Site Characterization Study
Banner County, Nebraska
Wind Energy Area of Interest

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EXECUTIVE SUMMARY

The proposed Banner County, Nebraska, Wind Energy Area of Interest (AOI) is located in Banner County in western Nebraska. The purpose of this report is to characterize the proposed project area, to evaluate the project area based on sensitive species and habitats, and to address implications for project development. The AOI was evaluated during a site visit conducted from public roads on August 7, 2014, during which biological features and overall potential wildlife habitat, plant communities, topography features, and potential raptor nesting habitat were identified.

The AOI is located in the Western High Plains Level III Ecoregion, a smooth to slightly irregular plain characterized by a semi-arid to arid climate, with dryland agriculture constituting the primary land use. The majority of the AOI consists of herbaceous landcover (63.4%) and cultivated crops (31.4%). Forests, hay/pasture, wetlands and open water, shrub/scrub, and developed areas represent a small percentage of the total study area.

Sensitive habitats within the AOI include shortgrass and mixedgrass prairie, ponderosa pine woodlands, and the Wildcat Hills South Biologically Unique Landscape (BUL). Several sensitive wildlife species associated with these have the potential to occur in the AOI. The US Fish and Wildlife Service (USFWS) Information, Planning, and Conservation (IPaC) system lists five federally-protected animal species that may occur in Banner County, including one endangered mammal (black-footed ferret), one endangered fish (pallid sturgeon) and three avian species (two endangered [whooping crane and interior least-tern], and one threatened [piping plover]). However, according to the USFWS Environmental Conservation Online System (ECOS), only the black-footed ferret has the potential to occur in Banner County, Nebraska. The last specimen of black-footed ferret in Nebraska was collected in 1949, and no known extant populations exist in Nebraska. Bald and golden eagles, protected under the federal Bald and Golden Eagle Protection Act (BGEPA), are also considered in this document. The Nebraska Game and Parks Commission (NGPC) lists state threatened and endangered species, two of which have the potential to occur in the AOI, and the Nebraska Natural Legacy Program (NNLP) maintains a list of Tier 1 species, several of which have some potential to occur in the AOI.

The USFWS does not list any federally endangered, threatened or candidate plant species that have the potential to occur in the AOI. The Nebraska Natural Heritage Program (NNHP) and NGPC list sensitive plant species by county, none of which have the potential to occur in the AOI.

Fourteen species of raptors, eight species of owls, and one species of vulture might be found within or near the AOIA throughout the year, including one resident special status species (golden eagle), two USFWS birds of conservation concern (prairie falcon and burrowing owl), and two NNLP Tier 1 species (burrowing owl and ferruginous hawk). Three raptor species were observed during the site visit, none of which were species of concern. Potential nest structures for above ground nesting species were also present in the form of living and dead trees and cliff faces;

grassland areas could also provide nesting habitats for ground-nesting raptors, such as the northern harrier.

No colonial rodents (such as prairie dogs), which are known to attract feeding raptors, were observed during the site visit. However, due to the limited access on public roads, it is unknown if these prey species are available on the AOI. Additionally, raptor use is generally not expected to be influenced by the topography in the AOI due to the east-west orientation of the ridge lines and lack of large, perennial waterbodies. It is likely that birds migrate through the proposed AOI, including passerines, raptors, and waterfowl; however, the AOI does not contain features that would be expected to concentrate avian migrants.

Ten bat species are likely to occur in the AOI. None of the species listed by the USFWS occur on the AOI; however, two NNLP Tier 1 species have the potential to occur (fringed bat and little brown bat). Eight of the bats with the potential to occur in the AOI are year-round residents in the region; however, these species all hibernate in the winter. Two additional bat species are likely to be present in spring, summer, and fall, and potentially breed in the area. Potential roosting habitat within the AOI is found in the form of trees, buildings, rocky cliffs, and rock outcrops. Although the operation of the proposed wind energy facility will likely result in the mortality of some bats, the magnitude of these fatalities and the degree to which bat species will be affected is difficult to predict.

Two state-listed species and 18 state Tier 1 species have some potential to occur in the project area. In addition, both bald and golden eagle have some potential to occur in the AOI. Of these species, golden eagle, Brewer's sparrow, loggerhead shrike, pinyon jay, swift fox, Rocky Mountain bighorn sheep, fringed bat, little brown bat, and sagebrush lizard are most likely to occur within the AOI. Areas that occur within and in the vicinity of the AOI that should be avoided include the Wildcat Hills South BUL. Habitats such as the high quality matrix of grasslands and ponderosa pine woodlands found in the northwest portions of the AOI should be avoided or minimized to minimize impacts. Some areas of the AOI are characterized by extensive agricultural production, offering already disturbed habitats with potential for project development, and with proper project siting, potential impacts to wildlife could be greatly reduced.

To characterize the species composition and abundance of the site's avifauna prior to project development, standardized year-round fixed-point bird use surveys should be conducted to detect common and rare species that occur in the site, and to determine which species of concern may be adversely affected by the project by collecting vertical as well as horizontal flight data to identify levels and patterns of activity within the turbine's rotor-swept zones. Breeding bird surveys should occur in habitats where species listed by the NPGC and NNLP Tier 1 species have the potential to nest. Aerial raptor nest and sharp-tailed grouse lek surveys should be conducted within the project and a surrounding buffer as recommended by NGPC. Due to the potential occurrence of swift fox (state endangered) and mountain plovers (state threatened), consultation with the NGPC should begin early in project development to determine whether species-specific surveys are warranted. Prairie dog town surveys are also recommended because several species of

concern with the potential to occur on the AOI are dependent on the presence of prairie dog towns.

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INTRODUCTION

Wind power is the world's most rapidly growing source of energy, and the challenges facing this industry are complex, due in part to concerns related to the impact of wind farms on wildlife species (Government Accountability Office [GAO] 2005). Knowledge of biological resource issues, early in the development phase of wind energy facilities helps the industry identify, avoid, and minimize future problems.

The objectives of this report are: a) to characterize the proposed Banner County, Nebraska Wind Energy Area of Interest (AOI) at the landscape and local levels, describing the biological resources present within and around the proposed area; b) to evaluate the project area based on sensitive species, assessing site-specific characteristics in terms of potential risks to wildlife and habitats, and comparing these characteristics with those at other wind facilities; and c) to address implications for project development, making recommendations for baseline monitoring studies. This Site Characterization Study (SCS) is intended to meet the requirements of a Tier 2 Site Characterization as described in Chapter 3 of the US Fish and Wildlife Service (USFWS) Land-Based Wind Energy Guidelines (WEG; USFWS 2012b).

The area evaluated for potential biological resources includes the AOI and the area within a two-mile buffer of the AOI (Evaluation Area). This report focuses on the following issues, as described in the WEG:

- Presence of areas where development is precluded or should be avoided
    - Areas precluded by law
    - Areas where critical, sensitive, or highly valuable habitat exists
    - Areas of congregation of species
- Presence of plant and animal species of concern and/or their habitat
- Presence of species of habitat fragmentation concern
- Presence of species known to be at risk by wind energy facilities

METHODS

Biological resources within the AOI were evaluated through a desktop search of existing data and a site visit conducted from public roads. Available datasets used to identify biological resources within the project area included topographical and aerial maps, land use/land cover or gap data, elevation data, data publicly available from several state, federal, and non-governmental agencies, published literature, and field guides. Request letters were sent to state and federal agencies; response letters from these agencies can be found in Appendix A.

Site-specific biological features and potential wildlife habitat, including plant communities, topographic features, suitable nesting and roosting habitat, and potential prey populations, were assessed during the reconnaissance-level site visit (August 7, 2014). All wildlife species observed during the site visit were recorded and photographs were taken of the AOI (Appendix B). Observations were made from public roads only, and accessibility to the AOI largely determined how much of the project area was surveyed.

Information about presence (potential or verified) and location of sensitive species was obtained from publicly available information on several websites, including the Nebraska Game and Parks Commission (NGPC 2013, 2014b), the Nebraska Natural Legacy Project (NNLP; Schneider et al. 2005, NNLP 2014b), the Nebraska Bird Library (2014), the United States Fish and Wildlife Service (USFWS 2014b, 2014a), and US Geological Survey Breeding Bird Survey (USGS 2013). Information about each species' conservation status was gathered from NGPC, NNLP, and USFWS websites. Survey recommendations were developed based on information collected in the resources described above, and recommendations in the WEG and The Nebraska Wind and Wildlife Working Group (NWWWG) Guidelines for Wind Energy and Wildlife Resource Management in Nebraska (NWWWG 2013).

SITE CHARACTERISTICS AND LANDCOVER

The AOI is located on private land in central Banner County in the panhandle of western Nebraska (Figure 1). The AOI is located in the Western High Plains Level III Ecoregion, a smooth to slightly irregular plain characterized by a semi-arid to arid climate, with dryland agriculture constituting the primary land use (US Environmental Protection Agency [USEPA] 2014). Topography is generally flat to rolling hills in the southwest portion of the AOI, with topographic variability increasing to the northern and eastern parts of the study area. Elevations in the AOI range from 1,304 to 1,630 meters (m; 4,278 to 5,348 feet [ft]) above mean sea level (Figure 2). The two primary Level IV Ecoregions that compose the AOI are the Flat to Rolling Plains Ecoregion in the southwest portion of the study area and the Pine Bluffs and Hills Ecoregion in the north and east; very little of the northern-central edge of the AOI is in the Platte Valley and Terraces Ecoregion (Figure 3). The Flat to Rolling Plains Ecoregion is primarily composed of dryland farming with areas of irrigated cropland agriculture, while the Pine Bluffs and Hills Ecoregion is characterized by bluffs, escarpments, and areas of exposed bedrock (Chapman et al. 2001). The rangeland and woodland vegetation of the Pine Bluffs and Hills Ecoregion contrast the dryland and irrigated cropland agriculture of the Flat to Rolling Plains Ecoregion (Chapman et al. 2001).

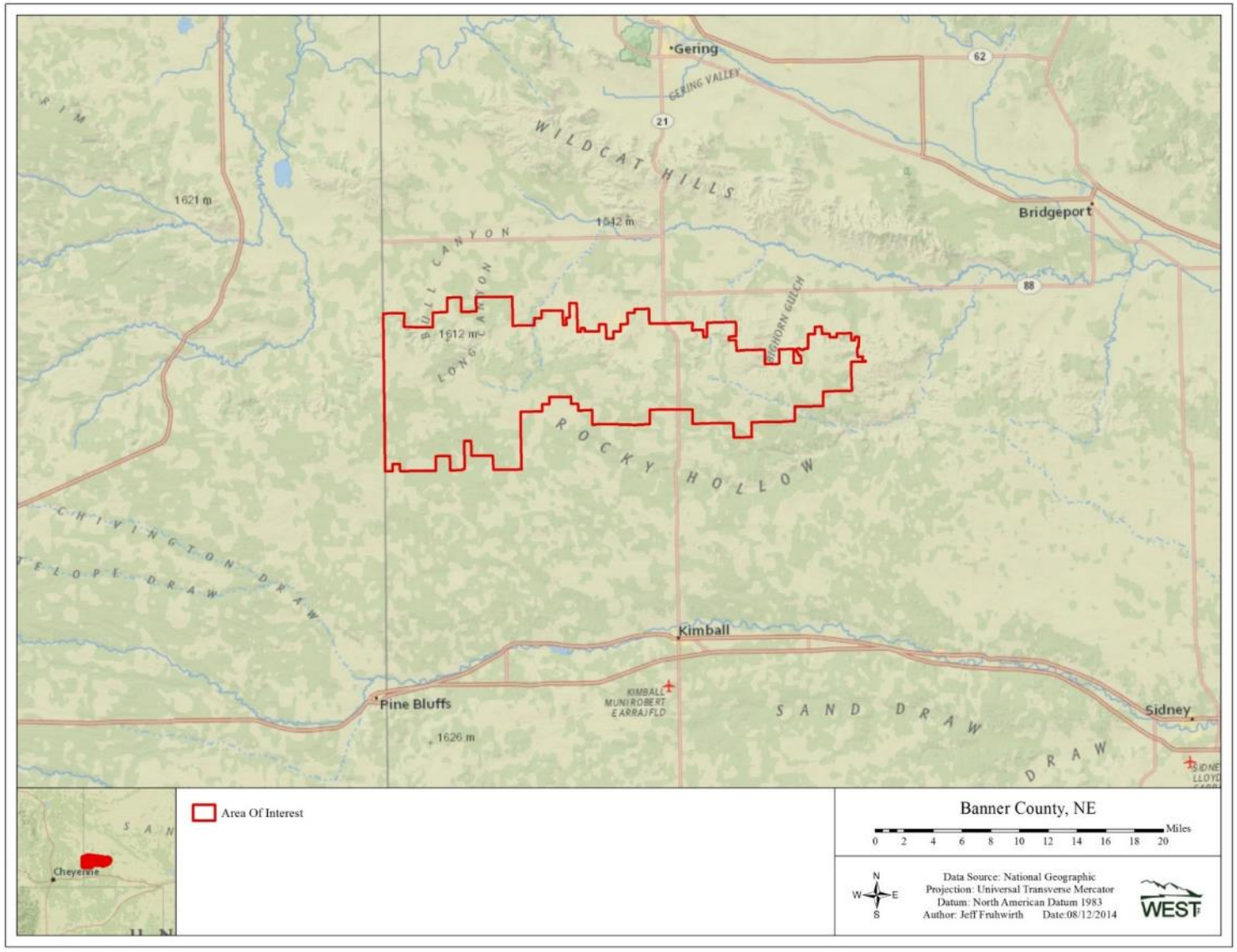


Figure 1. Location of the Banner County, Nebraska, Wind Energy Area of Interest.

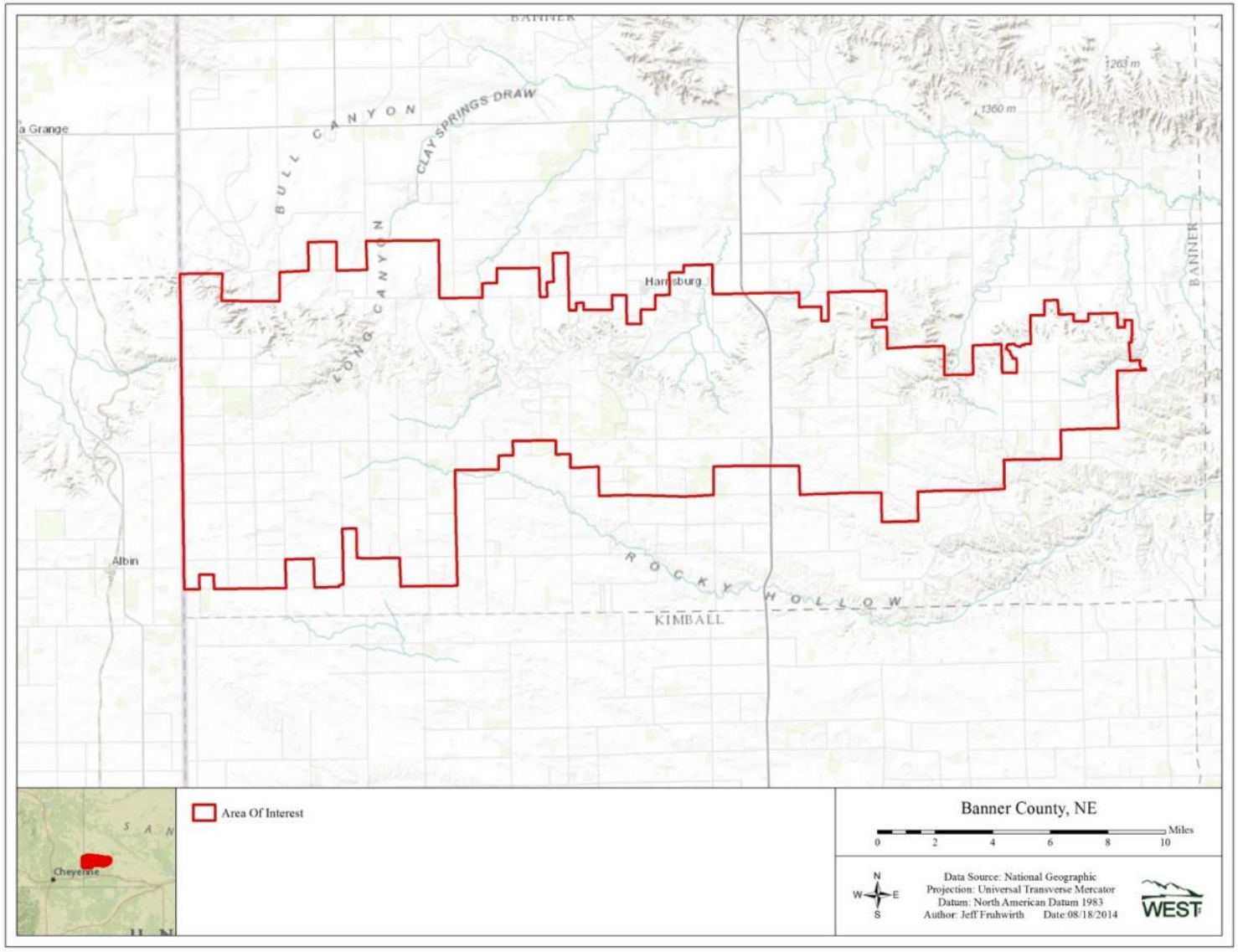


Figure 2. Topography of the Banner County, Nebraska, Wind Energy Area of Interest.

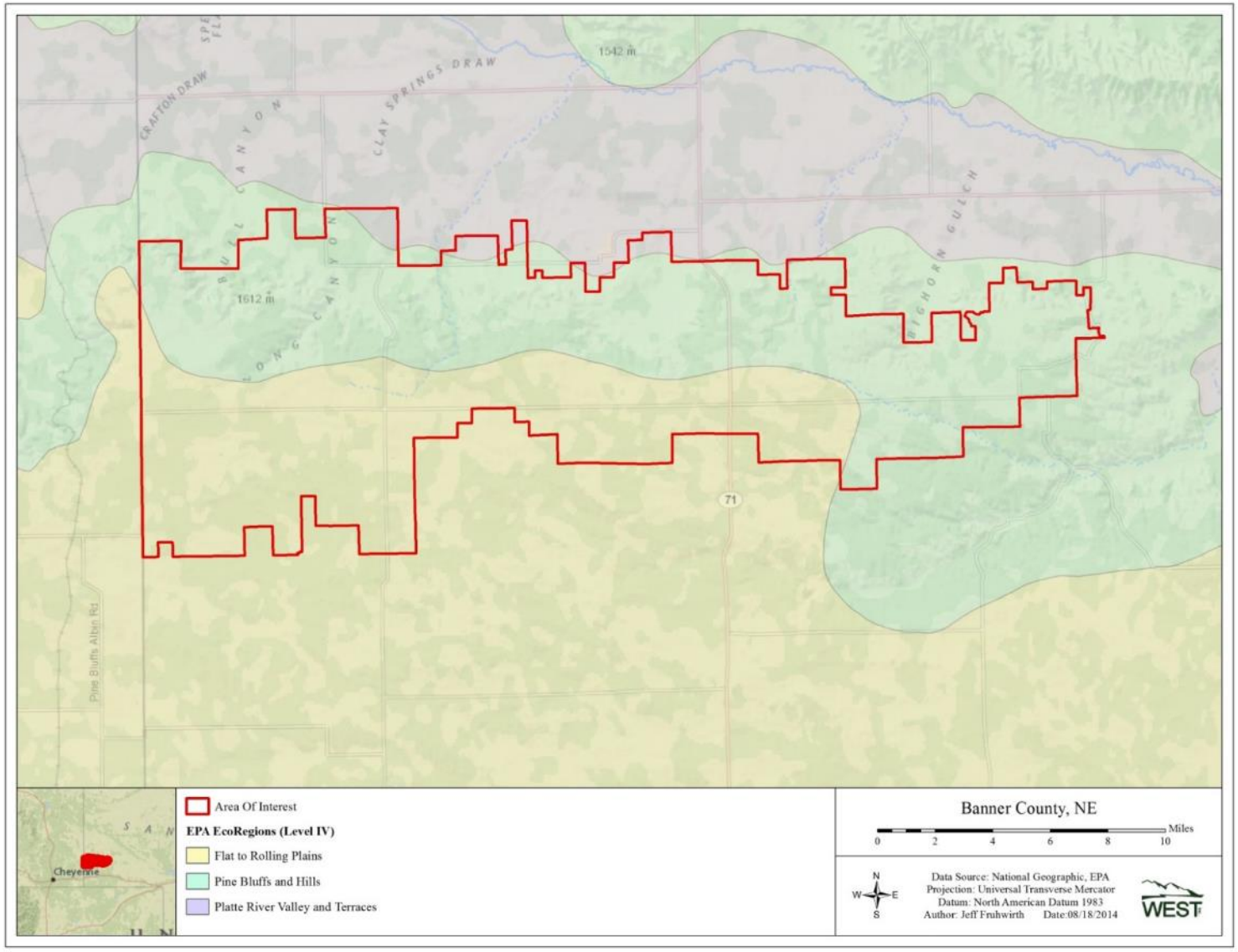


Figure 3. Ecoregions found within the Banner County, Nebraska, Wind Energy Area of Interest.

Land Use and Land Cover

According to the US Geological Service National Land Cover Dataset (NLCD), the majority of the AOI consists of herbaceous landcover (63.4%) and cultivated crops (31.4%; USGS NLCD 2011; Table 1, Figure 4). A small percent of the project is developed open space (2.1%), hay/pasture (1.5%), and evergreen forests (1.2%). The remaining landcover types each account for 0.2% of landcover or less. The distribution of landcover in the Evaluation Area is nearly the same as in the AOI (Table 1, Figure 4).

Landcover in the southwestern and southern portion of the AOI is dominated with dryland and some irrigated agriculture. Tree cover in this portion of the study area is generally restricted to deciduous, conifer, or mixed tree rows or small stands associated with occupied or abandoned homesteads. Tree species observed during the site visit included locust (*Gleditsia* or *Robinia* spp.), ash (*Fraxinus* spp.), cottonwood (*Populus* spp.), elm (*Ulmus* spp.), boxelder (*Acer negundo*), red cedar (*Juniperus* spp.), willow (*Salix* spp.), and ponderosa pine (*Pinus ponderosa*). In the northwest portion of the project, the landscape surrounding Bull Canyon and Long Canyon is marked by rugged hills with bluffs, escarpments, and exposed bedrock. Forested habitat is typically composed of conifer species (pines and junipers [*Pinus* and *Juniperus* spp.]). Open forests are prevalent in the lower elevations, and more dense stands of forest are located at higher elevations. The understory vegetation is primarily tall or mixed grassland, with some shrubby understory. Yucca (*Yucca glauca*) is typical species present in the open forests of the lower elevations. In the eastern portion of the AOI, some herbaceous cover is present in the open ponderosa pine forests, and this land is primarily used for cattle grazing.

Table 1. Land use/land cover types present within the Banner County, Nebraska Wind Energy Area of Interest and Evaluation Area (USGS NLCD 2011).

	Area of Interest		Evaluation Area	
Land Cover/Use	**Acres**	**%**	**Acres**	**%**
Herbaceous	95,887.04	63.4	229,280.50	64.1
Cultivated Crops	47,429.29	31.4	111,874.10	31.3
Developed, Open Space	3,228.85	2.1	7,722.39	2.2
Hay/Pasture	2,203.19	1.5	3,090.42	0.9
Evergreen Forest	1,877.84	1.2	4,072.17	1.1
Woody Wetlands	295.81	0.2	420.65	0.1
Developed, Low Intensity	118.71	0.1	289.58	0.1
Barren Land	68.07	0.1	257.85	0.1
Deciduous Forest	40.98	<0.1	80.44	<0.1
Shrub/Scrub	36.68	<0.1	127.65	<0.1
Open Water	26.48	<0.1	66.24	<0.1
Developed, Medium Intensity	13.38	<0.1	40.71	<0.1
Emergent Herbaceous Wetlands	2.59	<0.1	116.99	<0.1
Mixed Forest	1.49	<0.1	2.45	<0.1
Developed, High Intensity	0	0	4.39	<0.1
Total	**151,230.39**	**100**	**357,446.53**	**100**

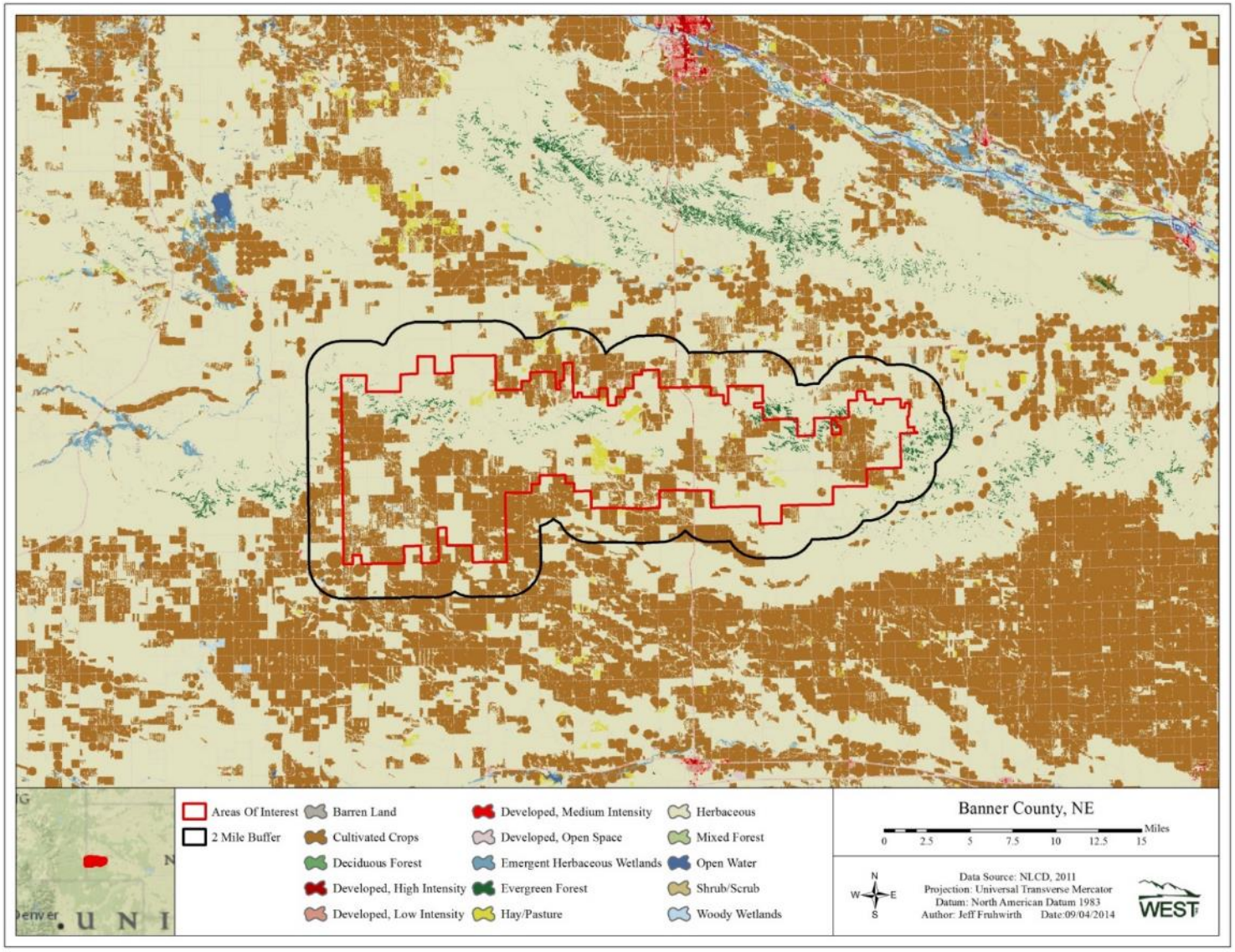


Figure 4. Land cover/land use types in the Banner County, Nebraska, Wind Energy Area of Interest.

National Wetland Inventory

During the site visit, several dry creek beds were observed, as well as a small stock pond. According to the National Wetland Inventory (NWI), the AOI contains 272 acres of wetland (0.2% of total landcover; Table 2, Figure 5). Approximately 236 acres of freshwater emergent wetlands, 15.5 acres of freshwater ponds, and 20.5 acres of other wetland types are found in the AOI. The Evaluation Area contains approximately 544 acres of wetland, which is about 0.2% of total landcover. Four hundred acres of freshwater emergent wetlands are found in the Evaluation Area. The Evaluation area also contains 75 acres of riverine habitat, 38 acres of other wetland types, and 30 acres of freshwater pond (Table 2, Figure 5).

Table 2. Wetland types present within the Banner County, Nebraska Wind Energy Area of Interest and Evaluation Area (USFWS NWI 1984[a]).

	Area of Interest		Evaluation Area	
Wetland Type	**Acres**	**%**	**Acres**	**%**
Freshwater Emergent Wetland	235.93	86.7	400.19	73.6
Other	20.55	7.6	38.21	7.0
Freshwater Pond	15.52	5.7	30.40	5.6
Riverine	0	0	75.24	13.8
Total	**272.00**	**100**	**544.03**	**100**

[a] AOI has not been resurveyed since the 1984 National Wetland Inventory surveys.

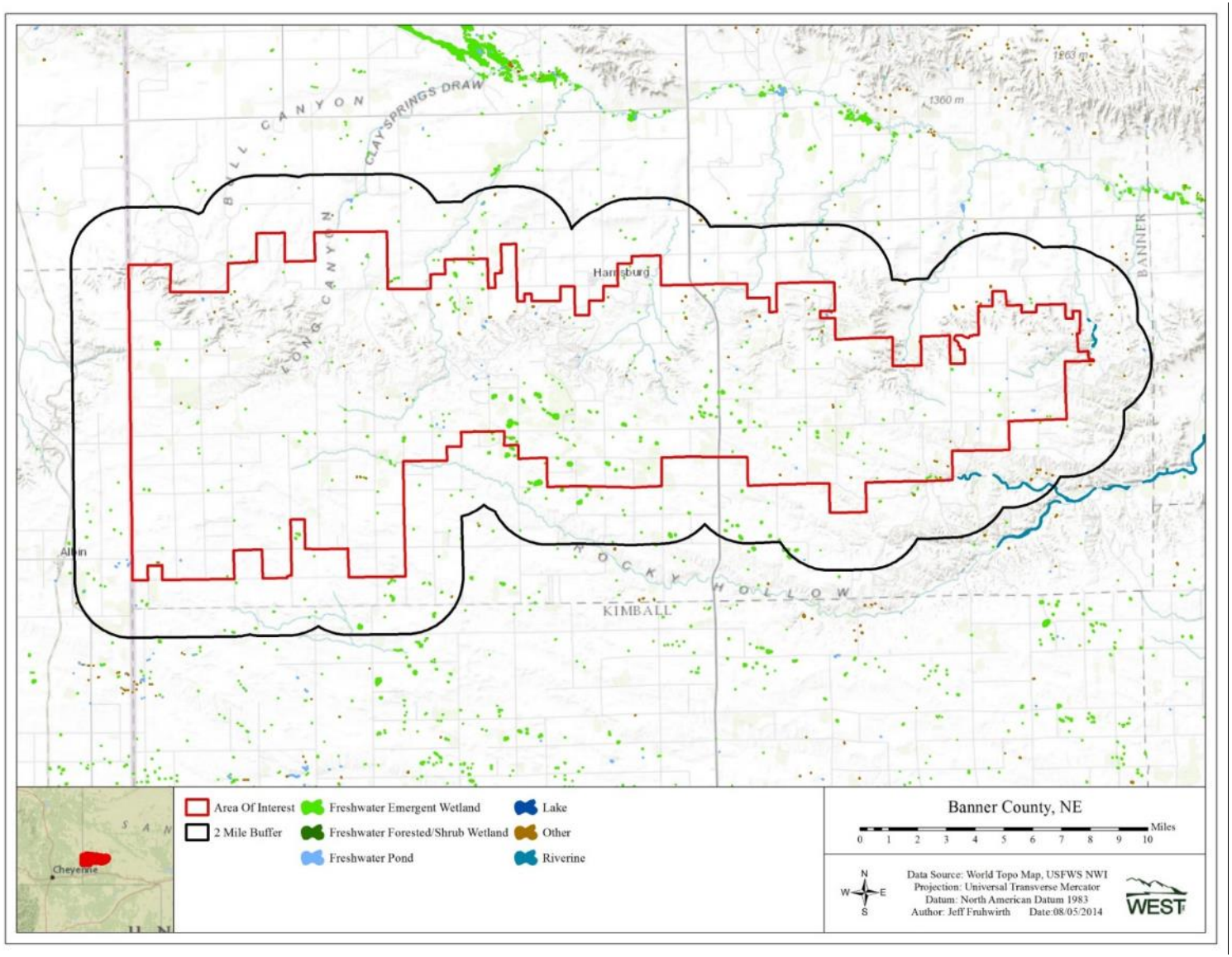


Figure 5. Wetland types in the Banner County, Nebraska, Wind Energy Area of Interest.

Sensitive Habitats

Habitat loss and fragmentation are often assumed to negatively impact bird populations due to increased predation, reduced suitable nesting and stopover areas, decreased habitat suitability, and alteration of prey availability. Potential negative effects of the proposed project include habitat fragmentation and loss from construction and placement of turbines and associated access roads. These changes to the landscape would reduce the size of contiguous patches of habitat and likely cause changes in vegetation structure and composition, which would subsequently decrease and alter suitable habitat for sensitive species.

According to the NNLP, Banner County is located in the shortgrass prairie ecosystem of Nebraska (Schneider et al. 2005). Though named the shortgrass prairie ecosystem, this area has a high diversity of habitats, including shortgrass, mixedgrass, and sandsage prairies; sparsely vegetated badlands, coniferous forest and playa wetlands. The AOI contains shortgrass prairie in the northwest, and mixedgrass prairie through the remainder of the area classified as herbaceous by the NLCD (Figure 4). Coniferous forest occurs on the upper elevations of the ridge that extends across the northern portion of the AOI (Figure 4).

The NNLP also describes Biologically Unique Landscapes (BUL), which are landscapes that offer the best opportunities for conserving the full array of biological diversity (Schneider et al. 2005). The AOI overlaps with the Wildcat Hills South BUL (Figure 6). The Wildcat Hills BUL, including Wildcat Hills North and Wildcat Hills South, is described below.

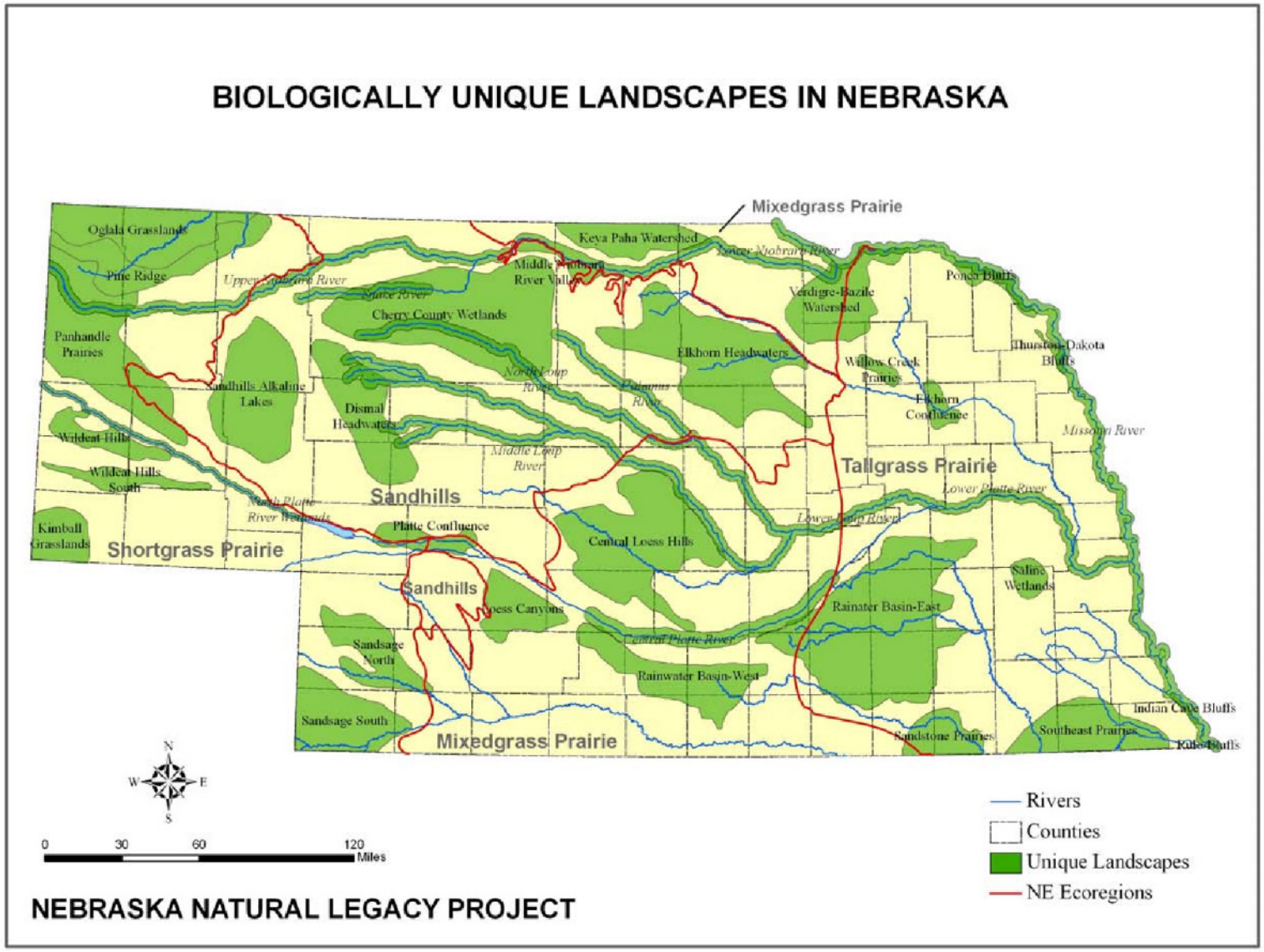


Figure 6. Biological Unique Landscapes identified in Nebraska's Natural Legacy Program (taken from Schneider et al. 2005).

Shortgrass Prairie

Shortgrass prairie is dominated by short grasses (e.g., buffalograss [*Bouteloua dactyloides*], blue grama [*B. gracilis*], side-oats grama [*B. curtipendula*], and purple threeawn [*Aristida purpurea*]), with forbs often interspersed with grasses (Schneider et al. 2005). Grasses rarely exceed 10 inches (25 centimeters [cm]) in height in shortgrass prairie, typically due to low precipitation and grazing (Schneider et al. 2005). Shortgrass prairie is primarily found in the eastern and northwestern portions of the AOI.

Mixedgrass Prairie

Mixedgrass prairie in this regions is typically dominated by blue grama, prairie sandreed (*Calamovilfa longifolia*), threadleaf sedge (*Carex filifolia*), needle-and-thread (*Stipa comata*), little bluestem (*Schizachyrium scoparium*), and western wheatgrass (*Pascopyrum smithii*), and grasses can reach 18 to 24 inches (46 to 61 cm) in height (Schneider et al. 2005). Shrubs may be interspersed in mixedgrass prairie, including yucca, fringed sage (*Artemisia frigida*), skunkbush sumac (*Rhus trilobata*), and ragweed (*Ambrosia* spp.). Forbs found in mixedgrass prairie include western ragweed (*Ambrosia psilostachya*), fringed sage, prairie coneflower (*Ratibida pinnata* or *R. columnifera*), scarlet globemallow (*Sphaeralcea coccinea*), scarlet guara (*Gaura coccinea*), and broom snakeweed (*Gutierrezia sarothrae*). Mixedgrass prairie is prevalent through much of the AOI, particularly along the ridge that runs east-west along the northern portion of the study area.

Ponderosa Pine Woodlands

Ponderosa pine dominates ponderosa pine woodlands, but quaking aspen (*Populus tremuloides*) and green ash (*Fraxinus pennsylvanica*) may be found in the subcanopy (Schneider et al. 2005). Shrubs of the ponderosa pine woodlands include Saskatoon serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), dwarf juniper (*Juniperus* spp.), fragrant sumac (*Rhus aromatica*), mountain mahogany (*Cercocarpus* spp.), and wolfberry (*Symphoricarpos occidentalis*). The herbaceous layer of ponderosa pine woodlands is sparse and includes Kentucky bluegrass (*Poa pratensis*) and littleseed ricegrass (*Oryzopsis micrantha*) (Schneider et al. 2005). Ponderosa pine woodlands are found along the ridge that runs east-west along the northern portion of the study area, particularly in the northwestern and eastern portions of the AOI.

Wildcat Hills Biologically Unique Landscape (BUL)

The NNLP describes BULs, which are landscapes that offer the best opportunities for conserving the full array of biological diversity. The AOI overlaps with the Wildcat Hills South BUL. The Wildcat Hills is a rocky escarpment composed of sandstone, siltstone, and volcanic ash that rises several hundred feet on the south side of the North Platte River. Deep canyons cut into the bluff on the north side and are covered with stands of mountain mahogany, eastern red cedar (*Juniperus virginiana*), and Rocky Mountain juniper (*J. scopulorum*). North facility slopes support ponderosa pine woodlands, and mixedgrass prairie, rock outcrops, and sandsage (*Artemisia filifolia*) cover the remainder of the Wildcat Hills. The intact mosaic of pine woodlands and mixed grass support one of the largest stands of mountain mahogany in Nebraska. The Wildcat Hills

South BUL does not contain any protected lands; however, the Wildcat Hills North BUL, located north of the AOI, contains the Wildcat Hills State Recreation Area (SRA) and Wildlife Management Area (WMA), Buffalo Creek WMA, Cedar Canyon WMA, Platte River Basin Environ's Bead Mountain Ranch, and Scottsbluff National Monument.

Sensitive and Special Status Plant Species

According to the NNHP and NGPC list of sensitive species by county, no state- or federally-listed plant species have the potential to occur in the AOI (NNHP 2013).

WILDLIFE

The most common wildlife species observed during the site visit were those associated with dryland agriculture, croplands, and herbaceous land cover. A total of 21 avian and two mammal species were recorded during the site visit to the AOI (Table 3). The most abundant avian species recorded during the site visit were horned larks (*Eremophila alpestris*), lark buntings (*Calamospiza melanocorys*), western meadowlarks (*Sturnella neglecta*), and western kingbirds (*Tyrannus verticalis*). American kestrel (*Falco sparverius*), red-tailed hawk (*Buteo jamaicensis*), and Swainson's hawk (*B. swainsoni*) were the only raptor species observed during the site visit. One great blue heron (*Ardea herodias*) was observed at a pond located in the eastern portion of the AOI. An adult and juvenile sharp-tailed grouse (*Tympanuchus phasianellus*) was observed in the northwestern portion of the AOI. Mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*) were also observed at the AOI. No federal- or state-listed sensitive species were observed during the site visit. Loggerhead shrike (*Lanus ludovicianus*) is listed as an NNLP Tier 1 species (see NNLP 2014c).

Table 3. Wildlife species observed during the site visit to the Banner County, Nebraska, Wind Energy Area of Interest, August 7, 2014.

Common Name	Scientific Name
Birds	
great blue heron	*Ardea herodias*
red-tailed hawk	*Buteo jamaicensis*
Swainson's hawk	*Buteo swainsoni*
American kestrel	*Falco sparverius*
turkey vulture	*Cathartes aura*
sharp-tailed grouse	*Tympanuchus phasianellus*
mourning dove	*Zenaida macroura*
American crow	*Corvus brachyrhynchos*
American goldfinch	*Spinus tristis*
barn swallow	*Hirundo rustica*
cliff swallow	*Petrochelidon pyrrhonota*
eastern kingbird	*Tyrannus tyrannus*
grasshopper sparrow	*Ammodramus savannarum*
horned lark	*Eremophila alpestris*
house wren	*Troglodytes aedon*
loggerhead shrike	*Lanius ludovicianus*
lark bunting	*Calamospiza melanocorys*
lark sparrow	*Chondestes grammacus*
savannah sparrow	*Passerculus sandwichensis*

Table 3. Wildlife species observed during the site visit to the Banner County, Nebraska, Wind Energy Area of Interest, August 7, 2014.

Common Name	Scientific Name
unknown thrush	
unknown warbler	
western kingbird	*Tyrannus verticalis*
western meadowlark	*Sturnella neglecta*
Mammals	
mule deer	*Odocoileus hemionus*
pronghorn	*Antilocapra americana*

Federal- or State-Listed Wildlife Species

No lands owned by US Forest Service and Bureau of Land Management occur in the AOI, therefore species of concern listed by these agencies were not considered in this analysis.

In lieu of an official response from the USFWS or NGPC regarding the potential of federally- or state-listed endangered or threatened species to occur in Banner County, the USFWS Information, Planning, and Conservation System (IPaC); the USFWS Environmental Conservation Online System (ECOS) species profiles; and the NGPC list of sensitive species and range maps were used to determine the potential occurrence of endangered and threatened species (USFWS 2014a, USFWS 2014b, NGPC 2013). According to the IPaC and NGPC list of sensitive species, seven federally- or state-listed wildlife species have the potential to occur in Banner County, Nebraska: four bird species, two mammal species, and one fish (Table 4). The three federally-listed bird species are unlikely to occur in the AOI: interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*) (Figures 7 and 8). Due to the concern regarding whooping cranes in Nebraska, this species will be discussed in detail below, despite being unlikely to occur in the AOI; the remaining federally-listed bird species are not discussed in detail. According to USFWS ECOS species profile, the black-footed ferret (*Mustella nigripes*; federally-listed endangered) has the potential to occur in Banner County. However, the last confirmed specimen of black-footed ferret was collected in 1949, and no known extant populations exist in Nebraska (NGPC 2014c); therefore, black-footed ferret will not be discussed in detail. The federally-endangered pallid sturgeon (*Scaphirhynchus albus*) was listed by the USFWS IPaC as having the potential to occur in Banner County; however, according to the NNHP and USFWS ECOS, this species is associated with the Missouri River and its tributaries and only occurs in eastern Nebraska (Figure 9). Therefore, the pallid sturgeon was not considered further in this analysis. The two state-listed species with the potential to occur on the AOI are described below.

Table 4. Federally- and state-listed endangered and threatened animal species with the potential for occurrence in the Banner County, Nebraska, Wind Energy Area of Interest.

Species	Federal/ State Status	Habitat Requirements	Potential for Occurrence within the Area of Interest
BIRDS			
interior least tern *Sterna antillarum*	FE/SE	Nests in sandpits along rivers in Nebraska. Remains near rivers prior to migration.	**Unlikely.** Suitable habitat is not present in the AOI.
mountain plover *Charadrius montanus*	ST	Shortgrass, fallow fields, prairie-dog towns; very short stature vegetation.	**Possible.** During breeding season. Availability of prairie dog towns on the AOI unknown.
piping plover *Charadrius melodus*	FT/ST	Nests in sandpits along rivers in Nebraska. Remains near rivers prior to migration.	**Unlikely.** Suitable habitat is not present in the AOI
whooping crane *Grus americana*	FE/SE	Sandbars and shallow water in rivers, wetlands, wet meadows.	**Unlikely.** Suitable habitat not available in AOI. No confirmed sighting in Banner County; however, confirmed sightings in Scotts Bluff, Morrill, and Cheyenne Counties (NNHP 2011e).
Mammals			
black-footed ferret *Mustella nigripes*	FE/SE[a]	Prairie dog colonies.	**Unlikely**. The species is likely extirpated throughout the state. Availability of prairie dog colonies in the AOI is unknown.
swift fox *Vulpes velox*	SE	Shortgrass and mixedgrass prairie habitats and prairie dog towns.	**Likely.** Suitable habitat is present in the AOI; availability of prairie dog towns unknown

Range from NGPC 2014b. Species habitat requirements from All About Birds 2014. Status information from NGPC 2013, USFWS 2014d

[a] historical occurrence in Nebraska, but no known extant populations

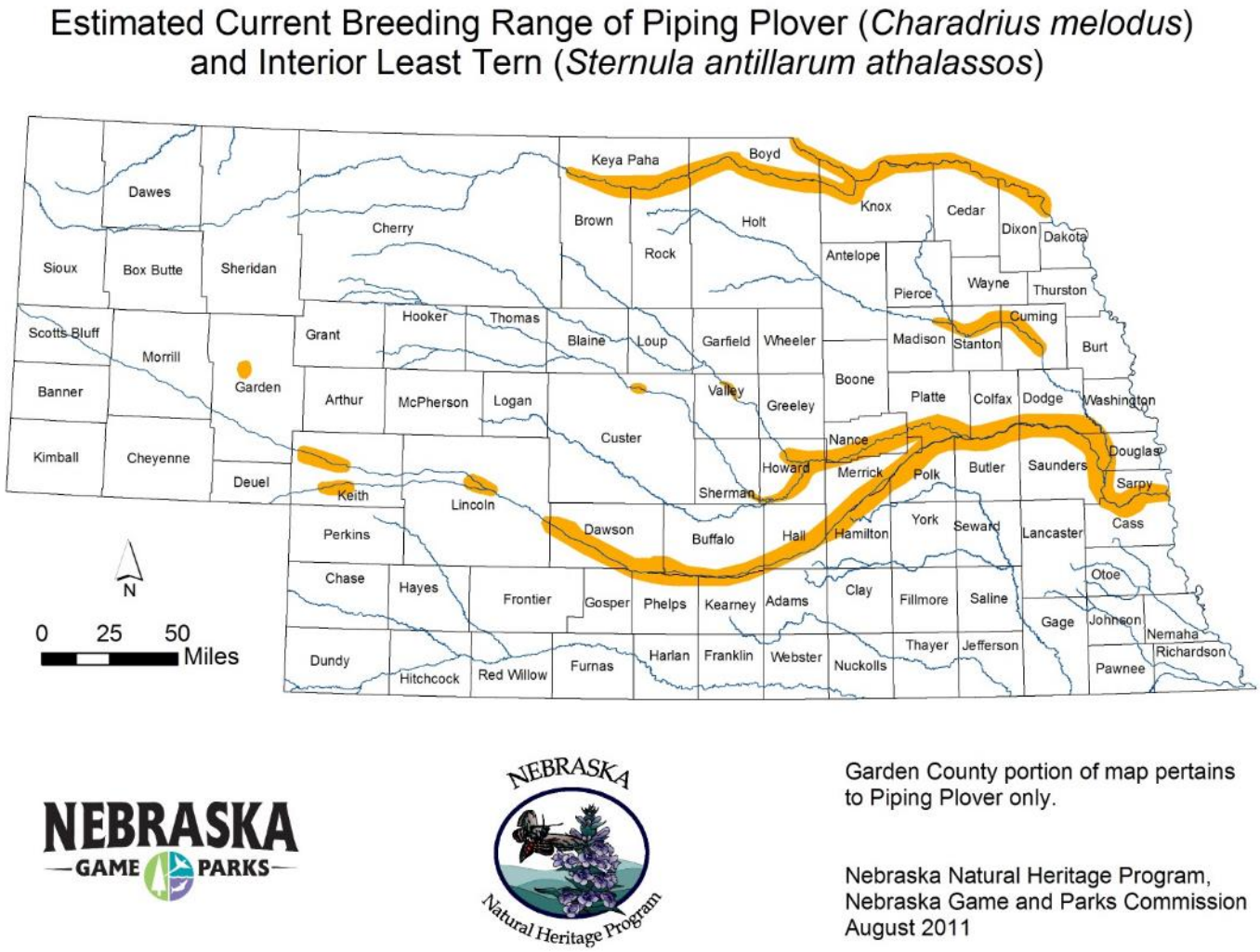
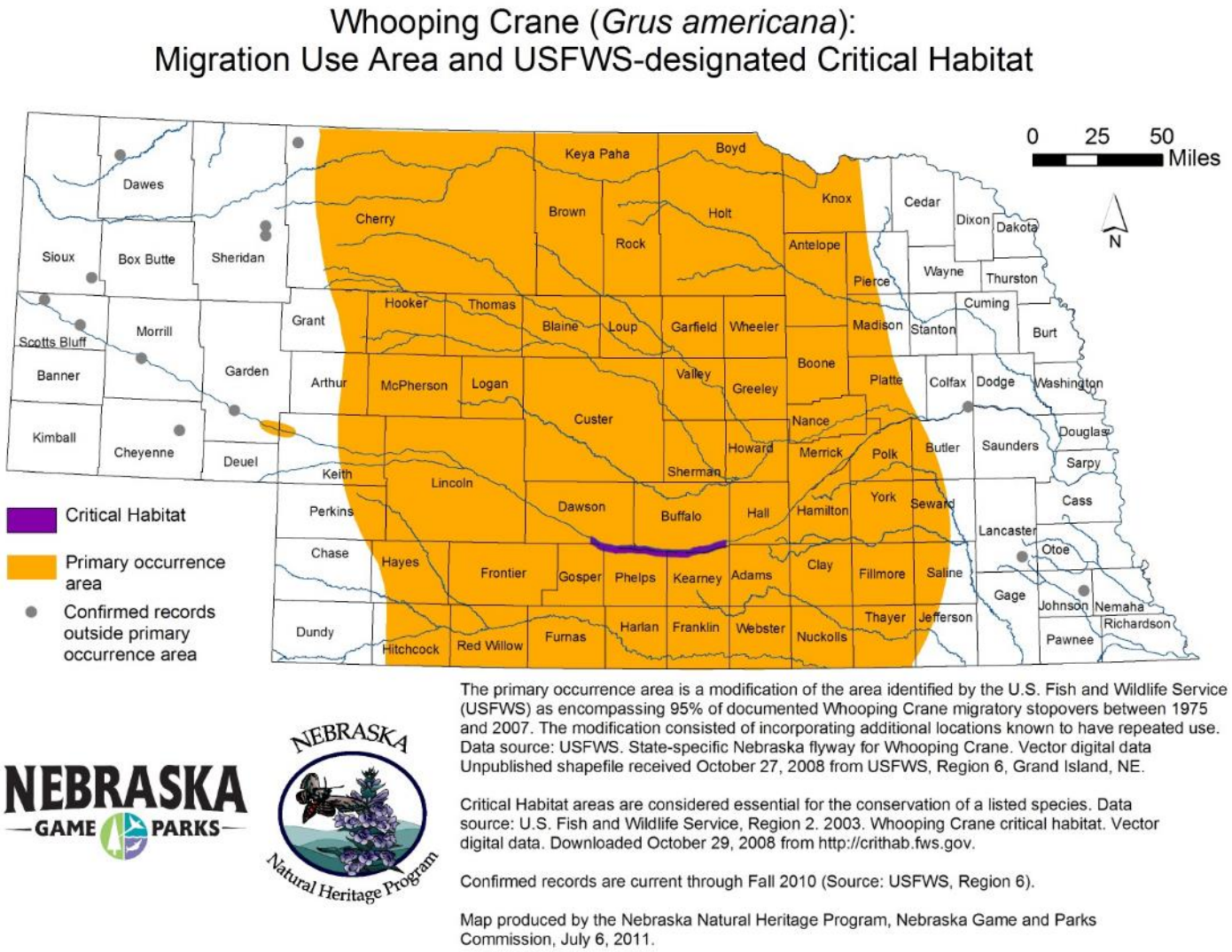


Figure 7. Distribution of the interior least tern and piping plover in Nebraska (NNHP 2011a).



The primary occurrence area is a modification of the area identified by the U.S. Fish and Wildlife Service (USFWS) as encompassing 95% of documented Whooping Crane migratory stopovers between 1975 and 2007. The modification consisted of incorporating additional locations known to have repeated use. Data source: USFWS. State-specific Nebraska flyway for Whooping Crane. Vector digital data Unpublished shapefile received October 27, 2008 from USFWS, Region 6, Grand Island, NE.

Critical Habitat areas are considered essential for the conservation of a listed species. Data source: U.S. Fish and Wildlife Service, Region 2. 2003. Whooping Crane critical habitat. Vector digital data. Downloaded October 29, 2008 from http://crithab.fws.gov.

Confirmed records are current through Fall 2010 (Source: USFWS, Region 6).

Map produced by the Nebraska Natural Heritage Program, Nebraska Game and Parks Commission, July 6, 2011.

NEBRASKA GAME PARKS

NEBRASKA Natural Heritage Program

Figure 8. Distribution of the whooping crane in Nebraska (NNHP 2011e).

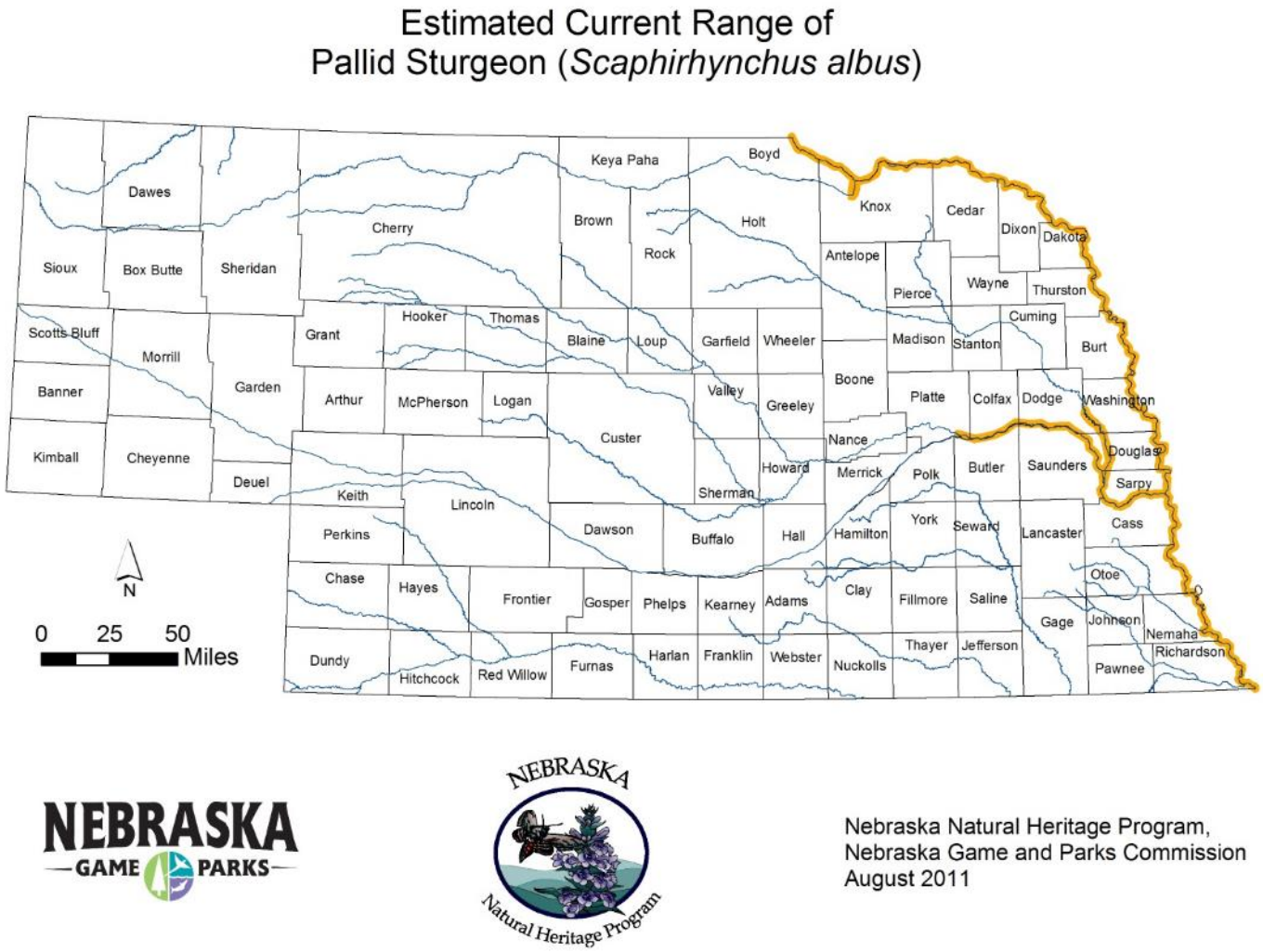


Figure 9. Distribution of the pallid sturgeon in Nebraska (NNHP 2011c).

Whooping Crane

Whooping cranes are federally-listed as endangered (USFWS 2014d, 2014e). Whooping cranes spend the winter at Aransas National Wildlife Refuge, Matagorda Island National Wildlife Refuge, and adjacent private lands in Texas, USA, and breed at Wood Buffalo National Park on the border of Alberta and the Northwest Territories in Canada. The fall migration during October and early November follows the Central Flyway corridor, with stopover sites in the Platte River in central Nebraska as well as other locations in Nebraska (Lewis 1995). The spring migration follows the same route north in April and early May. Whooping cranes use numerous habitats, including cropland and pastures; wet meadows; marshes; shallow portions of rivers, lakes, reservoirs, and stock ponds; freshwater and alkaline basins for feeding and resting during their spring and fall migration; and shallow water for roosting sites. These habitats are not largely available in the AOI. Critical habitat for this species has been designated (43 Federal Register [FR] 20938-20942) and includes locations along the migration route along the Platte River in central Nebraska, but well outside the AOI and Evaluation Area (Figure 8). While the USFWS IPaC system identified the whooping crane as potentially occurring in Banner County, the USFWS ECOS species profile and Threatened and Endangered Species System (TESS) do not include Banner County as an area of potential occurrence of whooping cranes (USFWS 2014b, 2014d 2014e), and occurrences have not been documented in Banner County (Figure 10). In addition, the AOI is located well outside of the migration corridor, as mapped by the USFWS (Figure 8). Impacts to whooping cranes are unlikely if the project is constructed.

Mountain Plover

Mountain plover (*Charadrius montanus*) is listed as threatened in Nebraska (NGPC 2013). Much of the AOI is located within the range of mountain plover (Figure 11). Mountain plovers occur in arid shortgrass prairie dominated by blue grama and buffalograss. Nesting sites occur in areas where vegetation is very short and bare ground is plentiful, and this species selectively nests in prairie dog (*Cynomys* spp.) towns, where available. In addition, mountain plovers will nest in agricultural land; however, these nesting attempts are often unsuccessful. Habitat in the majority of the AOI is unsuitable for nesting mountain plovers; however areas of short vegetation occur in the northwestern portion and southeastern portion of the study area. Agricultural land is widespread in the AOI. The availability of prairie dog colonies in the AOI is unknown. Mountain plovers may occur in the AOI during breeding season; however, with the exception of agricultural land, suitable habitat is limited.

Swift Fox

Swift fox is listed as endangered in Nebraska (NGPC 2013). Swift foxes (*Vulpes velox*) are small canids, about half the size of red fox (*V. vulpes*). All of Banner County is located within the swift fox range (Figure 12). Swift fox habitat is open shortgrass prairie, and sometimes mixedgrass prairie, with few shrubs and trees. Prairie dog colonies and badger (*Taxidea taxus*) dens are often used during breeding season, and swift fox use dens year-round. While shorter grasslands were observed in the northwest and southeast portions of the AOI, these areas also included shrubs and woodlands, which may preclude use by swift fox. Much of the grassland habitat observed during the site visit contained grasses that were too tall to support use by swift fox; however,

interannual and seasonal variation in grass height may enable swift fox to use larger proportions of the AOI in some years.

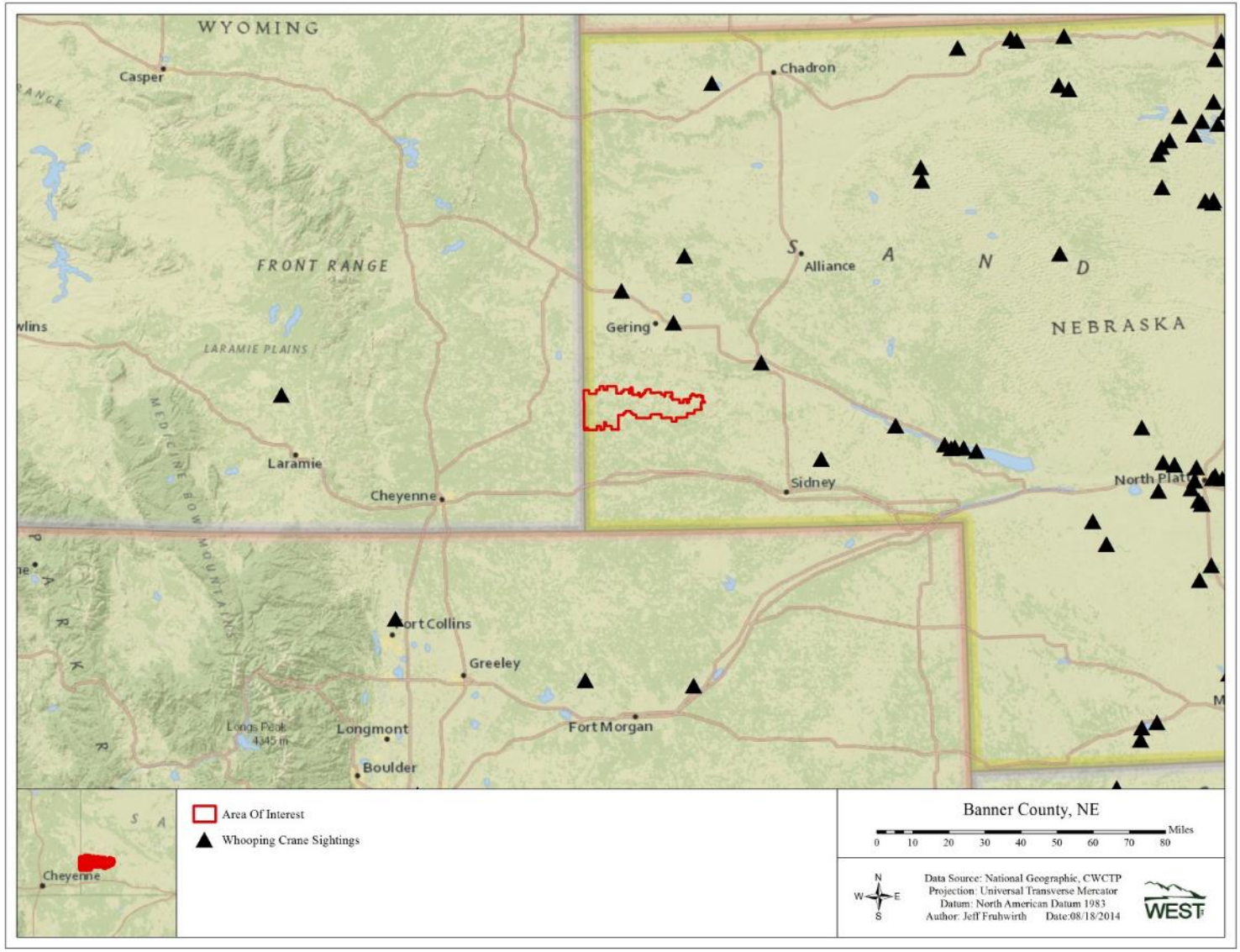


Figure 10. Whooping crane sightings in the area surrounding the Banner County, Nebraska, Wind Energy Area of Interest (Cooperative Whooping Crane Tracking Project [CWCTP] 2009).

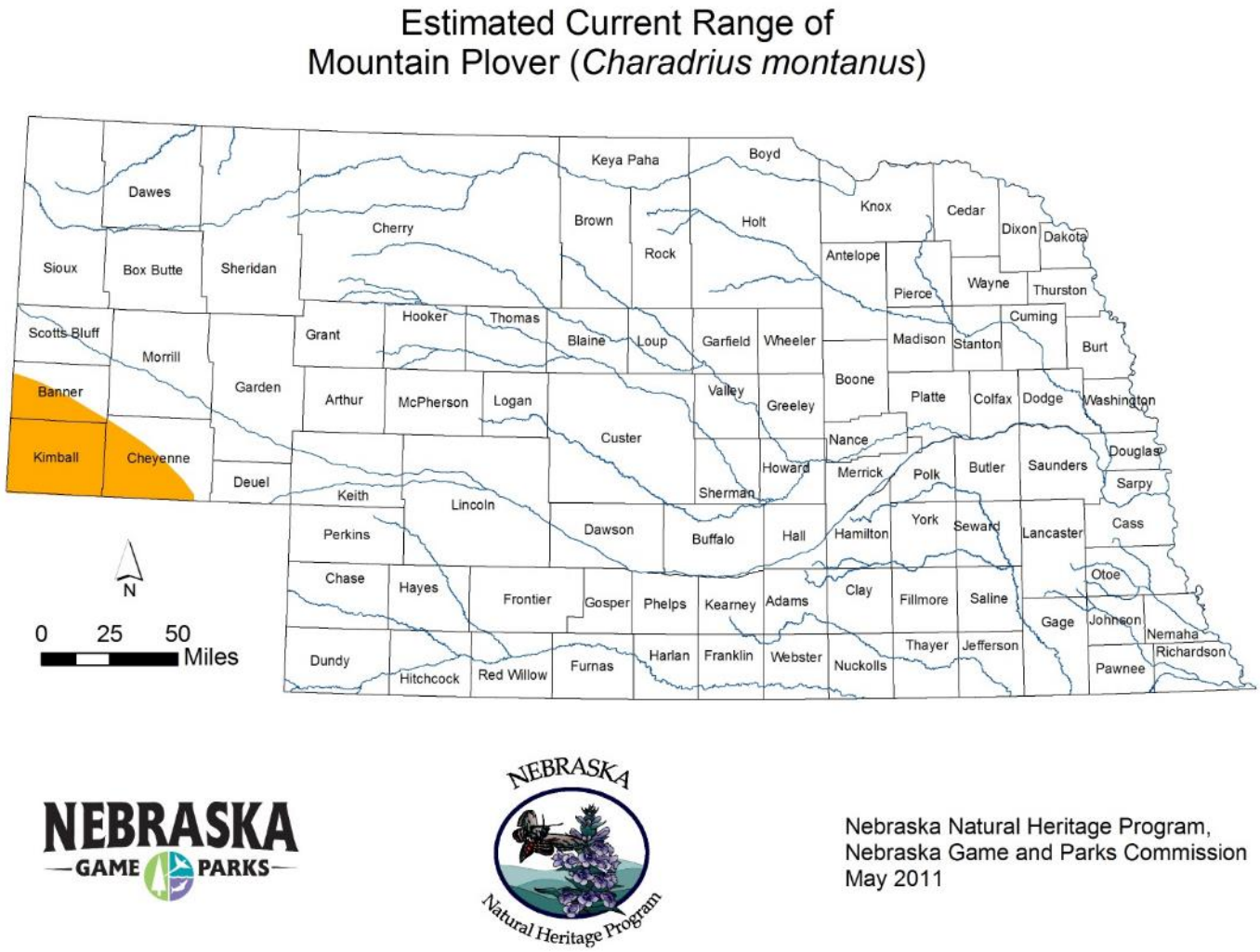


Figure 11. Distribution of the mountain plover in Nebraska (NNHP 2011b).

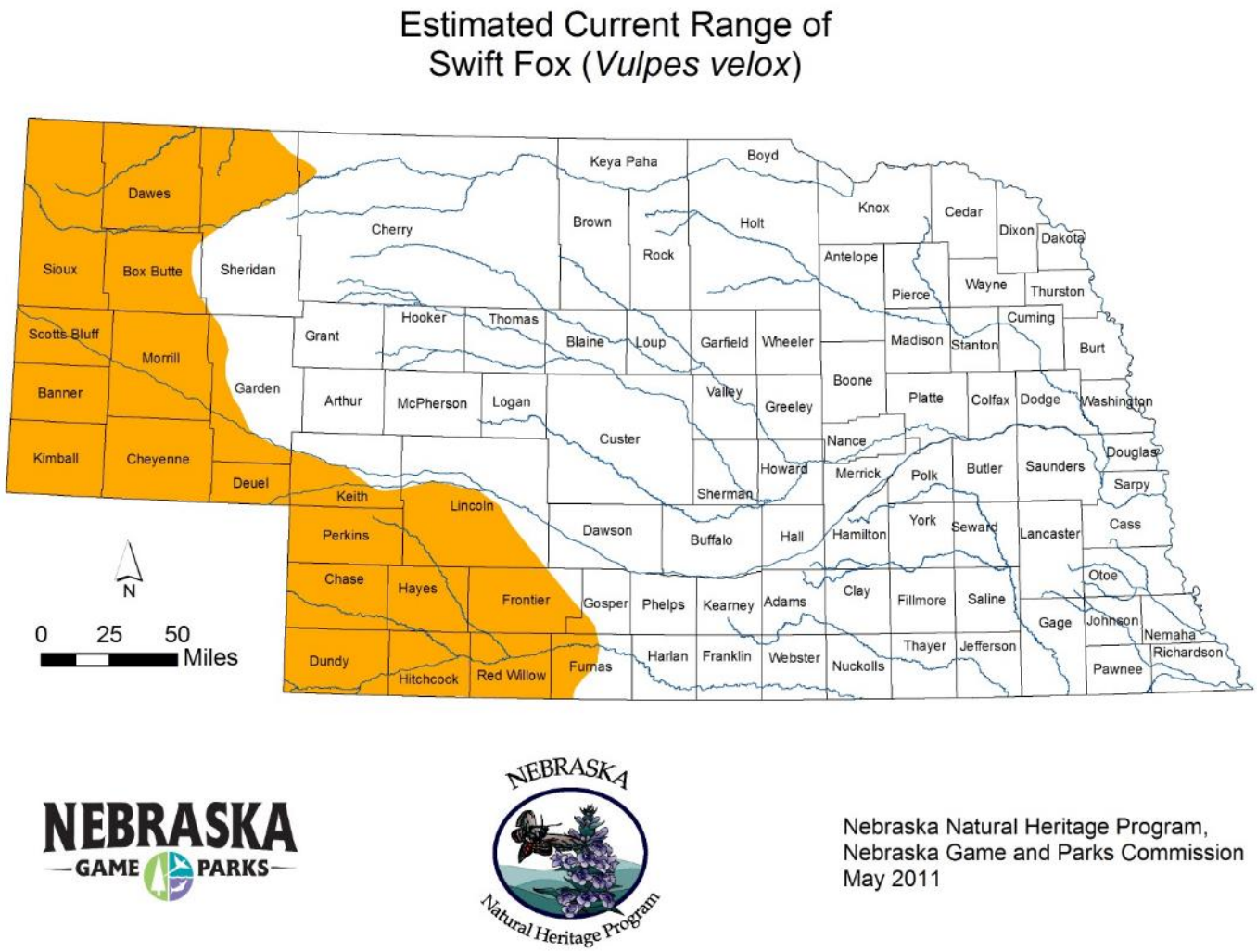


Figure 12. Distribution of the swift fox in Nebraska (NNHP 2011d).

Nebraska Natural Legacy Program Tier 1 Species

Nebraska Natural Legacy Program Tier 1 Species are those species that occur in Nebraska and are globally or nationally most at risk of extinction (NNLP 2014a). The Tier 1 Species list does not have legal or regulatory ramifications; rather, the list is designed to help prioritize conservation planning and actions. Tier 1 Species meet one or more of the following criteria: 1) state- or federally-listed species, 2) heritage ranked species, 3) declining species, 4) endemic species, and/or 5) species with disjunct populations (NNLP 2014a). Tier 1 species with the potential to occur in the shortgrass prairie ecoregion of Nebraska in general are listed in Table 5, and species likely to occur in the AOI are described in detail below. Mountain plover and swift fox are described in the state-listed species section above.

Table 5. Nebraska Natural Legacy Program Tier 1 animal species occurring in the Shortgrass Prairie Ecoregion and the potential for occurrence in or near the Banner County, Nebraska, Wind Energy Area of Interest.

Species	Habitat Requirements	Potential for Occurrence within the AOI
Birds		
Baird's sparrow *Ammodramus bairdii*	Prairies, natural grasslands, weedy fields; prefers open areas, such as native prairie mixed with forbs.	**Possible.** Potential to occur during migration; does not breed or winter in Nebraska.
Bell's vireo *Vireo bellii*	Dependent on shrubs; thickets near streams or rivers; second-growth scrub, forest edges, and brush patches.	**Probable.** Potential to occur during migration, but unlikely during breeding season. More likely to occur in the Wildcat Hills North BUL.
Brewer's sparrow *Spizella breweri*	Dependent on shrubs; sandsage prairie, shortgrass, mixedgrass with a sandsage, shrub association.	**Likely.** May occur in the shrubby lands and open ponderosa pine woodlands in the northwestern and southeastern portions of the AOI**.**
burrowing owl *Athene cunicularia*	Prairie dog towns, shortgrass prairies, mixedgrass prairies, heavily grazed grassland.	**Probable.** During breeding season. Prairie habitat plentiful; availability of prairie-dog towns unknown.
chestnut-collared longspur *Calcarius ornatus*	Shortgrass and mixedgrass prairie; native grasslands.	**Probable.** Potential to occur during breeding season and migration.
ferruginous hawk *Buteo regalis*	Rock outcrops, shortgrass prairies, prairie dog towns.	**Probable.** Shortgrass habitat limited in AOI. Availability of prairie dog towns unknown.
greater prairie-chicken *Tympanuchus cupido*	Sandsage prairie, tallgrass prairie, loess mixedgrass prairie.	**Unlikely.** Range of greater prairie-chicken typically east and south of the AOI.

Table 5. Nebraska Natural Legacy Program Tier 1 animal species occurring in the Shortgrass Prairie Ecoregion and the potential for occurrence in or near the Banner County, Nebraska, Wind Energy Area of Interest.

Species	Habitat Requirements	Potential for Occurrence within the AOI
loggerhead shrike *Lanius ludovicianus*	Grasslands with at least some scattered trees or shrubs.	**Present.** Suitable habitat is plentiful in AOI; likely to occur during breeding season.
long-billed curlew *Numenius americana*	Mixedgrass and shortgrass prairie; habitats with trees or high densities of sagebrush avoided.	**Possible.** During breeding season and migration. AOI contains some areas of prairie with no trees and few shrubs, by most prairie on the AOI is interspersed with trees and/or shrubs.
McCown's longspur *Rhynchophanes mccownii*	Mixedgrass and shortgrass prairie; prairie dog towns.	**Probable.** During breeding season and migration. Suitable habitat plentiful in the AOI. Availability of prairie dog towns unknown
pinyon jay *Gymnorhinus cyanocephalus*	Foothills and mid-elevations; pinion-juniper woodlands, ponderosa and Jeffery pine (*Pinus jeffreyi*) forests.	**Likely.** During breeding season and migration. Suitable habitat is found in the northwest portion of the AOI and along the higher elevation of the ridge running across east-west across the northern portion of the AOI.
short-eared owl *Asio flammeus*	Open grasslands with standing cover and little disturbance.	**Possible.** Potential to occur in winter.
trumpeter swan *Cygnus buccinator*	Deep water wetlands. Densely vegetated marsh lakes.	**Unlikely.** Suitable habitat not available in the AOI.
wood thrush *Hylocichla mustelina*	Deciduous or mixed forests; interior or edge species; moderate subcanopy and shrub density.	**Unlikely.** AOI is well west of species' range; rare occurrence may be possible in the woodlots associated with occupied or abandoned farmsteads.
Mammals		
northern pocket gopher (Cheyenne and Pierre subpopulations) *Thomomys talpoides*	Deep soils in cultivated fields and meadows.	**Unlikely.** Range of these subpopulations does not occur in the AOI.
northern river otter *Lontra canadensis*	Along rivers and streams with backwater areas, marshes, lakes, ponds.	**Unlikely.** Suitable waterbodies and streams are not present in the AOI.
Rocky Mountain bighorn sheep *Ovis canadensis canadensis*	Rocky buttes.	**Likely.** Habitat available in the northwest portion of the AOI. Population is known to occur in the Wildcat Hills North BUL, just north of the AOI.

Table 5. Nebraska Natural Legacy Program Tier 1 animal species occurring in the Shortgrass Prairie Ecoregion and the potential for occurrence in or near the Banner County, Nebraska, Wind Energy Area of Interest.

Species	Habitat Requirements	Potential for Occurrence within the AOI
fringed bat *Myotis thysanodes*	Ponderosa pine forests and woodlands, green ash-elm bottomland woodlands.	**Likely.** Habitat present in the upper elevations of the AOI and plentiful in the northwest and southeastern portions of the AOI.
little brown bat *Myotis lucifugus*	Roosts in buildings, trees, under rock or wood; forage over water, meadows, farmland, cliff faces, forest trails.	**Likely.** Trees, rocky outcrops, and abandoned farmstead buildings provide roosting opportunities throughout the AOI.
Reptiles		
sagebrush lizard *Sceloporus graciosus*	Open, rocky shortgrass prairie; sagebrush; higher elevations.	**Likely.** Potential to occur in the shortgrass prairie in the northwestern portion of the AOI.
Fish		
blacknose shiner *Notropis heterolepis*	Headwater streams, spring fed, clear water, quiet waters.	**Unlikely.** AOI is outside of species' range. Habitat not present.
northern redbelly dace *Chrosomus eos*	Spring fed, clear, headwater streams.	**Unlikely.** AOI is outside of species' range. Habitat not present.
plains topminnow *Fundulus sciadicus*	Vegetative backwaters and headwaters; shallow parts of rivers and streams.	**Unlikely.** Habitat no present in AOI.

Tier 1 Species list from NNLP 2014c, Schneider et al. 2005; Habitat and range information from Schneider et al. 2005, Bat Conservation International (BCI) 2014, and NGPC 2014b

Brewer's Sparrow

Brewer's sparrow (*Spizella breweri*) breeding habitat includes shrublands, typically where big sagebrush (*Artemesia tridentata*) is the dominant species. This species may also occur in large parks within open conifer forests. Suitable habitat is found primarily at the higher elevations in the project area and in the open ponderosa pine woodlands in the northwestern and southeastern portions of the AOI.

Loggerhead Shrike

Loggerhead shrikes prefer open habitat with scattered trees or shrubs, fencerows, and open woodlands. Nesting typically occurs near isolated trees or large shrubs. Suitable loggerhead shrike habitat can be found throughout the AOI. Loggerhead shrikes were observed on the AOI during the site visit.

Pinyon Jay

Pinyon jays (*Gymnorhinus cyanocephalus*) are found in foothills and mid-elevations pinyon-juniper (*Pinus edulis-Juniperus* spp.) woodlands, and are also found in ponderosa pine forests. Within the AOI, the ponderosa pine and juniper woodlands provide suitable nesting and foraging habitat.

Rocky Mountain Bighorn Sheep

Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) live in steep, mountainous habitat. Bighorn sheep eat grass and inhabit the rocky buttes of the Wildcat Hills. Rocky Mountain bighorn sheep are likely to be found in the area surrounding Long Canyon in the northwest portion of the AOI.

Fringed Bat

Fringed bat (*Myotis thysanodes*) is a widespread species that uses both woodlands and grasslands. Roosting habitat includes caves, mines, and abandoned buildings. Habitat for this species is more plentiful in the northern part of the AOI, and the AOI contains abandoned buildings for roosting throughout the study area.

Little Brown Bat

Little brown bats (*Myotis lucifugus*) are found in a variety of forest habitats, and roost in tree cavities and crevices, as well as buildings and other man-made structures. Foraging habitat includes open water, cliff faces, meadows, and farmland. Forested habitat is more plentiful in the northern part of the AOI, and abandoned buildings for roosting are scattered throughout the study area.

Sagebrush Lizard

Sagebrush lizards (*Sceloporus graciosus*) are found in sagebrush and other types of shrublands. Pinyon-juniper and open pine woodlands also provide habitat. Areas occupied by sagebrush lizards are typically have some open ground and low bushes. Sagebrush lizards are likely to occur in the open ponderosa pine woodlands in the northwest and eastern portions of the AOI.

USFWS Birds of Conservation Concern

Birds of Conservation Concern (BCC) are listed by Bird Conservation Regions (BCR; see USFWS 2008); the AOI is located within BCR 18 (Shortgrass Prairie). Of the 16 BCC species in BCR 18, two have the potential to occur on the AOI as year-round residents: golden eagle (*Aquila chrysaetos*) and prairie falcon (*Falco mexicanus*). An additional seven BBC species have some potential to nest on the AOI: mountain plover, upland sandpiper (*Bartramia longicauda*), long-billed curlew (*Numenius americana*), burrowing owl (*Athene cunicularia*), lark bunting, McCown's longspur (*Rhynchophanes mccownii*), and chestnut-collared longspur (*Calcarius ornatus*). Large numbers of lark buntings were observed during the site visit. Bell's vireo (*Vireo bellii*), a Tier 1 species, has the potential to occur on the AOI during migration, and bald eagle (*Haliaeetus leucocephalus*) has the potential for rare occurrences on the AOI in winter and during migration. All of the BCC species with the potential to occur on the AOI are protected under the Migratory

Bird Treaty Act (MBTA 1918), and bald and golden eagles are further protected under the Bald and Golden Eagle Protection Act (BGEPA 1940).

Eagles

Golden Eagle

Golden eagles' breeding range intersects western Nebraska, including the entire AOI (Figure 13); however, some golden eagles are year-round residents. Golden eagles often are usually found in open country, prairies, arctic and alpine tundra, open wooded country and barren areas, especially in hilly or mountainous regions. Preferred nesting habitat (nesting occurs from March-August) includes rock outcrops, cliff ledges, and trees, while foraging habitat includes prairies, sagebrush, and open woodlands and prairie. Suitable nesting and foraging habitat is found primarily in the northwestern portion of the AOI.

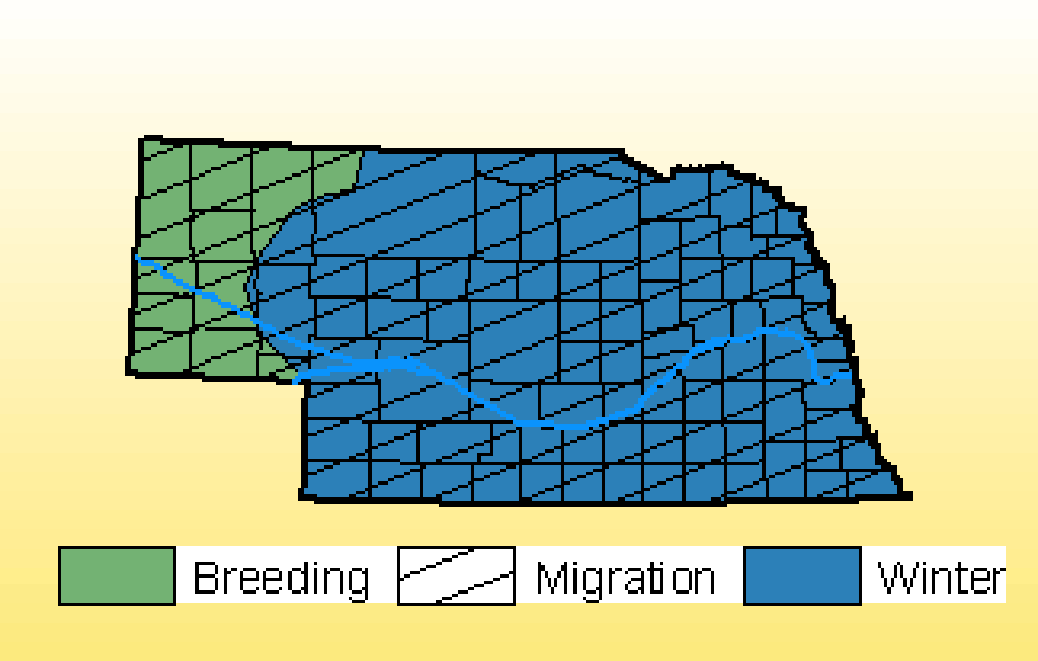
Bald Eagle

Bald eagles have a year-round range throughout Nebraska (Figure 13). Bald eagles are known to nest along the Platte River, north of the AOI (Figure 14); however, suitable breeding habitat is not present in the AOI. Bald eagles are typically associated with forested riparian areas. During migration and in winter, bald eagles may forage over land, typically in search of carrion. There is a potential for bald eagles to occur on the AOI in winter and during migration.

Sharp-tailed Grouse

Sharp-tailed grouse are species of concern for the NGPC, which has developed protocol to manage for sharp-tailed grouse at wind energy facilities. Sharp-tailed grouse are found in relatively open landscapes, such as shrub steppe, meadow steppe, mountain shrub, and brushy grassland; however, subclimax brush-grasslands are preferred (Natural Resource Conservation Service [NRCS] 2007). Breeding occurs on leks, where males gather and perform courtship displays to attract females. Leks are typically located on elevated areas, such as knolls or hilltops, in rangeland, cropland, plowed areas, or other areas that provide sparse, open vegetation cover. Sparse shrubs are often present near leks. Nesting typically occurs within one mile of leks, and the female nests, incubates, and rears the young (brood). Nests are located under shrubs, typically in vegetative cover that is denser than in the surrounding areas. Brooding habitat contains abundant and diverse vegetation, as well as abundant insects. Sharp-tailed grouse migrate short distances in late November to woody habitats; the timing of migration to winter habitat is strongly influenced by snow cover (NRCS 2007). Sharp-tailed grouse were observed in mixedgrass prairie intersperse with shrubs and forbs located in the northwest portion of the AOI, indicating suitable lek and brooding habitat is available in this area. Sharp-tailed grouse winter habitat is plentiful in the northwest and eastern portions of the AOI and along the ridge found in the northern portion of the AOI. The mixedgrass prairie-conifer matrix of the Wildcat Hills South BUL provide ample habitat for sharp-tailed grouse year round.

Golden Eagle Range



Bald Eagle Range

Figure 13. Distribution of the golden eagle (top) and bald eagle (bottom) in Nebraska (Nebraska Bird Library 2014).

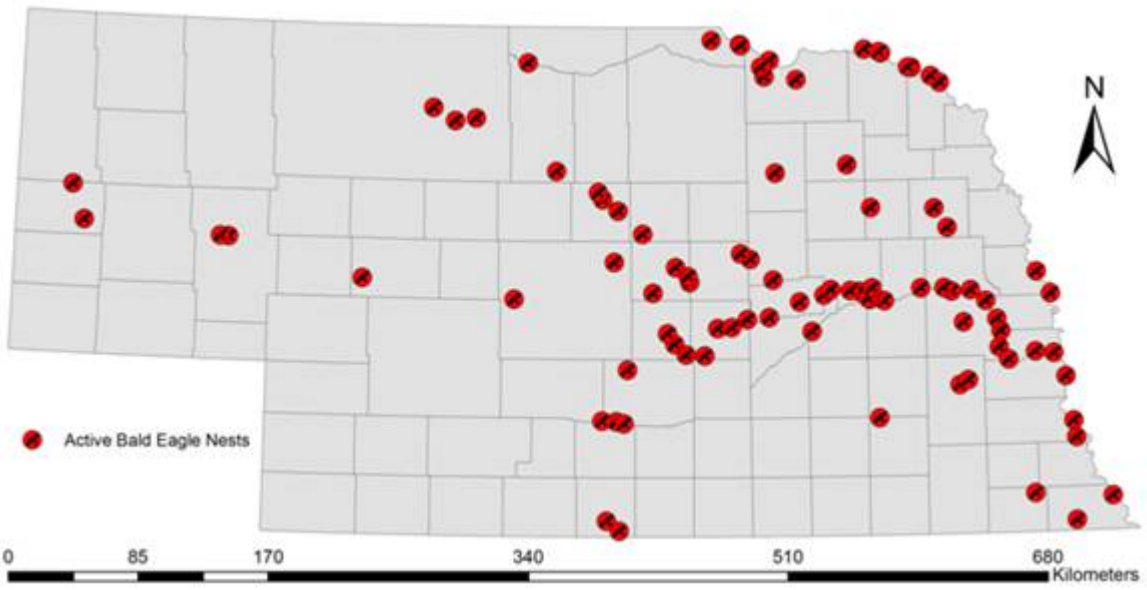


Figure 14. Active bald eagle nests in Nebraska found in 2010 (NGPC 2014a).

Raptors

Species Likely to Occur in the Area

Based on maps of distribution (Nebraska Bird Library 2014), 14 species of diurnal raptors, eight species of owls, and one species of vulture can be found within or near the AOI (Table 6). Of the total of 23 species, 13 have the potential to breed in the area, including golden eagle (BGEPA), prairie falcon (BCC), ferruginous hawk (*Buteo regalis*;Tier 1 Species), and burrowing owl (Tier 1 Species, BCC). Three raptor species were observed during the site visit (Table 3). No threatened, endangered, or other special status species were observed.

An old nesting structure and suitable nesting habitat were observed during the site visit. Potential nest structures included trees, cliffs, and man-made structures, including electric poles, and abandoned buildings; grassland areas could also provide nesting habitats for ground-nesting raptors, such as the northern harrier (*Circus cyaneus*). Species with the potential to breed in the AOI include red-tailed hawk, Swainson's hawk, ferruginous hawk, prairie falcon, American kestrel, northern harrier, and golden eagle. Five owl species have the potential to breed in the AOI: northern saw-whet owl (*Aegolius acadicus*), burrowing owl, great horned owl (*Bubo virginianus*), eastern screech-owl (*Megascops asio*), and barn owl (*Tyto alba*). Turkey vulture (*Cathartes aura*) is also a summer resident. Species that may occur within the AOI outside of the breeding season (migration, winter, or post-breeding dispersal), include merlin (*Falco columbarius*), peregrine falcon (*F. peregrinus;* rare migrant), rough legged hawk (*Buteo lagopus*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), osprey (*Pandion haliaetus;* rare migrant), and bald eagle. Three owl species have the potential to occur in the AOI during winter: short-eared owl (*Asio flammeus*), long-eared owl (*Asio otus*), and snowy owl (*Bubo scandiacus*).

Table 6. Diurnal raptors, owls, and vultures with potential to occur in the Banner County, Nebraska, Wind Energy Area of Interest throughout the year, based on distribution maps (Nebraska Bird Library 2014). YR = Year-round, S = Summer, W = Winter, M = Migration.

Scientific Name	Common Name	YR	S	W	M	Status
Diurnal Raptors						
Falco columbarius	merlin			x	x	
Falco mexicanus	prairie falcon	x				BCC
Falco peregrinus	peregrine falcon				x	
Falco sparverius	American kestrel	x				
Accipiter cooperii	Cooper's hawk				x	
Accipiter striatus	sharp-shinned hawk			x	x	
Buteo jamaicensis	red-tailed hawk	x				
Buteo lagopus	rough-legged hawk			x		
Buteo regalis	ferruginous hawk	x				Tier 1 Species
Buteo swainsoni	Swainson's hawk		x		x	
Circus cyaneus	northern harrier	x				
Pandion haliaetus	osprey				x	
Aquila chrysaetos	golden eagle	x				BGEPA; BCC
Haliaeetus leucocephalus	bald eagle			x	x	BGEPA; BCC
Owls						
Aegolius acadicus	northern saw-whet owl	x				
Asio flammeus	short-eared owl			x		Tier 1 Species
Asio otus	long-eared owl			x		
Athene cunicularia	burrowing owl		x			Tier 1 Species; BCC
Bubo scandiacus	snowy owl			x		
Bubo virginianus	great horned owl	x				
Megascops asio	eastern screech-owl	x				
Tyto alba	barn owl		x			
Vultures						
Cathartes aura	turkey vulture		x		x	

BGEPA = Bald and Golden Eagle Protection Act 1940; Tier 1 species = NNLP 2014a and 2014c; BCC = Birds of Conservation Concern, USFWS 2008.

Potential for Raptor Migration in the Area

Several factors influence the migratory pathways of raptors, the most significant of which is geography. Two geographical features often used by raptors during migration are ridgelines and the shorelines of large bodies of water (Liguori 2005). Updrafts formed as the wind hits the ridges, and thermals created over land and not water, make for energy-efficient travel over long distances (Liguori 2005), and it is for this reason that raptors sometimes follow corridors or pathways, for example along prominent ridges with defined edges, during migration. It is likely that raptors migrate through the proposed AOI in a broad-front fashion because there are no prominent north/south ridges or valleys that are likely to funnel migrants through the project area (Liguori 2005; Figure 2). A ridge transverses the AOI in an east-west orientation and would generally not provide the orographic lift that might attract migrating raptors. Trees and shrubs may provide some stopover habitat for migrating raptors, and the abundant grassland is likely to provide foraging opportunities; however, the AOI does not contain any features likely to concentrate migrating raptors.

Potential Raptor Nesting Habitat

Suitable raptor nesting habitat observed during the site visit included open ponderosa pine woodlands, cliffs and escarpments, shelter belts, and wooded farmsteads. Nesting habitat was often intermixed with open grasslands or agricultural areas. Grassland areas could provide nesting habitat for ground-nesting raptors, as well as foraging habitat for tree-nesting species (discussed below). The project generally lacks riparian habitat, though dry creek beds observed during the site visit indicate the presences of ephemeral streams. A single pond was the only waterbody observed during the site visit.

Potential Prey

Potential raptor prey includes small mammals, reptiles, and birds. No prairie dog colonies were observed during the site visit; however, this may be due to access being limited to public roads. With roost sites and food available, it is likely that raptors will use the area, but there were no extensive prey sources observed that might attract raptors to the AOI compared to the surrounding areas.

Does the Topography of the Site Increase the Potential for Raptor Use?

At wind energy facilities located on prominent ridges with defined edges, raptors often fly along the rim edges, using updrafts to maintain altitude while hunting, migrating, or soaring (Johnson et al. 2000b, Hoover and Morrison 2005). The AOI includes a ridge that crosses the northern edge of the AOI from east to west. The ridge is dissected by a canyon in the northwest portion of the AOI. This area of the AOI contains ridges and cliffs that might produce updrafts used by raptors to aid soaring flight. Topography in other areas of the AOI is flat to rolling.

Migratory and Breeding Birds

Although many species of passerines migrate at night and may collide with tall man-made structures, few large mortality events on the same scale as those seen at communication towers have been documented at wind energy facilities in North America (National Wind Coordinating

Collaborative [NWCC] 2004). Large numbers of passerines have collided with lighted communication towers and buildings when foggy conditions occur during spring and fall migration. Birds appear to become confused under these circumstances, flying lower and in circles around lighted structures until they become exhausted or collide with the structure (Erickson et al. 2001). Most collisions at communication towers are attributed to the guy wires on these structures, which wind turbines do not have. Additionally, the large mortality events observed at communication towers have occurred at structures greater than 500 feet (ft; 152 meters [m]) in height (Erickson et al. 2001), likely because most small birds migrate at elevations of 500 to 1,000 ft (152 to 305 m) above the ground (USFWS 1998), which is higher than most modern turbines. Migrating passerines are likely more at risk of turbine collision when using stopover habitats or during foggy conditions.

It is likely that passerines, raptors, and waterfowl migrate through the proposed AOI. Woodlands, grasslands, and cropland, which are found throughout the AOI may provide stopover habitat for migrants or individuals during post-breeding dispersal. The combination of open ponderosa pine woodlands and grasslands found in the project area may be attractive to broader suite of birds than when only one of these land cover types occurs. Harvested crops, such hay and wheat (*Triticum* spp.) fields, which were observed during the site visit, could serve as feeding areas for migrating cranes and waterfowl. These types of land cover are found throughout the region and therefore their presence in the AOI should not concentrate bird use in the project area as compared to adjacent areas.

No US Geological Survey (USGS) Breeding Bird Survey (BBS) routes intersect with the AOI; however, the Murray Lake and Kimball Routes are located to the north and south of the AOI and are generally representative of the habitat available in the AOI (Figure 15; USGS 2001, 2014). Each BBS route is about 24.5 miles (39.4 km) long; all birds seen or heard are tallied for a 3-minute period every half-mile (0.8 km) along the route (USGS 1998).

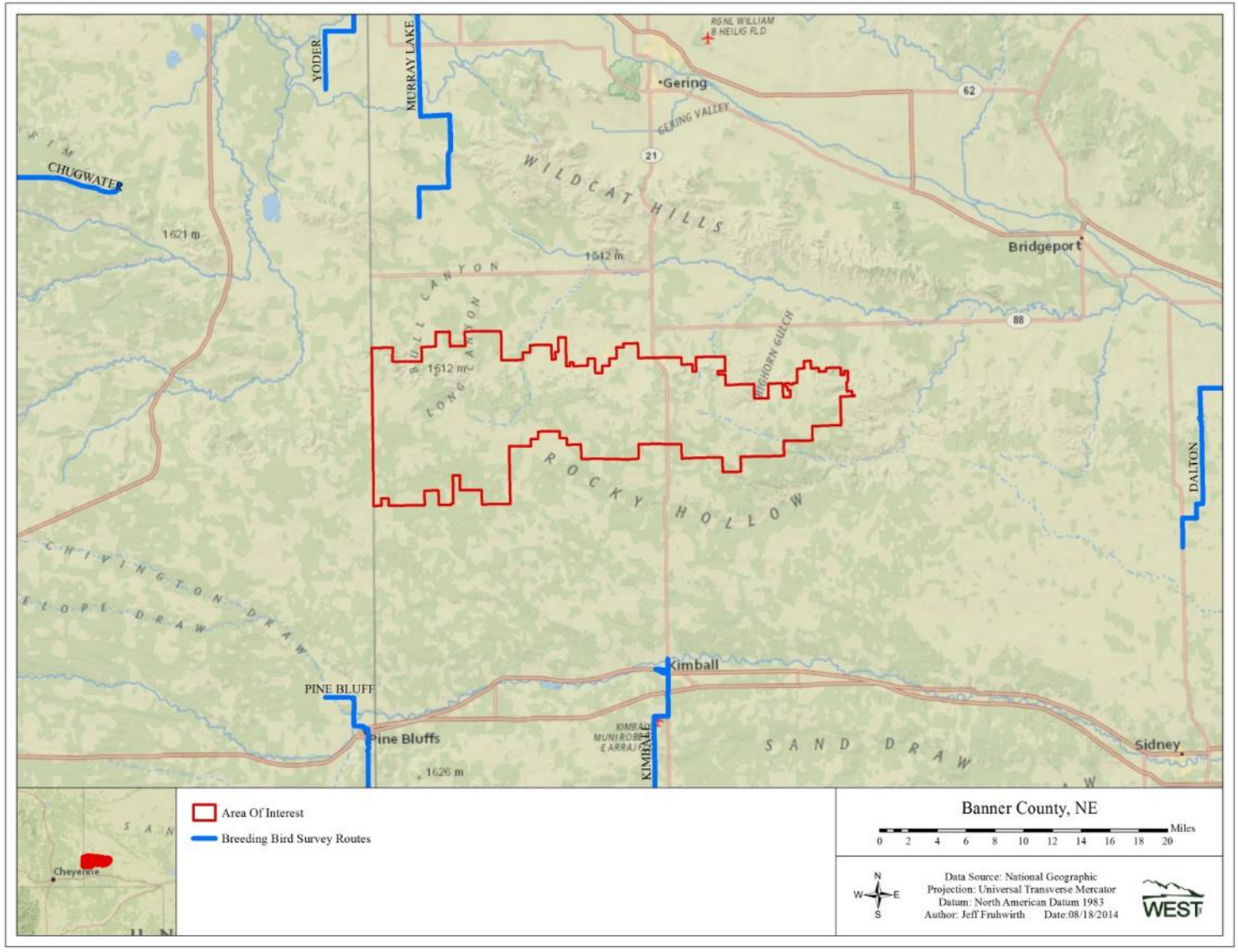


Figure 15. Location of the nearest US Geological Survey Breeding Bird Survey routes near the Banner County, Nebraska, Wind Energy Area of Interest (USGS 2001, 2014).

Overall, 94 bird species have been recorded along the Murray Lake BBS Route between 2003 and 2013 (Sauer et al. 2014). This list includes five Tier 1 species and six USFWS BCC, including golden eagle. Three of these species (lark bunting, upland sandpiper, and burrowing owl) were observed in the BBS data for this route in 2013, the most recent one for which data and results are publicly available (Sauer et al. 2014). A total of 46 bird species have been recorded along the Kimball BBS Route between 2003 and 2013 (Sauer et al. 2014), including one state-listed species (mountain plover), seven Tier 1 species (including mountain plover) and five USFWS BCC. Four of these species (lark bunting, loggerhead shrike, mountain plover upland sandpiper, and chestnut-collared longspur) were observed in the BBS data for this route in 2012, the most recent one for which data and results are publicly available (Sauer et al. 2014). The most abundant species at the Murray Lake BBS Route were western meadowlark, cliff swallow (*Petrochelidon pyrrhonota*), horned lark, and lark bunting. At the Kimball BBS Route, lark bunting and mourning dove (*Zenaida macroura*) were the most abundant species.

Displacement of grassland nesting birds is often one of the primary concerns wildlife agencies express, regarding the placement of wind facilities in and near grassland areas. Recent research has focused on the potential displacement of grassland passerines at wind energy facilities, and some uncertainty currently exists over the effects of wind energy facilities on the breeding success of these birds. In Minnesota, researchers found that breeding passerine density on Conservation Reserve Program (CRP) grasslands was reduced in the immediate vicinity of turbines (Leddy et al. 1999), but changes in density at broader scales were not detected (Johnson et al. 2000a). Erickson et al. (2004) documented a decrease in density of some native grassland passerines, such as grasshopper sparrow (*Ammodramus savannarum*), near turbines in Washington; however, they could not determine if a decrease in post-construction density was the result of behavioral disturbance or a loss of habitat. Piorkowski (2006) conducted a displacement study at a wind energy facility in Oklahoma where, of the grassland species present in the wind resource area, only the western meadowlark showed significantly lower densities near turbines. Piorkowski (2006) suggested that habitat characteristics were more important to determining passerine breeding densities than the presence of wind turbines. Shaffer and Johnson (2009) documented some avoidance by grasshopper sparrows out to 492 ft (150 m) at a wind energy facility in northern South Dakota. The proposed AOI contains a considerable amount of grassland/herbaceous cover, with the potential to support grassland sensitive species that have the potential to be affected by development. Species potentially affected include several grassland obligate species and area sensitive species such as the mountain plover, burrowing owl, lark bunting, and McCown's longspur; however, grassland/herbaceous cover is prevalent throughout the region, therefore significant adverse impacts to these species are not anticipated.

Bats

There has been growing concern in recent decades regarding the status of bats throughout North America, partly because of a general lack of basic natural history information (Hayes 2003), and also because a variety of habitats traditionally used by bats for roosting and foraging have been subjected to widespread disturbance, alteration, reduced availability, or complete removal (Fenton 1997, Pierson 1998). This lack of information regarding life history traits and basic biology has made it even more difficult to further any conservation and management efforts.

Although none of the bat species listed by the USFWS occur in Nebraska, two species of bats with verified or potential occurrence in the AOI are Tier 1 species in the State (Table 6). These include fringed bat and little brown bat, which are discussed above. Eight additional species can be found in the area based on distribution maps (Harvey et al. 1999, Bat Conservation International [BCI] 2014; Table 7). Eight of the bats with the potential to occur in the AOI are year-round residents in the region, and two additional species potentially breed in the area.

Table 7. Bat species with the potential to occur in the Banner County, Nebraska, Wind Energy Area of Interest, based on range and distribution maps (Bat Conservation International 2014, Harvey et al. 1999).

Scientific Name	Common Name	Habitat	Range
Corynorhinus townsendii	Townsend's big-eared bat	Arid western scrub and pine forests. Roosts in mines caves or buildings. Hibernates in caves or mines.	Year-round
Eptesicus fuscus	big brown bat	Common in most habitats, abundant in deciduous forests and suburban areas with agriculture, maternity colonies beneath bark, tree cavities, buildings, barns, bridges	Year-round
Lasionycteris noctivagans	silver-haired bat	Common bat in forested areas, particularly Old Growth; maternity colonies in tree cavities or hollows; hibernates in forests or cliff faces.	Year-round
Lasiurus borealis	eastern red bat	Abundant tree bat, roosts in trees, solitary	Summer
Lasiurus cinereus	hoary bat	Abundant tree bat, roosts in trees, solitary	Summer
Myotis volans	long-legged bat	Occurs mostly in forested mountain regions and river bottoms, also at high elevations. Roosts in trees, rock crevices, fissures in stream banks, and abandoned buildings. Hibernacula include caves and mines.	Year-round
Myotis ciliolabrum	western small-footed bat	Mesic and arid conifer forest, associated with rock outcrops, clay banks; and riparian woodlands. Roosts in rock outcrops, clay banks, loose bark, buildings, bridges, caves, and mines. Hibernacula include caves and mines.	Year-round
Myotis evotis	long-eared bat	Occupies a wide range of rocky and forested habitats over a broad elevation gradient (Jones et al. 1973). Summer day roosts include abandoned buildings, bridges, hollow trees, stumps, under loose bark, and rock fissures. Hibernacula include caves and abandoned mines.	Year-round
Myotis lucifugus	little brown bat	Roosts in buildings, trees, under rock or wood; forage over water, meadows, farmland, cliff faces, forest trails.	Year-round
Myotis thysanodes	fringed bat	Ponderosa pine forests and woodlands, green ash-elm bottomland woodlands.	Year-round

The northern long-eared bat (*Myotis septentrionalis*), a species proposed to be listed as endangered (see USFWS 2013b), deserves special mention. According to the USFWS species profile (USFWS2014c), the distribution range of this species does not include the AOI, but its range includes the northern panhandle of Nebraska. Therefore, conclusive data on the likelihood of this species to occur in the AOI is not available and further studies may be needed in order to determine its presence on the AOI.

At least 19 bat species have been documented as fatalities at wind energy facilities throughout the US (Table 8) and, of these, six species are likely to occur in the AOI based on range maps (Harvey et al. 1999, BCI 2014).

Potential roosting habitat within the AOI is found in the form of trees, buildings, rocky cliffs, and rock outcrops; all of these attributes were observed during the site visit. Woodlands, forests and rocky outcrops were present across the northern portion of the AOI. Rocky cliffs are found in the northwestern portion of the AOI, and abandoned buildings were observed throughout the project area.

Bats generally forage over water and open spaces such as agricultural fields, grasslands, streams, and wetlands/ponds. According to our site visit, agricultural fields and grasslands were common throughout the AOI, but streams, wetlands, and pools are uncommon in the project area. Bats may forage over the entire AOI, although the extent of use is not known. However, little data are available from Nebraska on the foraging behavior, diet, and range of bats, with little knowledge of specific habitat use or seasonal requirements in the state.

Bat casualties have been reported from most wind energy facilities where post-construction fatality data are publicly available. Reported estimates of bat mortality at wind energy facilities have ranged from 0.01 – 47.5 fatalities per turbine per year (0.9 – 43.2 bats per megawatt [MW] per year) in the US, with an average of 3.4 per turbine or 4.6 per MW (NWCC 2004). The majority of the bat casualties at wind energy facilities to date are migratory species which conduct long migrations between summer roosts and winter areas. The species most commonly found as fatalities at wind energy facilities include hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), and eastern red bat (*Lasiurus borealis*; Johnson 2005). The highest numbers of bat fatalities found at wind energy facilities to date have occurred in eastern North America on ridge tops dominated by deciduous forest (NWCC 2004). However, Gruver et al. (2009), BHE Environmental (2010, 2011), Barclay et al. (2007), Good et al. (2011, 2012), and Jain (2005) recently reported relatively high fatality rates from facilities in Wisconsin, Canada, Indiana, and Iowa that were located in grassland and agricultural habitats. Unlike the eastern US wind energy facilities that reported higher bat fatality rates, the Wisconsin, Alberta, Indiana, and Iowa facilities are in open grasslands and crop fields.

Table 8. Summary of bat fatalities (by species) from wind energy facilities in North America.

Common Name	Scientific Name	# Fatalities[1]	% Composition
hoary bat[2]	*Lasiurus cinereus*	5,027	36.5
eastern red bat[2]	*Lasiurus borealis*	3,179	23.1
silver-haired bat[2]	*Lasionycteris noctivagans*	2,500	18.2
little brown bat[2]	*Myotis lucifugus*	1,121	8.1
tricolored bat	*Perimyotis subflavus*	625	4.5
big brown bat[2]	*Eptesicus fuscus*	517	3.8
Mexican free-tailed bat	*Tadarida brasiliensis*	377	2.7
unidentified bat		325	2.4
unidentified myotis		32	0.2
northern long-eared bat	*Myotis septentrionalis*	15	0.1
Seminole bat	*Lasiurus seminolus*	12	0.1
western red bat	*Lasiurus blossevillii*	9	0.1
big free-tailed bat	*Nyctinomops macrotis*	5	<0.1
evening bat	*Nycticeius humeralis*	5	<0.1
western yellow bat	*Lasiurus xanthinus*	3	<0.1
eastern small-footed bat	*Myotis leibii*	2	<0.1
Indiana bat	*Myotis sodalis*	2	<0.1
pocketed free-tailed bat	*Nyctinomops femorosaccus*	2	<0.1
canyon bat	*Parastrellus hesperus*	1	<0.1
cave bat	*Myotis velifer*	1	<0.1
long-legged bat[2]	*Myotis volans*	1	<0.1
unidentified free-tailed bat		1	<0.1
Total	**19 species**	**13,763**	**100**

[1] These are raw data and are not corrected for searcher efficiency or scavenging.

[2] Potential resident or migrant in the AOI (Harvey et al. 1999, BCI 2014).

Cumulative fatalities and species from data compiled by Western EcoSystems Technology, Inc. from publicly available fatality documents (listed in Appendix C).

Additional notes on bat species and numbers:

Indiana bat fatalities in this table are also reported by USFWS (2010, 2011b). Three additional Indiana bat fatalities have been reported (USFWS 2011a, 2012a, 2012c), but are not included in this summary of bats found as fatalities.

One long-eared bat (*Myotis evotis*), a species that may also potentially be found in the AOI, was an incidental fatality recorded at Tehachapi, California (Anderson et al. 2004), but was not part of a formal search and is not included above.

Evening bat (*Nycticeius humeralis*) has also been reported as a fatality (Hale and Karsten 2010), but the number of fatalities is not known.

Canyon bat formerly known as western pipistrelle (*Pipistrellus hesperus*; BCI 2012a), and tricolored bat formerly known as eastern pipistrelle (*Pipistrellus subflavus*; BCI 2012b).

Development on the AOI is likely to result in some bat mortality. The magnitude of these fatalities and the degree to which bat species will be affected is difficult to determine, but it is likely that the mortality rate and species composition will be within the average range of bat mortalities found throughout the US based on general vegetation and landscape characteristics.

CONCLUSIONS

Two state-listed species and 18 state Tier 1 species have some potential occurrence in the project area. In addition, both bald and golden eagle have some potential to occur in the AOI. Of these species, golden eagle, Brewer's sparrow, loggerhead shrike, pinyon jay, swift fox, Rocky Mountain bighorn sheep, fringed bat, little brown bat, and sagebrush lizard are most likely to occur within the AOI. Areas that occur within and in the vicinity of the AOI that should be avoided include

the Wildcat Hills South BUL. Habitats such as the good quality tracts of grasslands and ponderosa pine woodlands found in the northwest portions of the AOI should be avoided to minimize impacts. A summary of the wildlife and habitat issues likely to occur in the project area is presented in Table 9.

Table 9. Summary of the potential for wildlife and habitat conflicts at the Banner County, Nebraska, Wind Energy Area of Interest. VH = Very High, H = High, M = Medium, and L = Low

Issue	VH	H	M	L	Notes
Areas to be avoided			✓		High quality, contiguous mixedgrass prairie; ponderosa pine woodlands and prairie matrix.
Potential for raptor nest sites		✓			Tree rows, woodlots, forests, cliffs.
Concentrated raptor flight potential				✓	Topography provides some potential for concentrated raptor flight; however, impact can be avoided by proper siting of turbines.
Potential for migratory pathway				✓	Stopover habitats available for grassland and forest edge species. However, these characteristics are not unique to AOI and are found elsewhere across the region.
Potential for raptor prey species			✓		Suitable habitat for small to mid-sized mammals exists.
Potential for federally-protected bird species to occur				✓	Federally-protected bird species generally unlikely to occur. Potential for golden eagles to occur year round; bald eagles have the potential for rare occurrence.
Potential for State issues		✓			The AOI overlaps the Wildcat Hills South BUL; likely state species issues exist as well (e.g., swift fox and possibly mountain plover). Several Tier 1 species have the potential to occur on the AOI.
Uniqueness of habitat at wind energy facility			✓		Grasslands are commonly found in the region; however, the ponderosa woodlands/grassland matrix is a unique feature of the Wildcat Hills BUL. The Wildcat Hills North BUL, just north of the AOI, is more extensive and contains similar habitats and protected lands. Displacement of grassland animals; however, similar habitat is found in the vicinity of the AOI.
Potential for rare plants to occur				✓	Rare plants of Nebraska are typically not found in the AOI.
Potential for use by bats		✓			Trees, buildings, grasslands, agricultural land, rocky cliffs and rocky outcrops occur in the AOI.

To characterize the species composition and abundance of the site's avifauna prior to project development, standardized year-round fixed-point bird use surveys should be conducted to detect common and rare species that occur in the site, and to determine which species of concern are most likely to be affected by the project. Bird use surveys should be designed to collect vertical and horizontal flight data to identify levels and patterns of activity within the turbine's rotor-swept zones. The USFWS' Eagle Conservation Plan (USFWS 2013a) recommends at least two years of repeated 800-m (2,625-ft) radius point counts surveys in the project footprint, nesting surveys in the project area, and utilization assessments within the project footprint to determine important

eagle use areas and assist with project planning decisions. Due to the potential occurrence of Tier 1 sensitive breeding bird and grassland obligate species, breeding bird surveys are recommended to determine densities and habitat use within the AOI; however, these surveys may be conducted in conjunction with the year-round bird use surveys. Aerial sharp-tailed grouse lek surveys should be conducted within the project, in conjunction with aerial raptor nest surveys. Due to the potential occurrence of swift fox (state endangered) and mountain plovers (state threatened), consultation with the NGPC should begin at least two years prior to development to determine if species-specific surveys are warranted. Prairie dog town surveys are also recommended because several species of concern with the potential to occur on the AOI are dependent on the presence of prairie dog towns. Due to the potential occurrence of resident and breeding and the uncertainty regarding their distribution and abundance, passive acoustic surveys to determine an index of bat use are recommended.

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Appendix A. Correspondence with the Nebraska Game and Parks Commission and US Fish and Wildlife Service

ENVIRONMENTAL & STATISTICAL CONSULTANTS
4007 State Street, Suite 109, Bismarck, ND 58503
Phone: 701-250-1756 • www.west-inc.com • Fax: 701-250-1761

BUSINESS CONFIDENTIAL

August 20, 2014

Michelle Koch
Nebraska Game and Parks Commission
2200 North 33rd Street
Lincoln, NE 68503-0370

Subject: Banner County, Nebraska, Wind Energy Project
Sensitive Species/Sensitive Habitat Review Request

Dear Ms. Koch:

I am currently assisting a wind energy development client in evaluating the feasibility of developing a wind energy project in western Nebraska (see attached map). The client is looking at a very large area within which a wind development may be placed and is utilizing wildlife related data to help inform overall project siting within the large overall area being considered.

As it is very early in development of the project, specific attributes such as total project size, turbine types, and construction dates are not yet known.

Please review the proposed project area and surrounding areas and provide us with any information about listed, proposed and candidate species (including plants) or sensitive environmental areas and other sensitive wildlife (e.g., eagle nest locations) that could potentially be affected by the project and thus should be considered in this early stage planning. This information will be treated as confidential and will be used for project purposes only.

This request is made pursuant to the U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines (March 2012), as part of the Site Characterization step (Tier 2).

We consider this request privileged and confidential business information and ask that you keep it confidential to the maximum extent allowed by law.

Thank you for your assistance. If you have any questions or require additional information, please contact me at 701-250-1756 or cderby@west-inc.com.

Sincerely,

Clayton Derby
Senior Manager

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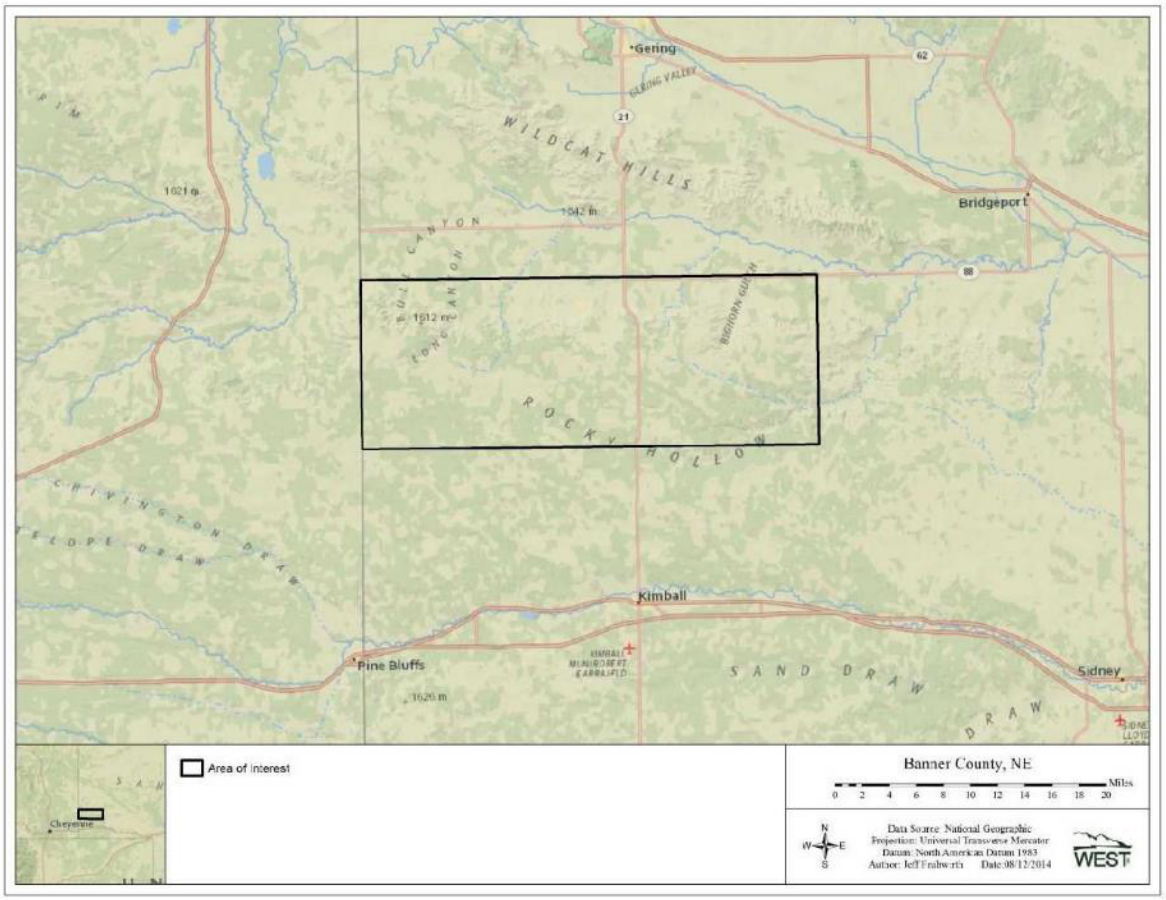

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August 20, 2014

Eliza Hines
USFWS Ecological Services
Nebraska Field Office
203 West Second Street
Grand Island, NE 68801

Subject: Banner County, Nebraska, Wind Energy Project
Sensitive Species/Sensitive Habitat Review Request

Dear Ms. Hines:

I am currently assisting a wind energy development client in evaluating the feasibility of developing a wind energy project in western Nebraska (see attached map). The client is looking at a very large area within which a wind development may be placed and is utilizing wildlife related data to help inform overall project siting within the large overall area being considered.

As it is very early in development of the project, specific attributes such as total project size, turbine types, and construction dates are not yet known.

Please review the proposed project area and surrounding areas and provide us with any information about listed, proposed and candidate species (including plants) or sensitive environmental areas and other sensitive wildlife (e.g., eagle nest locations) that could potentially be affected by the project and thus should be considered in this early stage planning. This information will be treated as confidential and will be used for project purposes only.

This request is made pursuant to the U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines (March 2012), as part of the Site Characterization step (Tier 2).

We consider this request privileged and confidential business information and ask that you keep it confidential to the maximum extent allowed by law.

Thank you for your assistance. If you have any questions or require additional information, please contact me at 701-250-1756 or cderby@west-inc.com.

Sincerely,

Clayton Derby
Senior Manager

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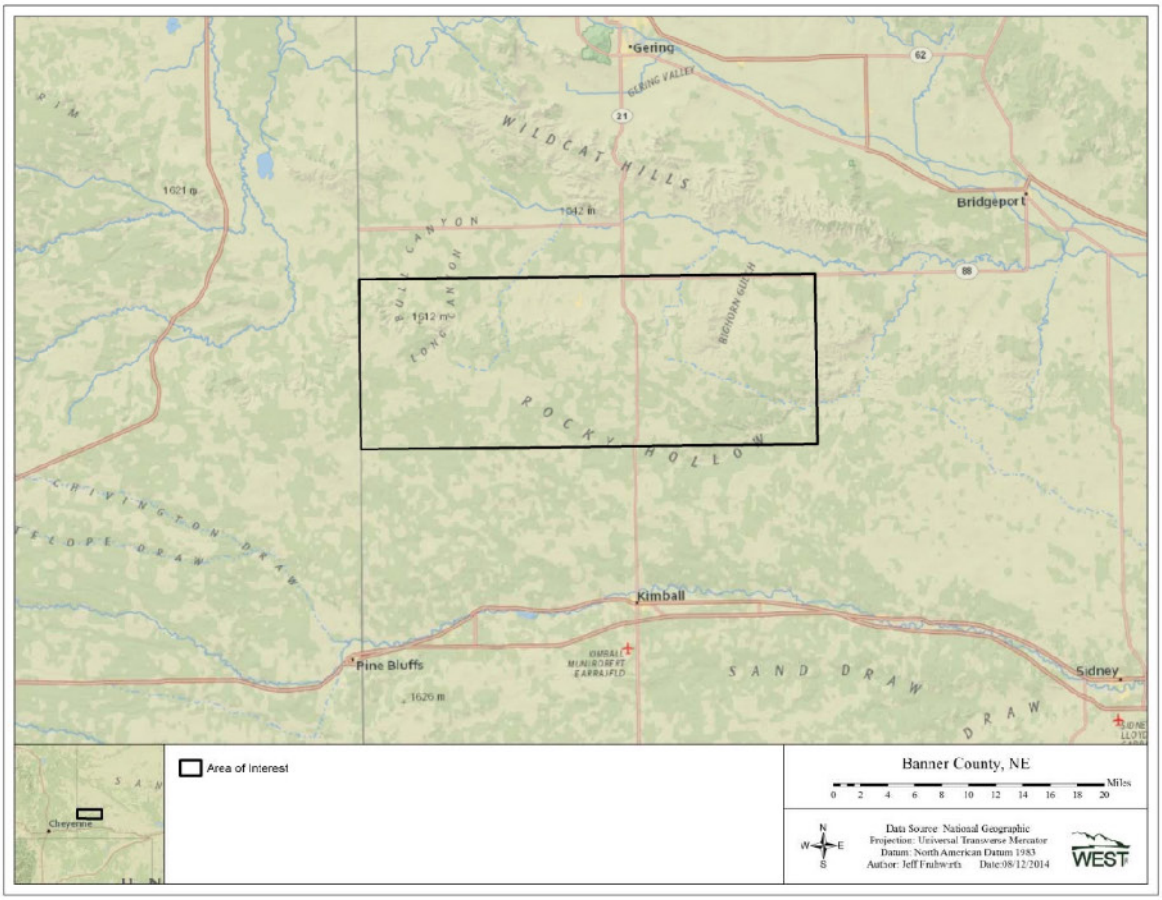

Appendix B. Photographs of the Banner County, Nebraska, Wind Energy Area of Interest

Photo 1. Rye and sunflower found in patches of tilled agriculture in the south-central portion of the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 2. Nonnative mixedgrass prairie of the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 3. Farmstead and woodlot in agricultural landcover at the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 4. Irrigated cropland (corn) at the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 5. Irrigated cropland and rangeland at the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 6. Rolling mixedgrass prairie at the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 7. Mixed grass prairie and yucca shrubs at the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 8. Conifer tree row at the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 9. Unknown raptor nest on cliff face in the northeastern portion of the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 10. Sandstone outcrops in grasslands at the Banner County Wind Energy Area of Interest.

Photo 11.Agriculture at the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 12. Abandoned farmstead at the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 13. Ponderosa pine forest and grassland/herbaceous matrix in the southeastern portion of the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 14. Rangeland and shortgrass prairie in eastern portion of the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 15. Stock pond in eastern portion of the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 16. Shrub/scrub and rocky outcroppings at the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 17. North-facing escarpment of the ridge that transverses the northern portion of the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 18. Agricultural landscape in the southeast portion of the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 19. Drainage off the north-facing slope of the ridge that transverses the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 20. Rolling hills in the northwestern portion of the Banner County, Nebraska, Wind Energy Area of Interest. Mixedgrass prairie with sparse ponderosa pine in background; agriculture in foreground.

Photo 21. Rugged terrain in small canyon on northwest portion of the Banner County, Nebraska, Wind Energy Area of Interest.

Photo 22. Rolling ridge terrain and ponderosa pine forest of the northeast portion of the Banner County, Nebraska, Wind Energy Area of Interest.

Appendix C. List of Wind Energy Facilities with Publicly-Available Bat Fatality Data

Appendix C. List of wind energy facilities with publicly-available bat fatality data.
Data from the following sources:

Project, Location	Reference	Project, Location	Reference
Alite, CA (09-10)	Chatfield et al. 2010	Klondike II, OR (05-06)	NWC and WEST 2007
Alta Wind I, CA (11-12)	Chatfield et al. 2012	Klondike III (Phase I), OR (07-09)	Gritski et al. 2010
Alta Wind II-V, CA (11-12)	Chatfield et al. 2012	Klondike IIIa (Phase II), OR (08-10)	Gritski et al. 2011
Barton I & II, IA (10-11)	Derby et al. 2011a	Leaning Juniper, OR (06-08)	Gritski et al. 2008
Barton Chapel, TX (09-10)	WEST 2011	Lempster, NH (09)	Tidhar et al. 2010
Beech Ridge, WV (12)	Tidhar et al. 2013	Lempster, NH (10)	Tidhar et al. 2011
Big Horn, WA (06-07)	Kronner et al. 2008	Linden Ranch, WA (10-11)	Enz and Bay 2011
Big Smile, OK (12-13)	Derby et al. 2013a	Locust Ridge, PA (Phase II; 09)	Arnett et al. 2011
Biglow Canyon, OR (Phase I; 08)	Jeffrey et al. 2009a	Locust Ridge, PA (Phase II; 10)	Arnett et al. 2011
Biglow Canyon, OR (Phase I; 09)	Enk et al. 2010	Madison, NY (01-02)	Kerlinger 2002b
Biglow Canyon, OR (Phase II; 09-10)	Enk et al. 2011a	Maple Ridge, NY (06)	Jain et al. 2007
Biglow Canyon, OR (Phase II; 10-11)	Enk et al. 2012b	Maple Ridge, NY (07)	Jain et al. 2009a
Biglow Canyon, OR (Phase III; 10-11)	Enk et al. 2012a	Maple Ridge, NY (07-08)	Jain et al. 2009d
Blue Sky Green Field, WI (08; 09)	Gruver et al. 2009	Marengo I, WA (09-10)	URS Corporation 2010b
Buena Vista, CA (08-09)	Insignia Environmental 2009	Marengo II, WA (09-10)	URS Corporation 2010c
Buffalo Gap I, TX (06)	Tierney 2007	Mars Hill, ME (07)	Stantec 2008
Buffalo Gap II, TX (07-08)	Tierney 2009	Mars Hill, ME (08)	Stantec 2009a
Buffalo Mountain, TN (00-03)	Nicholson et al. 2005	McBride, Alb (04)	Brown and Hamilton 2004
Buffalo Mountain, TN (05)	Fiedler et al. 2007	Melancthon, Ont (Phase I; 07)	Stantec Ltd. 2008
Buffalo Ridge, MN (94-95)	Osborn et al. 1996, 2000	Meyersdale, PA (04)	Arnett et al. 2005
Buffalo Ridge, MN (00)	Krenz and McMillan 2000	Moraine II, MN (09)	Derby et al. 2010d
Buffalo Ridge, MN (Phase I; 96)	Johnson et al. 2000a	Mount Storm, WV (Fall 08)	Young et al. 2009b
Buffalo Ridge, MN (Phase I; 97)	Johnson et al. 2000a	Mount Storm, WV (09)	Young et al. 2009a, 2010b
Buffalo Ridge, MN (Phase I; 98)	Johnson et al. 2000a	Mount Storm, WV (10)	Young et al. 2010a, 2011b
Buffalo Ridge, MN (Phase I; 99)	Johnson et al. 2000a	Mount Storm, WV (11)	Young et al. 2011a, 2012b
Buffalo Ridge, MN (Phase II; 98)	Johnson et al. 2000a	Mountaineer, WV (03)	Kerns and Kerlinger 2004
Buffalo Ridge, MN (Phase II; 99)	Johnson et al. 2000a	Mountaineer, WV (04)	Arnett et al. 2005
Buffalo Ridge, MN (Phase II; 01/Lake Benton I)	Johnson et al. 2004	Munnsville, NY (08)	Stantec 2009b
Buffalo Ridge, MN (Phase II; 02/Lake Benton I)	Johnson et al. 2004	Nine Canyon, WA (02-03)	Erickson et al. 2003
Buffalo Ridge, MN (Phase III; 99)	Johnson et al. 2000a	Noble Altona, NY (10)	Jain et al. 2011b

Appendix C. List of wind energy facilities with publicly-available bat fatality data.
Data from the following sources:

Project, Location	Reference	Project, Location	Reference
Buffalo Ridge, MN (Phase III; 01/Lake Benton II)	Johnson et al. 2004	Noble Bliss, NY (08)	Jain et al.2009e
Buffalo Ridge, MN (Phase III; 02/Lake Benton II)	Johnson et al. 2004	Noble Bliss, NY (09)	Jain et al. 2010a
Buffalo Ridge I, SD (09-10)	Derby et al. 2010b	Noble Chateaugay, NY (10)	Jain et al. 2011c
Buffalo Ridge II, SD (11-12)	Derby et al. 2012a	Noble Clinton, NY (08)	Jain et al. 2009c
Casselman, PA (08)	Arnett et al. 2009	Noble Clinton, NY (09)	Jain et al. 2010b
Casselman, PA (09)	Arnett et al. 2010	Noble Ellenburg, NY (08)	Jain et al. 2009b
Castle River, Alb. (01)	Brown and Hamilton 2006a	Noble Ellenburg, NY (09)	Jain et al. 2010c
Castle River, Alb. (02)	Brown and Hamilton 2006a	Noble Wethersfield, NY (10)	Jain et al. 2011a
Cedar Ridge, WI (09)	BHE Environmental 2010	NPPD Ainsworth, NE (06)	Derby et al. 2007
Cedar Ridge, WI (10)	BHE Environmental 2011	Oklahoma Wind Energy Center, OK (04; 05)	Piorkowski and O'Connell 2010
Cohocton/Dutch Hill, NY (09)	Stantec 2010	Pebble Springs, OR (09-10)	Gritski and Kronner 2010b
Cohocton/Dutch Hills, NY (10)	Stantec 2011	PGC site 6-3 (07)	Capouillez and Librandi-Mumma 2008, Librandi-Mumma and Capouillez 2011
Combine Hills, OR (Phase I; 04-05)	Young et al. 2006	Pine Tree, CA (09-10)	BioResource Consultants 2010
Combine Hills, OR (11)	Enz et al. 2012	Pioneer Prairie I, IA (Phase II; 11-12)	Chodachek et al. 2012
Condon, OR	Fishman Ecological Services 2003	PrairieWinds ND1 (Minot), ND (10)	Derby et al. 2011c
Crescent Ridge, IL (05-06)	Kerlinger et al. 2007	PrairieWinds ND1 (Minot), ND (11)	Derby et al. 2012c
Criterion, MD (11)	Young et al. 2012a	PrairieWinds SD1 (Crow Lake), SD (11-12)	Derby et al. 2012d
Criterion, MD (12)	Young et al. 2013	Prince Wind Farm, Ont (06)	Natural Resource Solutions 2009
Crystal Lake II, IA (09)	Derby et al. 2010a	Prince Wind Farm, Ont (07)	Natural Resource Solutions 2009
Diablo Winds, CA (05-07)	WEST 2006, 2008	Prince Wind Farm, Ont (08)	Natural Resource Solutions 2009
Dillon, CA (08-09)	Chatfield et al. 2009	Red Canyon, TX (06-07)	Miller 2008
Dry Lake I, AZ (09-10)	Thompson et al. 2011	Red Hills, OK (12-13)	Derby et al. 2013b
Dry Lake II, AZ (11-12)	Thompson and Bay 2012	Ripley, Ont (08)	Jacques Whitford 2009
Elkhorn, OR (08)	Jeffrey et a. 2009b	Ripley, Ont (08-09)	Golder Associates 2010
Elkhorn, OR (10)	Enk et al. 2011b	Rugby, ND (10-11)	Derby et al. 2011b
Elm Creek, MN (09-10)	Derby et al. 2010c	Searsburg, VT (97)	Kerlinger 2002a
Elm Creek II, MN (11-12)	Derby et al. 2012b	Shiloh I, CA (06-09)	Kerlinger et al. 2009
Foote Creek Rim, WY (Phase I; 99)	Young et al. 2003	Shiloh II, CA (09-10)	Kerlinger et al. 2010
Foote Creek Rim, WY (Phase I; 00)	Young et al. 2003	SMUD Solano, CA (04-05)	Erickson and Sharp 2005

Appendix C. List of wind energy facilities with publicly-available bat fatality data.
Data from the following sources:

Project, Location	Reference	Project, Location	Reference
Foote Creek Rim, WY (Phase I; 01-02)	Young et al. 2003	Stateline, OR/WA (01-02)	Erickson et al. 2004
Forward Energy Center, WI (08-10)	Grodsky and Drake 2011	Stateline, OR/WA (03)	Erickson et al. 2004
Fowler I, IN (09)	Johnson et al. 2010a	Stateline, OR/WA (06)	Erickson et al. 2007
Fowler III, IN (09)	Johnson et al. 2010b	Stetson Mountain I, ME (09)	Stantec 2009c
Fowler I, II, III, IN (10)	Good et al. 2011	Stetson Mountain I, ME (11)	Normandeau Associates 2011
Fowler I, II, III, IN (11)	Good et al. 2012	Stetson Mountain II, ME (10)	Normandeau Associates 2010
Fowler I, II, III, IN (12)	Good et al. 2013	Summerview, Alb (05-06)	Brown and Hamilton 2006b
Goodnoe, WA (09-10)	URS Corporation 2010a	Summerview, Alb (06; 07)	Baerwald 2008
Grand Ridge I, IL (09-10)	Derby et al. 2010g	Top of Iowa, IA (03)	Jain 2005
Harrow, Ont (10)	Natural Resource Solutions 2011	Top of Iowa, IA (04)	Jain 2005
Harvest Wind, WA (10-12)	Downes and Gritski 2012a	Tuolumne (Windy Point I), WA (09-10)	Enz and Bay 2010
Hay Canyon, OR (09-10)	Gritski and Kronner 2010a	Vansycle, OR (99)	Erickson et al. 2000
High Sheldon, NY (10)	Tidhar et al. 2012a	Vantage, WA (10-11)	Ventus Environmental Solutions 2012
High Sheldon, NY (11)	Tidhar et al. 2012b	Wessington Springs, SD (09)	Derby et al. 2010f
High Winds, CA (03-04)	Kerlinger et al. 2006	Wessington Springs, SD (10)	Derby et al. 2011d
High Winds, CA (04-05)	Kerlinger et al. 2006	White Creek, WA (07-11)	Downes and Gritski 2012b
Hopkins Ridge, WA (06)	Young et al. 2007	Wild Horse, WA (07)	Erickson et al. 2008
Hopkins Ridge, WA (08)	Young et al. 2009c	Windy Flats, WA (10-11)	Enz et al. 2011
Jersey Atlantic, NJ (08)	NJAS 2008a, 2008b, 2009	Winnebago, IA (09-10)	Derby et al. 2010e
Judith Gap, MT (06-07)	TRC 2008	Wolfe Island, Ont (May-June 09)	Stantec Ltd. 2010a
Judith Gap, MT (09)	Poulton and Erickson 2010	Wolfe Island, Ont (July-December 09)	Stantec Ltd. 2010b
Kewaunee County, WI (99-01)	Howe et al. 2002	Wolfe Island, Ont (January-June 10)	Stantec Ltd. 2011a
Kibby, ME (11)	Stantec 2012	Wolfe Island, Ont (July-December 10)	Stantec Ltd. 2011b
Kittitas Valley, WA (11-12)	Stantec Consulting 2012	Wolfe Island, Ont (January-June 11)	Stantec Ltd. 2011c
Klondike, OR (02-03)	Johnson et al. 2003	Wolfe Island, Ont (July-December 11)	Stantec Ltd. 2012

Two Indiana bat fatalities are reported by USFWS (2010, 2011b), among other reports. Three additional Indiana bat fatalities have been reported (2011a, 2012a, 2012c), but are not included in this list of public reports. One incidental long-eared bat (*Myotis evotis*) was recorded at Tehachapi, California (Anderson et al. 2004), but is not included in this list of public reports. Additional evening bat (*Nycticeius humeralis*) fatalities have also been reported (Hale and Karsten 2010), but the number of fatalities is not known.

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June 07, 2017

Michael Kurnik
Orion Renewable Energy Group, LLC
155 Grand Avenue, Suite 706
Oakland, California 94612

RE: Banner County Area of Interest 2017 Raptor Nest Survey Results

Dear Mr. Kurnik,

Orion Wind Resources LLC (Orion) requested that Western EcoSystems Technology, Inc. (WEST) conduct aerial raptor nest surveys, including golden eagle (*Aquila chrysaetos*) and other non-eagle raptors (hereafter, raptor) nests observed within an Area of Interest (AOI), called the Banner County AOI, located in Banner, Kimball, and Morrill Counties, Nebraska, and Goshen and Laramie Counties, Wyoming. This memo describes the methodologies and results of the survey. Raptors include accipiters, buteos, harriers, eagles, falcons, and owls.

The aerial survey was conducted in accordance with the guidance provided in the United States Fish and Wildlife Service's (USFWS) *Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2* (ECPG; USFWS 2013)[1] and the USFWS *Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations* (Pagel et al. 2010)[2]. The results of the aerial nest survey are documented below.

The purpose of the surveys was to identify raptor nest locations, determine the status (i.e. active and inactive) of nests, and determine species.

[1] US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance. Module 1 - Land-Based Wind Energy. Version 2. Division of Migratory Bird Management, USFWS. April 2013. Available online at: http://www.fws.gov/migratorybirds/Eagle_Conservation_Plan_Guidance-Module%201.pdf

[2] Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. US Fish and Wildlife Service (USFWS). February 2010. Available online at: http://steinadlerschutz.lbv.de/fileadmin/www.steinadlerschutz.de/terimGoldenEagleTechnicalGuidanceProtocols25March2010_1_.pdf.

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An aerial raptor nest survey was conducted from a Robinson R44 helicopter by a qualified biologist and pilot March 8 – March 12, 2017, and April 24 – April 25, 2017. The surveys were timed to occur before leaf out and to coincide with the period when golden eagles and most other non-eagle raptors were likely incubating eggs or tending young.

The helicopter was flown approximately 46 – 61 m (150 – 200 ft) above ground level at airspeeds of approximately 60-75 mi (97-121 km) per hour. The helicopter was positioned to allow thorough visual inspection of the habitat. When a potential nest was spotted, the helicopter approached slowly and was positioned such that the nest could be clearly seen. All eagle and raptor nests detected within suitable habitat (e.g., rocky outcrops, wooded areas, riparian corridors) within the AOI were recorded (Figure 1).

Data recorded for each observed nest site included a unique nest ID, species occupying the nest (when possible), nest condition (i.e. poor, fair, good, excellent), nest substrate, nest status (i.e., occupied or unoccupied, number of adults and young present), nest location (marked with a hand-held global positioning system unit), and any relevant information about the nest or raptor sightings and behavior nearby. Photographs were taken of all nests and are available to you upon request.

Categories used to describe nest status were consistent with the definitions contained in the ECPG. Nests were classified as occupied if any of the following were observed at the nest structure: 1) an adult in an incubating or brooding position; 2) eggs; 3) nestlings or fledglings; 4) occurrence of a pair of adults or sub-adults; 5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed early in the breeding season; or 6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if one or more eggs had been laid or nestlings or fledglings were observed, or inactive if no eggs or chicks were present. A nest that did not meet the above criteria for occupied was classified as unoccupied. In order for a nest to be considered unoccupied a minimum of two surveys must be conducted.

A total of 91 golden eagle or potential golden eagle nests were identified during aerial surveys of the AOI. For the purposes of this memo a potential golden eagle nest is defined as a large stick nest that is potentially suitable for use by an eagle. These nests were classified as follows: eight occupied active nests, six occupied inactive nests and 77 unoccupied potential golden eagle nests (Figures 1, 2 and 3; Table 1). Nest #'s 84, 99, 139 and 148 were considered occupied inactive based on observations seen during the first round of surveys. No activity was observed at these three nests during the second round of surveys. These nests are considered occupied inactive for the 2017 nesting season. Nest # 156 was considered occupied active based on observations seen during the first round of surveys. No activity was observed at this nest during the second round of surveys. This nest is considered occupied active for the 2017 nesting season.

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A total of 159 non-eagle raptor nests representing six species were documented within the AOI (Figures 1, 2, and 3; Table 2). The identified raptor nests were categorized as follows for the 2017 nesting seaon: one occupied American kestrel (*Falco sparverius*) nest, four occupied ferruginous hawk (*Buteo* regalis) nests, seven occupied great horned owl (*Bubo virginianu*) nests, five occupied active prairie falcon (*Falco mexicanus*) nests, 29 occupied red-tailed hawk (*Buteo jamaicensis*) nests, eight occupied Swainson's hawk (*Buteo swainsoni*) nests, one occupied unknown raptor nest and 101 unoccupied unknown raptor nests (Figures 1, 2, and 3; Table 2).

Sincerely,

Chris Fritchman
Project Manager

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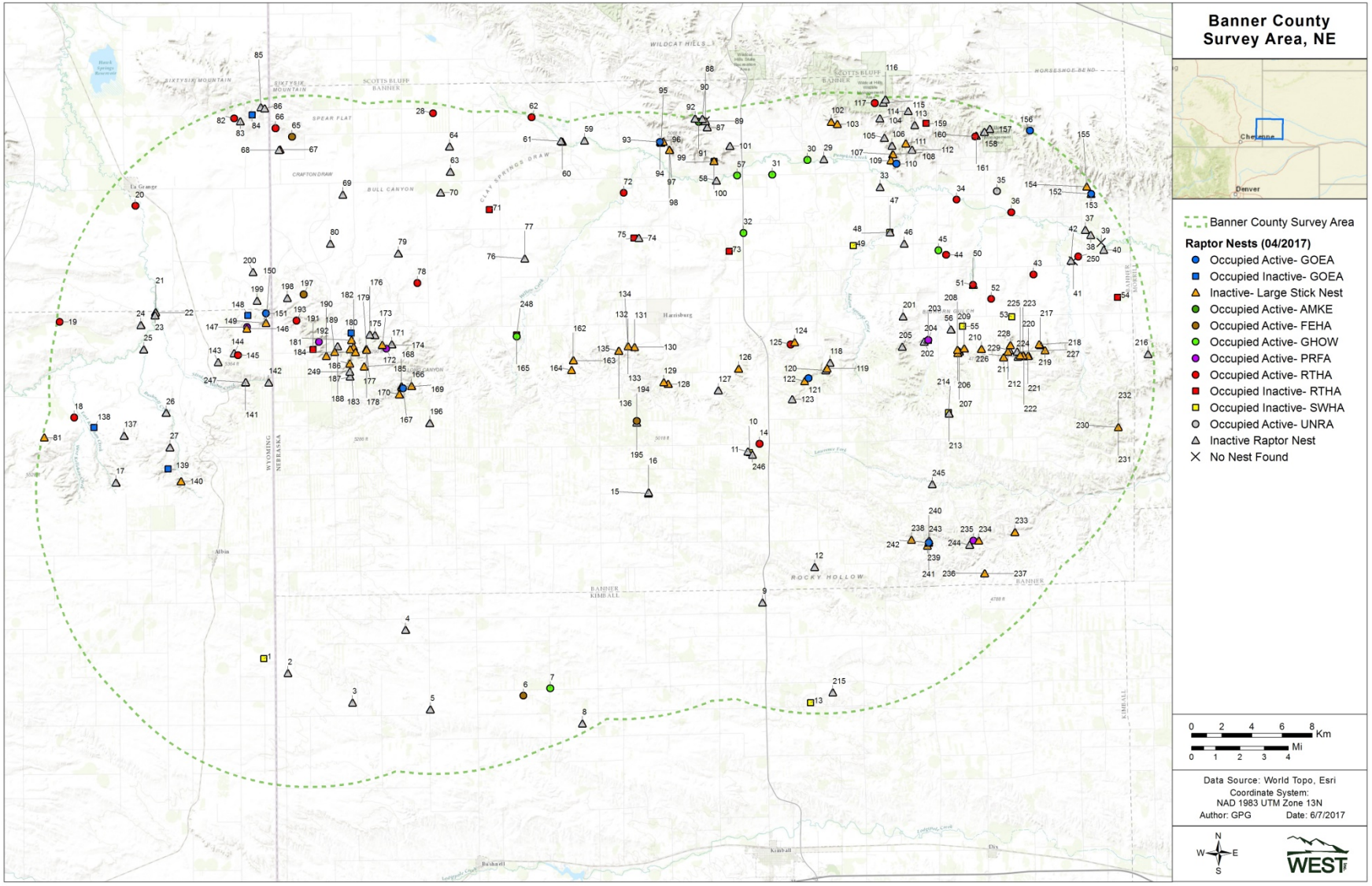

Figure 1. Results of golden eagle and raptor nest surveys of the Banner County AOI.

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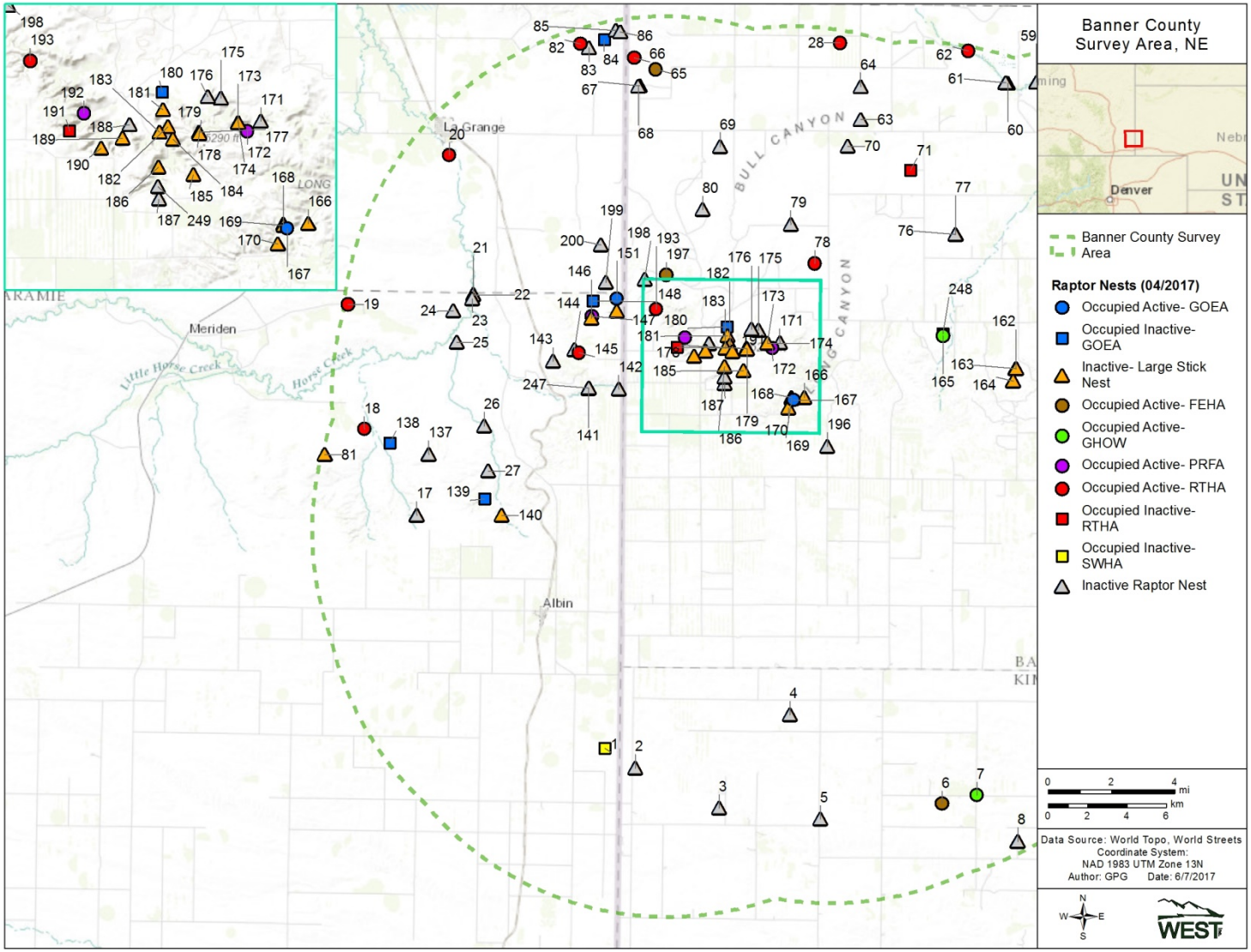

Figure 2. Results of golden eagle and raptor nest surveys within the western half of the Banner County AOI.

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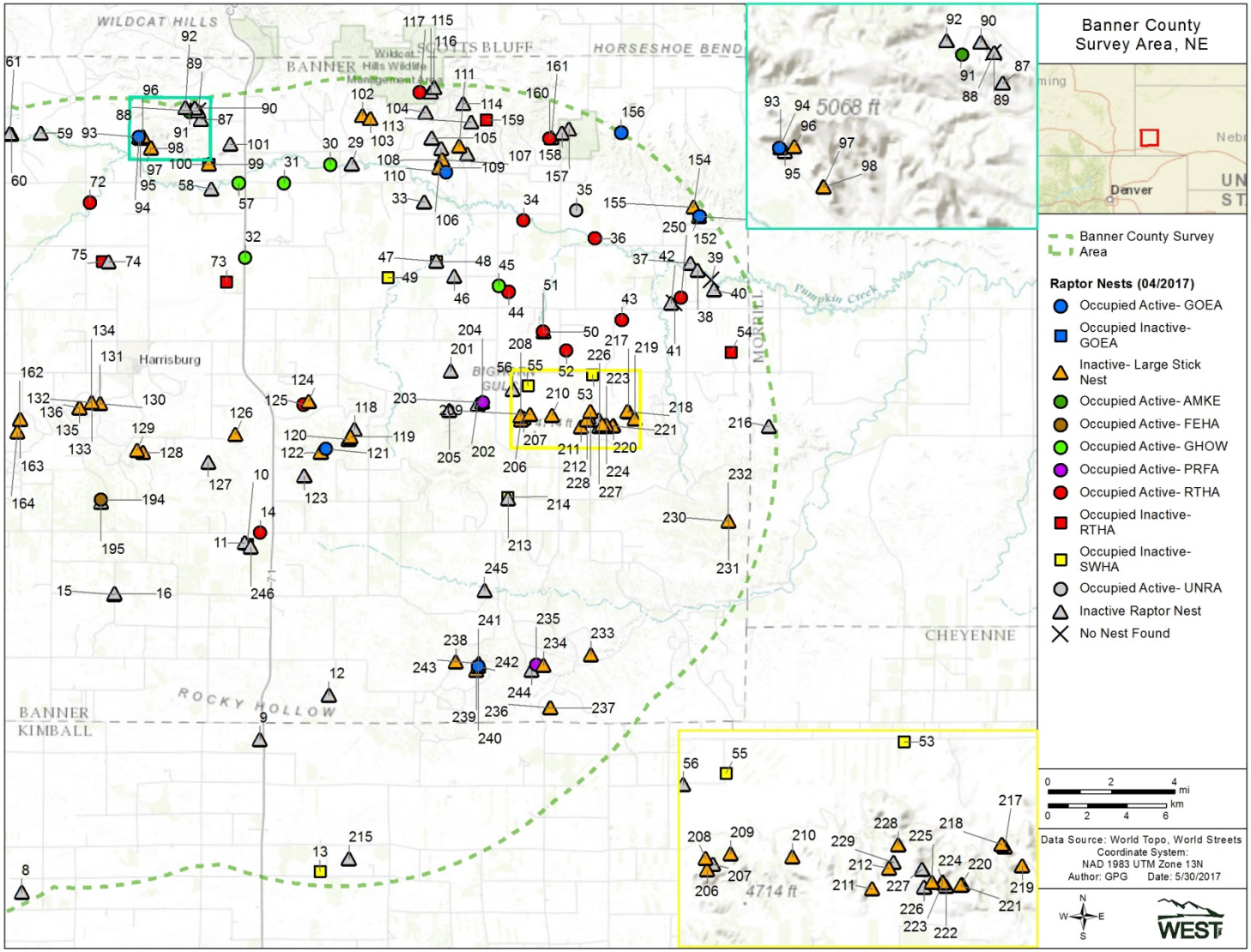

Figure 3. Results of golden eagle and raptor nest surveys within the eastern half of the Banner County AOI.

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Table 1. Golden eagle or potential golden eagle nests identified during aerial surveys in March and April 2017 within the Banner County AOI. Unique ID (ID), locations (NAD83, Zone 13), and nest features are included.

ID	Species[1]	Northing	Easting	Status	Condition	Substrate
81	GOEA[2]	4593343	563892	Unoccupied	Fair	Cliff
84	GOEA[3]	4614751	577700	Occupied-Inactive	Fair	Cliff
93	GOEA[2]	4612955	604775	Unoccupied	Good	Cliff
94	GOEA	4612949	604760	Occupied-Active	Good	Cliff
96	GOEA[2]	4612974	604974	Unoccupied	Fair	Cliff
97	GOEA[2]	4612422	605391	Unoccupied	Poor	Cliff
98	GOEA[2]	4612414	605394	Unoccupied	Good	Cliff
99	GOEA[3]	4611663	608351	Occupied-Inactive	Good	Cliff
100	GOEA[2]	4611668	608360	Unoccupied	Good	Cliff
102	GOEA[2]	4614279	616126	Unoccupied	Fair	Cliff
103	GOEA[2]	4614136	616531	Unoccupied	Fair	Cliff
108	GOEA[2]	4612126	620236	Unoccupied	Poor	Cliff
109	GOEA[2]	4611722	620097	Unoccupied	Good	Cliff
110	GOEA	4611506	620445	Occupied-Active	Good	Cliff
111	GOEA[2]	4612848	621083	Unoccupied	Fair	Cliff
119	GOEA[2]	4597925	615862	Unoccupied	Poor	Cliff
121	GOEA	4597271	614618	Occupied-Active	Good	Cliff
122	GOEA[2]	4597085	614361	Unoccupied	Fair	Cliff
124	GOEA[2]	4599666	613695	Unoccupied	Good	Cliff
126	GOEA[2]	4597911	609984	Unoccupied	Poor	Cliff
128	GOEA[2]	4596896	605306	Unoccupied	Fair	Cliff
129	GOEA[2]	4597013	605006	Unoccupied	Poor	Cliff
130	GOEA[2]	4599350	603084	Unoccupied	Fair	Cliff
131	GOEA[2]	4599350	603084	Unoccupied	Fair	Cliff
132	GOEA[2]	4599403	602653	Unoccupied	Fair	Cliff
133	GOEA[2]	4599403	602653	Unoccupied	Fair	Cliff
134	GOEA[2]	4599403	602652	Unoccupied	Fair	Cliff
135	GOEA[2]	4599098	602021	Unoccupied	Poor	Cliff
136	GOEA[2]	4599090	602040	Unoccupied	Good	Cliff
138	GOEA	4594011	567200	Occupied-Inactive	Good	Cliff
139	GOEA[3]	4591264	572103	Occupied-Inactive	Good	Cliff
140	GOEA[2]	4590445	572978	Unoccupied	Fair	Cliff
146	GOEA[2]	4600562	577342	Unoccupied	Good	Cliff
148	GOEA[3]	4601452	577400	Occupied-Inactive	Good	Cliff
149	GOEA[2]	4600943	578616	Unoccupied	Good	Cliff
150	GOEA[2]	4600943	578616	Unoccupied	Good	Cliff
151	GOEA	4601584	578616	Occupied-Active	Good	Cliff
152	GOEA[2]	4609510	633377	Unoccupied	Good	Cliff
153	GOEA	4609510	633387	Occupied-Active	Good	Cliff
154	GOEA[2]	4609995	633085	Unoccupied	Poor	Cliff
155	GOEA[2]	4609995	633085	Unoccupied	Good	Cliff
156	GOEA[4]	4613698	629313	Occupied-Active	Good	Cliff
162	GOEA[2]	4598464	599009	Unoccupied	Good	Cliff
163	GOEA[2]	4598458	599016	Unoccupied	Good	Cliff
164	GOEA[2]	4597814	598888	Unoccupied	Good	Cliff
166	GOEA[2]	4596765	588274	Unoccupied	Good	Cliff
167	GOEA	4596614	587704	Occupied-Active	Good	Cliff
168	GOEA[2]	4596736	587604	Unoccupied	Fair	Cliff

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Table 1. Golden eagle or potential golden eagle nests identified during aerial surveys in March and April 2017 within the Banner County AOI. Unique ID (ID), locations (NAD83, Zone 13), and nest features are included.

ID	Species[1]	Northing	Easting	Status	Condition	Substrate
169	GOEA[2]	4596693	587618	Unoccupied	Poor	Cliff
170	GOEA[2]	4596194	587461	Unoccupied	Poor	Cliff
173	GOEA[2]	4599475	586329	Unoccupied	Good	Cliff
174	GOEA[2]	4599479	586332	Unoccupied	Good	Cliff
177	GOEA[2]	4599213	585262	Unoccupied	Poor	Cliff
178	GOEA[2]	4599178	585285	Unoccupied	Good	Cliff
179	GOEA[2]	4599164	585283	Unoccupied	Good	Cliff
180	GOEA	4600276	584258	Occupied-Inactive	Fair	Cliff
181	GOEA[2]	4599809	584279	Unoccupied	Good	Cliff
182	GOEA[2]	4599341	584416	Unoccupied	Fair	Cliff
183	GOEA[2]	4599194	584188	Unoccupied	Fair	Cliff
184	GOEA[2]	4599008	584557	Unoccupied	Fair	Cliff
185	GOEA[2]	4598052	585133	Unoccupied	Poor	Cliff
186	GOEA[2]	4598248	584173	Unoccupied	Good	Cliff
189	GOEA[2]	4599015	583176	Unoccupied	Fair	Cliff
190	GOEA[2]	4598744	582605	Unoccupied	Poor	Cliff
206	GOEA[2]	4598956	624533	Unoccupied	Fair	Cliff
208	GOEA[2]	4599163	624506	Unoccupied	Good	Cliff
209	GOEA[2]	4599254	624963	Unoccupied	Fair	Cliff
210	GOEA[2]	4599222	626100	Unoccupied	Fair	Cliff
211	GOEA[2]	4598656	627574	Unoccupied	Poor	Cliff
212	GOEA[2]	4599039	627873	Unoccupied	Fair	Cliff
217	GOEA[2]	4599474	629996	Unoccupied	Good	Cliff
218	GOEA[2]	4599516	629936	Unoccupied	Poor	Cliff
219	GOEA[2]	4599127	630320	Unoccupied	Fair	Cliff
220	GOEA[2]	4598770	629221	Unoccupied	Fair	Cliff
221	GOEA[2]	4598755	629199	Unoccupied	Good	Cliff
223	GOEA[2]	4598793	628874	Unoccupied	Good	Cliff
225	GOEA[2]	4598796	628672	Unoccupied	Good	Cliff
228	GOEA[2]	4599473	628034	Unoccupied	Fair	Cliff
230	GOEA[2]	4594024	635185	Unoccupied	Fair	Cliff
231	GOEA[2]	4594024	635185	Unoccupied	Good	Cliff
232	GOEA[2]	4594026	635188	Unoccupied	Fair	Cliff
233	GOEA[2]	4587065	628331	Unoccupied	Good	Cliff
234	GOEA[2]	4586502	625928	Unoccupied	Good	Cliff
236	GOEA[2]	4584335	626313	Unoccupied	Good	Cliff
237	GOEA[2]	4584329	626322	Unoccupied	Fair	Cliff
238	GOEA[2]	4586565	621462	Unoccupied	Good	Cliff
239	GOEA[2]	4586167	622508	Unoccupied	Fair	Cliff
240	GOEA[2]	4586361	622606	Unoccupied	Fair	Cliff
241	GOEA	4586381	622611	Occupied-Active	Good	Cliff
242	GOEA[2]	4586381	622611	Unoccupied	Good	Cliff
243	GOEA[2]	4586513	622624	Unoccupied	Fair	Cliff

[1] GOEA: golden eagle (*Aquila chrysaetos*),[2] denotes potential golden eagle nest (defined as a large stick nest that is potentially suitable for use by an eagle); [3] denotes golden eagle nest that was considered occupied-inactive for the 2017 nesting season based on observations during the first round of surveys; [4] denotes golden eagle nest that was considered occupied-active for the 2017 nesting season based on observation during the first round of surveys

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Table 2. Non-eagle raptor nests identified during aerial surveys conducted in March and April 2017 within the Banner County AOI. Nest Unique ID (ID), locations (NAD83, Zone 13), and nest features are included.

ID	Species[1]	Northing	Easting	Status	Condition	Substrate
1	SWHA	4578691	578465	Occupied-Inactive	Good	Tree
2	Unknown	4577706	580056	Unoccupied	Fair	Tree
3	Unknown	4575755	584357	Unoccupied	Fair	Tree
4	Unknown	4580578	587875	Unoccupied	Fair	Tree
5	Unknown	4575302	589524	Unoccupied	Good	Tree
6	FEHA	4576218	595705	Occupied-Active	Good	Tree
7	GHOW	4576707	597471	Occupied-Active	Good	Tree
8	Unknown	4574379	599614	Unoccupied	Fair	Tree
9	Unknown	4582406	611568	Unoccupied	Good	Tree
10	SWHA	4592352	610706	Occupied-Inactive	Good	Tree
11	Unknown	4592424	610593	Unoccupied	Poor	Tree
12	Unknown	4584748	615030	Unoccupied	Fair	Powerline
13	SWHA	4575760	614761	Occupied-Inactive	Good	Tree
14	RTHA	4592931	611362	Occupied-Active	Good	Tree
15	Unknown	4589630	603988	Unoccupied	Poor	Tree
16	Unknown	4589696	604001	Unoccupied	Poor	Tree
17	Unknown	4590349	568650	Unoccupied	Poor	Cliff
18	RTHA	4594681	565890	Occupied-Active	Good	Tree
19	RTHA	4601021	564919	Occupied-Active	Good	Tree
20	RTHA[2]	4608718	569931	Occupied-Active	Good	Tree
21	Unknown	4601651	571286	Occupied-Inactive	Good	Tree
22	Unknown	4601633	571287	Occupied-Inactive	Good	Tree
23	Unknown	4601437	571252	Unoccupied	Fair	Tree
24	Unknown	4600798	570295	Unoccupied	Fair	Tree
25	Unknown	4599191	570492	Unoccupied	Fair	Tree
26	Unknown	4594975	571993	Unoccupied	Fair	Tree
27	Unknown	4592691	572239	Unoccupied	Good	Tree
28	RTHA	4614856	589701	Occupied-Active	Good	Tree
29	Unknown	4611805	615645	Unoccupied	Good	Tree
30	GHOW	4611769	614541	Occupied-Active	Good	Tree
31	GHOW	4610783	612218	Occupied-Active	Good	Tree
32	GHOW	4606927	610317	Occupied-Active	Fair	Tree
33	Unknown	4609958	619377	Unoccupied	Good	Tree
34	RTHA	4609123	624447	Occupied-Active	Good	Tree
35	UNRA	4609680	627133	Occupied-Active	Good	Tree
36	RTHA	4608291	628080	Occupied-Active	Good	Tree
37	Unknown	4607121	632993	Unoccupied	Good	Tree
38	Unknown	4606769	633353	Unoccupied	Fair	Tree
39	Unknown[5]	4606269	634066	Unoccupied	Good	Tree
40	Unknown	4605794	634220	Unoccupied	Good	Tree
41	Unknown[5]	4605061	632216	Unoccupied	Fair	Tree
42	Unknown	4605069	632050	Unoccupied	Good	Tree
43	RTHA	4604159	629549	Occupied-Active	Good	Tree
44	RTHA	4605471	623750	Occupied-Active	Good	Tree
45	GHOW[2]	4605763	623254	Occupied-Active	Fair	Tree
46	Unknown	4606198	620972	Unoccupied	Good	Tree
47	Unknown	4606950	620036	Unoccupied	Fair	Tree
48	SWHA	4606950	620028	Occupied-Inactive	Good	Tree
49	SWHA	4606076	617595	Occupied-Inactive	Good	Tree

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Table 2. Non-eagle raptor nests identified during aerial surveys conducted in March and April 2017 within the Banner County AOI. Nest Unique ID (ID), locations (NAD83, Zone 13), and nest features are included.

ID	Species[1]	Northing	Easting	Status	Condition	Substrate
50	RTHA	4603472	625554	Occupied-Active	Good	Tree
51	Unknown	4603472	625561	Unoccupied	Good	Tree
52	RTHA	4602543	626753	Occupied-Active	Good	Tree
53	SWHA	4601360	628115	Occupied-Inactive	Good	Tree
54	RTHA	4602649	635138	Occupied-Inactive	Good	Tree
55	SWHA	4600732	624851	Occupied-Inactive	Good	Tree
56	Unknown	4600503	624072	Unoccupied	Good	Tree
57	GHOW	4610718	609887	Occupied-Active	Good	Tree
58	Unknown	4610390	608505	Unoccupied	Fair	Tree
59	Unknown	4613040	599753	Unoccupied	Fair	Tree
60	Unknown	4612976	598277	Unoccupied	Good	Tree
61	Unknown	4613004	598192	Unoccupied	Good	Tree
62	RTHA	4614591	596239	Occupied-Active	Good	Tree
63	Unknown	4610968	590845	Unoccupied	Fair	Tree
64	Unknown	4612637	590789	Unoccupied	Poor	Tree
65	FEHA	4613297	580338	Occupied-Active	Good	Rock
66	RTHA	4613873	579241	Occupied-Active	Good	Cliff
67	Unknown	4612447	579549	Unoccupied	Fair	Tree
68	Unknown	4612414	579476	Unoccupied	Fair	Tree
69	Unknown	4609448	583702	Unoccupied	Fair	Tree
70	Unknown	4609600	590210	Unoccupied	Good	Tree
71	RTHA	4608454	593438	Occupied-Inactive	Good	Tree
72	RTHA	4609578	602360	Occupied-Active	Good	Tree
73	RTHA[4]	4605691	609357	Occupied-Inactive	Fair	Tree
74	Unknown	4606584	603358	Unoccupied	Fair	Tree
75	RTHA[3]	4606579	603037	Occupied-Inactive	Good	Tree
76	Unknown	4605217	595790	Unoccupied	Fair	Tree
77	Unknown	4605222	595791	Unoccupied	Fair	Tree
78	RTHA	4603604	588661	Occupied-Active	Good	Tree
79	Unknown	4605551	587385	Unoccupied	Fair	Tree
80	Unknown	4606209	582890	Unoccupied	Fair	Tree
82	RTHA	4614515	576484	Occupied-Active	Good	Cliff
83	Unknown	4614315	576911	Unoccupied	Poor	Cliff
85	Unknown	4615256	578276	Unoccupied	Poor	Rock
86	Unknown	4615182	578514	Unoccupied	Fair	Rock
87	Unknown	4613911	607908	Unoccupied	Poor	Rock
88	Unknown	4614339	607776	Unoccupied	Poor	Cliff
89	Unknown[5]	4614339	607771	Unoccupied	Poor	Cliff
90	Unknown	4614480	607585	Unoccupied	Poor	Cliff
91	AMKE[5]	4614301	607329	Occupied-Active	Good	Cliff
92	Unknown	4614494	607097	Unoccupied	Fair	Cliff
95	Unknown	4612899	604837	Unoccupied	Good	Cliff
101	Unknown	4612683	609417	Unoccupied	Good	Cliff
104	Unknown	4614510	619357	Unoccupied	Good	Cliff
105	Unknown	4613221	619667	Unoccupied	Fair	Cliff
106	Unknown	4612701	620161	Unoccupied	Fair	Cliff
107	Unknown	4612123	620204	Unoccupied	Good	Cliff
112	Unknown	4612438	621489	Unoccupied	Fair	Cliff
113	Unknown	4614064	621665	Unoccupied	Good	Cliff
114	Unknown	4614992	621244	Unoccupied	Good	Cliff

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Table 2. Non-eagle raptor nests identified during aerial surveys conducted in March and April 2017 within the Banner County AOI. Nest Unique ID (ID), locations (NAD83, Zone 13), and nest features are included.

ID	Species[1]	Northing	Easting	Status	Condition	Substrate
115	Unknown	4615558	619589	Unoccupied	Good	Cliff
116	Unknown	4615777	619739	Unoccupied	Good	Cliff
117	RTHA	4615541	619013	Occupied-Active	Good	Cliff
118	Unknown	4598311	616062	Unoccupied	Poor	Cliff
120	Unknown	4597794	615774	Unoccupied	Poor	Cliff
123	Unknown	4595880	613549	Unoccupied	Poor	Cliff
125	RTHA	4599528	613432	Occupied-Active	Good	Cliff
127	Unknown	4596465	608639	Unoccupied	Good	Cliff
137	Unknown	4593465	569189	Unoccupied	Good	Cliff
141	Unknown	4596989	577245	Unoccupied	Good	Cliff
142	Unknown	4596993	578793	Unoccupied	Good	Cliff
143	Unknown	4598342	575432	Unoccupied	Fair	Cliff
144	Unknown	4598939	576500	Unoccupied	Fair	Cliff
145	RTHA	4598802	576739	Occupied-Active	Good	Cliff
147	PRFA	4600672	577352	Occupied-Active	Fair	Cliff
157	Unknown	4613807	626665	Unoccupied	Fair	Cliff
158	Unknown	4613617	626306	Unoccupied	Fair	Cliff
159	RTHA[4]	4614184	622420	Occupied-Inactive	Good	Cliff
160	RTHA	4613305	625684	Occupied-Active	Fair	Cliff
161	Unknown	4613358	625761	Unoccupied	Poor	Cliff
165	GHOW	4600041	595253	Occupied-Active	Good	Cliff
171	Unknown	4599531	586952	Unoccupied	Fair	Cliff
172	PRFA	4599244	586589	Occupied-Active	Fair	Cliff
175	Unknown	4600132	585850	Unoccupied	Fair	Cliff
176	Unknown	4600177	585493	Unoccupied	Poor	Cliff
187	Unknown	4597381	584196	Unoccupied	Good	Cliff
188	Unknown	4599393	583366	Unoccupied	Fair	Cliff
191	RTHA[4]	4599190	581732	Occupied-Inactive	Good	Cliff
192	PRFA	4599685	582132	Occupied-Active	Good	Cliff
193	RTHA	4601101	580633	Occupied-Active	Good	Cliff
194	FEHA	4594452	603219	Occupied-Active	Good	Tree
195	Unknown	4594334	603218	Unoccupied	Poor	Tree
196	Unknown	4594299	589485	Unoccupied	Good	Tree
197	FEHA	4602845	581108	Occupied-Active	Good	Rock
198	Unknown	4602595	580021	Unoccupied	Fair	Cliff
199	Unknown	4602421	578024	Unoccupied	Fair	Rock
200	Unknown	4604320	577750	Unoccupied	Good	Cliff
201	Unknown	4601381	620903	Unoccupied	Fair	Rock
202	Unknown	4599700	622300	Unoccupied	Fair	Cliff
203	PRFA	4599819	622568	Occupied-Active	Fair	Cliff
204	Unknown	4599833	622534	Unoccupied	Fair	Cliff
205	Unknown	4599357	620850	Unoccupied	Poor	Cliff
207	Unknown	4599055	624640	Unoccupied	Good	Cliff
213	Unknown	4594935	623944	Unoccupied	Fair	Tree
214	SWHA	4594999	623921	Occupied-Inactive	Good	Tree
215	Unknown	4576431	616241	Unoccupied	Fair	Tree
216	Unknown	4598886	637160	Unoccupied	Good	Tree
222	Unknown	4598727	628923	Unoccupied	Poor	Cliff
224	Unknown	4598808	628865	Unoccupied	Fair	Cliff
226	Unknown	4598704	628526	Unoccupied	Good	Cliff

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Table 2. Non-eagle raptor nests identified during aerial surveys conducted in March and April 2017 within the Banner County AOI. Nest Unique ID (ID), locations (NAD83, Zone 13), and nest features are included.

ID	Species[1]	Northing	Easting	Status	Condition	Substrate
227	Unknown	4599032	628484	Unoccupied	Good	Cliff
229	Unknown	4599154	627954	Unoccupied	Poor	Cliff
235	PRFA	4586516	625561	Occupied-Active	Good	Cliff
244	Unknown	4586220	625324	Unoccupied	Fair	Cliff
245	Unknown	4590236	622841	Unoccupied	Poor	Cliff
246	Unknown	4592198	610895	Unoccupied	Good	Tree
247	Unknown	4597003	577271	Unoccupied	Fair	Cliff
248	RTHA	4600151	595250	Occupied-Inactive	Good	Cliff
249	Unknown	4597719	584170	Unoccupied	Good	Cliff
250	RTHA	4605351	632535	Occupied-Active	Good	Cliff

[1] AMKE: American kestrel (*Falco* sparverius), FEHA: ferruginous hawk (*Buteo regalis*), GBHE: great blue heron (*Ardea* Herodias), GHOW: great-horned owl (*Bubo virginianus*), PRFA: prairie falcon (*Falco* mexicanus), RTHA: red-tailed hawk (*Buteo jamaicensis*), SWHA: Swainson's hawk (*Buteo swainsoni*), UNRA: unidentified raptor; [2] denotes nest that was occupied-active great horned owl during first set of surveys but was considered unoccupied during the second round of surveys therefore the data in Table 2 is reflective of the overall status for the 2017 nesting season, [3] denotes nest that was occupied-active great horned owl during first set of surveys but was considered an occupied inactive RTHA nest based on observations during the second round of surveys therefore the data in Table 2 is reflective of the current status, [4] denotes nest that was occupied-inactive red-tailed hawk during first set of surveys but was considered unoccupied during the second round of surveys therefore the data in Table 2 is reflective of the overall status for the 2017 nesting season,; [5]denotes that nest wasn't able to be located during the second round of surveys – species, status, condition and substrates are reflective of the first round of surveys

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August 6, 2020

Michael Kurnik
Orion Renewable Energy Group, LLC
155 Grand Avenue, Suite 706
Oakland, California 94612

RE: Pronghorn Flats 2019 Aerial Eagle and Raptor Nest Survey Results

Dear Mr. Kurnik,

Orion Wind Resources LLC (Orion) requested that Western EcoSystems Technology, Inc. (WEST) conduct aerial eagle and raptor nest surveys for the proposed Pronghorn Flats Wind Energy Project (Project), formerly known as Banner County, located in Banner County, Nebraska. In addition to Banner County, the nest survey included portions of Kimball, County, Nebraska, and Goshen and Laramie Counties, Wyoming. The aerial survey was conducted in accordance with the guidance provided in the United States Fish and Wildlife Service's (USFWS) *Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2* (ECPG; USFWS 2013) and the USFWS *Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations* (Pagel et al. 2010). The purpose of the surveys was to identify raptor nest locations, determine the status (i.e. occupied and unoccupied; active and inactive) of nests, determine species, and determine whether the nest is potentially suitable for use by an eagle. This memorandum describes the methodologies and results of the 2019 surveys.

Surveys were conducted within a 10-mile buffer of the proposed turbine layout minimum convex polygon (MCP) provided by Orion in March 2019 (Figure 1), resulting in a survey area of 425 acres. An aerial nest survey was conducted from a Robinson R44 helicopter by a qualified biologist and pilot from March 20, 2019, to March 24, 2019, and a follow up survey was conducted on May 2, 2019. The Department of Defense (DOD) required a two nautical mile setback from missile silos, and as such, changes to the Project's turbine layout occurred in May 2020 following the completion of surveys (Figure 2).

The helicopter was flown approximately 46 – 61 m (150 – 200 ft) above ground level at airspeeds of approximately 60-75 mi (97-121 km) per hour. The helicopter was positioned to allow thorough visual inspection of the habitat. When a potential nest was spotted, the helicopter approached slowly and was positioned such that the nest could be clearly seen. All eagle and raptor nests detected within suitable habitat (e.g., rocky outcrops, wooded areas, riparian corridors) within the survey area were recorded (Figure 1).

Data recorded for each observed nest site included a unique nest ID, species occupying the nest (when possible), nest condition (i.e. poor, fair, good, excellent), nest substrate, nest status (i.e., occupied or unoccupied, number of adults and young present), nest location (marked with a hand-held global positioning system unit), and any relevant information about the nest or raptor sightings and behavior nearby. Photographs were taken of all nests and are available upon request.

Categories used to describe nest status were consistent with the definitions contained in the ECPG. Nests were classified as occupied if any of the following were observed at the nest structure: 1) an adult on the nest; 2) eggs; 3) nestlings or fledglings; 4) occurrence of a pair of adults or sub-adults; 5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed early in the breeding season; or 6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if one or more eggs had been laid or nestlings or fledglings were observed, or inactive if no eggs or chicks were present. A nest that did not meet the above criteria for occupied during a minimum of two surveys, was classified as unoccupied. Furthermore, a nest was classified as undetermined if it was only observed during one survey.

A total of 80 nest structures were identified during the two rounds of surveys in 2019. Of the 80 total nests, 68 golden eagle (*Aquila chrysaetos*) or large stick nests were identified during aerial surveys. Large stick nests are classified as an unoccupied or undetermined nest potentially suitable for use by an eagle.

The 68 eagle or large stick nests were classified as follows: seven occupied active golden eagle nests (Nest IDs 131, 138, 150, 169, 181, 257, and 292), four occupied inactive golden eagle nests (Nest IDs 130, 151,189, and 256), three unoccupied golden eagle nests (Nest IDs 167, 180, 193), two undetermined large stick nests (Nest ID 190, 262), and 52 unoccupied large stick nests (Figure 2, Tables 1 and 3).

A total of 12 other raptor nests representing three species and two unidentified species were documented within the study area (Figure 2; Tables 2 and 3). The identified other raptor nests were categorized as follows: two occupied active ferruginous hawk (*Buteo regalis*) nests, one unoccupied prairie falcon (*Falco mexicanus*) nest, four red-tailed hawk nests (two occupied active and two unoccupied), five unidentified raptor nests (four unoccupied, one undetermined Figure 2; Tables 2 and 3). Of the 12, three nests, all unidentified raptor nests, were within the MCP for the March 2019 layout. Those nests were either unoccupied (n=2) or undetermined (n=1). Only one unidentified unoccupied raptor nest occurs within the currently proposed MCP based on the May 2020 layout.

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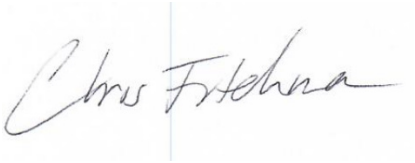
Sincerely,



Chris Fritchman
Project Manager

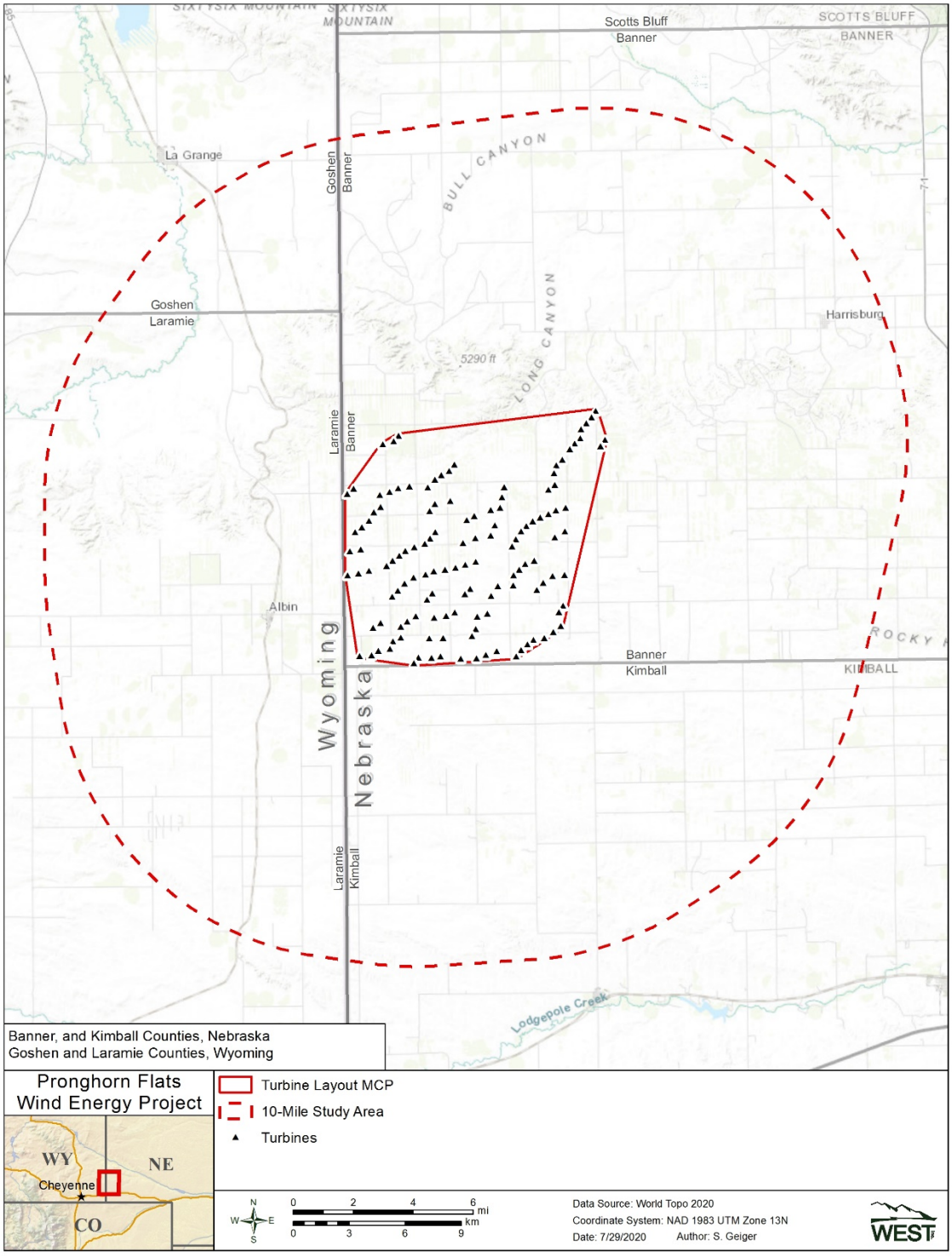


Figure 1. Aerial eagle and raptor nest survey area for the Pronghorn Flats Wind Energy Project in Banner, and Kimball counties, NE, Goshen and Laramie counties, WY. The turbine layout depicted was from March 2019.

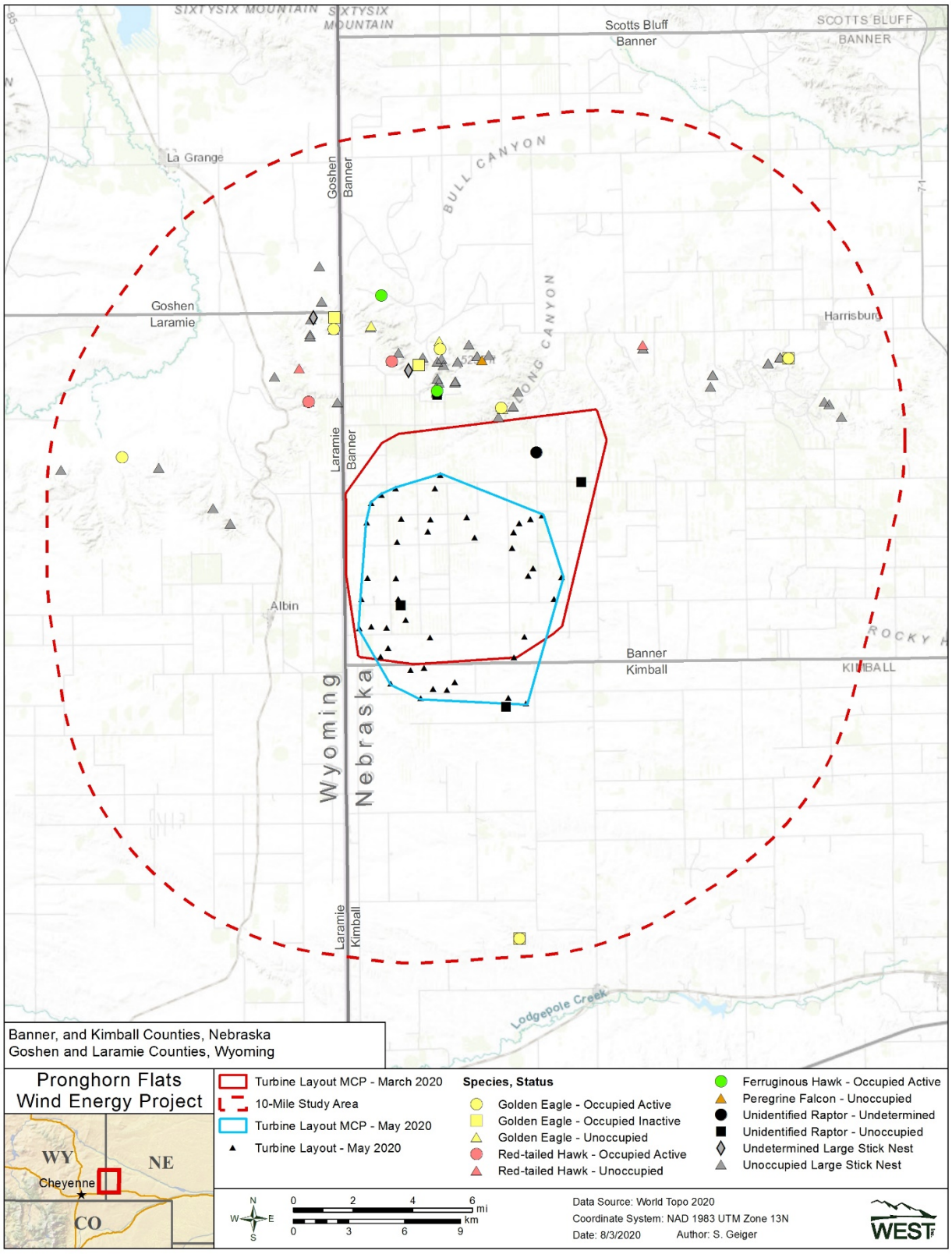


Figure 2. Results of the 2019 eagle and raptor nest surveys of the Pronghorn Wind Energy Project survey area in Banner, and Kimball counties, NE, Goshen and Laramie counties, WY.

Table 1. Golden eagle and large stick nests nests identified during aerial surveys in March and May 2019 within the Pronghorn Flats study area in Banner, and Kimball counties, NE, Goshen and Laramie counties, WY. Unique ID (ID), locations (NAD83, Zone 13), and nest features are included.

ID	Species[1]	Northing	Easting	Status	Condition	Substrate
81	UNKN	4593338	563914	Unoccupied Large Stick Nest	Fair	Cliff
128	UNKN	4596895	605288	Unoccupied Large Stick Nest	Poor	Cliff
129	UNKN	4597014	605028	Unoccupied Large Stick Nest	Poor	Cliff
130	GOEA	4599344	603087	Occupied Inactive	Fair	Cliff
131	GOEA	4599344	603087	Occupied Active	Good	Cliff
135	UNKN	4599094	602002	Unoccupied Large Stick Nest	Fair	Cliff
136	UNKN	4599092	602008	Unoccupied Large Stick Nest	Good	Cliff
137	UNKN	4593470	569177	Unoccupied Large Stick Nest	Good	Cliff
138	GOEA	4594025	567207	Occupied Active	Good	Cliff
139	UNKN	4591278	572100	Unoccupied Large Stick Nest	Good	Cliff
140	UNKN	4590455	573019	Unoccupied Large Stick Nest	Fair	Cliff
142	UNKN	4596989	578806	Unoccupied Large Stick Nest	Fair	Cliff
143	UNKN	4598374	575420	Unoccupied Large Stick Nest	Poor	Cliff
146	UNKN	4600554	577328	Unoccupied Large Stick Nest	Good	Cliff
147	UNKN	4600652	577323	Unoccupied Large Stick Nest	Fair	Cliff
148	UNKN	4601447	577367	Unoccupied Large Stick Nest	Good	Cliff
149	UNKN	4600916	578604	Unoccupied Large Stick Nest	Good	Cliff
150	GOEA	4600922	578603	Occupied Active	Good	Cliff
151	GOEA	4601545	578631	Occupied Inactive[2]	Good	Cliff
162	UNKN	4598465	599009	Unoccupied Large Stick Nest	Good	Cliff
163	UNKN	4598457	599019	Unoccupied Large Stick Nest	Good	Cliff
164	UNKN	4597821	598891	Unoccupied Large Stick Nest	Good	Cliff
166	UNKN	4596772	588265	Unoccupied Large Stick Nest	Poor	Cliff
167	GOEA	4596627	587704	Unoccupied	Good	Cliff
168	UNKN	4596748	587614	Unoccupied Large Stick Nest	Fair	Cliff
169	GOEA	4596694	587616	Occupied Active	Good	Cliff
170	UNKN	4596215	587480	Unoccupied Large Stick Nest	Poor	Cliff
171	UNKN	4599528	586955	Unoccupied Large Stick Nest	Fair	Cliff
173	UNKN	4599479	586319	Unoccupied Large Stick Nest	Fair	Cliff
174	UNKN	4599483	586325	Unoccupied Large Stick Nest	Good	Cliff
175	UNKN	4600110	585885	Unoccupied Large Stick Nest	Fair	Cliff
178	UNKN	4599175	585277	Unoccupied Large Stick Nest	Good	Cliff
179	UNKN	4599170	585283	Unoccupied Large Stick Nest	Good	Cliff
180	GOEA	4600275	584295	Unoccupied	Fair	Cliff
181	GOEA	4599850	584320	Occupied Active	Good	Cliff
182	UNKN	4599335	584415	Unoccupied Large Stick Nest	Good	Cliff
183	UNKN	4599202	584188	Unoccupied Large Stick Nest	Poor	Cliff
184	UNKN	4598994	584511	Unoccupied Large Stick Nest	Fair	Cliff
185	UNKN	4598068	585129	Unoccupied Large Stick Nest	Good	Cliff
186	UNKN	4598259	584183	Unoccupied Large Stick Nest	Good	Cliff
188	UNKN	4599418	583392	Unoccupied Large Stick Nest	Fair	Cliff
189	GOEA	4598989	583169	Occupied Inactive	Good	Cliff
190	UNKN	4598710	582630	Undetermined Large Stick Nest[3]	Poor	Cliff
192	UNKN	4599656	582097	Unoccupied Large Stick Nest	Good	Cliff
193	GOEA	4601118	580621	Unoccupied	Fair	Cliff
247	UNKN	4597009	577271	Unoccupied Large Stick Nest	Fair	Cliff
249	UNKN	4597734	584162	Unoccupied Large Stick Nest	Good	Cliff
255	UNKN	4568100	588600	Unoccupied Large Stick Nest	Fair	Cliff
256	GOEA	4568091	588605	Occupied Inactive	Fair	Cliff
257	GOEA	4568096	588602	Occupied Active	Good	Cliff

Table 1. Golden eagle and large stick nests nests identified during aerial surveys in March and May 2019 within the Pronghorn Flats study area in Banner, and Kimball counties, NE, Goshen and Laramie counties, WY. Unique ID (ID), locations (NAD83, Zone 13), and nest features are included.

ID	Species[1]	Northing	Easting	Status	Condition	Substrate
258	UNKN	4604324	577821	Unoccupied Large Stick Nest	Good	Cliff
260	UNKN	4602420	577961	Unoccupied Large Stick Nest	Fair	Rock
262	GOEA	4601553	577500	Undetermined Large Stick Nest[3]	Poor	Cliff
266	UNKN	4600999	580572	Unoccupied Large Stick Nest	Poor	Cliff
268	UNKN	4599216	581735	Unoccupied Large Stick Nest	Fair	Cliff
269	UNKN	4599271	581742	Unoccupied Large Stick Nest	Poor	Cliff
277	UNKN	4598060	584263	Unoccupied Large Stick Nest	Fair	Cliff
280	UNKN	4598129	585148	Unoccupied Large Stick Nest	Fair	Cliff
281	UNKN	4597624	584164	Unoccupied Large Stick Nest	Fair	Cliff
283	UNKN	4597520	584151	Unoccupied Large Stick Nest	Fair	Cliff
285	UNKN	4597554	588525	Unoccupied Large Stick Nest	Poor	Cliff
286	UNKN	4599876	595259	Unoccupied Large Stick Nest	Fair	Cliff
287	UNKN	4599876	595255	Unoccupied Large Stick Nest	Fair	Cliff
289	UNKN	4599405	602648	Unoccupied Large Stick Nest	Good	Cliff
290	UNKN	4599405	602648	Unoccupied Large Stick Nest	Good	Cliff
291	UNKN	4599405	602648	Unoccupied Large Stick Nest	Fair	Cliff
292	GOEA	4599344	603087	Occupied Inactive	Fair	Cliff
293	UNKN	4596204	605963	Unoccupied Large Stick Nest	Fair	Cliff

[1] GOEA: golden eagle (*Aquila chrysaetos*); UNKN: unidentified raptor,; [2] denotes golden eagle nest that was active during the 2017 aerial raptor nest survey;; [3] denotes nest that was first identified during the second round survey.

Table 2. Non-eagle raptor nests identified during aerial surveys conducted in March and May 2019 within Pronghorn Flats study area in Banner, and Kimball counties, NE, Goshen and Laramie counties, WY. Nest Unique ID (ID), locations (NAD83, Zone 13), and nest features are included.

ID	Species[1]	Northing	Easting	Status	Condition	Substrate
4	UNRA	4580587	587888	Unoccupied	Poor	Coniferous tree
141	RTHA	4597010	577251	Occupied Active	Good	Cliff
145	RTHA	4598808	576734	Unoccupied	Poor	Cliff
172	PRFA	4599250	586598	Unoccupied	Poor	Cliff
187	UNRA	4597401	584167	Unoccupied	Good	Cliff
191	RTHA	4599189	581729	Occupied Active	Good	Cliff
196	UNRA	4594295	589520	Undetermined	Fair	Deciduous tree
248	RTHA	4600088	595243	Unoccupied	Fair	Cliff
252	UNRA	4586066	582204	Unoccupied	Good	Deciduous tree
253	UNRA	4592692	591928	Unoccupied	Good	Deciduous tree
259	FEHA	4602744	581166	Occupied Active	Good	Rock
282	FEHA	4597594	584161	Occupied Active	Good	Cliff

[1] FEHA: ferruginous hawk (*Buteo regalis*), PRFA: prairie falcon (*Falco mexicanus*), RTHA: red-tailed hawk (*Buteo jamaicensis*), UNRA: unidentified raptor

Table 3. Number of each classification type of raptor nests identified during the 2019 aerial nest surveys within the Pronghorn Flats study area in Banner, and Kimball counties, NE, Goshen and Laramie counties, WY.

Species[1]	# Occupied-active	# Occupied-inactive	# Unoccupied	# Undetermined	# Undetermined Large Stick Nest	# Unoccupied Large Stick Nest
GOEA	7	4	3	-	2	52
FEHA	2	-	-	-	-	-
PRFA	-	-	1	-	-	-
RTHA	2	-	2	-	-	-
UNRA	-	-	4	1	-	-

[1] GOEA: Golden Eagle, FEHA: ferruginous hawk, PRFA: prairie falcon, RTHA: red-tailed hawk, UNRA: unidentified raptor

Avian Use Study
Pronghorn Flats Wind Energy Project
Banner County, Nebraska

Final Report
April 2019 – May 2021

Prepared for:

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EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. completed more than two years of avian use surveys for the proposed Pronghorn Flats Wind Energy Project (Project) in Banner County, Nebraska. The objective of surveys was to evaluate species composition and seasonal and spatial use of the Project area by birds, with a particular focus on eagles and special status species. The survey methods were consistent with recommendations in the US Fish and Wildlife Service's (USFWS) 2012 *Final Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the 2013 USFWS *Eagle Conservation Plan Guidelines* (ECPG), and the USFWS *Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests* (2016 Final Eagle Rule, USFWS 2016).

During the first 12 months of surveys (Year 1), monthly surveys were completed at 25 established points in the Project area from April 1, 2019 to March 11, 2020. During the 14 months of surveys (Year 2) following Year 1, monthly surveys were completed at 21 established points in the Project area from April 25, 2020 to May 26, 2021. Surveys consisted of 10-minute counts of small birds within 100-meter (m, 328-foot) radius plots, followed by 60 min counts recording large birds, including eagles, within 800-m (2,625-foot) radius plots. Observations of special status species (defined as species afforded protection under the Endangered Species Act of 1973, Bald and Golden Eagle Protection Act of 1940, and listed as threatened and endangered by the state of Nebraska), were recorded any time they were observed.

No federally listed threatened or endangered species were observed during surveys or incidentally. The only state listed species observed during the course of more than two years of surveys was the thick-billed longspur, a state-listed threatened species. During Year 1, three individual bald eagle, 12 individual golden eagle, and two unidentified eagle observations were recorded during 300 hours of surveys. These observations resulted in 11 risk minutes (flight minutes within 800 m and below 200 m) for bald eagles and 33 risk minutes for golden eagles. Bald eagles were observed in spring and fall, while golden eagles were observed during all seasons. During Year 2, two individual golden eagle observations, both during the fall, were recorded during 232 hours of surveys. These observations resulted in five risk minutes for golden eagles. Bald eagles were not observed during the Year 2 surveys.

During Year 1, twenty-four large bird species were recorded during surveys. Waterfowl and doves/pigeons accounted for most of the observations throughout the study period. Diurnal raptors were the most frequently occurring group of birds during spring, fall, and winter. Twenty-one species of small birds were recorded during surveys. Passerines accounted for all identifiable species of small birds. During Year 2, twenty-one large bird species were recorded during surveys. Similar to Year 1, waterfowl and doves/pigeons accounted for most of the observations throughout the study period. Diurnal raptors were also the most frequently occurring group of birds during spring, fall, and winter. Twenty-five species of small birds were recorded during surveys. Passerines and woodpeckers accounted for all identifiable species of small birds.

Overall, the species composition, seasonal abundance, and spatial use patterns documented during surveys are considered typical for birds in this region. The majority of species observed are common and abundant within the region. Large flocks of waterfowl and/or shorebirds may occur during migration seasons, although stopover habitat for these species is limited within the Project area.

STUDY PARTICIPANTS

Chris Fritchman	Project Manager and Report Writer
Kenton Taylor	Senior Reviewer
Guy DiDonato	Statistician
Stuart Geiger	GIS Technician
Carissa Goodman	Technical Editor
Shawn Opitz	Field Supervisor

REPORT REFERENCE

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INTRODUCTION

Orion Wind Resources LLC and its subsidiary, Banner County Transmission LLC (Orion), are developing the proposed Pronghorn Flats Wind Energy Project (Project) in Banner County, Nebraska (Figure 1). At this time, Orion is considering two potential options for the Project: an approximately 115 megawatt (MW) project and an approximately 250 MW project. To support the development of the Project, Orion contracted Western EcoSystems Technology, Inc. (WEST) to complete avian use surveys from April 2019 through May 2021 within the Project area. The surveys covered the entire 115 MW project area and a portion of the 250 MW project area. The objective of the surveys was to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on eagles and special status species. Special status species are defined as species afforded protection under the Endangered Species Act of 1973 (ESA), Bald and Golden Eagle Protection Act of 1940 (BGEPA), or listed as threatened and endangered by the state of Nebraska (Nebraska Game and Parks Commission [NGPC] 2021). Survey protocols were consistent with recommendations outlined in the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (WEG, USFWS 2012), the USFWS *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013), and the USFWS *Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests* (2016 Final Eagle Rule, USFWS 2016).

PROJECT AREA

The proposed wind turbines are located in Banner and Kimball Counties, Nebraska, approximately 28.1 kilometers (km; 17.5 miles [mi]) northeast of Kimball, Nebraska (Figure 1). The study area, is defined as the minimum convex polygon (MCP) around the proposed turbine locations during each year of surveys (Year 1 MCP and Year 2 MCP), respectively. The Year 1 MCP encompassed approximately 15,471 hectares (38,230 acres), while the Year 2 MCP encompassed 9,764 hectares (24,128 acres, Table 1). Both MCPs fall within the Level III Western High Plains Ecoregion, which encompasses much of the Nebraska panhandle (US Environmental Protection Agency [USEPA] 2016). The Western High Plains Level III Ecoregion consist of smooth to slightly irregular plains and is a mostly arid and dry climate. Natural land cover is dominated by shortgrass and mixed grass prairie, but current land cover is largely dominated by dryland agriculture. (USEPA 2016).

According to the National Land Cover Database (2016), approximately 95% of the land cover of both MCPs is dominated cultivated crops (58.1% within the Year 1 MCP, and 70.9% within the Year 2 MCP) and herbaceous land cover (36.9% within the Year 1 MCP, and 25.2% within the Year 2 MCP, Table 1, Figure 2). All other land cover types account for the last 5% of the Project area and include developed, open space, hay/pasture, evergreen forest, developed, low intensity, barren land, shrub/scrub, woody wetlands, and developed, medium intensity (Table 1, Figure 2).

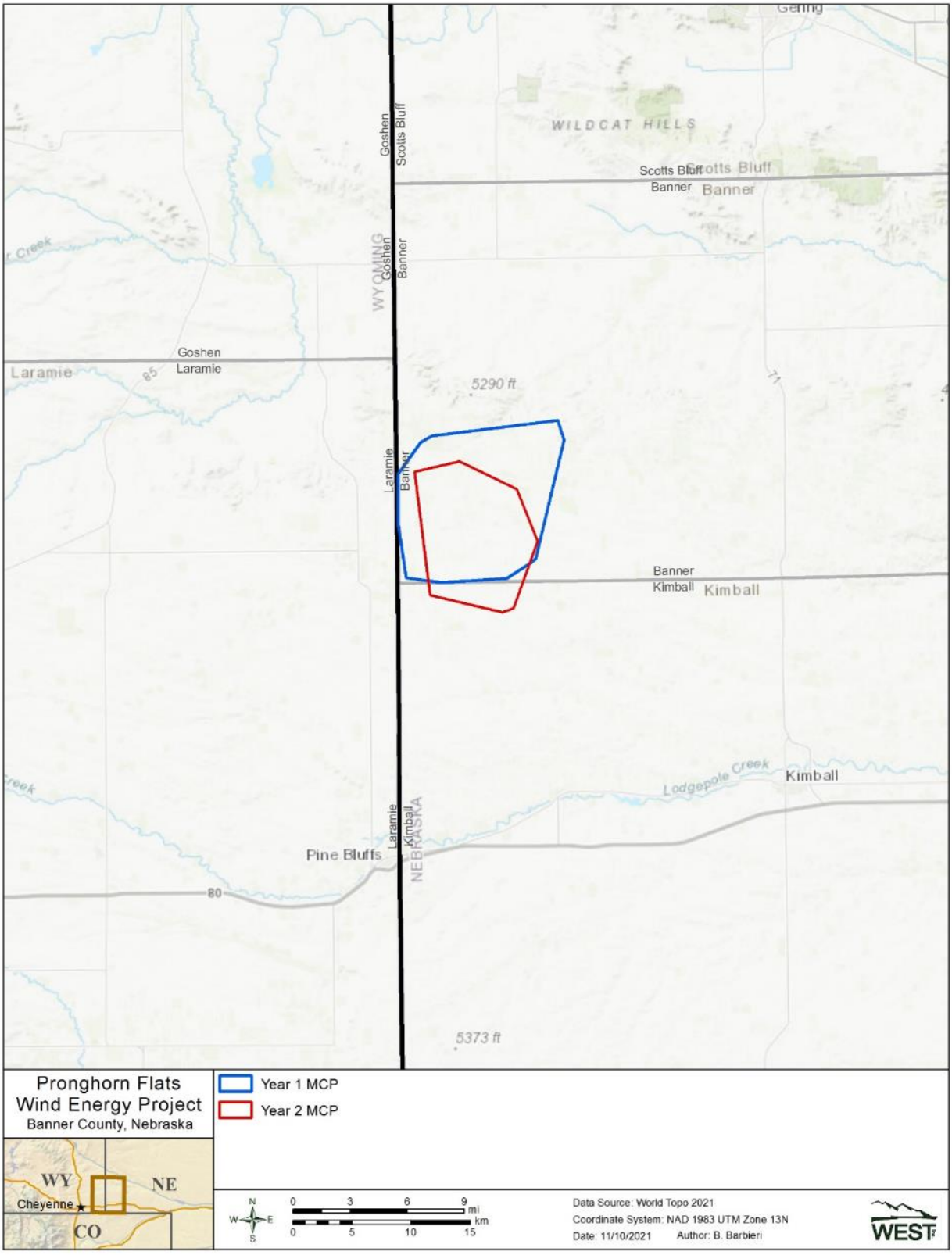

Figure 1. Location of the Pronghorn Flats Wind Energy Project, Banner County, Nebraska.

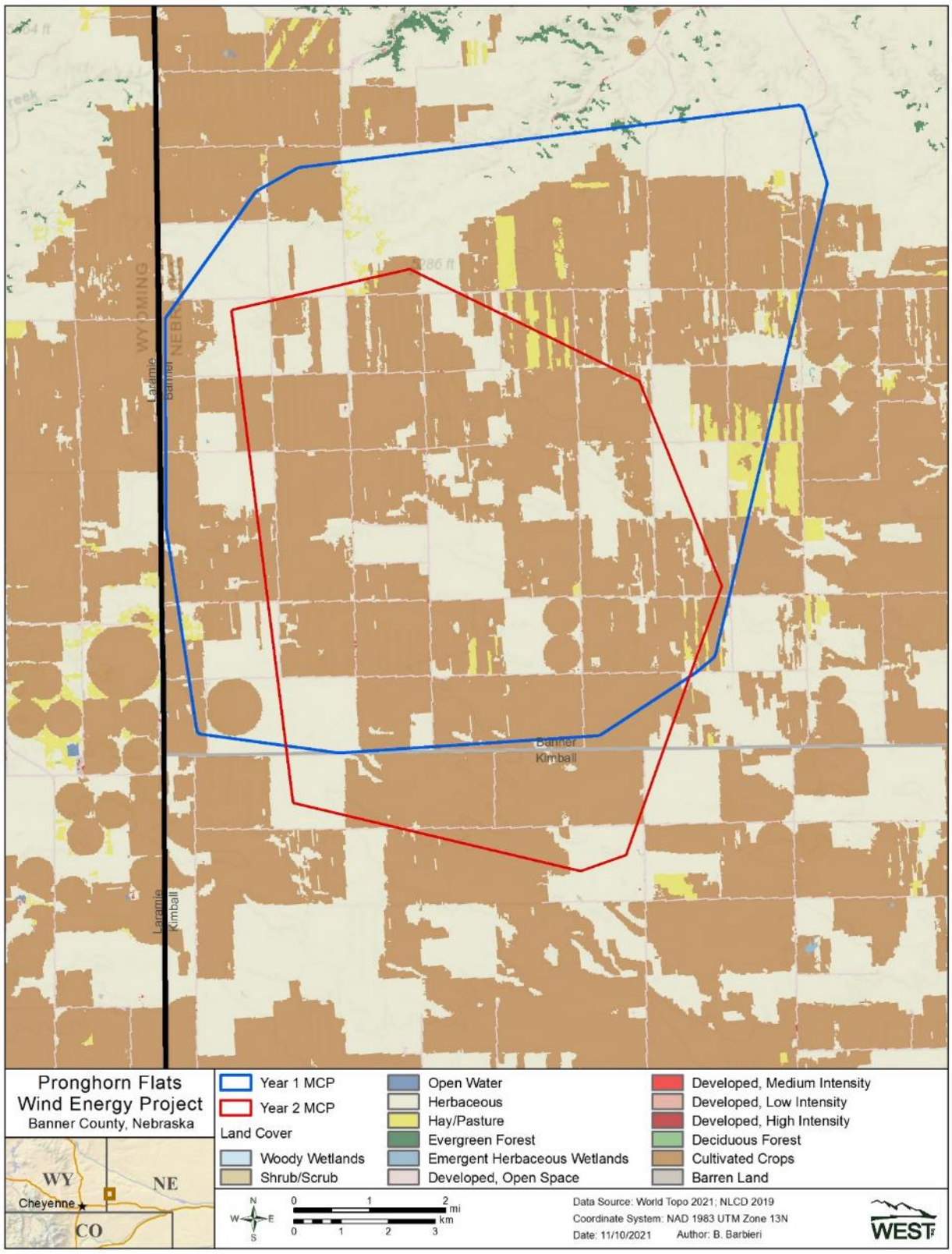

Figure 2. Land cover within the minimum convex polygons for the Pronghorn Flats Wind Energy Project in Banner County, Nebraska.

Table 1. Land cover, coverage, and percent (%) composition within the minimum convex polygons for the Pronghorn Flats Wind Energy Project in Banner County, Nebraska.

Year 1			
Land Cover Type	**Cover (Hectares)**	**Cover (Acres)**	**Percent Composition**
Cultivated Crops	8,983.56	22,198.87	58.1
Herbaceous	5,704.03	14,094.97	36.9
Developed, open space	408.61	1,009.69	2.6
Hay/pasture	357.35	883.04	2.3
Evergreen forest	12.76	31.54	0.1
Developed, low intensity	1.84	4.55	<0.1
Barren land	1.08	2.67	<0.1
Shrub/scrub	0.99	2.44	<0.1
Woody wetlands	0.90	2.22	<0.1
Developed, medium intensity	0.09	0.22	<0.1
Total	**15,471.22**	**38,230.22**	**100**
Year 2			
Land Cover Type	**Cover (Hectares)**	**Cover (Acres)**	**Percent Composition**
Cultivated Crops	6,924.69	17,111.28	70.9
Herbaceous	2,458.82	6,075.88	25.2
Developed, Open Space	295.72	730.74	3.0
Hay/Pasture	76.60	189.28	<0.1
Developed, Low Intensity	5.49	13.56	<0.1
Developed, Medium Intensity	2.25	5.56	<0.1
Woody Wetlands	0.72	1.78	<0.1
Barren Land	0.09	0.22	<0.1
Total	**9,764.37**	**24,128.29**	**100**

Sums of values may not add to total value shown due to rounding.

Sources: National Land Cover Database 2016.

METHODS

The study design and survey methods for the study primarily followed guidance in the ECPG and the 2016 Final Eagle Rule because of the need to collect information on eagles, while also following guidance from the WEG to collect information on other birds including those that are listed as threatened and endangered by the state of Nebraska. Methods described below, therefore, are common for all birds (i.e., large and small birds, eagles, and other species of concern) except as noted.

For the purposes of the study, large birds are defined as waterbirds, waterfowl, shorebirds, diurnal raptors (i.e., accipiters, buteos, eagles, falcons, northern harrier, and other raptors), owls, vultures, upland game birds, doves/pigeons, large corvids, and goatsuckers. Small birds are defined as passerines, including blackbirds/orioles, flycatchers, grassland/sparrows, swallows, shrikes, thrushes, warblers, woodpeckers and unidentified small birds.

Study Design

The study area was revised after the first 12 months of surveys, so the number of survey plots was modified to meet ECPG recommendations that survey plots cover at least 30% of each year's MCP. In total, 33 unique survey plots were established, with 25 survey plots occurring within the

Year 1 MCP (32.2% coverage), and 21 survey plots occurring within the Year 2 MCP (38.2%, Figures 3a and 3b). Survey plots were randomly selected, along a public roadway, using a spatially balanced sampling procedure as recommended in the 2016 Final Eagle Rule (Brown et al. 2015). Each survey plot consisted of an 800-meter (m; 2,625-foot [ft]) radius for large birds (including eagles) and 100-m (328-ft) radius for small birds (Reynolds et al. 1980, USFWS 2013, 2016).

Surveys were conducted once per month from April 1, 2019 to March 11, 2020, and from April 25, 2020 to May 26, 2021, as specified in the ECPG and 2016 Final Eagle Rule (USFWS 2013, 2016). Seasons for both years were defined as spring (March 1 to May 31), summer (June 1 to August 31), fall (September 1 to November 30), and winter (December 1 to February 28). Surveys were conducted during daylight hours and survey times at survey plots were randomized to cover all daylight hours during a season. Surveys were conducted under all weather conditions except when visibility was less than 800 m (2,625 ft) horizontally and/or 200 m (656 ft) vertically.

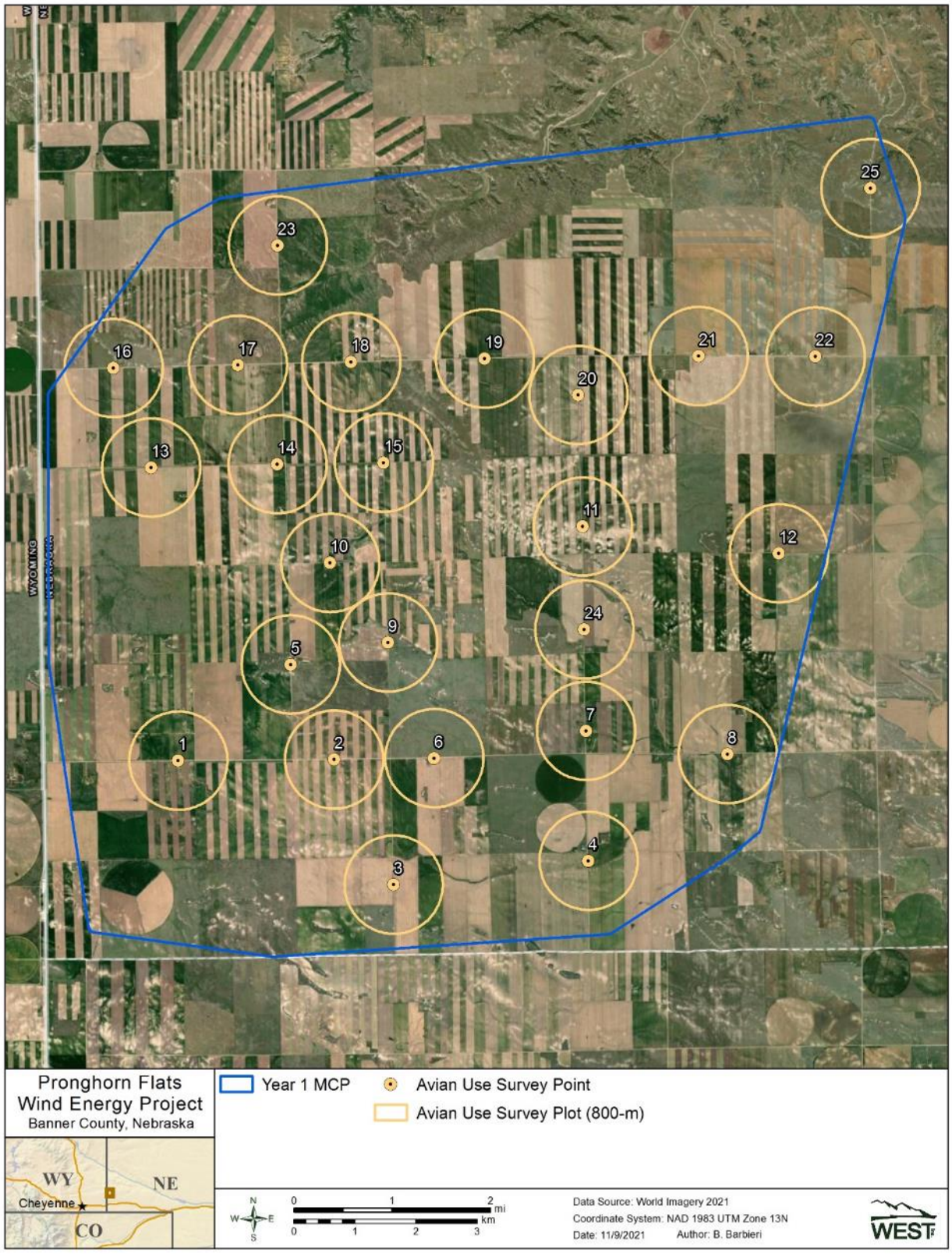

Figure 3a. Avian use survey points and plots at the Pronghorn Flat Wind Energy Project in Banner County, Nebraska from April 1, 2019 to March 11, 2020 (Year 1).

Figure 3b. Avian use survey points and plots at the Pronghorn Flat Wind Energy Project in Banner County, Nebraska from April 25, 2020 to May 26, 2021 (Year 2).

Survey Methods

All Birds

Surveys at each point were conducted for a period of 70 minutes (min), with only small birds recorded during the first 10 min of the survey period out to a 100-m radius, and only large birds (including eagles) recorded for the remaining 60 min of the survey period out to a 800-m radius. Special status species were recorded whenever observed. Biologists recorded the following information for each survey: date, start and end time, and weather (i.e., temperature, wind speed, wind direction, precipitation, and percent cloud cover). Additionally, the following data were recorded for each group of birds observed:

- Observation number
- Species (or best possible identification)
- Number of individuals
- Sex and age class (if possible)
- Distance from survey plot center to the nearest 5-m (16-ft) interval (first & closest)
- Flight height above ground level (AGL) to the nearest 5-m interval (first, lowest, and highest)
- Flight direction (first observed)
- Habitat
- Activity (e.g., flying, perched)
- Observation type (visual or aural)
- Flight paths and perch locations of eagles and other species of concern

Eagles

Data were collected based on the recommendations in the ECPG and the 2016 Final Eagle Rule if a golden eagle, bald eagle, or unidentified eagle was observed during the survey period (USFWS 2013, 2016). Biologists recorded eagle behavior (i.e., flight height, distance from observer, activity) each minute (eagle minute), at the beginning of the minute, to provide an instantaneous count for every eagle observed, whether or not the eagle was flying below 200 m AGL and within 800 m of the survey location at any time during the minute, and age class (juvenile [first year], immature or sub-adult [second to fourth year], adult [at least fifth year]).

Incidental Observations

Incidental observations are records of wildlife seen outside the standardized avian use surveys, but within the Project area, and were focused on special status species. Data recorded for incidentally observed species were similar to that recorded during scheduled surveys.

Data Management

Quality Assurance and Quality Control

WEST implemented quality assurance and quality control (QA/QC) measures at all stages of the study, including in the field, during data entry and analysis, and report writing. Following surveys, biologists were responsible for inspecting data forms for completeness, accuracy, and legibility. If errors or anomalies were found within the data, follow-up measures were implemented including discussions and review of field data with field technicians and/or Project Managers. If any errors, omissions, or problems were identified in later stages of analysis, they were traced back to the raw data forms where appropriate changes and measures were implemented, no matter what stage of analysis. Multiple reviews were conducted as QA/QC measures.

Data Compilation and Storage

A Microsoft® SQL database was specifically developed to store, organize, and retrieve survey data. Project data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. WEST retained all data forms and electronic data files for reference.

Statistical Analysis

A *visit* was defined as sequentially surveying all of the survey plots once within the Project area and a visit could occur across multiple dates, but could not overlap another visit and had to be completed in a single season (e.g., spring).

A *survey* was defined as a single 10-min or 60-min count of birds. In some cases, a count of bird observations may represent repeated observations of the same individual. Only observations within the survey plot were included for statistical analysis.

Species Richness

Species richness was illustrated by the total number of unique species observed. Species lists (with the number of observations and the number of groups) were generated by season for large birds detected within 800 m. An *Index to species richness* was calculated for each season by first averaging the total number of species observed within each plot during a visit, then averaging across plots within each visit, followed by averaging across visits within the season. An overall index to species richness was also calculated as a weighted average of seasonal values by the number of days in each season for each survey type. Indices to species richness were compared among seasons within respective survey types.

Mean Use, Percent of Use, and Frequency of Occurrence

Mean use is the average number of birds observed per plot per survey for small or large birds. Small bird use (per 100-m radius plot per 10-min survey) and large bird use (per 800-m radius plot per 60-min survey) was calculated by: 1) summing birds per plot per visit, 2) averaging number of birds over plots within a visit, and 3) averaging number of birds across visits within a season. Overall mean use was calculated as a weighted average of seasonal values by the number of days in each season. *Percent of use* was calculated as the percentage of small or

large bird use that was attributable to a particular bird type or species. *Frequency of occurrence* was calculated as the percent of surveys in which a particular bird type or species was observed.

Mean use and frequency of occurrence describe different aspects of relative abundance, in that mean use is based on the number of birds (i.e., large groups can produce high estimates), whereas frequency of occurrence is based on the number of groups (i.e., it is not influenced by group size). Qualitative comparisons were made with these metrics among bird types, seasons, and survey points to help illustrate temporal and spatial avian use of the Project. The top five bird groups were depicted graphically to show the dominant patterns in mean use, percent of use, and frequency of occurrence.

Flight Height

Flight heights are important metrics to assess relative potential exposure to turbine blades and were used to calculate the percentage of large birds, small birds, and eagles observed flying within the rotor-swept height (RSH) of proposed turbines. Although no decisions have yet been made regarding the RSH of turbines to be installed in the Project, an RSH of 25 to 150 m (82 to 492 ft) AGL was assumed for the purpose of the analysis. Flight height recorded during the initial observation was used to calculate the percentage of birds flying within the RSH and mean flight height.

Spatial Variation

Mean use was calculated by survey plot for eagles, large birds, and small birds to make spatial comparisons among the survey plots. Additionally, flight paths and perched locations of large birds and eagles were mapped during large bird use surveys to qualitatively show potential areas of concentrated flight paths and/or consistent flight patterns within the Project area compared to Project area characteristics (e.g., topographic features).

Eagles

Data collected during each minute eagles were observed were examined to count eagle risk minutes, defined by the ECPG as the number of minutes an eagle was observed in flight within the risk cylinder (defined as the area within 800 m of the survey point and below 200 m AGL during the 60-min survey periods) and total minutes, defined as the amount of time eagles were observed inside and outside the risk cylinder. The eagle risk minutes per observation hour were reported by survey plot and month, to enable spatial and temporal assessments of eagle risk minutes recorded in the Project area. Data collected on perched eagles and those outside of survey plots were not considered eagle risk minutes; however, they were included in the total eagle minutes. The perch locations and flight paths of all eagles were mapped to qualitatively assess areas of eagle use within the Project area.

RESULTS

During Year 1, three hundred avian use surveys were conducted for large birds and small birds (Table 2a). Twenty-four species of large birds and 21 species of small birds totaling 45 species were recorded during the first year study (Table 2a). Study results are summarized below, supplemented by the appendices, which present species-level detail on the following: scientific names and numbers of groups and observations seen during surveys, but not limited to viewshed (Appendix A), avian use, percent of use, and frequency of occurrence by season (Appendix B), and mean use by survey plot (Appendix C).

During Year 2, two hundred thirty-two avian use surveys were conducted for large birds and small birds (Table 2b). Twenty-one species of large birds and 25 species of small birds totaling 46 species of birds were recorded during the Year 2 study (Table 2b). Study results are summarized below, supplemented by the appendices, which present species-level detail on the following: scientific names and numbers of groups and observations seen during surveys, but not limited to viewshed (Appendix A), avian use, percent of use, and frequency of occurrence by season (Appendix B), and mean use by survey plot (Appendix C).

Table 2a. Summary of index to species richness and sample size by season and overall during the fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska, from April 1, 2019 to March 11, 2020 (Year 1).

Index to Species Richness (species/plot[a]/60-minute survey)				
Season	**# Visits**	**# Surveys Conducted**	**Species Richness**	**Large Birds**
Spring	3	75	19	1.23
Summer	3	75	13	1.81
Fall	3	75	16	1.09
Winter	3	75	8	0.35
Overall	**12**	**300**	**24**	**1.12**
Index to Species Richness (species/plot[a]/10-minute survey)				
Season	**# Visits**	**# Surveys Conducted**	**Species Richness**	**Small Birds[b]**
Spring	3	75	15	1.97
Summer	3	75	12	2.19
Fall	3	75	6	0.64
Winter	3	75	2	0.71
Overall	**12**	**300**	**21**	**1.38**

Species Richness: The total number of unique species observed within viewshed during avian use surveys.

Index to Species Richness: Average number of species observed within the observer viewshed/plot/visit within seasons.

[a] 800-meter (m; 2,625-foot [ft]) radius plot for large birds, 100-m (328-ft) radius plot for small birds.

[b] Please note surveys of small birds used smaller viewsheds and shorter survey periods than that used for large birds; direct comparison between large and small bird use is not possible.

Table 2b. Summary of index to species richness and sample size by season and overall during the fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska, from April 25, 2020 to May 26, 2021 (Year 2).

Index to Species Richness (species/plot[a]/60-minute survey)				
Season	**# Visits**	**# Surveys Conducted**	**Species Richness**	**Large Birds**
Spring	5	61	14	0.88
Summer	3	57	11	1.05
Fall	3	57	12	0.58
Winter	3	57	5	0.23
Overall	**14**	**232**	**21**	**0.69**
Index to Species Richness (species/plot[a]/10-minute survey)				
Season	**# Visits**	**# Surveys Conducted**	**Species Richness**	**Small Birds[b]**
Spring	5	61	17	2.43
Summer	3	57	15	2.25
Fall	3	57	9	1.60
Winter	3	57	4	0.93
Overall	**14**	**232**	**25**	**1.80**

Species Richness: The total number of unique species observed within viewshed during avian use surveys.

Index to Species Richness: Average number of species observed within the observer viewshed/plot/visit within seasons.

[a] 800-meter (m; 2,625-foot [ft]) radius plot for large birds, 100-m (328-ft) radius plot for small birds.

[b] Please note surveys of small birds used smaller viewsheds and shorter survey periods than that used for large birds; direct comparison between large and small bird use is not possible.

Special Status Species

Eagles

Mean use

During Year 1, bald eagle mean use was 0.03 observations/800-m radius plot/60-min survey during fall with no other bald eagle observations within 800 m recorded in other seasons (there was one bald eagle observation recorded in the spring but, not within 800 m; Appendix B1). Golden eagle mean use ranged from 0.01 observations/800-m radius plot/60-min survey during summer, fall, and winter to 0.07 in spring (Appendix B). Overall, eagle (both bald and golden) mean use was 0.03 observations/800-m radius plot/60-min survey.

There were no bald eagle observations during the Year 2 surveys. Golden eagles were only observed during the fall season and mean use was 0.04 observations/800-m radius plot/60-min survey (Appendix B).

Activity minutes

During Year 1, eleven bald eagle risk minutes from two bald eagle observations were recorded compared to 16 total bald eagle minutes from three bald eagle observations during 300 total survey hours (Table 3a). Bald eagle risk minutes per survey ranged from 0.17-0.75 risk min/800-m plot/60-min survey (Figure 4a).

Table 3a. The bald eagle minutes and observations recorded during avian use surveys at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska, from April 1, 2019 to March 11, 2020 (Year 1).

	Eagle Minutes		Eagle Observations			
Season	Within[a] Risk Cylinder	Total[b]	Within[a] Risk Cylinder	Total[b]	Survey Hours	Eagle Risk Minutes/Survey Hour
Spring	0	3	0	1	75	0
Summer	0	0	0	0	75	0
Fall	11	13	2	2	75	0.15
Winter	0	0	0	0	75	0
Total	**11**	**16**	**2**	**3**	**300**	**0.04**

[a] In = minutes or observations inside the risk cylinder; minutes inside risk cylinder = eagle exposure minutes.

[b] Total = minutes or observations inside and outside the risk cylinder.

During Year 1, thirty-three golden eagle risk minutes from five golden eagle observations were recorded compared to 95 total golden eagle minutes from 12 golden eagle observations during 300 total survey hours (Table 3b). Golden eagle risk minutes ranged from 0.08 to 1.08 risk min/800-m plot/60-min survey across five different survey plots (Figure 4b). The five survey plots with golden eagle risk minutes are spread throughout the Project area (Figure 4b).

Table 3b. The golden eagle minutes and observations recorded during avian use surveys in the Pronghorn Flats Wind Energy Project in Banner County, Nebraska, from April 1, 2019 to March 11, 2020 (Year 1).

	Eagle Minutes		Eagle Observations			
Season	Within[a] Risk Cylinder	Total[b]	Within[a] Risk Cylinder	Total[b]	Survey Hours	Eagle Risk Minutes/Survey Hour
Spring	10	49	2	7	75	0.13
Summer	9	27	1	3	75	0.12
Fall	13	18	1	1	75	0.17
Winter	1	1	1	1	75	0.01
Total	**33**	**95**	**5**	**12**	**300**	**0.11**

[a] In = minutes or observations inside the risk cylinder; minutes inside risk cylinder = eagle exposure minutes.

[b] Total = minutes or observations inside and outside the risk cylinder.

During Year 2, five golden eagle risk minutes from one golden eagle observation were recorded compared to nine total golden eagle minutes from two golden eagle observations during 232 total survey hours (Table 3c). Golden eagles were observed at survey Point 24 and Point 27. While, no risk minutes were associated with the observation at survey Point 24, there were 0.42 risk minutes per survey hour at survey Point 27 (Figure 4c). Survey Point 27 is located in the eastern part of the Year 2 MCP (Figure 4c).

Table 3c. The golden eagle minutes and observations recorded during avian use surveys in the Pronghorn Flats Wind Energy Project in Banner County, Nebraska, from April 25, 2020 to May 26, 2021 (Year 2).

	Eagle Minutes		Eagle Observations			
Season	Within[a] Risk Cylinder	Total[b]	Within[a] Risk Cylinder	Total[b]	Survey Hours	Eagle Risk Minutes/Survey Hour
Spring	0	0	0	0	61	0.00
Summer	0	0	0	0	57	0.00
Fall	5	9	1	2	57	0.09
Winter	0	0	0	0	57	0.00
Total	**5**	**9**	**1**	**2**	**232**	**0.02**

[a] In = minutes or observations inside the risk cylinder; minutes inside risk cylinder = eagle exposure minutes.

[b] Total = minutes or observations inside and outside the risk cylinder.

Additionally, two unidentified eagles were observed during the Year 1 surveys, but both were observed outside the 800-m viewshed, with the closest being approximately 1,500 m (4,900 ft) away. No unidentified eagles were observed in Year 2.

Spatial Variation

Mean Use by Point

During Year 1, eagle observations were recorded at six of the survey plots, with mean use ranging from zero to 0.25 eagles/800-m plot/60-min survey among plots (Figures 4a and 4b, Appendix C1). Bald eagles and golden eagles were both recorded at Points 18 and 20.

During Year 2, golden eagle observations were recorded at two of the survey plots (Points 24 and 27), with mean use estimated to 0.08 eagles/800-m plot/60-min survey, for both locations (Figures 4c and 4d, Appendix C). No bald eagles were observed during the Year 2 surveys.

Flight Paths

During Year 1, bald and golden eagle flight paths were recorded in the study area, though there doesn't appear to be a discernable pattern (Figures 5a and 5b). Also, the study area does not appear to contain topographic features that would be thought to concentrate eagles.

During Year 2, golden eagle flight paths were recorded within the study area. A single flight path was recorded at Point 24 and Point 27. There doesn't appear to be a discernable pattern to the flight paths that were recorded (Figures 5a and 5b).

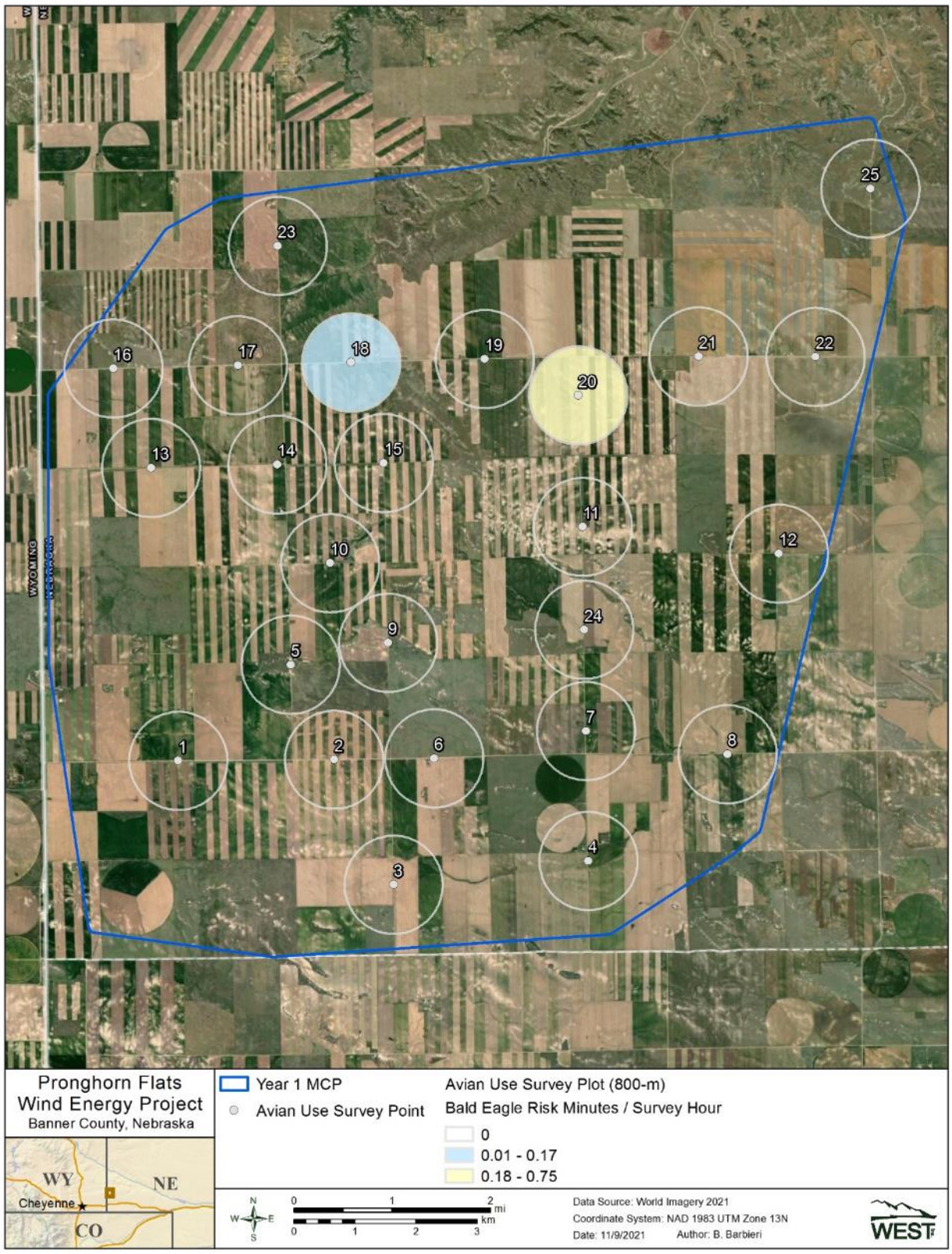

Figure 4a. Estimated bald eagle risk (flying within 800 meters and below 200 meters) minutes per survey hour at the Pronghorn Flats Wind Energy Project in Banner County, Nebraska, from April 1, 2019 to March 11, 2020.

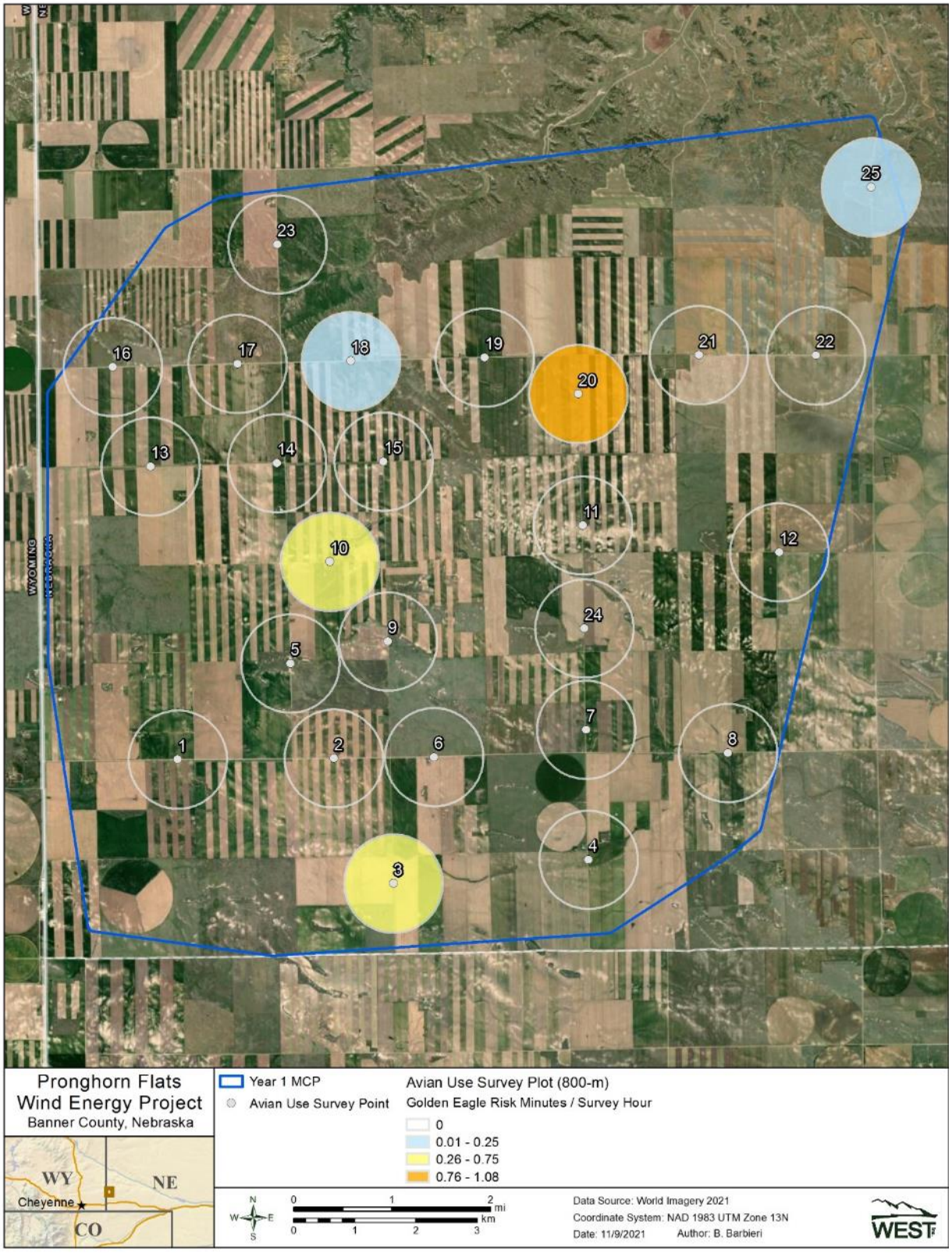

Figure 4b. Estimated golden eagle risk (flying within 800 meters and below 200 meters) minutes per survey hour at the Pronghorn Flats Wind Energy Project in Banner County, Nebraska, from April 1, 2019 to March 11, 2020.

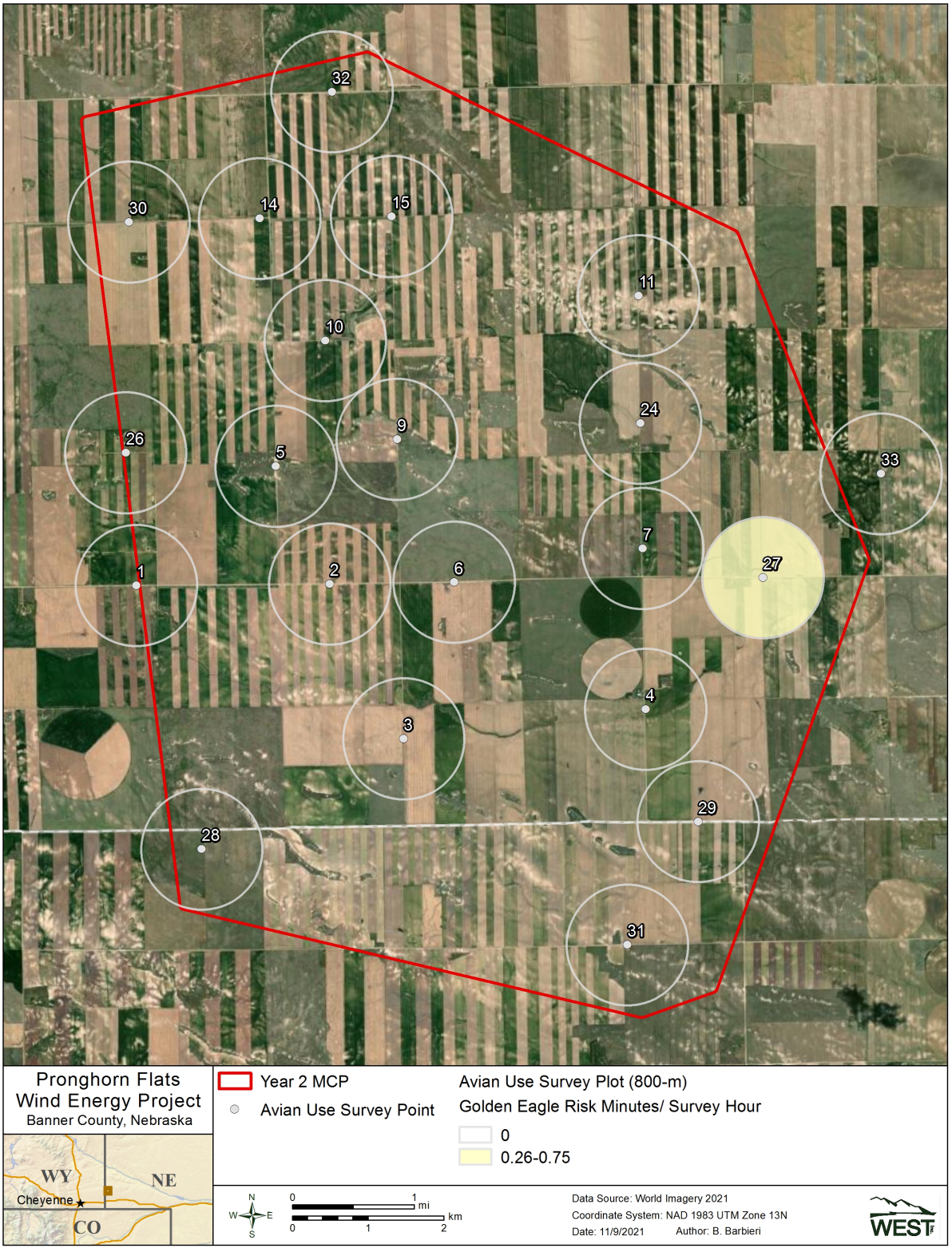

Figure 4c. Estimated golden eagle risk (flying within 800 meters and below 200 meters) minutes per survey hour at the Pronghorn Flats Wind Energy Project in Banner County, Nebraska, from April 25, 2020 to May 26, 2021.

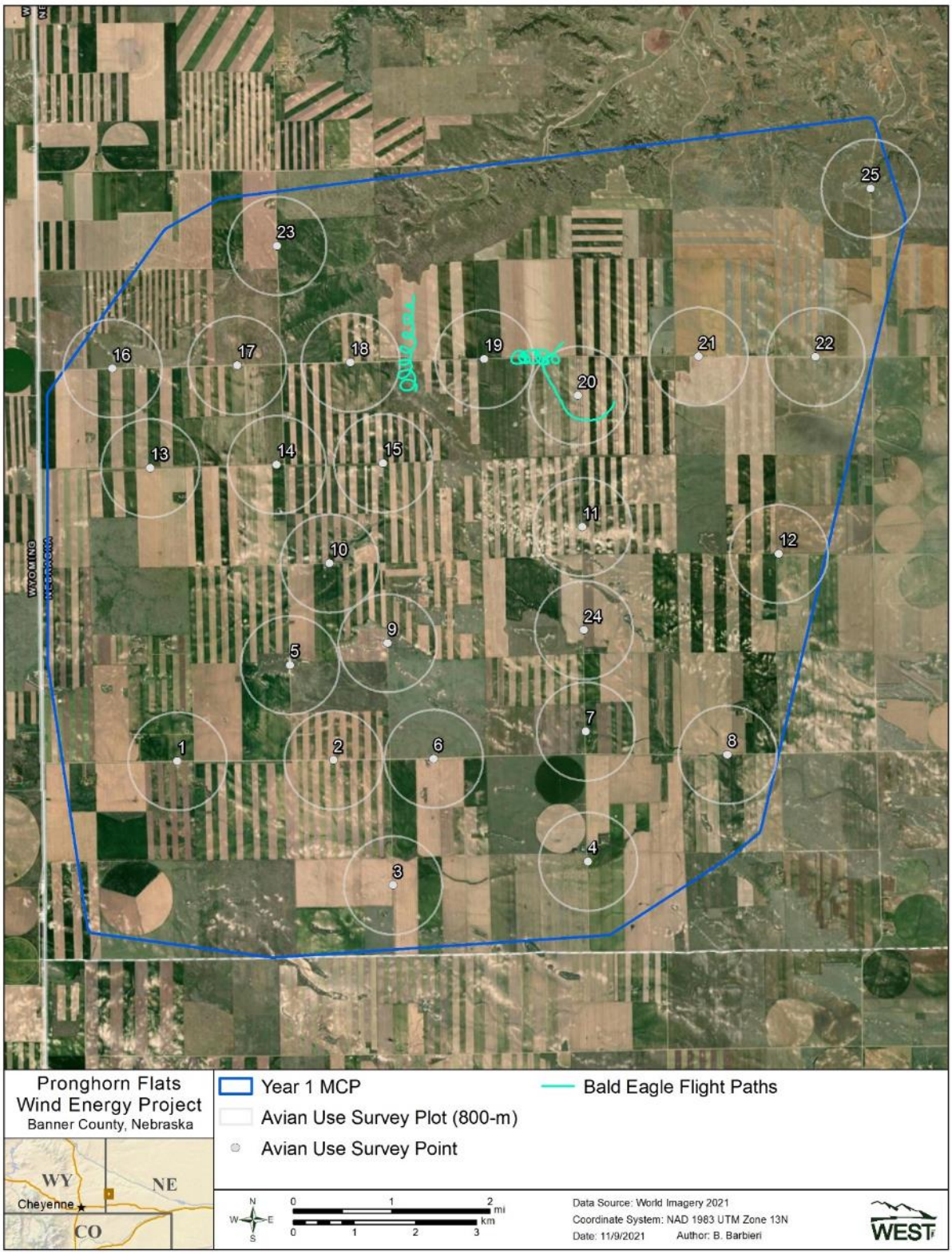

Figure 5a. Mapped bald eagle flight paths at the Pronghorn Flat Wind Energy Project, Banner County, Nebraska, from April 1, 2019 to March 11, 2020.

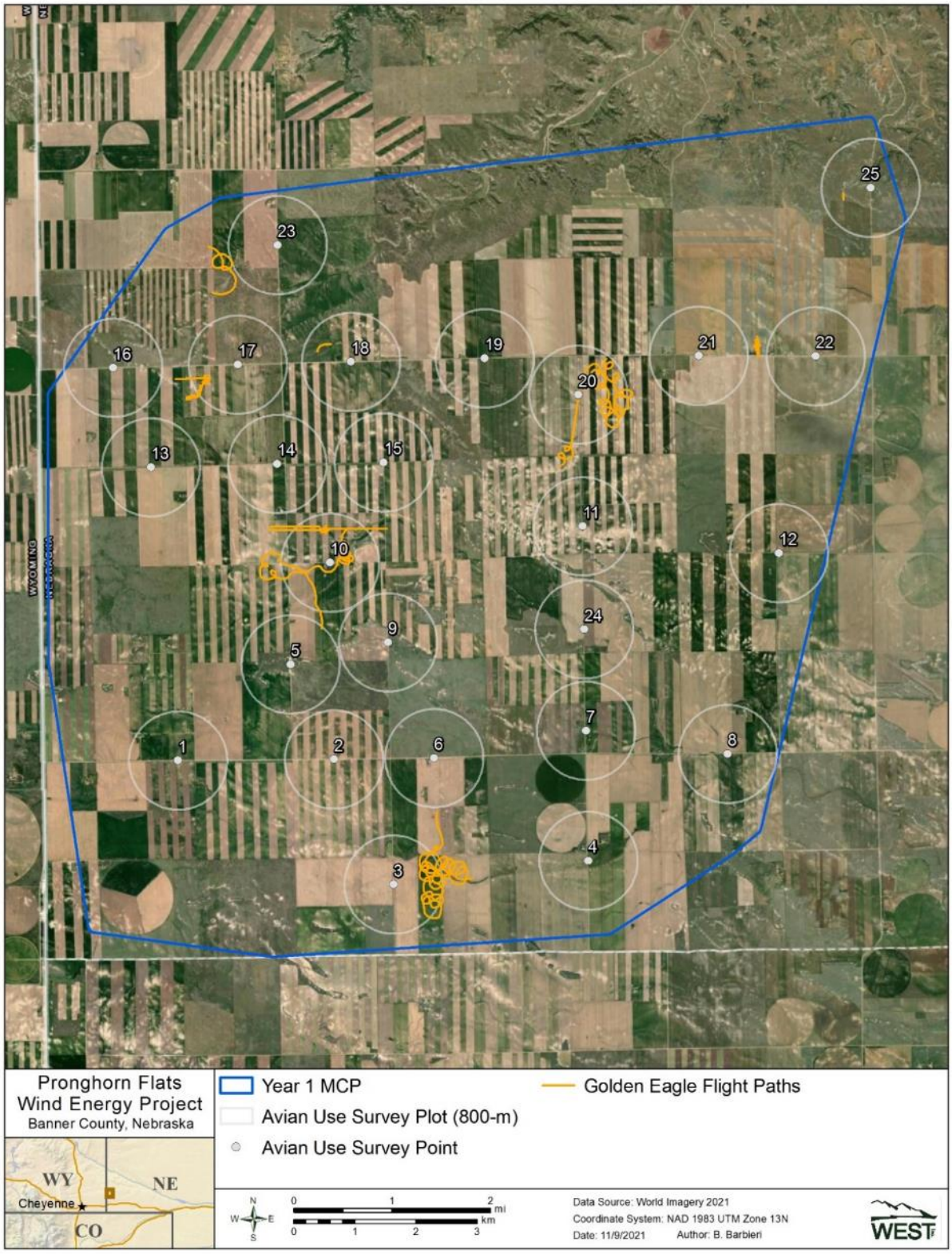

Figure 5b. Mapped golden eagle flight paths at the Pronghorn Flat Wind Energy Project, Banner County, Nebraska, from April 1, 2019 to March 11, 2020.

Figure 5c. Mapped golden eagle flight paths at the Pronghorn Flat Wind Energy Project, Banner County, Nebraska, from April 25, 2020 to May 26, 2021.

Federal- and State-protected Species

Other than bald and golden eagles, no other federal-protected species were observed within the Project (Tables 4a and 4b). Thick-billed longspur (*Rhynchophanes mccownii*), a state-listed threatened species, was observed during the Year 2 surveys (Tables 4a and 4b).

Table 4a. Special status species of concern by number (#) of groups (grps) and individual observations (obs) observed at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska during the fixed-point bird use surveys and as incidental wildlife observations from April 1, 2019 to March 11, 2020.

			Surveys		Incidental		Total	
Species	**Scientific Name**	**Status**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
golden eagle	*Aquila chrysaetos*	BGEPA	12	12	1	2	13	14
bald eagle	*Haliaeetus leucocephalus*	BGEPA	3	3	1	1	4	4
unidentified eagle		BGEPA	2	2	0	0	2	2
Total	**2 species**		**17**	**17**	**2**	**3**	**19**	**20**

BGEPA = Bald and Golden Eagle Protection Act of 1940.

Table 4b. Species of concern by number (#) of groups (grps) and individual observations (obs) observed at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska during the fixed-point bird use surveys and as incidental wildlife observations from April 25, 2020 to May 26, 2021.

			Surveys		Incidental		Total	
Species	**Scientific Name**	**Status**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
golden eagle	*Aquila chrysaetos*	BGEPA	2	2	1	1	3	3
Thick-billed longspur	*Rhynchophanes mccownii*	ST	2	4	0	0	2	4
Total	**2 species**		**4**	**6**	**1**	**1**	**5**	**7**

BGEPA = Bald and Golden Eagle Protection Act of 1940.

ST – state-listed threatened (Nebraska Game and Parks Commission 2021)

Large Birds

Mean Use, Percent of Use, and Frequency of Occurrence

During Year 1, mean use, percent of use, and frequency of occurrence were calculated by season for large bird types (Figures 6a, 6b, 6c) and species (Appendix B1). Large bird mean use ranged from 1.16 observations/800-m radius plot/60-min survey to 11.83 among seasons and was highest during spring (11.83), followed by fall (6.47), summer (5.37), and winter (1.16; Figure 6a). Waterfowl had the highest use during spring (10.07), fall (2.76), and winter (0.51), while doves/pigeons had the highest use during summer (3.64; Figure 6a). Based on large bird types, waterfowl also composed the majority of large bird use during spring (85.1%), winter (43.7%), and fall (42.7%), while doves/pigeons composed the majority of large bird use during summer (67.7%; Figure 6b). Large bird frequency of occurrence varied among seasons, with diurnal raptors most frequently observed during spring (58.7%), fall (61.3%) and winter (24.0%) and doves/pigeons during summer (86.7%; Figure 6c, Appendix B1).

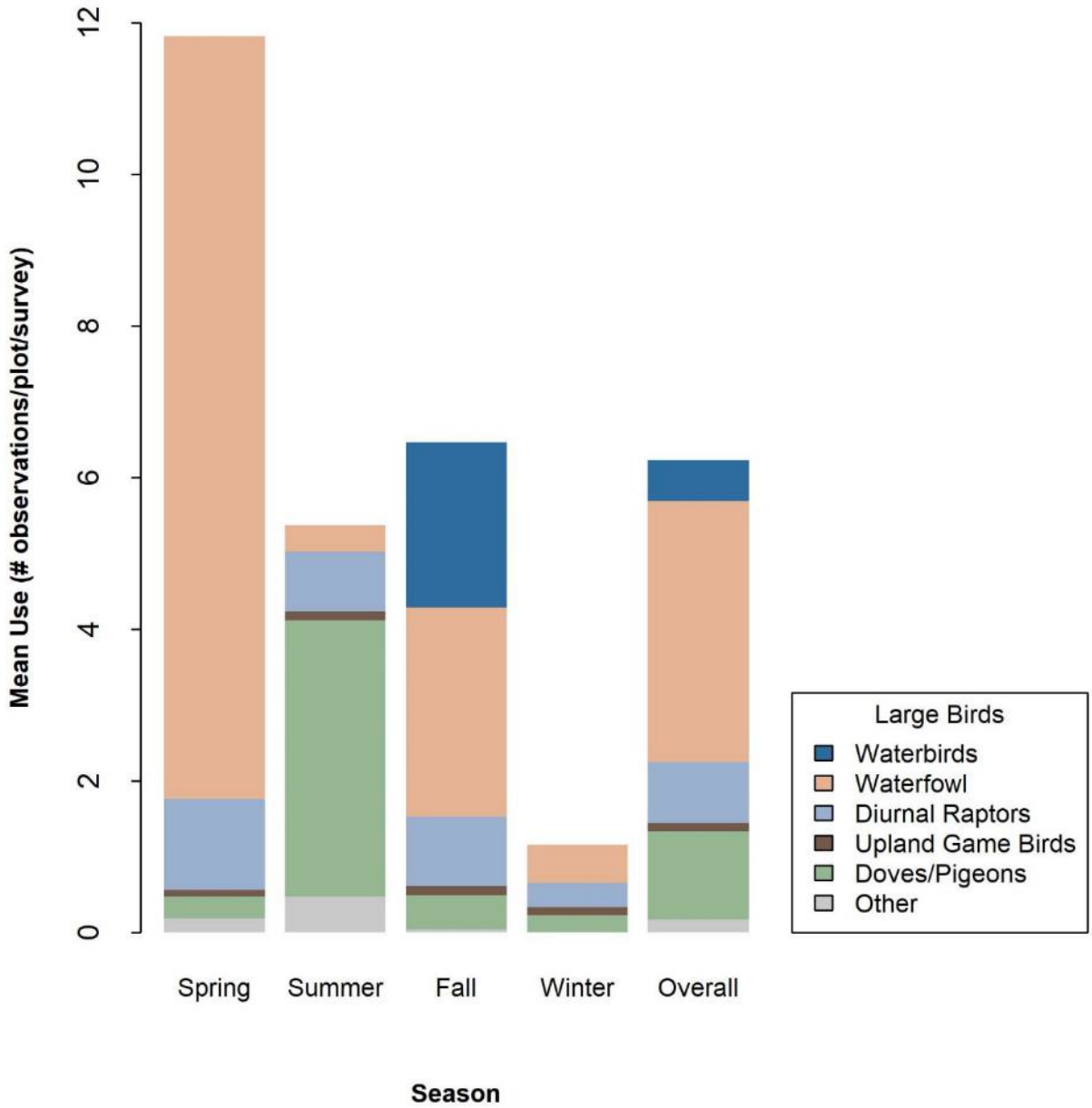

Figure 6a. Large bird mean use (observations/plot/60 minute survey) by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 1, 2019 to March 11, 2020.

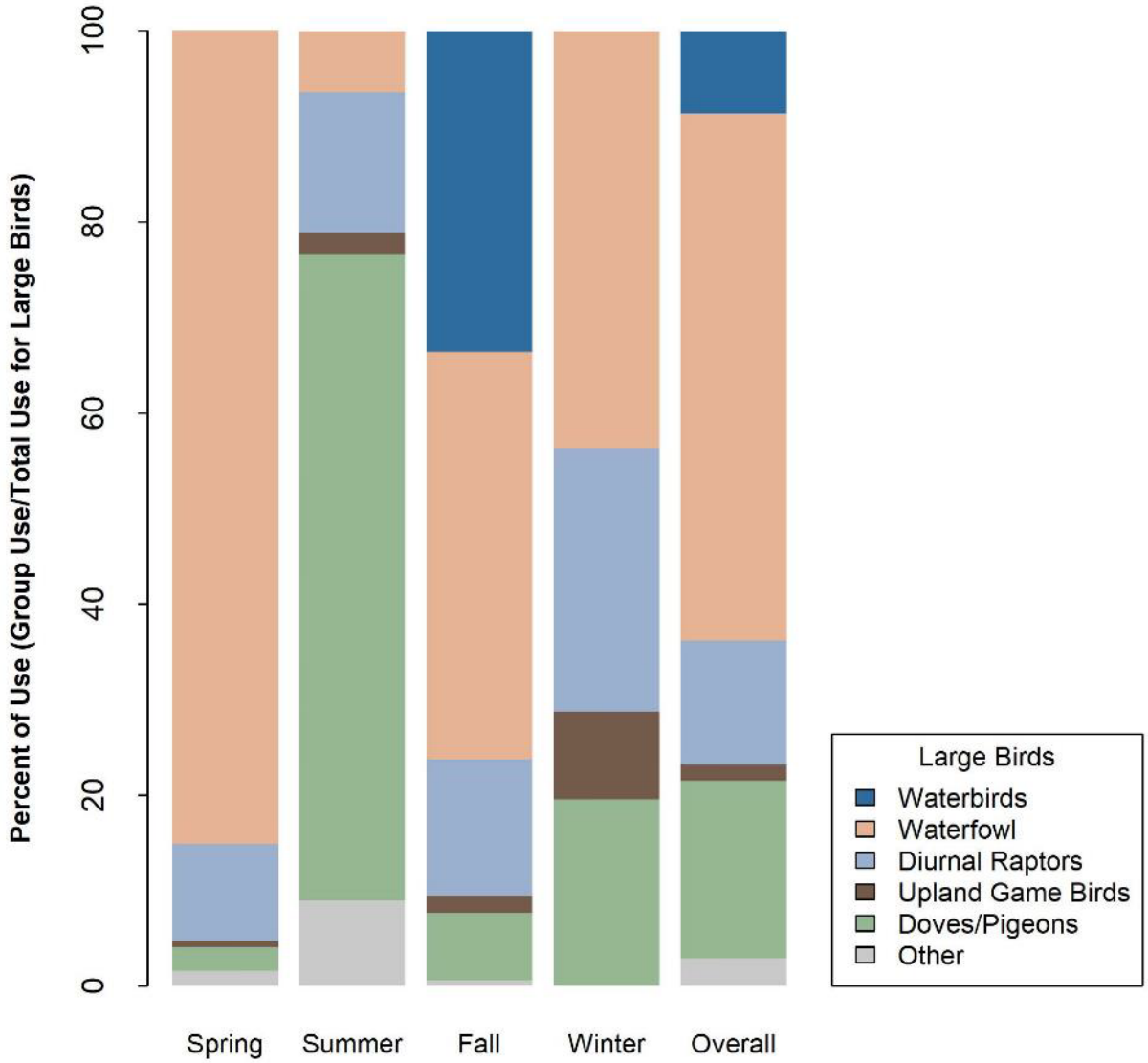

Figure 6b. Large bird percent of use by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 1, 2019 to March 11, 2020.

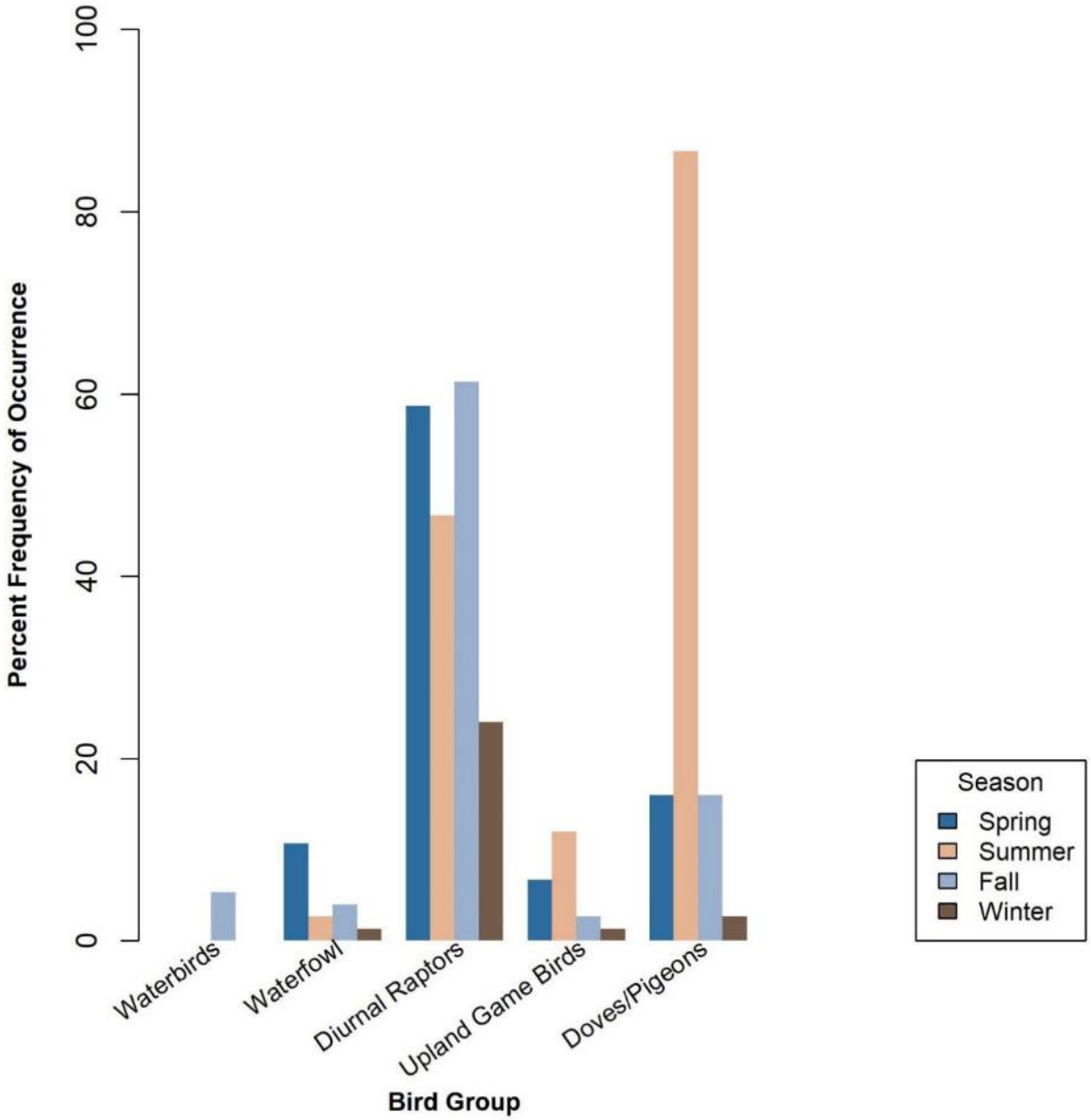

Figure 6c. Large bird frequency of occurrence by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 1, 2019 to March 11, 2020.

During Year 2, mean use, percent of use, and frequency of occurrence were calculated by season for large bird types (Figures 6d, 6e, 6f) and species (Appendix B). Large bird mean use ranged from 0.23 observations/800-m radius plot/60-min survey to 3.30 among seasons and was highest during fall (3.30), followed by summer (3.04), spring (1.89), and winter (0.23; Figure 6d). Doves/pigeons had the highest use during summer (2.25), and spring (0.67), while waterbirds had the highest use during fall (2.53). Diurnal raptors were the only bird type recorded in winter with a use value of 0.23. (Figure 6d). Based on large bird types, doves/pigeons composed the majority of use during summer (74.0%) and spring (35.4%), waterbirds composed the majority of use during fall (76.6%), and diurnal raptor during winter (100%, Figure 6e). Large bird frequency of occurrence varied among seasons, with diurnal raptors most frequently observed during spring (42.0%), fall (35.1%) and winter (21.1%) and doves/pigeons during summer (50.9%; Figure 6f, Appendix B).

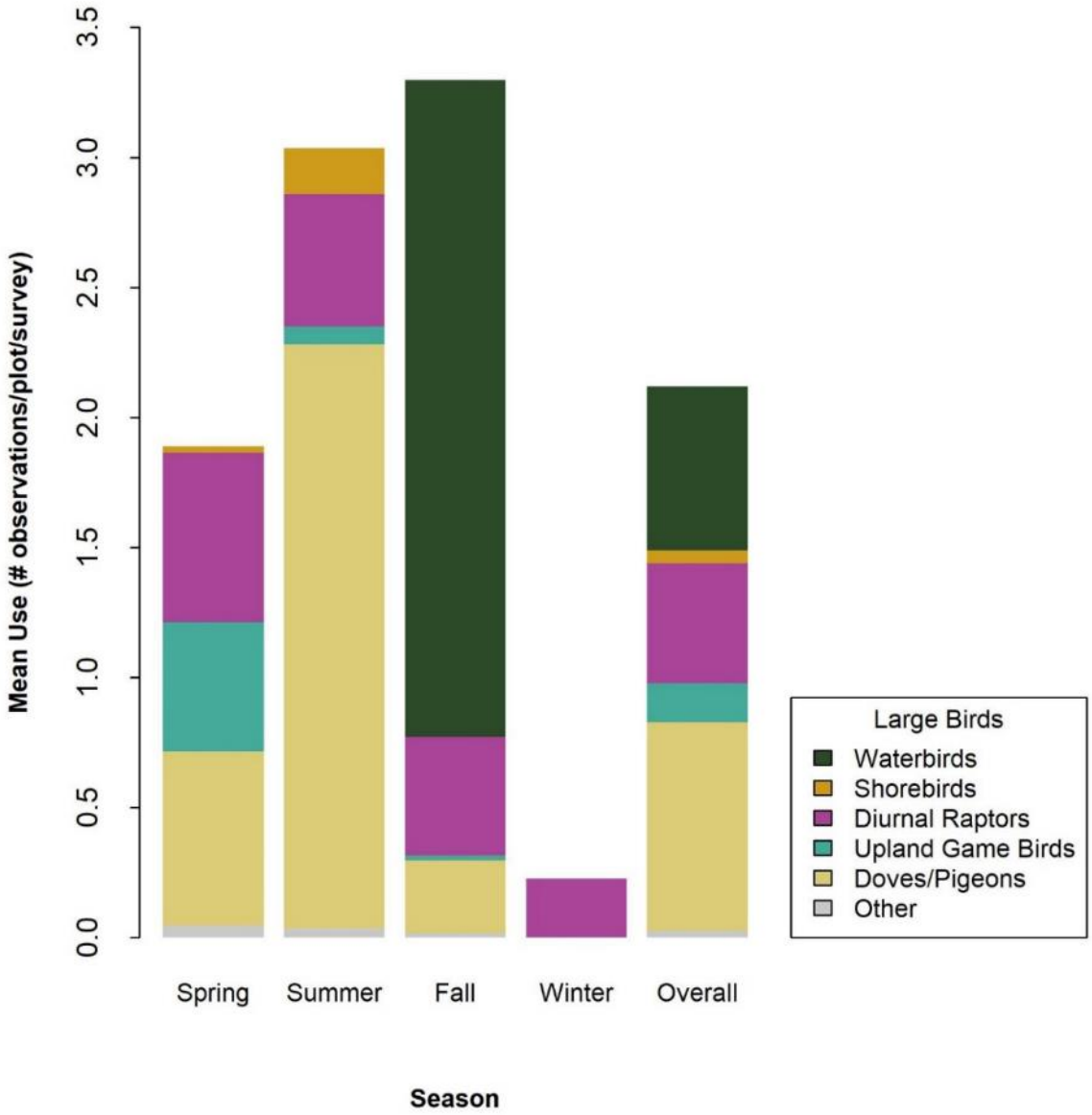

Figure 6d. Large bird mean use (observations/plot/60 minute survey) by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 25, 2020 to May 26, 2021.

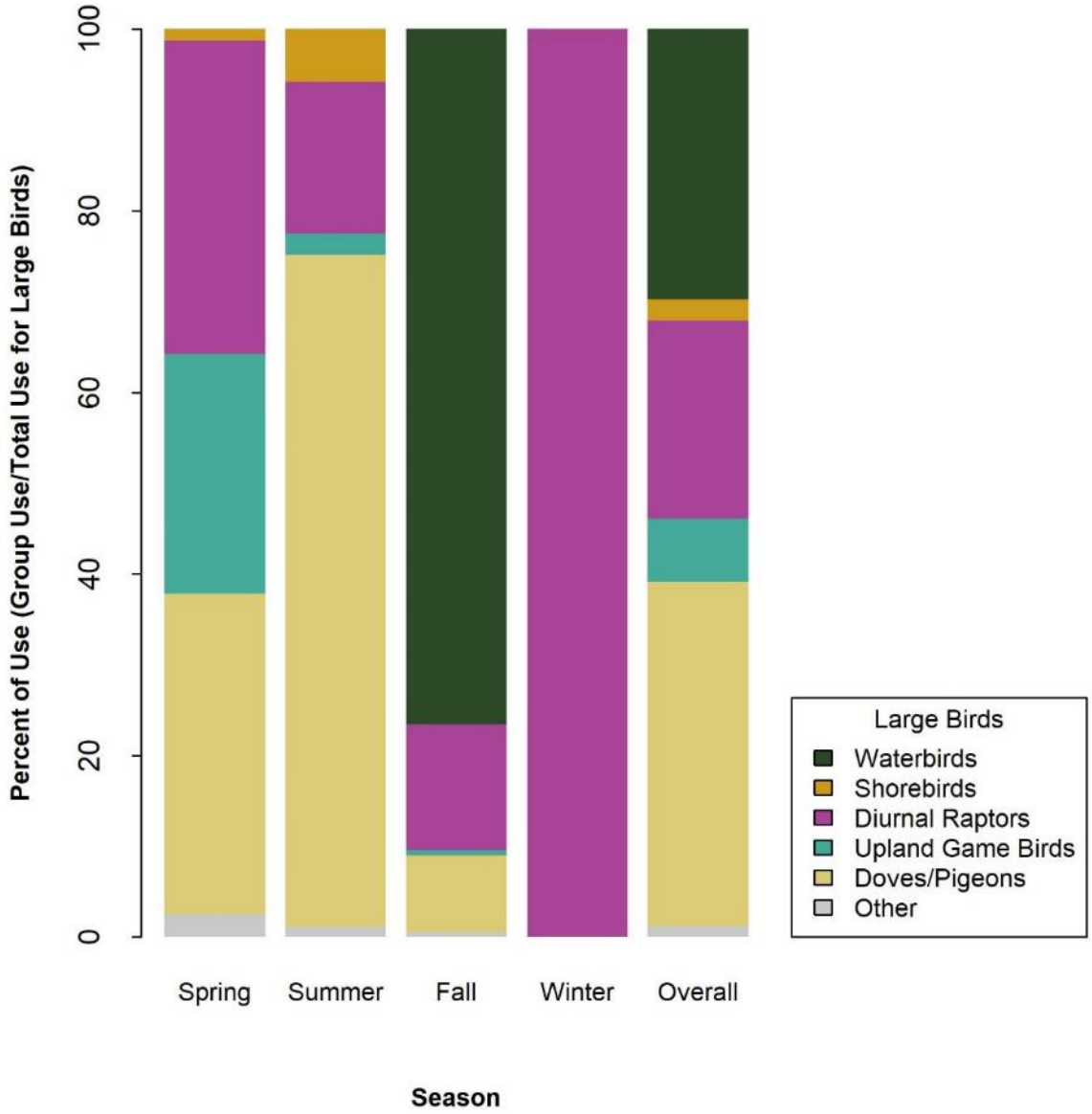

Figure 6e. Large bird percent of use by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 25, 2020 to May 26, 2021.

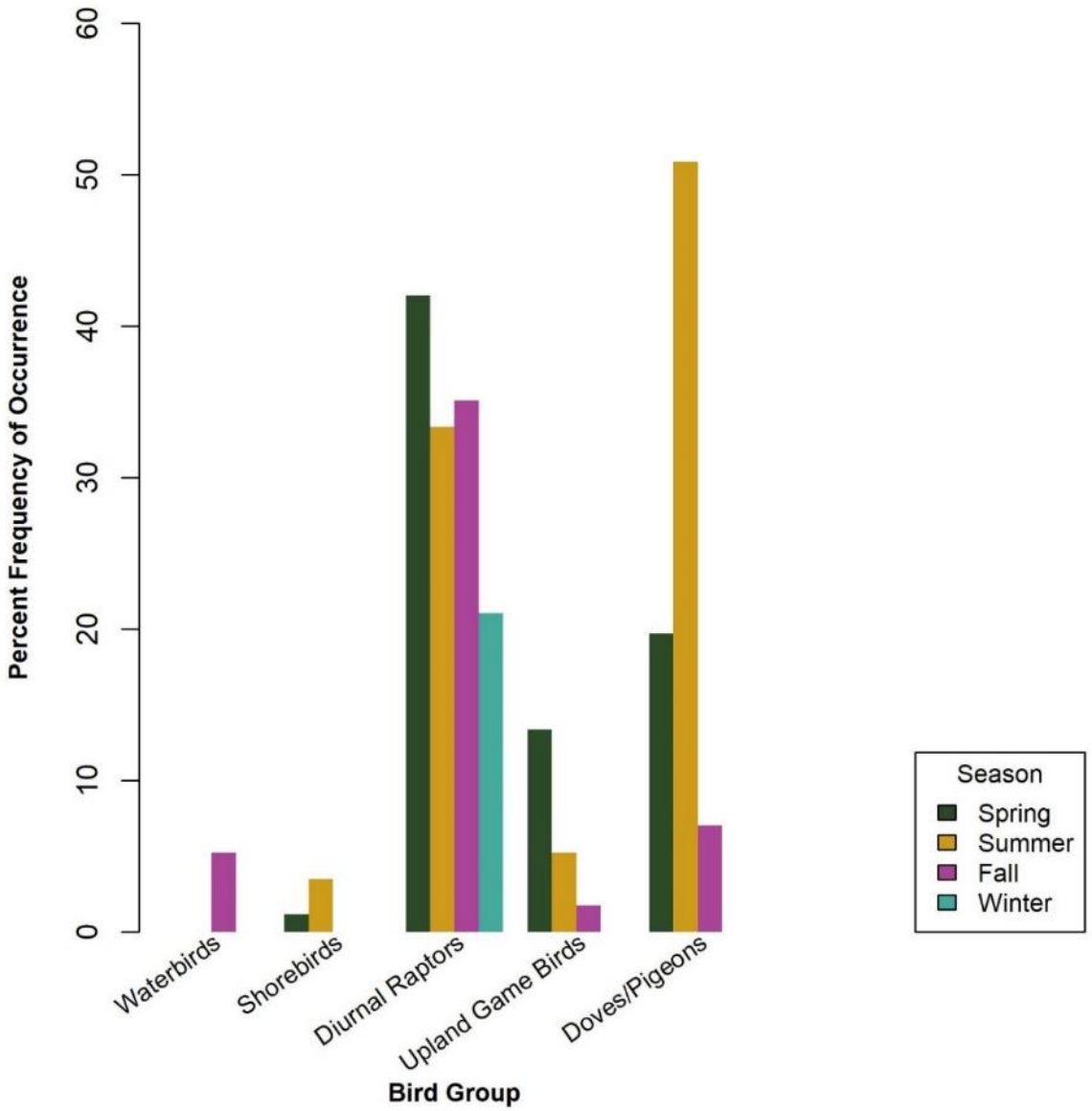

Figure 6f. Large bird frequency of occurrence by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 25, 2020 to May 26, 2021.

Large Bird Mean Flight Height

During Year 1, based on initial observations, mean large bird flight heights ranged from 2.0 m (6.6 ft) for upland game birds to 118.8 m (389.60 ft) for waterbirds. Waterbirds (100%), waterfowl (92.2%) and large corvids (85.7%) were initially recorded most frequently within the RSH range (Table 5a). Diurnal raptors were initially recorded flying within the estimated RSH 27.6% of the time. Amongst, diurnal raptor subtypes buteos (n = 86) and eagles (n = 10) were initially observed flying within the estimated RSH 43.0% and 40.0% of the time, respectively (Table 5a).

Table 5a. Group and individual observation flight height characteristics by large bird type[a] and raptor subtype during fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 1, 2019 to March 11, 2020.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight height Categories		
					<25 m	25−150 m[b]	> 150 m
Waterbirds	**4**	**161**	**118.8**	**98.8**	**0**	**100**	**0**
Waterfowl	**18**	**1,012**	**113.3**	**98.6**	**3.3**	**92.2**	**4.5**
Shorebirds	**6**	**11**	**5.5**	**57.9**	**100**	**0**	**0**
Diurnal Raptors	**204**	**225**	**28.2**	**93.0**	**68.0**	**27.6**	**4.4**
Accipiters	*1*	*1*	*12.0*	*100*	*100*	*0*	*0*
Buteos	*73*	*86*	*33.5*	*90.5*	*54.7*	*43.0*	*2.3*
Northern Harrier	*91*	*98*	*17.4*	*99.0*	*80.6*	*15.3*	*4.1*
Eagles	*10*	*10*	*95.9*	*100*	*30.0*	*40.0*	*30.0*
Falcons	*24*	*25*	*18.2*	*89.3*	*80.0*	*20.0*	*0*
Other Raptors	*5*	*5*	*61.4*	*55.6*	*60.0*	*20.0*	*20.0*
Vultures	**16**	**23**	**21.0**	**92.0**	**91.3**	**8.7**	**0**
Upland Game Birds	**4**	**11**	**2.0**	**34.4**	**100**	**0**	**0**
Doves/Pigeons	**133**	**220**	**4.5**	**63.6**	**100**	**0**	**0**
Large Corvids	**3**	**7**	**21.7**	**87.5**	**14.3**	**85.7**	**0**
Goatsuckers	**1**	**1**	**15.0**	**100**	**100**	**0**	**0**
Large Birds Overall	**389**	**1,671**	**23.9**	**89.7**	**27.0**	**69.7**	**3.4**

[a] 800-meter (m; 2,625-foot [ft]) radius plot for large birds.

[b] the assumed rotor-swept height for potential collision with a turbine blade, 25 to 150 m (82 to 492 ft) above ground level.

Zeroes and NA values indicate the species was observed, but was not flying.

Obs = observations.

All metrics are developed based on First Activity and First Flight Height.

During Year 2, initial mean large bird flight heights ranged from 3.0 m (9.8 ft) for owls to 333.0 m (1,092.5 ft) for waterbirds. Vultures (75%), diurnal raptors (38.4%) and shorebirds (33.3%) were initially recorded most frequently within the RSH range (Table 5b). Amongst, diurnal raptor subtypes buteos (n = 34) and falcons (n = 25) were initially observed flying within the estimated RSH 70.6% and 32.0% of the time, respectively (Table 5b).

Table 5b. Group and individual observation flight height characteristics by large bird type[a] and raptor subtype during fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 25, 2020 to May 26, 2021.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight height Categories		
					<25 m	25−150 m[b]	> 150 m
Waterbirds	**3**	**144**	**333.0**	**100**	**0**	**0**	**100**
Shorebirds	**3**	**3**	**12.0**	**25.0**	**66.7**	**33.3**	**0**
Diurnal Raptors	**79**	**86**	**33.0**	**87.8**	**59.3**	**38.4**	**2.3**
Accipiters	*0*	*0*	*NA*	*0*	*NA*	*NA*	*NA*
Buteos	*32*	*34*	*44.0*	*81.0*	*29.4*	*70.6*	*0*
Northern Harrier	*23*	*25*	*6.0*	*96.2*	*96.0*	*4.0*	*0*
Eagles	*2*	*2*	*250.0*	*100*	*0*	*0*	*100*
Falcons	*22*	*25*	*26.0*	*92.6*	*68.0*	*32.0*	*0*
Owls	**1**	**1**	**3.0**	**50.0**	**100**	**0**	**0**
Vultures	**4**	**4**	**68.0**	**100**	**25.0**	**75.0**	**0**
Upland Game Birds	**5**	**17**	**4.0**	**77.3**	**100**	**0**	**0**
Doves/Pigeons	**54**	**125**	**13.0**	**75.8**	**86.4**	**13.6**	**0**
Large Birds Overall	**149**	**380**	**31.0**	**84.8**	**47.4**	**14.2**	**38.4**

[a] 800-meter (m; 2,625-foot [ft]) radius plot for large birds.

[b] the assumed rotor-swept height for potential collision with a turbine blade, 25 to 150 m (82 to 492 ft) above ground level.

Zeroes and NA values indicate the species was observed, but was not flying.

Obs = observations.

All metrics are developed based on First Activity and First Flight Height.

Spatial Variation

Mean Use by Point

During Year 1, large birds were observed at all 25 survey plots, with highest use observed at Point 8 with 41.25 birds/800-m plot/60 min survey, followed by Point 17 (18.92), Point 14 (11.58), and Point 11 (10.92; Figure 7a, Appendix C). Use at these four plots was due primarily to use by waterfowl.

During Year 2, large birds were observed at all 21 survey plots, with highest use observed at Point 32 with 9.17 birds/800-m plot/60 min survey, followed by Point 11 (3.58), Point 30 (3.00), and Point 15 (2.67; Figure 7b, Appendix C). Use at Points 32 and 11 was due primarily to use by waterbirds, while use at Points 15 and 30 was due primarily to use by doves/pigeons.

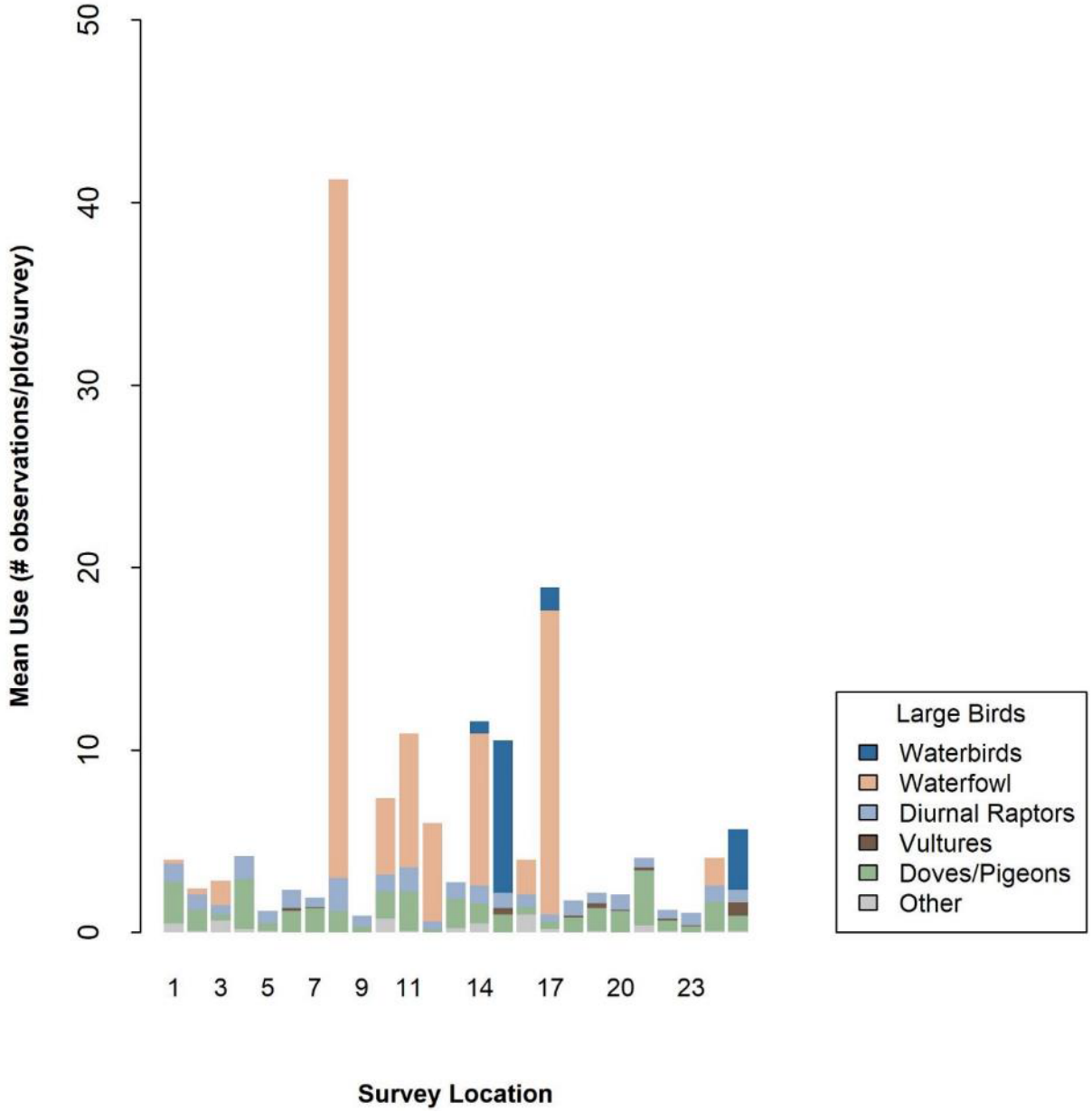

Figure 7a. Large bird mean use (# observations/plot/60 minute survey) by point by bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 1, 2019 to March 11, 2020.

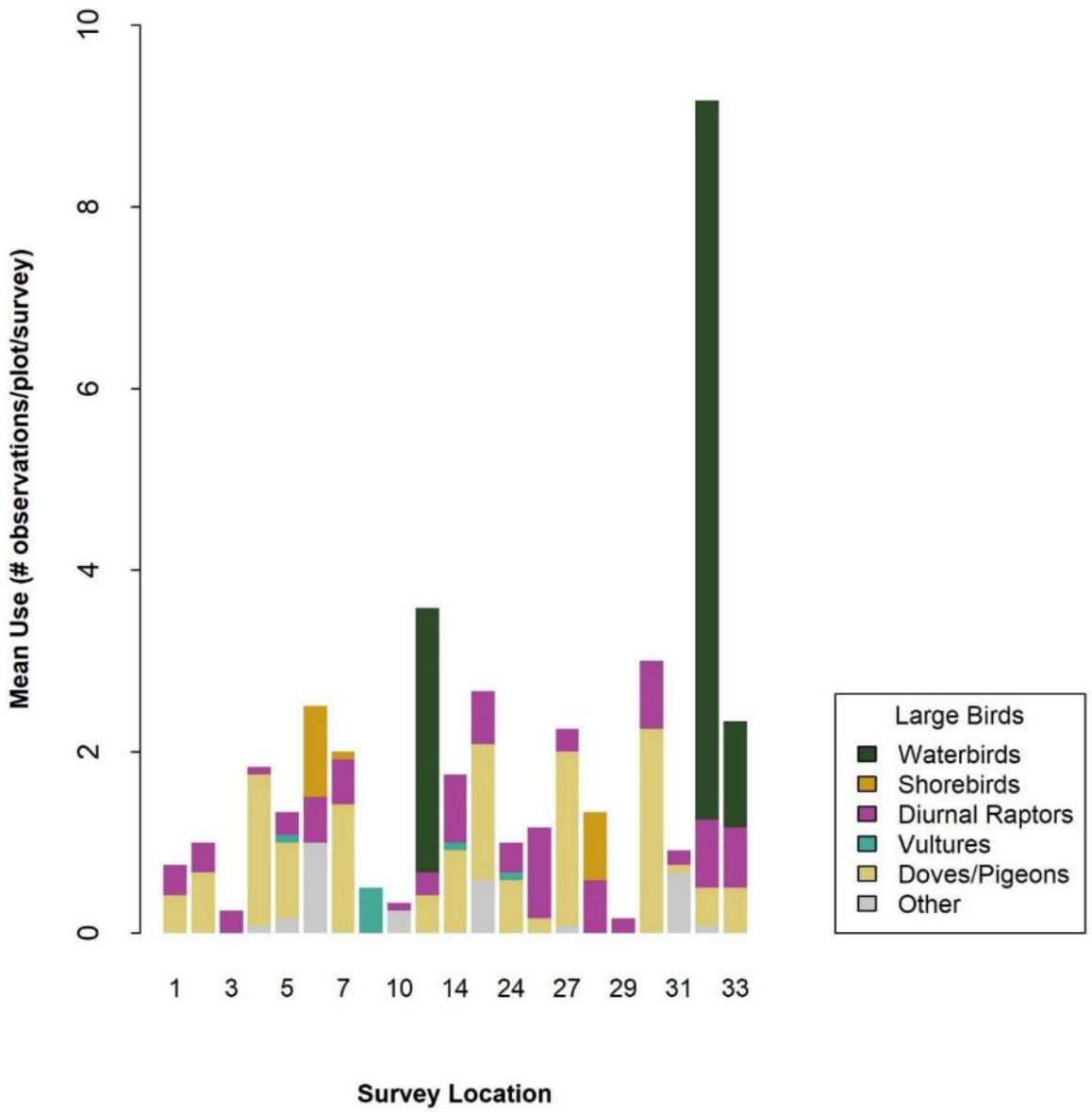

Figure 7b. Large bird mean use (# observations/plot/60 minute survey) by point by bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 25, 2020 to May 26, 2021.

Small Birds

Mean Use, Percent of Use, and Frequency of Occurrence

During Year 1, mean use, percent of use, and frequency of occurrence were calculated by season for small bird types (Figures 8a, 8b, 8c) and species (Appendix B2). Small bird mean use ranged from 2.92 observations/100-m radius plot/10-min survey to 28.81 among seasons and was highest during winter (28.81), followed by summer (7.09), spring (6.79), and fall (2.92; Figure 8a). Small bird frequency of occurrence varied among seasons with passerines most frequently observed during spring (94.7%), summer (84.0%), winter (61.3%) and fall (53.3%; Figure 8c, Appendix B2).

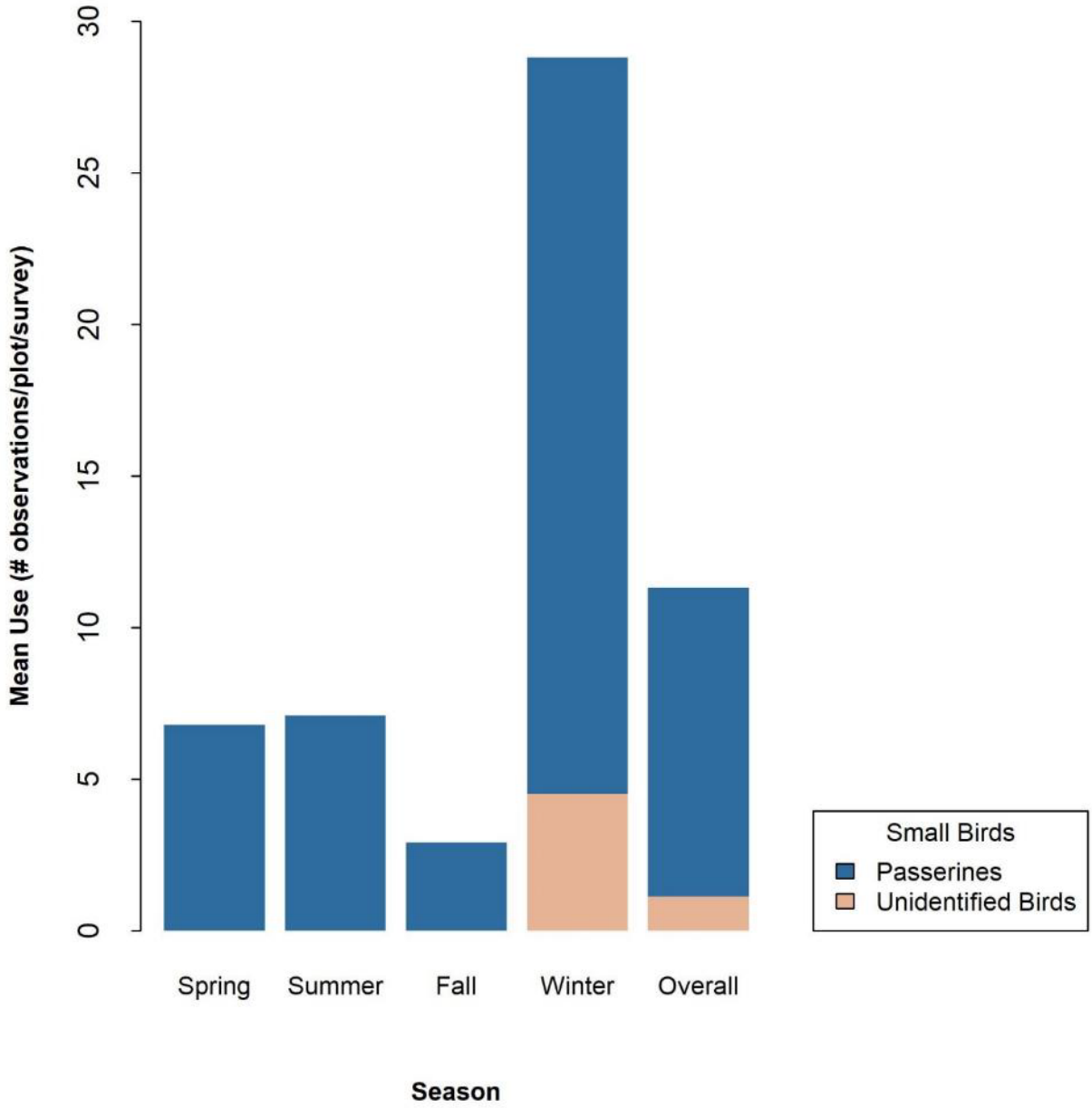

Figure 8a. Small bird mean use (observations/100-meter plot/10 minute survey) by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 1, 2019 to March 11, 2020.

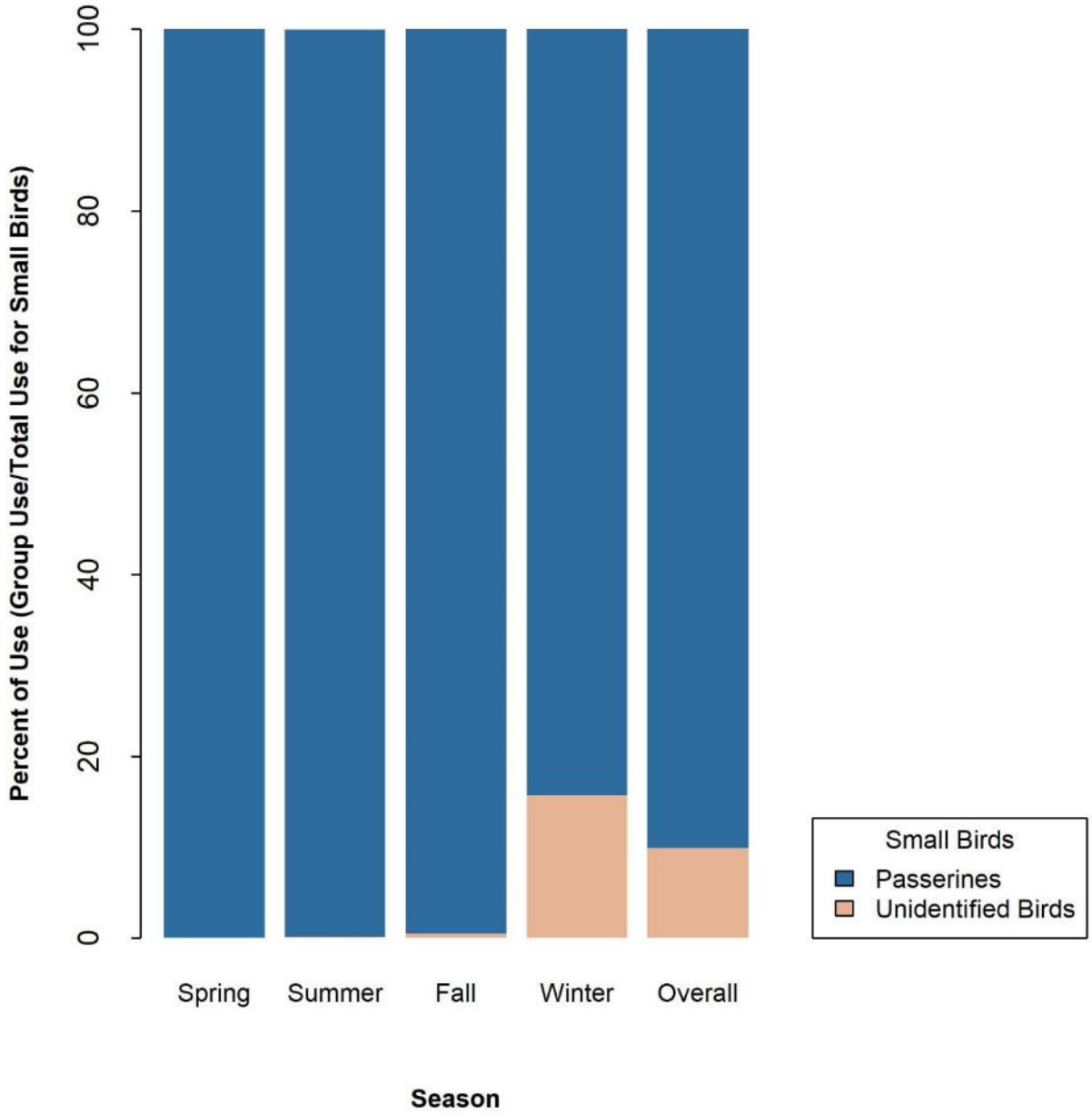

Figure 8b. Small bird percent of use by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska, from April 1, 2019 to March 11, 2020.

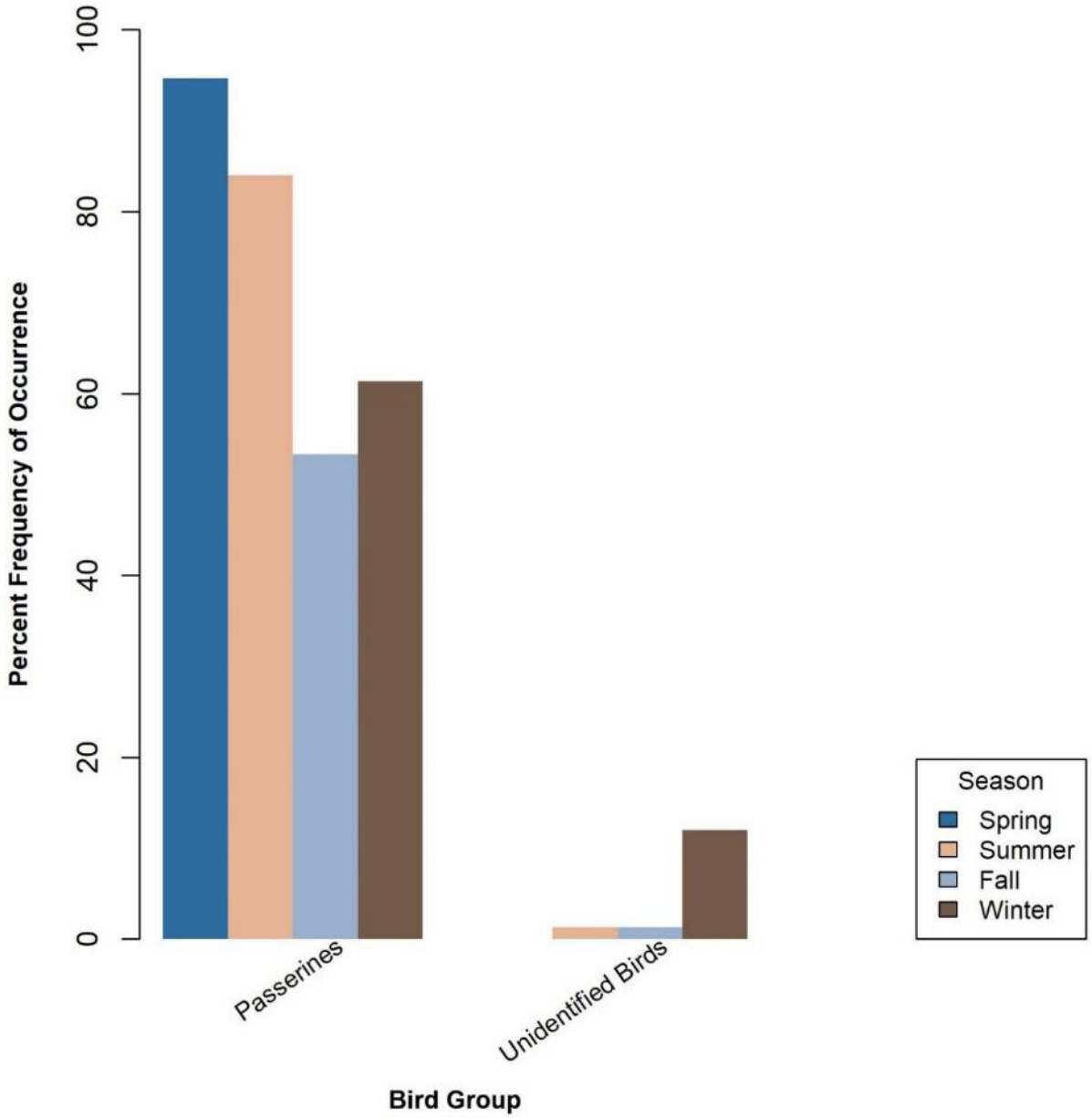

Figure 8c. Small bird frequency of occurrence by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 1, 2019 to March 11, 2020.

During Year 2, mean use, percent of use, and frequency of occurrence were calculated by season for small bird types and species (Figures 8d, 8e, 8f; Appendix B). Small bird mean use ranged from 10.09 observations/100-m radius plot/10-min survey to 25.49 among seasons and was highest during fall (25.49), followed by winter (20.51), spring (17.92), and summer (10.09; Figure 8c). Small bird frequency of occurrence varied among seasons and ranged from 80.7% in the winter to 92.6% in the spring, while unidentified small bird frequency of occurrence ranged from 8.8% in spring to 19.3% in fall (Figure 8f, Appendix B). Woodpeckers were only observed during the fall and occurred during 3.5% of surveys (Figure 8f, Appendix B).

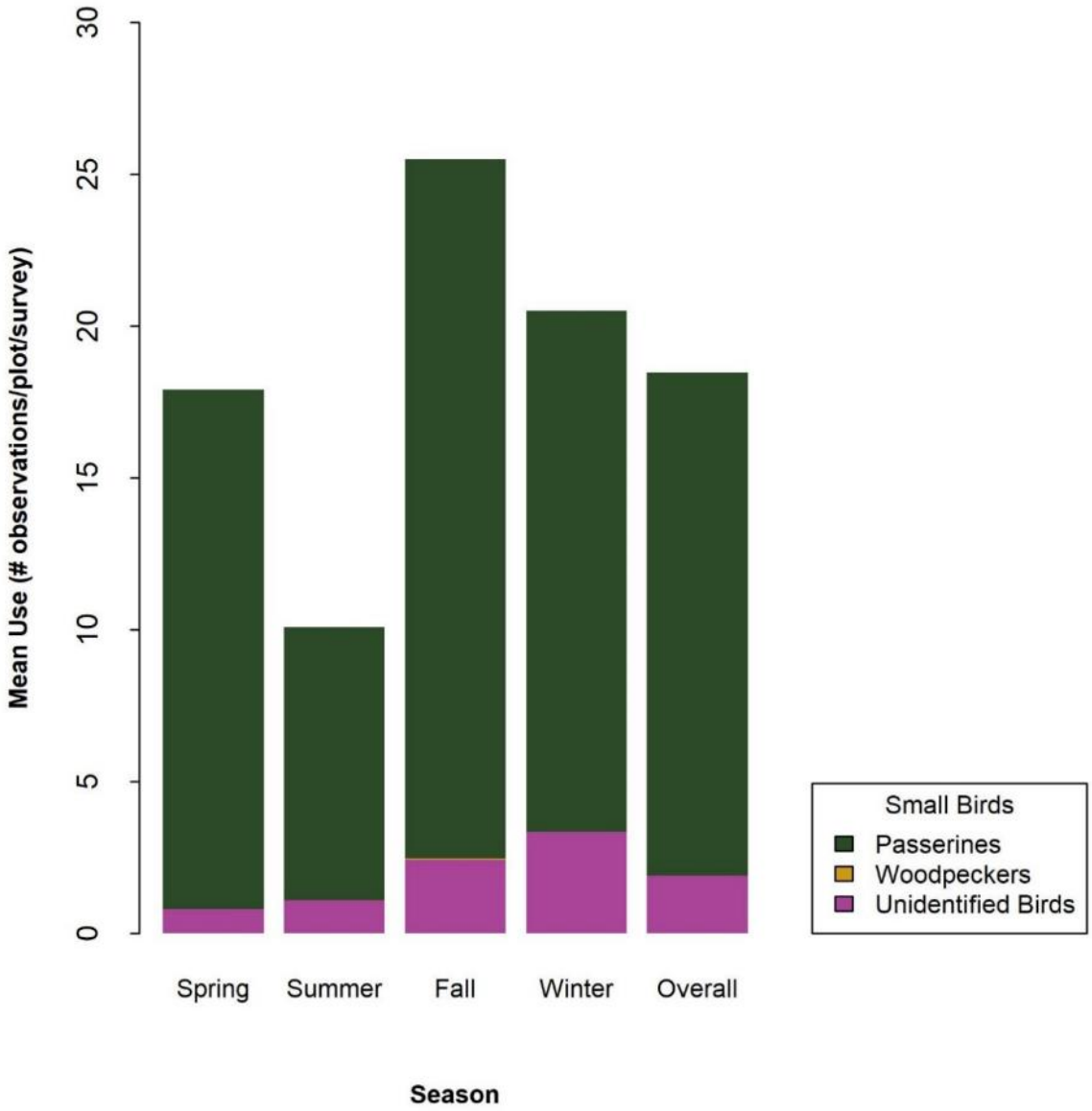

Figure 8d. Small bird mean use (observations/100-meter plot/10 minute survey) by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 25, 2020 to May 26, 2021.

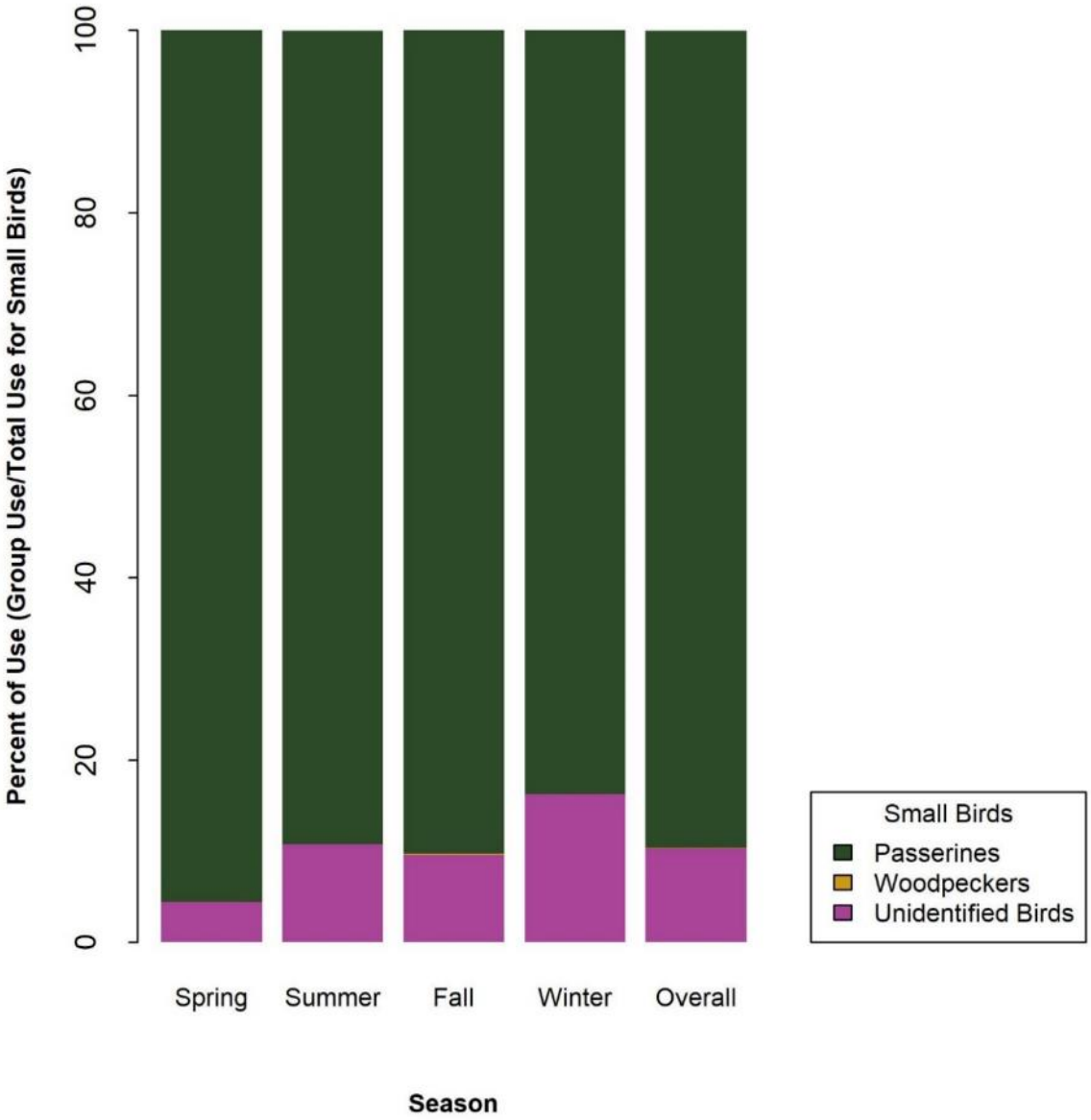

Figure 8e. Small bird percent of use by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska, from April 25, 2020 to May 26, 2021.

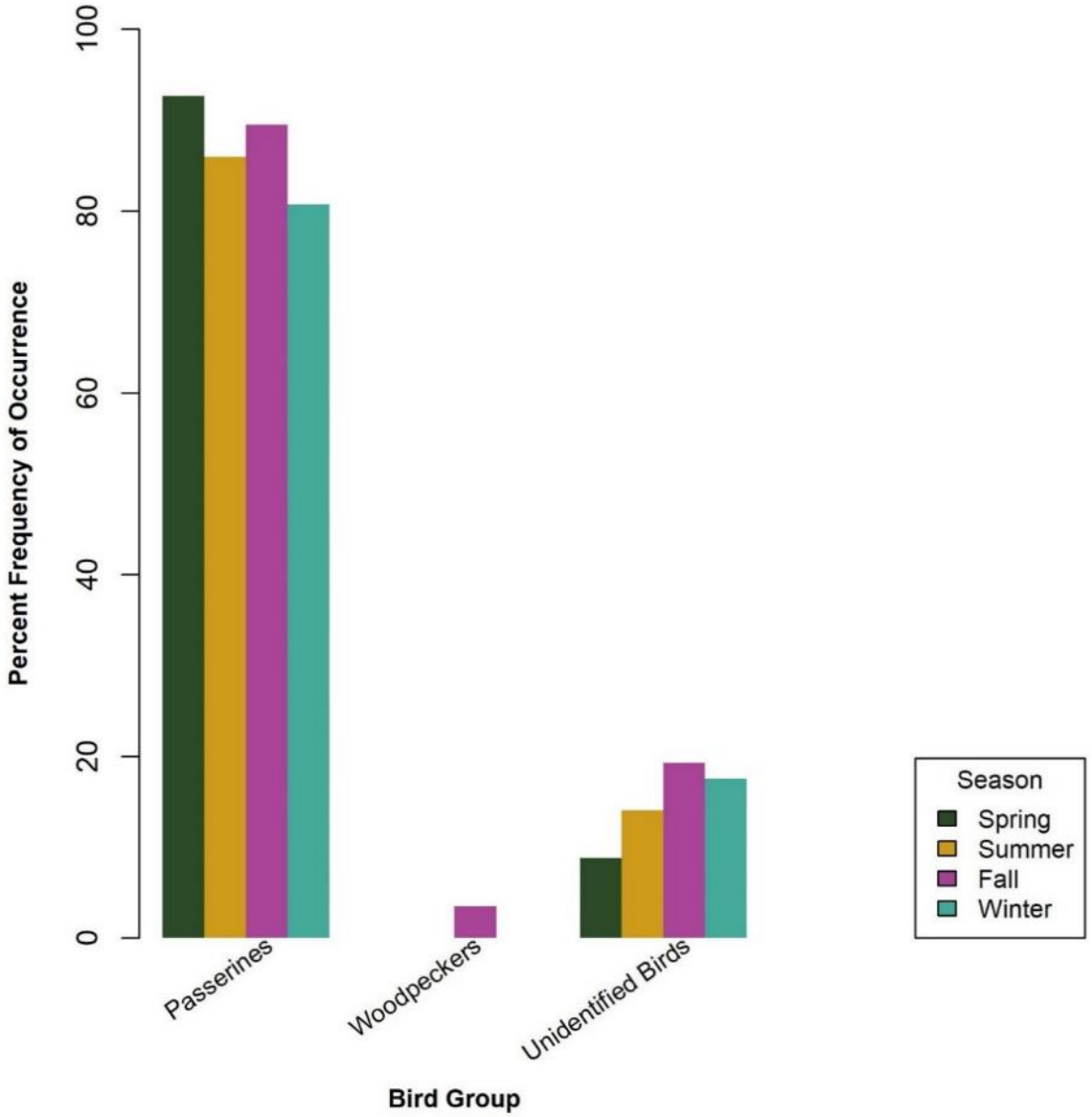

Figure 8f. Small bird frequency of occurrence by season and bird type at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 25, 2020 to May 26, 2021.

Small Bird Mean Flight Height

During Year 1, initial mean small bird flight heights ranged from 5.79 m (19.00 ft) for passerines to 11.00 m (36.09 ft) for unidentified small birds (Table 6a). Grassland/Sparrows were the most common subtype initially observed in flight (Table 6a). The vast majority (98.9%) of small birds were initially observed below the RSH (Table 6a).

Table 6a. Group and individual observation flight height characteristics by bird type[a] and passerine subtype during fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 1, 2019 to March 11, 2020.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight height Categories		
					<25 m	25−150 m[b]	> 150 m
Passerines	**322**	**2,343**	**5.79**	**76.1**	**98.8**	**1.2**	**0**
Blackbirds/Orioles	*41*	*59*	*3.95*	*21.9*	*100*	*0*	*0*
Flycatchers	*4*	*4*	*5.00*	*57.1*	*100*	*0*	*0*
Grassland/Sparrows	*261*	*2,234*	*6.25*	*81.1*	*98.7*	*1.3*	*0*
Swallows	*15*	*45*	*3.20*	*100*	*100*	*0*	*0*
Thrushes	*1*	*1*	*3.00*	*33.3*	*100*	*0*	*0*
Unidentified Birds	**13**	**339**	**11.00**	**99.1**	**100**	**0**	**0**
Small Birds Overall	**335**	**2,682**	**5.99**	**78.4**	**98.9**	**1.1**	**0**

[a] 100-meter (m; 328-foot [ft]) radius plot for small birds.

[b] The assumed rotor-swept height for potential collision with a turbine blade, or 25 to 150 m (82 to 492 ft) above ground level.

Zeroes and NA values indicate the species was observed, but was not flying.

Obs = observations.

All metrics are developed based on First Activity and First Flight Height.

During Year 2, initial mean small bird flight heights ranged from eight m (26 ft) for passerines to 20 m (66 ft) for woodpeckers (Table 6b). Thrushes (33.3%) were the most common subtype initially observed in flight (Table 6b). The vast majority (95.2%) of small birds were initially observed below the RSH (Table 6b).

Table 6b. Group and individual observation flight height characteristics by bird type[a] and passerine subtype during fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 25, 2020 to May 26, 2021.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight height Categories		
					<25 m	25−150 m[b]	> 150 m
Passerines	**643**	**3,461**	**8.00**	**88.6**	**98.2**	**1.8**	**0**
Blackbirds/Orioles	*94*	*217*	*9.00*	*58.0*	*95.4*	*4.6*	*0*
Flycatchers	*6*	*10*	*7.00*	*55.6*	*100*	*0*	*0*
Grassland/Sparrows	*519*	*3,184*	*8.00*	*92.0*	*98.6*	*1.4*	*0*
Swallows	*16*	*40*	*16.00*	*100*	*77.5*	*22.5*	*0*
Shrikes	*2*	*2*	*13.00*	*66.7*	*100*	*0*	*0*
Thrushes	*3*	*3*	*13.00*	*37.5*	*66.7*	*33.3*	*0*
Warblers	*1*	*1*	*20.00*	*100*	*100*	*0*	*0*

Table 6b. Group and individual observation flight height characteristics by bird type[a] and passerine subtype during fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project, Banner County, Nebraska from April 25, 2020 to May 26, 2021.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight height Categories		
					<25 m	25−150 m[b]	> 150 m
Woodpeckers	**1**	**1**	**20.00**	**50.0**	**100**	**0**	**0**
Unidentified Birds	**38**	**462**	**14.00**	**99.1**	**73.2**	**26.8**	**0**
Small Birds Overall	**682**	**3,924**	**8.00**	**89.7**	**95.2**	**4.8**	**0**

[a] 100-meter (m; 328-foot [ft]) radius plot for small birds.

[b] The assumed rotor-swept height for potential collision with a turbine blade, or 25 to 150 m (82 to 492 ft) above ground level.

Zeroes and NA values indicate the species was observed, but was not flying.

Obs = observations.

All metrics are developed based on First Activity and First Flight Height.

Spatial Variation

Mean Use by Point

During Year 1, small bird use ranged from 3.50 observations/100-m radius plot/10-minute survey to 104.00 across plots and was relatively uniform throughout the Project area except for Point 16, which is on the far western portion of the study area, and Point 8, which is located in the southeastern portion of the Project area (Figure 9a).

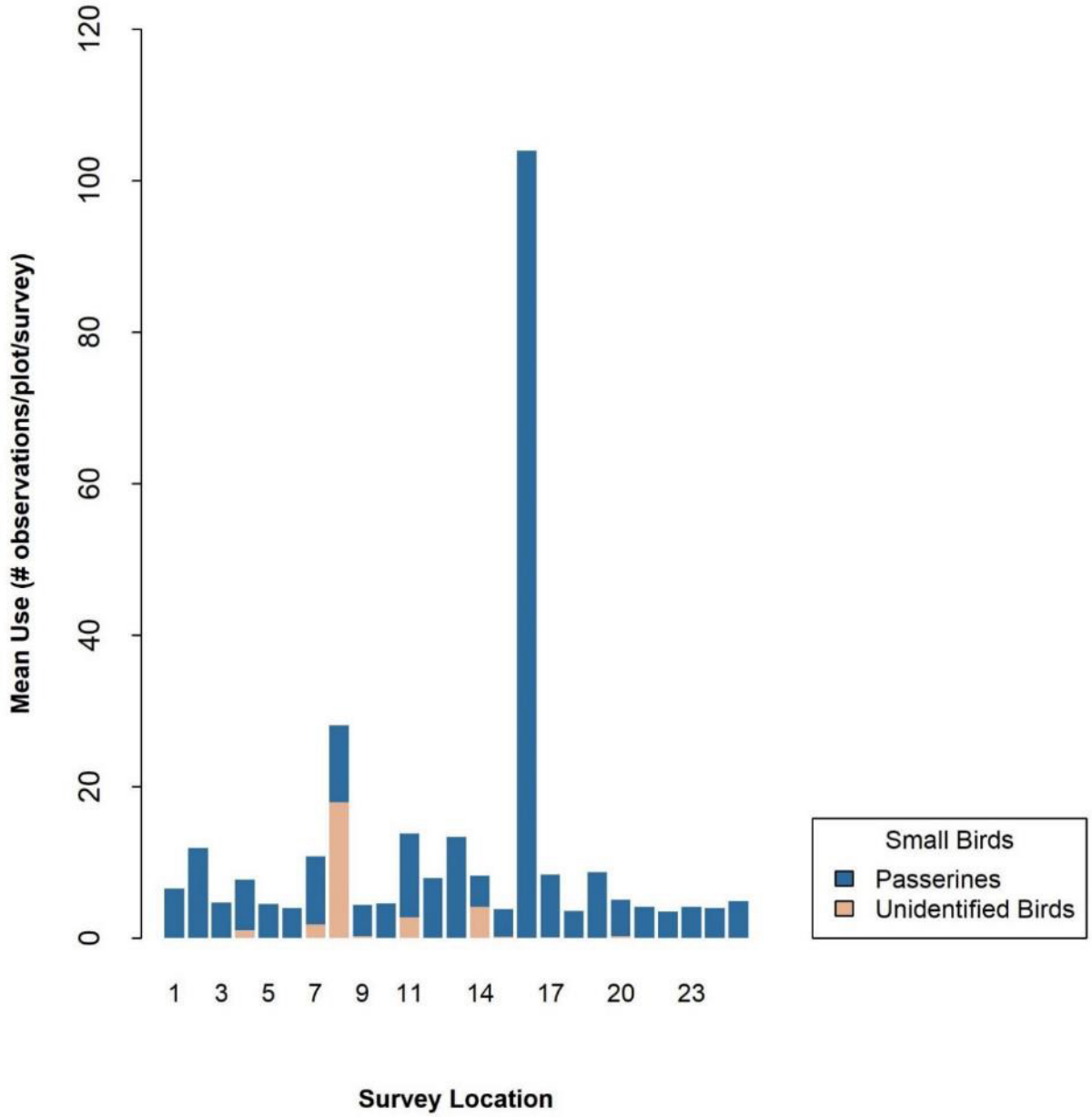

Figure 9a. Small bird mean use (observations/plot/10 minute survey) by survey point at the Pronghorn Flats Wind Energy Project area in Banner County, Nebraska from April 1, 2019 to March 11, 2020.

During Year 2, small bird use ranged from 4.00 observations/100-m radius plot/10-minute survey to 41.75 across points (Figure 9b). The highest use values were from passerines at Points 29 (41.75) and 33 (36.08), followed by Point 3 (27.08, Appendix C).

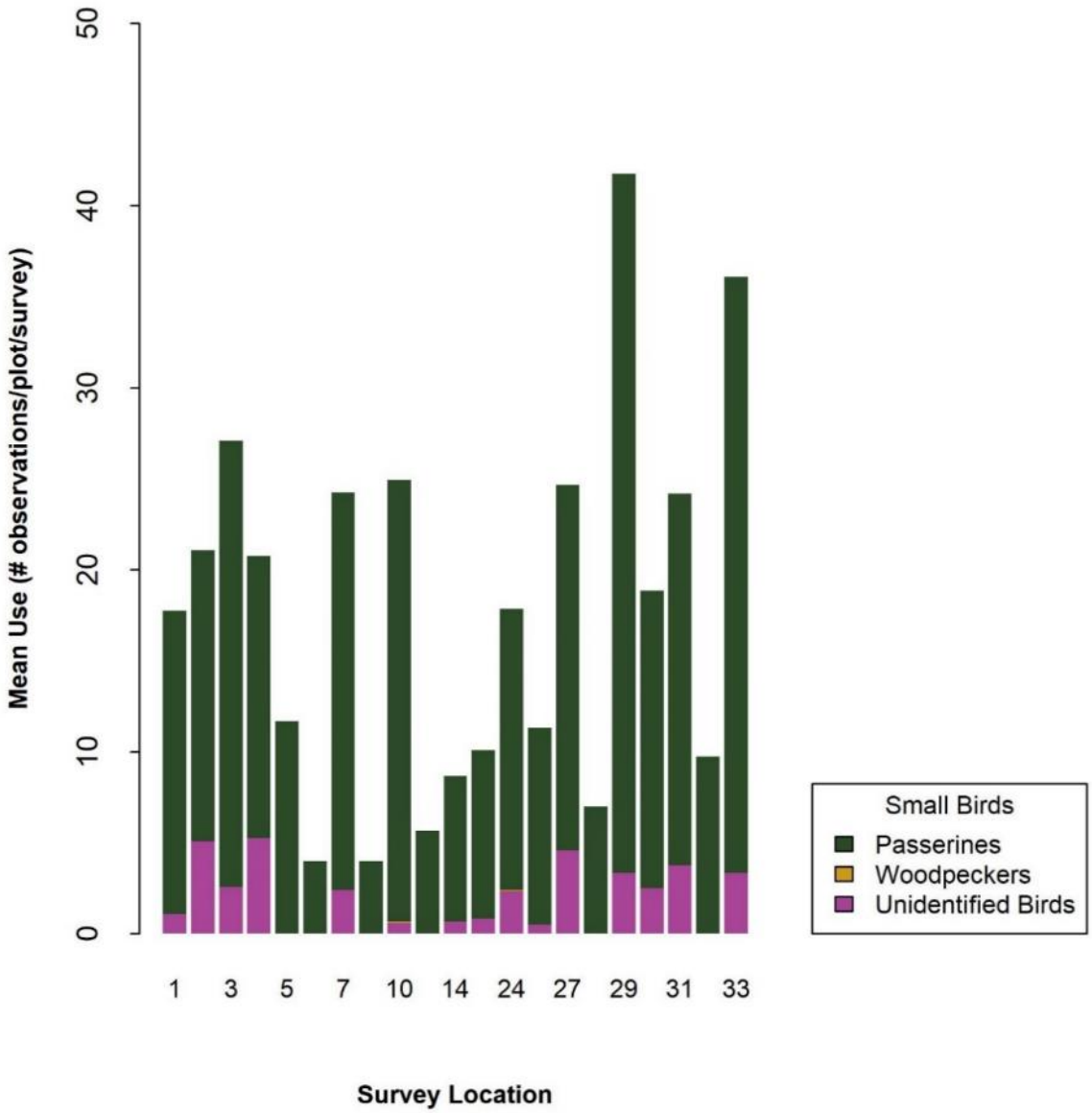

Figure 9b. Small bird mean use (observations/plot/10 minute survey) by survey point at the Pronghorn Flats Wind Energy Project area in Banner County, Nebraska from April 25, 2020 to May 26, 2021.

Incidental Observations

Over the course of two years of surveys, two special status avian species were observed incidentally and include bald eagle (one group, one individual) and golden eagle (two groups, three individuals).

SUMMARY

Special Status Species

No federally listed threatened or endangered species were recorded at the Project during surveys or incidentally during either year of surveys. One state listed species was observed during the course of more than two years of surveys: the thick-billed longspur, a state-listed threatened species, which was observed during the spring and summer of the Year 2 surveys. Both bald and golden eagles were observed during Year 1 surveys; bald eagles were observed only during the fall and spring, and golden eagles were observed during all seasons. No bald eagles were observed during the Year 2 surveys and golden eagles were observed only during the fall season.

Overall, the species composition, seasonal abundance, and spatial use patterns documented during surveys are considered typical for birds in this region. The majority of species observed are common and abundant within the region.

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Appendix A. All Bird Types and Species Observed at the Pronghorn Flats Wind Energy Project during Avian Use Surveys, April 1, 2019 to March 11, 2020 and April 25, 2020 to May 26, 2021.

Appendix A1. Summary of all groups and individual observations, regardless of distance from observer, by large bird type and species for fixed-point surveys at the Pronghorn Flats Wind Energy Project from April 1, 2019 to March 11, 2020.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Waterbirds		**0**	**0**	**0**	**0**	**5**	**163**	**0**	**0**	**5**	**163**
sandhill crane	*Antigone canadensis*	0	0	0	0	5	163	0	0	5	163
Waterfowl		**16**	**755**	**2**	**26**	**3**	**207**	**1**	**38**	**22**	**1,026**
green-winged teal	*Anas crecca*	1	2	0	0	0	0	0	0	1	2
Mallard	*Anas platyrhynchos*	3	14	0	0	0	0	0	0	3	14
Canada goose	*Branta canadensis*	11	693	1	23	1	200	1	38	14	954
cackling goose	*Branta hutchinsii*	1	46	0	0	2	7	0	0	3	53
unidentified duck		0	0	1	3	0	0	0	0	1	3
Shorebirds		**2**	**3**	**9**	**14**	**2**	**2**	**0**	**0**	**13**	**19**
Killdeer	*Charadrius vociferus*	2	3	9	14	2	2	0	0	13	19
Diurnal Raptors		**85**	**93**	**56**	**63**	**62**	**69**	**24**	**24**	**227**	**249**
Accipiters		*1*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*
Cooper's hawk	*Accipiter cooperii*	1	1	0	0	0	0	0	0	1	1
Buteos		*16*	*17*	*36*	*42*	*24*	*31*	*5*	*5*	*81*	*95*
red-tailed hawk	*Buteo jamaicensis*	4	4	4	4	7	7	0	0	15	15
rough-legged hawk	*Buteo lagopus*	0	0	0	0	2	2	5	5	7	7
unidentified buteo		2	2	3	4	4	4	0	0	9	10
Swainson's hawk	*Buteo swainsoni*	10	11	29	34	11	18	0	0	50	63
Northern Harrier		*48*	*55*	*10*	*10*	*22*	*22*	*12*	*12*	*92*	*99*
northern harrier	*Circus hudsonius*	48	55	10	10	22	22	12	12	92	99
Eagles		*8*	*8*	*5*	*5*	*3*	*3*	*1*	*1*	*17*	*17*
golden eagle	*Aquila chrysaetos*	7	7	3	3	1	1	1	1	12	12
bald eagle	*Haliaeetus leucocephalus*	1	1	0	0	2	2	0	0	3	3
unidentified eagle		0	0	2	2	0	0	0	0	2	2
Falcons		*9*	*9*	*2*	*3*	*10*	*10*	*6*	*6*	*27*	*28*
Merlin	*Falco columbarius*	0	0	0	0	4	4	4	4	8	8
American kestrel	*Falco sparverius*	7	7	2	3	6	6	1	1	16	17
unidentified falcon		2	2	0	0	0	0	1	1	3	3
Other Raptors		*3*	*3*	*3*	*3*	*3*	*3*	*0*	*0*	*9*	*9*
unidentified raptor		3	3	3	3	3	3	0	0	9	9
Vultures		**1**	**2**	**16**	**22**	**1**	**1**	**0**	**0**	**18**	**25**
turkey vulture	*Cathartes aura*	1	2	16	22	1	1	0	0	18	25
Upland Game Birds		**5**	**6**	**9**	**9**	**3**	**9**	**1**	**8**	**18**	**32**
ring-necked pheasant	*Phasianus colchicus*	3	3	8	8	3	9	0	0	14	20
sharp-tailed grouse	*Tympanuchus phasianellus*	2	3	1	1	0	0	1	8	4	12

Appendix A1. Summary of all groups and individual observations, regardless of distance from observer, by large bird type and species for fixed-point surveys at the Pronghorn Flats Wind Energy Project from April 1, 2019 to March 11, 2020.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Doves/Pigeons		**17**	**22**	**173**	**273**	**18**	**34**	**4**	**17**	**212**	**346**
rock pigeon	*Columba livia*	0	0	0	0	0	0	4	17	4	17
Eurasian collared-dove	*Streptopelia decaocto*	1	1	8	10	12	27	0	0	21	38
mourning dove	*Zenaida macroura*	16	21	165	263	6	7	0	0	187	291
Large Corvids		**4**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**8**
American crow	*Corvus brachyrhynchos*	3	7	0	0	0	0	0	0	3	7
common raven	*Corvus corax*	1	1	0	0	0	0	0	0	1	1
Goatsuckers		**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
common nighthawk	*Chordeiles minor*	1	1	0	0	0	0	0	0	1	1
Overall		**131**	**890**	**265**	**407**	**94**	**485**	**30**	**87**	**520**	**1,869**

[a] grps = groups; obs = observations.

Appendix A2. Summary of all groups and individual observations, regardless of distance from observer, by small bird type and species for fixed-point surveys at the Pronghorn Flats Wind Energy Project from April 1, 2019 to March 11, 2020.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Passerines		**288**	**509**	**312**	**531**	**76**	**218**	**106**	**1,821**	**782**	**3,079**
Blackbirds/Orioles		*108*	*169*	*70*	*89*	*11*	*12*	*0*	*0*	*189*	*270*
red-winged blackbird	*Agelaius phoeniceus*	15	48	27	38	0	0	0	0	42	86
Brewer's blackbird	*Euphagus cyanocephalus*	2	2	1	1	0	0	0	0	3	3
common grackle	*Quiscalus quiscula*	2	4	0	0	0	0	0	0	2	4
western meadowlark	*Sturnella neglecta*	88	113	41	46	11	12	0	0	140	171
European starling	*Sturnus vulgaris*	0	0	1	4	0	0	0	0	1	4
unidentified blackbird		1	2	0	0	0	0	0	0	1	2
Flycatchers		*5*	*5*	*2*	*2*	*0*	*0*	*0*	*0*	*7*	*7*
Say's phoebe	*Sayornis saya*	1	1	0	0	0	0	0	0	1	1
western kingbird	*Tyrannus verticalis*	2	2	0	0	0	0	0	0	2	2
Cassin's kingbird	*Tyrannus vociferans*	2	2	2	2	0	0	0	0	4	4
Grassland/Sparrows		*172*	*332*	*226*	*396*	*64*	*205*	*106*	*1,821*	*568*	*2,754*
grasshopper sparrow	*Ammodramus savannarum*	0	0	19	19	0	0	0	0	19	19
lark bunting	*Calamospiza melanocorys*	9	29	97	172	3	5	0	0	109	206
Lapland longspur	*Calcarius lapponicus*	0	0	0	0	0	0	9	895	9	895
lark sparrow	*Chondestes grammacus*	1	1	0	0	0	0	0	0	1	1
horned lark	*Eremophila alpestris*	158	290	106	200	57	193	97	926	418	1,609
dark-eyed junco	*Junco hyemalis*	1	9	0	0	0	0	0	0	1	9
vesper sparrow	*Pooecetes gramineus*	1	1	0	0	2	4	0	0	3	5
chipping sparrow	*Spizella passerina*	1	1	0	0	0	0	0	0	1	1
white-crowned sparrow	*Zonotrichia leucophrys*	0	0	0	0	1	2	0	0	1	2
unidentified sparrow		1	1	4	5	1	1	0	0	6	7
Swallows		*1*	*1*	*13*	*43*	*1*	*1*	*0*	*0*	*15*	*45*
barn swallow	*Hirundo rustica*	1	1	6	7	1	1	0	0	8	9
cliff swallow	*Petrochelidon pyrrhonota*	0	0	6	33	0	0	0	0	6	33
tree swallow	*Tachycineta bicolor*	0	0	1	3	0	0	0	0	1	3
Thrushes		*2*	*2*	*1*	*1*	*0*	*0*	*0*	*0*	*3*	*3*
American robin	*Turdus migratorius*	2	2	1	1	0	0	0	0	3	3
Unidentified Birds		**0**	**0**	**1**	**1**	**1**	**1**	**14**	**340**	**16**	**342**
unidentified small bird		0	0	1	1	1	1	14	340	16	342
Overall		**288**	**509**	**313**	**532**	**77**	**219**	**120**	**2,161**	**798**	**3,421**

grps = groups; obs = observations.

Appendix A3. Summary of all groups and individual observations, regardless of distance from observer, by large bird type and species during avian bird surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Waterbirds		**0**	**0**	**0**	**0**	**3**	**144**	**0**	**0**	**3**	**144**
sandhill crane	*Antigone canadensis*	0	0	0	0	3	144	0	0	3	144
Shorebirds		**2**	**2**	**2**	**10**	**0**	**0**	**0**	**0**	**4**	**12**
upland sandpiper	*Bartramia longicauda*	0	0	1	1	0	0	0	0	1	1
killdeer	*Charadrius vociferus*	2	2	0	0	0	0	0	0	2	2
long-billed curlew	*Numenius americanus*	0	0	1	9	0	0	0	0	1	9
Diurnal Raptors		**28**	**30**	**24**	**29**	**24**	**26**	**13**	**13**	**89**	**98**
Accipiters		*1*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*
sharp-shinned hawk	*Accipiter striatus*	1	1	0	0	0	0	0	0	1	1
Buteos		*11*	*12*	*14*	*17*	*9*	*9*	*4*	*4*	*38*	*42*
red-tailed hawk	*Buteo jamaicensis*	2	2	2	2	5	5	2	2	11	11
rough-legged hawk	*Buteo lagopus*	1	1	0	0	0	0	2	2	3	3
ferruginous hawk	*Buteo regalis*	0	0	0	0	2	2	0	0	2	2
unidentified buteo		1	1	0	0	0	0	0	0	1	1
Swainson's hawk	*Buteo swainsoni*	7	8	12	15	2	2	0	0	21	25
Northern Harrier		*11*	*12*	*3*	*3*	*5*	*6*	*5*	*5*	*24*	*26*
northern harrier	*Circus hudsonius*	11	12	3	3	5	6	5	5	24	26
Eagles		*0*	*0*	*0*	*0*	*2*	*2*	*0*	*0*	*2*	*2*
golden eagle	*Aquila chrysaetos*	0	0	0	0	2	2	0	0	2	2
Falcons		*5*	*5*	*7*	*9*	*8*	*9*	*4*	*4*	*24*	*27*
merlin	*Falco columbarius*	0	0	0	0	1	1	0	0	1	1
prairie falcon	*Falco mexicanus*	1	1	1	1	3	4	3	3	8	9
American kestrel	*Falco sparverius*	4	4	6	8	4	4	1	1	15	17
Owls		**1**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**2**	**2**
burrowing owl	*Athene cunicularia*	1	1	0	0	1	1	0	0	2	2
Vultures		**2**	**2**	**2**	**2**	**0**	**0**	**0**	**0**	**4**	**4**
turkey vulture	*Cathartes aura*	2	2	2	2	0	0	0	0	4	4
Upland Game Birds		**5**	**17**	**3**	**4**	**1**	**1**	**0**	**0**	**9**	**22**
ring-necked pheasant	*Phasianus colchicus*	1	1	0	0	1	1	0	0	2	2
sharp-tailed grouse	*Tympanuchus phasianellus*	4	16	3	4	0	0	0	0	7	20
Doves/Pigeons		**10**	**21**	**57**	**128**	**6**	**16**	**0**	**0**	**73**	**165**
Eurasian collared-dove	*Streptopelia decaocto*	0	0	1	1	0	0	0	0	1	1
mourning dove	*Zenaida macroura*	10	21	56	127	6	16	0	0	72	164

Appendix A3. Summary of all groups and individual observations, regardless of distance from observer, by large bird type and species during avian bird surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Large Corvids		**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
American crow	*Corvus brachyrhynchos*	1	1	0	0	0	0	0	0	1	1
Overall		**49**	**74**	**88**	**173**	**35**	**188**	**13**	**13**	**185**	**448**

[a] grps = groups; obs = observations.

Appendix A4. Summary of all groups and individual observations, regardless of distance from observer, by small bird type and species during avian bird surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Passerines		**326**	**1,105**	**212**	**513**	**238**	**1,312**	**139**	**979**	**915**	**3,909**
Passerines(Subtype)		*0*	*0*	*2*	*4*	*0*	*0*	*0*	*0*	*2*	*4*
unidentified passerine		0	0	2	4	0	0	0	0	2	4
Blackbirds/Orioles		*85*	*140*	*78*	*109*	*42*	*119*	*6*	*6*	*211*	*374*
red-winged blackbird	*Agelaius phoeniceus*	9	20	12	16	0	0	0	0	21	36
Brewer's blackbird	*Euphagus cyanocephalus*	0	0	1	1	1	50	0	0	2	51
common grackle	*Quiscalus quiscula*	3	8	0	0	0	0	0	0	3	8
western meadowlark	*Sturnella neglecta*	71	110	65	92	41	69	6	6	183	277
European starling	*Sturnus vulgaris*	1	1	0	0	0	0	0	0	1	1
unidentified blackbird		1	1	0	0	0	0	0	0	1	1
Flycatchers		*2*	*3*	*8*	*15*	*0*	*0*	*0*	*0*	*10*	*18*
Say's phoebe	*Sayornis saya*	1	1	0	0	0	0	0	0	1	1
western kingbird	*Tyrannus verticalis*	1	2	7	14	0	0	0	0	8	16
Cassin's kingbird	*Tyrannus vociferans*	0	0	1	1	0	0	0	0	1	1
Grassland/Sparrows		*230*	*941*	*108*	*354*	*195*	*1,192*	*133*	*973*	*666*	*3,460*
grasshopper sparrow	*Ammodramus savannarum*	1	1	0	0	0	0	0	0	1	1
lark bunting	*Calamospiza melanocorys*	27	47	33	155	0	0	0	0	60	202
Lapland longspur	*Calcarius lapponicus*	23	177	0	0	8	58	0	0	31	235
chestnut-collared longspur	*Calcarius ornatus*	1	6	1	2	0	0	0	0	2	8
lark sparrow	*Chondestes grammacus*	1	1	3	4	0	0	0	0	4	5
horned lark	*Eremophila alpestris*	165	692	63	174	174	1,103	130	967	532	2,936
vesper sparrow	*Pooecetes gramineus*	7	8	4	7	7	16	0	0	18	31
thick-billed longspur	*Rhynchophanes mccownii*	1	1	1	3	0	0	0	0	2	4
clay-colored sparrow	*Spizella pallida*	0	0	1	6	2	5	0	0	3	11
chipping sparrow	*Spizella passerina*	0	0	0	0	0	0	1	1	1	1
American tree sparrow	*Spizelloides arborea*	4	8	0	0	0	0	0	0	4	8
white-crowned sparrow	*Zonotrichia leucophrys*	0	0	0	0	2	7	1	3	3	10
unidentified sparrow		0	0	2	3	2	3	1	2	5	8
Swallows		*6*	*15*	*11*	*26*	*0*	*0*	*0*	*0*	*17*	*41*
barn swallow	*Hirundo rustica*	6	15	11	26	0	0	0	0	17	41
Shrikes		*0*	*0*	*3*	*3*	*0*	*0*	*0*	*0*	*3*	*3*
loggerhead shrike	*Lanius ludovicianus*	0	0	3	3	0	0	0	0	3	3
Thrushes		*3*	*6*	*2*	*2*	*0*	*0*	*0*	*0*	*5*	*8*
American robin	*Turdus migratorius*	3	6	2	2	0	0	0	0	5	8
Warblers		*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*1*
Wilson's warbler	*Cardellina pusilla*	0	0	0	0	1	1	0	0	1	1

Appendix A4. Summary of all groups and individual observations, regardless of distance from observer, by small bird type and species during avian bird surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Woodpeckers		**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**2**	**2**
northern flicker	*Colaptes auratus*	0	0	0	0	2	2	0	0	2	2
Unidentified Birds		**8**	**75**	**10**	**62**	**12**	**139**	**11**	**190**	**41**	**466**
unidentified small bird		8	75	10	62	12	139	11	190	41	466
Overall		**334**	**1,180**	**222**	**575**	**252**	**1,453**	**150**	**1,169**	**958**	**4,377**

[a] grps = groups; obs = observations.

Appendix B. Bird Use, Percent of Use, and Frequency of Occurrence for Large Birds and Small Birds Observed during Avian Use Surveys at the Pronghorn Flats Wind Energy Project from April 1, 2019 to March 11, 2020 and April 25, 2020 to May 26, 2021.

Appendix B1. Mean large birds use (number of large birds/plot[a]/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project from April 1, 2019 to March 11, 2020.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Waterbirds	**0**	**0**	**2.17**	**0**	**0**	**0**	**33.6**	**0**	**0**	**0**	**5.3**	**0**
sandhill crane	0	0	2.17	0	0	0	33.6	0	0	0	5.3	0
Waterfowl	**10.07**	**0.35**	**2.76**	**0.51**	**85.1**	**6.5**	**42.7**	**43.7**	**10.7**	**2.7**	**4.0**	**1.3**
green-winged teal	0.03	0	0	0	0.2	0	0	0	1.3	0	0	0
mallard	0.19	0	0	0	1.6	0	0	0	2.7	0	0	0
Canada goose	9.24	0.31	2.67	0.51	78.1	5.7	41.2	43.7	8.0	1.3	1.3	1.3
cackling goose	0.61	0	0.09	0	5.2	0	1.4	0	1.3	0	2.7	0
unidentified duck	0	0.04	0	0	0	0.7	0	0	0	1.3	0	0
Shorebirds	**0.04**	**0.19**	**0.03**	**0**	**0.3**	**3.5**	**0.4**	**0**	**1.3**	**8.0**	**2.7**	**0**
killdeer	0.04	0.19	0.03	0	0.3	3.5	0.4	0	1.3	8.0	2.7	0
Diurnal Raptors	**1.20**	**0.79**	**0.92**	**0.32**	**10.1**	**14.6**	**14.2**	**27.6**	**58.7**	**46.7**	**61.3**	**24.0**
Accipiters	*0.01*	*0*	*0*	*0*	*0.1*	*0*	*0*	*0*	*1.3*	*0*	*0*	*0*
Cooper's hawk	0.01	0	0	0	0.1	0	0	0	1.3	0	0	0
Buteos	*0.23*	*0.56*	*0.41*	*0.07*	*1.9*	*10.4*	*6.4*	*5.7*	*14.7*	*38.7*	*25.3*	*6.7*
red-tailed hawk	0.05	0.05	0.09	0	0.5	1.0	1.4	0	5.3	5.3	9.3	0
rough-legged hawk	0	0	0.03	0.07	0	0	0.4	5.7	0	0	2.7	6.7
unidentified buteo	0.03	0.05	0.05	0	0.2	1.0	0.8	0	2.7	2.7	5.3	0
Swainson's hawk	0.15	0.45	0.24	0	1.2	8.4	3.7	0	9.3	32.0	12.0	0
Northern Harrier	*0.73*	*0.13*	*0.29*	*0.16*	*6.2*	*2.5*	*4.5*	*13.8*	*41.3*	*10.7*	*29.3*	*13.3*
northern harrier	0.73	0.13	0.29	0.16	6.2	2.5	4.5	13.8	41.3	10.7	29.3	13.3
Eagles	*0.07*	*0.01*	*0.04*	*0.01*	*0.6*	*0.2*	*0.6*	*1.1*	*5.3*	*1.3*	*4.0*	*1.3*
golden eagle	0.07	0.01	0.01	0.01	0.6	0.2	0.2	1.1	5.3	1.3	1.3	1.3
bald eagle	0	0	0.03	0	0	0	0.4	0	0	0	2.7	0
Falcons	*0.12*	*0.04*	*0.13*	*0.08*	*1.0*	*0.7*	*2.1*	*6.9*	*12.0*	*2.7*	*13.3*	*8.0*
merlin	0	0	0.05	0.05	0	0	0.8	4.6	0	0	5.3	5.3
American kestrel	0.09	0.04	0.08	0.01	0.8	0.7	1.2	1.1	9.3	2.7	8.0	1.3
unidentified falcon	0.03	0	0	0.01	0.2	0	0	1.1	2.7	0	0	1.3
Other Raptors	*0.04*	*0.04*	*0.04*	*0*	*0.3*	*0.7*	*0.6*	*0*	*4.0*	*2.7*	*4.0*	*0*
unidentified raptor	0.04	0.04	0.04	0	0.3	0.7	0.6	0	4.0	2.7	4.0	0
Vultures	**0.03**	**0.29**	**0.01**	**0**	**0.2**	**5.5**	**0.2**	**0**	**1.3**	**12.0**	**1.3**	**0**
turkey vulture	0.03	0.29	0.01	0	0.2	5.5	0.2	0	1.3	12.0	1.3	0
Upland Game Birds	**0.08**	**0.12**	**0.12**	**0.11**	**0.7**	**2.2**	**1.9**	**9.2**	**6.7**	**12.0**	**2.7**	**1.3**
ring-necked pheasant	0.04	0.11	0.12	0	0.3	2.0	1.9	0	4.0	10.7	2.7	0
sharp-tailed grouse	0.04	0.01	0	0.11	0.3	0.2	0	9.2	2.7	1.3	0	1.3

Appendix B1. Mean large birds use (number of large birds/plot[a]/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project from April 1, 2019 to March 11, 2020.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Doves/Pigeons	**0.29**	**3.64**	**0.45**	**0.23**	**2.5**	**67.7**	**7.0**	**19.5**	**16.0**	**86.7**	**16.0**	**2.7**
rock pigeon	0	0	0	0.23	0	0	0	19.5	0	0	0	2.7
Eurasian collared-dove	0.01	0.13	0.36	0	0.1	2.5	5.6	0	1.3	9.3	12.0	0
mourning dove	0.28	3.51	0.09	0	2.4	65.3	1.4	0	14.7	82.7	8.0	0
Large Corvids	**0.11**	**0**	**0**	**0**	**0.9**	**0**	**0**	**0**	**5.3**	**0**	**0**	**0**
American crow	0.09	0	0	0	0.8	0	0	0	4.0	0	0	0
common raven	0.01	0	0	0	0.1	0	0	0	1.3	0	0	0
Goatsuckers	**0.01**	**0**	**0**	**0**	**0.1**	**0**	**0**	**0**	**1.3**	**0**	**0**	**0**
common nighthawk	0.01	0	0	0	0.1	0	0	0	1.3	0	0	0
Overall	**11.83**	**5.37**	**6.47**	**1.16**	**100**	**100**	**100**	**100**				

[a] 800-meter (2,625 foot) radius plot for large birds

Sums of values may not equal totals shown due to rounding.

Appendix B2. Mean small birds use (number of small birds/plot[a]/10-minute survey), percent of total use (%), and frequency of occurrence (%) for each small bird type and species by season during the fixed-point bird use surveys at the Pronghorn Flats Wind Energy Project from April 1, 2019 to March 11, 2020.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Passerines	**6.79**	**7.08**	**2.91**	**24.28**	**100**	**99.8**	**99.5**	**84.3**	**94.7**	**84.0**	**53.3**	**61.3**
Blackbirds/Orioles	*2.25*	*1.19*	*0.16*	*0*	*33.2*	*16.7*	*5.5*	*0*	*66.7*	*50.7*	*9.3*	*0*
red-winged blackbird	0.64	0.51	0	0	9.4	7.1	0	0	17.3	20.0	0	0
Brewer's blackbird	0.03	0.01	0	0	0.4	0.2	0	0	2.7	1.3	0	0
common grackle	0.05	0	0	0	0.8	0	0	0	2.7	0	0	0
western meadowlark	1.51	0.61	0.16	0	22.2	8.6	5.5	0	61.3	40.0	9.3	0
European starling	0	0.05	0	0	0	0.8	0	0	0	1.3	0	0
unidentified blackbird	0.03	0	0	0	0.4	0	0	0	1.3	0	0	0
Flycatchers	*0.07*	*0.03*	*0*	*0*	*1.0*	*0.4*	*0*	*0*	*5.3*	*1.3*	*0*	*0*
Say's phoebe	0.01	0	0	0	0.2	0	0	0	1.3	0	0	0
western kingbird	0.03	0	0	0	0.4	0	0	0	2.7	0	0	0
Cassin's kingbird	0.03	0.03	0	0	0.4	0.4	0	0	1.3	1.3	0	0
Grassland/Sparrows	*4.43*	*5.28*	*2.73*	*24.28*	*65.2*	*74.4*	*93.6*	*84.3*	*90.7*	*82.7*	*48.0*	*61.3*
grasshopper sparrow	0	0.25	0	0	0	3.6	0	0	0	17.3	0	0
lark bunting	0.39	2.29	0.07	0	5.7	32.3	2.3	0	8.0	53.3	4.0	0
Lapland longspur	0	0	0	11.93	0	0	0	41.4	0	0	0	9.3
lark sparrow	0.01	0	0	0	0.2	0	0	0	1.3	0	0	0
horned lark	3.87	2.67	2.57	12.35	57.0	37.6	88.1	42.9	88.0	65.3	44.0	61.3
dark-eyed junco	0.12	0	0	0	1.8	0	0	0	1.3	0	0	0
vesper sparrow	0.01	0	0.05	0	0.2	0	1.8	0	1.3	0	2.7	0
chipping sparrow	0.01	0	0	0	0.2	0	0	0	1.3	0	0	0
white-crowned sparrow	0	0	0.03	0	0	0	0.9	0	0	0	1.3	0
unidentified sparrow	0.01	0.07	0.01	0	0.2	0.9	0.5	0	1.3	5.3	1.3	0
Swallows	*0.01*	*0.57*	*0.01*	*0*	*0.2*	*8.1*	*0.5*	*0*	*1.3*	*9.3*	*1.3*	*0*
barn swallow	0.01	0.09	0.01	0	0.2	1.3	0.5	0	1.3	5.3	1.3	0
cliff swallow	0	0.44	0	0	0	6.2	0	0	0	5.3	0	0
tree swallow	0	0.04	0	0	0	0.6	0	0	0	1.3	0	0
Thrushes	*0.03*	*0.01*	*0*	*0*	*0.4*	*0.2*	*0*	*0*	*2.7*	*1.3*	*0*	*0*
American robin	0.03	0.01	0	0	0.4	0.2	0	0	2.7	1.3	0	0
Unidentified Birds	**0**	**0.01**	**0.01**	**4.53**	**0**	**0.2**	**0.5**	**15.7**	**0**	**1.3**	**1.3**	**12.0**
unidentified small bird	0	0.01	0.01	4.53	0	0.2	0.5	15.7	0	1.3	1.3	12.0
Overall	**6.79**	**7.09**	**2.92**	**28.81**	**100**	**100**	**100**	**100**				

[a] 100-meter (328 foot) radius plot for small birds. Sums of values may not equal totals shown due to rounding.

Appendix B3. Mean large birds use (number of large birds/plot[a]/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during avian bird use surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Waterbirds	**0**	**0**	**2.53**	**0**	**0**	**0**	**76.6**	**0**	**0**	**0**	**5.3**	**0**
sandhill crane	0	0	2.53	0	0	0	76.6	0	0	0	5.3	0
Shorebirds	**0.02**	**0.18**	**0**	**0**	**1.2**	**5.8**	**0**	**0**	**1.2**	**3.5**	**0**	**0**
upland sandpiper	0	0.02	0	0	0	0.6	0	0	0	1.8	0	0
killdeer	0.02	0	0	0	1.2	0	0	0	1.2	0	0	0
long-billed curlew	0	0.16	0	0	0	5.2	0	0	0	1.8	0	0
Diurnal Raptors	**0.65**	**0.51**	**0.46**	**0.23**	**34.5**	**16.8**	**13.8**	**100**	**42.0**	**33.3**	**35.1**	**21.1**
Accipiters	*0.01*	*0*	*0*	*0*	*0.6*	*0*	*0*	*0*	*1.2*	*0*	*0*	*0*
sharp-shinned hawk	0.01	0	0	0	0.6	0	0	0	1.2	0	0	0
Buteos	*0.33*	*0.30*	*0.16*	*0.07*	*17.5*	*9.8*	*4.8*	*30.8*	*21.8*	*21.1*	*14.0*	*7.0*
red-tailed hawk	0.02	0.04	0.09	0.04	1.2	1.2	2.7	15.4	1.2	3.5	8.8	3.5
rough-legged hawk	0.01	0	0	0.04	0.6	0	0	15.4	1.1	0	0	3.5
ferruginous hawk	0	0	0.04	0	0	0	1.1	0	0	0	3.5	0
unidentified buteo	0.01	0	0	0	0.6	0	0	0	1.1	0	0	0
Swainson's hawk	0.29	0.26	0.04	0	15.1	8.7	1.1	0	18.5	19.3	3.5	0
Northern Harrier	*0.14*	*0.05*	*0.11*	*0.09*	*7.3*	*1.7*	*3.2*	*38.5*	*9.2*	*5.3*	*8.8*	*8.8*
northern harrier	0.14	0.05	0.11	0.09	7.3	1.7	3.2	38.5	9.2	5.3	8.8	8.8
Eagles	*0*	*0*	*0.04*	*0*	*0*	*0*	*1.1*	*0*	*0*	*0*	*3.5*	*0*
golden eagle	0	0	0.04	0	0	0	1.1	0	0	0	3.5	0
Falcons	*0.17*	*0.16*	*0.16*	*0.07*	*9.1*	*5.2*	*4.8*	*30.8*	*17.1*	*12.3*	*14.0*	*7.0*
merlin	0	0	0.02	0	0	0	0.5	0	0	0	1.8	0
prairie falcon	0.01	0.02	0.07	0.05	0.6	0.6	2.1	23.1	1.1	1.8	5.3	5.3
American kestrel	0.16	0.14	0.07	0.02	8.5	4.6	2.1	7.7	16.1	10.5	7.0	1.8
Owls	**0.01**	**0**	**0.02**	**0**	**0.6**	**0**	**0.5**	**0**	**1.2**	**0**	**1.8**	**0**
burrowing owl	0.01	0	0.02	0	0.6	0	0.5	0	1.2	0	1.8	0
Vultures	**0.02**	**0.04**	**0**	**0**	**1.2**	**1.2**	**0**	**0**	**2.4**	**3.5**	**0**	**0**
turkey vulture	0.02	0.04	0	0	1.2	1.2	0	0	2.4	3.5	0	0
Upland Game Birds	**0.50**	**0.07**	**0.02**	**0**	**26.4**	**2.3**	**0.5**	**0**	**13.4**	**5.3**	**1.8**	**0**
ring-necked pheasant	0.01	0	0.02	0	0.6	0	0.5	0	1.2	0	1.8	0
sharp-tailed grouse	0.49	0.07	0	0	25.8	2.3	0	0	12.2	5.3	0	0
Doves/Pigeons	**0.67**	**2.25**	**0.28**	**0**	**35.4**	**74.0**	**8.5**	**0**	**19.7**	**50.9**	**7.0**	**0**
Eurasian collared-dove	0	0.02	0	0	0	0.6	0	0	0	1.8	0	0
mourning dove	0.67	2.23	0.28	0	35.4	73.4	8.5	0	19.7	50.9	7.0	0

Appendix B3. Mean large birds use (number of large birds/plot[a]/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during avian bird use surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Large Corvids	**0.01**	**0**	**0**	**0**	**0.6**	**0**	**0**	**0**	**1.2**	**0**	**0**	**0**
American crow	0.01	0	0	0	0.6	0	0	0	1.2	0	0	0
Overall	**1.89**	**3.04**	**3.30**	**0.23**	**100**	**100**	**100**	**100**	**NA**	**NA**	**NA**	**NA**

[a] 800-meter (2,625 foot) radius plot for large birds.

Sums of values may not equal totals shown due to rounding.

Appendix B4. Mean small birds use (number of small birds/plot[a]/10-minute survey), percent of total use (%), and frequency of occurrence (%) for each small bird type and species by season during avian bird use surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Passerines	**17.13**	**9.00**	**23.02**	**17.18**	**95.6**	**89.2**	**90.3**	**83.7**	**92.6**	**86.0**	**89.5**	**80.7**
Passerines(Subtype)	*0*	*0.07*	*0*	*0*	*0*	*0.7*	*0*	*0*	*0*	*3.5*	*0*	*0*
unidentified passerine	0	0.07	0	0	0	0.7	0	0	0	3.5	0	0
Blackbirds/Orioles	*2.67*	*1.91*	*2.09*	*0.11*	*14.9*	*19.0*	*8.2*	*0.5*	*67.4*	*59.6*	*40.4*	*8.8*
red-winged blackbird	0.46	0.28	0	0	2.6	2.8	0	0	10.9	14.0	0	0
Brewer's blackbird	0	0.02	0.88	0	0	0.2	3.4	0	0	1.8	1.8	0
common grackle	0.25	0	0	0	1.4	0	0	0	7.4	0	0	0
western meadowlark	1.94	1.61	1.21	0.11	10.8	16.0	4.7	0.5	67.4	57.9	40.4	8.8
European starling	0.01	0	0	0	0.1	0	0	0	1.2	0	0	0
unidentified blackbird	0.01	0	0	0	0.1	0	0	0	1.2	0	0	0
Flycatchers	*0.15*	*0.26*	*0*	*0*	*0.8*	*2.6*	*0*	*0*	*10.0*	*10.5*	*0*	*0*
Say's phoebe	0.05	0	0	0	0.3	0	0	0	5.0	0	0	0
western kingbird	0.10	0.25	0	0	0.6	2.4	0	0	5.0	10.5	0	0
Cassin's kingbird	0	0.02	0	0	0	0.2	0	0	0	1.8	0	0
Grassland/Sparrows	*14.07*	*6.21*	*20.91*	*17.07*	*78.5*	*61.6*	*82.0*	*83.2*	*86.8*	*70.2*	*86.0*	*80.7*
grasshopper sparrow	0.01	0	0	0	0.1	0	0	0	1.2	0	0	0
lark bunting	0.55	2.72	0	0	3.1	27.0	0	0	17.6	38.6	0	0
Lapland longspur	1.86	0	1.02	0	10.4	0	4.0	0	8.4	0	8.8	0
chestnut-collared longspur	0.30	0.04	0	0	1.7	0.3	0	0	5.0	1.8	0	0
lark sparrow	0.01	0.07	0	0	0.1	0.7	0	0	1.2	5.3	0	0
horned lark	10.91	3.05	19.35	16.96	60.9	30.3	75.9	82.7	78.5	57.9	86.0	78.9
vesper sparrow	0.32	0.12	0.28	0	1.8	1.2	1.1	0	22.4	7.0	8.8	0
thick-billed longspur	0.01	0.05	0	0	0.1	0.5	0	0	1.2	1.8	0	0
clay-colored sparrow	0	0.11	0.09	0	0	1.0	0.3	0	0	1.8	3.5	0
chipping sparrow	0	0	0	0.02	0	0	0	0.1	0	0	0	1.8
American tree sparrow	0.08	0	0	0	0.5	0	0	0	2.1	0	0	0
white-crowned sparrow	0	0	0.12	0.05	0	0	0.5	0.3	0	0	3.5	1.8
unidentified sparrow	0	0.05	0.05	0.04	0	0.5	0.2	0.2	0	3.5	3.5	1.8
Swallows	*0.16*	*0.46*	*0*	*0*	*0.9*	*4.5*	*0*	*0*	*4.7*	*14.0*	*0*	*0*
barn swallow	0.16	0.46	0	0	0.9	4.5	0	0	4.7	14.0	0	0
Shrikes	*0*	*0.05*	*0*	*0*	*0*	*0.5*	*0*	*0*	*0*	*5.3*	*0*	*0*
loggerhead shrike	0	0.05	0	0	0	0.5	0	0	0	5.3	0	0
Thrushes	*0.07*	*0.04*	*0*	*0*	*0.4*	*0.3*	*0*	*0*	*3.4*	*3.5*	*0*	*0*
American robin	0.07	0.04	0	0	0.4	0.3	0	0	3.4	3.5	0	0

Appendix B4. Mean small birds use (number of small birds/plot[a]/10-minute survey), percent of total use (%), and frequency of occurrence (%) for each small bird type and species by season during avian bird use surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Warblers	*0*	*0*	*0.02*	*0*	*0*	*0*	*0.1*	*0*	*0*	*0*	*1.8*	*0*
Wilson's warbler	0	0	0.02	0	0	0	0.1	0	0	0	1.8	0
Woodpeckers	**0**	**0**	**0.04**	**0**	**0**	**0**	**0.1**	**0**	**0**	**0**	**3.5**	**0**
northern flicker	0	0	0.04	0	0	0	0.1	0	0	0	3.5	0
Unidentified Birds	**0.80**	**1.09**	**2.44**	**3.33**	**4.4**	**10.8**	**9.6**	**16.3**	**8.8**	**14.0**	**19.3**	**17.5**
unidentified small bird	0.80	1.09	2.44	3.33	4.4	10.8	9.6	16.3	8.8	14.0	19.3	17.5
Overall	**17.92**	**10.09**	**25.49**	**20.51**	**100**	**100**	**100**	**100**	**NA**	**NA**	**NA**	**NA**

[a] 100-meter (328 foot) radius plot for small birds

Sums of values may not equal totals shown due to rounding.

Appendix C. Mean Use by Point for All Birds, Bird Types, and Diurnal Raptor Subtypes during Avian Use Surveys at the Pronghorn Flats Wind Energy Project from April 1, 2019 to March 11, 2020 and April 25, 2020 to May 26, 2021.

Appendix C1. Mean use (number of birds/60-minute survey) by point for large birds[a], major bird types, and diurnal raptor subtypes observed at the Pronghorn Flats Wind Energy Project during fixed-point bird use surveys from April 1, 2019 to March 11, 2020.

	Survey Point												
Bird Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Waterbirds	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Waterfowl	**0.25**	**0.33**	**1.33**	**0**	**0**	**0**	**0**	**38.25**	**0**	**4.17**	**7.33**	**5.42**	**0**
Shorebirds	**0.17**	**0**	**0**	**0.17**	**0**	**0**	**0**	**0**	**0**	**0.67**	**0**	**0**	**0**
Diurnal Raptors	**1.00**	**0.83**	**0.50**	**1.25**	**0.67**	**1.00**	**0.50**	**1.83**	**0.58**	**0.92**	**1.33**	**0.42**	**0.92**
Accipiters	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.08*	*0*	*0*
Buteos	*0.17*	*0.42*	*0.25*	*0.58*	*0.58*	*0.33*	*0.42*	*0.75*	*0.17*	*0.08*	*0.75*	*0.08*	*0.08*
Northern Harrier	*0.58*	*0.25*	*0.17*	*0.58*	*0.08*	*0.50*	*0.08*	*0.67*	*0.33*	*0.50*	*0.42*	*0.33*	*0.50*
Eagles	*0*	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0.25*	*0*	*0*	*0*
Falcons	*0.17*	*0.08*	*0*	*0.08*	*0*	*0.17*	*0*	*0.25*	*0.08*	*0*	*0*	*0*	*0.33*
Other Raptors	*0.08*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0.17*	*0*	*0.08*	*0.08*	*0*	*0*
Vultures	**0**	**0**	**0**	**0**	**0**	**0.17**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**
Upland Game Birds	**0.25**	**0.08**	**0.67**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0.08**	**0.08**	**0**	**0.17**
Doves/Pigeons	**2.25**	**1.17**	**0.33**	**2.75**	**0.42**	**1.17**	**1.33**	**1.17**	**0.33**	**1.50**	**2.17**	**0.17**	**1.58**
Large Corvids	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.08**
Goatsuckers	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
All Large Birds	**4.00**	**2.42**	**2.83**	**4.17**	**1.17**	**2.33**	**1.92**	**41.25**	**0.92**	**7.33**	**10.92**	**6.00**	**2.75**

[a] 800-meter (2,625 foot) radius plot for large birds

Sums of values may not equal totals shown due to rounding.

Appendix C1 (*continued*). Mean use (number of birds/60-minute survey) by point for large birds[a], major bird types, and diurnal raptor subtypes observed at the Pronghorn Flats Wind Energy Project during fixed-point bird use surveys from April 1, 2019 to March 11, 2020.

	Survey Point											
Bird Type	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Waterbirds	**0.67**	**8.33**	**0**	**1.25**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3.33**
Waterfowl	**8.33**	**0**	**1.92**	**16.67**	**0**	**0**	**0**	**0**	**0**	**0**	**1.50**	**0**
Shorebirds	**0.08**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0.25**	**0.08**	**0**	**0.08**	**0**
Diurnal Raptors	**1.00**	**0.83**	**0.67**	**0.42**	**0.83**	**0.58**	**0.83**	**0.50**	**0.50**	**0.67**	**0.92**	**0.67**
Accipiters	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Buteos	*0.42*	*0.42*	*0*	*0*	*0.17*	*0.17*	*0.42*	*0.33*	*0.25*	*0.25*	*0.58*	*0.25*
Northern Harrier	*0.42*	*0.17*	*0.58*	*0.33*	*0.33*	*0.33*	*0.17*	*0.08*	*0*	*0.42*	*0.33*	*0.08*
Eagles	*0*	*0*	*0*	*0.08*	*0.17*	*0*	*0.17*	*0*	*0*	*0*	*0*	*0.08*
Falcons	*0.17*	*0.25*	*0*	*0*	*0*	*0.08*	*0.08*	*0.08*	*0.25*	*0*	*0*	*0.25*
Other Raptors	*0*	*0*	*0.08*	*0*	*0.17*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Vultures	**0**	**0.33**	**0**	**0**	**0.08**	**0.25**	**0.08**	**0.17**	**0.08**	**0.08**	**0**	**0.75**
Upland Game Birds	**0**	**0**	**0.92**	**0.17**	**0**	**0**	**0**	**0.17**	**0**	**0**	**0**	**0**
Doves/Pigeons	**1.08**	**1.00**	**0.42**	**0.42**	**0.83**	**1.25**	**1.17**	**3.00**	**0.58**	**0.33**	**1.58**	**0.83**
Large Corvids	**0.42**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.08**
Goatsuckers	**0**	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**
All Large Birds	**11.58**	**10.50**	**4.00**	**18.92**	**1.75**	**2.17**	**2.08**	**4.08**	**1.25**	**1.08**	**4.08**	**5.67**

[a] 800-meter (2,625 foot) radius plot for large birds

Sums of values may not equal totals shown due to rounding.

Appendix C2. Mean use (number of birds/10-minute survey) by point for small birds[a] and major bird types observed at the Pronghorn Flats Wind Energy Project during fixed-point bird use surveys from April 1, 2019 to March 11, 2020.

	Survey Point												
Bird Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Passerines	6.58	11.92	4.67	6.67	4.50	4.00	9.00	10.17	4.17	4.58	11.08	7.92	13.33
Unidentified Birds	0	0	0	1.08	0	0	1.83	17.92	0.25	0	2.75	0	0
All Small Birds	6.58	11.92	4.67	7.75	4.50	4.00	10.83	28.08	4.42	4.58	13.83	7.92	13.33

[a] 100-meter (328 foot) radius plot for small birds

Sums of values may not equal totals shown due to rounding.

Appendix C2 (*continued*). Mean use (number of birds/10-minute survey) by point for small birds[a] and major bird types observed at the Pronghorn Flats Wind Energy Project during fixed-point bird use surveys from April 1, 2019 to March 11, 2020.

	Survey Point											
Bird Type	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Passerines	4.08	3.67	104.00	8.33	3.58	8.75	4.83	4.17	3.50	4.17	4.00	4.92
Unidentified Birds	4.17	0.17	0	0.08	0	0	0.25	0	0	0	0	0
All Small Birds	8.25	3.83	104.00	8.42	3.58	8.75	5.08	4.17	3.50	4.17	4.00	4.92

[a] 100-meter (328 foot) radius plot for small birds

Sums of values may not equal totals shown due to rounding.

Appendix C3. Mean use (number of birds/60-minute survey) by point for large birds[a] and bird types observed during avian bird use surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

	Survey Point										
Bird Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**	**14**
Waterbirds	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2.92**	**0**
Shorebirds	**0**	**0**	**0**	**0**	**0**	**1.00**	**0.08**	**0**	**0**	**0**	**0**
Diurnal Raptors	**0.33**	**0.33**	**0.25**	**0.08**	**0.25**	**0.50**	**0.50**	**0**	**0.08**	**0.25**	**0.75**
Accipiters	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Buteos	*0.17*	*0.25*	*0.08*	*0*	*0.17*	*0*	*0.17*	*0*	*0*	*0.08*	*0.42*
Northern Harrier	*0.08*	*0*	*0.08*	*0.08*	*0*	*0.50*	*0.25*	*0*	*0.08*	*0.17*	*0.25*
Eagles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Falcons	*0.08*	*0.08*	*0.08*	*0*	*0.08*	*0*	*0.08*	*0*	*0*	*0*	*0.08*
Owls	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0.08**	**0**	**0**
Vultures	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0.50**	**0**	**0**	**0.08**
Upland Game Birds	**0**	**0**	**0**	**0**	**0.08**	**1.00**	**0**	**0**	**0.17**	**0**	**0**
Doves/Pigeons	**0.42**	**0.67**	**0**	**1.67**	**0.83**	**0**	**1.42**	**0**	**0**	**0.42**	**0.92**
Large Corvids	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
All Large Birds	**0.75**	**1.00**	**0.25**	**1.83**	**1.33**	**2.50**	**2.00**	**0.50**	**0.33**	**3.58**	**1.75**

[a] 800-meter (2,625 foot) radius plot for large birds

Sums of values may not equal totals shown due to rounding.

Appendix C3 *(continued)*. Mean use (number of birds/60-minute survey) by point for large birds[a] and bird types observed during avian bird use surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

	Survey Point									
Bird Type	**15**	**24**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
Waterbirds	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7.92**	**1.17**
Shorebirds	**0**	**0**	**0**	**0**	**0.75**	**0**	**0**	**0**	**0**	**0**
Diurnal Raptors	**0.58**	**0.33**	**1.00**	**0.25**	**0.58**	**0.17**	**0.75**	**0.17**	**0.75**	**0.67**
Accipiters	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Buteos	*0*	*0*	*0.50*	*0*	*0.42*	*0*	*0.25*	*0.08*	*0.50*	*0.42*
Northern Harrier	*0.42*	*0.08*	*0.17*	*0.08*	*0.08*	*0.08*	*0.08*	*0*	*0.08*	*0*
Eagles	*0*	*0.08*	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*
Falcons	*0.17*	*0.08*	*0.33*	*0.08*	*0.08*	*0.08*	*0.42*	*0.08*	*0.17*	*0.25*
Owls	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Vultures	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Upland Game Birds	**0.58**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0.67**	**0.08**	**0**
Doves/Pigeons	**1.50**	**0.58**	**0.17**	**1.92**	**0**	**0**	**2.25**	**0.08**	**0.42**	**0.50**
Large Corvids	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
All Large Birds	**2.67**	**1.00**	**1.17**	**2.25**	**1.33**	**0.17**	**3.00**	**0.92**	**9.17**	**2.33**

[a] 800-meter (2,625 foot) radius plot for large birds

Sums of values may not equal totals shown due to rounding.

Appendix C4. Mean use (number of birds/10-minute survey) by point for small birds[a] and bird types observed during avian bird use surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

	Survey Point										
Bird Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**	**14**
Passerines	16.67	16.00	24.50	15.50	11.67	4.00	21.83	4.00	24.25	5.67	8.00
Woodpeckers	0	0	0	0	0	0	0	0	0.08	0	0
Unidentified Birds	1.08	5.08	2.58	5.25	0	0	2.42	0	0.58	0	0.67
All Small Birds	17.75	21.08	27.08	20.75	11.67	4.00	24.25	4.00	24.92	5.67	8.67

[a] 100-meter (328 foot) radius plot for small birds

Sums of values may not equal totals shown due to rounding.

Appendix C4 *(continued)*. Mean use (number of birds/10-minute survey) by point for small birds[a] and bird types observed during avian bird use surveys at the Pronghorn Flats Wind Energy Project from April 25, 2020 to May 26, 2021.

	Survey Point									
Bird Type	**15**	**24**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
Passerines	9.25	15.42	10.83	20.08	7.00	38.42	16.33	20.42	9.75	32.75
Woodpeckers	0	0.08	0	0	0	0	0	0	0	0
Unidentified Birds	0.83	2.33	0.50	4.58	0	3.33	2.50	3.75	0	3.33
All Small Birds	10.08	17.83	11.33	24.67	7.00	41.75	18.83	24.17	9.75	36.08

[a] 100-meter (328 foot) radius plot for small birds

Sums of values may not equal totals shown due to rounding.