11/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	67*	35	107	ESE	<1	Stand.	123
H03-095	11/18/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	62	53	110	ESE	<30	Stand.	126
H03-070	10/18/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	46	35	111	ESE	UNK	Stand.	127
H03-069	10/18/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	44	18	132	SE	<7	Stand.	148
H03-042	09/27/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	61	31	157	SSE	<14	Stand.	173
H04-026	03/29/04	1	MAR	Mexican Free-tailed Bat	Fatality	Bat	Bat	87*	14	175	S	<1	Stand.	191
H03-047	10/05/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	24*	0	189	S	<14	Stand.	205
H03-085	11/04/03	1	NOV	Hoary Bat	Fatality	Bat	Bat	57	30	194	SSW	<1	Stand.	210
H03-038	09/26/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	57	26	235	SW	<14	Stand.	251
H03-087	11/13/03	1	NOV	Mexican Free-tailed Bat	Fatality	Bat	Bat	4	5	254	WSW	<4	Stand.	270
H03-045	09/28/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	70	0	303	WNW	<1	Stand.	319
H04-016	03/05/04	1	MAR	Mexican Free-tailed Bat	Fatality	Bat	Bat	10	17	314	NW	<4	Stand.	330
H03-030	09/23/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	33	20	322	NW	<4	Stand.	338
H03-031	09/23/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	33	17	334	NNW	<14	Stand.	350
H03-011	09/03/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	34*	49	335	NNW	<4	Stand.	351
H03-060	10/12/03	1	OCT	Hoary Bat	Fatality	Bat	Bat	7*	34	348	NNW	<1	Stand.	4
H04-019	03/12/04	1	MAR	Hoary Bat	Fatality	Bat	Bat	86	7	348	NNW	<1	Stand.	4
H03-040	09/26/03	1	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	58	26	349	N	<7	Stand.	5
H03-039	09/26/03	1	SEP	Bat	Fatality	Bat	Bat	58	28	350	N	<14	Stand.	6

H03-034	09/23/03	1	SEP	Hoary Bat	Fatality	Bat	Bat	47*	19	356	N	<7	Stand.	12
H04-035	04/19/04	1	MAR	Hoary Bat	Fatality	Bat	Bat	18	30	357	N	<30	Stand.	13
H03-003	08/17/03	1	AUG	White-throated Swift	Fatality	Bird	Other Bird	44	33	2	N	<4	Stand.	18
H03-048	10/05/03	1	OCT	Turkey Vulture	Fatality	Bird	Other Bird	30	84	9	N	>30	Stand.	25
H03-059	10/12/03	1	OCT	Northern Flicker	Fatality	Bird	Other Bird	2	36	12	NNE	<7	Stand.	28
H03-028	09/19/03	1	SEP	Common Moorhen	Fatality	Bird	Other Bird	21	73	27	NNE	<4	Stand.	43
H03-041	09/26/03	1	SEP	Sora	Fatality	Bird	Other Bird	60	41	57	ENE	<1	Stand.	73
H04-058	06/22/04	1	JUN	Virginia Rail	Fatality	Bird	Other Bird	86	63	78	ENE	<4	Stand.	94
H04-044	05/11/04	1	MAY	Mourning Dove	Fatality	Bird	Other Bird	54*	72	117	ESE	UNK	Stand.	133
H04-025	03/28/04	1	MAR	Ring-necked Pheasant	Fatality	Bird	Other Bird	25	48	157	SSE	<30	Stand.	173
H04-030	04/07/04	1	APR	Ring-necked Pheasant	Fatality	Bird	Other Bird	37	3	173	S	<1	Stand.	189
H04-033	04/18/04	1	JAN	Mourning Dove	Fatality	Bird	Other Bird	5	3	191	S	<1	Stand.	207
H04-005	01/21/04	1	JAN	American Coot	Fatality	Bird	Other Bird	16*	35	241	WSW	<1	Stand.	257
H04-067	08/13/04	1	JUL	Double-crested Cormorant	Fatality	Bird	Other Bird	4	99	246	WSW	<30	Stand.	262
H04-063	07/16/04	1	JUL	White-throated Swift	Fatality	Bird	Other Bird	12	59	325	NW	<7	Stand.	341
H04-043	05/11/04	1	MAY	Townsend's Warbler	Fatality	Bird	Passerine	51*	7	5	N	<1	Stand.	21
H03-012	09/07/03	1	AUG	Western Meadowlark	Fatality	Bird	Passerine	35*	40	6	N	<14	Stand.	22
H03-035	09/26/03	1	SEP	Unidentified Warbler	Fatality	Bird	Passerine	51*	59	7	N	<1	Stand.	23
H03-029	09/19/03	1	AUG	Unidentified Passerine	Fatality	Bird	Passerine	23	59	14	NNE	<30	Stand.	30
H04-034	04/19/04	1	APR	Horned Lark	Fatality	Bird	Passerine	10	43	20	NNE	<7	Stand.	36
H03-052	10/09/03	1	OCT	Unidentified Passerine	Fatality	Bird	Passerine	38	54	20	NNE	UNK	Stand.	36
H04-046	05/27/04	1	MAY	Western Wood-Pewee	Fatality	Bird	Passerine	20*	41	22	NNE	<1	Stand.	38
H03-107	12/21/03	1	DEC	Unidentified black bird	Fatality	Bird	Passerine	64	68	24	NNE	UNK	Stand.	40
H04-056	06/17/04	1	JUN	Unidentified Warbler	Fatality	Bird	Passerine	14	31	25	NNE	UNK	Stand.	41
H03-033	09/23/03	1	SEP	Townsend's Warbler	Fatality	Bird	Passerine	35*	58	27	NNE	UNK	Stand.	43
H04-004	01/18/04	1	JAN	European	Fatality	Bird	Passerine	62	17	32	NNE	<4	Stand.	48

H03-046	10/05/03	1	OCT	Starling Lincoln Sparrow	Fatality	Bird	Passerine	22	67	41	NE	<1	Stand.	57
H03-055	10/10/03	1	SEP	Ruby-crowned Kinglet	Fatality	Bird	Passerine	57	36	44	NE	<14	Stand.	60
H04-059	06/22/04	1	JUN	Unidentified Passerine	Fatality	Bird	Passerine	87*	25	45	NE	UNK	Stand.	61
H04-053	06/10/04	1	JUN	Red-winged Blackbird	Fatality	Bird	Passerine	49	70	53	NE	UNK	Stand.	69
H04-048	05/27/04	1	MAY	Yellow Warbler	Fatality	Bird	Passerine	21	57	55	NE	<4	Stand.	71
H04-039	05/06/04	1	APR	Horned Lark	Fatality	Bird	Passerine	17	30	62	ENE	<7	Stand.	78
H03-056	10/10/03	1	OCT	Common Yellowthroat	Fatality	Bird	Passerine	63*	66	62	ENE	<7	Stand.	78
H03-050	10/09/03	1	OCT	Ruby-crowned Kinglet	Fatality	Bird	Passerine	36	75	63	ENE	<1	Stand.	79
H03-008	09/03/03	1	SEP	Unidentified *Empidonax* Flycatcher	Fatality	Bird	Passerine	19	65	66	ENE	<4	Stand.	82
H03-097	11/25/03	1	NOV	European Starling	Fatality	Bird	Passerine	19	18	70	ENE	<4	Stand.	86
H04-047	05/27/04	1	MAY	Warbling Vireo	Fatality	Bird	Passerine	20*	70	71	ENE	<4	Stand.	87
H04-037	04/26/04	1	APR	Horned Lark	Fatality	Bird	Passerine	38	1	82	E	<1	Stand.	98
H04-055	06/16/04	1	JUN	Horned Lark	Fatality	Bird	Passerine	3	15	86	E	<14	Stand.	102
H04-014	03/05/04	1	MAR	Unidentified Passerine	Fatality	Bird	Passerine	8*	63	119	ESE	UNK	Stand.	135
H04-054	06/10/04	1	JUN	Unidentified Passerine	Fatality	Bird	Passerine	55*	42	124	SE	UNK	Stand.	140
H04-020	03/12/04	1	MAR	Orange-crowned Warbler	Fatality	Bird	Passerine	43	52	164	SSE	<4	Stand.	180
H03-004	08/17/03	1	JUL	Western Meadowlark	Fatality	Bird	Passerine	13*	49	194	SSW	<30	Stand.	210
H04-042	05/10/04	1	MAY	Horned Lark	Fatality	Bird	Passerine	86	15	198	SSW	<7	Stand.	214
H04-029	04/07/04	1	APR	Horned Lark	Fatality	Bird	Passerine	24*	12	224	SW	<7	Stand.	240
H04-041	05/10/04	1	APR	Horned Lark	Fatality	Bird	Passerine	84	31	225	SW	<14	Stand.	241
H04-024	03/25/04	1	MAR	Horned Lark	Fatality	Bird	Passerine	20*	6	251	WSW	<4	Stand.	267
H04-038	05/06/04	1	MAY	Red-winged Blackbird	Fatality	Bird	Passerine	2	33	263	W	UNK	Stand.	279
H03-110	12/30/03	1	DEC	Horned Lark	Fatality	Bird	Passerine	32	34	282	WNW	<1	Stand.	298
H04-013	02/28/04	1	FEB	Brewer's Blackbir	Fatality	Bird	Passerine	43	64	297	WNW	<7	Stand.	313

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H03-106	12/17/03	1	DEC	Horned Lark	Fatality	Bird	Passerine	50	10	304	NW	<1	Stand.	320
H04-049	05/27/04	1	MAY	European Starling	Fatality	Bird	Passerine	27	29	313	NW	UNK	Stand.	329
H04-017	03/07/04	1	MAR	Brewer's Blackbird	Fatality	Bird	Passerine	15	59	342	NNW	UNK	Stand.	358
H04-010	02/11/04	1	FEB	Unidentified bird	Fatality	Bird	Passerine	25	49	344	NNW	UNK	Stand.	0
H04-061	07/02/04	1	JUL	European Starling	Fatality	Bird	Passerine	31	11	353	N	UNK	Stand.	9
H03-108	12/30/03	1	DEC	Red-tailed Hawk	Fatality	Bird	Raptor	22	21	2	N	<1	Stand.	18
H03-061	10/12/03	1	OCT	American Kestrel	Fatality	Bird	Raptor	7*	26	3	N	<1	Stand.	19
H03-104	12/15/03	1	DEC	Red-tailed Hawk	Fatality	Bird	Raptor	26	21	4	N	<1	Stand.	20
H03-091	11/16/03	1	NOV	American Kestrel	Fatality	Bird	Raptor	33	54	4	N	<4	Stand.	20
H04-045	05/25/04	1	MAY	Ferruginous Hawk	Fatality	Bird	Raptor	72*	49	22	NNE	<30	Stand.	38
H03-086	11/05/03	1	NOV	American Kestrel	Fatality	Bird	Raptor	60	35	44	NE	<1	Stand.	60
H03-102	12/08/03	1	DEC	Red-tailed Hawk	Fatality	Bird	Raptor	2	3	58	ENE	<1	Stand.	74
H03-062	10/12/03	1	OCT	American Kestrel	Fatality	Bird	Raptor	11	65	64	ENE	>30	Stand.	80
H03-099	12/04/03	1	DEC	American Kestrel	Fatality	Bird	Raptor	61	54	64	ENE	<1	Stand.	80
H04-050	06/02/04	1	JUN	American Kestrel	Fatality	Bird	Raptor	6	38	66	ENE	UNK	Stand.	82
H04-022	03/17/04	1	MAR	White-tailed Kite	Fatality	Bird	Raptor	55*	63	72	ENE	<7	Stand.	88
H04-009	02/11/04	1	FEB	American Kestrel	Fatality	Bird	Raptor	14	40	79	E	<4	Stand.	95
H03-093	11/17/03	1	NOV	Red-tailed Hawk	Fatality	Bird	Raptor	55*	31	82	E	<1	Stand.	98
H03-082	11/02/03	1	NOV	Red-tailed Hawk	Fatality	Bird	Raptor	39*	43	88	E	<1	Stand.	104
H03-005	08/17/03	1	AUG	American Kestrel	Fatality	Bird	Raptor	15	45	90	E	<1	Stand.	106
H03-089	11/13/03	1	NOV	American Kestrel	Fatality	Bird	Raptor	9	39	94	E	<14	Stand.	110
H03-068	10/17/03	1	OCT	American Kestrel	Fatality	Bird	Raptor	35*	17	97	E	<4	Stand.	113
H04-052	06/07/04	1	JUN	American Kestrel	Fatality	Bird	Raptor	30	16	111	ESE	<4	Stand.	127
H04-006	01/26/04	1	JAN	American Kestrel	Fatality	Bird	Raptor	34*	34	118	ESE	<1	Stand.	134
H03-002	08/07/03	1	JUL	American Kestrel	Fatality	Bird	Raptor	31	55	124	SE	<30	Stand.	140
H04-040	05/07/04	1	APR	American Kestrel	Fatality	Bird	Raptor	33	27	131	SE	<14	Stand.	147
H03-001	08/04/03	1	JUL	American Kestrel	Fatality	Bird	Raptor	7*	21	134	SE	<30	Stand.	150
H03-081	11/02/03	1	OCT	Red-tailed Hawk	Fatality	Bird	Raptor	31	26	144	SE	<14	Stand.	160
H04-060	06/28/04	1	JUN	Golden Eagle	Fatality	Bird	Raptor	72*	20	148	SSE	<4	Stand.	164

H03-101	12/08/03	1	DEC	Red-tailed Hawk	Fatality	Bird	Raptor	1*	39	154	SSE	<7	Stand.	170
H04-012	02/20/04	1	FEB	White-tailed Kite	Fatality	Bird	Raptor	59*	78	182	S	<14	Stand.	198
H04-002	01/13/04	1	JAN	American Kestrel	Fatality	Bird	Raptor	31	31	194	SSW	<4	Stand.	210
H03-109	12/30/03	1	DEC	American Kestrel	Fatality	Bird	Raptor	28*	33	204	SSW	<14	Stand.	220
H04-003	01/16/04	1	JAN	American Kestrel	Fatality	Bird	Raptor	55*	35	220	SW	<4	Stand.	236
H03-079	11/02/03	1	OCT	American Kestrel	Fatality	Bird	Raptor	30	17	234	SW	<14	Stand.	250
H03-088	11/13/03	1	NOV	American Kestrel	Fatality	Bird	Raptor	9	6	244	WSW	<14	Stand.	260
H03-098	12/03/03	1	NOV	American Kestrel	Fatality	Bird	Raptor	44	36	245	WSW	<14	Stand.	261
H03-094	11/18/03	1	NOV	American Kestrel	Fatality	Bird	Raptor	61	31	264	W	<4	Stand.	280
H03-105	12/17/03	1	DEC	American Kestrel	Fatality	Bird	Raptor	44	10	314	NW	<14	Stand.	330
H03-077	10/30/03	1	OCT	American Kestrel	Fatality	Bird	Raptor	18	59	315	NW	<30	Stand.	331
H03-100	12/04/03	1	DEC	American Kestrel	Fatality	Bird	Raptor	63*	23	335	NNW	<1	Stand.	351
H03-084	11/04/03	1	NOV	American Kestrel	Fatality	Bird	Raptor	54*	26	337	NNW	<1	Stand.	353
H03-103	12/15/03	1	DEC	American Kestrel	Fatality	Bird	Raptor	23	58	344	NNW	<14	Stand.	0
H03-092	11/16/03	1	NOV	American Kestrel	Fatality	Bird	Raptor	44	54	349	N	<14	Stand.	5
H04-028	04/04/04	1	APR	Red-tailed Hawk	Fatality	Bird	Raptor	76	38	349	N	<4	Stand.	5
H03-080	11/02/03	1	OCT	American Kestrel	Fatality	Bird	Raptor	30	35	352	N	<14	Stand.	8
H04-011	02/13/04	1	FEB	Red-tailed Hawk	Fatality	Bird	Raptor	83	38	356	N	<1	Stand.	12
H04-062	07/13/04	1	JUL	Red-tailed Hawk	Injury	Bird	Raptor	SITE	n/a	n/a	n/a	<1	Stand.	n/a
H04-109	09/30/04	2	SEP	Western Red Bat	Fatality	Bat	Bat	7*	23	2	N	<1	Stand.	18
H04-097	09/15/04	2	SEP	Hoary Bat	Fatality	Bat	Bat	2	34	7	N	<1	Stand.	23
H05-006	02/25/05	2	FEB	Mexican Free-tailed Bat	Fatality	Bat	Bat	18	18	9	N	<1	Stand.	25
H04-124	10/14/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	Bat	81*	51	10	N	<1	Stand.	26
H04-095	09/14/04	2	SEP	Hoary Bat	Fatality	Bat	Bat	75*	28	14	NNE	<14	Stand.	30
H04-135	10/25/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	Bat	45	30	17	NNE	<4	Stand.	33
H04-092	09/10/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	57	59	22	NNE	<4	Stand.	38
H05-024	05/10/05	2	APR	Hoary Bat	Fatality	Bat	Bat	27	33	23	NNE	<14	Stand.	39
H04-126	10/14/04	2	OCT	Bat	Fatality	Bat	Bat	5	53	37	NE	<4	Stand.	53

H04-093	09/10/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	57	53	40	NE	<4	Stand.	56
H05-035	06/28/05	2	JUN	Mexican Free-tailed Bat	Fatality	Bat	Bat	86	33	41	NE	<30	Stand.	57
H04-074	08/28/04	2	AUG	Mexican Free-tailed Bat	Fatality	Bat	Bat	67*	55	53	NE	<1	Stand.	69
H04-096	09/14/04	2	AUG	Hoary Bat	Fatality	Bat	Bat	77	73	53	NE	<30	Stand.	69
H05-015	04/25/05	2	APR	Mexican Free-tailed Bat	Fatality	Bat	Bat	2	6	58	ENE	<14	Stand.	74
H04-073	08/27/04	2	AUG	Hoary Bat	Fatality	Bat	Bat	61	62	60	ENE	<4	Stand.	76
H05-013	04/06/05	2	MAR	Mexican Free-tailed Bat	Fatality	Bat	Bat	79	15	60	ENE	<14	Stand.	76
H05-038	07/22/05	2	JUL	Hoary Bat	Fatality	Bat	Bat	37	42	65	ENE	<7	Stand.	81
H04-068	08/20/04	2	AUG	Hoary Bat	Fatality	Bat	Bat	30	18	69	ENE	<14	Stand.	85
H04-085	09/06/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	34*	19	69	ENE	<4	Stand.	85
H04-123	10/14/04	2	OCT	Silver-haired Bat	Fatality	Bat	Bat	79	39	75	ENE	<4	Stand.	91
H04-108	09/28/04	2	SEP	Hoary Bat	Fatality	Bat	Bat	81*	32	76	ENE	<4	Stand.	92
H04-104	09/24/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	60	69	77	ENE	<30	Stand.	93
H05-009	03/13/05	2	MAR	Mexican Free-tailed Bat	Fatality	Bat	Bat	37	42	82	E	<14	Stand.	98
H04-136	10/25/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	Bat	47*	16	85	E	<4	Stand.	101
H04-128	10/14/04	2	OCT	Hoary Bat	Fatality	Bat	Bat	10	49	88	E	<1	Stand.	104
H04-078	09/06/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	18	15	88	E	<1	Stand.	104
H04-098	09/17/04	2	SEP	Silver-haired Bat	Fatality	Bat	Bat	24*	5	95	E	<4	Stand.	111
H04-119	10/12/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	Bat	65	13	99	E	<4	Stand.	115
H04-087	09/08/04	2	SEP	Hoary Bat	Fatality	Bat	Bat	38	22	105	ESE	<7	Stand.	121
H04-106	09/24/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	62	30	111	ESE	<7	Stand.	127
H04-079	09/06/04	2	AUG	Mexican Free-tailed Bat	Fatality	Bat	Bat	24*	4	146	SE	<7	Stand.	162

				Bat										
H04-089	09/09/04	2	AUG	Mexican Free-tailed Bat	Fatality	Bat	Bat	42*	38	158	SSE	<14	Stand.	174
H04-115	10/12/04	2	OCT	Mexican Free-tailed Bat	Fatality	Bat	Bat	88	13	172	S	<1	Stand.	188
H04-101	09/22/04	2	SEP	Hoary Bat	Fatality	Bat	Bat	48	20	185	S	<1	Stand.	201
H04-120	10/12/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	71*	28	228	SW	<30	Stand.	244
H04-121	10/12/04	2	OCT	Hoary Bat	Fatality	Bat	Bat	74*	38	239	WSW	<1	Stand.	255
H05-010	03/14/05	2	MAR	Mexican Free-tailed Bat	Fatality	Bat	Bat	42*	17	266	W	<4	Stand.	282
H04-114	10/11/04	2	OCT	Hoary Bat	Fatality	Bat	Bat	57	71	274	W	<1	Stand.	290
H04-105	09/24/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	61	1.5	281	W	<1	Stand.	297
H05-007	03/09/05	2	MAR	Mexican Free-tailed Bat	Fatality	Bat	Bat	81*	31	282	WNW	<1	Stand.	298
H04-084	09/06/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	34*	5	306	NW	<4	Stand.	322
H04-083	09/06/04	2	SEP	Hoary Bat	Fatality	Bat	Bat	34*	58	310	NW	<4	Stand.	326
H04-091	09/10/04	2	SEP	Mexican Free-tailed Bat	Fatality	Bat	Bat	87*	27	332	NNW	<4	Stand.	348
H04-125	10/14/04	2	OCT	Hoary Bat	Fatality	Bat	Bat	3	21	344	NNW	<1	Stand.	0
H04-080	09/06/04	2	SEP	Hoary Bat	Fatality	Bat	Bat	26	48	351	N	<1	Stand.	7
H04-081	09/06/04	2	SEP	Hoary Bat	Fatality	Bat	Bat	26	48	354	N	<1	Stand.	10
H04-117	10/12/04	2	OCT	Virginia Rail	Fatality	Bird	Other Bird	62	42	57	ENE	<14	Stand.	73
H04-077	08/31/04	2	AUG	Sora	Fatality	Bird	Other Bird	8*	34	87	E	<7	Stand.	103
H04-069	08/20/04	2	AUG	Rock Dove	Fatality	Bird	Other Bird	33	35	95	E	UNK	Stand.	111
H04-118	10/12/04	2	OCT	Northern Flicker	Fatality	Bird	Other Bird	63*	52	98	E	<1	Stand.	114
H04-065	08/11/04	2	AUG	Virginia Rail	Fatality	Bird	Other Bird	43	67	153	SSE	<7	Stand.	169
H04-086	09/06/04	2	SEP	Rock Dove	Fatality	Bird	Other Bird	34*	69	167	SSE	UNK	Stand.	183
H04-153	12/23/04	2	DEC	Sora	Fatality	Bird	Other Bird	5	16	231	SW	<4	Stand.	247
H04-133	10/25/04	2	OCT	Turkey Vulture	Fatality	Bird	Other Bird	85	19	294	WNW	<4	Stand.	310
H04-152	12/20/04	2	DEC	America n Coot	Fatality	Bird	Other Bird	44	26	346	NNW	<1	Stand.	2
H05-026	05/17/05	2	MAY	Warblin g Vireo	Fatality	Bird	Passeri ne	2	49	3	N	<4	Stand.	19
H05-016	04/26/05	2	APR	Red-winged Blackbir	Fatality	Bird	Passeri ne	23	34	4	N	UNK	Stand.	20

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H04-076	08/31/04	2	AUG	Tree Swallow	Fatality	Bird	Passerine	1*	61	7	N	<1	Stand.	23
H05-036	07/03/05	2	JUL	Horned Lark	Fatality	Bird	Passerine	4	3	22	NNE	<4	Stand.	38
H05-023	05/10/05	2	APR	Red-winged Blackbird	Fatality	Bird	Passerine	18	69	22	NNE	<14	Stand.	38
H05-018	04/30/05	2	APR	Horned Lark	Fatality	Bird	Passerine	90*	5	23	NNE	<4	Stand.	39
H05-037	07/09/05	2	JUN	Horned Lark	Fatality	Bird	Passerine	18	31	27	NNE	<14	Stand.	43
H05-028	05/26/05	2	MAY	Horned Lark	Fatality	Bird	Passerine	57	71	27	NNE	UNK	Stand.	43
H05-033	06/20/05	2	JUN	Red-winged Blackbird	Fatality	Bird	Passerine	24*	43	31	NNE	<14	Stand.	47
H04-110	09/30/04	2	SEP	Wilson's Warbler	Fatality	Bird	Passerine	15	40	41	NE	<4	Stand.	57
H05-022	05/10/05	2	MAY	Red-winged Blackbird	Fatality	Bird	Passerine	18	71	43	NE	UNK	Stand.	59
H04-082	09/06/04	2	SEP	Unidentified Warbler - probably Dendroica	Fatality	Bird	Passerine	31	59	48	NE	UNK	Stand.	64
H05-021	05/10/05	2	MAY	Red-winged Blackbird	Fatality	Bird	Passerine	18	57	57	ENE	<7	Stand.	73
H04-130	10/15/04	2	OCT	Townsend's Warbler	Fatality	Bird	Passerine	19	70	71	ENE	<14	Stand.	87
H05-017	04/29/05	2	APR	Red-winged Blackbird	Fatality	Bird	Passerine	85	1	71	ENE	<1	Stand.	87
H05-029	06/03/05	2	JUN	Red-winged Blackbird	Fatality	Bird	Passerine	79	41	86	E	UNK	Stand.	102
H05-025	05/13/05	2	MAY	Red-winged Blackbird	Fatality	Bird	Passerine	90*	44	91	E	<4	Stand.	107
H05-027	05/24/05	2	MAY	Yellow Warbler	Fatality	Bird	Passerine	82	47	92	E	<4	Stand.	108
H04-144	11/12/04	2	NOV	Horned Lark	Fatality	Bird	Passerine	8	27	111	ESE	<1	Stand.	127
H04-150	12/02/04	2	DEC	American Pipit	Fatality	Bird	Passerine	41	60	124	SE	<1	Stand.	140
H05-001	01/14/05	2	JAN	Red-winged Blackbird	Fatality	Bird	Passerine	17	15	138	SE	<1	Stand.	154
H05-003	01/31/05	2	JAN	Western Meadowlark	Fatality	Bird	Passerine	85	39	166	SSE	<4	Stand.	182
H04-111	10/05/04	2	SEP	Horned Lark	Fatality	Bird	Passerine	31	47	219	SW	<30	Stand.	235
H04-127	10/14/04	2	OCT	Horned Lark	Fatality	Bird	Passerine	5	8	220	SW	<4	Stand.	236
H04-142	11/07/04	2	NOV	European	Fatality	Bird	Passerine	42*	1	289	WNW	<4	Stand.	305

H05-012	03/31/05	2	MAR	Starling American Pipit	Fatality	Bird	Passerine	53	6	293	WNW	<4	Stand.	309
H05-020	05/10/05	2	APR	Red-winged Blackbird	Fatality	Bird	Passerine	17	41	323	NW	<30	Stand.	339
H05-032	06/20/05	2	JUN	Red-winged Blackbird	Fatality	Bird	Passerine	22	66	334	NNW	UNK	Stand.	350
H04-137	10/26/04	2	OCT	European Starling	Fatality	Bird	Passerine	59*	24	342	NNW	<4	Stand.	358
H05-030	06/12/05	2	JUN	Red-winged Blackbird	Fatality	Bird	Passerine	51*	43	352	N	<14	Stand.	8
H05-014	04/14/05	2	APR	American Kestrel	Fatality	Bird	Raptor	71*	27	0	N	<4	Stand.	16
H04-129	10/15/04	2	OCT	Red-tailed Hawk	Fatality	Bird	Raptor	16*	64	4	N	<14	Stand.	20
H04-132	10/22/04	2	OCT	American Kestrel	Fatality	Bird	Raptor	36	57	10	N	<7	Stand.	26
H04-116	10/12/04	2	OCT	American Kestrel	Fatality	Bird	Raptor	58	52	24	NNE	UNK	Stand.	40
H04-072	08/25/04	2	AUG	Barn Owl	Fatality	Bird	Raptor	53	54	38	NE	<4	Stand.	54
H04-140	10/31/04	2	OCT	American Kestrel	Fatality	Bird	Raptor	15	7	54	NE	<7	Stand.	70
H04-100	09/21/04	2	SEP	American Kestrel	Fatality	Bird	Raptor	37	33	73	ENE	<4	Stand.	89
H04-122	10/12/04	2	OCT	American Kestrel	Fatality	Bird	Raptor	68	41	73	ENE	UNK	Stand.	89
H04-090	09/09/04	2	SEP	American Kestrel	Fatality	Bird	Raptor	42*	51	75	ENE	UNK	Stand.	91
H04-094	09/13/04	2	SEP	American Kestrel	Fatality	Bird	Raptor	67*	29	110	ESE	UNK	Stand.	126
H04-088	09/08/04	2	SEP	American Kestrel	Fatality	Bird	Raptor	41	26	116	ESE	UNK	Stand.	132
H04-143	11/07/04	2	OCT	Red-tailed Hawk	Fatality	Bird	Raptor	51*	61	121	ESE	<14	Stand.	137
H04-071	08/24/04	2	AUG	American Kestrel	Fatality	Bird	Raptor	87*	16	121	ESE	<14	Stand.	137
H04-107	09/28/04	2	SEP	American Kestrel	Fatality	Bird	Raptor	76	10	140	SE	<7	Stand.	156
H04-103	09/22/04	2	SEP	Red-tailed Hawk	Injury	Bird	Raptor	53	357	143	SE	<1	Stand.	159
H05-004	02/11/05	2	FEB	Red-tailed Hawk	Fatality	Bird	Raptor	87*	17	184	S	<1	Stand.	200
H04-138	10/28/04	2	OCT	American Kestrel	Fatality	Bird	Raptor	70	31	186	S	<1	Stand.	202
H04-112	10/05/04	2	OCT	American Kestrel	Fatality	Bird	Raptor	82	35	200	SSW	UNK	Stand.	216
H04-102	09/22/04	2	SEP	Barn Owl	Fatality	Bird	Raptor	49	72	207	SSW	UNK	Stand.	223
H04-131	10/21/04	2	OCT	Red-tailed Hawk	Fatality	Bird	Raptor	29	45	217	SW	<14	Stand.	233
H04-145	11/15/04	2	NOV	American Kestrel	Fatality	Bird	Raptor	21	31	269	W	<14	Stand.	285
H05-005	02/24/05	2	FEB	American Kestrel	Fatality	Bird	Raptor	9	21	293	WNW	UNK	Stand.	309
H04-146	11/15/04	2	NOV	Rough-legged Hawk	Fatality	Bird	Raptor	23	29	313	NW	<1	Stand.	329

H05-031	06/18/05	2	JUN	Red-tailed Hawk	Fatality	Bird	Raptor	80	50	339	NNW	<7	Stand.	355
H04-151	12/09/04	2	DEC	White-tailed Kite	Fatality	Bird	Raptor	77	69	348	NNW	<1	Stand.	4
H04-134	10/25/04	2	OCT	Red-tailed Hawk	Fatality	Bird	Raptor	43	17	350	N	<4	Stand.	6
H05-002	01/20/05	2	JAN	American Kestrel	Fatality	Bird	Raptor	67*	11	358	N	<7	Stand.	14
H04-075	08/30/04	2	AUG	Red-tailed Hawk	Injury	Bird	Raptor	SITE	n/a	n/a	n/a	<1	Stand.	n/a

* Asterisk denotes tower with FAA lighting

Appendix I. Permit conditions regarding mitigation of project impacts.

> **BIO-7c:** Prior to project operation, a Raptor Mitigation Plan (RMP) shall be developed in consultation with California Department of Fish and Game and U.S. Fish and Wildlife Service. The Plan shall contain specific provisions for action to minimize or offset impacts to golden eagles and other raptors and shall include some or all of the following:

- Control of rodent populations along and around turbine pads and access roads, to avoid attracting foraging raptors.
- Enhancement of open space areas within the Project Area or in suitable areas off-site as raptor nesting and foraging habitat through the acquisition of conservation easements or the placement of nesting substrate (nesting boxes, trees, perches, and/or other natural or artificial features).
- Donations to raptor rehabilitation centers in the Project Area, such as the University of California, Davis, Raptor Center.
- Based on the studies on avian mortality performed by the project developer, the project developer shall implement measures in accordance with the RMP, proportional to the documented loss of individuals.
- To ensure that appropriate mitigation measures are carried out, including both research and monitoring efforts and the subsequent implementation of measures to lessen impacts, the project proponent shall establish an escrow account in an amount to be determined in consultation with CDFG, USFWS and the County, as part of the RMP. The amount in escrow shall reflect accepted costs of monitoring to professional standards and a "performance bond" for mitigation based on estimates of avian mortality contained in [the EIR].