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Stage 1 Initial Site Assessment of Eagle Use/Risk Rolette Wind Power Project, Rolette County, North Dakota

Prepared for:

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October 29, 2015

INTRODUCTION

Rolette Power Development, LLC, is considering the development of a proposed wind energy facility in Rolette County, North Dakota (Figure 1), known as the Rolette Wind Power Project (RWPP). The project developer has asked Western Ecosystems Technology, Inc. (WEST) to develop an initial site assessment for eagles, which determines the relative importance of the project area (defined as the project boundary as currently defined by Rolette Power Development, LLC and portrayed in figures below) to resident breeding and non-breeding eagles and migrant and wintering eagles. This initial site assessment is intended to meet the requirements of a Stage 1 Initial Site Assessment as described in the US Fish and Wildlife Service's (USFWS) *Eagle Conservation Plan Guidance: Module 1 – Land-Based Wind Energy, Version 2* (ECPG; USFWS 2013).

The principal objective of this Stage 1 Initial Site Assessment for the RWPP is to assess whether the RWPP is within areas known or likely to be used by eagles, and if so, to determine the expected extent and type of eagle use of the site.

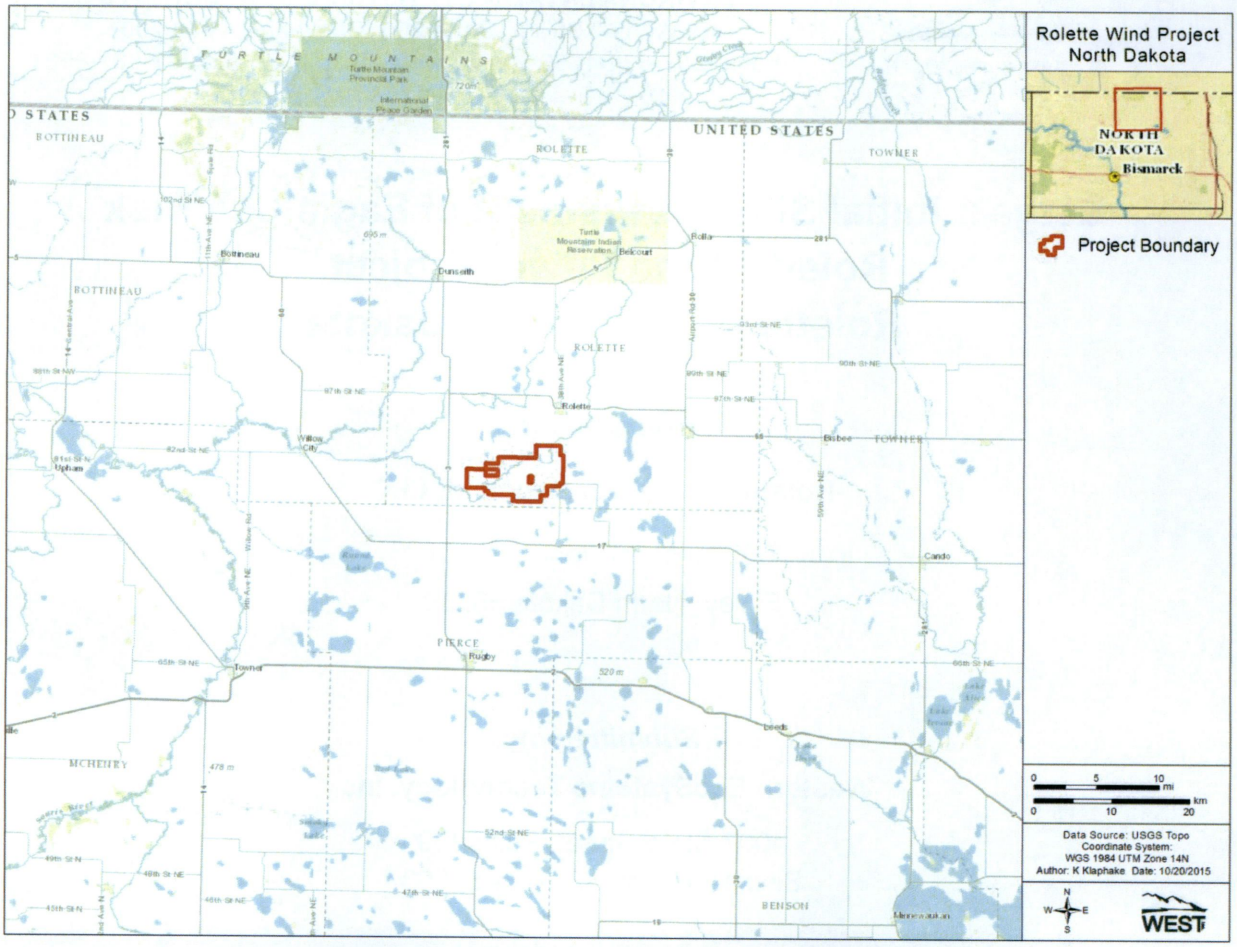

Figure 1. Location of the Rolette Wind Power Project in Rolette County, North Dakota.

Study Area

The RWPP project area encompasses approximately 14,000 acres in Rolette County, North Dakota (Figure 1). The RWPP falls within the Northern Glaciated Plains Level III Ecoregion, which stretches from eastern North and South Dakota into north-central North Dakota and the Glacial Lake Deltas Level IV Ecoregion (USEPA 2013). Much of the Northern Glaciated Plains region was originally characterized by trembling aspen, oak groves, mixed tall shrubs, fescue grasslands, tall and short-grass prairie, and seasonal wetlands but is now primarily farmland (Griffith 2010). The Northern Glaciated Plains region is a very productive agricultural area with a variety of crops including spring wheat, flax, rye, barley, oats, corn, soybeans, and sunflowers (Griffith 2010). The majority of the land cover within the RWPP is cultivated crop and herbaceous grassland (US Geological Service [USGS] National Land Cover Data [NLCD] 2011).

The topography of the RWPP is primarily flat (Figure 2) with the elevation ranging from approximately 460 – 540 meters (m; 1,509 – 1,772 feet [ft]; Figure 3). Though most of the RWPP is composed of cultivated cropland and herbaceous grassland, there is some forested land cover (less than 1%). Open water and wetland habitat is present within the RWPP as well. There are some lakes within and around the RWPP (Figure 4) and a number of larger lakes outside of the project area.

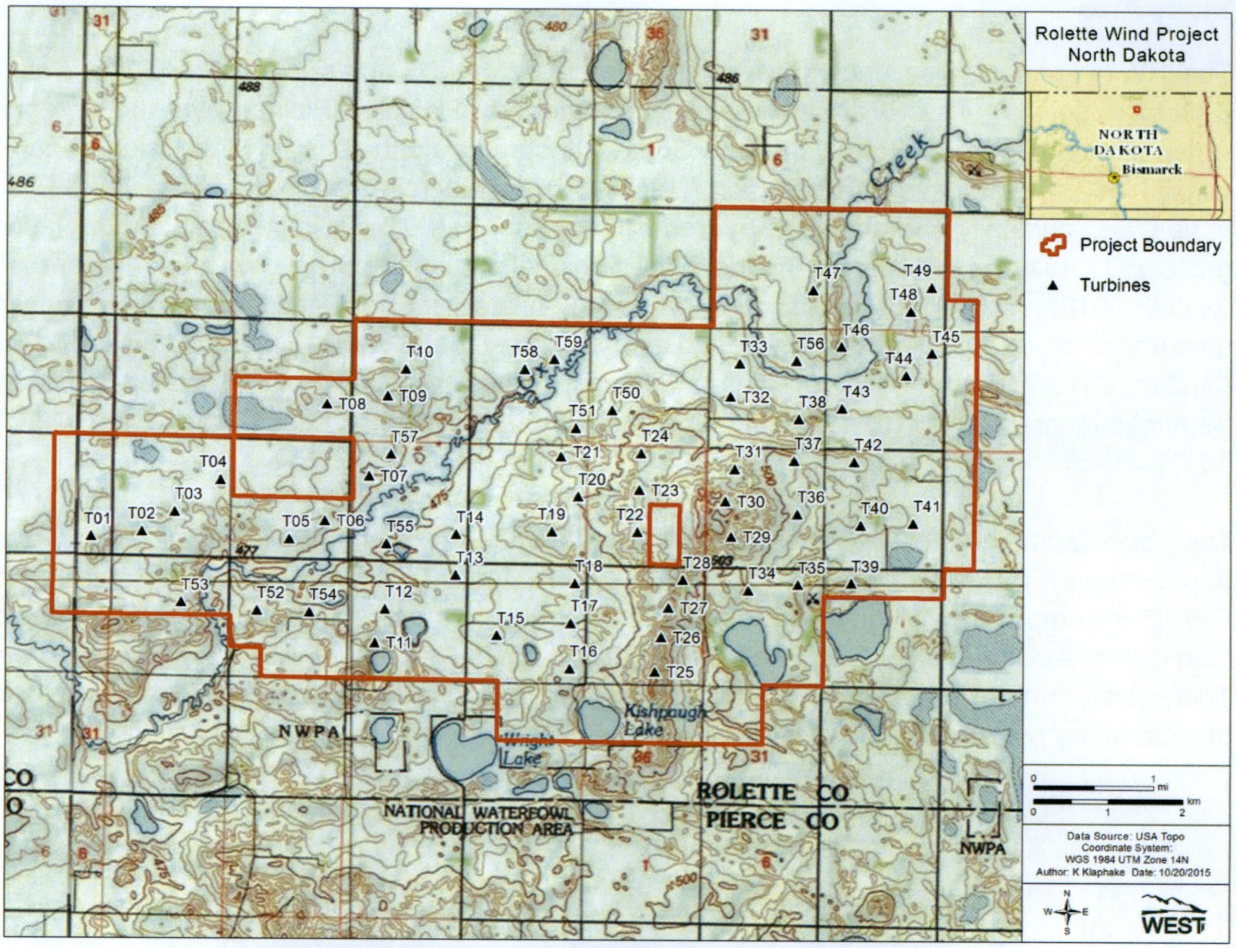

Figure 2. Topographic image of the Rolette Wind Power Project.

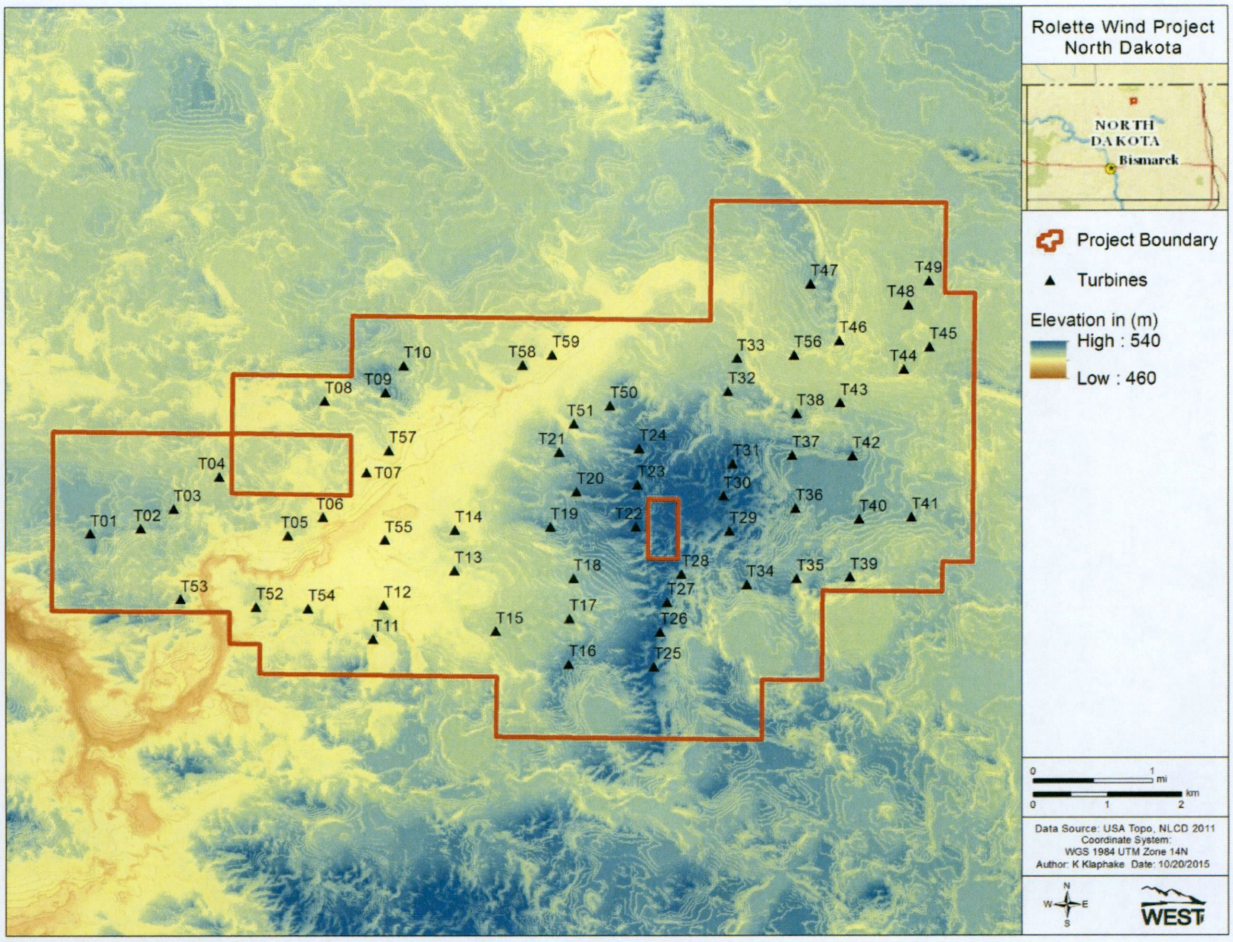

Figure 3. Elevation at the Rolette Wind Power Project.

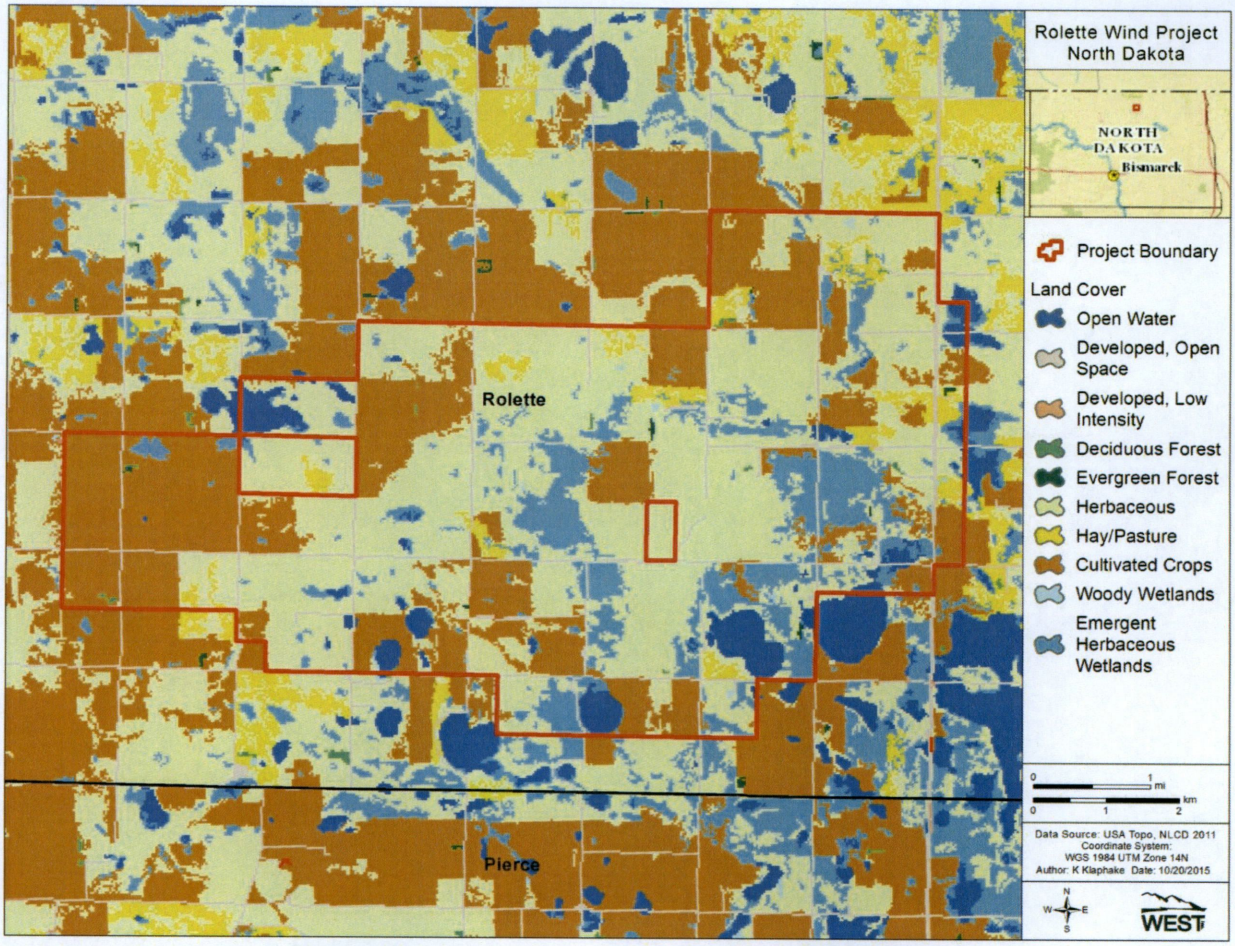

Figure 4. Land cover in the Rolette Wind Power Project (USGS NLCD 2011).

METHODS

This Stage 1 Initial Site Assessment describes existing information from publicly available literature, databases, and other sources to evaluate the appropriateness of the RWPP for development as it relates to potential risk to eagles. Several sources of available data were used to identify biological resources within the RWPP. These sources included publicly available reports, publications, geographic information system (GIS) maps, agency reports, species experts, and online databases. Per the ECPG (USFWS 2013), areas of focus for this Stage 1 Initial Site Assessment included:

1. recent or historical nesting and seasonal occurrence data for eagles at the prospective area;
2. migration or other regular movement by eagles through the area or surrounding landscape;
3. seasonal concentration areas, such as a communal roost site in a mature riparian woodland, or waterfowl concentration serving as a major forage base; and
4. physical features of the landscape, especially topography, that may attract or concentrate eagles.

ROLETTE WIND POWER PROJECT SITE CHARACTERISTICS

Land Use/Land Cover

Approximately 47% of the RWPP is herbaceous grassland. Cultivated crops compose approximately 28% of the RWPP and emergent herbaceous wetlands make up approximately 13% of the project area. Developed space covers around 4% of the RWPP, mainly in the form of roads. Open water and forest account for 4% and <1% of the project area, respectively (Table 1, Figure 4; USGS NLCD 2011).

Table 1. Land use/cover types present within the Rolette Wind Power Project (USGS NLCD 2011).

Land Use/Cover	Percent Composition
Herbaceous	47.41
Cultivated Crops	28.15
Emergent Herbaceous Wetlands	12.93
Open Water	4.23
Developed, Open Space	4.08
Hay/Pasture	2.79
Deciduous Forest	0.15
Woody Wetlands	0.14
Evergreen Forest	0.10
Developed, Low Intensity	0.01
Total	**100**

Wetlands

Based on National Wetland Inventory (NWI) polygon data (USFWS NWI 2014), there are approximately 702.41 acres (284.25 hectares [ha]) of wetlands, found in the RWPP (Table 2, Figure 5). Freshwater emergent wetlands account for 428 acres of the wetlands within the RWPP, followed by lakes (222 acres), freshwater ponds (46 acres), and freshwater forest/shrub wetland (6 acres). There is one named stream within the RWPP. Ox Creek meanders northeast to southwest through the RWPP.

Table 2. National Wetland Inventory polygon types present within the Rolette Wind Power Project (USFWS NWI 2014).

Wetland Type	Project Acres	Percent Composition
Freshwater Emergent Wetland	428.07	60.94
Lake	222.33	31.65
Freshwater Pond	45.91	6.54
Freshwater Forested/Shrub Wetland	6.10	0.87
Total	**702.41**	**100**

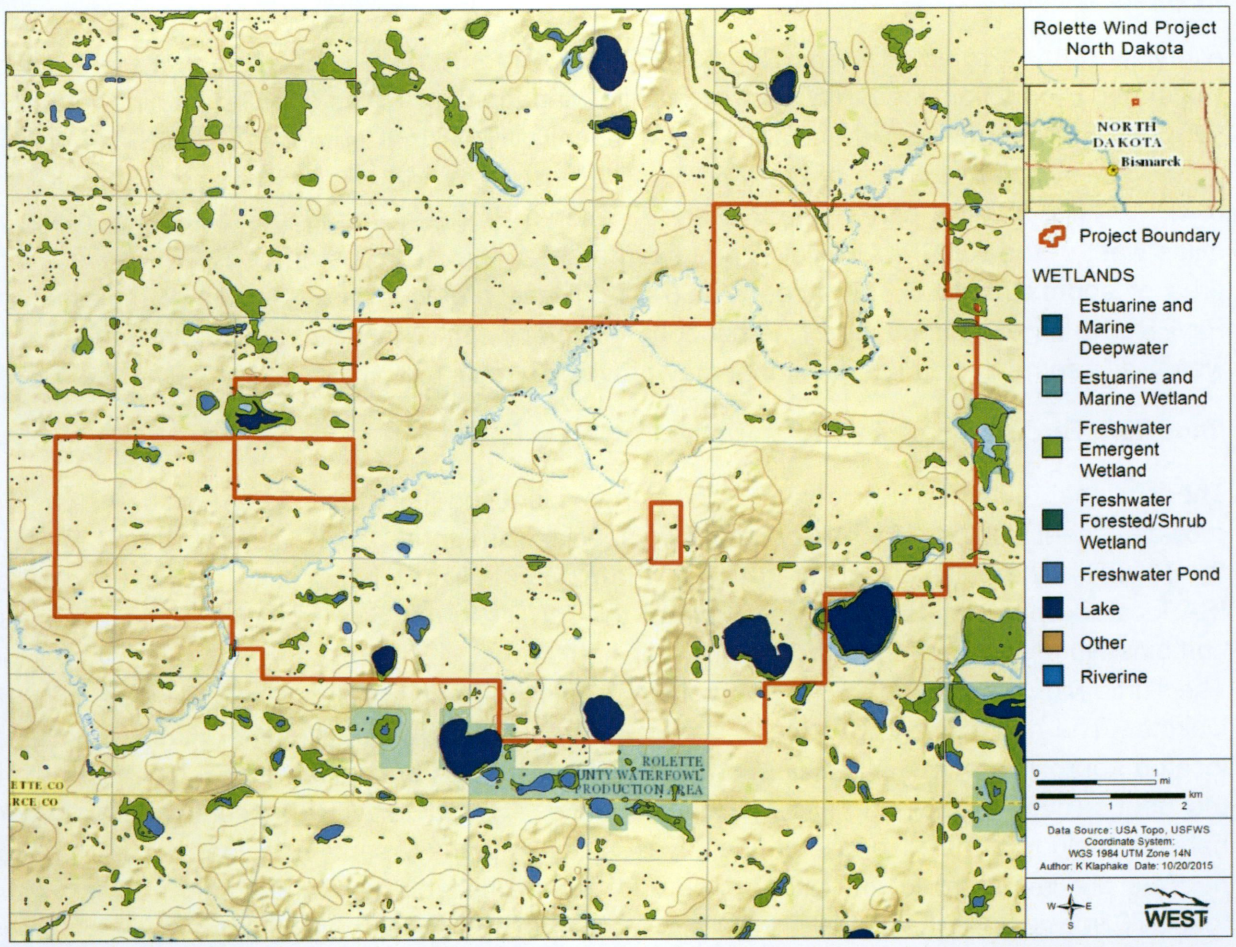

Figure 5. Wetlands and streams in the Rolette Wind Power Project (USFWS NWI 2014, USGS NHD 2015a).

Protected Areas

A review of the Protected Areas Database (PAD-US) from the USGS notes that there are no Waterfowl Production Areas (WPAs) or Wildlife Management Areas (WMAs) within the RWPP (USGS 2012b). However, there are Rolette County WPAs that border the RWPP as well as other WPAs within 10 miles of the RWPP. There is one WMA within 10 miles (16 km) of the RWPP. This WMA is part of the Wetlands Reserve Program and is located approximately 6 miles west of the RWPP. All wildlife protected areas within 10 miles of the RWPP have a total area of approximately 5,678 acres (2,298 ha). These protected areas within 10 miles of the RWPP are largely composed of herbaceous grassland, emergent herbaceous wetlands, open water, and some deciduous forest that may provide suitable foraging opportunities for eagles.

Important Bird Areas

The National Audubon Society (Audubon) has identified Important Bird Areas (IBAs) that provide essential habitat for one or more bird species (Audubon 2014). There are no IBAs within the RWPP. The closest registered IBA to the RWPP is Turtle Mountains, a state recognized IBA located approximately 15 miles north of the RWPP in northern Rolette County. This IBA contains woodland, wetland, and open water habitat that is used by a variety of bird species. The Turtle Mountain IBA is said to support the greatest diversity of birds within the state of North Dakota. The next closest IBA, the J. Clark Sayler National Wildlife Refuge (JCSNWR) IBA, is located approximately 18 miles west of the RWPP. This IBA encompasses 58,700 acres along the Souris River in Bottineau and McHenry Counties. The JCSNWR IBA contains a variety of habitats including mixed grass prairie, river valley, marshes, sand hills, and forest. These habitats are important for migratory birds and provide suitable habitat for bald eagles. More than 270 species use the JCSNWR IBA and more than 160 species breed there.

EAGLE OCCURRENCE IN THE ROLETTE WIND POWER PROJECT

Golden Eagle

Golden eagles (*Aquila chrysaetos*) are typically considered more susceptible to wind turbine collision than bald eagles (*Haliaeetus leucocephalus*), as evidenced by higher mortality rates throughout their range (Allison 2012). North-central North Dakota is outside of the breeding range of the golden eagle, although the western third of North Dakota is within the breeding range. There are no records of golden eagle observations within the RWPP, but there is one golden eagle observation record in northern Rolette County (eBird 2015e; Figure 6). The North Dakota Game and Fish Department (NDGFD) classifies golden eagle as "uncommon" throughout North Dakota (NDGFD 2012), although this species has been reported more frequently in the western half of the state (Figure 6). The NDGFD reports that there are no known golden eagle nests located within the RWPP or within a 10-mile buffer of the RWPP (S. Johnson, pers. comm., October 2015).

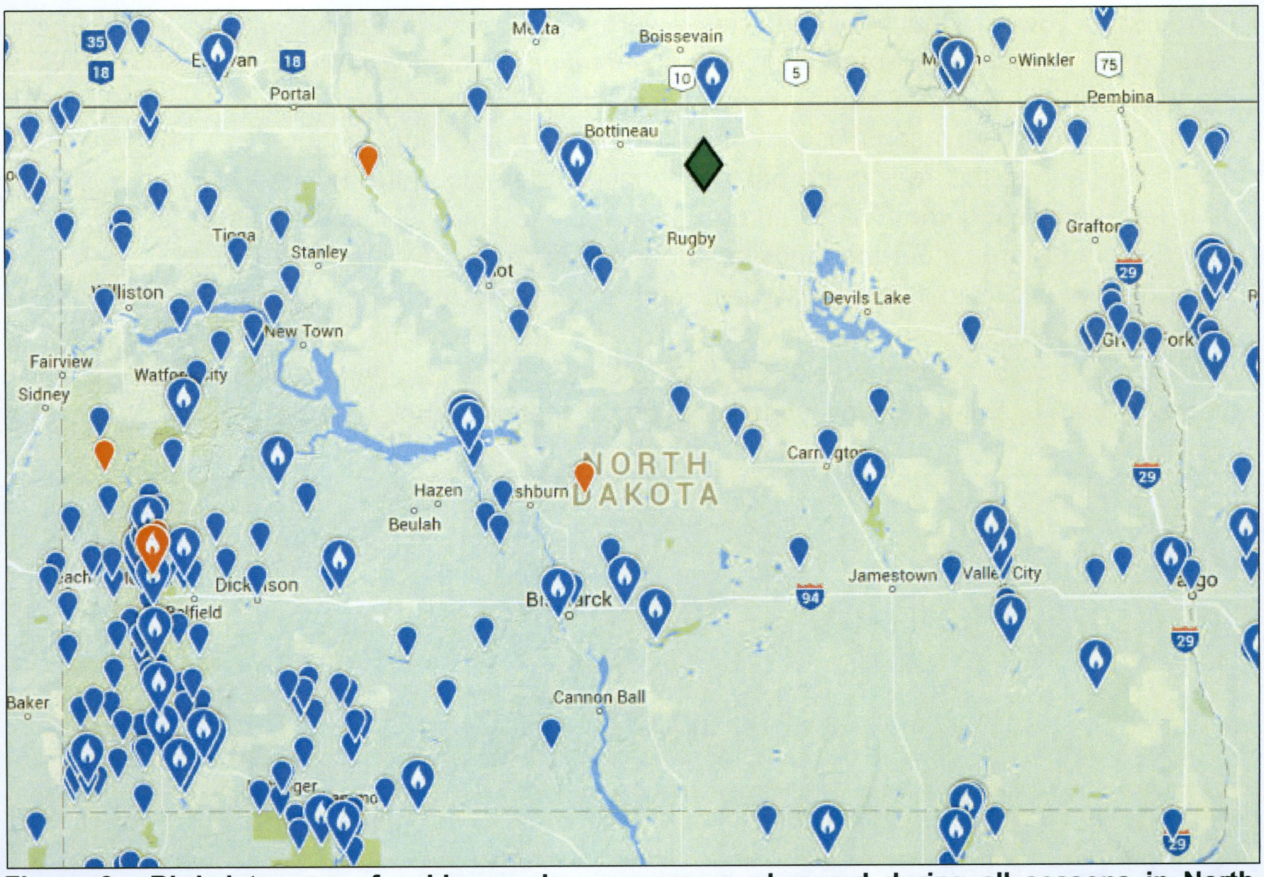

Figure 6. eBird data map of golden eagle occurrences observed during all seasons in North Dakota (ebird 2015e). The green diamond indicates the approximate location of the Rolette Wind Power Project. Blue markers indicate all golden eagle observations from 1900-2015, red markers indicate observations less than 30 days old (data from October 18, 2015). Each blue marker can represent one golden eagle observation or multiple golden eagle observations in the same location.

Bald Eagle

In North Dakota, bald eagles historically nested along the Missouri River, Red River, and in the Devils Lake area (Johnson 2010). Bald eagles prefer nesting, roosting, and foraging in areas with mature trees near permanent water bodies in undisturbed areas with abundant prey resources such as fish and waterfowl (Swenson et al. 1986, Mojica et al. 2008). Though North Dakota has experienced an increase in the number of nesting bald eagles over the past four decades, challenges and threats to bald eagles remain. Threats to bald eagles include loss or alteration of nesting and roosting habitat, exposure to poisons and environmental contaminants (e.g., lead, pesticides, pollution), electrocution and collision with power lines, and collision with wind turbines (Kochert and Steenhof 2002). Potential impacts to bald eagles from wind energy development and operations include collision with wind turbines and associated transmission lines, as well as disturbance of nests, roosting sites, and foraging areas.

A review of all years of bald eagle year-round data in the eBird database (Sullivan et al. 2009) for a 4-county region (Rolette County and the surrounding North Dakota counties [Bottineau,

Pierce, and Towner Counties]) indicates a very strong seasonal trend, with eagle occurrence peaking in February with some additional observations occurring more sporadically throughout the year (Figures 7). Bald eagle observations within Rolette County peak in November with a few additional observations occurring between May and July (Figure 8). The bald eagle observations from this region are primarily concentrated along the Souris River (approximately 30 miles southwest of the RWPP) and at Devils Lake (50 miles southeast of the RWPP), but are also dispersed throughout the landscape in lower densities (Figure 9). It should be noted that eBird data is a citizen-science database and is comprised of reported observations collected without a systematic sampling structure. These data should be interpreted with caution as observation locations are often skewed toward birding hotspots and accessible areas. However, these data are useful for the investigation of broad spatial-temporal trends.

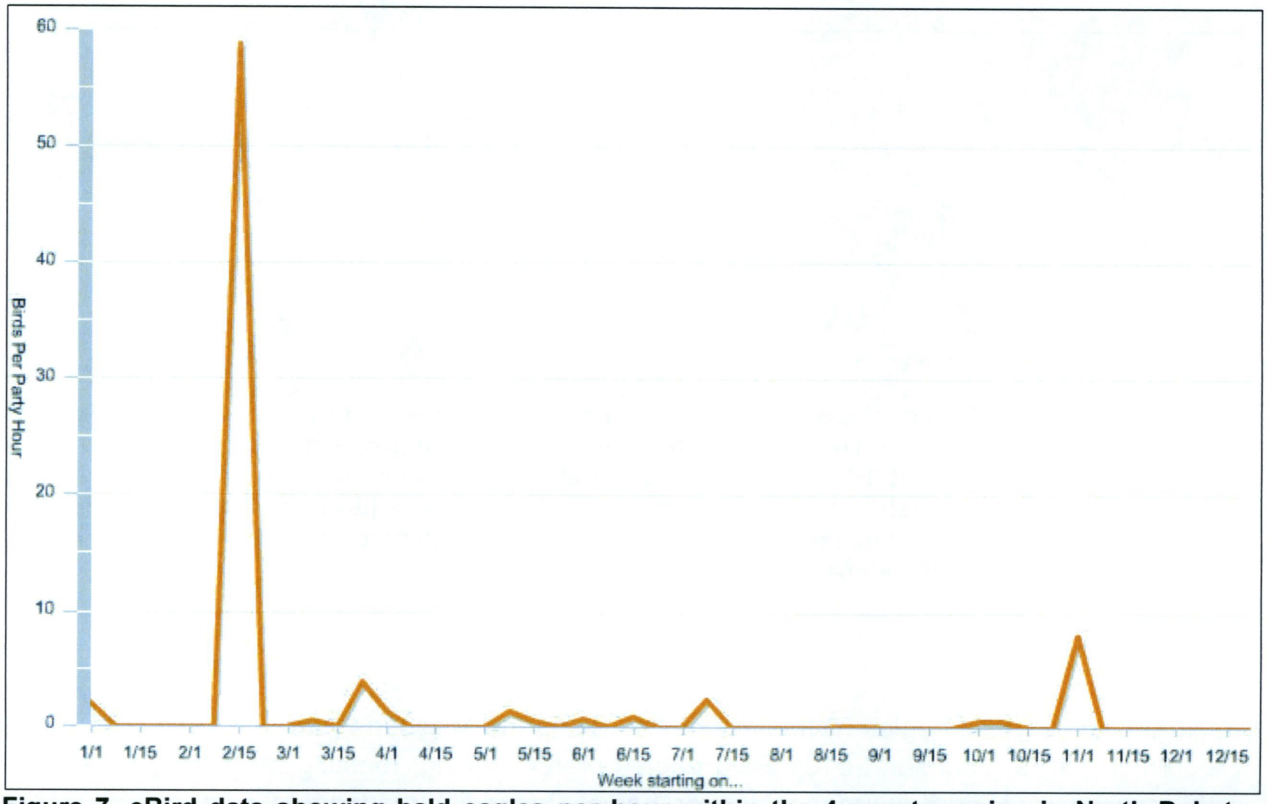

Figure 7. eBird data showing bald eagles per hour within the 4-county region in North Dakota, including Rolette County, in which the Rolette Wind Power Project is located (eBird 2015b). Birds per hour is the average number of bald eagles seen per hour spent birding within a specified date range and region. Dates range from January 1, 1900, to October 18, 2015.

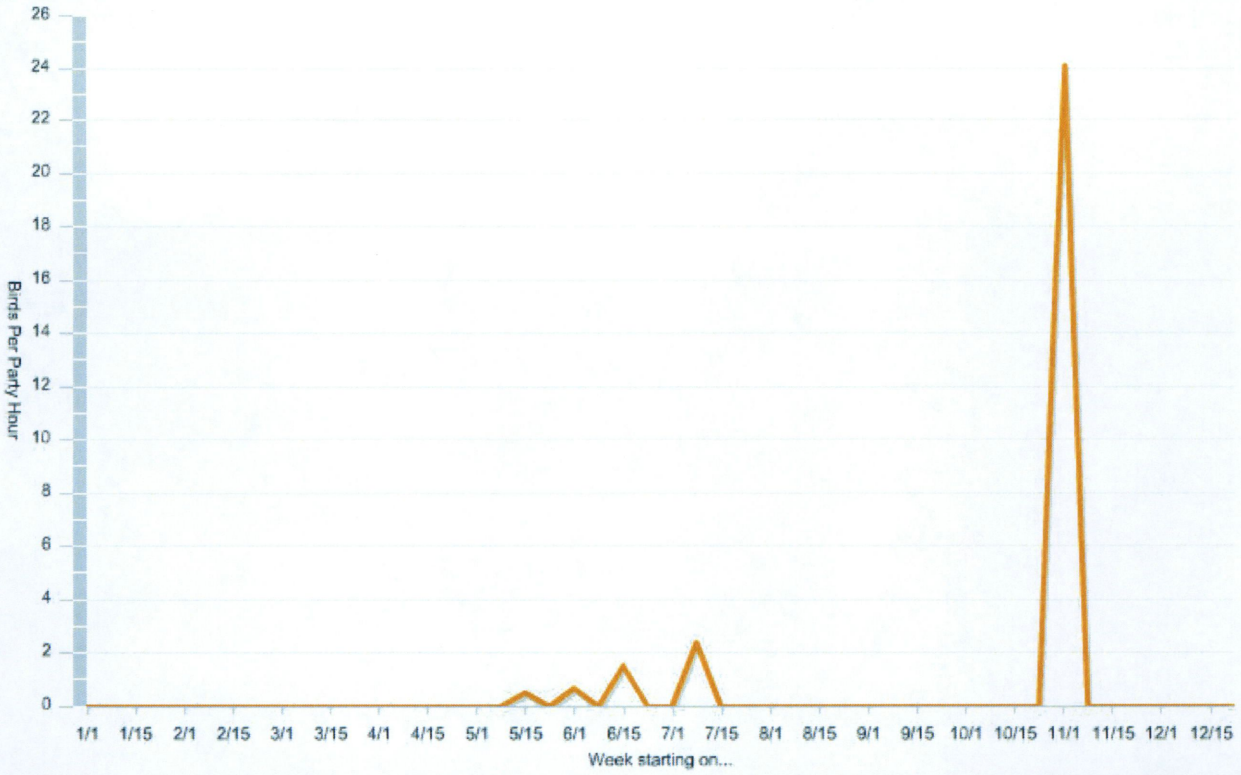

Figure 8. eBird data showing bald eagles per hour in Rolette County, North Dakota (eBird 2015d). Birds per hour is the average number of bald eagles seen per hour spent birding within a specified date range and region. Dates range from January 1, 1900, to October 18, 2015.

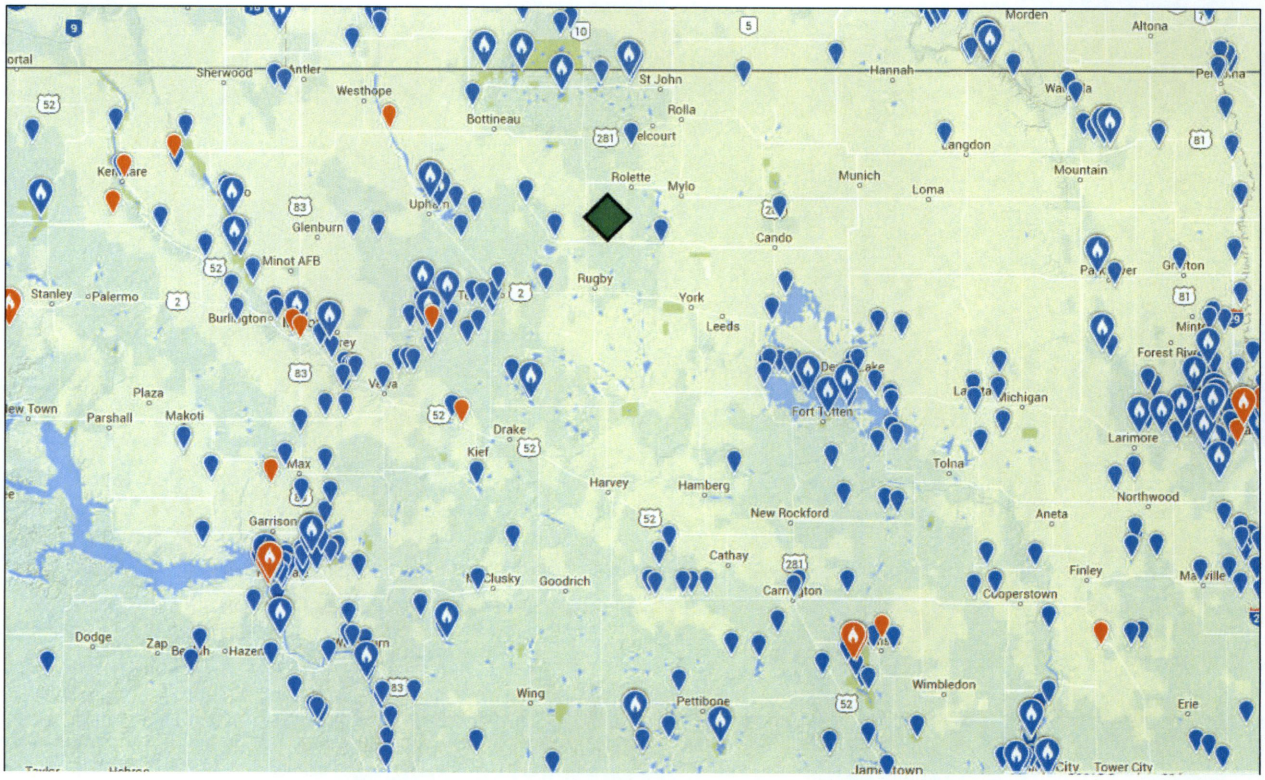

Figure 9. eBird data map of bald eagle observations within the region in which the Rolette Wind Power Project is located (eBird 2015a). Observation data are from all months and all years. The green diamond indicates the approximate location of the Rolette Wind Power Project. Blue markers indicate all year round observations from 1900-2015 that are more than 30 days old. Red markers indicate data from the last 30 days (data from October 18, 2015). Each blue marker can represent one bald eagle observation or multiple bald eagle observations in the same location.

Resident Breeding and Non-Breeding Eagles

In the 1800s, bald eagles were common breeders along North Dakota's major rivers and lakes, such as the Missouri River, the Red River, and Devils Lake (Johnson 2010). A significant decline in their numbers caused by environmental contaminants and loss of habitat led to the enactment of the Bald and Golden Eagle Protection Act in 1940; however, in 1978, the bald eagle was listed as an endangered species (Johnson 2010). Nationwide conservation efforts led to the recovery of bald eagles, and the bald eagle was removed from the federal list of endangered and threatened wildlife and plants in 2007 (USFWS 2007b, Johnson 2010).

In 2009, the NDGFD reported 66 pairs of bald eagles nesting in 29 counties in the state (Johnson 2010). Johnson (2010) reported one occupied bald eagle nest in northern Rolette County, approximately 22 miles north of the RWPP (Figure 10). Nesting bald eagle numbers are increasing, as the NDGFD estimated 140 active bald eagle nests in North Dakota in 2015 (Kessler 2015). An increase in migrating bald eagles has also been observed throughout the state as bald eagles migrate through grassland areas in the fall and spring (Kessler 2015). The NDGFD reports that there are two recently occupied/active bald eagle nests located within a 5-mile buffer of the RWPP (S. Johnson, pers. comm., October 2015, Figure 11) and a total of 3 recently active/occupied bald eagle nests within a 10 mile buffer of the project area (S. Johnson, pers. comm., October 2015, Figure 12).

The closest USGS Breeding Bird Survey (BBS) route to the RWPP is the Rolla route which extends from eastern Rolette County into western Towner County. (http://www.pwrc.usgs.gov/BBS/PublicDataInterface/). The next closest route is the Turtle Mountains Route, which extends from eastern Bottineau County into northwestern Rolette County. BBS routes are typically 24.5 miles (39.4 km) long and consist of 50 3-minute (min) counts along the length of the route (USGS 2001b). Information gathered from the survey provides information about what species may occur in the RWPP either transiently or during the breeding season.

Between 1966 and 2014, a total of 117 species were observed along the Rolla BBS route, including seven raptor species (Cooper's hawk (*Accipiter cooperii)*, red-tailed hawk (*Buteo jamaicensis)*, American kestrel (*Falco sparverius)*, northern harrier (*Circus cyaneus)*, ferruginous hawk (*Buteo regalis)*, Swainson's hawk (*Buteo swainsoni)* and merlin (*Falco columbarius*)) and two owl species (great-horned owl (*Bubo virginianus)*, short-eared owl (*Asio flammeus*)). No bald eagles have been observed along the Rolla BBS Route nor along the Turtle Mountains Route.

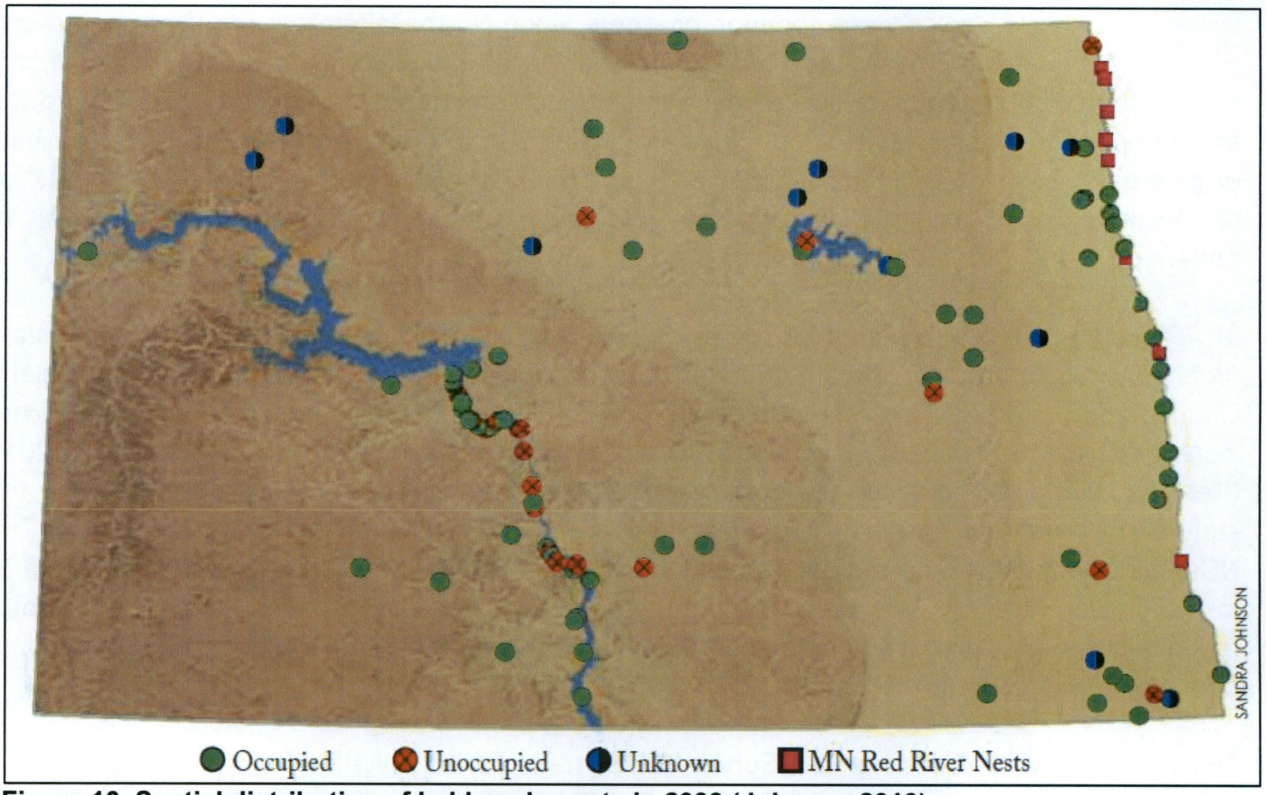

Figure 10. Spatial distribution of bald eagle nests in 2009 (Johnson 2010).

During the breeding season, bald eagles typically breed in forested areas adjacent to large bodies of water, nesting in large mature deciduous or coniferous trees in forest tracts that have relatively open canopies or foliage-height diversity that allow for access to nest trees (Buehler 2000, Anthony and Isaacs 1989, Wood et al. 1989). The distance to water varies depending on the population, and occasionally, distance to water appears to be less important than the presence of quality foraging areas (defined by diversity, abundance, and availability of prey [MacDonald and Austin-Smith 1989]), and absence of human disturbance (McGarigal et al. 1991). Trees that bald eagles use for perching are variable and include both coniferous and deciduous species, if available (Buehler 2000). Perch trees encompass a wider range of tree species and sizes than nest or roost-trees (Stalmaster 1987).

The RWPP land use is primarily cultivated crops and herbaceous grassland, with limited deciduous forest. These land cover types are not likely to provide abundant forage and habitat for eagles. However, there is some open water (lakes) within the RWPP which provides some suitable foraging habitat for bald eagles. If bald eagles are found within the site, they will likely be near these lakes; however, none within the project area are known to contain fish, a potential forage base for bald eagles.

During surveys conducted in and around the RWPP on July 22, 2015 by KLJ, two bald eagle nests previously identified by the NDGFD were verified, one located 2.7 miles north of the

closest turbine and one approximately 5 miles east of the closest turbine (Figure 11). The potential exists that these nesting eagles could pass through the RWPP from time to time or forage within the RWPP. The habitat within the project area includes some open water sources (less than 5% of the project) that could provide habitat for eagles with more open water areas outside of the project. However, there is no reason to believe that the project area habitat is more attractive to eagles than habitat outside of the RWPP. Bald eagle home range size varies based upon location, time of year, breeding status, and food availability (Griffen and Baskett 1985; Buehler 2000) and may vary considerably even within the same region. Bald eagles also defend territories, often using the same territory each year (USFWS 2009). Bald eagle nest territory size and shape can vary widely based on food supply, habitat, nest density, and human disturbance. However, as noted in the ECPG, a majority of eagle territorial and foraging behavior is typically observed within 0.3 to 2 miles of nests (Buehler 2000, Hodges and Robards 1982, Gerrard et al. 1992). Thus, while the majority of eagle activity will likely take place within 0.3 to 2 miles of the two known bald eagle nests, it is possible that the eagles could use the RWPP to some level.

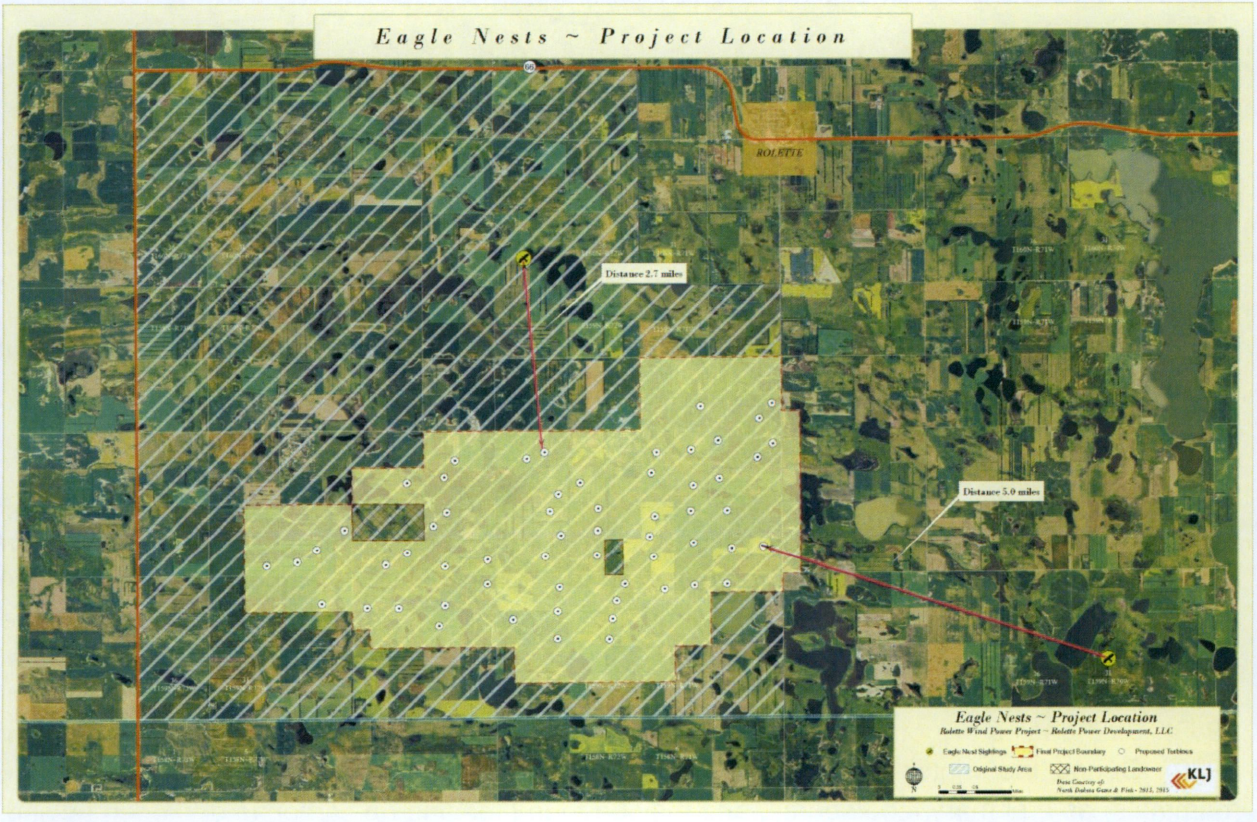

Figure 11. Location of bald eagle nests observed during bald eagle nest surveys conducted at the Rolette Wind Power Project on July 22, 2015 by KLJ.

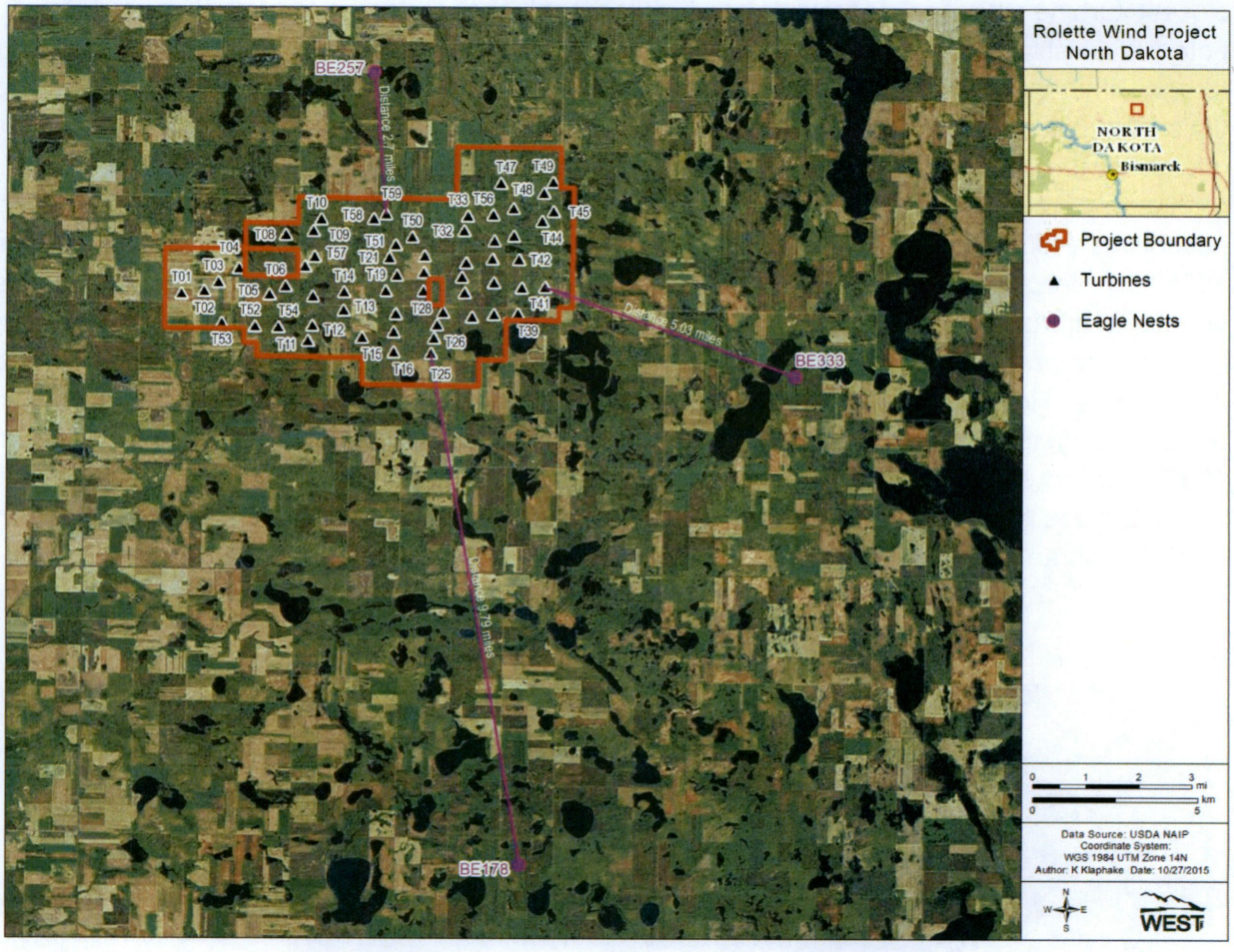

Figure 12. Location of bald eagle nests within 10 miles of the Rolette Wind Power Project, as identified by the NDGFD, October 2015.

Wintering Eagles

Bald eagles may congregate in communal roosts in winter to conserve energy, exploit protective microclimates, and reduce foraging costs (USFWS 2010). Roost sites are typically in mature trees where eagles are sheltered from the wind and inclement weather (USFWS 2007a). Buehler et al. (1991) found that winter communal roosts are more often located close to water sources and away from human development than at random sites. Bald eagles are considered opportunistic foragers and food habits vary and depend on prey species available (Mersmann 1989). Bald eagles are often attracted to aquatic habitats and prefer foraging on fish (DeLong 1990). During the winter months, bald eagles may rely heavily on carrion (fish, birds, and mammals) as a primary food source, and may be found feeding on carrion in dry, open uplands during the winter (Buehler 2000). Bald eagles also forage at waterfowl concentration areas during the winter where mortality due to hunting provides a reliable supply of waterfowl carcasses for scavenging (Griffin et al. 1982). Perching habitat during the winter is similar to other times of the year and is characterized by tall trees located adjacent to foraging areas (Buehler et al. 1992, Chandler et al. 1995).

Bald eagles are present during the winter in North Dakota, especially near rivers and reservoirs (Kessler 2015). The annual Garrison Dam Christmas Bird Count reported 62 bald eagles in December 2014, and has reported an average of 45 eagles annually over the last five years (Kessler 2015). In 2014, bald eagles were reported during 13 of the 20 Christmas Bird Counts that take place throughout the state of North Dakota, with a total of 113 bald eagles observed statewide (National Audubon Society, 2015).

The RWPP does not contain significant habitat features that would be attractive to wintering eagles. However, the lakes within the RWPP and the Waterfowl Production Areas or Wildlife Management Areas adjacent to the project area could attract eagles if waterfowl are present during open water periods in late fall and early spring. Bald eagles may occur within the RWPP during the winter. However, larger bodies of water that are free of ice longer, such as Devil's Lake southeast of the project area, are expected to provide better winter habitat. The RWPP does contain areas where carrion (e.g., deer carcasses, road kill) or small game may be present and could be an attractant for bald eagles.

Bald Eagle Migration or Other Regular Movement

Bald eagle migration patterns depend primarily on the age of the bird (immature or adult), location of the breeding site, breeding site climate, and food availability (Buehler 2000). Bald eagle migration is not as regular as with other migratory birds, as movements are often opportunistic, somewhat unpredictable, and widely dispersed in time (Buehler 2000). Bald eagles typically do not migrate in kettles or flocks, but concentrations of migrants may occur at communal feeding and roost sites during migration (Buehler 2000). Fall migration occurs during August through January. Bald eagles often migrate along major river systems in search of food (Buehler et al. 1991). In the spring, bald eagles may return to their breeding grounds as soon as the weather improves and food is available, again using major river valleys as migration corridors. The spring migratory period is generally considered to occur from January to March. Migration occurs during the day, when thermals provide opportunities to soar with limited energetic expense.

Eagles may pass through the RWPP in a broad-front fashion during migration, especially if there are food sources such as carrion available. Little information is available regarding the characteristics of stopover habitat used during migration. It is likely that the suitability of stopover habitat is most related to food availability rather than vegetative composition or structural characteristics. Stopover sites are usually areas with consistent fish-kills, concentrations of fish and waterfowl, or the presence of large mammals as carrion (McClelland et al. 1996). Roosts that most commonly see repeated use as stopover sites consist of clumps of mature deciduous trees in riparian areas protected from human disturbance and proximate to foraging opportunities. Locations within the RWPP that may serve as stopover sites for eagles are limited to small wooded patches and around lakes with opportunities for foraging. Grasslands and other areas within the RWPP may attract bald eagles if carrion or small game is present. Bald eagles are more likely to occur within these areas during the migratory period.

Eagle Seasonal Concentration Areas

The RWPP does not contain habitat or landscape features that would appear to lead to significant seasonal concentrations of bald or golden eagles. Most of the RWPP consists of grassland and cultivated cropland with little forest or wetland habitat. There are a few lakes within the RWPP that eagles could use during winter, migration, or during the breeding season. Ephemeral foraging opportunities in the form of carrion and road kill may temporarily attract eagles, especially during the winter.

Eagle Physical Landscape Features

Physical features of the landscape that may attract or concentrate eagles are limited within the RWPP. The general topography across the RWPP is flat to rolling. It is likely that bald or golden eagles will migrate through the RWPP in a broad-front fashion. The RWPP is lacking prominent north/south ridges or valleys that would funnel migrants through the project area (Liguori 2005; Figures 2 and 3). Trees, shrubs, and open water sources may provide some stopover habitat for migrating eagles, but concentrated use is not expected within the RWPP.

CONCLUSIONS

The ECPG (USFWS 2013) suggests specific questions that should be considered to help place a prospective project site into an appropriate risk category. These questions are answered below based on the information compiled during the Stage 1 Initial Site Assessment.

1. *Does existing or historical information indicate that eagles or eagle habitat may be present within the geographic region under development consideration?*

Eagles have been observed within the geographic region under development consideration. While there are no known bald or golden eagle nests within the RWPP, there are two active bald eagles nests within 5 miles of the RWPP. Bald eagle habitat is limited within the RWPP as there are few trees (<1% forest cover) and open water (<5%). The RWPP has similar to lower potential to have bald eagle use compared to surrounding areas because the biological resources eagles often rely on are more abundant outside of the project area, such as large waterbodies with forest cover.

2. *Within a prospective project site, are there areas of habitat known to be or potentially valuable to eagles that would be destroyed or degraded due to the project?*

There is some potentially valuable habitat in the form of larger waterbodies for eagles within the RWPP. Land use is predominantly grasslands and cultivated crops. Impact to larger waterbodies will be avoided by project development.

3. *Are there important eagle use areas or migration concentration sites documented or thought to occur in the project area?*

To date, no important eagle use areas and migration concentration sites have been documented or are thought to occur within the project area. The important bald eagle use areas

and migration concentration sites are located approximately 90 miles to the southwest along the Missouri River. No bald or golden eagle nests are known within the RWPP; however, two active bald eagle nests were found within 5 miles of the RWPP.

4. *Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration?*

Abundant prey for eagles is not expected to be present within the project area, but may be found in the larger geographic region. Some foraging opportunities may be present in the form of waterfowl, small game, and road killed deer and other carrion within the project area. However, better foraging opportunities and more abundant concentrations of suitable prey are likely to be outside the project area.

5. *For a given prospective site, is there potential for significant adverse impacts to eagles based on answers to above questions and considering the design of the proposed project?*

Bald and golden eagles have the potential to occur in the RWPP during all seasons, but will likely occur in low numbers. Given golden eagles are uncommon in this area, the potential for the project to result in significant adverse impacts to this species is particularly low. There are two bald eagle nests near the RWPP and this species has been observed in the general area more commonly than golden eagles. Generally, bald eagles do not move broadly across the landscape during the nesting season. As such, the potential risk of bald eagles interacting with wind turbines at this site could be greater during the migratory season; however, no migration concentration sites have been documented or are thought to occur within the project area. Based on available information, it is not likely that eagle populations will be significantly adversely impacted by development of the proposed project.

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