3.4 PLANTS AND ANIMALS

WAC 463-42-332 Natural environment – Plants and animals.

(1) Habitat for and number or diversity of species of plants, fish, or other wildlife *– The applicant shall describe all habitat types, vegetation, wetlands, animal life, and aquatic life which might reasonably be affected by construction, operation, or cessation of construction or operation of the energy facility and any associated facilities. Assessment of these factors shall include density and distribution information. The application shall contain a full description of each measure to be taken by the applicant to protect all habitat types, vegetation, wetlands, animal life, and aquatic life from the effects of project construction, operation, abandonment, termination, or cessation of operations.*

(2) Unique species *– Any endangered species or noteworthy species or habitat shall receive special attention.*

(3) Fish or wildlife migration routes *– The applicant shall identify all fish or wildlife migration routes, which may be affected by the energy facility or by any discharge to the environment.*

3.4.1 Vegetation

This section describes the biological resources of the Project area, assesses the potential impacts of the proposed Kittitas Valley Wind Power Project on these resources, and describes the mitigation planned for the Project. A complete report of the rare plant investigation and habitat characterization is provided as Exhibit 8,'Rare Plant Report'. Relevant agencies were contacted to initiate informal consultation and to identify potential concerns relating to the Project. Plant resources were assessed within 1,000 feet of proposed Project infrastructure sites (e.g. roads, turbine strings, substation site, operations and maintenance facility, etc.) The information presented below was gathered from published literature, resource management agencies, local biologists, and on-the-ground surveys.

Habitat maps of the Project area have been developed based on recent aerial photos of the Project area obtained from the Kittitas County Public Works Department and verified with field observations by botanists from CH2MHill and Eagle Cap Consulting. This information has been entered into a GIS database to allow accurate calculations to be made of the total land area occupied by different habitat types (shrub steppe, wetlands, coniferous forest, riparian, etc.) and has been provided in Exhibit 9, 'Project Habitat Map'.

The Project site, as described in detail in Section 2.1 'Site Description', will be built on areas of exposed ridge tops, most of which is classified as shrub steppe and much of which is degraded due to historic grazing practices. No development is planned for any wetland areas.

3.4.1.1 Physiography and Soils

The Kittitas Valley Project area is located at the eastern base of the Cascade Mountain range, at the western edge of the Columbia Basin physiographic province (Franklin and Dyrness, 1988). This lowland province, surrounded on all sides by mountain ranges and highlands, covers a vast area of eastern Washington, and extends south into Oregon. The province is characterized by moderate topography incised by a network of streams and rivers which empty into the centrally located Columbia River.

The Project area extends over a nine by six kilometer portion of land which consists primarily of long north-south trending ridges. Between the ridges are ephemeral and perennial creeks that flow into the Yakima River, which is located just south of the Project area. Slopes within the Project area generally range from 5º to 20º, but can reach 40º or more in some of the stream canyons. Elevations in the Project area range from 670 m above mean sea level along Highway 97, to 960 m at the top of String G.

The soils on the Project area ridgetops are primarily complexes of very shallow to moderately deep durixerolls that formed in alluvium and glacial drift over a duripan. Loess mixed with volcanic ash is typically present at the surface. Ridgetop soils in this portion of the Project area (which includes the majority of the turbines) include the Lablue, Reelow, Sketter, and Reeser series (USDA, 2002*a*).

3.4.1.2 Climate

The Kittitas Valley Project area is located at the western edge of the Columbia Basin physiographic province. This large province occurs within the rain shadow of the Cascade mountain range, and is characterized by semi-arid conditions, as well as a large range of annual temperatures indicative of a continental climate. However, the relatively close proximity of the Pacific Ocean and the dominant westerly winds of the region combine to moderate the continental influence (Franklin and Dyrness, 1988).

The Cle Elum, WA weather station is located in the Yakima River valley, approximately 14 km northwest of the Project area. The coldest average monthly temperatures at this station occur in January, with an average minimum of -6.7º Centigrade (C), and a maximum of 1.6º C. The warmest average monthly temperatures occur in July, when the minimum is 10.6º C and the maximum is 27.3º C. The average total annual precipitation for Cle Elum is 56.5 centimeters (cm). The wettest month is December with an average total monthly precipitation of 10.6 cm, while the driest month is July with an average total monthly precipitation of 0.89 cm. Snowfall typically occurs from November through March, with the heaviest average monthly snowfall of 62.2 cm occurring in January. The total annual average snowfall is 205 cm (WRCC, 2000*a*).

In the other direction, the Ellensburg, WA weather station is located downstream from the Project area along the Yakima River, approximately 20 km to the southwest. The coldest average monthly temperatures at Ellensburg also occur in January, and are similar to Cle Elum, with a minimum of -7.6º C, and a maximum of 1.2º C. Likewise the warmest average monthly temperatures in Ellensburg occur in July, when the minimum is 11.5º C and the maximum is 29.0º C. The average total annual precipitation at Ellensburg, is 22.6 cm, less than half that of Cle Elum. Similarly, Ellensburg's average annual snowfall (71.4 cm) is nearly one third that of Cle Elum (WRCC, 2000*b*).

It should be noted that the highest point in the Project area is over 400 m higher in elevation than the reporting station in both Ellensburg and Cle Elum. Therefore the Project area would likely experience cooler temperatures, and perhaps receive slightly more precipitation, than is reported for either station.

3.4.1.3 Existing Plant Communities

The project area is at the western edge of the Central Arid Steppe zone defined by the Washington State Gap Analysis (Cassidy *et al.,* 1997). Their classifications for Eastern Washington steppe vegetation closely follow Daubenmire (1970). The Central Arid Steppe zone typically contains plant communities dominated by big sagebrush (*Artemisia tridentata*), bluebunch wheatgrass (*Pseudoroegnaria spicata*), and Sandberg's bluegrass (*Poa secunda*). In many areas of the zone, the introduced species cheatgrass (*Bromus tectorum*) is common due to past and present disturbance factors (Cassidy *et al.,* 1997). The higher portions of the Project area, border the Ponderosa Pine (*Pinus ponderosa*) zone.

The Project area lies at the western edge of the big sagebrush/bluebunch wheatgrass vegetation zone as defined by Franklin and Dyrness (1988). They describe a number of other shrub species that may be present in the zone (all in small numbers), in addition to big sagebrush. These include: rabbitbrushes (*Chrysothamnus* spp. and *Ericameria* spp.), threetip sagebrush (*Artemisia tripartita*), and spiny hopsage (*Grayia spinosa*). The bluebunch wheatgrass is supplemented by variable amounts of needle-and-thread grass (*Hesperostipa comata*), Thurber's needlegrass (*Achnatherum thurberianum*), Cusick's bluegrass (*Poa cusickii*), and bottlebrush (*Elymus elymoides*). They also describe a low layer of plants consisting of Sandberg's bluegrass, cheatgrass, and flatspine stickseed (*Lappula occidentalis*).

Franklin and Dyrness (1988) also describe a number of plant associations that occur on lithosols (shallow soils) within the shrub-steppe region. These are particularly important for the purposes of this investigation, as lithosolic habitats occur commonly on the ridgetops within the Project area. Daubenmire (1970) recognizes a variety of lithosolic plant associations. All are typically composed of a uniform layer of Sandberg's bluegrass, over a crust of mosses and lichens, with a low shrub layer above. The primary difference in these communities is in the composition of the shrub layer. Within the Project area, the shrub layer on these lithosols is principally composed of several different buckwheat (*Eriogonum*) species.

The above descriptions of generalized vegetation zones and associations are based on climax communities, which typically develop over time in the absence of anthropogenic disturbance. Within the Project area (as in most of the shrub-steppe region) many of the plant communities have been significantly modified due to numerous disturbance factors. Some of this disturbance is visible in Exhibit 2, 'Aerial Photo with Project Site Layout'. Disturbance is especially pronounced in the valley bottoms and side slopes. Cattle grazing, wildfire frequency changes, introduction of exotic plant species, ground disturbance from development activities, and a host of other factors have resulted in plant communities that are kept at an early- to mid-seral stage of development. Non-native aggressive invader species are common, and often dominate the community. Within the Project area, the effects of these anthropogenic disturbances are common, although most of the communities are still dominated by native species. In many places, however, cheatgrass and bulbous bluegrass (*Poa bulbosa*) dominate the grass layer, and noxious weeds, such as diffuse knapweed (*Centaurea diffusa*), are common.

Several riparian areas associated with springs, seeps, and creeks are also present in the Kittitas Valley project area. These habitats are typically degraded from heavy cattle use, and much of the riparian vegetation has been removed. Common native riparian associates include chokecherry (*Prunus virginiana*), golden current (*Ribes aureum*), various rush species (*Juncus* spp.), various speedwell species (*Veronica* spp.), and yellow monkeyflower (*Mimulus guttatus*).

Table 3.4.1-1 below describes the general cover types and habitat conditions found along the proposed turbine string ridgetops. In addition, a cover type map for the entire Project area has been prepared and is shown in Exhibit 9, 'Project Habitat Map'.

Habitat quality within the Project area ranges from 'poor' in many of the valley bottoms, to 'good' along some of the ridgetops and flats (see the legend at the bottom of Table 3.4.1.3 for a description of habitat quality rating criteria). Generally, the ridgetop habitats are in 'fair' to 'good' condition. More specifically, the ridgetop lithosols are typically in 'good' condition, containing a relatively intact vegetative structure and few non-native species. The deeper-soiled ridgetop habitats are generally in 'fair' condition, with certain areas dominated or co-dominated by non-native species in the grass layer.

The non-ridgetop habitats are generally more degraded from past disturbance than the ridgetop areas. This is especially true in the valley bottoms, where cattle grazing and road impacts have created large areas dominated by non-native invader species. Overall, the non-ridgetop habitats within the potential impact corridors are in 'fair' condition. However, habitat quality ranges from 'poor' in many of the valley bottoms, to 'good' on some of the canyon slopes.

Table 3.4.1-1
Summary of Habitats Associated with the Proposed Turbine Strings of the Project

Facility	Habitat Description[1]
Turbine String 'A'	Shallow-soiled lithosol alternates with deeper-soiled shrub-steppe habitat. Habitat quality is generally good: native species dominate the shallow soils, and native shrubs and forbs combine with native and non-native grasses to dominate the deeper soils.
Turbine String 'B'	The north half of this string is located on a mosaic of shallow-soiled rocky areas and deeper-soiled shrub-steppe habitat. Habitat quality is generally good: native species dominate the shallow soils, and native shrubs and forbs combine with native and non-native grasses to dominate the deeper soils. Various limited ground and vegetation disturbance has occurred here from recreational activities (gun club). One noxious weed population was observed along a jeep trail which runs along this section of the proposed string. The south half of this string contains the same mosaic of shallow and deeper soils, however, a fire within the last 10 years has removed most of the shrubs, and the habitat now consists of a mix of native and non-native grasses and forbs, with widely scattered small shrubs. Habitat quality is generally fair. Weedy species are more common in the deeper-soiled areas, and several populations of noxious weeds are present.
Turbine String 'C'	Shallow-soiled grassland and lithosol alternates with deeper-soiled shrub-steppe habitat. Habitat quality is generally good: native species dominate the shallow soils, and native shrubs and forbs combine with native and non-native grasses to dominate the deeper soils.
Turbine String 'D'	The north half of this string is similar to String C with alternating lithosols and deeper-soiled habitats in generally good condition. The south half of this string is a continuation of the same deeper-soiled shrub-steppe habitat.

Table 3.4.1-1
Summary of Habitats Associated with the Proposed Turbine Strings of the Project

Facility	Habitat Description[1]
Turbine String 'E'	This string consists mainly of deeper-soiled shrub-steppe habitat, with inclusions of shallow-soiled lithosol in the north half, and small patches of non-native species throughout. Much of the habitat in the string is in fair to good condition (i.e., dominated by native shrubs and forbs, and a mix of native and non-native grasses), although some areas have been burned recently, and one noxious weed population is present along the jeep trail, which runs the length of the ridgetop.
Turbine String 'F'	This string contains mainly shallow-soiled lithosol, with some areas of deeper-soiled shrub-steppe in the south half. Habitat quality is generally good: native species dominate the shallow soils, and native shrubs and forbs combine with native and non-native grasses to dominate the deeper soils. However, a large gravel pit operation at the north end of this string has completely displaced the lithosol habitat in that area. A rough jeep trail runs the length of this proposed string.
Turbine String 'G'	This string consists almost entirely of shallow-soiled lithosol habitat, with small areas of deeper-soiled shrub-steppe and deciduous thicket habitats in the north half and at the south end. Habitat quality is generally good: native species dominate the shallow soils, and native shrubs and forbs combine with native and non-native grasses to dominate the deeper soils. Two noxious weed populations were observed, one along a road at the north end of the string, and another in a small draw near the south end of the string. A well-developed jeep trail is present along the north half of the corridor.
Turbine String 'H"	This string also consists almost entirely of shallow-soiled lithosol habitat, with areas of deeper-soiled shrub-steppe habitat at the north end, midpoint, and the south end. Habitat quality is generally good: native species dominate the shallow soils, and native shrubs and forbs combine with native and non-native grasses to dominate the deeper soils. However, there are two areas of major soil disturbance (blading) near the midpoint of the string, where the lithosol species have been largely replaced by non-native forbs and grasses. In addition, three populations of noxious weeds were observed along this string, near roads. Finally, one portion of the lithosol in the south end shows signs of heavy livestock use, although native plants continue to dominate. A well-developed two-lane gravel access road runs the length of this ridgetop, providing access for local landowners.
Turbine String 'I'	This string consists primarily of shallow-soiled lithosol habitat, although portions of the middle section, and all of the southern tip, contain deeper-soiled shrub-steppe habitat, as well as small inclusions of grassland. Habitat quality is generally good: native species dominate the shallow soils, and native shrubs and forbs combine with native and non-native grasses to dominate the deeper soils. However, the areas of grassland are only fair quality, dominated by non-native grasses and forbs, and one noxious weed population was observed at the south end of the string.

Table 3.4.1-1
Summary of Habitats Associated with the Proposed Turbine Strings of the Project

Facility	Habitat Description[1]
Turbine String 'J'	The south half of the string is located mainly on deeper-soiled shrub-steppe habitat, with one area of shallow-soiled lithosol. Habitat quality is generally good: native species dominate the shallow soils, and native shrubs and forbs combine with native and non-native grasses to dominate the deeper soils. However, the south tip of the string consists of fair quality, shallow-soiled grassland dominated by non-native grasses and forbs. Two populations of noxious weeds were observed in this half of the string. The north half of this string contains the same general pattern of shallow and deeper soils, however, a fire within the last 5-10 years removed most of the shrubs, and the deeper-soiled habitat now consists of a mix of native and non-native grasses and forbs, with widely scattered small shrubs. Although overall habitat quality is fair, several small inclusions of generally good quality lithosol are present in this half of the string.
Intervening Facilities (access roads, electric lines, O&M facilities, etc., located between turbine strings)	Over 40% of the potential project impact corridor is located off of the ridgetops, between the turbine strings. Primarily, these are connecting facilities such as access roads and electrical lines, but include O&M areas also. These non-ridgetop habitats are typically deeper-soiled, and are generally more degraded from past disturbance than the ridgetop habitats. This is especially true in the valley bottoms, where cattle grazing and road impacts have created large areas dominated by non-native invader species. Overall, the non-ridgetop habitats within the impact corridors are in fair condition. However, habitat quality ranges from poor in many of the valley bottoms, to good on some of the canyon slopes.

Legend: Habitat Description[1]: In the habitat descriptions, ratings of habitat quality are based on general observed patterns of plant species diversity, native versus non-native ratios, and overall vegetative structure. The habitat ratings are qualitative only, based on general visual observations. Quantitative habitat quality information was not collected. The following categories were used: 'Excellent' (high species diversity with negligible amounts of non-native weedy species, along with well developed native vegetative structure); 'Good' (moderate to high species diversity dominated by native plants, with significant inclusions of non-native species in certain areas, and fair to well-developed native plant structure); 'Fair' (moderate diversity with non-native species dominance or co-dominance in some or all layers, and fair native structure); and 'Poor' (low species diversity, dominated by non-native, weedy invaders in some or all layers, and poor native plant structure.

3.4.1.4 Existing Land Uses

The majority of lands within the Project area are privately owned, although several parcels are owned and administered by the State of Washington Department of Natural Resources (DNR). Cattle grazing is the primary land use, although some rural homesite development has also taken place. The area is also used, on a much more limited basis, for recreational activities (primarily hunting). In addition, communications antenna clusters are located at several points within the Project area. A high-voltage transmission line corridor crosses on a roughly east-west axis through the middle of the Project area. This corridor contains four BPA steel-tower electrical transmission lines. Additionally, there is a PSE wood-pole transmission line that roughly parallels the four-line corridor, and a BPA steel-tower line running through the northern portion of the project area.

Several paved roads run through the Project area. Highway 97 parallels the proposed turbine strings in the eastern portion of the Project area, and Highway 10 runs along the Yakima River, just to the south of the Project area. In addition, numerous smaller unpaved roads and jeep trails are located within the Project area boundaries. These range from all-weather gravel roads, to two-track trails.

3.4.1.5 Rare Plant Investigation Methodology

3.4.1.5.1 Study Area

For the purposes of the rare plant investigation, the study area included all lands within 50 m of the centerline of proposed facilities, as defined through July of 2002. This included proposed turbine strings, underground and overhead electrical lines, access roads, staging areas, and substation sites. In most cases, the resultant study corridors were 100 m wide, although in many areas, several Project facilities are proposed to be located along side each other, resulting in a wider study corridor.

The study area was designed to take in all ground potentially disturbed by the Project, however, changes to proposed facilities layouts occurred in late 2002, after the botanical field survey season. Approximately seventy-five percent of the present layout was surveyed.

County-maintained roads were not analyzed, as these roads are not proposed for upgrade by the Project. All other proposed new or existing access roads likely to be upgraded by the Project were included in the rare plant study area.

Although for the purposes of impact analysis, only the study corridors were considered, a larger area was addressed during the prefield review in determining which rare plant species had potential for occurrence within the Project area. This was necessary to analyze the Project area in a regional context, and ensure that the target species list for the investigation was complete.

3.4.1.5.2 Target Species

For the rare plant investigation, the target species included all plant taxa listed as ‘Endangered’, or ‘Threatened’ by the US Fish and Wildlife Service (USFWS). In addition, taxa that have been formally proposed, or are candidates for such federal listing, were also considered target species. Target species also included all plant taxa defined as ‘Endangered’,

'Threatened', 'Sensitive', 'Review', or 'Extirpated' by the Washington Natural Heritage Program (WNHP). Taxa meeting the above criteria were targeted by the investigation to determine their presence or absence within the study area. Determinations of status for rare plant species were based on the WNHP's list of tracked plant species (WNHP 2002*a*), and entries published in the US Federal Register.

3.4.1.5.3 Prefield Review

As part of the investigation, a review of available literature and other sources was conducted to identify the rare plant species potentially found within the Project area. As per Section 7(c)(1) of the US Endangered Species Act of 1973 (16 USC 1531, *et seq.*, as amended), a letter was sent to the USFWS requesting a list of federally Threatened, Endangered, or Proposed taxa which have potential to occur within the Project area. In addition, the WNHP was contacted to obtain element occurrence records for any known rare plant populations in the vicinity. To supplement the information provided by the above agencies, a number of other sources were consulted. These sources provided additional information on the potential rare plant species for the Project, including critical information such as habitat preferences, morphological characteristics, phenologic development timelines, and species ranges. Sources included: taxonomic keys and species guides (Flora ID Northwest, 2001; USFWS, 2001; WNHP, 1999; Hickman, 1993; Hitchcock and Cronquist, 1973; Hitchcock *et al.,* 1964); online databases of common and rare plant species (ECCI, 2002; USDA, 2002*b*); species lists from nearby areas (PNL 2000); environmental documents from other energy projects in the area (BPA, 2002; USFS, 1998; Dames and Moore Consultants, 1998*a,b*); and Natural Resources Conservation Service (NRCS) soils data (USDA, 2002*a*). Agency, university, and private botanists with local knowledge of the region were also contacted (Beck, 2001; Downs, 2001; Simmons, 2001).

Using data collected during the prefield review, a list of rare plant species potentially occurring in the project area was compiled, Table 3.4.1-2 below. Habitat preferences and identification periods were derived from the literature for each potential species. Using this information, along with topographic maps of the Project area, a field survey plan was developed to guide the timing and intensity of the field surveys.

Table 3.4.1-2
Rare Plant Species with Potential for Occurrence in the Kittitas Valley Wind Power Project Area

Name		Status1	Typical Habitat	ID Period
Agoseris elata	**Tall agoseris**	S	Meadows, open woods, and exposed rocky ridgetops	June-August
Anemone nuttalliana	**Pasque flower**	S	Prairies to mountain slopes, mostly on well-drained soil	May-August
Astragalus arrectus	**Palouse milk-vetch**	S	Grassy hillsides, sagebrush flats, river bluffs, and openings in open ponderosa pine and Douglas fir forests	April-July

Table 3.4.1-2 Rare Plant Species with Potential for Occurrence in the Kittitas Valley Wind Power Project Area				
Astragalus columbianus		LT (SC)	Sagebrush-steppe	March-June
Astragalus misellus var. *pauper*	**Pauper milk-vetch**	S	Open ridgetops and slopes Aprilmid	June
Camissonia pygmaea	**Dwarf evening-primrose**	LT	Unstable soil or gravel in steep talus, dry washes, banks and roadcuts	June-August
Camissonia scapoidea	**Naked-stemmed eveningprimrose**	S	Sagebrush desert, mostly in sandy, gravelly areas	May-July
Carex buxbaumii	**Buxbaum's sedge**	S	Peat bogs, marshes, wet meadows, and other wet places	June-August
Carex comosa	**Bristly sedge**	S	Marshes, lake shores, and wet meadows	May-July
Carex hystricina	**Porcupine sedge**	S	Wet ground near creeks, seeps, and springs	May-June
Collomia macrocalyx	**Bristle-flowered collomia**	S	Dry, open habitats late Mayearly	June
Corydalis aurea	**Golden corydalis**	R1	Varied habitats, moist to dry and well drained soil	May-July
Cryptantha leucophaea	**Gray cryptantha**	S (SC)	Unstable sandy substrate along the Columbia River	May-June
Cryptantha rostellata	**Beaked cryptantha**	S	Very dry microsites within sagebrush steppe	late April –mid June
Cyperus bipartitus	**Shining flatsedge**	S	Streambanks and other wet, low places in valleys and lowlands	August-September
Cypripedium fasciculatum	**Clustered lady's slipper**	S (SC)	Mid- to late seral Douglas fir or ponderosa pine forest	early May-mid June
Delphinium viridescens	**Wenatchee larkspur**	LT (SC)	Moist meadows, moist microsites in open coniferous forest, springs, seeps, and riparian areas	July
Eatonella nivea	**White eatonella**	LT	Dry, sandy, or volcanic areas within sagebrush-steppe	May
Erigeron basalticus	**Basalt daisy**	LT (C)	Crevices in basalt cliffs on canyon walls	May-June
Erigeron piperianus	**Piper's daisy**	S	Dry, open places, often with sagebrush	May-June
Hackelia hispida var. *disjuncta*	**Sagebrush stickseed**	S	Rocky talus	May-June

Table 3.4.1-2 Rare Plant Species with Potential for Occurrence in the Kittitas Valley Wind Power Project Area				
Iliamna longisepala	**Longsepal globemallow**	S	Sagebrush-steppe and open ponderosa pine and Douglas fir forest	June-August
Lomatium tuberosum	**Hoover's desert-parsley**	LT (SC)	Loose talus and drainage channels of open ridgetops within sagebrush-steppe	March-early April
Mimulus suksdorfii	**Suksdorf's monkey-flower**	S	Open, moist to rather dry places within sagebrush-steppe	mid April-July
Nicotiana attenuata	**Coyote tobacco**	S	Dry, sandy bottom lands, dry rocky washes, and other dry open places	June-September
Oenothera cespitosa ssp.*cespitosa*	**Cespitose evening-primrose**	S	Open sites on talus or other rocky slopes, roadcuts, and the Columbia River terrace	late April-mid June
Ophioglossum pusillum	**Adder's-tongue**	LT	Terrestrial in pastures, old fields, roadside ditches, and flood plain woods, in seasonally wet soil	June-September
Pediocactus simpsonii var.*robustior*	**Hedgehog cactus**	R1	Desert valleys and low mountains	May-July
Pellaea breweri	**Brewer's cliff-brake**	S	Rock crevices, ledges, talus slopes, and open rocky soil	April-August
Penstemon eriantherus var.*whitedii*	**Fuzzytongue penstemon**	R1	Dry open places	May-July
Phacelia minutissima	**Least phacelia**	S (SC)	Moist to fairly dry open places	July
Polygonum polygaloides ssp.*kelloggii*	**White-margin knotweed**	R1	Meadows and vernal pools	June-August
Pyrrocoma hirta var. *sonchifolia*	**Sticky goldenweed**	R1	Meadows and open or sparsely wooded slopes	July-August
Sidalcea oregana var. *calva*	**Oregon checker-mallow**	LE (PE)	Moist meadows, open coniferous stands, and along the edge of shrub and hardwood thickets	mid June-late July
Silene seelyi	**Seely's silene**	LT (SC)	Shaded crevices in ultramafic to basaltic cliffs and rock outcrops, and among boulders in talus	May-August
Spiranthes porrifolia	**Western ladies-tresses**	S	Wet meadows, streams, bogs, and seepage slopes	May-August

Table 3.4.1-2 Rare Plant Species with Potential for Occurrence in the Kittitas Valley Wind Power Project Area				
Tauschia hooveri	**Hoover's tauschia**	LT (SC)	basalt lithosols within sagebrush-steppe	March-mid April

3.4.1.5.4 Field Investigation

All fieldwork was performed by trained botanists who have experience performing rare plant surveys in the region. Exhibit 8, 'Rare Plant Report', contains a summary of each investigator's education and experience.

Immediately prior to the first rare plant survey of the site in April, the surveyors visited a known population of Hoover's tauschia (*Tauschia hooveri*) near Fort Simcoe south of Yakima. This visit served to confirm assumptions regarding identification characteristics for the species, and verified the timing of the early-season surveys.

Three pedestrian field surveys were performed during the 2002 growing season to locate rare plant species within the study area. The first of these took place on April 25 and 26, and was designed to located populations of Hoover's tauschia and other early-blooming species. Only habitats capable of supporting these early-blooming target species were searched (primarily the shallow-soiled ridgetops and talus slopes). However, because these habitats are common in the area, the majority of the study area was surveyed. Two botanists visually surveyed most of the ridgetop habitats within the study area at a level sufficient to determine the presence of the target early-season species. Where road access was available and no suitable habitat existed, the survey was cursory and took place from a vehicle. Where suitable habitat was found, the survey was accomplished by performing meander pedestrian transects, zigzagging back and forth across the survey corridor.

The second rare plant survey was performed from June 3-7, 2002. This survey was designed to locate those target species that are identifiable during mid- to late-spring (this includes the majority of the target rare plant species). The June survey was conducted by three field botanists, who surveyed all ground within the study area using an 'intuitive controlled' survey pattern. The 'intuitive controlled' pattern is a variable intensity survey protocol designed to cover all ground within a study area at a level sufficient to locate all occurrences of the target species. The botanists, primarily working singly, walked each survey corridor, crossing back and forth from one edge of the corridor to the other in a zigzag pattern. The intensity of the pattern, and the speed at which the surveyors walked, was variable, and depended on the structural complexity of the habitat, the visibility of the target species, and the probability of species occurrence in a given area. In some high probability, low visibility habitats, a tight grid pattern was walked. Care was taken to thoroughly search all unique features and any high probability habitats encountered.

The third survey took place from July 17 through July 22, 2002 and was designed to locate certain rare plant species not identifiable in the spring. These were all species associated with riparian habitats, and the summer survey focused on the springs, seeps, and creeks of the project area. This survey used a 'targeted' survey pattern to search only the riparian habitats, which had been identified previously during the spring fieldwork. Two botanists traveled,

either on foot or by vehicle, to each riparian habitat, intensively searched the area on foot, and then continued on to the next identified riparian habitat.

During all surveys, the investigators kept a list of all vascular plants encountered, and made informal collections of unknown species for later identification in the laboratory. *Vascular Plants of the Pacific Northwest* (Hitchcock *et al*., 1964) and *Flora of the Pacific Northwest* (Hitchcock and Cronquist, 1973) were used as the primary authorities for vascular plant species identification. Updated taxonomy was referenced in the NRCS PLANTS database, (which also serves as the source for the common plant names used in this document) (USDA, 2002*b*). Notes were also recorded regarding plant associations, land use patterns, unusual habitats, etc.

When target plant populations were found, data were collected regarding population size, location, associated habitat, and a number of other parameters. A standard rare plant site form was used to collect the information. Photographs of the population (both close-ups and general habitat shots) were taken using a Nikon® 950 digital camera. The location of the population was mapped on 7.5" US Geological Survey topographic quadrangle sheets. Garmin® 12-Series Geographic Positioning System (GPS) receivers were used to record the perimeter of the population for later entry into the project Geographic Information System (GIS). In the Project area, these GPS units typically self-reported an estimated positional error of seven meters or less.

The entire extent of each population was mapped, where feasible. However, where the populations were extensive and extended well beyond the edge of the study corridors, mapping the entire extent was not undertaken. In these cases, only the part of the population that occurred within the study corridor was mapped.

3.4.1.6 Rare Plant Resource Investigation Results

3.4.1.6.1 Prefield Review

The USFWS Section 7 response letter listed one federally threatened plant species with potential for occurrence in the Project area: *Spiranthes diluvialis* (Ute ladies'-tresses). No other plant species of concern to the USFWS were listed in the letter.

The WNHP reported one element occurrence record for a tracked plant species in the Project vicinity (WNHP, 2002*b*). This species occurrence, Suksdorf's monkey-flower (*Mimulus suksdorfii*), was reported from Township 19N Range 16E Section 1, which is just north of the Project area. The locational information for this population is not precise, and the last reported observation was in 1980. It should be noted that, although the section containing the population is immediately adjacent to the Project area, the habitat in that section is primarily forested, as opposed to the Project area, which is non-forested.

The final list of rare plant species thought to have potential for occurrence within the Kittitas Valley Wind Power project area is presented in Table 3.4.1-2 above. It includes all of the species discussed in this section above, as well as a number of others which were suggested by additional contacts and references consulted during the prefield review. Although rare plant species other than those listed in Table 3.4.1-2 were not thought to have potential for occurrence within the project area, all rare plant species known or suspected to occur in

Washington were considered during the field survey. The species listed in Table 3.4.1-2, however, received the most focus during the investigation.

3.1.4.6.2 Field Investigation

The field surveys did not locate any USFWS Endangered, Threatened, Proposed, or Candidate plant species. Marginal potential habitat was found for one federally listed species, Ute ladies'-tresses (*Spiranthes diluvialis*), in several of the project area riparian zones. However, the Project area is west of the species' known range, and the habitat at these sites was degraded due to past disturbance. Both these factors greatly reduced the potential for occurrence of Ute ladies'-tresses.

Marginal potential habitat was also found for one federal Candidate species; basalt daisy (*Erigeron piperianus*). Although basalt daisy is typically restricted to the extensive cliffs along the Yakima River and Selah Creek, all cliffs within the project area were searched intensively for the presence of the species with negative results.

Marginal potential habitat was also found within the study area for a number of federal 'Species of Concern'. These include Columbia milkvetch (*Astragalus columbianus*),

Figure 3.4.1-1 Photo of White Margined Knotweed

Hoover's desert-parsley (*Lomatium tuberosum*), least phacelia (*Phacelia minutissima*), Seely's silene (*Silene seelyi*), and Hoover's tauschia. In all cases, where potential habitat was found for these species, the area was searched carefully, with negative results.

Likewise, the field surveys did not locate any plants listed as Endangered, Threatened, or Sensitive by the State of Washington. Potential habitat, however, was found for a number of these species throughout the Project area. These habitats were searched thoroughly for the presence of the target species, but none was found.

Figure 3.4.1-2 Photo of White Margined Knotweed Habitat

Four populations of one plant species on the Washington State 'Review' list were found within, or immediately adjacent to, the Project area. The species, white-margined knotweed (*Polygonum polygaloides* ssp. *kelloggii*), was found in the Project area in vernally moist draws and swales (Figures 3.4.1-1 & 3.4.1-2). An estimated 2,500 white-margined knotweed plants were found in these four populations, and totaled over 2.5 ha in gross population area. Much of the suitable habitat present (vernally moist areas) was found to contain the species. Most of the knotweed plants were in full flower, or beginning to fruit at the time of the second survey.

It should also be noted that during the surveys of the original project area, which included a large portion of proposed project area west of Swauk Creek that was subsequently dropped

from consideration, eleven populations of white-margined knotweed were found (including the four described above). Several of the populations were extensive and contained tens of thousands of plants within the survey corridor. These populations extended out of the survey corridor for an unknown distance, so estimates of total individuals and population size are likely conservative. An estimated 67,600 white-margined knotweed plants were found within the study corridors (with many more extending outside the corridors). Gross population areas ranged from 0.01 ha to 2 ha within the study corridors, and totaled over 14 ha for all eleven populations.

Figure 3.4.1-3 Photo of Habitat at the bottom on 'G-String'

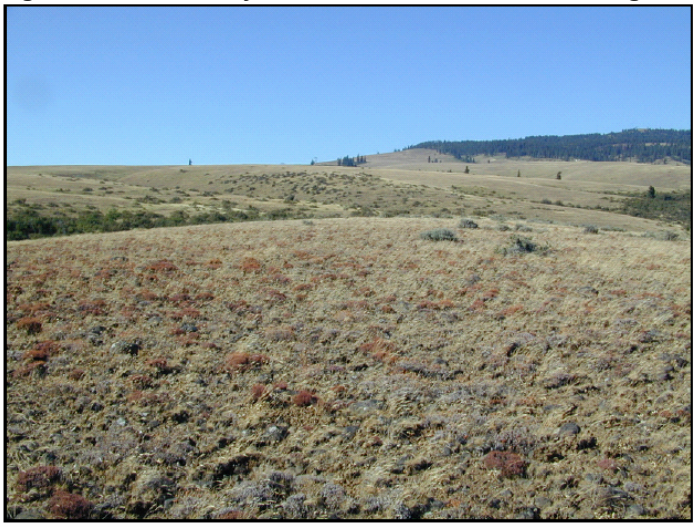


Figure 3.4.1-4 Photo of Habitat along 'A-String'

Locations of the white-margin knotweed populations and a complete list of all plant species encountered during the surveys is included in Exhibit 8, 'Rare Plant Report' Typical habitat encountered in the project area is shown in Figures 3.4.1-3 and 3.4.1-4

3.4.1.6.3 Survey Timing and Coverage

The combination of three surveys targeting species identifiable in the early spring, late spring, and summer was thought to be sufficient to identify all of the target species within the areas surveyed. As is common during the permitting process for most large construction projects, however, late-season changes to proposed facilities layouts occurred for the Project. This resulted in certain areas of the current proposed impact corridors that have not yet been surveyed for rare plants. It is unlikely, though, that significant rare plant populations exist within these unsurveyed corridors. In all cases, the habitat in the unsurveyed corridors is similar to that encountered in the surveyed areas. Given that no target plant species were found in the adjacent surveyed corridors (other than white-margined knotweed), the potential for other rare plant populations in these areas is thought to be limited.

In addition, several riparian areas within the survey corridors contained marginal habitat for Ute ladies'-tresses, a late-season rare orchid which blooms from late July through September. When these areas were surveyed in the latter half of July, no orchids of any species were found. Late August surveys of these small areas were not conducted for the following reasons:

- The Project area is well west of the species' known range;

- The riparian areas contained only marginal potential habitat for the species; and
- No orchids of any kind were found during the July survey.

It was felt that these three factors indicated that no Ute ladies'-tresses individuals exist within the Project area.

3.4.1.6.4 Target Plant Species within the Project Area

Only one target plant species is known to exist within the Project area; white margined knotweed. It is a small, annual plant in the buckwheat (Polygonaceae) family, which typically grows in meadows and vernal pools, up to dry subalpine slopes (Hitchcock and Cronquist 1964). It ranges from British Columbia southward on the east side of the Cascade Crest to Northern California, extending east to Montana, Wyoming, Colorado, and Arizona. The taxon was originally considered a separate species (*Polygonum kelloggii*), but the current consensus treats it as a subspecies of *P. polygaloides*.

White-margined knotweed is currently a Washington State 'Review 1' species, indicating that, within the state, the species is a, "[p]lant taxon of potential concern, [but is] in need of additional field work before a status can be assigned" (WNHP 2002*c*). The Review designation carries no legal requirement for protection; however, WNHP personnel are interested in tracking occurrences of Review species to aid in the assignment of status. White-margined knotweed is not currently regarded as Endangered, Threatened, or 'Species of Concern' by the USFWS.

The four populations found within the Project area are all located in vernally wet swales, seeps, and draws. These habitats are well represented within the Project area, and much of the suitable habitat searched was found to contain the species. In addition, a large amount of suitable habitat exists nearby, adjacent to the survey corridors. Although areas outside of the corridors were typically not surveyed, it is reasonable to assume that much of this suitable habitat also contains white-margined knotweed.

3.4.1.6.5 Potential Project Impacts to Target Plant Species

Due to the absence of known populations within the Project area as surveyed to date, no Project-related impacts are anticipated to any federally Endangered, Threatened, Proposed, or Candidate plant species. Likewise, no Project-related impacts are predicted for any Washington State Endangered, Threatened, or Sensitive plant species.

Limited impacts are anticipated, however, to one species on the Washington State Review list, white-margined knotweed. Ground disturbance related to construction and operation of the proposed Project could cause direct adverse impacts to knotweed individuals if they are located within the impact footprint. However, due to the large size of many of the populations, and the high likelihood that many more populations occur in the area adjacent to the impact corridors, the Project is not expected to significantly impact the species' viability in the Project area. Of the estimated 2,500 knotweed individuals in the study corridor, less than 10% are expected to be directly impacted by the Project. This level of direct impact is not anticipated to jeopardize the continued existence of the local population, or lead to the need for state or federal listing.

Furthermore, in the Project vicinity, eleven populations of white-margined knotweed are known, totaling more than 67,500 individuals. Within this larger area the Project is expected to impact less than 0.5% of these individuals.

In addition to direct impacts from ground disturbing activities, the Project also has the potential to impact white-margined knotweed indirectly if the Project leads to the degradation of habitat in the area through the introduction and spread of noxious weeds. Although little is known about how white-margined knotweed responds to competition from non-native species, it is safest to assume that significant increases in noxious weeds in the area would be detrimental to the species. At the present time, the habitat where white-margined knotweed is found is relatively intact. Native species predominate at the sites, although some noxious weeds are present. If the Project lead to the degradation of these vernally wet communities by increasing noxious weed densities, it is likely that some level of adverse impact to the knotweed populations would occur.

3.4.1.7 Proposed Mitigation Measures

Proposed mitigation measures for potential impacts to both plants and wildlife are discussed in Section 1.4.5.

3.4.2 Wetlands

No wetland areas have been identified on or near the Project site in areas designated for project facilities or construction impacts. As no wetlands exist on or near the Project site, no construction or operation impacts are expected, and no wetlands mitigation measures have been proposed.

3.4.3 Wildlife

This section summarizes results of the extensive wildlife studies that have been done to characterize the existing wildlife present at the Project site and estimate potential impacts to wildlife from construction and operation of the Project. The complete results of the wildlife studies and all accompanying maps and figures are presented in Exhibit 11, 'Wildlife Baseline Study'.

The Applicant has contracted with CH2MHILL, Western Ecosystems Technology, Inc. (WEST), and Northwest Wildlife Consultants, Inc. to develop and implement a survey protocol for a baseline study of wildlife and habitat in the Project area. The protocol for the ecological baseline study is similar to protocols used at the Vansycle, Klondike, Stateline, Maiden, Condon and Nine Canyon wind projects in Washington and Oregon, the Buffalo Ridge wind project in Minnesota, and the Foote Creek Rim wind project in Wyoming.

This section summarizes the results of the ecological baseline studies conducted from February 2002 through early November 2002. The wildlife portion of the ecological baseline study consists of 1) point count and in-transit surveys for wildlife species with an emphasis on birds and big game, 2) two aerial surveys within approximately two miles of the project boundary for visible raptor nests in the spring of 2002, and 3) nine driving transect surveys along Highway 10, Highway 97, Bettas Road, and Hayward Road to estimate the number of wintering bald eagles in the project vicinity. Information on sensitive wildlife species within the vicinity of the project was requested from the U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), and the Washington Natural Heritage Program (WNHP). The recent synthesis of baseline and operational monitoring studies at wind

developments by Erickson *et al.* (2002), as well as other relevant information has been reviewed and utilized for predicting impacts from the Kittitas Valley Project.

3.4.3.1 Existing Habitat

The ecological and current habitat conditions of the Project area are described in detail in Section 3.4.1 'Vegetation' and thus are not repeated here.

3.4.3.2 Agency and Local Audubon Consultation

Consultation with local, regional and central office personnel of WDFW was initiated in early 2002 for the proposed Project. A study protocol was provided to WDFW and the Kittitas Audubon Society in February 2002. Representatives of the Applicant, project consultants, and WDFW met in Yakima on February 27, 2002 to discuss the Project and protocol. Representatives of the Applicant and project consultants also met with Kittitas Audubon Society on February 26, 2002 to introduce the proposed Project and again after the spring surveys were completed to discuss the results of those surveys. Information on sensitive plant and wildlife species within the vicinity of the Project was requested and received from the U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), and the Washington Natural Heritage Program (WNHP).

3.4.3.3 Baseline Study Methodology

3.4.3.3.1 Diurnal Fixed-point and In-Transit Avian Use Surveys

The goal of the avian use surveys was to estimate the temporal and spatial use of the study area by birds. The avian use surveys combined observations collected at eleven fixed-point circular plots in the study area with in-transit observations of birds made while driving to and from the study area. All wildlife species of concern and unusual species observed were recorded while the observers were in the study area traveling between observation points and while conducting other field activities. Two experienced wildlife and avian biologists, Jay Jeffrey of WEST Inc., and Laurie Ness of Northwest Wildlife Consultants Inc., conducted the avian surveys. Fixed-point surveys were conducted weekly from March 21 through November 1, 2002 at the Project. A total of 279 20-minute point count surveys were conducted in the Project area.

3.4.3.3.2 Fixed-point Surveys

Each plot consists of an 800-m radius circle centered on an observation point location (See Exhibit 11, 'Wildlife Baseline Study', Figure 2, 'Location of fixed-point avian use stations for the Project site'). Landmarks were located to aid in identifying the 800 m boundary of each observation point. Observations of birds beyond the 800 m radius were recorded, but may be analyzed separately from observations made within the plot, if warranted.

All detections of birds, mammals, reptiles, and amphibians in and near plots during the 20-minute plot surveys were recorded. Visual and binocular scanning of the entire plot view shed and beyond were continuously performed throughout the survey period. A unique observation number was assigned to each sighting. The following data were recorded for each plot survey: date, start and end time of observation period, plot number, species or best possible identification, number of individuals, sex and age class when known, distance from plot center

when first observed, closest distance, altitude above ground (first, low and high), flight direction, behavior(s), habitat(s), whether observed during one or more of the three instantaneous counts, and in which of the two ten minute periods it was observed. Flight paths were mapped for raptors and species of concern and given corresponding observation numbers. The map indicates whether the bird was within or outside the survey radius based on reference points at known distances from the plot center. Flight paths were digitized using ARCVIEW 3.2. Climate information, such as temperature, wind speed, wind direction, precipitation and cloud cover were also recorded for each point count survey.

3.4.3.3.3 Incidental/In-transit Observations

All wildlife species of concern and uncommon species observed while field observers were traveling between plots were recorded on incidental/in-transit data sheets. Other incidental observations made during other surveys or visits to the sites were also recorded. These observations were recorded in a similar fashion to those recorded during the plot studies. The observation number, date, time, species, number, sex/age class, height above ground, and habitat were recorded. Observations of species of concern and uncommon species were recorded in additional detail, mapped on a USGS quadrangle map by observation number, and digitized using ARCVIEW 3.2.

3.4.3.3.4 Observation Schedule

Surveys were conducted weekly at intervals designed to include approximately all daylight hours. During a set of surveys, each selected plot was visited once. A pre-established schedule was developed prior to field work to ensure that each station was surveyed about the same number of times each period of the day, during each season, and to most efficiently utilize personnel time. The schedule was altered in response to adverse weather conditions or farming operations, which required delays and/or rescheduling of observations.

3.4.3.3.5 Statistical Analysis

Avian Use

Species lists were generated by season including all observations of birds detected regardless of their distance from the observer. The number of birds seen during each point count survey was standardized to a unit area and unit time surveyed. The standardized unit time was 20 minutes and the standardized unit area was 2.01 km^2 (800 m radius view shed for each station). For example, if four raptors were seen during the 20 minutes at a point with a viewing area of 2.01 km^2, these data may be standardized to 4/2.01 = 1.98 raptors/km^2 in a 20-minute survey. For the standardized avian use estimates, only observations of birds detected within 800 m of the observer were used. Estimates of avian use (expressed in terms of number of birds/plot/20-minute survey) were to used to compare differences in avian use between 1) avian groups and 2) seasons.

Avian Diversity and Richness

The total number of unique species was calculated by season. The mean number of species observed per survey (i.e., per station per 20-minute survey) was tabulated to illustrate and compare differences in mean number of species per survey between seasons.

Avian Flight Height/Behavior

The first flight height recorded was used to estimate percentages of birds flying below, within and above the rotor swept area (RSA). The zone of collision risk was estimated at 25-100 m above ground level (AGL) which is the combination of proposed tower heights with 50 m diameter rotors.

Avian Exposure Index

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

$$R = A*P_f*P_t$$

Where A = mean relative use for species *i* (observations within 800 m of observer) averaged across all surveys, P_f = proportion of all observations of species *i* where activity was recorded as flying (an index to the approximate percentage of time species *i* spends flying during the daylight period), and P_t = proportion of all flight height observations of species *i* within the rotor-swept area (RSA). This index does not account for differences in behavior other than flight characteristics (i.e., flight heights and percent of birds observed flying).

3.4.3.3.6 Avian Flight Patterns and Behavior

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

3.4.3.3.7 Raptor Nest Surveys

Raptor nest surveys were conducted within approximately two miles of the proposed turbine locations (Exhibit 11, 'Wildlife Baseline Study', Figure 18, 'Raptor nest locations within two miles of the site'). The search area encompassed approximately 70 square miles which is the study area plus the two-mile radius buffer, referred to as the raptor nest study area (RNA). The survey was conducted via a helicopter by searching suitable habitat for nests, such as stands of trees, shrubs, rocky areas, cliffs, and power lines. If a nest was observed the helicopter was moved to a position where nest occupancy and species could be determined. Efforts were made to minimize disturbance to breeding raptors, including keeping the helicopter a maximum distance from the nest to identify species. Those distances varied depending upon nest location and wind conditions. No nesting raptors were flushed from their nests during the aerial surveys.

Two surveys of the RNA were conducted. The purpose of the initial survey, conducted between May 5 and 8, 2002 was to document the location of all raptor nest structures and to determine nest occupancy. A total of approximately 908 linear miles was covered from the air during the initial visit.

A second survey was conducted on June 5, 2002 to determine productivity of nests occupied during the initial survey. Inactive nests found during the initial survey were also revisited to determine if late nesting species (e.g. Swainson's hawks) occupied nests that were empty during the initial visit. Approximately 54 linear air miles were covered during the second visit.

3.4.3.3.8 Wintering Bald Eagle Surveys

Driving transects to evaluate the numbers of wintering bald eagles and their movements in the Project area were initiated in mid-February, 2002. Surveys involved driving and counting bald eagles along four different routes (see below and Exhibit 11, 'Wildlife Baseline Study', Figure 19, 'Approximate perches and flight paths of bald eagles observed during weekly winter driving surveys at the site'). Surveyors drove a pre-determined survey route at weekly intervals. A total of 9 surveys were conducted between February 15 and April 11, 2002. The one-way distance for all survey routes combined is approximately 35 miles. Most routes were surveyed twice on any given survey day (e.g., starting in the east to west direction, and returning on the west-east direction).

Route 1: From the junction of Highway 97 and Highway 10 along 97 North to the intersection with Bettas Road. Also includes approximately 2.5 miles of Smithson road. Total distance (one-way) is approximately 11 miles.

Route 2: North on Highway 97 from Bettas Road to Northern Bettas Road Junction including all of Bettas Road and south on Hayward Road. Total distance (one-way) is approximately 10 miles.

Route 3: Junction of Hayward Road and Highway 10, west on Highway 10 to Junction with Hart Road. Total distance (one-way) is approximately 7.4 miles.

Route 4: Junction of Highway 97 and Highway 10 west on Highway 10 to Hayward Road. Total distance (one-way) is approximately 6.7 miles.

Depending on the traffic and safe pull-off availability, the surveyor looked for eagles within the view shed from the road. During periodic stops, the surveyor scanned areas of large cottonwoods and conifer trees with binoculars to look for perched eagles. A spotting scope was used if closer views were required to confirm identifications or if a potential roost tree grove was identified in the distance. Between stops, the observer drove at a slow speed of approximately 25 mph (40 Kph), where appropriate. Surveys were conducted in the morning and evening hours, alternating each week. If bald eagles or other species of interest (e.g., raptors, elk) were sighted, they were assigned an observation number and mapped on USGS 7.5' quadrangle maps. Habitat, activity, and time of day were also recorded for each observation. Flight paths of bald eagles were mapped for as long as the bird was visible. Perch sites and evening roost sites were recorded on the topo maps. The direction of the route followed (forward or reverse), total time spent and distance driven was recorded for each survey route.

3.4.3.4 Wildlife Study Results

3.4.3.4.1 Avian Species Distribution

A total of 97 avian species were identified during the point count, in-transit, and/or bald eagle surveys and incidentally while conducting other field tasks at the Project (See Table 3.4.3-1). A total of 3,600 individual bird detections within 1,210 separate groups were recorded from during the fixed-point surveys. Cumulatively, four passerines, American pipits, American

robins, horned larks, and western meadowlarks, comprised approximately 47% of the observations. All other species comprised less than 5% of the observations individually.

The mean number of species observed per survey (20-minute point count) was 3.63 with an average of 12.05 bird observations per survey. Higher overall avian-use occurred in the spring (15.14/survey) and fall (12.20/survey) compared with the summer (9.16/survey). The apparent higher use in spring was primarily due to observations of relatively large flocks of birds (e.g., 520 American pipits, 141 Canada geese).

Passerines were the most abundant avian group observed during all seasons. The next most abundant avian group varied by season, with corvids higher in spring and fall, and raptors more prevalent in summer. The most common raptor species observed were red-tailed hawks and American kestrels. Canada geese were observed primarily during spring, and common ravens were observed throughout the study period.

3.4.3.4.2 Raptors

Compared to results of studies at other wind developments including Buffalo Ridge (MN), Foote Creek Rim (WY), Klondike (OR), Nine Canyon (WA), Zintel Canyon (WA), Stateline (OR/WA), and Vansycle (OR), the Kittitas Valley Project site had relatively high spring and summer raptor use and moderate fall use. The higher use is primarily due to the presence of American kestrels and red-tailed hawks, two very common raptor species. High red-tailed hawk use is partly due to two active nests located within 0.25 mile of two avian point count stations.

A total of six red-tailed hawk nests and nine inactive raptor nests were found during the aerial raptor nest surveys. Five of the six red-tailed hawk nests produced a total of 9 young for an average of 1.5 young per nest. One previously active red-tailed hawk nest was not found during the second visit. The nest may have been blown out of the tree during a high wind event. Of the 15 nests found during surveys, six were in mature cottonwoods, six were in coniferous trees, one was in a shrub, one was located on a power line pole, and one was on a cliff. Much of the study area was dominated by coniferous forest. Due to the presence of thick foliage and interlocking crowns of coniferous forests, detection of raptor nests in many areas was difficult from the helicopter. Based on the current project layout, two of the six nests are within 0.25 mile of a proposed turbine string. One nest is between 0.25 and 0.5 mile of a proposed turbine string, and the other three nests are greater than one mile from proposed turbine strings.

Table 3.4.3-1: List of avian species observed during fixed-point, in-transit and bald eagle surveys on the Kittitas Valley Project site.

Species/Group	Scientific Name	Species/Group	Scientific Name	Species/Group	Scientific Name
blue-winged teal	*Anas discors*	black-headed grosbeak	*Pheucticus melanocephalus*	Townsend's solitaire	*Myadestes townsendi*
Canada goose	*Branta canadensis*	Brewer's blackbird	*Euphagus cyanocephalus*	Townsend's warbler	*Dendroica townsendi*
greater white-fronted goose	*Anser Albifrons*	Brewer's sparrow	*Spizella breweri*	Vaux's swift	*Chaetura vauxi*
Mallard	*Anas platyrhynchos*	brown-headed cowbird	*Molothrus ater*	vesper sparrow	*Pooecetes gramineus*
great blue heron	*Ardea herodias*	Bullock's oriole	*Icterus bullockii*	violet-green swallow	*Tachycineta thalassina*
herring gull	*Larus argentatus*	Cassin's finch	*Carpodacus purpureus*	warbling vireo	*Vireo gilvus*
common snipe	*Gallinago Gallinago*	cedar waxwing	*Bombycilla cedrorum*	western kingbird	*Tyrannus verticalis*
greater yellowlegs	*Tringa melanoleuca*	chipping sparrow	*Spizella passerina*	western meadowlark	*Sturnella neglecta*
Killdeer	*Charadrius vociferus*	cliff swallow	*Petrochelidon pyrrhonota*	western tanager	*Piranga ludoviciana*
long-billed curlew	*Numenius americanus*	dark-eyed junco	*Junco hyemalis*	western wood-pewee	*Contopus virens*
spotted sandpiper	*Actitis macularia*	eastern kingbird	*Tyrannus tyrannus*	white-crowned nuthatch	*Sitta carolinenis*
Wilson's phalarope	*Phalaropus tricolor*	European starling	*Sturnus vulgaris*	white-crowned sparrow	*Zonotrichia leucophrys*
American kestrel	*Falco sparverius*	golden-crowned kinglet	*Regulus satrapa*	yellow-headed blackbird	*Xanthocephalus xanthocephalus*
bald eagle	*Haliaeetus leucocephalus*	golden-crowned sparrow	*Zonotrichia atricapilla*	yellow-rumped warbler	*Dendroica coronata*
Cooper's hawk	*Accipiter cooperii*	gray-crowned rosy finch	*Leucosticte arctoa*	common nighthawk	*Chordeiles minor*
Golden eagle	*Aquila chrysaetos*	horned lark	*Eremophila alpestris*	downy woodpecker	*Picoides pubescens*
great-horned owl	*Bubo virginianus*	house finch	*Carpodacus mexicanus*	Lewis's woodpecker	*Melanerpes lewis*
Gyrfalcon	*Falco rusticolus*	lazuli bunting	*Passerina amoena*	northern flicker	*Colaptes auratus*
Merlin	*Falco columbarius*	Lincoln's sparrow	*Melospiza lincolnii*	Rufous hummingbird	*Selasphorus rufus*
northern goshawk	*Accipiter gentilis*	loggerhead shrike	*Lanius ludovicianus*	blue grouse	*Dendragapus obscurus*
northern harrier	*Circus cyaneus*	Macgillivray's warbler	*Oporornis tolmiei*	California quail	*Callipepla californica*
Osprey	*Pandion haliaetus*	mountain bluebird	*Sialia currucoides*	gray partridge	*Perdix perdix*
Prairie falcon	*Falco mexicanus*	mountain chickadee	*Poecile gambeli*	ruffed grouse	*Bonasa umbellus*
red-tailed hawk	*Buteo jamaicensis*	northern shrike	*Lanius excubitor*	mourning dove	*Zenaida macroura*
rough-legged hawk	*Buteo lagopus*	orange-crowned warbler	*Vermivora celata*		
sharp-shinned hawk	*Accipter striatus*	pine grosbeak	*Pinicola enucleator*		
Turkey vulture	*Cathartes aura*	purple finch	*Carpodacus purpureus*		
black-billed magpie	*Pica pica*	red crossbill	*Loxia curvirostra*	unidentified duck	
common raven	*Corvus corax*	red-breasted nuthatch	*Sitta canadensis*	unidentified accipiter	
Steller's jay	*Cyanocitta stelleri*	red-winged blackbird	*Agelaius phoeniceus*	unidentified buteo	
American goldfinch	*Carduelis tristis*	ruby-crowned kinglet	*Regulus calendula*	unidentified eagle	
American green-winged teal	*Anas crecca*	sage thrasher	*Oreoscoptes montanus*	unidentified falcon	
American pipit	*Anthus rubescens*	savannah sparrow	*Passerculus sandwichensis*	unidentified finch	
American redstart	*Setophaga ruticilla*	Say's phoebe	*Sayornis saya*	unidentified flycatcher	
American robin	*Turdus migratorius*	song sparrow	*Melospiza melodia*	unidentified passerine	
barn swallow	*Hirundo rustica*	spotted towhee	*Pipilo maculatus*	unidentified swallow	
black-capped chickadee	*Poecile atricapillus*			unidentified bluebird	

3.4.3.4.3 Flight Height Characteristics

Flight height characteristics were estimated for avian species and groups. Percentages of observations below, within, and above the rotor swept area (RSA) of 25 to 100 m above ground level were reported. Overall, 27.9% of the birds observed were recorded within the defined RSA, 64.9% were below the RSA and 7.1% were flying above the RSA. Certain species were commonly observed flying within the RSA, for example, 98.2% of 112 flying cedar waxwings, 85.7% of 14 common nighthawks, 79.2% of 322 American robins, 58.8% of 34 barn swallows, and 57.1% of 14 American goldfinches. However, other commonly observed species were not often observed within the RSA, such as 8.1% of 258 horned larks, and 4.3% of 23 western meadowlarks. Gray-crowned rosy finches, long-billed curlew, Townsend's solitaire, an unidentified swallow and an unidentified accipiter were always observed within the RSA based upon one bird observation for each species (except for gray-crowned rosy finches which was one group of five individuals).

3.4.3.4.4 Relative Exposure Index

A relative exposure index (avian-use multiplied by proportion of observations where bird flew within the RSA) was calculated for each species (See Table 3.4.3-2). This index is only based on flight height observations and relative abundance and does not account for other possible collision risk factors such as foraging or courtship behavior. Small bird species with the highest exposure indexes were American robin, cedar waxwing, and American pipit. Large bird species with the highest exposure index were common raven, red-tailed hawk and American kestrel. Mortality studies at other wind projects have indicated that although ravens are often observed at wind projects within the zone of risk, they appear to be less susceptible to collision with wind turbines than other similar size birds (e.g., raptors, waterfowl). Red-tailed hawks and American kestrels have been the most common species of the raptor fatalities at older wind projects in California, and a few fatalities of these two species have been observed at new wind projects (one red-tailed hawk at Buffalo Ridge, MN, and three American kestrels at Foote Creek Rim, WY). One common nighthawk fatality was observed at Foote Creek Rim (WY), but apparently no other common nighthawk fatalities have been observed at other U.S. wind projects.

Table 3.4.3-2
Mean exposure indices calculated by species observed during fixed-point surveys at the Project site.

Species/Group	Overall mean use	% flying	% flying within RSA	Exposure Index
American robin	1.377	81.9	79.2	0.893
Cedar waxwing	0.402	97.4	98.2	0.385
American pipit	2.077	100.0	9.6	0.199
Common raven	0.421	74.6	48.4	0.152
Red-tailed hawk	0.319	76.0	52.1	0.126
American kestrel	0.242	78.9	42.9	0.082
Horned lark	1.595	57.5	8.1	0.075
Barn swallow	0.140	85.0	58.8	0.070
Mountain bluebird	0.301	67.5	25.0	0.051
Common nighthawk	0.052	93.3	85.7	0.042
American goldfinch	0.056	87.5	57.1	0.028
Cliff swallow	0.119	91.2	22.6	0.024
Gray-crowned rosy finch	0.017	100.0	100.0	0.017
Northern harrier	0.061	94.4	29.4	0.017
Turkey vulture	0.087	92.3	20.8	0.017
Brewer's blackbird	0.342	67.7	6.2	0.014
Rough-legged hawk	0.068	62.5	30.0	0.013
Killdeer	0.052	26.7	75.0	0.010
Sharp-shinned hawk	0.035	100.0	30.0	0.010
Violet-green swallow	0.014	100.0	75.0	0.010
Golden eagle	0.026	71.4	40.0	0.007
Mourning dove	0.029	100.0	25.0	0.007
Northern flicker	0.077	18.2	50.0	0.007
Bald eagle	0.017	85.7	33.3	0.005
Cooper's hawk	0.017	57.1	50.0	0.005
Lewis's woodpecker	0.007	100.0	50.0	0.004
Black-billed magpie	0.201	54.4	3.2	0.004
Western meadowlark	0.873	9.3	4.3	0.004
European starling	0.378	75.0	1.2	0.003
Unidentified passerine	0.077	77.3	5.9	0.003
Steller’s jay	0.042	66.7	12.5	0.003
Prairie falcon	0.017	80.0	25.0	0.003
Townsend's solitaire	0.014	25.0	100.0	0.003
Northern goshawk	0.007	100.0	50.0	0.003
Long-billed curlew	0.003	100.0	100.0	0.003
Unidentified swallow	0.003	100.0	100.0	0.003
Unidentified buteo	0.003	100.0	66.7	0.002
Unidentified accipiter	0.003	50.0	100.0	0.002
Blue-winged teal	N/A	100.0	0.0	0.000
Unidentified duck	N/A	0.0	N/A	0.000
Unidentified eagle	N/A	100.0	50.0	0.000
Unidentified falcon	N/A	100.0	0.0	0.000

Table 3.4.3-2
Mean exposure indices calculated by species observed during fixed-point surveys at the Project site.

	Overall	%	% flying	Exposure
Vesper sparrow	0.435	5.6	0.0	0.000
Yellow-rumped warbler	0.406	86.2	0.0	0.000
Spotted towhee	0.190	5.6	0.0	0.000
Savannah sparrow	0.189	53.7	0.0	0.000
Chipping sparrow	0.169	40.4	0.0	0.000
Dark-eyed junco	0.134	65.8	0.0	0.000
White-crowned sparrow	0.119	11.8	0.0	0.000
Brown-headed cowbird	0.063	5.6	0.0	0.000
Red-winged blackbird	0.052	100.0	0.0	0.000
Unidentified finch	0.052	100.0	0.0	0.000
Canada goose	0.049	70.4	0.0	0.000
California quail	0.045	0.0	N/A	0.000
Black-capped chickadee	0.045	46.2	0.0	0.000
Unidentified bluebird	0.045	100.0	0.0	0.000
House finch	0.042	50.0	0.0	0.000
Mallard	0.038	10.3	0.0	0.000
Mountain chickadee	0.038	54.5	0.0	0.000
Purple finch	0.024	100.0	0.0	0.000
Blue grouse	0.024	57.1	0.0	0.000
Lazuli bunting	0.021	0.0	N/A	0.000
Orange-crowned warbler	0.017	0.0	N/A	0.000
Red crossbill	0.017	0.0	N/A	0.000
Ruby-crowned kinglet	0.017	0.0	N/A	0.000
Warbling vireo	0.017	0.0	N/A	0.000
Eastern kingbird	0.017	20.0	0.0	0.000
Western kingbird	0.017	20.0	0.0	0.000
Brewer's sparrow	0.014	0.0	N/A	0.000
Golden-crowned kinglet	0.014	0.0	N/A	0.000
Western wood-pewee	0.014	0.0	N/A	0.000
Rufous hummingbird	0.014	100.0	0.0	0.000
Song sparrow	0.010	0.0	N/A	0.000
Say's phoebe	0.010	33.3	0.0	0.000
Bullock's oriole	0.007	0.0	N/A	0.000
Lincoln's sparrow	0.007	0.0	N/A	0.000
Northern shrike	0.007	0.0	N/A	0.000
Western tanager	0.007	0.0	N/A	0.000
Vaux's swift	0.007	100.0	0.0	0.000
Herring gull	0.007	100.0	0.0	0.000
Merlin	0.007	100.0	0.0	0.000
Cassin's finch	0.003	0.0	N/A	0.000
Macgillivray's warbler	0.003	0.0	N/A	0.000

Table 3.4.3-2
Mean exposure indices calculated by species observed during fixed-point surveys at the Project site.

	Overall	%	% flying	Exposure
Townsend's warbler	0.003	0.0	N/A	0.000
Wilson's phalarope	0.003	0.0	N/A	0.000
Common snipe	0.003	0.0	N/A	0.000
Downy woodpecker	0.003	0.0	N/A	0.000
Golden-crowned sparrow	0.003	0.0	N/A	0.000
Great-horned owl	0.003	0.0	N/A	0.000
Osprey	0.003	0.0	N/A	0.000
Pine grosbeak	0.003	0.0	N/A	0.000
Ruffed grouse	0.003	0.0	N/A	0.000
Sage thrasher	0.003	0.0	N/A	0.000
American redstart	0.003	100.0	0.0	0.000
Black-headed grosbeak	0.003	100.0	0.0	0.000
Greater yellowlegs	0.003	100.0	0.0	0.000
Red-breasted nuthatch	0.003	100.0	0.0	0.000
Unidentified flycatcher	0.003	100.0	0.0	0.000
Yellow-headed blackbird	0.003	100.0	0.0	0.000

3.4.3.4.5 Non-Avian Wildlife Observations

Mammals

Mule deer (*Odocoileus hemionus*) were commonly observed throughout the Project area (Table 11). Observations of 10-20 individuals were commonly observed in the spring, with 3-7 individuals observed throughout the summer. Observations in the fall were typically small groups of does. Elk (*Cervis elaphus*) were observed in some large groups (15-25) individuals near the northern points (A, E, F and G) during the spring surveys, with few observations made in the summer and fall periods. American pika (*Ochotona princeps*) has been heard regularly on the large talus slope near station A.

Reptiles and Amphibians

Reptiles observed during the field studies included rubber boa (*Charina bottae*), Great Basin gopher snake (*Pituophis catenifer deserticola*), Northern Pacific rattlesnake (*Crotalus viridis oreganus*), and short-horned lizard (*Phrynosoma douglassii*). One amphibian chorus was heard during the spring at a distance of over 300 meters, and is likely one of the true frog species (e.g., Cascade frog, *Rana cascadae*). Spotted frogs (*Rana pretiosa*) and red-legged frogs (*Rana aurora*) have auditory calls that typically don't carry over 30 meters, and the northern leopard frog (*Rana pipiens*) is not known to occur in Kittitas county.

3.4.3.5 Potential Wildlife Impacts

3.4.3.5.1 Displacement

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

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

Reduced avian use near turbines was attributed to avoidance of turbine noise and maintenance activities and reduced habitat effectiveness due to the presence of access roads and large gravel pads surrounding turbines (Leddy, 1996; Johnson *et al.,*. 2000a).

Construction and operation of the Foote Creek Rim wind plant did not appear to cause reduced use of the wind plant and adjacent areas by most avian groups, including raptors, corvids, or passerines (Johnson *et al.,* 2000b). Some reduced use of the areas near turbines was apparent for a local population of mountain plovers. A pair of golden eagles successfully nested 0.5 miles from the wind plant after one phase was operational and another phase was under construction.

Avoidance of wind plants by raptors has not been reported at any U.S. wind plants, and anecdotal evidence indicates that raptor use of the Altamont Pass, California wind resource area (WRA) may have increased since installation of wind turbines (American Wind Energy Association, 1995). Although displacement of birds by wind plants is not desirable, especially where important habitats may be limited, if other suitable habitats are available, one potential benefit of avian avoidance of turbines is the reduced potential for collision mortality to occur (Crockford, 1992).

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

Operation of the proposed Project would not affect raptor nests unless there were displacement effects that caused raptors to not return to the nests close to the project site. Impacts would be considered very low, given the low density observed in close proximity to the turbines, and the species involved (red-tailed hawk).

3.4.3.5.2 Risk of Turbine Collision

Raptors

Based on the level of raptor use within the Project, raptor mortality is expected to be slightly higher compared to other wind projects with similar turbine types. American kestrels and red-tailed hawks account for much of the raptor use at the site, and are expected to be the species with the highest mortality. The potential exists for other raptor species to collide with turbines, including northern harrier, rough-legged hawk, bald eagle, and turkey vulture. However, the mortality risk associated with these species is expected to be lower than the risk for American kestrel and red-tailed hawk. Turkey vultures appear less susceptible to collision that most other raptors (Orloff and Flannery, 1992). Very few northern harrier fatalities and no rough-legged hawk or bald eagle fatalities have been observed at wind projects to date. Golden eagle use of the site is low relative to other wind sites and the mortality risk for golden eagles is also expected to be very low.

As a group, raptor use ranged from 0.73 per 20 minute survey in the fall to 1.03 in the summer, with an overall average of approximately 0.9. For comparison, raptor use at three wind projects studied with the same methods[1] was lower. Raptor use at the Vansycle wind

[1] Fixed-point surveys were conducted following the same methods at all three wind projects but had variable survey

project was approximately 0.36 raptors per 20-minute survey; at the Buffalo Ridge wind project raptor use was approximately 0.49 raptors per 20-minute survey; and at the Foote Creek Rim wind project raptor use was approximately 0.73 raptors per 20-minute survey. Overall raptor use as well as habitat is most similar to the Foote Creek Rim, Wyoming wind project.

Raptor mortality at other newer generation wind projects has been very low. The estimate of raptor mortality at the Foote Creek Rim wind project in Wyoming is the highest observed and is 0.03 raptors per turbine per year based on a three-year study of 69 turbines (Young *et al.,* 2002). No raptor mortality was observed at the Vansycle wind project in Oregon during a one-year study; and 1 raptor was recorded over a four-year study at the Buffalo Ridge wind project (Erickson *et al.,* 2001).

Considering these mortality results as well as raptor use estimates at these wind projects, it is estimated that potential raptor mortality at the proposed Project would be approximately 25% greater than that of the Foote Creek Rim Wind project (or approximately 0.038 raptors per turbine per year). Using these raptor mortality rates, a range of approximately 0 to 4 raptor fatalities per year at the Project may be expected if 115 turbines are constructed. It should be noted that the fatality estimates may vary from the expected range based on many factors, including the number of occupied raptor nests near the wind project after construction, turbine size and other site specific and/or weather variables. It should also be noted that the majority of raptor fatalities are expected to be American kestrels and red-tailed hawks, two very common raptor species.

Passerines

Passerines have been the most abundant avian fatality at other wind projects studied (see Johnson *et al.,* 2000; Young *et al.,* 2002; Erickson *et al.,* 2000), often comprising more than 80% of the avian fatalities. Both migrant and resident passerine fatalities have been observed. Given that passerines make up the vast majority of the avian observations on-site, it is expected passerines will make up the largest proportion of fatalities. Species most common to the study area will likely be most at risk, including western meadowlark, vesper sparrow and horned lark. Horned larks have been the most commonly observed fatality at several wind projects, including Vansycle and Foote Creek Rim (Erickson *et al.,* 2001, Young *et al.,* 2002). A few large flocks of birds such as American pipits were observed, but given their infrequent use, mortality would be expected to be low. Nocturnal migrating species may also be affected, but it is not expected that they would be found in large numbers based on data collected at other wind plants [i.e., no large mortality events documented (Erickson *et al.,* 2001)]. Based on the mortality estimates from the other wind plants studied, between 50 and 300 passerine fatalities may occur per year at the Project if all 120 turbines are constructed.

Carcass search studies at the Foote Creek Rim Wind Plant, Wyoming, have found avian casualties associated with guyed met towers. Based on searches of five permanent met towers at Foote Creek Rim over a three-year period, it was estimated that these towers resulted in approximately 8.1 avian casualties per tower per year (Young *et al.,* 2002). The vast majority of these avian casualties were passerines. The nine permanent met towers

duration. The calculated use at these wind projects was standardized to 20-minute duration surveys under the assumption that raptor observations were uniform across time for each survey period.

proposed for the Project would be expected to result in collision deaths for passerines at the site, although the use of bird flight diverters on guy wires should reduce the risk of collision.

Waterfowl

Some waterfowl mortality has been documented at other wind plants (Erickson *et al.,* 2001). However, studies at Foote Creek Rim, Vansycle, and Buffalo Ridge have not documented mortality of Canada geese, one the most common waterfowl species observed flying over the Project study area. Because of the low use of the site by waterfowl, little mortality would be expected from the Project.

Other Avian Groups/Species

Other avian groups (e.g., upland game birds, doves, shorebirds) occur in relatively low numbers within the study area and mortality would be expected to be low. Other species only observed during migration may be at risk; however, mortality would be expected to be low given the low use estimates by these species and groups.

Big Game

The Project area is within a transition zone between the dry grassland/shrub steppe basin towards the Columbia River and the wetter coniferous forest of the east slope of the Cascade Mountains. Portions of the proposed wind plant are within habitats designated by WDFW as winter range for mule deer and elk, although the human development that has already occurred in the project area has likely reduced the quality of the winter range. In addition, portions of the wind plant are near elk calving areas and elk migration routes. Wintering elk forage on native grass species such as Sandberg's bluegrass, which greens up with fall and winter rains, while mule deer likely utilize more shrub species in the project area. Wind-blown slopes and ridges remain snow-free most of the year. West and south-facing slopes green up earlier and provide accessible nutritious forage during the harsh winter months. Elk travel through the area between seasons and calving occurs at Lookout Mountain during the spring.

Although this area has been designated as elk and deer winter range, significant amounts of human activity have already occurred within the Project area. Highway 97, which accommodates an average of 2,200 vehicles a day, runs through the Project area, with turbine strings on both sides of the road. Bettas and Hayward roads each serve approximately 20 vehicles per day. Several of the turbine strings and associated roads will follow existing roads which are currently used to access private property in the Project area.

The WDFW has expressed some concern over the potential effects of wind project development on wintering big game. Winter is a crucial period of time for the survival of many big game species. Deer, for example, cannot maintain body condition during the winter because of reduced forage availability combined with the increased costs of thermogenesis (Reeve and Lindzey, 1991). In other words, as deer expend more energy than they take in, body condition gradually declines throughout the winter (Short, 1981). Unnecessary energy expenditures may increase the rate at which body condition declines, and the energy balance determining whether a deer will survive the winter is thought to be relatively narrow, especially for fawns (Wood, 1998). Overwinter fawn survival may decrease in response to human activity or other disturbances (Stephenson *et al.,* 1996). Roads and energy

development may also fragment otherwise continuous patches of suitable habitat, effectively decreasing the amount of winter range available for big game. Fragmentation of habitat may also limit the ability of big game populations to move throughout the winter range as conditions change, causing big game to utilize less suitable habitat (Brown, 1992).

Two published studies of big game winter use may be relevant to the development of wind turbines and wintering deer and elk (Rost and Bailey, 1979; Van Dyke and Klein, 1996). Van Dyke and Klein (1996) documented elk movements through the use of radio telemetry before, during and after the installation of a single oil well within an area used year round by elk. Drilling activities during their study ceased by November 15, however, maintenance activities continued throughout the year.

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

While several authors have documented elk avoiding roads within forested environments during the summer, the effects of roads and associated human activity on wintering elk and mule deer have not been well documented. Rost and Bailey (1979) found that wintering mule deer and elk avoided areas within 200 m of roads in eastern portions of their Colorado study area, where presumably greater amounts of winter habitat were present. Road avoidance was greater where roads were more traveled. Only mule deer showed a clear avoidance of roads in the western portion of their study area, where winter range was assumed to be more limiting. Mule deer also showed greater avoidance of roads in shrub habitats versus more forested areas. The authors concluded that impacts of roads depended on the availability of suitable winter range away from roads, as well as the amount of traffic associated with roads.

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

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

Due to the lack of knowledge regarding the potential impacts of energy development on big game, it is difficult to predict with certainty the effects of the proposed wind project on mule deer and elk. Van Dyke and Klein (1996) showed wintering elk shifted use of core areas out of view of human related activities associated with an oil well and access road. Most turbines and roads in the project area will be located on ridges and will be visible over a fairly large area. Where wind turbines will be constructed in elk wintering areas, elk may concentrate use away from the wind development during construction. While human related activity at wind turbines during regular maintenance will be less than during the construction period, it is not known if human activity associated with regular maintenance activity will exceed tolerance thresholds for wintering elk. If tolerance thresholds during regular maintenance activities are exceeded, elk are likely to permanently utilize areas away from the wind development. Given the amount of residential development and the existing roads and disturbance within the Project area (approximately half are existing roads that will be improved), and including Highway 97 which runs through the middle of the Project area, disturbance levels after operation begins will not be greatly increased.

The proposed wind facility occurs approximately 3 miles southeast of mapped elk calving areas. Assuming calving areas are mapped accurately, the proposed project is not likely to impact the mapped calving area.

Other Mammals

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

Reptiles and Amphibians

Construction of the Project may affect reptiles and amphibians on site through loss of habitat and direct mortality of individuals occurring in construction zones. The level of mortality associated with construction would be based on the abundance of the species on site. Some mortality may be expected as common reptiles such as short-horned lizards and yellow-bellied racers often retreat to underground burrows for cover or during periods of winter dormancy. Excavation for turbine pads, roads, or other wind project facilities could kill individuals in underground burrows. While above ground, yellow-bellied racers and other snakes are generally mobile enough to escape construction equipment, however, short-horned lizards do not move fast over long distances and rely heavily on camouflage for predator avoidance. Some individual lizard fatalities can be expected from vehicle activity. Impacts are expected to be very low and not significant.

Bats

The potential for bats to occur is based on key habitat elements such as food sources, water, and roost sites. Potential roost structures such as trees are abundant along the riparian areas within the project area. Ponds in the Project area such as those located along the Dry Creek drainage may be used as foraging and watering areas. Little is known about bat species distribution, but several species of bats could occur in the Project area based on the Washington GAP project and inventories conducted on the Hanford Site, Arid Lands Ecology Reserve (ALE) located in Benton County to the southeast.

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

At the Buffalo Ridge Wind Plant, Minnesota, based on a 2-year study, bat mortality was estimated to be 2.05 bats per turbine per year (Johnson *et al.*, 2000b). At the Foote Creek Rim Wind Plant, based on 2 years of study, bat mortality was estimated at 1.51 bats per turbine per year (Young *et al.*, 2001). At the Vansycle Ridge Wind Plant in Oregon, bat mortality was estimated at 0.74 bats per turbine for the first year of operation (Erickson *et al.*, 2000).

Although potential future mortality of migratory bats is difficult to predict, an estimate can be calculated based on levels of mortality documented at other wind plants. Using the estimates from other wind plants, operation of the proposed Project could result in approximately 240 bat fatalities per year. Actual levels of mortality are unknown and could be higher or lower depending on regional migratory patterns of bats, patterns of local movements through the area, and the response of bats to turbines, individually and collectively.

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

3.4.4 Fisheries

Facilities for the project are located more than ¼ mile from the Yakima River, and the small tributaries such as Dry Creek apparently do not support fish habitat (PHS data). No impacts to fish are likely to occur as a result of the project.

3.4.5 Unique Species

3.4.5.1 Sensitive, Threatened, and Endangered Species

A list of state and federally protected species that potentially occur within the project area was generated to assess the potential for impacts to these species (See Table 3.4.5-1). Species were identified based on the WDFW Species of Concern list, which includes state listed endangered, threatened, sensitive and candidate species; and the USFWS, Central Washington Ecological Services office list of Endangered, Threatened, Proposed, Candidate and Species of Concern for Kittitas County.

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

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

A detailed analysis of the potential impacts to bald eagles and other endangered, threatened, proposed and candidate species is provided in Exhibit 12, 'Biological Assessment of Endangered, Threatened, Proposed and Candidate Species'.

Table 3.4.5-1. A list of state and federally protected species potentially occurring within the KVP area.

Species	State Status	Federal Status	Occurrence	Documentation
Birds				
Northern goshawk (*Accipiter gentilis*)	C	SC	Documented breeder north and west of project; numerous PHS records from mountains north and west of project [T19N, R16E, Secs 21, 24, 28; T20N, R17E, Secs 6, 11, 14, 15]; coniferous and aspen forests	PHS 1989-1996
Golden eagle (*Aquila chrysaetos*)	C	-	Documented on site (6 observations in spring/ summer); No nest found	Erickson *et al.* 2002
Bald eagle (*Haliaeetus leucocephalus*)	T	T	Documented winter resident	Erickson *et al.* 2002
Merlin *(Falco columbarius*)	C	-	Possible breeder; one old PHS record from project area [T19N, R17E, Sec 8]	PHS 1981
Peregrine falcon (*Falco peregrinus*)	S	SC	Unlikely; most records in western WA; possible transient or migrant	Smith *et al.* 1997
Ferruginous hawk (*Buteo regalis*)	T	SC	Unlikely; most records in eastern WA in steppe zones; possible rare transient or migrant	Smith *et al.* 1997
Harlequin duck (*Histrionicus histrionicus*)	-	SC	Unlikely, occurs in fast flowing mountain rivers and streams; recorded in Kittitas Co. west of project	Smith *et al.* 1997
Spotted owl (*Strix occidentalis*)	E	T	Documented site centers north and west of project; PHS - T20N, R17E; T20N, R16E; T20N, R18E	PHS no date
Flammulated owl (*Otus flammeolus*)	C	-	Possible in forests nearby; unlikely in steppe habitats; recorded in Kittitas Co.	recorded in Kittitas Co.
Burrowing owl (*Athene cunicularia*)	-	SC	Unlikely due to species distribution in WA; possible in extreme eastern Kittitas Co.	Smith *et al.* 1997
Black tern (*Chlidonias niger*)	-	SC	Unlikely due to species distribution in WA; no records from Kittitas Co.	Smith *et al.* 1997
Pileated woodpecker (*Dryocopus pileatus*)	C	-	Possible in forests nearby, unlikely on-site; recorded in Kittitas Co.	Smith *et al.* 1997
Black-backed woodpecker (*Picoides arcticus*)	C	-	Possible in forests/burns nearby, unlikely on-site; recorded in Kittitas Co.	Smith *et al.* 1997
White-headed woodpecker (*Picoides albolarvatus*)	C	-	Possible in forests nearby, unlikely on-site; recorded in Kittitas Co.	Smith *et al.* 1997
Lewis' woodpecker (*Melanerpes lewis*)	C	-	Possible in forests nearby, unlikely on-site; recorded in Kittitas Co.	Smith *et al.* 1997

Table 3.4.5-1. A list of state and federally protected species potentially occurring within the KVP area.

Species	State Status	Federal Status	Occurrence	Documentation
Vaux's swift (*Chaetura vauxi*)	C	-	Possible breeder; varied habitats below alpine habitats and excluding extensive steppe; recorded in Kittitas Co.	Smith *et al.* 1997
Olive-sided flycatcher (*Contopus borealis*)	-	SC	Possible breeder in forested habitats; recorded in Kittitas Co.	Smith *et al.* 1997
Willow flycatcher (*Empidonax traillii*)	-	SC	Possible breeder; moist forested areas, riparian habitats; recorded in Kittitas Co.	Smith *et al.* 1997
Sage thrasher (*Oreoscoptes montanus*)	C	-	Possible breeder; sagebrush shrublands; records from southern and eastern Kittitas Co.	Smith *et al.* 1997
Loggerhead shrike (*Lanius ludovicianus*)	C	SC	Possible breeder; shrub steppe, shrublands, agriculture, mixed habitats; recorded in Kittitas Co.	Smith *et al.* 1997
Sage sparrow (*Amphispiza belli*)	C	-	Possible breeder; sagebrush shrublands; records from southern and eastern Kittitas Co.	Smith *et al.* 1997
Mammals				
Gray wolf (*Canis lupus*)	E	E	Unlikely; unknown status in Washington but suitable habitat in North Kittitas Co., nearest PHS records from 1992 and 1993 from L.T. Murray State Wildlife Recreation Area southwest of I-90 [T19N, R16E, Sec 16, 34]	WDFW web page; WA GAP Analysis Project; PHS 1992-1993
Grizzly bear (*Ursus arctos*)	E	T	Unlikely; unknown status in Washington but suitable habitat in North Kittitas Co., one PHS record north of project [T20N, R17E, Sec 15]	WA GAP Analysis Project; PHS 1993
Wolverine (*Gulo gulo*)	C	SC	Unlikely; generally associated with northern coniferous forest; suitable habitat in western Kittitas Co.; PHS record from northeast of project [T20N, R18E, Sec 29]	WA GAP Analysis Project; PHS 1991
Fisher (*Martes pennanti*)	E	SC	Unlikely resident; associated with mature coniferous forests; suitable habitat in western Kittitas Co.	WA GAP Analysis Project
Western gray squirrel (*Sciurus griseus*)	T	SC	Unlikely resident; suitable habitat in northeast Kittitas Co.; PHS records from south of I-90 in L.T. Murray State Wildlife Recreation Area [T19N, R16E, Sec 35]	WA GAP Analysis Project; PHS 1997, 2000
White-tailed jackrabbit (*Lepus townsendii*)	C	-	Possible resident; grassland/ shrub habitats; recorded in northeast Kittitas Co.	WA GAP Analysis Project
Black-tailed jackrabbit	C	-	Possible resident; grassland/shrub	WA GAP Analysis

Table 3.4.5-1. A list of state and federally protected species potentially occurring within the KVP area.

Species	State Status	Federal Status	Occurrence	Documentation
(*Lepus californicus*)			habitats; records from southeast Kittitas Co.	Project
Townsend's big-eared bat (*Coryhorhinus townsendii*)	C	SC	Unlikely resident; varied habitats but tends to prefer forested and riparian areas, hibernates in caves; no records from Kittitas Co.	WA GAP Analysis Project
Long-legged myotis (*Myotis evotis*)	-	SC	Unlikely due to habitat; coniferous and mixed forests, riparian areas; roosts caves, crevices, buildings, mines; potential habitat in western and northern Kittitas Co.	WA GAP Analysis Project
Long-eared myotis (*Myotis volans*)	-	SC	Unlikely due to habitat; primarily forested habitats and edges, juniper woodland, mixed conifers, riparian areas; roosts snags, crevices, bridges, buildings, mines; potential habitat in western and northern Kittitas Co.	WA GAP Analysis Project
Fringed myotis (*Myotis thysanodes*)	-	SC	Possible; varied habitats, forested or riparian habitats, shrublands; roosts buildings, trees; hibernates in mines and caves; potential habitat throughout eastern two-thirds of Kittitas Co.	WA GAP Analysis Project
Small-footed myotis (*Myotis ciliolabrum*)	-	SC	Possible; varied arid grasslands/ shrublands, mixed forests; roosts in crevices, cliffs; hibernates in caves, mines; records from eastern Kittias Co.	WA GAP Analysis Project
Yuma myotis (*Myotis yumanensis*)	-	SC	Possible resident; closely associated with water in varied habitats; no records from Kittitas Co.	WA GAP Analysis Project
Merriam's shrew (*Sorex merriami*)	C	-	Possible resident; sagebrush shrub and mesic grass/shrub habitats; records from southeast Kittitas Co.	WA GAP Analysis Project
Reptiles and Amphibians				
Striped whipsnake (*Masticophis taeniatus*)	C	-	Possible resident; occurs in grasslands, sagebrush, dry rocky canyons; records from eastern Kittitas Co.	WA GAP Analysis Project; Nussbaum *et al.* 1983
Sharptail Snake (*Contia tenuis)*	C	-	Likely resident; found in stable talus slopes, damp/moist habitats; forest edges; records from Kittitas Co.	WA GAP Analysis Project; Nussbaum *et al.* 1983
Larch Mountain Salamander (*Plethodon larselli*)	S	SC	Unlikely resident; found in lava talus slopes; recorded in western Kittitas Co.	WA GAP Analysis Project

Table 3.4.5-1. A list of state and federally protected species potentially occurring within the KVP area.

Species	State Status	Federal Status	Occurrence	Documentation
Western toad (*Bufo boreas*)	C	SC	Possible resident; occurs in spring pools, ponds, lake shallows, slow moving streams and uplands nearby; documented in Kittitas Co.	WA GAP Analysis Project; Nussbaum *et al.* 1983
Columbia spotted frog (*Rana luteiventris*)	C	SC	Likely resident; occurs in wetlands, marshy edges of ponds/lakes; documented throughout Kittitas Co.; two PHS records north of project T20N, R17E, Sec 22	WA GAP Analysis Project; Nussbaum *et al.* 1983; PHS 1992-1993
Cascades frog (*Rana cascadae*)	-	SC	Unlikely due to habitat; occurs in wet mountain meadows with ponds and potholes; records in western and northern Kittitas Co.	WA GAP Analysis Project; Nussbaum *et al.* 1983;
Red-legged frog (*Rana aurora*)	-	SC	Unlikely due to species range; moist forests, streams, and ponds; recorded in western Kittitas Co.	WA GAP Analysis Project; Nussbaum *et al.* 1983
Tailed frog (*Ascaphus truei*)	-	SC	Unlikely due to habitat; fast flowing permanent streams in forested areas; records in western and northern Kittitas Co.	WA GAP Analysis Project; Nussbaum *et al.* 1983;
Fish				
Chinook salmon (*Oncorhynchus tshawytscha*)	C	T	Yakima River and major tributaries; PHS record from Swauk Creek T20N, R17E and Yakima River T20N R16E	PHS 1997
Steelhead (*Oncorhynchus mykiss*)	C	T	Yakima River and major tributaries; PHS record from Swauk Creek T20N, R17E and Yakima River T20N R16E	PHS 1997
Bull trout (*Salvelinus confluentus*)	C	T	Yakima River and major tributaries; PHS records from Teanaway River and Yakima River T20N R16E	PHS 1997
Westslope cutthroat (*Oncorhynchus clarki lewisi*)	-	SC	Yakima River and major tributaries	no records located
Interior Redband trout (*Oncorhynchus mykiss gairdneri*)	-	SC	Yakima River and major tributaries	no records located
Mountain sucker (*Catostomus platyrhynchus*)	C	-	Yakima River and major tributaries; PHS record from Teanaway River north west of project [T20N, R16E, Sec 25]	PHS 1994
Pacific lamprey (*Lampetra tridentate*)	-	SC	Yakima River and major tributaries	no records located

E=Endangered, T=Threatened, C=Candidate, S = Sensitive, SC=Species of Concern

3.4.5.2 Potential Impacts to Threatened and Endangered Species

The Project area occurs within the potential range of 21 bird, 14 mammal, eight reptile and amphibian and six fish species which are of interest based on designations made under the State of Washington or Federal Endangered Species Act, or which are species of concern because of declining numbers (See Table 3.4.5-1). Several of these species are unlikely to occur within the Project area due to limited habitat or occurrence on the periphery of the known species distributions. These species are not likely to occur within the project area and the Project should have no effect on them. A total of 10 state and Federal sensitive, threatened, candidate and monitor species were observed during 2002 wildlife surveys at the Project site, these are listed in Table 3.4.5-2.

Table 3.4.5-2

A summary of State and Federal sensitive species and State Monitor species observed during 2002 wildlife surveys at the Project site.

Bald eagle	***State and Federally Threatened*** – Average of 5.6 bald eagles per winter driving survey, with a maximum survey day count of 12 (3/11/02). Winter use relatively high compared to other wind projects, but mostly along Yakima river. No bald eagle fatalities documented at any U.S. wind project.
Golden eagle	***State Candidate*** –Six observations during fixed-point surveys, six during in-transit surveys. Much lower use at KVP (0.02-0.05 per 20-minute survey) compared to Foote Creek Rim (WY) (0.2 – 0.3 per 20-minute survey) and Altamont Pass (CA) (0.2-0.3 per 20-minute survey). One golden eagle was killed during two years of monitoring at the Foote Creek Rim Phase I and II facility.
Merlin	***State Candidate*** – Two observations during spring and summer surveys. Occasional merlin observations have been recorded at several wind projects. No fatalities have been reported at U.S. wind projects.
Lewis's woodpecker	***State Candidate*** – One observation. Observed as a fatality at Vansycle in 1999.
Loggerhead shrike	***State Candidate and Federal Species of Concern*** – Not observed during spring and summer avian use surveys. One observation during winter bald eagle surveys as well as two unidentified shrike observations. One fatality observed each at Altamont Pass and Tehachapi Pass (CA).
Long-billed curlew	***State Monitor***[b] – One observation. Also observed occasionally at Stateline. No fatalities documented at any U.S. wind projects.
Turkey vulture	***State Monitor*** – Twenty-five observations during fixed-point surveys, 31 during in-transit surveys. A few fatalities observed at U.S. wind projects, but apparently not very susceptible to collision due to foraging/scavenging behavior.
Prairie falcon	***State Monitor*** – Five observations during the spring. Observed occasionally at most wind projects. One fatality documented at Foote Creek Rim (WY), two at Altamont Pass (CA), one at Montezuma Hills and one at Tehachapi Pass (CA).
Gyrfalcon	***State Monitor*** – One observation during winter bald eagle surveys. No fatalities documented at U.S. wind projects.
Osprey	***State Monitor*** – One observation during fixed-point surveys, one in-transit. No fatalities documented at U.S. wind projects.

3.4.5.2.1 Critical Habitat

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

Under the ESA, it is unlawful to adversely modify designated critical habitat. According to the USFWS letter, there is no critical habitat as defined by the ESA for threatened or endangered species that may be affected by the Project. Therefore, construction, maintenance, and operation of the proposed Project will not adversely modify critical habitat for endangered or threatened species.

3.4.5.2.2 No Effect

For most of the species identified, the Project should have no effect. Resource investigations indicated that gray wolf, bull trout, northern spotted owl, and Ute ladies'-tresses orchid are not likely to occur or only accidentally occur in the Project area and that essential habitat for some of these species is lacking within the Project area.

3.4.5.2.3 Birds

Bald eagle and northern spotted owl are the only bird species listed under the Endangered Species Act that may potentially occur within the Project area.

Bald eagle is documented wintering, but not breeding, within the Project area. To date, there have been no bald eagle fatalities documented at other wind plants in the U.S. (see Erickson et al., 2001). Few bald eagles were observed within the Project area during surveys, rather most bald eagles were observed along the Yakima River and in areas where cattle are pastured. While use of the Project site by bald eagles does occur, it is relatively low compared to adjacent areas along the Yakima River and appears to be related to the presence of livestock or wildlife carcasses (carrion), which they utilize for forage.

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

During Project operations, based on the available information about bald eagle use of the site, potential bald eagle mortality due to operation of the wind plant will confined to the winter and early spring seasons. Bald eagles will not be at risk from the wind plant in the summer or fall. Bald eagles are not expected to frequently occur within the wind plant and operation of the wind plant should have minimal disturbance on bald eagles. Additionally, proposed mitigation measures are intended to further reduce the possibility of disturbance or displacement.

Although the risk is low, the potential exists for bald eagle fatalities during operation of the Project. The status of bald eagle in the Project area and range wide is not expected to change due to the Project. Bald eagle populations appear to be generally increasing and the USFWS has proposed the species for delisting (USFWS, 1999). The bald eagle populations in Washington and throughout North America will continue to increase during and after the Project is constructed. Exhibit 12, 'Biological Assessment of Endangered, Threatened, Proposed and Candidate Species', contains a detailed analysis of potential impacts to bald eagles.

Northern spotted owl site centers and associated territory buffers are mapped by the WDFW approximately ½ mile to the north of the Project area. Spotted owls occur almost exclusively within forested environments. The Project area is located within the transition zone between forest and grassland. No nesting habitat is present within the Project area. Although possible, it is unlikely that spotted owls will hunt within or disperse through the Project area. The Project is not expected to impact the northern spotted owl.

Northern goshawks are documented as breeding within the National Forest a few miles from the Project. Although the Project area does not contain suitable nesting habitat for northern goshawks, the species may occasionally occur within the Project area while hunting or migrating. This is expected to be a very rare occurrence, as no goshawks were observed during surveys within the Project area. The proposed Project is not expected to affect northern goshawks.

One historic record of a breeding merlin is present within the Project area, and two merlins were observed during avian use surveys. No merlin fatalities have been documented at other wind plants and considering the low use of the Project area by merlins, the Proposed project is not expected to impact merlins in the area.

3.4.5.2.4 Mammals

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

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

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

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

3.4.5.2.5 Reptiles and Amphibians

Two species of amphibians have been documented in the study area by the WDFW, including tailed frog and Columbia spotted frog. Field surveys conducted for the Project did not specifically target reptiles or amphibians. Reptiles observed during the field studies included rubber boa, Great Basin gopher snake, Northern Pacific rattlesnake, and short-horned lizard. One amphibian chorus was heard during the spring at a distance of over 300 meters, and is likely one of the true frog species (e.g., Cascade frog). Spotted frogs and red-legged frogs have auditory calls that typically don't carry over 30 meters, and the northern leopard frog is not known to occur in Kittitas county. Up to 25 additional species of reptiles and amphibians occur in Kittitas county and could possibly be present in the Project area, including the striped whipsnake, sharptail snake, and western toad. There is very little suitable habitat for amphibians or aquatic reptiles (e.g., turtles) in the study area. Two Pygmy short-horned lizards were present at points I & C in August.

Construction of the Project may affect reptiles on site through loss of habitat and direct mortality of individuals occurring in construction zones. The level of mortality associated with construction would be based on the abundance of the species on site. Some mortality may be expected as common reptiles such as short-horned lizards and yellow-bellied racers often retreat to burrows underground for cover or during periods of winter dormancy. Excavation for turbine pads, roads, or other wind project facilities could kill individuals in underground burrows. While above ground, yellow-bellied racers and other snakes are generally mobile enough to escape construction equipment, however, short-horned lizards do not move fast over long distances and rely heavily on camouflage for predator avoidance. Some individual lizard fatalities can be expected from vehicle activity.

Once operational, the wind Project is not expected to substantially impact reptiles. Operations and maintenance activities may occasionally result in a road killed snake or lizard, however, this is expected to be a rare occurrence due to the limited nature of traffic expected within the Project area.

3.4.5.2.6 Threatened and Endangered Plant Species

The proposed Project, as mitigated, is not expected to have direct impacts on any federal or state listed species. The limited direct impacts to white-margined knotweed (a Washington 'Review' species) are not expected to significantly impact the local population. In addition, the mitigated project is not expected to produce significant indirect impacts (resulting from noxious weed increases or fire frequency changes) to local populations of any plant species of concern.

3.4.6 Wildlife Migration

3.4.6.1 Current Migration in Project Location

The proposed Project site does not currently support large congregations of mule deer or elk but is within area considered winter range for these species (WDFW, PHS database 2002). The Project falls within portions of the Lauderdale, Ellensburg, and Highway 10 Mule Deer Wintering Areas and the Lookout Mountain Elk Winter Area. During the winter months there is an influx of mule deer and elk moving from the surrounding mountains to the west and north to these winter

areas. Based on the information in the WDFW PHS database, it is estimated that between 200 and 400 mule deer and 50 elk winter in these areas. No distinct migration routes have been identified within the Project area. The Quilomene Elk Migration Corridor is located north and east of the Project area (WDFW, PHS database). It is likely that wintering mule deer and elk simply move in from surrounding areas through undeveloped tracts of land.

Reptiles and amphibians are present in the Project area and may be concentrated in areas of suitable habitat (e.g., wetlands). No migration corridors for reptiles or amphibians are known to be present in the Project area. Many amphibians migrate short distances during spring or fall breeding periods to and from suitable wetlands and during fall dispersal of juveniles.

The Project area is located within the Pacific Flyway, one of four principal north-south bird migration routes in North America. Bounded roughly by the Pacific Ocean and the Rocky Mountains, the Pacific Flyway extends from the arctic regions of Alaska and Canada to Central and South America. Within the flyway, certain groups of birds may travel along narrower migration corridors, with more well defined paths.

The Project's location along the east flank of the Cascades places it within possible migration corridors of several bird species and the Yakima River riparian corridor south of the project may also be used by migrating songbirds. The river provides a distinct geographic visual cue to migrating birds and provides resting habitat for waterfowl. Riparian habitat along the river provides resting and foraging habitat for songbirds and raptors.

Passerine use (# observations/20 minute survey) for the Project Site was highest in the spring and fall compared to summer, suggesting some migrant use during the migration seasons (Table 3.4.6-1). Overall raptor use was relatively similar in the spring and summer periods, and slightly lower in the fall. Accipiter use (primarily sharp-shinned hawks) was highest in the spring, likely due to migrant hawks returning or passing through from wintering grounds.

Table 3.4.6-1

Species/Group	Mean Use (#/20 minute survey)			Group Composition (%)			% Frequency		
	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall
Waterfowl	0.25	0.03	0.00	1.7	0.3	0.0	4.5	2.1	0.0
Waterbirds	0.02	0.00	0.00	0.2	0.0	0.0	1.1	0.0	0.0
Shorebirds	0.09	0.07	0.04	0.6	0.8	0.3	6.8	2.0	2.0
Accipiters	0.11	0.01	0.07	0.8	0.1	0.6	10.2	1.0	6.1
Buteos	0.39	0.38	0.40	2.6	4.1	3.3	28.7	31.7	28.0
Northern Harriers	0.01	0.00	0.17	0.1	0.0	1.4	1.1	0.0	16.5
Eagles	0.11	0.02	0.01	0.7	0.2	0.1	8.4	1.0	1.0
Large Falcons	0.06	0.00	0.00	0.4	0.0	0.0	5.7	0.0	0.0
Small Falcons	0.24	0.45	0.06	1.6	4.9	0.5	19.3	40.5	4.0
Other – Raptor	0.09	0.17	0.02	0.6	1.9	0.2	8.0	16.2	2.0
Raptors Subtotal	1.01	1.03	0.73	6.7	11.2	6.0	62.8	59.1	47.6
Corvids	1.04	0.21	0.78	6.9	2.2	6.4	38.5	16.4	39.8
Passerines	12.48	7.55	10.40	82.5	82.3	85.3	80.0	97.0	73.6
Other Birds	0.11	0.21	0.13	0.8	2.3	1.1	10.2	11.2	12.1
Gamebirds	0.11	0.03	0.08	0.8	0.3	0.7	5.7	1.0	3.0
Doves/Pigeons	0.01	0.04	0.03	0.1	0.4	0.3	1.1	3.0	3.4

Subtotal	15.14	9.16	12.20		

Waterfowl were occasionally observed during the wildlife baseline study within the Project Site including Canada geese (142 observations, 5 groups), mallards (29 observations, 6 groups), greater white-fronted geese (10 observations, 1 group), blue-winged teal (3 observations, 1 group), and one unidentified waterfowl group (7 observations, 1 group). Waterfowl use is expected to be higher south of the Project near the Yakima River. Some waterfowl use can be expected in ponds along the Dry Creek drainage and along Swauk Creek to the west of the Project (WDFW 2002).

Some species of bats may also migrate through the Project area. At least two species of bats, hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasonycteris noctivagans*), are known to migrate through Washington and other species such as little brown bat (*Myotis lucifugus*) and big brown bat (*Eptesicus fuscus*) may make localized short distance migrations to suitable hibernacula sites (e.g, caves, mines). Bats typically migrate at night, and are most frequently observed migrating during August and mid-September.

3.4.6.2 Predicted Migration Impacts

No impacts are expected from the Project to big game or reptile and amphibian movement or migration. The Quilomene Elk migration corridor is outside the Project area and no Project features or construction will occur within the area identified as this migration corridor. Additionally, no wetlands will be affected which could impede amphibian movements.

Migrant birds and bats may be at risk of collision with turbines in the Project. Passerines have been the most abundant avian fatality at some other wind projects studied (see Johnson *et al.*, 2000; Young *et al.,* 2001; Erickson *et al.,* 2000), often comprising more than 80% of the avian fatalities. Both migrant and resident passerine fatalities have been observed. Given that passerines make up the vast majority of the avian observations on-site, passerines would likely make up the largest proportion of fatalities. Common species such as horned larks and western meadowlarks (confirmed casualties at other wind plants) would be most at risk. Nocturnal migrating species may also be affected, but would not be expected to be found in large numbers based on data collected at other projects (i.e., no large mortality events documented, see Erickson *et al.* 2001). Estimates of the percentage of bird fatalities that are migrants have ranged from approximately 30% at the Wisconsin wind plant to 60% at Buffalo Ridge, Minnesota (Erickson *et al.*, 2001). Estimates of total bird mortality at other wind plants have ranged from approximately 0.6 birds per turbine per year at the Vansycle wind plant in Oregon to 2.8 birds per turbine per year at the Buffalo Ridge wind plant in Minnesota (Erickson *et al.,* 2001). Provided 120 turbines are constructed at the proposed project, approximately 50-300 birds may be killed at the wind plant annually. The number of these that would be expected to be migrants would vary from approximately 30-180 birds.

Migrant bats, and in particular hoary bats and silver-haired bats, have been documented fatalities at other wind plants. Bat mortality at wind plants is highly seasonal, occurring primarily during the fall migration season (August – mid September). At the Buffalo Ridge Wind Plant, based on a 2-year study, bat mortality was estimated to be 2.05 bats per turbine per year (Johnson *et al.,* 2000b). At the Foote Creek Rim Wind Plant, based on 2 years of study, bat mortality was estimated at 1.51 bats per turbine per year (Young *et al.,* 2001). At the Vansycle Ridge Wind Plant in Oregon, bat mortality was estimated at 0.74 bats per turbine for the first year of operation (Erickson *et al.,* 2000). Provided 121 turbines are constructed, approximately 80-250 bats may be

killed at the wind plant annually. Based on the species composition of bats at the other wind plants studied, nearly all of these would be expected to be migrants.

3.4.7 Potential Effects of Decommissioning and/or Cessation of Project

A more detailed discussion of decommissioning and site restoration plans is provided in Section 7.3, 'Initial Site Restoration Plan'.

3.4.7.1 Vegetation

Impacts from decommissioning the project would be similar but lower than those for construction, assuming that all access roads remained in place. Decommissioning vehicles would travel on established roadways, which would not impact vegetation. Vegetation around Project facilities to be removed would likely be impacted to the same extent as described for construction.

All facilities would be removed to a depth of 3 feet below grade and the soil surface would be restored as close as possible to its original condition, or to match the current land use. Reclamation procedures would be based on site-specific requirements and techniques commonly employed at the time the area would be reclaimed, and would likely include regrading, adding topsoil, and revegetating disturbed areas.

3.4.7.2 Wildlife

Impacts from decommissioning the proposed Project would be lower than those for construction, assuming that all access roads remain in place. Vehicles would travel on established roadways which would not impact habitat for special status species. Dismantling the project would eliminate avian mortality caused by the presence of wind turbines. Wildlife habitat would have the potential to return to pre-project conditions over time, therefore impacts from decommissioning would be low. Mitigation for impacts to wildlife would follow procedures in use at the time of decommissioning.

3.4.8 Proposed Mitigation Measures for Potential Impacts to Plants and Animals

The potential direct impacts to plants and animals from the Project can be grouped into two main categories, loss of habitat from construction and operation of the Project, and potential mortality to individual birds or other animals from construction and operation of the Project. The loss of habitat associated with the Project can be further broken down into "temporary" and "permanent" habitat impacts. "Temporary" impacts are those arising from ground disturbance necessary for the construction of Project infrastructure but that will be not be permanently occupied once construction is complete. Examples include trenches for underground electrical collector cables, construction staging areas, etc. These areas will be disturbed during the construction period but will be replanted and restored after construction is finished. The vast majority (approximately 75%) of the total area impacted by construction of the Project will only be temporarily disturbed (i.e. for less than one year.) The remainder, (approximately 25%) will continue to be occupied by the Project, such as string roads, turbine foundation pads, Project substation and the O&M facility. These are considered "permanent" impacts for the purpose of this analysis.

Potential indirect impacts to plants and animals are more diffuse and could be caused by habitat fragmentation, wildlife disturbance or avoidance of the Project site, and introduction of noxious weeds and/or wildfire.

A comprehensive mitigation package for plants and animals is proposed for this Project. It consists of several categories of actions, including:

- Thorough study and analysis to avoid impacts;
- Project design features to minimize impacts;
- Construction techniques and (Best Management Practices) BMPs to minimize impacts;
- Post-construction restoration of temporarily disturbed areas;
- Operational BMPs to minimize impacts;
- Monitoring and adaptive management to minimize impacts during operations; and
- Acquisition and enhancement of on-site habitat Acquisition and enhancement of a large, contiguous on-site area of good quality habitat that faces immediate threat of development.

3.4.7.1 Thorough study and analysis to avoid impacts

The Applicant has commissioned extensive studies by qualified biologists of plants and animals at the Project site to avoid impacts to sensitive populations. These studies, results of which are included as Exhibits 8 - 12 include:

- Rare plant surveys;
- Habitat mapping;
- Avian use point count surveys;
- Aerial raptor nest surveys;
- Wintering bald eagle surveys;
- Non-avian wildlife surveys; and
- Biological assessment for threatened and endangered species.

The results and recommendations of these studies have been incorporated into the proposed design, construction, operation and mitigation for the Project. In the event that the final Project layout includes areas that contain habitat suitable for rare plants which have not previously been surveyed for rare plants, an additional rare plant survey will be conducted at the appropriate time in 2003.

3.4.7.2 Project design features to avoid and/or minimize impacts

The proposed design of the Project incorporates numerous features to avoid and/or minimize impacts to plants and wildlife. These features are based on site surveys, experience at other wind power projects, and recommendations from consultants performing studies at the site. Features of the Project that are designed to avoid or minimize impacts to plants and animals include the following:

- Avoidance of construction in sensitive areas such as riparian zones, wetlands, forests, etc.;
- Minimization of new road construction by improving and using existing roads and trails instead of construction new roads;

- Choice of underground (vs. overhead) electrical lines wherever feasible to minimize perching locations and electrocution hazards to birds;
- Choice of turbines with low RPM and use of tubular towers to minimize risk of bird collision with turbine blades and towers;
- Use of bird flight diverters on guyed permanent meteorological towers or use of unguyed permanent meteorological towers to minimize potential for avian collisions with guy wires;
- Equipping all overhead power lines with raptor perch guards to minimize risks to raptors; and
- Spacing of all overhead power line conductors to minimize potential for raptor electrocution.

3.4.7.3 Construction techniques and BMPs to minimize impacts

Construction of the Project has the potential to impact both habitat and wildlife in a variety of ways. The Applicant proposes the use of construction techniques and Best Management Practices (BMPs) to minimize these potential impacts. These include the following:

- Use of BMPs to minimize construction-related surface water runoff and soil erosion (these are described in detail in Section 2.10 Surface Water Runoff;
- Use of certified "weed free" straw bales during construction to avoid introduction of noxious or invasive weeds;
- Flagging of any sensitive habitat areas (e.g. raptor nests, wetlands, etc.) near proposed areas of construction activity and designation of such areas as "off limits" to all construction personnel;
- Development and implementation of a fire control plan, in coordination with local fire districts, to minimize risk of accidental fire during construction and respond effectively to any fire that does occur;
- Establishment and enforcement of reasonable driving speed limits during construction to minimize potential for road kills;
- Proper storage and management of all wastes generated during construction;
- Require construction personnel to avoid driving over or otherwise disturbing areas outside the designated construction areas;
- Monitoring of raptor nests on site for activity prior to construction and modify construction timing and activities to avoid impacts to nesting raptors; and
- Designation of an environmental monitor during construction to monitor construction activities and ensure compliance with mitigation measures.

3.4.7.4 Post-Construction Restoration of Temporarily Disturbed Areas

All temporarily disturbed areas will be reseeded with an appropriate mix of native plant species as soon as possible after construction is completed to accelerate the revegetation of these areas and to the prevent spread of noxious weeds. The Applicant will consult with Washington Department of Fish and Wildlife regarding the appropriate seed mixes for the Project area.

3.4.7.5 Operational BMPs to Minimize Impacts

During Project operations, appropriate operational BMPs will be implemented to minimize impacts to plants and animals. These include the following:

- Implementation of a fire control plan, in coordination with local fire districts, to avoid accidental wildfires and respond effectively to any fire that might occur;

- Establishment and enforcement of reasonable driving speed limits during construction to minimize potential for road kills;
- Operational BMPs to minimize storm water runoff and soil erosion;
- Implementation of an effective noxious weed control program, in coordination with the Kittitas County Noxious Weed Control Board, to control the spread and prevent the introduction of noxious weeds;
- Identification and removal of all carcasses of livestock, big game, etc. from within the Project that may attract foraging bald eagles or other raptors.

3.4.7.6 Monitoring and Adaptive Management to Minimize Impacts During Operations

The Applicant plans to convene a Technical Advisory Committee (TAC) to evaluate the mitigation and monitoring program and determine the need for further studies or mitigation measures. The TAC will be composed of representatives from Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Kittitas County, local interest groups (e.g., Kittitas Audubon Society), Project landowners, and the Applicant. The role of the TAC will be to coordinate appropriate mitigation measures, monitor impacts to wildlife and habitat, and address issues that arise regarding wildlife impacts during construction and operation of the wind plant. The post-construction monitoring plan should be developed in coordination with the TAC.

The Applicant proposes to develop a post construction monitoring plan for the Project to quantify impacts to avian species and to assess the adequacy of mitigation measures implemented and the possible need for additional measures. The monitoring plan will include the following components: 1) fatality monitoring involving standardized carcass searches, scavenger removal trials, searcher efficiency trials, and reporting of incidental fatalities by maintenance personnel and others; and 2) a minimum of one breeding season raptor nest survey of the study area and a 1 mile buffer to locate and monitoring active raptor nests potentially affected by the construction and operation of the wind plant.

The protocol for the fatality monitoring study will be similar to protocols used at the Vansycle Wind Plant in northeastern Oregon (Erickson *et al.,* 2000) and the Stateline Wind Plant in Washington and Oregon (FPL *et al.,* 2001).

3.4.7.7 Acquisition and Enhancement of On-site Habitat

In addition to all of the mitigation measures described above, the Applicant proposes to purchase and protect, for the life of the Project, a large area of habitat on-site. This privately owned parcel, which is located in Sections 22 and 27, Township 19 North, Range 17 East, and is adjacent to land owned by the Washington DNR, is currently under immediate threat of development. The parcel had been on the market for at least one year prior to the Applicant negotiating a purchase option with the current owner. The current owner has had active negotiations with and has received offers from developers to purchase this land and convert it to rural residential development.

The Applicant proposes to purchase this parcel and implement measures to enhance its value as habitat. The Applicant proposes to protect and restore a minimum of 1.5 acres of replacement habitat for every acre of habitat permanently disturbed the Project and a minimum of 0.5 acres of

replacement habitat for every acre of habitat temporarily disturbed by Project construction. These proposed replacement ratios are consistent with, or higher than, replacement ratios that have been implemented at other wind power projects in Washington State.

3.4.7.8 Description of Proposed Mitigation Parcel

This proposed mitigation parcel consists of portions of two broad-topped north south trending ridges, with an unnamed creek and associated canyon running between them. A detailed description of this parcel written by a qualified plant ecologist is provided in Exhibit 10, 'Mitigation Parcel Description'. Within the parcel, five different cover types have been mapped. The largest of these is the Shrub-Steppe type, with a total area extent of 351 acres (or 64% of the parcel). These are areas dominated by tall shrubs, primarily bitterbrush (*Purshia tridentata*), containing an understory of native bunchgrasses (or in disturbed areas cheatgrass [*Bromus tectorum*]). The category was further broken down based on the relative spatial density of the shrub layer (Dense, Moderate, and Sparse sub-categories). Within the parcel, 278 acres (50% of the parcel) were categorized as Moderately Dense Shrub-Steppe, and 74 acres (13% of the parcel) were classed as Sparse Shrub-Steppe.

The majority of the remaining ground (189 acres or 34% of the parcel) was classed as Grassland habitat. This cover type includes a variety of plant associations, all dominated by grass species. In most cases these are bunchgrasses, such as Sandberg's bluegrass (*Poa secunda*) or bluebunch wheatgrass (*Pseudoroegnaria spicata*), but disturbed areas are sometimes dominated by cheatgrass or bulbous bluegrass (*Poa bulbosa*). The majority of the grassland habitat, is located on the westernmost ridgetop, and is likely the result of a recent fire that has removed most of the shrub component. The habitat now consists of a mix of native and non-native grasses and forbs, with widely scattered small shrubs.

Two cover types are exclusively associated with the unnamed creek that runs through the middle of the parcel. The largest of these is the Riparian Tree category which is present on approximately eight acres (1.5%) of the parcel. This cover type includes areas within riparian zones dominated by trees. Primarily this includes hydrophytic species such as cottonwoods (*Populus balsamifera* ssp. *trichocarpa*), but scattered conifers are also present in some areas. In addition, one 2.8 acre area (0.5% of the parcel) above the creek was typed as Deciduous Scrub Thicket. This cover type describes upland areas dominated by deciduous shrubs. Typical shrub species for this cover type include chokecherry (*Prunus virginiana*), bittercherry (*Prunus emarginata*), oceanspray (*Holodiscus discolor*), common snowberry (*Symphoricarpos albus*), and serviceberry (*Amelanchier alnifolia*).

3.4.7.9 Current Habitat Condition of Proposed Mitigation Parcel

A thorough discussion of current habitat conditions on this parcel written by a qualified plant ecologist is provided in Exhibit 10, 'Mitigation Parcel Description'. In the habitat descriptions that follow, ratings of habitat quality are based on general observed patterns of plant species diversity, native versus non-native species ratios, and overall vegetative structure. The following categories were used: 'Excellent' (high species diversity with negligible amounts of non-native weedy species, along with well developed native vegetative structure); 'Good' (moderate to high species diversity dominated by native plants, with significant inclusions of non-native species in certain areas, and fair to well-developed native vegetative structure); 'Fair' (moderate diversity with non-native species dominance or co-dominance in some or all layers, and fair native

structure); and 'Poor' (low species diversity, dominated by non-native, weedy invaders in some or all layers, and poor native vegetative structure).

The eastern ridgetop contains primarily shrub-steppe habitat in fair to good condition (Photo 3.4.7-1). Native shrubs (primarily bitterbrush) and forbs dominate most of this area, with a mixture of native and non-native grasses. Areas along the jeep trails and canal road contain a higher percentage of non-native species. There are also several small inclusions of lithosol (shallowsoiled) habitat on this ridge (Photo 3.4.7-2). These are in good condition, dominated by native bunchgrasses (primarily Sandberg's bluegrass), as well as native forbs and low shrubs.

The western ridgetop has recently burned. The habitat now consists of a mix of native and non-native grasses and forbs, with widely scattered small shrubs (Photo 3.4.7-3). Habitat quality is generally fair. Weedy species are more common in the deeper-soiled areas, and several populations of noxious weeds are present. Further up the ridgeline, there is an unburned portion that is similar in condition to the eastern ridgetop (*i.e.* fair to good condition dominated by native shrubs and forbs, and a mix of native and non-native grasses).

The creek bottom ranges in habitat quality along its length. The upper portions are in poor to fair condition, with little development of riparian vegetation (Photo 3.4.7-4). Non-native species are common in these upper portions, although native species still dominate in areas. The creek appears to be intermittent in this upper section. Lower down, the creek bottom is in fair to good condition. Riparian vegetation is better developed and the creek flows late into the summer (Photos 3.4.7-5 and 3.4.7-6). Riparian trees and shrubs are present along this lower reach, and in places are dense and well developed.

Figure 3.4.7-1Shrub-Steppe Habitat Along the Eastern Ridgetop

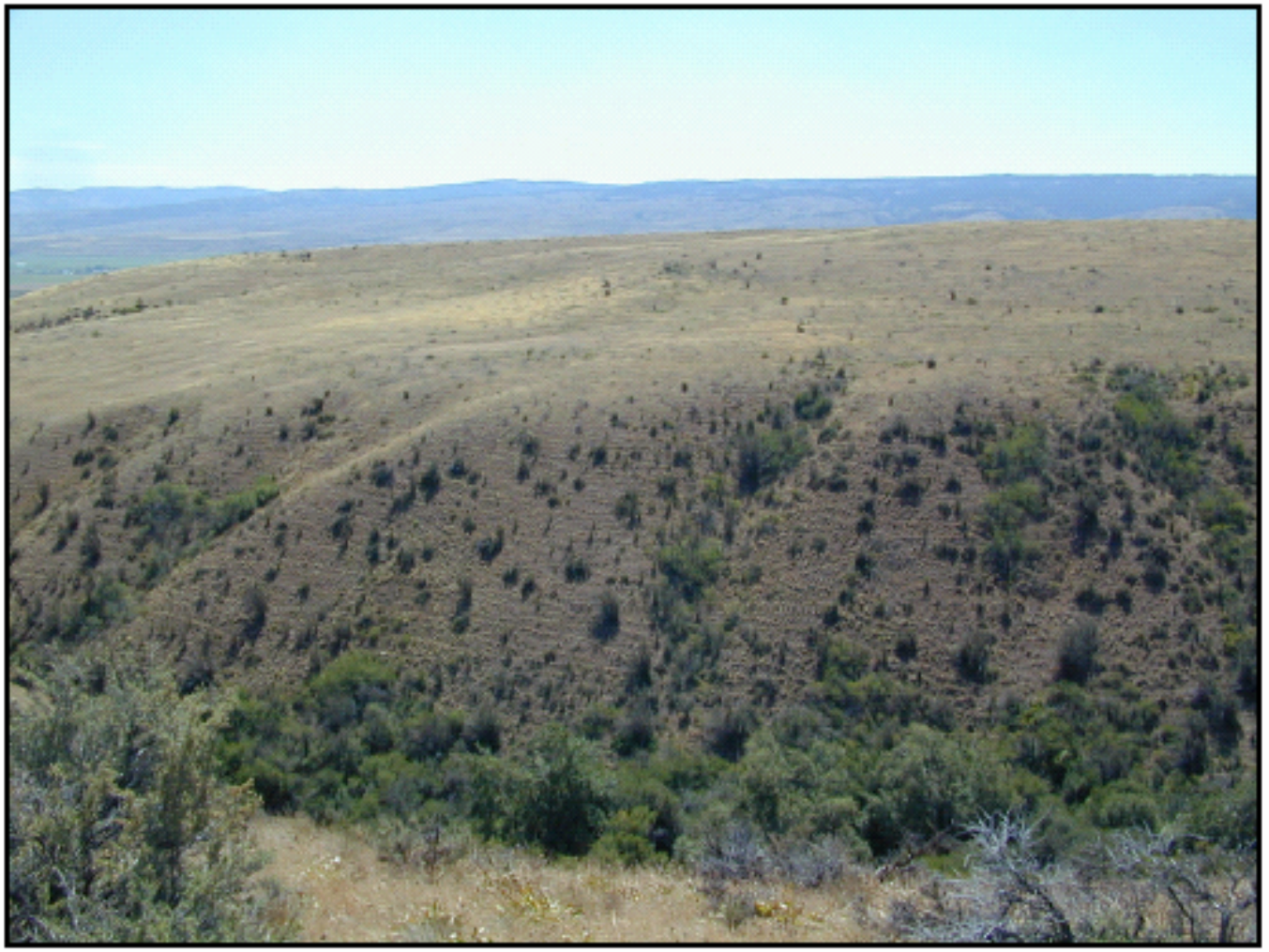
Figure 3.4.7-2 Lithosol Habitat Along the Eastern Ridgetop

Figure 3.4.7-3 Recently Burned Habitat Along the Western Ridgetop

Figure 3.4.7-4 Creek Bottom in Upper Portion of Parcel

Figure 3.4.7-5 Creek Bottom in Lower Portion of Parcel (Canal Road in Foreground)

Figure 3.4.7-6 Overview of Creek in Lower Portion of Parcel (Western Ridge in Background)



3.4.7.10 Proposed Habitat Enhancement Measures

Overall, the parcel is in fair to good condition. However, several opportunities for enhancement exist that would be expected to raise habitat quality further. Primary among these is management and control of cattle grazing within the entire parcel, and especially within the riparian zone. A grazing management plan could be developed that reduces or eliminates cattle pressure on the most sensitive portions, and allows for reestablishment of native vegetation in specific problem areas.

Although high concentrations of noxious weeds were not found within the parcel, scattered patches and individuals (primarily diffuse knapweed [*Centaurea diffusa*]) are present throughout. An overall noxious weed control effort for the parcel, developed in coordination with the Kittitas County Noxious Weed Control Board, would likely be effective at reducing or eliminating noxious weeds from the site, increasing the habitat quality and effectiveness.