Leaning Juniper II Wind Power Facility
Wildlife Fatality Monitoring Study
January 2011–July 2013

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Executive Summary

The Leaning Juniper II Wind Power Facility (Project) is located south of Arlington in Gilliam County, Oregon and is owned and operated by Leaning Juniper Wind Power II, LLC (LJWPII), which is owned by Iberdrola Renewables, LLC. Commercial operations began in June 2011. The Project consists of 117 wind turbines, three non-guyed meteorological towers, and other related or supporting facilities as described in the site certificate. The Project is comprised of two areas, referred to as Leaning Juniper IIA and IIB. Leaning Juniper IIA has 43 Suzlon S88 2.1 megawatt (MW) turbines for an installed capacity of 90.3 MW. Leaning Juniper IIB has 74 GE 1.5 MW sle turbines for an installed capacity of 111 MW. Combined, the Project has an installed capacity of 201.3 megawatts. General habitat types present within the Project boundary are non-irrigated agricultural, shrub-steppe, native perennial grassland, non-native annual grassland, and revegetated grassland.

Post-construction wildlife monitoring at Leaning Juniper II consists of five principal components: avian and bat fatality monitoring, a wildlife reporting and handling system, raptor nest surveys, Washington ground squirrel monitoring, and grassland bird studies. Raptor nesting surveys, Washington ground squirrel surveys and grassland bird surveys were conducted in the spring/summer of 2011 and were previously reported in Downes et al., 2012. This report summarizes two years of post-construction avian and bat fatality monitoring implemented by Northwest Wildlife Consultants, Inc. (NWC) and summarizes fatalities found under the Wildlife Reporting and Handling System managed by Leaning Juniper II operations staff.

Avian and Bat Fatality Monitoring

The primary objective of the avian and bat fatality monitoring is to estimate the number of avian and bat fatalities attributable to the operating wind facility on an annual basis. Avian and bat fatality monitoring consists of four primary components: 1) standardized carcass searches at selected turbines, 2) searcher efficiency trials to estimate the proportion of available carcasses found by searchers, 3) carcass removal trials to estimate the length of time a carcass remains available for detection, and 4) statistical analyses that use results of the searcher efficiency and carcass removal trials (collectively referred to as bias correction trials) to adjust observed fatality rates to obtain estimated fatality rates.

In standardized carcass searches, 50 turbines were selected for searching each year for two years through a stratified random design. Seven turbines on IIA were sampled both years. This resulted in 79% (93/117) of the Project's turbines being sampled during the two years of monitoring. Further, the 50 turbines selected were divided into 25 turbines at IIA and 25 at IIB. This resulted in 100% (43/43) of the turbines on IIA being searched and 68% (50/74) of the turbines on IIB being searched. A 240-meter square search plot centered on the turbine was delineated at each turbine base selected for search on IIA, and a 246-meter square search plot centered on the turbine was delineated at each turbine base selected for search on IIB. Search plots were walked in six-meter transects. Following an initial clean-up search, turbines were searched 16 times during each year of monitoring. Searches were conducted twice a month during spring and fall seasons and once a month during summer and winter seasons.

Bias correction trials—carcass removal and searcher efficiency trials—were conducted during each of the four seasons, and their results were used to correct for scavenging and observer detection bias of observed avian and bat fatalities during standardized carcass searches. Bias correction trial results yielded relatively long carcass removal rates and high searcher efficiency rates.

One hundred twenty-five fatalities—100 birds and 25 bats—were found during standardized searches from July 2011 through July 2013. During avian and bat fatality monitoring, three avian and two bat fatalities were found incidentally (that is, not on a scheduled search) by NWC crews. Additionally, two bats were found incidentally on search plots under the Wildlife Reporting and Handling System (also referred to as the Wildlife Monitoring and Reporting System by Iberdrola Renewables) and were used in calculating fatality estimates. One fatality (a nestling western meadowlark) found on scheduled searches was determined not to be attributable to Project operation and was not used for fatality estimates. One hundred twenty-six fatalities—99 birds and 27 bats—were used for calculating the fatality estimates.

Twenty-six species of birds and two species of bats were found during standardized searches. Passerines were the most frequently found taxon (80% of total fatalities) on standardized searches; horned lark was the most frequently found species (47%). Hoary and silver-haired bats were found as fatalities in nearly equal percentages during standardized searches (52% vs. 48%, respectively).

Seasonal distribution of observed avian fatalities from standardized searches showed a peak in October. Observed fatalities in February, April, May, July, August, September, and October were also higher than other months. The peak of observed bat fatalities was in September.

Two raptors (both Swainson's hawks) were found incidentally prior to the start of the study period. Ten raptor fatalities were found during the formal two-year study period (July 2011–July 2013) of wildlife fatality monitoring. Three were found as incidentals; these were one American kestrel, one golden eagle, and one Swainson's hawk, and none was on a search plot. One raptor, a Swainson's hawk, was found during clean-up searches. Six raptors were found during standardized searches used for fatality estimates; these were one ferruginous hawk, one long-eared owl, and four Swainson's hawks.

One federal special status species, golden eagle, was found incidentally as a fatality (one individual). Golden eagle is listed under the Bald and Golden Eagle Protection Act (BGEPA). Three Oregon State Sensitive avian species were found. These were ferruginous hawk (Sensitive-Critical; one individual), Lewis' woodpecker (Sensitive-Critical; one) and Swainson's hawk (Sensitive-Vulnerable; eight). Two species of State Sensitive mammals, hoary bat and silver-haired bat, were found.

Annual estimated fatality rates for combined turbine types were calculated using two estimators, Schoenfeld and Huso. For Schoenfeld, estimated average annual all bird fatality for the Project was 450 birds, 2.24 per MW/year and 3.85 per turbine/year. Estimated average annual raptor fatality for the Project was 9 raptors, 0.05 per MW/year and 0.08 per turbine/year. Estimated mean annual bat fatality for the Project was 122 bats, 0.60 per MW/year and 1.04 per turbine/ year. For Huso, estimated average annual all bird fatality for the Project was 504 birds, 2.50 per MW/year and 4.31 per turbine/year. Estimated average annual raptor fatality for the Project was 14 raptors, 0.06 per MW/year and 0.09 per turbine/year. Estimated mean annual bat fatality for the Project was 126 bats, 0.63 per MW/year and 1.08 per turbine/ year.

Wildlife Reporting and Handling System

Prior to the start of avian and bat fatality monitoring in July 2011, two avian fatalities were reported to NWC by Leaning Juniper II staff. Both were Swainson's hawks. During the two-year avian and bat fatality monitoring period, two avian fatalities and two bat fatalities were reported to NWC by Leaning Juniper II staff. The avian fatalities were an American kestrel and a golden eagle. The bat fatalities were a silver-haired bat and a hoary bat.

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1.0 INTRODUCTION

1.1 Wind Project Description

The Leaning Juniper II Wind Power Facility (LJF; also referred to as the "Project" in this report) is owned and operated by Leaning Juniper Wind Power II, LLC (LJWPII), which is owned by Iberdrola Renewables, LLC. A permit ("Site Certificate") for construction and operations was issued to LJWPII by the Oregon Energy Facility Siting Council in 2007 (LJWPII, 2007) and an Amended Site Certificate was issued in 2009 (LJWPII, 2009a). The Project is located south of Arlington, Gilliam County, Oregon. Commercial operations began in June 2011. The Project consists of 117 wind turbines, three non-guyed meteorological (met) towers, and other related or supporting facilities as described in the site certificate. The Project is comprised of two areas, referred to as Leaning Juniper IIA and IIB. Leaning Juniper IIA has 43 Suzlon S88 2.1 megawatt (MW) turbines for an installed capacity of 90.3 MW. The Suzlon turbines have a rotor diameter of 88 meters and a hub height of 79 meters. Leaning Juniper IIB has 74 GE 1.5 MW sle turbines for an installed capacity of 111 MW. The GE turbines have a rotor diameter of 77 meters and a hub height of 80 meters. Combined, the Project has an installed capacity of 201.3 megawatts.

General habitat types present within the Project boundary (also referred to as the Facility boundary) are non-irrigated agricultural, shrub-steppe, native perennial grassland (both of which are used for livestock grazing), non-native annual grassland, and revegetated grassland. Some of the revegetated grassland (prior farmland) may be enrolled in the federal Conservation Reserve Program (CRP). The agricultural lands were in active crop (wheat) production, in a fallow stage, or bare ground (tilled/plowed). Scattered juniper trees and rock outcrops are also present.

1.2 Post-construction Wildlife Monitoring Study

The 2009 Amended Site Certificate contains a study plan for operations phase wildlife monitoring. The Wildlife Monitoring and Mitigation Plan (WMMP; LJWPII, 2009b) consists of five components whose methods are further described in Section 2.0 of this report:

- Avian and bat fatality monitoring including:
  - Standardized carcass searches
  - Carcass removal trials
  - Searcher efficiency trials
  - Statistical analysis
- Raptor nesting surveys (conducted in 2011 and reported in Downes et al, 2012)
- Washington ground squirrel surveys (conducted in 2011 and reported in Downes et al, 2012)
- Grassland bird study (conducted in 2011 and reported in Downes et al, 2012)
- Wildlife Reporting and Handling System (also referred to as Wildlife Monitoring and Reporting System by Iberdrola Renewables)

This report summarizes the two years of avian and bat fatality monitoring planned for the Project (July 2011 through July 2013). The report is for the period January 2011 through July 2013, as training under the wildlife reporting and handling system started in January 2011. Raptor nesting surveys, Washington ground squirrel surveys and grassland bird surveys were conducted in the spring/summer of 2011 and are not included in this report (previously reported in Downes et al., 2012). Substantial construction completion of Leaning Juniper IIA facilities occurred by October 20, 2010 and IIB facilities were completed on December 20, 2010. Commercial operation for the full Project began on June 9, 2011.

The objective of fatality monitoring is to determine whether the facility causes significant fatalities of birds and bats. Avian and bat fatality monitoring was scheduled to be initiated

one month following the start of commercial operations. There was a delay of several months from substantial completion of construction and the official start of operations. Commercial operation began in June 2011 and the first year of the two-year formal fatality monitoring study was initiated in July 2011. Reporting of incidentally-found fatalities was established in January 2011 following the training of LJWPII operations staff by NWC biologists for the handling and reporting of wildlife injuries and fatalities. Construction was substantially completed at both IIA and IIB by the end of 2010; minor routine turbine testing and routine inspections and maintenance occurred from late 2010 through June 9, 2011.

2.0 METHODS

2.1 Standardized Carcass Searches

Wildlife fatality monitoring seeks to estimate the number of avian and bat fatalities attributable to the operating wind facility on an annual basis by using the following components:

- Standardized carcass searches to record number of fatalities found ("observed fatalities")
- Searcher efficiency trials to estimate percentage of carcasses located by searchers
- Carcass removal trials to estimate length of time a carcass remains (persists) in the field prior to removal or decay beyond searcher detection ability.

2.2 Standardized Search Plots

In standardized carcass searches, 50 turbines were selected for searching through a stratified random design. This resulted in 43% (50/117) of the Project's turbines sampled during each year of monitoring. Further, the 50 turbines selected for searches each year were divided into 25 turbines at IIA and 25 at IIB. The goal of turbine sampling was to not re-select turbines for year two that were used during year one of monitoring. However, as IIA contains only 43 turbines, there were not enough turbines to prevent re-selection. Thus, seven turbines (D2, D3, F1, X4, X5, Y1 and Y2) were randomly selected to be sampled during both years of monitoring. No re-selection of turbines occurred at IIB. Cumulative sampling for the two years of monitoring involved 79% of the Project's turbines (93/117), 100% (43/43) of turbines at IIA and 68% (50/74) of turbines at IIB. Location of the turbines selected for monitoring is shown in Figure 1. Where possible, turbines were grouped in pairs to allow two searchers to work together for safety.

The 50 selected turbines were systematically surveyed for avian and bat fatalities. A 240-meter square search plot centered on the turbine was delineated at each turbine base selected for search on IIA, and a 246-meter square search plot centered on the turbine was delineated at each turbine base on IIB. Turbine plots on IIA had a maximum perpendicular distance from the turbine of 120 meters and a diagonal distance of 170 meters (Figure 2a). Turbine plots on IIB had a maximum perpendicular distance from the turbine of 123-meters and a diagonal distance of 174-meters (Figure 2b). Turbines selected for monitoring are outlined below.

Year One:
IIA turbines: B2, B3, C1, C2, C4, D1, D2, D3, D4, F1, H3, H4, M1, M2, T2, T3, X1, X2, X4, X5, Y1, Y2, Z1, Z2 and Z5.
IIB turbines: BB1, BB2, BB5, CC1, CC2, CC9, CC10, DD4, DD5, DD7, DD8, FF1, FF2, FF4, FF5, GG8, GG9, JJ10, JJ11, JJ14, JJ15, KK4, KK5, KK9 and KK10.

Year Two:
IIA turbines: B1, B4, B5, B6 B7, C3, D2, D3, D5, F1, H2, K1, K2, M3, T4, T5, T6, X3, X4, X5, Y1, Y2, Y3, Z3 and Z4.

IIB turbines: BB3, BB4, CC5, CC6, CC7, CC8, GG1, GG2, GG3, GG4, GG6, GG7, GG10, HH2, HH3, HH5, HH6, HH7, JJ1, JJ2, JJ3, JJ8, JJ9, KK7 and KK8.

2.3 Search Schedule

Standardized searches were conducted according to the search schedule outlined in the WMMP. Number of searches and season definitions are presented in Table 1. A clean-up search was conducted from July 14–18, 2011 to remove fatalities from plots prior to the start of standardized searches that would be used to estimate fatality levels. A clean-up search for the second year of monitoring was conducted from July 19–24, 2012. Following the clean-up search, 16 searches were conducted each year (32 over the two-year period). Fatalities found during the 32 searches plus incidentals found on search plots were used for annual fatality estimation as outlined in the WMMP. The first search period used for the year one fatality estimation was August 17–23, 2011 and the last search period was July 12–17, 2012. The first search period used for the year two fatality estimation was August 20–24, 2012 and the last search period was July 15–22, 2013. As described in Section 2.1.2, some IIA turbines were searched during both monitoring years.

Turbine searches were completed on the scheduled day except in case of weather-related events such as freezing fog, high winds, lightning or snow. Searches were not conducted under these conditions for reasons of searcher safety, poor detectability, or both. If search conditions improved in the days immediately following the planned search, a delayed search was completed. If search conditions did not improve beyond the mid-point of the search interval, the search would have been canceled and turbine plots would not be searched until the next available search period. No searches were canceled. The January 2011 search was delayed eight days due to snow depth.. Occasionally, planned search schedules were adjusted slightly (started the day before or the day after) as needed.

2.4 Search Protocol and Data Collection

Personnel trained and experienced in search techniques ("searchers") searched for fatalities by walking parallel transects spaced at six-meter intervals across the search plots. Searchers walked at a rate of approximately 45–60 meters per minute along each transect, searching both sides of the transect out to three meters for fatalities.

For each fatality found, observers recorded species, sex and age (when possible to determine), date and time collected, location, condition, and any comments helpful for assessing when the casualty occurred and cause of death (such as injuries or dismemberment). For carcasses where a different cause of death was not apparent, the fatality was attributed to the Project.

The found fatality was assigned to the turbine within the search plot unless otherwise noted (such as incidentals not found near turbines). The term "turbine" for this study refers to a turbine search plot (as described in Section 2.1.2), which consists of one turbine and it's defined search area. All fatalities found near turbines were grouped with a turbine even if the turbine itself may not have been the cause of collision (i.e., a vehicle strike or other Project-related activity was the cause of the collision).

All carcasses found were labeled with a unique number, bagged, and frozen for future reference. A freezer tag or a copy of the data sheet for each carcass was inserted with the bagged specimen. All fatalities were photographed as found, and coordinates of the fatality were taken. All carcasses were collected and stored in accordance with ODFW and United States Fish and Wildlife Service (USFWS) collection and salvage permits obtained by NWC.

At the end of the monitoring year, biologists experienced in avian and bat fatality identification examined each fatality in detail to reconfirm identification or further identify species, age, and sex. Any fatalities that were suspected to be special status species were confirmed to species, when feasible, shortly after their discovery.

2.5 Definitions

The following definitions for fatality condition, taxonomic group, age and size are used for this study. Incidentals and State of Oregon Special Status Species are also defined.

Fatality Condition

- Intact – a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- Scavenged – an entire carcass that shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass (e.g., wings, skeletal remains, legs, pieces of skin, etc.).
- Feather Spot – 10 or more feathers or 2 or more primaries (the outermost 9–12 wing feathers) or 2 or more tail feathers at one location, indicating predation or scavenging.
- Dismembered – a carcass in 2 or more pieces, not readily attributable to scavengers; may not include all parts of the carcass.

Taxonomic Group

Bird casualties were assigned to a taxonomic group. Taxonomic groups are defined by the American Ornithologist Union Checklist of North American Birds, Seventh Edition (AOU, 1998). Common names are listed in this report in convention with AOU through the 53rd supplement of the seventh edition (AOU, 2012). The basic definitions of the taxonomic groups found as casualties are as follows:

- Dove – Any member of the order Columbiformes.
- Passerine – Any member of the order Passeriformes, or perching birds.
- Raptor – Any diurnal or nocturnal bird of prey belonging to the orders Falconiformes or Strigiformes. This includes falcons, hawks and owls (USFWS, 2002).
- Gamebird – Any member of the order Galliformes.
- Goatsucker – Any member of the order Caprimulgiformes.
- Gull – Any member of the family Laridae.
- Vulture – Any member of the family Cathartidae.
- Woodpecker – Any member of the order Piciformes.

Age

Bird and bat fatalities were aged and sexed (when possible), and these data were entered into the database. The terms adult, immature, and juvenile are used in this report. The following definitions are applied to any mention of age:

- Birds - Birds were classified as immature if they were found as fatalities during the year of hatch. Birds were classified as adult if they were found as fatalities after the year of hatch. Birds were classified as juvenile if they were still in nestling plumage and had not reached an immature plumage. Typically, juveniles obtain immature plumage within a month or two of leaving the nest. This follows the convention for aging birds as described in Pyle (1997, 2008). The exception to this rule is for taxa such as gulls or raptors that take multiple years to obtain adult status. Birds classified as sub-adult birds (more than one year old but not an adult) were also classified as immature birds. Birds were aged by a combination of techniques including molt limits, feather wear, and other characteristics (Pyle, 1997; 2008).

- Bats - Bats were aged using ossification of wing joints. Bats were classified as immature if their wing joints were not fully ossified. Bats were aged as adults if full ossification of wing joints was present or if timing of fatality (spring) led to the conclusion that the bat had to be an adult. Aging of bats during the fall can be difficult, as young of the year are in a transition period between immature and adult stage; the age of some fall bat fatalities was recorded as unknown.

Size

The WMMP does not define size classes. Size class definitions of other wildlife fatality monitoring studies conducted in the nearby area—Leaning Juniper I (Gritski et al., 2008), Rattlesnake Road (Gritski et al., 2011), Wheat Field (Gritski and Downes, 2011a) and Willow Winds (NWC, 2011)—were used to insure consistency among wildlife monitoring post-construction studies. Species were classified as large if total length was greater than nine inches as listed in Sibley, 2000 and were classified as small if the total length was nine inches or less. These two size classes of fatalities matched bias correction trials and allowed for estimation of annual fatalities. All bats were classified within the small category.

Incidentals

Incidental discoveries include fatalities observed on non-searched turbines, on search turbines but not during the scheduled searches, or found elsewhere on the Project. These could have been found either by NWC biologists or by Leaning Juniper II employees (discussed in Section 2.1.6). The discoveries were documented in a fashion similar to those found during standardized searches. The specific permit compliance protocol for the reporting and handling of injured or dead birds and bats is included in the WMMP (LJWPII, 2009b).

Incidentals are noted in this report, but are not displayed in the figures or used in tables (except where specifically noted). Incidentals found outside of the search plots were not included in calculation of estimated annual fatality rates.

State of Oregon Special Status Species

At Leaning Juniper II, several Oregon State Sensitive status wildlife species are known to occur or have the potential to be present. A partial status definition of each category is listed below. For full definitions of all special statuses and a listing of special status species in Oregon, refer to ODFW, 2008.

- State Endangered: These are species whose status is such that they are at some degree of risk of becoming extinct. Under State law (ORS 496.171-496.192) the Fish and Wildlife Commission through ODFW maintains the list of native wildlife species in Oregon that have been determined to be either "threatened" or "endangered" according to criteria set forth by rule (OAR 635-100-0105).
- State Sensitive-Critical: Species are imperiled with extirpation from a specific geographic area of the State because of small population sizes, habitat loss or degradation, and/or immediate threats. Critical species may decline to the point of qualifying for threatened or endangered status if conservation actions are not taken.
- State Sensitive-Vulnerable: Species facing one or more threats to their populations and/or habitat. Vulnerable species are not currently imperiled with extirpation from a specific geographic area or the State, but could become so with continued or increased threats to populations and/or threats.

Fatality Categories

The WMMP specifies bats and seven categories of birds for which fatality estimates are to be reported (LJWPII, 2009b, page A-5). After two years of study, in addition to these eight fatality categories, the WMMP also requires fatality estimates for another category—raptor species of concern (LJWPII, 2009b, page A-9). The nine categories are defined as:

All Birds: All bird species, regardless of size or taxon.

Small Birds: All bird species whose adult size has an average length of nine inches or less.

Large Birds: All bird species whose adult size has an average length of greater than nine inches.

Raptors: All eagles, hawks, falcons and owls, including burrowing owls.

Raptor Species of Special Concern: Includes Swainson's hawk, ferruginous hawk, peregrine falcon, golden eagle, bald eagle, burrowing owl, and any federal threatened or endangered raptor species.

Grassland Birds: All native bird species that rely on grassland habitat and are either resident species occurring year round or species that nest in the area, excluding horned lark, burrowing owl and northern harrier.

Nocturnal Migrants: Any avian species known to migrate at night for which the fatality occurred during its potential migration season. This does not include species breeding or wintering on the Project, or taxa such as woodpeckers or raptors that regularly migrate during the day. Taxa included in this category for this study were passerines and goatsuckers that were found during spring and fall migration periods.

Oregon State Sensitive Avian Species: Includes any species listed under OAR 635-100-0040 including Sensitive-Critical, Sensitive-Vulnerable, and any listed species. Excludes raptor species listed under "Raptor species of special concern."

Bats: All bats.

2.6 Wildlife Reporting and Handling System

Protocols for reporting and handling of dead or injured wildlife found incidentally by operations personnel during the wildlife monitoring study are described in detail in the WMMP (LJWPII, 2009b). The Wildlife Reporting and Handling System is also called the Wildlife Monitoring and Reporting System by Iberdrola Renewables. Any carcasses found by maintenance personnel were recorded, photographed, and reported to Iberdrola personnel who reported the incident to the designated NWC biologist. The NWC biologist identified and collected data on the fatality in the same manner as fatalities found during NWC searches. These fatalities were treated as incidental discoveries and are lumped into the incidental category for tables in this report. Incidentals found that were within the search plots were included in the fatality estimates.

2.7 Observed Fatality Rates of Nocturnal Migrants at Lit and Unlit Turbines

As specified in the WMMP (page A-9), differences in observed nocturnal avian migrant and bat fatality rates were compared between lit turbines and unlit turbines that are adjacent to lit turbines. Observed nocturnal avian and bat fatality rates were also compared for lit turbines and unlit turbines that were not adjacent to lit turbines. A difference of means test was used, with a significance value of 0.10 to determine if there was a statistically significant difference among groups. The turbine was the sample unit and numbers of observed nocturnal avian and bat fatalities were counted for each turbine. Nocturnal avian fatalities are defined in Section 2.5.

2.8 Searcher Efficiency Trials

Searcher Efficiency (SE) trials were conducted to estimate the percentage of avian/bat fatalities that were found by searchers. Carcasses were placed in search plots by a biologist not doing the searching, who subsequently documented the number of these carcasses found by searchers during standardized carcass searches. Personnel conducting the searches were not informed of the dates of the trials or the location of the carcasses. SE trials were conducted during multiple dates during each of the four seasons, during both years, and on both Leaning Juniper IIA and IIB in roughly equal proportions. Results of searcher efficiency trials were used in conjunction with observed fatalities (and results of the carcass removal trials described below) to arrive at estimates of turbine fatalities.

Immediately following each trial, the test administrator removed the carcasses and adjusted trial carcass numbers for any carcasses deemed to have been removed (as by scavengers) prior to the search. Carcasses were deemed to have been removed if the carcass was not found by searchers and was no longer present to be recovered by the test administrator. Numbers reflected in this report represent only trial carcasses that were recovered by the test administrator.

During two years of monitoring, 324 searcher efficiency trial carcasses (165 large and 159 small) were placed. This exceeds the number specified in the WMMP. The language as stated in the WMMP calls for approximately 25 trial carcasses per season and approximately 100 trial carcasses per year. Small carcasses (e.g., European starling, house sparrow, red-winged blackbird, white-crowned sparrow and various gamebird chicks) were used to represent small birds such as passerines. Large carcasses (e.g. barn owl, California quail, Canada goose, Eurasian collared-dove, mallard and ring-necked pheasant) were used to represent large birds. Carcasses were distributed throughout the different habitat types present on the search plots. Small brown birds were used to simulate bat carcasses.

2.9 Carcass Removal Trials

Estimates of carcass removal were used to adjust observed fatalities (carcasses found) for removal bias for the two-year monitoring period. Carcass removal includes removal by predation or scavenging or removal by other means (such as being plowed into a field). Carcass Removal Trials (CRT) were conducted during each of the four seasons, during both years, and on both Leaning Juniper IIA and IIB in equal proportions.

During the two years, 180 trial carcasses (79 large and 81 small) were placed. Each season the CRT consisted of randomly placing 20 bird carcasses of two size classes onto separate trial plots for 35 days. Similar numbers of large and small trial carcasses were placed during each season and year. These plots were located on non-searched turbines to avoid confusing CRT carcasses with actual wind facility related fatalities. Carcasses were checked every day for the first 4 days and again on day 7, day 10, day 14, day 21, day 28, and day 35. At the end of the 35-day trial period, any remaining birds and feathers were removed and stored or disposed of appropriately.

Small carcasses (e.g., European starling, horned lark, house sparrow, and various gamebird chicks) were used to represent small birds (such as passerines) and bats. Large carcasses (e.g. chukar, mallard and ring-necked pheasants) were used to represent large birds (such as raptors, game birds, and waterfowl).

2.10 Statistical Methods for Estimating Fatalities

Methods and processes for calculating estimates from bias trials and fatality estimates followed conventions outlined in Schoenfeld (2004) and Huso (2010).

Searcher Efficiency Trials

Estimates of the probability that a carcass was detected by an observer during a search (searcher efficiency) were used to adjust carcass counts for observer bias. The failure of an observer to detect a carcass that was on the search plot may have been due various factors including position of the carcass, habitat, or carcass size. In most fatality monitoring efforts, because time since death cannot be measured, it is assumed that a carcass' probability of being detected is constant over the period of the search interval.

As described in the WMMP, potential covariates included carcass size, habitat type, and season. Habitat was separated into two categories, native and agriculture. Replanted

grasslands were included in the native category due to their similarity (in use by wildlife generally) to native habitats. Other factors, such as position of the bird (hidden or exposed), were addressed by the random placement of the trials. Potential covariates selected for modeling were carcass size, habitat, season, and their various interactions. Interactions of covariates were examined for inclusion since carcass sizes might have different detection probability during different seasons or in different habitat types.

Data from 324 (165 large, 159 small bird) trials were fit to a logistic regression model. Model selection for searcher efficiency trials was conducted through the Akaike Information Criterion (AIC) approach (Burnham and Anderson, 2002). Covariates required in the WMMP (carcass size, habitat type, and season) were included in the model. Interaction of covariates was induded in the model only if their inclusion resulted in a change in the AIC of less than two. The model selected for the SE data induded carcass size, habitat type, and season (AIC- 430.38). That is, interaction factors did not significantly add to the model's value. Bootstrap estimates and 90% confidence intervals were obtained for searcher efficiency data and used in calculating fatality estimates.

Carcass Removal Trials

Estimates of the probability that a carcass was not removed in the interval between searches were used to adjust carcass counts for removal bias. As part of an underlying assumption of calculating carcass removal rates, it is assumed that carcass removal occurs at a constant rate and is not dependent on the time since death. This simplifying assumption allows estimation of fatality when search intervals exceed one day.

The length of time a carcass remains in the study area before it is removed is typically modeled as an exponentially distributed random variable. The probability that a carcass persists an interval of length I given that its death might have occurred on any day (d) in the interval can be roughly approximated as:

$$\hat{r} \cong \sum_{d=1}^{I} \exp(-(d-0.5)/t)/I$$

If carcass removal rates are rapid and the search interval is long enough, then I is the length of the effective interval at the turbine, i.e. the length of time when 99% of carcasses can be expected to be removed.

While 160 (79 large and 81 small) carcass removal trials (CRT) were placed during the study, habitat type did not have the minimum sample sizes (ten) to be included in the model for some seasons. Categories were randomly sampled among trials to meet the minimum sample sizes necessary for inclusion into the model. Random samples were added (all in agriculture habitat type) for fall season large size (one sample), winter season small size (one sample), spring season large size (one sample) and summer season small size (two samples). Trials were fit to an interval-censored parametric failure time model, with 'survival' rate modeled as a function of the covariates selected in modeling to account for a non-linear relationship between these factors. Survival rate is assumed to be inter-changeable with removal rates for this estimation.

As described in the WMMP, potential covariates included carcass size, habitat type, and season. Interactions of covariates were examined for inclusion since carcass sizes might have different removal probability during different seasons or in different habitat types.

The CRT data were modeled using an exponential failure time distribution, as an exponential distribution was the best fit to the carcass removal time at Leaning Juniper II. Model selection was conducted through the AIC approach (Burnham and Anderson, 2002). Covariates required in the WMMP (carcass size, habitat type, and season) were included in the model. Interaction of covariates was included in the model only if their inclusion resulted in a change in the AIC of less than two. The model selected for the CRT data included carcass size, habitat type, season, and the interaction of habitat type and season (AIC-729.97). Bootstrap estimates and 90% confidence intervals were obtained for carcass removal data and used in calculating fatality estimates.

Fatality Estimates

The WMMP statistical methods for fatality estimates describe a method known as the Schoenfeld estimator (Schoenfeld, 2004). A second estimator, the Huso estimator (Huso, 2010) has since been published in a peer-reviewed journal. This estimator was used in fatality analyses for several other wind-energy projects nearby, including the Leaning Juniper I, Pebble Springs, Rattlesnake Road, Wheat Field and Willow Winds wildlife fatality monitoring studies (Gritski et al., 2008; Gritski and Kronner, 2010a; Gritski et al., 2011; Gritski and Downes, 2011a; NWC, 2011). Fatality estimates from both estimators are presented in this report. As the Schoenfeld estimator method is the one prescribed by the WMMP, comparisons to other Columbia Plateau Ecoregion (CPE) projects use the Schoenfeld estimates and not the Huso estimates. The annual estimated fatality rate is reported as an estimate of (assumed wind project related) bird and bat fatalities on Project wide, per turbine, and per MW basis. Refer to Section 2.1.5 for the list of nine categories for which fatalities were calculated.

Variance in these estimates was due to sampling variance as well as to the uncertainty with which searcher efficiency and carcass persistence are estimated and uncertainty about the adequacy of the model in capturing the actual fatality rates. No closed-form solution is yet available for the variance of either estimator, so 90% confidence intervals of these estimates were calculated by bootstrapping (Manly, 1997). The lower 5th and upper 95th quantiles from 5000 bootstrapped estimates form the 90% confidence limits of the estimated mortality using the equation described above. The number of bootstrapped estimates used was derived from specifications in the WMMP (LJWPII, 2009b).

Schoenfeld

This estimator adjusts the observed number of fatalities by dividing the number of observed carcasses by an estimate of the probability that a carcass is available to be detected during a fatality search (i.e., the probability the carcass was not removed by a scavenger) and is observed (the probability of detection).

Observed Number of Carcasses

The estimated average number of carcasses ($\bar{c}$) observed per turbine per year is:

$$\bar{c} = \frac{\sum_{i=1}^{n} c_i}{k}$$

Estimation of Carcass Removal

Mean carcass removal time ($\bar{t}$) is the average length of time a carcass remains at the site before it is removed:

$$\bar{t} = \frac{\sum_{i=1}^{s} t_i}{s - s_c}$$

This estimator is the maximum likelihood estimator assuming the removal times follow an exponential distribution and there is right-censoring of data. Any trial carcasses still remaining at the end of the trial are collected, yielding censored observations. If all trial carcasses are removed before the end of the trial, then s_c is 0, and $\bar{t}$ is just the arithmetic average of the removal times.

Estimation of Observer Detection Rates

Observer detection rates (i.e., searcher efficiency rates) are expressed as *p*, the proportion of trial carcasses that are detected by searchers.

Estimation of Facility-Related Fatality Rates

The estimated per turbine annual fatality rate (m_t) is calculated by:

$$m_t = \frac{\bar{c}}{\hat{\pi}}$$

where $\hat{\pi}$ includes adjustments for both carcass removal (from scavenging and other means) and observer detection bias assuming that the carcass removal times t_i follow an exponential distribution. Under these assumptions, this detection probability is estimated by:

$$\hat{\pi} = \frac{\bar{t} \cdot p}{I} \cdot \left[\frac{\exp\left(I/\bar{t}\right) - 1}{\exp\left(I/\bar{t}\right) - 1 + p} \right]$$

The estimated per MW annual fatality rate (m) is calculated by:

$$m = \frac{m_t}{C}$$

where the variables in the above equations are defined as:

c_i	Number of carcasses detected at plot *i* for the study period of interest for which the cause of death is either unknown or is attributed to the facility
n	Number of search plots
k	Number of turbines searched (includes the turbines centered within each search plot and a proportion of the number of turbines adjacent to search plots to account for the effect of adjacent turbines on the search plot buffer area)
$\bar{c}$	Average number of carcasses observed per turbine per year
s	Number of carcasses used in removal trials
s_c	Number of carcasses in removal trials that remain in the study area after 40 days
se	Standard error (square of the sample variance of the mean)
t_i	The time (days) a carcass remains in the study area before it is removed
$\bar{t}$	the average time (days) a carcass remains in the study area before it is removed

d The total number of carcasses placed in searcher efficiency trials
p The estimated proportion of detectable carcasses found by searchers
I Interval between searches in days
$\hat{\pi}$ Estimated probability that a carcass is both available to be found during a search and is found
m_t Estimated annual average number of fatalities per turbine per year, adjusted for removal and observer detection bias
C Nameplate energy output of turbine in megawatts (MW)

Huso

Fatality estimates were derived using the Estimator software developed by Huso et al., 2012. Fatality numbers were modified by estimates of searcher efficiency and carcass removal to arrive at estimates of actual number of carcasses in the k^{th} size class at the i^{th} turbine during the j^{th} search using the following equation:

$$\hat{m}_{ijk} = \frac{c_{ijk}}{\hat{p}_{jk}\hat{r}_{jk}\hat{f}_{jk}}$$

where the variables in the above equation are defined as:

$\hat{m}_{ijk}$ Estimated mortality in the k^{th} size class that occurred at the i^{th} turbine during the j^{th} search
c_{ijk} Observed number of carcasses in the k^{th} size dass at the i^{th} turbine during the j^{th} search
$\hat{p}_{jk}$ Estimated probability that a carcass in the k^{th} size class that is on the ground during the j^{th} search will actually be seen by the observer
$\hat{\bar{t}}_{jk}$ Estimated average time (in days) that a carcass in the k^{th} size class that is killed during the j^{th} interval will persist
$\hat{r}_{jk}$ Estimated probability that a carcass in the k^{th} size class that died during the interval preceding the j^{th} search will remain unscavenged and observable. This is a function of the average carcass persistence rate, $\bar{t}$, estimated through searcher efficiency trials, and the length of the interval preceding the j^{th} search
$\hat{f}_{jk}$ Estimated *effective* interval, i.e. the ratio of the length of time before 99% of carcasses can be expected to be removed to the length of the search interval, or 1, whichever is less
$\hat{\bar{t}}_{jk}$, $\hat{r}_{jk}$, $\hat{f}_{jk}$ and $\hat{p}_{jk}$ are assumed not to differ among turbines, but differ with season (i.e. search (j) and carcass size (k)

The estimate of the total avian or bat mortality was calculated as:

$$\hat{m} = \frac{N\sum_{i=1}^{n}\sum_{j=1}^{s_i}\sum_{k=1}^{2}\hat{m}_{ijk}}{n}$$

where the variables in the above equation are defined as:

s_i Number of searches carried out at turbine i
n Number of turbines searched
N Total number of turbines at the site

3.0 RESULTS

This section summarizes the results of Leaning Juniper II avian and bat fatality monitoring for the period from July 2011 through July 2013. Also included are incidental fatalities found prior to the start of the formal avian and bat fatality monitoring in July 2011. Additional details for each casualty found during fatality monitoring can be found in Appendix A. Results from clean-up searches are used in tables and figures to obtain greater sample sizes of observed fatalities on searched turbines. Incidental fatalities are not used in figures or tables unless specifically noted. Incidental and clean-up search fatalities are not used in the fatality estimates except those incidentals that were found on scheduled search plots, as specified in the WMMP page A-6.

3.1 Incidental Avian and Bat Fatalities

Prior to the start of avian and bat fatality monitoring

Prior to the start of avian and bat fatality monitoring, two avian fatalities were reported by Leaning Juniper II staff. Refer to Section 3.1.6 for details.

During avian and bat fatality monitoring

During avian and bat fatality monitoring, five avian and four bat fatalities were found incidentally. NWC crews found three avian and two bat fatalities. Leaning Juniper II staff found two avian and two bat fatalities. NWC incidental avian fatality discoveries were a Swainson's hawk on May 22, 2012 (turbine KK6), a golden-crowned kinglet on December 3, 2012 (turbine Z5), and a horned lark on March 26, 2013 (turbine X2). NWC incidental bat fatality discoveries were a hoary bat on September 26, 2011 (turbine CC4) and a hoary bat on September 5, 2012 (turbine CC4). Refer to Section 3.6 for details on fatalities found by Leaning Juniper II staff.

3.2 Avian and Bat Fatalities during Standardized Carcass Searches

Clean-up Searches

Five avian fatalities and no bat fatalities were found during the clean-up search for year one. No avian fatalities and two bats were found during the clean-up search for year two. The avian fatalities were horned lark (three), Lewis' woodpecker (one) and Swainson's hawk (one). The bat fatalities were both silver-haired bats.

Standardized Searches used for Fatality Estimate Calculations

One hundred twenty five fatalities—100 birds and 25 bats—were found during standardized searches (Table 2). One of the avian fatalities, a nestling western meadowlark was condusively determined to be unrelated to Project operation (stepped on by cattle) and was not included in the fatality estimates. Two incidental bats found on search plots were also used in calculating fatality estimates. One hundred twenty-six fatalities—99 birds and 27 bats—were used for calculating the fatality estimates.

3.3 Composition of Observed Avian and Bat Fatalities

Birds

Twenty-six species of birds were observed as fatalities during standardized searches (Table 3). Horned lark was the most commonly observed fatality at 47.0%. Passerines were the most frequently found taxon (80%) on standardized searches, followed by raptors (7%), doves (6%), goatsuckers and woodpeckers (2% each), and gamebirds, gulls and vultures (1% each; Figure 3).

Bats

Two species of bat (hoary and silver-haired) were observed as fatalities during standardized searches. Hoary and silver-haired bats were found in similar composition levels during standardized searches (52% vs. 48%, respectively; Table 3).

3.4 Seasonal Distribution of Observed Avian and Bat Fatalities

Seasonal distribution of observed avian fatalities from standardized searches showed a peak in October. Observed fatalities in February, April, May, July, August, September and October were higher than other months (Figure 4). The months of March, April, May, August, September and October are assumed avian migration months and were searched at an increased search interval. Passerines generally mirrored these trends, with peaks of observed fatalities in February, April, May and October. This is expected, since passerines comprised 80% of observed avian fatalities. Sample sizes of any group other than passerines are too small for drawing conclusions. Refer to Figure 4 for periods of discovery for other groups.

Seasonal distribution of observed bat fatalities was from April through October (Figure 5). The peak of observed bat fatalities was in September.

3.5 Spatial Distribution of Observed Avian and Bat Fatalities

Observed avian fatalities found on searched turbine plots ranged from zero to four fatalities per turbine plot (Table 4). There were no documented avian fatalities at 38 of the 100 (38%) turbine plots used for searches. Four avian fatalities were found at each of four turbine plots; these were T4, X2, HH5 and JJ8.

Observed bat fatalities found on searched turbine plots ranged from zero to two fatalities per turbine plot (Table 4). There were no documented bat fatalities at 77 of the 100 (77%) turbine plots used for searches. Two turbine plots had two documented bat fatalities; these were T5 and DD4. Turbine plot DD4 had only one bat fatality found on scheduled searches, with the other found incidentally outside of scheduled searches.

Distance from turbine was plotted into 15-meter distance bands for avian and bat fatalities (Figure 6). Due to the square nature of the search plots, the maximum possible distances for fatalities to be found were 170 meters (on 120 meter plots) and 174 meters (on 123 meter plots). The maximum distance of an observed avian fatality was 163 meters from turbine base and the maximum distance of an observed bat fatality was 98 meters from turbine base. Avian fatalities were relatively evenly distributed out to 120 meters from turbines, with fewer observed fatalities 0–30 meters from turbine base. Ten avian fatalities (10/104; 9.6%) were found at distances greater than 120 meters from turbine base. Of the ten avian fatalities observed at distances greater than 120 meters, eight were passerines, one was a raptor (long-eared owl), and one was a goatsucker. Most bats (22/25; 88%) were found at distances of 45 meters or less from the turbine. There was an increase of observed bat fatalities at distances from 16–30 meters when compared to 0–15 meters and 31–45 meters (Figure 6).

3.6 Wildlife Reporting and Handling System

Prior to the start of avian and bat fatality monitoring

Prior to the start of avian and bat fatality monitoring, two avian fatalities were reported to NWC by Leaning Juniper II staff. Both were Swainson's hawks, one on April 27, 2011 (turbine JJ16) and one on June 20, 2011 (turbine HH1).

During avian and bat fatality monitoring

During avian and bat fatality monitoring, two avian fatalities and two bat fatalities were reported to NWC by Leaning Juniper II staff. The avian fatalities were an American kestrel on September 19, 2011 (turbine JJ16) and a golden eagle on October 8, 2012 (turbine JJ12). The bat fatalities were a silver-haired bat on July 29, 2011 (turbine DD4) and a hoary bat on August 5, 2011 (turbine C1).

3.7 Raptor Fatalities

Two raptor fatalities (both Swainson's hawks) were found incidentally prior to the start of the study period. Ten raptor fatalities were found during the two year study period (July 2011–July 2013) of wildlife fatality monitoring (Table 5). Three were found as incidentals; these were one American kestrel, one golden eagle, and one Swainson's hawk, and none was on a search plot. One raptor, a Swainson's hawk, was found during clean-up searches. Six raptors were found during standardized searches used for fatality estimates; these were one ferruginous hawk, one long-eared owl, and four Swainson's hawks. Of the six raptor fatalities used for fatality estimates, two were found during summer season (ferruginous hawk and Swainson's hawk), three were found during fall season (all Swainson's hawks) and one during winter season (long-eared owl). No raptor fatalities were found during scheduled spring season searches.

Age and sex of the raptor fatalities included both adults and immature birds and male and female birds. The American kestrel was an immature male. The ferruginous hawk was an adult male. The golden eagle was an adult male. The long-eared owl was a feather spot and could not be sexed or aged due to condition. Two of the eight Swainson's hawks could be sexed; one was a male and one was a female. Five of the eight Swainson's hawks could be aged; two were adults and three were sub-adults. The remaining birds could not be aged or sexed either due to their condition when found or because of overlap in measurements between age and sex categories (Pyle 2008).

3.8 Grassland Bird Fatalities

The WMMP defines grassland birds as all native bird species that rely on grassland habitat and are either resident species occurring year round or species that nest in the area, excluding horned lark, burrowing owl and northern harrier. Species found on scheduled searches included ferruginous hawk, Swainson's hawk and western meadowlark. Fifteen fatalities were found during scheduled searches used for fatality estimates; one ferruginous hawk, four Swainson's hawks, and ten western meadowlarks (one additional nestling was found that was not attributed to Project operation).

3.9 Special Status Wildlife Species Found as Fatalities

One federal special status species was found, a golden eagle. Golden eagle is listed under the Bald and Golden Eagle Protection Act (BGEPA). The eagle was an adult male found next to turbine JJ12 on October 8, 2012.

Three Oregon State Sensitive avian species were found. Avian species were one ferruginous hawk (Sensitive-Critical), one Lewis' woodpecker (Sensitive-Critical) and eight Swainson's hawks (Sensitive-Vulnerable). The ferruginous hawk was found during standardized searches, the Lewis' woodpecker was found during clean-up searches, and Swainson's hawks were found incidentally (three), during clean-up searches (one), and during standardized searches (four). Two species of State Sensitive-Vulnerable mammals, hoary bat and silver-haired bat, were found. Refer to Section 2.1.5 for definition of status.

3.10 Special Status Wildlife Species Live Observations

Observers recorded observations of live federal and State special status bird and mammal species while conducting various components of wildlife monitoring on the Project (Appendix B). USFWS Birds of Conservation Concern (USFWS, 2008) were also recorded. In addition, observers recorded detections of birds that were locally rare even if the species had no listed special status designation.

One federal special status species, golden eagle, was observed. Two Oregon State Sensitive-Critical avian species (ferruginous hawk and loggerhead shrike) and three Oregon State Sensitive-Vulnerable avian species (grasshopper sparrow, long-billed curlew, and Swainson's hawk) were recorded. One USFWS Bird of Conservation Concern (prairie falcon) was recorded.

Two mammal species with special status were recorded during incidental observations. Washington ground squirrels (federal candidate species and Oregon State endangered species) were recorded as incidental observations on the FF and JJ turbine strings. Refer to details in Appendix B on locations and approximate numbers observed. White-tailed jackrabbit (Oregon State Sensitive-Vulnerable) was recorded on multiple occasions around the Project.

3.11 Review of Findings at Lit and Unlit Turbines

Observed nocturnal avian and bat fatality rates were compared between lit turbines (n=45) and unlit turbines that are adjacent to lit turbines (n=41). Observed nocturnal avian and bat fatality rates were also compared for lit turbines (n=45) and unlit turbines that were not adjacent to lit turbines (n=14). There were 17 observed nocturnal avian fatalities. At lit turbines, there were ten nocturnal migrants observed as fatalities (0.22 fatalities/turbine), and at unlit turbines there were seven fatalities. Of the seven fatalities at unlit turbines, four were at turbines adjacent to lit turbines (0.10 fatalities/turbine) and three were at turbines neither lit nor adjacent to lit (0.21 fatalities/turbine). Graphical depiction of means for nocturnal avian fatalities is shown in Figure 7 as specified in the WMMP.

Comparison of means for nocturnal avian fatalities between lit turbines (0.22 fatalities/turbine) and unlit turbines that are adjacent to lit turbines (0.10 fatalities/turbine) did not show a significant difference (P=0.39). Comparison of means between lit turbines (0.22 fatalities/turbine) and unlit turbines that were not adjacent to lit turbines (0.21 fatalities/turbine) did not show a significant difference (P=0.26).

Twenty-five bats were observed during scheduled searches. At lit turbines there were 13 bats observed as fatalities (0.29 fatalities/turbine), and at unlit turbines there were 12 fatalities. Of the 12 fatalities at unlit turbines, nine were at turbines adjacent to lit turbines (0.22 fatalities/turbine) and three were at turbines neither lit nor adjacent to lit (0.21 fatalities/turbine). Graphical depiction of means for bat fatalities is shown in Figure 8 as specified in the WMMP.

Comparison of means for bat fatalities between lit turbines (0.29 fatalities/turbine) and unlit turbines that are adjacent to lit turbines (0.22 fatalities/turbine) did not show a significant difference (P=0.39). Comparison of means between lit turbines (0.29 fatalities/turbine) and unlit turbines that were not adjacent to lit turbines (0.21 fatalities/turbine) did not show a significant difference (P=0.43).

3.12 Searcher Efficiency Trials

Searcher efficiency rates were relatively high, with the lowest efficiency occurring in small birds of spring season placed in native habitats (37% of trial birds detected). The highest searcher efficiency was documented among large birds during winter season placed in agriculture habitats (77% of trial birds detected). Large size trials had higher mean searcher efficiency rates than small size. Native and agriculture habitat had similar searcher efficiency rates. In general, fall and winter season had higher mean searcher efficiency rates than spring and summer, though there was substantial overlap of confidence intervals among all seasons. Refer to Table 6 for the associated 90% confidence intervals of each mean.

3.13 Carcass Removal Trials

Carcass removal rates ranged from a mean of 3.0 days (small size, spring in agriculture) to 87.4 days (large size, summer in agriculture). Large size trials had longer removal times than small size trials on average. Large size trials had carcass removal rates ranging from a mean of 9.1 days in spring in agriculture to 74.5 days in spring in native habitats. Small size trials had carcass removal rates ranging from a mean of 3.0 days in spring in agriculture to 28.8 days in summer in agriculture. Carcass removal rates varied by season and habitat type. For trials placed in agriculture habitats, the shortest mean removal times occurred in spring while the longest occurred in summer. For trials placed in native habitats, the shortest mean removal times occurred in winter and the longest occurred in spring. The interaction of season and habitat type was also important for building the model for estimating fatalities as described in Section 2.10. Refer to Table 7 for the associated 90% confidence intervals of each mean.

3.14 Estimated Annual Fatality Rates

Means for annual estimated fatality levels of birds and bats for combined turbine types are reported in Tables 8a and 8b along with their 90% confidence intervals. Results from the Schoenfeld estimator are presented in Table 8a and results from the Huso estimator are presented in Table 8b.

Schoenfeld

Estimated mean annual all bird fatality for the Project was 450 birds, 2.24 per MW/year and 3.85 per turbine/year. Estimated average annual raptor fatality for the Project was 9 raptors, 0.05 per MW/year and 0.08 per turbine/year. Estimated mean annual bat fatality for the Project was 122 bats, 0.60 per MW/year and 1.04 per turbine/year. Refer to Table 8a for annual estimates of the other avian categories.

Huso

Estimated mean annual all bird fatality for the Project was 504 birds, 2.50 per MW/year and 4.31 per turbine/year. Estimated mean annual raptor fatality for the Project was 14 raptors, 0.07 per MW/year and 0.12 per turbine/year. Estimated mean annual bat fatality for the Project was 126 bats, 0.63 per MW/year and 1.08 per turbine/year. Refer to Table 8b for annual estimates of the other avian categories.

3.15 Estimated All Bird Fatality Rates by Turbine Size

Schoenfeld and Huso all bird fatality rates were calculated for the two turbines sizes present at Leaning Juniper II; 1.5 MW and 2.1 MW. Results are shown for per turbine and per MW. Estimated mean annual all bird fatality for the 2.1 MW turbines under Schoenfeld was 0.84 per MW/year and 1.77 per turbine/year (Table 9a). For the 1.5 MW turbines, rates were 1.26 per MW/year and 1.89 per turbine/year. Estimated mean annual all bird fatality for the

2.1 MW turbines under Huso was 1.03 per MW/year and 2.17 per turbine/year (Table 9b). For the 1.5 MW turbines, rates were 1.43 per MW/year and 2.14 per turbine/year. Refer to the tables for their associated 90% confidence intervals.

4.0 DISCUSSION

4.1 Potential Biases in Estimated Fatality Rates

A brief discussion of potential biases is warranted before comparing estimated fatality rates from this study with those at other wildlife fatality monitoring projects in the Columbia Plateau Ecoregion of Oregon and Washington. Though methods employed at Leaning Juniper II during wildlife fatality monitoring were similar to methods employed at other CPE projects to which they are being compared, the biases may not be equal among projects. Among observed fatalities, there is a suite of potential positive biases (those that would overestimate fatalities) and negative biases (those that would underestimate fatalities).

The primary positive bias is the assumption that all fatalities found within standardized search plots are attributable to the Project unless evidence suggests an alternative cause of death (such as a fledgling bird unable to fly found away from roads or turbine pad). This background mortality is likely present at all projects, though it is rarely studied, and likely varies considerably among projects as predator population levels (and other natural causes of mortality) likely vary considerably from site to site. This background mortality is primarily a factor for bird fatality rates, as bat background mortality is believed to be very low to nonexistent.

Another positive bias is that some projects include incidentally observed fatalities found on search plots in the calculation of fatality estimates while other projects do not. This discrepancy can create differences in estimated annual fatality rates. These discrepancies can affect comparisons between estimated fatality rates among projects.

Negative biases include factors such as crippling bias and search plot size. Crippling bias, the event where a bird or bat is struck by a turbine and injured but manages to move outside of the search plot prior to succumbing to injuries, is likely present in each project but is believed to be minimal in relation to the overall fatality levels. Search plot size can have a negative bias in that some fatalities may fall at distances greater than the search plot dimensions. Search plots for fatality monitoring projects conducted under the direction of the Oregon Department of Energy are often based on the maximum turbine height, which relates to a turbine plot size of 120-meters from the base of the turbines at Leaning Juniper IIA and 123-meters from turbine base at Leaning Juniper IIB. Some projects in the CPE have conducted searches at distances less than the maximum height of the turbine in order to maximize number of turbines being searched. Examples of these in the CPE include Big Horn (Kronner et al., 2008), Goodnoe Hills (URS, 2010a), Hay Canyon (Gritski and Kronner, 2010b), Hopkins Ridge I (Young et al., 2007, 2009), Klondike II (NWC and West, 2007), Marengo I and II (2011a and b), Pebble Springs (Gritski and Kronner, 2010a), Rattlesnake Road (Gritski et al., 2011), Wheat Field (Gritski and Downes, 2011a), and Willow Creek (NWC, 2011). Turbine characteristics for projects where completed fatality monitoring reports are public are listed in Table 10.

Another potential bias of fatality estimates is the selection of animals used for bias correction trials. For bats, most projects in the CPE have used small brown birds as surrogates for most SE and CRT trials. There is potential bias in the detection and removal rates between bats and small birds, though the amount of bias in either CRT or SE rates is unknown. For comparative purposes, since most projects in the CPE have used small brown birds as surrogates, this bias (and likely their estimates) is comparable between projects.

For birds, many projects have had to rely on non-native species, such as house sparrow, and various species of gamebirds for SE and CRT trials. This is due to the fact that the supply of legally obtained native birds is highly variable. This bias may affect raptor estimates, particularly among CRT rates, as it is possible that raptors may not be scavenged at the same rates as gamebirds. Avian and bat fatality monitoring at Leaning Juniper II relied primarily on gamebirds for most large size SE, but were supplemented with some native birds.

Finally, there is likely year to year variation in the numbers of avian and bat species present in the region. Comparison of the results of fatality studies conducted in different years should take into account that annual variation in populations of local and migratory avian and bat species can occur.

4.2 Comparison of Fatalities with Existing Regional Wind Projects

4.2.1 Birds

Mean annual estimates for the CPE included data calculated using several different estimators, including Schoenfeld (2004) and Huso (2010) which introduces inconsistency and makes detailed comparisons more difficult. For the purpose of comparing Leaning Juniper II estimates to regional wind project study results, the Leaning Juniper II estimate derived using the Schoenfeld estimator is used in this section, as specified in the WMMP. The per MW estimate is used for comparisons. Estimated mean annual all bird fatalities at Leaning Juniper II was 2.24 per MW/year which is similar to the reported mean for the CPE (2.19 birds/MW/year; Table 11). For all birds at Leaning Juniper II, the per MW/year 90% confidence interval ranged from 1.69 to 2.85, having overlap with the CPE reported mean, thus no significant difference to the CPE reported mean. For raptors, the estimated mean annual fatality rate at Leaning Juniper II (0.05 raptors/MW/year) were lower than the reported mean for the CPE (0.11 raptors/MW/year; Table 11). For raptors at Leaning Juniper II, the per MW/year 90% confidence interval ranged from 0.02 to 0.09, having no overlap with the CPE reported mean.

A comparison between observed fatalities found at Leaning Juniper II and other CPE reported projects is presented in Table 12. One species found as a fatality at Leaning Juniper II, fox sparrow, had not been found in other CPE reported projects. Horned lark was the most commonly observed fatality at Leaning Juniper II and has the highest average composition for other CPE reported projects. Two species of birds were found in substantially higher percent composition at Leaning Juniper II than other reported CPE Projects; these were Swainson's hawk and western meadowlark. The CPE average observed composition percent for Swainson's hawk is 0.6% (n=9), while the observed percent for Leaning Juniper was 4.8% (n=5). The CPE average observed composition percent for western meadowlark is 2.9% (n=43), while the observed percent for Leaning Juniper was 10.5% (n=11).

When comparing observed fatalities between Leaning Juniper II and other CPE projects it should be noted that observed fatalities comprise only a portion of the estimated fatalities. This percentage varies for each project, generally due to factors such as carcass removal, searcher efficiency and sampling schemes such as number of turbines searched and frequency of search. For the two groups, all birds and raptors, the percentage of observed fatalities to their estimated mean per year were 11% and 33% respectively. Those percentages are also important to consider when examining tables and figures that use observed fatalities in this report.

4.2.2 Bats

Mean annual estimates for the CPE included data calculated using several different estimators, including Schoenfeld (2004) and Huso (2010); this fact also introduces inconsistency and makes detailed comparisons more difficult. For the purpose of comparing Leaning Juniper II estimates to regional wind project study results, the Leaning Juniper II estimate derived using the Schoenfeld estimator is used in this section, as specified in the WMMP. The per MW estimate is used for comparisons. Estimated mean annual bat fatalities at Leaning Juniper II (0.60 bats/MW/year) were lower than the reported mean for the CPE (1.00 bat/MW/year; Table 13). For bats at Leaning Juniper II, the per MW/year 90% confidence interval ranged from 0.41 to 0.81, having no overlap with the CPE reported mean.

A comparison of observed species composition between bat fatalities found at Leaning Juniper II and other CPE reported projects is presented in Table 14. Hoary and silver-haired bat were the only observed bat species found during standardized searches at Leaning Juniper II. Bat species composition at Leaning Juniper II was similar to that at other CPE reported projects.

When comparing observed fatalities between Leaning Juniper II and other CPE projects it is important to remember that observed fatalities only comprise a percentage of the estimated fatalities. As stated in Section 4.2.1 above, several factors influence this percentage and various projects have different rates. The observed and estimated numbers are presented in Table 8a for Schoenfeld estimates. For bats the percentage of observed fatalities to their estimated mean per year was 11%. That percentage is also important to consider when examining tables and figures that use observed fatalities in this report.

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7.0 TABLES

Table 1. Standardized carcass search periods at Leaning Juniper II Wind Power Facility, July 2011–July 2013.

Season	Search Period	# of Searches Per Year
Fall	August 16–October 31	5
Winter	November 1–March 15	4
Spring	March 16–May 15	4
Summer	May 16– August 15	3

Table 2. Avian and bat fatalities found at Leaning Juniper II Wind Power Facility, January 2011–July 2013, listed by taxon.

Taxon	Number of Fatalities		
	Total Year 1	**Total Year 2**	**Cumulative Total**
Dove	4	3	7
Galliform	1	0	1
Goatsucker	2	0	2
Gull	1	0	1
Passerine[1]	36 +3 Clean-up	45 + 2 Incidental	81 + 3 Clean-up + 2 Incidentals
Raptor	4 + 1 Clean-up + 4 Incidentals	2 + 1 Incidental	6 + 1 Clean-up + 5 Incidentals
Vulture	0	1	1
Woodpecker	1 + 1 Clean-up	0	1 + 1 Clean-up
Total Birds	**49 + 5 Clean-up + 4 Incidentals**	**51 + 3 Incidentals**	**100 + 5 Clean-up + 7 Incidentals**
Bats	11 +3 Incidentals	14 + 2 Clean-up + 1 Incidental	25 + 2 Clean-up + 4 Incidentals
Total Birds and Bats	**60 + 5 Clean-up + 7 Incidentals**	**65 + 2 Clean-up + 4 Incidentals**	**125 + 7 Clean-up + 11 Incidentals**

[1] Includes nesting western meadowlark found on scheduled search but not attributed to the Project
Note: This table includes fatalities found during clean-up searches and incidentals found prior to the start of formal fatality monitoring on July 14, 2011 in addition to those found during the scheduled search period.

Table 3. Summary of avian and bat species and percent composition of all fatalities found at Leaning Juniper II Wind Power Facility, January 2011–July 2013.

Species Listed by highest to lowest % search composition	Total Found During Scheduled Searches				Total Including Incidentals*
	Year 1 2011–2012	Year 2 2012–2013	Total 2011–2013	% Composition	Total 2011–2013
Avian Species					
Horned Lark	20	27	47	47.0	51
Western Meadowlark	4	7	11	11.0	11
Golden-crowned Kinglet	3	1	4	4.0	5
Mourning Dove	1	3	4	4.0	4
Swainson's Hawk	3	1	4	4.0	8
European Starling (*n*)	3	0	3	3.0	3
Rock Pigeon (*n*)	3	0	3	3.0	3
American Robin	2	0	2	2.0	2
Common Poorwill	2	0	2	2.0	2
Common Raven	1	1	2	2.0	2
Dark-eyed Junco	2	0	2	2.0	2
Spotted Towhee	0	2	2	2.0	2
Ferruginous Hawk	1	0	1	1.0	1
Fox Sparrow	0	1	1	1.0	1
Gray Partridge (*n*)	1	0	1	1.0	1
House Wren	0	1	1	1.0	1
Long-eared Owl	0	1	1	1.0	1
Northern Flicker	1	0	1	1.0	1
Orange-crowned Warbler	0	1	1	1.0	1
Red-breasted Nuthatch	0	1	1	1.0	1
Ring-billed Gull	1	0	1	1.0	1
Turkey Vulture	0	1	1	1.0	1
Unidentified Passerine	0	1	1	1.0	1
Varied Thrush	0	1	1	1.0	1
Wilson's Warbler	0	1	1	1.0	1
Yellow Warbler	1	0	1	1.0	1
American Kestrel	0	0	0	0.0	1
Golden Eagle	0	0	0	0.0	1
Lewis' Woodpecker	0	0	0	0.0	1
Avian Subtotal	**49**	**51**	**100**	**100**	**112**
Bat Species					
Silver-haired Bat	6	6	12	48.0	15
Hoary Bat	5	8	13	52.0	16
Bat Subtotal	**11**	**14**	**25**	**100**	**31**

* Includes both scheduled search findings and incidental observations (including clean-up searches)

n = non-native species

Table 4. Number of avian and bat fatalities found at Leaning Juniper II Wind Power Facility for each turbine plot during standardized searches, July 2011–July 2013.

Year 1				Year 2			
Turbine Plot ID	**Avian**	**Bat**	**Total**	**Turbine Plot ID**	**Avian**	**Bat**	**Total**
			IIA				
B2	1	0	1	B1	0	0	0
B3	2	1	3	B4	1	1	2
C1	0	1	1	B5	2	1	3
C2	1	0	1	B6	0	0	0
C4	1	1	2	B7	0	1	1
D1	2	0	2	C3	2	0	2
D2	0	0	0	D2	0	0	0
D3	1	0	1	D3	0	0	0
D4	1	0	1	D5	0	0	0
F1	1	1	2	F1	0	0	0
H3	2	0	2	H2	3	0	3
H4	1	0	1	K1	0	0	0
M1	1	0	1	K2	1	1	2
M2	2	0	2	M3	1	0	1
T2	0	0	0	T4	4	1	5
T3	1	0	1	T5	2	2	4
X1	2	1	3	T6	0	1	1
X2	4	0	4	X3	1	0	1
X4	2	0	2	X4	2	0	2
X5	1	0	1	X5	2	0	2
Y1	2	0	2	Y1	2	0	2
Y2	3	0	3	Y2	1	1	2
Z1	1	0	1	Y3	0	0	0
Z2	0	1	1	Z3	1	0	1
Z5	1	0	1	Z4	2	1	3
Total IIA	33	6	39		27	10	37
			IIB				
BB1	2	0	2	BB3	0	0	0
BB2	0	0	0	BB4	0	0	0
BB5	0	0	0	CC5	0	0	0
CC1	1	0	1	CC6	1	0	1
CC2	2	0	2	CC7	1	0	1
CC9	0	0	0	CC8	0	0	0
CC10	1	1	2	GG1	0	0	0
DD4	2	2	4	GG2	0	0	0
DD5	0	0	0	GG3	2	0	2
DD7	0	0	0	GG4	0	0	0
DD8	1	0	1	GG6	2	0	2
FF1	1	1	2	GG7	1	1	2
FF2	1	1	2	GG10	0	0	0
FF4	2	1	3	HH2	1	1	2
FF5	2	0	2	HH3	0	0	0
GG8	0	0	0	HH5	4	0	4
GG9	0	0	0	HH6	0	0	0

Year 1				Year 2			
Turbine Plot ID	**Avian**	**Bat**	**Total**	**Turbine Plot ID**	**Avian**	**Bat**	**Total**
JJ10	2	0	2	HH7	0	0	0
JJ11	0	0	0	JJ1	0	0	0
JJ14	0	1	1	JJ2	2	0	2
JJ15	1	0	1	JJ3	2	0	2
KK4	1	0	1	JJ8	4	0	4
KK5	2	0	2	JJ9	0	0	0
KK9	0	0	0	KK7	3	0	3
KK10	0	0	0	KK8	1	0	1
Total IIB	21	7	28		24	2	26
Total IIA and IIB	**54**	**13**	**67**		**51**	**12**	**63**

[1] Includes findings from clean-up search and inddentals found on search plot during year of search

Table 5. Summary of raptor fatalities found at Leaning Juniper II Wind Power Facility, January 2011–July 2013.

Season	Species	Date Found	Year[1]	Turbine	Sex[2]	Age[3]	Found During
Spring	Swainson's Hawk	4/27/11	Before	JJ16	U	I	Incidental
Summer	Swainson's Hawk	6/20/11	Before	HH1	U	I	Incidental
	Swainson's Hawk	7/15/11	1	FF4	U	U	Clean-up
	Swainson's Hawk	5/22/12	1	KK6	F	A	Incidental
	Swainson's Hawk	6/18/12	1	KK5	M	A	Search
	Ferruginous Hawk	7/13/12	1	KK4	M	A	Search
Fall	Swainson's Hawk	8/23/11	1	FF1	U	U	Search
	American Kestrel	9/19/11	1	JJ16	M	I	Incidental
	Swainson's Hawk	9/28/11	1	FF4	U	U	Search
	Swainson's Hawk	8/20/2012	2	C3	U	I	Search
	Golden Eagle	10/08/12	2	JJ12	M	A	Incidental
Winter	Long-eared Owl	1/15/2013	2	Y1	U	U	Search

[1] Year: Before=Prior to start of monitoring, 1=First year of monitoring, 2=Second year of monitoring

[2] Sex: U = Unknown, M = Male, F = Female

[3] Age: U = Unknown, A = Adult, I = Immature

Table 6. Bootstrapped Searcher Efficiency (%) and 90% confidence limits for two years of wildlife fatality monitoring at Leaning Juniper II Wind Power Facility, July 2011–July 2013.

Season	Native Habitat				Agriculture Habitat			
	Number	Searcher Efficiency	Lower CI[1]	Upper CI	Number	Searcher Efficiency	Lower CI[1]	Upper CI
Large Size								
Fall	23	71	62	80	21	74	64	83
Winter	20	75	65	84	20	77	67	84
Spring	21	59	47	70	19	62	50	73
Summer	23	66	55	76	18	68	58	78
Small Size								
Fall	20	50	38	62	17	53	41	66
Winter	19	55	42	66	21	58	46	68
Spring	21	37	27	48	20	40	29	51
Summer	22	44	33	56	19	47	35	58

[1] lower and upper limits of the 90% confidence interval (CI)

Table 7. Bootstrapped Carcass Removal (days) and 90% confidence limits for two years of wildlife fatality monitoring at Leaning Juniper II Wind Power Facility, July 2011–July 2013.

Season	Native Habitat				Agriculture Habitat			
	Number	Carcass Removal	Lower CI[1]	Upper CI	Number	Carcass Removal	Lower CI[1]	Upper CI
Large Size								
Fall	11	52.9	29.1	101.9	10	23.1	12.8	38.4
Winter	10	27.1	15.7	49.1	10	16.8	11.9	24.1
Spring	11	74.5	40.1	148.1	10	9.1	4.8	15.0
Summer	10	35.5	16.9	69.1	11	87.4	51.6	171.3
Small Size								
Fall	10	17.5	10.1	28.8	10	7.6	3.5	13.0
Winter	11	9.0	4.9	15.4	10	5.5	3.7	7.8
Spring	10	24.6	12.5	49.5	10	3.0	1.6	4.7
Summer	11	11.7	5.1	21.8	10	28.8	15.7	54.1

[1] lower and upper limits of the 90% confidence interval (CI)

Table 8a. Bootstrapped fatality estimates and 90% confidence intervals for site, per turbine and per megawatt (MW), derived using the *Schoenfeld Estimator*, for two years of wildlife fatality monitoring at Leaning Juniper II Wind Power Facility, July 2011–July 2013.

Categories	Average Number Found per year	Annual Estimates Project		Annual Estimates per Turbine		Annual Estimates per MW	
		Estimate	90% Confidence Interval Range	Estimate	90% Confidence Interval Range	Estimate	90% Confidence Interval Range
All Birds	49.5	450	339-573	3.85	2.90-4.90	2.24	1.69-2.85
Small Birds	34	392	281-503	3.35	2.40-4.30	1.95	1.39-2.50
Large Birds	15.5	55	39-71	0.47	0.33-0.61	0.27	0.19-0.35
Grassland Birds	7.5	26	15-39	0.22	0.13-0.33	0.13	0.08-0.19
Nocturnal Migrants	8.5	75	46-107	0.64	0.39-0.91	0.37	0.23-0.53
Raptors	3	9	4-18	0.08	0.03-0.15	0.05	0.02-0.09
Raptor Species of Concern	2.5	8	2-15	0.07	0.02-0.13	0.04	0.01-0.08
State Sensitive Avian Species[1]	0	0	-	0.00	-	0.00	-
Bats	13.5	122	82-164	1.04	0.70-1.40	0.60	0.41-0.81

[1] Excludes raptor species as specified in the WMMP.

Table 8b. Bootstrapped fatality estimates and 90% confidence intervals for site, per turbine and per megawatt (MW), derived using the *Huso Estimator*, for two years of wildlife fatality monitoring at Leaning Juniper II Wind Power Facility, July 2011–July 2013.

Categories	Average Number Found per year	Annual Estimates Project		Annual Estimates per Turbine		Annual Estimates per MW	
		Estimate	90% Confidence Interval Range	Estimate	90% Confidence Interval Range	Estimate	90% Confidence Interval Range
All Birds	49.5	504	406-734	4.31	3.47-6.27	2.50	2.02-3.65
Small Birds	34	434	330-662	3.70	2.82-5.65	2.16	1.64-3.29
Large Birds	15.5	71	55-97	0.61	0.46-0.82	0.35	0.27-0.48
Grassland Birds	7.5	35	21-52	0.30	0.17-0.44	0.17	0.10-0.26
Nocturnal Migrants	8.5	82	48-150	0.70	0.41-1.28	0.41	0.24-0.75
Raptors	3	14	6-25	0.12	0.05-0.21	0.07	0.03-0.12
Raptor Species of Concern	2.5	12	4-21	0.09	0.03-0.17	0.06	0.02-0.10
State Sensitive Avian Species[1]	0	0	-	0.00	-	0.00	-
Bats	13.5	126	87-215	1.08	0.74-1.84	0.63	0.43-1.07

[1] Excludes raptor species as specified in the WMMP.

Table 9a. Bootstrapped fatality estimates and 90% confidence intervals for All Birds per turbine and per megawatt (MW), derived using the *Schoenfeld Estimator*, for two turbines types at Leaning Juniper II Wind Power Facility, July 2011–July 2013.

Per Turbine

2.1 MW Turbines		1.5 MW Turbines	
Estimate	90% Confidence Interval Range	Estimate	90% Confidence Interval Range
1.77	1.30–2.30	1.89	1.10–2.80

Per Megawatt

2.1 MW Turbines		1.5 MW Turbines	
Estimate	90% Confidence Interval Range	Estimate	90% Confidence Interval Range
0.84	0.62–1.10	1.26	0.73–1.87

Table 9b. Bootstrapped fatality estimates and 90% confidence intervals for All Birds per turbine and per megawatt (MW), derived using the *Huso Estimator*, for two turbines types at Leaning Juniper II Wind Power Facility, July 2011–July 2013.

Per Turbine

2.1 MW Turbines		1.5 MW Turbines	
Estimate	90% Confidence Interval Range	Estimate	90% Confidence Interval Range
2.17	1.58–3.44	2.14	1.36–3.44

Per Megawatt

2.1 MW Turbines		1.5 MW Turbines	
Estimate	90% Confidence Interval Range	Estimate	90% Confidence Interval Range
1.03	0.75–1.64	1.43	0.91–2.29

Table 10. Project and turbine characteristics of regional wind energy facilities where wildlife fatality monitoring studies have been completed.

Columbia Plateau Ecoregion Wind Project*	Project Size		Turbine Characteristics		
	# Turbines	MW	RD** (meters)	Tip Height (max. meters)	MW
Big Horn, WA	133	199.5	77	118.5	1.5
Biglow Canyon I, OR	76	125.4	90	121	1.65
Biglow Canyon II, OR	65	150	93	126.5	2.3
Biglow Canyon III, OR	76	174.8	93	126.5	2.3
Combine Hills I/II, OR	104	104	61.4	84	1.0
Echo Wind, OR (2 types of turbines)	37	20/44.6	92/82	126/121	2.0/1.65
Goodnoe Hills, WA	47	94	92.5	135	2.0
Harvest Wind, WA	43	98.9	93	126.5	2.3
Hay Canyon, OR	48	100.8	97	124	2.1
Hopkins Ridge I, WA	83	150	80	107	1.8
Kittitas Valley, WA	48	100.8	97	124	2.1
Klondike I, OR	16	24	65	100	1.5
Klondike II, OR	50	75	77	118.5	1.5
Klondike III, OR (Phase 1) (3 types of turbines)	80/44/1	120/101.2/2.4	77/93/100	118.5/126.5/127.5	1.5/2.3/2.4
Klondike IIIa, OR (Phase 2)	51	77	77	118.5	1.5
Leaning Juniper I, OR	67	100.5	77	118.5	1.5
Leaning Juniper II, OR	**43/74**	**90.3/111**	**88/77**	**123/118.5**	**2.1/1.5**
Marengo I, WA	78	140.4	80	110	1.8
Marengo II, WA	39	70.2	80	110	1.8
Nine Canyon I, WA	37	48	62	91	1.3
Pebble Springs, OR	47	98.7	97	124	2.1
Rattlesnake Road, OR	49	102.9	88	123	2.1
Star Point, OR	47	98.7	97	124	2.1
Stateline I and 2, OR/WA	454	300	47	74/89 (20 turbines)	0.66
Stateline 3, OR	43	98.9	93	126.5	2.3
Tuolumne, WA (2 types of turbines)	42/20	136.6	93/92.5	126.5/135	2.3/2.0
Vansycle, OR	38	25	47	74	0.66
Vantage, OR	60	90	77	118.5	1.5
Wheat Field, OR	46	96.6	88	123	2.1
Windy Flats, WA	114	262.2	93	126.5	2.3
White Creek Wind I, WA	89	204.7	93	126.5	2.3
Wild Horse, WA	127	229	80	107	1.8
Willow Creek Winds, OR	48	72	77	118.5	1.5

Table 11. Reported mean annual fatality estimates on a per MW and per turbine basis for all birds and raptors in the Columbia Plateau Ecoregion where wildlife fatality monitoring studies have been completed and are public.

Columbia Plateau Ecoregion Wind Project[1]	All Bird Fatality Rates		Raptor Fatality Rates	
Listed in order of highest to lowest All Bird Fatality Rate per MW/Year	#/MW	#/Turbine	#/MW	#/Turbine
Windy Flats, WA (Year 1)	8.45	19.43	0.04	0.09
Leaning Juniper I, OR[2]	6.66	9.99	0.21	0.32
White Creek Wind I, WA[2]	4.05	9.31	0.47	1.09
Willow Creek Wind, OR[2]	3.22	4.82	0.38	0.57
Tuolumne, WA	3.20	7.06	0.29	0.63
Klondike III, OR (Phase 1)[2]	3.19	5.65	0.15	0.27
Klondike II, OR	3.14	4.71	0.11	0.17
Hopkins Ridge I, WA (Phase 1, Year 2)	2.99	5.38	0.07	0.12
Harvest Wind, WA[2]	2.94	6.76	0.23	0.52
Stateline 1 and 2, OR/WA (2001-2003	2.92	1.93	0.09	0.06
Klondike IIIa, OR (Phase 2)[2]	2.80	4.20	0.06	0.09
Nine Canyon I, WA	2.76	3.59	0.05	0.07
Biglow Canyon, OR (Phase II, Year 2)	2.60	5.98	0.03	0.06
Combine Hills I, OR (2004/2005 study	2.56	2.56	0.00	0.00
Big Horn, WA[2]	2.54	3.81	0.15	0.23
Leaning Juniper II, OR (Huso)[2]	**2.50**	**4.31**	**0.07**	**0.12**
Biglow Canyon, OR (Phase I, Year 2)	2.47	4.07	0.04	0.06
Combine Hills I/II, OR (2011 study year)	2.33	2.33	0.08	0.08
Leaning Juniper II, OR (Schoenfeld)	**2.24**	**3.85**	**0.05**	**0.08**
Biglow Canyon, OR (Phase III, Year 1)	2.28	5.25	0.05	0.11
Hay Canyon, OR[2]	2.21	4.65	0.00	0.00
Rattlesnake Road, OR[2]	2.16	4.54	0.06	0.13
Pebble Springs, OR[2]	1.93	4.06	0.04	0.08
Biglow Canyon, OR (Phase I, Year 1)	1.76	2.90	0.03	0.06
Vantage, WA[2]	1.60	2.40	0.35	0.53
Wild Horse, WA	1.55	2.79	0.09	0.17
Wheat Field, OR[2]	1.42	2.99	0.28	0.60
Goodnoe Hills, WA	1.40	2.80	0.17	0.34
Hopkins Ridge I, WA (Phase 1, Year 1)	1.23	2.21	0.14	0.25
Stateline 1 and 2, OR/WA (2006)	1.23	0.81	0.11	0.07
Kittitas Valley, WA (Year 1)[2]	1.06	2.23	0.09	0.19
Klondike I, OR	0.95	1.43	0.00	0.00
Vansycle, OR	0.95	0.63	0.00	0.00
Star Point, OR[2]	0.80	1.70	0.00	0.00
Echo Wind, OR[2]	0.66	1.15	0.04	0.07
Stateline 3, OR	0.36	0.84	0.05	0.12
Marengo I, WA (Year 1)	0.27	0.49	0.00	0.00
Marengo I, WA (Year 2)	0.22	0.40	0.03	0.05
Marengo II, WA (Year 2)	0.17	0.31	0.00	0.00
Marengo II, WA (Year 1)	0.16	0.29	0.05	0.09
Mean *(without Leaning Juniper II)*	**2.19**	**3.85**	**0.11**	**0.19**

Footnotes from Table 11

[1] References for wind project studies: Big Horn (Kronner et al., 2008), Biglow Canyon Phase I (Jeffrey et al., 2009; Enk et al., 2010), Biglow Canyon Phase II (Enk et al., 2012), Biglow Canyon Phase III (Enk et al., 2012), Combine Hills I (Young et al., 2006), Combine Hills I/II (Enz et al., 2012), Echo Wind (Gritski and Downes, 2012), Goodnoe Hills (URS, 2010a), Harvest Wind (Downes and Gritski 2012a), Hay Canyon (Gritski and Kronner, 2010b); Hopkins Ridge I (Young et al., 2007, 2009), Kittitas Valley (Stantec, 2012), Klondike I (Johnson et al., 2003), Klondike II (NWC and West, 2007), Klondike III (Gritski et al., 2010a), Klondike IIIa (Gritski et al., 2010b), Leaning Juniper I (Gritski et al., 2008), Leaning Juniper II (this report), Marengo I and II year 1 (URS, 2010a and b), Marengo I and II year 2 (URS, 2011a and b), Nine Canyon (Erickson et al., 2003), Pebble Springs (Gritski and Kronner, 2010a), Rattlesnake Road (Gritski et al., 2011), Star Point (Gritski and Downes, 2011b), Stateline I and 2 (Erickson et al., 2004; Erickson et al., 2007), Stateline 3 (Kronner et al., 2012), Tuolumne (Enz and Bay, 2010), Vansycle (Erickson et al., 2000), Vantage (Ventus, 2012), Wheat Field (Gritski and Downes, 2011a), White Creek Wind I (Downes and Gritski 2012b), Wild Horse (Erickson et al., 2008), Willow Creek (NWC, 2011), Windy Flats (Enz et al., 2011).

[2] Huso estimator was used to determine estimated fatality rates for these projects.

Table 12. Observed species composition and number of avian fatalities found on standardized searches at Columbia Plateau Ecoregion wind projects compared with those found at Leaning Juniper II Wind Power Facility.

Species (in descending order of % Composition)	Columbia Plateau Ecoregion[1]		Leaning Juniper II	
	% Composition (Only Standardized Searches)	Number of Fatalities Found on Standardized Searches	% Composition (Only Standardized Searches)	Number of Fatalities Found on Standardized Searches
Horned Lark	32.1	477	47.6	47
Golden-crowned Kinglet	5.3	79	3.8	4
Gray Partridge (*n*)	4.6	69	1.0	1
Ring-necked Pheasant (*n*)	4.3	64	0.0	0
Mourning Dove	3.0	44	3.8	4
Western Meadowlark	2.9	43	10.5	11
American Kestrel	2.6	39	0.0	0
Chukar (*n*)	2.5	37	0.0	0
European Starling (*n*)	2.5	37	2.9	3
Unidentified Passerine	2.2	33	1.0	1
Dark-eyed Junco	2.2	32	1.9	2
Unidentified Bird	2.2	32	0.0	0
Red-tailed Hawk	2.2	32	0.0	0
White-crowned Sparrow	2.0	29	0.0	0
Townsend's Warbler	1.8	26	0.0	0
Yellow-rumped Warbler	1.5	23	0.0	0
Ruby-crowned Kinglet	1.3	19	0.0	0
Rock Pigeon (*n*)	1.3	19	2.9	3
Pacific Wren	0.9	14	0.0	0
Northern Flicker	0.9	14	1.0	1
Savannah Sparrow	0.8	12	0.0	0
Unidentified Kinglet	0.7	11	0.0	0
American Robin	0.7	11	1.9	2
Common Nighthawk	0.7	11	0.0	0
Red-breasted Nuthatch	0.7	10	1.0	1
Short-eared Owl	0.7	10	0.0	0
Vaux's Swift	0.7	10	0.0	0
Swainson's Hawk	0.6	9	4.8	5
Warbling Vireo	0.5	8	0.0	0
Great Horned Owl	0.5	8	0.0	0
House Sparrow (*n*)	0.5	8	0.0	0
Black-billed Magpie	0.5	7	0.0	0
House Wren	0.5	7	1.0	1
Common Raven	0.5	7	1.9	2
Unidentified Sparrow	0.5	7	0.0	0
Barn Owl	0.4	6	0.0	0

Species (in descending order of % Composition)	Columbia Plateau Ecoregion[1]		Leaning Juniper II	
	% Composition (Only Standardized Searches)	Number of Fatalities Found on Standardized Searches	% Composition (Only Standardized Searches)	Number of Fatalities Found on Standardized Searches
Unidentified Warbler	0.4	6	0.0	0
Brewer's Sparrow	0.3	5	0.0	0
California Quail	0.3	5	0.0	0
Golden-crowned Sparrow	0.3	5	0.0	0
Chipping Sparrow	0.3	5	0.0	0
Cassin's Vireo	0.3	4	0.0	0
Lincoln's Sparrow	0.3	4	0.0	0
Vesper Sparrow	0.3	4	0.0	0
Cliff Swallow	0.3	4	0.0	0
House Finch	0.3	4	0.0	0
Western Tanager	0.3	4	0.0	0
Wilson's Warbler	0.3	4	1.0	1
American Coot	0.2	3	0.0	0
American Goldfinch	0.2	3	0.0	0
Canada Goose	0.2	3	0.0	0
Ferruginous Hawk	0.2	3	1.0	1
Great Blue Heron	0.2	3	0.0	0
Mountain Bluebird	0.2	3	0.0	0
Orange-crowned Warbler	0.2	3	1.0	1
Rough-legged Hawk	0.2	3	0.0	0
Song Sparrow	0.2	3	0.0	0
Spotted Towhee	0.2	3	1.9	2
Unidentified *Buteo*	0.2	3	0.0	0
Unidentified Duck	0.2	3	0.0	0
Unidentified *Vireo*	0.2	3	0.0	0
White-throated Swift	0.2	3	0.0	0
Mallard	0.2	3	0.0	0
Empidonax spp.	0.2	3	0.0	0
Varied Thrush	0.2	3	1.0	1
Common Yellowthroat	0.1	2	0.0	0
Downy Woodpecker	0.1	2	0.0	0
Gray Flycatcher	0.1	2	0.0	0
Hammond's Flycatcher	0.1	2	0.0	0
Hermit Thrush	0.1	2	0.0	0
Long-eared Owl	0.1	2	1.0	1
MacGillivray's Warbler	0.1	2	0.0	0
Northern Harrier	0.1	2	0.0	0
Northern Rough-winged Swallow	0.1	2	0.0	0
Pacific-slope Flycatcher	0.1	2	0.0	0

Species (in descending order of % Composition)	Columbia Plateau Ecoregion[1]		Leaning Juniper II	
	% Composition (Only Standardized Searches)	Number of Fatalities Found on Standardized Searches	% Composition (Only Standardized Searches)	Number of Fatalities Found on Standardized Searches
Pine Siskin	0.1	2	0.0	0
Red-winged Blackbird	0.1	2	0.0	0
Rock Wren	0.1	2	0.0	0
Sage Thrasher	0.1	2	0.0	0
Sharp-shinned Hawk	0.1	2	0.0	0
Virginia Rail	0.1	2	0.0	0
American Pipit	0.1	2	0.0	0
Tree Swallow	0.1	2	0.0	0
Accipiter spp.	0.1	1	0.0	0
American Crow	0.1	1	0.0	0
Ash-throated Flycatcher	0.1	1	0.0	0
Black-throated Sparrow	0.1	1	0.0	0
Brewer's Blackbird	0.1	1	0.0	0
Brown Creeper	0.1	1	0.0	0
Brown-headed Cowbird	0.1	1	0.0	0
Burrowing Owl	0.1	1	0.0	0
Common Poorwill	0.1	1	1.9	2
Cooper's Hawk	0.1	1	0.0	0
Eastern Kingbird	0.1	1	0.0	0
Golden Eagle	0.1	1	0.0	0
Grasshopper Sparrow	0.1	1	0.0	0
Hairy Woodpecker	0.1	1	0.0	0
Horned Grebe	0.1	1	0.0	0
Killdeer	0.1	1	0.0	0
Lewis' Woodpecker	0.1	1	1.0	1
Long-billed Curlew	0.1	1	0.0	0
Merlin	0.1	1	0.0	0
Northern Bobwhite	0.1	1	0.0	0
Northern Pintail	0.1	1	0.0	0
Northern Shrike	0.1	1	0.0	0
Peregrine Falcon	0.1	1	0.0	0
Purple Finch	0.1	1	0.0	0
Ring-billed Gull	0.1	1	1.0	1
Say's Phoebe	0.1	1	0.0	0
Swainson's Thrush	0.1	1	0.0	0
Townsend's Solitaire	0.1	1	0.0	0
Turkey Vulture	0.1	1	1.0	1
Unidentified Owl	0.1	1	0.0	0
Unidentified Swallow	0.1	1	0.0	0

Species (in descending order of % Composition)	Columbia Plateau Ecoregion[1]		Leaning Juniper II	
	% Composition (Only Standardized Searches)	Number of Fatalities Found on Standardized Searches	% Composition (Only Standardized Searches)	Number of Fatalities Found on Standardized Searches
Unidentified Thrush	0.1	1	0.0	0
Western Grebe	0.1	1	0.0	0
Western Kingbird	0.1	1	0.0	0
Western Screech-owl	0.1	1	0.0	0
Western Wood-pewee	0.1	1	0.0	0
White-breasted Nuthatch	0.1	1	0.0	0
Barn Swallow	0.1	1	0.0	0
Unidentified Gull	0.1	1	0.0	0
Yellow Warbler	0.1	1	1.0	1
Fox Sparrow	0.0	0	1.0	1
Total	**100**	**1,485**	**100**	**105**

* Incidentals are not included.

n = non-native species

[1] References for wind project studies: Big Horn (Kronner et al., 2008), Biglow Canyon Phase I (Jeffrey et al., 2009; Enk et al., 2010), Biglow Canyon Phase II (Enk et al., 2012), Biglow Canyon Phase III (Enk et al., 2012), Combine Hills I (Young et al., 2006), Combine Hills I/II (Enz et al., 2012), Echo Wind (Gritski and Downes, 2012), Goodnoe Hills (URS, 2010a), Harvest Wind (Downes and Gritski 2012a), Hay Canyon (Gritski and Kronner, 2010b); Hopkins Ridge I (Young et al., 2007, 2009), Kittitas Valley (Stantec, 2012), Klondike I (Johnson et al., 2003), Klondike II (NWC and West, 2007), Klondike III (Gritski et al., 2010a), Klondike IIIa (Gritski et al., 2010b), Leaning Juniper I (Gritski et al., 2008), Leaning Juniper II (this report), Marengo I and II year 1 (URS, 2010a and b), Marengo I and II year 2 (URS, 2011a and b), Nine Canyon (Erickson et al., 2003), Pebble Springs (Gritski and Kronner, 2010a), Rattlesnake Road (Gritski et al., 2011), Star Point (Gritski and Downes, 2011b), Stateline I and 2 (Erickson et al., 2004; Erickson et al., 2007), Stateline 3 (Kronner et al., 2012), Tuolumne (Enz and Bay, 2010), Vansycle (Erickson et al., 2000), Vantage (Ventus, 2012), Wheat Field (Gritski and Downes, 2011a), White Creek Wind I (Downes and Gritski 2012b), Wild Horse (Erickson et al., 2008), Willow Creek (NWC, 2011), Windy Flats (Enz et al., 2011).

Table 13. Reported mean annual fatality estimates on a per turbine and per MW nameplate basis for all bats in the Columbia Plateau Ecoregion where wildlife fatality monitoring studies have been completed and are public.

Wind Project[1] Listed in order of highest to lowest mean bat fatality rate per MW/year (first column)	**Mean Number of Bat Fatalities per MW/Year**	**Mean Number of Bat Fatalities per Turbine/Year**
Rattlesnake Road, OR[2]	2.87	6.03
Nine Canyon I, WA	2.47	3.21
White Creek Wind I, WA[2]	2.04	4.70
Biglow Canyon, OR (Phase I, Year 1)	1.99	3.29
Leaning Juniper I, OR[2]	1.98	2.97
Big Horn, WA[2]	1.90	2.86
Combine Hills I, OR (2004/2005 study year)	1.88	1.88
Stateline I and 2, OR/WA (2001-2003 study)	1.70	1.12
Pebble Springs, OR[2]	1.55	3.25
Stateline 3, OR[2]	1.44	3.31
Hopkins Ridge I, WA (Phase 1, Year 2)	1.39	2.50
Harvest Wind, WA[2]	1.28	2.94
Stateline 3, OR (Schoenfeld)	1.18	2.72
Klondike III, OR (Phase 1)[2]	1.17	2.07
Vansycle, OR	1.12	0.74
Echo Wind, OR[2]	0.99	1.72
Stateline 1 and 2, OR/WA (2006)	0.95	0.63
Tuolumne, WA	0.94	2.07
Willow Creek Wind, OR[2]	0.81	1.22
Klondike I, OR	0.77	1.16
Combine Hills I/II, OR (2011 study year)	0.73	0.73
Wheat Field, OR[2]	0.69	1.46
Hopkins Ridge I, WA (Phase 1, Year 1)	0.63	1.13
Leaning Juniper II, OR (Huso)[2]	**0.63**	**1.08**
Leaning Juniper II, OR (Schoenfeld)	**0.60**	**1.04**
Biglow Canyon, OR (Phase I, Year 2)	0.58	0.96
Biglow Canyon, OR (Phase II, Year 2)	1.32	0.57
Hay Canyon, OR[2]	0.53	1.12
Star Point, OR[2]	0.48	1.00
Klondike II, OR	0.41	0.63
Vantage, WA[2]	0.60	0.40
Windy Flats, WA (Year 1)	0.41	0.95
Wild Horse, WA (Year 1)	0.39	0.70
Goodnoe Hills, WA	0.34	0.68

Wind Project[1] Listed in order of highest to lowest mean bat fatality rate per MW/year (first column)	**Mean Number of Bat Fatalities per MW/Year**	**Mean Number of Bat Fatalities per Turbine/Year**
Marengo II, WA (Year 1)	0.27	0.49
Biglow Canyon, OR (Phase III, Year 1)	0.51	0.22
Marengo I, WA (Year 1)	0.17	0.31
Klondike IIIa, OR (Phase 2)[2]	0.16	0.24
Marengo I, WA (Year 2)	0.15	0.27
Kittitas Valley, WA[2]	0.26	0.12
Marengo II, WA (Year 2)	0.00	0.00
Mean (*without Leaning Juniper II*)	**1.00**	**1.60**

[1] References for wind project studies: Big Horn (Kronner et al., 2008), Biglow Canyon Phase I (Jeffrey et al., 2009; Enk et al., 2010), Biglow Canyon Phase II (Enk et al., 2012), Biglow Canyon Phase III (Enk et al., 2012), Combine Hills I (Young et al., 2006), Combine Hills I/II (Enz et al., 2012), Echo Wind (Gritski and Downes, 2012), Goodnoe Hills (URS, 2010a), Harvest Wind (Downes and Gritski 2012a), Hay Canyon (Gritski and Kronner, 2010b); Hopkins Ridge I (Young et al., 2007, 2009), Kittitas Valley (Stantec, 2012), Klondike I (Johnson et al., 2003), Klondike II (NWC and West, 2007), Klondike III (Gritski et al., 2010a), Klondike IIIa (Gritski et al., 2010b), Leaning Juniper I (Gritski et al., 2008), Leaning Juniper II (this report), Marengo I and II year 1 (URS, 2010a and b), Marengo I and II year 2 (URS, 2011a and b), Nine Canyon (Erickson et al., 2003), Pebble Springs (Gritski and Kronner, 2010a), Rattlesnake Road (Gritski et al., 2011), Star Point (Gritski and Downes, 2011b), Stateline I and 2 (Erickson et al., 2004; Erickson et al., 2007), Stateline 3 (Kronner et al., 2012), Tuolumne (Enz and Bay, 2010), Vansycle (Erickson et al., 2000), Vantage (Ventus, 2012), Wheat Field (Gritski and Downes, 2011a), White Creek Wind I (Downes and Gritski 2012b), Wild Horse (Erickson et al., 2008), Willow Creek (NWC, 2011), Windy Flats (Enz et al., 2011).

[2] Huso estimator was used to determine estimated fatality rates for these projects.

Table 14. Observed species composition and number of bat fatalities found on standardized searches at Columbia Plateau Ecoregion wind projects compared with those found at Leaning Juniper II Wind Power Facility.

Species (in descending order of % Composition for CPE Wind Projects)	CPE Wind Projects[1]		Leaning Juniper II	
	% Composition Found (Includes Standardized Searches Only)	Number of Fatalities Found (on Standardized Searches)	% Composition Found (Includes Standardized Searches Only)	Number of Fatalities Found (on Standardized Searches)
Hoary Bat	48.5	321	48.1	13
Silver-haired Bat	47.1	312	51.9	14
Unidentified Bat	2.2	15	0.0	0
Big Brown Bat	1.1	7	0.0	0
Little Brown Myotis	0.8	5	0.0	0
Myotis spp.	0.3	2	0.0	0
Totals	**100**	**662**	**100**	**27**

* Incidentals are not included.

[1] References for wind project studies: Big Horn (Kronner et al., 2008), Biglow Canyon Phase I (Jeffrey et al., 2009; Enk et al., 2010), Biglow Canyon Phase II (Enk et al., 2012), Biglow Canyon Phase III (Enk et al., 2012), Combine Hills I (Young et al., 2006), Combine Hills I/II (Enz et al., 2012), Echo Wind (Gritski and Downes, 2012), Goodnoe Hills (URS, 2010a), Harvest Wind (Downes and Gritski 2012a), Hay Canyon (Gritski and Kronner, 2010b); Hopkins Ridge I (Young et al., 2007, 2009), Kittitas Valley (Stantec, 2012), Klondike I (Johnson et al., 2003), Klondike II (NWC and West, 2007), Klondike III (Gritski et al., 2010a), Klondike IIIa (Gritski et al., 2010b), Leaning Juniper I (Gritski et al., 2008), Leaning Juniper II (this report), Marengo I and II year 1 (URS, 2010a and b), Marengo I and II year 2 (URS, 2011a and b), Nine Canyon (Erickson et al., 2003), Pebble Springs (Gritski and Kronner, 2010a), Rattlesnake Road (Gritski et al., 2011), Star Point (Gritski and Downes, 2011b), Stateline I and 2 (Erickson et al., 2004; Erickson et al., 2007), Stateline 3 (Kronner et al., 2012), Tuolumne (Enz and Bay, 2010), Vansycle (Erickson et al., 2000), Vantage (Ventus, 2012), Wheat Field (Gritski and Downes, 2011a), White Creek Wind I (Downes and Gritski 2012b), Wild Horse (Erickson et al., 2008), Willow Creek (NWC, 2011), Windy Flats (Enz et al., 2011).

8.0 APPENDICES

Appendix A. Summary of avian and bat fatalities found at Leaning Juniper II Wind Power Facility, January 2011–July 2013.

Date Found	Season	Species[1]	Taxon	Sex[2]	Age[3]	Habitat	Condition	Found During[4]	Plot	Distance to Turbine (meters)
Fatalities Prior to Start of Monitoring										
Birds (2)										
4/27/2011	Spring	Swainson's Hawk	Raptor	U	I	Road	Dismembered	Incidental	JJ16	45
6/20/2011	Summer	Swainson's Hawk	Raptor	U	I	Disturbed	Dismembered	Incidental	HH1	22
Bats (0)										
First Year of Monitoring										
Birds (56)										
7/14/2011	Summer	Horned Lark	Passerine	U	U	Grassland	Feather Spot	Clean-up	H3	63
7/15/2011	Summer	Horned Lark	Passerine	U	I	Turbine Pad	Scavenged	Clean-up	FF5	2
7/15/2011	Summer	Swainson's Hawk	Raptor	U	U	Grassland	Scavenged	Clean-up	FF4	64
7/15/2011	Summer	Lewis' Woodpecker	Woodpecker	U	U	Grassland	Feather Spot	Clean-up	FF5	117
7/18/2011	Summer	Horned Lark	Passerine	U	U	Disturbed	Scavenged	Clean-up	JJ15	24
8/23/2011	Fall	Swainson's Hawk	Raptor	U	U	Grassland	Feather Spot	Search	FF1	93
9/6/2011	Fall	Horned Lark	Passerine	U	U	Ag-Fallow	Feather Spot	Search	C2	82
9/8/2011	Fall	Rock Pigeon	Dove	U	U	Grassland	Feather Spot	Search	JJ10	92
9/19/2011	Fall	American Kestrel	Raptor	M	I	Disturbed	Intact	Incidental	JJ16	20
9/23/2011	Fall	Horned Lark	Passerine	U	U	Grassland	Feather Spot	Search	X2	109
9/23/2011	Fall	Horned Lark	Passerine	F	I	Ag-Wheat	Intact	Search	C4	10
9/26/2011	Fall	Common Poorwill	Goatsucker	U	U	Grassland	Feather Spot	Search	Y2	130
9/27/2011	Fall	Common Poorwill	Goatsucker	U	A	Grassland	Scavenged	Search	JJ10	83
9/28/2011	Fall	Swainson's Hawk	Raptor	U	U	Grassland	Feather Spot	Search	FF4	65
10/10/2011	Fall	Golden-crowned Kinglet	Passerine	F	U	Ag-Plowed	Intact	Search	B3	40
10/13/2011	Fall	Rock Pigeon	Dove	U	U	Ag-Plowed	Feather Spot	Search	DD4	67
10/27/2011	Fall	European Starling	Passerine	U	U	CRP	Feather Spot	Search	H3	103
10/28/2011	Fall	Mourning Dove	Dove	U	U	Ag-Plowed	Feather Spot	Search	DD4	103
10/28/2011	Fall	Horned Lark	Passerine	U	U	CRP	Feather Spot	Search	Y1	89
10/28/2011	Fall	Horned Lark	Passerine	U	U	CRP	Feather Spot	Search	X2	101
10/28/2011	Fall	Horned Lark	Passerine	F	U	CRP	Scavenged	Search	X2	31
10/28/2011	Fall	Dark-eyed Junco	Passerine	U	U	CRP	Feather Spot	Search	X5	101
10/28/2011	Fall	Golden-crowned Kinglet	Passerine	F	U	Ag-Plowed	Scavenged	Search	D3	84
10/28/2011	Fall	Golden-crowned Kinglet	Passerine	M	A	Road	Scavenged	Search	D4	42
10/31/2011	Fall	Dark-eyed Junco	Passerine	U	U	Ag-Plowed	Feather Spot	Search	CC2	37

Date Found	Season	Species[1]	Taxon	Sex[2]	Age[3]	Habitat	Condition	Found During[4]	Plot	Distance to Turbine (meters)
11/29/2011	Winter	Horned Lark	Passerine	M	U	Grassland	Scavenged	Search	X1	32
11/29/2011	Winter	Horned Lark	Passerine	M	U	Grassland	Intact	Search	Y2	51
11/29/2011	Winter	European Starling	Passerine	M	U	Ag-Wheat	Dismembered	Search	CC1	35
12/26/2011	Winter	Horned Lark	Passerine	U	U	Ag-Plowed	Feather Spot	Search	D1	120
12/27/2011	Winter	Horned Lark	Passerine	U	U	CRP	Feather Spot	Search	X4	126
2/20/2012	Winter	Common Raven	Passerine	U	U	CRP	Feather Spot	Search	M1	72
2/21/2012	Winter	American Robin	Passerine	U	A	CRP	Feather Spot	Search	X1	113
4/17/2012	Spring	American Robin	Passerine	U	A	Grassland	Feather Spot	Search	T3	87
4/18/2012	Spring	Western Meadowlark	Passerine	U	A	CRP	Feather Spot	Search	Y1	131
4/18/2012	Spring	Horned Lark	Passerine	U	A	Disturbed	Feather Spot	Search	X4	115
4/19/2012	Spring	Horned Lark	Passerine	U	A	Ag-Plowed	Feather Spot	Search	CC10	93
4/19/2012	Spring	Horned Lark	Passerine	U	A	Ag-Wheat	Feather Spot	Search	DD8	77
4/19/2012	Spring	Horned Lark	Passerine	U	A	Ag-Stubble	Feather Spot	Search	BB1	31
5/1/2012	Spring	European Starling	Passerine	U	A	CRP	Scavenged	Search	M2	82
5/16/2012	Summer	Horned Lark	Passerine	U	A	Ag-Wheat	Feather Spot	Search	D1	32
5/16/2012	Summer	Horned Lark	Passerine	F	A	CRP	Scavenged	Search	H4	49
5/16/2012	Summer	Horned Lark	Passerine	U	A	Disturbed	Dismembered	Search	F1	49
5/17/2012	Summer	Rock Pigeon	Passerine	U	A	CRP	Feather Spot	Search	FF2	61
5/17/2012	Summer	Horned Lark	Passerine	U	A	Ag-Wheat	Scavenged	Search	CC2	73
5/18/2012	Summer	Yellow Warbler	Passerine	F	A	Ag-Stubble	Scavenged	Search	BB1	98
5/18/2012	Summer	Western Meadowlark	Passerine	U	A	CRP	Feather Spot	Search	Y2	116
5/18/2012	Summer	Western Meadowlark	Passerine	U	A	CRP	Dismembered	Search	Z1	63
5/22/2012	Summer	Swainson's Hawk	Raptor	M	A	Turbine Pad	Dismembered	Incidental	KK6	7
6/13/2012	Summer	Northern Flicker	Woodpecker	U	A	Ag-Plowed	Feather Spot	Search	B3	90
6/18/2012	Summer	Swainson's Hawk	Raptor	F	A	Ag-Stubble	Scavenged	Search	KK5	65
7/12/2012	Summer	Gray Partridge	Gamebird	U	A	CRP	Feather Spot	Search	M2	106
7/12/2012	Summer	Horned Lark	Passerine	U	J	CRP	Scavenged	Search	X2	98
7/12/2012	Summer	Western Meadowlark	Passerine	U	U	CRP	Feather Spot	Search	Z5	87
7/13/2012	Summer	Ferruginous Hawk	Raptor	M	A	Ag-Fallow	Intact	Search	KK4	52
7/13/2012	Summer	Horned Lark	Passerine	U	J	Ag-Fallow	Scavenged	Search	KK5	3
7/16/2012	Summer	Ring-billed Gull	Gull	U	I	Disturbed	Feather Spot	Search	B2	12
			Bats (14)							
7/29/2011	Summer	Silver-haired Bat	Bat	F	A	Turbine Pad	Scavenged	Incidental	DD4	4
8/5/2011	Fall	Hoary Bat	Bat	U	I	Turbine Pad	Intact	Incidental	C1	N/A
8/22/2011	Fall	Hoary Bat	Bat	U	U	Disturbed	Scavenged	Search	Z2	26
9/6/2011	Fall	Hoary Bat	Bat	F	A	Ag-Fallow	Intact	Search	F1	34
9/6/2011	Fall	Hoary Bat	Bat	U	A	Turbine Pad	Scavenged	Search	B3	7

Date Found	Season	Species[1]	Taxon	Sex[2]	Age[3]	Habitat	Condition	Found During[4]	Plot	Distance to Turbine (meters)
9/12/2011	Fall	Silver-haired Bat	Bat	M	A	Road	Intact	Search	DD4	26
9/13/2011	Fall	Silver-haired Bat	Bat	M	A	Disturbed	Intact	Search	FF4	22
9/23/2011	Fall	Silver-haired Bat	Bat	F	I	Ag-Wheat	Intact	Search	C4	10
9/23/2011	Fall	Silver-haired Bat	Bat	F	I	Grassland	Scavenged	Search	X1	63
9/26/2011	Fall	Hoary Bat	Bat	U	A	Road	Intact	Incidental	CC4	33
10/12/2011	Fall	Silver-haired Bat	Bat	M	I	Ag-Stubble	Intact	Search	CC10	17
10/13/2011	Fall	Hoary Bat	Bat	M	U	Ag-Fallow	Intact	Search	JJ14	89
5/17/2012	Spring	Silver-haired Bat	Bat	M	A	CRP	Intact	Search	FF1	25
5/17/2012	Spring	Hoary Bat	Bat	F	A	CRP	Intact	Search	FF2	70
Second Year of Monitoring										
Birds (54)										
8/20/2012	Fall	Horned Lark	Passerine	U	U	Ag-Fallow	Scavenged	Search	B5	17
8/20/2012	Fall	Swainson's Hawk	Raptor	U	I	Ag-Stubble	Scavenged	Search	C3	45
8/20/2012	Fall	Wilson's Warbler	Passerine	F	I	Ag-Fallow	Dismembered	Search	B4	49
8/21/2012	Fall	Horned Lark	Passerine	U	U	CRP	Scavenged	Search	Z4	117
8/22/2012	Fall	House Wren	Passerine	U	I	CRP	Scavenged	Search	GG3	67
8/23/2012	Fall	Mourning Dove	Dove	U	U	Ag-Fallow	Feather Spot	Search	JJ1	89
8/23/2012	Fall	Orange-crowned Warbler	Passerine	F	A	Ag-Stubble	Intact	Search	HH2	81
9/6/2012	Fall	Horned Lark	Passerine	U	U	CRP	Feather Spot	Search	GG6	108
9/7/2012	Fall	Mourning Dove	Dove	U	U	Ag-Fallow	Feather Spot	Search	KK7	98
9/17/2012	Fall	Horned Lark	Passerine	F	J	Ag-Planted	Intact	Search	B5	31
9/18/2012	Fall	Western Meadowlark	Passerine	U	U	Grassland	Feather Spot	Search	X5	91
10/1/2012	Fall	Common Raven	Passerine	U	J	Shrub-steppe	Feather Spot	Search	H2	103
10/3/2012	Fall	Golden-crowned Kinglet	Passerine	M	J	CRP	Intact	Search	GG6	61
10/3/2012	Fall	Red-breasted Nuthatch	Passerine	M	A	CRP	Intact	Search	GG7	106
10/4/2012	Fall	Spotted Towhee	Passerine	M	J	CRP	Feather Spot	Search	GG3	70
10/4/2012	Fall	Horned Lark	Passerine	U	U	Ag-Stubble	Feather Spot	Search	HH5	107
10/5/2012	Fall	Horned Lark	Passerine	U	U	CRP	Scavenged	Search	JJ8	45
10/5/2012	Fall	Spotted Towhee	Passerine	U	U	CRP	Feather Spot	Search	JJ8	98
10/5/2012	Fall	Unidentified Passerine	Passerine	U	U	Ag-Fallow	Feather Spot	Search	KK7	107
10/8/2012	Fall	Golden Eagle	Raptor	M	A	Grassland	Dismembered	Incidental	JJ12	18
10/19/2012	Fall	Horned Lark	Passerine	U	U	Shrub-steppe	Feather Spot	Search	JJ3	54
10/19/2012	Fall	Fox Sparrow	Passerine	I	U	Ag-Plowed	Feather Spot	Search	KK7	122
10/19/2012	Fall	Horned Lark	Passerine	U	U	Ag-Stubble	Feather Spot	Search	HH5	98
11/15/2012	Winter	Horned Lark	Passerine	M	U	Grassland	Scavenged	Search	Y1	41
12/3/2012	Winter	Golden-crowned Kinglet	Passerine	U	U	Grassland	Scavenged	Incidental	Z5	38
12/17/2012	Winter	Turkey Vulture	Vulture	U	U	Shrub-steppe	Scavenged	Search	H2	103
12/19/2012	Winter	Varied Thrush	Passerine	U	U	Shrub-steppe	Feather Spot	Search	JJ2	35

Date Found	Season	Species[1]	Taxon	Sex[2]	Age[3]	Habitat	Condition	Found During[4]	Plot	Distance to Turbine (meters)
1/14/2013	Winter	Horned Lark	Passerine	U	A	Shrub-steppe	Feather Spot	Search	H2	116
1/15/2013	Winter	Long-eared Owl	Raptor	U	U	Shrub-steppe	Feather Spot	Search	Y1	140
1/19/2013	Winter	Horned Lark	Passerine	U	A	Ag-Planted	Feather Spot	Search	HH5	122
2/18/2013	Winter	Horned Lark	Passerine	U	A	Ag-Stubble	Scavenged	Search	C3	112
2/19/2013	Winter	Western Meadowlark	Passerine	U	A	Grassland	Feather Spot	Search	T4	95
2/19/2013	Winter	Horned Lark	Passerine	U	A	Grassland	Feather Spot	Search	T5	163
2/20/2013	Winter	Western Meadowlark	Passerine	U	A	Grassland	Feather Spot	Search	Z3	140
2/23/2013	Winter	Horned Lark	Passerine	U	A	CRP	Feather Spot	Search	JJ8	89
2/23/2013	Winter	Horned Lark	Passerine	U	A	Shrub-steppe	Feather Spot	Search	JJ2	37
2/23/2013	Winter	Horned Lark	Passerine	U	A	Ag-Planted	Feather Spot	Search	JJ1	131
3/19/2013	Spring	Horned Lark	Passerine	U	A	Shrub-steppe	Feather Spot	Search	T5	116
3/20/2013	Spring	Horned Lark	Passerine	U	A	Grassland	Scavenged	Search	Y2	91
3/21/2013	Spring	Horned Lark	Passerine	M	A	Ag-Planted	Injured	Search	HH5	49
3/26/2013	Spring	Horned Lark	Passerine	U	A	Grassland	Scavenged	Incidental	X2	30
4/2/2013	Spring	Horned Lark	Passerine	F	A	Shrub-steppe	Dismembered	Search	T4	12
4/3/2013	Spring	Horned Lark	Passerine	U	A	Grassland	Intact	Search	X5	84
4/19/2013	Spring	Horned Lark	Passerine	U	J	Ag-Planted	Scavenged	Search	JJ1	75
4/29/2013	Spring	Horned Lark	Passerine	U	A	Shrub-steppe	Scavenged	Search	T4	25
5/3/2013	Spring	Western Meadowlark	Passerine	F	A	Shrub-steppe	Scavenged	Search	JJ3	125
5/3/2013	Spring	Mourning Dove	Dove	U	A	CRP	Feather Spot	Search	JJ8	88
5/21/2013	Summer	Western Meadowlark	Passerine	U	A	Shrub-steppe	Feather Spot	Search	T4	117
5/22/2013	Summer	Western Meadowlark[5]	Passerine	U	J	Grassland	Intact	Search	Z4	14
5/23/2013	Summer	Horned Lark	Passerine	U	U	Ag-Planted	Scavenged	Search	CC7	34
6/17/2013	Summer	Horned Lark	Passerine	U	J	Shrub-steppe	Scavenged	Search	M3	89
6/18/2013	Summer	Western Meadowlark	Passerine	U	A	Shrub-steppe	Feather Spot	Search	K2	117
6/24/2013	Summer	Horned Lark	Passerine	M	A	Road	Scavenged	Search	KK8	35
7/18/2013	Summer	Horned Lark	Passerine	U	U	Ag-Plowed	Feather Spot	Search	CC6	50
			Bats (17)							
7/19/2012	Summer	Silver-haired Bat	Bat	M	A	Ag-Stubble	Intact	Clean-up	B4	24
7/20/2012	Summer	Silver-haired Bat	Bat	U	A	Turbine Pad	Scavenged	Clean-up	Y2	8
8/21/2012	Fall	Hoary Bat	Bat	F	I	CRP	Scavenged	Search	T5	26
9/4/2012	Fall	Hoary Bat	Bat	U	A	Grassland	Dismembered	Search	X4	22
9/4/2012	Fall	Hoary Bat	Bat	U	A	Shrub-steppe	Scavenged	Search	T4	17
9/5/2012	Fall	Hoary Bat	Bat	M	A	Disturbed	Intact	Search	Z4	8
9/5/2012	Fall	Hoary Bat	Bat	U	A	Ag-Stubble	Scavenged	Search	HH2	38
9/5/2012	Fall	Hoary Bat	Bat	U	A	Ag-Stubble	Dismembered	Incidental	CC4	98
9/18/2012	Fall	Hoary Bat	Bat	U	A	Grassland	Intact	Search	X4	31
9/21/2012	Fall	Hoary Bat	Bat	M	U	Ag-Fallow	Intact	Search	JJ1	35
9/21/2012	Fall	Silver-haired Bat	Bat	U	U	Turbine Pad	Scavenged	Search	JJ1	7

Date Found	Season	Species[1]	Taxon	Sex[2]	Age[3]	Habitat	Condition	Found During[4]	Plot	Distance to Turbine (meters)
10/1/2012	Fall	Silver-haired Bat	Bat	U	I	Road	Intact	Search	B7	16
10/15/2012	Fall	Silver-haired Bat	Bat	U	A	Ag-Planted	Scavenged	Search	B5	77
10/16/2012	Fall	Silver-haired Bat	Bat	U	A	Grassland	Scavenged	Search	T5	4
10/18/2012	Fall	Hoary Bat	Bat	U	U	Disturbed	Scavenged	Search	GG7	26
4/29/2013	Spring	Silver-haired Bat	Bat	U	A	Shrub-steppe	Scavenged	Search	K2	49
4/29/2013	Spring	Silver-haired Bat	Bat	F	A	Shrub-steppe	Scavenged	Search	T6	33

Note: Includes all casualties found. All are attributable to the wind project operations in the absence of sufficient information to determine causes of death.

[1] Includes those identified to species and for those where species identification could not be confirmed, taxonomic group or other is used.

[2] Sex: U = Unknown, M = Male, F = Female

[3] Age: U = Unknown, A = Adult, I = Immature, J = Juvenile

[4] Fatalities were found during standardized carcass search (Search), clean-up search (Clean-up) or Incidental

[5] Nestling, not attributed to Project operation

Appendix B. Special status wildlife observed (live) incidentally during wildlife monitoring at Leaning Juniper II Wind Power Facility, January 2011–July 2013.

Species	Status[1]	Date	Number	Location (nearest turbine or other feature)	Notes
Birds (7)					
Ferruginous Hawk	SC	4/17/2012	1	F1	Adult
		4/17/2012	1	JJ4	Adult
		6/18/2012	1	KK4	Female sitting on nest #1508 adjacent to KK-string.
		7/13/2012	1	KK5	Female perched on post next to KK5. Same day as male was found as fatality.
		7/24/2012	1	JJ3	Adult. Possibly from pair who nested near KK string.
		3/29/2013	1	C3	Perched in tree between C and D strings.
		4/15/2013	1	C3	Perched in tree between C and D strings.
Golden Eagle	BGEPA	12/18/2012	1	K1	150m north of turbine. Being mobbed by crows and ravens.
Grasshopper Sparrow	SV	6/14/2012	1	Z1	
		5/1/2013	1	Y1	
		5/27/2013	2	Z3	
		5/27/2013	2	Z4	
		6/24/2013	1	T6	
Loggerhead Shrike	SC	8/27/2012	1	GG6	Weatherford Rd. between DD and GG strings.
		10/18/2012	1	GG6	Weatherford Rd. between DD and GG strings.
		3/28/2013	1	JJ2	Along Plateau Farms Rd.
		3/29/2013	1	JJ2	Along Plateau Farms Rd.
		4/8/2013	1	JJ2	Along Plateau Farms Rd.
		4/29/2013	1	JJ3	
		4/29/2013	1	D1	
		6/19/2013	1	JJ2	
Long-billed Curlew	SV	4/17/2012	4	C2	
		4/17/2012	1	H3	
		4/17/2012	4	H4	
		4/17/2012	3	M1	
		4/18/2012	1	Y1	
		4/19/2012	2	CC1	Pair
		4/19/2012	1	FF1	
		4/19/2012	1	FF2	
		4/20/2012	1	FF4	

Species	Status[1]	Date	Number	Location (nearest turbine or other feature)	Notes
		4/20/2012	2	FF5	
		4/20/2012	1	GG9	
		4/30/2012	1	H4	Territorial bird
		5/1/2012	1	M1	
		5/1/2012	2	FF4	Pair
		5/2/2012	1	JJ15	
		6/13/2012	1	M2	
		7/16/2012	1	BB1	Territorial bird flying over plot.
		3/19/2013	1	C3	500m east of turbine.
		3/19/2013	1	X4	Across Rattlesnake Rd., 200m NW of turbine.
		3/22/2013	2	JJ1	
		3/25/2013	1	FF2	
		3/25/2013	2	JJ8	Pair flying around JJ7 and JJ8.
		3/26/2013	1	FF1	200m east of turbine in draw.
		3/26/2013	2	H4	
		3/26/2013	1	M1	200m east of turbine.
		4/1/2013	2	H4	
		4/4/2013	2	GG2	
		4/18/2013	2	GG9	
		4/19/2013	1	HH7	
		4/19/2013	2	JJ2	
		4/29/2013	1	D1	On road, 600m northeast of turbine.
		4/29/2013	1	FF4	250m south of turbine.
		4/29/2013	1	H3	
		5/23/2013	1	CC7	
		5/27/2013	2	KK7	Pair flying around KK7 and KK8.
		4/17/2012	1	Jones Canyon	Adult
		5/16/2012	1	K1	Adult
		7/12/2012	1	M1/M2	Adult perched on road between turbines M1 and M2
Prairie Falcon	BoCC	9/18/2012	1	Z3	75m from turbine
		10/1/2012	1	K2	100m from turbine
		11/14/2012	1	K2	
		11/19/2012	1	GG6	Flying 1m off ground
		12/18/2012	1	C4	
		2/19/2013	1	K1	Flying through fatality

Species	Status[1]	Date	Number	Location (nearest turbine or other feature)	Notes
					search plot
		3/20/2013	1	Z4	
		4/8/2013	1	K1	Jones Canyon Rd. Near Historical nest location.
		4/8/2013	2	JJ4	
		4/29/2013	1	JJ4	
		5/24/2013	2	JJ1	Pair. Courtship behavior.
		4/17/2012	2	JJ4	Pair flying near turbine
		4/17/2012	1	DD1	Adult flying
		4/19/2012	1	JJ4	Adult flying
		4/19/2012	1	FF2	Adult flying
		5/2/2012	1	JJ15	Adult flying
		5/21/2012	1	JJ14	Adult flying west of JJ string
		7/16/2012	2	Plateau Farms Road	Swainson's hawk nest. NWC nest #1276. At least one nestling in nest.
		7/19/2012	1	F1	
		7/23/2012	2	JJ2	Pair screaming during turbine search
		7/23/2012	1	JJ1	
Swainson's Hawk	SV	7/23/2012	1	Weatherford Road Between GG and DD strings	Nest in Juniper Tree
		7/24/2012	1	Intersection of Hwy 19 and Montague Road	
		8/21/2012	1	C4	Flying close to turbine in Rotor Swept Area
		8/23/2012	3	JJ1	Family group
		8/27/2012	1	DD1	
		9/3/2012	1	Weatherford Road	Flushed from Juniper near nest on Weatherford Rd.
		4/16/2013	2	H2	Pair
		4/17/2013	2	DD1	Pair at nest #3417. On Weatherford Rd.
		4/19/2013	3	JJ8	
		4/29/2013	1	HH7	
		5/20/2013	3	F1	
		6/24/2013	2	F1	
Mammals (2)					
Washington Ground Squirrel	SE	4/18/2011	4	JJ9	Recorded by Montague NWC wildlife survey crew on edge of proposed Montague transmission line corridor. In CRP habitat, four holes, many calls. 204 meters east of Plateau

Species	Status[1]	Date	Number	Location (nearest turbine or other feature)	Notes
					Farms Rd. near turbines JJ8 and JJ9.
		4/19/2012	6	FF1	Northwest quadrant of search plot. Calls heard.
		5/17/2012	3	FF1	
		2/22/2013	1	JJ2	One active hole w/scat NW of turbine.
		2/22/2013	50+	JJ3	Active holes and calls throughout search plot.
		3/25/2013	1	FF4	
		4/5/2013	5+	JJ8	In replanted grassland
		4/5/2013	5+	JJ9	In replanted grassland
		4/19/2013	15+	JJ2	Mostly on east side of turbine.
		5/24/2013	1	JJ1	
		5/24/2013	1+	JJ8	
White-tailed Jackrabbit	SV	4/17/2012	1	K2	
		4/17/2012	1	M1	
		4/30/2012	1	C2	
		5/1/2012	1	M1	
		5/1/2012	1	T2	
		5/1/2012	1	X2	
		6/13/2012	1	M2	
		6/13/2012	1	D3	
		6/14/2012	1	X4	
		7/12/2012	1	Jones Canyon	250 m NW of K-string.
		7/12/2012	1	F1	
		7/19/2012	1	K1	
		10/1/2012	1	D2	
		1/17/2013	1	T4	
		2/18/2013	1	M3	
		6/17/2013	4	H2	Juveniles

[1] Status:
SE = State of Oregon Endangered
SC = State of Oregon Sensitive-Critical
SV = State of Oregon Sensitive-Vulnerable
BoCC = USFWS Bird of Conservation Concern
BGEPA = Bald and Golden Eagle Protection Act

9.0 FIGURES

Figure 1. Turbine search plots at Leaning Juniper II Wind Power Facility, July 2011–July 2013.

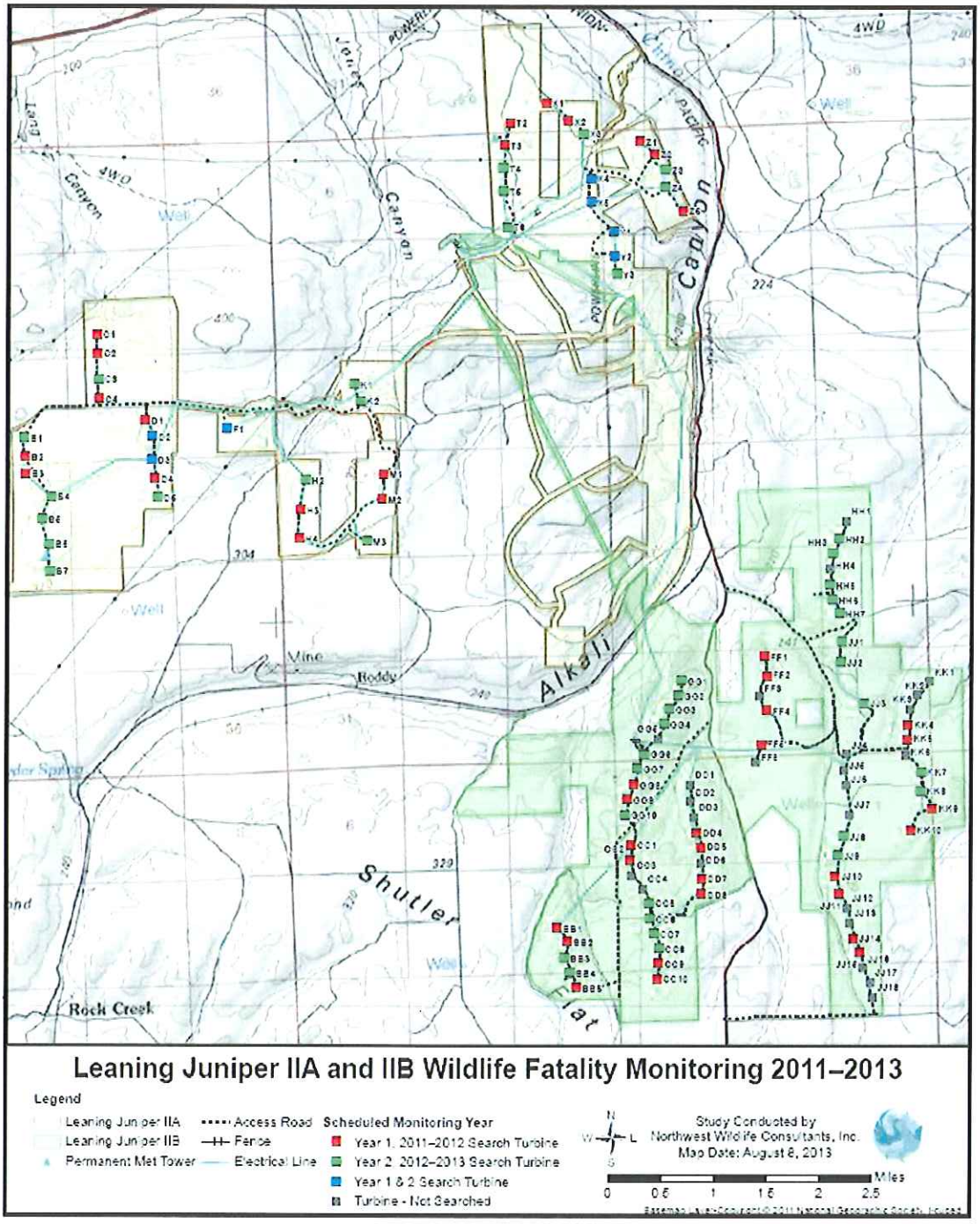


Figure 2a. Graphical depiction of 240 x 240 meter search plots conducted during wildlife fatality monitoring, at Leaning Juniper IIA Wind Power Facility, July 2011–July 2013.

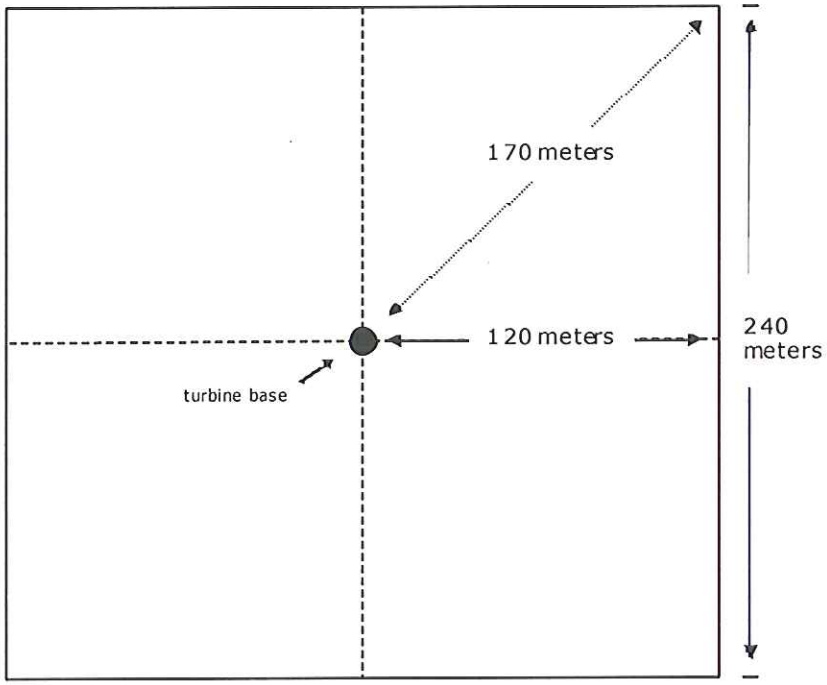


Figure 2b. Graphical depiction of 246 x 246 meter search plots conducted during wildlife fatality monitoring at Leaning Juniper IIB Wind Power Facility, July 2011–July 2013.

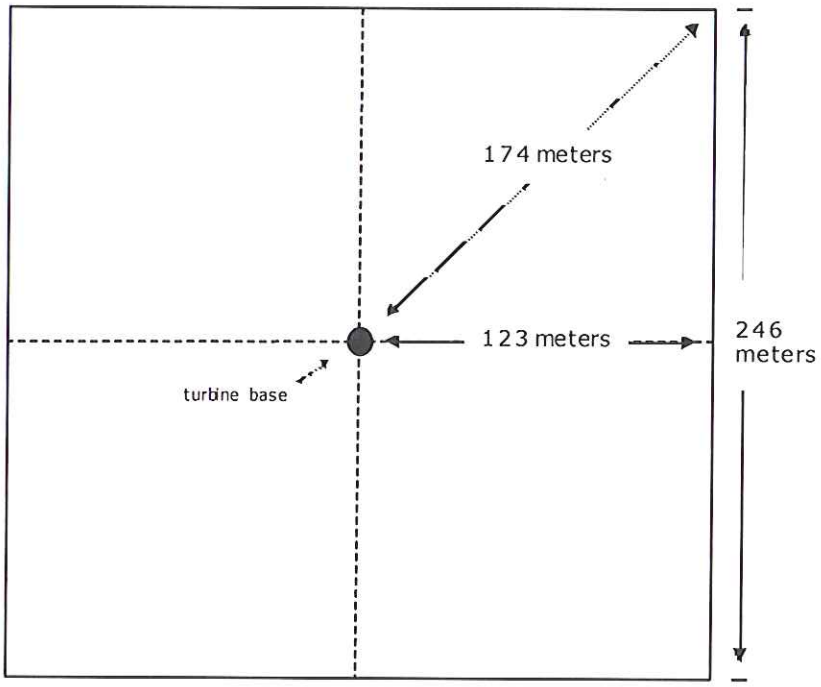
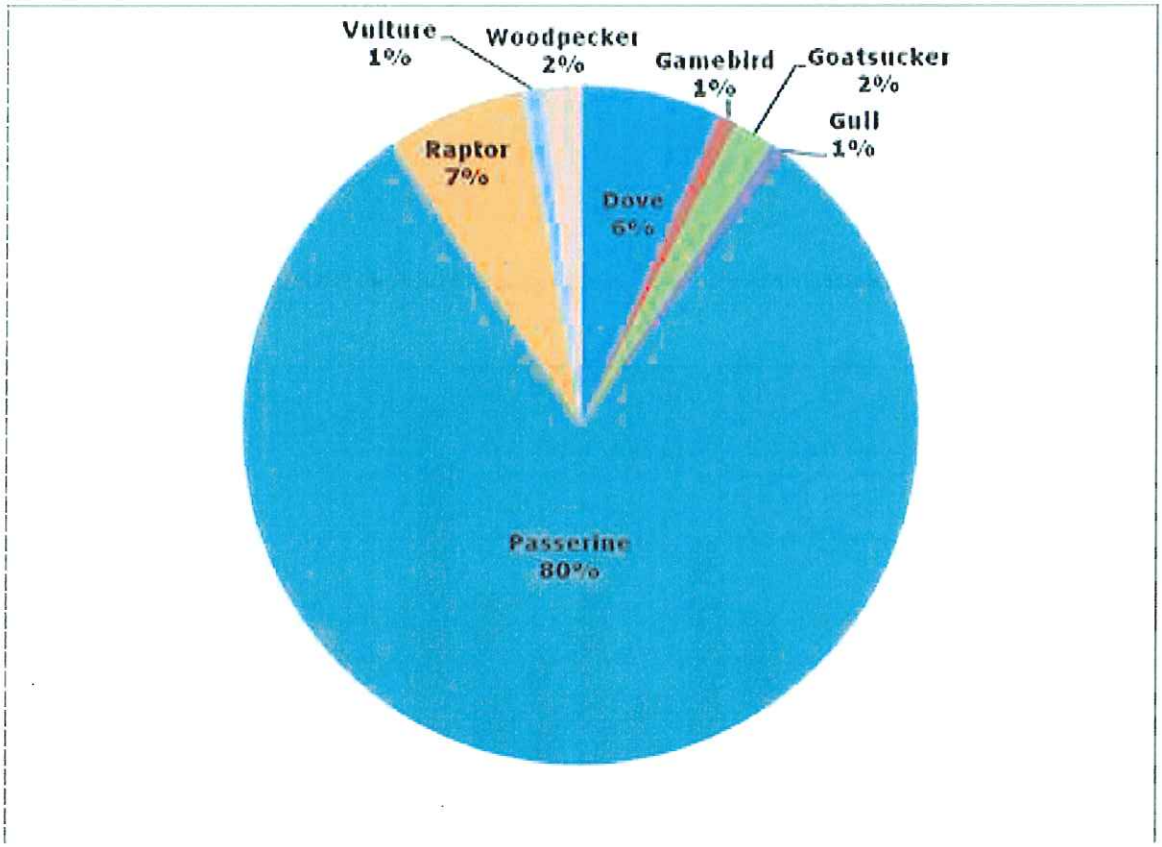
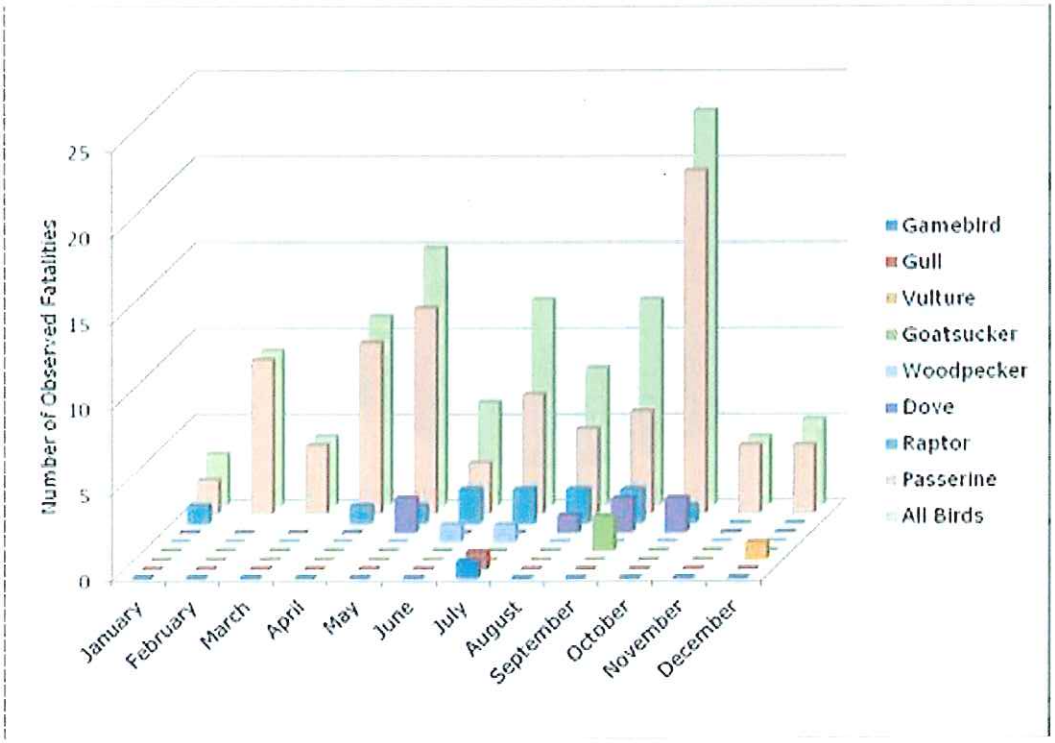


Figure 3. Composition of observed avian fatalities during standardized searches by taxonomic group at Leaning Juniper II Wind Power Facility, July 2011–July 2013.



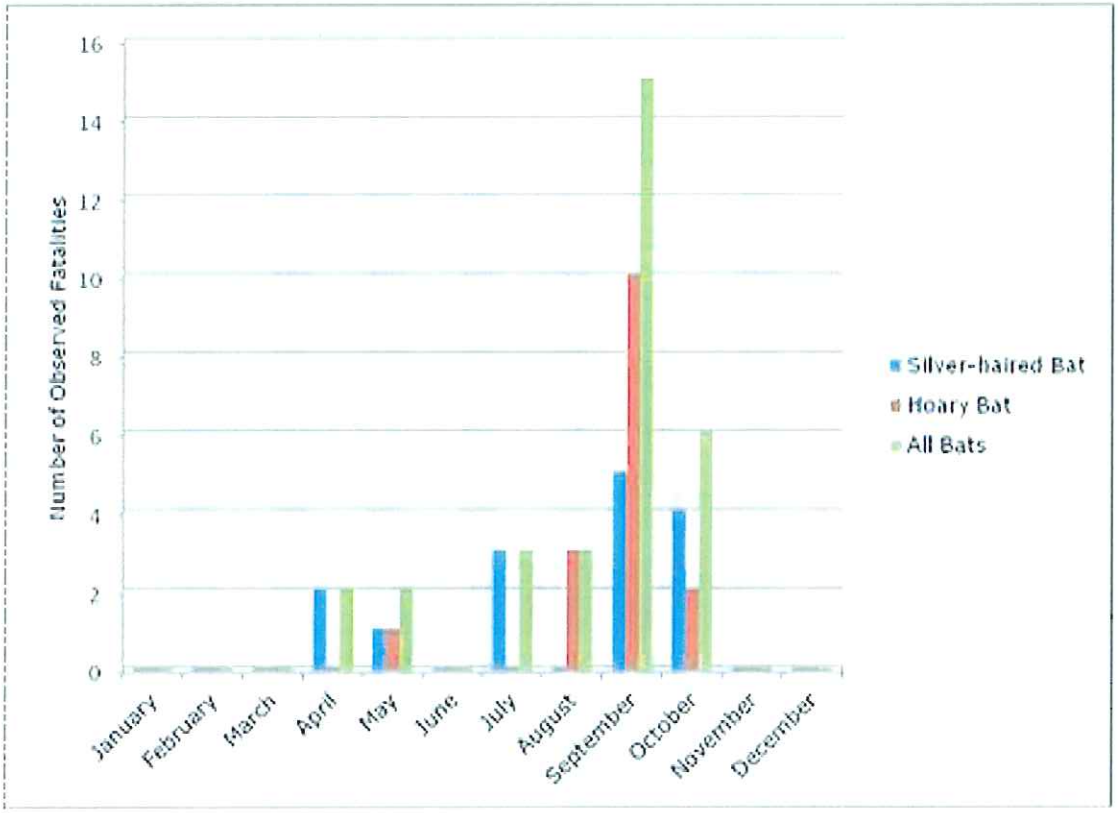
Note: Includes fatalities found during clean-up searches

Figure 4. Observed avian fatalities found by month at Leaning Juniper II Wind Power Facility, July 2011–July 2013.



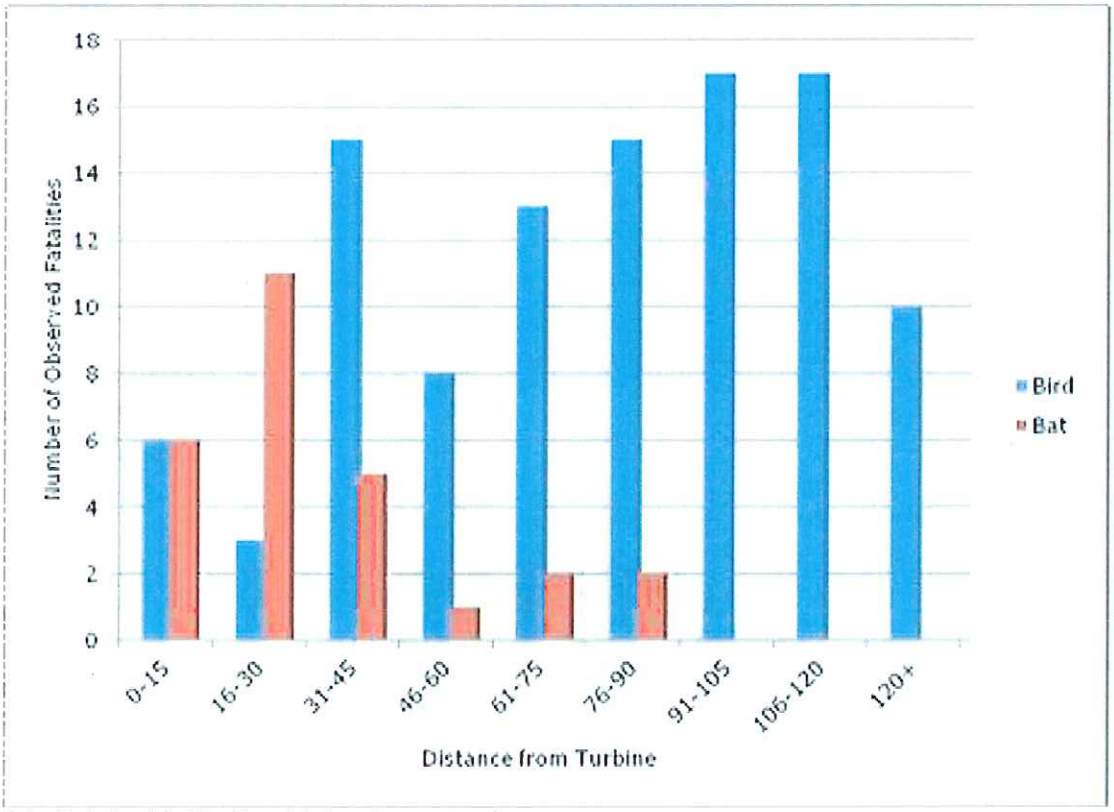
Note: Includes fatalities found during clean-up searches and incidentals

Figure 5. Observed bat fatalities found by month at Leaning Juniper II Wind Power Facility, July 2011–July 2013.



Note: Includes fatalities found during clean-up searches and incidentals

Figure 6. Observed fatalities of birds and bats during standardized searches, grouped by distance from turbine at Leaning Juniper II Wind Power Facility, July 2011–July 2013.



Note: Includes fatalities found during clean-up searches

Figure 7. Mean observed avian fatalities for turbines with FAA lighting, turbines adjacent to turbines with FAA lighting and turbines without FAA lighting and not adjacent to lit turbines at Leaning Juniper II Wind Power Facility, July 2011–July 2013.

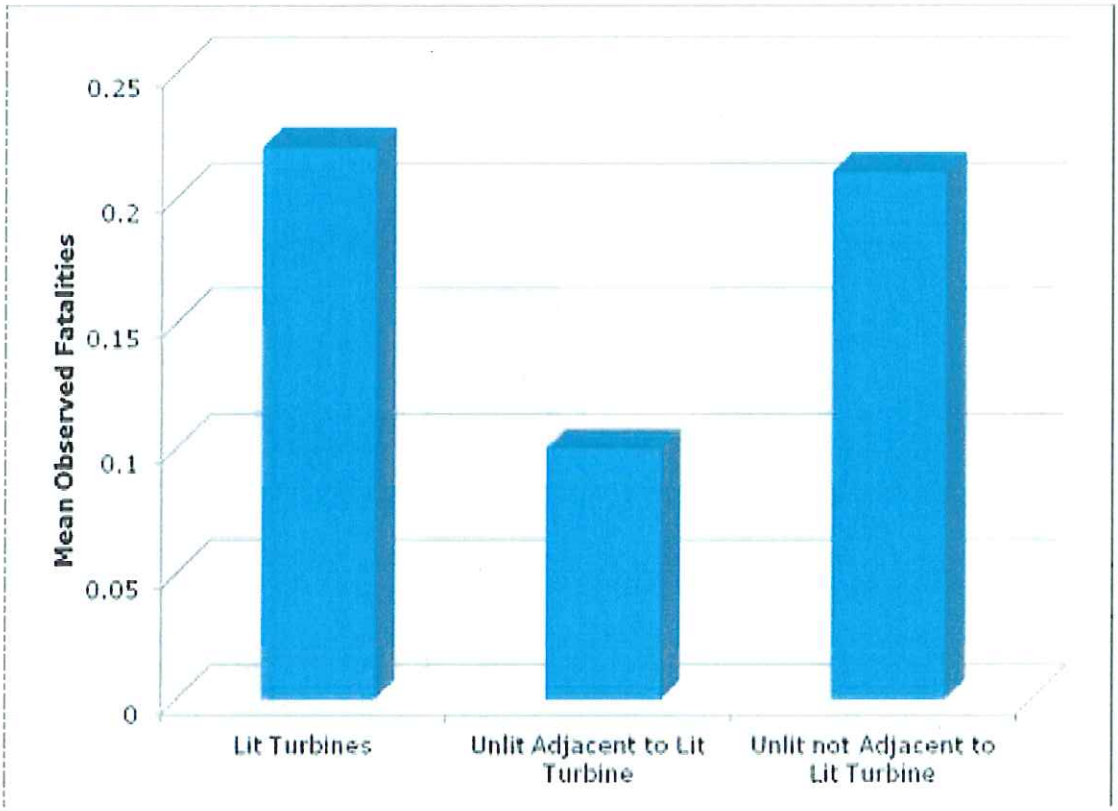


Figure 8. Mean observed bat fatalities for turbines with FAA lighting, turbines adjacent to turbines with FAA lighting and turbines without FAA lighting and not adjacent to lit turbines at Leaning Juniper II Wind Power Facility, July 2011–July 2013.