

**Interpreting the Areas of Wildlife Habitat Sensitivity Map:** A support document to use in association with the *Wildlife Directive for Alberta Wind Energy Projects* and the *Wildlife Directive for Alberta Solar Energy Projects*.

**Introduction**

The Alberta Government has developed a Climate Leadership Plan (<http://www.alberta.ca/documents/climate/climate-leadership-report-to-minister-executive-summary.pdf>) and a key piece of this plan will be reducing Alberta’s dependency on coal electricity generation and moving to renewable energy sources such as wind and solar. Even though wind and solar provide a reliable source of clean and renewable energy, the related infrastructure has direct and indirect effects on wildlife, particularly birds and bats (Baerwald and Barclay 2011; Drewitt and Langston 2008; Erickson et al., 2001, Kaegan 2015, Walston et al. 2015). A role of Government of Alberta’s Ministry of Environment and Parks, specifically Wildlife Management (GOA-Wildlife) is to ensure that development of wind and solar power projects includes appropriate considerations and mitigation of potential effects on wildlife and wildlife habitat.

Appropriate site selection is the first and most critical factor in preventing significant negative effects on wildlife (Drewitt and Langston 2008). Projects that are sited to avoid important wildlife habitats decrease wildlife mortality, disturbance and habitat loss as well as reduce the need for further mitigation measures or costs to the project proponent. The AEP *Wildlife Directive for Alberta Wind Energy Projects* and AEP *Interim Solar Guidelines* (the Directives) identify areas or zones that should be avoided or minimized to limit the negative impact of a renewable energy development on wildlife and wildlife habitat.

This document is organized by descriptions of the layers incorporated into the Areas of Wildlife Habitat Sensitivity Map (available at: <http://aep.alberta.ca/fish-wildlife/wildlife-land-use-guidelines>). For each layer, background information is provided, along with a sensitivity ranking for renewable energy operations. To facilitate this process, zones and habitat features identified within the Directives have been ranked as follows:

- **Critical Wildlife Zone:** Areas included in this category are either designated as protected areas or identified as critical importance for one or more wildlife species of conservation concern. These areas must be avoided by renewable energy projects.
- **High Risk:** Several Wildlife Sensitivity Layers are ranked as High Risk since these areas are likely used by one or more species at risk or priority management species. The Directives recommend avoiding areas ranked as high risk.
- **Moderate Risk:** These wildlife habitat areas are considered to be at a moderate risk since species at risk or priority management species can likely inhabit these areas. Due to the close

proximity to native grasslands and the potential of habitat values existing for multiple species in these areas, there will likely be risks that could require mitigation considerations and potentially added costs to siting renewable energy projects in these areas.

- **Lower Risk:** The remaining areas of wildlife habitat of the province are considered to be at lower risk since the chance of a species at risk or priority management species occurring in these areas is less likely than the other ranked areas. The lower risk areas are typically between 500-1000 meters from native grassland. However, there is still the potential of these areas possessing quality wildlife habitat. If a species at risk feature is identified, mitigation is required as per the Directives which may impact the overall project costs, siting and operations.

The following sections outline the justification and GOA policy support for the map layers used to develop the *Areas of Wildlife Habitat Sensitivity Map*.

### Methods

The renewable energy risk datasets were created using a combination of different wildlife sensitivity data, parks and protected areas, and native grassland landcover data (i.e., Grassland Vegetation Inventory, ABMI Landcover). The data were divided into four categories: 1) The Critical Wildlife Zone consists of all provincial parks and protected areas, trumpeter swan, mountain goat and sheep, greater sage-grouse, woodland caribou, and piping plover areas; 2) The “High Risk” category includes key wildlife and biodiversity zones, grizzly bear core habitat, native grassland and a 1000 meter buffer around all named lakes. 3) The “Moderate Risk” category consists of areas within 500 meters of all native grassland; and 4) the “Lower Risk” category consists of special access zones, grizzly bear support habitat, and areas 500-1000 meters from native grassland. All data were rasterized to 100 meter cells and the cell statistics tool was used to extract the highest value when multiple layers overlapped. The zonal statistics tool was then used to downscale the data by determining the majority risk value within a quarter-section, and that value was extrapolated to the entire quarter section and assigned to a risk category.

### 1.0 Greater Sage-Grouse (*Centrocercus urophasianus urophasianus*) Range:

#### Desired Outcomes:

1. Conserve and protect greater sage-grouse critical habitat and range.
  - a. Maintain integrity of remaining leks and allow for reoccupation of historical lek sites
  - b. Maintain habitat connectivity between lek sites and nesting/brood rearing habitat
  - c. Maintain key winter and nesting/brood rearing habitat
  - d. No new sensory disturbance
  - e. Maintain greater sage-grouse lek attendance

#### Digital Layers available:

- Greater Sage-Grouse Range (existing Wildlife Sensitivity Layer in LAT)

- Greater Sage-Grouse leks and buffers
- Emergency Protection Order (EPO) for greater sage-grouse

**Risk Ranking:** Critical Wildlife Zone

**Rational for Risk Ranking:**

*Critical Habitat* has been designated under the Federal *Species At Risk Act* for the greater sage grouse (Government of Canada, 2014). Wind energy developments have been specifically identified as an *Activity Likely to Result in the Destruction of Critical Habitat*. Activities required to install a solar facility have also been identified as an *Activity Likely to Result in the Destruction of Critical Habitat*, including removal of sagebrush habitat, installing a structure greater than 1.2 meters in height, and construction of new fences. The primary concerns with development are mortality, direct loss and degradation of habitats, and indirect impacts due to habitat fragmentation, increases in predation risk, and increases in visual and auditory disturbance.

Prairie grouse species are adapted to landscapes without tall vertical structures. The addition of structures to the landscape, especially tall structures over 1.2 meters in height, represents a significant change in the environment (Pearce-Higgins, 2009). This causes habitat avoidance, and thus has impacts far beyond the actual structure. If these structures provide anthropogenic subsidies to predator species for perching or nesting, they can also lead to increased predation. Sage-grouse are extremely sensitive to noise, and breeding behavior is disrupted by noise emitting infrastructure (Patricelli, 2013). Roads/traffic, power lines, and maintenance activities associated with industrial developments provide additional impacts to grouse that are also documented to cause habitat avoidance, disruption of breeding and nesting, and increased mortality (Pearce-Higgins, 2009; Patricelli, 2013; Barber, 2009). The Directives require an 8 km setback from all greater sage grouse habitat as identified in the *Greater Sage-Grouse Range* map. This digital layer includes this required setback.

**2.0 Trumpeter Swan (*Cygnus buccinator*) Waterbodies and Watercourses:**

**Desired Outcomes:**

1. Protection of the long term integrity and productivity of trumpeter swan breeding habitat.
2. Avoid industrial disturbance to trumpeter swans during nesting and rearing of cygnets.
3. Minimize the access created near swan lakes to reduce the potential for disturbance of trumpeter swans from recreational and industrial use.
4. Avoid habitat alteration in proximity to swan breeding habitat areas.

**Digital Layers available:**

- Trumpeter Swan Waterbodies (existing Wildlife Sensitivity Layer in LAT) (2015/16 data not yet added to layer)

**Risk Ranking:** Critical Wildlife Zone

**Rational for Risk Ranking:**

Trumpeter swan is listed as *Species of Special Concern* under the *Alberta Wildlife Act* and as such is afforded protection against hunting and the destruction of their nests (Alberta Environment and

Sustainable Resource Development, 2013). Trumpeter swans are sensitive to human disturbance and human activity in breeding areas may decrease survival of eggs or cygnets<sup>1</sup>. Trumpeter swans that are disturbed repeatedly may not nest or may abandon the existing nest. Above ground structures such as powerlines and wind turbines are also a direct threat to the species due to the mortality risk. Initial studies have shown that waterfowl have increased mortality rates at solar facilities (Kagan, 2015). The Directives require avoidance by up to 800 m of all waterbodies and watercourses designated for trumpeter swans. This digital layer includes this required setback.

### 3.0 Caribou Zones

#### Desired Outcomes:

1. Reduce all sources of human-caused direct mortality associated with anthropogenic activities (e.g., hunting, poaching, and vehicle collision).
2. Reduce excessive predator-caused mortality for both calves and adults (i.e., related to predator abundance, distribution, ease of travel, and hunting success).
3. Reduce habitat loss as a result of habitat change or conversion.
  - a. Avoid habitat changes which negatively affect caribou population growth.
  - b. Avoid development within key habitats (local and landscape scales) and key seasons.
  - c. Increase harmonization with forest industry operating ground rules and long-term spatial forest harvesting plans.
4. Reduce the partial avoidance (i.e., reduced use) that caribou demonstrate in relation to industrial features.
5. Reduce potential increases in the distribution and productivity of other prey species.

#### Digital Layers available:

Caribou Range (existing Wildlife Sensitivity Layer in LAT)

**Risk Ranking:** Critical Wildlife Zone

#### Rationale for Risk Ranking:

The Recovery Strategy for Woodland Caribou (Environment Canada 2012) identifies any new footprint created within caribou ranges to be counter to caribou recovery objectives and in Alberta would reduce the amount of critical habitat available. Caribou recovery planning initiatives in Alberta are aimed on working collaboratively with all industries to ensure reduction of overall footprint.

The intention of the caribou zone is to identify caribou herd ranges across the province for the application of appropriate land management decisions for the recovery of caribou populations within these zones. Caribou ranges that occur within Alberta include the Richardson, the East Side Athabasca, the West Side Athabasca, the Cold Lake Air Weapons Range, the Red Earth, the Slave

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<sup>1</sup> Cygnets: term referring to swan young of the year.

Lake, the Nipisi, The Bitscho /Caribou Mountains/Yates, the Chinchaga, the Narraway, the Red Rock /Prairie Creek, the Little Smoky, the A La Peche, South Jasper and North Banff herds (Note: West Central range is composed of Narraway, Little Smoky, A La Peche and Red Rock/Prairie Creek herds). The Directives require that renewable energy activities avoid areas designated as Caribou Range. All caribou ranges are endorsed by the Alberta Caribou Committee (ACC) and the range shapefiles are available online

#### 4.0 Sheep (*Ovis spp.*) and Mountain Goat (*Oreamnos americanus*) Zones

##### Desired Outcomes:

1. Avoid land use disturbances that may have a direct or indirect adverse effect on the behaviour of the sheep/goats.
2. Conduct industrial activities at times when sheep/goats are least sensitive to disturbance (e.g., outside of lambing and kidding period).
3. Ensure that the majority of a given sheep/goat zone is available for sheep/goats use at any point in time.
4. Provide periods of no industrial activity to allow full use of the entire zone following each industrial activity period and during sensitive periods in the life cycle of sheep and goats.
5. Avoid alteration of physical habitat conditions, including conducting activities such that ideally no long-term residue of industrial activity persists.
6. Protect sheep and goat energy reserves, body condition and reproductive potential.

##### Digital Layers available:

Mountain Goat and Sheep Areas (existing Wildlife Sensitivity Layer in LAT)

**Risk Ranking:** Critical Wildlife Zone

##### Rationale for Risk Ranking:

Mountain goat and bighorn sheep are alpine ungulates that react to predator/human disturbance by running to escape terrain typically consisting of cliffs and very steep slopes. The majority of goat and sheep ranges in Alberta are contained in Prime Protection Zones (Zone 1) where industrial activity is not permitted (A Policy for Resource Management of the Eastern Slopes 1977, revised 1984). However, there are a number of ranges that fall within the 'Critical Wildlife Zone' (Zone 2) designation (initially under the Eastern Slopes Policy and subsequently under various Regional and Sub-Regional Integrated Resource Plans). In these areas, the intent "is to protect ranges of terrestrial and aquatic habitats that are crucial to the maintenance of specific fish and wildlife populations".

The mountain goat and sheep areas consist of high alpine areas and associated valleys used by mountain goats and bighorn sheep. Mountain goats in particular have shown negative responses to industrial activities, particularly aerial activity such as helicopters and turbines (Cole 1996, MacArthur *et al* 1982; Stemp 1983) potentially resulting in abandonment of ranges or loss of

populations due to reproductive stress over time. Renewable energy operations are not compatible with ensuring populations of these important alpine species remain. Additionally, alpine habitat within mountain goat and sheep areas is more difficult to reclaim. The Directives require renewable development to avoid activities in the mountain goat and sheep zones.

**5.0 Piping Plover (*Charadrius melodus*) Waterbodies:**

**Desired Outcomes:**

1. Maintain piping plover waterbodies including identified habitat areas.
2. Decrease mortalities, nest abandonment, and nest depredation, off road vehicles and cattle.

**Digital Layers available:**

Piping Plover Waterbodies (existing Wildlife Sensitivity Layer in LAT)

**Risk Ranking:** Critical Wildlife Zone

**Rational for Risk Ranking:**

The piping plover is designated as *Endangered* in Alberta. Shoreline protection is identified as a key habitat management objective to ensure the long term persistence of this species in Alberta. Implementation of setbacks from the shoreline of identified water bodies will ensure renewable energy operations do not impact shorelines for breeding and foraging, or contribute to degradation of habitat required to recover this endangered species. The Directives requires avoidance of all lakes designated as Critical Habitat for piping plovers as identified by Environment Canada (Government of Canada 2007).

**6.0 Native Grassland and Parkland Natural Region**

**Desired Outcomes**

1. Reduce human caused wildlife mortality.
2. Recover and conserve habitat for species at risk.
3. Recover and conserve populations of species at risk.
4. Reduce increased predation associated with anthropogenic features.
5. Conserve and protect critical habitat.
6. Maintain the ecological conditions necessary for naturally sustainable wildlife populations to exist throughout Alberta, and conserve the habitat that they require.
  - a. Maintain unique and/or important wildlife habitat sites.
  - b. Avoid or minimize development within key habitats (local and landscape scales) and key seasons.
  - c. Maintain habitat intactness, connectivity, and allow for wildlife use, breeding and passage

- throughout areas by minimizing habitat loss and fragmentation.
7. Minimize potential adverse effects of land use activities on wildlife population health.
  8. Reduce the potential for species avoidance of anthropogenic features.
  9. Decrease potential for sensory disturbance and displacement of wildlife.

### Digital Layers

- Grassland Vegetation Inventory (GVI)
- Alberta Biodiversity Monitoring Inventory Native Landcover 2010 Grassland Habitat
  - o Note this layer will only be used in areas within the Grassland Natural Region for which GVI is not available. Once GVI or relative substitute (Parkland Vegetation Inventory, PVI) is fully available this layer will no longer be necessary.

**Risk Ranking:** To assist in industrial project preplanning, all areas of remaining native grassland in Alberta have been mapped. Quarter sections identified as native grassland within the Alberta GVI have been ranked as High, Moderate and Lower risk.

- **High:** Areas of native grasslands are ranked as High risk as they are likely habitat for one or more species at risk.
- **Moderate:** Areas within 500 meters of native grassland have been ranked as Moderate Risk.
- **Lower:** Areas between 500 - 1000 meters from native grassland are ranked as Lower Risk.

### Rational for Risk Ranking:

The Grassland and Parkland Natural Region has undergone significant habitat changes since European settlement in the late 1800's. This has resulted in only 30% of the region remaining under native grassland cover (The Alberta Prairie Conservation Forum, 2016). The significant habitat alterations have had a direct impact on the wildlife populations in the region; consequently, the region is home to 75% of Alberta's species at risk. Species at risk found in the Grassland and Parkland Natural Region include, but are not limited to: ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), sharp-tailed grouse (*Tympanuchus phasianellus*), eastern short-horned lizard (*Phrynosoma herandesi*), prairie rattlesnake (*Crotalus viridis viridis*), northern leopard frog (*Lithobates pipens*), Great Plains toad (*Anaxyrus cognatus*), plains spadefoot toad (*Spea bombifrons*), mountain plover (*Charadrius montanus*), Sprague's pipit (*Anthus spragueii*), chestnut-collared longspur (*Calcarius ornatus*), Ord's kangaroo rat (*Dipodomys ordii*) and swift fox (*Vulpes velox*).

Industrial scale developments in these sensitive areas may result in negative impacts to these wildlife species and their associated habitat features. This includes, but is not limited to, direct mortality of species at risk, reduced productivity, and habitat loss/fragmentation, disturbance to the population or individuals and habitat avoidance/abandonment. The Directives identifies that

avoidance of native grassland and parkland habitat as the first strategy to mitigating the potential negative impacts of development on species at risk.

As per the Directives, all areas ranked as *High* risk should be avoided for renewable developments. Areas identified as *Moderate* may require increased pre-assessment work, mitigation and project constraints due to the risk to specific species at risk in the area. The primary strategy identified in the Directives is to avoid development in these areas. Where avoidance is not possible specific mitigation strategies must be adhered to.

## 7.0 Grizzly Bear (*Ursus arctos horribilis*) Zone

### Desired Outcomes:

1. Reduce all sources of human-caused mortality.
2. Reduce human-bear conflicts.
3. Avoid development within key habitats (local and landscape scales) and key seasons.
  - a. Maintain high value and low mortality risk habitat areas.
  - b. Avoid development of grizzly bear attractants (all sources).

### Digital Layers available:

- Grizzly Bear Zone (existing Wildlife Sensitivity Layer in LAT)

**Risk Ranking:** Grizzly Bear Core Zones: High risk

Grizzly Bear Support Zones: Moderate

### Rational for Risk Ranking:

The grizzly bear is listed as a *Threatened* species under the Alberta *Wildlife Act*. The Alberta recovery plan has identified *Habitat Needed to Support Recovery* for the species (Government of Alberta, 2016). Human caused mortality (both direct and indirect) resulting from human access on roads is identified as the number one threat to grizzly bear populations in Alberta. Recommendations coming out of the *Grizzly Bear Recovery Plan for Alberta* suggest prioritising use of existing roads and minimizing increasing road footprint within the grizzly bear zone. This includes necessary breeding, overwintering, foraging habitat as well as movement corridors. These areas have been identified as areas of Moderate and High risk for future developments. The primary strategy identified in the Directives is to avoid development in these areas. Where avoidance is not possible specific mitigation strategies must be adhered to.

## 8.0 Key Wildlife and Biodiversity Zones

**Desired Outcomes:**

1. Protect the integrity of ungulate winter ranges, river corridors and biodiversity areas where species tend to concentrate.
2. Protect locally and regionally-significant wildlife movement corridors, including bird and bat migration corridors.
3. Protect areas with rich habitat diversity and regionally-significant habitat types and habitat diversity.
4. Protect hiding and thermal cover.
5. Protect the complex biological structure and processes of identified riparian areas.
6. Reduce excessive mortality of wildlife from all sources.
7. Protect ungulate energy reserves, body condition and reproductive potential.

**Digital Layers available:**

Key Wildlife and Biodiversity Areas (existing Wildlife Sensitivity Layer in LAT)

**Risk Ranking:** High Risk

**Rational for Ranking:**

The Key Wildlife and Biodiversity Zone is a combination of key wildlife habitat from both uplands and major watercourse valleys. The basis of this zone was determined using major river corridors, valley topography, valley slope breaks, bird and bat migration corridors<sup>2</sup> and ungulate winter densities. The Key Wildlife and Biodiversity Zone is intended to prevent loss and fragmentation of habitat; maintain migration corridors, prevent short and long-term all-weather public vehicle access; prevent sensory disturbance during periods of thermal or nutritional stress on wildlife; and prevent the development of barriers to wildlife corridors (e.g. stream crossings). No new roads and no new development within the valley breaks for renewable activities are consistent with the management intent of the area.

**9.0 Special Access Zones**

**Desired Outcomes:**

1. Maintain natural habitat viability of wildlife refuges (i.e., source habitats).
2. Maintain intent and structure of existing Buck for Wildlife project areas.
3. Reduce excessive mortality of wildlife from all sources.

**Digital Layers available:**

- Special Access Area (existing Wildlife Sensitivity Layer in LAT)

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<sup>2</sup> Migration corridors for birds and bats exist in other areas of the province but are not mapped at this time. This is an initial attempt to identify key bird and bat migration corridors to enable preplanning by the renewable industry. However work will continue to provide more comprehensive mapping product in future.

**Risk Ranking:** Moderate Risk

**Rationale for Risk Ranking:**

Special Access Zones (SAZ) are areas of natural habitat within an intensively developed landscape. Maintaining contiguous habitat parcels is important all wildlife species that tend to cluster in these regions.

The intent of Special Access Zones is to maintain the habitat viability of an area by reducing access related impacts. This zone is based upon a combination of data including ungulate surveys, road densities, PFRA soil maps, ortho-rectified imagery and topographical data. This zone is primarily located in the boreal region of the province, where the lower topographical relief causes the few hills in the region to become important wildlife refugia areas. Specific timing requirements are identified for working with this zone and must be adhered to.

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