

**APPENDIX C**  
**2007-2008 AVIAN BASELINE STUDY**

# 2007-2008 Avian Baseline Study Draft Report

Coyote Crest Wind Resource Area  
Pacific and Lewis Counties, Washington



Prepared for  
**Everpower Wind Holdings, Inc**

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TETRA TECH EC, INC.

## EXECUTIVE SUMMARY

Tetra Tech EC, Inc. (TtEC) was contracted by Everpower Wind Holdings, Inc to undertake a year of ecological baseline studies for the proposed Coyote Crest Wind Resource Area (WRA) in Pacific and Lewis Counties, Washington. The studies were conducted to identify potential ecological impacts associated with building and operating the wind conversion facility. Birds have been identified as a group potentially at risk because of collisions with wind turbines and power lines and displacement due to the presence of the associated structures. A total of 41 avian use surveys were performed at the Coyote Crest WRA between September 27, 2007 and October 6, 2008. A survey of habitats was conducted in the fall of 2008. The avian survey and habitat results are reported here. Surveys for northern spotted owls, radar surveys of spring and fall migration, and radar surveys for passage of nesting marbled murrelets were also conducted and are reported separately.

### *Agency Coordination*

Coordination with state and federal agency personnel included site visits and follow-up discussions regarding the proposed study protocol and issues of concern to these agencies.

### *Habitat Classification and Mapping*

The land in the Coyote Crest WRA consists of mountainous topography with elevations ranging from 40 to 2,487 feet. Mixed coniferous forests with patches of red alder are found at the higher elevations while mixed deciduous and coniferous forests are found at lower elevations. Closed canopy forest with an open understory borders the project area to the east, and patches of this forest type border the area to the northwest and west. The majority of the WRA is intensively managed as industrial forest which has created a mosaic of clear cuts and coniferous tree stands of varying ages classes; the harvesting of forested units within the WRA creates continually changing habitat conditions. This type of previously disturbed area is optimal for future wind development because the bird communities utilizing these habitats are likely comprised of non-area sensitive species able to utilize the variety of habitats created by the current land use practices. As a result, further development in this area is not expected to alter existing, local bird communities.

Additionally, the portion of the project area that encompasses the transmission line includes portions of the Gerrard Creek and Chehalis River floodplains which have largely been converted to agricultural habitat, including farm buildings, houses and pasturelands. These habitats may provide stop-over and wintering habitat for migratory waterfowl.

### *Avian Studies*

A total of 61 identified species and 8 unidentified species, consisting of 2,806 birds were observed within the Coyote Crest WRA. Overall mean bird use within the Coyote



Crest WRA was 11.74 birds/20 minutes (min) and ranged from 0 to 185 birds/20 min point count. Overall mean bird use ranged from a low of 5.46 birds/20 min during the fall 2008 season to a high of 26.54 birds/20 min during the fall 2007 season. Comparing non-raptor and raptor bird use rates to existing wind energy facilities with publicly available data throughout the country, non-raptor use ranked moderate in the first fall season, winter and summer, and low in the spring and second fall season. Raptor use ranked low for all seasons.

Songbirds had the highest mean use out of all species groups observed (9.38 birds/20 min). The most commonly observed species overall were the pine siskin (3.71 birds/20 min), red crossbill (1.17 birds/20 min), evening grosbeak (0.62 birds/20 min), dark-eyed junco (0.56 birds/20 min), cedar waxwing (0.49 birds/20 min), and common raven (0.50 birds/20 min). The dark-eyed junco and common raven are widespread species with relatively stable populations; therefore development is not expected to have population-level implications for these species. The pine siskin is experiencing population declines at the state level, the evening grosbeak overall population has demonstrated decline, and reliable population level information is not readily available for the red crossbill; however, as the tendency for these species is to fly below the rotor swept area (RSA), direct mortality is not expected to have population-level consequences.

Turkey vultures were the most commonly observed raptor in the Coyote Crest WRA (0.07 birds/20 min) followed by the red-tailed hawk (0.03 birds/20 min). Both species have relatively stable populations (Sauer et al. 2008), so individual mortalities are not expected to have population level consequences.

### ***Listed and Sensitive Species***

The bald eagle is protected by the Bald and Golden Eagle Protection Act (BGEPA) and is a Washington State listed sensitive bird. During avian use surveys, bald eagles were observed within the survey time-frame with a very low mean use of 0.01 birds/20 min. Bald eagles were also observed incidentally. The BGEPA prohibits the take of any bald or golden eagle, alive or dead, including any part, nest, or egg.

In addition to the bald eagle, one state endangered species, the sandhill crane; two state candidate species, the merlin and the pileated woodpecker; and two state monitor species, the turkey vulture and the western bluebird, were observed during avian surveys and incidentally. Of these state species of concern, the merlin, turkey vulture, western bluebird and bald eagle were observed flying within the RSA. Over 5 seasons, the western bluebird had a low encounter rate of 0.06 birds flying within the RSA/20 min and the turkey vulture had an encounter rate of 0.05 birds flying within the RSA/20 min. All of the other species were not observed flying within the RSA. Overall, these low encounter rates are primarily due to low occurrence of the species within the Coyote Crest WRA, however, encounter rates vary seasonally and pre-construction encounter rates may not equate to post-construction mortality. In Washington, although protected from hunting and fishing, state listed species require



no take permits. All of these species, as well as the other species observed in the Coyote Crest WRA, are protected under the Migratory Bird Treaty Act (MBTA).

**Table ES-1. Coyote Crest Avian Baseline Study Summary**

	<b>Indices</b>	<b>Ranking</b>	<b>Details</b>
<b>Raptor use</b>			
	Mean use	Low	
	Mean use without turkey vultures	Low	
	Mean use within RSA	Low	
	Number of species with encounter rate >1.0 birds/20 min	0	
	Eagles observed in WRA	Yes	bald eagle
	Eagles observed nesting in WRA	No	
	Federally listed <sup>1</sup> species observed within WRA	No	
	Federally listed <sup>1</sup> species observed nesting	No	
	Federally listed <sup>1</sup> species within RSA	No	
	State listed species within WRA	Yes	1 state monitor species (Section 4.4)
	State listed species observed nesting within WRA	No	
	State listed species within RSA	No	
<b>Non-raptor use</b>			
	Mean use	Medium-low	
	Mean use within RSA	Low	
	Number of species with encounter rate >1.0 birds/20 min	0	
	Federally listed <sup>1</sup> species observed within the WRA	No	
	Federally listed <sup>1</sup> species within RSA	No	
	State listed species within WRA	Yes	4 state species of concern (Section 4.3)
	State listed species observed nesting within the WRA	No	
	Grouse leks observed within WRA	N/A	
	Grouse leks observed within 2 miles of WRA	N/A	
<b>Habitat</b>			
	Native habitat likely to be impacted by development	No	
	Lakes (waterfowl attractant)	No	
	Wetlands (attractant for cranes, waterfowl, and other water-based species)	Yes	riparian areas and floodplains
	Cliffs (raptor nesting and traveling)	No	
	River (permanent water source, migration corridor)	Yes	
	Known refuges or other migration concentrations	No	
<sup>1</sup> Federally listed species include species with the designation as federally threatened, endangered, or candidate species.			



<sup>2</sup> State listed species include species with the state designation of threatened, endangered, candidate, species of concern, and species of conservation concern. State species listed are those in addition to federally listed species.

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## 1.0 INTRODUCTION

Everpower Wind Holdings, Inc. (Everpower) is planning to develop a wind energy conversion facility in the coastal range of west central Washington in Pacific and Lewis Counties (Figure 1). The Coyote Crest Wind Resource Area (WRA) is located on privately held land managed as Industrial Forest. Everpower is committed to environmental due diligence and has contracted Tetra Tech EC, Inc. (TTEC) to conduct a variety of baseline ecological surveys at the Coyote Crest WRA to characterize the area and to identify potential impacts associated with building and/or operating the proposed facility.

The Coyote Crest WRA consists of approximately 31,700 acres of mountainous terrain located in Southwestern Washington in the Oregon Coast Range physiographic region (USGS 2003). The climate is influenced by the proximity of the WRA to the Pacific Ocean, producing seasonally frequent fog and drizzle, high annual precipitation ranging from 35-100 inches, and dry summer conditions. Topography in the region ranges from relatively flat riverine floodplain valleys to steep, mountainous terrain. The land is predominantly owned by Weyerhaeuser and intensively managed as industrial forest for timber production. The land can be characterized primarily as second- or third-growth commercial forestland in various stages of regeneration (recent clear-cut to forest up to 60 years old). Fragments of closed canopy forest with an open understory exist within the WRA as do numerous creeks with riparian buffers. A prominent north/south ridge running the length of the WRA divides the site into two main drainages (Figure 1).

Wind energy provides a clean, renewable energy source that is in high demand. As wind power has become more common, the need to address potential environmental impacts has increased. Birds have been identified as a group potentially at risk because of collisions with wind turbines and power lines and displacement due to the presence of the associated structures (Erickson et al. 2005, Drewitt and Langston 2006, Arnett et al. 2007). Specifically, raptors and migrant passerines (e.g., songbirds) were found more often in post-construction mortality monitoring compared to other groups of birds (Erickson et al. 2001, Drewitt and Langston 2006, Johnson et al. 2007a, Strickland and Morrison 2008).

Washington has over 450 documented bird species and is situated within the Pacific Flyway, one of the four main bird migratory routes. The Pacific Flyway extends from Alaska to Patagonia and through the western side of the continental divide of the United States (USFWS 2008). Most birds moving along this flyway travel from Canada through the western coastal states to portions of Central and South America (USFWS 2008).

## 2.0 METHODS

To evaluate avian risk at wind energy facilities, standardized protocols for pre-construction studies have been established and were used here to evaluate potential avian habitats and quantify avian use. State and federal agencies were also contacted to ensure that the survey methods met their approval. Data collected from these studies can then be used to identify species, species groups or habitats of concern and may provide additional information for micro-siting to minimize impacts to important habitats and birds. To facilitate identifying species at risk, results in this report are presented in terms of species groupings, and highlight federally listed species, state listed species, and species of concern.

Initial wildlife studies focused on a unique area being examined for wind development potential by Everpower, but predominantly owned and managed for timber by Weyerhaeuser. As wind land use data became available, the Coyote Crest WRA was established (Figure 1). The project area includes the WRA, and additional land that will be needed for a transmission line.

### 2.1 Agency Coordination

In order to identify and best inform the wildlife survey needs within the Coyote Crest WRA, state and federal agencies were contacted to provide input on wildlife studies and development activities. A site visit occurred on March 10, 2008 and again on May 29, 2008. Those in attendance included members of the Washington Department of Natural Resources (WDNR), Washington Department of Fish and Wildlife (WDFW), and U.S. Fish and Wildlife Service (USFWS).

### 2.2 Habitat Classification and Mapping

The habitat inventory was completed over an approximately 69.4-square-mile area, which represents the most current understanding and layout of the WRA. A variety of GIS digital data sources were used to categorize habitat within the project area including: WDNR Natural Heritage Rare Plant Data, WDFW Priority Habitats and Species data (PHS), Weyerhaeuser Stand data, and National Wetlands Inventory data (NWI). Using different types of digital maps can sometimes produce different results, in particular when using remote sensing techniques to categorize habitats (Glenn and Ripple 2004). In order to determine the accuracy of older forest patches within the Coyote Crest project area, a biologist ground-truthed these stands for potential spotted owl habitat within and in the vicinity of the project area. Therefore, all patches of forest with a closed canopy and a developed understory (generally older than 40 years) were verified on the ground.

## 2.3 Avian Studies

### 2.3.1 Point Count Surveys

Experienced field biologists conducted 20-minute (min) point count surveys at 6 locations within the Coyote Crest WRA to evaluate avian use, behavior, and species composition throughout the course of a year (Figure 2). Weekly surveys were attempted between September 27, 2007 and October 6, 2008 (Table 1) but a number of winter surveys were missed due to weather. Between December and April, deep snow limited access to portions of the WRA and/or fog obscured visibility. During this time period, surveys were conducted whenever weather permitted with at least one survey per month occurring in each month. Regular weekly surveys resumed May 1, 2008. TTEC distributed the survey locations throughout the WRA and chose locations that maximized the 360-degree sight distance for the observer. These locations included mostly ridge tops and covered a diversity of habitats found within the WRA.

Experienced field biologists collected data on all birds observed within an 800-meter (m) radius circle centered on the point count location. The biologists also recorded incidental observations -- birds detected outside of the 800-m radius or while the observer was moving between point count locations. Surveys at each point lasted for 20 minutes, during which time the biologist continuously scanned for birds and recorded any visual or auditory observations. The biologist collected the following data: species, number of individuals, time, height above ground (in this case, height above the ridge-top on which the observation point was located), behavior, and flight direction. Data on flight direction can be found in Appendix A. The biologist estimated flight heights and distances referencing existing meteorological towers, local transmission lines, and topographic maps.

The survey protocol used in this study is designed to collect data on all bird species and to provide results that are comparable with other studies of avian use at wind farms rather than to target specific taxa. The benefit of using this method is that it estimates avian use throughout the day and captures activity by a variety of bird species. During the breeding season, songbirds are most active in the morning and can be difficult to detect during the afternoon. In contrast, raptors become active as the sunlight heats the air and creates thermals, which individuals use for soaring (Ballam 1984). Thus, raptors are more readily detected several hours after sunrise. Therefore, the survey method used in this study is appropriate for characterizing the diurnal bird community utilizing habitats within the WRA.

TTEC chose 20-min survey periods because they provide adequate time to detect both raptors and non-raptors. However, time periods of 20 min may lead to double-counting of songbirds (i.e., counting the same individual more than once) because individuals may appear and disappear from view. For example, if a red crossbill is detected perched in a tree then disappears from view and, 5

minutes later, a red crossbill is seen flying, these birds are recorded as separate observations because it is not possible to distinguish individuals. Double-counting of birds is not problematic for this type of survey because the objective is to document use in terms of number of birds noted per 20-min survey, not number of distinct individual birds.

Detectability varies among species and potentially not all individuals within the 800-m survey were counted. This variation in detectability results in an overestimate of mean use in conspicuous species and an underestimate of mean use in reclusive species (Thompson 2002). Birds not easily identifiable, such as those seen under low light conditions or small birds seen at a distance, were identified to the lowest taxonomic level possible. Hence, unidentified birds are included in the results.

### ***2.3.1.1 Incidental Observations***

Incidental observations included observations that occurred 1) during travel between points, 2) before or after the official 20-min survey period, and 3) outside of the 800-m radius circular plot. The biologist recorded these observations on separate data sheets and these data were not used in the formal analysis; however, a summary of incidental birds is presented to provide additional information about species found in the local area.

### ***2.3.1.2 Data Quality Assurance/Quality Control***

TtEC implemented quality assurance and quality control measures during all stages of data collection, analysis, and report preparation. To ensure legibility and completeness of data sheets, each biologist reviewed, and clarified if needed, all data sheets before data entry into a Filemaker™ relational database for data storage and analysis. Prior to analysis, an independent reviewer conducted a 100-percent quality review of the data entries. Any questions that arose at this time were directed toward and answered by field personnel.

### ***2.3.1.3 Data Analysis***

#### ***Species Groupings***

TtEC considered two primary groups of interest: raptors and non-raptors. TtEC defined raptors as vultures, hawks, eagles, falcons, and owls. As turkey vulture flight behavior is similar to raptors and as they are often included as raptors in other studies, TtEC has included them with raptors for the purpose of our analyses. Non-raptors were defined as all other species groups.

#### ***Avian Use of the Coyote Crest WRA***

TtEC derived avian use (mean use) of the Coyote Crest WRA by calculating the average number of birds observed per 20-min survey at each point. To evaluate

the diversity and composition of avian species using the Coyote Crest WRA, TTEC first summarized the number of individuals (birds/20 min) and species. TTEC also calculated a measure of variability (90 percent confidence intervals) for all mean use values. In addition, the number of observations (observations/20 min) is also presented, where an observation can be either an individual bird or a discrete flock of birds. This information helps evaluate whether high mean use is driven by a single event (e.g., flock of birds moving through the rotor swept area). Because individual birds are not uniquely marked and identified, actual population size or abundance cannot be determined. One individual may be counted multiple times during a survey period or across survey periods. Therefore, avian use does not equate to abundance. TTEC compared raptor and non-raptor use to other sites for which publicly available data on use are available.

### ***Flight Behavior***

TTEC evaluated flight behavior by calculating the proportion of flying birds observed below, within, or above the turbine rotor swept area (RSA). The REpower 2 MW turbine with 80 m hub height and 92.5 m rotor diameter has been identified for use in the Coyote Crest WRA. With these turbine specifications, the estimated RSA was calculated to fall between 33.75 and 126.25 m above ground. TTEC considered a bird to have flown within the RSA if any of its recorded heights overlapped the RSA.

### ***Encounter Rate***

To estimate the rate at which a species flew through the anticipated RSA, TTEC applied the following equation to every species observed in the WRA:

$$\text{Encounter Rate} = A * P_f * P_t$$

where  $A$  is the mean number of birds/20 min for a given species,  $P_f$  is the proportion of all activity observations for a given species that were flying; and  $P_t$  is the proportion flying observations that were within the turbine RSA for a given species. The encounter rate provides information on the rate at which a species moves through the RSA. This information is an important component in evaluating risk; however, this number alone does not indicate risk to a species.

Encounter rate is an index of birds flying within the RSA and may not equate to actual post-construction mortality. Species with a high encounter rate are at a higher risk of collision than species with a low risk, but it does not mean that mortality is certain. Other factors such as a species' ability to detect turbine blades, flight maneuverability to avoid blades, and habitat selection also influence mortality; therefore, actual mortality may be higher or lower than indicated by the encounter rate (Orloff and Flannery 1992). Encounter rate is based on day-time observations of bird mean use and flight height. Values are sensitive to large flocks of birds flying within the RSA. Encounter rate applies only

to daytime activity (the spring and fall migration radar surveys addressed nocturnal activity).

### ***Mortality Estimates***

TtEC has not included mortality estimates as part of this report. The statistical relationship between pre-construction avian use and post-construction mortality remains poorly defined, thereby limiting our power to predict mortality based on use. Previous studies (e.g., Johnson 2007) have documented a significant positive relationship between use and mortality for raptors; however, these studies have been based on data sets from throughout the U.S., contain several statistical inconsistencies, and likely have limited applicability on a regional scale. This limited applicability is due, in large part, to the highly regional nature of avian mean use across North America (Arnett et al. 2007). Unfortunately, data on avian mortality at wind farms are lacking at regional scales in many parts of North America. Rather than attempt to draw conclusions from limited data sets, TtEC takes a conservative approach, limiting our discussion to patterns of avian use and mortality risk factors.

### **2.3.2 Raptor Nest Surveys**

The purpose of a raptor nest survey is to estimate the number of active and inactive raptor nests in the WRA. Raptor nest surveys were not conducted for the Coyote Crest WRA given the low mean use of this species group within the WRA and compromised nesting habitat due to industrial forest management.

## **3.0 RESULTS**

### **3.1 Agency Coordination**

During meetings with the WDFW, and USFWS, the parties involved voiced no objections and requested no alterations to the methods used within this study. It was also stated that the methodology of this study follows WDFW's Wind Power Guidelines developed as of August 2003.

### **3.2 Habitat Classification and Mapping**

Habitats within the WRA and surrounding areas vary. Within the matrix of industrially managed forest and individually owned parcels of land, nine types of habitat exist: Westside lowland conifer and hardwood forest (most abundant habitat type), recent clearcuts, sapling and pole vegetation, closed canopy forest, closed canopy forest with an open understory, red alder stands, riparian, agricultural, and herbaceous wetlands. As each of these habitats provide different resources, each habitat classification individually contributes to the avian composition within the WRA.

### 3.2.1 Westside Lowland Conifer and Hardwood Forest

The most abundant habitat type on the Coyote Crest WRA is mixed conifer and hardwood forest, dominated by evergreen conifers, deciduous broadleaf trees, or a combination of both. In this habitat type, most stands are dominated Douglas-fir, western hemlock, western red cedar, Sitka spruce, red alder, or bigleaf maple or combination of these species.

Land use within the WRA and surrounding area is characterized primarily by second- or third-growth commercial forestland intensively managed for timber production. The structure of the mixed conifer and hardwood forests varies across the landscape, depending on harvest regime and timing. Clearcut logging and industrial forestry have resulted in less forest structure and diversity for wildlife. The dominant species in these managed forests is typically Douglas fir, and harvest rotations often truncate natural succession prior to old growth forest characteristics develop. Wildlife distribution is related to the types of vegetation available for cover, foraging and nesting. The mixed conifer and hardwood habitat type, therefore, will be described with regard to the types of succession present on the landscape that is controlled by harvest regimes. Due to the present level of data and the cutting of older forests and the re-growth of newer forests, the relative percentages of each stand type are not known.

#### Recent Clearcuts

Recent clearcuts are recently cut forests, usually less than 5 years old, which contain abundant slash, bare ground, planted seedlings, and some regeneration of native species such as blue elderberry and sword fern. Regeneration of other vegetation is repressed due to pesticide application and soil scarification and consequently little structural complexity remains. The extremes of light, heat and moisture loss restricts the range of many forest associated species from these areas. The open habitat and young vegetation does provide habitat for some migratory bird species and ground foraging birds such as song sparrow. Roosevelt elk range overlaps the WRA (WDFW PHS 2007) and smaller clearcuts with re-growth of conifers provide potential forage for this species.

#### Sapling and Pole Vegetation

Both deciduous and coniferous trees, when they grow to approximately two to three meters high, form a dense vegetation layer in this early succession from forest clearcut. This habitat tends to attract bird species such as willow flycatchers, black headed grosbeak, warblers and an open field hunting raptor, the American kestrel.

#### Closed canopy forest

This stage of forest succession after a clearcut is associated with a closed tree canopy and a sparse understory due to a lack of light on the forest floor. The trees are typically smaller with single-storied canopies, and may be dominated by conifers, broadleaf trees, or both. Forest in this is mainly closed canopy even-

aged mixed conifer forest made up of Douglas-fir, western hemlock, western red cedar with minor components of sitka spruce and grand fir. Birds that can be associated with these dense shaded forests are Golden crowned- kinglets and winter wren.

### **Closed canopy forest with an open understory**

When trees within the closed canopy conifer dominated stands become large enough, or are thinned, the understory of shrubs and ferns such as swordfern, Oregon grape, vine maple begins to develop and allows for greater habitat complexity. Increased ground cover benefits birds that nest or forage on the ground. For birds nesting and feeding in shrub and mid-story tree foliage habitat, variety increases as a result of the vertical layering of vegetation. This increase in the structural complexity of vegetation increases the availability and diversity of the niches that birds and other species use. Older forests with an open understory are likely to provide the most heterogeneous forage and cover and are therefore most likely to support a higher diversity of wildlife. Closed canopy conifer dominated stands of large trees with an area below the live crown allow for spotted owl movement may provide habitat for this species. Other wildlife associated with this habitat includes cavity nesting species such as Vaux's swifts, and brown creepers that use dead standing wood for nesting, roosting or foraging. Conifer seeds also provide forage for pine siskin, evening grosbeak and red crossbill. Large raptors, such as red-tailed hawks, are also associated with these older forests where nesting structure such as large trees occur. Amphibians are most often associated with closed canopy forests, along with mice and shrews.

### **Red alder stands**

Red alder stands are maintained both in riparian areas and in isolated patches across the WRA. The red alder is a fast growing pioneer species that is successful in after typical logging disturbance due to the species' ability to establish abundantly on scarified soils. Salmonberry often forms a thick understory in alder stands due to the species ability to colonize after soil disturbance, such as that associated with logging. Alder forest stands provide nesting and foraging species associated with alder stands include downy woodpecker, house wren, black-capped chickadee and American goldfinch.

### **3.2.2 Riparian**

During timber harvesting on private forestland, buffers of trees and vegetation next to streams are protected. This habitat occurs in linear strips within the WRA, and includes small patches of Herbaceous Wetlands. Open water habitat is often adjacent to these riparian wetlands. This habitat is characterized by wetland hydrology or soils, periodic riverine flooding, or perennial flowing freshwater. Most often this habitat is either a tall deciduous broadleaf shrubland, woodland or forest, Red alder is the most widespread tree species. Other deciduous broadleaf trees that commonly dominate or co-dominate include

devil's-club, salmonberry and black cottonwood in the lower elevation floodplains, and bigleaf maple.

Riparian habitat that connects forest uplands with wetlands and is mainly composed of deciduous trees is likely to harbor the highest diversity of wildlife habitats on the WRA. Forested riparian habitat has an abundance of snags, which are critical to many cavity-nesting and insectivorous birds. Riparian habitat forms natural corridors that are important travel routes between feeding and breeding areas and seasonal ranges. Some *myotis* bats use the riparian corridors for foraging habitat and travel corridors but roost upslope. These corridors also provide protected dispersal routes for young birds. In shaded reaches, amphibians such as the pacific giant salamander and red-legged frog are associated with stream banks and cool, fast flowing streams. Salmon, steelhead and trout species use the larger riverine systems for migration and spawn in the upper tributaries of unblocked gravel bed streams.

### 3.2.3 Agricultural

The broad river valleys have largely been converted to agricultural habitat, or are occupied by houses, roads and pasture lands. Habitat elements such as shelterbelts and field borders provide structure in these altered landscapes and may function as corridors for wildlife. Ephemeral or farmed wetlands in the broad floodplain provide stop-over and wintering habitat for migratory waterfowl in the Pacific Flyway. Most wildlife species using agricultural habitat are either seasonal migrants or use the areas on combination with adjacent forest habitats.

### 3.2.4 Herbaceous Wetlands

The transmission line in the northern portion of the WRA encompasses portions of the Gerrard Creek and Chehalis River floodplains, with freshwater emergent and riverine habitats. In areas of the floodplain, open grasslands with shrub species snowberry and serviceberry potentially host rare wetland plant species such as Roemer's fescue and white-topped aster (WDNR 2008). Oregon ash habitats occur in the northern portion of the WRA and are associated with black cottonwood, red alder, white alder, bigleaf maple, Oregon white oak, and various willows. Oregon ash and slough sedge occur in the northern project area in the Chehalis floodplain where soils are saturated for most of the growing season. The wet habitats, structural diversity, flowering and fruiting trees provide habitat for foraging birds and other wildlife.

## 3.3 Avian Studies

Biologists surveyed about 2,979 acres of the Coyote Crest WRA during point count surveys covering 9.4% of the total project area. The 6 point count locations were surveyed 41 times between fall 2007 and fall 2008 resulting in 239 total 20-min surveys. Although weekly surveys were attempted in all seasons,

weather conditions limited access to both the WRA and specific point count locations during both the winter and spring seasons.

### 3.3.1 Species Composition

Biologists recorded a total of 2,806 birds of 61 identified species and 8 unidentified species groups during the 239 fixed-point count surveys. The birds with the highest percent composition overall were the pine siskin (31.6 percent of all birds observed), red crossbill (10.0 percent of all birds observed), the Canada goose (8.2 percent of all birds observed), evening grosbeak (5.2 percent of all birds observed), the dark-eyed junco (4.8 percent of all birds observed), the common raven (4.3 percent of all birds surveyed) and cedar waxwing (4.1 percent of all birds surveyed). Each remaining species comprised less than 4 percent of the total number of birds observed.

The species composition varied by season with each season presenting a unique set of top 4 species. For each season, at least 2 of the top 5 species with highest overall percent composition were present (Tables 2, 4). The pine siskin was commonly observed in fall 2007 and winter 2007-2008, while the dark-eyed junco was commonly observed in the spring, summer and fall 2008. White-crowned sparrows were also commonly observed in spring, summer and fall 2008. Other species comprised a high percentage of individuals observed within one particular season only such as cedar waxwing and the Canada goose (9.0 and 18.1 [comprised of 5 flocks] percent, respectively, Table 4) in fall 2007, and tree swallow and American pipit (20.2 and 11.5 percent composition, respectively, Table 4) in fall 2008. With the exception of the Canada goose and American pipit which are migrants; and the tree swallow which was mostly observed as a migrant but is also a summer resident, all species with high percent composition are year-round residents of the WRA.

### 3.3.2 Mean Use

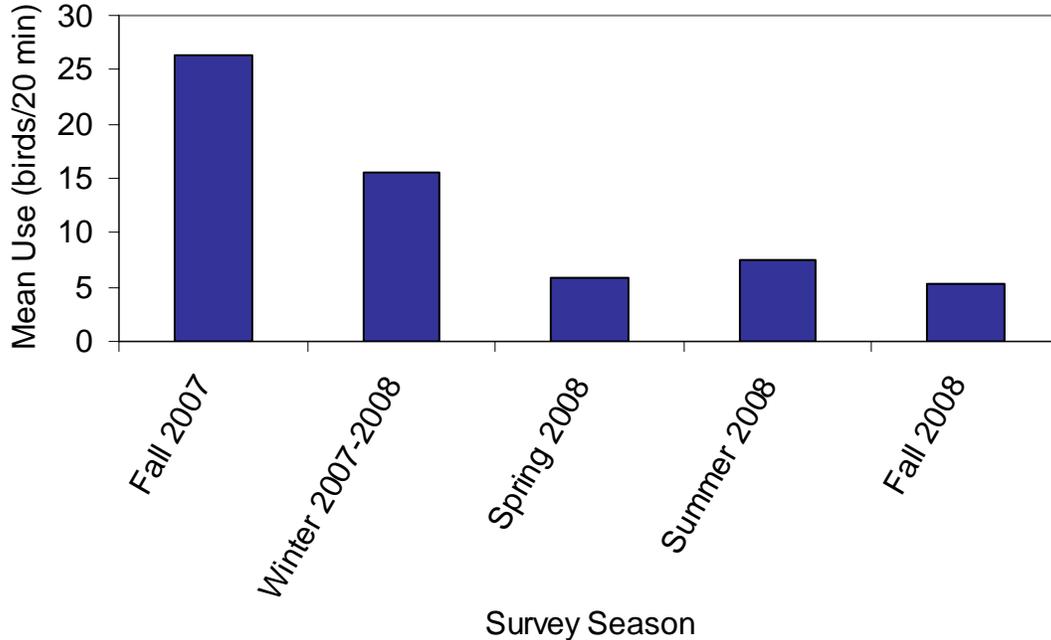
Overall mean bird use within the Coyote Crest WRA over 5 seasons was 11.74 birds/20 min and ranged from 0 to 185 birds per 20-min point count survey. The species with the highest overall mean use was the pine siskin (3.71 birds/20 min), followed by red crossbill (1.17 birds/20 min, Table 2). In fall 2007, the pine siskin and Canada goose had the highest mean use (10.44 and 4.79 birds/20 min, respectively). In winter 2007-2008, the pine siskin and red crossbill had the highest mean use (9.86 and 3.31 birds/20 min respectively; Table 2). In the spring and summer seasons, red crossbill, dark-eyed junco and common raven having the highest mean use (Table 2). In fall 2008, the tree swallow (1.10 birds/20 min) and the American pipit (0.63 birds/20 min) had the highest mean use (Table 2). Again, with the exception of the Canada goose, (mostly migrant but also summer resident) tree swallow and American pipit, year-round residents had the highest mean use in each season.

### 3.3.2.1 Non-raptors

Non-raptors accounted for the majority of all bird activity observed. Overall mean use by non-raptors for the Coyote Crest WRA was 11.59 birds/20 min. Among species groups, overall mean use was highest for songbirds (9.37 birds/20 min). This number is strongly influenced by a high mean use (20.04 birds/20 min) for this species group in fall 2007 (Table 3). The top species, the pine siskin, accounted for 39.2 percent of individuals in this species group. Among crows and allies, the second highest species group overall (0.78 birds/20 min), the most commonly observed species was the common raven (0.50 birds/20 min). For seasonal surveys, songbirds, and crows and allies were the top species groups observed in the winter, spring, summer and fall 2008 (Table 3). In the fall 2007, however, waterfowl were the second highest species group; the Canada goose had the highest mean use (4.79 birds/20 min) within that category with 5 flocks of up to 70 individuals observed flying through the area.

Non-raptor mean use was highest in the fall 2007 season (26.36 birds/20 min, Figure 4). The species that contributed to high mean use in fall 2007 were the pine siskin (10.44 birds/20 min) and Canada goose (4.79 birds/20 min). This mean use is more than 1.5 times higher than the mean use for winter (15.46 birds/20 min), the next highest season, in which the low total number of surveys conducted influenced the overall mean use. Additionally, numerous observations of flocks in the fall 2007 season contributed to the relatively high mean use. Overall mean use for non-raptors was highest at point L (14.31 birds/20 min), and observations at this point included predominantly pine siskins (196 individuals), tree swallows (51 individuals) and red crossbills (50 individuals, Tables 5a-e), many of which were traveling in flocks of greater than 15 birds. During the spring and fall 2008 seasons, the highest non-raptor use also occurred at point L (Figure 5). During fall 2007 and winter, non-raptor use was highest at point J (Figure 5). The habitat at point J is similar to point L with prominent topographic features.

Figure 4: Non-raptor mean use by Season (2007-2008)



### 3.3.2.2 Raptors

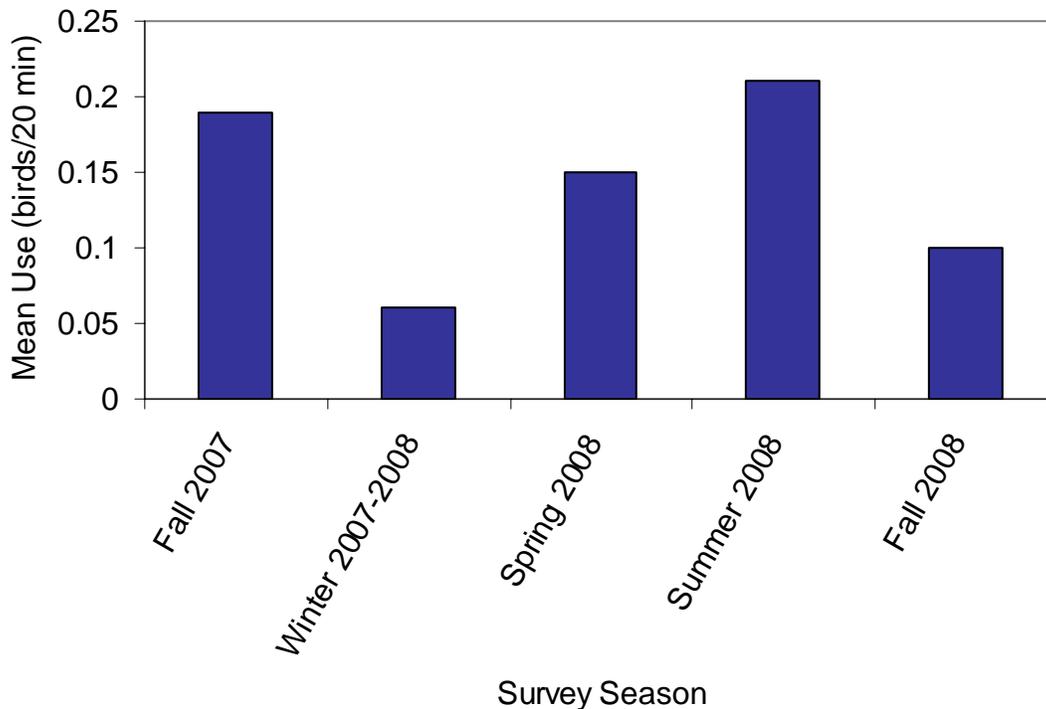
Raptors are a group of special interest because of their propensity to fly at heights similar to those encompassed by a turbine RSA. Overall mean use for raptors was low at 0.15 birds/20 min. The raptors with the highest use of the WRA were the turkey vulture (0.7 birds/20 min), red-tailed hawk (0.3 birds/20 min), and northern harrier (0.2 birds/20 min). Mean use for each other raptor species was 0.01 birds/20 min including sharp-shinned hawk, merlin, Cooper's hawk, northern pygmy-owl, bald eagle and unidentified accipiter hawk, all of which had only one individual observed over the course of the five seasons surveyed.

Raptor mean use is low for the Coyote Crest WRA; observed changes in raptor use between the seasons are as expected based on migratory tendencies of these species. Mean use was highest in the summer season (0.21 birds/20 min); comprised of only turkey vultures and red-tailed hawks. Mean use was second highest in fall 2007 followed by spring 2008 (0.19 and 0.15 birds/20 min, respectively; Figure 6), with the greatest diversity of raptor species observed in these seasons. Winter had the lowest raptor mean use of all seasons (0.06 birds/20 min, Figure 6). The turkey vulture, a breeding resident, winter migrant,

and a Washington State Monitored species, was the most commonly observed raptor in spring, summer, and fall 2008 seasons (absent from winter, Table 3). One turkey vulture individual was observed during fall 2007 in which surveys started mid-season. The red-tailed hawk, a year round resident with seasonal movements out of the WRA weather dependent, was most commonly observed in winter, summer, and fall 2008 (Table 3). The Coyote Crest WRA falls within breeding range of the northern harrier, northern pygmy owl, Cooper's hawk and the bald eagle; however, each of these species had low, variable mean uses across the seasons ranging between 0 and 0.08 birds/20 min (Table 3).

The mean use by raptors was highest at Point J (0.23 birds/20 min, Figure 7) which included observations of turkey vulture (5 individuals), red-tailed hawk (2 individuals), Cooper's hawk (1 individual), and bald eagle (1 individual, Tables 5a-e). Point J is sited on a ridge top with prominent topographic features which create updrafts utilized by raptors.

Figure 6: Raptor mean use by season 2007-2008



### 3.3.3 Frequency of Occurrence

Songbirds were present in the majority of surveys at the Coyote Crest WRA (Table 3) throughout the 5 seasons; the dark-eyed junco (34.3 percent of surveys), American robin (21.3 percent of surveys), song sparrow (17.2 percent of surveys), winter wren (15.9 percent of surveys), red crossbill (15.5 percent of surveys), and white-crowned sparrow (15.1 percent of surveys, Table 4) were the most

frequently detected songbirds. These species, all year-round residents, were commonly observed as single individuals throughout the course of the surveys. All other songbird species were detected in less than 14 percent of surveys. For individual seasons, the songbird with the highest frequency of occurrence varied. In fall 2007, the evening grosbeak was most frequently observed in all surveys. In winter 2007-2008, the red crossbill was most frequent; in spring, summer and fall 2008, the dark-eyed junco was most frequent. All of these species are year-round residents. In summer, however, the Swainson's thrush, a migrant and summer resident, was the second most frequently observed species (52.1 percent, Table 4).

Two other species are worthy of noting. The Canada goose, detected in only 1.3 percent of surveys, but in flocks of 23 individuals or greater, was the only species in the waterfowl group, and observed only in fall 2007. The common raven was detected in 30.5 percent of all surveys and observed in all seasons (Table 4), and the dominant species in the Crows and Allies group, which was the third most commonly observed group overall.

#### 3.3.4 Distribution within the WRA

Species distribution was consistent throughout the WRA for most bird species. Pine siskins, red crossbills, and dark-eyed juncos, the most commonly observed species, were observed at all point count locations in all seasons (Tables 5a-e). The available habitat at point count locations H, I, J, K and L is similar: areas of clear-cut forest along a ridge-top with limited vegetative regrowth near the center of the 800-m circle, and various aged tree stands covering portions of the circle. Point M is the exception; it encompasses younger and older stands of mixed coniferous forest on all sides. Overall mean use per point count location over 5 seasons ranged from a high of 14.46 birds/20 min at point L to a low of 7.95 birds/20 min at point K. Although the overall mean use for point M was the second lowest (9.36 birds/20 min), the observations at this point demonstrate the greatest variety of species (Tables 5a-e), both overall and seasonally. Point J, with its prominent topographical features, had the highest overall raptor mean use (0.23 birds/20 min, which is still regarded as low as it is less than 1 bird/20 min), however raptor observations occurred at each point count location throughout the 5 seasons showing no unique patterns of distribution. Turkey vultures were observed at all points, northern harriers were observed at points H and I, and only in fall 2007, and red-tailed hawks were observed at points H, I, J, M (Tables 5a-e).

#### 3.3.5 Flight Height and Encounter Rate

During the avian use surveys, biologists collected behavioral data for 94.6 percent of all birds observed during point count surveys. Biologists observed 68.2 percent of birds flying and collected flight height data for 93.9 percent and flight direction data for 92.8 percent of observations. For flying non-raptors over the

course of 5 seasons, 61.6 percent flew below the anticipated RSA, 26.1 percent flew within the anticipated RSA, and 12.3 percent flew above the anticipated RSA overall (Table 6). For flying raptors over the course of 5 seasons, 43.8 percent flew below the anticipated RSA, 53.1 percent flew within the anticipated RSA, and 3.1 percent flew above the anticipated RSA (Table 6). Data on flight direction were variable, and are provided in Appendix 1.

Flying non-raptors demonstrated a propensity for flying below the RSA. For individuals flying within the RSA, however, seasonal variation exists. Fall 2007 and fall 2008 demonstrated the highest proportion of individuals flying within the RSA (28.9 percent and 41.0 percent, respectively; Tables 6). This proportion was highest during fall 2008 (41%) and fall 2007 (28.9%); and in the 10% to 20% range for the other seasons (Table 6). Species contributing to the percent of individuals utilizing the RSA include the American robin, red crossbill, American goldfinch, western bluebird, tree swallow, and band-tailed pigeon, Table 7f), with the percent of each of these species flying within the RSA varying by season (Tables 7a-e). Caution should be used when interpreting this trend, however, as 13 weekly surveys were missed due to winter and spring weather conditions.

Raptors utilized the RSA across the seasons, but raptors flew within the RSA more frequently in the summer (77.8 percent), fall 2008 (60.0 percent), and winter (50 percent, Table 6). In these seasons, turkey vultures and red-tailed hawks contributed to the percentages of raptors flying within the RSA, however it should be noted that these percentages are driven by low numbers of individual raptors (between 1 and 6) flying within the RSA for each season (Tables 7a-e).

Encounter rates for individual species varied across seasons, and in each season, the species with the highest encounter rate changed. Overall, species with the highest encounter rates were the pine siskin, red crossbill, tree swallow, evening grosbeak, Canada goose, and cedar waxwing (0.77, 0.31, 0.24, 0.20, 0.10, 0.10 birds flying within the RSA respectively; Table 7f). All other species had overall encounter rates of less than 0.10 birds flying within the RSA/20 min. In fall 2007, the pine siskin had the highest encounter rate (3.17 birds flying within the RSA/20 min); in winter, red crossbills (1.33 birds flying within the RSA/20 min); in spring, evening grosbeaks (0.15 birds flying within the RSA/20 min); summer, turkey vultures (0.13 birds flying within the RSA/20 min), and in fall 2008, tree swallows (1.04 birds flying within the RSA/20 min, Tables 7a-e). With the exception of the tree swallow, each species with the highest encounter rate in each season is a year-round resident. Additionally, those species with seasonal encounter rates greater than 1.0 birds flying within the RSA/20 min (pine siskin, red crossbill, tree swallow) were frequently observed in flocks. When examining the encounter rate of raptor species other than the turkey vulture, low encounter rate variability occurred for those species observed in more than one season. The red-tailed hawk had an encounter rate of 0.03 birds flying within the RSA/20 minutes in winter, 0.02 flying within the RSA/20 min birds in spring, and zero in fall 2008; the Cooper's hawk showed similar low variability from 0.02 birds flying within the

RSA/20 min in fall 2007 and zero in spring. This low variability correlates to the overall low number of individual raptors utilizing the WRA. All other raptor species were observed in only one season and had seasonal encounter rates of 0.02 birds/20 min or less (Tables 7a-e).

### 3.3.6 Incidental Observations

Biologists documented 23 species and a total of 811 birds as incidental observations (Tables 8). Red-winged blackbirds had the highest number of individuals observed (a flock of 620 birds), followed by the dark-eyed junco (46 individuals). Biologists documented 7 incidental species that were not detected during spring point count surveys – the red-winged blackbird, ruffed grouse, barred owl, American kestrel, wild turkey, hermit thrush, and brown creeper (in order of most to least observed).

## 4.0 DISCUSSION

### 4.1 Agency Coordination

Agency personnel present at the two site visits requested no significant modifications to the ongoing wildlife studies at the Coyote Crest WRA.

### 4.2 Habitat Classification and Mapping

Land use within the Coyote Crest WRA and surrounding area is characterized primarily by second- or third-growth commercial forestland intensively managed for timber production. This land use results in a mosaic of habitats ranging from recent clearcut to stands of mixed species, closed canopy forest of varying age classes. The most abundant habitat type within the WRA is mixed conifer and hardwood forest which occupies substantial portions of the lower elevations within the WRA.

Agricultural habitat, primarily in the form of pasture land, exists in the broad river valleys of the Chehalis River and Gerrard Creek which border the WRA to the northeast and southeast. Ephemeral or farmed wetlands within these broad floodplain areas provide stop-over and wintering habitat for migratory waterfowl.

The variety of habitats found within the Coyote Crest WRA provided a variety of resources for the avian community found in this study. As the current land use practices at the Coyote Crest WRA have resulted in fragmentation of large, contiguous tracts of forested land creating an altered landscape, habitat resources are altered. This study has found that the avian community utilizing the WRA is comprised primarily of species that are not area sensitive and thus are able to utilize a wide variety of habitats typical of the industrial forests of the Washington Coast Range.

### 4.3 Non-Raptor Use and Encounter Rate

Overall use by non-raptors at the Coyote Crest WRA is high compared to other species groups within the avian use surveys (11.59 birds/20 min; Table 4). Comparing annual non-raptor use rates reported for existing wind energy facilities throughout the country with publicly available data, the Coyote Crest WRA ranked fourth out of 6 studies with annual data available (Table 9). For individual seasons, the Coyote Crest WRA ranked twenty-first of 24 studies in spring, thirteenth of 22 studies in summer, and second of 18 studies in fall 2007, fourteenth of 18 studies in fall 2008, and seventh of 18 studies in winter (Table 9). Therefore, non-raptor use within the Coyote Crest WRA was medium-low using the TTEC classification of falling in between the second and third 1/3 of sites for which avian use is published, accounting for seasonal variation. Because studies of avian use do not share identical methodologies (e.g., length of survey period) and there is variance associated with the mean values, comparisons of avian use represent generalizations only.

Songbirds had the highest mean use out of all groups, a value driven by local residents and punctuated by migrants. Pine siskins and red crossbills had the highest encounter rates of all species overall (0.77 and 0.31 birds flying within the RSA/20 min, respectively). Pine siskins and red crossbills also had the highest overall mean use of all species within the WRA (3.71 and 1.17 birds/20 min). The encounter rate and mean use of these species, however, was subject to seasonal variation. Although observed at all point count locations and in all seasons, the fall 2007 and winter seasons contributed considerably to these results. During the non-breeding season, these species travel and forage in large flocks, which differs from the territorial behaviors exhibited during the breeding season. These seasonal behavioral patterns likely contribute to seasonal variation in encounter rate. Additionally, the pine siskin has irruptive tendencies which lead to annual fluctuations in numbers of birds at particular sites (Granlund, 1994). Declining population trends have been identified for the pine siskin in Washington (Sauer, 2008), and extreme variability of food supply which leads to irruptions (Cramp and Perrins, 1994) makes reliable population estimates difficult for the red crossbill (Adkisson, 1996). Additionally, there is little available data directly linking these two species to mortality events at wind conversion facilities. Given these two species' low overall mean use and encounter rates while utilizing the WRA, direct mortality resulting from avian interaction with turbines is not expected to have population level consequences in either case.

Waterfowl and cranes were observed in the WRA only in the fall 2007. Flocks of Canada geese and one flock sandhill cranes were observed. While the encounter rate for sandhill crane was zero birds flying within the RSA/20 min both overall and within the fall season, the encounter rate for the Canada goose was higher given its propensity to fly within the RSA. In fall 2007, the only season in which the Canada goose was observed, the encounter rate was 0.48 birds flying within the RSA/20 min. Although this encounter rate is the fourth highest for of all species observed in fall 2007, when considered over 5 seasons, it drops to 0.10

birds flying within the RSA/20 min as the species was not observed in any other season. Given the seasonal and annual variability use of the WRA, and that the Canada goose typically has lower mortality rates at wind farms than would be expected based on solely on encounter rate (Erickson, et al. 2002, Jain 2005), any direct mortality resulting from avian interactions with turbines are unlikely to affect Canada goose populations.

The six point count locations used for this study were selected for their viewshed and the area habitats they encompassed. Five points (H-L) were situated on ridge tops immediately surrounded by clearcut forest; one point (M) was surrounded tree stands of varying ages. Overall non-raptor mean use varied by point ranging from 7.83 birds/20 min at Point K to 14.31 birds/20 min at Point L. Point L is located on a ridge immediately surrounded by clear cut forest with older stands within the 800m boundary. These habitats are not unique within the WRA, and the location affords a view of flocks utilizing the forested areas (Figure 5) contributing to the high mean use of point L.

#### 4.4 Raptor Use and Encounter Rate

Overall raptor use at the Coyote Crest WRA was low compared to other species groups within the avian use surveys (0.15 birds/20 min). The Coyote Crest WRA ranked six out of 6 studies comparing annual raptor use rates reported for existing wind energy facilities with publicly available data throughout the country (Table 9). For individual seasons, the Coyote Crest WRA ranked twenty-fourth of 29 studies in fall 2007, twenty-eighth of 29 in winter, thirty-fourth of 35 in spring, fifteenth of 33 studies in summer, and twenty-ninth of 29 in fall 2008 (Table 9). High raptor use has been associated with high raptor mortality at wind farms (Erickson 2007); however, the strength of the conclusion is based on two data points for high raptor use (>2.0 birds/20 min). Conversely, raptor mortality appears to be low when raptor use is low, as defined by Erickson (2007) as <1.0 birds/20 min. Raptor mean use at the Coyote Crest WRA was classified as low by TTEC (based on its rank in Table 9); less than 1 bird/20 min. Because raptor use is less than 1 bird/20 minute, raptor mortality is expected to be low for all seasons.

The turkey vulture was the most commonly observed raptor species during avian surveys, followed by red-tailed hawk. The turkey vulture is a migrant and absent, as expected, from winter surveys. The encounter rate for the turkey vulture over the course of 5 seasons was 0.05 birds flying within the RSA/20 min with the highest seasonal encounter rate occurring in the summer (0.13 birds flying within the RSA/20 min). Although the red-tailed hawk is a year round resident species it was observed only in the winter, summer, and fall 2008 seasons. For the red-tailed hawk, the overall 5-season encounter rate was 0.01 birds flying within the RSA/20 min with the highest seasonal encounter rate occurring outside of breeding season in the winter (0.03 birds flying within the RSA/20 min).

Mortality of turkey vultures due to collisions with stationary structures such as utility lines is rare due to their slow, maneuverable flight (McNeil et al. 1985). In contrast, turkey vultures have been found to collide with faster moving objects at higher altitudes, such as military aircraft (Defusco, 1993). In Washington, the turkey vulture holds the status of a state-monitored species, although the overall population is considered stable (Sauer et al. 2008). Thus, due to the low mean use and encounter rate, tendency to avoid terrestrial based objects while in flight, and stable population, potential turbine-related mortality of turkey vultures is unlikely to have population-level consequences.

Mortality of red-tailed hawks due to collisions with wind turbines has been documented at multiple sites (Johnson et al., 2002, Erickson et al., 2004, Erickson 2007); therefore, red-tailed hawk mortality events may occur at the Coyote Crest WRA. However, like the turkey vulture, the overall low mean use and encounter rate of red-tailed hawks within the WRA coupled with a large population (Sauer et al. 2008) make it unlikely that fatalities of red-tailed hawks will have population-level consequences.

The merlin, Cooper's hawk, bald eagle, sharp-shinned hawk, northern pygmy owl, and northern harrier were also observed at the Coyote Crest WRA. Each of these species had encounter rates of  $\leq 0.02$  birds flying within the RSA/20 minutes over the course of 5 seasons. Seasonally, the mean use for each of these species is below 0.1 birds/20 min. With the exception of the Northern harrier and Cooper's hawk, one individual was observed for each raptor species, the greatest variety of which was observed in fall 2008. When broken down by season, the encounter rates increase slightly for some species. The northern harrier, with 4 individuals observed in fall 2007 had the highest seasonal encounter rate of 0.08 birds flying within the RSA/20 minutes. Raptors were observed at each point, with overall mean use highest at point count location J, featuring prominent topography utilized by raptors. Again, though, the raptor mean use for each season and at each point was low at  $\leq 0.63$  birds/ 20 min. The low mean use, and low encounter rates both overall and seasonally, are suggestive of low risk of raptor fatality events for the Coyote Crest WRA. However, pre-construction encounter rates may not equate to post construction mortality.

#### 4.5 Potential Impacts to Birds

The possible impacts to avian species from the construction and operation of the Coyote Crest wind energy facility are direct mortality and injury from collisions with wind turbines and guy wires, and displacement of birds from habitats near turbines (Drewitt and Langston 2006). Historically, raptor mortality has received the most attention. Raptor mortality at newer generation wind projects has been low relative to previous generation wind farms (Erickson et al. 2002). A number of mortality monitoring studies at newer generation wind projects have found fewer than five individual raptor mortalities (e.g., Johnson et al. 2002,

Erickson et al. 2003a, Kerns and Kerlinger 2004, Jain et al. 2007), but one study at the Stateline Wind Project in Oregon and Washington found as many as 17 dead raptors within a 2.5-year monitoring period (Erickson et al. 2004); however, there are 454 turbines at Stateline. Although raptor mortality is reduced, mortality may not be eliminated by advances in turbine technology and local micro-siting and site evaluation efforts are still necessary.

At newer generation wind energy facilities outside of California, approximately 80 percent of documented mortalities have been passerines (e.g., songbirds); of which 50 percent were night migrants (Erickson et al. 2002). It is estimated that less than 0.01 percent of migrant songbirds that pass over wind farms are killed, based on radar data and mortality monitoring at wind farms in Oregon, Washington, and Minnesota (Erickson 2007). Resident species may have lower mortality than migrants because many songbirds do not fly within the RSA. However, some resident species have behaviors that increase the risk of collisions with turbines because they fly within the RSA. This may apply to the pine siskin and red crossbill for the Coyote Crest WRA.

In addition to mortality associated with wind farms, concerns have been raised that bird species may avoid areas near turbines after the wind farm is in operation (Drewitt and Langston 2006). For example, at the Buffalo Ridge wind energy facility in Minnesota, densities of male songbirds were significantly lower in Conservation Reserve Program (CRP) grasslands containing turbines than in CRP grasslands without turbines. It was suggested that the reduced density may be due to avoidance of turbine noise and maintenance activities, and reduced habitat quality due to the presence of access roads and large gravel pads surrounding the turbines (Leddy et al. 1999). Reduced abundance of grassland songbirds was found within 50 m of a turbine pad for a wind farm in Washington and Oregon, but the investigators attributed displacement to the direct loss of habitat or reduced habitat quality and not the presence of the turbines (WEST and NWC 2004). Although breeding grassland songbirds have not shown strong avoidance to date, other species groups (e.g., prairie grouse) may respond differently based on avoidance of other anthropogenic features on the landscape (Pitman et al. 2005). How turbine avoidance applies to the forest breeding birds of the Pacific Northwest is yet unknown.

The current land use practices at the Coyote Crest WRA have resulted in fragmentation of large, contiguous tracts of forested land creating an altered landscape with clear-cuts and tree stands of different ages and species. This type of intensive land use exposes avian species to the disturbances created by timber harvesting; those species with the highest species composition and mean use detected in this study are likely species that tolerate disturbance. This study has found that the bird community using the WRA is comprised of species that are not area sensitive (i.e., require large contiguous tracts of habitat), at least during the non breeding season. These species are less constrained by specific habitat features and therefore are able to utilize a wide diversity of habitats. It is

unlikely that the construction of the wind facility will result in changes to the bird community because the species observed during the survey already inhabit a disturbed area. Thus, the altered landscape of the Coyote Crest WRA is optimal for wind energy development because the current land management practices in creating disturbed areas will minimize habitat alteration for the construction of the energy facility.

#### **4.6 Listed and Sensitive Species**

The bald eagle is protected by the Bald and Golden Eagle Protection Act (BGEPA). During avian use surveys, one bald eagle was observed and was likely a transient. The BGEPA prohibits the take of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. Currently, take permits are not available for the BGEPA, but the US Fish and Wildlife Service (USFWS) is currently developing permits which will be available in the near future. The USFWS uses discretion when prosecuting eagle mortality for energy development. The likelihood of prosecution can be reduced by demonstrating a good faith effort to lower eagle mortality through avian use studies, micrositing turbines away from areas of high eagle use, and consulting with the USFWS. Although the Coyote Crest WRA is with breeding range of the bald eagle, suitable breeding habitat within the WRA is largely absent. Therefore, micrositing away from high eagle use areas is not applicable at the Coyote Crest WRA.

In addition to eagles, one Washington state endangered species, the sandhill crane, two state candidate species, the merlin and pileated woodpecker, and two state monitor species, the turkey vulture and western bluebird were observed during avian surveys or as incidental observations. Of these state species of concern, the merlin, turkey vulture, and western bluebird were observed flying within the RSA; the encounter rate for each species was low ( $\leq 0.06$  birds/20 min flying within the RSA over 5 seasons) primarily because of their overall low occurrence within the Coyote Crest WRA.

In Washington, state species of concern are afforded no regulatory protection and take permits are not required. All of these species, as well as most of the other species observed, are protected under the Migratory Bird Treaty Act.

## **5.0 SUMMARY OF FINDINGS**

### **5.1 Habitat Mapping Summary of Findings**

The land within in the Coyote Crest WRA is currently managed as industrial forest. A habitat mosaic exists which includes various aged tree stands, recently harvested plots, mature forest (potential spotted owl habitat), and farms and residences. Such previously disturbed areas are optimal for future wind development, because the bird communities using these habitats are likely

comprised of those species that are not area specific, are less constrained by specific habitat features and therefore are able to utilize a wide diversity of habitats. As a result, development in this area is not expected to alter existing bird communities found during the avian point count surveys and no further recommendations exist at this time.

## 5.2 Non-raptor Summary of Findings

Non-raptor use at the Coyote Crest WRA was medium-low, primarily attributable to resident species. Although mortality events will likely occur at the Coyote Crest WRA, the most commonly observed species—pine siskins and red crossbills—have relatively low encounter rates and variable local population densities based on irruptive tendencies; therefore, individual mortalities are unlikely to have population-level consequences or receive a high level of scrutiny from state or federal wildlife agencies.

No federally listed species were observed during the year of avian point count surveys; however four Washington state species of concern (of varying status levels) were observed. Observations include the sandhill crane, merlin, pileated woodpecker, and western bluebird, all of which had a low encounter rate of  $\leq 0.06$  birds flying within the RSA/20 min.

Contiguous weekly surveys were not conducted in the winter and spring seasons due to weather events prohibiting visibility or access to the point count locations. Therefore species composition and mean use of the WRA are based on 41 weeks of surveys rather than 54. Although the seasonal data collected affords understanding of non-raptor avian use within the WRA, filling in the survey gaps will provide a more complete picture.

## 5.3 Raptor Summary of Findings

Raptor use at the Coyote Crest WRA was very low when compared to other wind generation facilities, using the TTEC classification of falling in the bottom 1/3 of sites for which avian use is published. It was low based on Erickson's (2007) criterion of being less than 1 bird/20 min for all seasons. This level of raptor use at the Coyote Crest WRA suggests that raptor mortality is anticipated to be low for all seasons.

Two listed species were observed during the year of avian point count surveys, the federally protected bald eagle, and the state monitor species, the turkey vulture. Washington state species of concern are afforded no regulatory protection and take permits are not required; however, these species are also protected under the Migratory Bird Treaty Act.

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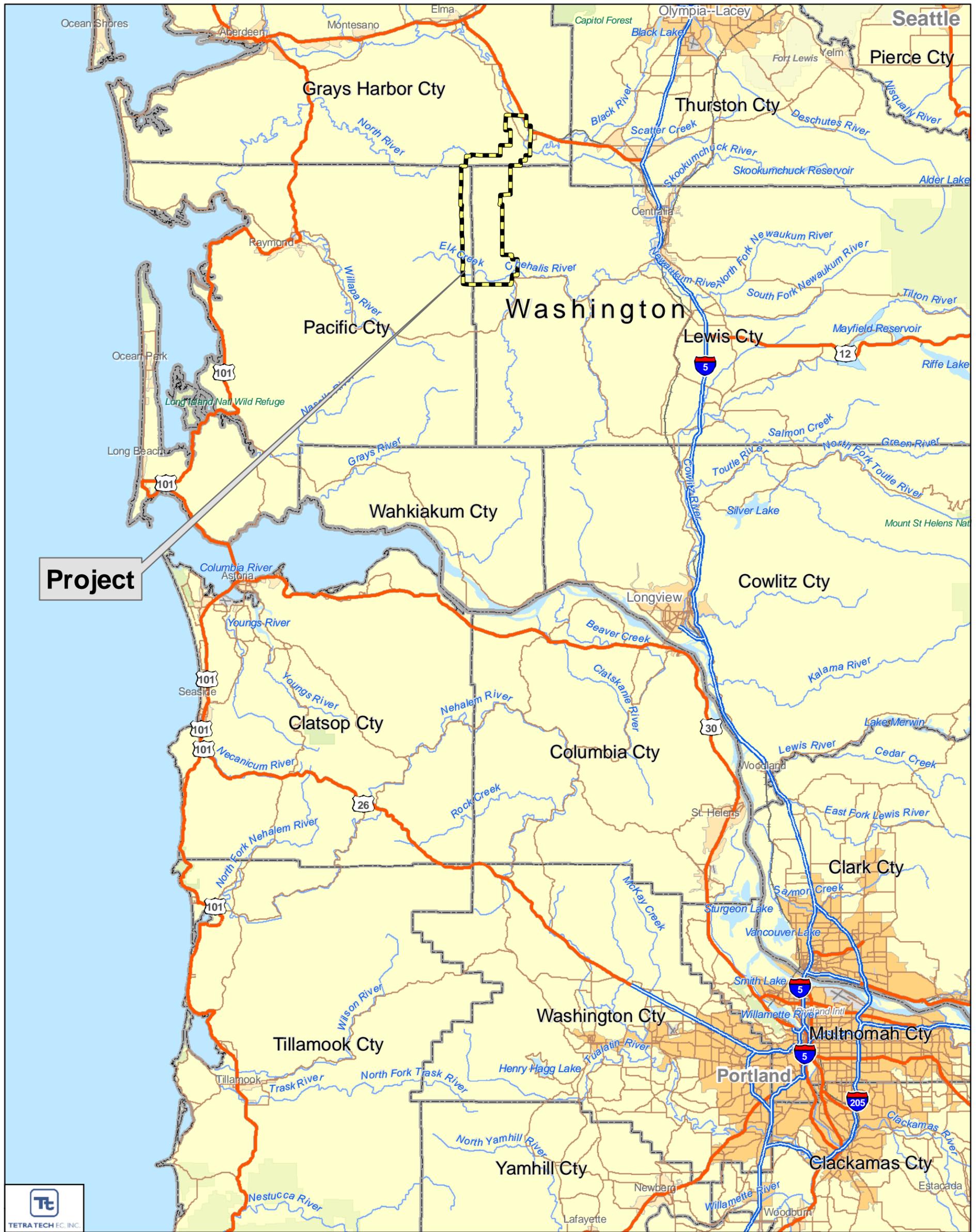
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Jennifer Taylor	11/17/08
Report Author	Date
Lynn Sharp	11/21/08
Peer Review #1	Date
Karl Kosciuch	12/2/08
Peer Review #2	Date

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**Figure 1. Coyote Crest Wind Resource Area Location Map Pacific and Lewis Counties Washington**

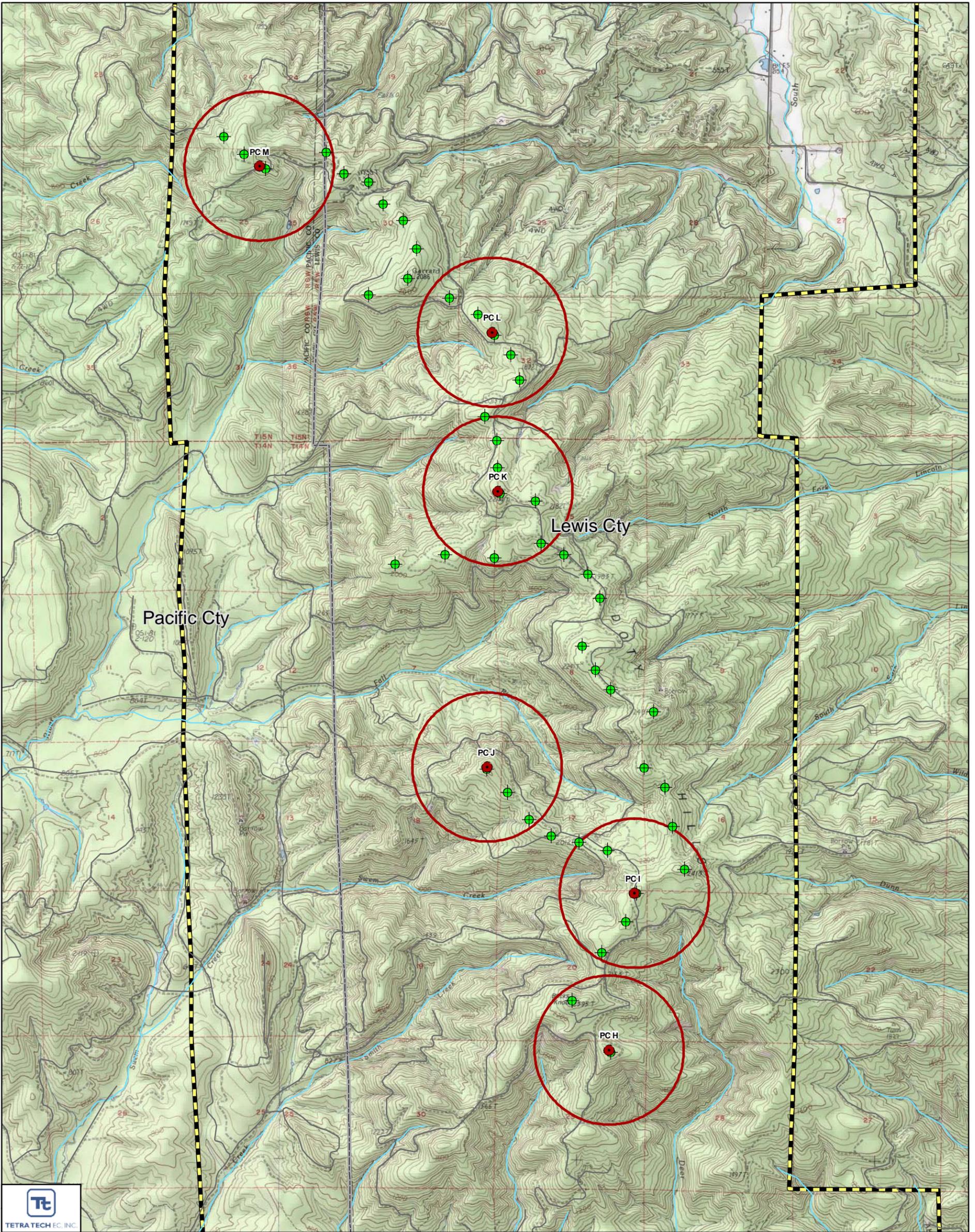
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0 5 10 Miles

July 15, 2008

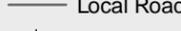
- General Project Boundary
- State Boundary
- County Boundary
- Water Bodies**
- Rivers/Streams
- Lakes/Reservoirs
- Transportation**
- Limited Access
- Highway
- Major Road



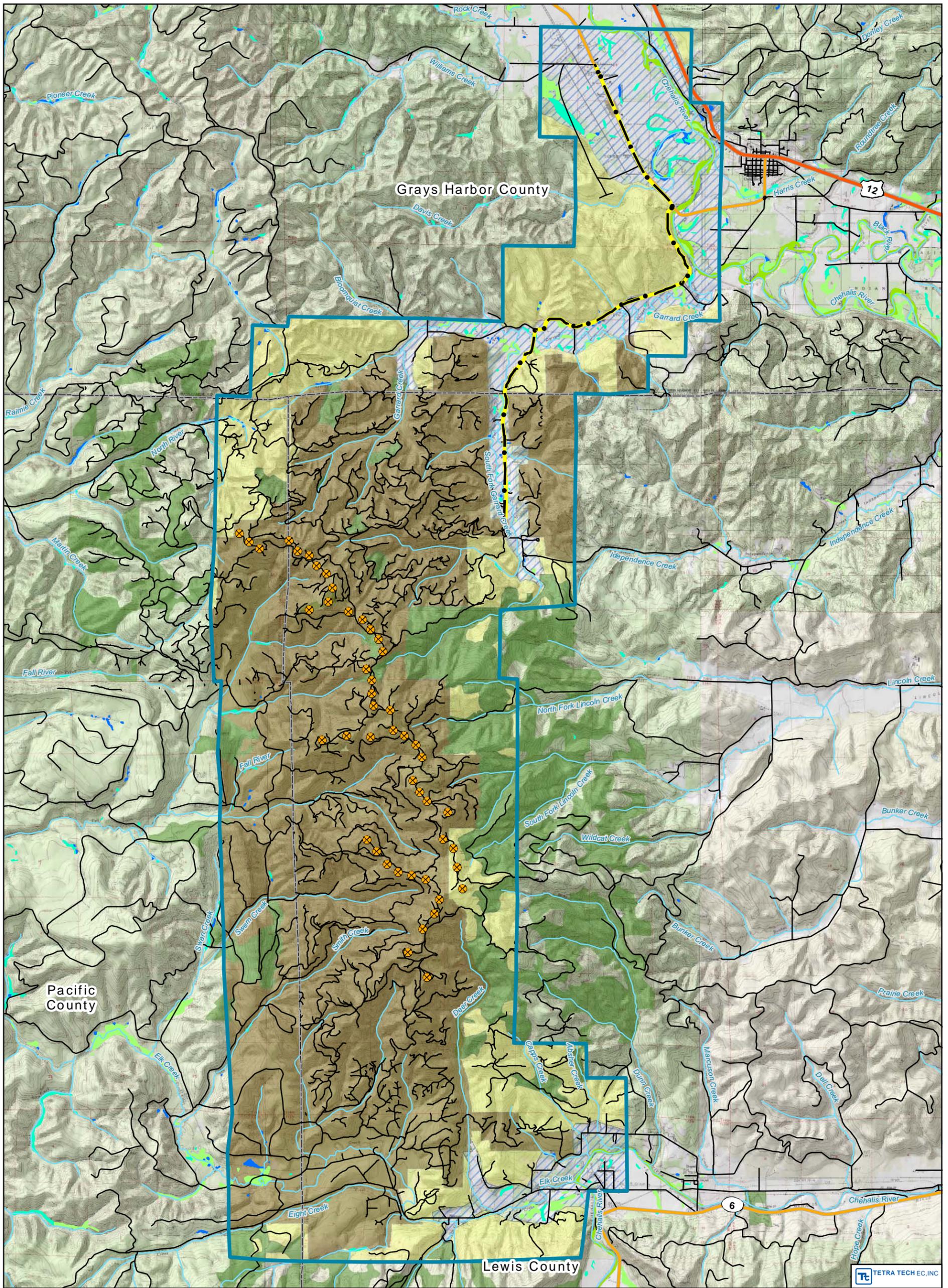


**Figure 2. Coyote Crest Point Count Location (spring 2008)**  
**Pacific and Lewis Counties Washington**

  
 1:40,000  
  
 0 0.5 1  
 Miles  
 July 15, 2008

-  Avian Survey Points
-  800m Buffer Avian Survey Points
-  General Project Boundary
-  County Boundary
-  Perennial Stream
-  Local Road
-  Proposed Turbines





**Figure 3. Coyote Crest Habitat Survey**  
 Lewis, Pacific, and Gray's Harbor Counties, WA  
 November 14, 2008



1:80,000  
 NAD 83 UTM Zone 10 North  
 0 1 2  
 Miles

**Project Facilities**

- Project Boundary
- Turbines
- Proposed T-Line
- Perennial Stream
- Intermittent Stream

**Roads**

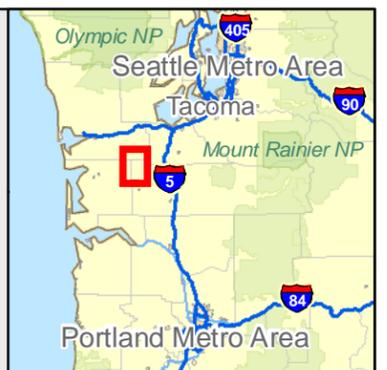
- Interstate
- Highway
- Major Road
- Local Road

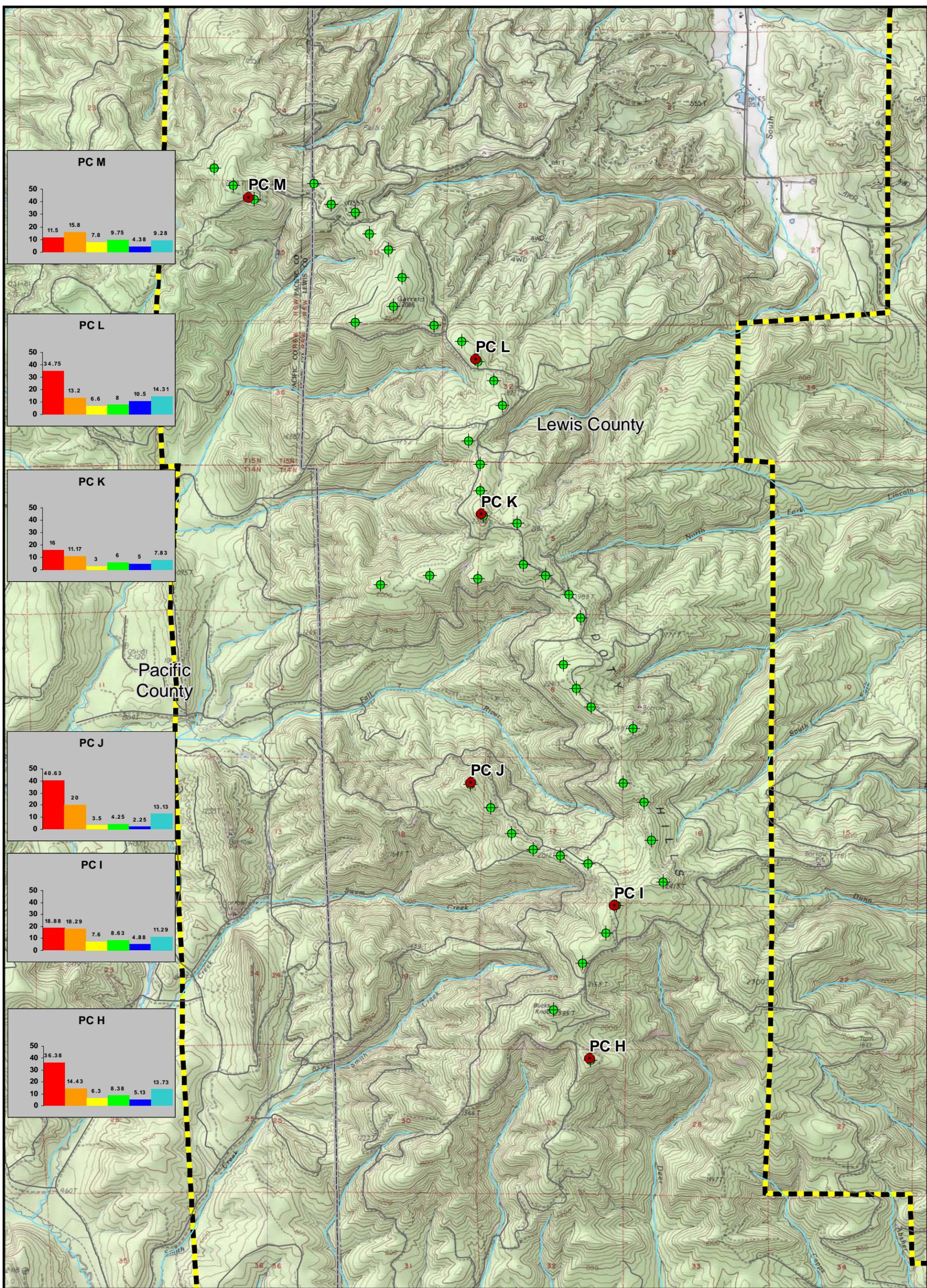
**Wetlands**

- Freshwater Emergent
- Freshwater Forest/Shrub
- Freshwater Pond
- Other
- Riverine

**Habitat Type**

- Mosaic of Forest, Farm, Residences
- Potential Spotted Owl Habitat
- Other Industrial Forest
- Weyerhaeuser Industrial Forest





**FIGURE 5. Coyote Crest Non-Raptor Mean Use by Point (2007-2008)**  
 Pacific and Lewis Counties, Washington  
 October 19, 2008

**everpower**  
 RENEWABLES

1:40,000  
 NAD 1983 UTM 10

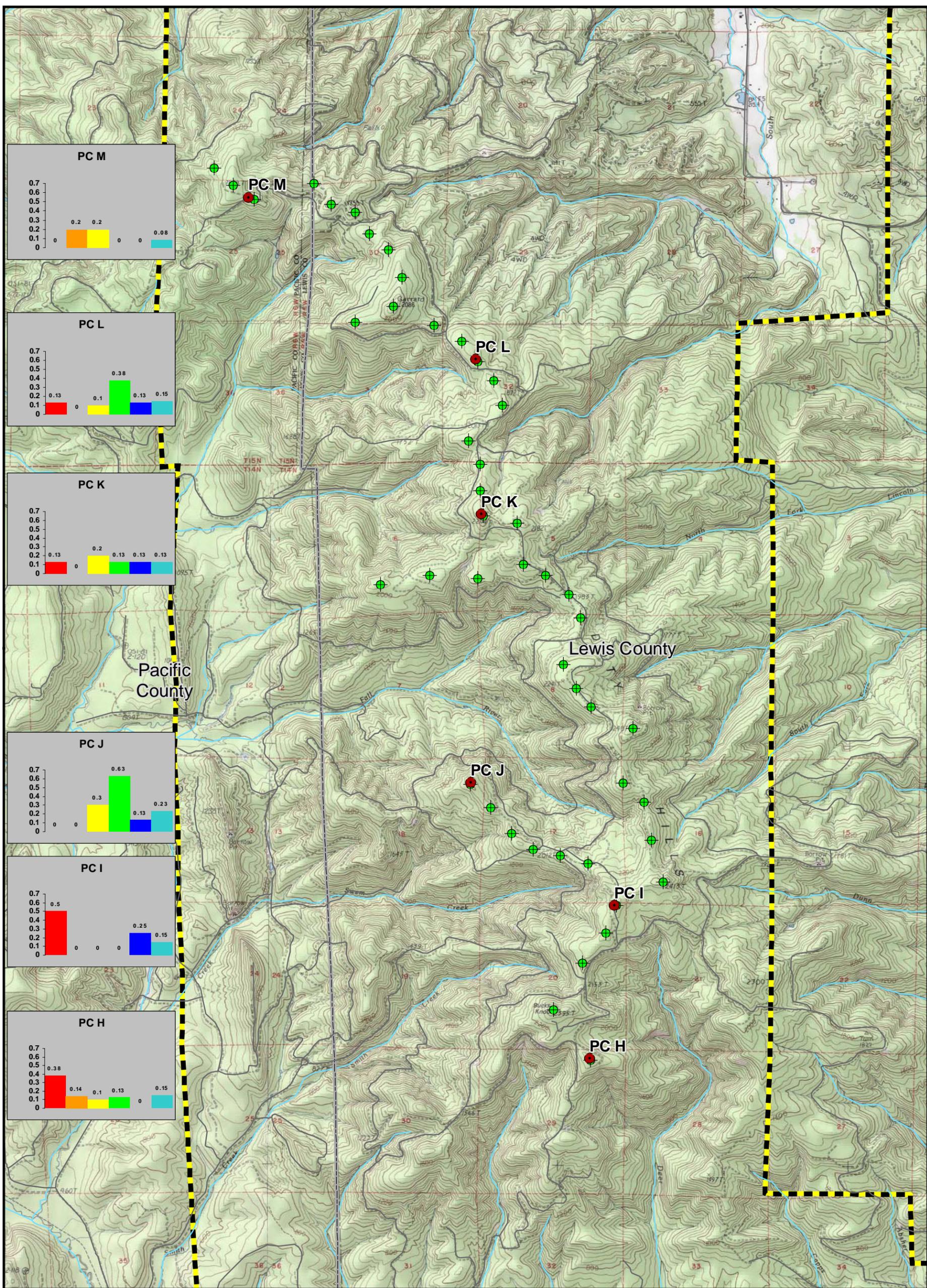
Miles  
 0 0.25 0.5 1

- Avian Survey Points
- Project Area
- County Boundary
- Proposed Turbines
- Perennial Stream
- Local Road

Y Axis: mean use per 20 minutes  
 X Axis: survey season (left to right)

Fall 2007  
 Winter 2007-2008  
 Spring 2008  
 Summer 2008  
 Fall 2008  
 Overall





**FIGURE 7. Coyote Crest Raptor Mean Use by Point (2007-2008)**  
 Pacific and Lewis Counties, Washington  
 October 19, 2008

**everpower**  
 RENEWABLES

1:40,000  
 NAD 1983 UTM 10

Miles  
 0 0.25 0.5 1

- Avian Survey Points
- Project Area
- County Boundary
- Proposed Turbines
- Perennial Stream
- Local Road

Y Axis: mean use per 20 minutes  
 X Axis: survey season (left to right)

Fall 2007  
 Winter 2007-2008  
 Spring 2008  
 Summer 2008  
 Fall 2008  
 Overall



**Table 1.** Coyote Crest Wind Resource Area 2007-2008 point count survey dates.

<b>Survey Number</b>	<b>Date</b>
<b>Fall 2007</b>	
1	9/27/07
2	10/3/07
2	10/4/07
3	10/10/07
3	10/11/07
4	10/15/07
5	10/27/07
6	10/28/07
7	11/5/07
8	11/13/07
8	11/14/07
<b>Winter 2007</b>	
1	11/22/07
2	11/26/07
3	12/17/07
4	1/23/08
5	2/18/08
6	3/5/08
7	3/12/08
<b>Spring 2008</b>	
1	3/21/08
2	4/15/08
3	5/1/08
4	5/8/08
5	5/15/08
6	5/22/08
7	5/31/08
8	6/4/08
9	6/11/08
9	6/13/08
10	6/20/08
<b>Summer 2008</b>	
1	6/27/08
2	7/3/08
3	7/11/08

**Table 1.** Coyote Crest Wind Resource Area 2007-2008 point count survey dates.

<b>Survey Number</b>	<b>Date</b>
4	7/18/08
5	7/24/08
6	8/1/08
7	8/8/08
8	8/15/08
<hr/>	
<b>Fall 2008</b>	
1	8/22/08
2	8/28/08
3	9/5/08
4	9/12/08
5	9/18/08
6	9/26/08
7	10/1/08
8	10/5/08
8	10/6/08

**Table 2.** Avian species observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species	Fall 2007			Winter 2007-2008			Spring 2008			Summer 2008			Fall 2008			Overall		
	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*
pine siskin	501	12	10.44	345	12	9.86	5	4	0.08	18	2	0.38	17	5	0.35	886	35	3.71
red crossbill	96	7	2.00	116	14	3.31	18	11	0.30	49	7	1.02	1	1	0.02	280	40	1.17
Canada goose	230	5	4.79	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	230	5	0.96
evening grosbeak	117	13	2.44	0	0	0.00	11	6	0.18	17	8	0.35	2	1	0.04	147	28	0.62
dark-eyed junco	20	7	0.42	10	8	0.29	41	32	0.68	43	27	0.90	21	15	0.44	135	89	0.56
common raven	33	20	0.69	30	17	0.86	31	17	0.52	6	6	0.13	20	18	0.42	120	78	0.50
cedar waxwing	115	4	2.40	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	116	5	0.49
American robin	25	10	0.52	3	3	0.09	30	28	0.50	17	14	0.35	2	1	0.04	77	56	0.32
tree swallow	0	0	0.00	0	0	0.00	3	2	0.05	5	2	0.10	53	2	1.10	61	6	0.26
white-crowned sparrow	0	0	0.00	0	0	0.00	27	23	0.45	23	19	0.48	2	2	0.04	52	44	0.22
Steller's jay	15	14	0.31	2	2	0.06	9	9	0.15	15	14	0.31	10	9	0.21	51	48	0.21
Swainson's Thrush	0	0	0.00	0	0	0.00	8	5	0.13	41	28	0.85	0	0	0.00	49	33	0.21
winter wren	7	6	0.15	4	4	0.11	23	20	0.38	7	7	0.15	3	3	0.06	44	40	0.18
song sparrow	0	0	0.00	2	2	0.06	20	20	0.33	10	10	0.21	11	9	0.23	43	41	0.18
unidentified songbird	38	13	0.79	2	2	0.06	1	1	0.02	0	0	0.00	0	0	0.00	41	16	0.17
chestnut-backed chickadee	9	4	0.19	12	3	0.34	0	0	0.00	6	5	0.13	8	6	0.17	35	18	0.15
golden-crowned kinglet	3	1	0.06	2	1	0.06	5	5	0.08	3	2	0.06	20	11	0.42	33	20	0.14
varied thrush	6	6	0.13	6	5	0.17	6	6	0.10	12	11	0.25	2	2	0.04	32	30	0.13
band-tailed pigeon	4	1	0.08	0	0	0.00	14	9	0.23	13	12	0.27	0	0	0.00	31	22	0.13
American pipit	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	30	4	0.63	30	4	0.13
yellow-rumped warbler	0	0	0.00	0	0	0.00	2	2	0.03	0	0	0.00	17	6	0.35	19	8	0.08
northern flicker	5	5	0.10	0	0	0.00	4	4	0.07	5	5	0.10	4	4	0.08	18	18	0.08

\* Mean use=# birds/20 min.

**Table 2.** Avian species observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species	Fall 2007			Winter 2007-2008			Spring 2008			Summer 2008			Fall 2008			Overall		
	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*
turkey vulture	1	1	0.02	0	0	0.00	6	5	0.10	6	6	0.13	4	4	0.08	17	16	0.07
Hutton's vireo	0	0	0.00	3	3	0.09	8	8	0.13	4	4	0.08	2	2	0.04	17	17	0.07
hermit warbler	0	0	0.00	0	0	0.00	11	10	0.18	6	6	0.13	0	0	0.00	17	16	0.07
red-breasted nuthatch	4	4	0.08	1	1	0.03	4	4	0.07	4	4	0.08	3	3	0.06	16	16	0.07
gray jay	1	1	0.02	0	0	0.00	4	2	0.07	0	0	0.00	11	8	0.23	16	11	0.07
western bluebird	13	2	0.27	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	14	3	0.06
hairy woodpecker	1	1	0.02	2	2	0.06	4	4	0.07	4	4	0.08	3	3	0.06	14	14	0.06
blue grouse	0	0	0.00	0	0	0.00	11	11	0.18	1	1	0.02	0	0	0.00	12	12	0.05
common nighthawk	0	0	0.00	0	0	0.00	5	5	0.08	6	4	0.13	0	0	0.00	11	9	0.05
Wilson's warbler	0	0	0.00	0	0	0.00	6	6	0.10	4	4	0.08	0	0	0.00	10	10	0.04
violet-green swallow	0	0	0.00	0	0	0.00	5	3	0.08	0	0	0.00	5	2	0.10	10	5	0.04
rufous hummingbird	0	0	0.00	0	0	0.00	0	0	0.00	8	7	0.17	2	2	0.04	10	9	0.04
spotted towhee	0	0	0.00	0	0	0.00	5	5	0.08	4	4	0.08	0	0	0.00	9	9	0.04
pacific-slope flycatcher	0	0	0.00	0	0	0.00	3	3	0.05	6	6	0.13	0	0	0.00	9	9	0.04
American goldfinch	0	0	0.00	0	0	0.00	6	6	0.10	1	1	0.02	2	2	0.04	9	9	0.04
willow flycatcher	0	0	0.00	0	0	0.00	1	1	0.02	7	5	0.15	0	0	0.00	8	6	0.03
sandhill crane	8	1	0.17	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	8	1	0.03
black-headed grosbeak	0	0	0.00	0	0	0.00	5	3	0.08	3	3	0.06	0	0	0.00	8	6	0.03
warbling vireo	0	0	0.00	0	0	0.00	3	3	0.05	4	3	0.08	0	0	0.00	7	6	0.03
red-tailed hawk	0	0	0.00	2	2	0.06	0	0	0.00	4	4	0.08	1	1	0.02	7	7	0.03
unidentified bird	5	2	0.10	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	5	2	0.02
orange-crowned warbler	0	0	0.00	0	0	0.00	4	4	0.07	1	1	0.02	0	0	0.00	5	5	0.02

\* Mean use=# birds/20 min.

**Table 2.** Avian species observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species	Fall 2007			Winter 2007-2008			Spring 2008			Summer 2008			Fall 2008			Overall		
	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*
northern harrier	4	2	0.08	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	4	2	0.02
fox sparrow	3	3	0.06	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	4	4	0.02
unidentified swallow	0	0	0.00	0	0	0.00	0	0	0.00	3	1	0.06	0	0	0.00	3	1	0.01
yellow warbler	0	0	0.00	0	0	0.00	0	0	0.00	2	1	0.04	0	0	0.00	2	1	0.01
mountain bluebird	2	1	0.04	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2	1	0.01
golden-crowned sparrow	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2	1	0.04	2	1	0.01
Cooper's hawk	1	1	0.02	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	2	2	0.01
western tanager	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	1	1	0.00
unidentified vireo	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
unidentified sparrow	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
unidentified flycatcher	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
unidentified finch	0	0	0.00	1	1	0.03	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
unidentified accipiter hawk	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
sharp-shinned hawk	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
savannah sparrow	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	1	1	0.00
ruby-crowned kinglet	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	1	1	0.00
red-breasted sapsucker	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
ring-billed gull	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	1	1	0.00
pileated woodpecker	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
northern shrike	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
northern pygmy-owl	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
merlin	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00

\* Mean use=# birds/20 min.

**Table 2.** Avian species observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species	Fall 2007			Winter 2007-2008			Spring 2008			Summer 2008			Fall 2008			Overall		
	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*
house wren	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
downy woodpecker	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
bald eagle	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
<b>Grand Total</b>	<b>1274</b>	<b>154</b>	<b>26.54</b>	<b>543</b>	<b>82</b>	<b>15.51</b>	<b>357</b>	<b>295</b>	<b>5.95</b>	<b>370</b>	<b>250</b>	<b>7.71</b>	<b>262</b>	<b>131</b>	<b>5.46</b>	<b>2806</b>	<b>912</b>	<b>11.74</b>

\* Mean use=# birds/20 min.

**Table 3.** Avian mean use, by species group, observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species Group Species	Fall 2007			Winter 2007-2008			Spring 2008			Summer 2008			Fall 2008			Overall		
	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*
<b>Songbirds</b>																		
pine siskin	501	12	10.44	345	12	9.86	5	4	0.08	18	2	0.38	17	5	0.35	886	35	3.71
red crossbill	96	7	2.00	116	14	3.31	18	11	0.30	49	7	1.02	1	1	0.02	280	40	1.17
evening grosbeak	117	13	2.44	0	0	0.00	11	6	0.18	17	8	0.35	2	1	0.04	147	28	0.62
dark-eyed junco	20	7	0.42	10	8	0.29	41	32	0.68	43	27	0.90	21	15	0.44	135	89	0.56
cedar waxwing	115	4	2.40	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	116	5	0.49
American robin	25	10	0.52	3	3	0.09	30	28	0.50	17	14	0.35	2	1	0.04	77	56	0.32
tree swallow	0	0	0.00	0	0	0.00	3	2	0.05	5	2	0.10	53	2	1.10	61	6	0.26
white-crowned sparrow	0	0	0.00	0	0	0.00	27	23	0.45	23	19	0.48	2	2	0.04	52	44	0.22
Swainson's Thrush	0	0	0.00	0	0	0.00	8	5	0.13	41	28	0.85	0	0	0.00	49	33	0.21
winter wren	7	6	0.15	4	4	0.11	23	20	0.38	7	7	0.15	3	3	0.06	44	40	0.18
song sparrow	0	0	0.00	2	2	0.06	20	20	0.33	10	10	0.21	11	9	0.23	43	41	0.18
unidentified songbird	38	13	0.79	2	2	0.06	1	1	0.02	0	0	0.00	0	0	0.00	41	16	0.17
chestnut-backed chickadee	9	4	0.19	12	3	0.34	0	0	0.00	6	5	0.13	8	6	0.17	35	18	0.15
golden-crowned kinglet	3	1	0.06	2	1	0.06	5	5	0.08	3	2	0.06	20	11	0.42	33	20	0.14
varied thrush	6	6	0.13	6	5	0.17	6	6	0.10	12	11	0.25	2	2	0.04	32	30	0.13
American pipit	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	30	4	0.63	30	4	0.13
yellow-rumped warbler	0	0	0.00	0	0	0.00	2	2	0.03	0	0	0.00	17	6	0.35	19	8	0.08
Hutton's vireo	0	0	0.00	3	3	0.09	8	8	0.13	4	4	0.08	2	2	0.04	17	17	0.07
hermit warbler	0	0	0.00	0	0	0.00	11	10	0.18	6	6	0.13	0	0	0.00	17	16	0.07
red-breasted nuthatch	4	4	0.08	1	1	0.03	4	4	0.07	4	4	0.08	3	3	0.06	16	16	0.07
western bluebird	13	2	0.27	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	14	3	0.06
Wilson's warbler	0	0	0.00	0	0	0.00	6	6	0.10	4	4	0.08	0	0	0.00	10	10	0.04

\* Mean use=# birds/20 min.

**Table 3.** Avian mean use, by species group, observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species Group Species	Fall 2007			Winter 2007-2008			Spring 2008			Summer 2008			Fall 2008			Overall		
	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*
violet-green swallow	0	0	0.00	0	0	0.00	5	3	0.08	0	0	0.00	5	2	0.10	10	5	0.04
spotted towhee	0	0	0.00	0	0	0.00	5	5	0.08	4	4	0.08	0	0	0.00	9	9	0.04
pacific-slope flycatcher	0	0	0.00	0	0	0.00	3	3	0.05	6	6	0.13	0	0	0.00	9	9	0.04
American goldfinch	0	0	0.00	0	0	0.00	6	6	0.10	1	1	0.02	2	2	0.04	9	9	0.04
willow flycatcher	0	0	0.00	0	0	0.00	1	1	0.02	7	5	0.15	0	0	0.00	8	6	0.03
black-headed grosbeak	0	0	0.00	0	0	0.00	5	3	0.08	3	3	0.06	0	0	0.00	8	6	0.03
warbling vireo	0	0	0.00	0	0	0.00	3	3	0.05	4	3	0.08	0	0	0.00	7	6	0.03
orange-crowned warbler	0	0	0.00	0	0	0.00	4	4	0.07	1	1	0.02	0	0	0.00	5	5	0.02
fox sparrow	3	3	0.06	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	4	4	0.02
unidentified swallow	0	0	0.00	0	0	0.00	0	0	0.00	3	1	0.06	0	0	0.00	3	1	0.01
yellow warbler	0	0	0.00	0	0	0.00	0	0	0.00	2	1	0.04	0	0	0.00	2	1	0.01
mountain bluebird	2	1	0.04	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2	1	0.01
golden-crowned sparrow	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2	1	0.04	2	1	0.01
western tanager	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	1	1	0.00
unidentified vireo	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
unidentified sparrow	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
unidentified flycatcher	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
unidentified finch	0	0	0.00	1	1	0.03	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
savannah sparrow	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	1	1	0.00
ruby-crowned kinglet	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	1	1	0.00
northern shrike	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
house wren	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
<b>Group Total</b>	<b>962</b>	<b>96</b>	<b>20.04</b>	<b>507</b>	<b>59</b>	<b>14.49</b>	<b>264</b>	<b>224</b>	<b>4.40</b>	<b>302</b>	<b>187</b>	<b>6.29</b>	<b>206</b>	<b>81</b>	<b>4.29</b>	<b>2241</b>	<b>647</b>	<b>9.38</b>

\* Mean use=# birds/20 min.

**Table 3.** Avian mean use, by species group, observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species Group Species	Fall 2007			Winter 2007-2008			Spring 2008			Summer 2008			Fall 2008			Overall		
	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*
<b>Waterfowl</b>																		
Canada goose	230	5	4.79	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	230	5	0.96
<b>Group Total</b>	<b>230</b>	<b>5</b>	<b>4.79</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>230</b>	<b>5</b>	<b>0.96</b>
<b>Crows and Allies</b>																		
common raven	33	20	0.69	30	17	0.86	31	17	0.52	6	6	0.13	20	18	0.42	120	78	0.50
Steller's jay	15	14	0.31	2	2	0.06	9	9	0.15	15	14	0.31	10	9	0.21	51	48	0.21
gray jay	1	1	0.02	0	0	0.00	4	2	0.07	0	0	0.00	11	8	0.23	16	11	0.07
<b>Group Total</b>	<b>49</b>	<b>35</b>	<b>1.02</b>	<b>32</b>	<b>19</b>	<b>0.91</b>	<b>44</b>	<b>28</b>	<b>0.73</b>	<b>21</b>	<b>20</b>	<b>0.44</b>	<b>41</b>	<b>35</b>	<b>0.85</b>	<b>187</b>	<b>137</b>	<b>0.78</b>
<b>Woodpeckers</b>																		
northern flicker	5	5	0.10	0	0	0.00	4	4	0.07	5	5	0.10	4	4	0.08	18	18	0.08
hairy woodpecker	1	1	0.02	2	2	0.06	4	4	0.07	4	4	0.08	3	3	0.06	14	14	0.06
red-breasted sapsucker	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
pileated woodpecker	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
downy woodpecker	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
<b>Group Total</b>	<b>7</b>	<b>7</b>	<b>0.15</b>	<b>2</b>	<b>2</b>	<b>0.06</b>	<b>10</b>	<b>10</b>	<b>0.17</b>	<b>9</b>	<b>9</b>	<b>0.19</b>	<b>7</b>	<b>7</b>	<b>0.15</b>	<b>35</b>	<b>35</b>	<b>0.15</b>
<b>Raptors/Vultures/Owls</b>																		
turkey vulture	1	1	0.02	0	0	0.00	6	5	0.10	6	6	0.13	4	4	0.08	17	16	0.07
red-tailed hawk	0	0	0.00	2	2	0.06	0	0	0.00	4	4	0.08	1	1	0.02	7	7	0.03
northern harrier	4	2	0.08	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	4	2	0.02
Cooper's hawk	1	1	0.02	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	2	2	0.01
unidentified accipiter hawk	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
sharp-shinned hawk	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00

\* Mean use=# birds/20 min.

**Table 3.** Avian mean use, by species group, observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species Group Species	Fall 2007			Winter 2007-2008			Spring 2008			Summer 2008			Fall 2008			Overall		
	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*
northern pygmy-owl	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
merlin	1	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.00
bald eagle	0	0	0.00	0	0	0.00	1	1	0.02	0	0	0.00	0	0	0.00	1	1	0.00
<b>Group Total</b>	<b>9</b>	<b>7</b>	<b>0.19</b>	<b>2</b>	<b>2</b>	<b>0.06</b>	<b>9</b>	<b>8</b>	<b>0.15</b>	<b>10</b>	<b>10</b>	<b>0.21</b>	<b>5</b>	<b>5</b>	<b>0.10</b>	<b>35</b>	<b>32</b>	<b>0.15</b>
<b>Pigeons/Doves</b>																		
band-tailed pigeon	4	1	0.08	0	0	0.00	14	9	0.23	13	12	0.27	0	0	0.00	31	22	0.13
<b>Group Total</b>	<b>4</b>	<b>1</b>	<b>0.08</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>14</b>	<b>9</b>	<b>0.23</b>	<b>13</b>	<b>12</b>	<b>0.27</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>31</b>	<b>22</b>	<b>0.13</b>
<b>Gamebirds</b>																		
blue grouse	0	0	0.00	0	0	0.00	11	11	0.18	1	1	0.02	0	0	0.00	12	12	0.05
<b>Group Total</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>11</b>	<b>11</b>	<b>0.18</b>	<b>1</b>	<b>1</b>	<b>0.02</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>12</b>	<b>12</b>	<b>0.05</b>
<b>Goatsuckers</b>																		
common nighthawk	0	0	0.00	0	0	0.00	5	5	0.08	6	4	0.13	0	0	0.00	11	9	0.05
<b>Group Total</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>5</b>	<b>5</b>	<b>0.08</b>	<b>6</b>	<b>4</b>	<b>0.13</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>11</b>	<b>9</b>	<b>0.05</b>
<b>Swifts/Hummingbirds</b>																		
rufous hummingbird	0	0	0.00	0	0	0.00	0	0	0.00	8	7	0.17	2	2	0.04	10	9	0.04
<b>Group Total</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>8</b>	<b>7</b>	<b>0.17</b>	<b>2</b>	<b>2</b>	<b>0.04</b>	<b>10</b>	<b>9</b>	<b>0.04</b>
<b>Cranes/Rails</b>																		
sandhill crane	8	1	0.17	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	8	1	0.03
<b>Group Total</b>	<b>8</b>	<b>1</b>	<b>0.17</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>8</b>	<b>1</b>	<b>0.03</b>
<b>Other</b>																		
unidentified bird	5	2	0.10	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	5	2	0.02

\* Mean use=# birds/20 min.

**Table 3.** Avian mean use, by species group, observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species Group Species	Fall 2007			Winter 2007-2008			Spring 2008			Summer 2008			Fall 2008			Overall		
	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*	# Birds	# Obs.	Mean Use*
<b>Group Total</b>	<b>5</b>	<b>2</b>	<b>0.10</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>5</b>	<b>2</b>	<b>0.02</b>
<b>Gulls/Terns</b>																		
ring-billed gull	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	1	1	0.02	1	1	0.00
<b>Group Total</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>1</b>	<b>1</b>	<b>0.02</b>	<b>1</b>	<b>1</b>	<b>0.00</b>
<b>Grand Total</b>	<b>1274</b>	<b>154</b>	<b>26.54</b>	<b>543</b>	<b>82</b>	<b>15.51</b>	<b>357</b>	<b>295</b>	<b>5.95</b>	<b>370</b>	<b>250</b>	<b>7.71</b>	<b>262</b>	<b>131</b>	<b>5.46</b>	<b>2806</b>	<b>912</b>	<b>11.74</b>

\* Mean use=# birds/20 min.

**Table 4.** Avian percent composition\* and frequency, sorted by species group, observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species Group Species	Fall 2007		Winter 2007-2008		Spring 2008		Summer 2008		Fall 2008		Overall	
	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected
<b>Songbirds</b>												
pine siskin	39.3	20.8	63.5	31.4	1.4	6.7	4.9	4.2	6.5	4.2	31.6	13.4
red crossbill	7.5	14.6	21.4	34.3	5.0	16.7	13.2	14.6	0.4	14.6	10.0	15.5
evening grosbeak	9.2	25.0	0.0	0.0	3.1	10.0	4.6	14.6	0.8	14.6	5.2	10.9
dark-eyed junco	1.6	14.6	1.8	17.1	11.5	46.7	11.6	54.2	8.0	54.2	4.8	34.3
cedar waxwing	9.0	8.3	0.0	0.0	0.0	0.0	0.3	2.1	0.0	2.1	4.1	2.1
American robin	2.0	14.6	0.6	5.7	8.4	46.7	4.6	27.1	0.8	27.1	2.7	21.3
tree swallow	0.0	0.0	0.0	0.0	0.8	3.3	1.4	4.2	20.2	4.2	2.2	2.5
white-crowned sparrow	0.0	0.0	0.0	0.0	7.6	28.3	6.2	35.4	0.8	35.4	1.9	15.1
Swainson's Thrush	0.0	0.0	0.0	0.0	2.2	8.3	11.1	52.1	0.0	52.1	1.7	12.6
winter wren	0.5	12.5	0.7	11.4	6.4	30.0	1.9	14.6	1.1	14.6	1.6	15.9
song sparrow	0.0	0.0	0.4	5.7	5.6	33.3	2.7	20.8	4.2	20.8	1.5	17.2
unidentified songbird	3.0	22.9	0.4	5.7	0.3	1.7	0.0	0.0	0.0	0.0	1.5	5.9
chestnut-backed chickadee	0.7	8.3	2.2	5.7	0.0	0.0	1.6	10.4	3.1	10.4	1.2	7.1
golden-crowned kinglet	0.2	2.1	0.4	2.9	1.4	8.3	0.8	4.2	7.6	4.2	1.2	8.4
varied thrush	0.5	12.5	1.1	8.6	1.7	10.0	3.2	22.9	0.8	22.9	1.1	11.7
American pipit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	0.0	1.1	1.7
yellow-rumped warbler	0.0	0.0	0.0	0.0	0.6	3.3	0.0	0.0	6.5	0.0	0.7	3.3
Hutton's vireo	0.0	0.0	0.6	5.7	2.2	13.3	1.1	8.3	0.8	8.3	0.6	6.7
hermit warbler	0.0	0.0	0.0	0.0	3.1	16.7	1.6	12.5	0.0	12.5	0.6	6.7
red-breasted nuthatch	0.3	8.3	0.2	2.9	1.1	6.7	1.1	8.3	1.1	8.3	0.6	6.7
western bluebird	1.0	4.2	0.0	0.0	0.3	1.7	0.0	0.0	0.0	0.0	0.5	1.3
Wilson's warbler	0.0	0.0	0.0	0.0	1.7	10.0	1.1	8.3	0.0	8.3	0.4	4.2

**Table 4.** Avian percent composition\* and frequency, sorted by species group, observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species Group Species	Fall 2007		Winter 2007-2008		Spring 2008		Summer 2008		Fall 2008		Overall	
	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected	Percent Comp.	Frequency % of surveys detected
violet-green swallow	0.0	0.0	0.0	0.0	1.4	5.0	0.0	0.0	1.9	0.0	0.4	2.1
spotted towhee	0.0	0.0	0.0	0.0	1.4	8.3	1.1	8.3	0.0	8.3	0.3	3.8
pacific-slope flycatcher	0.0	0.0	0.0	0.0	0.8	3.3	1.6	12.5	0.0	12.5	0.3	3.3
American goldfinch	0.0	0.0	0.0	0.0	1.7	10.0	0.3	2.1	0.8	2.1	0.3	3.8
willow flycatcher	0.0	0.0	0.0	0.0	0.3	1.7	1.9	10.4	0.0	10.4	0.3	2.5
black-headed grosbeak	0.0	0.0	0.0	0.0	1.4	5.0	0.8	6.3	0.0	6.3	0.3	2.5
warbling vireo	0.0	0.0	0.0	0.0	0.8	5.0	1.1	6.3	0.0	6.3	0.2	2.5
orange-crowned warbler	0.0	0.0	0.0	0.0	1.1	6.7	0.3	2.1	0.0	2.1	0.2	2.1
fox sparrow	0.2	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1	1.7
unidentified swallow	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.1	0.0	2.1	0.1	0.4
yellow warbler	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.1	0.0	2.1	0.1	0.4
mountain bluebird	0.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
golden-crowned sparrow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.1	0.4
western tanager	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.1	0.0	2.1	0.0	0.4
unidentified vireo	0.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
unidentified sparrow	0.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
unidentified flycatcher	0.0	0.0	0.0	0.0	0.3	1.7	0.0	0.0	0.0	0.0	0.0	0.4
unidentified finch	0.0	0.0	0.2	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
savannah sparrow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.4
ruby-crowned kinglet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.4
northern shrike	0.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
house wren	0.0	0.0	0.0	0.0	0.3	1.7	0.0	0.0	0.0	0.0	0.0	0.4
<b>Group Total</b>	<b>75.5</b>		<b>93.4</b>		<b>73.9</b>		<b>81.6</b>		<b>78.6</b>		<b>79.9</b>	





**Table 4.** Avian percent composition\* and frequency, sorted by species group, observed during point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species Group Species	Fall 2007		Winter 2007-2008		Spring 2008		Summer 2008		Fall 2008		Overall	
	Percent Comp.	Frequency % of surveys detected										
<b>Group Total</b>	<b>0.4</b>		<b>0.0</b>		<b>0.0</b>		<b>0.0</b>		<b>0.0</b>		<b>0.2</b>	
<b>Gulls/Terns</b>												
ring-billed gull	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.4
<b>Group Total</b>	<b>0.0</b>		<b>0.0</b>		<b>0.0</b>		<b>0.0</b>		<b>0.4</b>		<b>0.0</b>	
<b>Grand Total</b>	<b>100.0%</b>											

\* Percent composition is the fraction of the total number of individuals

**Table 5a.** Avian species observed by point during Fall point count surveys at the Coyote Crest Wind Resource Area, 2007.

Species	Number of Birds	Number of Obs.	Points					
			H	I	J	K	L	M
pine siskin	501	12	185	47	27	47	170	25
Canada goose	230	5	0	0	177	30	23	0
evening grosbeak	117	13	33	19	40	4	16	5
cedar waxwing	115	4	0	20	40	30	25	0
red crossbill	96	7	51	3	0	8	10	24
unidentified songbird	38	13	1	15	3	1	14	4
common raven	33	20	12	2	10	3	3	3
American robin	25	10	2	17	3	0	0	3
dark-eyed junco	20	7	0	3	10	1	2	4
Steller's jay	15	14	0	5	3	2	4	1
western bluebird	13	2	1	12	0	0	0	0
chestnut-backed chickadee	9	4	0	1	0	0	2	6
sandhill crane	8	1	0	0	8	0	0	0
winter wren	7	6	1	0	1	0	1	4
varied thrush	6	6	2	2	1	0	0	1
unidentified bird	5	2	0	0	0	2	3	0
northern flicker	5	5	1	2	0	0	1	1
red-breasted nuthatch	4	4	1	0	0	0	1	2
northern harrier	4	2	2	2	0	0	0	0
band-tailed pigeon	4	1	0	0	0	0	0	4
golden-crowned kinglet	3	1	0	0	0	0	0	3
fox sparrow	3	3	0	1	0	0	0	2
mountain bluebird	2	1	0	2	0	0	0	0
unidentified vireo	1	1	0	0	1	0	0	0
unidentified sparrow	1	1	0	0	1	0	0	0
unidentified accipiter hawk	1	1	0	0	0	0	1	0
turkey vulture	1	1	1	0	0	0	0	0
sharp-shinned hawk	1	1	0	1	0	0	0	0
red-breasted sapsucker	1	1	0	0	0	0	1	0
northern shrike	1	1	0	0	0	0	1	0
merlin	1	1	0	0	0	1	0	0
hairy woodpecker	1	1	1	0	0	0	0	0
gray jay	1	1	0	0	0	0	1	0
Cooper's hawk	1	1	0	1	0	0	0	0
<b>Grand Total</b>	<b>1274</b>	<b>154</b>	<b>294</b>	<b>155</b>	<b>325</b>	<b>129</b>	<b>279</b>	<b>92</b>

**Table 5b.** Avian species observed by point during Winter point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species	Number of Birds	Number of Obs.	Points					
			H	I	J	K	L	M
pine siskin	345	12	55	116	95	50	20	9
red crossbill	116	14	33	0	0	11	28	44
common raven	30	17	9	7	2	4	5	3
chestnut-backed chickadee	12	3	0	0	0	0	0	12
dark-eyed junco	10	8	1	1	2	1	3	2
varied thrush	6	5	0	0	1	0	5	0
winter wren	4	4	0	0	0	1	1	2
Hutton's vireo	3	3	0	0	0	0	2	1
American robin	3	3	0	0	0	0	1	2
unidentified songbird	2	2	0	0	0	0	1	1
Steller's jay	2	2	1	1	0	0	0	0
song sparrow	2	2	0	1	0	0	0	1
red-tailed hawk	2	2	1	0	0	0	0	1
hairy woodpecker	2	2	1	1	0	0	0	0
golden-crowned kinglet	2	1	0	0	0	0	0	2
unidentified finch	1	1	0	1	0	0	0	0
red-breasted nuthatch	1	1	1	0	0	0	0	0
<b>Grand Total</b>	<b>543</b>	<b>82</b>	<b>102</b>	<b>128</b>	<b>100</b>	<b>67</b>	<b>66</b>	<b>80</b>

**Table 5c.** Avian species observed by point during Spring point count surveys at the Coyote Crest Wind Resource Area, 2008.

Species	Number of Birds	Number of Obs.	Points					
			H	I	J	K	L	M
dark-eyed junco	41	32	9	10	3	6	10	3
common raven	31	17	5	13	1	2	5	5
American robin	30	28	8	4	6	3	6	3
white-crowned sparrow	27	23	9	8	7	0	2	1
winter wren	23	20	1	1	4	5	5	7
song sparrow	20	20	2	5	0	6	3	4
red crossbill	18	11	4	2	1	1	10	0
band-tailed pigeon	14	9	0	3	0	1	6	4
hermit warbler	11	10	2	2	0	2	2	3
evening grosbeak	11	6	2	1	0	2	1	5
blue grouse	11	11	3	1	1	0	3	3
Steller's jay	9	9	0	2	1	1	3	2
Swainson's thrush	8	5	1	4	0	0	0	3
Hutton's vireo	8	8	1	1	0	0	1	5
Wilson's warbler	6	6	1	3	1	0	0	1
varied thrush	6	6	2	0	1	0	1	2
turkey vulture	6	5	0	0	1	2	1	2
American goldfinch	6	6	1	1	0	0	3	1
violet-green swallow	5	3	0	0	1	0	2	2
spotted towhee	5	5	1	0	0	1	0	3
pine siskin	5	4	0	1	1	0	3	0
golden-crowned kinglet	5	5	0	0	0	0	0	5
common nighthawk	5	5	0	2	3	0	0	0
black-headed grosbeak	5	3	0	2	0	0	0	3
red-breasted nuthatch	4	4	3	0	1	0	0	0
orange-crowned warbler	4	4	1	1	0	0	0	2
northern flicker	4	4	1	1	1	0	0	1
hairy woodpecker	4	4	4	0	0	0	0	0
gray jay	4	2	0	0	0	0	0	4
warbling vireo	3	3	1	1	0	0	0	1
tree swallow	3	2	0	2	1	0	0	0
pacific-slope flycatcher	3	3	0	0	0	0	0	3
yellow-rumped warbler	2	2	0	2	0	0	0	0
willow flycatcher	1	1	0	0	0	0	0	1
western bluebird	1	1	0	0	1	0	0	0
unidentified songbird	1	1	1	0	0	0	0	0
unidentified flycatcher	1	1	0	0	0	0	0	1
pileated woodpecker	1	1	0	1	0	0	0	0
northern pygmy-owl	1	1	1	0	0	0	0	0
house wren	1	1	0	1	0	0	0	0

**Table 5c.** Avian species observed by point during Spring point count surveys at the Coyote Crest Wind Resource Area, 2008.

Species	Number of Birds	Number of Obs.	Points					
			H	I	J	K	L	M
downy woodpecker	1	1	0	1	0	0	0	0
Cooper's hawk	1	1	0	0	1	0	0	0
bald eagle	1	1	0	0	1	0	0	0
<b>Grand Total</b>	<b>357</b>	<b>295</b>	<b>64</b>	<b>76</b>	<b>38</b>	<b>32</b>	<b>67</b>	<b>80</b>

**Table 5d.** Avian species observed by point during Summer point count surveys at the Coyote Crest Wind Resource Area, 2008.

Species	Number of Birds	Number of Obs.	Points					
			H	I	J	K	L	M
red crossbill	49	7	2	12	0	18	11	6
dark-eyed junco	43	27	5	10	4	4	9	11
Swainson's thrush	41	28	6	10	6	5	6	8
white-crowned sparrow	23	19	10	7	2	2	2	0
pine siskin	18	2	1	0	0	0	0	17
evening grosbeak	17	8	8	1	3	1	3	1
American robin	17	14	9	2	1	2	2	1
Steller's jay	15	14	1	2	3	2	6	1
band-tailed pigeon	13	12	2	2	1	1	4	3
varied thrush	12	11	3	1	4	1	2	1
song sparrow	10	10	1	4	1	2	1	1
rufous hummingbird	8	7	5	1	0	1	0	1
winter wren	7	7	1	2	0	0	2	2
willow flycatcher	7	5	0	2	0	0	1	4
turkey vulture	6	6	0	0	3	1	2	0
pacific-slope flycatcher	6	6	0	1	0	1	1	3
hermit warbler	6	6	0	1	0	2	1	2
common raven	6	6	0	0	0	3	2	1
common nighthawk	6	4	0	1	0	1	4	0
chestnut-backed chickadee	6	5	1	0	0	0	0	5
tree swallow	5	2	0	0	4	0	1	0
northern flicker	5	5	0	2	1	2	0	0
Wilson's warbler	4	4	1	1	0	0	0	2
warbling vireo	4	3	2	2	0	0	0	0
spotted towhee	4	4	1	0	0	0	0	3
red-tailed hawk	4	4	1	0	2	0	1	0
red-breasted nuthatch	4	4	2	0	0	0	1	1
Hutton's vireo	4	4	1	0	0	0	1	2
hairy woodpecker	4	4	2	2	0	0	0	0
unidentified swallow	3	1	3	0	0	0	0	0
golden-crowned kinglet	3	2	0	1	0	0	2	0
black-headed grosbeak	3	3	0	2	0	0	1	0
yellow warbler	2	1	0	0	2	0	0	0
western tanager	1	1	0	0	1	0	0	0
orange-crowned warbler	1	1	0	0	0	0	0	1
cedar waxwing	1	1	0	0	0	0	0	1
blue grouse	1	1	0	0	1	0	0	0
American goldfinch	1	1	0	0	0	0	1	0
<b>Grand Total</b>	<b>370</b>	<b>250</b>	<b>68</b>	<b>69</b>	<b>39</b>	<b>49</b>	<b>67</b>	<b>78</b>

**Table 5c.** Avian species observed by point during Fall point count surveys at the Coyote Crest Wind Resource Area, 2008.

Species	Number of Birds	Number of Obs.	Points					
			H	I	J	K	L	M
tree swallow	53	2	0	0	0	3	50	0
American pipit	30	4	0	1	1	27	1	0
dark-eyed junco	21	15	1	10	1	1	3	5
golden-crowned kinglet	20	11	3	2	0	0	3	12
common raven	20	18	7	4	4	0	2	3
yellow-rumped warbler	17	6	4	5	6	0	1	1
pine siskin	17	5	13	0	0	1	3	0
song sparrow	11	9	2	4	0	0	4	1
gray jay	11	8	3	0	0	1	4	3
Steller's jay	10	9	2	3	3	0	2	0
chestnut-backed chickadee	8	6	1	1	0	0	0	6
violet-green swallow	5	2	0	2	3	0	0	0
turkey vulture	4	4	0	1	1	1	1	0
northern flicker	4	4	1	1	0	0	2	0
winter wren	3	3	0	0	0	2	0	1
red-breasted nuthatch	3	3	0	0	0	1	1	1
hairy woodpecker	3	3	1	2	0	0	0	0
white-crowned sparrow	2	2	1	1	0	0	0	0
varied thrush	2	2	0	1	0	0	0	1
rufous hummingbird	2	2	2	0	0	0	0	0
Hutton's vireo	2	2	0	0	0	0	1	1
golden-crowned sparrow	2	1	0	0	0	2	0	0
evening grosbeak	2	1	0	0	0	0	2	0
American robin	2	1	0	0	0	0	2	0
American goldfinch	2	2	0	0	0	1	1	0
savannah sparrow	1	1	0	0	0	1	0	0
red-tailed hawk	1	1	0	1	0	0	0	0
red crossbill	1	1	0	0	0	0	1	0
ruby-crowned kinglet	1	1	0	1	0	0	0	0
ring-billed gull	1	1	0	0	0	0	1	0
fox sparrow	1	1	0	1	0	0	0	0
<b>Grand Total</b>	<b>262</b>	<b>131</b>	<b>41</b>	<b>41</b>	<b>19</b>	<b>41</b>	<b>85</b>	<b>35</b>

**Table 6.** Summary of avian flight heights (includes flying birds only) in relation to the turbine rotor swept area (RSA) during point count surveys at Coyote Crest Wind Resource Area, 2007-2008.

	Fall 2007 Individuals		Winter 2007-2008 Individuals		Spring 2008 Individuals		Summer 2008 Individuals		Fall 2008 Individuals		Overall Individuals	
	#	%	#	%	#	%	#	%	#	%	#	%
<b>Non-raptors</b>												
Above RSA (>126.3m)	214	20.6%	0	0.0%	0	0.0%	3	2.6%	0	0.0%	217	12.3%
Below RSA (<33.8m)	526	50.5%	314	79.7%	71	82.6%	100	87.0%	77	59.2%	1088	61.6%
Within RSA (33.8m–126.3m)	301	28.9%	80	20.3%	15	17.4%	12	10.4%	53	40.8%	461	26.1%
<b>Raptors/Vultures/Owls</b>												
Above RSA (>126.3m)	0	0.0%	0	0.0%	0	0.0%	1	11.1%	0	0.0%	1	3.1%
Below RSA (<33.8m)	6	66.7%	1	50.0%	4	57.1%	1	11.1%	2	40.0%	14	43.8%
Within RSA (33.8m–126.3m)	3	33.3%	1	50.0%	3	42.9%	7	77.8%	3	60.0%	17	53.1%

<sup>1</sup>These values assume a rotor diameter of 92.5 (m) and a hub height of 80 (m)

**Table 7a.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, during Fall 2007.

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
pine siskin	3.17	10.44 (3.23 - 17.65)	86.0	64.7	35.3	0.0
evening grosbeak	0.83	2.44 (0.76 - 4.12)	99.1	65.5	34.5	0.0
cedar waxwing	0.52	2.40 (0.43 - 4.37)	100.0	78.3	21.7	0.0
Canada goose	0.48	4.79 (-1.37 - 10.95)	100.0	0.0	10.0	90.0
red crossbill	0.44	2.00 (0.15 - 3.85)	47.9	53.7	46.3	0.0
unidentified songbird	0.32	0.79 (0.26 - 1.32)	84.2	51.6	48.4	0.0
American robin	0.29	0.52 (0.05 - 0.99)	80.0	25.0	70.0	5.0
western bluebird	0.27	0.27 (-0.14 - 0.68)	100.0	0.0	100.0	0.0
common raven	0.17	0.69 (0.40 - 0.98)	84.8	45.8	29.2	25.0
band-tailed pigeon	0.08	0.08 (-0.06 - 0.22)	100.0	0.0	100.0	0.0
turkey vulture	0.02	0.02 (-0.01 - 0.05)	100.0	0.0	100.0	0.0
red-breasted sapsucker	0.02	0.02 (-0.01 - 0.05)	100.0	0.0	100.0	0.0
merlin	0.02	0.02 (-0.01 - 0.05)	100.0	0.0	100.0	0.0
Cooper's hawk	0.02	0.02 (-0.01 - 0.05)	100.0	0.0	100.0	0.0
winter wren	0.00	0.15 (0.05 - 0.25)	14.3	0.0	0.0	0.0
varied thrush	0.00	0.13 (0.05 - 0.21)	0.0	0.0	0.0	0.0
unidentified vireo	0.00	0.02 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
unidentified sparrow	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
unidentified bird	0.00	0.10 (-0.02 - 0.22)	40.0	100.0	0.0	0.0
unidentified accipiter hawk	0.00	0.02 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
Steller's jay	0.00	0.31 (0.19 - 0.43)	20.0	100.0	0.0	0.0
sharp-shinned hawk	0.00	0.02 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
sandhill crane	0.00	0.17 (-0.10 - 0.44)	100.0	100.0	0.0	0.0
red-breasted nuthatch	0.00	0.08 (0.01 - 0.15)	0.0	0.0	0.0	0.0
northern shrike	0.00	0.02 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
northern harrier	0.00	0.08 (-0.02 - 0.18)	100.0	100.0	0.0	0.0

**Table 7a.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, during Fall 2007.

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
northern flicker	0.00	0.10 (0.03 - 0.17)	0.0	0.0	0.0	0.0
mountain bluebird	0.00	0.04 (-0.03 - 0.11)	100.0	100.0	0.0	0.0
hairy woodpecker	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
gray jay	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
golden-crowned kinglet	0.00	0.06 (-0.04 - 0.16)	0.0	0.0	0.0	0.0
fox sparrow	0.00	0.06 (0.00 - 0.12)	0.0	0.0	0.0	0.0
dark-eyed junco	0.00	0.42 (0.05 - 0.79)	75.0	100.0	0.0	0.0
chestnut-backed chickadee	0.00	0.19 (0.00 - 0.38)	11.1	0.0	0.0	0.0

<sup>1</sup>These values assume a rotor diameter of 92.5 (m) and a hub height of 80 (m)

**Table 7b.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, during Winter 2007-2008.

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
red crossbill	1.33	3.31 (0.96 - 5.66)	72.4	44.4	55.6	0.0
pine siskin	0.77	9.86 (4.79 - 14.93)	85.5	90.9	9.1	0.0
common raven	0.27	0.86 (0.50 - 1.22)	83.3	62.5	37.5	0.0
red-tailed hawk	0.03	0.06 (-0.01 - 0.13)	100.0	50.0	50.0	0.0
varied thrush	0.03	0.17 (0.00 - 0.34)	50.0	66.7	33.3	0.0
winter wren	0.00	0.11 (0.02 - 0.20)	25.0	100.0	0.0	0.0
unidentified songbird	0.00	0.06 (-0.01 - 0.13)	0.0	0.0	0.0	0.0
unidentified finch	0.00	0.03 (-0.02 - 0.08)	100.0	100.0	0.0	0.0
Steller's jay	0.00	0.06 (-0.01 - 0.13)	0.0	0.0	0.0	0.0
song sparrow	0.00	0.06 (-0.01 - 0.13)	0.0	0.0	0.0	0.0
red-breasted nuthatch	0.00	0.03 (-0.02 - 0.08)	0.0	0.0	0.0	0.0
Hutton's vireo	0.00	0.09 (-0.01 - 0.19)	0.0	0.0	0.0	0.0
hairy woodpecker	0.00	0.06 (-0.01 - 0.13)	0.0	0.0	0.0	0.0
golden-crowned kinglet	0.00	0.06 (-0.03 - 0.15)	0.0	0.0	0.0	0.0
dark-eyed junco	0.00	0.29 (0.09 - 0.49)	20.0	100.0	0.0	0.0
chestnut-backed chickadee	0.00	0.34 (-0.18 - 0.86)	58.3	100.0	0.0	0.0
American robin	0.00	0.09 (-0.01 - 0.19)	0.0	0.0	0.0	0.0

<sup>1</sup>These values assume a rotor diameter of 92.5 (m) and a hub height of 80 (m)

**Table 7c.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, during Spring 2008.

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
evening grosbeak	0.15	0.18 (0.03 - 0.33)	81.8	0.0	100.0	0.0
American goldfinch	0.08	0.10 (0.04 - 0.16)	83.3	0.0	100.0	0.0
common nighthawk	0.08	0.08 (-0.02 - 0.18)	100.0	0.0	100.0	0.0
common raven	0.04	0.52 (0.19 - 0.85)	77.4	90.9	9.1	0.0
turkey vulture	0.03	0.10 (0.02 - 0.18)	100.0	66.7	33.3	0.0
bald eagle	0.02	0.02 (-0.01 - 0.05)	100.0	0.0	100.0	0.0
band-tailed pigeon	0.02	0.23 (0.09 - 0.37)	100.0	92.9	7.1	0.0
violet-green swallow	0.02	0.08 (0.00 - 0.16)	100.0	80.0	20.0	0.0
yellow-rumped warbler	0.00	0.03 (-0.01 - 0.07)	0.0	0.0	0.0	0.0
winter wren	0.00	0.38 (0.24 - 0.52)	0.0	0.0	0.0	0.0
Wilson's warbler	0.00	0.10 (0.04 - 0.16)	0.0	0.0	0.0	0.0
willow flycatcher	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
western bluebird	0.00	0.02 (-0.01 - 0.05)	100.0	0.0	0.0	0.0
white-crowned sparrow	0.00	0.45 (0.28 - 0.62)	14.8	100.0	0.0	0.0
warbling vireo	0.00	0.05 (0.00 - 0.10)	0.0	0.0	0.0	0.0
varied thrush	0.00	0.10 (0.04 - 0.16)	16.7	100.0	0.0	0.0
unidentified songbird	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
unidentified flycatcher	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
tree swallow	0.00	0.05 (-0.01 - 0.11)	100.0	100.0	0.0	0.0
Swainson's thrush	0.00	0.13 (0.02 - 0.24)	0.0	0.0	0.0	0.0
Steller's jay	0.00	0.15 (0.07 - 0.23)	0.0	0.0	0.0	0.0
spotted towhee	0.00	0.08 (0.02 - 0.14)	0.0	0.0	0.0	0.0
song sparrow	0.00	0.33 (0.23 - 0.43)	0.0	0.0	0.0	0.0
red crossbill	0.00	0.30 (0.12 - 0.48)	88.9	100.0	0.0	0.0
red-breasted nuthatch	0.00	0.07 (0.02 - 0.12)	0.0	0.0	0.0	0.0
pacific-slope flycatcher	0.00	0.05 (-0.01 - 0.11)	0.0	0.0	0.0	0.0

**Table 7c.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, during Spring 2008.

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
pileated woodpecker	0.00	0.02 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
pine siskin	0.00	0.08 (0.01 - 0.15)	100.0	100.0	0.0	0.0
orange-crowned warbler	0.00	0.07 (0.02 - 0.12)	0.0	0.0	0.0	0.0
northern pygmy-owl	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
northern flicker	0.00	0.07 (0.02 - 0.12)	25.0	100.0	0.0	0.0
Hutton's vireo	0.00	0.13 (0.06 - 0.20)	0.0	0.0	0.0	0.0
house wren	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
hermit warbler	0.00	0.18 (0.09 - 0.27)	0.0	0.0	0.0	0.0
hairy woodpecker	0.00	0.07 (0.02 - 0.12)	50.0	100.0	0.0	0.0
gray jay	0.00	0.07 (-0.01 - 0.15)	100.0	100.0	0.0	0.0
golden-crowned kinglet	0.00	0.08 (0.02 - 0.14)	0.0	0.0	0.0	0.0
downy woodpecker	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
dark-eyed junco	0.00	0.68 (0.49 - 0.87)	26.8	100.0	0.0	0.0
Cooper's hawk	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
blue grouse	0.00	0.18 (0.10 - 0.26)	0.0	0.0	0.0	0.0
black-headed grosbeak	0.00	0.08 (0.00 - 0.16)	0.0	0.0	0.0	0.0
American robin	0.00	0.50 (0.38 - 0.62)	13.3	100.0	0.0	0.0

<sup>1</sup>These values assume a rotor diameter of 92.5 (m) and a hub height of 80 (m)

**Table 7d.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, during Summer 2008.

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
turkey vulture	0.13	0.13 (0.00 - 0.26)	100.0	0.0	100.0	0.0
common nighthawk	0.13	0.13 (0.01 - 0.25)	100.0	0.0	100.0	0.0
tree swallow	0.10	0.10 (-0.04 - 0.24)	100.0	0.0	100.0	0.0
band-tailed pigeon	0.06	0.27 (0.14 - 0.40)	61.5	62.5	37.5	0.0
red-tailed hawk	0.02	0.08 (0.01 - 0.15)	75.0	33.3	33.3	33.3
yellow warbler	0.00	0.04 (-0.03 - 0.11)	100.0	100.0	0.0	0.0
winter wren	0.00	0.15 (0.07 - 0.23)	0.0	0.0	0.0	0.0
Wilson's warbler	0.00	0.08 (0.01 - 0.15)	0.0	0.0	0.0	0.0
willow flycatcher	0.00	0.15 (0.04 - 0.26)	28.6	100.0	0.0	0.0
western tanager	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
white-crowned sparrow	0.00	0.48 (0.30 - 0.66)	0.0	0.0	0.0	0.0
warbling vireo	0.00	0.08 (0.00 - 0.16)	0.0	0.0	0.0	0.0
varied thrush	0.00	0.25 (0.14 - 0.36)	0.0	0.0	0.0	0.0
unidentified swallow	0.00	0.06 (-0.04 - 0.16)	100.0	0.0	0.0	100.0
Swainson's thrush	0.00	0.85 (0.61 - 1.09)	0.0	0.0	0.0	0.0
Steller's jay	0.00	0.31 (0.19 - 0.43)	0.0	0.0	0.0	0.0
spotted towhee	0.00	0.08 (0.01 - 0.15)	0.0	0.0	0.0	0.0
song sparrow	0.00	0.21 (0.11 - 0.31)	0.0	0.0	0.0	0.0
rufous hummingbird	0.00	0.17 (0.07 - 0.27)	100.0	100.0	0.0	0.0
red crossbill	0.00	1.02 (0.22 - 1.82)	100.0	100.0	0.0	0.0
red-breasted nuthatch	0.00	0.08 (0.01 - 0.15)	0.0	0.0	0.0	0.0
pacific-slope flycatcher	0.00	0.13 (0.05 - 0.21)	0.0	0.0	0.0	0.0
pine siskin	0.00	0.38 (-0.20 - 0.96)	94.4	100.0	0.0	0.0
orange-crowned warbler	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
northern flicker	0.00	0.10 (0.03 - 0.17)	0.0	0.0	0.0	0.0
Hutton's vireo	0.00	0.08 (0.01 - 0.15)	0.0	0.0	0.0	0.0

**Table 7d.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, during Summer 2008.

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
hermit warbler	0.00	0.13 (0.05 - 0.21)	0.0	0.0	0.0	0.0
hairy woodpecker	0.00	0.08 (0.01 - 0.15)	0.0	0.0	0.0	0.0
golden-crowned kinglet	0.00	0.06 (-0.02 - 0.14)	0.0	0.0	0.0	0.0
evening grosbeak	0.00	0.35 (0.05 - 0.65)	88.2	100.0	0.0	0.0
dark-eyed junco	0.00	0.90 (0.58 - 1.22)	14.0	100.0	0.0	0.0
common raven	0.00	0.13 (0.05 - 0.21)	50.0	100.0	0.0	0.0
cedar waxwing	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
chestnut-backed chickadee	0.00	0.13 (0.04 - 0.22)	0.0	0.0	0.0	0.0
blue grouse	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
black-headed grosbeak	0.00	0.06 (0.00 - 0.12)	0.0	0.0	0.0	0.0
American robin	0.00	0.35 (0.18 - 0.52)	29.4	100.0	0.0	0.0
American goldfinch	0.00	0.02 (-0.01 - 0.05)	100.0	100.0	0.0	0.0

<sup>1</sup>These values assume a rotor diameter of 92.5 (m) and a hub height of 80 (m)

**Table 7c.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, during Fall 2008.

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
tree swallow	1.04	1.10 (-0.61 - 2.81)	100.0	5.7	94.3	0.0
turkey vulture	0.06	0.08 (0.01 - 0.15)	100.0	25.0	75.0	0.0
common raven	0.04	0.42 (0.27 - 0.57)	70.0	85.7	14.3	0.0
American robin	0.04	0.04 (-0.03 - 0.11)	100.0	0.0	100.0	0.0
yellow-rumped warbler	0.00	0.35 (0.08 - 0.62)	94.1	100.0	0.0	0.0
winter wren	0.00	0.06 (0.00 - 0.12)	0.0	0.0	0.0	0.0
white-crowned sparrow	0.00	0.04 (-0.01 - 0.09)	0.0	0.0	0.0	0.0
violet-green swallow	0.00	0.10 (-0.02 - 0.22)	100.0	100.0	0.0	0.0
varied thrush	0.00	0.04 (-0.01 - 0.09)	0.0	0.0	0.0	0.0
Steller's jay	0.00	0.21 (0.10 - 0.32)	10.0	100.0	0.0	0.0
song sparrow	0.00	0.23 (0.11 - 0.35)	9.1	0.0	0.0	0.0
savannah sparrow	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
rufous hummingbird	0.00	0.04 (-0.01 - 0.09)	100.0	100.0	0.0	0.0
red-tailed hawk	0.00	0.02 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
red crossbill	0.00	0.02 (-0.01 - 0.05)	100.0	0.0	0.0	0.0
ruby-crowned kinglet	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
red-breasted nuthatch	0.00	0.06 (0.00 - 0.12)	0.0	0.0	0.0	0.0
ring-billed gull	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
pine siskin	0.00	0.35 (-0.07 - 0.77)	100.0	100.0	0.0	0.0
northern flicker	0.00	0.08 (0.01 - 0.15)	25.0	100.0	0.0	0.0
Hutton's vireo	0.00	0.04 (-0.01 - 0.09)	0.0	0.0	0.0	0.0
hairy woodpecker	0.00	0.06 (0.00 - 0.12)	0.0	0.0	0.0	0.0
gray jay	0.00	0.23 (0.09 - 0.37)	27.3	100.0	0.0	0.0
golden-crowned sparrow	0.00	0.04 (-0.03 - 0.11)	0.0	0.0	0.0	0.0
golden-crowned kinglet	0.00	0.42 (0.19 - 0.65)	0.0	0.0	0.0	0.0
fox sparrow	0.00	0.02 (-0.01 - 0.05)	0.0	0.0	0.0	0.0

**Table 7e.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, during Fall 2008.

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
evening grosbeak	0.00	0.04 (-0.03 - 0.11)	100.0	0.0	0.0	0.0
dark-eyed junco	0.00	0.44 (0.26 - 0.62)	0.0	0.0	0.0	0.0
chestnut-backed chickadee	0.00	0.17 (0.06 - 0.28)	0.0	0.0	0.0	0.0
American pipit	0.00	0.63 (-0.29 - 1.55)	100.0	100.0	0.0	0.0
American goldfinch	0.00	0.04 (-0.01 - 0.09)	100.0	100.0	0.0	0.0

<sup>1</sup>These values assume a rotor diameter of 92.5 (m) and a hub height of 80 (m)

**Table 7f.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA) at the Coyote Crest Wind Resource Area, 2007-2008 .

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
pine siskin	0.77	3.71 (10.92 - 26.00)	86.3	76.0	24.0	0.0
red crossbill	0.31	1.17 (3.41 - 8.25)	70.0	61.7	38.3	0.0
tree swallow	0.24	0.26 (-0.45 - 2.99)	100.0	6.8	93.2	0.0
evening grosbeak	0.20	0.62 (1.40 - 4.72)	96.6	65.9	34.1	0.0
common raven	0.09	0.50 (2.21 - 2.79)	78.3	68.4	24.1	7.6
cedar waxwing	0.10	0.49 (0.45 - 4.39)	99.1	78.3	21.7	0.0
Canada goose	0.10	0.96 (-1.37 - 10.95)	100.0	0.0	10.0	90.0
American robin	0.07	0.32 (1.17 - 2.03)	40.3	45.2	51.6	3.2
unidentified songbird	0.06	0.17 (0.25 - 1.11)	78.0	51.6	48.4	0.0
western bluebird	0.06	0.06 (-0.10 - 0.56)	100.0	0.0	100.0	0.0
turkey vulture	0.05	0.07 (0.19 - 0.51)	100.0	29.4	70.6	0.0
common nighthawk	0.05	0.05 (0.07 - 0.39)	100.0	0.0	100.0	0.0
band-tailed pigeon	0.03	0.13 (0.43 - 0.87)	83.9	69.2	30.8	0.0
red-tailed hawk	0.01	0.03 (0.07 - 0.23)	85.7	50.0	33.3	16.7
American goldfinch	0.01	0.04 (0.10 - 0.28)	88.9	66.7	33.3	0.0
varied thrush	0.00	0.13 (0.51 - 0.83)	12.5	75.0	25.0	0.0
violet-green swallow	0.00	0.04 (0.06 - 0.36)	100.0	90.0	10.0	0.0
red-breasted sapsucker	0.00	0.00 (-0.01 - 0.05)	100.0	0.0	100.0	0.0
merlin	0.00	0.00 (-0.01 - 0.05)	100.0	0.0	100.0	0.0
Cooper's hawk	0.00	0.01 (-0.01 - 0.07)	50.0	0.0	100.0	0.0
bald eagle	0.00	0.00 (-0.01 - 0.05)	100.0	0.0	100.0	0.0
yellow warbler	0.00	0.01 (-0.03 - 0.11)	100.0	100.0	0.0	0.0
yellow-rumped warbler	0.00	0.08 (0.12 - 0.68)	84.2	100.0	0.0	0.0
winter wren	0.00	0.18 (0.77 - 1.07)	4.5	100.0	0.0	0.0
Wilson's warbler	0.00	0.04 (0.11 - 0.31)	0.0	0.0	0.0	0.0
willow flycatcher	0.00	0.03 (0.06 - 0.28)	25.0	100.0	0.0	0.0

**Table 7f.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA) at the Coyote Crest Wind Resource Area, 2007-2008 .

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
western tanager	0.00	0.00 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
white-crowned sparrow	0.00	0.22 (0.89 - 1.27)	7.7	100.0	0.0	0.0
warbling vireo	0.00	0.03 (0.05 - 0.25)	0.0	0.0	0.0	0.0
unidentified vireo	0.00	0.00 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
unidentified swallow	0.00	0.01 (-0.04 - 0.16)	100.0	0.0	0.0	100.0
unidentified sparrow	0.00	0.00 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
unidentified flycatcher	0.00	0.00 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
unidentified finch	0.00	0.00 (-0.02 - 0.08)	100.0	100.0	0.0	0.0
unidentified bird	0.00	0.02 (-0.02 - 0.22)	40.0	100.0	0.0	0.0
unidentified accipiter hawk	0.00	0.00 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
Swainson's thrush	0.00	0.21 (0.78 - 1.26)	0.0	0.0	0.0	0.0
Steller's jay	0.00	0.21 (1.00 - 1.12)	7.8	100.0	0.0	0.0
sharp-shinned hawk	0.00	0.00 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
spotted towhee	0.00	0.04 (0.10 - 0.28)	0.0	0.0	0.0	0.0
song sparrow	0.00	0.18 (0.80 - 1.00)	2.3	0.0	0.0	0.0
savannah sparrow	0.00	0.00 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
sandhill crane	0.00	0.03 (-0.10 - 0.44)	100.0	100.0	0.0	0.0
rufous hummingbird	0.00	0.04 (0.10 - 0.32)	100.0	100.0	0.0	0.0
ruby-crowned kinglet	0.00	0.00 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
red-breasted nuthatch	0.00	0.07 (0.22 - 0.44)	0.0	0.0	0.0	0.0
ring-billed gull	0.00	0.00 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
pacific-slope flycatcher	0.00	0.04 (0.08 - 0.30)	0.0	0.0	0.0	0.0
pileated woodpecker	0.00	0.00 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
orange-crowned warbler	0.00	0.02 (0.03 - 0.17)	0.0	0.0	0.0	0.0
northern shrike	0.00	0.00 (-0.01 - 0.05)	100.0	100.0	0.0	0.0
northern pygmy-owl	0.00	0.00 (-0.01 - 0.05)	0.0	0.0	0.0	0.0

**Table 7f.** Avian flight height characteristics in relation to the turbine rotor swept area (RSA)<sup>1</sup> at the Coyote Crest Wind Resource Area, 2007-2008 .

<b>Species</b>	<b>Encounter Rate</b>	<b>Mean Use</b> # birds/ 20 min. (90% confidence interval)	<b>Percent Flying</b>	<b>Percent Below RSA</b>	<b>Percent Within RSA</b>	<b>Percent Above RSA</b>
northern harrier	0.00	0.02 (-0.02 - 0.18)	100.0	100.0	0.0	0.0
northern flicker	0.00	0.08 (0.26 - 0.50)	11.1	100.0	0.0	0.0
mountain bluebird	0.00	0.01 (-0.03 - 0.11)	100.0	100.0	0.0	0.0
Hutton's vireo	0.00	0.07 (0.23 - 0.47)	0.0	0.0	0.0	0.0
house wren	0.00	0.00 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
hermit warbler	0.00	0.07 (0.23 - 0.47)	0.0	0.0	0.0	0.0
hairy woodpecker	0.00	0.06 (0.18 - 0.40)	14.3	100.0	0.0	0.0
gray jay	0.00	0.07 (0.17 - 0.49)	43.8	100.0	0.0	0.0
golden-crowned sparrow	0.00	0.01 (-0.03 - 0.11)	0.0	0.0	0.0	0.0
golden-crowned kinglet	0.00	0.14 (0.44 - 0.94)	0.0	0.0	0.0	0.0
fox sparrow	0.00	0.02 (0.01 - 0.15)	0.0	0.0	0.0	0.0
downy woodpecker	0.00	0.00 (-0.01 - 0.05)	0.0	0.0	0.0	0.0
dark-eyed junco	0.00	0.56 (? - ?)	25.2	100.0	0.0	0.0
chestnut-backed chickadee	0.00	0.15 (0.31 - 1.15)	22.9	100.0	0.0	0.0
blue grouse	0.00	0.05 (0.15 - 0.35)	0.0	0.0	0.0	0.0
black-headed grosbeak	0.00	0.03 (0.06 - 0.28)	0.0	0.0	0.0	0.0
American pipit	0.00	0.13 (-0.29 - 1.55)	100.0	100.0	0.0	0.0

<sup>1</sup>These values assume a rotor diameter of 92.5 (m) and a hub height of 80 (m)

**Table 8.** Incidental observations of birds during point counts at the Coyote Crest Wind Resource Area, 2007-2008.

Species	Fall 2007	Winter 2007-2008	Spring 2008	Summer 2008	Fall 2008	Overall
	Number of individuals					
red-winged blackbird	0	0	0	0	620	620
red crossbill	20	37	0	0	0	57
dark-eyed junco	0	1	0	0	45	46
Canada goose	20	0	0	0	0	20
band-tailed pigeon	0	0	0	7	3	10
red-tailed hawk	1	1	4	1	2	9
common raven	6	0	2	0	0	8
turkey vulture	0	1	1	0	5	7
northern harrier	5	0	0	0	1	6
unidentified buteo	2	1	0	0	0	3
ruffed grouse	0	0	1	0	2	3
bald eagle	2	1	0	0	0	3
merlin	0	1	0	0	1	2
common nighthawk	0	0	1	1	0	2
blue grouse	0	0	0	0	2	2
barred owl	0	0	1	1	0	2
American kestrel	0	0	0	0	2	2
wild turkey	0	0	1	0	0	1
western bluebird	0	0	0	0	1	1
unidentified hawk	0	0	1	0	0	1
unidentified bird	1	0	0	0	0	1
sharp-shinned hawk	0	0	1	0	0	1
hermit thrush	0	0	0	0	1	1

**Table 8.** Incidental observations of birds during point counts at the Coyote Crest Wind Resource Area, 2007-2008.

Species	Fall 2007	Winter 2007-2008	Spring 2008	Summer 2008	Fall 2008	Overall
	Number of individuals					
fox sparrow	0	0	0	0	1	1
Cooper's hawk	0	0	0	0	1	1
brown creeper	0	1	0	0	0	1
<b>Grand Total</b>	<b>57</b>	<b>44</b>	<b>13</b>	<b>10</b>	<b>687</b>	<b>811</b>

Table 9. Comparison of raptor and other bird use per 20-minute survey with other studies of wind projects using the similar survey methodology.

Project Site	Mean Use by Raptors					Mean Use by Other Birds					Duration of Survey (minutes)	Plot Radius	Reference	Correction factor <sup>b</sup>
	Spr	Sum	Fall	Win	Ann	Spr	Sum	Fall	Win	Ann				
Windy Point, WA	0.79	N/A	N/A	0.77		16.41	N/A	N/A	13.55		20	800m	Johnson et al. (2006a)	
Klickitat County PEIS study area, WA	0.96	1.12	N/A	N/A		14.39	12.36	N/A	N/A		20	800m	Johnson et al. (2006)	
Klondike Phase III, OR				0.13					34.90		20	800m	Mabee et al. (2005)	
Lower Linden Ranch, WA	1.37					11.63					20	800m	Johnson et al. (2007c)	
Hocor Ridge, WA	1.42	1.33				10.00	17.92				20	800m	Johnson et al. (2006b)	
Sand Ridge, WA	0.34	0.46				6.19	5.21				20	800m	Johnson et al. (2007b)	
Bighorn Site, WA	0.40	0.44				9.72	10.04				20	800m	Johnson and Erickson (2004)	
Altamont Pass, CA	3.80	3.00	4.60	3.00		N/A	N/A	N/A	N/A		10	800m	Orloff and Flannery (1992)	x 2
Cotterel Mountain, ID	1.69	1.89	1.49	0.18		14.26	11.22	7.65	8.86		20	800m	USDI, BLM (2005)	
Foot Creek WEC, WY	0.49	0.76	0.97	0.21		N/A	N/A	N/A	N/A		40	800m	Johnson et al. (2000)	x 0.5
Buffalo Ridge Phase III, MN	0.64	0.54	0.85	0.18		N/A	N/A	N/A	N/A		20	800m	Erickson et al. (2002)	
Buffalo Ridge Phase II, MN	0.84	0.69	0.83	0.10		N/A	N/A	N/A	N/A		20	800m	Erickson et al. (2002)	

Windy Flats, WA	0.77	0.88	0.82	0.86		21.51	13.96	16.03	24.56		20	800m	Johnson et al. (2007a)	
Elkhorn, OR	0.81	1.56	0.79			29.43	12.15	20.36			20	800m	WEST (2005b)	
Columbia Hills, WA	0.94	1.34	0.78	0.26							20	800m	Erickson et al. (2002)	
Buffalo Ridge Phase I, MN	0.65	0.43	0.76	0.13		N/A	N/A	N/A	N/A		20	800m	Erickson et al. (2002)	
Kittitas Valley, WA	1.01	1.03	0.73			14.13	8.13	11.47			20	800m	Erickson et al. (2003b)	
Zintel Canyon, WA	0.19	0.30	0.70	0.51							20	800m	Erickson et al. (2002)	
Buffalo Ridge, MN	0.68	0.52	0.69	0.44		N/A	N/A	N/A	N/A		20	800m	Erickson et al. (2002)	
Maiden, WA	0.30	0.35	0.62	0.15		4.58	4.71	11.93	8.58		30	800m	Young et al. (2002a)	x 0.67
White Creek, WA	0.46	0.87	0.56	0.38		9.91	9.10	15.24	11.01		20	800m	Kronner et al. (2005b)	
Shepherds Flat, OR	0.44	0.49	0.55	0.32		8.98	14.71	5.22	3.97		20	800m	Welch and Schleder (2006)	
Leaning Juniper, OR	0.39	1.07	0.53	0.24		11.36	5.68	19.09	47.00		20	800m	Kronner et al. (2005a)	
Combine Hills, OR	0.80	0.56	0.44	0.64		5.96	2.63	1.34	2.68		30	800m	Young et al. (2002b)	x 0.67
Klondike Phase I, OR	0.47	0.39	0.38	0.56		N/A	N/A	N/A	N/A		20	800m	Erickson et al. (2002)	
Wild Horse, WA	0.46	0.46	0.31	0.14		5.78	5.78	4.02	3.59		30	800m	Erickson et al. (2003a)	x 0.67
Stateline Wind EIS, OR/WA	0.59	0.40	0.25	0.42		7.09	5.47	29.34	9.04		20	800m	URS and West (2001)	

Biglow Canyon project area, OR	0.31	0.39	0.19	0.32		10.17	3.34	7.18	11.66		30	800m	WEST (2005a)	x 0.67
Nine Canyon, WA	0.35	0.20	0.16	0.31							20	800m	Erickson et al. (2002)	
Vantage, WA	0.29	0.40	0.14	0.15		10.57	8.83	3.70	4.90		20	800m	Jefferey et al (2007)	
Biglow Canyon WRA, OR	0.37	0.34	0.11	0.25		6.76	5.09	6.71	17.07		30	800m	WEST (2005a)	x 0.67
High Winds, CA					6.72					474 <sup>a</sup>	20	800m	Kerlinger et al. (2005)	
Combine study of: Kittitas Valley; Desert Claim; Wild Horse, WA	0.89	0.85	0.76	0.51	0.75	11.72	8.18	7.99	15.64	10.88	20	800m	Young et al. (2003)	0
Hatchet Ridge, CA	0.70	1.03	0.91	0.12	0.69	5.24	6.94	6.32	4.03	5.65	30	800m	Young et al. (2007b)	x0.67
Stateline Wind, OR/WA	0.28	0.26	0.16	0.02	0.22					23.08	10	800m	Erickson et al. (2004)	x 2
Dry Lake, AZ	0.08	0.14	0.21	0.14	0.15	8.10	11.02	16.10	18.00	13.52	30	800m	Young et al. (2007a)	x0.67
Coyote Crest, WA	0.15	0.21	0.19 (0.10 Fall 2008)	0.06	0.15	5.80	7.50	5.35	15.46	11.59	20	800m	TtEC	0



**Appendix 1a.** Flight directions of birds observed during Fall point count surveys at the Coyote Crest Wind Resource Area, 2007.

Species	Number Flying	Number of Observations	Percentage of Flights in Various Flight Directions								
			N	NE	E	SE	S	SW	W	NW	Variable
merlin	1	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Cooper's hawk	1	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Grand Total</b>	<b>1037</b>	<b>77</b>	<b>8.4</b>	<b>5.2</b>	<b>6.8</b>	<b>20.1</b>	<b>26.7</b>	<b>4.9</b>	<b>3.8</b>	<b>5.3</b>	<b>18.9</b>

**Appendix 1b** Flight directions of birds observed during Winter point count surveys at the Coyote Crest Wind Resource Area, 2007-2008.

Species	Number Flying	Number of Observations	Percentage of Flights in Various Flight Directions								
			N	NE	E	SE	S	SW	W	NW	Variable
pine siskin	275	9	22.2	0.0	3.3	18.2	20.0	0.0	7.3	0.0	29.1
red crossbill	81	8	3.7	27.2	33.3	0.0	0.0	0.0	3.7	0.0	32.1
common raven	24	12	29.2	0.0	0.0	33.3	4.2	8.3	12.5	12.5	0.0
chestnut-backed chickadee	7	2	0.0	0.0	0.0	0.0	85.7	0.0	0.0	0.0	14.3
varied thrush	3	2	0.0	0.0	0.0	66.7	0.0	33.3	0.0	0.0	0.0
red-tailed hawk	2	2	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0
dark-eyed junco	2	1	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
winter wren	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
unidentified finch	1	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Grand Total</b>	<b>396</b>	<b>38</b>	<b>18.4</b>	<b>5.6</b>	<b>9.1</b>	<b>15.2</b>	<b>15.7</b>	<b>1.3</b>	<b>6.6</b>	<b>0.8</b>	<b>27.5</b>

**Appendix 1c.** Flight directions of birds observed during Spring point count surveys at the Coyote Crest Wind Resource Area, 2008.

Species	Number Flying	Number of Observations	Percentage of Flights in Various Flight Directions								
			N	NE	E	SE	S	SW	W	NW	Variable
common raven	21	7	4.8	0.0	0.0	76.2	9.5	0.0	4.8	4.8	0.0
band-tailed pigeon	14	9	14.3	0.0	28.6	0.0	0.0	21.4	14.3	21.4	0.0
dark-eyed junco	10	6	30.0	0.0	20.0	0.0	20.0	20.0	0.0	10.0	0.0
turkey vulture	6	5	33.3	0.0	0.0	0.0	0.0	0.0	0.0	33.3	33.3
violet-green swallow	5	3	0.0	40.0	20.0	0.0	0.0	40.0	0.0	0.0	0.0
evening grosbeak	5	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
common nighthawk	5	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
white-crowned sparrow	4	3	25.0	25.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
American robin	4	4	0.0	0.0	25.0	0.0	25.0	0.0	25.0	25.0	0.0
red crossbill	3	2	0.0	0.0	33.3	66.7	0.0	0.0	0.0	0.0	0.0
pine siskin	2	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
hairy woodpecker	2	2	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0
gray jay	2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
tree swallow	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
pileated woodpecker	1	1	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
northern flicker	1	1	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
bald eagle	1	1	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
American goldfinch	1	1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
<b>Grand Total</b>	<b>88</b>	<b>54</b>	<b>10.2</b>	<b>4.5</b>	<b>19.3</b>	<b>21.6</b>	<b>10.2</b>	<b>9.1</b>	<b>4.5</b>	<b>9.1</b>	<b>11.4</b>

**Appendix 1d.** Flight directions of birds observed during Summer point count surveys at the Coyote Crest Wind Resource Area, 2008.

Species	Number Flying	Number of Observations	Percentage of Flights in Various Flight Directions								
			N	NE	E	SE	S	SW	W	NW	Variable
red crossbill	42	4	28.6	26.2	0.0	0.0	40.5	0.0	4.8	0.0	0.0
pine siskin	17	1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
evening grosbeak	11	3	0.0	0.0	27.3	0.0	0.0	0.0	0.0	72.7	0.0
band-tailed pigeon	8	7	0.0	12.5	12.5	25.0	12.5	12.5	12.5	12.5	0.0
rufous hummingbird	7	6	0.0	28.6	28.6	0.0	0.0	0.0	14.3	0.0	28.6
turkey vulture	6	6	0.0	0.0	0.0	0.0	33.3	0.0	0.0	16.7	50.0
dark-eyed junco	6	4	16.7	16.7	0.0	0.0	0.0	0.0	0.0	0.0	66.7
tree swallow	5	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
American robin	5	3	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
common nighthawk	4	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
unidentified swallow	3	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
red-tailed hawk	3	3	66.7	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0
yellow warbler	2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
common raven	2	2	0.0	0.0	0.0	50.0	0.0	0.0	0.0	50.0	0.0
American goldfinch	1	1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
<b>Grand Total</b>	<b>122</b>	<b>46</b>	<b>18.9</b>	<b>12.3</b>	<b>4.9</b>	<b>2.5</b>	<b>30.3</b>	<b>0.8</b>	<b>4.9</b>	<b>9.0</b>	<b>16.4</b>

**Appendix 1e.** Flight directions of birds observed during Fall point count surveys at the Coyote Crest Wind Resource Area, 2008.

Species	Number Flying	Number of Observations	Percentage of Flights in Various Flight Directions								
			N	NE	E	SE	S	SW	W	NW	Variable
tree swallow	53	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
American pipit	28	2	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.4
yellow-rumped warbler	15	4	0.0	0.0	0.0	0.0	60.0	6.7	0.0	33.3	0.0
pine siskin	12	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
common raven	7	6	28.6	0.0	0.0	28.6	0.0	0.0	28.6	14.3	0.0
violet-green swallow	5	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
turkey vulture	4	4	0.0	0.0	25.0	0.0	0.0	0.0	25.0	25.0	25.0
gray jay	3	2	0.0	0.0	0.0	33.3	0.0	66.7	0.0	0.0	0.0
rufous hummingbird	2	2	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
American robin	2	1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Steller's jay	1	1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
red-tailed hawk	1	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
northern flicker	1	1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
American goldfinch	1	1	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
<b>Grand Total</b>	<b>135</b>	<b>30</b>	<b>3.0</b>	<b>0.7</b>	<b>10.4</b>	<b>2.2</b>	<b>7.4</b>	<b>3.0</b>	<b>4.4</b>	<b>5.2</b>	<b>63.7</b>