PRE-CONSTRUCTION AVIAN SURVEY AND RISK ASSESSMENT

Border Winds Energy Project

Rolette and Towner Counties, North Dakota
September 24, 2009

Prepared For:

Sequoia Energy U.S. Inc.
259 Portage Avenue, Suite 210
Winnipeg, MB R3B 2A9 Canada

Prepared By:

Westwood

This page is intentionally blank.

Pre-Construction Avian Survey and Risk Assessment

Border Winds Energy Project

Rolette and Towner Counties, North Dakota

Prepared for:

Sequoia Energy, Inc.
259 Portage Avenue, Suite 210
Winnipeg, Manitoba R3B 2A9, Canada
(204) 523-0216

Prepared by:

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344
(952) 937-5150

Project Number: 20071163.00

September 24, 2009

This page is intentionally blank

CONTENTS

TABLES

EXHIBITS

1.0 EXECUTIVE SUMMARY

Sequoia Energy, Inc. (Sequoia), contracted with Westwood Professional Services (Westwood) to conduct a pre-construction avian survey and risk assessment at Border Winds Energy Project (Border Winds) in Rolette and Towner Counties, North Dakota. The survey was designed to characterize the avian community and identify potential risks to recorded species based on flight patterns relative to proposed turbines during the 10-week survey period (April 3-June 2, 2009). Raptors, waterfowl, and grassland birds were given special attention as "groups of interest" because of their potential to be impacted and the project's location in the Prairie Pothole Region.

Westwood observed a total of 68,425 birds of 94 species at Border Winds in the 10-week spring survey. More than 75% of these observations were Snow Geese, typically recorded migrating through the study site. Overall mean use was 325.8 birds per 5 minutes. The most frequently seen species was the Horned Lark. Grassland birds were the most diverse of the groups of interest, with 21 different species. We observed 17 species of waterfowl and 16 raptor species.

The bird species observed at Border Winds showed substantial overlap with the species reported for the nearest and most recent North American Breeding Bird Survey route. The most predominant groups of birds at Border Winds during the survey period were waterfowl, shorebirds, and songbirds. Raptors were also prominent. This avian community reflects the prevalence of prairie pothole and grassland habitats in the area.

There were 75 species of birds observed in flight, and only 18 of these species had an index of collision hazard equal to or greater than 0.001. The species with the highest indices of collision hazard were Snow Goose (1.304), Unidentified Warbler (0.165), and Canada Goose (0.140). Grassland bird species were more likely than birds in general to fly below the rotor-swept height (RSH). Both waterfowl and raptors were more likely than birds in general to fly within and above the RSH. Raptors were more likely than other groups of interest to fly within the RSH.

Twenty-six active raptor nests of three different species were recorded in the study area. Red-tailed Hawk, Great Horned Owl, and Swainson's Hawk nests were located throughout the study area. All observed active nests were more than 0.25 mile (400 m) from turbines proposed in the revised project layout.

We observed no Whooping Cranes or other federally listed species. We did observe Sandhill Cranes, which are sometimes used as a "surrogate" for Whooping Cranes because of their similar flight patterns and habitat preferences, in weeks 3-5. Most crane observations consisted of groups of Sandhill Cranes flying well above the RSH at the typically high altitude of migrating cranes, while other observations were of foraging cranes in upland agricultural areas.

We observed 20 species with North Dakota Comprehensive Wildlife Conservation Strategy (CWCS) status. In general, species with CWCS status were not highly abundant or frequently seen. Over half of the CWCS species observed at Border Winds were grassland species, and half of the grassland species observed had CWCS status.

The avian community at Border Winds was about twice as large as that observed during a recent similar survey at Langdon Wind Farm, which is located approximately 60 miles (97 km) east of Border Winds. The higher avian use and higher species numbers at Border Winds are probably attributable to the wetlands and tree cover in the study area. The abundance of wetlands and the higher tree cover at Border Winds were accompanied by relatively high waterfowl and raptor use of the study area. Despite the high waterfowl and raptor use at Border Winds, the risk of waterfowl and raptor collision fatality is likely to be low, similar to fatality rates reported in other recent studies. Avoiding wetlands and siting turbines at least 0.25 mile (400 m) from known raptor nest locations are the most tangible mitigation measures to reduce fatality risk for waterfowl and raptors, respectively.

The risk of avian fatality can be reduced most effectively with project design strategies that minimize the interaction between turbines and key resources for waterfowl and raptors (i.e., wetlands and woodlands). The revised Border Winds layout avoids Waterfowl Production Areas, raptor nest locations, and to the extent practicable, wetlands, grasslands, and woodlands. Avoidance of wetlands and U.S. Fish and Wildlife Service (USFWS) wetland easement lands was a high priority during turbine siting. This habitat-based approach to mitigating fatality risk has the added benefit of reducing potential impacts related to habitat disruption. Although the proposed project layout will cause some habitat impacts, in part by affecting some Conservation Reserve Program (CRP) grasslands, potential impacts were minimized by avoiding turbine placement in relatively large tracts of mapped grasslands and by prioritizing avoidance of wetland easement lands.

2.0 INTRODUCTION

Sequoia is planning to develop a wind energy conversion facility in Rolette and Towner Counties, North Dakota. The Border Winds Energy Project study area encompasses approximately 126 square miles (321 square kilometers), or 79,525 acres (32,183 hectares), of land immediately south of the Canadian border (Exhibit 1). This study was undertaken to address the risk of avian impacts at Border Winds. The objectives of the study were to: (1) characterize the community of birds using the study area for migrating and breeding; (2) describe use of the study area by three groups of birds (grassland birds, waterfowl, and raptors); (3) quantify flight patterns and avian/turbine collision risk relative to turbine height; and (4) map the locations of observed raptor stick nests. An understanding of the composition and behavior of the avian community during spring migration provides an opportunity to assess the risk of avian impacts caused by collisions, electrocutions, and habitat disruption, and to consider measures that reduce and mitigate this risk.

3.0 PROJECT DESCRIPTION AND STUDY AREA

3.1 Project Description

The Border Winds Energy Project will be configured as a wind energy conversion facility with up to 66 turbines and a total nameplate capacity of approximately 150 megawatts (MW). Additional facilities include a collection system consisting of buried electrical cables, access roads, an operations and maintenance facility, and a substation that will

connect the system to an existing Xcel Energy transmission line. The project will be constructed to serve the electric power needs of people and industries in North Dakota and the Upper Midwest Region of the United States.

The preliminary project layout has been revised since October 2008 when Sequoia submitted an Application for a Certificate of Site Compatibility to the North Dakota Public Service Commission. At that time, the project area encompassed approximately 122 square miles (316 sq km), and the preliminary layout included 66 turbines proposed in Rolette and Towner Counties. The revised layout features a more compact design with 66 turbines proposed in Rolette County. The revised layout increased the size of the study area from 122 to 126 square miles, but it relocated some preliminary proposed turbine string locations farther northwest, out of the southeastern portion of the study area. The revised turbine string locations are closer to other turbine strings than in the preliminary layout. The revised layout also includes 12 alternate turbine locations, which will be used only if some of the proposed turbine locations become unworkable. The revised layout will limit disturbance in the southeastern portion of the study area, increase turbine setbacks from identified raptor nests, and reduce the area to be affected by road improvements and electrical cables. Although the methodology of the avian survey was based on the preliminary project layout, we refer to the revised layout in this report to clarify how the revisions affect interpretation of the avian survey results.

3.2 Study Area and Habitat

The predominant land cover in the study area is agricultural cropland consisting mostly of small grains (Exhibit 2). Grasslands and pastures are present in certain areas. Woodlands are mainly limited to shelter belts and farmsteads that are scattered throughout the area. Wetlands are abundant and exist primarily as seasonally flooded prairie potholes, ranging in size from less than an acre to 90 acres.

The study area contains federal lands designated for avian use and lands that are retired from crop production and enrolled in federal farm programs (Exhibit 2). The lands designated for avian use include U.S. Fish and Wildlife Service (USFWS) Waterfowl Production Areas (WPAs) and wetland easement lands. WPAs are public lands managed by the USFWS that preserve wetlands and grasslands critical to waterfowl and other wildlife. Border Winds facilities will be set back at least 0.25 mile (400 m) from WPAs. USFWS wetland easement lands provide breeding, loafing, and migratory habitat for birds by protecting wetlands through perpetual agreements on privately owned land. The easements prevent conversion of wetlands to upland through fill or drainage. The Border Winds project will avoid most USFWS wetland easement lands in the study area. The federal farm program lands are private lands enrolled in the Conservation Reserve Program (CRP) through the U.S. Department of Agriculture Farm Service Agency (FSA). CRP lands are maintained in perennial vegetative cover for the duration of enrollment, which is typically 10 years unless the enrollment is renewed. Border Winds facilities will avoid much of the CRP land in the study area. Where wind turbines and access roads will be constructed on CRP lands, it will be necessary to amend the CRP contract between the FSA and the landowner.

The study area also includes state-owned lands and state program lands that benefit birds and other wildlife (Exhibit 2). These areas consist of North Dakota State Land Department lands and a Waterfowl Rest Area (WRA). North Dakota State Land Department lands include school trust lands and other state property. Within the study area, these lands exist as vacant properties that support primarily grasslands and wetlands. One WRA is located in the southern portion of the study area. WRAs are designated by proclamation of the State of North Dakota and are closed to hunting during the regular waterfowl season for the purpose of attracting and holding waterfowl. The WRA within the Border Winds study area, and most WRAs statewide, are privately owned. The Border Winds project will avoid North Dakota State Land Department lands and the WRA.

4.0 METHODS

4.1 Field Surveys

4.1.1 Point Counts

Westwood conducted point counts along roadside transects, recorded incidental observations, and documented the location of raptor stick nests visible from the survey route (Exhibit 3). These methods, and the specific location of point counts, were selected to provide comprehensive coverage of the study area. Point count locations were established at 2-mile (3.2-km) intervals in the northern portion of the study area (i.e., north of the airport zone and within Rolette County) and in representative locations in the eastern portion of the study area (i.e., within Towner County). The survey effort in Rolette County was more intensive than in Towner County due to the predominance of proposed turbine strings in Rolette County.

For all birds observed, we recorded the following data: species; number of individuals; movement status (perched or in flight); observation method (visual, auditory, or both); and altitude of flight, if applicable. Our three altitude categories were based on the height and diameter of the rotation of wind turbine blades (110 ft to 415 ft, or 33.5 m to 126.5 m) that Sequoia intends to install: "below" the rotor-swept height (RSH) (< 110 ft, or < 33.5 m); "within" the RSH (110 ft to 415 ft, or 33.5 m to 126.5 m); and "above" the RSH (> 415 ft, or > 126.5 m). Estimates of flight altitude were field-calibrated using the known height (160 ft and 200 ft, or 50 m and 60 m) of three meteorological towers in the study area. Observations were not limited by distance; however, observations were only recorded for birds that could be identified at least to taxonomic family. Weather data (cloud cover, visibility, temperature, wind speed) were also recorded for each survey day. Birds observed outside of point counts were recorded as incidental observations if the observation involved a raptor, a species not previously observed, and/or a species with conservation status. Scientific names of observed species are given in Tables 2 and 3.

Surveys took place between April 3 and June 2, 2009, timed to coincide with the spring migration period. Twenty-one point count surveys were completed during one day each week for 10 consecutive weeks. Survey days were selected on a weekly

basis to coincide with optimal migration conditions, such as winds from the south, whenever possible. If optimal conditions did not exist, the weekly survey day was selected to optimize weather conditions. Visibility was either fair or good on all survey days. The entire survey was generally completed between 7:00 a.m. and 4:00 p.m., and each point count survey lasted 5 minutes. The survey route was split in half and varied each week so that the order and direction of each half-segment differed (i.e., forward-forward; backward-backward; forward-backward; backward-forward). This allowed temporal variation for each point count location.

4.1.2 Raptor Nests

Raptor stick nests, which tend to be large and elevated in trees, were inventoried because some raptors tend to fly within the rotor-swept-height. Raptor stick nests are quite visible in the spring prior to deciduous tree leaf emergence. Other raptor nests may exist within the study area because raptors also nest on the ground, in cavities, and in abandoned structures, but these nests could not be located from roadside transects. Stick nests were located by scanning the surroundings from point count locations and the survey route. Identified nests were observed weekly until they could be verified as active based on raptor nesting behavior (i.e., material carries, incubation, or nest/territory defense). Documented raptor nest locations were then mapped using aerial photograph interpretation and buffered by 0.25 mile (400 m) in ArcGIS 9.3. This distance is becoming a minimum standard in the building industry as a seasonal construction setback during the raptor breeding season to minimize disturbance to breeding raptors (El Dorado County 2006, CDOW 2008).

4.2 Analysis

4.2.1 Community Composition

Animal communities are typically characterized by measuring the diversity and abundance of different species. We calculated the relative abundance of each bird species recorded during point counts by dividing the number of individuals observed per species by the total number of individuals observed. Although relative abundance is a conventional metric of species abundance, it often results in many zero values because communities commonly contain a few species that are very numerous and many species that are rare.

In order to have a secondary indicator of avian species abundance at Border Winds, we calculated mean use (i.e., number of birds/number of point counts/number of survey days) for each species. As with relative abundance, mean use is derived from the number of individuals, but it is calculated as a function of survey effort rather than the abundance of other species and is therefore less likely to skew rankings excessively. Mean use, when calculated for groups of species, is also a common metric for comparing avian communities among different wind farm studies. "Standardizing" mean use values to account for different methodologies (e.g., multiplying our mean use values by four to make our 5-minute point count results comparable to studies using 20-minute point counts) does not eliminate biases, however (Erickson et al. 2002). In our case, multiplying mean use by four is

extremely likely to result in overestimates of bird abundance, because all birds at a point count location could routinely be counted within 5 minutes. An additional 15 minutes would be unlikely to produce new observations and would in fact increase the probability of counting the same individuals twice. To allow comparisons with other studies and minimize overestimation of mean use, we give both "actual" (# birds/5 min) and "standardized" (# birds/20 min) mean use values when comparing mean use of groups at Border Winds to other wind farm sites.

In addition to quantifying species abundance, characterizing a bird community involves quantifying the frequency with which species are observed. Some species are not naturally abundant but may be considered "common" because they are frequently observed in the community. We calculated the relative frequency of each bird species seen during point counts by dividing the number of observations of each species by the total number of observations. Birds seen during incidental observations (i.e., outside of a 5-minute point count or at a non-point count location) were not included in relative frequency calculations or any other analysis due to the non-systematic nature of these observations. Additionally, "unidentified species" (unidentified blackbird, unidentified sparrow, unidentified duck, unidentified warbler, and unidentified hawk) were not included in the total species count because these "species" could only be identified to genus and potentially represent more than 5 species.

As a tool for interpreting the tables in this report and also to provide a simplified summary of diversity, we grouped observed species into categories. Birds were grouped first according to taxonomic relationships and then (where needed to keep the number of categories manageable) according to ecological adaptations (Table 1). The taxonomic families that make up "raptors," for example, were grouped because they are all birds of prey. Similarly, the numerous wetland-using bird families were divided into two categories based on whether they forage primarily in open water or along shorelines. Grouping birds on the basis of similar behavior and habitat needs helps us understand the potential impacts of wind energy development.

From the categories in Table 1, we identified three "groups of interest" that merited more in-depth consideration than others: raptors, waterfowl, and grassland birds. Raptors have drawn attention for their potential to be impacted since the early days of large-scale wind energy generation. Although "new generation" wind energy facilities have reduced mortality rates, raptors continue to be a group of interest. Waterfowl and grassland birds are groups of interest because of the location of Border Winds within the Prairie Pothole Region. This region has a higher density of wetlands than anywhere else in North America and produces over half the continent's ducks (USGAO 2007). Grasslands were also historically important in this region and have been largely converted to agriculture, resulting in the decline of grassland birds more than any other guild of birds (Johnson 2000). The term "waterfowl" describes members of the family Anatidae (ducks, geese, and swans), which are part of the "wetland swimmers" category in Table 1. "Grassland birds" as a group of interest were designated as such if included either in Johnson et al. (2004) or Sauer et al.

(1995). "Grassland birds" included species from four of the seven different categories in Table 1. Species within these three "groups of interest" are noted in Tables 2, 3, 4, and 6.

4.2.2 Flight Patterns and Collision Risk

For birds that were observed in flight, we summarized the number of observations per species for which birds were flying in the height categories of below, within, and above the RSH. We then calculated an index of collision hazard for each species. The index is a function of species abundance, how often individuals of the species are seen in flight, and how often those flights occur at a height that overlaps the RSH. In our index calculation, we also included how frequently the species was observed as an indicator of detection probability. The index (I) was based on Erickson et al. (2000), as follows:

$$I = M*R*Pf*Pt, \text{ where}$$

M = mean use, as calculated above;
R = relative frequency, as calculated above;
Pf = proportion of observations where flight occurred; and
Pt = proportion of flight observations where flight was within the RSH.

4.2.3 Conservation Status

The status of bird populations for species observed at Border Winds was examined by consulting federal endangered and threatened species lists. In addition, because North Dakota does not have a state-level threatened and endangered species list, we reviewed the Comprehensive Wildlife Conservation Strategy (CWCS) for North Dakota, known as the Wildlife Action Plan (Hagen et al. 2005). In exchange for federal funding from the State Wildlife Grants program, states are required to prepare a CWCS plan that identifies Species in Greatest Conservation Need (SGCN) and prioritizes conservation activities.

Border Winds is at the eastern fringe of the migration corridor of federally endangered Whooping Cranes. The study area is about 12 miles (19.3 km) east of a 180-mile (290-km) wide migration corridor that includes 95% of validated Whooping Crane observations. The study area is approximately 100 miles (161 km) from the migration corridor's central portion, which includes 50% of the validated Whooping Crane sightings since 1943 (Exhibit 4). Although the likelihood of observing migrating Whooping Cranes during the study was small, we could still assess the potential for impacts on this species by using Sandhill Cranes as "surrogate" indicators of Whooping Crane flight patterns and habitat use. These two related species are known to migrate together and have similar habitat requirements.

5.0 RESULTS

5.1 Community Composition

We observed 94 species of birds using the study area during point counts. There were 16 species categorized as "wetland waders" (mostly shorebirds), 19 species of "wetland swimmers" (mostly waterfowl), 13 raptors, 36 songbirds, 2 gamebirds, 1 crane, and 7 other miscellaneous species (Table 2). We recorded 9 additional species during incidental observations: 3 "waders" (including an American Bittern, the only representative of the heron family observed); 3 "swimmers;" 2 raptors; and 1 songbird (Table 3). We observed another 5 "unidentified species" that could not be identified due to distance or visibility.

The most abundant species was the Snow Goose (Table 2). Observations of migrating Snow Geese in flocks of up to 5,000 birds, primarily in survey weeks 3 and 4, resulted in numbers highly skewed toward this single species. Of 68,425 total birds seen over 10 weeks, more than 75% of them were Snow Geese. Large migrating flocks were similarly responsible for the next most abundant species, unidentified warblers and Canada Geese, though their flocks numbered mostly in the hundreds rather than the thousands. Other very abundant species either ranked highly in relative abundance/mean use because of some large flock sizes (e.g., Snow Buntings, Sandhill Cranes), or because they were so frequently seen (e.g., Red-winged Blackbirds, Horned Larks, Mallards). Overall mean use was 325.8 birds/5 min. In general, the ranking of species according to relative abundance/mean use was distributed across the different bird groups (Table 2).

The most frequently seen species was the Horned Lark (Table 4). Many species were like the Horned Lark in having both a high relative abundance and a high relative frequency (e.g., Canada Goose, Red-winged Blackbird). Other species tended to be observed in relatively large groups (e.g., 10 to 30 birds) but were not frequently observed (e.g., Snow Bunting, Sharp-tailed Grouse), while still others were commonly seen but never in large numbers (e.g., Red-tailed Hawk, Western Meadowlark). No Sharp-tailed Grouse display areas were observed. Sharp-tailed Grouse were only observed foraging and were observed in different locations each time. Overall, the ranking of species according to relative frequency was distributed across the different bird groups (Table 4).

Grassland birds were the most diverse of the groups of interest. We observed 21 grassland bird species (18 during point counts and 3 during incidental observations) (Tables 2 and 3). Most grassland species were songbirds (particularly sparrows), but raptors, shorebirds, and a gamebird were also included. Horned Larks and Brown-headed Cowbirds were both highly abundant and frequently seen. Other grassland birds were distributed throughout the ranks of relative abundance and frequency.

We observed 17 species of waterfowl (16 during point counts and 1 during incidental observations) (Tables 2 and 3). As mentioned above, Snow Geese and Canada Geese were both highly abundant and frequently seen. Mallards were also prevalent, and most of the other common waterfowl species were dabbling ducks. Divers were less common. Mean

use for waterfowl as a group was 266.6 birds/5 min, or 16.7 birds/5 min without Snow Geese.

We observed 16 raptor species (13 during point counts and 3 during incidental observations) (Tables 2 and 3). Red-tailed Hawks and Northern Harriers were the most abundant and frequently seen raptors. Other hawks, eagles, owls, falcons, and vultures were distributed throughout the ranks of relative abundance and frequency. Mean use for raptors as a group was 2.8 birds/5 min.

5.2 Flight Patterns and Collision Risk

Of 1,724 total observations, there were 845 observations that involved birds in flight. Most of these observations (close to 70%) involved birds flying below the RSH (Table 5). Of the remaining observations, there were slightly more flights within the RSH than above the RSH.

There were 75 species of birds observed in flight, and only 18 of these species had a measurable index of collision hazard (i.e., $I \geq 0.001$) (Table 6). The top three index values corresponded to the three species that had the highest relative abundance. Certain species had a lower index value than would be predicted by their relative abundance alone, mainly because these species tended to fly above (e.g., Sandhill Cranes) or below (e.g., Snow Buntings, Red-winged Blackbirds) the RSH more often than birds in general. The remaining species with $I \geq 0.001$ had a higher index value than would be predicted by their relative abundance alone, either because they were observed frequently or because they were more likely to fly within the RSH than birds in general (Table 6).

Grassland bird species were more likely than birds in general to fly below the RSH (Table 5). The lower percentage of grassland bird flights within and above the RSH probably reflects the predominance of songbirds in this group of interest and the reduced probability of seeing and identifying songbirds at substantial heights. Brown-headed Cowbirds and Northern Harriers showed some risk of collision hazard, with $I \geq 0.001$ (Table 6).

Waterfowl species were less likely than birds in general to fly below the RSH and more likely to fly above the RSH, but flew within the RSH just slightly more than birds in general (Table 5). Mallards, Blue-winged Teal, and Northern Shovelers showed some risk of collision hazard, with $I \geq 0.001$ (Table 6).

Like waterfowl, raptors were less likely than birds in general to fly below the RSH. Raptors were more likely to fly within and above the RSH than birds in general (Table 5). Red-tailed Hawks (and Northern Harriers, as noted above) showed some risk of collision hazard, with $I \geq 0.001$ (Table 6).

5.3 Raptor Nests

Twenty-six active raptor stick nests of 3 different species were recorded in the study area, with occupancy confirmed in weeks 3-10 of the survey (Exhibit 3). Red-tailed Hawk nests

were most abundant, with 21 nests located throughout the study area. Three Great Horned Owl nests and 2 Swainson's Hawk nests were also located. Two potential conflicts arose between the 0.25-mile (400-m) raptor nest buffer and the initial turbine layout, involving one Red-tailed Hawk nest northwest of point count 19 and another northwest of point count 2 (Exhibit 3). These conflicts were resolved, however, when the turbine layout was revised. The revisions eliminated the potential overlap between turbines and nest buffers. The turbine string near point count 19 was repositioned within the project layout, and the turbine string near point count 2 was moved just beyond the 0.25-mile (400-m) buffer (Exhibit 3).

5.4 Conservation Status

We observed no Whooping Cranes or other federally listed species. We did observe Sandhill Cranes, the "surrogate" species for whooping cranes, in weeks 3-5. Some of these observations consisted of groups of Sandhill Cranes flying well above the RSH at the typically high altitude of migrating cranes. Flocks included as many as 63 individuals. Two groups of Sandhill Cranes, in two separate weeks, were observed foraging in upland agricultural areas, one in the northern portion of the study area (east of point count 9) and the other in the southern portion (south of point count 21) (Exhibit 3).

We observed 20 species with CWCS status (16 during point counts and 4 during incidental observations), including eight at Level I status (i.e., Species in Greatest Conservation Need) (Tables 2 and 3). Six of the Level I species were wetland "waders;" the other two included a songbird and a raptor species. The Grasshopper Sparrow was the most abundant and most frequently observed Level I species, but in general species with CWCS status did not have high relative abundance or frequency (most ranked lower than the top one-third of species for both measures).

6.0 DISCUSSION

6.1 Community Composition

The most predominant groups of birds at Border Winds during the survey period were waterfowl, shorebirds, and songbirds such as sparrows, blackbirds, flycatchers, and swallows. Raptors were also prominent. This avian community reflects the prevalence of prairie pothole and grassland habitats in the area. Over one-third of North American bird species use the Prairie Pothole Region for breeding and/or migration due to the high density of wetlands and the surrounding grassland mosaic (Rich et al. 2004, USGAO 2007).

The bird species observed at Border Winds showed substantial overlap with the species reported for the nearest and most recent North American Breeding Bird Survey (BBS) route. The BBS, conducted by the U.S. Geological Survey's Patuxent Wildlife Research Center, provides a long-term database for monitoring bird populations. Roadside survey routes are covered during June of each year, using methodology similar to our study (each route is 24.5 miles (39.4 km) long, with stops at 0.5-mile (800-m) intervals for auditory and

visual counts within a 0.25-mile (400-m) radius. The nearest BBS route starts near Rolla and has been surveyed regularly since 1969. In 2007 there were 105 species reported for the Rolla BBS route (Sauer et al. 2008), about 60 of which were also seen during our survey period. Notable species from the BBS data that were not recorded on our surveys included an additional waterfowl (Bufflehead), raptor (Ferruginous Hawk), gamebird (Wild Turkey), and some grassland specialists (Chestnut-collared Longspur, Nelson's Sharp-tailed Sparrow, and Short-eared Owl). Overall, however, the overlap of the lists suggests that the birds observed during our survey at Border Winds were representative of the breeding bird community in this portion of North Dakota, with additional representation of some migratory species because of the timing and duration of our study period.

The avian community at Border Winds was about twice as large (at 103 species) as that observed during a recent similar survey at Langdon Wind Farm, which is located approximately 60 miles (97 km) east of Border Winds in neighboring Cavalier County (Tetra Tech 2007). The overall composition of the two bird communities was similar, including about the same number of waterfowl species, though only about half as many raptor species were documented at Langdon (with many fewer nests; see below). Langdon's overall mean use (at 424.4 birds/20 min) was higher than the actual mean use of 325.8 birds/5 min at Border Winds, but much lower than our standardized mean use (1,303 birds/20 min). The higher avian use and higher species numbers at Border Winds (and the higher raptor diversity in particular) is probably attributable to habitat differences. On a brief windshield survey of Langdon in May 2009, we noted that there were considerably fewer wetlands and trees and more cultivated fields at Langdon than at Border Winds. The land cover at Border Winds is likely able to support more types of birds and more breeding sites for nesting raptors.

Comparison of mean use at Border Winds to other wind farms indicates that waterfowl use at Border Winds was relatively high. Erickson et al. (2002) compiled mean use values for several wind farms and standardized them to # birds/20 min. According to their Table 21, the highest mean use by waterfowl/waterbirds during spring surveys occurred at Buffalo Ridge Wind Resource Area (WRA) in Minnesota (a range of 6.1 to 8.1 birds/20 min for four study areas within the WRA) and at San Gorgonio Pass WRA in California (a range of 11.0 to 30.8 birds/20 min for three study areas within the WRA). All other wind farms in the analysis had a mean use of less than 1.0 bird/20 min for waterfowl/waterbirds in the spring.

Actual mean use for waterfowl at Border Winds was extremely high (at 266.6 birds/5 min) compared to these other sites, even without multiplying by four to achieve standardization. Actual mean use for waterfowl at Border Winds was more similar to Buffalo Ridge and San Gorgonio Pass when Snow Geese were removed from the calculation to account for the skew produced by their large flocks (16.7 birds/5 min). Standardizing this mean use to 67.0 birds/20 min still places Border Winds at the high end of waterfowl use compared to other wind farms. Although this standardized mean use is very likely an overestimate (as explained under Methods), use of the site by Snow Geese cannot be completely discounted either. The bottom line is that waterfowl use at Border Winds during the survey period was high compared to the spring season at other wind farm sites that were analyzed and was

most similar to sites with substantial amounts of open water (Erickson et al. 2002). The high use of Border Winds by waterfowl and other waterbirds corresponds to the abundance of wetlands in the study area.

According to Table 7 in Erickson et al. (2002), the highest mean use by raptors during spring surveys occurred at Altamont Pass WRA in California (2.1 birds/20 min) and at Stateline/Vansycle WRA in Oregon (1.1 birds/20 min). All other wind farms in the analysis had a mean use of less than 1.0 bird/20 min for raptors in the spring. Actual mean use for raptors at Border Winds was high (at 2.8 birds/5 min) compared to these other sites, even without standardization. Although Erickson et al. (2002) acknowledged the biases of comparing sites, even when standardized estimates of mean use are incorporated, the available data suggest that raptor use at Border Winds was relatively high compared to other sites.

6.2 Flight Patterns and Collision Risk

Migration was clearly occurring during the survey period. The combination of high-altitude flights, large flocks of certain species, and observation of species known to breed farther north all indicated that migration was underway. While most observations of flight above the RSH likely represented migratory behavior, flights below the RSH – where most flight observations occurred – are more difficult to interpret. Birds flying below the RSH could be engaged in foraging activity or other local movements, or they could represent migratory birds that have stopped to feed and rest. Just under 20% of observations involving flight below the RSH also involved flight within or above the RSH (i.e., the same birds sometimes flew in different height categories). Thus, some birds flying below the RSH could still be at risk of collision with turbines, though the overall prevalence of low-altitude flight suggests the risk is small.

The species with a measurable risk for collision (i.e., $I \geq 0.001$) were quite similar between Border Winds and nearby Langdon Wind Farm; Snow Geese had the highest index, with two other waterfowl species (Canada Geese and Mallards) also ranking relatively high at both sites. Red-tailed Hawks and Northern Harriers were the two raptors with a measurable risk at both sites. Border Winds had more non-waterfowl and non-raptor species with a small but measurable risk, including Sandhill Cranes, Common Ravens, some passerines, a shorebird, and a gull. Potential impacts to cranes are discussed below under Conservation Status. Impacts to passerines in general are likely to be small because of their tendency to fly below the RSH. The large flocks of migrating warblers observed at Border Winds merit some consideration, though passerine fatality at wind farms has been generally limited to a few individuals rather than involving large numbers of birds (Erickson et al. 2002).

The high level of waterfowl use at Border Winds during both migration and breeding, along with the measurable index values for some species, suggests that there is a risk of waterfowl fatality due to turbine collisions. Studies have shown, however, that waterfowl fatality rates at wind farms tend to be low even when use is high. Only five cases of windpower-related waterfowl fatality were observed during a four-year study at Buffalo

Ridge, for example, and this was only two more waterfowl fatalities than observed in the control area (Johnson et al. 2000). Four waterfowl carcasses were found in a preliminary fatality assessment at San Gorgonio Pass (Anderson et al. 2000). It is important to note that while the index is a predictor of exposure to turbine collision, actual collision fatalities are not just a function of bird abundance and flight height during the day. Other factors include season, weather, species-specific and individual behavior, and nocturnal flight. Johnson et al. (2000) found a correlation between turbine exposure index and actual bird fatality during the breeding season at Buffalo Ridge, but little correlation during spring and fall. Based on their findings, the most tangible mitigation measure to reduce the risk of waterfowl mortality is minimizing the proximity of turbines to wetlands.

The project design includes two turbines proposed to be placed on USFWS wetland easement lands. It is expected that all turbine pads will be sited to avoid wetlands. The project team will coordinate with USFWS staff regarding avoidance of USFWS jurisdictional wetlands on USFWS wetland easement lands. Although wetlands will be avoided wherever practicable, the linear interconnected nature of turbine access roads and electrical collection cables will render wetlands unavoidable in some cases. It will be necessary to obtain authorization from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act for unavoidable wetland impacts in a limited number of locations.

As with waterfowl, the level of raptor use and the index results suggest a risk of raptor fatality at Border Winds, but the risk is likely to be low. The similarity of raptor mean use between Border Winds and Altamont Pass, where high raptor mortality occurred in the 1980s, should not raise an undue red flag. In addition to revisions in turbine design and layout for newer generation wind facilities, there were certain unique features (e.g., topography, prey availability) at Altamont Pass that are not replicated at Border Winds (Schwartz 2004). Raptor fatality due to turbine collisions has been very low to non-existent at other wind farms studied in the U.S. (Erickson et al. 2002). Although high raptor use at Border Winds merits attention to potential raptor impacts, abundance alone does not necessarily predict fatality rates. de Lucas et al. (2008) showed, for example, that raptor fatality was a function of species-specific flight behavior and turbine layout but was not related to raptor abundance. At Border Winds, raptor fatality risk is most likely to be related to nesting sites and associated behavior given the abundance of raptor nests found during the survey period.

6.3 Raptor Nests

The 26 active raptor nests were scattered throughout the study area, indicating fairly extensive use of the study area by breeding raptors. In addition to documented nesting by Red-tailed Hawks, Swainson's Hawks, and Great Horned Owls, other raptors likely breeding within the study area include American Kestrels and Northern Harriers. Kestrels were observed on multiple survey days throughout the study area; nesting behavior and active nests were not observed, however, probably due to the relatively small size of the bird and their preference for nesting in abandoned structures. Similarly, Northern Harriers

were abundant throughout the study site, but their habit of ground nesting makes nest observation difficult from roadside surveys.

Compared to nearby Langdon Wind Farm, raptor nests at Border Winds were much more abundant. The pre-construction survey at Langdon located one Red-tailed Hawk nest during the 10-week survey. As described above, our field review of land cover at Langdon revealed that suitable habitat for raptor stick nests was very limited because shelter belts and tree stands were scarce and widely scattered. According to Erickson et al. (2002), the highest known raptor nesting density at a wind farm occurs at the Foote Creek Rim Wind Plant in Wyoming. Most nests within 2 miles (3.2 km) of turbines were associated with Red-tailed Hawks, but Red-tailed Hawk fatality has not been reported at Foote Creek Rim (Young et al. 2003). Erickson et al. (2002) point out, however, that there are currently not enough data on turbines within 0.5 mile (800 m) of raptor nests to determine potential impacts. The most tangible mitigation measure to reduce the risk of raptor fatality is minimizing proximity of turbines to wooded areas that provide nesting habitat. All observed active raptor nests at Border Winds are at least 0.25 mile (400 m) from proposed turbine locations. Woodlands and field shelterbelts will be avoided wherever practicable. Although it is anticipated that turbines will be sited to avoid woodlands, the linear interconnected design of access roads and electrical collection cables will necessitate woodland and shelterbelt disturbance in a small number of locations during project construction.

6.4 Conservation Status

While no federally endangered Whooping Cranes were observed during our survey, Sandhill Cranes were observed migrating through the study area and foraging in upland agricultural areas. These "surrogate" observations of Whooping Crane flight patterns and habitat use indicate that the study area provides suitable migration stopover habitat. Although there is potential for Whooping Cranes to utilize the study area as a migration stopover, the probability of impact is low due to the location of Border Winds on the periphery of known Whooping Crane migration flight paths and their tendency to fly above the RSH.

The species with CWCS status that we observed represented five of the seven categories of birds described in Table 1 (species of CWCS status were not observed for the "crane" and "other" categories). These species were observed using the study area as both migrants and breeders. Although nesting was confirmed only for the Swainson's Hawk, a Level I species of conservation priority, it is likely that many of the CWCS species utilize the study area for breeding. The diversity of CWCS species observed at Border Winds highlights the importance of taking a habitat-based approach to impact minimization. Although there is some potential for fatality of CWCS species, the risk is expected to be low because only one species (Northern Harrier) had a measurable index of collision hazard, and the index was low (0.001). The risk of fatality and habitat disruption can be minimized by avoiding turbine siting in proximity to key habitat resources (i.e., wetlands, woodlands, grasslands).

Four grassland bird species (Grasshopper Sparrow, Dickcissel, Swainson's Hawk, and Sharp-tailed Grouse) observed at Border Winds are listed in the CWCS and are also "species of continental importance" according to the Partners in Flight North American Landbird Conservation Plan. Although species of continental importance are not officially listed as threatened or endangered, they are considered to be at risk of extinction or serious decline, or to be native species that characterize the continent's varied and unique ecosystems (Rich et al. 2004). Their populations are declining primarily due to habitat degradation and fragmentation. The species of continental importance observed at Border Winds are among a group of grassland birds with populations that have declined on a continental scale. Although the risk of collision was low for the grassland bird group, some grassland species avoid nesting in areas surrounding wind towers and other structures (Rich et al. 2004). Siting turbines in cultivated agricultural land will help minimize habitat fragmentation and lower the potential for collisions.

7.0 CONCLUSIONS

This study provided a pre-construction assessment of migrating and breeding birds at Border Winds Energy Project. We characterized the spring avian community, quantified flight patterns and associated collision risk, described potential conservation issues, and examined potential impacts to raptors, waterfowl, and grassland birds. The community was dominated by waterfowl, shorebirds, songbirds, and raptors, all of which utilized wetland and grassland habitats within the study area for migration and/or breeding.

Seasonally flooded wetlands are abundant in the study area, and the USFWS has wetland protection easements on certain properties in the area. CRP lands provide considerable grassland habitat in the study area. Although some habitat impact and fragmentation is unavoidable, the proposed turbine locations avoid wetland and grassland habitat to the extent practicable. Avoidance of wetlands and wetland easement lands was a high priority during turbine siting. The proposed turbine layout avoids wetlands more effectively than CRP grasslands. USFWS wetland easement and CRP lands cover approximately 7.4 and 6.3% of the 52.5-square-mile (136 km^2) contiguous area, respectively, in which facilities will be constructed, but the respective lands include 3.0 and 10.6% of the proposed turbine locations. Furthermore, the revised layout avoids turbine placement in Towner County where wetland easement lands are more abundant, and also avoids turbine placement in relatively large tracts of non-CRP mapped grasslands (Exhibit 2).

A habitat-based approach to mitigating avian impacts has the benefit of reducing potential impacts related to habitat disruption while also reducing fatality risk. Waterfowl and raptor use of the study area were relatively high compared to other wind farms that have been studied. The risk of waterfowl and raptor fatality is expected to be low overall, based on findings at wind farms with comparable levels of use by these groups of birds. The index of collision hazard was highly variable for waterfowl and raptors, suggesting that species-specific behavior plays an important role in fatality risk. This risk can be reduced most effectively by using project design strategies that minimize the interaction between turbines and key resources for waterfowl and raptors (i.e., wetlands and woodlands). There was no evidence of federally endangered species

using the site, though observations of Sandhill Cranes serve as a reminder for the potential for Whooping Cranes to migrate through the area and use the site for feeding and resting.

One season of baseline avian use data has been shown to allow for accurate prediction of avian impacts, especially as they relate to raptors (Erickson et al. 2002). Although additional seasons of baseline surveying are not warranted at this time, focused periods of data collection can help identify specific cost-effective mitigation practices. The revised layout of the Border Winds Energy Project helps achieve avoidance and minimization of impacts of the avian community and avian habitats by:

1. Siting turbines and other facilities at least 0.25 mile (400 m) from USFWS WPAs.
2. Avoiding turbine placement in wetlands and avoiding USFWS wetland easement lands to the extent practicable.
    a. Proposed locations of 66 turbines include only 2 turbines (3.0%) on USFWS wetland easement lands.
3. Minimizing the effects of turbines and related infrastructure on CRP lands and other grasslands.
    a. Although proposed turbine locations include 7 of 66 turbines (10.6%) to be sited on CRP lands, turbine locations effectively avoid the relatively large intact non-CRP grasslands shown on USFWS land cover mapping.
4. Providing a more compact project layout that avoids turbine placement in the Towner County portion of the study area, which has more abundant USFWS wetland easement and North Dakota state lands.
5. Siting turbines at least 0.25 mile (400 m) from known raptor nest locations.
6. Avoiding turbine placement in areas of substantial woodland.
    a. Proposed turbine locations will avoid woodlands, and disturbance of woodlands for roads and electrical cables is expected to be limited to small impacts necessary to cross farmstead shelterbelts.

Final micrositing of turbines and access roads may provide an additional opportunity to identify and confirm setbacks from raptor nests, as well as opportunities to avoid and minimize effects on wetlands, grasslands, and woodlands.

8.0 LITERATURE CITED

Anderson, R.L., D. Strickland, J. Tom, N. Neumann, W. Erickson, J. Cleckler, G. Mayorga, G. Nuhn, A. Leuders, J. Schneider, L. Backus, P. Becker, and N. Flagg. 2000. Avian monitoring and risk assessment at Tehachapi Pass and San Gorgonio Pass Wind Resource Areas, California: Phase 1 preliminary results. Proceedings of the National Avian-Wind Power Planning Meeting III, held May 1998, San Diego, CA.

CDOW (Colorado Division of Wildlife). 2008. Appendix B: Raptor Buffer Guidelines. Obtained June 26, 2009, from Celia Greenman (Celia.Greenman@state.co.us), Northeast Energy Coordinator, Colorado Division of Wildlife, Denver, CO.

de Lucas, M., F.E. Guyonne, D.P. Whitfield, and M. Ferrer. 2008. Collision fatality of raptors in wind farms does not depend on raptor abundance. Journal of Applied Ecology 45(6):1695-1703.

El Dorado County. 2006. Modified Findings for the El Dorado Hills Planned Development, Planning Commission Meeting held August 10, 2006. El Dorado County Planning Services, Placerville, CA.

Erickson, W.P., M.D. Strickland, G.D. Johnson, and J.W. Kern. 2000. Examples of statistical methods to assess risk of impacts to birds from wind plants. Proceedings of the National Avian-Wind Power Planning Meeting III, held May 1998, San Diego, CA.

Erickson, W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. Synthesis and comparison of baseline avian and bat use, raptor nesting and mortality information from proposed and existing wind developments. Final Report prepared for Bonneville Power Administration, Portland, OR.

Johnson, D.H. 2000. Grassland bird use of Conservation Reserve Program fields in the Great Plains. Pages 19-33 in L. P. Heard, A. W. Allen, L. B. Best, S. J. Brady, W. Burger, A. J. Esser, E. Hackett, D. H. Johnson, R. L. Pederson, R. E. Reynolds, C. Rewa, M. R. Ryan, R. T. Molleur, and P. Buck. A comprehensive review of farm bill contributions to wildlife conservation, 1985-2000. W. L. Hohman and D. J. Halloum, Fincham, eds. U.S. Dept. Agric., Nat. Resour. Cons. Serv., Wildl. Hab. Manage. Inst., Tech. Rep., USDA/NRCS/WHMI-2000. Northern Prairie Wildlife Research Center Online, http://www.npwrc.usgs.gov/resource/birds/glbuseindex.htm (Version 30JUL2001), Jamestown, ND.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000. Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-Year Study. Final Report prepared for Northern States Power Company, Minneapolis, MN.

Johnson, D. H., L. D. Igl, and J. A. Dechant Shaffer (Series Coordinators). 2004. Effects of management practices on grassland birds. Northern Prairie Wildlife Research Center Online, http://www.npwrc.usgs.gov/resource/literatr/grasbird/index.htm (Version 12AUG2004), Jamestown, ND.

Hagen, S. K., P. T. Isakson, and S. R. Dyke. 2005. North Dakota Comprehensive Wildlife Conservation Strategy. North Dakota Game and Fish Department, Bismarck, ND.

Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, M.S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Iñigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, and T.C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Version March 2005. Cornell Lab of Ornithology, Ithaca, NY.

Sauer, J. R., B. G. Peterjohn, S. Schwartz, and J. E. Hines. 1995. The Grassland Bird Home Page. Version 95.0. USGS Patuxent Wildlife Research Center, Laurel, MD.

Sauer, J. R., J. E. Hines, and J. Fallon. 2008. The North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Version 5.15.2008. USGS Patuxent Wildlife Research Center, Laurel, MD.

Schwartz, S.S. (ed) 2004. Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts, held May 2004, Washington, D.C..

Tetra Tech. 2007. Spring avian survey: Langdon Wind Resource Area, Cavalier County, North Dakota. Prepared for FPL Energy and submitted to the North Dakota Public Service Commission, Bismarck, ND.

USGAO (U.S. Government Accountability Office). 2007. Prairie Pothole Region. Report to the Subcommittee on Interior, Environment, and Related Agencies, Committee on Appropriations, House of Representatives. GAO-07-1093. Washington, D.C.

Young, D.P., Jr., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003. Avian and bat mortality associated with the initial phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming. Final Report prepared for Pacificorp, Inc., SeaWest Windpower, Inc., and Bureau of Land Management Rawlins District Office. Cheyenne, WY.

Tables

Border Winds Energy Project
Rolette and Towner Counties, North Dakota

This page is intentionally blank.

Table 1. Key to Avian Groups Observed at Border Winds (Spring 2009)

Group Name	Taxonomic Group(s)
Cranes	Gruidae (Cranes)
Gamebirds	Phasianidae (Pheasants, Grouse, etc.)
Other	Caprimulgidae (Nightjars); Columbidae (Doves, Pigeons); Corvidae (Crows etc.); Picidae (Woodpeckers)
Passerines	Passeriformes (Songbirds)
Raptors	Accipitridae (Hawks, Eagles); Cathartidae (Vultures); Falconidae (Falcons); Strigidae (Owls)
Wetland Swimmers	Anatidae (Ducks, Geese, Swans); Phalacrocoracidae (Cormorants); Podicipedidae (Grebes)
Wetland Waders	Ardeidae (Herons, Egrets, Bitterns); Charadriiformes (Shorebirds); Laridae (Gulls, Terns); Rallidae (Coots, Rails)

Table 2. Mean Use, Relative Abundance, Conservation Status, and Groups of Interest for Birds Observed During Point Counts at Border Winds (Spring 2009)

Group	Species Name	Scientific Name	Mean Use	Rel Abund	CWCS[1]	Waterfowl[2]	Grassland[3]	Raptor[4]
Wetland Swimmers	Snow Goose	*Chen caerulescens*	249.88	0.77		X		
Passerines	Unidentified Warbler	Parulidae *sp.*	23.76	0.07				
Wetland Swimmers	Canada Goose	*Branta canadensis*	12.72	0.04		X		
Passerines	Snow Bunting	*Plectrophenax nivalis*	5.04	0.02				
Passerines	Red-winged Blackbird	*Agelaius phoeniceus*	3.74	0.01				
Passerines	Unidentified Blackbird	Icteridae *sp.*	3.33	0.01				
Cranes	Sandhill Crane	*Grus canadensis*	3.32	0.01				
Passerines	Brown-headed Cowbird	*Molothrus ater*	3.14	0.01			X	
Passerines	Horned Lark	*Eremophila alpestris*	2.35	0.01			X	
Passerines	Common Grackle	*Quiscalus quiscula*	2.00	0.01				
Passerines	Unidentified Sparrow	Emberizidae *sp.*	1.99	0.01				
Wetland Swimmers	Mallard	*Anas platyrhynchos*	1.55	0.00		X		
Wetland Waders	Killdeer	*Charadrius vociferus*	1.29	0.00				
Wetland Waders	American Coot	*Fulica americana*	0.99	0.00				
Passerines	European Starling	*Sturnus vulgaris*	0.99	0.00				
Passerines	Brewer's Blackbird	*Euphagus cyanocephalus*	0.81	0.00				
Passerines	Song Sparrow	*Melospiza melodia*	0.61	0.00				
Wetland Swimmers	Northern Shoveler	*Anas clypeata*	0.57	0.00		X		
Wetland Waders	Ring-billed Gull	*Larus delawarensis*	0.57	0.00				
Raptors	Red-tailed Hawk	*Buteo jamaicensis*	0.55	0.00				X
Wetland Swimmers	Blue-winged Teal	*Anas discors*	0.50	0.00		X		
Passerines	Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	0.47	0.00				
Wetland Swimmers	Canvasback	*Aythya valisineria*	0.38	0.00	II	X		
Passerines	Barn Swallow	*Hirundo rustica*	0.36	0.00				
Wetland Swimmers	Northern Pintail	*Anas acuta*	0.33	0.00	II	X		
Wetland Swimmers	Unidentified Duck	Anatinae *sp.*	0.32	0.00		X		
Passerines	Grasshopper Sparrow	*Ammodramus savannarum*	0.30	0.00	I		X	
Passerines	Western Meadowlark	*Sturnella neglecta*	0.28	0.00			X	
Other (Corvids)	Common Raven	*Corvus corax*	0.28	0.00				
Passerines	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	0.23	0.00				
Other (Doves & Pigeons)	Rock Dove (Pigeon)	*Columba livia*	0.22	0.00				
Passerines	White-crowned Sparrow	*Zonotrichia leucophrys*	0.21	0.00				
Gamebirds	Sharp-tailed Grouse	*Tympanuchus phasianellus*	0.20	0.00	II		X	
Passerines	Tree Swallow	*Tachycineta bicolor*	0.20	0.00				
Raptors	Northern Harrier	*Circus cyaneus*	0.20	0.00	II		X	X
Wetland Waders	Black Tern	*Chlidonias niger*	0.16	0.00	I			
Other (Corvids)	American Crow	*Corvus brachyrhynchos*	0.14	0.00				
Passerines	Bobolink	*Dolichonyx oryzivorus*	0.11	0.00	II		X	
Passerines	Dark-eyed Junco	*Junco hyemalis*	0.10	0.00				
Wetland Swimmers	Gadwall	*Anas strepera*	0.09	0.00		X		
Wetland Swimmers	Ring-necked Duck	*Aythya collaris*	0.09	0.00		X		
Passerines	American Robin	*Turdus migratorius*	0.08	0.00				
Wetland Swimmers	Greater Scaup	*Aythya marila*	0.07	0.00		X		
Wetland Swimmers	Redhead	*Aythya americana*	0.06	0.00	II	X		
Wetland Swimmers	Red-necked Grebe	*Podiceps grisegena*	0.06	0.00				
Wetland Waders	Lesser Yellowlegs	*Tringa flavipes*	0.06	0.00				
Raptors	Great Horned Owl	*Bubo virginianus*	0.06	0.00				X
Other (Doves & Pigeons)	Mourning Dove	*Zenaida macroura*	0.06	0.00				
Wetland Waders	Semipalmated Sandpiper	*Calidris pusilla*	0.05	0.00				
Passerines	Eastern Kingbird	*Tyranus tyranus*	0.05	0.00				
Wetland Waders	Common Snipe	*Gallinago delicata*	0.05	0.00				
Raptors	Sharp-shinned Hawk	*Accipiter striatus*	0.04	0.00				X
Passerines	House Finch	*Carpodacus mexicanus*	0.04	0.00				
Passerines	Clay-colored Sparrow	*Spizella pallida*	0.04	0.00			X	
Passerines	House Sparrow	*Passer domesticus*	0.04	0.00				
Passerines	Savannah Sparrow	*Passerculus sandwichensis*	0.04	0.00			X	
Other (Woodpeckers)	Northern "Yellow-shafted" Flicker	*Colaptes auratus*	0.04	0.00				
Wetland Waders	Franklin's Gull	*Larus pipixcan*	0.03	0.00	I			
Raptors	American Kestrel	*Falco sparverius*	0.03	0.00				X
Wetland Waders	Greater Yellowlegs	*Tringa melanoleuca*	0.02	0.00				
Wetland Waders	Upland Sandpiper	*Bartramia longicauda*	0.02	0.00			X	
Wetland Waders	Wilson's Phalarope	*Phalaropus tricolor*	0.02	0.00	I		X	
Raptors	Swainson's Hawk	*Buteo swainsoni*	0.02	0.00	I		X	X
Passerines	Black-capped Chickadee	*Poecile atricapillus*	0.02	0.00				
Passerines	Lark Sparrow	*Chondestes grammacus*	0.02	0.00			X	
Passerines	Unidentified Empidonax Flycatcher	*Empidonax sp.*	0.02	0.00				
Wetland Swimmers	Lesser Scaup	*Aythya affinis*	0.02	0.00		X		
Wetland Waders	American Golden Plover	*Pluvalis dominica*	0.02	0.00				
Wetland Waders	Herring Gull	*Larus argentatus*	0.02	0.00				
Raptors	Bald Eagle	*Haliaeetus leucocephalus*	0.02	0.00	II			X
Passerines	American Goldfinch	*Carduelis tristis*	0.02	0.00				

Table 2. Mean Use, Relative Abundance, Conservation Status, and Groups of Interest for Birds Observed During Point Counts at Border Winds (Spring 2009)

Group	Species Name	Scientific Name	Mean Use	Rel Abund	CWCS[1]	Waterfowl[2]	Grassland[3]	Raptor[4]
Passerines	Purple Martin	*Progne subis*	0.02	0.00				
Passerines	Yellow-rumped Warbler	*Dendroica coronata*	0.02	0.00				
Gamebirds	Gray Partridge	*Perdix perdix*	0.02	0.00				
Wetland Swimmers	American Green-winged Teal	*Anas crecca*	0.01	0.00		**X**		
Wetland Swimmers	Common Goldeneye	*Bucephala clangula*	0.01	0.00		**X**		
Wetland Swimmers	Eared Grebe	*Podiceps nigricollis*	0.01	0.00				
Wetland Waders	American Woodcock	*Scolopax minor*	0.01	0.00				
Raptors	Rough-legged Hawk	*Buteo lagopus*	0.01	0.00				**X**
Passerines	Le Conte's Sparrow	*Ammodramus leconteii*	0.01	0.00	**II**		**X**	
Wetland Swimmers	Hooded Merganser	*Lophodytes cucullatus*	0.01	0.00		**X**		
Wetland Swimmers	Ruddy Duck	*Oxyura jamaicensis*	0.01	0.00		**X**		
Wetland Swimmers	Wood Duck	*Aix sponsa*	0.01	0.00		**X**		
Wetland Waders	Stilt Sandpiper	*Calidris himantopus*	0.01	0.00				
Wetland Waders	Willet	*Catoptrophorus semipalmatus*	0.01	0.00	**I**		**X**	
Raptors	Cooper's Hawk	*Accipiter cooperii*	0.01	0.00				**X**
Raptors	Turkey Vulture	*Cathartes aura*	0.01	0.00				**X**
Passerines	American Tree Sparrow	*Spizella arborea*	0.01	0.00				
Passerines	Cliff Swallow	*Petrochelidon pyrhonota*	0.01	0.00				
Passerines	Western Kingbird	*Tyranus verticalis*	0.01	0.00				
Other (Corvids)	Black-billed Magpie	*Pica hudsonia*	0.01	0.00				
Raptors	Merlin	*Falco columbarius*	0.00	0.00			**X**	**X**
Raptors	Peregrine Falcon	*Falco peregrinus*	0.00	0.00	**III**			**X**
Raptors	Snowy Owl	*Bubo scandiacus*	0.00	0.00				**X**
Passerines	Dickcissel	*Spiza americana*	0.00	0.00	**II**		**X**	
Passerines	Swamp Sparrow	*Melospiza georgiana*	0.00	0.00				
Passerines	Vesper Sparrow	*Pooecetes gramineus*	0.00	0.00			**X**	
Passerines	Yellow Warbler	*Dendroica petechia*	0.00	0.00				
Other (Nightjars)	Common Nighthawk	*Chordeiles minor*	0.00	0.00				

[1]CWCS = Conservation status according to North Dakota Comprehensive Wildlife Conservation Strategy (NDGFD 2008).

[2]Waterfowl = Family Anatidae (Ducks, Geese, Swans).

[3]Grassland = Species included on grassland bird lists by Johnson et al. (2004) or Sauer et al. (1995).

[4]Raptor = Birds of Prey (Hawks, Falcons, Eagles).

Table 3. Additional Species Recorded as Incidental Observations at Border Winds (Spring 2009)[1]

Group	Species Name	*Scientific Name*	Location[2]	Week	# Indiv	# Obs	Flight[3]	CWCS[4]	Waterfowl[5]	Grassland[6]	Raptor[7]
Wetland Waders	American Bittern	*Botaurus lentiginosus*	S of town	10	1	1		**I**		**X**	
Wetland Swimmers	American Wigeon	*Anas americana*	PC8 to PC9	3	1	1			**X**		
Passerines	Baltimore Oriole	*Icterus galbula*	PC17 to PC16	10	1	1					
Wetland Waders	Caspian Tern	*Sterna caspia*	PC11 to Hwy 281	7	1	1					
Wetland Swimmers	Double-crested Cormorant	*Phalacrocorax auritus*	between town and PC21	4	26	1	B				
Raptors	Golden Eagle	*Aquila chrysaetos*	between town and PC21	1	1	1	W, A	**II**		**X**	**X**
Wetland Swimmers	Pied-billed Grebe	*Podilymbus podiceps*	PC12 to PC13	8	1	1					
Raptors	Prairie Falcon	*Falco mexicanus*	between town and PC21	7,8	1	2	W, A	**II**		**X**	**X**
Raptors	Unidentified Hawk	Buteo spp.	PC18 to PC17	6	1	1					**X**
Wetland Waders	Yellow Rail	*Coturnicops noveboracensis*	between town and PC21	10	1	1		**I**			

[1]Table includes birds observed outside point counts and not otherwise recorded during survey period.

[2]Locations of observations given relative to point count (PC) locations; see Exhibit 3.

[3]Refers to flights B=Below RSH, W=Within RSH, and A=Above RSH

[4]CWCS = Conservation status according to North Dakota Comprehensive Wildlife Conservation Strategy (NDGFD 2008).

[5]Waterfowl = Family Anatidae (Ducks, Geese, Swans).

[6]Grassland = Species included on grassland bird lists by Johnson et al. (2004) or Sauer et al. (1995).

[7]Raptor = Birds of Prey (Hawks, Falcons, Eagles).

Table 4. Relative Frequency of Birds Observed During Point Counts at Border Winds (Spring 2009)

Group	Species Name	Rel Freq	CWCS[1]	Waterfowl[2]	Grassland[3]	Raptor[4]
Passerines	Horned Lark	0.11			X	
Passerines	Red-winged Blackbird	0.08				
Wetland Swimmers	Mallard	0.06		X		
Wetland Waders	Killdeer	0.06				
Raptors	Red-tailed Hawk	0.05				X
Passerines	Brown-headed Cowbird	0.05			X	
Wetland Swimmers	Canada Goose	0.04		X		
Passerines	Song Sparrow	0.04				
Wetland Swimmers	Snow Goose	0.03		X		
Passerines	Common Grackle	0.03				
Passerines	Western Meadowlark	0.03			X	
Wetland Swimmers	Northern Shoveler	0.03		X		
Wetland Swimmers	Blue-winged Teal	0.02		X		
Wetland Waders	American Coot	0.02				
Raptors	Northern Harrier	0.02	II		X	X
Passerines	Grasshopper Sparrow	0.02	I		X	
Other (Corvids)	Common Raven	0.02				
Passerines	Yellow-headed Blackbird	0.02				
Passerines	Barn Swallow	0.02				
Wetland Swimmers	Northern Pintail	0.01	II	X		
Wetland Swimmers	Unidentified Duck	0.01		X		
Passerines	Northern Rough-winged Swallow	0.01				
Wetland Waders	Ring-billed Gull	0.01				
Passerines	Tree Swallow	0.01				
Passerines	Unidentified Warbler	0.01				
Wetland Swimmers	Canvasback	0.01	II	X		
Passerines	American Robin	0.01				
Other (Corvids)	American Crow	0.01				
Cranes	Sandhill Crane	0.01				
Wetland Waders	Common Snipe	0.01				
Passerines	Unidentified Sparrow	0.01				
Wetland Swimmers	Gadwall	0.01		X		
Wetland Waders	Black Tern	0.01	I			
Passerines	Bobolink	0.01	II		X	
Other (Doves & Pigeons)	Rock Dove (Pigeon)	0.01				
Wetland Swimmers	Redhead	0.00	II	X		
Raptors	Great Horned Owl	0.00				X
Passerines	Eastern Kingbird	0.00				
Passerines	European Starling	0.00				
Other (Woodpeckers)	Northern "Yellow-shafted" Flicker	0.00				
Other (Doves & Pigeons)	Mourning Dove	0.00				
Raptors	Sharp-shinned Hawk	0.00				X
Passerines	Savannah Sparrow	0.00			X	
Passerines	Snow Bunting	0.00				
Wetland Swimmers	Ring-necked Duck	0.00		X		
Wetland Swimmers	Red-necked Grebe	0.00				
Wetland Waders	Lesser Yellowlegs	0.00				
Raptors	American Kestrel	0.00				X
Raptors	Swainson's Hawk	0.00	I		X	X
Passerines	Clay-colored Sparrow	0.00			X	
Wetland Swimmers	Greater Scaup	0.00		X		
Raptors	Bald Eagle	0.00	II			X
Gamebirds	Sharp-tailed Grouse	0.00	II		X	
Wetland Waders	American Woodcock	0.00				
Wetland Waders	Herring Gull	0.00				
Wetland Waders	Upland Sandpiper	0.00			X	

Table 4. Relative Frequency of Birds Observed During Point Counts at Border Winds (Spring 2009)

Group	Species Name	Rel Freq	CWCS[1]	Waterfowl[2]	Grassland[3]	Raptor[4]
Wetland Waders	Wilson's Phalarope	0.00	I		X	
Raptors	Rough-legged Hawk	0.00				X
Passerines	Black-capped Chickadee	0.00				
Passerines	Brewer's Blackbird	0.00				
Passerines	Purple Martin	0.00				
Passerines	Unidentified Empidonax Flycatcher	0.00				
Passerines	Yellow-rumped Warbler	0.00				
Wetland Swimmers	American Green-winged Teal	0.00		X		
Wetland Swimmers	Eared Grebe	0.00				
Wetland Waders	Franklin's Gull	0.00	I			
Wetland Waders	Greater Yellowlegs	0.00				
Wetland Waders	Semipalmated Sandpiper	0.00				
Wetland Waders	Willet	0.00	I		X	
Raptors	Cooper's Hawk	0.00				X
Passerines	American Goldfinch	0.00				
Passerines	Dark-eyed Junco	0.00				
Passerines	House Finch	0.00				
Passerines	Lark Sparrow	0.00			X	
Passerines	Le Conte's Sparrow	0.00	II		X	
Other (Corvids)	Black-billed Magpie	0.00				
Gamebirds	Gray Partridge	0.00				
Wetland Swimmers	Common Goldeneye	0.00		X		
Wetland Swimmers	Hooded Merganser	0.00		X		
Wetland Swimmers	Lesser Scaup	0.00		X		
Wetland Swimmers	Ruddy Duck	0.00		X		
Wetland Swimmers	Wood Duck	0.00		X		
Wetland Waders	American Golden Plover	0.00				
Wetland Waders	Stilt Sandpiper	0.00				
Raptors	Merlin	0.00			X	X
Raptors	Peregrine Falcon	0.00	III			X
Raptors	Snowy Owl	0.00				X
Raptors	Turkey Vulture	0.00				X
Passerines	American Tree Sparrow	0.00				
Passerines	Cliff Swallow	0.00				
Passerines	Dickcissel	0.00	II		X	
Passerines	House Sparrow	0.00				
Passerines	Swamp Sparrow	0.00				
Passerines	Unidentified Blackbird	0.00				
Passerines	Vesper Sparrow	0.00			X	
Passerines	White-crowned Sparrow	0.00				
Passerines	Western Kingbird	0.00				
Passerines	Yellow Warbler	0.00				
Other (Nightjars)	Common Nighthawk	0.00				

[1]CWCS = Conservation status according to North Dakota Comprehensive Wildlife Conservation Strategy (NDGFD 2008).

[2]Waterfowl = Family Anatidae (Ducks, Geese, Swans).

[3]Grassland = Species included on grassland bird lists by Johnson et al. (2004) or Sauer et al. (1995).

[4]Raptor = Birds of Prey (Hawks, Falcons, Eagles).

Table 5. Summary of Flight Heights in Relation to Rotor-Swept Height (RSH) for Birds Observed During Point Counts at Border Winds (Spring 2009)

Bird Group	Below RSH		Within RSH		Above RSH	
	# Obs	% Obs	# Obs	% Obs	# Obs	% Obs
All Birds	683	66.5	193	18.8	151	14.7
Raptors	75	49.0	39	25.5	39	25.5
Waterfowl	167	51.9	70	21.7	85	26.4
Grassland	143	82.2	26	14.9	5	2.9

[1]Sum > 845 because some observations involved birds in more than one flight category.

Table 6. Flight Patterns and Collision Risk for Birds Observed in Flight During Point Counts at Border Winds (Spring 2009)

Group	Species Name	# Obs	Index	% Fly	Below RSH	Within RSH	Above RSH
Waterbirds	Snow Goose	53	1.304	83.0	10.7	16.1	73.2
Passerines	Unidentified Warbler	18	0.165	94.4	36.7	40.0	23.3
Waterbirds	Canada Goose	73	0.140	72.6	38.1	30.2	31.7
Passerines	Common Grackle	53	0.039	56.6	82.4	14.7	2.9
Passerines	Brown-headed Cowbird	90	0.035	88.9	80.0	20.0	0.0
Waterbirds	Mallard	109	0.018	63.3	73.6	23.0	3.4
Raptors	Red-tailed Hawk	90	0.008	53.3	41.6	31.2	27.3
Shorebirds/Gulls	Killdeer	97	0.004	69.1	90.4	8.2	1.4
Cranes	Sandhill Crane	11	0.004	81.8	9.1	18.2	72.7
Shorebirds/Gulls	Ring-billed Gull	20	0.003	85.0	33.3	41.7	25.0
Passerines	Snow Bunting	7	0.003	100.0	87.5	12.5	0.0
Waterbirds	Blue-winged Teal	42	0.003	54.8	68.8	28.1	3.1
Passerines	Unidentified Sparrow	10	0.002	80.0	80.0	20.0	0.0
Passerines	Red-winged Blackbird	144	0.002	11.1	94.1	5.9	0.0
Waterbirds	Northern Shoveler	46	0.001	47.8	84.0	16.0	0.0
Waterbirds	Unidentified Duck	23	0.001	95.7	17.2	20.7	62.1
Other (Corvids)	Common Raven	36	0.001	55.6	68.0	24.0	8.0
Raptors	Northern Harrier	37	0.001	100.0	77.3	13.6	9.1
Passerines	Brewer's Blackbird	3	0.000	100.0	75.0	25.0	0.0
Passerines	Northern Rough-winged Swallow	21	0.000	100.0	91.3	8.7	0.0
Shorebirds/Gulls	Common Snipe	10	0.000	80.0	50.0	50.0	0.0
Waterbirds	Canvasback	14	0.000	28.6	60.0	20.0	20.0
Waterbirds	Northern Pintail	23	0.000	47.8	83.3	8.3	8.3
Other (Corvids)	American Crow	11	0.000	54.5	71.4	28.6	0.0
Raptors	Sharp-shinned Hawk	7	0.000	100.0	16.7	41.7	41.7
Waterbirds	Gadwall	9	0.000	66.7	85.7	14.3	0.0
Raptors	American Kestrel	6	0.000	66.7	50.0	33.3	16.7
Other (Woodpeckers)	Northern "Yellow-shafted" Flicker	8	0.000	87.5	87.5	12.5	0.0
Shorebirds/Gulls	American Woodcock	3	0.000	100.0	50.0	33.3	16.7
Raptors	Swainson's Hawk	5	0.000	60.0	50.0	25.0	25.0
Shorebirds/Gulls	Herring Gull	3	0.000	100.0	33.3	33.3	33.3
Other (Corvids)	Black-billed Magpie	2	0.000	100.0	66.7	33.3	0.0
Passerines	Cliff Swallow	1	0.000	100.0	50.0	50.0	0.0
Raptors	Turkey Vulture	1	0.000	100.0	0.0	50.0	50.0
Other (Nightjars)	Common Nighthawk	1	0.000	100.0	50.0	50.0	0.0
Passerines	American Goldfinch	2	0.000	100.0	100.0	0.0	0.0
Passerines	American Robin	11	0.000	72.7	100.0	0.0	0.0
Passerines	American Tree Sparrow	1	0.000	100.0	100.0	0.0	0.0
Raptors	Bald Eagle	4	0.000	50.0	0.0	0.0	100.0
Passerines	Barn Swallow	29	0.000	100.0	100.0	0.0	0.0
Shorebirds/Gulls	Black Tern	9	0.000	100.0	100.0	0.0	0.0
Passerines	Bobolink	9	0.000	55.6	100.0	0.0	0.0
Passerines	Clay-colored Sparrow	5	0.000	20.0	100.0	0.0	0.0
Waterbirds	Common Goldeneye	1	0.000	100.0	100.0	0.0	0.0
Raptors	Cooper's Hawk	2	0.000	100.0	0.0	0.0	100.0
Passerines	Eastern Kingbird	8	0.000	75.0	100.0	0.0	0.0
Passerines	European Starling	8	0.000	62.5	100.0	0.0	0.0
Shorebirds/Gulls	Franklin's Gull	2	0.000	100.0	100.0	0.0	0.0
Gamebirds	Gray Partridge	2	0.000	50.0	100.0	0.0	0.0
Waterbirds	Greater Scaup	4	0.000	50.0	100.0	0.0	0.0

Table 6. Flight Patterns and Collision Risk for Birds Observed in Flight During Point Counts at Border Winds (Spring 2009)

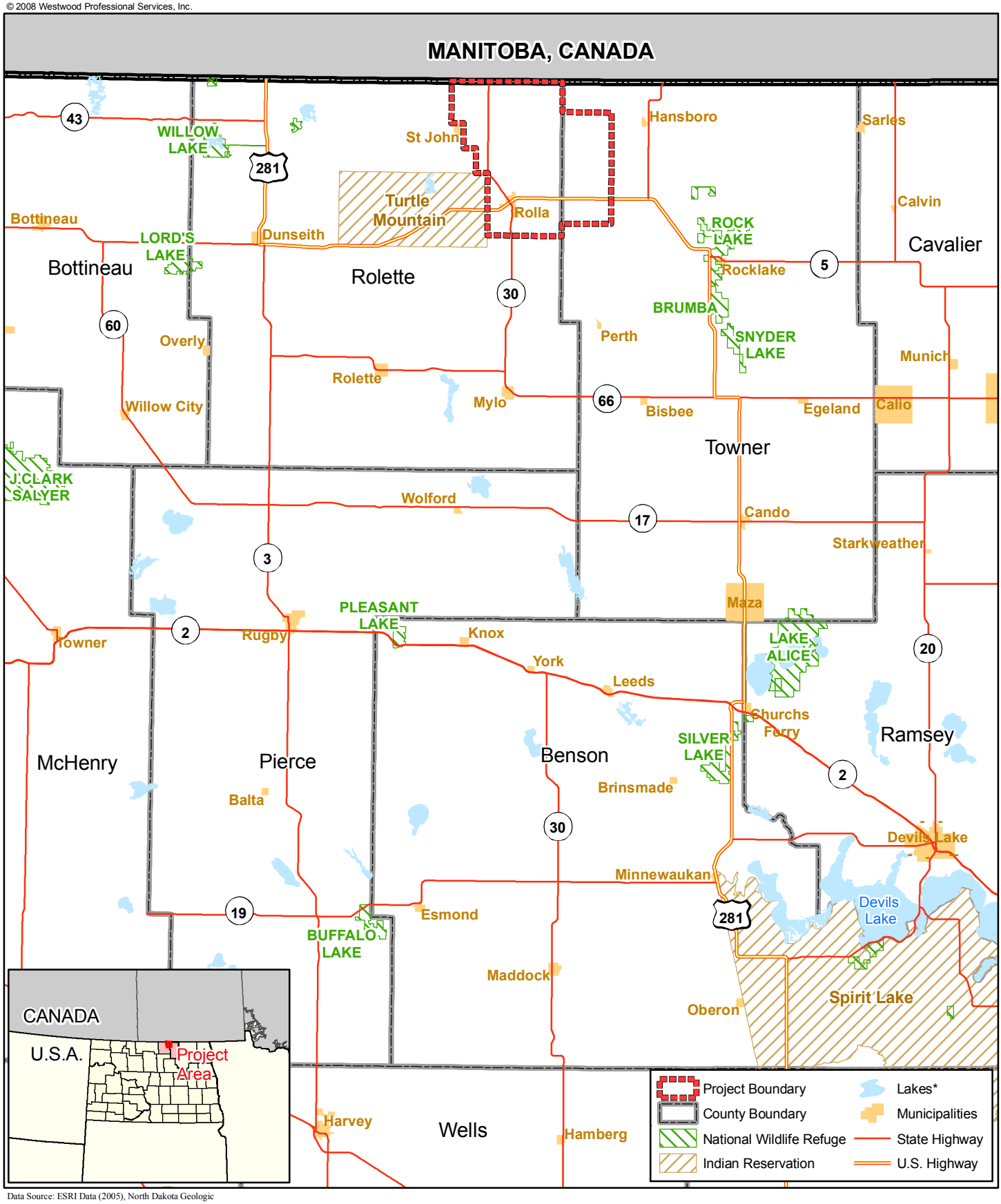
Group	Species Name	# Obs	Index	% Fly	Below RSH	Within RSH	Above RSH
Passerines	Horned Lark	182	0.000	4.9	100.0	0.0	0.0
Passerines	House Finch	2	0.000	100.0	100.0	0.0	0.0
Passerines	Lark Sparrow	2	0.000	50.0	100.0	0.0	0.0
Shorebirds/Gulls	Lesser Yellowlegs	6	0.000	16.7	100.0	0.0	0.0
Raptors	Merlin	1	0.000	100.0	100.0	0.0	0.0
Other (Doves & Pigeons)	Mourning Dove	8	0.000	62.5	100.0	0.0	0.0
Passerines	Puruple Martin	3	0.000	100.0	100.0	0.0	0.0
Waterbirds	Red-necked Grebe	6	0.000	16.7	100.0	0.0	0.0
Waterbirds	Redhead	8	0.000	12.5	100.0	0.0	0.0
Waterbirds	Ring-necked Duck	6	0.000	16.7	100.0	0.0	0.0
Other (Doves & Pigeons)	Rock Dove (Pigeon)	9	0.000	55.6	100.0	0.0	0.0
Raptors	Rough-legged Hawk	3	0.000	100.0	33.3	0.0	66.7
Passerines	Savanah Sparrow	7	0.000	28.6	100.0	0.0	0.0
Shorebirds/Gulls	Semipalmated Sandpiper	2	0.000	50.0	100.0	0.0	0.0
Passerines	Tree Swallow	20	0.000	100.0	100.0	0.0	0.0
Passerines	Unidentified Blackbird	1	0.000	100.0	100.0	0.0	0.0
Passerines	Unidentified Empidonax Flycatcher	3	0.000	33.3	100.0	0.0	0.0
Passerines	Vesper Sparrow	1	0.000	100.0	100.0	0.0	0.0
Passerines	Western Kingbird	1	0.000	100.0	100.0	0.0	0.0
Passerines	Western Meadowlark	48	0.000	18.8	100.0	0.0	0.0
Passerines	White-crowned Sparrow	1	0.000	100.0	100.0	0.0	0.0
Shorebirds/Gulls	Willet	2	0.000	100.0	100.0	0.0	0.0
Waterbirds	Wood Duck	1	0.000	100.0	100.0	0.0	0.0
Passerines	Yellow-headed Blackbird	32	0.000	46.9	100.0	0.0	0.0
Passerines	Yellow-rumped Warbler	3	0.000	33.3	100.0	0.0	0.0

This page is intentionally blank.

Exhibits

Border Winds Energy Project
Rolette and Towner Counties, North Dakota

This page is intentionally blank.



Data Source: ESRI Data (2005), North Dakota Geologic Survey US PLS System (1994), Westwood (2007).

*Note: Lakes shown have an area greater than 2.5 sq. km.

Border Winds Energy Project

Rolette and Towner Counties, North Dakota

Project Vicinity

EXHIBIT 1

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344

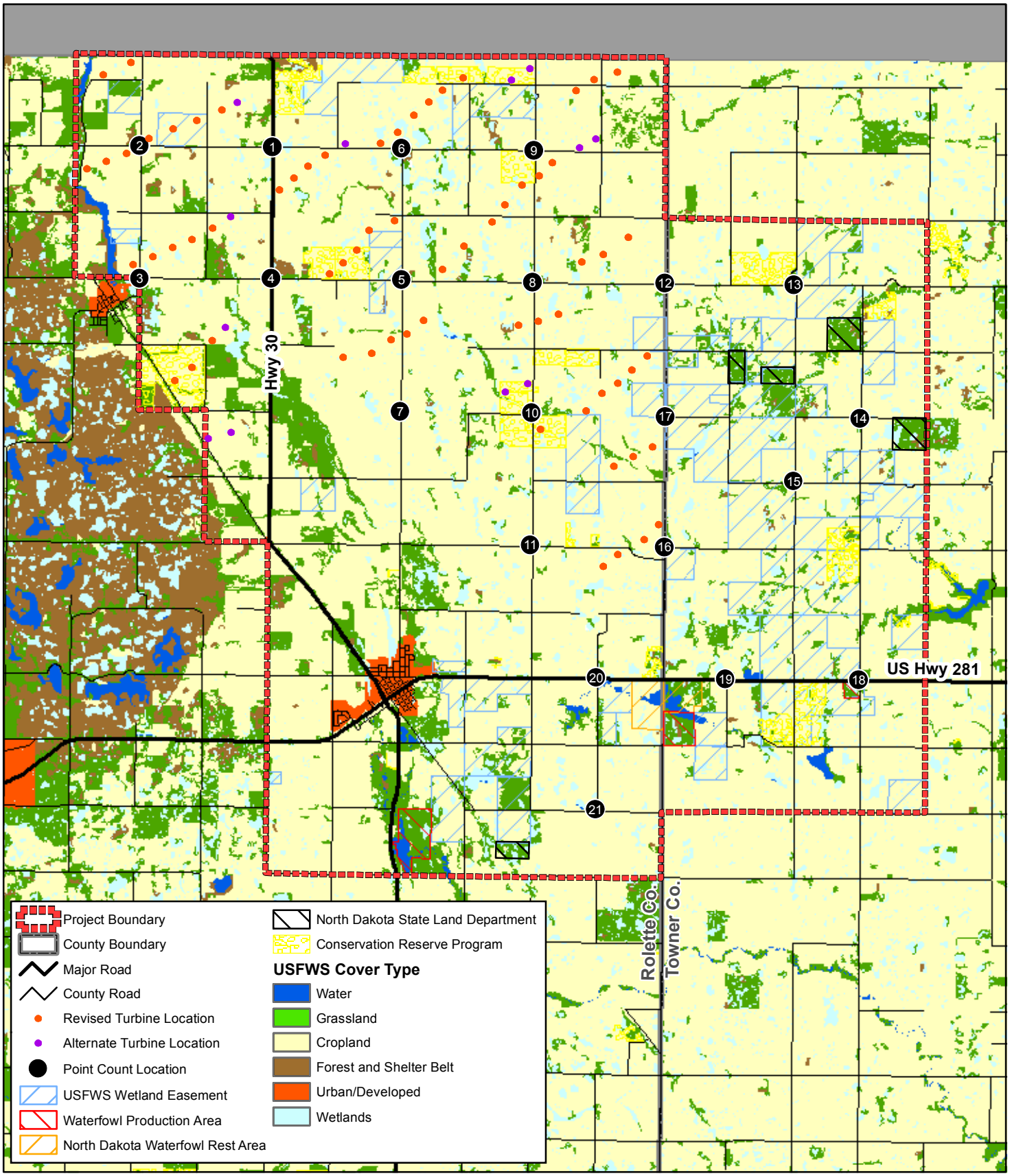
PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150

www.westwoodps.com

N

0 10 Miles

Map Document: (P:\20071163\gis\psc\20071163loc01A_fig1.mxd)
6/30/2009 -- 12:09:13 PM



Data Source(s): ESRI (2008), North Dakota DOT (2008), Westwood (2009).

Border Winds Energy Project

Rolette and Towner Counties, North Dakota

USFWS Land Cover and Natural Resource Lands

EXHIBIT 2

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344

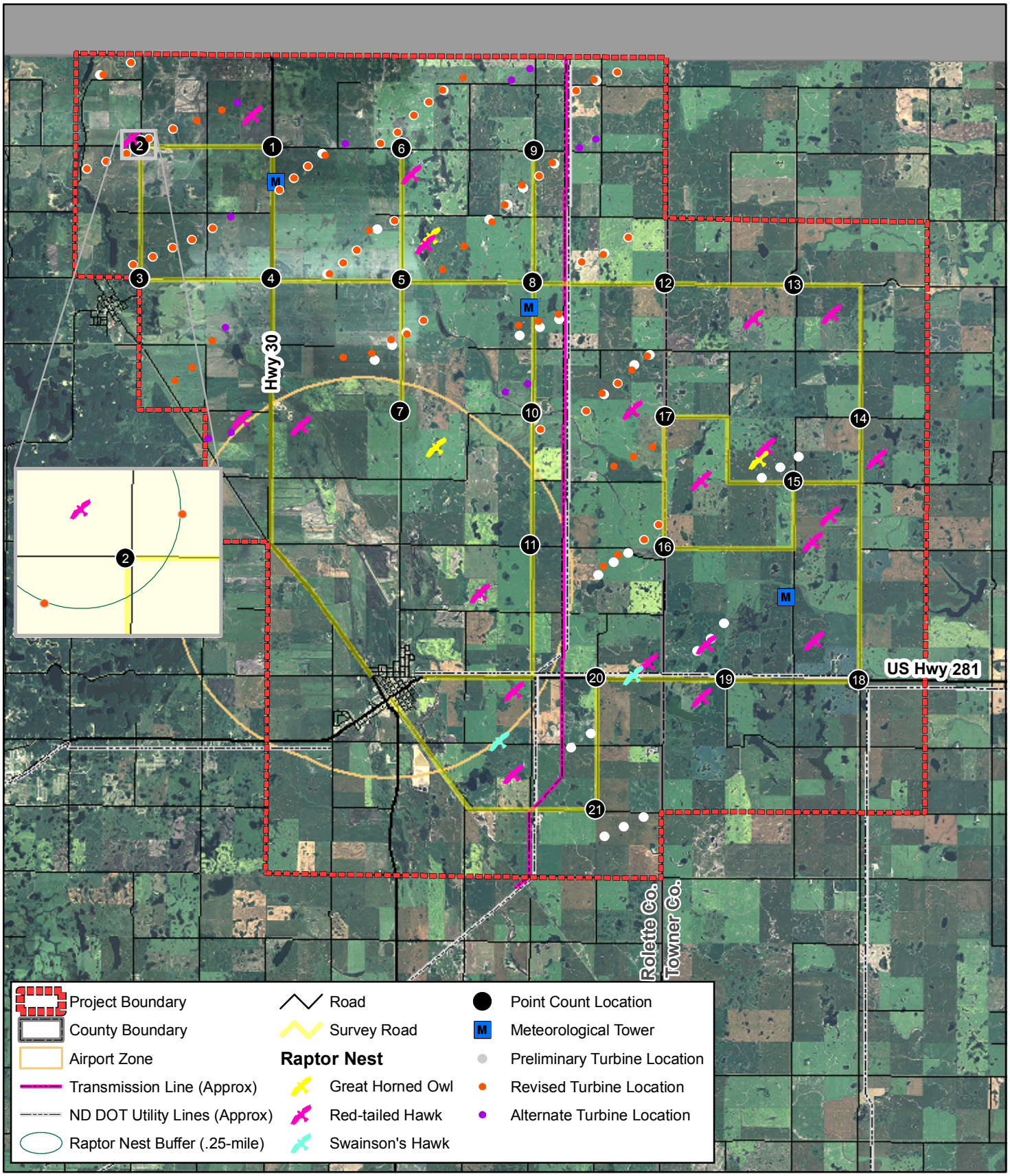
PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150

www.westwoodps.com

N

0 2 Miles

Map Document: (P:\20071163\gis\PreConAvian\20071163luc01A_avian.mxd)
9/24/2009 -- 12:52:21 PM



Data Source(s): ESRI (2008), North Dakota DOT (2008), Westwood (2009).

Border Winds Energy Project

Rolette and Towner Counties, North Dakota

Project Layout, Survey Route, and Raptor Nests

EXHIBIT 3

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344

PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150

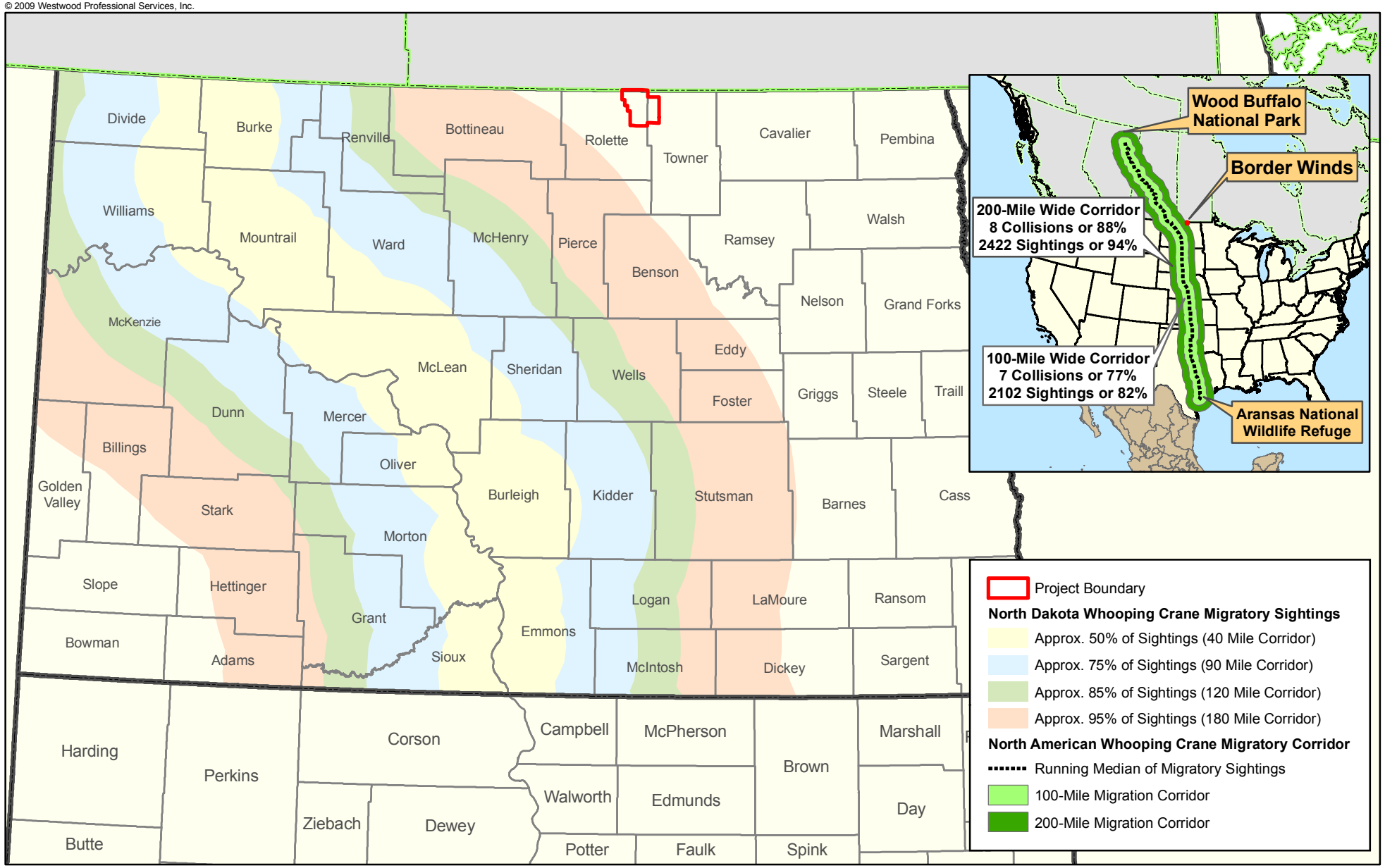
www.westwoodps.com

N

0 2 Miles

Map Document: (P:\20071163\gis\PreConAvian\20071163bird02A_nest.mxd)
9/24/2009 -- 1:18:20 PM

Map Document: (P:\20071163\gis\PreConAvian\20071163whcr01A_Ex3.mxd)
7/8/2009 -- 12:01:27 PM



Data Source(s): North American Whooping Crane data from Tom Wassenich (2005), U.S. Fish and Wildlife Service, Canadian Wildlife Service; North Dakota Whooping Crane Sighting from the USFWS North Dakota Field Office, Whooping Crane Sightings (2007).

Border Winds Energy Project

Rolette and Towner Counties, North Dakota

Whooping Crane Migration Corridor

EXHIBIT 4

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344

PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150

www.westwoodps.com

N

0 45 Miles