Wildlife Baseline Study for the Wild Horse Wind Project

Summary of Results from 2002-2003 Wildlife Surveys

May 10, 2002– May 22, 2003

November 2003

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EXECUTIVE SUMMARY

Zilkha Renewable Energy (the "Applicant") proposes to construct and operate approximately 136 wind turbines on high open ridge tops between the towns of Kittitas and Vantage in Kittitas County, Washington on and near Whiskey Dick Mountain. This report summarizes the results of the ecological baseline studies conducted from May 10, 2002 through May 22, 2003. The wildlife portion of the ecological baseline study consisted of 1) point count and in-transit surveys for wildlife species, 2) an aerial survey within approximately two miles of the Project boundary for visible raptor nests and wintering big game in the spring of 2003 and 3) aerial and ground surveys during the breeding season for sage grouse in the Project vicinity. Rare plant surveys and habitat mapping were also conducted and has been summarized in a separate report (Lack *et al.* 2003).

A total of 53 avian species were identified during the point count, in-transit, and/or sage grouse surveys at the Project Site. The mean number of species observed per survey (30-minute point count) was 2.427 with an average of 7.468 bird observations per survey. Higher overall avian-use occurred in the spring/summer (9.311/survey) compared with the fall (6.456/survey) and winter (5.056). The higher use in spring/summer was due to higher overall use for all groups except corvids.

Passerines were the most abundant avian group observed in all seasons. The majority of bird observations were horned larks, snow buntings and European starlings. The next most abundant avian group varied by season, with raptors followed by corvids in the spring and corvids followed by raptors in the fall and winter. The most common raptor species observed were American kestrels, red-tailed hawks, and golden eagles. Canada geese were only observed during the spring/summer, and common ravens were observed throughout the study period.

Flight height characteristics were estimated for avian species and groups. Percentages of observations below, within, and above the rotor swept area (RSA) of 82 to 328 feet (25 to 100m) above ground level were reported. Overall, 36.0% of the birds observed were recorded within the defined RSA, 63.3% were below the RSA and 0.7% were flying above the RSA (Table 8). Species commonly observed were often flying within the RSA, for example, 72.7% of 99 flying European starlings, 68.2% of 44 gray-crowned rosy finches, 61.0% of 141 snow buntings, 53.8% of 13 golden eagles, and 50.0% of 70 common ravens. However, other commonly observed species such as horned larks (12.8%) and mountain bluebirds (9.8%) were not often observed within the RSA. Ring-billed gull, American pipit, common nighthawk and bald eagle were always observed within the RSA based upon one group observation for each species (except for common nighthawk which was two groups of one individual).

A relative exposure index (avian-use multiplied by proportion of observations within the RSA) was calculated for each species. This index is only based on flight height observations and relative abundance and does not account for other possible collision risk factors such as foraging or courtship behavior. Snow buntings, European starlings and gray-crowned rosy finch were the top three small bird species with the highest turbine exposure indexes for small birds. Larger bird species with the highest exposure index were common raven, American kestrel and ring-billed gull. Mortality studies at other wind projects have indicated that although ravens are often observed at wind projects within the zone of risk, they appear to be less susceptible to collision with wind turbines than other similar size birds (e.g., raptors, waterfowl).

Twelve active nest sites were documented during aerial nest surveys, including 6 great horned owls, 3 red-tailed hawks, and one American crow, common raven and prairie falcon (only 1 adult observed perched on cliff). No active nests were identified within ½ mile (0.80 km) of proposed turbine strings.

Sage grouse surveys consisted on two aerial surveys conducted on March 22 and April 14, 2003, and three ground surveys during March and April. No sage grouse observations (lekking or flushed birds) were observed during any of the sage grouse surveys or during other activities.

The most probable impact to birds resulting from the Project is direct mortality or injury due to collisions with the turbines or guy wires of temporary or permanent meteorological towers. Bird fatality projections of 0.6 to 3.5 bird fatalities per turbine year are anticipated, based on the results of completed studies conducted at the modern 38 turbine Vansycle wind project in Umatilla County, Oregon (Erickson *et al.* 2000), the Foote Creek Rim Phase I wind project in Carbon County, Wyoming (Young *et al.* 2003), the 16 turbine Klondike Wind Project in Sherman County Oregon (Johnson *et al.* 2003a), the 400+ turbine Buffalo Ridge wind project in southwestern Minnesota (Johnson *et al.* 2002), the Stateline Wind Project in Umatilla County Oregon and Walla Walla County Washington (Erickson *et al.* 2003a), and the Nine Canyon Wind Project in Benton County Washington (Erickson *et al*. 2003b). Most of the fatalities will likely involve resident songbirds such as horned lark, vesper sparrow, and western meadowlark, and other common species. Some upland gamebird fatalities are anticipated. Occasional nocturnal migrating songbird fatalities are also anticipated, but the risk of large mortality events would appear to be low (Erickson *et al.* 2001). Waterfowl and other waterbird (e.g., gulls) mortality are estimated to be low, given the low use of the Project area by these groups.

Red-tailed hawks and American kestrels have been the most common species of the raptor fatalities at older wind projects in California and new facilities outside California. Low numbers of fatalities of these two species have been observed at new wind projects (Erickson *et al.* 2001, Erickson et al. 2003a, Erickson et al. 2003b). Overall raptor mortality for the Project is expected to be low, considering the relatively small project size (approximately 136 turbines), the relatively low raptor use of the site compared to sites like Foote Creek Rim Wind Project and the low active raptor nest density and lack of raptor nesting habitat in the Project area. A range of 1 to 10 raptor fatalities total for the approximately 136 turbines is estimated per year, with American kestrels and red-tailed hawks likely the most common raptor fatality observed. Great horned owls, northern harriers, and golden eagles have a lower risk of collision given their low to moderate abundance in the Project area. Very low risk of collision is expected for all other raptors that occur or potentially occur given their anticipated low use of the Project site.

Some mortality of migratory bats, in particular hoary and silver-haired bats, is anticipated during operation of the Project. At the Buffalo Ridge Wind Plant, Minnesota, based on a 2-year study, bat mortality was estimated to be 2.05 bats per turbine per year (Johnson *et al.* 2000a). At the Foote Creek Rim Wind Plant, based on 3+ years of study, bat mortality was estimated at 1.34 bats per turbine per year (Young *et al.* 2003). At the Vansycle Ridge Wind Plant in Oregon, bat mortality was estimated at 0.74 bats per turbine for the first year of operation (Erickson *et al.* 2000). At the Klondike Wind Project, bat mortality was estimated at 1.16 bat fatalities per turbine per year (Johnson *et al.* 2003a). At the Stateline Wind Project, bat mortality was estimated at approximately 1 bat fatality per turbine per year (Erickson et *al.* 2003a) from July 2001 through December 31, 2002. At the Nine Canyon Wind Project, bat mortality was estimated at approximately 3 bat fatalities per turbine per year (Erickson *et al*. 2003b).

Although potential future mortality of migratory bats is difficult to predict, an estimate can be calculated based on levels of mortality documented at other wind projects. Using the estimates from other wind plants in the west and midwest, operation of the project could result in approximately 100 to 400 bat fatalities per year. Actual levels of mortality are unknown and could be higher or lower depending on regional migratory patterns of bats, patterns of local movements through the area, and the response of bats to turbines, individually and collectively. Mortality will likely involve silver-haired and hoary bats, two relatively common migratory species.

The Project is within habitats designated by WDFW as winter range for mule deer and elk. There is little information regarding wind project effects on big game. During the construction period, it is expected

that elk and mule deer will be displaced from the site due to the influx of humans and heavy construction equipment and associated disturbance. Construction related disturbance and displacement is expected to be temporary for the duration of the construction period. Most construction will take place during the summer months, minimizing construction disturbance to wintering big game. Following completion of the Project, the disturbance levels from construction equipment and humans will diminish and the primary disturbances will be associated with operations and maintenance personnel, occasional vehicle traffic, and the presence of the turbines and other facilities. Controlled access of the site by recreationists (e.g., ATV and motorcycle users, hikers, hunters, mountain bikers) will limit disturbance on big game, and reductions and possible reduction and or elimination of cattle and horse grazing on the site will improve habitat for big game within the Project area.

PARTICIPANTS

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INTRODUCTION

Zilkha Renewable Energy (Applicant) proposes to construct and operate approximately 136 wind turbines on high open ridge tops between the towns of Kittitas and Vantage in Kittitas County, Washington, on and near Whiskey Dick Mountain. The Wild Horse Wind Power Project (the "Project") is anticipated to provide up to 312 megawatts (MW) of generating capacity. It would be constructed on privately owned land and public land administered by the Washington Department of Natural Resources (WDNR).

The Applicant has contracted with Western Ecosystems Technology, Inc. (WEST) to develop and implement a survey protocol for a baseline study of wildlife, habitat, and plants in the Project area. The protocol for the ecological baseline study is similar to protocols used at the Kittitas Valley, Vansycle, Klondike, Stateline, Maiden, Condon and Nine Canyon wind projects in Oregon and Washington, the Buffalo Ridge wind project in southwest Minnesota, and the Foote Creek Rim wind project in Wyoming.

This report summarizes the results of the ecological baseline studies conducted from May 10, 2002 through May 22, 2003. The wildlife portion of the ecological baseline study consisted of 1) point count and in-transit surveys for wildlife species, 2) an aerial survey within approximately two miles of the Project boundary for visible raptor nests and wintering big game in the spring of 2003 and 3) aerial and ground surveys during the breeding season for sage grouse in the Project vicinity. Rare plant surveys and habitat mapping were also conducted and has been summarized in a separate report (Lack *et al.* 2003). Information on sensitive plant and wildlife species within the vicinity of the Project was requested from the U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), and the Washington Natural Heritage Program (WNHP). The recent synthesis of baseline and operational monitoring studies at wind developments by Erickson *et al.* (2002), as well as other relevant information has been reviewed and has been utilized for predicting impacts from the Project. Agency personnel were contacted for information regarding their concerns and data available on wildlife of the general Project area.

SITE DESCRIPTION

Location

The Wild Horse Wind Power Project (the "Project") is to be constructed in central Washington's Kittitas County (Figure 1). The Project will be built on high open ridge tops between the towns of Kittitas and Vantage, at a site located about 10 miles (16km) east of the town of Kittitas known as Whiskey Dick Mountain. The site boundary is located approximately 2 miles (3km) north of the Old Vantage Highway, 11 miles (18km) east of the town of Kittitas. The Project turbines will be located on open rangeland owned by the Applicant. The site extends over an area of approximately 8,650 acres. The Project site has been selected primarily for its energetic wind resource and close proximity to power transmission lines adequate for transferring wind-generated electricity into the power grid.

Facility Description

The Project consists of several prime elements which will be constructed in consecutive phases including roads, foundations, underground, and overhead collection system electrical lines, one or two grid interconnection substations, one or two step-up substations, one or two feeder lines running from the on-site step-up substations to interconnection substations, an operations and maintenance (O&M) center and associated infrastructure and facilities (Figure 2). A permanent footprint of approximately 165 acres (67 hectares) of land area will be required to accommodate the proposed turbines and related support facilities.

The Project will consist of up to 158 wind turbines and have an installed nameplate capacity of up to 312 megawatts (MW). The Project will utilize 3-bladed wind turbines on tubular steel towers each ranging from 1 MW to 3 MW (generator nameplate capacity) and with rotor diameters ranging from 197 to 295 feet (60 to 90m, Figure 3). The smallest 1 MW turbine considered for the Project has a rotor diameter of 197 feet (60

meters), and up to 158 units would be installed for a Project nameplate capacity of 158 MW. The largest 3 MW turbine being considered has a rotor diameter of 295 feet (90m), and up to 104 units would be installed for a Project capacity of 312 MW. The Project Site Layout in Figure 2 shows 136 turbines with a turbine spacing based on a 236 feet (72m) rotor diameter, which is in the middle of the range of turbines proposed and represents the anticipated Project configuration.

The Project site is currently crisscrossed with an extensive network of existing roads that will be utilized to minimize new ground disturbance. Roughly 17.3 miles (23.7 km) of new gravel roads will be constructed and approximately 14.7 miles (26km) of existing roads will be improved for turbines. The roads will generally consist of a 20 foot (6m) wide compacted graveled surface to allow the safe passage of heavy construction equipment. Note that project roads along turbine strings may be up to 34 feet wide, while roads in between turbine strings will only be 20 feet (6 m) wide.

The Project transmission feeder lines will require the installation of a construction trail. The construction trail will be a 12-foot (4m) wide swath, which is cleared off large boulders to allow high clearance vehicles to pass. The trail will be installed to allow access to support the construction of the feeder lines. Once construction is complete, the trail will remain as a minimum maintenance access way, which will be used approximately every 6 months for inspection and maintenance. The PSE feeder line will require approximately 8 miles (13km) and the BPA feeder line will require approximately 5 miles (8km) of new construction trails.

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Climate

The Columbia Basin physiographic province lies within the rain shadow of the Cascade mountain range, and is characterized by semi-arid conditions, as well as a large range of annual temperatures indicative of a continental climate. However, the relatively close proximity of the Pacific Ocean and the dominant westerly winds of the region combine to moderate the continental influence (Franklin and Dyrness 1988). Annual precipitation ranges from 7 inches in the drier localities along the southern slopes of the Saddle Mountains, Frenchman Hills and east of Rattlesnake Mountains, to 15 inches in the vicinity of the Blue Mountains.

Summer precipitation is usually associated with thunderstorms. During July and August, it is not unusual for four to six weeks to pass without measurable rainfall. The last freezing temperature in the spring occurs during the latter half of May in the colder localities of the Columbia Basin. The first freezing temperature in the fall is usually recorded between mid-September and mid-October (*Climate of Washington*, Western Region Climate Center (WRCC)).

The Ellensburg, WA weather station is located along the Yakima River, approximately 15 air miles west of the project area. The coldest average monthly temperatures at Ellensburg occur in January, with a minimum of 18.6º Fahrenheit (F), and a maximum of 34º F. The warmest average monthly temperatures in Ellensburg occur in July, when the minimum is 53º F and the maximum is 84º F. The average total annual precipitation at Ellensburg is 8.9 inches. The wettest month is December with an average total monthly precipitation of 1.45 inches, while the driest month is August with an average total monthly precipitation of 0.27 inches. Snowfall typically occurs from November through April, with the heaviest

average monthly snowfall of 9.4 inches occurring in each December and January. Ellensburg's average annual snowfall is 28 inches (WRCC, 2003).

The highest point in the Project area is approximately 2,300 feet higher in elevation than the reporting station in Ellensburg. Therefore, it is expected that the Project area likely experiences cooler temperatures and receives more precipitation than that reported for the Ellensburg station.

Habitat

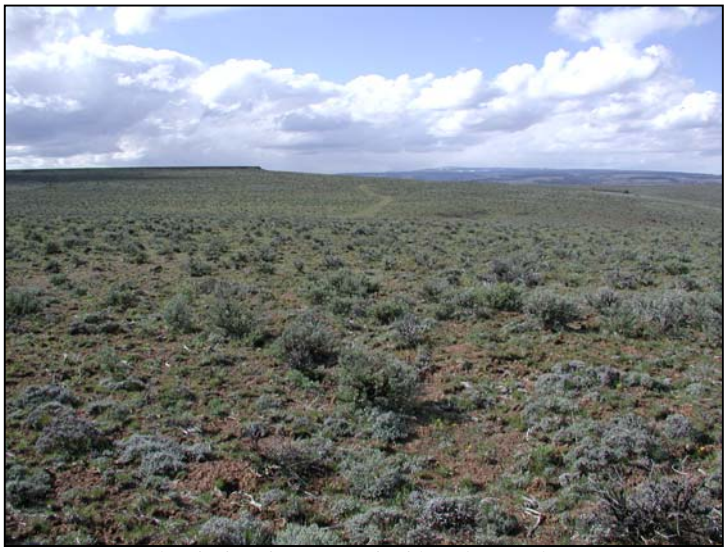
The Project area lies within big sagebrush/bluebunch wheatgrass vegetation zone typical of much of the Columbia Basin physiographic province (Daubenmire 1970). The primary habitat in the Project area is shrub-steppe; grasslands are also found on very steep slopes and exposed ridges (Figure 4). The following habitat types were mapped in the Project area and along the transmission line corridors (within 50-m buffer of transmission line):

	Project Area		Transmission Line Corridors	
Vegetation Type	Acres	%	Acres	%
Shrub-steppe Dense	1434.8	16.6	0.0	0.0
Shrub-steppe Medium	4934.8	57.1	313.9	64.9
Shrub-steppe Sparse	1622.7	18.8	124.9	25.8
Herbaceous	468.5	5.4	37.4	7.7
Herbaceous/Talus	96.8	1.1	0.0	0.0
Talus	5.6	0.1	2.4	0.5
Pasture	0.0	0.0	3.6	0.7
Pine Forest	31.3	0.4	0.0	0.0
Woody Riparian	53.7	0.6	1.3	0.3
Seasonal Waterbody	1.7	<0.1	0.0	0.0
Total	8649.9	100.0	483.5	100.0

A small amount of riparian habitat is associated with the larger creeks. Native trees and shrubs, such as Douglas hawthorn and chokecherry, dominate the riparian areas. A small amount of Ponderosa pine forest occurs in a narrow strip along one of the main Project area drainages. Within the Project area, the primary habitat type is shrub-steppe. This upland habitat type is dominated by shrubs; big sagebrush and stiff sagebrush and the most common dominants, occasionally threetip sagebrush (*Artemisia tripartita*), antelope bitterbrush (*Purshia tridentata*), and squaw current (*Ribes cereum*) dominate. A mix of grasses and forbs make up the understory. Big sagebrush is typically dominant in areas with deeper soils, while stiff sagebrush is dominant on exposed sites with shallow soils (i.e., lithosols). The shrub-steppe habitat type was broken down into three categories based on relative spatial density of the shrub layer – dense, moderate, and sparse. These categories are subjective, but generally fall into the following cover categories:

- dense – greater than 60 percent shrub cover
- moderate – between 30 and 60 percent shrub cover
- sparse – less than 30 percent shrub cover

In general, areas with a dense shrub layer were found on deep-soiled sites (primarily on gentle to moderate slopes and valley bottoms) and were dominated by big sagebrush, antelope bitterbrush, or squaw current. The Project area has approximately 1,435 acres of dense shrub (17 percent of the Project area). Areas with a moderate shrub layer were found on flat to gently sloping sites, and were typically dominated by big sagebrush or stiff sagebrush, although threetip sagebrush was common in some areas. Most of the shrub steppe fell into the moderate category; approximately 4,935 acres (57 percent of the Project area) were mapped as moderate. Areas with sparse shrub cover were generally found on exposed ridgetops and knolls and dominated by low-growing stiff sagebrush, or in some areas, various buckwheats. Approximately 1,623 acres (19 percent of the project area) were mapped as sparse.



Typical shrub-steppe habitat in Project area.

Areas dominated by herbaceous species (grasses and forbs) comprise approximately 5 percent of the Project area and are generally limited to very steep slopes and exposed ridges that do not support shrubs, although scattered individual shrubs (usually stiff sagebrush or buckwheats) may be found. The herbaceous habitat type includes a variety of plant associations dominated by grass species, particularly Sandberg's bluegrass (*Poa secunda*) and bluebunch wheatgrass; forb species typically co-dominate. Common forbs include Hood's phlox (*Phlox hoodii*), Hooker's balsamroot (*Balsamorhiza hookeri*), and narrowleaf goldenweed (*Haplopappus stenophllus*). Lithosols are common in this habitat type, especially on exposed ridgetops. Sandberg's bluegrass is the dominant grass on lithosols. On some steeps slopes, fingers of exposed cobbles and rock are intermingled among the herbaceous habitat. This herbaceous/rock outcrop habitat type makes up an additional 1.1 percent of the Project area. A 5.6 acre site (0.1 percent of the Project area) on top of Whiskey Dick peak is classified as simply rock outcrop.

METHODS

Diurnal Fixed-point and In-Transit Avian Use Surveys

The goal of the avian use surveys was to estimate the temporal and spatial use of the study area by birds. The avian use surveys combined observations collected at seven fixed-point circular plots in the study area with in-transit observations of birds made while driving to and from the study area. All wildlife species of concern and uncommon species observed were recorded while the observers were in the study area traveling between observation points and while conducting other field activities. An experienced wildlife and avian biologist, Jay Jeffrey of WEST Inc., conducted the avian surveys.

Fixed-point Surveys

Each plot consists of a 2,625 feet (800m) radius circle centered on an observation point location (Figure 5). Landmarks were located to aid in identifying the 2,625 feet (800m) boundary of each observation point. Observations of birds beyond the 2,625 feet (800m) radius were recorded, but these observations were not included in standardized use estimates.

All detections of birds, mammals, reptiles, and amphibians in and near plots during the 30-minute plot surveys were recorded. Visual and binocular scanning of the entire plot viewshed and beyond were continuously performed throughout the survey period. A unique observation number was assigned to each sighting. The following data were recorded for each plot survey: date, start and end time of observation period, plot id, species or best possible identification, number of individuals, sex and age class when known, distance from plot center when first observed, closest distance, altitude above ground (first, low and high), flight direction, behavior(s), habitat(s), whether observed during one or more of the three instantaneous counts, and in which of the two ten minute periods it was observed. Flight paths were mapped for raptors and species of concern 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. Flight paths were digitized using ARCVIEW 3.2. Climate information, such as temperature, wind speed, wind direction, precipitation and cloud cover were also recorded for each point count survey.

Behavior categories recognized included perched (PE), soaring (SO), flapping (FL), circle soaring (CS), hunting (HU), and other (OT). Habitats were recorded as grassland-steppe (GS), coniferous forest (CF), riparian (RI), shrub-steppe (SS), deciduous forest (DS), Rock (RO), and other (OT). Initial flight patterns and habitats were identified with ”1” in the data sheet and subsequent patterns and habitats (if any) recorded as an “x” or check mark. Any comments or unusual observations were recorded in the comment section of the data form.

Incidental/In-transit Observations

All wildlife species of concern and uncommon species observed while field observers were traveling between plots were recorded on incidental/in-transit data sheets. Other incidental observations made during other surveys or visits to the sites were also recorded. These observations were recorded in a similar fashion to those recorded during the plot studies. The observation number, date, time, species, number, sex/age class, height above ground, and habitat were recorded.

Observation Schedule

Surveys were conducted typically on weekly intervals during the spring, early summer and fall, and occasionally during the winter months. During a set of surveys, each selected plot was visited once. A pre-established schedule was developed prior to field work to ensure that each station was surveyed about the same number of times each period of the day, during each season, and to most efficiently utilize personnel time. The schedule was altered in response to adverse weather conditions, which required delays and/or rescheduling of observations.

Statistical Analysis

Avian Use

Species lists were generated by season including all observations of birds detected regardless of their distance from the observer. 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 0.78 mi^2 (2.01km^2) (2,625 ft (800m) radius viewshed for each station). For example, if four raptors were seen during the 30 minutes at a point with a viewing area of 0.78 mi^2 (2.01 km^2), these data may be standardized to 4/0.78 = 5.13 raptors/mi^2 (1.98 raptors/km^2) in a 30-minute survey. For the standardized

avian use estimates, only observations of birds detected within 2,625 ft (800m) of the observer were used. Estimates of avian use (expressed in terms of number of birds/plot/30-minute survey) were used to compare differences in avian use between 1) avian groups and 2) seasons.

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 tabulated to illustrate and compare differences in mean number of species per survey between seasons.

Avian Flight Height/Behavior

The first flight height recorded was used to estimate percentages of birds flying below, within and above the rotor swept area (RSA). The zone of collision risk we used was 82-328 ft (25-100 m) above ground level (AGL).

Avian Exposure Index

A relative index to collision exposure (*R*) was calculated for bird species observed during the fixed-point surveys using the following formula:

$$R = A * P_f * P_t$$

Where A = mean relative use for species *i* (observations within 2,625 ft (800 m) of observer) 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 area (RSA). This index does not account for differences in behavior other than flight characteristics (i.e., flight heights and percent of birds observed 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 Microsoft® ACCESS 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, field surveys, data entry, and during data analysis and report writing. At the end of each survey day, each observer was responsible for inspecting his or her data forms for completeness, accuracy, and legibility. Periodically data forms were reviewed to ensure completeness and legibility; any problems detected were corrected. Any changes made to the data forms were initialed and dated by the individual making the change.

A sample of records from the electronic files was compared to the raw data forms and any errors found were corrected. Any irregular codes detected, or any data suspected as questionable, was discussed with the observer and study team leader. All changes made to the raw data were documented for future reference. Any errors or suspect data identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps made.

Raptor Nest Surveys

We searched for raptor, raven and American crow nests within the Project area and a two-mile buffer, an area totaling approximately 49 mi^2 (127km^2) (Figure 6). Surveys were conducted from a helicopter with one observer on April 14, 2003. Search paths were recorded with a handheld Global Positioning System (GPS) at five second intervals. In addition to raptor nests, we also recorded observations of big game and searched for sage grouse (leks and flushed birds). Flight paths totaled 290 miles (467km) in length, of which 95 miles (153km) were conducted during sage grouse lek surveys (Figure 6). The helicopter was kept at an elevation of approximately 250' (76m) above the ground during sage grouse lek surveys.

Raptor nest surveys were scheduled after most species of raptor finished courtship and were incubating eggs or brooding young. Surveys were also scheduled just prior to the onset of leaf out to increase the visibility of raptor nests within deciduous habitats. Nest searches were conducted by searching habitat suitable for most above ground nesting species, such as cottonwood, ponderosa pine, tall shrubs, and cliffs or rocky outcrops. The helicopter is flown at an altitude of tree top level to approximately 250' (76m) above the ground during surveys. If a nest was observed the helicopter was moved to a position where nest status and species present could be determined. Efforts were made to minimize disturbance to breeding raptors, including keeping the helicopter a maximum distance from the nest at which the species could be identified. Those distances varied depending upon nest location and wind conditions. Data recorded for each nest location included species occupying the nest, nest status (inactive, bird incubating, young present, eggs present, adult present, unknown or other), nest substrate (pine, oak, cottonwood, juniper, shrub, rocky outcrop, cliff or power line), number of young present, time and date of observation and the nest location (recorded with a handheld GPS). Mule deer and elk locations were recorded while conducting sage grouse lek and raptor nest surveys.

Sage Grouse Surveys

The objective of the sage grouse surveys was to investigate the likelihood of presence of breeding sage grouse within the Project vicinity. Surveys for breeding season sage grouse presence, including leks, included two helicopter surveys (March 20 and April 14, 2003) and 3 ground surveys (March 13, March 22, April 2, 2003). Surveys for sage grouse leks focused on relatively flat areas of sagebrush and steep canyons were avoided. Sage grouse surveys were conducted from 0600 – 0830 H. Approximately 95 linear miles (153km) were flown for each aerial sage grouse survey. The helicopter was kept at an elevation of approximately 250' (76m) above the ground. Ground surveys focused on areas of historic observations (WDFW PHS 2003) and other relatively flat observations.

Big Game Surveys

Big game surveys were done in conjunction with the avian use and raptor nest surveys. Standardized observations of big game were recorded during the fixed point surveys. Observations of big game were recorded and mapped during the raptor nest survey on April 14, 2003.

RESULTS

Field work (all survey types) on the Project occurred between May 10, 2002 and May 22, 2003. A total of 53 avian species were identified during the avian point count surveys, sage grouse surveys, in-transit travel, and incidentally while conducting other field tasks at the Project site (Table 1).

Fixed-Point Avian Use Surveys

A total of 179 30-minute fixed-point count surveys were conducted from May 10, 2002 through May 22, 2003 at the Project (Table 2).

Avian Diversity

A total of 50 species were observed during the fixed-point surveys (30-minute point count). The mean number of species observed per survey was 2.427 (Table 2). The mean number of species was highest in the spring/summer and lowest during the fall and winter (Table 2, Figure 7). The passerine diversity was relatively low for the Project, likely due to the low diversity of habitats associated with the point count locations.

Avian Use by Species

A total of 1,332 individual bird detections within 512 separate groups were recorded during the fixed-point surveys (Table 3). Three passerine species and a corvid species comprised approximately 53% of all observations; these species were horned larks, snow buntings, European starlings, and common ravens, respectively. All other species comprised less than 5% of the observations individually.

Mean avian-use estimates (number of birds/30-minute survey using detections within 800 m (2625ft) of each point) were calculated by species and season, and grouped by bird size due to differences in the detectability of small and large birds (Table 4). During the **spring/summer**, large birds with the highest use were American kestrel (0.388), common raven (0.366), Canada goose (0.352) and black-billed magpie (0.209). Small bird species with the highest spring/summer use were horned lark (3.148), European starlings (1.125), vesper sparrow (0.663), western meadowlark (0.555), and sage thrasher (0.504) (Table 4). During the **fall**, large bird species with the highest use were common raven (0.684), gray partridge (0.500), golden eagle (0.143), and northern harrier (0.102). Small bird species with the highest spring/summer use were horned lark (1.680), mountain bluebird (0.901), American robin (0.806), and gray-crowned rosy finch (0.592) (Table 4). During the **winter**, large birds with the highest use (Table 4) were common raven (0.362) and golden eagle (0.082). The only small bird species observed were snow bunting (3.347), horned lark (0.648), gray-crowned rosy finch (0.352), and northern shrike (0.102) (Table 4).

Frequency of Occurrence by Species

Frequency of occurrence measures how often a species is observed during 30-minute point count surveys (% of surveys) and is calculated as the percent of surveys in which a particular species was observed (Table 5). During the **spring/summer**, American kestrel (28.94%), common raven (26.19%), red-tailed hawk (10.81%), and killdeer (10.44%) were observed during more than ten percent of the surveys. Small bird species observed during more than fifteen percent of the surveys were horned lark (79.12%), sage thrasher (33.70%), vesper sparrow (33.33%), western meadowlark (31.50%), and Brewer's sparrow (21.61%). During the **fall**, common raven had the highest frequency of occurrence (33.67%) for large birds, followed by golden eagle (14.29%), northern harrier (10.20%) and red-tailed hawk (8.16%). Small bird species observed during more than ten percent of the surveys were horned lark (28.57%) and mountain bluebird (14.63%). During the **winter**, common raven (23.98%) and golden eagle (8.16%) were observed during more than five percent of the surveys. The only small bird species observed were horned lark (13.78%), snow bunting (9.69%), northern shrike (8.16%), and gray-crowned rosy finch (5.61%).

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Table 1. List of avian species observed during fixed-point, in-transit and sage grouse surveys on the Wild Horse Project site.

Species/Group	Scientific Name	Species/Group	Scientific Name
Canada goose	*Branta canadensis*	northern shrike	*Lanius excubitor*
ring-billed gull	*Larus delawarensis*	rock wren	*Salpinctes obsoletus*
killdeer	*Charadrius vociferus*	ruby-crowned kinglet	*Regulus calendula*
American kestrel	*Falco sparverius*	sage sparrow	*Amphispiza belli*
bald eagle	*Haliaeetus leucocephalus*	sage thrasher	*Oreoscoptes montanus*
Cooper's hawk	*Accipiter cooperii*	Say's phoebe	*Sayornis saya*
golden eagle	*Aquila chrysaetos*	snow bunting	*Plectrophenax nivalis*
gyrfalcon	*Falco rusticolus*	spotted towhee	*Pipilo maculatus*
merlin	*Falco columbarius*	Swainson's thrush	*Catharus ustulatus*
northern goshawk	*Accipiter gentilis*	Townsend's warbler	*Dendroica townsendi*
northern harrier	*Circus cyaneus*	vesper sparrow	*Pooecetes gramineus*
prairie falcon	*Falco mexicanus*	violet-green swallow	*Tachycineta thalassina*
red-tailed hawk	*Buteo jamaicensis*	western bluebird	*Sialia mexicana*
rough-legged hawk	*Buteo lagopus*	western kingbird	*Tyrannus verticalis*
sharp-shinned hawk	*Accipter striatus*	western meadowlark	*Sturnella neglecta*
turkey vulture	*Cathartes aura*	white-crowned sparrow	*Zonotrichia leucophrys*
black-billed magpie	*Pica pica*	yellow-rumped warbler	*Dendroica coronata*
common raven	*Corvus corax*	California quail	*Callipepla californica*
American pipit	*Anthus rubescens*	chukar	*Alectoris chukar*
American robin	*Turdus migratorius*	gray partridge	*Perdix perdix*
Brewer's blackbird	*Euphagus cyanocephalus*	sage grouse	*Centrocercus urophasianus*
Brewer's sparrow	*Spizella breweri*	mourning dove	*Zenaida macroura*
Bullock's oriole	*Icterus bullockii*	common nighthawk	*Chordeiles minor*
dark-eyed junco	*Junco hyemalis*	northern flicker	*Colaptes auratus*
European starling	*Sturnus vulgaris*	unidentified gull	
gray-crowned rosy finch	*Leucosticte arctoa*	unidentified buteo	
horned lark	*Eremophila alpestris*	unidentified falcon	
loggerhead shrike	*Lanius ludovicianus*	unidentified empidonax	
mountain bluebird	*Sialia currucoides*	unidentified hummingbird	

Table 2. Mean use, mean # species/survey, total number of species, and total number of fixed-point surveys conducted by season and overall for the Project site.

Season	Number of Visits	Mean Use[a]	# Species/ Survey[b]	# Species	# Surveys Conducted
Spring/Summer[c]	13	9.311	3.707	36	86
Fall	7	6.456	1.619	28	47
Winter	7	5.056	0.857	11	46
Overall	27	7.468	2.427	50	179

[a] # observations per 30-minute survey
[b] % of 30-minute surveys species/group is recorded
[c] one June survey was included in the spring/summer results

Table 3. Avian species observed while conducting fixed-point surveys (May 10, 2002 – May 22, 2003) on the Project Site. [a]

	Spring/ Summer[b]		Fall		Winter		Grand Total	
Species/Group	#obs.	#groups	#obs.	#groups	#obs.	#groups	# obs.	#groups
Waterfowl								
Canada goose	32	1	0	0	0	0	32	1
Waterbird								
ring-billed gull	8	1	0	0	0	0	8	1
unidentified gull	0	0	1	1	0	0	1	1
Subtotal	8	1	1	1	0	0	9	2
Shorebirds								
killdeer	13	9	0	0	0	0	13	9
Raptors								
Accipiters								
northern goshawk	0	0	0	0	2	2	2	2
sharp-shinned hawk	0	0	2	2	0	0	2	2
Subtotal	0	0	2	2	2	2	4	4
Buteos								
red-tailed hawk	12	12	4	4	0	0	16	16
rough-legged hawk	1	1	1	1	2	2	4	4
unidentified buteo	0	0	1	1	0	0	1	1
Subtotal	13	13	6	6	2	2	21	21
Eagles								
bald eagle	0	0	0	0	1	1	1	1
golden eagle	3	3	7	7	5	5	15	15
Subtotal	3	3	7	7	6	6	16	16
Falcons								
American kestrel	34	31	1	1	0	0	35	32
merlin	1	1	1	1	0	0	2	2
prairie falcon	4	4	1	1	0	0	5	5
unidentified falcon	1	1	0	0	0	0	1	1
Subtotal	40	37	3	3	0	0	43	40
northern harrier	4	4	5	5	2	2	11	11
Raptor Subtotal	60	57	23	23	12	12	95	92
Corvids								
black-billed magpie	18	9	0	0	2	2	20	11
common raven	32	26	33	19	22	15	87	60
Subtotal	50	35	33	19	24	17	107	71
Passerines								
American pipit	0	0	7	1	0	0	7	1
American robin	21	11	38	3	0	0	59	14

Table 3 (continued).

Species/Group	Spring/ Summer[b] #obs.	Spring/ Summer[b] #groups	Fall #obs.	Fall #groups	Winter #obs.	Winter #groups	Grand Total # obs.	Grand Total #groups
Passerines *(continued)*								
Brewer's blackbird	6	1	0	0	0	0	6	1
Brewer's sparrow	35	22	0	0	0	0	35	22
Bullock's oriole	1	1	0	0	0	0	1	1
dark-eyed junco	0	0	6	1	0	0	6	1
European starling	99	5	0	0	0	0	99	5
gray-crowned rosy finch	0	0	29	2	15	2	44	4
horned lark	271	94	73	14	31	6	375	114
loggerhead shrike	4	3	0	0	0	0	4	3
mountain bluebird	16	8	44	9	0	0	60	17
northern shrike	0	0	1	1	5	4	6	5
rock wren	0	0	1	1	0	0	1	1
ruby-crowned kinglet	1	1	0	0	0	0	1	1
sage sparrow	12	8	0	0	0	0	12	8
sage thrasher	42	41	1	1	0	0	43	42
Say's phoebe	0	0	1	1	0	0	1	1
snow bunting	0	0	1	1	140	4	141	5
spotted towhee	2	2	0	0	0	0	2	2
Townsend's warbler	1	1	0	0	0	0	1	1
unidentified empidonax	0	0	1	1	0	0	1	1
vesper sparrow	56	33	1	1	0	0	57	34
violet-green swallow	2	2	0	0	0	0	2	2
western bluebird	0	0	6	1	0	0	6	1
western kingbird	1	1	0	0	0	0	1	1
western meadowlark	48	27	7	2	0	0	55	29
yellow-rumped warbler	3	1	4	1	0	0	7	2
Subtotal	622	263	221	41	191	16	1034	320
Upland Gamebirds								
California quail	1	1	0	0	0	0	1	1
chukar	2	1	0	0	0	0	2	1
gray partridge	0	0	21	1	0	0	21	1
Subtotal	3	2	21	1	0	0	24	3
Doves								
mourning dove	1	1	0	0	0	0	1	1
Other Birds								
common nighthawk	2	2	0	0	0	0	2	2
northern flicker	13	9	1	1	0	0	14	10
unidentified hummingbird	1	1	0	0	0	0	1	1
Subtotal	16	12	1	1	0	0	17	13
Grand Total	805	381	300	86	227	45	1332	512

[a] all observations included even those outside the 2,625 ft (800m) viewshed
[b] one June survey was included in the spring/summer results

Table 4. Avian species observed within 2,625 ft (800m) of the observer and estimated mean use (#/30-minute survey) on the Project site (May 10, 2002 – May 22, 2003).

Large Birds

Spring/Summer[a]		Fall		Winter	
Species/Group	Use	Species/Group	Use	Species/Group	Use
American kestrel	0.388	common raven	0.684	common raven	0.362
common raven	0.366	gray partridge	0.500	golden eagle	0.082
Canada goose	0.352	golden eagle	0.143	northern goshawk	0.041
black-billed magpie	0.209	northern harrier	0.102	rough-legged hawk	0.041
killdeer	0.148	red-tailed hawk	0.082	black-billed magpie	0.041
red-tailed hawk	0.132	sharp-shinned hawk	0.041	bald eagle	0.020
ring-billed gull	0.088	American kestrel	0.024	northern harrier	0.020
northern harrier	0.048	prairie falcon	0.024		
prairie falcon	0.044	merlin	0.020		
golden eagle	0.035	rough-legged hawk	0.020		
common nighthawk	0.026				
chukar	0.022				
merlin	0.011				
rough-legged hawk	0.011				
unidentified falcon	0.011				
California quail	0.011				

[a] one June survey was included in the spring/summer results

Table 4 (continued).					
Small Birds					
Spring/Summer[a]		Fall		Winter	
Species/Group	Use	Species/Group	Use	Species/Group	Use
horned lark	3.148	horned lark	1.680	snow bunting	3.347
European starling	1.125	mountain bluebird	0.901	horned lark	0.648
vesper sparrow	0.663	American robin	0.806	gray-crowned rosy finch	0.352
western meadowlark	0.555	gray-crowned rosy finch	0.592	northern shrike	0.102
sage thrasher	0.504	American pipit	0.167		
Brewer's sparrow	0.416	western meadowlark	0.167		
American robin	0.240	dark-eyed junco	0.122		
mountain bluebird	0.176	western bluebird	0.122		
sage sparrow	0.152	yellow-rumped warbler	0.082		
northern flicker	0.145	rock wren	0.024		
Brewer's blackbird	0.077	Say's phoebe	0.024		
loggerhead shrike	0.048	sage thrasher	0.024		
spotted towhee	0.037	vesper sparrow	0.024		
yellow-rumped warbler	0.033	northern shrike	0.020		
violet-green swallow	0.024	snow bunting	0.020		
ruby-crowned kinglet	0.013	unidentified empidonax	0.020		
western kingbird	0.013	northern flicker	0.020		
Bullock's oriole	0.011				
Townsend's warbler	0.011				
mourning dove	0.011				
unidentified hummingbird	0.011				

[a] one June survey was included in the spring/summer results

Table 5. Avian species observed within 2,625 ft (800m) of observer and estimated frequency of occurrence for large and small birds on the Project Site (May 10, 2002 – May 22, 2003).

Large Birds

Spring/Summer[a]		Fall		Winter	
Species/Group	% freq.	Species/Group	% freq.	Species/Group	% freq.
American kestrel	28.94	common raven	33.67	common raven	23.98
common raven	26.19	golden eagle	14.29	golden eagle	8.16
red-tailed hawk	10.81	northern harrier	10.20	northern goshawk	4.08
killdeer	10.44	red-tailed hawk	8.16	rough-legged hawk	4.08
black-billed magpie	9.52	American kestrel	2.38	black-billed magpie	4.08
northern harrier	4.76	prairie falcon	2.38	bald eagle	2.04
prairie falcon	4.40	gray partridge	2.38	northern harrier	2.04
golden eagle	3.48	merlin	2.04		
common nighthawk	2.56	rough-legged hawk	2.04		
California quail	1.10	sharp-shinned hawk	2.04		
chukar	1.10				
Canada goose	1.10				
ring-billed gull	1.10				
merlin	1.10				
rough-legged hawk	1.10				
unidentified falcon	1.10				

[a] one June survey was included in the spring/summer results

Table 5 (continued).					
Small Birds					
Spring/Summer[a]		Fall		Winter	
Species/Group	% Freq	Species/Group	% Freq	Species/Group	% Freq
horned lark	79.12	horned lark	28.57	horned lark	13.78
sage thrasher	33.70	mountain bluebird	14.63	snow bunting	9.69
vesper sparrow	33.33	American robin	6.46	northern shrike	8.16
western meadowlark	31.50	gray-crowned rosy finch	4.08	gray-crowned rosy finch	5.61
Brewer's sparrow	21.61	American pipit	2.38		
American robin	12.82	rock wren	2.38		
northern flicker	10.07	Say's phoebe	2.38		
mountain bluebird	8.79	sage thrasher	2.38		
sage sparrow	6.23	vesper sparrow	2.38		
European starling	5.86	western meadowlark	2.38		
spotted towhee	3.66	dark-eyed junco	2.04		
loggerhead shrike	3.48	northern shrike	2.04		
violet-green swallow	2.38	snow bunting	2.04		
Brewer's blackbird	1.28	unidentified empidonax	2.04		
ruby-crowned kinglet	1.28	western bluebird	2.04		
western kingbird	1.28	yellow-rumped warbler	2.04		
Bullock's oriole	1.10	northern flicker	2.04		
Townsend's warbler	1.10				
yellow-rumped warbler	1.10				
mourning dove	1.10				
unidentified hummingbird	1.10				

[a] one June survey was included in the spring/summer results

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Avian Use by Seasons and Groups

Higher overall avian use occurred in the spring/summer (9.311) compared to the fall and winter use (6.456 and 5.056, respectively) (Table 6, Figure 8). The apparent higher use in spring/summer was due to the higher overall use for all groups except corvids.

Passerines

Passerines were the most abundant avian group observed during all seasons (Table 6). Passerines showed higher abundance in spring/summer (7.244) compared to fall and winter (4.796 and 4.449, respectively, Figure 8). The moderate winter use was primarily due to several large flocks of snow buntings (140 individuals) (Table 6). Passerines made up approximately 74% or more of the avian use in all seasons. Passerines were observed during 90.11% of the surveys in the spring/summer, 58.16% in the fall and 33.16% in the winter (Table 6, Figure 9).

Raptors

Raptor use was second highest to passerines in the spring/summer (0.679) and third to passerines and corvids in the fall (0.456) and winter (0.204) (Table 6). American kestrels, red-tailed hawks, and golden eagles were the most abundant raptor species. Raptor use decreased from spring/summer through the fall, and more during the fall to winter period (Figure 8). In all seasons, raptors made up less than eight percent of overall avian use, and were observed in 43.77% of the spring/summer surveys, 31.29% in the fall and 16.33% of the winter surveys (Table 6, Figure 9).

Corvids

Corvid use and frequency of occurrence was similar in all seasons, and consisted of several groups of common ravens (Table 6, Figure 8 and 9).

Waterfowl

The only waterfowl use occurred in the spring/summer, and consisted of one group of Canada geese.

Spatial Use of the Project Area

No large differences for use are apparent other than the higher use at station D from the large flocks of snow buntings, European starlings and Canadian geese observed (Figure 9). Passerine use by station shows the same pattern as all birds (Figure 10). Raptor use by station ranged from 0.1 to 0.8, indicating relatively similar spatial use of the Project area (Figure 11). Station F had the lowest raptor use. Station E, located to the northeast of the Project area, had moderate raptor use compared to the other stations.

Flight paths for large birds are found in Figures 12-15. A few spatial patterns of raptor use appear to exist. The ridge along Whiskey Dick Creek near station G is effectively perpendicular to prevailing winds. There appears to be a pattern of raptor flight paths flying parallel to the western side of the ridge, which is consistent behavior observed in similar situations. The one bald eagle observation was flying along the Whiskey Dick drainage (Figure 13). There appears to be little pattern in the flight paths in the areas of the project with less topographic relief, such as near station D and E. The raptor flight paths near station C at the highest point of the project sometimes follow the main Whiskey Dick Mountain ridgeline and other times cross the ridgeline. The main ridgeline in this case is not perpendicular to the prevailing wind direction, likely affecting patterns of use in this area. The turbine arrangement near station C with gaps along the ridgeline may pose less collision risk for raptors to a long string of turbines along this ridgeline with no gaps based on these patterns of use. Most prominent saddles along the Whiskey Dick Mountain Ridge, which may have higher bird use, do not contain turbine locations. American kestrel observations did not show distinctive patterns in use of topography, but did appear more abundant near Station E, the one station where no turbines proposed.

Table 6. Mean use, percent composition and percent frequency of occurrence for avian groups by season for the Wild Horse Project site.

Species/Group	Mean Use (#/30 min. survey)			Group Composition (%)			% Frequency		
	Spring/ Summer	Fall	Winter	Spring/ Summer	Fall	Winter	Spring/ Summer	Fall	Winter
Waterfowl	0.352	0.000	0.000	3.78	0.00	0.00	1.10	0.00	0.00
Waterbirds	0.088	0.000	0.000	0.94	0.00	0.00	1.10	0.00	0.00
Shorebirds	0.148	0.000	0.000	1.59	0.00	0.00	10.44	0.00	0.00
Accipiters	0.000	0.041	0.041	0.00	0.63	0.81	0.00	2.04	4.08
Buteos	0.143	0.102	0.041	1.53	1.58	0.81	11.90	10.20	4.08
Eagles	0.035	0.143	0.102	0.37	2.21	2.02	3.48	14.29	10.20
Large Falcons	0.044	0.024	0.000	0.47	0.37	0.00	4.40	2.38	0.00
Small Falcons	0.399	0.044	0.000	4.29	0.68	0.00	30.04	4.42	0.00
Unidentified Falcons	0.011	0.000	0.000	0.12	0.00	0.00	1.10	0.00	0.00
Northern Harriers	0.048	0.102	0.020	0.51	1.58	0.40	4.76	10.20	2.04
Raptors	0.679	0.456	0.204	7.30	7.06	4.04	43.77	31.29	16.33
Corvids	0.575	0.684	0.403	6.18	10.59	7.97	35.71	33.67	26.02
Passerines	7.244	4.796	4.449	77.79	74.29	87.99	90.11	58.16	33.16
Upland Gamebirds	0.033	0.500	0.000	0.35	7.74	0.00	2.20	2.38	0.00
Doves	0.011	0.000	0.000	0.12	0.00	0.00	1.10	0.00	0.00
Other Birds	0.181	0.020	0.000	1.95	0.32	0.00	11.36	2.04	0.00
Subtotal	9.311	6.456	5.056						

Flight Height Characteristics

At least 10 groups of flying birds were observed for seven species during the fixed-point surveys. Of these species, golden eagle (53.8%), common raven (50.0%) and red-tailed hawk (42.9%) were most often observed within the RSA. Common passerines including horned lark (12.8%) and mountain bluebird (9.8%) were not often observed within the RSA (Table 7).

Overall, 36.0% of the birds observed were recorded within the defined RSA, 63.3% were below the RSA, and 0.7% were flying above the RSA (Table 8). As a group, raptors had the third highest percentage of observations within the RSA (36.5%) behind waterbirds and corvids. Raptor subgroups observed above this mean percent within the RSA included eagles (57.1%; mostly golden eagles), buteos (44.4%) and large falcons (40.0%). The majority of all groups were observed below the RSA except waterbirds, which were most often observed within the RSA (88.9%; all ring-billed gulls).

Exposure Indices

Relative exposure indices (use multiplied by proportion of observations where bird flew within the rotor swept area) were calculated by species (Table 9). This index is only based on flight height observations and relative abundance and does not account for other possible factors such as foraging behavior. Small bird species with the highest exposure indexes were snow bunting, European starling and gray-crowned rosy finch. Due to high use estimates, horned lark had the highest exposure index at the Stateline and Foote Creek Rim wind plants, and has been the most commonly observed fatality. The large bird species with the highest exposure index was common raven, followed by American kestrel, and ring-billed gull. Mortality studies at other wind projects have indicated that although ravens are often observed at wind projects within the zone of risk, they appear to be less susceptible to collision with wind turbines than other similar size birds (e.g., raptors, waterfowl).

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

Species/Group	# Groups Flying	# Birds Flying	% Birds Flying	Collision Risk Height (25-100 m AGL)		
				Below	Within	Above
ring-billed gull	1	8	100.0	0.0	100.0	0.0
American pipit	1	7	100.0	0.0	100.0	0.0
common nighthawk	2	2	100.0	0.0	100.0	0.0
bald eagle	1	1	100.0	0.0	100.0	0.0
European starling	5	99	100.0	27.3	72.7	0.0
gray-crowned rosy finch	4	44	100.0	31.8	68.2	0.0
snow bunting	5	141	100.0	39.0	61.0	0.0
golden eagle	13	13	86.7	30.8	53.8	15.4
rough-legged hawk	4	4	100.0	50.0	50.0	0.0
northern goshawk	2	2	100.0	50.0	50.0	0.0
common raven	47	70	80.5	48.6	50.0	1.4
red-tailed hawk	14	14	87.5	35.7	42.9	21.4
prairie falcon	5	5	100.0	60.0	40.0	0.0
American kestrel	29	31	88.6	67.7	32.3	0.0
western meadowlark	2	7	12.7	71.4	28.6	0.0
northern harrier	11	11	100.0	81.8	18.2	0.0
horned lark	52	218	58.1	87.2	12.8	0.0
killdeer	5	9	69.2	88.9	11.1	0.0
mountain bluebird	11	41	68.3	90.2	9.8	0.0
yellow-rumped warbler	2	7	100.0	100.0	0.0	0.0
Brewer's blackbird	1	6	100.0	100.0	0.0	0.0
dark-eyed junco	1	6	100.0	100.0	0.0	0.0
western bluebird	1	6	100.0	100.0	0.0	0.0
merlin	2	2	100.0	100.0	0.0	0.0
sharp-shinned hawk	2	2	100.0	100.0	0.0	0.0
violet-green swallow	2	2	100.0	100.0	0.0	0.0
Bullock's oriole	1	1	100.0	100.0	0.0	0.0
Say's phoebe	1	1	100.0	100.0	0.0	0.0
Townsend's warbler	1	1	100.0	100.0	0.0	0.0
mourning dove	1	1	100.0	100.0	0.0	0.0
ruby-crowned kinglet	1	1	100.0	100.0	0.0	0.0
unidentified gull	1	1	100.0	100.0	0.0	0.0
unidentified hummingbird	1	1	100.0	100.0	0.0	0.0
western kingbird	1	1	100.0	100.0	0.0	0.0
black-billed magpie	9	18	90.0	100.0	0.0	0.0
American robin	6	48	81.4	100.0	0.0	0.0
loggerhead shrike	2	3	75.0	100.0	0.0	0.0
northern shrike	3	3	50.0	100.0	0.0	0.0
northern flicker	4	6	42.9	100.0	0.0	0.0
sage sparrow	1	1	8.3	100.0	0.0	0.0
vesper sparrow	3	3	5.3	100.0	0.0	0.0
sage thrasher	1	1	2.3	100.0	0.0	0.0

Table 7 (continued).						
Species/Group	# Groups Flying	# Birds Flying	% Birds Flying	Collision Risk Height (82-328 ft (25-100m) AGL)		
				Below	Within	Above
Brewer's sparrow	0	0	0.0	N/A	N/A	N/A
California quail	0	0	0.0	N/A	N/A	N/A
Canada goose	0	0	0.0	N/A	N/A	N/A
chukar	0	0	0.0	N/A	N/A	N/A
gray partridge	0	0	0.0	N/A	N/A	N/A
rock wren	0	0	0.0	N/A	N/A	N/A
spotted towhee	0	0	0.0	N/A	N/A	N/A
unidentified buteo	0	0	0.0	N/A	N/A	N/A
unidentified empidonax	0	0	0.0	N/A	N/A	N/A
unidentified falcon	0	0	0.0	N/A	N/A	N/A
Overall	262	849	63.7	63.3	36.0	0.7

Table 8. Flight height characteristics by avian group during fixed-point surveys.

Group	# Groups Flying	# Birds Flying	% Birds Flying	Collision Risk Height (82-328 ft (25-100m) AGL)		
				below	within	above
Waterfowl	0	0	0.0	N/A[a]	N/A	N/A
Waterbirds	2	9	100.0	11.1	88.9	0.0
Shorebirds	5	9	69.2	88.9	11.1	0.0
Accipiters	4	4	100.0	75.0	25.0	0.0
Buteos	18	18	85.7	38.9	44.4	16.7
Northern Harriers	11	11	100.0	81.8	18.2	0.0
Eagles	14	14	87.5	28.6	57.1	14.3
Unidentified Falcons	0	0	0.0	N/A	N/A	N/A
Large Falcons	5	5	100.0	60.0	40.0	0.0
Small Falcons	31	33	89.2	69.7	30.3	0.0
All Raptors	83	85	89.5	57.6	36.5	5.9
Corvids	56	88	82.2	59.1	39.8	1.1
Passerines	108	648	62.7	64.7	35.3	0.0
Upland Gamebirds	0	0	0.0	N/A	N/A	N/A
Doves	1	1	100.0	100.0	0.0	0.0
Other Birds	7	9	52.9	77.8	22.2	0.0
Subtotal	262	849	63.7	63.3	36.0	0.7

[a] not applicable, no data on flight heights.

Table 9. Mean exposure indices calculated by species observed during fixed-point surveys at the Project site.				
Species/Group	Overall Mean Use	% Flying	% Flying within RSA	Exposure Index
snow bunting	0.873	100.00	60.99	0.532
European starling	0.541	100.00	72.73	0.394
common raven	0.448	80.46	50.00	0.180
gray-crowned rosy finch	0.245	100.00	68.18	0.167
horned lark	2.119	58.13	12.84	0.158
American kestrel	0.193	88.57	32.26	0.055
American pipit	0.043	100.00	100.00	0.043
ring-billed gull	0.042	100.00	100.00	0.042
golden eagle	0.075	86.67	53.85	0.035
red-tailed hawk	0.085	87.50	42.86	0.032
mountain bluebird	0.318	68.33	9.76	0.021
common nighthawk	0.012	100.00	100.00	0.012
western meadowlark	0.310	12.73	28.57	0.011
prairie falcon	0.027	100.00	40.00	0.011
rough-legged hawk	0.021	100.00	50.00	0.011
northern harrier	0.055	100.00	18.18	0.010
killdeer	0.071	69.23	11.11	0.005
northern goshawk	0.011	100.00	50.00	0.005
bald eagle	0.005	100.00	100.00	0.005
vesper sparrow	0.325	5.26	0.00	0.000
American robin	0.325	81.36	0.00	0.000
sage thrasher	0.249	2.33	0.00	0.000
Brewer's sparrow	0.200	0.00	N/A[a]	N/A
Canada goose	0.169	0.00	N/A	N/A
gray partridge	0.130	0.00	N/A	N/A
black-billed magpie	0.111	90.00	0.00	0.000
northern flicker	0.075	42.86	0.00	0.000
sage sparrow	0.073	8.33	0.00	0.000
Brewer's blackbird	0.037	100.00	0.00	0.000
yellow-rumped warbler	0.037	100.00	0.00	0.000
dark-eyed junco	0.032	100.00	0.00	0.000
northern shrike	0.032	50.00	0.00	0.000
western bluebird	0.032	100.00	0.00	0.000
loggerhead shrike	0.023	75.00	0.00	0.000
spotted towhee	0.018	0.00	N/A	N/A
violet-green swallow	0.011	100.00	0.00	0.000
merlin	0.011	100.00	0.00	0.000
sharp-shinned hawk	0.011	100.00	0.00	0.000
chukar	0.011	0.00	N/A	N/A
Say's phoebe	0.006	100.00	0.00	0.000
ruby-crowned kinglet	0.006	100.00	0.00	0.000
western kingbird	0.006	100.00	0.00	0.000
Bullock's oriole	0.005	100.00	0.00	0.000
Townsend's warbler	0.005	100.00	0.00	0.000

Table 9 (continued).				
Species/Group	Overall Mean Use	% Flying	% Flying within RSA	Exposure Index
mourning dove	0.005	100.00	0.00	0.000
unidentified hummingbird	0.005	100.00	0.00	0.000
rock wren	0.006	0.00	N/A	N/A
California quail	0.005	0.00	N/A	N/A
unidentified empidonax	0.005	0.00	N/A	N/A
unidentified falcon	0.005	0.00	N/A	N/A
unidentified gull	N/A	100.00	0.00	N/A
unidentified buteo	N/A	0.00	N/A	N/A

[a] not applicable, no data on flight heights.

text continued from page 17

In-transit Survey Data and Non-avian Observations

Avian Observations During In-transit Surveys

Observations of state or federally listed species, raptors, and other species of interest observed while in-transit between surveys points were recorded (Table 10). The most abundant avian species recorded (# of observations) were yellow-rumped warbler (19), followed by snow bunting (7), and mountain bluebird (6). Six species observed during in-transit surveys were not detected during the fixed-point surveys including white-crowned sparrow, Swainson's thrush, Copper's hawk, gyrfalcon, and turkey vulture (Table 10). Sage grouse pellets were observed on the southern side of Whiskey Dick Mountain during the fall 2002. One loggerhead shrike was observed along the PSE transmission line route.

Reptiles and Amphibians

The only reptile observed during the field studies was short-horned lizard (*Phrynosoma douglassii*).

Mammals

Paiute ground squirrels were seen regularly within the Project site but most commonly around station B. Mule deer and elk were observed throughout the Project area during the entire year, with larger but fewer groups observed during the winter periods. Coyotes were observed on a regular basis, and white and black-tailed jackrabbits were observed in a few locations.

Table 10. Summary of observations of state or federal-listed species, raptors, other species, and non-avian species observed during in-transit surveys and sage grouse surveys that were not observed during the fixed-point surveys (big game not recorded).

Species	# Obs.	# Groups
yellow-rumped warbler	19	2
snow bunting	7	2
mountain bluebird	6	1
sage thrasher	5	5
northern harrier	5	5
dark-eyed junco	5	1
white-crowned sparrow	3	1
red-tailed hawk	2	2
golden eagle	2	2
rough-legged hawk	2	2
Swainson's thrush	1	1
western kingbird	1	1
Cooper's hawk	1	1
gyrfalcon	1	1
turkey vulture	1	1
loggerhead shrike	1	1
sage grouse pellets	2[a]	2
Avian Subtotal	62	29
Paiute ground squirrel	28	16
white-tailed jack rabbit	6	5
black-tailed jack rabbit	1	1
coyote	1	1
Mammal Subtotal	36	23
short-horned lizard	7	7

[a] pellets not included in subgroup total.

Raptor Nests

The majority of the study area is dominated by sagebrush habitats ranging from flat to steeply sloping draws. Raptor nesting habitat within these canyons includes relatively tall shrubs, widely scattered cliffs and rock outcrops, and occasional patches of ponderosa pine with some intermixed aspen and/or cottonwood. A few patches of ponderosa pine are also present on the north end of the search area. Overall, habitat for above ground nesting raptors is very limited within the search area.

A total of 23 nests were found during surveys, 11 of which, showed no signs of raptor activity (Table 11). Species observed with active nests include red-tailed hawk, American crow and common raven. One great-horned owl was observed flying from a tree with a nest structure, but relatively dense branches prevented a good view of the nest. The status of the great-horned owl nest is considered unknown. One adult prairie falcon was observed perched on a cliff face and may have an unobserved nest within a pothole or cavity. One inactive nest was located in an area described as a historic golden eagle nest within the northern portion of the search area. No active golden eagle nests were found.

Sage Grouse Surveys

No sage grouse observations (leks or flushed birds) were observed during any of the sage grouse surveys or during other activities.

Big Game Surveys

Mule deer (*Odocoileus hemionus*) were commonly observed near points E, F and G (Table 12). Observations of 3-11 individuals were commonly observed in the spring/summer, with 6 or less individuals observed throughout the winter and fall for each observation. Elk (*Cervis elaphus*) were observed in some large groups, 7-26 individuals near the northern points (A, D, F and G) during the spring/summer and winter surveys, with no observations made in the fall period.

Observations 331 mule deer within 27 groups were recorded during the raptor nest survey. In addition, 129 elk observations with 17 groups were observed. Density from this survey is approximately 7 deer per square mile and 3 elk per square mile based on this one survey. Big game likely move around between this area, the state wildlife areas to the east, private range and agricultural lands to the west and south, and the forested lands to the north of the Project.

Table 11. Raptor and other nests observed within the two-mile search buffer.						
Species	Number of Nests	Nest Substrate				
		Cottonwood	Shrub	Pine	Radio Tower	Rock or Cliff
red-tailed hawk[a]	6	2	0	2	0	2
great-horned owl[b]	1	1	0	0	0	0
prairie falcon[c]	1	0	0	0	0	1
American crow[d]	3	1	0	0	0	2
Common raven[e]	1	0	0	0	1	0
inactive[f]	11	5	1	2	0	3
Total	23	9	1	4	1	8

[a]Adults were observed incubating at all six nests
[b]Nest status was unknown
[c]1 Adult observed on cliff face, nest hole was not located.
[d]Adults were observed incubating at all six nests
[e]Nest located in radio tower
[f]No adults, young or signs of activity were observed.

Table 12. Summary of observations and mean use of big game species observed during the fixed-point surveys.				
Species	**Station**	**#Obs.**	**#Groups**	**Mean Use[a]**
Mule deer	A	3	1	0.115
	B	2	2	0.077
	C	0	0	0.000
	D	6	2	0.222
	E	61	7	2.259
	F	48	5	1.778
	G	48	7	1.778
Subtotal		168	24	0.890
Elk	A	67	1	2.913
	B	8	2	0.348
	C	0	0	0.000
	D	60	4	2.500
	E	0	0	0.000
	F	71	4	2.958
	G	104	10	4.333
Subtotal		310	21	1.865
Grand Total		478	45	1.377

[a] # observations/30-minute survey

WILDLIFE IMPACT ASSESSMENT

Evaluation Criteria

Some impacts to wildlife species and in particular avian and bat species are expected to occur from the Project. Measured use of the site by avian species in addition to mortality estimates from other existing wind plants is used to predict mortality of birds and bats from the Project. For example, use of the site by raptors is relatively low compared to other wind plants and mortality estimates of raptors from other "newer generation" wind plants are relatively low (e.g. 0.07 raptors/turbine/year for Nine Canyon Wind Project, <0.04 raptors/turbine/year for Foote Creek Rim wind plant, Wyoming; <0.01 raptors/turbine/ year for the Buffalo Ridge wind plant, Minnesota). Therefore mortality estimates for raptors from the Project are expected to be low. Post construction monitoring is proposed to validate mortality predictions and monitor the actual level of mortality from the Project.

Other impacts include direct loss of habitat due to the Project facilities, and indirect impacts such as disturbance and displacement from the wind turbines, roads and human activities. Both construction (e.g., blasting) and operations impacts are discussed. Potential impacts are discussed for fish, bats, big game, other mammals, reptiles and amphibians, and birds. Discussion of potential impacts to unique species including State and Federal listed species is also included.

Fish

There are no fish-bearing streams within the project area, according to the WDFW habitats and species maps and the StreamNet database (WDFW 2003). However, the majority of the project streams drain into fish-bearing streams and/or priority fish-bearing streams. Priority fish are defined as any federal or state listed threatened, endangered, or candidate species, or any special status species of concern.

The nearest fishery is located along Quilomene Creek approximately 1 mile (1.6 km) to the north of the Project and will not be impacted. Downstream from the project area, The lower ends of Whiskey Dick, the North Fork of Whiskey Dick and Skookymchuck Creeks contain rainbow trout, and summer steelhead is identified along the lower end of Whiskey Dick Creek as well. These fisheries are more than five miles to the east of the Project. Provided best management practices are employed on site and compliance with applicable permits regarding runoff and sediment control is maintained, no fish should be affected by construction or operation of the Project.

No other waterbodies in the project area, including wetlands and the Highlands irrigation canals contain any priority fish species based on WDFW habitat and species maps. No survey information was available for these waters. If any fish species are present in these other water bodies, they would most likely be warm-water fish that would not be subject to federal or state mitigation requirements.

Bats

The potential for bats to occur is based on key habitat elements such as food sources, water, and roost sites. Potential roost structures such as trees are in general are limited within the Project to "the Pines" area near Government Springs and within the riparian corridors along Whiskey Dick and Skookymchuck Creeks. The various springs within the Project area may be used as foraging and watering areas. Little is known about bat species distribution, but several species of bats could occur in the Project area based on the Washington GAP project and inventories conducted on the Hanford Site, Arid Lands Ecology Reserve (ALE) located in Benton County to the south (Table 13).

Table 13. Bat species of potential occurrence in the Project area.			
Common Name and Scientific Name	**Typical Habitat**	**Expected Occurrence in Project Area**	**Occurrence Documentation**
California bat *Myotis californicus*	Generally found in open habitats where it forages along tree edges, riparian areas, open water; roosts in cliffs, caves, trees	Possible; documented on ALE	WA GAP Analysis Project[a], 1999; England, 2000; Fitzner and Gray, 1991
small-footed myotis *Myotis ciliolabrum*	Varied arid grass/shrublands, ponderosa pine and mixed forests; roosts in crevices and cliffs; hibernates in caves, mines	Possibe; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
long-eared myotis *Myotis evotis*	Primarily forested habitats and edges, juniper woodland, mixed conifers, riparian areas; roosts snags, crevices, bridges, buildings, mines	Unlikely due to habitat; not documented on ALE	WA GAP Analysis Project, 1999; England, 2000; TNC, 1999
little brown bat *Myotis lucifugus*	Closely associated with water; riparian corridors; roosts buildings, caves, hollow trees; hibernates in caves	Possible; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
fringed myotis *Myotis thysanodes*	Primarily forested or riparian habitats; roosts buildings, trees; hibernates in mines and caves	Possible in suitable habitat; not documented on ALE	WA GAP Analysis Project, 1999; England, 2000; TNC, 1999
long-legged myotis *Myotis volans*	Coniferous and mixed forests, riparian areas; roosts caves, crevices, buildings, mines	Possible in suitable habitat; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; Fitzner and Gray, 1991
yuma myotis *Myotis ymanensis*	Closely associated with water; varied habitats: riparian, shrublands, forests woodlands; roosts in mines, buildings, caves, bridges	Possible; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
hoary bat *Lasiurus cinereus*	Forested habitats, closely associated with trees; roosts in trees; migratory species	Possible in suitable habitat; probable migrant; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
silver-haired bat *Lasionycteris noctivagans*	Forested habitats; generally coniferous forests; roosts under bark; believed to be a migratory species	Possible in suitable habitat; probable migrant; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999

Table 13 (continued).			
Common Name and Scientific Name	**Typical Habitat**	**Expected Occurrence in Project Area**	**Occurrence Documentation**
western pipistrelle *Pipistrellus hesperus*	Primarily desert lowlands; desert shrublands; canyons; roosts under rocks, crevices and possibly in sagebrush	Possible; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
big brown bat *Eptesicus fuscus*	Generally deciduous forests; buildings; roosts in buildings, trees, crevices; hibernates in caves, mines	Possible; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
spotted bat *Euderma maculatum*	Varied habitat—pine forests to desert scrub with nearby cliffs; roosts in crevices, cliff faces	Unlikely due to rarity; not documented on ALE	WA GAP Analysis Project, 1999; England, 2000; TNC, 1999
Townsend's big-eared bat *Corynorhinus townsendii*	Varied habitats—forests to desert scrub; roosts in buildings, caves, mines, bridges; hibernates in caves	Possible in suitable habitat; not documented on ALE	WA GAP Analysis Project, 1999; England, 2000; TNC, 1999
pallid bat *Antrozous pallidus*	Generally occurs in arid regions, desert scrub habitats; roosts in cliff faces, caves, mines, buildings	Unlikely due to lack of suitable habitat; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999

[a] GAP Analysis Program (GAP). The Washington State Gap Analysis Project is based on a two primary data sources: vegetation types (actual vegetation, vegetation zone, and ecoregion) and species distribution. The two data sources are combined to map the predicted distribution of vertebrate species. More information about the Washington Gap Analysis Project can be found on the WDFW web page: www.wa.gov/wdfw/wlm/gap/dataprod.htm

Construction. Impacts to bats or bat habitat on the site are unlikely during construction. The potential for bats to occur is based on key habitat elements such as food sources, water, and roost sites. Potential roost structures such as trees are in general are limited within the Project to "the Pines" area near Government Springs and within the riparian corridors along Whiskey Dick and Skookymchuck Creeks. The various springs within the Project area may be used as foraging and watering areas. None of the key habitat elements will be impacted by construction.

Operations. Bat research at other wind plants indicates that migratory bat species are at some risk of collision with wind turbines, mostly during the fall migration season *(*Johnson *et al.* 2003b). It is likely that some bat fatalities would occur at the Project site. Most bat fatalities found at wind plants have been tree-dwelling bats, with hoary and silver-haired bats being the most prevalent fatalities. Both hoary bats and silver-haired bats may use the forested habitats near the Project site and may migrate through the Project.

Some mortality of mostly migratory bats, especially hoary and silver-haired bats, is anticipated during operation of the Project. At the Buffalo Ridge Wind Plant, Minnesota, based on a 2-year study, bat mortality was estimated to be 2.05 bats per turbine per year (Johnson *et al.* 2003b). At the Foote Creek Rim Wind Plant, based on 3+ years of study, bat mortality was estimated at 1.34 bats per turbine per year (Young *et al.* 2003). At the Vansycle Ridge Wind Plant in Oregon, bat mortality was estimated at 0.74 bats per turbine for the first year of operation (Erickson *et al.* 2000). At the Klondike Wind Project, bat mortality was estimated at 1.16 bat fatalities per turbine per year (Johnson *et al.* 2003a). At the Stateline Wind Project, bat mortality was estimated at approximately 1 bat fatality per turbine per year (Erickson et *al.* 2003a) from July 2001 through December 31, 2002. At the Nine Canyon Wind Project, bat mortality was estimated at approximately 3 bat fatalities per turbine per year (Erickson *et al*. 2003b).

Although potential future mortality of migratory bats is difficult to predict, an estimate can be calculated based on levels of mortality documented at other wind plants. Using the estimates from other wind plants, operation of the Project could result in approximately 100 to 400 bat fatalities per year. Actual levels of mortality are unknown and could be higher or lower depending on regional migratory patterns of bats, patterns of local movements through the area, and the response of bats to turbines, individually and collectively. Mortality will likely involve silver-haired and hoary bats, two relatively common migratory species.

The significance of this impact is hard to predict since there is very little information available regarding bat populations. Studies do suggest resident bats do not appear to be significantly impacted by wind turbines (Johnson *et al.* 2003b, Johnson 2003, Gruver 2002), since almost all mortality is observed during the fall migration period. Furthermore, hoary bat, which is expected to be the most common fatality, is one of the most widely distributed bats in North America. Pre-construction studies to predict impacts to bats may be relatively ineffective, because current state-of-the-art technology for studying bats does not appear to be highly effective for documenting migrant bat use of a site (Johnson *et al.* 2003b).

Big Game

The Project is located within habitats designated by WDFW as winter range for mule deer and elk, is located adjacent to the Quilomene migration corridor, and the northern boundary of the Project is approximately ½ mile (0.80km) from the Colockum elk calving area (Figure 16, WDFW 2003). The Quilomene elk winter range is approximately 83,000 acres in size and winters approximately 1500-2000 elk. The Quilomene mule deer winter range is approximately 40,000 acres in size and winters

approximately 700-800 deer. The Project area is not located within the high-density deer sub-area of Quilomene mule deer winter range that typically supports 100-200 deer. This area begins approximately 1.5 miles (2.4 km) to the north east of the Project area, and extends to the east towards the Columbia River. The Project area is also not located within the Quilomene primary winter range, a sub-area of the Quilomene winter range, which winters approximately 500 elk.

Aerial surveys are conducted for deer and elk near the project in February and March by WDFW. The Project area is overlapped by four different deer survey units (Appendix B). Three of the units were surveyed in March 2003, and a total of 1065 deer were observed. The Project area (approximately 8650 acres) comprises about 20% of the area surveyed in 2003. Historical WDFW elk and deer survey units and counts from WDFW surveys near the project area shown in Appendix B.

Wintering elk forage on native grass species such as Sandberg's bluegrass, which greens up with fall and winter rains, while mule deer likely utilize more shrub species in the Project area. Wind-blown slopes and ridges remain snow-free most of the year. West and south-facing slopes green up earlier and provide accessible nutritious forage during the harsh winter months. Mule deer and elk also use the site during the other seasons. The riparian corridors of Whiskey Dick Creek provide some cover and the various developed and undeveloped springs provide a constant water source. Mule deer and elk hunting have been allowed on the Project area lands historically.

The site appears to get some year-round use by mule deer and elk, but is more concentrated in the winter. The biologist conducting the helicopter survey on April 14, 2003 identified 129 elk in 15 groups and 331 mule deer in 27 groups within 2 miles of the Project site. Several large groups (~ 4) of 50 or more elk were observed on March during reconnaissance level surveys of the Project site.

The WDFW has expressed some concern over the potential effects of wind project development and operation wintering big game. Winter is a crucial period of time for the survival of many big game species. Deer, for example, cannot maintain body condition during the winter because of reduced forage availability combined with the increased costs of thermogenesis (Reeve and Lindzey 1991). In other words, as deer expend more energy than they take in, body condition gradually declines throughout the winter (Short 1981). Unnecessary energy expenditures may increase the rate at which body condition declines, and the energy balance determining whether a deer will survive the winter is thought to be relatively narrow, especially for fawns (Wood 1988). Overwinter fawn survival may decrease in response to human activity or other disturbances (Stephenson *et al.* 1996). Roads and energy development may also fragment otherwise continuous patches of suitable habitat, effectively decreasing the amount of winter range available for big game. Fragmentation of habitat may also limit the ability of big game populations to move throughout the winter range as conditions change, causing big game to utilize less suitable habitat (Brown 1992).

Construction: The elk and mule deer on site primarily occupy the grassland/shrub-steppe habitats, springs, and riparian corridors. During the construction period, it is expected that elk and mule deer will be displaced from the site due to the influx of humans and heavy construction equipment and associated disturbance (e.g., blasting). Construction related disturbance and displacement is expected to be limited to the construction period time frame. Most construction will take place during the summer months, minimizing construction disturbance to wintering big game. Following completion of the Project, the disturbance levels from construction equipment and humans will diminish and the primary disturbances will be associated with operations and maintenance personnel, occasionally vehicular traffic, and the presence of the turbines and other facilities.

Operations: A few published studies of big game winter use may be relevant to the development of wind turbines and wintering deer and elk (Rost and Bailey 1979; Van Dyke and Klein 1996, Johnson et

al. 2000c, Bracken and Musser 1993, Wisdom et al. 2002). Van Dyke and Klein (1996) documented elk movements through the use of radio telemetry before, during and after the installation of a single oil well within an area used year round by elk. Drilling activities during their study ceased by November 15, however, maintenance activities continued throughout the year.

Elk showed no shifts in home range between the pre and post drilling periods, however, elk shifted core use areas out of view from the drill pad during the drilling and post drilling periods. Elk also increased the intensity of use in core areas after drilling and slightly reduced the total amount of range used. It was not clear if the avoidance of the well site during the post-drilling period was related to maintenance activities or to the use of a new road by hunters and recreationalists. The authors concluded that if drilling activities occupy a relatively small amount of elk home ranges, that elk are able to compensate by shifting areas of use within home ranges.

Studies have been conducted at the Starkey Research Unit, a large fenced experimental study area near La Grande using radio-collared elk and deer. Results of spring studies (April – early June) suggest that elk habitat selection may be negatively related to traffic and other human disturbance (Johnson et al. 2000c). Elk also tended to increase movement distances as a function of increased use by humans, including ATV use, hiking, and horse back riding (Wisdom et al. 2002). Mule deer habitat selection, on the other hand, appears to primarily be related to elk distribution, with mule deer avoiding areas used by elk. Traffic and roads did not appear to be an important factor in spring distribution of mule deer. In fact, there was some selection for areas close to roads with medium levels of traffic, but the cause of this relationship is unknown. Mule deer showed some increase in movement distances as a function of increased use by humans, including ATV use, hiking and horseback riding (Wisdom et al. 2002), but much less response than elk showed.

Rost and Bailey (1979) found that wintering mule deer and elk avoided areas within 656 ft (200m) of roads in eastern portions of their Colorado study area, where presumably greater amounts of winter habitat were present. Road avoidance was greater where roads were more traveled. Only mule deer showed a clear avoidance of roads in the western portion of their study area, where winter range was assumed to be more limiting. Mule deer also showed greater avoidance of roads in shrub habitats versus more forested areas. The authors concluded that impacts of roads depended on the availability of suitable winter range away from roads, as well as the amount of traffic associated with roads.

There is little information regarding wind project effects on big game. At the Foote Creek Rim wind project in Wyoming, pronghorn observed during raptor use surveys were recorded year round (Johnson *et al.* 2000b). The mean number of pronghorn observed at the six survey points was 1.07 prior to construction of the wind plant and 1.59 and 1.14/survey the two years immediately following construction, indicating no reduction in use of the immediate area. Mule deer and elk also occurred at Foote Creek Rim, but their numbers were so low that meaningful data on wind plant avoidance could not be collected.

Due to the lack of knowledge regarding the potential impacts of energy development on big game, it is difficult to predict with certainty the effects of the Project on mule deer and elk. Van Dyke and Klein (1996) showed wintering elk shifted use of core areas out of view of human related activities associated with an oil well and access road. Most turbines and roads in the Project area will be located on ridges and will be visible over a fairly large area. While human related activity at wind turbines during regular maintenance will be less than during the construction period, it is not known if human activity associated with regular maintenance activity will exceed tolerance thresholds for wintering elk. If tolerance thresholds during regular maintenance activities are exceeded, elk are likely to permanently utilize areas away from the wind development. The Project area proposed for development has historically received regular use throughout the year by hunter's and other recreationalists including motorcycle and ATV riders, campers, birders and hikers. Access during construction and operation of the Project will be

controlled by the Applicant and disturbance to big game may be minimized and actually less than that which occurred pre-development.

WDFW has also expressed concern regarding the potential for wind projects to increase elk and mule deer damage claims on private agricultural lands near wind projects. Elk and mule deer, if displaced from the Project area, may increase their utilization of agricultural lands in the vicinity of the Project area. If elk and mule deer and not displaced from the Project, then WDFW is concerned that the Project may create a "santuary", if WDFW cannot manage the herds. The Project area is more than 5 miles (8km) from the nearest agricultural areas, so the "santuary effect" is not anticipated. The Applicant has agreed to work with WDFW to allow for management of herds within the project area if this effect does appear to occur. In addition, the Applicant has agreed to allow controlled hunting within the Project area.

Other Mammals

Other mammals that likely exist within the Project site include, badger, coyote, pocket gopher, Pauite ground squirrels and other small mammals such as rabbits, voles and mice. Construction of the Project may affect these mammals on site through loss of habitat and direct mortality of individuals occurring in construction zones. Excavation for turbine pads, roads, or other wind project facilities could kill individuals in underground burrows. Road and facility construction will result in loss of foraging and breeding habitat for small mammals. Ground-dwelling mammals will lose the use of the permanently impacted areas; however, they are expected to repopulate the temporarily impacted areas. Some small mammal fatalities can be expected from vehicle activity during operations. Impacts are expected to be very low and not significant.

Reptiles and Amphibians

Twenty-seven species of reptiles and amphibians occur in Kittitas County and could be present in the Project area. Short-horned lizards were commonly observed within the Project area. Other reptiles that may likely occur in the Project site include snakes such as the yellow-bellied racer and rattlesnakes. Amphibian and aquatic reptile habitat is limited within the Project area. No migration corridors for reptiles or amphibians are known to be present in the Project area. Many amphibians migrate short distances during spring or fall breeding periods to and from suitable wetlands and during fall dispersal of juveniles.

Construction: Impacts to reptiles and amphibians on site through loss of habitat and direct mortality of individuals occurring in construction zones. Provided best management practices are employed on site and compliance with applicable permits regarding runoff and sediment control is maintained, no amphibians should be affected by construction or operation of the Project. The level of mortality to reptiles on site associated with construction would be based on the abundance of species on site. Some mortality may be expected as common reptiles that may occur on site such as short-horned lizards and yellow-bellied racers often retreat to burrows underground for cover or during periods of winter dormancy. Excavation for turbine pads, roads, or other Project facilities could kill individuals in underground burrows. While above ground, yellow bellied racers and other snakes are likely mobile enough to escape construction equipment, however, short horned lizards do not move fast over long distances and rely heavily on camouflage for predator avoidance. Some individual lizard fatalities can be expected from vehicle activity.

Operations: No impacts to amphibians are anticipated during operations. Impacts to reptiles during operation are likely limited to some potential direct mortality due to vehicle collisions. While above ground, yellow bellied racers and other snakes are likely mobile enough to escape most vehicles, however, short horned lizards do not move fast over long distances and rely heavily on camouflage for predator avoidance. Some individual lizard fatalities can be expected from vehicle activity.

Birds

Primary habitats for birds on the Project area are the grassland/shrub-steppe and riparian communities, although some species will utilize lithosol type habitats for various resources. The various springs on site likely provide important water sources for avian species. The Project area is located within the Pacific Flyway, one of four principal north-south bird migration routes in North America. Bounded roughly by the Pacific Ocean and the Rocky Mountains, the Pacific Flyway extends from the arctic regions of Alaska and Canada to Central and South America. Within the flyway, certain groups of birds may travel along narrower migration corridors.

The Project's location along the east flank of the Cascades places it within possible migration corridors of several bird species. Given the limited riparian and other important stopover habitat (water bodies), and the few likely migrants observed during the study, use by migratory birds is likely low. It would be expected that areas further to the east along and closer to the Columbia River would be more important to migrating birds, including songbirds, waterfowl and raptors.

Information about bird fatalities at other wind plants suggests that a wide variety of species and groups are susceptible to collision with turbines. Some evidence also suggests that peak mortality may occur during migration periods although some mortality has been documented throughout all seasons (see Erickson *et al.* 2000, Young *et al.* 2003, Johnson *et al.* 2002, Erickson *et al.* 2003a, Erickson *et al.* 2003b).

Potential impacts to birds using the study area include fatalities from collision with wind turbines or from construction equipment, loss of habitat, disturbance to foraging and breeding behavior, collision with overhead power lines, and electrocution. Project-related human activity could alter bird behavior and cause displacement during the construction phase of the Project, and the post-construction density of turbines and facilities on the developed portion of the site may alter avian use.

Construction. Wind plant construction may affect birds through loss of habitat, potential fatalities from construction equipment, and disturbance/displacement effects from construction and human occupation of the area. Vegetation type/habitat losses from the Project are addressed in Lack *et al.* (2003). Potential mortality from construction equipment on site is expected to be quite low. Equipment used in wind plant construction generally moves at slow rates (e.g., cranes) or is stationary for long periods. The risk of mortality from construction to avian species is most likely limited to potential destruction of a nest with eggs or young for ground and shrub nesting species when equipment initially disturbs the habitat. Disturbance type impacts can be expected to occur if construction activity occurs near an active nest or primary foraging area. Birds displaced from these areas may move to areas with less disturbance, however, breeding effort may be affected and foraging opportunities altered during the life of the construction. No disturbance or displacement impacts to raptor nests are anticipated, since no active raptor nests were identified within ½ mile (0.80km) of Project facilities (Figure 6).

Operations - Mortality

Raptors. Raptor use at the Project is estimated to be lower than the Kittitas Valley Wind Project (KVP), and similar or lower compared to other wind projects with similar turbine types (Figure 17). Data were recorded in the field to allow standardization to 10, 20 and 30 minute survey duration, to allow comparison to survey data from other wind projects. As a group, raptor use ranged from 0.122 per 20 minute survey in the winter, to 0.41 and 0.35 in the spring and fall respectively. For comparison, raptor use at the KVP Wind Project was estimated to be 1.01 raptors per 20-minute survey in the spring, and 0.727 in the fall. The primary differences in use are primarily due to higher red-tailed hawk use at the KVP site. Only bald eagle surveys, and not general avian use surveys were conducted in the winter at the KVP site. Raptor use at the Vansycle wind project in Oregon and the Buffalo Ridge wind project in

Minnesota is estimated similar to the Project (0.36 and 0.49 raptors per 20-minute survey respectively). Raptor use at the Foote Creek Rim wind project was approximately 0.73 raptors per 20-minute survey.

Raptor mortality at new generation wind projects has been low. The estimate of raptor mortality at the Foote Creek Rim wind project in Wyoming, which is located in native grassland and shrub steppe habitat, was estimated at 0.03 raptors per turbine per year based on a three-year study of 69 turbines (Young *et al.* 2002). No raptor mortality was observed at the Vansycle wind project in Oregon during a one-year study (Erickson *et al.* 2000); and 1 raptor was recorded over a four-year study at the Buffalo Ridge wind project (Johnson *et al.* 2002). No raptor fatalities were observed at the 16-turbine Klondike wind project in Sherman County, Oregon (Johnson *et al.* 2003a), and one American kestrel fatality has been observed at the Ponnequin Wind Project in Weld County Colorado (Kerlinger pers. comm.). Raptor mortality estimates from the Stateline Wind Project (Erickson *et al.* 2003a) and the Nine Canyon Wind Project (Erickson *et al.* 2003b) have ranged from 0.05 to 0.07 raptor fatalities per turbine per year, with most fatalities consisting of red-tailed hawks and American kestrels. Completed studies at other small wind projects have not documented any raptor fatalities (Erickson *et al.* 2001).

Considering these mortality results as well as raptor use estimates at these wind projects, it is estimated that potential raptor mortality at the Project will be within the range of raptor mortality observed at other projects in the west and midwest. We expect approximately 1 to 10 raptor fatalities per year at the Project if 136 turbines are constructed. It should be noted that the fatality estimates may vary from the expected range based on many factors, including the number of occupied raptor nests near the wind project after construction, turbine size and other site specific and/or weather variables.

American kestrels and red-tailed hawks account for much of the diurnal raptor use at the site, and are expected to be the two species of raptors with the highest fatality rates over the life of the Project. Species with low risk of collisions includes northern harrier, golden eagle, rough-legged hawk and Swainson's hawk. Northern goshawk, bald eagle, Cooper's hawk and sharp-shinned hawk are expected to have a very low risk of collision. Turkey vultures appear less susceptible to collision that most other raptors (Orloff and Flannery 1992). Very few northern harrier fatalities, Cooper's hawks, sharp-shinned hawks and rough-legged hawks and no bald eagle fatalities have been observed at wind projects to date. Golden eagle use of the site is low relative to other existing wind projects (e.g., Foote Creek Rim and Altamont Pass, Erickson et al. 2002) and the mortality risk for golden eagles is also expected to be low. Golden eagle mortality at Foote Creek Rim is estimated to be approximately 1 per 200 turbines per year (Erickson et al. 2002), and estimates at the Project are expected to be lower.

Passerines. Passerines have been the most abundant avian fatality at other wind projects studied (see Johnson *et al.* 2002; Young *et al.* 2003; Erickson *et al.* 2000, Erickson *et al.* 2001), often comprising more than 80% of the avian fatalities. Both migrant and resident passerine fatalities have been observed. Given that passerines make up the vast majority of the avian observations on-site, it is expected passerines will make up the largest proportion of fatalities. Species most common to the study area will likely be most at risk, including western meadowlark, vesper sparrow and horned lark. Horned larks have been the most commonly observed fatality at several wind projects, including Vansycle, Foote Creek Rim, Stateline, and Nine Canyon (Erickson *et al.* 2000, Young *et al.* 2003, Erickson *et al.* 2003a, Erickson *et al.* 2003b). A few large flocks of birds such as snow buntings were observed, but given their infrequent use, mortality would be expected to be low. Estimates of passerine use during daytime surveys suggest much higher use at the KVP project compared to the Wild Horse Project (Figure 18). Some nocturnal migrating songbird fatalities are expected. However, no large events have been documented at wind projects. Only two small events have been reported. At Buffalo Ridge Minnesota, fourteen migrating passerine fatalities (vireos, warblers, flycatchers) were found at two turbines during a single night in May 2002 (Johnson *et al*. 2002). Approximately 25 to 30 migrating passerine fatalities (mostly warblers) were observed near three turbines and a well-lit substation at the Mountaineer West Virginia

wind project. Based on the mortality estimates from the other wind plants studied, between 50 and 300 passerine fatalities may occur per year at the Project if 136 turbines are constructed.

Carcass search studies at the Foote Creek Rim Wind Plant, Wyoming, have found avian casualties associated with guyed met towers. Based on searches of five permanent met towers at Foote Creek Rim over a three-year period, it was estimated that these towers resulted in approximately 8.1 avian casualties per tower per year (Young *et al.* 2003). The vast majority of these avian casualties were passerines. The nine permanent met towers proposed for the Project would be expected to result in collision deaths for passerines at the site, although the use of bird flight diverters on guy wires should reduce the risk of collision.

Waterfowl. Some waterfowl mortality has been documented at other wind plants (Erickson *et al.* 2001, Johnson *et al.* 2002 2003a, Kerlinger pers. comm., Erickson *et al.* 2003). However, studies at Foote Creek Rim, Vansycle, and Buffalo Ridge have not documented mortality of Canada geese, the only waterfowl species observed flying over the Project area. Two Canada geese fatalities were recorded at the Klondike project, in an area where relatively high use has been documented (Johnson *et al.* 2003a), and one Canada goose fatality has been documented at the Stateline Wind Project (Erickson *et al.* 2003). Because of the low use of the site by waterfowl, little waterfowl mortality would be expected from the Project.

Other Avian Groups/Species. Some upland game bird mortality has been documented at wind projects (Erickson *et al.* 2001, Erickson *et al.* 2003). Based on habitat and use, there is potential for mortality of some upland gamebirds such as chukars and gray partridge. Other avian groups (e.g., doves, shorebirds) occur in relatively low numbers within the study area and mortality would be expected to be very low.

Operations - Disturbance

Most studies of disturbance or displacement effects have been conducted in Europe, and most of the impacts have involved wetland habitats and groups of birds not common on this Project, including waterfowl, shorebirds and waders (Larsen and Madsen 2000; Pederson and Poulsen 1991; Vauk 1990; Winkelman 1989; Winkelman 1990; Winkelman 1992). Most disturbance has involved feeding, resting, and migrating birds in these groups (Crockford 1992). European studies of disturbance to breeding birds suggest negligible impacts and disturbance effects were documented during only one study (Pedersen and Poulsen 1991). For most avian groups or species or at other European wind plants, no displacement effects on breeding birds were observed (Karlsson 1983; Phillips 1994; Winkelman 1989; Winkelman 1990).

Avian disturbance or displacement associated with wind power development has not received as much attention in the U.S. At a large wind plant on Buffalo Ridge, Minnesota, abundance of shorebirds, waterfowl, upland game birds, woodpeckers, and several groups of passerines was found to be significantly lower at survey plots with turbines than at plots without turbines. There were fewer differences in avian use as a function of distance from turbine, however, suggesting that the area of reduced use was limited primarily to those areas within 328 ft (100m) of the turbines (Johnson *et al.* 2000a). A sizeable portion of these effects are likely due to the direct loss of habitat near the turbine for the turbine pad and associated roads. These results are similar to those of Osborn *et al.* (1998) who reported that birds at Buffalo Ridge avoided flying in areas with turbines. Also at Buffalo Ridge, Leddy *et al.* (1999) found that densities of male songbirds were significantly lower in Conservation Reserve Program (CRP) grasslands containing turbines than in CRP grasslands without turbines. Grasslands without turbines as well as portions of grasslands located at least 591 ft (180m) from turbines had bird densities four times greater than grasslands located near turbines. Reduced avian use near turbines was attributed to avoidance of turbine noise and maintenance activities and reduced habitat effectiveness due to the presence of access roads and large gravel pads surrounding turbines (Leddy 1996; Johnson *et al.* 2000a).

Construction and operation of the Foote Creek Rim wind plant did not appear to cause reduced use of the wind plant and adjacent areas by most avian groups, including raptors, corvids, or passerines (Johnson *et al.* 2000b). Some reduced use of the areas near turbines was apparent for a local population of mountain plovers, although a regional downward trend was also observed during the same time period (Young, 2003 pers. comm.). A pair of golden eagles successfully nested ½ mile (0.80km) from the wind plant after one phase was operational and another phase was under construction.

Development of wind turbines near raptor nests may result in indirect and direct impacts to the nesting birds; however, the only report of avoidance of wind plants by raptors occurred at Buffalo Ridge, where raptor nest density on 261 km^2 of land surrounding a wind plant was 5.94/100 km^2, yet no nests were present in the 32 km^2 wind plant facility itself, even though habitat was similar (Usgaard *et al*. 1997). The difference between observed (0 nests) and expected (2 nests) is not statistically significant. Similar numbers of raptor nests were found before and after construction of Phase 1 of the Montezuma Hills, California wind plant (Howell and Noone 1992). A pair of golden eagles successfully nested 0.8 km from the Foote Creek Rim, Wyoming wind plant for three different years after it became operational (Johnson *et al*. 2000b), and a Swainson's hawk nested within 0.8 km of a small wind plant in Oregon (Johnson *et al*. 2003a). Anecdotal evidence indicates that raptor use of the Altamont Pass, California wind resource area (WRA) may have increased since installation of wind turbines (Orloff and Flannery 1992, American Wind Energy Association 1995).

Operation of the proposed Project would not affect raptor nests unless there were disturbance or displacement effects that caused raptors to not return to the nests close to the Project site. Impacts would be considered low since no active raptor nests were identified within ½ mile (0.80km) of turbines, and since there is very little raptor nesting habitat near the wind turbines.

Based on the available information, it is probable that some disturbance or displacement effects may occur to the grassland/shrub-steppe avian species occupying the study area. The extent of these effects and their significance is unknown and hard to predict but could range from none to several hundred feet, resulting in a low level of impacts.

Unique Species

A list of state and federally protected species that potentially occur within the Project area was generated to assess the potential for impacts to these species (See Table 14). Species were identified based on the WDFW Species of Concern list, which includes state listed endangered, threatened, sensitive and candidate species; and the USFWS, Central Washington Ecological Services office list of Endangered, Threatened, Proposed, Candidate and Species of Concern for Kittitas County.

Information about occurrence of these species in the Project area is based largely on the following resources:

- Habitat mapping and predicted distribution from Washington State Gap Analysis Program (GAP) project;
- WDFW Priority Habitats and Species (PHS) records for the project area and a buffer or approximately 5 miles (8km);
- Breeding Bird Atlas of Washington State, Location Data and Predicted Distributions (Smith *et al.* 1997);
- Baseline field studies being conducted on site (this report); and
- Other published literature where available.

Critical Habitat

According to Washington Department of Fish and Wildlife (WDFW), there are no riparian areas within the project areas labeled as priority habitats. Riparian and priority habitats are listed as Critical Areas by Kittitas County (Kittitas County Critical Area Ordinance Title 17A.02.230 and 17A.02.250). No riparian areas will be impacted by construction of project roads and wind turbines. No impacts are anticipated from the transmission line crossing of Parke Creek (WDFW letter, Exhibit 11, WH ASC).

The Endangered Species Act defines critical habitat for threatened or endangered species as specific area(s) within the geographical range of a species where physical or biological features are found that are essential to the conservation of the species and which may require special management consideration or protection. Critical habitat is a specific geographic area designated by the USFWS for a particular species.

Under the ESA, it is unlawful to adversely modify designated critical habitat. According to the USFWS letter, critical habitat for the northern spotted owl may be present at or near the proposed wind plant. However, it was determined that no critical spotted owl habitat is present within the Project area after further review of critical habitat maps by the USFWS (Skip Stonesifer, USFWS, pers. comm.). Therefore, construction, maintenance, and operation of the proposed Project will not adversely modify critical habitat for endangered or threatened species.

No Effect

Resource investigations indicated that gray wolf, bull trout, Canada lynx, northern spotted owl, and western yellow-billed cuckoo are not likely to occur or only accidentally occur in the Project area and that essential habitat for some of these species is lacking within the Project area. The Project is not likely to impact these species.

Table 14. Species of special status documented as occurring or likely to occur within the vicinity of the Project area.		
Group/Species	Status[a]	Notes
Mammals		
black-tailed jack rabbit (*Lepus californicus*)	SC	Documented as occurring near the Project area. One observation during the baseline study. The species is likely to occur within the Project area due to the presence of suitable sagebrush and shrub habitats.
white-tailed jack rabbit (*Lepus townsendi*)	SC	Documented as occurring near the Project area. 6 individuals were observed during the baseline study. The species is likely to occur within the Project area due to the presence of suitable sagebrush and shrub habitats.
brush prairie pocket gopher (*Thomomys talpoides douglasi*)	SC	Project occurs within the potential range of the species. No individuals have been documented near the Project area.
Merriam's shrew (*Sorex merriami*)	SC	Project occurs within the potential range of the species. No individuals have been documented near the Project area.
Townsend's big-eared bat (*Coryhorhinus townsendii*)	SC	Project occurs within the potential range of the species. No individuals have been documented near the Project area.
Amphibians and Reptiles		
Columbia spotted frog (*Rana luteiventris*)	SC	The Project area occurs within the potential range for the species, although no observations were made during the baseline study. However, impacts to wetlands and springs from the Project are not anticipated, and no impacts to the species are anticipated.
western toad (*Bufo boreas*)	SC	The Project area occurs within the potential range for the species although no observations were made during the baseline study. However, impacts to wetlands and springs from the Project are expected not anticipated, and no impacts to the species are anticipated.
sharptail snake (*Contia tenuis*)	SC	The Project area occurs within the potential range for the species although no observations were made during the baseline study.
striped whipsnake (*Masticophis taeniatus*)	SC	The Project area occurs within the potential range for the species although no observations were made during the baseline study.

Table 14 (continued).

Group/Species	Status[a]	Notes
Raptors		
bald eagle (Haliaeetus leucocephalus)	ST FT	One bald eagle was observed during the winter. No documented breeding records within two miles of the Project. Bald eagles may rarely fly through the Project area, especially in the winter. No impacts to bald eagles are anticipated. Removal and reduction of cattle grazing may reduce bald eagle use and risk, due to lack of carrion.
golden eagle (Aquila chrysaetos)	SC	WDFW has historic nesting records within two miles of the Project area. No active golden eagle nests were observed during raptor nest surveys in 2003. Mean use of the Project area was low overall, but highest in the fall (0.143 observations / 30-minute survey) and winter (0.082 observations / 30 minute survey). Two individuals were observed during the in-transit surveys.
peregrine falcon (Falco peregrinus)	SS	Potential exists for species to rarely fly through the Project area during migration or rarely to forage in breeding season. No peregrine falcons were observed during raptor nest, fixed-point, in-transit count surveys. Active eyries do exist more than 6.5 miles (10.5km) to the east of the Project between the Quilomene Creek and Vantage. No impacts to peregrine falcons are expected.
burrowing owl (Athene cunicularia)	SC	One documented burrowing owl breeding area occurs 3- 4 miles (5-6km) southeast of the Project area and transmission route. However, no burrowing owls were observed during surveys within the Project area, and no impacts to the species are expected.
ferruginous hawk (Buteo regalis)	ST	The species is considered a rare migrant and potential breeder within the Project area. No ferruginous hawks were observed during fixed-point, in-transit, or raptor nest surveys. No impacts to the species are anticipated.
merlin (Falco columbarius)	SC	Two observations of merlins were noted during fixed point surveys. The species is considered a rare migrant through the Project area and is not likely to breed within the Project area. No impacts to migrating merlins are expected.
flammulated owl (Otus flammeolus)	SC	The Project occurs within the potential range of flammulated owls. Suitable habitat exists for the species within patches of conifer within and to the north of the Project area. If flammulated owls occur within the Project area, a low potential exists for the species to collide with turbines. Only one flammulated owl has been documented as a fatality at wind plants within the U.S. (Erickson *et al.* 2001).
northern goshawk (Accipiter gentiles)	SC	Two observations of two individuals were made within the Project area during the winter of 2002 - 2003. Overall use of the Project area by breeding northern goshawks appears to be relatively low, and no impacts to the species are anticipated.

Table 14 (continued).		
Group/Species	Status[a]	Notes
Grouse		
sage grouse (*Centrocercus urophasianus*)	ST	The Project area occurs within a mapped area of historic high use. One documented lek is present approximately 2.75 miles (4.43km) from a proposed southern transmission route. No sage grouse or leks were observed during fixed point or lek surveys within the Project area, although pellets were found incidentally on the south side of Whiskey Dick Mountain in the fall. Although potentially used historically, the Project area is not currently occupied by sage grouse leks, and no to very low impacts to the species are anticipated. The project is located within the Colockum Management Unit in the Draft Washington Recovery Plan for Sage-grouse. This managment unit is most important for potential connectivity between the breeding population on the YTC and the populations in Douglas County.
sharp-tailed grouse (*Tympanuchus phasianellus*)	ST	The WDFW has one record of a sharp-tailed grouse sighting from 1981 approximately 4 – 6 miles (6-10km) from the Project area and 3 miles northwest of the BPA feeder line. No sharp-tailed grouse were observed during surveys. It is unlikely that the species occupies the Project area and no impacts are expected.
Waterbirds / Waterfowl		
common loon (*Gavia immer*)	SS	Common loons are considered a rare migrant through the Project area. No loons were observed during surveys, and no impacts to the species are anticipated.
western grebe (*Aechmophorus occidentalis*)	SC	Western grebes are considered a rare migrant through the Project area. No grebes were observed during surveys, and no impacts to the species are anticipated.
Songbirds		
Lewis' woodpecker (*Melanerpes lewis*)	SC	The Project occurs within the potential range of the Lewis' woodpecker. Suitable habitat exists for the species within patches of conifer within and to the north of the Project area. However, no Lewis' woodpeckers were observed during surveys, and no impacts to the species are anticipated.
white-headed woodpecker (*Picoides albolarvatus*)	SC	The Project occurs within the potential range of the White-headed woodpecker. Suitable habitat exists for the species within patches of conifer within and to the north of the Project area. However, no White-headed woodpeckers were observed during surveys, and no impacts to the species are anticipated.
loggerhead shrike (*Lanius ludovicianus*)	SC	Three observations totaling four individuals were observed within the Project area during the spring of 2002 and 2003. One observation was made along the PSE transmission route. Use of the Project area by breeding loggerhead shrikes appears to be relatively low, and low impacts to the species are anticipated.

Table 14 (continued).		
Group/Species	Status[a]	Notes
sage sparrow (*Amphispiza belli*)	SC	Sage sparrows are documented as occurring within sagebrush habitats within and surrounding the Project area during fixed point surveys and by the WDFW. The potential exists for the migrating individuals to collide with turbines. Observations of breeding individuals indicate that the species generally does not fly within blade height (Table 7 and 9).
sage thrasher (*Oreoscoptes montanus*)	SC	Sage thrashers are documented as occurring within sagebrush habitats within and surrounding the Project during the fixed and in-transit surveys. The potential exists for the migrating individuals to collide with turbines. Observations of breeding individuals indicate that the species generally does not fly within blade height (Table 7 and 9).
Vaux's swift (*Chaetura vauxi*)	SC	The Project area occurs within the potential range of the Vaux's swift. No individuals were observed during fixed point surveys. The potential exists for migrating individuals to collide with turbines, however, the overall risk to the species is considered low.

[a]
FE Federal Endangered,
FT Federal Threatened
FC Federal Candidate
FSC Federal Species of Concern
SE State Endangere
ST State Threatened
SC State Candidate
SS State Sensitive

Potentially Impacted Species

Birds

Bald Eagle. Only one bald eagle was observed during surveys within the Project area. The bald eagle was observed during the winter, and no bald eagle nests were observed during raptor nest surveys. Based on the apparent low use of the Project area by bald eagles, impacts to the species are considered negligible. Bald eagle is the only federal threatened or endangered species documented to occur on the Project site. No bald eagle fatalities have been observed at other wind projects (Erickson *et al.* 2001), and many have estimated bald eagle use similar or higher than this Project.

During Project construction the possibility of mortality effects to bald eagles is considered negligible and very unlikely to occur. Bald eagles in the area during the construction period are unlikely to occur within the construction zones due to disturbances and therefore unlikely to be at risk of construction related mortality. In addition, the majority of construction is likely to take place during late spring, summer and fall months when bald eagles very rarely or do not occur in the area.

During Project operations, based on the available information about bald eagle use of the site, potential bald eagle mortality due to operation of the wind plant will confined to the winter and early spring

seasons. Bald eagles will not be at risk from the wind plant in the summer or fall. Bald eagles are not expected to frequently occur within the wind plant and operation of the wind plant should have minimal disturbance on bald eagles. Additionally, proposed mitigation measures are intended to further reduce the possibility of disturbance or displacement.

Although the risk is low, the potential exists for bald eagle fatalities during operation of the Project. The status of bald eagle in the Project area and range wide is not expected to change due to the Project. Bald eagle populations appear to be generally increasing and the USFWS has proposed the species for delisting (USFWS 1999). Bald eagle populations in Washington and throughout North America will likely continue to increase during and after the Project is constructed.

Golden Eagle. Although no active nests were documented during surveys, golden eagles were documented during fixed point surveys throughout the year and golden eagles have nested historically within two miles of the Project area. Overall use of the Project area by golden eagles is relatively low compared to other wind plants where golden eagle fatalities have been documented. While the potential exists for golden eagles to collide with turbines, overall risks to golden eagle populations are considered low and only a few individuals are expected to collide with turbines over the life of the Project.

Sage Sparrow and Sage Thrasher. Sage sparrows and sage thrashers breed within sagebrush and shrub habitats within the Project area. Most sagebrush and other shrub habitats within the Project area occur on the sides of ridges and in drainages, while most turbines will be located on ridge tops lacking dense shrub habitats. Observations of breeding individuals indicate that the species generally does not fly within blade height (Table 7 and 9). The potential exists for the migrating individuals to collide with turbines. It is likely that the presence of turbines, roads and associated facilities will result in local displacement of breeding sage sparrows and sage thrashers from shrub habitats near Project facilities. However, based on research in Minnesota, displacement effects will likely be limited to areas within 328 ft (100m) of turbines and associated facilities (Johnson *et al.* 2000a). Overall impacts to sage sparrow and sage thrasher populations are considered negligible.

Sage Grouse. The Project area has been used historically by sage grouse (WDFW PHS Data). Sage grouse have historically been observed in the Project area, especially in the fall and winter, with the most recent observations that were entered into the WDFW PHS data occurring in the fall 1997. Apparently no leks have been observed near the Project area based on systematic searches, as well as incidental observations. The nearest known lek is 5 miles (16km) south of the Project area and 2.75 miles (4.4km) at the closest point to the proposed PSE transmission line (Figure 6). At least one brood was observed in the general vicinity of the Project in the early 1990's, suggesting nesting may have occurred near the Project at that time (WDFW PHS). No sage grouse or leks were observed during targeted surveys in March and April 2003 within and surrounding the proposed Project area. In addition, no sage grouse were observed during avian use surveys between May 10, 2002 and May 22, 2003. Two sage grouse pellet groups were observed on the south side of Whiskey Dick Mountain during the fall 2002.

Currently, two populations of sage grouse remain in Washington; one within the Yakima Training Center in Yakima and Kittitas counties south of the Project area, and one within Douglas and Grant counties to the northeast of the Project area. The sage grouse population in 1997 was estimated at approximately 1000 birds, with 600 located in Douglas County and 400 birds on the YTC (Hays *et al.* 1998).

The Project area is located within the western portion of the Colockum sage grouse management unit, as defined in the Draft Washington Sage Grouse Recovery Plan (Stinson *et al.* 2003). The Colockum management unit primarily provides a possible corridor between the sage grouse population within the Yakima Training Center to the south of the Project and the populations to the north and west of the Project in Douglas County population. The potential function of the Colochum management unit includes

secondary breeding[1], connectivity[2], and seasonal use[3] with uncertain but apparently limited potential for reintroduction and established breeding.

Presence of very young broods at the Foote Creek Rim Wind Project suggest nesting has likely occurred somewhere near wind turbines, although the exact nesting location relative to the wind project is not known (R. Good pers. comm.). Historic data suggest the potential for sage grouse to use the Proposed Project area for winter habitat and for potential movement between the YTC and Douglas County populations. It would appear there is currently much less likelihood of consistent use of the Project area for nesting, based on no documented birds observed in the Project vicinity during the breeding season in the past 10 years, the current nesting habitat quality, and other factors (Stinson *et al.* 2003). Important components to nest sites and nest success include a large grass and sagebrush canopy cover (Sveum 1995). The grass cover component would appear to be lacking within the Project area, due to current grazing practices. Proposed mitigation measures include reduction and possible elimination of domestic cattle and horse grazing within the Project area, which likely would improve residual grass cover and potential nesting, brood-rearing and wintering habitat for sage grouse. It is not known what impact the project will have on seasonal movements and movements, if they exist, between the two existing populations. There still does exist relatively large blocks of shrub-steppe habitats within WDFW lands to the east that may serve to connect the two populations. Controlled access to the project area will limit human activity, and in fact, may reduce human disturbance levels compared to current levels.

Peregrine Falcon. The nearest known peregrine eyrie is located approximately 6.5 miles (10.5km) from the Project area. No peregrine falcon eyries were located during raptor nest surveys. Cliff habitat is present within two miles of the Project area, and the potential exists for peregrine falcons to nest within these cliff habitats. However, most suitable peregrine falcon nesting habitat is located along the Columbia River and it is unlikely that peregrine falcons will nest within two miles of the Project area. Use of the Project area by peregrine falcons is likely limited rare dispersal events or occasional individuals migrating or hunting within the Project area. Over the life of the Project there is a very low risk that an individual peregrine falcon will collide with turbines, however, there will be no effect to peregrine falcon populations from the Project.

Burrowing Owl. Although no burrowing owls have been documented within the Project area during surveys, burrowing owl breeding areas have been designated by the WDFW 3-4 miles (5-6km) southeast of the Project area. The potential exists for breeding burrowing owls to occur within the Project area. However, considering the lack of sightings within the Project area, burrowing owls likely occur only occasionally within the Project area, and no impacts to burrowing owl populations are expected.

Other Bird Species. The potential range of several other species listed as candidates under the Washington Endangered Species Act overlap with the Project, including ferruginous hawk, flammulated owl, merlin, northern goshawk, sharp-tailed grouse, common loon, western grebe, Lewis' woodpecker, white-headed woodpecker, and Vaux's swift (Table 14). The potential exists for these species to occur within the Project area; however, use of the Project area by these species is expected to occur very rarely during migration or dispersal events. The potential exists for a few individuals of each species to collide with turbines over the life of the Project; however, impacts to these species populations are not anticipated.

[1] areas that may support limited breeding
[2] providing habitat connectivity between breeding areas or seasonal use areas
[3] areas likely to be used seasonally during winter, summer, or fall.

Mammals

The Project occurs within the potential range of several species of federally and state protected mammals, which are unlikely to occur within the Project area due to habitat constraints and/or uncertain population status in Washington. These species include Townsend's big-eared bat, long-legged myotis, and long-eared myotis. These species are not expected to occur within the Project area and no impacts to these species are likely to occur.

Both the white-tailed and black-tailed jackrabbits have been documented in the Project area. The potential exists for individuals to be killed by vehicles on roads, and some suitable habitat for these species will be lost to turbine pads and road construction. Limits on vehicle speeds within the Project will minimize the potential for road kills, and the permanent loss of suitable habitat is relatively small. Overall, impacts to these species should be minimal.

Suitable habitat for three bat species, which are listed as federal species of concern, is present within the Project area: fringed myotis, small-footed myotis and Yuma myotis. However, only general descriptions of habitat requirements and potential distribution are available for the three species. Very little is known concerning the ecology of the three species, making it even more difficult to accurately predict potential impacts to these species. To date, we are unaware of any documented fatalities of these species at wind projects within the U.S.

Merriam's shrew has been documented within Kittitas County, and suitable habitat for the species occurs within the Project area. The potential also exists for the brush prairie pocket gopher to occur within the Project area. Assuming these species are present within the Project area, the construction of turbine pads and roads, and vehicle traffic has the potential to crush individuals within burrows or moving about above ground. Overall, total impacts to habitat are small and no significant impacts to populations of these species are expected to occur as a result of this Project.

Reptiles and Amphibians

The Project area occurs within the potential range of the striped whipsnake, sharptail snake, western toad and Columbia spotted frog. There is very little suitable habitat for amphibians or aquatic reptiles (e.g., turtles) in the study area. None of these sensitive status reptiles or amphibians were documented on the Project site and no impacts are anticipated.

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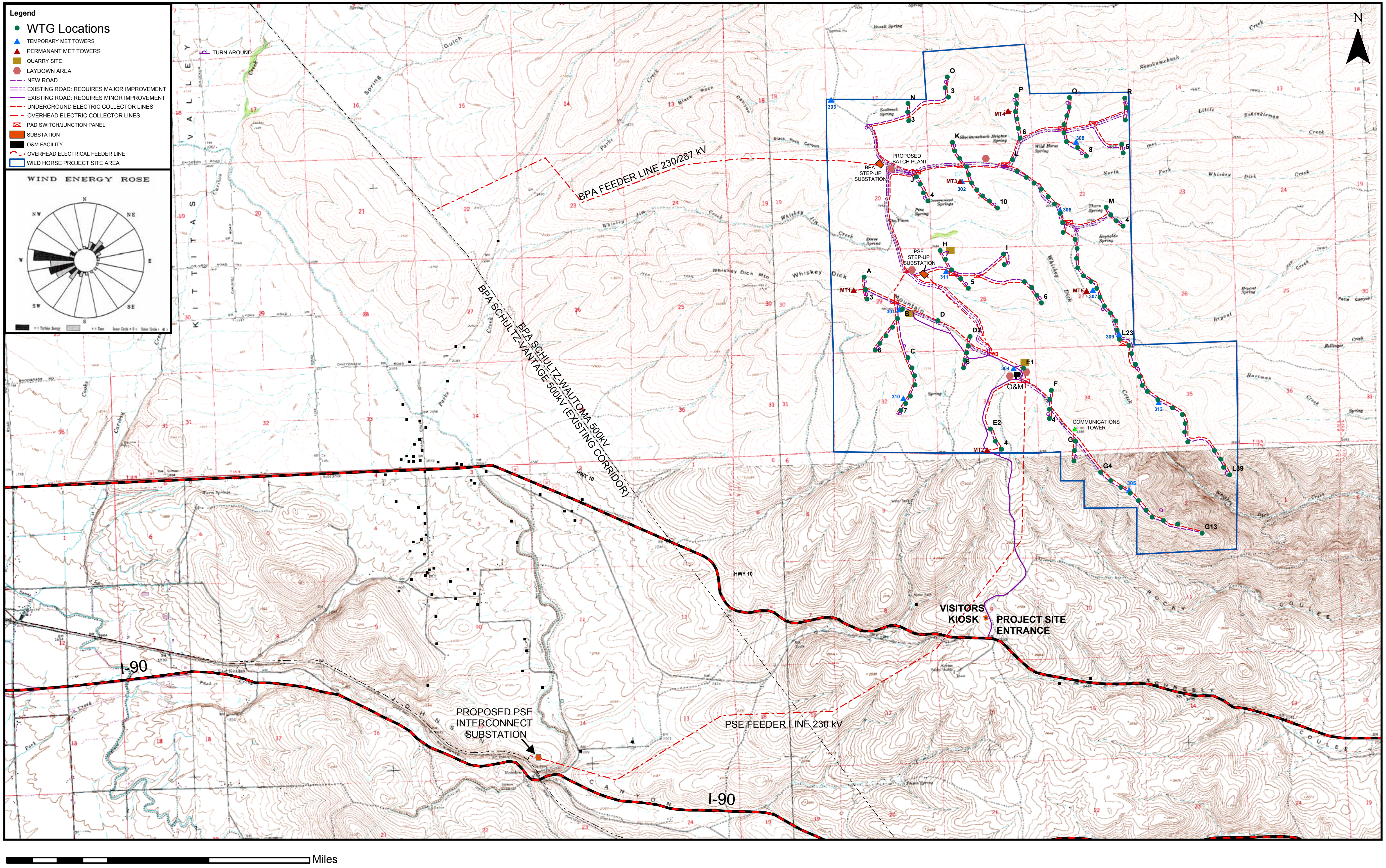
Figure 1. Location of the Project.



DWG: PROJECT SITE LAYOUT

DATE: November 20, 2003

FILENAME: WH_Layout_11.6.mxd

EXHIBIT 1-B PROJECT SITE LAYOUT

Wild Horse Wind Power Project

Wind Ridge Power Partners, LLC

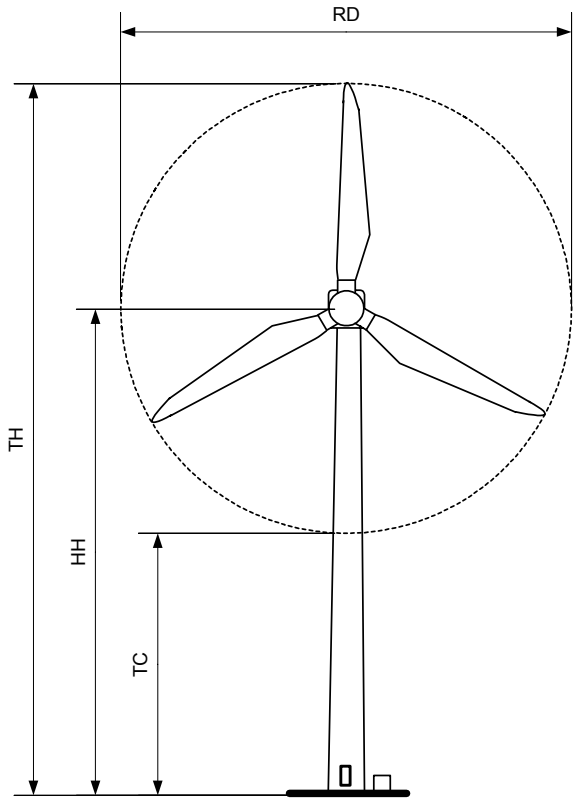
Zilkha Renewable Energy

210 SW MORRISON
SUITE 310
PORTLAND, OR 97204
TEL: (503) 222-9400
FAX: (503) 222-9404

PRELIMINARY

NOT FOR CONSTRUCTION

Figure 3. Wind turbine dimensions



	MAX	MIN	Dimension
HH	80 m/262 ft.	46 m/151 ft.	Hub Height
RD	90 m/295 ft.	60 m/197 ft.	Rotor Diameter
TC	40 m/131 ft.	15 m/49 ft.	Tip Clearance
TH	125 m/410 ft.	76 m/249 ft.	Tip Height

Figure 4. Habitat map.

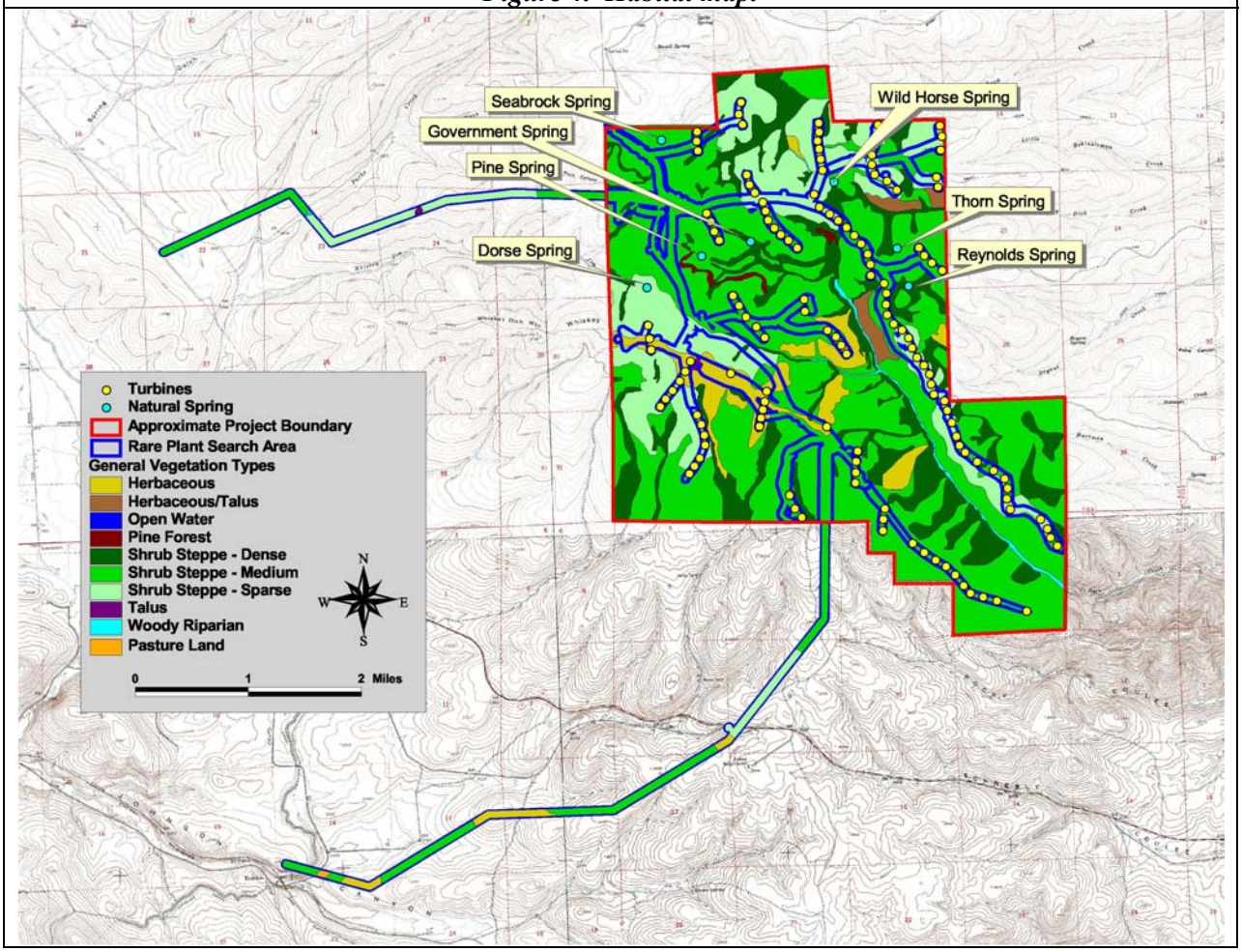


Figure 5. Location of avian observation stations.

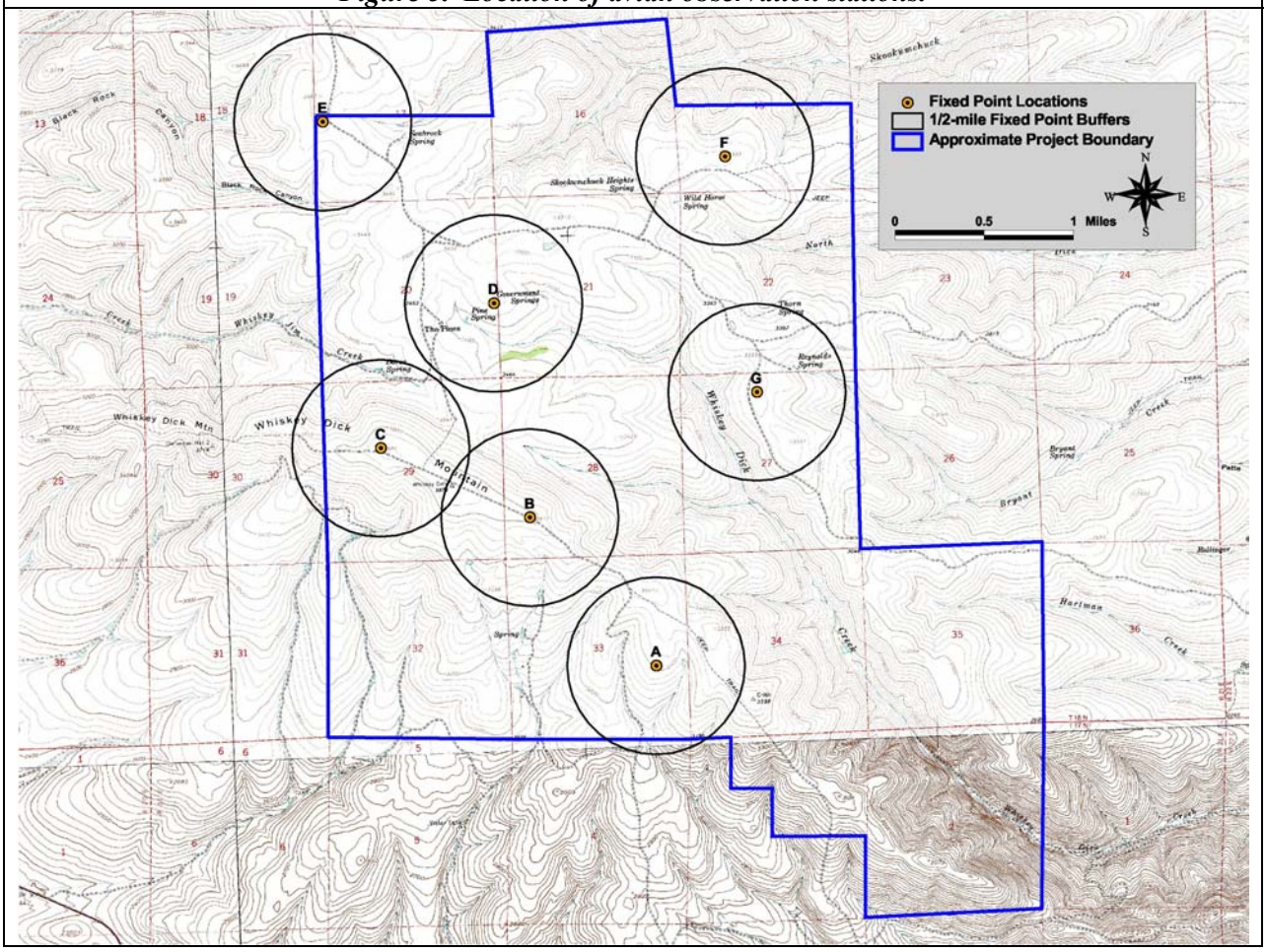


Figure 6. Raptor nest survey area, flight paths, and nest locations (new and historic).

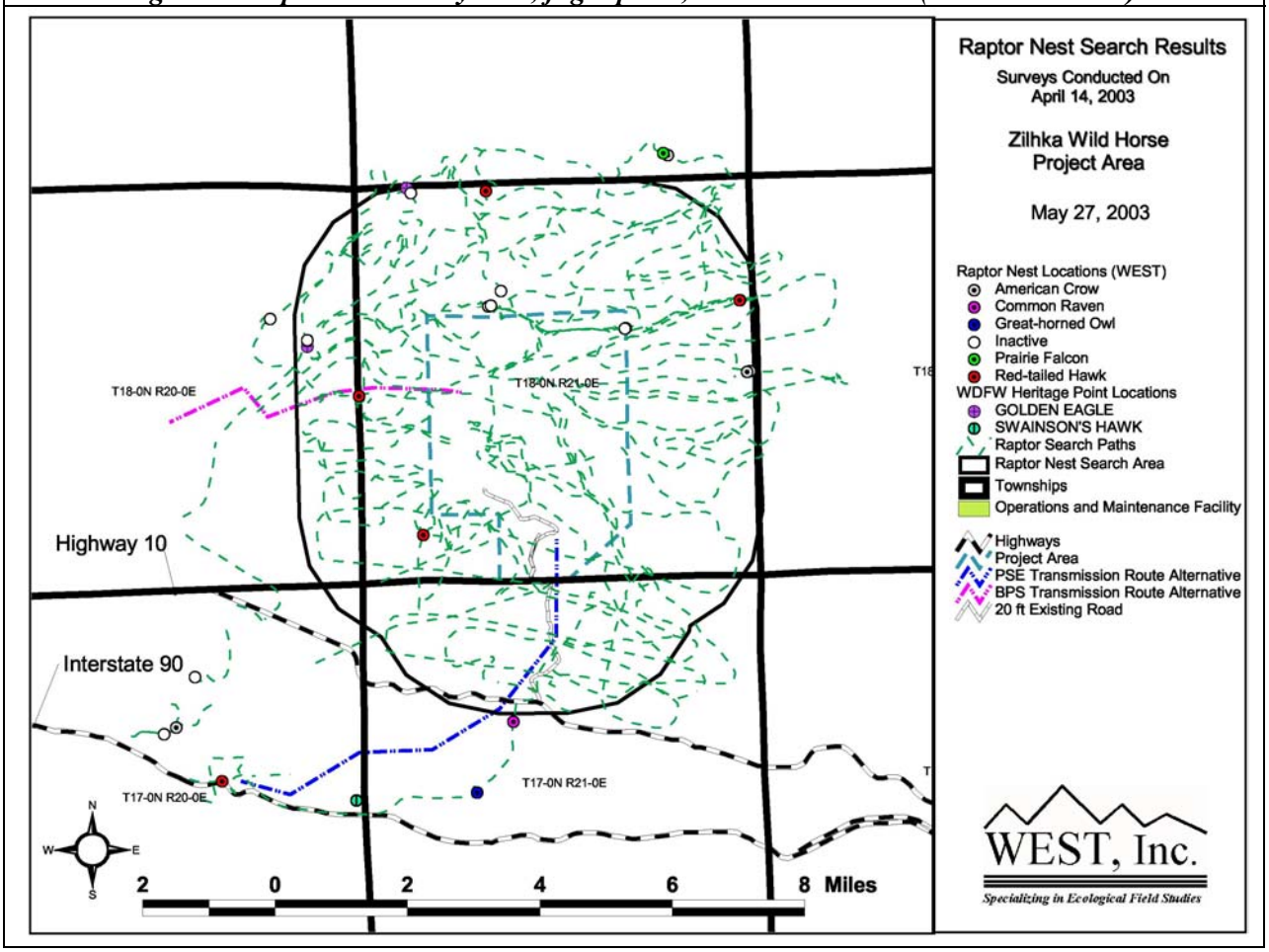
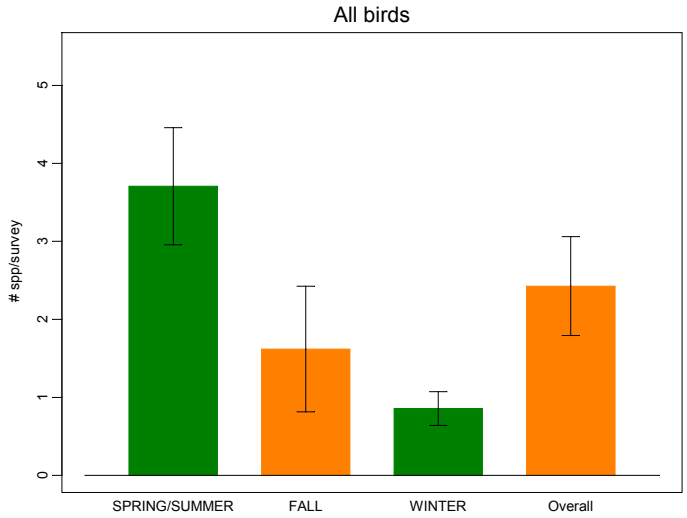


Figure 7. Mean number of species observed per survey per season and per visit.



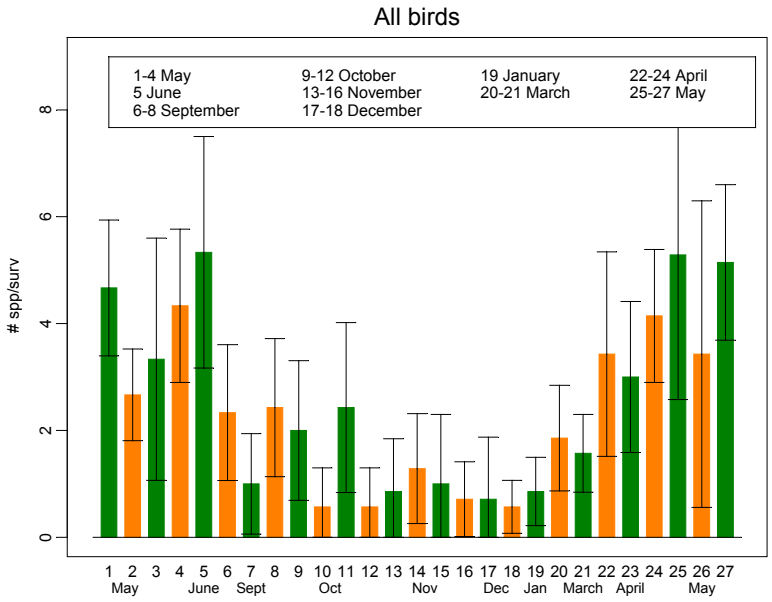


Figure 8. Avian use by major bird group.

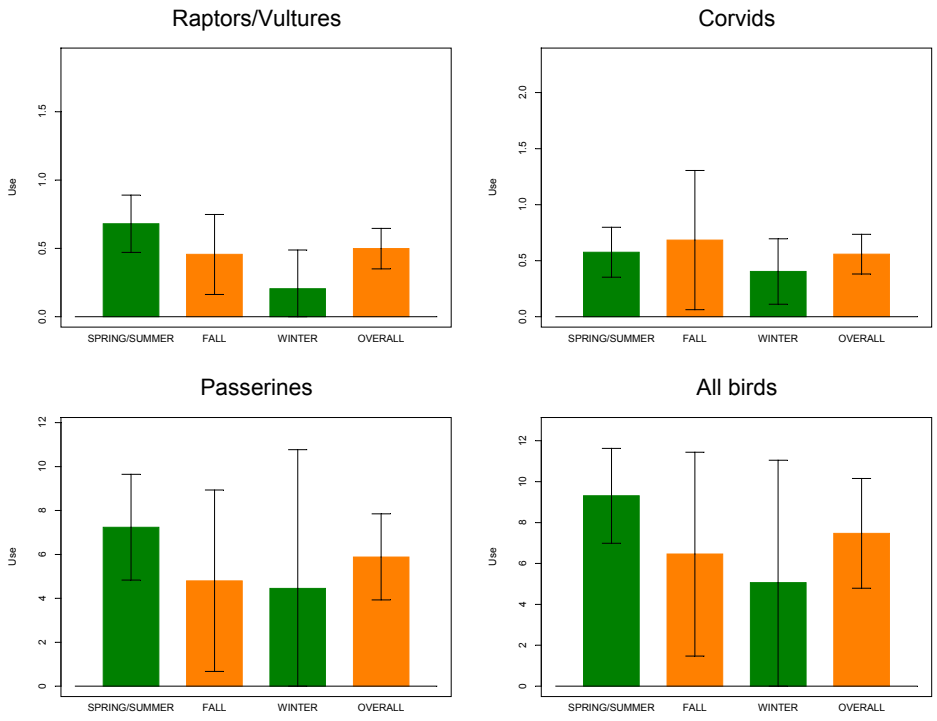


Figure 9. Frequency of occurrence by major bird groups.

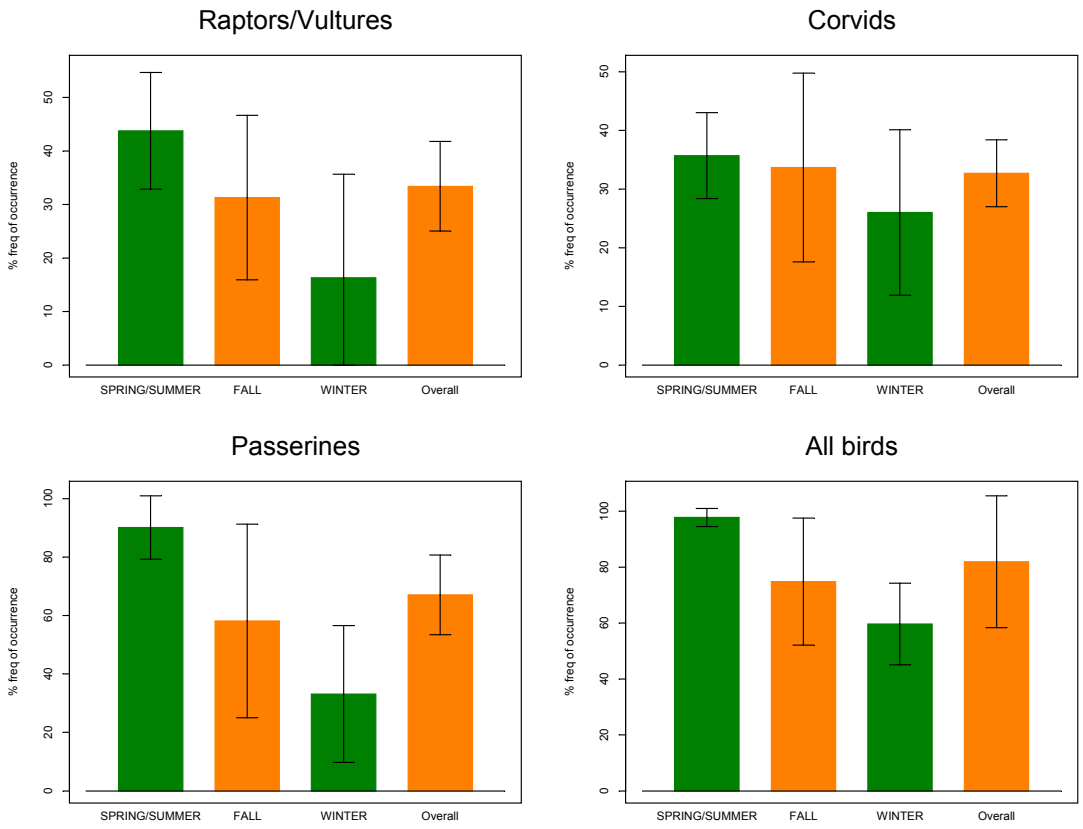


Figure 10. Mean use for passerines and all birds combined by station.

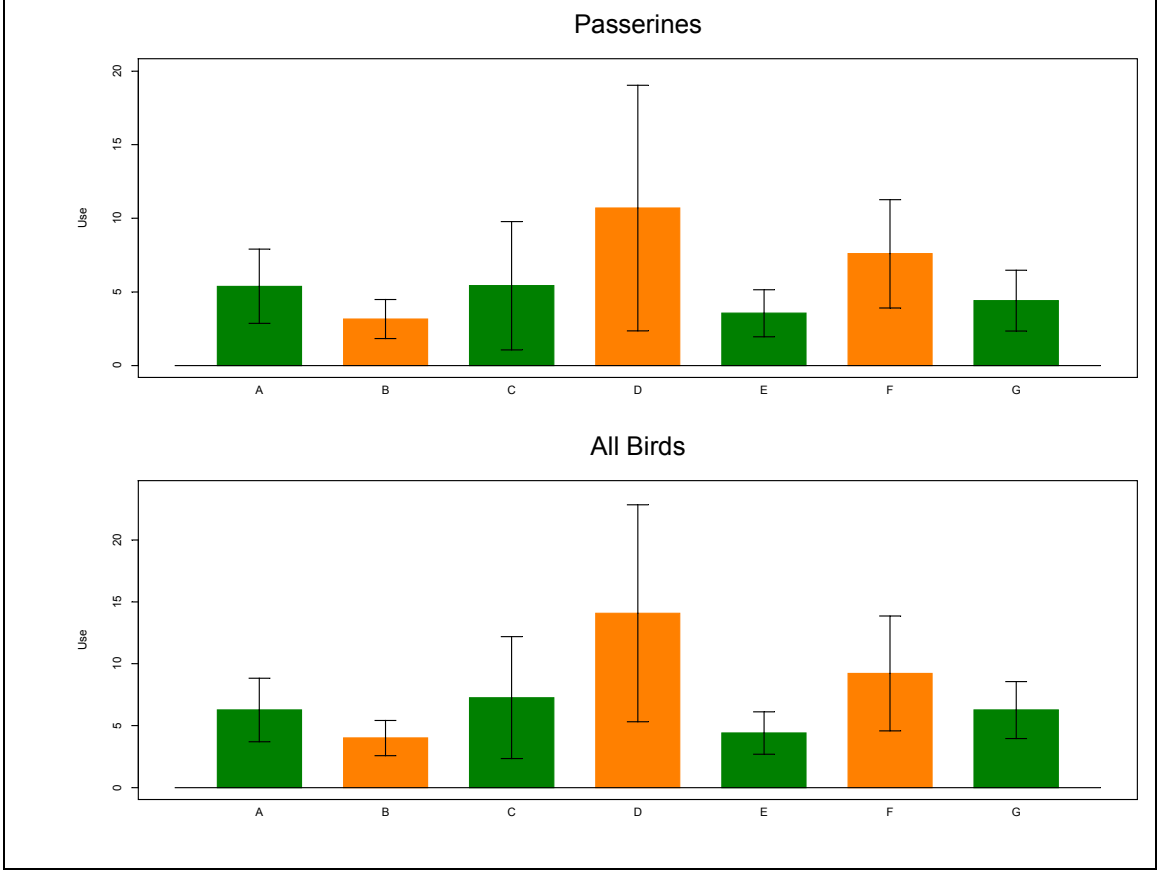


Figure 11. Mean use for raptors and corvids by station.

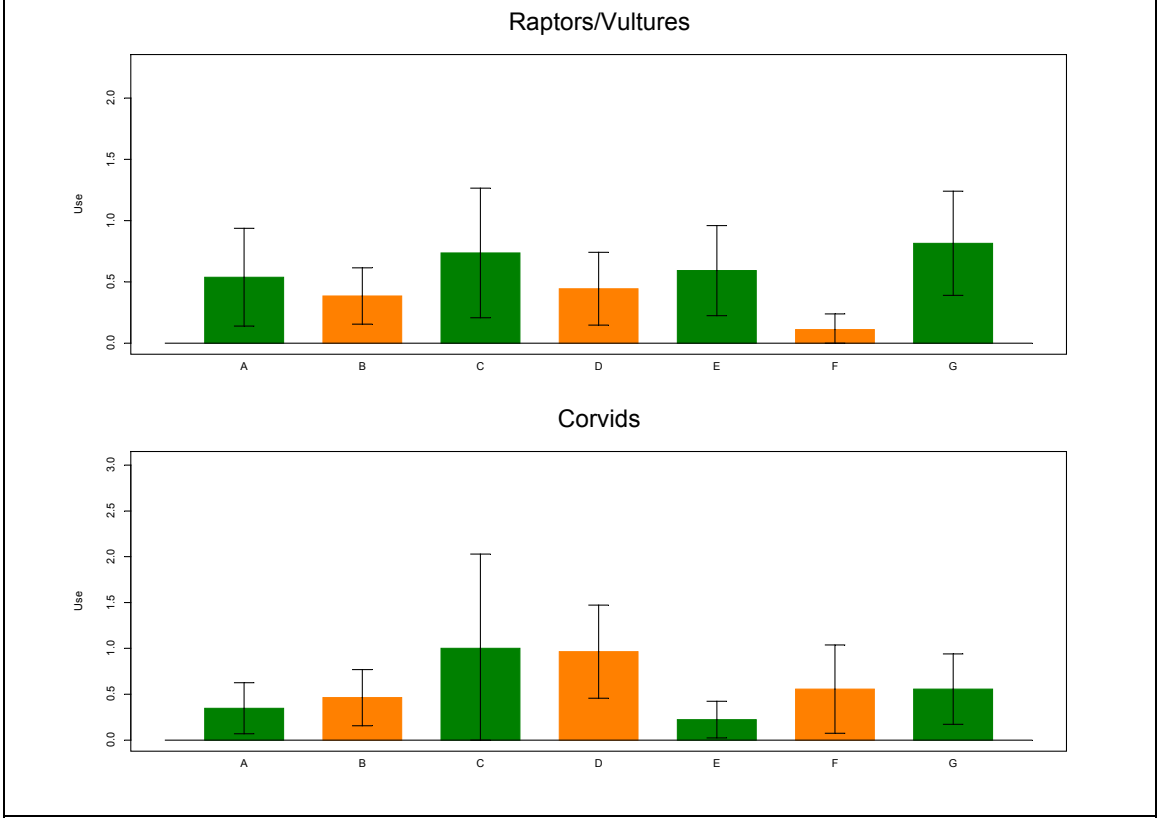


Figure 12. Flight paths of red-tailed hawks, rough-legged hawks and unidentified buteos.

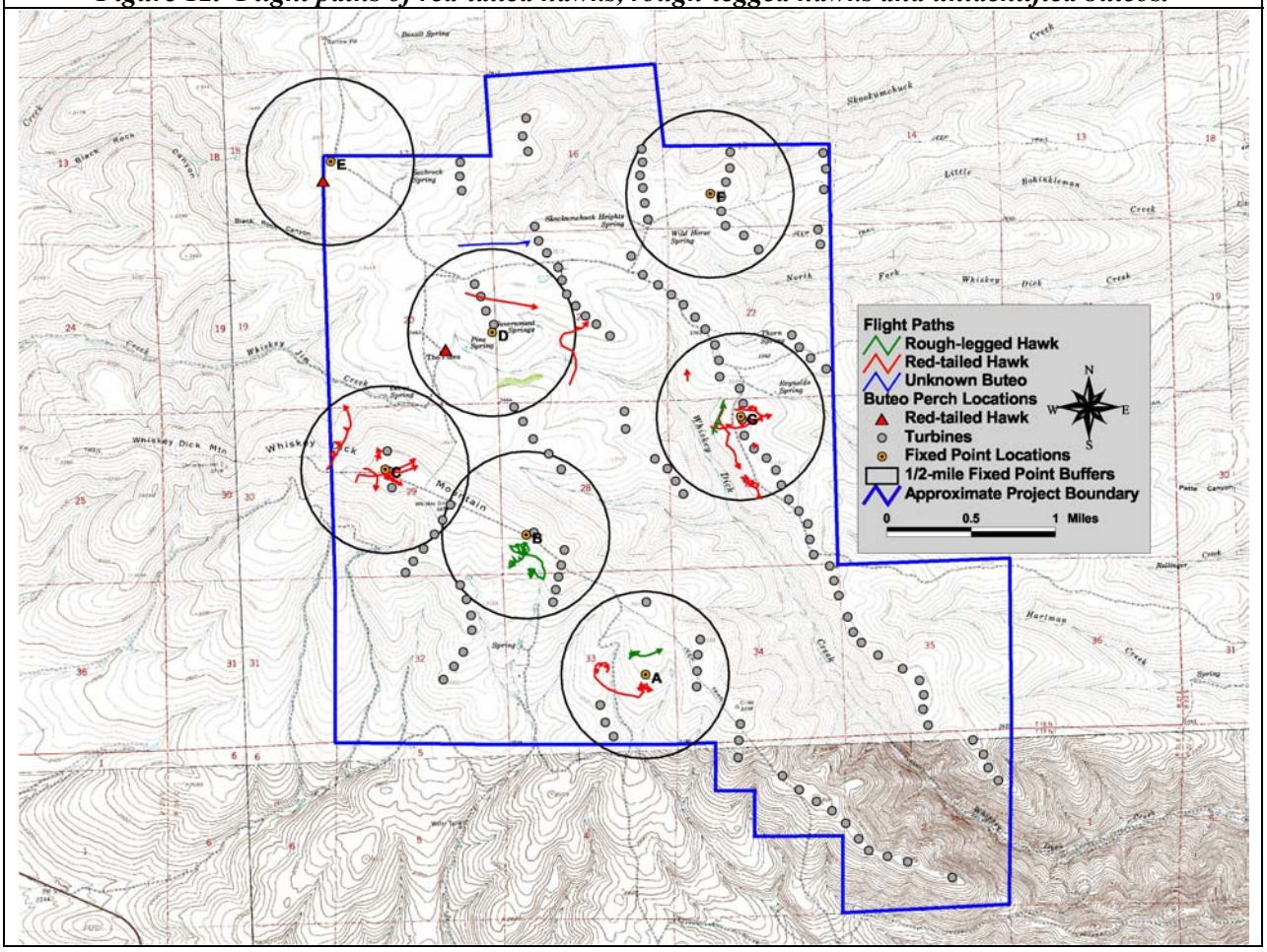


Figure 13. Flight paths of golden and bald eagles.

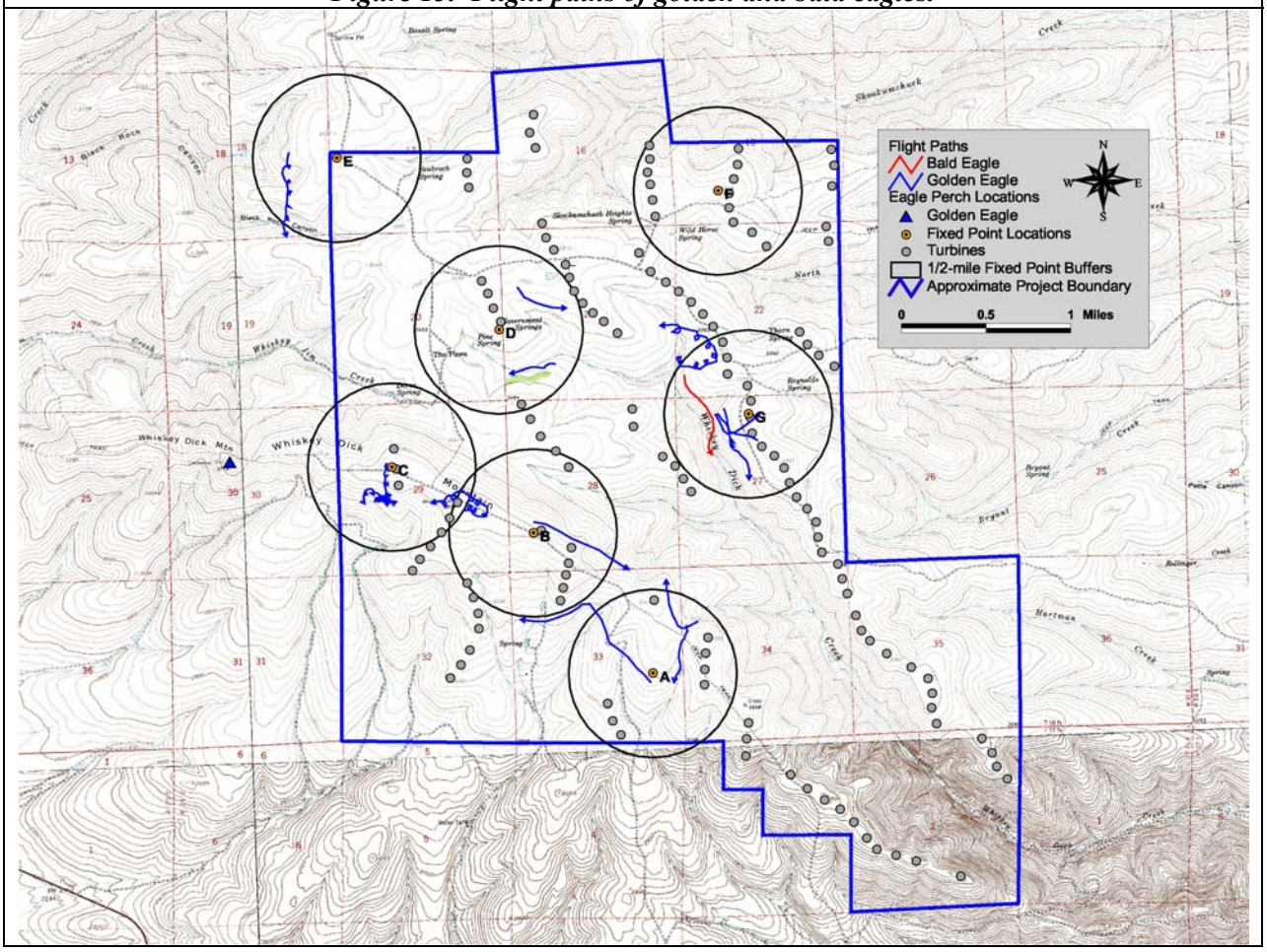


Figure 14. Locations and flight paths of American kestrels, merlins, prairie falcons and unidentified falcons.

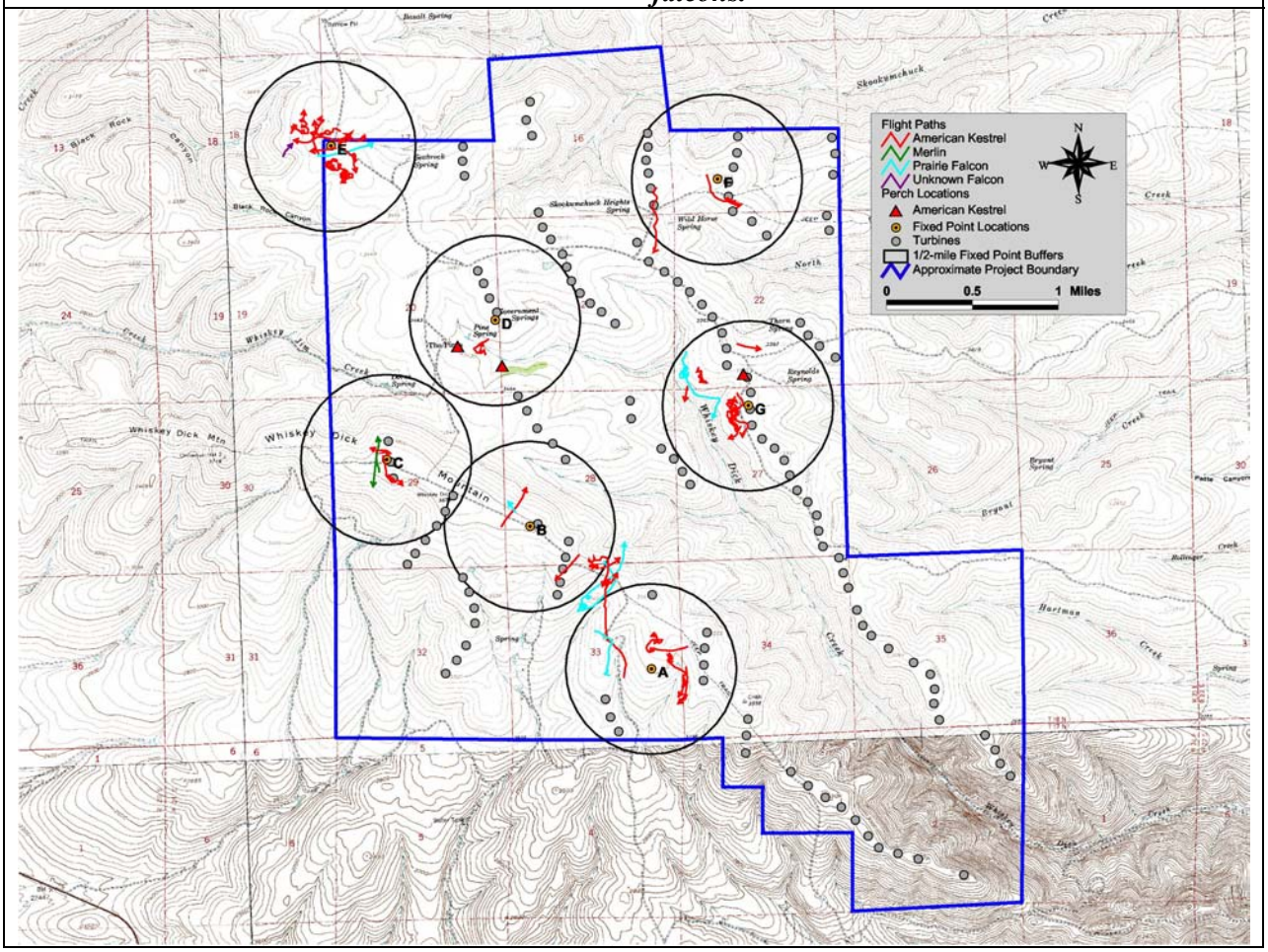


Figure 15. Locations and flight paths of Canada geese, common nighthawk, northern goshawk, northern harriers, ring-billed gulls and sharp-shinned hawks.

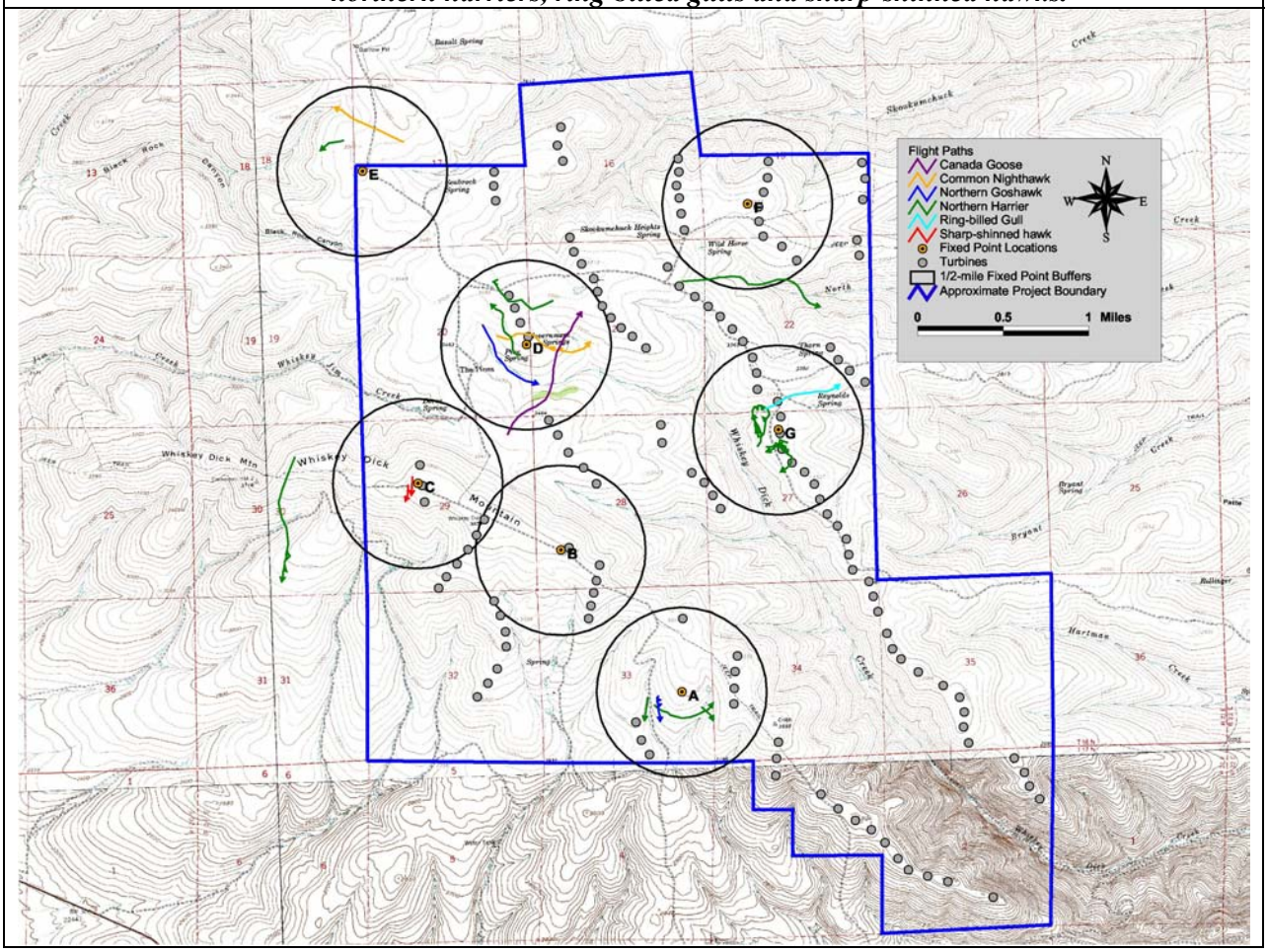


Figure 16. WDFW Priority habitats data for the Project (raptor nests included in Figure 6).

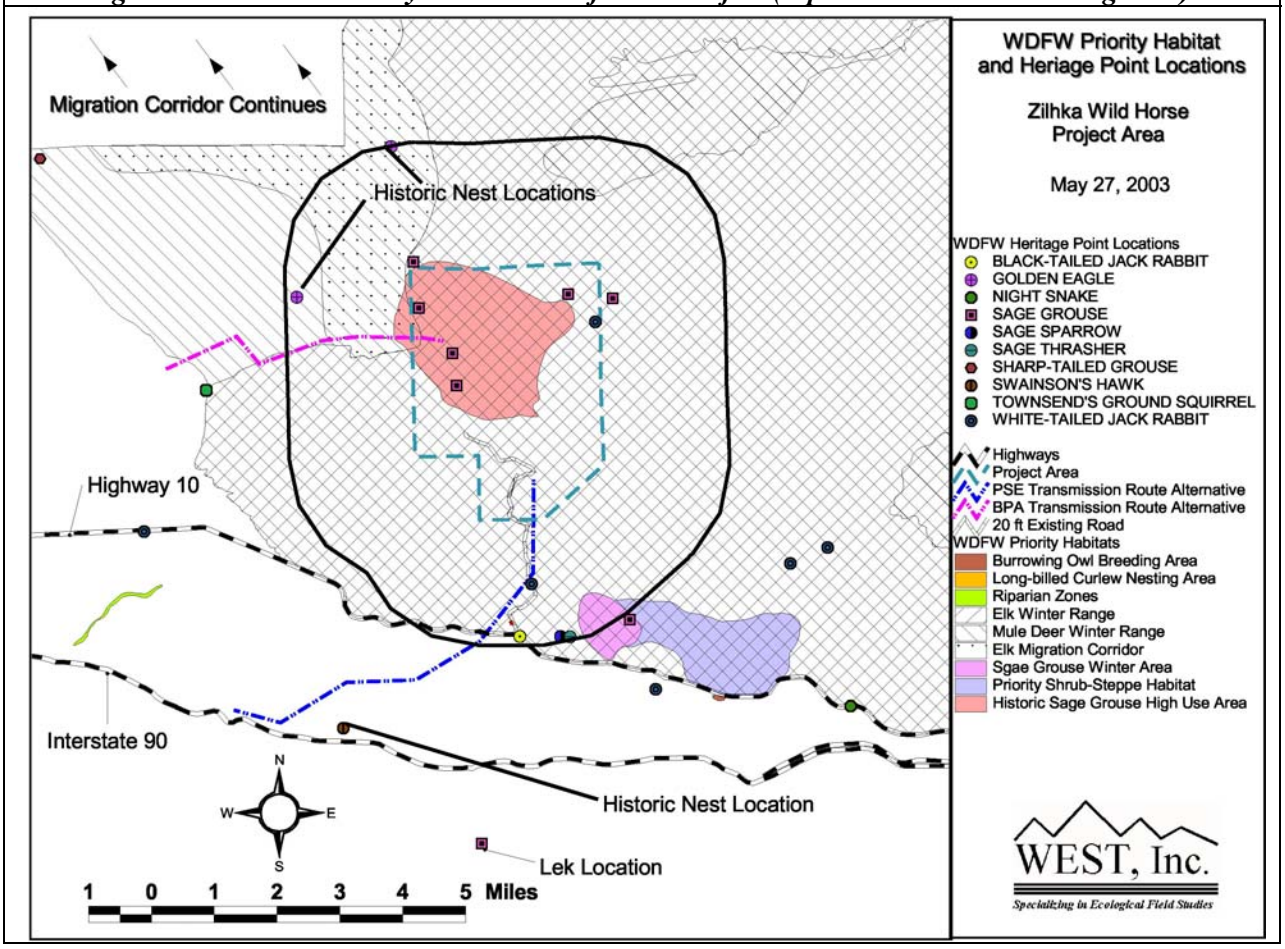


Figure 17. Comparison of raptor use (#/20-minute survey) between the Kittitas Valley Project (KVP) and the Wild Horse Project (WH).

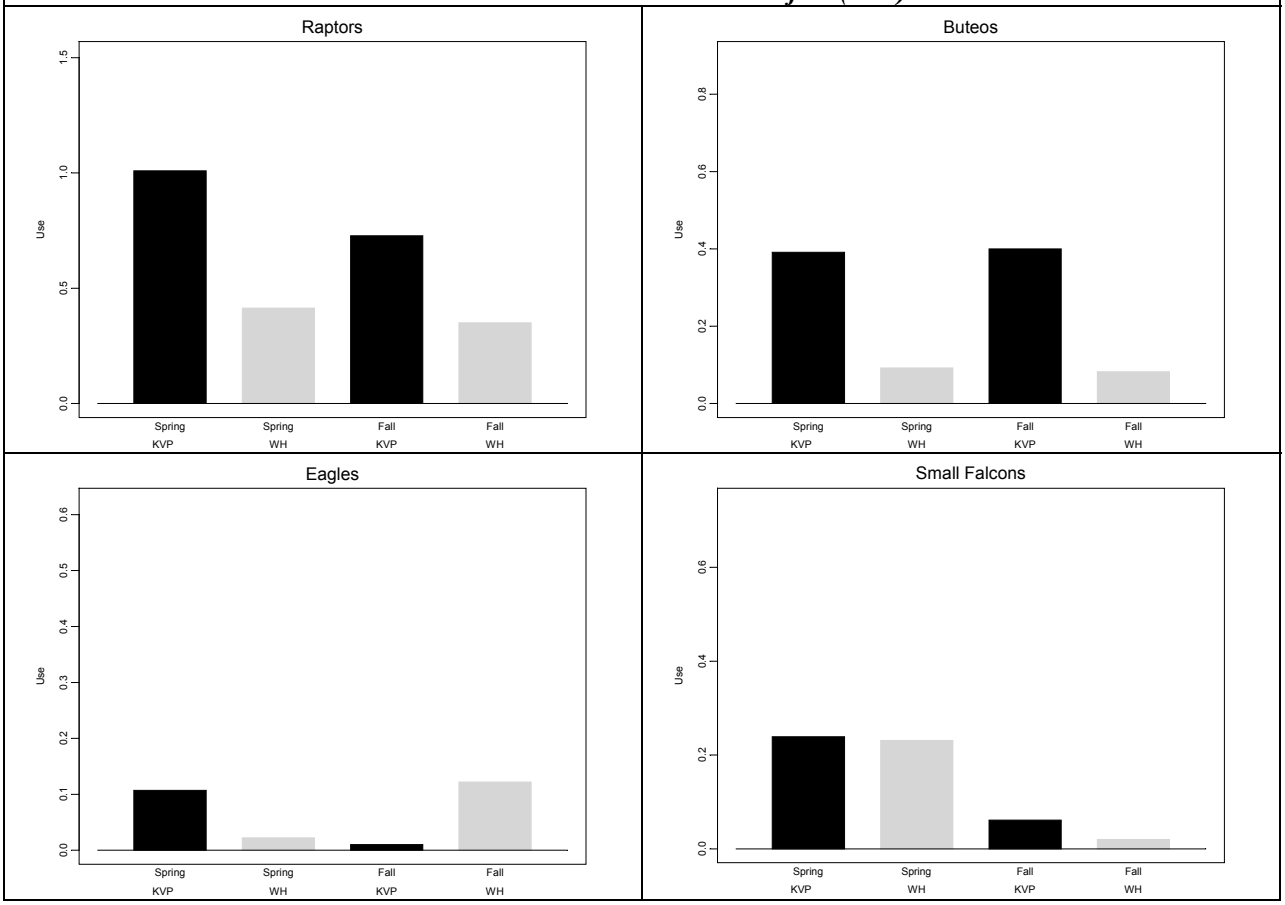
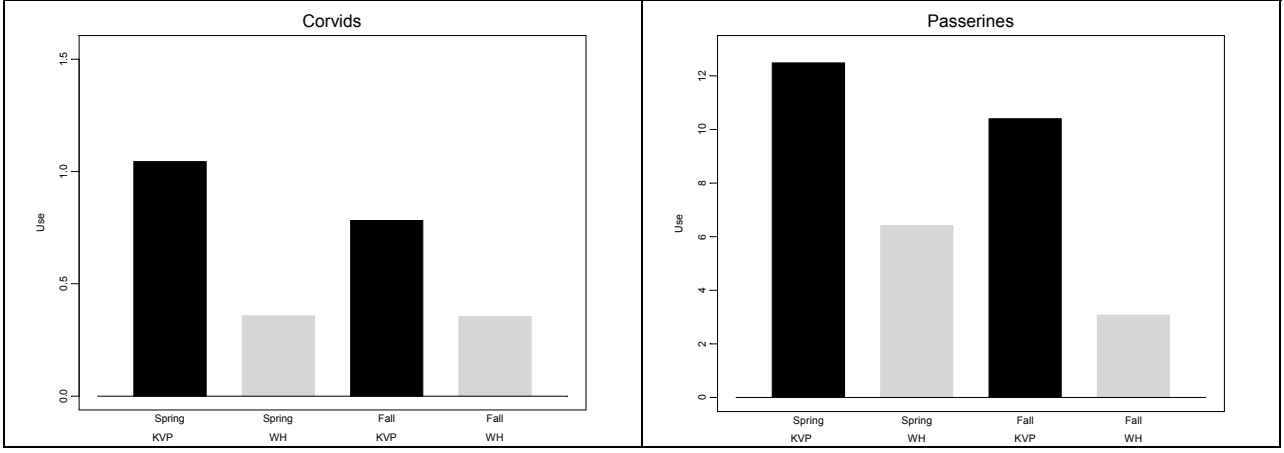


Figure 18. Comparison of corvid and passerine use (#/20-minute survey) between the Kittitas Valley Project (KVP) and the Wild Horse Project (WH).



APPENDIX A – USFWS LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Central Washington Ecological Services Office
215 Melody Lane, Suite 119
Wenatchee, Washington 98801
Phone: (509) 665-3508 Fax: (509) 665-3509

November 19, 2002

Rhett E. Good
WEST, Inc.
~~203 Central Avenue~~ 2003 Central Ave.
Cheyenne, Wyoming 8200~~1~~6

RE. Species List Request
FWS Reference: 03-SP-W0047

Dear Mr. Good:

Thank you for your request dated November 26, 2002. The following threatened or endangered species may be present, at or near the proposed wind plant in Kittitas County, Washington.

KITTITAS COUNTY

LISTED
Endangered
Gray wolf *(Canis lupus)*

Threatened
Bald eagle *(Haliaeetus leucocephalus)*
Bull trout *(Salvelinus confluentus)*
Canada lynx *(Lynx canadensis)*
Northern spotted owl *(Strix occidentalis caurina)*
Ute ladies'-tresses *(Spiranthes diluvialis)*, plant

Designated
Critical habitat for the northern spotted owl

PROPOSED
None

CANDIDATE
Basalt daisy *(Erigeron basalticus)*, plant
Western sage grouse *(Centrocercus urophasianus phaios)*
Western yellow-billed cuckoo (*Coccyzus americanus*)
Western yellow-billed cuckoo (*Coccyzus americanus*)

If there is federal agency involvement in this project (funding, authorization, or other action),

the involved federal agency must meet its responsibilities under section 7 of the Endangered Species Act of 1973, as amended (Act), as outlined in Enclosure A. Enclosure A includes a discussion of the contents of a Biological Assessment (BA), which provides an analysis of the impacts of the project on listed and proposed species, and designated and proposed critical habitat. Preparation of a BA is required for all major construction projects. Even if a BA is not prepared, potential project effects on listed and proposed species should be addressed in the environmental review for this project. Federal agencies may designate, in writing, a non-federal representative to prepare a BA. However, the involved federal agency retains responsibility for the BA, its adequacy, and ultimate compliance with section 7 of the Act.

Preparation of a BA would be prudent when listed or proposed species, or designated or proposed critical habitat, occur within the project area. Should the BA determine that a listed species is likely to be affected by the project, the involved federal agency should request section 7 consultation with the U. S. Fish and Wildlife Service (Service). If a proposed species is likely to be jeopardized by the project, regulations require conferencing between the involved federal agency and the Service. If the BA concludes that the project will have no effect on any listed or proposed species, we would appreciate receiving a copy for our information

Candidate species receive no protection under the Act, but are included for your use during planning of the project. Candidate species could be formally proposed and listed during project planning, thereby falling within the scope of section 7 of the Act. Protection provided to these species now may preclude possible listing in the future. If evaluation of the subject project indicates that it is likely to adversely impact a candidate species, we encourage you to modify the project to minimize/avoid these impacts.

If there is no federal agency involvement in your project, and you determine that it may negatively impact a listed or proposed species, you may contact us regarding the potential need for permitting your actions under section 10 of the Act.

Several species of anadromous fishes that have been listed by the National Marine Fisheries Service (NMFS) may occur in the project area. Please contact NMFS in Seattle, Washington, at (206) 526-6150, in Portland, Oregon, at (503) 231-2319, or in Boise, Idaho, at (208) 378-5696 to request a list of these species.

If you would like information concerning state listed species or species of concern, you may contact the Washington Department of Fish and Wildlife, at (360) 902-2543, for fish and wildlife species; or the Washington Department of Natural Resources, at (360) 902-1667, for plant species.

This letter fulfills the requirements of the Service under section 7 of the Act. Should the project plans change significantly, or if the project is delayed more than 90 days, you should request an update to this response.

Thank you for your efforts to protect our nation's species and their habitats. If you have any questions concerning the above information, please contact Skip Stonesifer at (509)664-2793.

Sincerely,

Supervisor

For

Enclosure

Enclosure A

Responsibility of Federal Agencies under Section 7 of the Endangered Species Act

Section 7(a) - Consultation/Conferencing

Requires: 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with the U.S. Fish and Wildlife Service (Service) when a federal action may affect a listed species to ensure that any action authorized, funded, or carried out by a federal agency will not jeopardize the continued existence of listed species, or result in destruction or adverse modification of critical habitat. The process is initiated by the federal agency after determining that the action may affect a listed species; and

3) Conferencing with the Service when a federal action may jeopardize the continued existence of a proposed species, or result in destruction or adverse modification of proposed critical habitat.

Section 7(c) Biological Assessment for Major Construction Activities

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities[1]. The BA analyzes the effects of the action, including indirect effects and effects of interrelated or interdependent activities, on listed and proposed species, and designated and proposed critical habitat. The process begins with a request to the Service for a species list. If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the list should be verified with the Service. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable between the Service and the involved federal agency).

We recommend the following for inclusion in a BA: an onsite inspection of the area to be affected by the proposal, which may include a detailed survey of the area to determine if listed or proposed species are present; a review of pertinent literature and scientific data to determine the species' distribution, habitat needs, and other biological requirements; interviews with experts, including those within the Service, state conservation departments, universities, and others who may have data not yet published in scientific literature; an analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; and an analysis of alternative actions considered. The BA should document the results of the impacts analysis, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not any listed species may be affected, proposed species may be jeopardized, or critical habitat may be adversely modified by the project. Upon completion, the

BA should be forwarded to the Service.

Major concerns that should be addressed in a BA for listed and proposed animal species include:

1. Level of use of the project area by the species, and amount or location of critical habitat;

2. Effect(s) of the project on the species' primary feeding, breeding, and sheltering areas;

3. Impacts from project construction and implementation (*e.g.*, increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to the species and/or their avoidance of the project area or critical habitat.

Major concerns that should be addressed in a BA for listed or proposed plant species include:

1. Distribution of the taxon in the project area;

2. Disturbance (*e.g.*, trampling, collecting) of individual plants or loss of habitat; and

3. Changes in hydrology where the taxon is found.

Section 7(d) - Irreversible or Irretrievable Commitment of Resources

Requires that, after initiation or reinitiation of consultation required under section 7(a)(2), the Federal agency and any applicant shall make no irreversible or irretrievable commitment of resources with respect to the action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternatives which would avoid violating section 7(a)(2). This prohibition is in force during the consultation process and continues until the requirements of section 7(a)(2) are satisfied

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[1] A major construction activity is a construction project, or other undertaking having similar physical impacts, which is a major action significantly affecting the quality of the human environment as referred to in the National Environmental Policy Act [42 U.S.C. 4332 (2)(c)].

Enclosure B

Additional Information for *Spiranthes diluvialis* - Ute Ladies'-tresses
Status: Threatened

Spiranthes diluvialis was first described in 1984 (Sheviak 1984), and it is not yet included in many of the dichotomous keys commonly used by botanists in the northwest or Great Basin regions. It is found up to about 6,000 feet in elevation throughout much of its range in the western United States, below the lower margin of montane forests or in the transitional zone. It generally occurs in wetland and riparian areas of open shrub or grassland habitats, including springs, mesic to wet meadows, river meanders, and flood plains. This species has only recently been recorded on a few sites in central Washington, where it can occur at relatively low elevations (down to roughly 700 feet in Chelan County). It is possible that the species occurs in other appropriate wetland and riparian areas in central and eastern Washington.

Ute ladies'-tresses is a perennial, terrestrial orchid (family Orchidaceae) with stems 20 to 50 centimeters (cm) (8 to 20 inches [in]) tall, arising from tuberously thickened roots. Its narrow (0.5 to 1 cm; 0.2 to 0.4 in) leaves are about 28 cm (11 in) long at the base of the stem, and become reduced in size going up the stem. The flowers consist of 7 to 32 small (0.8 to 1.5 cm; 0.3 to 0.6 in) white or ivory flowers clustered into a spike arrangement at the top of the stem. The species is characterized by whitish, stout, ringent (gaping at the mouth) flowers. The sepals and petals, except for the lip, are rather straight, although the lateral sepals are variably oriented, often spreading abruptly from the base of the flower. Sepals are sometimes free to the base.

The non-blooming plants of Ute ladies'-tresses are very similar to those of the widespread, congeneric species *S. romanzoffiana* - hooded ladies' tresses. Usually, it is only possible to positively identify Ute ladies'-tresses when it is flowering. *S. romanzoffiana* has a tight helix of inflated ascending flowers around the spike and lateral appressed sepals. *S. diluvialis* has flowers facing directly away from the stalk, neither ascending nor nodding, and appressed or free lateral sepals (please refer to the attached drawings). Ute ladies'- tresses generally blooms from late July through September, depending on location and climatic conditions. However, in some areas, including central Washington, this species may bloom in early July or as late as early October. Bumblebees are apparently required for pollination.

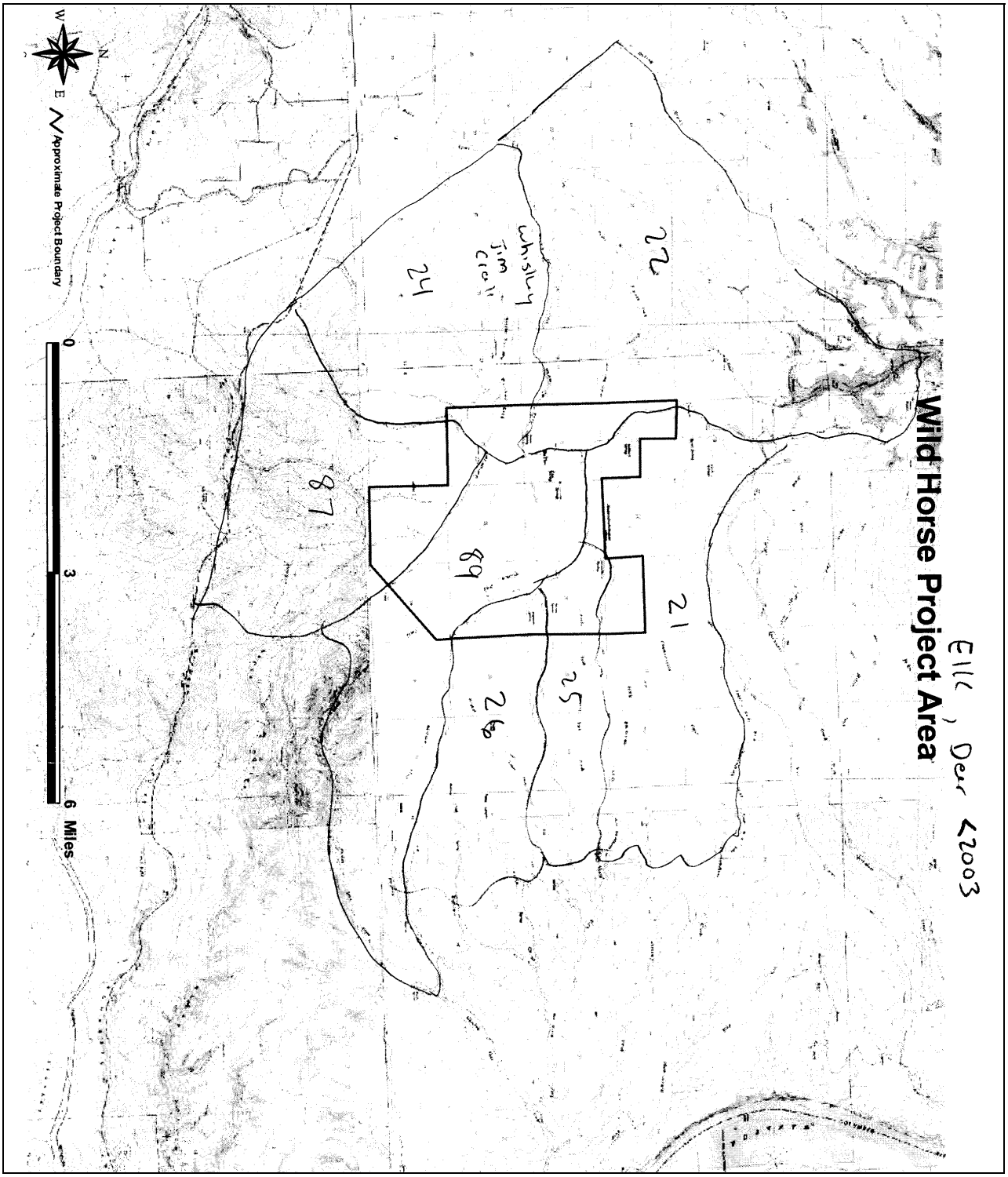
Mature plants may not produce above ground shoots for one or more growing seasons, or may exhibit vegetative shoots only. Orchids generally require symbiotic associations with mycorrhizal fungi for seed germination. In addition, many plants of some *Spiranthes* species are initially saprophytic, and persist underground for several years before emerging (USFWS 1995). Therefore, it may require multiple years of surveys to document the presence or absence of Ute ladies'-tresses in a given area.

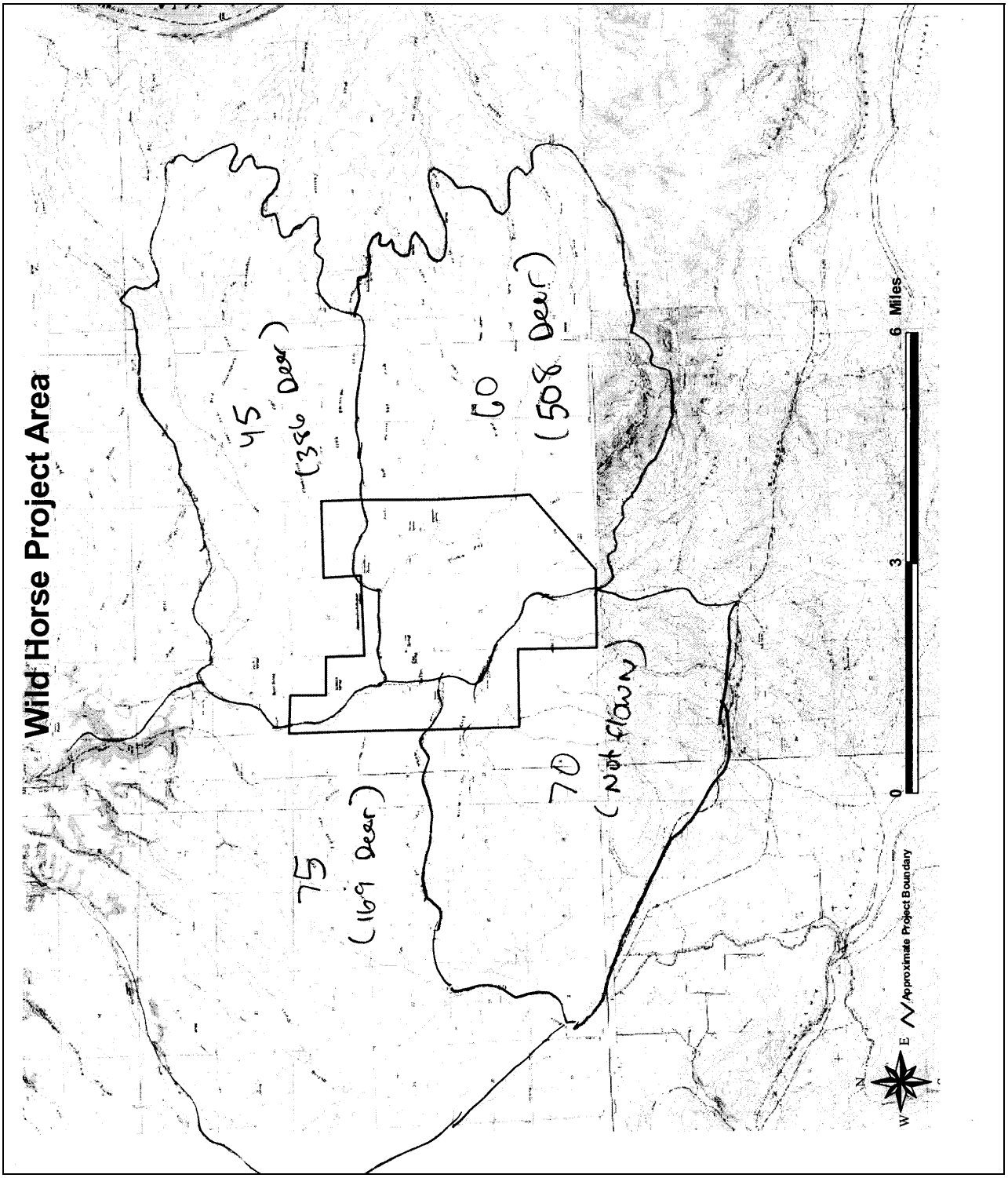
This species may be adversely affected by alterations of its habitat due to livestock grazing, vegetation removal, excavation, construction, stream channelization, and other actions that alter hydrology.

References Cited

Sheviak, C.J. 1984. *Spiranthes diluvialis* (Orchidaceae), a new species from the western United States. Brittonia 36(1):8-14.

USFWS. 1995. Ute Ladies'-tresses (*Spiranthes diluvialis*): Agency Review Draft Recovery Plan. Prepared by the U.S. Fish and Wildlife Service Ute Ladies'-tresses Recovery Team for Region 6, Denver, Colorado.


Wild Horse Project Area
Approximate Project Boundary
0
3
6 Miles
Elk, Deer 2003
Whistling Jim Creek
24
22
87
89
21
25
26


Wild Horse Project Area
45
(356 Deer)
60
(508 Deer)
75
(169 Deer)
70
(Not flown)
0
3
6 Miles
Approximate Project Boundary
N
W
E

Post. Season Surveys (Generally February)

<----------number of elk seen---------->

Quad	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
21	154				20			194	364		128	194	63	393
22	99	280		34	144		38	0				43	138	233
24		188		9	83	21					82	46		
25				187				254			56		79	
26				321	2		233	130	304			384	312	140
87					40			32						7
89					21			460	359		66		272	72

<----------number of deer seen---------->

Quad #	1990	1991	1992	1993	1994	1995	1996	1997	1998
21					158			263	363
22	45	34			0		35	0	
24		1		0	14	5			
25				14				21	
26				18	14		119	10	46
87					47			91	
89					16			15	