

FINAL REPORT

BASELINE ECOLOGICAL STUDIES FOR THE KLONDIKE WIND PROJECT, SHERMAN COUNTY, OREGON

Prepared For:

Northwestern Wind Power
85 John Day Dam Road
Goldendale, Washington 98620

Prepared By:

Gregory D. Johnson
Wallace P. Erickson
Kimberly Bay
Western EcoSystems Technology, Inc.
2003 Central Avenue
Cheyenne, Wyoming 82001

&

Karen Kronner

Northwest Wildlife Consultants
815 NW 4th Street
Pendleton, Oregon 97801

May 29, 2002

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EXECUTIVE SUMMARY

Northwestern Wind Power (“Northwestern”) completed construction and testing of a 24 Megawatt (MW) windplant (the “Project”) in Sherman County, Oregon near Klondike in January 2002. The completed development consists of sixteen 1.5 MW wind turbines manufactured by Enron Wind. An additional 25.5 MW development is planned for late 2002 or 2003, and a 50 MW development in 2003 or 2004. Northwestern is committed to monitoring avian and bat resources at these sites to determine if they impact these resources. Most of the site vicinity is cultivated wheat. Minor habitat types include Conservation Reserve Program (“CRP”) fields, wooded drainages and woodlots associated with farmsteads. Pre-construction monitoring began in April 2001 and concluded in April 2002. Monitoring included collection of data on bird use of the area, determining the number of raptor nests within 5 miles of the sites, and surveys for sensitive species. The goal of the avian use surveys was to estimate the temporal and spatial use of the study area by birds. Seven circular plots with 0.5-mile radii were surveyed in the study area on a weekly basis. All sightings of native birds, upland gamebirds, and mammal, reptile, and amphibian species of concern in and near plots during a 30-minute interval were recorded. Two walking surveys were conducted during June 2001 in appropriate habitat to document burrowing owls and other sensitive grassland species within 1000 feet of Phase I project facilities. Two night-time spotlight surveys for white-tailed jackrabbits in the Phase I project area were conducted in August 2001. Aerial raptor nest surveys were conducted to obtain information on nesting species, nest locations, timing, and success in the study area. The nest search area included the project sites and an approximate 5-mile buffer of the project sites. Researchers documented 41 species of birds, seven species of mammal, and one reptile (western rattlesnake) in the study area. Sensitive species documented during baseline monitoring included Swainson’s hawk (11 nests within 5 miles; 12 birds observed during point counts), ferruginous hawk (2 observed during point count surveys), long-billed curlew (one observation), golden eagle (one nest within 5 miles; 3 observed during point count surveys), loggerhead shrike (one individual), and white-tailed jackrabbit (5 individuals). A total of 1184 flocks of birds representing 8675 individuals were recorded at the seven survey points. Mean use by all species of birds combined was 17.46/survey. Avian use of the study area was highest in winter (34.46/survey) and lowest in the summer (3.70/survey). The mean number of species observed per survey (avian richness) was highest in the summer (3.14 species/survey) and lowest in the spring (2.10/survey). Use of the study area by waterbirds and shorebirds was extremely low.

The only species of waterfowl observed was Canada goose; 43 flocks totaling 4845 individuals were observed flying over the study area over the yearlong survey period. The only gallinaceous game bird observed was ring-necked pheasant, with 31 observations. The only other upland gamebird recorded was mourning dove, with 23 observations totaling 33 individuals. Eight species of raptors were documented during the study. The species with the greatest number of individuals recorded was rough-legged hawk (83), followed by northern harrier (74), red-tailed hawk (65), American kestrel (32), Swainson's hawk (12), golden eagle (3), prairie falcon (3), and ferruginous hawk (2). Use of the area by all raptors combined was highest in the winter (0.73/survey) and lowest in the fall (0.49/survey); raptor use of the area in the spring (0.59/survey) and summer (0.60/survey) was similar. Twenty-three species of passerines were observed during surveys. The most abundant passerines were horned lark (2.25/survey), American goldfinch (0.89/survey), western meadowlark (0.75/survey), violet-green swallow (0.33/survey), common raven (0.21/survey), cliff swallow (0.16/survey), and American robin (0.14/survey). The rotor-swept height of the Phase I Enron turbine is approximately 30 to 100 m above ground. Over the study, 745 flocks comprised of 7,483 birds were observed flying during point count surveys. Mean flight height for all species combined was 34.5 m. For all species combined, 52.7% of all flying birds observed were below the rotor-swept height, 37.8% were within the rotor-swept height, and 9.4% were above the rotor-swept height. Bird groups most often observed flying within the turbine rotor-swept height were waterfowl (56.2%), swallows (42.6%) and buteos (27.6%). Species with the greatest proportion of observations within the turbine rotor-swept height were rough-legged hawk (64.9%), Swainson's hawk (62.5%), Canada goose (56.2%), red-tailed hawk (40.9%), and American robin (37.5%). Based on abundance and flight behavior, species with the highest probability of turbine exposure were Canada goose, horned lark, rough-legged hawk, violet-green swallow, and common raven. Thirty-five active raptor nests were found within an approximate 5-mile buffer of the project sites during the May and June 2001 helicopter surveys, including 16 red-tailed hawks, 11 Swainson's hawks, 6 great horned owls, and one each of the following species: American kestrel, common raven, and golden eagle. The estimated raptor use in the project area averaged 0.42/20-minute survey. Raptor use of the project area is higher than estimated raptor use at the Nine Canyon, Washington site (0.27/20-minute survey), is similar to estimated raptor use at the Stateline, Washington/Oregon site (0.41/20-minute survey), and is lower than raptor use at the Vansycle, Oregon site (0.51/20-minute survey). No documented turbine-related raptor fatalities have been

found at the Nine Canyon, Vansycle, or Stateline sites. Estimated raptor use at Klondike is also much lower than at Buffalo Ridge, Minnesota (0.50/20-minute survey), and Foote Creek Rim, Wyoming (0.55/20-minute survey). Only one raptor mortality (red-tailed hawk) was documented during a 6-year monitoring period of the Buffalo Ridge site. At Foote Creek Rim, Wyoming, only five turbine-related raptor fatalities (3 American kestrels, 1 northern harrier, and 1 short-eared owl) were observed during 2 years of monitoring within the Phase I windplant comprised of 69 turbines. Overall, based on raptor use data in the project area and raptor use and mortality data collected at other windplants, raptor mortality at the Phase I, Phase II and Phase III project sites would likely be absent or very low. Mortality monitoring of all 16 Klondike Phase I turbines began in early February 2002, and the only fatality found to date has been one European starling.

INTRODUCTION

Northwestern Wind Power (“Northwestern”) is presently developing wind power in Sherman County, Oregon. Northwestern completed construction and testing of a 24 Megawatt (MW) windplant in Sherman County, Oregon near Klondike in late January 2002 (Figure 1). The wind plant consists of sixteen 1.5 MW wind turbines manufactured by Enron Wind. Northwestern is currently proposing development of another 25.5 MW windplant in early 2003, and a 50 MW development in 2003 or 2004. Northwestern contracted with Western Ecosystems Technology, Inc. (WEST) to develop a survey protocol for a one-year baseline study of avian use of the project area where all three phases have been or will be built, as well as a protocol to monitor avian and bat mortality for one year once the turbines within each phase become operational. The protocol for the avian baseline study and proposed post-construction monitoring study was similar to protocols used at the Vansycle Windplant in Oregon (Erickson *et al.* 2000), the Buffalo Ridge Windplant in southwest Minnesota (Johnson *et al.* 2000a), the SeaWest Windplant in Wyoming (Johnson *et al.* 2000b) and other proposed wind plants in Oregon and Washington. WEST, Inc. and Northwest Wildlife Consultants, Inc. were contracted to conduct the baseline study. Northwestern is committed to monitoring avian and bat resources at the project sites to determine if the projects impact these resources. The post-construction monitoring effort began on the existing Phase I wind plant in early February 2002.

This report presents results of the 1-year baseline monitoring study conducted for the project area. The avian baseline study consisted of 1) point count and in-transit surveys for wildlife species, 2) two aerial surveys within 5 miles of the project boundary for visible raptor nests, 3) surveys for sensitive grassland species (e.g., burrowing owl, white-tailed jackrabbit) within suitable habitat near proposed turbine strings, and 4) vegetation mapping. Furthermore, information on sensitive plant and wildlife species within the vicinity of the project area was requested from the U.S. Fish and Wildlife Service (USFWS), the Oregon Department of Fish and Wildlife (ODFW), and the Oregon Natural Heritage Program (ONHP) and is reported in this document.

STUDY AREA

The Project area is within the Columbia Basin Physiographic Province. The study area (referred to herein as the “Project area”) is 3 miles directly east of Wasco and approximately 7.5 miles south of the Columbia River. The initial Project consists of 16 turbines placed in Sections 10, 15 and 22, Township 1 N, Range 18 E (Figure 1). The second phase will consist of approximately 17 turbines and will be constructed in late 2002 or 2003. Phase II turbines will be located in Sections 7, 18 and 19, Township 1 N, Range 18 E. The third phase will consist of approximately 33 turbines.

The original vegetation of this area was the bluebunch wheatgrass-Idaho fescue zonal association, which was predominately grassland and shrub-steppe with deciduous riparian forest and scrub along drainages (Franklin and Dyrness 1973). Agriculture and livestock grazing have converted the area to a mosaic of grazed shrub-steppe, Conservation Reserve Program (“CRP”) seeded pastures, and cultivated wheat fields. CRP fields are areas that had previously been farmed, but have been seeded to grasslands for a minimum of 10 years to reduce soil erosion. Most of the Project area is cultivated wheat. Minor habitat types include wooded drainages and woodlots associated with abandoned and occupied farmsteads. Thirteen of the 16 turbines in the first phase were placed within wheat fields and the remaining three (turbines 11-13) were placed within a narrow strip of CRP. All 17 turbines in the second phase and all 33 turbines in the third phase of development will be placed in wheat fields.

METHODS

Agency/Local Audubon Consultation

A meeting was held with Oregon Department of Fish and Wildlife (“ODFW”) staff at The Dalles, Oregon on April 4, 2001. At that time a draft study protocol was provided to Jim Torland of the ODFW for review and comment. In mid-April, a draft protocol was also sent to Mike Green of the U.S. Fish and Wildlife Service (“USFWS”) in Portland, Oregon. Several members of the ODFW were also present for discussions at the first Oregon Solutions meeting for the Project held on May 15, 2001 in Rufus, Oregon. No comments on the protocol were received from the USFWS. Two letters were received from Jim Torland with ODFW the week of June 4, 2001 (Appendix A). The comments were generally favorable; however, ODFW requested that the technical work for Phase I include some additional monitoring for sensitive species including white-tailed jackrabbit and burrowing owl. ODFW also requested that the

Phase I post-construction monitoring be extended past the proposed first year of operation. A formal presentation regarding the project, and the baseline and monitoring plan, was given to the Audubon chapter in Bend, Oregon at their monthly meeting in July 2001. A letter outlining support for the project was received from Bend Audubon.

Vegetation Mapping

The vegetation of the project area for all three project phases was mapped based on ground observations and black and white aerial photographs obtained from the USGS. The project field biologist visually assessed the study area from access roads, delineating vegetation types based on the dominant cover type. Plant species were identified during walking transects conducted through representative vegetation types.

Avian Baseline Study

The principal goals of the avian baseline study were to: (1) quantitatively describe the temporal and spatial use by birds of the study area and (2) provide baseline information on these species sufficient for use in evaluating the probable impact of wind power development in the study area. The study area was defined as all areas within two miles of existing and proposed turbine locations. A much larger area than that required for the Phase I 24 MW development was surveyed to obtain data in areas potentially included in future expansions of the wind farm.

The goals of the avian use surveys were to estimate the temporal and spatial use of the study area by birds. Seven circular plots were surveyed in the study area using the method described by Reynolds *et al.* (1980). The points were selected to achieve good coverage of the study area. All native birds, upland gamebirds, and reptile, amphibian, and mammal species of concern detected were recorded while the observers were in the study area traveling between observation points.

Plot Surveys

Each plot was an approximate 800-m radius circle centered on an observation point (Figure 1). Landmarks (e.g., draws, farmsteads, roads, etc.) were located to identify the 800-m boundary of each observation point. Observations of birds beyond the 800-m radius were recorded, but were analyzed separately from data within the plot. All sightings of native birds, upland gamebirds, and mammal, reptile, and amphibian species of concern in and near plots during the 30-minute plot surveys were recorded. A unique observation number was assigned to each sighting. Weather information such as temperature, wind speed, wind direction and cloud cover was

recorded for each survey point. The date, start time and end time of the observation period, plot number, species, number of individuals, sex and age class, distance from plot center when first observed, closest distance, altitude above ground, activity, and habitat(s) were recorded. Flight or movement paths were mapped and given corresponding observation numbers. The map indicates whether the bird was within or outside the survey radius based on reference points at known distances from the plot center.

Four instantaneous counts were made during each 30-minute observation period. The first instantaneous count was made at the beginning of the observation period and the remaining counts occurred at 10-minute intervals. For an instantaneous count, all birds present in and near the plot at a particular point in time were recorded. During an instantaneous count, the observer made a quick 360-degree visual scan followed by quick scanning with binoculars of likely perch sites, areas where birds might not be detectable by visual scan due to background color and/or texture, and sites where birds were previously observed during the 30-minute survey. Visual and binocular scanning of the entire plot and beyond were continuously performed between instantaneous counts.

Behavior categories recorded included perched (PE), soaring (SO), flapping (FL), flushed (FH), circle soaring (CS), hunting (HU), gliding (GL), and other. Initial flight patterns and habitats were identified with "1" in the data sheet and subsequent patterns and habitats (if any) were recorded as "x". For example, if a raptor was first sighted while perched, and then left its perch and flew out of the study area, then a 1 was written in the box next to perching, and an x was written in the box for flapping. The flight direction of the bird was also recorded. Flight altitude at first observation and the low and high altitude observed were recorded to the nearest meter and any other altitude categories traversed by the bird were marked. Flight heights and distances to the nearest meter were also recorded if the bird was observed during an instantaneous count. Habitats were recorded as Conservation Reserve Program (CRP), wheat stubble (ST), wheat (WW), plowed (PL), tree (TR), riparian (RI), and other (OT). Any comments or unusual observations were recorded. Locations of raptors, other large birds, and any species of concern seen during the surveys were recorded on the field maps by observation number. Mapped information and flight paths were digitized using ARCVIEW 3.2.

Incidental/In-transit Observations

All species of concern sighted while field observers were traveling between plots were recorded on data sheets for incidental observations. The data recorded were similar to those recorded during the plot studies. The observation number, date, time, species, number, sex/age class, flight height and habitat were recorded. Observations of uncommon species and species of concern were recorded in additional detail, mapped on a USGS quadrangle map by observation number, and digitized.

Observation Schedule

Visual observations were made to cover all daylight hours. During a set of surveys, each plot was visited once. Weekly surveys were conducted during daylight hours all four seasons. Observation days were divided into two periods, morning (6-12) and afternoon (12-6), with each station being surveyed for 30 minutes. Each station was surveyed about the same number of times each period of the day during each season.

Sampling Intensity

Sampling intensity was designed to document avian use and behavior by habitat within the study area. One observer was in the study area one day a week throughout the year. Observations of raptors and other large birds were also made along roads in between points. The routes traveled were mapped, and observations of birds were located on these maps.

Statistical Analysis

Avian Use

Species lists were generated by season including all observations of birds detected regardless of their distance from the observer. Seasons were defined as follows:

Spring Migration	March 16 – May 15
Summer/Breeding	May 16-August 15
Fall Migration	August 16-October 31
Winter	November 1-March 15

The number of birds seen during each point count survey was standardized to a unit area and unit time surveyed. The standardized unit time was 30 minutes and the standardized unit area was 2.01 km² (800-m radius view shed for each station). For example, if four raptors were seen during the 30 minutes at a point with a viewing area of 2.01 km², these data may be standardized to $4/2.01 = 1.98$ raptors/km² in a 30-minute survey. To be consistent with studies conducted at other wind

resource areas, only data from the continuous counts (i.e., not the instantaneous counts) were summarized and reported. For the standardized avian use estimates, only observations of birds detected within 800 m of the observer were used.

Estimates of avian use (expressed in terms of number of birds/plot/30-minute survey) were tabulated in the final report to compare differences in avian use between 1) avian groups and 2) seasons. Differences in avian use between the survey plots were examined to determine possible locations of relatively high avian use within the study area.

Avian Diversity and Richness

The total number of unique species was calculated by season. The mean number of species observed per survey (i.e., per station per 30-minute survey) was used as an index to avian richness in the study area. Mean number of species per survey was tabulated to illustrate and compare differences between seasons.

Avian Flight Height/Behavior

The Enron turbine used on the Klondike Phase I development has a 65-meter (“m”) tall tower and a rotor diameter of 70.5 m. Therefore, the rotor-swept height of the turbine ranges from approximately 30 to 100 m above ground. The first flight height recorded was used to estimate percentages of birds flying below, within and above the rotor swept area (RSA) of the 1.5 MW turbine.

Avian Risk Index

A relative index to risk (R) was calculated for bird species observed in the project area using the following formula:

$$R = A * P_f * P_t$$

Where A = mean relative use for species i averaged across all surveys, P_f = proportion of all observations of species i where activity was recorded as flying (an index to the approximate percentage of time species i spends flying during the daylight period), and P_t = proportion of all flight height observations of species i within the rotor-swept height (RSH). This index does not account for differences in behavior other than flight characteristics (i.e., flight heights and proportion of time spent flying).

Avian Flight Patterns and Behavior

Maps of flight paths of raptors and other species of concern were generated and reported to illustrate patterns in flight paths and behaviors.

Data Compilation and Storage

A database was developed to store, organize and retrieve field observation data. Data from field forms were keyed into electronic data files using a pre-defined format to facilitate subsequent QA/QC and data analysis. All field data forms, field notebooks, and electronic data files were retained for reference.

Quality Assurance/Quality Control (QA/QC)

QA/QC measures were implemented at all stages of the study, including field surveys, data entry, data analysis and report preparation. At the end of each survey day, each observer was responsible for inspecting their data forms for completeness, accuracy, and legibility. Data forms were reviewed to insure completeness and legibility and any problems detected were corrected. Any changes made to the data forms were initialed and dated by the individual making the change. Data were entered into electronic database files (Microsoft ACCESS), queried and reviewed for inconsistencies. Any irregular codes detected, or any data suspected as questionable, were discussed with the observer and study team leader. All changes made to the raw data were documented for future reference.

Sensitive, Threatened, and Endangered Species

The USFWS was contacted for information on the listed and sensitive plant and animal species that may occur in the Phase I, Phase II, and Phase III project areas. Because there is not federal involvement in these projects, it is USFWS policy not to provide sensitive species lists. Therefore, WEST also sent a request for information on sensitive species to the Oregon Natural Heritage Program (“ONHP”) database. ODFW personnel were also interviewed about sensitive species that may occur in the vicinity of the project area. Letters received from the ODFW (Appendix A) identified white-tailed jackrabbits and burrowing owls as sensitive species, and requested surveys for these species within suitable habitat. To address this request, two walking transect surveys for burrowing owls and other sensitive species were conducted in the Phase I project area in June 2001 within 1000 feet of the proposed location of Turbines 11-13, which were located in CRP habitat, as well as in suitable habitat within 1000 feet of the proposed distribution line. In addition, nocturnal spotlighting surveys were conducted within 600 feet on either side of the proposed turbine string locations in August 2001. Both wheat and non-wheat

habitats were included in the surveys. All sensitive species surveys were designed based on guidelines presented in ODFW (1994).

Walking Surveys for Burrowing Owls and Other Sensitive Grassland Species

The goal of the walking surveys was to document burrowing owls and other sensitive grassland species including grasshopper sparrow, long-billed curlew, and white-tailed jackrabbit near the Phase I project facilities. Two walking transect surveys were conducted (June 19 and June 24, 2001) in CRP or native habitats within 1000 feet of the proposed location for the Phase I turbine strings and distribution line. Transects were spaced approximately 200 feet apart. Any observations of sensitive species were recorded and mapped. Presence of burrows, scat and other sign was also recorded.

Spotlight Surveys for White-tailed Jackrabbits

Nighttime spotlight surveys for white-tailed jackrabbits were conducted on August 8 and 18, 2001 in the Phase I project area after the wheat had been harvested. Surveys were conducted between sunset and midnight. Surveys were conducted using a 500,000 candlepower spotlight. Surveys were conducted from the center of the proposed location of the turbine strings either from an ATV or on foot. Observers spotlighted both sides of the centerline for presence of jackrabbits.

Raptor Nest Surveys

The goal of the nesting raptor surveys was to gather information on nesting species visible from the air, nest locations, timing, and success in the study area. The nest search area included the Phase I, Phase II, and Phase III project sites and an approximate 5-mile buffer of the project sites, which totaled approximately 150 square miles (Figure 2). The focal species for the nesting surveys were buteos, primarily red-tailed and Swainson's hawks. The buffer is based on data provided in Table 1. Given the paucity of available nest trees, a nearly total count of nesting buteos in the immediate vicinity of the project sites was possible. The first helicopter raptor nest survey was conducted on May 7 and 8, 2001. A subsequent helicopter survey was conducted to gather nest success statistics including number of active nests, number of nests with young, and number of young per active nest. This survey was conducted on June 5, 2001. Locations of inactive nests were also recorded as they may be occupied during future years. All nests, whether active or inactive, were given an identification number.

RESULTS AND DISCUSSION

Vegetation

The principal vegetation types identified in the project area were:

AD – agricultural lands, primarily dryland wheat. Throughout the study period, fields varied from being plowed, to having wheat crop or stubble present.

TR – planted groves or individual trees. The trees noted were primarily black locust and cottonwoods, live trees and snags were located at old homesteads and existing farmsteads. These trees may provide nesting or roosting structure for raptors and smaller birds, and if loose bark is present, roosting structure for bats.

SS – shrub-steppe. Areas defined as shrub-steppe are grasslands with the addition of an obvious shrub component (>50%) consisting primarily of gray rabbitbrush (*Chrysothamnus nauseosus*) and big sagebrush (*Artemisia tridentata*).

CRP – Conservation Reserve Program seeded grasslands. The CRP field in the Phase I project area is comprised primarily of grasses including fescue, intermediate and crested wheatgrass, bulbous bluegrass, and cheatgrass. A few grey rabbitbrush shrubs also currently occur in the area.

DE – homesites or storage buildings associated with farming activities. Abandoned buildings or infrequently used structures may provide roosting and nesting structure/habitat for some birds (swallows, Say's phoebe) and roosting structure for bats.

Most of the area in and around the Phase I project site is comprised of cultivated wheat fields. Compared to other portions of Oregon, there is relatively little CRP acreage. Thirteen Phase I turbines (1-10, 14-16) were placed in wheat fields and three turbines (11-13) were placed in a narrow strip of CRP grassland. All of the Phase II and Phase III turbines will be placed in wheat fields. Wheat fields have little wildlife habitat value because they are monocultures, the ground is greatly disturbed, and intensive agricultural practices, including the application of insecticides and herbicides, make these fields unattractive as wildlife habitat.

General Wildlife Observations

Researchers documented 41 species of birds, seven species of mammal, and one reptile (western rattlesnake) in the study area during the baseline study (Appendix B).

Endangered, Threatened and Special Concern Species

No species currently listed as endangered by the USFWS or State of Oregon have been previously documented in the study area by resource agencies. No state or federal endangered species were documented during this study. According to the Oregon Natural Heritage Program (“ONHP”), the only threatened species documented near the study area is the Middle Columbia River summer run population of steelhead. Because no drainages were or will be impacted by construction of the wind farm, no impacts will occur to steelhead in the Columbia River. Table 2 lists all sensitive species that may potentially occur in the general area of the Phase I, Phase II, and Phase III project sites, along with federal and state status for each species, whether the species has been observed in the study area, and other biological information about the species.

The ONHP also has records of four species of special concern within two miles of the project sites, including Swainson’s hawk, long-billed curlew, Dalles mountain snail, and silky lupine. The Dalles Mountain snail population was located at a gravel quarry in Sherman County. The silky lupine plants documented by ONHP were located on an open, rocky slope. This habitat does not exist where turbines have been or will be built and no impacts are anticipated. All turbine strings have or will be located in areas previously disturbed and no impacts to sensitive plant species are anticipated, as these species are generally associated with undisturbed native habitats.

Presence of Swainson’s hawk and long-billed curlew was confirmed during the baseline study. Eleven Swainson’s hawk nests were observed within 5 miles of the project sites during the aerial surveys. One of the Swainson’s hawk nests was located approximately 0.5 miles from a Phase I turbine site. Construction did not begin until after the nesting season in the fall of 2001; therefore, this nest was not disturbed by construction activities. Twelve Swainson’s hawks were observed during the point count surveys and while travelling between survey points (Appendix C). An active golden eagle nest was located during the helicopter raptor nest survey approximately 2.5 miles east of the Phase I project site, and three golden eagles were observed during point count surveys. Although no ferruginous hawk nests were documented within 5 miles of the project sites, two ferruginous hawks were observed flying over the area during point count surveys. One long-billed curlew was observed at Point 4 on April 13, 2001 and one loggerhead shrike was observed at Survey Point 6 on June 10, 2001. The possibility of Swainson’s hawk, golden eagle, ferruginous hawk, long-billed curlew and loggerhead shrike

collision mortality exists. However, use of the study area by all of these species was very low. Low use of the study area by these species is likely due to the abundance of wheat fields, which have low habitat value for these species compared to other habitats such as grasslands and native shrublands. Therefore, collision risk for these species appears low at the Phase I, Phase II and Phase III project sites.

Based on location in Sherman County and habitat in the study area, other sensitive species may possibly occur in the area, depending on the time of year (Table 2). No nests of bald eagle or peregrine falcon were documented within 5 miles of the project sites during the helicopter surveys and no impacts to nesting individuals of these species are anticipated by the development of the project phases. Neither of these species have been documented in the study area, but an occasional migrant could occur in the spring or fall. The only sensitive species documented during the diurnal transect walking surveys conducted in CRP habitats in June 2001 were two white-tailed jackrabbits. During the August spotlighting surveys, 3 white-tailed jackrabbits were observed in wheat stubble adjacent to the Phase I turbine strings. Habitats occupied by jackrabbits in the area are not limited and habitat loss associated with the turbines should not significantly impact jackrabbit populations in the study area.

Avian Abundance and Species Composition

While conducting avian surveys in the study area, 1184 flocks of birds representing 8675 individuals were recorded at the seven survey points. Mean use by all species of birds combined was 17.46/survey. Avian use of the study area was highest in winter (34.46/survey) and lowest in the summer (3.70/survey) (Table 3). The most species were observed in spring (31) and the fewest were observed in winter (23). The mean number of species observed per survey was used as an index to avian richness. Based on this index, richness was highest in the summer (3.14 species/survey) and lowest in the spring (2.10/survey) (Table 3).

Use of the study area by waterbirds was extremely low. Only one great blue heron and one unidentified gull were observed during the study. Shorebird use was also extremely low, with a total of 6 killdeer and one long-billed curlew observed. The only species of waterfowl observed was Canada goose; 43 flocks totaling 4845 individuals were observed flying over the study area during the yearlong survey period. Approximately 80% of the Canada goose flocks were observed during the winter period when mean use was 17.41 per survey. Only one flock of

Canada geese each was observed in the spring and summer, and 7 flocks were observed in fall. Mean flock size was large, averaging 113 birds. The only gallinaceous game bird observed was ring-necked pheasant, with 31 observations. Mean use by this species ranged from 0.02/survey in winter to 0.25/survey in spring. The high number of spring recordings likely reflects the increase in male crowing activities associated with breeding season rather than any changes in numbers of individuals. The only other upland gamebird recorded was mourning dove, with 23 observations totaling 33 individuals. Highest use by mourning dove occurred in fall (0.16/survey) (Table 4).

Eight species of raptors were documented during the study. The species with the greatest number of individuals recorded was rough-legged hawk (83), followed by northern harrier (74), red-tailed hawk (65), American kestrel (32), Swainson's hawk (12), golden eagle (3), prairie falcon (3), and ferruginous hawk (2) (Appendix C). Due to the prominence of rough-legged hawks, which only winter in the area, highest use of the area by buteos occurred in winter (0.70/survey) and lowest use of the area by buteos occurred in fall (0.32/survey). Buteo use in spring (0.49/survey) was similar to the summer (0.48/survey). The 3 golden eagles were all observed in summer. Use of the area by falcons (91% of which were American kestrels) was highest in the fall (0.17/survey) and lowest in the winter (0.04/survey) (Table 5). Use of the area by all raptors combined was highest in the winter (0.73/survey) and lowest in the fall (0.49/survey); raptor use of the area in the spring (0.59/survey) and summer (0.60/survey) was similar.

Twenty-three species of passerines were observed during surveys. The most abundant passerines were horned lark (2.25/survey), American goldfinch (0.89/survey), western meadowlark (0.75/survey), violet-green swallow (0.33/survey), common raven (0.21/survey), cliff swallow (0.16/survey), and American robin (0.14/survey) (Table 4).

Flight Behavior

The Enron turbine used on the Klondike Phase I development has a 65-meter ("m") tall tower and a rotor diameter of 70.5 m. Therefore, the rotor-swept height of the turbine ranges from approximately 30 to 100 m above ground. Over the study, 745 flocks comprised of 7,483 birds were observed flying during point count surveys (Table 6). Mean flight height for all species combined was 34.5 m. For avian groups with at least 5 observations of flying flocks, mean flight

height was lowest for sparrows (4.3 m), larks (9.5 m), and finches (13.6 m). Highest mean flight heights were recorded for waterfowl (115.9 m), followed by falcons (66.1 m) and buteos (61.9 m) (Table 7).

For all species combined, 52.7% of all flying birds observed were below the rotor-swept height, 37.8% were within the rotor-swept height, and 9.4% were above the rotor-swept height (Table 6). Bird groups most often observed flying within the turbine rotor-swept height were waterfowl (56.2%), swallows (42.6%), and buteos (27.6%) (Table 6). For species with ≥ 5 flying flocks recorded during surveys, the five with the greatest proportion of observations within the turbine rotor-swept height were rough-legged hawk (64.9%), Swainson's hawk (62.5%), Canada goose (56.2%), red-tailed hawk (40.9%), and American robin (37.5%). Some common species were never observed flying at the turbine rotor-swept height, including American goldfinch, cliff swallow, and western meadowlark (Table 7).

Flight paths for the larger birds (raptors and waterfowl) observed during surveys are presented in Figures 3-6. Based on flight path data, most raptor activity tended to be concentrated immediately north of the existing and proposed turbine strings both east and west of the Klondike elevator. Areas north of the Klondike study area had much lower raptor use than the other areas sampled. There were no consistent trends in flight directions by raptors in the area. Canada geese used all portions of the area sampled. The lowest use occurred in the vicinity of the existing Phase I turbines. Highest use occurred within one mile east of the Klondike elevator. Most of the Canada goose flightpaths were of birds flying north to south or northeast to southwest (and vice versa).

Risk Indices

Based on our exposure index, species with the highest probability of turbine exposure were Canada goose (3.75), horned lark (0.33), rough-legged hawk (0.09), violet-green swallow (0.05), and common raven (0.04) (Table 8). This analysis may provide insight into what species might be the most likely turbine casualties. However, this index only considers relative probability of exposure based on abundance, proportion of daily activity budget spent flying, and flight height of each species. This analysis is based on observations of birds during the daylight period and does not take into consideration flight behavior or abundance of nocturnal migrants. It also does not take into consideration varying ability among species to detect and avoid turbines, habitat

selection and other factors that may influence exposure to turbine collision; therefore, the actual risk may be lower or higher than indicated by these data. For example, in the Altamont Pass WRA in California, mortality among the five most common species was not related to their abundance. American kestrels, red-tailed hawks, and golden eagles were killed more often, and turkey vultures and common ravens were killed less often than predicted based on abundance (Orloff and Flannery 1992). Similarly, at the Tehachapi Pass WRA in California, common ravens were found to be the most common large bird in the WRA, yet no fatalities for this species were documented during intensive studies (Anderson *et al.* 1996). Only one Canada goose mortality has been reported at all U.S. wind plants (Erickson *et al.* 2002).

Raptor Nest Data

Thirty-six active nests were found within an approximate 5-mile buffer of the project sites during the May and June 2001 helicopter surveys. The nests included 35 raptor nests and one common raven nest. Red-tailed hawks had the largest number of active nests (16), followed by Swainson's hawk (11), great horned owl (6), and one each of the following species: American kestrel, common raven, and golden eagle. Twenty-three inactive nests were also located during the surveys (Table 9). Four other active nests were located outside the 5 mile buffer during the survey, including two red-tailed hawk nests, one Swainson's hawk nest, and one American kestrel nest. An additional 12 inactive nests were found outside the 5-mile buffer (Figure 2). During the June 2001 survey, the golden eagle nest had two young in it. Active red-tailed hawk nests averaged 1.6 young per nest. All Swainson's hawks were still incubating eggs during the second flight. Most of the active and inactive nests (86%) were in cottonwood trees, 5% were in locust trees, 3% were in cliffs along the Columbia River, and 2% each were found on a building, a rock pile, and a willow tree. The northernmost section of the Phase I turbine string is approximately 0.5 miles from an active Swainson's hawk nest. Construction occurred in the fall of 2001 after the nesting season and no impacts occurred.

CONCLUSIONS

Comparison of Observed Avian Use to Other Wind Plants

Use estimates for raptors at Klondike were compared to those at other wind plants where comparable fixed plot survey data exist, including the Buffalo Ridge Wind Resource Area (WRA), Minnesota (Higgins *et al.* 1996, Johnson *et al.* 2000a, Johnson *et al.* In press), the Foote

Creek Rim, Wyoming WRA (Johnson *et al.* 2000b), the Vansycle, Oregon WRA (URS *et al.* 2001), the Stateline (Washington/Oregon) WRA (URS *et al.* 2001), the Nine Canyon, Washington WRA (Erickson *et al.* 2001) and the Condon, Oregon WRA (URS *et al.* 2001). Due to differences in the time of surveys and possible differences in the quality of viewsheds out to 800 meters, however, some biases may exist. The estimated raptor use at the Klondike Project averaged 0.42/20-minute survey (Table 10). Raptor use of the Klondike site is higher than estimated raptor use at the Nine Canyon, Washington site (0.27/20-minute survey), is similar to estimated raptor use at the Stateline, Washington/Oregon site (0.41/20-minute survey) and is lower than estimated raptor use at the Vansycle, Oregon site (0.51/20-minute survey). No documented turbine-related raptor fatalities have been found at the Nine Canyon, Vansycle, or Stateline sites. Estimated raptor use in the Klondike study area is also much lower than at Buffalo Ridge, Minnesota (0.50/20-minute survey), and Foote Creek Rim, Wyoming (0.55/20-minute survey) (Table 10). Only one raptor mortality (red-tailed hawk) was documented during a 6-year monitoring period of the Buffalo Ridge, Minnesota site. At Foote Creek Rim, Wyoming, where mean raptor use is 30% greater than in the Klondike study area, only five turbine-related raptor fatalities (3 American kestrels, 1 northern harrier, and 1 short-eared owl) were observed during 2 years of monitoring within the Foote Creek Rim Phase I windplant comprised of 69 turbines (Johnson *et al.* 2001). Overall, based on raptor use data at Klondike and raptor use and mortality data collected at other windplants, raptor mortality in the Klondike study area would likely be absent or extremely low. Mortality monitoring of all 16 Phase I turbines at Klondike began in early February 2002, and the only fatality found to date has been one European starling.

LITERATURE CITED

- Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 1996. Avian monitoring and risk assessment at Tehachapi Pass Wind Resource Area, California. Staff Report to California Energy Commission, Sacramento, CA, November 1996. 40pp.
- Babcock, K.W. 1995. Home range and habitat use of breeding Swainson's hawks in the Sacramento Valley of California. *The Journal of Raptor Research*. 29(3):193-197.
- Brown, E. R. (Ed.) 1985. Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington.
- CH2M Hill. 2000. SEPA Final EIS on FPL Energy's Proposal for the Stateline Wind Project. Prepared for Florida Power and Light (FPL).
- Erickson, W.P., E. Lack, M. Bourassa, K. Sernka, and K. Kronner. 2001. Wildlife baseline study for the Nine Canyon Wind Project. Technical Report prepared by WEST, Inc. for Energy Northwest.
- URS Corporation, WEST, Inc., and Northwest Wildlife Consultants, Inc. 2001. Avian baseline study for the Stateline Project, Vansycle Ridge, Oregon and Washington. Technical report prepared for ESI Vansycle Partners, L.P.
- Erickson, W.P., G.D. Johnson, D.P. Young, M.D. Strickland, R. Good, M. Bourassa, and K. Bay. 2002. Synthesis and comparison of baseline avian and bat use, raptor nesting and mortality information from proposed and existing wind developments. Draft technical report prepared for Bonneville Power Administration.
- Estep, J.A. 1989. Biology, movements, and habitat relationships of the Swainson's hawk in the Central Valley of California, 1986-1987. State of California, The Resources Agency, Department of Fish and Game, Wildlife Management Division, Nongame Bird and Mammal Section.

- Fitch, H. S., F. Swenson, and D. F. Tillotson. 1946. Behavior and food habits of the Red-tailed Hawk. *Condor* 48: 205–237.
- Fitzner, R.E. 1980. Behavior ecology of the Swainson's hawk in Washington. PNL Technical report to U.S. Dept. of Energy, contract DE-AC06-76RLO 1830.
- Franklyn, J.F. and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. USDA Forest Service General Technical Report PNW-8.
- Hagar, D. C. 1957. Nesting populations of Red-tailed Hawks and Horned Owls in central New York. *Wilson Bulletin* 69: 263–272.
- Haug, E.A. and L.W. Oliphant. 1990. Movements, activity patterns, and habitat use of Burrowing Owls in Saskatchewan. *J. Wildl. Manage.* 54:27-35.
- Higgins, K. F., R. G. Osborn, C. D. Dieter and R. E. Usgaard. 1996. Monitoring of seasonal bird activity and mortality at the Buffalo Ridge Wind Resource Area, Minnesota, 1994-1995. Completion Report for the Research Period May 1, 1994 - December 31, 1995. Unpubl. report prepared for Kenetech Windpower, Inc. by the South Dakota Cooperative Fish and Wildlife Research Unit, Brookings, SD. 84pp.
- Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, and S.A. Sarappo. In Press. Collision mortality of local and migrant birds at a large-scale wind power development on Buffalo Ridge, Minnesota. *Wildlife Society Bulletin* 30: In press.
- Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd and D.A. Shepherd. 2000a. Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-year study. Technical Report prepared for Northern States Power Co., Minneapolis, MN. 212pp.
- Johnson, G.D., D.P. Young, Jr., C.E. Derby, W.P. Erickson, M.D. Strickland, and J.W. Kern. 2000b. Wildlife Monitoring Studies, SeaWest Windpower Plant, Carbon County,

- Wyoming, 1995-1999. Tech. Rept. prepared by WEST for SeaWest Energy Corporation and Bureau of Land Management. 195pp.
- Johnson, G. D., D. P. Young Jr., W. P. Erickson, C. E. Derby, M. D. Strickland, and R. E. Good. 2001. Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming. November 3, 1998 – October 31, 2000. Technical report prepared by Western EcoSystems Technology, Inc. for SeaWest Energy Corporation and Bureau of Land Management.
- Leary, A.W. 1996. Home ranges, core use areas, and dietary habits of ferruginous hawks in North Dakota. Raptor Res. 20:35–39.
- Luttich, S.N., L.B. Keith, and J.D. Stephenson. 1971. Population dynamics of the Red-tailed Hawk (*Buteo jamaicensis*) in Alberta. Auk 88: 75–87.
- McAnnis D. 1990. Home range, activity budgets, and habitat use of ferruginous hawks (*Buteo regalis*) breeding in southwest Idaho. M.S. Thesis, Boise State University, Boise, Id. 81pp
- Oregon Department of Fish and Wildlife. 1994. Survey methodologies for sensitive, threatened, and endangered species in Oregon. Oregon Department of Fish and Wildlife Habitat Conservation Division.
- Orians, G. and F. Kuhlman. 1956. The Red-tailed Hawk and Great Horned Owl populations in Wisconsin. Condor 58: 371–385.
- Orloff, S. and A. Flannery. 1992. Wind turbine effects on avian activity, habitat use, and mortality in Altamont Pass and Solano County Wind Resource Areas, 1989-1991. Final Report to Alameda, Contra Costa and Solano Counties and the California Energy Commission by Biosystems Analysis, Inc., Tiburon, CA.
- Reynolds, R.T., J.M. Scott, R.A. Nussbaum. 1980. A variable circular-plot method for estimating bird numbers. Condor 82:309-313.

- Runyan, C. S. 1987. Location and density of nests of the Red-tailed Hawk, *Buteo jamaicensis*, in Richmond, British Columbia. The Canadian Field-Naturalist 101: 415–418.
- Sernka, K.J. 1999. Swainson's hawks breeding in the Owen's Valley of California. California Department of Fish and Game, Wildlife Management Division, Non-game Bird and Mammal Section.
- Thomas, J. W. 1973. Wildlife Habitats in Managed Forests – the Blue Mountains of Oregon and Washington. USDA Forest Service Agriculture Handbook No. 553. 512 p.
- URS Corporation, WEST, Inc., and Northwest Wildlife Consultants. 2001. Final Report: Ecological Baseline Study for the Condon Wind Project.
- Walla Walla County Regional Planning Department. 2000. Final Environmental Impact Statement on FPL Energy's Proposal for the Stateline Wind Project.

Table 1. Home range dimensions of raptors known or which may occur in the Klondike study area

Species	Home range/territory size dimension and reference
Red-tailed hawk	1.5 mi ² home range, territory up to 3 mi ² /pair (Brown 1985) nesting territory 0.5-3mi ² (Thomas 1973) 1 nest/3.6 km ² (Richmond, B.C., Runyan 1987) 1 pair per 7.0 km ² (Wisconsin, Orians and Kuhlman 1956) 1 pair per 7.2 km ² (Alberta, Luttich et al. 1971) 1 pair per 5.7 km ² (New York, Hagar 1957) 1 pair per 1.3 km ² (California, Fitch et al. 1946)
Swainson's hawk	6.27 km ² (females - 3.4 km ² , males - 9.1 km ²) (Washington, Fitzner 1980) 2760.4 hectares (California, Estep 1989) 4038.4 hectares (California, Babcock 1995) 3265.4 hectares (California, Sernka 1999)
Ferruginous hawk	31 - 79 km ² (Washington, Leary 1996) 7.6 km ² (Idaho, McAnnis 1990)
Rough-legged hawk	n/a, migrant and wintering only, winter range data unavailable
Sharp-shinned hawk	n/a
Cooper's hawk	n/a
Golden eagle	home range 4 mile radius; territory 5.5-8.0 mi ² (Brown 1985) home range 4–10 mi ² (Wyoming, Postovit, pers. comm. 1981)
Bald eagle	home range – 4 mile radius (Brown 1985)
American kestrel	home range – 275 acres breeding; 1100 acres winter; territory 275 acres breeding, 275 acres winter (Brown 1985)
Merlin	n/a, transient only
Prairie falcon	home range up to 4.5 mi ² winter (Brown 1985)
Peregrine falcon	n/a, transient only
Northern harrier	home range 240-2200 acres, breeding; 30–640 acres, winter; territory up to 70 acres (Brown 1985)
Turkey vulture	not available
Burrowing owl	home range 0.1–4.0 acres, average 2 acres (Brown 1985) 0.14 – 4.81 km ² (day and night observations) (Haug and Oliphant 1990)
Short-eared owl	home range 3.5 mile radius, territory size 50–250 acres (Brown 1985)

Table 2. List of sensitive wildlife occurring in Sherman County and those that have been documented or may occur in the project area.

Common and Scientific Name	Federal	State	ONHP List	Habitat and probable occurrence
Bald eagle (<i>Haliaeetus leucocephalus</i>)	LT	LT	2	Not documented. Wintering birds along the Columbia River may occasionally be observed in the study area.
Golden eagle (<i>Aquila chrysaetos</i>)	N/A	N/A	N/A	One nest within 5 miles of Project; three individuals observed in study area. Not technically a species of concern itself, but is treated the same as bald eagle by the federal Eagle Protection Act.
Bank swallow (<i>Riparia riparia</i>)	N/A	SU	4	Not documented. Nests in burrows in earthen or sandy banks. Unlikely to nest within the study area.
Ferruginous hawk (<i>Buteo regalis</i>)	SOC	SC	2	Two individuals observed during point count surveys. No nests observed, but suitable nesting habitat in the form of scattered trees present.
Grasshopper sparrow (<i>Ammodramus savannarum</i>)	N/A	SV/SP	3	Not documented. May possibly occur in CRP fields.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	N/A	SV	4	One individual observed on 10 June 2001. Summer resident nesting in tall shrubs in ravines.
Long-billed curlew (<i>Numenius americanus</i>)	N/A	SV	4	One individual observed 13 April 2001. Possible summer resident, nesting and/or post-nesting foraging in shrub-steppe and grassland habitats.
Swainson's hawk (<i>Buteo regalis</i>)	N/A	SV	3	Eleven active nests documented within ~five miles of project area. Twelve individuals recorded during point count surveys. Nesting summer resident, nests in trees.
Western greater sage-grouse (<i>Centrocercus urophasianus urophasianus</i>)	SOC	SV	1	Not documented. No suitable habitat in project area.
Willow flycatcher (<i>Empidonax traillii adastus</i>)	SOC	SU	4	Not documented. No suitable habitat in project area.
Peregrine falcon (<i>Falco peregrinus anatum</i>)	NW	E	1*	Not documented. Nests in cliffs on the Columbia River.

Table 2 continued. List of sensitive wildlife occurring in Sherman County and those that have been documented or may occur in the project area.

Common and Scientific Name	Federal	State	ONHP List	Habitat and probable occurrence
Western burrowing owl (<i>Athene cunicularia hypugea</i>)	SOC	SC	2	Not documented. Possible summer nesting resident in CRP fields and grasslands. Little suitable habitat in project area.
Columbian sharp-tailed grouse (<i>Tympanuchus phasianellus columbianus</i>)	SOC	N/A	1	Not documented. No suitable shrubland habitat in project area.
Pale western big-eared bat (<i>Corynorhinus townsendii pallescens</i>)	SOC	SC	2	Not documented. May occur, limited suitable roosting habitat exists in the study area
Small-footed myotis (<i>Myotis ciliolabrum</i>)	SOC	SU	4	Not documented. May occur, limited suitable roosting habitat exists in the study area
Long-eared myotis (<i>Myotis evotis</i>)	SOC	SU	4	Not documented. May occur, suitable roosting habitat in thinly forested areas around buildings or trees, caves is limited in study area
Long-legged myotis (<i>Myotis volans</i>)	SOC	SU	3	Not documented. May occur, suitable roosting habitat of buildings and rock crevices is limited in study area
Yuma myotis (<i>Myotis yumanensis</i>)	SOC	–	4	Not documented. Roosts: caves, tunnels, buildings; arid areas
White-tailed jackrabbit (<i>Lepus townsendii</i>)	N/A	SU	3	Two individuals documented in CRP field near turbines in June 2001; 3 individuals documented in wheat stubble during August 2001 spotlighting surveys.
Pallid bat (<i>Antrozous pallidus pallidus</i>)	N/A	SV	3	Not documented. May occur, suitable roosting habitat of buildings and rock crevices is limited in study area
Northern leopard frog (<i>Rana pipiens</i>)	N/A	SC	2	Not documented. No habitat in project area.
Painted turtle (<i>Chrysemys picta</i>)	N/A	SC	2	Not documented. No habitat in project area.
Sharptail Snake (<i>Contia tenuis</i>)	N/A	SV	4	Not documented. No habitat in project area.
Northern sagebrush lizard (<i>Sceloporus graciosus graciosus</i>)	SOC	SV	4	Not documented. No suitable shrub- dominated shrub-steppe habitats in study area
Mountainsnail (<i>Oreohelix variabilis</i>)	N/A	N/A	1	Not documented. May occur in gravel pits used to construct roads for project.
Silky lupine (<i>Lupinus sericeus</i>)	N/A	N/A	2-x	No documented. No suitable undisturbed habitat in project area.
Steelhead – Mid Columbia River (<i>Oncorhynchus mykiss</i>)	LT	SC/ SV**	1	Occurs in Columbia River. No suitable habitat (streams with suitable habitat and flow) in project area.

State and Federal Status Definitions

- SoC** Species of Concern. Former Category 2 candidates for which additional information is needed in order to propose as threatened or endangered under the ESA; these species are under review for consideration as Candidates for listing under the ESA.
- SC** State Critical. Species for which listing as threatened or endangered is pending; or those for which listing as threatened or endangered may be appropriate if immediate conservation activities are not taken. Also considered critical are some peripheral species which are at risk throughout their range, and some disjunct populations.
- SV** State Vulnerable. Species for which listing as threatened or endangered is not believed to be imminent and can be avoided through continued or expanded use of adequate protective measures and monitoring. In some cases the population is sustainable, and protective measures are being implemented; in others, the population may be declining and improved protective measures are needed to maintain sustainable populations over time.
- SP** Peripheral or Naturally Rare. Peripheral species refer to those whose Oregon populations are on the edge of their range. Naturally rare species are those which had low population numbers historically in Oregon because of natural limiting factors. Maintaining the status quo for the habitats and populations of these species is a minimum requirement. Disjunct populations of several species which occur in Oregon should not be confused with peripheral.
- SU** Undetermined Status. Animals in this category are species whose status is unclear. They may be susceptible to population decline of sufficient magnitude that they could qualify for endangered, threatened, critical or vulnerable status, but scientific study will be required before a judgment can be made.
- C** Candidate species.

SC/ SV**

Mid Columbia River Steelhead: The SC listing applies to the winter run, the SV listing applies to the summer run.

ONHP Definitions

- List 1** Taxa that are threatened with extinction or presumed to be extinct throughout their entire range.
- List 2** Taxa threatened with extirpation or presumed extirpated from Oregon; often peripheral or disjunct species which are of concern considering species diversity within Oregon; can be very significant in protecting the genetic diversity of the taxon; ONHP regards extreme rarity as a significant threat and has included species which are very rare in Oregon on this list.
- List 3** Taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
- List 4** Taxa which are of conservation concern but not currently threatened or endangered; including taxa that are very rare but considered secure as well as those declining in numbers or habitat but still too common to be proposed as threatened or endangered; these taxa require continued monitoring.

Table 3. Mean use, mean # species/survey, total number of species and total number of fixed-point surveys conducted by season and overall for the Klondike Project Site.

Season	Mean Use	# Species/ Survey	# Species	# Surveys Conducted
Spring	6.03	2.10	31	9
Summer	3.70	3.14	26	13
Fall	11.60	2.13	24	10
Winter	34.46	2.41	23	20
Overall	17.46	2.41	45	52

Table 4. Mean use and frequency of occurrence by species at the Klondike study area, April 2001 - April 2002.

Species	Spring		Summer		Fall		Winter	
	Use	% Freq	Use	% Freq	Use	% Freq	Use	% Freq
Great Blue Heron	0	0	0	0	0	0	0.01	0.71
Unidentified Gull	0	0	0.01	1.10	0	0	0	0
Canada Goose	0	0	0.44	1.10	1.79	1.43	17.41	10.71
Killdeer	0	0	0	0	0.01	1.43	0.04	2.14
Long-billed Curlew	0.02	1.59	0	0	0	0	0	0
Mourning Dove	0.10	6.35	0.12	6.59	0.16	5.71	0.04	2.14
Ring-necked Pheasant	0.25	23.81	0.08	7.69	0.04	1.43	0.02	2.43
Ferruginous Hawk	0	0	0.01	1.10	0	0	0.01	0.71
Northern Harrier	0.25	22.22	0.19	15.38	0.10	8.57	0.19	17.29
Rough-legged Hawk	0.02	1.59	0	0	0	0	0.40	31.71
Red-tailed Hawk	0.16	12.70	0.20	14.29	0.13	12.86	0.10	8.86
Swainson's Hawk	0.05	3.17	0.07	5.49	0.03	2.86	0	0
Unidentified Buteo	0.02	1.59	0.02	2.20	0.06	4.29	0.01	0.71
Golden Eagle	0	0	0.01	1.10	0	0	0	0
American Kestrel	0.11	11.11	0.09	8.79	0.17	11.43	0.03	2.86
Prairie Falcon	0	0	0.01	1.10	0	0	0.01	0.71
American Pipit	0	0	0	0	0.06	1.43	0.02	0.71
Horned Lark	1.92	80.95	1.84	67.03	7.69	62.86	13.63	70.43
Black-billed Magpie	0	0	0.01	1.10	0	0	0	0
Common Raven	0.38	17.46	0	0	0.29	17.14	0.26	13.57
Brewer's Blackbird	0.03	3.17	0	0	0	0	0	0
European Starling	0.02	1.59	0	0	0	0	0	0
Red-winged Blackbird	0.03	3.17	0	0	0.01	1.43	0	0
American Goldfinch	0.83	3.17	0.02	1.10	0.41	5.71	0.17	1.71
House Finch	0.02	1.59	0	0	0	0	0	0
Unidentified Finch	0	0	0	0	0	0	0.15	1.43
Lark Sparrow	0	0	0	0	0.01	1.43	0	0
Spotted Towhee	0.02	1.59	0	0	0	0	0	0
White-crowned Sparrow	0	0	0	0	0.01	1.43	0.01	0.71
Western Meadowlark	0.83	41.27	0.33	24.18	0.19	10.00	0.86	20.71
Unidentified Sparrow	0	0	0.01	1.10	0	0	0	0
Barn Swallow	0.06	4.76	0.01	1.10	0.03	1.43	0	0
Cliff Swallow	0.13	1.59	0.09	6.59	0	0	0	0
N. Rough-winged Swallow	0.06	3.17	0.01	1.10	0.01	1.43	0	0
Tree Swallow	0.08	3.17	0	0	0	0	0	0
Violet-green Swallow	0.33	3.17	0	0	0	0	0	0
Unidentified Swallow	0.05	1.59	0.02	1.10	0.11	7.14	0	0
American Robin	0.11	6.35	0.03	3.30	0.04	2.86	0.03	1.43
Common Yellowthroat	0	0	0.01	1.10	0	0	0	0
Loggerhead Shrike	0	0	0.01	1.10	0	0	0	0
Northern Flicker	0	0	0	0	0.03	2.86	0	0
Say's Phoebe	0.02	1.59	0	0	0	0	0.01	0.71
Western Kingbird	0.03	1.59	0.07	3.30	0.04	4.29	0	0
Unidentified Large Bird	0	0	0	0	0	0	0	0
Unidentified Passerine	0.13	3.17	0	0	0.17	4.29	1.08	2.43

Table 5. Mean abundance, percent composition, and percent frequency of occurrence of avian groups observed during point count surveys on the Klondike study area, April 2001 - April 2002.

Group	Mean Abundance				% Composition				% Freq. Of Occurrence			
	Spr	Sum	Fall	Win	Spr	Sum	Fall	Win	Spr	Sum	Fall	Win
Waterbirds	0	0.01	0	0.01	0	0.30	0	0.02	0	1.10	0	0.71
Waterfowl	0	0.44	1.79	17.41	0	11.87	15.39	50.53	0	1.10	1.43	10.71
Shorebirds	0.2	0	0.01	0.04	0.26	0	0.12	0.10	1.59	0	1.43	2.14
Up. Gamebirds	0.25	0.08	0.04	0.02	4.21	2.08	0.37	0.07	23.81	7.69	1.43	2.43
Doves	0.10	0.12	0.16	0.04	1.58	3.26	1.36	0.10	6.35	6.59	5.71	2.14
Raptors	0.60	0.59	0.49	0.73	10.00	16.03	4.19	2.12	52.38	49.45	40.01	62.85
Buteos	0.49	0.48	0.32	0.70	8.16	13.06	2.71	2.02	41.27	38.46	28.58	59.28
Eagles	0	0.01	0	0	0	0.30	0	0	0	1.10	0	0
Falcons	0.11	0.10	0.17	0.04	1.84	2.67	1.48	0.10	11.11	9.89	11.43	3.57
Swallows	0.71	0.13	0.16	0	11.84	3.56	1.36	0	17.45	9.89	10.00	0
Finches	0.84	0.02	0.41	0.32	13.95	0.59	3.57	0.93	4.76	1.10	5.71	3.14
Blackbirds	0.08	0	0.01	0	1.32	0	0.12	0	7.93	0	1.43	0
Corvids	0.38	0.01	0.29	0.26	6.32	0.30	2.46	0.75	17.46	1.10	17.14	13.57
Sparrows	0.84	1.18	0.21	0.87	13.95	9.20	1.85	2.53	42.86	25.28	12.86	21.42
Larks	1.92	1.84	7.74	13.65	31.84	49.56	66.75	39.62	80.95	67.03	64.29	71.14
Other	0.29	0.12	0.29	1.11	4.74	3.26	2.46	3.23	12.70	8.80	14.30	4.57
TOTAL	6.03	3.70	11.60	34.46	100	100	100	100	--	--	--	--

^aMean abundance = mean number observed /30-minute count; % Composition = proportion of all observations comprised of species *i*, Frequency of Occurrence = percent of all surveys where group *i* was recorded.

Table 6. Flight height characteristics by avian group during fixed-point surveys.

Group	# flocks	# birds	% birds	Turbine rotor-swept height (30 – 100 m)			mean flight height
	flying	flying	Flying	below	within	above	
Waterbirds	2	2	100.0	100.0	0.0	0.0	12.5
Waterfowl	40	4519	93.3	22.5	56.2	14.6	115.9
Shorebirds	3	5	71.4	100.0	0.0	0.0	14.3
Doves	17	26	78.8	76.9	23.1	0.0	15.6
Up. Gamebirds	0	0	0.0	N/A	N/A	N/A	0
Buteos	222	232	83.2	30.6	27.6	10.3	61.9
Eagles	3	3	100.0	0.0	33.3	0.0	43.3
Falcons	16	19	54.3	52.6	10.5	5.3	66.1
Larks	306	2152	78.9	92.3	5.4	0.0	9.5
Corvids	52	88	89.8	62.5	20.5	12.5	25.2
Blackbirds	5	5	83.3	80.0	20.0	0.0	26.4
Finches	8	95	76.6	100.0	0.0	0.0	13.6
Sparrows	23	92	41.4	93.5	0.0	0.0	4.3
Swallows	27	68	100.0	57.4	42.6	0.0	20.7
Other	12	16	47.0	68.8	25.0	0.0	20.5
Unknown	9	161	100.0	90.7	3.1	6.2	46.9
Subtotal	745	7483	86.8	52.7	37.8	9.4	34.5

Table 7. Flight height characteristics by species observed during fixed-point surveys.

Species/Group	# Groups	# Birds	% Birds	Turbine rotor-swept height			mean flight
	flying	Flying	Flying	Below	Within	Abov	Height
American Goldfinch	5	73	71.6	100.0	0.0	0.0	13.2
American Kestrel	13	16	50.0	75.0	25.0	0.0	15.9
American Pipit	2	7	100.0	100.0	0.0	0.0	1.5
American Robin	6	8	47.1	62.5	37.5	0.0	22.7
Barn Swallow	5	7	100.0	85.7	14.3	0.0	19.6
Black-billed Magpie	0	0	0.0	N/A	N/A	N/A	N/A
Brewer's Blackbird	2	2	100.0	100.0	0.0	0.0	17.5
Canada Goose	40	4519	93.3	29.2	56.2	14.6	115.9
Cliff Swallow	7	16	100.0	100.0	0.0	0.0	8.4
Common Raven	52	88	90.7	65.9	21.6	12.5	25.2
Common Yellowthroat	0	0	0.0	N/A	N/A	N/A	N/A
European Starling	0	0	0.0	N/A	N/A	N/A	N/A
Ferruginous Hawk	2	2	100.0	0.0	50.0	50.0	125.0
Great Blue Heron	1	1	100.0	100.0	0.0	0.0	10.0
Golden Eagle	3	3	100.0	0.0	100.0	0.0	43.3
House Finch	1	1	100.0	100.0	0.0	0.0	25.0
Horned Lark	304	2145	78.9	94.5	5.5	0.0	9.52
Killdeer	3	5	83.3	100.0	0.0	0.0	14.3
Lark Sparrow	1	1	100.0	100.0	0.0	0.0	1.00
Long-billed Curlew	0	0	0.0	N/A	N/A	N/A	N/A
Loggerhead Shrike	0	0	0.0	N/A	N/A	N/A	N/A
Mourning Dove	17	26	78.8	76.9	23.1	0.0	15.6
Northern Harrier	71	71	95.9	90.1	8.5	1.4	15.2
N.Rough-wing Swallow	4	6	100.0	100.0	0.0	0.0	8.5
Prairie Falcon	3	3	100.0	33.3	33.3	33.3	28.4
Rough-legged Hawk	74	74	89.2	32.4	64.9	2.7	50.0
Ring-necked Pheasant	0	0	0.0	N/A	N/A	N/A	N/A
Red-shafted Flicker	1	1	50.0	100.0	0.0	0.0	25.0
Red-tailed Hawk	39	44	67.7	31.8	40.9	27.3	116.1
Red-winged Blackbird	3	3	100.0	66.7	33.3	0.0	32.3
Say's Phoebe	0	0	0.0	N/A	N/A	N/A	N/A
Spotted Towhee	1	1	100.0	100.0	0.0	0.0	1.0
Swainson's Hawk	7	8	66.7	25.0	62.5	12.5	74.3
Tree Swallow	2	5	100.0	20.0	80.0	0.0	60.0
Unidentified Buteo	29	33	76.7	9.1	69.7	21.2	126.7
Unidentified Finch	2	21	100.0	100.0	0.0	0.0	9.0
Unidentified Gull	1	1	100.0	100.0	0.0	0.0	15.0
Unidentified Large Bird	1	1	100.0	100.0	0.0	0.0	5.0
Unidentified Passerine	8	160	100.0	90.6	3.1	6.3	52.1
Unidentified Sparrow	0	0	0.0	N/A	N/A	N/A	N/A
Unidentified Swallow	7	13	100.0	76.9	23.1	0.0	13.1
Violet-green Swallow	2	21	100.0	0.0	100.0	0.0	77.5
White-crowned Sparrow	0	0	0.0	N/A	N/A	N/A	N/A
Western Kingbird	5	7	63.6	85.7	14.3	0.0	17.0
Western Meadowlark	21	90	41.5	100.0	0.0	0.0	4.7
Subtotal	745	7483	86.8	52.7	37.8	9.4	34.5

Table 8. Mean exposure indices calculated by species observed during fixed-point surveys at the Klondike Project Site.

Species/Group	Overall mean use	% flying	% flying within RSA	Exposure Index
Horned Lark	7.51	78.9	5.5	0.326
Canada Goose	7.15	93.3	56.2	3.749
Western Meadowlark	0.59	41.5	0.0	0.000
Unidentified Passerine	0.46	100.0	3.1	0.014
American Goldfinch	0.29	71.6	0.0	0.000
Common Raven	0.21	90.7	21.6	0.041
Northern Harrier	0.18	95.9	8.5	0.015
Rough-legged Hawk	0.15	89.2	64.9	0.087
Red-tailed Hawk	0.13	67.7	40.9	0.036
Mourning Dove	0.09	78.8	23.1	0.016
American Kestrel	0.08	50.0	25.0	0.010
Ring-necked Pheasant	0.08	0.0	0.0	0.000
Violet-green Swallow	0.05	100.0	100.0	0.050
Unidentified Finch	0.05	100.0	0.0	0.000
American Robin	0.04	47.1	37.5	0.007
Cliff Swallow	0.04	100.0	0.0	0.000
Unidentified Swallow	0.03	100.0	23.1	0.007
Swainson's Hawk	0.03	66.7	62.5	0.012
Western Kingbird	0.03	63.6	14.3	0.003
Unidentified Buteo	0.02	76.7	69.7	0.011
American Pipit	0.01	100.0	0.0	0.000
Barn Swallow	0.01	100.0	14.3	0.001
Killdeer	0.01	83.3	0.0	0.000
Northern Rough-winged Swallow	0.01	100.0	0.0	0.000
Tree Swallow	0.01	100.0	80.0	0.008
Red-winged Blackbird	0.01	100.0	33.3	0.003
White-crowned Sparrow	0.01	0.0	0.0	0.000
Say's Phoebe	0.01	0.0	0.0	0.000
Brewer's Blackbird	0.01	100.0	0.0	0.000
Ferruginous Hawk	0.01	100.0	50.0	0.003
Prairie Falcon	0.01	100.0	33.3	0.002
Spotted Towhee	0.00	100.0	0.0	0.000
Black-billed Magpie	0.00	0.0	0.0	0.000
Unidentified Gull	0.00	100.0	0.0	0.000
House Finch	0.00	100.0	0.0	0.000
European Starling	0.00	0.0	0.0	0.000
Unidentified Sparrow	0.00	0.0	0.0	0.000
Great Blue Heron	0.00	100.0	0.0	0.000
Golden Eagle	0.00	100.0	100.0	0.003
Loggerhead Shrike	0.00	0.0	0.0	0.000
Lark Sparrow	0.00	100.0	0.0	0.000
Long-billed Curlew	0.00	0.0	0.0	0.000
Common Yellowthroat	0.00	0.0	0.0	0.000
Unidentified Large Bird	0.00	100.0	0.0	0.000

Table 9. Raptor nests observed within 5 miles of the Klondike Project Site during the aerial helicopter surveys, May and June 2001.

Species	Number of Nests
American Kestrel	1
Common Raven	1
Great Horned Owl	6
Golden Eagle	1
Red-tailed Hawk	16
Swainson's Hawk	11
Total Number Active Nests	36
Large, Inactive Stick Nests	23
Total Number Nests	59

Table 10. Mean raptor use estimates standardized to 20 minutes from studies conducted at the Klondike Project Site, the Nine Canyon Project Site, the Vansycle Project Site, the Stateline WRA, the Buffalo Ridge Project Site, and the Foote Creek Rim Project Site.

Project Site	Raptor Use (estimated #/20 minute survey)				Mean ^f
	Spring	Summer	Fall	Winter	
Klondike, OR	0.40	0.39	0.33	0.49	0.42
Nine Canyon, WA ^a	0.36	0.24	0.15	0.31	0.27
Vansycle, OR ^b	0.67	0.27	0.20	0.78	0.51
Stateline WA/OR ^b	0.59	0.40	0.25	0.42	0.41
Buffalo Ridge, MN ^c	0.49	0.45	0.56	ns ^e	0.50
Foote Creek Rim, WY ^d	0.49	0.75	0.96	0.21	0.55

^a Erickson et al. (2001)

^b Walla Walla County Regional Planning Department (2000)

^c Johnson *et al.* (2000a)

^d Johnson *et al.* (2000b)

^e not surveyed

^f weighted average based on length of season (spring=2 months, summer=3 months, fall=2.5 months, winter=4.5 months).

Figure 1. Location of the existing Phase I turbine strings, and the proposed Phase II and Phase III turbine strings and the avian use survey stations.

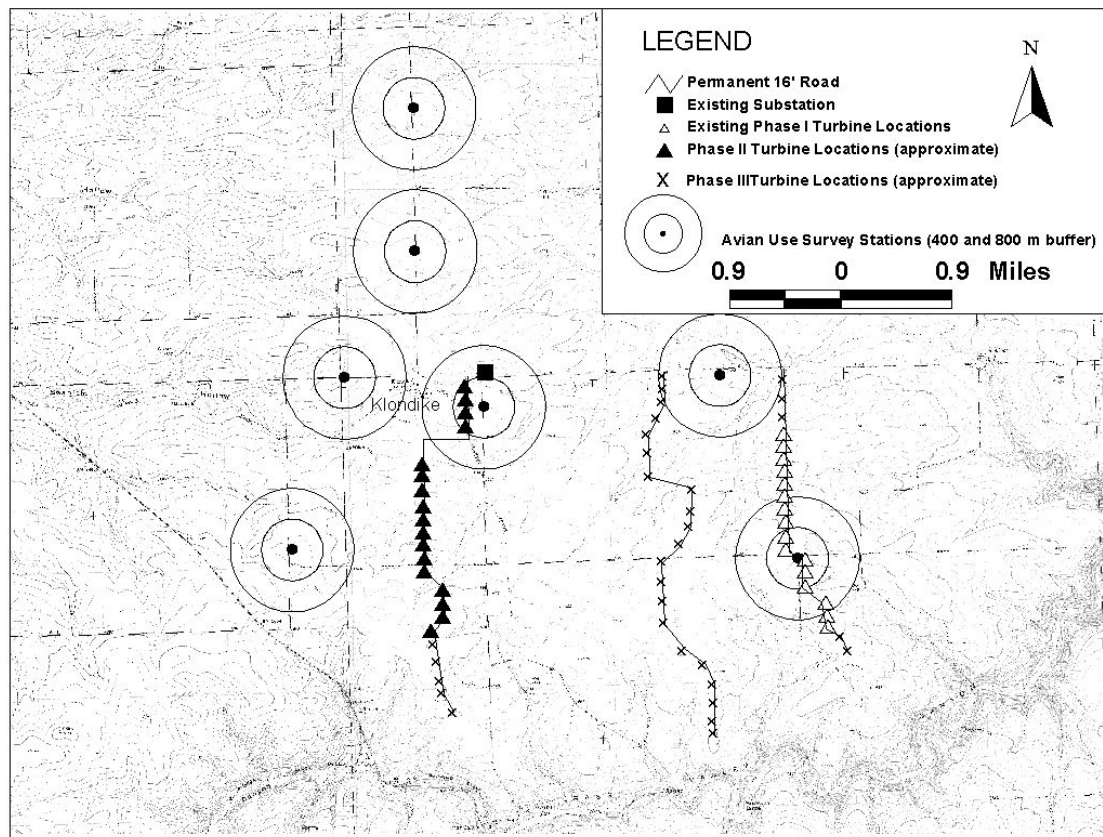


Figure 2. Location of active and inactive raptor and raven nests within approximately five miles of the Klondike Project Area.

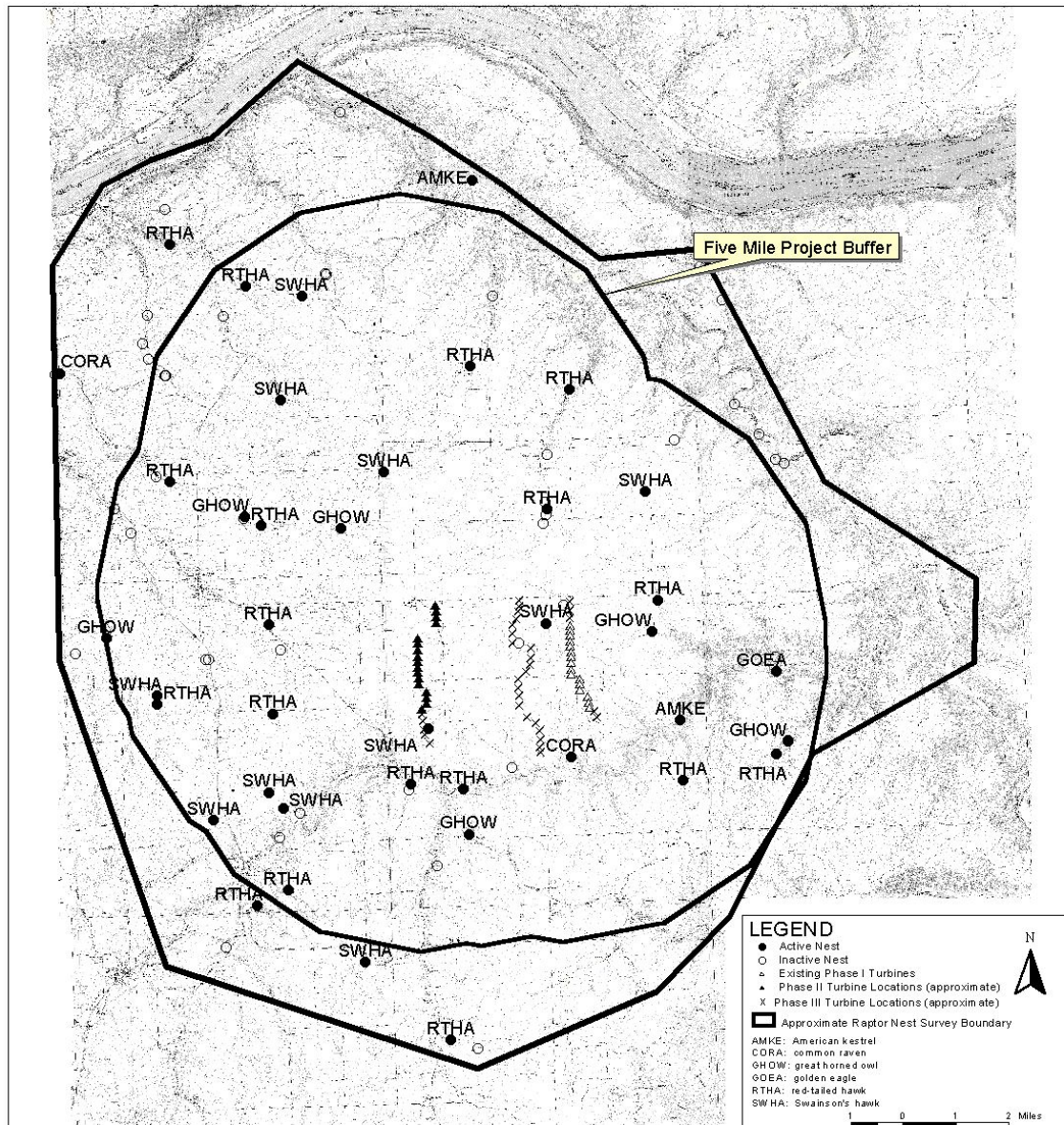


Figure 3. Flight paths of target species (buteos).

Figure 4. Flight paths of target species (falcons).

Figure 5. Flight paths of target species (other raptors).

Figure 6. Flight paths of target species (waterbirds/waterfowl).

Appendix A. Letters received from Oregon Department of Fish and Wildlife regarding wildlife studies for the Klondike Wind Power Development Project



Oregon

Joan A. Kitzhaber, M.D., Governor

May 22, 2001

Department of Fish and Wildlife

Mid-Columbia District Office

3701 West 15th Street

Tillamook, OR 97141

(503) 296-4628

FAX (503) 298-4993



Mr. Greg Johnson
West Inc.
2003 Central Avenue
Cheyenne, Wyoming 82001

Greg:

Sorry for not getting back to you sooner regarding the Northwest Wind Power Company windmill project in Sherman County, Oregon. It has taken some time to get all the state personnel together that needed to be involved in the review.

The participants in the meeting agreed that if the projects followed the field methods outlined in "Survey Methodologies for Sensitive, Threatened, and Endangered Species in Oregon," January 1994, that adequate baseline biological data would be gathered to assess anticipated project impacts and appropriate mitigation. The surveys proposed for the Sherman County wind project appear to meet those methodologies. Our only recommended addition to your sensitive species survey list is the white-tailed jackrabbit. Spotlight surveys out to 600' from the project are recommended.

Other than searching for T&E and sensitive species, the most important data that can be provided by the field surveys is raptor nest surveys within five miles of the project and waterfowl flight patterns during fall and winter within two miles of the project. Canadian geese and mallards are the most likely waterfowl to be using the area.

If T&E or sensitive species or their habitats are found within the areas surveyed, a long term monitoring program needs to be developed to assess the potential impacts. Long term means for the life of the project, but frequency of monitoring is up for negotiation depending on the species.

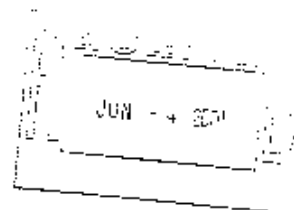
Please stress to current and potential clients that ODFW requires one full year of surveys prior to construction. This project area is rather unique because of the habitat and wildlife species involved and ODFW does not foresee a reason that construction cannot begin before a full year's survey has been completed. It is unlikely that requirement will be waived again.

Thank you for the chance to review your survey proposal. I apologize again for the delay in responding. I look forward to working with you and Karen Kromer on this and future projects.

Regards,

Jim Torland
District Wildlife Biologist

c: McEwen
Blakely





Oregon

John A. Kitzhaber, M.D., Governor

Department of Fish and Wildlife

Mid-Columbia District Office

3701 West 13th Street

The Dalles, OR 97058

(503) 296-4626

FAX (503) 298-4593



June 1, 2001

Mr. Greg Johnson
West, Inc.
2003 Central Ave.
Cheyenne, Wyoming 82001

Dear Greg:

Sorry for not getting back to you sooner regarding the Northwest Wind Power wind energy project in Sherman County, Oregon. There are several energy projects currently under review in the state, and it has taken some time to get all the staff together that needed to be involved in the review.

Avian Baseline Study and Monitoring Plan

The following threatened, endangered or sensitive species of concern may be located within the project area: Golden Eagle, Burrowing Owl, Loggerhead Shrike, Swainson's Hawk, Peregrine Falcon and White Tailed Jackrabbit.

The studies described in your April 5, 2001 Avian Baseline Study and monitoring plan are adequate to quantitatively describe the temporal and spatial use by birds of the study area and to provide baseline information on nesting raptors within five miles of the project area, with the following exceptions.

First, additional information is needed on the use of the project area by wintering waterfowl. The project area is used by waterfowl during the fall and winter. Canadian geese and mallards are the most likely waterfowl to be using the area. During fog or other adverse weather conditions, migrating waterfowl may move to lower elevations where their risk of collision with wind turbines would increase. We realize that some incidental mortality of these species is bound to occur. However, information on how waterfowl use patterns change during adverse weather conditions would help to avoid unacceptably high levels of mortality of these species during their migrations.

In addition to the proposed plot surveys, the Department recommends that a wintering waterfowl use survey be conducted during the months of November, December and January. Two survey seasons might be needed to obtain adequate data on how wintering waterfowl use changes with weather patterns. A radar study would provide the most useful information on wintering waterfowl use because it would provide data on use



during early morning and late evening hours when waterfowl are most likely to be migrating, and would provide data on use during periods of high wind and fog when visual observations cannot be made. If the project developer is planning other wind energy facilities in Sherman County, we encourage you to design this wintering waterfowl survey to cover other potential development areas.

Second, the avian baseline study and monitoring plan identifies burrowing owls as a species that could be located within the project area. If suitable habitat for burrowing owls is located within the project area, ground surveys for nesting burrowing owls should be conducted. Survey methodologies should follow the field methods outlines in "Survey Methodologies for Sensitive, Threatened, Endangered Species in Oregon, January 1994.

As a general rule, ODFW believes that one full year of baseline biological surveys prior to construction is necessary to adequately assess bird use at a wind project site. However, the project area for this project is primarily in level dryland wheat, is not located along a ridge and few raptors nest in the project area. For these reasons, we believe that the proposal outlined on page 9-10 of the Avian Monitoring Plan (providing a biological survey progress report prior to construction describing the results of spring biological surveys, followed by a final report summarizing the entire one year biological surveys after construction has begun) is acceptable.

Biological surveys for white-tailed jackrabbit also need to be conducted within areas of suitable habitat within the project area. Two spotlight surveys conducted within 600 feet on either side of project features (e.g., roads, turbines) are recommended.

Operational Monitoring Plan

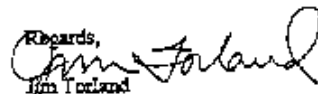
If nesting raptors or burrowing owls are located within the project area, an operational monitoring plan will need to be developed to assess the potential impact of facility operation on these species. The duration and frequency of this monitoring will vary depending upon the species present and their proximity to developed project facilities. The Department will be glad to work with you to develop a monitoring program once we see the results of the surveys for raptors and burrowing owls.

Phase I Fatality Study

The objective of the fatality study is to estimate the number of avian and bat fatalities by species attributable to wind turbine collisions. Page 10 of the Avian Monitoring Plan indicates that the study will be conducted for a minimum of one year. Because the level of bird and bat use at a site can naturally vary from year to year, the Department is concerned that conducting the Phase I fatality study for only one year may not provide an adequate estimation of avian and bat fatalities.

In addition, after the Phase I fatality study is completed, some level of ongoing fatality and injury monitoring will need to continue for the life of the project. The purpose of the ongoing fatality and injury monitoring would be to document existing fatalities, not to estimate future mortalities. For this reason, the ongoing fatality monitoring would not need to be at the same level of detail as proposed in the Phase I fatality study.

Thank you for the chance to review your survey proposal. I apologize again for the delay in responding. I look forward to working with you and Karen Kronner on this and future projects.

Regards,

Jim Forland
District Wildlife Biologist

c. McEwen

Appendix B. Common and scientific names of wildlife seen in the vicinity of the Klondike
Wind Project, April 2001 - April 2002

Common Name	Scientific Name
<u>Birds</u>	
Great Blue Heron	<i>Ardea herodias</i>
Canada Goose	<i>Branta canadensis</i>
Turkey Vulture	<i>Cathartes aura</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Swainson's Hawk	<i>Buteo swainsoni</i>
Ferruginous Hawk	<i>Buteo regalis</i>
Rough-legged Hawk	<i>Buteo regalis</i>
Northern Harrier	<i>Circus cyaneus</i>
Golden Eagle	<i>Aquila chrysaetos</i>
Prairie Falcon	<i>Falco mexicanus</i>
American Kestrel	<i>Falco sparverius</i>
Ring-necked Pheasant	<i>Phasianus colchicus</i>
Short-eared Owl	<i>Asio flammeus</i>
Unidentified Gull	<i>Larus sp.</i>
Long-billed Curlew	<i>Numenius americanus</i>
Killdeer	<i>Charadrius vociferus</i>
Mourning Dove	<i>Zenaida macroura</i>
Great Horned Owl	<i>Bubo virginianus</i>
Northern Flicker	<i>Colaptes auratus</i>
Western Kingbird	<i>Tyrannus verticalis</i>
Say's Phoebe	<i>Sayornis saya</i>
Horned Lark	<i>Eremophila alpestris</i>
American Pipit	<i>Anthus rubescens</i>
Common Raven	<i>Corvus corax</i>
Black-billed Magpie	<i>Pica pica</i>
Tree Swallow	<i>Tachycineta bicolor</i>
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
Barn Swallow	<i>Hirundo rustica</i>
Cliff Swallow	<i>Hirundo pyrrhonota</i>
Violet-green Swallow	<i>Tachycineta thalassina</i>

Appendix B continued. Common and scientific names of wildlife seen in the vicinity of the
Klondike Wind Project, April 2001 - April 2002

Common Name	Scientific Name
<u>Birds continued</u>	
American Robin	<i>Turdus migratorius</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
European Starling	<i>Sturnus vulgaris</i>
Western Meadowlark	<i>Sturnella neglecta</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Spotted Towhee	<i>Pipilo maculatus</i>
Savannah Sparrow	<i>Passerculus sandwichensis</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Lark Sparrow	<i>Chondestes grammacus</i>
House Finch	<i>Carpodacus mexicanus</i>
American Goldfinch	<i>Carduelis tristis</i>
<u>Mammals</u>	
Mule Deer	<i>Odocoileus hemionus</i>
Pronghorn Antelope	<i>Antilocapra americana</i>
White-tailed Jackrabbit	<i>Lepus townsendi</i>
Northern Pocket Gopher	<i>Thomomys talpoides</i>
Porcupine	<i>Erythizon dorsatum</i>
American Badger	<i>Taxidea taxus</i>
Coyote	<i>Canis latrans</i>
<u>Herps</u>	
Western Rattlesnake	<i>Crotalis viridis</i>

Appendix C. Species and numbers of flocks and individuals observed while conducting fixed-point surveys (April 13, 2001 – April 1, 2002) on the Klondike Project Site.

Species/Group	Spring		Summer		Fall		Winter		Grand Total	
	# obs.	# group	# obs.	# group	# obs.	# group	# obs.	# group	# obs.	# group
<u>Waterbirds</u>										
Great Blue Heron	0	0	0	0	0	0	1	1	1	1
Unidentified Gull	0	0	1	1	0	0	0	0	1	1
Subtotal	0	0	1	1	0	0	1	1	2	2
<u>Waterfowl</u>										
Canada Goose	25	1	40	1	530	7	4250	34	484	43
<u>Shorebirds</u>										
Killdeer	0	0	0	0	1	1	5	3	6	4
Long-billed Curlew	1	1	0	0	0	0	0	0	1	1
Subtotal	1	1	0	0	1	1	5	3	7	5
<u>Doves</u>										
Mourning Dove	6	4	11	8	11	8	5	3	33	23
<u>Upland Gamebirds</u>										
Ring-necked Pheasant	18	18	7	7	3	1	3	3	31	29
<u>Raptors</u>										
<u>Buteo</u>										
Ferruginous Hawk	0	0	1	1	0	0	1	1	2	2
Northern Harrier	18	18	21	21	7	7	28	28	74	74
Rough-legged Hawk	3	3	0	0	0	0	80	80	83	83
Red-tailed Hawk	17	16	18	14	11	11	19	18	65	59
Swainson's Hawk	3	2	7	7	2	2	0	0	12	11
Unidentified Buteo	16	15	4	4	9	7	14	13	43	39
Buteo Subtotal	57	54	51	47	29	27	142	140	279	268
<u>Eagles</u>										
Golden Eagle	2	2	1	1	0	0	0	0	3	3
<u>Falcon</u>										
American Kestrel	7	7	8	8	12	8	5	5	32	28
Prairie Falcon	1	1	1	1	0	0	1	1	3	3
Falcon Subtotal	8	8	9	9	12	8	6	6	35	31
Raptor Subtotal	67	64	61	57	41	35	148	146	317	302

Appendix C Continued. Species and Numbers of Flocks and Individuals Observed While
Conducting Fixed-Point Surveys (April 13, 2001 – April 1, 2002) On The Klondike Project Site.

	Spring		Summer		Fall		Winter		Grand Total	
Species/Group	# obs.	# group	# obs.	# group	# obs.	# group	# obs.	# group	# obs.	# group
<u>Larks</u>										
Horned Lark	121	92	167	138	538	99	1894	174	272	503
American Pipit	0	0	0	0	4	1	3	1	7	2
Subtotal	121	92	167	138	542	100	1897	175	272	505
<u>Corvids</u>										
Black-billed Magpie	0	0	1	1	0	0	0	0	1	1
Common Raven	27	13	2	1	23	15	45	30	97	59
Subtotal	27	13	3	2	23	15	45	30	98	60
<u>Blackbirds</u>										
Red-winged Blackbird	2	2	0	0	1	1	0	0	3	3
Brewer's Blackbird	2	2	0	0	0	0	0	0	2	2
European Starling	1	1	0	0	0	0	0	0	1	1
Subtotal	5	5	0	0	1	1	0	0	6	6
<u>Finches</u>										
House Finch	1	1	0	0	0	0	0	0	1	1
American Goldfinch	52	2	2	1	29	4	19	2	102	9
Unidentified Finch	0	0	0	0	0	0	21	2	21	2
Subtotal	53	3	2	1	29	4	40	4	124	12
<u>Sparrows</u>										
Western Meadowlark	52	46	30	29	13	10	122	46	217	131
Lark Sparrow	0	0	0	0	1	1	0	0	1	1
Spotted Towhee	1	1	0	0	0	0	0	0	1	1
White-crowned Sparrow	0	0	0	0	1	1	1	1	2	2
Unidentified Sparrow	0	0	1	1	0	0	0	0	1	1
Subtotal	53	47	31	30	15	12	123	47	222	136
<u>Swallows</u>										
Tree Swallow	5	2	0	0	0	0	0	0	5	2
Northern Rough-winged	4	2	1	1	1	1	0	0	6	4
Violet-green Swallow	21	2	0	0	0	0	0	0	21	2
Cliff Swallow	8	1	8	6	0	0	0	0	16	7
Barn Swallow	4	3	1	1	2	1	0	0	7	5
Unidentified Swallow	3	1	2	1	8	5	0	0	13	7
Subtotal	45	11	12	9	11	7	0	0	68	27

Appendix C continued. Species And Numbers Of Flocks And Individuals Observed While
Conducting Fixed-Point Surveys (April 13, 2001 – April 1, 2002) On The Klondike Project Site.

Species/Group	Spring		Summer		Fall		Winter		Grand Total	
	# obs.	# group	# obs.	# group	# obs.	# group	# obs.	# group	# obs.	# group
Others / Unknown										
Say's Phoebe	1	1	0	0	0	0	1	1	2	2
American Robin	7	4	3	3	3	2	4	2	17	11
Red-shafted Flicker	0	0	0	0	2	2	0	0	2	2
Western Kingbird	2	1	6	4	3	3	0	0	11	8
Common Yellowthroat	0	0	1	1	0	0	0	0	1	1
Loggerhead Shrike	0	0	1	1	0	0	0	0	1	1
Unidentified Passerine	8	2	0	0	12	3	140	3	160	8
Unidentified Large Bird	0	0	0	0	0	0	1	1	1	1
Subtotal	18	8	11	9	20	10	146	7	195	34
Grand Total	439	267	346	263	1227	201	6663	453	867	1184