2.6 Aquatic Habitat, Fish Species, and Wildlife

2.6.1 Affected Environment

2.6.1.1 Aquatic Habitat and Fish Species

The Project is located in the Middle Snake River Watershed. Within the Project boundary there are four fish-bearing streams: Tucannon River and its tributary, Pataha Creek, as well as Meadow Creek and Brown Gulch. All four water bodies are considered major salmonid habitat (Ecology 1995). WDFW habitats and species maps and the StreamNet database confirmed that these are the only fish-bearing streams in the Project area (WDFW 2009a; StreamNet 2009).

Eight fish with federal and/or state status have been identified by the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and/or WDFW as having the potential to occur in or adjacent to the Project (see Table 2-18). Of these eight species, three species, bull trout (*Salvelinus confluentus*), spring/summer and fall runs of chinook salmon (*Oncorhynchus tshawytscha*), and steelhead (*O. mykiss*), are federally listed threatened species, and as such are currently protected under the Endangered Species Act (ESA).

Table 2-18 Sensitive Fish Species Occurring In or Near the Project Area

Species	Federal Status	State Status	Occurrence
Bull trout (*S. confluentus*)	Threatened	Candidate	Tucannon R.
Chinook salmon (*O. tshawytscha*)			
Spring/summer run	Threatened	Species of Concern	Tucannon R.
Fall run	Threatened	Species of Concern	Tucannon R.
Steelhead (*O. mykiss*)	Threatened	Species of Concern	Tucannon R./Pataha Cr.
Margined sculpin (*Cottus marginatus*)	Species of Concern	Sensitive	Tucannon R.
Pacific lamprey (*Lampetra tridentata*)	Species of Concern	Monitor	Tucannon R.
Redband/Rainbow trout (*O. mykiss*)	Species of Concern	–	Tucannon R./Pataha Cr.
River lamprey (*L. ayresi*)	Species of Concern	Candidate	Snake R./Tucannon R.
Western brook lamprey (*L. richardsoni*)	Species of Concern	Monitor	Snake R.

Sources: Mongillo and Hallock 1998; Moser and Close 2003; Snake River Salmon Recovery Board 2006, USFWS 2009a; NMFS 2009; WDFW 2009a

<u>Tucannon WRA</u>

Tucannon River runs along Tucannon WRA's north east boundary and is utilized by all three federally listed species for spawning and rearing (Ecology 1995, Faler et al. 2003, HDR 2007). In addition, WDFW operates a salmon, steelhead, and rainbow trout hatchery south of the Project, near Rainbow Lake. Fish from this hatchery utilize the Tucannon River in and near the Project area. Pacific lamprey has also been documented in the Tucannon River (Moser and Close 2003). River lamprey may occur in this river as well; however, the presence is currently unknown due to this species limited numbers (Snake River Salmon Recovery Board 2006).

<u>Kuhl Ridge WRA</u>

Pataha Creek runs through the southern portion of the Kuhl Ridge WRA and northern portion of the Oliphant Ridge WRA. This stream supports steelhead in the upper reaches, native and planted rainbow trout in the mid to upper reaches, as well as redband trout (*O. mykiss gairdneri*) and eastern brook trout (*Salvelinus fontinalis*) throughout the river (Bartels 1999, HDR 2007, USFWS 2009c, WDFW 2009a). Suckers (*Catostomus* species), northern pikeminnow (*Ptychocheilus oregonensis*), and shiners inhabit the lower portion of Pataha Creek because of the higher water temperatures and lack of vegetation (Bartels 1999).

Summer steelhead and rainbow trout have been documented in Meadow Creek (WDFW 2009a). This stream runs through the northeast corner of this WRA.

<u>Dutch Flats WRA</u>

One fish-bearing stream, Brown Gulch, contains rainbow trout (WDFW 2009a). Located at the north end of this WRA, this stream is hydrologically connected to Pataha Creek. There are no other fish-bearing streams in this WRA.

<u>Oliphant Ridge WRA</u>

The Tucannon River runs along the southern border of this WRA and Pataha Creek runs along the northern-northeast border of this WRA. See discussion under Tucannon and Kuhl Ridge WRA's for fish species present in these streams. There are no other fish-bearing streams in this WRA.

2.6.1.2 Wildlife

<u>All Four WRAs</u>

Special Status Species

Species were identified based on the WDFW Species of Concern list (WDFW 2009b), which includes state listed endangered, threatened, sensitive, and candidate species; and the USFWS list of Endangered, Threatened, Proposed, Candidate and Species of Concern for Garfield and Columbia counties (USFWS 2009a).

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 project (WDFW 2009c);
- WDFW Priority Habitats and Species records for the Project area and a buffer of approximately 5 miles (WDFW 2009a);
- Baseline field studies conducted onsite (Appendix C); and
- Other published literature where available.

Species lists provided by the USFWS indicated two federally listed species, gray wolf (*Canis lupus*) and Canadian lynx (*Lynx canadensis*), as occurring in Garfield and Columbia counties. Gray wolf is listed as Endangered while the lynx is listed as Threatened under the federal ESA (USFWS 2009a). Washington State also lists the gray wolf and lynx as Endangered and Threatened, respectively (WDFW 2009b).

Wolves are highly adaptable and can live in a variety of habitats as long as sufficient prey is available. In the northwestern United States and western Canada, wolves are most common in forested areas with relatively flat, open spaces such as river valleys and basins where prey are easier to chase and catch (WDFW 2008). Wolf populations fare best in areas where conflicts with humans are low. These tend to be locations with extensive public lands, few or no livestock, few roads, and low human densities.

At present, the number of individuals needed to ensure that wolves are no longer in danger of extirpation from Washington is difficult to determine on a scientific basis because of the absence of species specific data on population dynamics (such as pack densities and predator-prey relationships) for the state. Since 2006, there have been multiple public reports of gray wolves in the Blue Mountains, south of the Tucannon WRA (WDFW 2008). In 2007 and 2008, single reports of groups of three to five wolves were also made in Garfield and Asotin counties (WDFW 2008).

Based on the lack of gray wolf habitat and the continued presence of human activity in the region, this species is unlikely to occur in the Project area.

Although listed by USFWS as occurring in both Garfield and Columbia counties, lynx are primarily found in high-elevation forests of north central and northeast Washington, including Okanogan, Chelan, Ferry, Stevens, and Pend Oreille counties.

Based on the habitat attributes present on the Project area and the habitats with which this species is associated with, it is unlikely this species occurs in the Project area. Furthermore, it is doubtful lynx were ever consistently present in this part of the state (Stinson 2001).

No federal- or state-listed threatened, endangered, or candidate wildlife species have been observed in the Project area (Appendix C).

General Wildlife

Big game species documented to occur throughout the Project area include elk (*Cervus elaphus nelsoni*), mule deer (*Odocoileus hemionus*), moose (*Alces alces*) and white-tail deer (white-tails; *Odocoileus virginianus*) (see Figure 2-9). Winter range habitat for elk, mule deer and white-tail deer has been designated by WDFW in the Project area (WDFW 2009a). These areas are considered Fish and

Wildlife Habitat Conservation Areas under the Columbia and Garfield County CAOs.

Moose inhabit primarily northeast Washington, but have been observed in limited numbers the Blue Mountains only over the last five years or so (WDFW 2004). While they can be found at any elevation, they are most likely found in the 3,000 to 5,000 foot elevation range. In the fall they prefer browse, primarily willows that grow in brushy forest plantations or in burns that are 15 years old or older. In the fall and early winter moose seek out snow, rather than avoid it. Due to their limited presence in this region of Washington, moose will not be discussed further.

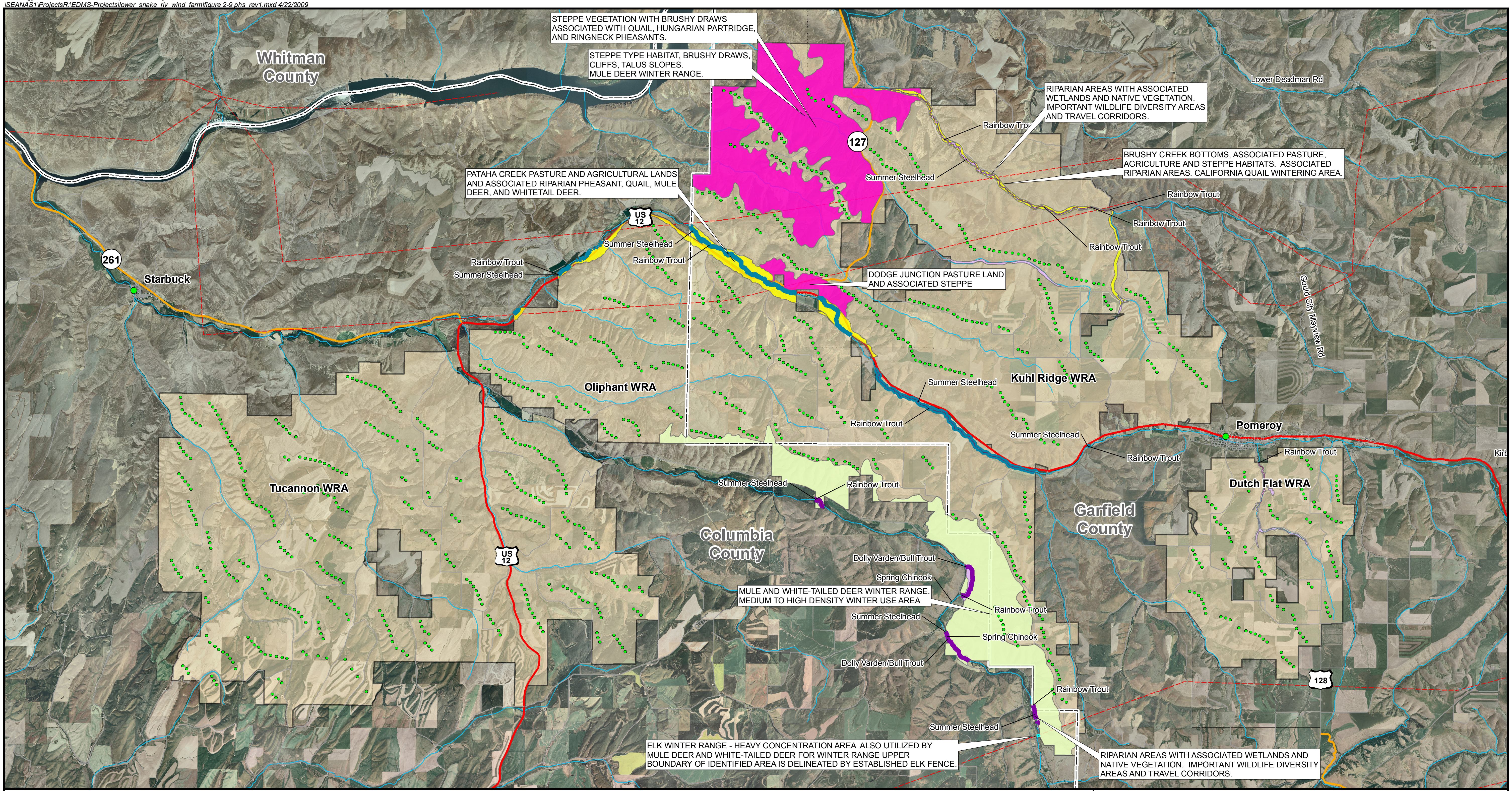
The Project area is located within the Blue Mountain elk herd distribution area, an area of approximately 900 square miles. The elk herd ranges in elevation from 1,400 to 6,100 feet. While the primary range for elk is predominantly south of the Project area, winter habitat does occur along the southern portions of the Project area. Wintering elk forage on native grass species, which greens up with fall and winter rains.

Peaking in the late 1970s at an estimated 6,500 elk, the Blue Mountain elk population started declining in the late 1980's with an estimated population of 4,500 (+/- 500 elk) by 1999 (WDFW 2001). The elk population in this region is currently stable while their distribution in southeast Washington is limited biologically by the carrying capacity of seasonal ranges, and socially by human-elk conflicts on agricultural lands (WDFW 2001).

Mule deer range throughout southeast Washington, occupying various habitats from coniferous forest at 6,000 feet in the Blue Mountains, to the farmlands and shrub steppe/grassland habitats along the breaks of the Snake River. Mule deer in the Blue Mountains do not normally migrate long distances to winter range, but move from higher elevations (6,000 feet) toward the foothills in winter.

Elevation of white-tail distribution in the Blue Mountain region ranges from the foothills to more than 6,500 feet. This species occupies a variety of habitats including riparian areas, mixed species woodlands, agricultural croplands, forests with multiple successional stages, and short diversified slopes. As with mule deer, white-tails occupy similar habitat for forage, for example, along the riparian corridors of Tucannon River and Pataha Creek. Hunting for all three big game species occurs in the Project area.

Late summer/fall rains create a "green-up" of forage that is very important for mule deer. The riparian corridors of Tucannon River and Pataha Creek provide suitable foraging habitat for mule deer. Deep snow, limited forage, and cold temperatures can result in high mortality in mule deer populations, especially among the old and young. During winter months, windblown slopes and ridges in the Project area remain snow-free, providing mule deer shrub species to graze.



Legend

- Turbine Location
- City
- Transmission Line
- US and State Highways
- State and County Highways
- Local Rural Road
- Streams
- County Lines

Salmonid Stock Inventory (SaSI)

- Bull Trout, Chinook, and Steelhead
- Salmonid Stock Inventory (SaSI)

Priority Habitats and Species

- CHUKAR
- MULE DEER
- RING-NECKED PHEASANT
- RIPARIAN ZONES
- ROCKY MOUNTAIN ELK

- Project Area

Lower Snake River Wind Energy Project

Columbia & Garfield Counties
Washington

Figure 2-9
Priority Habitat Species Area

0 1 2 4 6 8
Scale 1:140,000
Miles

Source Information: SSURGO

Furthermore, west and south-facing slopes green up earlier and provide accessible, much-needed nutritious forage during the harsh winter months.

Other general wildlife species that may occur throughout the Project area include badger (*Taxidea taxus*), coyote (*Canis latrans*), porcupines (*Erethizon dorsatum*), red fox (*Vulpes vulpes*), rabbits, voles, and mice. Several species of reptiles are also present including the northern pacific rattlesnake (*Crotalus viridis oreganus*), western yellow-bellied racer (*Coluber constrictor*), and gopher snake (*Pituophis catenifer*)**.**

Hunting on private lands occurs in the Project area. Please refer to Section 2.14.1.2 Land Use and Recreation, Hunting for a discussion of the existing hunting programs.

<u>Tucannon WRA</u>

Special Status Species

Gray wolves and lynx are unlikely to occur in this WRA. The extent of gray wolves' territories is south of this WRA, in the Blue Mountains, while there is a scarcity of evidence lynx occur in this part of the state (Stinson 2001).

General Wildlife

All three big game species are commonly observed in this WRA. In general, white-tails and mule deer are seen throughout the year, but most elk are observed in the fall and winter. Mule deer numbers typically increase in the fall and winter.

Elk are more common in the southern portions, near bands of conifer trees in the transition zone to the Blue Mountain physiographic region, than elsewhere in this WRA (Young et al. 2003 *as cited in* Young et al. 2007); however, they can also be found in the northern section of this WRA in smaller numbers. Elk, mule deer, and white-tails are expected to occur in the northern section of this WRA, except that numbers of elk are likely to be small given the vegetation type distribution (WDFW 2001). There are less forested areas and areas with large trees which create shelter for big game (e.g. Tucannon River corridor).

<u>Kuhl Ridge WRA</u>

Special Status Species

Gray wolves and lynx are unlikely to occur in this WRA for the same reasons as stated above.

General Wildlife

Elk are occasionally observed in this WRA; however, the numbers of elk are likely to be small given the vegetation type distribution (WDFW 2001).

Mule deer winter range occurs throughout the northern portion of this WRA (WDFW 2009a). Mule deer and white-tailed deer have also been documented along the Pataha Creek pastures and riparian habitat along this stream (WDFW

2009a), where stands of deciduous trees, some conifers, and riparian shrubs and wetlands of various sizes exist. These riparian areas also provide some cover and a constant water source.

WDFW data identified riparian habitat along Meadow Creek as an important wildlife habitat and travel corridor (WDFW 2009a).

Dutch Flats WRA

Special Status Species
Gray wolves and lynx are unlikely to occur in this WRA for the same reasons as stated above.

General Wildlife
In addition to the general wildlife species listed at the beginning of this section, all three big game species would likely occur in this WRA. No winter habitat for big game is within this WRA.

Oliphant Ridge WRA

Special Status Species
Gray wolves and lynx are unlikely to occur in this WRA for the same reasons as stated above.

General Wildlife
All three big game species are known to occur in this WRA (WEST 2008). Mule deer and white-tails' winter range occupy the south side of this WRA (WDFW 2009a).

A 27-mile long elk fence forms the entire southern border of Game Management Unit 178 (Peola) and is designed to prevent elk from moving north onto agricultural lands in the unit (WDFW 2001). A portion of this fence occurs in the southern tip of the Oliphant WRA, limiting elk access north into this WRA. However, failure to adequately maintain this elk fence and the inadequate length of the fence has resulted in many elk accessing private land to the north (WDFW 2001); therefore elk are likely to venture into the WRA.

2.6.2 Impacts and Mitigation

2.6.2.1 Preferred Alternative

Construction Impacts

All Four WRAs

Mitigation Measures Inherent in Project Design
Implementation of BMPs which include measures to reduce erosion and include set backs from fish bearing streams will be implemented where possible. Measures include but are not limited to use of existing roads, minimizing the number of stream crossings, staying 250 feet from the banks of fish bearing streams, and where avoidance of the riparian corridor is not possible, stabilized

rock construction access roads will be used. Additionally, the appropriate state and local agencies will be consulted on the appropriate permit requirements and associated mitigation measures which pertain to stormwater management, invasive weed management, and hazardous materials. These measures in addition to those discussed in this chapter will reduce or eliminate potential impacts to aquatic habitat and fish species.

Restoration of temporarily impacted habitat and Project facility footprints after decommissioning will minimize permanent impacts to wildlife. While injury or mortality to burrowing wildlife may occur during construction activities, construction will be confined to a very limited area and will be conducted in phases. This will minimize disturbance to small mammals and burrowing wildlife.

Aquatic Habitat and Fish Species

Potential impacts on fish or aquatic habitat associated with construction of the Project include changes to water quality and water quantity. Construction of the Project has the potential to affect fish-bearing waters primarily through exposure of soils leading to erosion and sedimentation or direct impacts to fish bearing streams.

Stormwater runoff potential will be the greatest during the construction of the Project, when large quantities of soil will be disturbed during the construction of roads, turbine foundations, and other Project facilities. Precipitation during construction can result in increased stormwater runoff which exacerbates the rates of erosion and sedimentation. Sediment often carries organic matter, nutrients, such as phosphorus, and chemicals, all of which can impact the water quality of a stream. If nutrients are bound to the sediment particles, a decrease in dissolved oxygen levels in the stream may result, leading to adverse impact to aquatic life.

As currently proposed no Project facility, except road crossings, will be located closer than 250 feet from the onsite fish-bearing streams (i.e., Tucannon River, Pataha Creek, Meadow Creek, and Brown Gulch) (refer to Section 2.4 Water Resources for a discussion of potential impacts to streams).

Construction of roadways and/or culverts also has the potential to affect fish and aquatic habitats in the Project area by eliminating, diverting, or otherwise impeding flow of onsite waterways. Obstructions to fish movement are most common when culverts or low water crossings are not properly sized to allow for the passage of fish during these critical migration periods (Furniss et al. 1991, WDFW 2003). Water movement can be obstructed during periods of either high or low stream flow.

Wildlife

The potential direct wildlife impacts from Project construction can be grouped into two main categories, loss of habitat and inadvertent mortality to individual species. 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 reclaimed upon completion of construction. Examples include trenches for underground electrical collector cables and construction staging areas. These areas will be disturbed during the construction period but will be reseeded and restored once construction is completed. Permanent habitat impacts are defined as areas where operational facilities are located and habitat cannot be reclaimed until after the end of the Project’s design life (decommissioning).

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

Please refer to Section 2.14.2.2 Land Use and Recreation, Construction Impacts for a discussion of the temporary curtailment of hunting activities during construction activities.

Special Status Species
Gray wolves and lynx are unlikely to occur in the Project area due to lack of habitat in the Project area. There are no documented sitings in the Project area, as well as current geographic distribution and limited population numbers in Washington. As a result, these species will unlikely be affected by the construction activities of the Project. No additional discussion will be included regarding these two species.

General Wildlife
During the construction period, it is expected that big game species may be temporarily displaced from the site due to the influx of humans, heavy construction equipment, and associated disturbance (e.g., noise, blasting). However, studies involving big game species have shown little to no evidence of foraging disturbance during construction of wind farms. Walter et al (2004) found no elk left a wind farm development study site during the researcher’s investigation, while carbon and nitrogen isotopes and percent nitrogen in feces suggested that wind power development did not affect nutrition of elk during construction.

Displacement during construction is a potential impact as it is likely that big game species will avoid areas where large machinery and heavy human traffic are concentrated. However, following completion of each phase of the Project, the disturbance levels from construction equipment and humans will diminish dramatically and the primary disturbances will be associated with operations and maintenance personnel, occasionally vehicular traffic, and the presence of the turbines and other facilities. Therefore, displaced elk utilizing areas away from the construction activities will likely return to the area.

Construction of the Project may also affect other wildlife in the Project, including badger, coyote, and other small mammals such as rabbits, voles and mice. Direct impacts to these mammals may include unintentional mortality or injuries of individuals occurring in construction zones. Permanent indirect impacts will include the loss of habitat. Road and facility construction could result in loss of foraging and breeding habitat for small mammals. Ground-dwelling mammals will lose the use of the permanently disturbed areas; however, they are expected to repopulate the temporarily impacted areas.

The level of injury or mortality to reptiles associated with construction will be based on the abundance of species onsite. Some mortality may be expected with common slow-moving reptiles. Reptiles that are dormant or using burrows or rock crevices for cover within development corridors may be vulnerable. Excavation for turbine pads, roads, or other Project facilities could kill individuals in underground burrows or rock refuges or hibernacula. While above ground, snakes are likely mobile enough to be less vulnerable to construction equipment.

Tucannon WRA

Aquatic Habitat and Fish Species

No construction of new roads and alterations to existing roads will occur through the fish-bearing Tucannon River; therefore, there will be no direct impacts to fish species in this stream or to their aquatic habitat.

Although no fish-bearing streams may be disturbed in this WRA, the crossing of an unnamed, non fish-bearing stream (CTS2), east of turbines A56 and A57 may occur to facilitate the construction of a new road and may require a 40-foot culvert (see Figure 2-3). Indirect impacts to aquatic habitats may occur from road crossings over this non-fish-bearing stream.

Installation of the new overhead 230-kV transmission line will require 10 overhead riparian crossings. In addition, to connect the Tucannon WRA with the Oliphant Ridge WRA, a crossing of the Tucannon River will be necessary for the installation of a new overhead 230-kV transmission line.

Collector lines will be installed parallel to the road system, where possible. Trenching during installation of these lines will occur outside the 250-foot buffer of the Tucannon River, avoiding degrading this fish-bearing stream.

Wildlife

During the construction period, elk, white-tail deer, and mule deer may be temporarily displaced in the southern portion of the Tucannon WRA, due to the influx heavy construction equipment and associated disturbance resulting from construction activities.

Injury or mortality to burrowing wildlife may occur during the construction of roads, turbine foundations, and during trenching activities. However, construction will be conducted in phases and the amount of area impacted during construction will be minimal, thereby minimizing impacts to burrowing wildlife.

Kuhl Ridge WRA

Aquatic Habitat and Fish Species

No construction of new roads and alterations to existing roads will occur through Pataha Creek and Meadow Creek; therefore, there will be no direct impacts to fish species in these streams or to their aquatic habitat.

Although no fish-bearing streams will be disturbed in the Kuhl Ridge WRA, the crossing of unnamed stream GKS720, which may intersect a new road south of turbine T221 has the potential to impact habitat.

Indirect impacts to aquatic habitats may occur from road crossings over the non-fish bearing streams of Dry Gulch, New York Gulch, and Weimer Creek.

Installation of the new overhead 230-kV transmission line will require four riparian crossings over Pataha Creek, three to Oliphant WRA and one offsite, to facilitate the connections between Project substations (see Figure 2-4). An additional 7 unnamed streams are each crossed once by the transmission line. These streams include: GKS719, GKS603, GKS701, GKS711, GKS712, GKS725, and GKS716.

In addition, Dry Gulch, New York Gulch, and three unnamed streams identified by SWCA, will be crossed. Stream GKS2A will be crossed twice to facilitate the installation of the overhead 230-kV line (see Figure 2-4). Streams GKS12A and GKS1-1A may each be crossed once.

Collector lines will be installed parallel to the road system, where possible. Trenching during installation of these lines will occur outside the 250-foot buffer of Pataha Creek, avoiding degrading this fish-bearing stream.

Wildlife

Elk are occasionally observed in the Kuhl Ridge WRA, but this area is not documented winter range (WDFW 2001); therefore construction activities will not likely disturb this species. Mule deer and white-tails winter range the steppe habitat in the northern region of this WRA (WDFW 2009a). These deer species may be temporarily displaced in this area during winter construction activities.

Construction activities during the spring/summer and fall may disturb deer species foraging activities along the riparian area of Pataha Creek. Construction activities, particularly noise, may temporarily startle deer at this time. There will be no loss of foraging habitat or mortality.

Construction of the new 230 kV line will cross both Pataha Creek and deer winter range in the steppe habitat. Depending of the timing and extent of this construction activity, deer may temporarily avoid these areas at the time of construction.

As no riparian areas along Pataha Creek and Meadow Creek will be impacted, there will be no loss of riparian habitat for those wildlife species utilizing this habitat as travel corridors or foraging (as see in Figure 2-9).

Dutch Flats WRA

Aquatic Habitat and Fish Species
No construction will occur along or over Brown Gulch; therefore there will be no loss of aquatic habitat along this fish-bearing stream.

Although no fish-bearing streams will be disturbed in the Dutch Flats WRA, crossing of a perennial stream (Benjamin Gulch) near turbine T-23 may include placement of a culvert to accommodate a proposed road crossing. This crossing has the potential to impact aquatic habitat. Additionally, four unnamed streams, identified by SWCA (2009), may be crossed by Project roads (see Figure 2-5). The first stream, GDS5B, may be crossed by a proposed road north of turbine T21; the second stream, GDS5O, may be crossed by a proposed road between turbines T22 and T23; and the third stream, GDS6C, may be culverted during the widening of the Dutch Flat Road; the fourth stream, GDS22 intersects a new proposed road east of turbine T34.

Installation of the new overhead 230-kV line will require five riparian crossings in the Dutch Flat WRA. Five unnamed streams (GDS13B, GDS7C, and GDS13B-D, GDS25 and GDS26), identified by SWCA (2009), will be crossed by the new overhead 230-kV line (see Figure 2-5).

Collector lines will be installed parallel to the road system, where possible. The same BMPs for road installation will protect downstream aquatic habitat at Benjamin Gulch during the line installation.

Wildlife
Although no documented elk, mule deer, or white-tail winter habitat occurs within the Dutch Flats WRA, big game does utilize this area and may avoid it during construction activities throughout each construction phase. In addition, local accounts indicate the presence of moose, and this species may also avoid the WRA during construction.

Oliphant Ridge WRA

Aquatic Habitat and Fish Species
The construction of a new road, west of turbine T123 has the potential to result in habitat impacts associated with unnamed stream, GOS21a. Dry Hollow, an ephemeral, non-fish-bearing stream may also be impacted by construction activities. Road improvements have the potential to directly impact three unnamed streams, identified by SWCA (see Figure 2-6). Streams GOS6A and

GOS5D may intersect road widening needed for Oliphant Road and may require culverting. Stream GOS5D flows through the center of the environmental permitting corridor in this area. Additionally, stream GOS17C may need culverting due to the widening of West Oliphant Road. Stream GOS708, an ephemeral stream, may be crossed by the road widening west of turbine A114. Stream COS702 may be crossed by the road widening northwest of turbine A97.

Connecting the Oliphant Ridge WRA with the Kuhl Ridge WRA will require installation of a new overhead 230-kV transmission line. This line system will include three crossings of Pataha Creek, which are discussed above ("Kuhl Ridge WRA"). In addition, 7 unnamed streams will each be crossed once by the transmission line: GOS704, GOS15A, GOS718, GOS719, GOS720, COS702, GOS13, and GOS715.

Construction related to the overhead transmission line will be at least 250 feet from Pataha Creek, and no heavy equipment will be used in the stream bed or riparian corridor for construction. Collector lines will be installed parallel to the road system. The same BMPs for road installation will protect downstream aquatic habitat at Pataha Creek and the unnamed streams during the line installation.

Wildlife

The southern portion of the Oliphant Ridge WRA is considered as a Medium to High density elk winter use area by WDFW (2009b). The elk fence along the southern tip of this WRA limits the amount of area elk can utilize as winter range. A string of turbines is currently proposed in this winter use area; therefore, construction activities at this time of the year related to this turbine string could temporarily displace elk.

Furthermore, construction activities during the spring/summer and fall may also disturb deer species foraging activities in the adjacent riparian area along the Tucannon River. Construction activities, particularly noise, could temporarily displace deer foraging along the Tucannon River. There will be no loss of foraging habitat.

Project Facility Impacts

<u>All Four WRAs</u>

Operation or maintenance impacts to fisheries and aquatic habitats anticipated under the Proposed Action will be the same across all WRAs.

Aquatic Habitat and Fish

A total of approximately 600 acres of permanently disturbed area will result from the various Project facilities, including roads, turbines, and support facilities once construction is completed. Operation activities associated with the Project that could potentially impact fisheries and aquatic habitats include stormwater, water use, and wastewater. These potential impacts will be minimized through the following ways:

- Siting all O&M facilities, turbines, and roads 250 feet from existing fish-bearing streams;
- Implementation of proper drainage, erosion control plans, and stormwater management practices during the operation of the Project, avoiding impacts on fish and fish habitat downstream of the Project area; and
- Project operations facilities will be built and operated in accordance with applicable local and state water use and wastewater regulatory requirements.

Overall, no erosion or sedimentation impacts to fish-bearing streams or other aquatic habitats within the Project area will occur during operation of the Project. Furthermore, due to the small footprint of the O&M facilities, the distance these facilities will be from aquatic habitats, and the limited amount of stormwater runoff generated for the low volume of rainfall each year (approximately 9 inches per year), it will be unlikely stormwater runoff will impair water quality of fish-bearing streams in the Project area.

Wildlife

Special Status Species

Gray wolves and lynx are unlikely to occur in the Project area due to lack of habitat in the Project area. There are no documented wolf or lynx sightings in the Project area. Additionally, the overall geographic distribution and population numbers are limited in Washington State. As a result, these species will unlikely be affected by the construction activities of the Project. No additional discussion will be made under "Project Facility Impacts" regarding these two species.

General Wildlife

Although the presence of Project facilities will alter the landscape so that wildlife use patterns may be affected, it is likely that wildlife species will become accustomed to the presence of Project facilities and are unlikely to be permanently displaced.

The results of a recent study by Walter et al (2004) on interactions of elk with operating wind farms address displacement or avoidance behavior. Researchers found no elk left the study site during their investigation and elk freely crossed the gravel roads used to access the wind power facility. They concluded that although disturbance and loss of some grassland habitat was apparent, elk were not adversely affected by the wind power development as determined by home range and dietary quality.

Furthermore, anecdotal observations of big game saw no change in big game activities during wind farm operations. Big game species appear to become accustomed to the presence of wind turbines (Johnson et al. 2000, Erickson et al. 2008).

There is the potential for indirect impacts to occur to big game as result of this development. With the development of roads to access the string of wind turbines, there is a potential for elk and mule deer to shift their migration routes to avoid them. Van Dyke and Klein (1996) showed that wintering elk shifted use of core areas out of view of human-related activities associated with an oil well and access road, while Rost and Bailey (1979) found that wintering mule deer and elk avoided areas within 656 feet of roads in eastern portions of their Colorado study area, where presumably greater amounts of winter habitat were present.

However, road avoidance was typically greater where roads were more traveled. The authors concluded that the influence of roads on big game species depended on the availability of suitable winter range away from roads, as well as the amount of traffic associated with roads – the heavier the traffic, the more likely big game avoided the roads.

Human-related activity at wind turbines during regular maintenance will be relatively infrequent, and therefore unlikely tolerance thresholds for elk will be exceeded during regular maintenance activities.

If traditional hunting activities with the Project area were curtailed or eliminated this could cause “refuge effect” impacts to local big game species on the Project site. However, with the proposed permissive hunting programs, similar to the program implemented at the Hopkins Ridge project, refuge impact effects are not expected to be a problem.

Please refer to Section 2.14.2.2 Land Use and Recreation, Project Facility Impacts and Mitigation for a discussion of the existing hunting programs in the area and the potential impacts related to the proposed Project.

Tucannon WRA

Wildlife

No loss of habitat to big game species will likely result from the Project which will primarily occur in dryland agricultural fields. Elk are expected to become accustomed to the presence of wind turbines over time and are expected to continue to occupy the area over the long term (Walter et al. 2004, Erickson et al. 2008).

In general, due to the lack of good cover habitat and greater distance from the Blue Mountain physiographic region and Tucannon River corridor, wind turbines in the Tucannon WRA are not expected to impact big game species.

Kuhl Ridge WRA

Wildlife
Mule deer and white-tails using the riparian area along the Pataha Creek will not be disturbed by operations, as this is a low lying area while turbines and the majority of roads will be located along adjacent ridge tops.

Dutch Flats WRA

Wildlife
With no documented big game winter habitat within this WRA, no impacts to big game species are expected.

Oliphant Ridge WRA

Wildlife
Mule deer and white-tails using the riparian area along the Tucannon River will not likely be disturbed by turbine operations. The riparian area is a low lying area, while turbines and their associated roads will be located along adjacent ridge tops,

End of Design Life Impacts

Aquatic Habitat and Fish Species and Wildlife
There will be no new disturbances to fish, aquatic habitats, and wildlife from repowering turbines or continuing operations as all modifications will remain within the existing operations footprint.

Disturbances to fish and aquatic habitats from decommissioning the Project will be similar to those described for construction. Surface water runoff potential will be greatest during dismantling, when soil is disturbed by vehicles and removal activities. Over the long-term, dismantling the Project will reduce the quantity of impervious surfaces (associated with the turbine foundations and O&M facility rooftops) in the area. Mitigation for any potential disturbances will follow the same procedures in use during construction.

Impacts to wildlife species from decommissioning the Project will be less than those for construction, as no access roads will need to be built and thus there will be less heavy equipment and ground disturbance. Vehicles will travel on established roadways, not creating additional impacts to wildlife habitat. Disturbed areas will be reseeded with appropriate seed mixes to accelerate revegetation of these areas resulting in wildlife habitat likely returning to pre-Project conditions over time.

Mitigation

Aquatic Habitat and Fish Species
Mitigation measures, such as implementation of BMPs to minimize erosion and avoidance of impacts to identified fish bearing streams, will be incorporated into the Project design to minimize impacts to aquatic habitat and fish species.

A formal SWPPP, specifying the types of sediment and erosion control measures and accidental spill prevention and control measures to be implemented, will be designed prior to construction. The development and implementation of construction BMPs prescribed in the SWPPP will be required as a condition of the construction stormwater permit. During construction, BMPs will be implemented, inspected, and maintained to minimize the potential for adversely affecting downstream water quality. The measures identified in the SWPPP will minimize erosion, sedimentation, and impacts to water quality of fish-bearing streams. WDFW will be consulted with on appropriate culvert placement and sizes to minimize impacts on fish-bearing streams.

See the Mitigation discussion in Section 2.4 Water Resources and Section 2.5 Wetlands for a more detailed discussion on mitigation measures for water resources and wetlands.

Wildlife

Measures to mitigate impacts to non-avian and bat wildlife include:

- In consultation with permitting authorities, develop Project specific wildlife mitigation consistent with Washington Department of Fish and Wildlife Wind Power Guidelines (April 2009).
- Applicant will implement a Wildlife Incident Reporting and Handling System (WIRHS). Any wildlife mortality finds will be documented and bird fatalities will be reported to the USFWS in accordance with the Applicant's Federal Fish Wildlife Special Purpose Permit. The WIRHS will be modeled after the reporting and handling system in place at the Hopkins Ridge Wind Project.
- Establish a Technical Advisory Committee (TAC) as described in Bird and Bat Resources mitigation, Section 2.7 below.
- In areas documented as winter range habitat for big game species, the maximum amount of heavy construction, including road and foundation construction and blasting, will occur between April 15 and November 15, outside the critical winter periods.
- WDFW and the permitting authority will be consulted and involved with respect to managing the big game populations in and around the Project area during the operations of the Project; and
- Consultation with Columbia and Garfield counties to ensure compliance with their respective CAOs.

2.6.2.2 No Action Alternative

Aquatic Habitat and Fish Species

Under this alternative the existing fisheries within the Project area will remain generally as they are, subject to ongoing broad-based regional management (e.g., ongoing hatchery operations and dam management on the Snake River). Impacts to aquatic habitat and fish are not expected to change if the Project is not constructed.

Wildlife
Under the No Action alternative the existing wildlife conditions within the Project area will remain generally as they are. Impacts to wildlife are not expected to change if the Project is not constructed.

2.6.2.3 Probable Significant and Unavoidable Adverse Impacts

Aquatic Habitat and Fish Species
As mitigated no probable significant and unavoidable adverse impacts to aquatic habitat and fish species will occur.

Wildlife
As mitigated no probable significant and unavoidable impacts to wildlife species will occur.

2.6.2.4 Cumulative Impacts

Aquatic Habitat and Fish Species
The effects of the Project on fish and their habitat will represent an additive impact to other past, present and foreseeable future development projects in Columbia and Garfield counties. The existing wind power projects (Hopkins Ridge and Marengo I and II) in the area required construction of roads, which may have resulted in minor hydrological modifications to the streams within the respective project areas. These projects were developed in accordance with local, state, and federal regulations for impacts to water features, therefore impacts were negligible. The potential wind projects and interconnections listed in Table 2-1 will involve similar construction activities and disturbance types. It is assumed that these projects will adhere to the same stream set-back requirements as stipulated in the Garfield and Columbia counties CAOs. Primary impacts to any fish resources will be short-term during construction and/or will be related to road crossings and associated culvert installation. It is assumed that these constructions will follow similar BMPs and federal, state and local guidelines, avoiding impacts to fish species.

Wildlife
Temporary impacts associated with other projects in the area, if they occur concurrently or in the near vicinity of the Project, may result in cumulative impacts. The construction schedule of these other projects is not currently known; however, it is assumed the construction impacts will be temporary in nature and will not occur in the vicinity of the proposed Project, therefore no cumulative impacts to wildlife are expected.

Human activity levels from the operations of this Project, combined with the other three wind projects (Hopkins Ridge, and Marengo I and II) will occur at low levels year-round, and has not been identified as an impact of concern at the existing wind energy facilities in the region.

2.7 Bird and Bat Resources

This section summarizes results of the bird and bat studies that characterize the existing avian species present at the Project site. In addition, it includes a description of the avian species known to occur or potentially occurring at the Project site and discusses potential impacts on birds and bats from construction and operation of the Project.

Information used to analyze potential impacts of the Project was derived primarily from the Wildlife Baseline Study report prepared by Western Ecosystems Technology, Inc. (Young et al. 2009) (Appendix C), which describes wildlife surveys conducted in association with the Project, results of the surveys, and potential impacts on species either known to occur on the site or potentially occurring on the site. Information was also obtained from the Biological Resources Investigation Reports for the Dayton (Marengo II) and Hopkins Ridge Wind Energy Projects (Young et al. 2007, Young et al. 2003). Information was also obtained from the Hopkins Ridge Monitoring Reports (Young et al. 2007, Young et al. 2009). Finally, existing databases were reviewed for information regarding state and federal special status species (e.g. Washington Priority Habitats and Species database)

Baseline avian surveys were conducted by WEST, Inc from April 9, 2007 through January 14, 2009 (Young et al. 2009). Fixed-point bird use surveys, raptor nest surveys, acoustic bat surveys, and incidental and special-status species wildlife observations were conducted. In addition to site-specific data, the Wildlife Baseline Study Report (Appendix C) presents existing information and results of studies conducted at other wind-energy facilities.

2.7.1 Affected Environment

The study area for avian species includes the proposed wind power development area and an adjacent buffer of variable width depending on the study component. The primary study area includes the proposed development area or the location where wind turbines and associated facilities would occur and an adjacent buffer of variable width depending on the study component. All avian use surveys, bat acoustic surveys, general wildlife observations, and vegetation surveys occurred within the primary study area. The raptor nest study area included the primary study area and the surrounding area within two miles. Characteristics of the habitat found at the Project are described in detail in Section 2.8 Vegetation.

2.7.1.1 Birds

The results discussed in this section are a summary of avian survey data provided in the Wildlife Baseline Study Report (Appendix C Young et al. 2009). Note that results pertinent to a specific WRA are presented where necessary as well as in the Wildlife Baseline Study report.

Fixed-Point Bird Use Surveys

The objective of the fixed-point bird use surveys was to estimate the seasonal, spatial, and temporal use of the study area by birds. The study was conducted between April 2007 and January 2009. A total of 57 points were selected throughout the four WRAs. Each point was visited weekly for 1 year, for a total of 1,655 fixed-point surveys. Each survey plot was an 800-meter radius circle centered on a point. All species of birds observed during the fixed-point surveys were recorded, in addition to several other factors including temperature, wind speed, wind direction, and cloud cover, number of individuals, sex and age class, distance from plot center, closest distance, altitude above ground, activity, and habitat.

A total of 90 individual bird species were observed in the Project area (89 species identified during fixed-point surveys, one during raptor nest surveys, including incidental species). Bird use was calculated as the mean number of individual birds within an 800 meter plot observed during a 20-minute point count for each species, which provides an index of relative abundance of birds that are using the Project Area and therefore may be at risk of collision with proposed turbines.

Bird Diversity and Species Richness

Eighty-nine individual species were observed over the course of all fixed-point bird use surveys. A total of 17,608 individual bird observations were recorded during the fixed-point surveys. Cumulatively, three species accounted for over half of the observations: horned lark (*Eremophila alpestris*), European starling (*Sturnus vulgaris*), and common raven (*Corvus corax)*. Individually, all other species documented comprised less than 5% each of the total birds observed.

Passerines represented the most abundant avian group, accounting for 65% of all observations. Raptors were the second most consistently observed, ranging from 8% to 16% seasonally. Upland game birds contributed up to 5% of avian observations and waterfowl contributed 2% in the winter.

A total of 1,516 individual raptors of 15 different species were observed within the study area. The most frequently observed raptors in the Project area were red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and northern harrier (*Circus cyaneus*). Seasonal variation in abundance was similar among these three species. Raptors in the genus Accipiter were seldom observed. Raptors in the genus Buteo were the raptor subtype most often observed at the Project area, comprising 68.4% of all raptor observations. Eagle observations consisted of both bald eagle (*Haliaeetus leucocephalu*s) and golden eagle (*Aquila chrysaetos*). Owls and other raptors were infrequently observed and there were four sightings of osprey (*Pandion haliaetus*).

Bird Use, Composition, and Frequency of Occurrence by Season

Mean bird use, percent composition, and frequency of occurrence for all species and bird types were calculated by season (for details see Appendix C Table 4.3).

Overall bird use was fairly consistent across seasons ranging from approximately 5.7 to 7.0 birds per survey. The highest overall bird use occurred in the winter, followed by fall, summer, and spring.

Waterfowl
Waterfowl were primarily recorded in the winter as flocks of geese and swan flying over the site, with one observation in the spring (Appendix C Table 4.3). Waterfowl accounted for 2.3% of all birds observed during the winter.

Raptors
Raptors were observed throughout the year and used the study area most during the spring, followed by summer, fall, and winter, respectively (Appendix C Table 4.3). Raptors comprised 16.1% of the overall bird use in the spring and gradually decreased through the summer, fall, and winter to 8.0%. Red-tailed hawk represented a majority of raptor observations, followed by American kestrel and northern harriers. Other raptors observed included Swainson's hawk, sharp-shinned hawk, bald eagle, golden eagle, great horned and short-eared owls.

Upland Gamebirds
Upland gamebirds such as chukar (*Alectoris chukar*), ring-necked pheasant (*Phasianus colchicus*), and California quail (*Callipepla californica*) had the highest use in spring and comprised 5% or less of all bird use across all seasons (Appendix C Table 4.3).

Passerines
Passerines had the highest use by any bird type during all four seasons, with abundance highest in the winter primarily due to most observations being large flocks. Horned lark was the most common passerine and most common bird observed onsite (Appendix C Table 4.3). Passerines made up 52.0% of all bird composition at the Project site in the fall, and more than 65% of all bird composition across all seasons.

Spatial Use
Flight paths of raptors were recorded during the avian use survey to investigate the potential for consistent flight patterns or flight paths within the Project area (see Appendix C, [App A-D]). No obvious flyways or concentration areas were observed for any species. The data from the site studies do not suggest that any portions of the study area received concentrated raptor use and thus warrant being excluded from development due to high or concentrated bird use.

Bird Flight Height and Exposure Index
Flight height characteristics were estimated for both individual bird species and bird types (Appendix C Tables 4.4 and 4.5). Percentages of observations below, within, and above the likely zone of risk (ZOR) of 82 to 410 feet (~25 to 125 m) above ground level were reported. Forty-nine species were observed flying within the likely ZOR. Observations for most species were uncommon and consisted of

only one, two, or three groups of flying birds for all seasons, providing little information about the propensity of species to be exposed to turbine rotors. Twenty-nine species were observed flying in the likely ZOR for at least 50% or greater of the observations. The remaining twenty-one species were observed flying in the likely ZOR for less than 50% of the observations. Overall, 18.7% of the bird types observed flying were recorded within the ZOR, 80.3% were below the ZOR, and 1.0% were flying above the ZOR.

A relative exposure index (bird use multiplied by proportion of flying observations within the ZOR) was calculated for each species observed during the study (Appendix C Table 4.4). This index provides a relative measure of exposure to turbine rotors from the avian use data collected onsite. Red-tailed hawk had the highest probability of turbine exposure followed by American goldfinch, horned lark, and rock pigeon (Appendix C Table 4.4). Horned lark was the most common bird in the Project area and red-tailed hawk, goldfinch and pigeon were often seen flying at heights within the rotor swept zone. These factors influenced the relatively high exposure index for these species.

Raptor Nest Surveys

The raptor nest study area included the primary study area and the surrounding area within two miles. Aerial raptor nest surveys were scheduled after most species of raptor had finished courtship and were incubating eggs or brooding young. Surveys within the Oliphant area were conducted from a helicopter on April 24, 2007; surveys in the Kuhl Ridge, Dutch flats, and Tucannon areas were conducted from April 4 to 8, 2008. Search paths were recorded with a real-time differentially-corrected Trimble Trimflight III GPS at 5-second intervals; coordinates were set as Universal Transverse Mercator (UTM) North American Datum (NAD) 27. Additional data about raptor nest sites that were visible from routes regularly traveled by observers were opportunistically gathered during other surveys in the study area. Some nest sites were ground-truthed when activity was unknown; for example, potential Swainson's hawk (*Buteo swainsoni*) nests.

One-hundred-two active red-tailed hawk nests, 18 active great horned owl nests, five active Swainson's hawk nests, two active golden eagle nests, one active barn owl nest, and one active prairie falcon (*Falco mexicanus*) nest were found within the survey area (see Table 2-19; Appendix C Figure 4.2), resulting in an active raptor nest density of 0.40 nests/mi^2. One-hundred-eighty inactive nests were found within the survey area (Appendix C Table 4-6; Figure 4.2). Two of the inactive nests were historic nests of ferruginous hawks, one of which lies within the boundaries of the Project. Most of the remaining inactive nests were likely those of red-tailed hawk, based on the number of active nests and abundance of red-tailed hawk in the Project; however, these nests could potentially be used by other raptor species, such as great horned owl or Swainson's hawk.

Table 2-19 Nesting Raptor Species and Nest Density for the Lower Snake River Wind Resource Area, based on Raptor Nest Surveys

Species	Scientific name	# of nests within Project Area	# of nests within 1-mi buffer of Project	Density: Project (# of nests/mi^2)	Density: 1-mi buffer of Project (#nests/mi^2)
Red-tailed hawk	*Buteo jamaicensis*	50	102	0.25	0.32
Great horned owl	*Bubo virginianus*	10	18	0.05	0.06
Swainson's hawk	*Buteo swainsoni*	3	5	0.01	0.02
Golden eagle	*Aquila chrysaetos*	0	2	0	0.01
Barn owl	*Tyto alba*	1	1	<0.01	<0.01
Prairie falcon	*Falco mexicanus*	0	1	0	<0.01
Inactive		63	180	0.31	0.56
Total		**128**	**309**	**0.64**	**0.96**

Source: Preliminary WEST Report, Data Gaps

Incidental Wildlife and Special Status Species Observations

Sightings of raptors, unusual or unique birds, sensitive species, mammals, reptiles, and amphibians were recorded while observers were within the study area conducting the various surveys, and provide occurrence information about wildlife outside of the standardized bird survey areas that may be affected by the proposed wind-energy facility.

Special status species include those species given a specific designation either by the WDFW or the U.S. Fish and Wildlife under the Federal Endangered Species Act in order to grant a level of monitoring or regulatory protection. The WDFW maintains a list of Species of Concern in Washington that includes State threatened, endangered, and sensitive species and State candidate species. Additionally, the WDFW also maintains a State Monitor Species List. These State Monitor species are not considered Species of Concern by the WDFW, but are managed as required to prevent these species from being listed as endangered, threatened, or sensitive (WDFW 2008; WDNR 2008).

Seven State Species of Concern were observed during surveys or incidentally at the Project (Appendix C Table 4.10). Golden eagle, Vaux's swift (*Chaetura vauxi*), Oregon vesper sparrow (*Pooecetes gramineus affinis*), merlin (*Falco columbarius*), and sage thrasher (*Oreoscoptes montanus*) are State Candidate species observed. Bald eagle (*Haliaeetus leucocephalus*), a State sensitive species, was also observed, as well as ferruginous hawk (*Buteo regalis*), a State threatened species.

Seven species that occur on the Washington State Monitor Species list were observed during surveys or incidentally at the Project. The most common State Monitor species observed at the Project was Swainson's hawk (*Buteo swainsoni*), followed by grasshopper sparrow (*Ammodramus savannarum*). Other State

Monitor species observed include great blue heron, western bluebird, prairie falcon, turkey vulture, and osprey.

Table 2-20 lists special status bird species that have potential to occur within Garfield and Columbia counties, including state and federal species listed as threatened or endangered. In addition to state and federal designations, those species that are also included in the WDFW Priority Habitats and Species (PHS) Program are indicated in the table. Protection of special status species occurs under federal, state, and local jurisdictions. The PHS List catalogs the habitats and species considered to be priorities for conservation and management within the state. Federal laws include the Endangered Species Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. Protections under state statutes include the WAC 232-12-297. Protection of species under local jurisdiction is provided by Garfield and Columbia counties. Following Table 2-20 is a description of each species with a high to medium likelihood of occurrence within the Project site based on habitat and survey results.

Table 2-20 Federal and State Listed Avian Species Occurring in Garfield and Columbia Counties

Group/Species	Status	Potential to Occur in the Project Area	Habitat
Birds			
American white pelican (*Pelecanus erythrorhynchos*)	SE	Medium - migration along the Snake River.	Lakes, rivers, bays, and estuaries.
Bald eagle (*Haliaeetus leucocephalus*)	BGEPA/SS/PHS	High- present (flying), nonbreeding along the Snake River	Large tree stands near open water.
Burrowing owl (*Athene cunicularia*)	FCo/SC/PHS	Low- potential nesting habitat	Dry, open, shortgrass, treeless plains, often associated with burrowing mammals.
Common loon (*Gavia immer*)	SS	Low – habitat not present.	Large lakes and water bodies with fish.
Ferruginous hawk (*Buteo regalis*)	FCo/ST/PHS	Medium - present (flying), breeding range	Plateaus, plains, rolling grasslands, agricultural fields, and shrub-steppe.
Flammulated owl (*Otus flammeolus*)	SC/PHS	Low - habitat not present	Mid-elevation, open, coniferous forests
Golden eagle (*Aquila chrysaetos*)	SC/PHS	High - present (nesting), year-round range.	Open, arid sagebrush, ponderosa pine, and grassland habitats near cliffs and plateaus.
Lewis' woodpecker (*Melanerpes lewis*)	SC	Low - outside range, no suitable habitat.	Woodlands with an open canopy and brushy understory.
Loggerhead shrike (*Lanius ludovicianus*)	FCo/SC/PHS	Medium - suitable habitat	Open fields and grasslands, nesting in shrubs and trees.
Merlin (*Falco columbarius*)	SC	Medium- present, winter range	Open to semi-open grasslands and forests.

Table 2-20 Federal and State Listed Avian Species Occurring in Garfield and Columbia Counties

Group/Species	Status	Potential to Occur in the Project Area	Habitat
Northern goshawk (*Accipiter gentilis*)	FCo/SC/PHS	Low - no suitable habitat	Mature to old-growth forests with high canopy cover.
Olive-sided flycatcher (*Contopus cooperi*)	FCo	Low - no suitable habitat	Montane and northern coniferous forests.
Oregon Vesper sparrow (*Pooecetes gramineus*)	FCo/SC	High - recorded.	Montane meadows, grasslands, prairie, and sagebrush steppe.
Peregrine falcon (*Falco peregrinus*)	FCo/SS/PHS	Medium - breeding range	Wide variety of habitats with abundant prey species such as open areas near water. Cliff or ledge nesting.
Sage thrasher (*Oreoscoptes montanus*)	SC	High - recorded.	Shrub-steppe dominated by big sagebrush (*Artemisia tridentata*).
Sandhill crane (*Grus canadensis*)	SE	Medium - migration range	Open, isolated wetlands surrounds by shrubs, forest, or grassland.
Vaux's swift (*Chaetura vauxi*)	SC/PHS	High - recorded, breeding and migration range	Late stages of coniferous forests and deciduous forests mixed with coniferous, foraging in open areas.
Western Grebe (*Aechmophorus occidentalis*)	SC	Medium - migration and nonbreeding along the Snake River.	Lakes, ponds, and wetlands with open water.
White-headed woodpecker *(Picoides albolarvatus)*	SC/PHS	Low - habitat not present	Open Ponderosa pine forests at altitudes from 2,000 to 5,000 feet.
Yellow billed cuckoo (*Coccyzus americanus*)	FC/SC/PHS	Low - habitat not present	Open woodland with clearings and low, dense, scrubby vegetation; often associated with watercourses.

Sources: Cornell Lab of Ornithology 2009; Jeffrey et al. 2009; Seattle Audubon Society 2009; WDFW 1997, 2008

Status:

BGEPA = Bald and Golden Eagle Protection Act
FC = Federal Candidate
FCo = Federal Species of Concern
SE = State Endangered
ST = State Threatened
SC = State Candidate
SS = State Sensitive
PHS = WDFW Priority Habitat and Species

Potential to Occur in the Project Area:
High = A species may occur on a regular basis. Suitable habitat is present.
Medium = A species could occasionally occur. The area contains only marginally suitable habitat.
Low = A species would not occur except as a transient species because habitat requirements are not met and/or the area is outside the species' range.
Present = Recorded during 2007-2008 surveys of the Project Area (Jeffrey et al. 2009).

American White Pelican – State endangered
The American white pelican primarily breeds in western North America. Wintering grounds are located on the Gulf Coast from Florida to the Yucatan Peninsula, and on the Pacific Coast from Sacramento into Central America (Knopf et al. 2004). This species is known to utilize Snake River as a migration path, which occurs from late February to late April, and again from mid September to mid November (Knopf and Evans 2004). The species forages on inland marshes, lakes, or rivers and favors shallows. No pelicans were observed in the Project study area during field surveys (see Appendix C).

Bald eagle – Federal Bald and Golden Eagle Protection Act, State sensitive
Bald eagle nesting habitat consists of large trees among stands near open water for efficient foraging. In Washington, nearly all bald eagle nests (99%) are within 1 mile of a lake, river, or marine shoreline (WDFW 2007). Migration occurs from early March to late May (Buehler 2000). No active bald eagle nests were observed in the Project study area during field surveys, however a total of seven individuals were observed (see Appendix C).

Burrowing Owl - Federal species of concern, State candidate
Burrowing owls inhabit open, dry areas in well-drained grasslands, shrub-steppe, prairies, deserts and often agricultural and suburban lands across much of western North America (WDFW 2003). In Washington, burrowing owls typically occupy shrub-steppe habitat of the eastern part of the state during the breeding season (WDFW 2003). The Project site is situated in the northern reaches of the burrowing owl's range. No burrowing owls, or nests, were identified in the Project area.

Ferruginous hawk – Federal species of concern, State threatened
Ferruginous hawk habitat primarily includes plateaus, plains, rolling grasslands, agricultural fields, and shrub-steppe across much of the American west (Bechard and Schmutz 1995). Southeastern Washington forms the northwestern range limit for this species.

The two inactive nesting sites (see Appendix C) and the predicted habitat are located within the Tucannon, Oliphant, and Kuhl ridge Project boundaries (WDFW 1997). Migration occurs from late February to mid-June, and from early August to late November (Bechard and Schmutz 1995). Migrating individuals may pass through the Project Area en route to southern wintering grounds. No active ferruginous hawk nests were observed in the Project study area during field surveys, and one individual was observed in-flight (see Appendix C).

Golden eagle – State candidate
Golden eagles occupy most of western North America (Kochert et al. 2002). East of the Cascades in the Pacific Northwest the species is associated with open, arid sagebrush, ponderosa pine, and grassland habitats near cliffs and plateaus (Watson and Whalem 2003). Migration occurs from mid-March to mid-May, and

September through December. Golden eagle observations in the wind power development area likely related to spring migration and foraging activity. Two active golden eagle nests and 41 sitings were detected in the wind power development area and its two-mile buffer during field surveys (see Appendix C).

Loggerhead shrike – Federal species of concern, State candidate
The Loggerhead shrike is present in much of North America. The species nests in shrubs and trees and is seen primarily in open fields and grasslands. In Washington, this species breeds in valleys east of the Cascade Range (Yosef 1996). The Project area is located over 50 miles to the east of known breeding sites as identified by GAP analysis (WDFW 1997). Although migration patterns are generally poorly understood for this species, fall migrations are thought to occur from September through November, and spring migrations in and around March (Yosef 1996). No loggerhead shrikes were observed in the study area during field surveys (see Appendix C). Presence of this species is possible in the Project Area, as suitable habitat is present.

Merlin - State candidate
Merlins are present throughout most of North America. This species prefers open to semi-open areas. Merlins usually nest near forest openings, and often near water (Warkentin et al. 2005). No confirmed breeding sites or predicted habitat are located in or near the Project area (WDFW 1997). This species winters in much of the western U.S., and migration through the Project area is likely (Warkentin et al. 2005). Migration to breeding areas occurs from early February to early May, with peak migration in early April. Return migration occurs from early August to early November (Warkentin et al. 2005). No active merlin nests were observed in the study area during field surveys, although one individual was observed (see Appendix C).

Oregon vesper sparrow- Federal species of concern, State candidate
Oregon vesper sparrows breed in Washington, Oregon and northern California. The species occupies areas with bare ground and low-to-moderate shrub, or tall forb cover (Jones and Cornely 2002). Migration occurs from late March to early April and from mid July to late September (Jones and Cornely 2002). A total of twenty-seven Oregon vesper sparrows were observed in the Project study area during field surveys (see Appendix C). Breeding and migration in the Project area is likely.

Peregrine falcon – Federal species of concern, State sensitive
The peregrine falcon is present throughout most of North America. The species nests in cliff habitats and generally forages in open landscapes. In Washington, nesting may occur in all but the driest parts of the state. The birds are sensitive to disturbance during the nesting season (1 March through 30 June) (Towry 1987). No peregrine falcons or active nests were observed in the Project study area during field surveys (see Appendix C); however the Project site is situated within the species' breeding range.

<u>Sage thrasher – State candidate</u>
Sage thrashers breed from British Columbia to eastern Montana, south to northern Arizona and west to California. In Washington, the sage thrasher is found in the Columbia Basin shrub-steppe region. The species is highly dependant on healthy shrub-steppe communities (Rich 1980). One sage thrasher was observed in the Project study area during field surveys (see Appendix C).

<u>Sandhill crane – State endangered</u>
Sandhill cranes (*Grus canadensis*) breeding in Washington belong to the Central Valley population and winter in the Central Valley of California (Kramer et al. 1983, Pogson and Lindstedt 1991). Migrants moving through Washington belong to both the Central Valley and Pacific Flyway populations, and could potentially migrate through the Project area. The closest known migratory stopovers and nesting areas occur more than 60 miles west and northwest of the Project site. Sandhill cranes use large and small tracts of open habitat with good visibility. Wet meadows, marshes, shallow ponds, and agricultural fields are all favored for nesting, feeding, and roosting. Emergent wetland vegetation is a key component for nesting (Safina 1993, Baker et al. 1995). No sandhill cranes were observed in the Project study area during field surveys (see Appendix C).

<u>Vaux' swift – State candidate</u>
Vaux's swifts (*Chaetura vauxi*) breeding range is extensive in north-western America, and includes the southern half of both Columbia and Garfield counties (Cassidy 2003). The species usually arrives in Washington around early May and remains until September (WDFW 2002). Breeding populations may occur in forested habitats throughout the state (WDFW 2002). The species overall range includes most of Columbia and Garfield counties, and a total of forty Vaux's swifts were observed in the Project study area during field surveys (see Appendix C).

<u>Western grebe – State candidate</u>
The western grebe (*Aechmophorus occidentalis*) breeding range expands across areas of the interior western United States, and includes eastern Washington (PIF 2009). Western Grebes breed on freshwater lakes and wetlands with large expanses of open water, bordered by marsh vegetation. Nests are most often placed in flooded emergent vegetation. No breeding habitat occurs within the vicinity of the Project area (WNMP 2009), however grebes may be found as non-breeding summer residents or migrants on Snake River. No western grebes were observed in the Project study area during field surveys (see Appendix C).

Nearby Bird Areas and Refuges
An Important Bird Area (IBA) is a terrestrial or aquatic site designated by the National Audubon Society, Inc. (Audubon) that provides essential habitat for one or more species of birds during breeding, wintering, and/or migration. The purpose of Audubon's IBA program is to identify sites essential to maintaining

naturally occurring populations of birds, and to steward those sites for long-term conservation (Cullinan 2001). The National Wildlife Refuge (NWR) system, managed by the U.S. Fish and Wildlife Service, was created to set aside public lands and waters to conserve for fish, wildlife and plants. There are no IBAs or NWRs adjacent to or in the vicinity of the Project (see Figure 2-10). The closest IBAs to the Project are approximately 42 to 57 miles to the west and occur in a north-south orientation along the Columbia River and some of its tributaries and nearby water bodies. This system of four IBAs (Walla Walla River Delta IBA, Yakima River Delta IBA, Hanford Reach IBA, and Columbia IBA) creates a corridor for avian utilization with the McNary NWR and the Saddle Mountain NWR providing a vital interconnection between these refuges. Two additional IBAs, the Sprague Lake IBA and Turnbull NWR IBA, are located north of the Project approximately 45 to 55 miles (see Table 2-21).

Table 2-21 Nearby Important Bird Areas

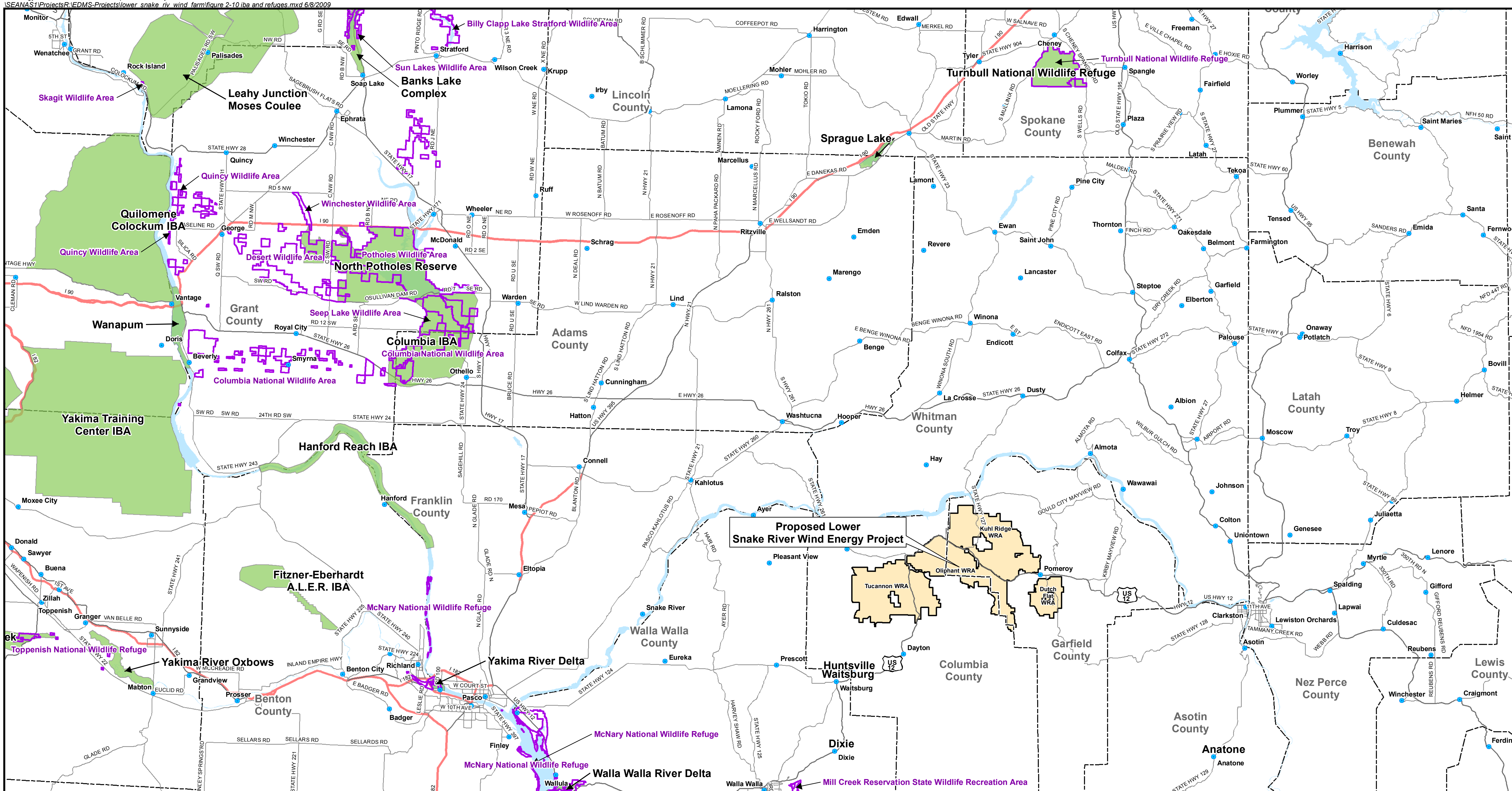
IBA	Distance from Project area (straight line distance)
Walla Walla River Delta IBA	42
Yakima River Delta IBA	54
Hanford Reach IBA	54
Columbia IBA	10
Sprague Lake IBA	45
Turnbull IBA	20

Flyways and Migration Corridors in Relation to Project Location

Migratory flight patterns in the Columbia basin generally correspond to a north-south orientation along the pacific flyway. This broad flyway is generally defined by the Pacific Ocean to the west and the Rocky Mountains to the east. Variations occur within this area depending on species and season, routes can be affected according to habitat availability and topographic features. Waterfowl prefer to follow large river valleys, lakes and ponds which they use for stopovers during their migration (Terres 1996). Documented use of the Turnbull NWR, Columbia NWR, McNary NWR and associated IBAs by migrating waterfowl for stopovers indicates that there is migratory activity in the river valleys and wetland complexes north and west of the Project area (Cullinan 2001).

2.7.1.2 Bats

Bat use in the Project area depends on availability of key habitat elements such as food sources, water, and roost sites. Species found in the Columbia basin feed exclusively on insects and typically use cavities in large trees, caves, mine shafts, tunnels, old wells, and attics for roosting and hibernation. There are fourteen species of bats identified as potentially occurring in Columbia and Garfield counties (see Table 2-22).



Legend
- City
- Major Highway
- State and County Roads
- Local Roads
- National Wildlife Refuge
- Audubon IBA's (important bird area)
- County Lines
- Project Area

Lower Snake River Wind Energy Project

Columbia & Garfield Counties
Washington

Figure 2-10
Regional Important Bird Areas and Refuges

0 5 10 20 30 40
Scale 1:800,000 Miles

Source Information:

The Townsend's big-eared bat (*Corynorhinus townsendii*) is a state candidate species and federal species of concern. Occurrence of this species has been recorded in Columbia County south of the Project area and is predicted to occur in Garfield County (Washington Gap Analysis Project 1997). According to Washington Gap Analysis Project mapping, Columbia and Garfield counties are considered core breeding habitat for the Townsend's big-eared bat.

Table 2-22 Bat Species Determined from Range-maps as Likely to Occur within the Project Area, Sorted by Call Frequency

Common Name	Scientific Name
High-frequency (> 35 kHz)	
California bat	*Myotis californicus*
western small-footed bat	*Myotis ciliolabrum*
western long-eared bat	*Myotis evotis*
little brown bat[3]	*Myotis lucifugus*
long-legged bat	*Myotis volans*
Yuma bat	*Myotis yumanensis*
western pipistrelle[2,3]	*Parastrellus Hesperus*
Low-frequency (< 35 kHz)	
pallid bat	*Antrozous pallidus*
Townsend's big-eared bat	*Corynorhinus townsendii*
big brown bat[3]	*Eptesicus fuscus*
spotted bat[2]	*Euderma maculatum*
silver-haired bat[1,3]	*Lasionycteris noctivagans*
hoary bat[1,3]	*Lasiurus cinereus*
fringed bat	*Myotis thysanodes*

1 = long-distance migrant; 2 = species distribution on edge or just outside Project area; 3 = known casualty from wind turbines.
Table source: Wildlife Baseline Study, attached as Appendix C
(PROVIDED BY WEST, PENDING FINAL REPORT)
Range maps: BCI website; Harvey et al. 1999

Acoustic Bat Survey Results

Acoustic bat surveys were conducted at two fixed stations within each of the four wind resource areas within the Project. Bat activity was monitored at eight sampling locations on a total of 185 nights during the period April 30 to October 31, 2008 (Appendix C Figure 4.3). Overall all sampling nights an average of 1.21 bat passes were recorded per detector-night.

Bat activity was highest at Station 2 in the Oliphant WRA, which recorded 5.13 bat passes per detector night (64.5% of all bat passes). Bat activity across the other stations in the Project area was similar, ranging from 0.33 to 0.62 bat passes per detector night. Activity levels were highest from early-June through late-August, then decreased to lower levels through September and October. Overall, more activity was recorded from high-frequency (HF) bats than low-frequency (LF) bats throughout the year (66% to 44%, respectively). However, during

September and October when overall bat pass activity was lower, LF bat activity was more frequent then HF bat activity.

2.7.2 Impacts and Mitigation

Wind projects can potentially impact birds and bats through collisions with the turbines, meteorological towers and overhead transmission, displacement from habitat, or disturbance during construction or operation. Collisions are typically the primary concern with operation-related impacts. Potential impacts can vary among different bird and bat populations and groups.

Some positive impacts on bird populations would result from increased use of renewable energy such as wind energy. Air emissions and global climate change are serious concerns for North American bird populations (see “A Birdwatcher’s Guide to Global Warming,” by the National Wildlife Federation and American Bird Conservancy [Price and Glick 2004]). Increased wind energy use would slow the negative impacts of global climate change and air emissions on people and wildlife. On the other hand, wind energy facilities could have some adverse impacts by causing injury or death to birds through collisions or displacement of birds through loss or degradation of habitat. While studies have shown that these negative impacts have occurred at a few sites, numerous studies and reviews of bird impacts from wind energy facilities in North America and Europe indicate that mortality rates are low, especially compared to other sources of bird mortality (Erickson et al. 2001; NWCC 2004; GAO 2005).

A March 2009 technical report entitled “Comparison of Reported effects and Risks to Vertebrate Wildlife from Six Electricity Generation Types in the New York/New England Region” concludes that of the six major electricity generation sources, oil, natural gas, coal, nuclear, hydro and wind:

> “Wind has Lowest to Moderate Potential risks to wildlife and high risks of bird and bat collisions with wind turbines during operation. No population-level risks to birds have been noted. Population level risks to bats are unknown at this time”.

The report concludes that acidic deposition, climate change, and mercury bioaccumulation are the three most significant and widespread stressors to wildlife:

- Acidic deposition results from electricity generation from coal, oil, and to a lesser extent natural gas.
- Mercury bioaccumulation results from electricity generation from coal, oil, and to a lesser extent hydro.
- Climate change results from electricity generation from coal, oil, gas and to a lesser extent hydro.

Most importantly, electricity generation from wind does not contribute to any of these stressors.

In November 2004, the National Wind Coordinating Committee (NWCC), a consortium of consumer groups; economic development organizations; electric, green, and wind power groups; environmental organizations; and federal, state, and tribal governments issued the second edition of a fact sheet, "Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions" (NWCC 2004). The following, taken from the fact sheet, is part of an overview on the status of bird and bat issues at wind energy facilities that aptly describes the current understanding:

> Wind energy's ability to generate electricity without many of the environmental impacts associated with other energy sources (air pollution, water pollution, mercury emissions, and greenhouse gas emissions associated with global climate change) can significantly benefit birds, bats, and many other plant and animal species. However, direct and indirect local and cumulative impacts of wind plants on birds and bats continue to be issues.

In a September 2005 report to congressional requesters, the United States Government Accountability Office (GAO) reviewed impacts on wildlife from wind power. The report concluded that outside of the Altamont site in northern California, research to date has not shown bird kills in alarming numbers (GAO 2005). The GAO review of post-construction mortality studies found that bird fatalities ranged from 0 to 7.28 birds/turbine/year. Similarly, the 2004 NWCC fact sheet shows that an average of 2.3 birds/turbine/year (3.1 birds/MW/year) are killed at facilities outside of California.

WEST, Inc. published the "Avian and Bat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon" in October 2008 to address the potential for direct impacts to birds and bats through collision mortality to be significant to populations (Johnson and Erickson 2008). The analysis concluded that the low level of direct impacts associated with wind turbines in the Columbia Plateau Ecoregion were unlikely to cause a decline in avian populations. Mortality to birds from collisions with turbines is likely to result in local mortality to individual birds with no population-level effects and a high degree of species recovery (NRC 2007, Newman et al. 2009). Biodiversity declines are unlikely for birds (Newman et al. 2009).

Research on bats and wind turbines is much more limited. No known collisions of federally endangered or threatened bat species have been documented in conjunction with wind turbines (NRC 2007). Collisions involving other bat species are typically on the same order as expected for birds, with 3.4 bat kills/turbine/year (4.6 bats/MW/year) as the national average from the NWCC fact sheet (NWCC 2004). However, much higher rates (15.3 to 41.1 bats/MW/year) were found during some studies in the Appalachian Mountains and at other locations in recent years (GAO 2005; NRC 2007). Bat mortality estimates have been made for 10 existing wind-energy facilities in the Pacific Northwest, where they have ranged from 0.39 to 2.46/MW/year, and averaged 1.21/MW/year. In addition, Johnson and Erickson (2008) reported an estimate of 1.18/MW/year for the Columbia Plateau Ecoregion.

2.7.2.1 Preferred Alternative

Potential Impacts on Birds and Bats from Construction of the Facility

<u>All Four WRAs</u>

Construction related activities (i.e., clearing for road construction, infrastructure construction, equipment noise, and increased vehicle traffic) can potentially disturb birds and bats by causing temporary displacement from habitat. Because construction activity is temporary, disturbance to avian populations is also temporary. Habitat loss due to construction activity is described in Section 2.6.2.1 Aquatic Habitat, Fish Species and Wildlife.

Overall, the risk of mortality during the construction phase is low considering the lack of suitable nesting habitat in the areas proposed for construction. Impacts to ground nesting species could occur, but these species are likely to be accustomed to agricultural activities in the area and unlikely to be significantly disturbed by Project construction activities. For species using the area as a primary foraging area, foraging behaviors may be temporarily altered during the period of construction.

<u>Potential Disturbance to Migratory Birds</u>

Disturbance of migratory bird populations including raptors, passerines, and water birds is expected to be minimal as a result of construction of the Project. Habitat and topography of the site are not expected to concentrate migratory birds and site specific survey results did not reveal an increase in use or abundance of birds during the migration seasons (see Appendix C). The nearest IBAs and NWRs in proximity to the Project are between 42 and 57 miles to the north and west. At that distance, the Project is unlikely to cause disturbance to migrant birds using those areas for stopovers.

<u>Potential Disturbance to Project Area Breeding Birds</u>

Breeding bird populations are expected to experience minimal disturbance by construction of the Project. In general, most of the construction will occur in agriculture areas. Agricultural lands are not considered good nesting habitat for birds due to the land management and periodic disturbance associated with farming activity. If construction begins before the breeding season, breeding birds would likely avoid areas during the active construction period. If construction begins during the breeding season, because many breeding birds have been exposed to similar disturbance, such as farming, they would either be accustomed to disruption of this nature or they would relocate to other adjacent suitable habitat.

Incidental loss of some nests, eggs, and/or young is possible when construction (e.g., land clearing for access roads, foundations, etc.) is conducted during the breeding season. Indirect impacts on breeding birds will occur as a result of habitat alteration during construction of the Project; however, these impacts are not expected to be significant because agricultural fields are not considered good nesting habitat and other suitable habitat that will not be disturbed exists in the Project area. Outside of localized construction disturbance, no significant adverse impacts on breeding birds are anticipated during the construction period.

Potential impacts to nesting raptors include direct loss of nests, if habitat where nests are located is disturbed by construction, and potential disturbance or displacement effects if construction occurs in close proximity to nests. Due to the location of the majority of nests in the Project area being in the riparian corridors or drainages and proposed facilities being on top of the ridges in the agricultural areas, there is little potential for direct take of a raptor nest. An additional raptor nest survey will be conducted prior to construction of each phase to identify active raptor nests. The results of these studies will be used to determine appropriate measures for minimizing risk to active raptor nests.

Red-tailed hawk and great-horned owl, as the most abundant nesting raptors in the study area, are the species at highest risk to disturbance or displacement effects from construction activity. Red-tailed hawk is likely the most common *Buteo* species and great-horned owl likely the most common owl species in North America and both species are nearly ubiquitous across the U.S. and Canada (Preston et al. 2009; Houston et al. 1998). Generally less concern is raised over these species than other species with far smaller populations. Golden eagle, a Washington State candidate species was among the raptor species identified during raptor nest surveys. The two golden eagle nests located during the survey are unlikely to be affected by the Project construction or operation as they were both identified greater than ½ mile from the proposed Project area (see Appendix C). No impacts to nesting golden eagles are expected from the Project.

Potential Disturbance to Bats

Some disturbance to bats could occur as a result of habitat alteration or habitat loss as a result of ground disturbance, although the majority of disturbance will occur in agricultural lands which would be considered foraging habitat only and disturbance in the area by farming activities has been ongoing. The Project ground disturbance is unlikely to affect roosting habitat or bat hibernacula. Disturbances to foraging habitat are not anticipated to significantly disturb bat populations and it is expected that bats will return to temporarily disturbed areas upon construction completion.

Potential Impacts to Special Status Avian Species

Consultation with WDFW did not result in identification of any federally listed threatened or endangered avian species within the Project area (WDFW 2009). However, occurrences of several special status species recognized under Washington Administrative Code 232-12-297 were identified during field surveys of the Project site, including one species listed as Washington State threatened (ferruginous hawk), one state sensitive species (bald eagle) and five state candidate species (golden eagle, merlin, Oregon vesper sparrow, sage thrasher and Vaux's swift).

Potential ranges of seven other species which are Species of Concern under Washington law overlap with the Project area (American white pelican, common loon, loggerhead shrike, peregrine falcon, sandhill crane and western grebe). The potential exists for these species to occur within the Project area; however, due to lack of suitable habitat within the Project area, use of the Project area by these species is unexpected or expected only very rarely during migration or dispersal events.

Ferruginous hawk

The potential to disturb ferruginous hawk during construction activity is unlikely. Use of the site by ferruginous hawk was low and no nesting activity was documented during the baseline studies. This species can utilize a wide range of habitats available in the area and is likely to forage in adjacent habitat if it occurs onsite during construction. No active nests were located in the Project area and few observations were recorded onsite.

Bald eagle

The potential to disturb Bald eagles occurring in the Project area during construction activity is unlikely. Avoidance behavior by this species is expected in areas of construction activity, thus mortality is very unlikely to occur. No bald eagle nests occur onsite and few individuals were observed in the area.

Golden eagle

Golden eagles were observed using the Project area and two nests were located within 2 miles of the site. There is potential for disturbance to golden eagles if they are identified nesting onsite during construction of the facility. This potential is minimal and no impacts to golden eagles are expected. Avian avoidance behavior during the construction phases of wind farm development is very poorly documented; however, avoidance of areas with greater than normal human activity is expected.

Sage thrasher

The sage thrasher depends on shrub-steppe habitat similar to what is found in the Project area. With very low use (only one observation) of this species recorded on the Project site the potential for mortality or disturbance due to construction activity is unlikely.

<u>Oregon vesper sparrow</u>
The Oregon vesper sparrow utilizes patchy bare ground in conjunction with grassland or shrubby habitats similar to those found on the Project site. Presence was confirmed by multiple observations during point-count surveys (see Appendix C). Construction activity has potential to disturb Oregon vesper sparrows if they occur in the area of construction. While collision with construction equipment is unlikely, disturbance to nesting birds and their young is possible.

<u>Burrowing Owl</u>
Burrowing owls could potentially nest within the Project area. However, considering the lack of sightings within the Project area, burrowing owls likely occur only occasionally or are only transient within the Project area, and no construction impacts on burrowing owls are expected.

<u>Merlin</u>
Due to the merlin's preference toward forested habitats not occurring onsite, Project construction is unlikely to impact this species. Observations of merlin during the studies were likely migrant or transient birds and represent temporary presence. The potential of construction activity disturbing this species is unlikely and mortality is very unlikely.

<u>Vaux's swift</u>
There is potential for disturbance of Vaux's swift due to construction activity if it occurs in the Project area during construction. This species occurs in a range of habitats although prefers forested habitats during breeding season. The Vaux's swift was observed in the Project area in low numbers and will likely avoid construction and forage elsewhere during construction. The potential for mortality due to construction activity is low.

Potential Impacts on Birds and Bats from Operation of the Facility

<u>All Four WRAs</u>
Wind projects can potentially impact birds and bats through collisions with turbine blades and/or towers, met towers, overhead collection lines and transmission lines, or displacement due to permanent loss of habitat. Collision related mortality to birds and bats is typically the primary concern with operation related impacts. Potential impacts can vary among different bird and bat populations and groups. However, data from numerous post-construction mortality studies at wind turbine projects in the Columbia Plateau Ecoregion demonstrate that avian fatality rates are generally low (see Appendix C) and are not considered significant. Potential collision related impacts are addressed for each of these groups below as well as for special status avian species.

Potential Impacts on Migratory Birds

The Project area is within the broad Pacific Flyway for migratory birds; however, WDFW did not identify the site as a significant migratory corridor in the Priority Habitat data provided (WDFW 2009) nor did the site specific studies indicate that there was an increase in bird use of the site during the migration season. Results of marine radar surveys for proposed wind projects have indicated that the vast majority of nocturnal migrants fly at altitudes that do not put them at risk of collision with turbines (Young and Erickson 2006). In general for wind projects in the Columbia Plateau, approximately 25% of the fatalities have been considered migrants spread over many species (Young and Poulton 2007). At the nearby Hopkins Ridge facility, the post construction monitoring studies found that approximately 37 to 45% of the avian mortality was of nocturnal migrants for the two years of study.

In general, fatalities of migrant species are found in lower numbers than non-migrants. Because cumulatively the impacts to migrants are spread over a much larger population base, the number of fatalities is not considered significant to the species or the migratory population.

Potential Impacts on Raptors

There are no geographical or topographical features in the Project area that are expected to attract or concentrate migrating raptors. In general, mean raptor use at the Project would be considered low to moderate over the four WRAs (refer to Figure 5.1, Appendix C; WEST 2009). Raptor species observed nesting in or near the Project site include red-tailed hawk, great horned owl, Swainson's hawk, golden eagle, barn owl, and prairie falcon.

Although high numbers of raptor fatalities have been documented at some wind-energy facilities (e.g., Altamont Pass Wind Resource Area), a review of studies at newer-generation wind-energy facilities across the United States indicated that approximately 3.2% of casualties were raptors (Erickson et al. 2001, 2002; Kerlinger et al. 2005). Within the Pacific Northwest and CPE the percent of avian fatalities being raptors was higher at approximately 8.6% (Johnson and Erickson 2008).

The annual mean raptor use at the Project was compared with other wind-energy facilities that implemented similar protocols and had results representative of a full year. The annual mean raptor use at other wind-energy facilities ranged from 0.085 to 2.34 birds/20-min survey (see Figure 5.1, Appendix C). Mean raptor use at the Project 0.71 was near the mid-level compared to the other sites.

A regression analysis of raptor use and mortality for 13 modern wind-energy facilities, where similar methods were used to estimate raptor use and mortality, found that there was a significant correlation between use and mortality (see Figure 5.2, Appendix C). Using this regression to predict raptor collision mortality at the Project, based on an adjusted mean raptor use of 0.71 birds/20-

min survey, yields an estimated fatality rate of 0.09 raptors/MW/year, or nine raptor fatalities per year for a 100-MW wind-energy facility. A 90% prediction interval around this estimate is 0 to 0.23 raptors/MW/year. Raptor fatalities at wind-energy facilities near the Project fall within this range: Combine Hills wind project (0.0/MW/year; Young et al. 2005), Nine Canyon wind project (0.05/MW/year; Erickson et al. 2003b), Stateline wind project (0.09/MW/year; Erickson et al. 2004), and the Hopkins Ridge wind project (0.14/MW/year; Young et al. 2007a) which is less than two miles south of the Project. The Hopkins Ridge project had a similar pre-project raptor use estimate (0.64 birds/20-min survey) as the Project, further supporting the predicted raptor mortality range, which is relatively low.

At the Project, the raptor species with the highest exposure indices were red-tailed hawk which was influenced by the relatively high use estimates by this species. Swainson's hawk, golden eagle, and rough legged hawk (a winter resident) ranked much lower due again, primarily to the lower use estimates for these species. Based on the results of other studies (see Johnson and Erickson 2008 for a summary of CPE projects) and the results of the baseline studies at the Project, red-tailed hawk is the raptor species most likely affected by the Project through direct impacts. Another commonly impacted raptor species is American kestrel. Kestrel fatalities were recorded at the nearby Hopkins Ridge wind project in both years of monitoring. While these two species are likely to be the most commonly affected, impacts are not expected to be significant given the low mortality rate, the large population sizes and likely spread of mortality across the year as opposed to concentrated within one season.

Potential Impacts on Breeding Birds

The majority of turbines will be sited in agricultural fields and open areas that have a relatively low species diversity and density. However, breeding birds in these habitats may be temporarily displaced during construction. Of the non-raptor avian groups, passerines have been the most abundant avian fatality at newer generation wind facilities, often comprising more than 80% of the avian fatalities (Erickson et al. 2001, Johnson and Erickson 2008). The overall national average for passerine fatalities at wind projects has been approximately 2.2 birds/turbine/year (Erickson et al. 2002b) and in the CPE the average mortality rate for non-raptor birds has been approximately 2.03 birds/turbine/year (Johnson and Erickson 2008).

Exposure indices of passerines indicate that the vast majority of species recorded during the site surveys tend not to fly within the rotor swept zone and are relatively uncommon in the study area (see Appendix C). While use was variable across seasons, a few common open grassland species; horned lark, western meadowlark, common raven, European starling, made up the vast majority of passerine use in the study area. Provided that relative abundance is related to exposure and risk of collision, these species would be the most likely affected by the Project through direct impacts. Results of other monitoring studies corroborate this as horned lark, European starling, and western meadowlark are three of the most commonly found passerine fatalities at CPE wind projects (Johnson and Erickson 2008). Population estimates for horned lark and western meadowlark in the CPE are very high. Results of USGS BBS surveys suggest that the CPE population for these species is well over 100,000 breeding birds (Saur et al. 2008). Potential mortality impacts to these species from the Project will be insignificant. European starling is an introduced non-protected species and there is no concern over impacts to this species. Despite relatively high use and exposure, common ravens are rarely reported as fatalities according to monitoring studies at other wind-energy facilities (Erickson et al. 2001a; 2002b, Young and Poulton 2007, Johnson and Erickson 2008) and no common raven fatalities were recorded during two years of monitoring at the nearby Hopkins Ridge project (Young et al. 2007, 2009). No impacts to common ravens are expected from the Project.

Predicting numbers of fatalities is difficult, however, the results of monitoring studies within the CPE provide a basis for estimating mortality (see Table 5.1, Appendix C). Estimates of mortality for all birds have ranged from approximately 1.0 to 3.2 birds/MW for CPE wind projects. Using this as a basis for the proposed Project, it is expected that between approximately 100 and 300 bird fatalities would occur per year for each 100 MW constructed or 1,400 to 4,200 per year for this Project. The majority of these fatalities would be passerines as up to 80% of fatalities recorded at CPE projects are passerines (Young and Poulton 2007, Johnson and Erickson 2008). Due to the overall low numbers of non-raptor fatalities expected and the high population sizes for the species most likely affected, is unlikely that non-raptor populations will be adversely affected by direct mortality from the operation of the wind-energy facility.

Potential Impacts on Bats

The research on impacts to bats from wind turbines has been limited until recent years. There are not as many available studies with bat fatality data as bird fatality data. Collisions involving bats were previously considered to be on the same order as expected for birds with 3.4 bat kills per turbine per year (4.6 bats per MW per year) as the national average (NWCC 2004). However, lower rates (0.7 to 3.4 bats per turbine per year have been found during studies in the Pacific Northwest (Johnson and Erickson 2008, Arnett et al. 2007). The significance of localized bat mortality from collisions on a population as a whole is largely not understood, and current research is being aimed at addressing this issue. A discussion of the inherent difficulties in predicting bat mortality is provided in Appendix C.

It is likely that some bat fatalities would occur during operation of the Project. Post-construction bat mortality and species composition in the Project area are expected to be similar to fatalities reported for the Hopkins Ridge Wind Project (Young et al. 2007, 2009). Risk to resident/summering populations will likely be much lower than risk to migrants.

The number of bat calls per night as determined from bat detectors shows a rough correlation with bat mortality, but may be misleading because effort, timing of sampling, species recorded, and detector settings (equipment and locations) varied among studies. Bat activity within the Project (mean of 1.1 bat passes per detector-night) was fairly low and lower than activity observed at facilities in Minnesota and Wyoming, where bat mortality was also low, and was much lower than activity recorded at sites in West Virginia, Iowa and Tennessee, where bat mortality rates were high (see Table 5.2, Appendix C). Thus, based on the presumed relationship between bat activity as measured by Anabat detectors and post-construction fatalities, bat mortality rates at the Project are expected to be low and likely similar to the average for other wind projects within the CPE (see Johnson and Erickson 2008).

The proposed wind-energy facility is not located near any known bat colonies or other features that are likely to attract large numbers of bats, but it is expected that areas within the Project area, such as the riparian corridors, likely receive higher bat use than the areas where turbines will be constructed. The Project area does not appear to contain topographic features that may funnel migrating bats, and is lacking forest cover, such as present at the high-mortality sites in the eastern U.S.

Bat activity at the site was relatively consistent from June to August and likely represented foraging by resident bats and the fall migration period for bats (August). Overall activity dropped off in September, which is likely an indication that most migrant bats have moved through by this time and resident bats have retreated to areas around hibernacula. Fatality studies of bats at wind-energy facilities in the US have shown a peak in mortality in August and September and generally lower mortality earlier in the summer (Johnson 2005; Arnett et al. 2008). These findings are supported by monitoring studies from CPE wind projects (see for example Young et al. 2007, 2009). Based on the available data, it is expected that bat mortality at the Project will be highest in August with little to no mortality in the spring and early summer.

Overall, the site study results do not suggest that bat mortality impacts from the Project would be different than other CPE wind projects. Mortality is likely to be primarily of hoary bats and silver-haired bats and be highest during the months of August and September. Hoary bats and silver-haired bats are two of the most widely distributed bat species in North America (Shump and Shump 1982; Kunz 1982) and it is likely that, due to the size of the species ranges and abundance of suitable habitat (woods, forests, trees), that they have fairly large population sizes. In general, mortality levels on the order of one to two bats per turbine or per MW are likely not significant to these populations. Minor impacts are expected to other species, little brown and big brown bats and during the spring and early summer.

Potential Impacts to Special Status Avian Species

Ferruginous hawk
Ferruginous hawk use of the Project area is very low. Over the course of the standardized avian surveys only two observations were made of ferruginous hawk. There is one historical nest site known near the Project area but it was not active in either of the two years of study. No impacts to ferruginous hawk are expected from the Project.

Bald eagle
Bald eagle use of the Project area is very low. Over the course of the standardized avian surveys only three observations were made of bald eagle. There are currently no known nest sites near the Project area. No impacts to bald eagle are expected from the Project. Additionally, no bald eagle fatalities have been found to date in Columbia Plateau Ecoregion wind projects (Johnson, et al. 2008).

Golden eagle
While golden eagle use of the Project area was not very high, they were observed over all seasons and two nests were located within 2 miles of the site. Exposure risk to golden eagle is considered moderate. In general, golden eagle fatalities are rarely reported for wind projects outside the Altamont Pass WRA and no golden eagle fatalities were found at the Hopkins Ridge wind project over two years of monitoring despite a nest within one mile of the Hopkins Ridge project area (see Figure 4.2, Appendix C). No impacts to golden eagles are expected.

Oregon vesper sparrow
Vesper sparrows were recorded during the standardized use surveys in the spring, summer, and fall seasons but use was very low for any given season. While vesper sparrows have been recorded as fatalities at other CPE wind projects (Johnson and Erickson 2008) the number of fatalities has been very low and no vesper sparrows were found at the Hopkins Ridge project. Vesper sparrow is not expected to be impacted by the Project.

Sage thrasher
One sage thrasher was observed in the Project area during the fall migration season. Use by sage thrasher in the Project area was very low. No impacts to sage thrasher are expected from the proposed Project.

Burrowing Owl
Burrowing owls are potential breeding residents in the Project area; however, they have not been recorded during the site specific studies. No impacts to burrowing owl are expected from the proposed Project.

Merlin
Merlin use of the Project area is very low. Over the course of the standardized avian surveys only three observations were made of merlin during the non-

breeding season. There is currently no known nest sites or habitat (forested areas) within the Project area. No impacts to merlin are expected from the Project. Additionally, no fatalities have been recorded in Columbia Plateau Ecoregion wind projects (Johnson, et al. 2008).

Vaux's swift
Several observations of Vaux's swift were made over the spring, summer, and fall seasons during the standardized use surveys; however, use by this species onsite was relatively low. The occurrence of the species suggests there will be some exposure risk, however, impacts to this species at other wind projects is low. Only one fatality has been reported at other CPE wind projects (Johnson and Erickson 2008). No Vaux's swift fatalities were recorded during the two years of monitoring at Hopkins Ridge (Young et al. 2007, 2008). Consequently, no impacts to this species are expected.

End of Design Life Impacts

Impacts from the decommissioning of the facility are anticipated to be similar to construction in terms of noise, disturbance, and equipment. Decommissioning will involve restoration of areas impacted by the Project, therefore, there will be little permanent impacts associated with loss of habitat.

With repowering turbines or continuing Project operations beyond estimated Project life, impacts to birds and bats would be similar to those impacts described for Construction, assuming all access roads remain in place.

Mitigation

1. The Applicant shall establish a Technical Advisory committee (TAC) for the Project to formulate and review the results of wildlife monitoring studies, as well as research-oriented studies, as needed, to be carried out by the Applicant after the Project becomes operational. The TAC will be responsible for reviewing the appropriate timing and duration of monitoring studies, review results of monitoring studies, and make suggestions to the Project owner and permitting authority regarding the need to adjust mitigation and monitoring protocols based on the results of monitoring. Potential TAC members include the Project owners or operators, landowners, county representatives, state and federal resource agencies, tribal representatives, and local environmental stakeholder groups.

2. The duration and scope of the post-construction monitoring program will be recommended to the appropriate permitting authority by the TAC through consultation with a qualified biology consultant familiar with the impacts on birds and bats at wind energy projects. The overall objective of the monitoring study is to estimate the annual number of avian and bat

casualties (fatalities and injured birds/bats) attributable to collisions with wind turbines and meteorological towers for the entire Project. The Post-Construction Monitoring Program will consist of four components:

a. Standardized carcass searches of selected turbines or turbine strings in a rectangular plot centered on the turbines;
b. Searcher efficiency trials to estimate the percentage of carcasses found by searchers;
c. Carcass removal trials to estimate the length of time that a carcass remains in the field for possible detection; and
d. A Wildlife Incident Reporting and Handling System (WIRHS) for wind project personnel to handle and report casualties found in the Project incidentally to the study. This program will be modeled after the Hopkins Ridge Incidental Fatality Reporting Program (Young et al. 2005, 2007).

3. Following completion of the Post-Construction Monitoring Program, bird and/or bat fatalities and injuries observed would be reported annually for the life of the Project to the appropriate agencies.

4. A raptor nesting survey will be conducted in the appropriate season prior to each phase of construction to identify active raptor nest sites in the vicinity of the Project. The Applicant will minimize disturbance during construction in the vicinity of any active Federal or State threatened or endangered raptor nest. A qualified avian biologist will be contracted to determine what measures are appropriate for minimization of impacts. These recommendations will be presented to the county permitting authority prior to initiation of Project construction phase activities in the case of an identified Federal or State threatened or endangered active raptor nest identification within 1/4 mile of proposed construction activities.

5. Construction personnel will avoid driving over or otherwise disturbing areas outside the designated construction areas.

6. An environmental monitor will be designated during construction to monitor construction activities and ensure compliance with mitigation measures.

7. Per the recommendations stated in the WDFW Wind Power Guidelines (April 2009), the Applicant will minimize bird and bat impacts to the greatest extent practicable.

2.7.2.2 No Action Alternative

Under the No Action Alternative, the Project will not be constructed or operated. It is estimated that continued use of the land for agricultural purposes will occur and impacts to birds and bats would be confined to those associated with existing agricultural practices.

2.7.2.3 Probable Significant and Unavoidable Adverse Impacts

The Project will cause bird and bat mortality, primarily through collisions during turbine operations. However, give the predicted mortality rates in context of what is known of the size of the bird and bat populations impacted, this impact is not deemed to be significant in light of continuing viability of the population of these species.

The information from the monitoring will be reviewed by the Technical Advisory Committee in consultation with appropriate wildlife agencies and may lead to future modifications to wildlife agencies' windpower guidelines for use in future wind farm developments, thus, potentially, reducing future cumulative impacts to these populations.

2.7.2.4 Cumulative Impacts

This section provides a qualitative assessment of the cumulative impacts to birds and bats associated with past, present, and reasonably foreseeable future actions (projects) in the Project area. For the purpose of this analysis, we have defined cumulative impact as the potential for the Project to significantly alter the existing range and/or population of birds and bats. This study uses mortality data compiled from existing CPE wind projects, as well as a broad qualitative analysis of potential future development to evaluate cumulative impacts.

There are currently 1,167 MW of existing or potential wind-energy facilities in Garfield and Columbia counties. A list of the projects considered in the cumulative impact analysis is provided in Table 2-1.

Birds

For most studies that have occurred in agricultural settings, a few common species make up the majority of bird observations and fatalities at the site. A variety of other species, including migrants, have been recorded as fatalities, but typically in low numbers and frequency. The majority of avian deaths (70 percent) due to wind power facilities in the Columbia Plateau Ecoregion were of common passerines in mixed agriculture and grassland habitat.

The expected number of fatalities from Lower Snake River alone or in combination with the other wind projects in Garfield and Columbia counties would not be significant to the regional populations, in general simply because the regional populations are so large. For example, over all passerines recorded during the regional monitoring studies, horned lark made up over half (51%) of the fatalities. Assuming this pattern holds for the projects in Columbia and Garfield counties, it is expected that on average there would be approximately 1350 horned lark fatalities per year for Lower Snake River and approximately 2750 horned lark fatalities for all other proposed projects. Under the assumption that the fatalities occur equally across all seasons then approximately 335 and 685 horned lark fatalities would occur for Lower Snake River and all projects respectively. This compares to an estimated regional breeding population of approximately 111,000 horned larks based on the BBS results for the Columbia Plateau Ecoregion (Saur et al. 2008). Natural variation in the horned lark population is likely substantially higher than the estimated impacts.

Impacts to other bird species are expected to be less based on the results of the other monitoring studies and comprise a much smaller percentage of the pool of fatalities from Columbia Plateau wind projects. These small impacts would be to individuals and would not result in a significant impact to species or regional populations such as that of the Columbia Plateau Ecoregion. For example, 57 raptor fatalities have been recorded during monitoring studies in the CPE which is approximately 8.7% of all avian fatalities. Of these 22 (approximately 38%) were American kestrels and 14 (24%) were red-tailed hawks, two of the most common raptors in North America. Assuming that the mean raptor fatality rate (0.07 per MW) from the CPE wind projects (Johnson and Erickson 2008) is representative of raptor mortality at Lower Snake River then it would be expected that there would be approximately 112 raptor fatalities at Lower Snake River and 215 for all the projects. The majority of these fatalities (~62%) are expected to be of kestrels and red-tailed hawks. The breeding populations of these species in the CPE are estimated at 170,000 and 77,000 individuals, respectively. Assuming that approximately one-quarter of the fatalities occur in the breeding season then these impacts would be a minor or immeasurable percent of the breeding population in the CPE. Impacts to all other raptor species would be less and insignificant.

Similar to the county level analysis, previous analyses of cumulative impacts on birds and bats for the whole Columbia Plateau physiographic region have demonstrated that the proposed level of wind development in the region is unlikely to have consequences at the population level for birds (Johnson and Erickson 2008, Young and Poulton 2007). Conclusions from the analyses were that the total cumulative mortality impacts associated with wind development was less than 0.05% of the breeding population of the species that were the most commonly found fatalities and far less for the less common species. For the vast majority of species recorded as wind project fatalities in the Columbia Plateau (11 wind projects monitored; Johnson and Erickson 2008) five or fewer fatalities have been found. This level of mortality is essentially immeasurable when compared to the total estimates of the breeding population sizes (Johnson and Erickson 2008, Young and Poulton 2007). The overall conclusions of the cumulative effects analyses for the entire Columbia Plateau were that the additional mortality associated with wind development in the region would not have population consequences.

Bats

Research at wind projects indicates that the primary impact to bats appears to be risk of collision for fall migratory species. The hoary bat (*Lasiurus cinereus*) and silver-haired bat (*Lasionycteris noctivagans*) are the species with the most prevalent wind project fatalities in the Columbia Plateau Ecoregion (Arnett et al. 2008, Johnson 2005). Sparse information exists regarding bat populations in the region; however, non-migratory and resident bat populations do not appear to be negatively impacted by wind turbines (see Johnson 2005).

Fatality estimates for 11 CPE wind projects studied have ranged from 0.39 to 2.46 bats per MW per year, with an average of 1.20 bats per MW per year (Table 2-23). In these studies more than 93% of the bat fatalities have been hoary and silver-haired bats. Using a per-MW estimation basis, bat mortality at the Project may range from approximately 0.4 to 2.5 bats per MW per year, or between 572 and 3580 total bats per year with a 1,432 MW capacity. Provided bat mortality at the Project and future wind energy projects is similar to the rates at other Columbia Plateau wind projects, impacts to resident and non-migratory species would be minor and not significant. The low level of mortality impacts for *Myotis* species and big brown bats would be to individuals and not populations, are not considered significant, and would likely be far less than natural levels of variation in mortality for these species.

Table 2-23 Summary of bat mortality at existing wind energy projects in the Columbia Plateau Ecoregion

Project Name [state]	No. Bats /turbine/year	Bats per MW[1]	Reference
Stateline [OR/WA]	0.95	1.44	Erickson et al. 2004, 2007
Vansycle [OR]	0.74	1.12	Erickson et al. 2000
Klondike [OR]	1.16 0.77	Johnson et al.	2003b
Klondike II [OR]	0.63	0.41	NWC and WEST, Inc. 2007
Hopkins Ridge [WA]	1.13	0.63	Young et al 2007
Wild Horse [WA]	0.70	0.39	Erickson et al. 2008
Nine Canyon [WA]	3.21	2.46	Erickson et al. 2001b
Leaning Juniper [OR]	1.28	0.86	Kronner et al. 2007
Big Horn I [WA]	2.85	1.90	Kronner et al. 2008
Combine Hills [OR]	1.88	1.88	Young et al. 2005
Average	**1.46**	**1.18**	

Source: Johnson et al. 2008

1. Most reports do not provide number per MW of energy produced so this number was calculated based on the mortality per turbine and capacity of turbines studied.

Unlike the situation with birds, there is little information available about local, regional or national populations of bat species. For most species that are not threatened or endangered and have large geographic distributions, very little is known about population sizes or total numbers that exist. Results of monitoring studies across the U.S. and Canada have found similar trends in impacts, such as finding that risk to bats from wind turbines is unequal across species and across seasons. The majority of bat fatalities at wind projects in the U.S. and Canada have been tree/forest dwelling, long-distance migrant species found in the late summer and fall periods.

The significance of the cumulative impacts on bat populations is difficult to determine, as there is very little information available regarding the overall population size and distribution of the bats potentially affected. Hoary bats and silver-haired bats are two of the most widely distributed bat species in North America (Shump and Shump 1982; Kunz 1982) and it is likely that, due to the size of the species ranges and abundance of suitable habitat, that they have fairly large population sizes. In general, mortality levels on the order of one to two bats per turbine or per MW are likely not significant to populations.

2.8 Vegetation

2.8.1 Affected Environment

Taxonomic authority for this discussion follows Cronquist, *et al.* (1994).

2.8.1.1 Vegetation Communities

The Project area lies within the extensive Intermountain Semidesert Province ecoregion (Bailey 1995). This province includes the plains and tablelands of the Columbia-Snake River Plateaus and the Wyoming Basin. Prior to modification by human activities, this region was dominated by sagebrush steppe, comprising sagebrush (primarily *Artemisia tridentata*) or shadscale (*Atriplex* spp.) interspersed with short bunch grasses, including Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Agropyron spicatum*), and Sandberg bluegrass (*Poa sandbergii)*. These dominant shrubs are replaced by greasewood (*Sarcobatus vermiculatus*) in more mesic, alkaline flats. More mesic upland areas in the Columbia River Basin give way to open cover dominated by the bunchgrasses. Stream corridors are lined with willows (*Salix* spp.), other riparian shrubs such as snowberry (*Symphoricarpos albus*) and Wood's rose (*Rosa woodsii*) and herbaceous, sedge-dominated (*Carex* spp.) wetlands.

The results of human land use are pronounced in the Project area. The historic land cover of sagebrush steppe and bunchgrass grasslands has been substantially modified and replaced by human activities, including ranching, farming, water diversion and movement, as well as highway and town construction. The following description of the dominant vegetation communities reflects this dynamic. The majority of the Project area is now dominated by agricultural fields that bear no resemblance to the original cover, plant species diversity, and ecological function of the unmodified native plant communities. Other modified plant communities include those under cultivation as Conservation Reserve Program (CRP) lands, and those dominated by annual weeds. Small remnant areas of native bunchgrass grassland, sagebrush steppe, and riparian areas with associated wetlands also occur throughout the area. Each of the seven dominant vegetation communities in the Project area is briefly described below. Locations of these communities are illustrated in Figure 2-11 and the area of each type is summarized by WRA in Table 2-24.

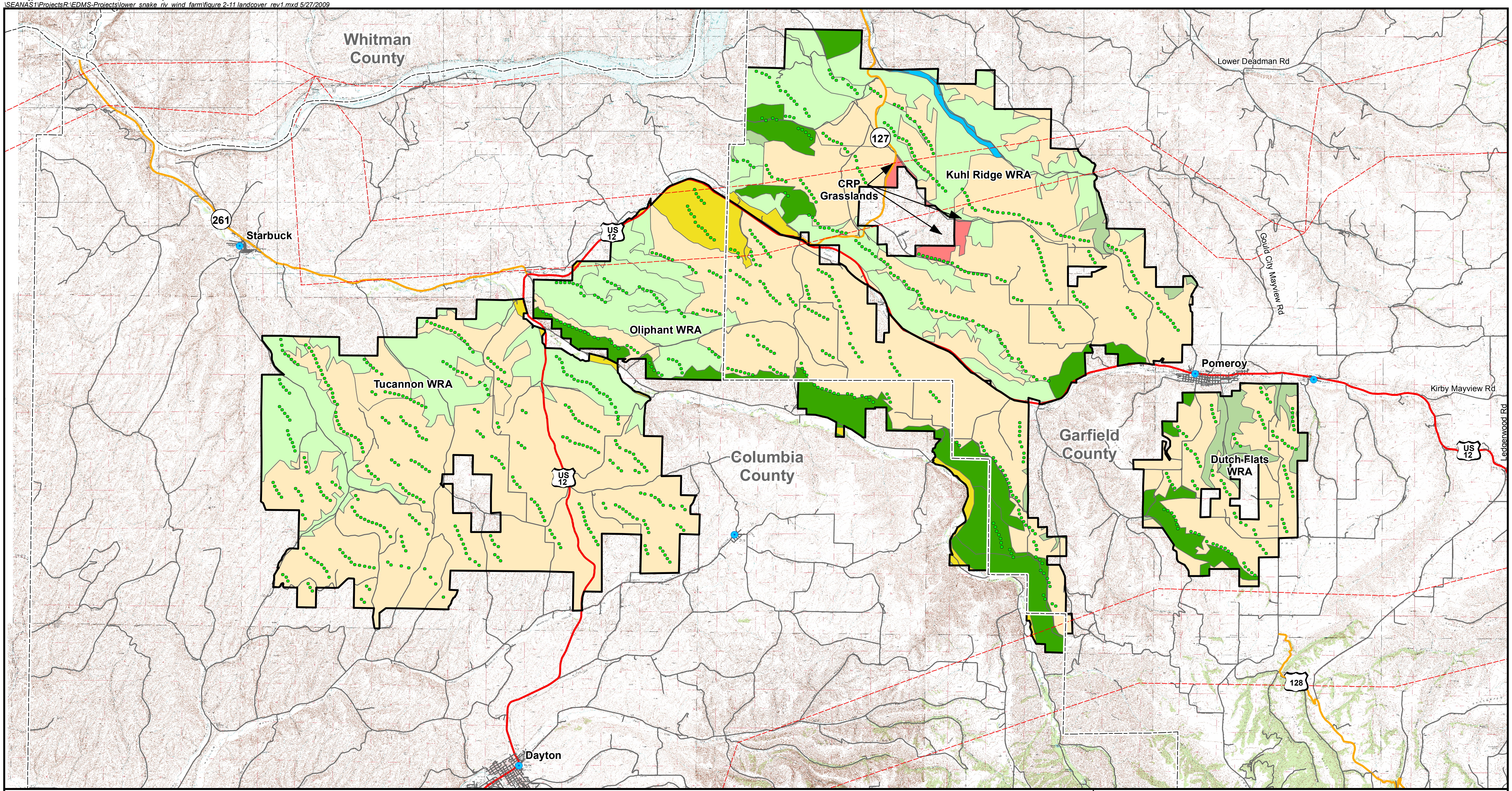
Agricultural Land – Winter Wheat

Winter wheat cropland is the most extensive vegetation type in the Project area (55% to 76% total area of the Project WRAs). These areas are seeded as monocultures of non-irrigated winter wheat (*Triticum aestivum*) with few fence rows.

Most of these croplands are cultivated and treated with herbicides and fertilizer on an annual basis. Due to the intensive human land use, these areas have been completely modified in terms of ecological function. They may be a source of seeds or other food stuffs for a short time following harvests. However, these extensive areas provide minimal habitat for native plant species.

Table 2-24 Vegetation Communities by WRA

Community Type	Dominant Species		WRA – Acres (% of total)			
	Common Name	Binomial	Kuhl	Dutch Flats	Oliphant	Tucannon
Agricultural Land – Winter Wheat	winter wheat	*Triticum aestivum*	22,112.6 (55.4)	7,175.2 (71.2)	17,865.7 (54.6)	31,610.4 (76.2)
Agricultural Land – Row Crops	Irrigated crop species		343.6 (0.9)	0	2440.2 (7.5)	197.3 (0.5)
CRP Grassland	crested wheatgrass	*Agropyron cristatum*	558.5 (1.4)	0	0	0
Disturbed Annual Grassland	cheatgrass tall tumblemustard	*Bromus tectorum* *Sisymbrium altissimum*	13,430 (33.7)	0	6,247.7 (19.1)	9,687.8 (23.3)
Native Bunchgrass Grassland	bluebunch wheatgrass Idaho fescue Sandberg bluegrass	*Agropyron spicatum* *Festuca idahoensis* *Poa sandbergii*	2,572.6 (6.4)	1,251.2 (12.4)	6,065.8 (18.5)	1.5 (<1)
Sagebrush Steppe	big sagebrush rabbitbrush	*Artemisia tridentate* *Chrysothamnus nauseosus*	565.7 (1.4)	1,654.2 (16.4)	115.8 (0.4)	0
Riparian/Wetlands	reed canary grass Pacific willow snowberry Wood's rose	*Phalaris arundinacea* *Salix lasiandra* *Symphoricarpos albus* *Rosa woodsii*	358.3 (0.9)	1.7 (<1)	1.2 (<1)	0
		Total	**39,941.3 (100)**	**10,082.3 (100)**	**32,736.5 (100)**	**41,496.9 (100)**



Legend

- Turbine Location
- City
- Transmission Line
- US and State Highways
- State and County Highways
- Local Rural Road
- County Lines
- Project Area

Landcover

- Agricultural Land - Row Crops
- Agricultural Land - Winter Wheat
- CRP Grassland
- Disturbed Annual Grassland
- Native Bunchgrass Grassland
- Riparian/Wetlands
- Sagebrush Steppe

Lower Snake River Wind Energy Project

Columbia & Garfield Counties
Washington

Figure 2-11
Project Area Vegetation Communities

0 1 2 4 6 8
Scale 1:160,000
Miles

Source Information:

These areas are also discussed in Section 2.14, Land Use and Recreation.

Agricultural Land – Row Crops

This agricultural cropland includes row crops in irrigated fields. This vegetation represents less than one percent of the Dutch Flats, Kuhl Ridge and Tucannon WRAs' cover, and approximately 7.5 percent of the cover area in the Oliphant WRA. These row crop fields are cultivated and treated with herbicides and fertilizer on an annual basis and so have been largely removed from the ecological function of their original, native vegetation communities they once supported. Therefore, like the wheat fields, these areas provide minimal habitat for native plant species.

CRP Grassland

A very small area of the Kuhl Ridge WRA (1.4 percent) has been seeded under Conservation Reserve Program (CRP) contracts. This grassland includes fields of non-irrigated crested wheatgrass (*Agropyron cristatum*) or related species. While these plantings do prevent soil erosion and weed invasion, they provide little habitat for native plant species.

Disturbed Annual Grassland

Areas dominated by annual grasslands have experienced surface disturbance to such a degree that exotic species such as the annual cheatgrass (*Bromus tectorum*) has been favored during revegetation and has now established as a dominant cover type. These areas also support exotic forbs as well, including tall tumblemustard (*Sisymbrium altissimum*) and Russian-thistle (*Salsola australis*). These areas provide little habitat for native plant or wildlife species. Disturbed annual grasslands are the second-most extensive vegetation type in the Oliphant and Kuhl Ridge WRAs, and represent 5.6 percent of the Tucannon WRA and are not present in the Dutch Flats WRA.

Native Bunchgrass Grassland

Native bunchgrass grasslands, including bluebunch wheatgrass, Idaho fescue and Sandberg bluegrass, occur in small areas in all but the Tucannon WRA. A sparse but diverse forb component includes gaura (*Gaura coccinea*), scarlet globe mallow (*Sphaeralcea coccinea*), salsify (*Tragopogon dubius*), prairie-turnip (*Psoralidium tenuiflorum*), locoweeds (*Oxytropis* spp.), milk vetches (*Astragalus* spp), woolly plantain (*Plantago patagonica*), and purple tansy aster (*Macaeranthera pinnatifida*). This native bunchgrass grassland provides habitat for native plants. However, the species-carrying capacity of this type of habitat is reduced due to the very small size of these areas and relatively large edge-effect of nearby modified vegetation types.

Sagebrush Steppe

Sagebrush steppes are dominated by sagebrush (*Artemisia tridentata*.) and rabbitbrush (*Chrysothamnus nauseosus*), with a grass-dominated herbaceous component similar to the native bunchgrass grassland described above. These very small areas occur along the side-slopes of drainages or ravines with sandy soils, and usually have north aspects. These steppes grade into riparian areas along the bottoms of more mesic drainages, with perennial surface water flow. The Tucannon WRA does not support any of this steppe community, the Kuhl Ridge WRA has less than two percent cover by this type. The Dutch Flats WRA contains over 12 percent, and it comprises almost 19 percent of the Oliphant WRAs. This steppe community provides habitat for native plants.

Riparian/Wetlands
Riparian areas and wetlands include those areas near streams or springs and support hydrophytic herbaceous vegetation as well as limited woody species. Riparian and wetlands are discussed further in Section 2.5 Wetlands.

Noxious Weeds
Several noxious weed species of concern to Garfield and Columbia counties have the potential to occur within the Project area, as listed in Appendix D. Washington State assigns weed management classes to all listed species. Class A species are designated for mandated control and required eradication. Class B species are designated for control by counties where they are not yet widespread (Washington State Noxious Weed List 2009).

Introduction and spread of noxious weeds into vegetation communities negatively impacts community composition and function. Many noxious weed species are known to displace native plants and disrupt the structure and function of local ecosystems (Vitousek 1990). As noxious weed populations increase in size and frequency, they tend to reduce the diversity of surrounding native plant communities, alter the composition and community structure, the habitat quality in the infested area, recreation opportunities, and the visual aesthetic quality of the landscape (USFS 1998; Usher 1988; Weiss and Murphy 1998). These changes to native plant communities can alter ecosystem processes, including productivity, decomposition, hydrology, nutrient cycling, and disturbance patterns such as frequency and intensity of wildfires (USFS1997).

Special Status Plant Species
Based on a review of occurrence databases, a number of special status plant species have the potential to occur within the Project area. Only those listed by the USFWS under the Endangered Species Act (ESA) as endangered, threatened, or candidate species receive regulatory protection. Those species known to occur in eastern Washington are contained in Appendix D hereto, although no known populations of these species occur in the Project area. However, potential habitat (native bunchgrass grassland, sagebrush steppe, and riparian/wetland communities) that could support two of these plants species could exist in the Project area, based on review of habitat requirements and known locations. These species include Ute ladies' tresses and Spalding's catchfly. Surveys of appropriate habitat for these species are being conducted at this time.

2.8.2 Impacts and Mitigation

While plant communities are inherently variable due to a number of environmental and biological forces (MacCracken et. al., 1983), there is a general understanding that ecosystem stability is characterized by increasing species diversity and structural complexity (Kormondy, 1969; Odum, 1971). Greater structure and diversity generally indicate better intrinsic value, and a stronger ecological role in primary production, soil and water quality; wildlife and special status plant species habitat, and the aesthetic context vegetation communities provide to human uses of the Project area.

These considerations lead to the general assumption that naturally-occurring native plant communities – in this case, native bunchgrass grassland, sagebrush steppe, and riparian/wetlands - are more likely to support the vegetation functions described above, than communities comprising non-native species, especially agricultural fields or communities dominated by weedy, exotic species, and are of greater ecological value and therefore impacts to these areas will be of greater consequence. The social and economic consequences of disturbance and removal of agricultural fields is discussed in Section 2.14, Land Use and Recreation.

Direct impacts to vegetation include disruption or removal of rooted vegetation.

Application of mitigation actions and BMPs may reduce the amount or severity of surface disturbance. These will be included in a vegetation management plan to be developed in consultation with the respective county weed management authorities prior to construction. Implementation of the plan, including its mitigation and restorative measures and BMPs, is assumed throughout the following analysis of impacts to vegetation resources.

A distinction is made between temporary and permanent disturbance. A temporary disturbance is one which, following restorative measures, will return ecological function to pre-disturbance condition to the maximum extent possible. An area of permanent disturbance to vegetation will not return to ecological function, either because of permanent removal of vegetation, or on-going actions in an area that functionally prevent re-establishment of vegetation.

Calculation of precise numbers of acres affected by temporary and permanent disturbance is undertaken when construction is complete and the as-built Project, including the affected acreages, can be verified with certainty. At that time, application of the mitigation ratios contained in the WDFW Wind Power Guidelines is imposed; *see* 2.8.2.1 – Mitigation**,** *infra,* for further discussion.

A number of indirect impacts to vegetation resources are also a potential result of proposed management actions. Potential indirect impacts include introduction of noxious weeds by various vectors or conditions that enhance the spread of weeds; general loss of habitat due to surface occupancy, surface compaction, or trampling; disruption or reduction of pollinator populations; and loss of habitat suitable for colonization due to surface disturbance. Indirect impacts are assumed to result from direct impacts in proportion to the relative amount of surface disturbance.

2.8.2.1 Preferred Alternative

Construction Impacts

All Four WRAs

There will be approximately 2,750 acres of temporarily disturbed land during the construction of the Project and approximately 600 acres of permanent conversion of vegetation due to the construction of Project facilities.

Studies will be completed prior to Project construction to identify sensitive and special status species to be avoided by Project design and micrositing. Restorative measures and monitoring contained in the Project vegetation management plan will be implemented and no permanent impacts to special status species are anticipated.

Project Facilities Impacts

All Four WRAs

Once the Project is constructed, the operating Project will have little impact upon vegetation other than the control of noxious weeds.

End of Design Life Impacts

No permanent impacts to vegetation are expected to result from repowering turbines or continuing Project operations beyond estimated Project life, as all such future modifications would be expected to remain within the existing Project footprint. Therefore, impacts to vegetation resources, including special status plant species, from repowering or continuing operations of this Project will be less than those impacts described for Construction, assuming all access roads remain in place.

If decommissioning is undertaken, vehicles will travel on established roadways, generating dust and potentially introducing or spreading non-native, invasive, or noxious weeds. It is assumed these actions will be conducted in accordance with the Project vegetation management plan in order to mitigate this possibility. Final reclamation and revegetation will be conducted in accordance with the Project vegetation management plan. This is expected to avoid the spread of noxious weeds and greatly increase the likelihood of returning all surface-disturbed areas to pre-construction function.

Mitigation

As discussed above, calculation of precise numbers of acres affected by temporary and permanent disturbance is undertaken when construction is complete and the as-built Project, including the affected acreages, can be verified with certainty.

Some areas of vegetation of native vegetation will be permanently removed from the local ecosystem. The mitigation ratios contained in the WDFW Wind Power Siting Guidelines (April 2009) for these habitat losses will be utilized to mitigate any losses covered under such guidelines. For Class II, shrub-steppe, mitigation ratios are 0.5:1 for temporary impacts and 2:1 for permanent impacts. For Class III/eastside interior [native vegetative] grasslands and CRP lands, the ratios are 0.1:1 for temporary impacts, and 1:1 for permanent impacts. For Class IV/croplands, pasture, urban and mixed environments, there is no mitigation required for temporary or permanent impacts.

Studies will be completed prior to Project ground disturbance activities to identify sensitive and special status species to be avoided by Project design and micrositing.

A number of noxious weed management and revegetation actions will be integrated to mitigate impacts to vegetation as a result of the Project construction and operation. Noxious weed management and revegetation activities for this Project will be accomplished in two phases. Phase One will occur during facility construction. Phase Two will be applied following completion of construction activities as an on-going effort during the active life of the Project. Each phase will incorporate appropriate management objectives and control strategies. Integrated weed management (IWM) and best revegetation practices will serve as the foundation for all management actions associated with this Project.

Phase One: Facility Construction/Operations

During this phase of the Project, weed management will focus on ***prevention*** of weed spread and introduction of new weed populations.

Weed prevention is addressed by:

- limiting opportunities for weed propagules (e.g. seeds, shoots, root fragments) to enter an area or move between areas;
- reducing negative human impacts to existing vegetation;
- maintaining healthy and vigorous plant communities that can exclude weeds, should they enter the local system.

Prior to site construction activities, consultation with the respective county weed management authorities will be conducted to develop a Project vegetation management plan that accounts for the existing Project area environment, addresses Project impacts and implements mitigation as negotiated with the appropriate county authorities. The Project vegetation management plan shall be submitted to each county's public works and/or planning departments prior to commencement of onsite disturbance activities.

Phase Two: Post-Construction Management
Post-construction weed management objectives will be ***eradication*** of incipient weed populations, ***suppression*** of existing populations, and ***restoration*** of temporarily disturbed existing plant communities.

Monitoring known weed populations and checking for new introductions within restored areas will be done on a regular schedule throughout post-construction growing seasons. Monitoring efforts will concentrate on those weed species noted to be a concern in Garfield and Columbia counties.

IWM control techniques appropriate to individual species and specific sites within areas impacted by the Project will be developed and employed in consultation with the appropriate county Weed Coordinators. These will include mechanical and chemical weed control. Revegetation techniques and BMPs discussed above will be implemented during this phase of Project weed management as well.

2.8.2.2 No Action Alternative
Under the No Action alternative, the proposed wind power facility will not be constructed. Therefore, no disturbance to vegetation would be incurred. Past and current ongoing land use activities will continue to affect vegetation communities into the foreseeable future.

2.8.2.3 Probable Significant and Unavoidable Adverse Impacts
As mitigated, the Project will have no probable significant and unavoidable adverse impact to vegetation.

2.8.2.4 Cumulative Impacts

Vegetation Communities
Implementation of the potential projects listed in Table 2-1 would result in temporary and permanent loss of vegetation through land disturbance associated with construction of roads, turbine pads, other infrastructure, and project operations. The dimensions of such other potential projects are unknown. However, assuming the energy projects identified therein will be wind-based and built in similar agricultural areas, the types and proportions of impacts are likely to be similar to this Project. Considering the relatively small proportion of vegetative communities of this Project that are permanently disturbed, it is unlikely that the cumulative impact of those other potential projects would be significant.

Special Status Plant Species
While it is not known whether Ute ladies'-tresses and Spalding's catchfly or other federally listed special-status plant species are likely to occur, or are present,

within the larger cumulative impacts area, all potential projects should either completely avoid any located populations or undertake Section 7 consultation with USFWS, to enable avoiding any impacts to these species.

Noxious Weeds

The additional potential projects will create the possibility of introducing or spreading noxious weeds in existing native and cultivated vegetation communities. Noxious weeds associated with this Project will be managed in accordance with the Project vegetation management plan to be prepared for the Project in order to prevent the establishment and spread of new populations of noxious weeds, eradicate existing populations, and restore native and cultivated vegetation communities. The collective impact of the introduction or spread of noxious weeds and potential minimization or reduction of noxious weeds associated with the additional potential projects is unknown because it is unknown if specific weed management and mitigation measures will be required or implemented for each project.

2.9 Visual Resources

2.9.1 Affected Environment

2.9.1.1 Introduction

This section describes the existing visual environment (aesthetics plus light and glare) in and around the Project area. It assesses the potential for aesthetics and light and glare impacts using accepted methods of evaluating visual landscape quality and predicts the type and degree of changes the Project would likely have. This section also identifies mitigation measures designed to minimize those impacts.

The visual study area was described by the Lewis and Clark Corps of Discovery as a rugged landscape containing rolling hills and a canyon lined with the Snake River that had swift waters and rapids (NPS 1982; WSAAT 2001). Today industrial developments for shipping and storage of grain can be seen along the Snake River. Large hydroelectric dams that effectively form a series of lakes have altered the Snake River heavily. Navigation along the waterway is provided by a system of locks for ocean going vessels all the way to Lewiston, Idaho. Hydroelectric power generation occurs from two large Army Corps of Engineers dams, Little Goose and Lower Monument dams. Away from the rivers, agricultural land use now dominates upland and lowland areas; rural homes, ranches and towns, and numerous high voltage electric transmission lines have also become landscape features.

The visual study area is comprised of rolling hills and deep valleys near the Snake River (500 feet amsl) in the north, and transitions towards the foothills of the Blue Mountains near the Tucannon Lakes area and Goat Mountain (3,600 feet amsl) in the southeast. Flowing from the mountains the Tucannon River and Pataha Creek drainages bisect the visual study area. Wheat and barley dryland farming are the predominant vegetation type on hillsides and tops, with cultivated perennial pasture, hay, and row crops in the river bottomlands.

The northern tip of the Umatilla National Forest occurs at the southern edge of the eight-mile visual study area boundary. A site visit to the Tucannon Lakes area in May 2009 revealed that due to the Tucannon River canyon, most of the publicly accessible viewpoints located south of the intersection of Blind Grade Road and Tucannon Road do not have Project visibility. The Wenaha Tucannon Wilderness Area is contained within the Umatilla National Forest. Views from this Wilderness Area include the existing Hopkins Ridge and Marengo wind farms.

Another scenic area of regional importance is the Palouse Falls State Park, the entry to which is located off of SR 261. Visibility from the State Park is well beyond eight miles away and doesn't include views of the Project area from the areas associated with viewing the Palouse Falls.

Pomeroy and Dayton are located in the Pataha Creek and Touchet River valleys below the surrounding hillsides. Pomeroy is a Historic District and "represents the only social, commerce, and living center for the residents of Garfield County" (Garfield County Planning Division 2008). Pomeroy contains approximately 700 residences and is located directly north of Dutch Flat WRA and southeast of Kuhl Ridge WRA. There are also many historic structures located in the City of Dayton. Located south of the Tucannon WRA, Dayton contains approximately 1,160 residences, a small commercial area with businesses and governmental offices, and it is "the primary social, commerce, and living center for the residents of Columbia County" (Columbia County Planning Department 2007). There are no views of the Project from Dayton. The rural town of Starbuck is located northwest of the Tucannon WRA. Starbuck contains approximately 80 residences, a small grocery store, a restaurant, a grade school, a post office and several businesses. Views from Starbuck city limits of the Project area do not occur. Figure 8 shows views of the Project from SR 261 at a point southeast of Starbuck.

Several long distance transmission lines cross the view study area, and Marengo and Hopkins Ridge wind energy facilities are located southwest of Tucannon Road between Dayton and Pomeroy. Two 500-kV transmission lines in the north as well as a 230-kV and a 115-kV transmission line in the southeast cross the view study area. Marengo and Hopkins Ridge wind energy developments include 165 total V80 1.8-MW Vestas wind turbines and associated infrastructure. Vestas V80 2.0-MW wind turbines are similar in appearance and have the following dimensions; 128-foot (39-meter) blade length, 262-foot (80-meter) rotor diameter 54,110-foot^2 (5,027-meter^2) swept area, 262-foot (80-meter) hub height, and a 394-foot (120-meter) ground to tip height (Vestas 2009).

Within the Project area, Tucannon WRA extends over several ridges, each approximately 1,600 feet amsl, between the Tucannon River and Whetstone Hollow. Oliphant Ridge WRA is located between Tucannon River in the southwest and Pataha Creek and Linville Gulch in the east. The WRA extends from a single ridge, approximately 2,800 feet amsl, in the south to four ridges, approximately 1,600 feet amsl, in the north. The Kuhl Ridge WRA extends from a relatively flat ridge near Pomeroy, approximately 2,600 feet amsl, north to three ridges near the Snake River, approximately 1,600 feet amsl. Dutch Flat WRA extends south of Pomeroy across flattened ridges from approximately 3,200 feet amsl in the south to 2,600 feet amsl in the north. Dryland agriculture is the predominant vegetation type throughout the visual study area.

2.9.1.2 Project Features

The Project appearance consists of Project facilities that may be publicly seen during Project operations. Project facilities include; turbines, the electrical system, operation and maintenance facilities, meteorological towers, and roads.

The angle of the sun and climate conditions affects visibility of Project features. At low angles (morning and evening) sunlight will reflect off a greater surface of the turbine and result in greater visibility. Conversely, when the sun is directly over the Project area (mid day) a relatively small surface of the turbine will reflect sunlight and result in lower visibility. Climate conditions such as dark clouds will also increase Project visibility due to contrast between white turbines against a dark backdrop. Sky cover information for Lewiston, Idaho, indicates that an annual average of 91 clear days, 78 partially cloudy days, and 196 cloudy days occur in the vicinity of the Project area (Western Regional Climate Center 2009).

Turbines

The 2.3 MW turbine is the tallest turbine being considered for this Project. This EIS also evaluates approximately 1,000 1.8 MW turbine locations. This represents the worst case scenario for height and quantity related to visual impacts. The approximate total capacity being planned for is 1,432 MW. If 2.3 MW models are used, only 622 turbines would be built.

Table 1-1, in section 1.4.3.1 “Turbines,” provides comparison model dimensions. Commercial scale turbines are similar in appearance and are comprised of a tower, a nacelle, and turbine blades attached to a rotor. A typical wind energy turbine is shown in Figure 1-12. The tower will appear to be a steel pole, tapered from base to hub, with a base diameter of approximately 14 feet. Atop and perpendicular to the tower, the nacelle will appear to be an elongated metal box-like structure. Three aerodynamically shaped blades connected to a nose cone will attach to the front of the nacelle. Typically wind turbines are painted white to comply with FAA daytime lighting requirements. A 23-foot diameter gravel buffer and crane pad will be maintained at each turbine site.

Electrical System

Electrical system appearance includes primarily below-ground, and minor above-ground collector system, substations, overhead transmission lines, and microwave towers (communication system). The collector system, when sited above ground, will be similar in appearance to a single pole (approximately 60-feet tall) transmission line. Substations generally consist of a fenced yard with electrical components on foundations. Views of transmission lines will include single pole or H-frame structures. For 230 kV transmission lines, H-frame structures consisting of two 95-foot poles with crossarms are typically spaced 500 to 700 feet apart. Microwave towers generally consist of lattice type structures with solid dish-like components. Towers will be sited in association with meteorological towers, operation and maintenance facilities, and to maintain line of site.

Operation & Maintenance (O&M) Facilities

O&M facilities will likely include a several thousand square foot building approximately 35 feet in height, a water storage tank, a graveled area, and surrounded by a chain link fence and gated entrance (see figure 1-14).

Meteorological & Microwave Towers

Typically, meteorological and microwave towers are up to 220-foot tall lattice-type structures with a triangular base (see Figure 1-15).

Roads

The Project will require 120 miles of new permanent and 83 miles of temporary roads. New permanent and improved roads will be visually similar to existing secondary and gravel roads. Temporary roads will be required during construction, and will be visually similar to un-graveled dirt roads that occur extensively throughout the Project area.

2.9.2 Impacts and Mitigation

2.9.2.1 Preferred Alternative

Construction Impacts

<u>All Four WRAs</u>

Construction activities and facilities required to implement the Project are described in Section 1.5.4 “Project Phases and Construction Activities Description” and Section 1.5.3 “Project Facilities.” Construction appearance includes activities that may be publicly seen. Views of all construction activities may include personnel and dust, the appearance of road construction, views of material movement at the staging areas, construction of turbine foundations, installation of the electrical system (including overhead transmission), construction of the O & M buildings, and the assembly of the turbine tower/nacelle/blades. Views of this activity will be temporary. Much of the Project construction will not be seen due to the intervening topography that obscures views of the ground located ridgelines away. Following construction related activities; the construction sites will be restored with contour grading and re-vegetation. The resulting views will include native grasses.

Light and glare may be emitted during Project construction. All construction activities require the use of heavy equipment as well personnel operated vehicles that may emit light and glare. Due to their temporary and intermittent nature, construction activities will not have a significant adverse impact on the visual resources of the Project area.

Project Facility Impacts

<u>All Four WRAs</u>

Methodology

Analysis was conducted both within the four separate WRAs and up to eight miles outside of the WRAs. The individual WRAs and their overall 8 mile buffer form the visual study area. This limit was utilized because the limits of Project visibility that result in a perceptible change greatly diminish beyond eight miles from sensitive viewpoints (NAP 2009).

There are three separately recognized methodologies for conducting visual impact assessments. The United States Forest Service, the Bureau of Land Management, and the Federal Highway Administration (FHWA) each have recognized methodologies. BLM’s is known as the Visual Resource Management (VRM) system. The BLM VRM system was mostly utilized for this analysis because it lays the overall groundwork for viewer sensitivity, distance zone application, and visual contrast assessment. The FHWA system was used in this analysis to the degree that Project visibility affects the visual sensitivity of the viewer and the scenic quality viewed also results in a relationship to visual sensitivity. The Forest Service's method is titled the Scenery Management System (SMS). The Forest Service's SMS system was not used in this analysis because the indicative layouts do not have forested vegetation present.

The National Academies Press suggests taking relevant pieces from the recognized methodologies and utilizing them to assess visual impacts from wind energy projects (NAP 2009).

The Project's impacts to visual resources are assessed in this EIS by addressing:

- The visual sensitivity of the viewpoint, and
- The visual contrast seen, and
- The distance from the viewpoint to the closest Project component.

Stated as a formula, **I**mpact = **V**isual **S**ensitivity + **V**isual **C**ontrast + **D**istance **Z**one (I=VS+VC+DZ).

In accordance with the NAP's recognition that different elements of visual effects must be assessed in doing visual impact assessment, professional judgment is necessarily applied to each of the factors present. For this EIS, this formula is weighted as follows: Visual Sensitivity has a 20% weighting, and Visual Contrast and Distance Zone are each assigned 40 percent. This weighting was assigned based on the independent professional judgment applied by the author, as recommended by the National Academies Press (NAP 2009). The weighting by the author takes into account the selection of principally moderate to highly sensitive viewpoints from which to begin analysis in order to assess the maximum impact potential, as well as the degree of visual contrast of each site selected and the proximity of receptors in the distance zone, all of which, when assigned their weighting, result in a conclusion that the Project will have probable significant unavoidable adverse impacts. It is likely that the same conclusion would be arrived at utilizing different weightings if the same selected viewpoints were utilized for this assessment.

Visual Sensitivity

Sensitivity levels are a measure of public concern for landscape aesthetics found within the region. Visual sensitivity is comprised of viewer attitudes (expectation of scenic view), the amount of use (overall use volume of the viewpoint), and the duration of view. Overall levels of visual sensitivity at various viewpoints are identified as being High, Moderate, or Low.

Visual Contrast

The amount of visual contrast is the amount of perceptible visual change that would be created by the Project upon overall forms visible in the landscape. Contrast in form results from changes in the shape and mass of landforms or structures. The degree of change depends on how dissimilar the introduced forms are to those already present in the landscape. Visual contrast is ranked Strong, Moderate, or Weak, as defined in Table 2-25.

Table 2-25 Visual Contrast Descriptions

Degree of Contrast	Criteria
None	The element contrast is not visible or perceived.
Weak	The element contrast can be seen but does not attract attention.
Moderate	The element contrast begins to attract attention and begins to dominate the characteristic landscape.
Strong	The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Distance Zones

Distance zones are established based upon perception thresholds. The perception of form, texture, color and other visual elements in the landscape does change as the distance from a viewpoint increases. Landscape elements tend to become less obvious and detailed. Elements of form and line become more dominant than color or texture at longer viewing distances. For this study, five distance zones were use to establish Project visibility from viewpoints. These distance zones are based partially on the visibility thresholds of wind energy projects established in research done by the NAP (NAP 2009) and the BLM established criteria for distance zones (BLM 1986). These distance thresholds or zones are generally defined by the BLM in the established VRM methodology as indicated in Table 2-26.

Analysis

Based on discussions with the SEPA Responsible Official with lead agency Garfield County, consultation with the Columbia County Planning Department, and upon review of comments received during scoping for this EIS, several types of viewpoints were selected for representative assessment and visual simulation. Those viewpoints included those of (1) residents and landowners in or immediately adjacent to the Project area; (2) viewpoints within the towns of Pomeroy, Dayton, and Starbuck; (3) temporary visitors drawn to the areas due to the history of Lewis and Clark's passage; (4) temporary visitors to the Project area generally; (5) drivers traveling general travel routes in the area; and (6) drivers on US Route 12 and SR 261, both of which are state-designated scenic highways. It should be noted that the Washington Department of Transportation regulates scenic byways. Statutes implementing the Scenic and Recreational Highway Act of 1967 are found in RCW Chapter 47.39, and are focused on regulating billboards and development directly adjacent to the highways.

Table 2-26 Distance Zone Descriptions

Distance Zone	Criteria
Proximate Foreground	The limit of a viewshed area in which details are perceived and obvious. Textural and other aesthetic qualities of vegetation are readily perceived in this zone.
Foreground	The limit of a viewshed area in which details begin to fade and lose the impression of texture. Textural and other aesthetic qualities of vegetation are less noticeable but remain evident within this zone. (1/2 to 1 mile).
Middle Ground	The zone in which details of foliage and fine textures cease to be perceptible. Vegetative patterns begin to appear as outlines or patterns (1 to 3 miles).
Background	That portion of the landscape where texture and color are weak and landforms become the most dominant element (3 to 8 miles).
Seldom Seen	Those areas of the landscape where topographic relief or vegetation screen viewpoints or when viewing distances are beyond 8 miles.

These types of viewpoints were chosen based on the viewers being representative of individuals or groups particularly focused on changes to the aesthetics of the Project area or the surrounding area. Within each type of viewpoint, the sites that were selected for simulation and assessment were those that have a high, moderate, and low visual sensitivity.

Within these six types of viewpoints, each sensitivity level viewpoint were chosen to characterize both the scenic qualities of the landscape and potential impacts of the Project were selected for application of the methodology described above in order to assess impact. Those viewpoints are:

- Three viewpoints from Tucannon Road looking at both the Tucannon and Oliphant Ridge WRAs (Appendix E, Figures 1, 2, and 3)
- Two viewpoints from U.S. Highway 12 (Appendix E, Figures 4 and 5)
- Two viewpoints from State Route 127 (Appendix E, Figures 6 and 7)
- One viewpoint from State Route 261 (Appendix E, Figure 8)

- One viewpoint from the Dutch Flat WRA that looks at both the Dutch Flat and Oliphant WRAs and existing Hopkins Ridge Project for cumulative impacts (Appendix E, Figure 16)
- One viewpoint from dispersed rural residential homes looking at the Oliphant Ridge WRA (Appendix E, Figure 9)
- Three viewpoints from Pomeroy Historic District (Appendix E, Figures 10, 17, and 18)
- Two additional viewpoints from within the Dutch Flat WRA to respond to viewer concern expressed during the scoping period (Appendix E, Figures 11 and 12)
- One from recreation area on the Snake River (Appendix E, Figure 13)
- One from Patit Campsite on Patit Road at Tucannon WRA (Appendix E, Figure 14)
- One from residential area within the town of Pomeroy (Appendix E, Figure 15)

To apply the methodology described above to generate this visual resource impact assessment, photographic visual simulations of the Project area and surrounding region were generated. A series of simulations were produced using computer modeling and rendering techniques to illustrate before and after visual conditions. The simulations illustrate the location, scale, and appearance of the proposed Project turbines as seen from 18 representative viewpoints from across the entire visual study area (see Table 2-27, Figure 2-12, and Appendix E for viewpoint locations and the simulations).

The simulations used an objective analytical and computer modeling process described briefly below. The images are accurate within the constraints of available site and Project data. A digital single lens reflex camera (Nikon D70) with a 35-millimeter lens (equivalent view angle of 52.5 degrees) was used to shoot site photographs. Site location data for each photograph were collected using GPS equipment. Accurate digital location data were later incorporated into the three-dimensional digital model.

Existing GIS topographic and site data and digital aerial photographs provided the basis for the initial digital model. This was combined with a three-dimensional computer model of the proposed WTGs to produce a complete computer model of the proposed Project. Sets of computer-generated perspective plots were then produced to represent the selected viewpoints.

For each of the simulation viewpoints, GPS viewer location data were added to the three-dimensional digital model, using 5 feet (1.5 m) as the assumed eye level. Computer “wireframe” perspective plots were overlaid on photographs to verify scale and viewpoint location. Digital visual simulation images were then produced based on computer renderings of the three-dimensional model combined with digital versions of the selected site photographs.

Table 2-27 below is a summary of Visual Sensitivity, Visual Contrast and Distance Zone for each of the selected viewpoints, and is followed by a written narrative of each viewpoint, detailing the content of each viewpoint and assessment of the impacts of the Project to those viewpoints.

Table 2-27 Viewpoint Summary

Figure Number	Location	Visual Contrast	Visual Sensitivity	Distance Zone/ Turbine distance to Viewpoint
1	From farm and residence on Tucannon Road looking southeast towards Tucannon WRA	Strong	High	Middle Ground (1.1 mi)
2	View looking north from Tucannon Road looking at the Oliphant Ridge WRA	Moderate	Moderate	Middle Ground (1.7 mi)
3	View looking southwest from Tucannon Road at the Tucannon WRA	Strong	Low	Middle Ground (1.6 mi)
4	View from US-12 looking north at Tucannon WRA	Strong	Moderate	Foreground (0.9 mi)
5	View from US-12 at Dodge Junction looking south at the Oliphant Ridge WRA	Strong	Moderate	Middle Ground (1.3 mi)
6	View from SR 127 looking northeast at the Kuhl Ridge WRA	Strong	Low	Middle Ground (1.8 mi)
7	View from SR 127 looking southwest at the Oliphant WRA	Strong	Low	Middle Ground (1.1 mi)
8	From residence on SR 261 near Starbuck looking southeast at the Tucannon WRA	Strong	High	Middle Ground (2.2 mi)
9	View from a farm with residence at the intersection of Marengo Road and U.S. 12 looking south at a Oliphant Ridge WRA	Strong	High	Foreground (0.7 mi)
10	View from Garfield County Courthouse and Pomeroy Historic District looking southwest at the Dutch Flat WRA	Moderate	High	Middle Ground (1.5 mi)
11	View from Peola Road looking northwest at Dutch Flat WRA	Strong	Low	Middle Ground (1.7 mi)

Table 2-27 Viewpoint Summary

Figure Number	Location	Visual Contrast	Visual Sensitivity	Distance Zone/ Turbine distance to Viewpoint
12	View from abandoned Grange on Peola Road looking north at Dutch Flat WRA	Strong	Low	Proximate Foreground (0.4 mi)
13	View from Central Ferry State Park looking southeast at the Kuhl Ridge WRA	Moderate	Moderate	Background (3.3 mi)
14	View from the Lewis and Clark National Historic Trail Patit Creek Campsite looking west at the Tucannon WRA	Weak	Moderate	none visible
15	View from Arlington and Sixth streets in Pomeroy looking northwest at the Kuhl Ridge WRA	Weak	High	Middle Ground (1.5 mi)
16	View from Dutch Flat Road looking west at Dutch Flat WRA and Oliphant Ridge WRA with Hopkins Ridge in the background	Strong	Low	Foreground (0.7 mi)
17	View from the intersection of Main and 10th Street looking east at Dutch Flat WRA	Moderate	High	Middle Ground (1.4 mi)
18	View from the intersection of Main and 10th Street looking west at the Kuhl Ridge WRA	Weak	High	Background (4.2 mi)
19 and 20	Panoramic view from the Garfield County Courthouse	Moderate	High	Middle Ground (1.5 miles)

Three viewpoints from Tucannon Road

Viewpoint 1 (Appendix E, Figure 1): This view is representative of the viewing conditions and distance zones seen from other dispersed rural residential viewpoints located outside of the Tucannon WRA. From similar dispersed rural residential viewpoints, visibility is similar or does not occur due to the intervening topographic rolling hills that obscure views and constrain the views to the sudden bluffs and narrow valleys formed by the topography. When there are views of the Project, they will be visible for long durations. In some areas the Project will be visible within the proximate foreground distance zone, where Project facilities will dominate the view and will be impossible to ignore. There is noticeable visual contrast seen in the existing view that includes agricultural field patterns comprised of alfalfa and fallow fields, irrigation pipe, grazed hillsides, and fence lines. This view has high visual sensitivity, strong visual contrast, and views of the Project seen in the middle ground distance zone.

Viewpoint 2 and 3 (Appendix E, Figures 2 & 3 respectively): These views are representative of the viewing conditions and distance zones seen from Tucannon Road. In many areas along the road, views of the Project do not occur due to the intervening topographic rolling hills that obscure views and constrain the views to roadside edges or narrow valleys formed by the topography. When views open up at the top of ridge tops or hills, views of the Project will be difficult to ignore but will not dominate the entire viewshed. Views of the Project will be visible for seconds until the motorist descends back into areas of the roadway where the Project would not be visible from. Figure 2 (Appendix E) displays this experience: there is visual contrast including the roadway, and grazed hillsides. This view has moderate visual sensitivity, moderate visual contrast, and views of the Project seen in the middle ground distance zone. Visual contrast in Figure 3 (Appendix E) includes the roadway, plowed agricultural fields, road cuts, fence lines, and farm outbuildings. This view has low visual sensitivity, moderate visual contrast, and views of the Project seen in the middle ground distance zone.

Views from U.S. Route 12
Viewpoint 4 and 5 (Appendix E, Figures 4 & 5 respectively) are representative of the viewing conditions and distance zones seen from U.S. Route 12. In many areas along the highway views of the Project do not occur due to the intervening topographic rolling hills that obscure views and constrain the views to roadside edges or narrow valleys formed by the topography. When views open up at the top of ridge tops or hills, views of the Project will be difficult to ignore but will not dominate the entire viewshed. Views of the Project will be visible for seconds until the motorist descends back into areas of the roadway where the Project would not be visible from. Figure 4 (Appendix E) displays this experience: visual contrast seen in the existing view that includes the roadway, plowed agricultural fields, and road cuts. This view has moderate visual sensitivity, strong visual contrast, and views of the Project seen in the foreground distance zone.

Figure 5 (Appendix E) includes views that would be seen for a somewhat longer duration due to the slower speed of the motorist. This road junction is known as Dodge Junction where SR 127 and U.S. Route 12 meet. The view already has several built agricultural and industrial structures that contrast with the rolling hill landscape. As the motorist passes this point different viewing conditions occur. Despite having the turbines located closer to the roadway, many are not visible due to the steeply rising hillsides that prevent Project visibility. This view has moderate visual sensitivity, moderate visual contrast, and views of the Project seen in the middle ground distance zone.

Views from State Route 127
Viewpoint 6 and 7 (Appendix E, Figures 6 & 7 respectively) are representative of the viewing conditions and distance zones seen from SR 127. In many areas along the highway, views of the Project do not occur due to the intervening topographic rolling hills that obscure views and constrain the views to roadside edges or narrow valleys formed by the topography. When views open up at the top of ridge

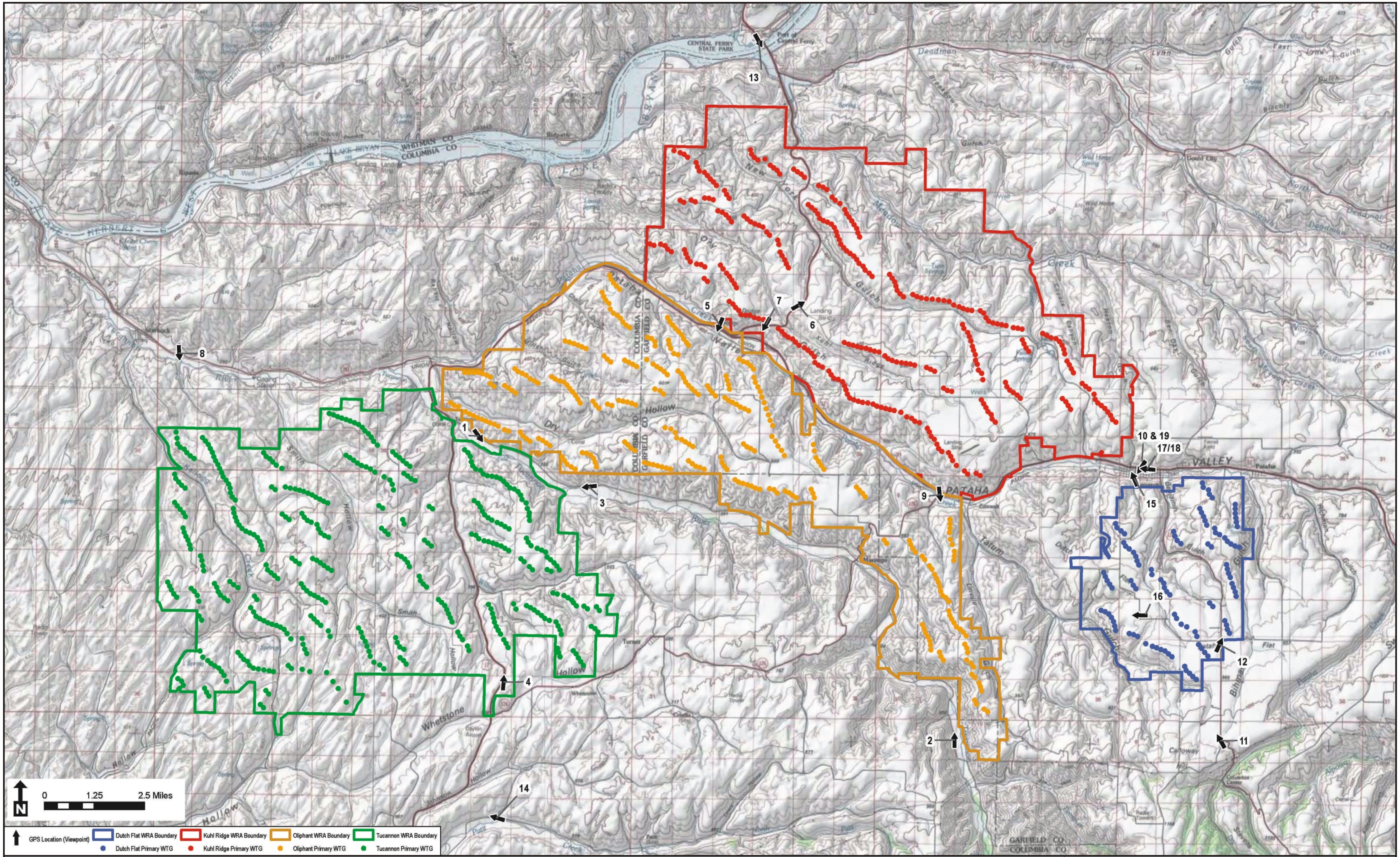


Figure 2-12
Viewpoint Locations

Lower Snake River Wind Energy Project

Columbia & Garfield Counties
Washington

tops or hills, views of the Project will be difficult to ignore but will not dominate the entire viewshed. Views of the Project will be visible for seconds until the motorist descends back into areas of the roadway where the Project would not be visible from. Figure 6 (Appendix E) displays this experience: little visual contrast seen in the existing view except for the roadway and road cuts. This view has low visual sensitivity, strong visual contrast, and views of the Project seen in the middle ground distance zone.

Figure 7 (Appendix E) includes views that would be seen for a longer duration due to the open character of this piece of roadway, just above the Dodge Junction described above. The view contains several visible turbines, and includes the roadway, guardrail, and agricultural tilling practices that visually contrast with the dominant rolling hill landscape. As the motorist passes this point, different viewing conditions occur which prevent views of the Project. This view has low visual sensitivity, strong visual contrast, and views of the Project seen in the middle ground distance zone.

Views from State Route 261
Viewpoint 8 (Appendix E, Figure 8) includes views that would be seen for a longer duration due to the open character of this piece of roadway. This is one of the few areas where open views of the Project area are directly visible to motorists on this roadway. The view contains several faintly visible turbines. The existing view includes the roadway and agricultural land use that visually contrast with the plateau landscape. As the motorist passes this point, different viewing conditions occur which prevent views of the Project. Despite having the turbines faintly visible from the roadway, dominant elements of the plateau above the Snake River remain very prevalent. This view has moderate visual sensitivity, weak visual contrast, and views of the Project within the middle ground distance zone.

Views from rural residential homes within the Oliphant Ridge WRA
Viewpoint 9 (Appendix E, Figure 9) is representative of the viewing conditions and distance zones seen from other dispersed rural residential viewpoints within the Oliphant Ridge WRA. From similar dispersed rural residential viewpoints, visibility does not occur due to the intervening topographic rolling hills that obscure views and constrain the views to the sudden bluffs and narrow valleys formed by the topography. Views of the Project will be visible for long durations from dispersed rural residential viewpoints that have Project visibility. In some areas the Project will be visible within the foreground distance zone. Project facilities will dominate the view and will be impossible to ignore. Figure 9 (Appendix E) displays this experience: noticeable visual contrast seen in the existing view that includes Marengo Road, the guardrail, the farm buildings, and the agricultural field patterns comprised of new wheat germination and fallow fields. This view has high visual sensitivity, strong visual contrast, and views of the Project seen in the foreground distance zone.

Four Viewpoints from Pomeroy Historic District

In developing siting regulations for wind energy within Garfield County, specific emphasis was placed upon views from the historic district. This district represents the center for cultural, commercial, and historic interpretation within Garfield County. Some elements present during the forming of the district have already changed in response to new markets and new technologies (e.g., street lights). The introduction of a wind energy facility visible in the middle ground distance zone from the historic district will further modify the visual context of the historic district, but will not result in a lost historical context.

Viewpoint 10, 17, 18 and 19/20 (Appendix E, Figures 10, 17, 18 & 19/20 respectively) are representative of the viewing conditions from downtown Pomeroy toward the Dutch Flat WRA. These views contain the town of Pomeroy, outlying residential and agricultural areas nearby. Views of the Project are seen from these viewpoints but do not attract attention or obscure the overall context of the town scene. Many of the turbines are difficult to interpret on the horizon from these two viewpoints. Views from viewpoint 10 have high visual sensitivity, moderate visual contrast, and views of the Project in the middle ground distance zone.

Figure 17 (Appendix E) illustrates a closer view of the Project seen from the eastern edge of the Pomeroy Historic District. The Project will be visible in the middle ground distance zone but does not dominate or attract a viewer's eye for long durations. The elements of the town are prominently left intact with the Project appearing as a noticeable feature on the horizon. No views of existing features are obscured or blocked or left unable to interpret given the introduction of the Project. Viewpoint 17 has high visual sensitivity, moderate visual contrast, and views of the Project in the middle ground distance zone.

Figure 18 (Appendix E) illustrates a distant view of the Project seen from the eastern edge of the Pomeroy Historic District looking west towards the Kuhl Ridge WRA. The Project will be visible in the back ground distance zone and is difficult to discern. The elements of the town are prominently left intact with the Project appearing as a distant feature on the western horizon. No views of existing features are obscured or blocked or left unable to interpret given the introduction of the Project. Viewpoint 18 has high visual sensitivity, weak visual contrast, and views of the Project in the background distance zone.

Figure 19/20 illustrates a middle ground view from the Garfield County Courthouse looking at the Dutch Flat WRA. The Project will be visible in the middle ground distance zone and is difficult to discern given the lighting conditions shown during the date of photography. However, this is a typical lighting condition found during May in the region. Furthermore, this figure is a rendition rather than a simulation because it overexaggerates the view by showing the panoramic perspective. All other simulations contain the field of view visible without having a need to turn one's head to see other elements of the horizon. The elements of the town are prominently left intact with the Project appearing as a visible feature on the southern horizon. No views of existing features are obscured or blocked or left unable to interpret given the introduction of the Project. Viewpoint 19/20 has high visual sensitivity, moderate visual contrast, and views of the Project in the middle ground distance zone.

Two viewpoints from within the Dutch Flat WRA
Viewpoints 11 and 12 (Appendix E, Figures 11 & 12 respectively) are representative of the viewing conditions and distance zones seen from other general roadway viewpoints within the Dutch Flat WRA. Project views will be difficult to ignore and will begin to dominate the view. There is noticeable visual contrast seen in the existing view seen in Figure 11 (Appendix E) that includes the roadway, and the extensively cultivated agricultural fields. However, the overall dominance of the existing visual pattern expressed in this view will not be lost as a result of the Project. This view has low visual sensitivity, strong visual contrast, and views of the Project seen in the middle ground distance zone.

Project views from viewpoint 12 will be difficult to ignore and will dominate the view. There is noticeable visual contrast seen in the existing view that includes the roadway, the extensively cultivated agricultural fields, and the 34.5 kV transmission line. However, the overall dominance of the existing visual pattern expressed in this view will not be lost as a result of the Project. This view has low visual sensitivity, strong visual contrast, and views of the Project seen in the proximate foreground distance zone.

One viewpoint from a recreation area on the Snake River
Viewpoint 13 (Figure 13) is representative of the viewing conditions and distance zones seen from other Snake River recreation based viewpoints with views of the Kuhl Ridge WRA. This viewpoint is also representative of areas where the Project will be visible within the background distance zone. Project views will be difficult to discern and will not dominate the view. There is noticeable visual contrast seen in the existing view that includes the Port of Garfield County grain storage, the extensively cultivated agricultural fields, and a 500kV transmission line. However, the overall dominance of the existing visual pattern expressed in this view will not be lost as a result of the Project. This view has moderate visual sensitivity, moderate visual contrast, and views of the Project seen in the background distance zone.

One viewpoint from a Lewis and Clark National Historic Trail interpretative area
This location at the Patit Campsite on Patit Road represents potential Project views from a recognized Lewis and Clark National Historic Trail interpretive area. Viewpoint 14 (Figure 14, Appendix E) is representative of the viewing conditions and distance zones seen from other Trail viewpoints with views of the Tucannon WRA. Project views will not be seen from this viewpoint due to topographic obstruction seen in the middle ground distance zone.

Viewpoint 13 (Figure 13, Appendix E) also represents views from a Lewis and Clark interpretive area.

One viewpoint from a residential area within the town of Pomeroy
Viewpoint 15 (Figure 15, Appendix E) is representative of the viewing conditions and distance zones seen from other viewpoints with views of the Kuhl Ridge WRA. Project views will be difficult to discern and will not dominate the view. There is noticeable visual contrast seen in the existing view that includes the cultivated agricultural fields, a residential area of the town of Pomeroy, the residential roadway, and an electrical distribution line. However, the overall dominance of the existing visual pattern expressed in this view will not be lost as a result of the Project. This view has high visual sensitivity, moderate visual contrast, and views of the Project seen in the middle ground distance zone.

One viewpoint from the Dutch Flat WRA that looks at both the Dutch Flat and Oliphant WRAs and existing Hopkins Ridge Project for cumulative impacts
Viewpoint 16 (Appendix E, Figure 16) is representative of the viewing conditions and distance zones seen from other viewpoints with views of the Dutch Flat WRA that also have visibility of the distant Oliphant Ridge WRA. Project views will dominate the view and will be impossible to ignore. There is noticeable visual contrast seen in the existing view that includes the cultivated agricultural fields and the distantly visible Hopkins Ridge wind farm. This view has low visual sensitivity, strong visual contrast, and views of the Project seen in the foreground distance zone.

Project Facility Impacts Summary
As described in the analysis above, the Project will likely have probable significant adverse impacts on visual resources that are unavoidable.

Project Facility Light and Glare Impacts
Light and glare may be emitted from permanent facilities. Project facilities will be equipped with nighttime and motion sensor lights for safety and security. Sensors and switches would be used to keep lights off when not required. Emergency lighting with back-up power would be included to allow personnel to perform manual operations during an outage of normal power sources.

The Project would be constructed and operated in accordance with FAA rules for turbine lighting, locations, and height. Lights typically used to meet FAA requirements would to some extent be shielded from ground level view due to a constrained (3-5 degree) vertical beam. The Project and individual turbines therein will be independently reviewed during the micrositing process by the FAA and mitigation will be determined through consultation with the FAA. Daytime lighting of the wind turbines will not be necessary if turbine towers are painted white.

Due to the rural character of the Project vicinity and the Applicant's commitment to minimize nighttime light emissions in accordance with applicable law, the Project would not create a new substantial source of light and would result in a less-than significant impact of light and glare on visual resources.

End of Design Life Impacts

The Project could either be decommissioned or the turbines repowered with a different nacelle and blade or outright wind turbine generator replacement. If the Project is repowered, impacts would be similar to those described above for construction and operations. If the Project is to be decommissioned, impacts would be similar to those described above for construction.

Mitigation

- The Applicant must comply with FAA's aircraft safety lighting requirements for structures greater than 200 feet tall, which includes turbines and meteorological towers. The FAA does not require daytime (white) lights if the turbines are painted a light color. The FAA requires periodically spaced nighttime red aviation synchronized warning lights controlled by a time clock. The lighting system will be developed in consultation with the FAA.

- To the extent allowed by FAA regulations, nonreflective paints will be used to minimize glare.

2.9.2.2 No Action Alternative

Under the No Action Alternative the Project would not be built. Impacts on visual resources related to construction, operations and maintenance, and decommissioning of wind turbines and other Project facilities would not occur.

2.9.2.3 Significant and Unavoidable Adverse Impacts

The Project will have probable significant adverse impacts on visual resources that cannot be avoided. Numerous turbines will be visible from various locations throughout the region.

2.9.2.4 Cumulative Impacts

A list of other potential wind projects used for the cumulative impact analysis is provided in Table 2-1.

It is assumed that projects listed under the "Transmission/Interconnection Requests" heading in Table 2-1 are wind energy projects. Due to the absence of project-specific details, and to provide additional details for analysis purposes, the project size and impacts were estimated as a function of the installed capacity. It is assumed that energy projects would be wind generated from 2.0-MW model turbines located in northern portions of Garfield County, with project areas proportionally similar to the Project. The construction periods of the identified projects could overlap with construction of the Project.

Cumulative impacts are assessed from viewpoints selected for the potential interaction between the Project, other existing projects and the reasonably foreseeable projects identified above. Figure 16 (Appendix E) shows a viewpoint selected for cumulative impact analysis. Residential viewers and viewers traveling along U.S. Highway 12 will experience many views of the project and the existing and reasonably forseeable wind energy projects over a long period of time.

Viewpoint 16 illustrates the existing Hopkins Ridge wind energy project which is in the seldom seen distance zone. The simulated condition illustrates existing wind energy projects as well as turbines within Dutch Flat WRA in the foreground distance zone and turbines within Oliphant Ridge WRA in the background distance zone. Cumulatively turbines will be located within multiple distance zones and on multiple ridges that could give the impression that turbines extend for greater unseen distances on distant ridgelines.

In the vicinity of viewpoint 8 a potential 500-kV transmission line to serve these additional projects would likely sited adjacent to the existing transmission line corridor. No mitigation has been identified that would reduce or avoid the probable significant adverse cumulative impacts of this Project on visual resources when combined with other existing and potential projects.