Fall 2014 and Spring 2015 Avian Surveys

Foxtail Wind Energy Center
Dickey County, North Dakota

Prepared for:

Foxtail, LLC

October 13, 2015

Revised July 2017

TETRA TECH

This page intentionally left blank

Executive Summary

Tetra Tech, Inc. (Tetra Tech) was contracted by Foxtail Wind, LLC, to undertake fall and spring avian use surveys for the proposed Foxtail Wind Energy Center (Project) in Dickey County, North Dakota. The studies were conducted to identify potential avian impacts associated with building and operating a wind energy facility. Birds have been identified as a group potentially at risk because of the potential for collisions with wind turbines and associated power lines and loss of habitat and/or displacement due to the presence of the associated structures. Weekly surveys were performed at the Project in the fall from August 20th to November 6th, 2014, and again in the spring from March 17th through June 11th, 2015. Each season, point-count surveys (fixed 800-meter [m] radius) were conducted at 16 point-count locations distributed throughout the Project Area.

Results of the fall 2014 and spring 2015 avian surveys at the Project suggest an overall low impact of Project development on the local bird community. A total of 10,462 birds from 65 species and 1,057 birds that could not be identified to species were recorded during the fall point-count surveys and 13,956 birds from 87 species and 363 birds that could not be identified to species were recorded during the spring point-count surveys. Overall mean bird use within the Project Area was 61.05 birds/20 minute (min) and ranged from 0 to 1,577 birds/20 minute for each survey. Mean use by season was higher in the spring at 67.10 birds/20 min (90 percent CI = 47.82–67.16; ranged from 0 to 1,577 birds/20 minute survey) survey and while fall's mean use was 54.49 birds/20 min (90 percent CI = 41.82–67.16; ranged from 0 to 1,077 birds/20 minute survey). The mean use values for each season are not statistically different given the overlap of the confidence intervals (Table ES-1).

The bird community detected within the Project Area during spring and fall avian surveys was characterized by species associated with grassland prairie vegetation, agricultural lands, and prairie potholes typical of this region of North Dakota. Within habitats such as these, the greatest potential impact of wind facilities to avian species is collisions with turbines rather than disturbance or displacement. Overall (fall and spring combined) mean use was highest for waterfowl (35.81 birds/20 min) and songbirds (15.14 birds/20 min) and the species found to be the most common were the snow goose (16.82 birds/20 min), Canada goose (13.75 birds/20 min), and mallard (1.59 birds/20 min) for waterfowl and red-winged blackbird (3.11 birds/20 min), brown-headed cowbird (2.66 birds/20 min), and horned lark (1.58 birds/20 min) for songbirds. All of these species are common in North America and have large populations. Any fatalities observed at the Project, should they occur, are unlikely to have population-level impacts. Encounter rate is the estimate at which a given species flew at the height of the anticipated rotor-swept area (RSA), which may indicate a species is at greater risk for collisions with turbines. The encounter rates reported here were based on the dimensions of GE 1.85

megawatt (MW) Xle model turbines; however, the currently proposed Vestas V110 and V116 turbine models have equal or slightly smaller dimensions and therefore collision risk is considered to be comparable. The species with the highest risk for collisions, as defined by the encounter rate, included snow goose (10.01 birds flying at RSA height/20 min), followed by Canada goose, unidentified blackbird, double-crested cormorant, and red-winged blackbird (4.52, 0.69, 0.52, and 0.44 birds flying at RSA height/20 min, respectively). Fatalities observed at the Project, should they occur, are unlikely to have population-level impacts for any of these species. All other species had an encounter rate at or below 0.17 birds flying at RSA height/20 min, which suggests a low risk for collisions with Project turbines.

Mean raptor use was low for both seasons (0.71 {90 percent CI = 0.55–0.87} for fall and 0.33 birds/20 min {90 percent CI = 0.26–0.40} for spring), although fall raptor mean use was significantly higher than spring. The most common raptors observed were Swainson's hawk, red-tailed hawk, and northern harrier during fall surveys, and red-tailed hawk and northern harrier during spring surveys, all of which breed locally. All raptor species had low encounter rates of 0.07 birds flying at RSA height/20 min or less, suggesting a low risk for collisions with Project turbines. Additionally, red-tailed hawk, Swainson's hawk, and great-horned owls were found to be actively nesting within or near the Project Area, which may increase the risk for collisions during nesting activities and the time when young begin to fledge (typically July and August). Other raptor species detected during spring and fall surveys included unidentified buteo, prairie falcon, turkey vulture, merlin, broad-winged hawk, rough-legged hawk, unidentified hawk, and bald eagle.

Protected Species

No federally-listed threatened or endangered species were detected during avian point-count surveys. Three bald eagles, which are protected under the Bald and Golden Eagle Protection Act, were observed during the spring and fall avian point-count surveys; a fourth bald eagle was observed incidentally to avian point-count surveys. . Bald eagles had a low encounter rate in the Project Area (<0.01 birds flying at the RSA height/20 min). During the aerial raptor nest surveys, which covered a 10-mile buffer surrounding the Project Area, 43 individual bald eagles were observed. The low use of the Project Area and low encounter rate suggests collision risk of bald eagle at the Project is low.

Table ES-1. Fall 2014 and Spring 2015 Avian Use Summary

Variable	Fall Results	Spring Results	Details
Non-raptors			
Mean use	53.78 birds/20 min (90% CI = 41.82–67.16 birds/20 min)	66.77 birds/ 20 min (90% CI = 47.89–86.30 birds/20 mins)	
Species detected at Foxtail that are commonly (> 15 records from publically available data) detected as wind farm fatalities	Yes	Yes	Section 4.1
Federally listed[1] bird species observed within the Project Area	No	No	
State-listed[2] bird species within the Project Area	No	No	
Raptors			
Mean use	0.71 birds/20 min (90% CI = 0.55–0.87 bird/20 min)	0.33 birds/20 min (90% CI = 0.26–0.40 birds/20 min)	
Species detected at Foxtail that are commonly (> 15 records) detected as wind farm fatalities	Yes	Yes	Section 4.2
Eagles observed within the Project Area	Yes	Yes	bald eagle (Sections 3.1, 3.3 and 3.6)
Eagles observed within the RSA	Yes	No	bald eagle (Section 3.6)
Eagles observed nesting within the Project Area	No	No	
Federally listed species observed within the Project Area	No	No	
State-listed[2] species within the Project Area	No	No	
Habitat (within the Project Area)			
Native habitat likely to be affected by development	Yes		Grassland prairie
Lakes (waterfowl and crane attractant)	Yes		Several lakes within and to the west and south of the Project
Wetlands (attractant for cranes, waterfowl, and other water-based species)	Yes		Kettle ponds and intermittent flowing creeks.
Cliffs (raptor nesting and traveling)	Yes		Ridgeline paralleling the east edge of the Project
Rivers (permanent water source, migration corridor)	None		None
Known refuges or habitat features that may funnel migrants	None		

1 Federally listed species include species listed as endangered, threatened, or candidate under the Endangered Species Act (ESA).

2 There are no listings as state endangered or threatened species in North Dakota. The North Dakota Game and Fish Department maintains a list of Species of Conservation Priority (Hagen et al. 2005) but these species are not afforded any formal protection by the state of North Dakota and there are no state permitting requirements for them.

This page intentionally left blank

Table of Contents

List of Figures

List of Tables

Appendices

1 Introduction

1.1 Wind Energy and Birds

Wind energy provides a clean, renewable energy source. Birds have been identified as a group potentially impacted by wind energy development because of collisions with wind turbines and power lines and displacement due to the presence of associated structures (Erickson et al. 2005, Drewitt and Langston 2006, Arnett et al. 2007). Specifically, migrant passerines (e.g., songbirds) are found more often during post-construction mortality monitoring compared to other groups of birds (Arnett et al. 2007, Erickson et al. 2014). Although commonly detected as fatalities, turbine-related mortality of passerines does not appear to result in population-level impacts. Wind energy projects in the United States and Canada, for example, are estimated to only cause fatality rates ranging from 0.008 to 0.043 percent of population size per year for the most heavily affected passerine species (Erickson et al. 2014).

Despite the observation that most wind farm fatalities are songbirds, raptor mortality has received the most attention due to high fatality rates at the Altamont Wind Project in California (Thelander et al. 2003, ICF International 2014) and the more recent Eagle Conservation Plan Guidance (USFWS 2013a). Raptor mortality at newer wind projects has been low relative to previous generation wind farms, although there is substantial regional variation (Johnson et al. 2002, Erickson et al. 2002, 2004, Kerns and Kerlinger 2004, Jain et al. 2007). Although raptor mortality is reduced at newer generation facilities, raptors remain the avian species group considered most susceptible to collisions with turbines (Strickland et al. 2011). Local micro-siting and site evaluation efforts, therefore, are still necessary to minimize potential project-related impacts to raptors.

In addition to mortality associated with wind farms, there is the potential for bird species to avoid areas near turbines or experience habitat displacement after the wind farm is in operation (Drewitt and Langston 2006). To date, evidence of this potential impact to birds does not demonstrate a distinct trend; some studies have found decreased density or abundance of birds near turbines (e.g., grassland songbirds; Leddy et al. 1999, Erickson et al. 2004, Shaffer and Johnson 2009), while others have found no evidence of declines near turbines (Devereux et al. 2008, Shaffer and Johnson 2009, Pearce-Higgins et al. 2012). Pearce-Higgins et al. (2012), detected disturbance-related effects during construction, suggesting that disturbance effects may occur on a short-term basis.

Agencies and non-governmental groups have raised particular concern over avoidance issues (e.g., habitat displacement) with respect to grouse species (Manville 2004, USFWS 2012). The existing information on avoidance by grouse species is limited to observational studies, with results varying by grouse species and source of disturbance (roads, oil and gas wells, vertical

structures, transmission lines). Studies of grouse and anthropogenic features have observed that some species of grouse avoid transmission lines, improved roads, buildings, oil and gas wells, and communication towers (Pitman et al. 2005, Pruett et al. 2009, Johnson et al. 2011). But other studies have found no evidence of avoidance of transmission lines or of wind facilities (Johnson et al. 2011, Johnson et al. 2012, Sandercock et al. 2013).

Most native migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918. Under the MBTA it is unlawful to take (i.e., kill) any migratory bird including nests and nest contents. The United States Fish and Wildlife Service (USFWS) has established a permitting process for a variety of intentional activities, such as hunting and scientific research (Beveridge 2005). While the MBTA clearly applies to intentional takes, the applicability of the MBTA to a take that occurs incidental to otherwise lawful activities is still unsettled law. Therefore, as such a permit is arguably unnecessary, there is no current permitting framework under the MBTA for incidental takes occurring at a wind energy facility. On May 26, 2015, the USFWS published a notice in the Federal Register regarding MBTA permitting. This notice indicated USFWS's intent to prepare a programmatic environmental impact statement pursuant to the National Environmental Policy Act to evaluate the potential environmental impacts of its proposal to create an incidental take permitting program under the MBTA. The proposed incidental take permitting program would expand the availability of incidental take permits under the MBTA to a wider range of industries and activities, including wind facilities. However, this proposal has not moved forward since its initial notice.

1.2 Study Description

Foxtail Wind, LLC (Foxtail) is planning to develop the Foxtail Wind Energy Center (Project) in Dickey County, North Dakota (Figure 1), located on private lands. Foxtail is committed to environmental due diligence and has contracted Tetra Tech, Inc. (Tetra Tech) to conduct avian migration surveys in the Project Area to quantify local bird use in the area and to evaluate the potential impacts of the Project to birds detected during the survey. These study objectives are consistent with recommendations from Tier 3 of the Voluntary *USFWS Land-Based Wind Energy Guidelines* (USFWS 2012; Voluntary Guidelines).

The Project Area covers 20,029 acres and is located in the Missouri Coteau sub-region of the Northwestern Glaciated Plains ecoregion (Bryce et al. 1998). The Northwestern Glaciated Plains ecoregion marks the western-most extent of continental glaciations and is characterized by significant surface irregularity and high concentrations of wetlands known as potholes. Streams and rivers are nearly absent, as are upland deciduous forests. Land use on the Missouri Coteau is a mixture of hay and spring wheat tilled agriculture in flatter areas, and cattle grazing on steeper slopes. Much of the native prairie has been largely replaced by wheat, alfalfa and other commercial crops over most of the ecoregion (Bryce et al. 1998). The Project Area is a mix of

cattle pastures, agricultural lands, and remnant native prairie, and contains numerous wetlands that vary from shallow vegetated depressions to large ponds and intermittent creeks.

North Dakota has 362 documented bird species (Nature Worldwide 2015a) and is situated within the Central Flyway, one of the main bird migratory routes in North America (USFWS 2015a). During spring and fall migration, most birds that move along the Central Flyway travel to and from wintering grounds from as far away as South America via the Gulf of Mexico through the central states and eventually reaching breeding grounds as far away as Alaska and northern Canada (USFWS 2015a).

2 Methods

The protocols utilized for avian surveys presented in this report are designed to be responsive to the level of effort recommended in the *National Wind Coordinating Committee's Comprehensive Guide to Studying Wind Energy/Wildlife Interactions* (Strickland et al. 2011) and the USFWS *Voluntary Land-Based Wind Energy Guidelines* (WEGs; USFWS 2012).

2.1 Avian Surveys

2.1.1 Point-count Surveys

To evaluate avian risk at wind energy facilities, standardized protocols for pre-construction point counts have been established and were used in this study (Strickland et al. 2011, USFWS 2012). Data collected from point counts are used to identify species or species groups that may be at risk from Project development, and may provide additional information for micro-siting wind turbines to minimize impacts to birds.

An experienced field biologist (biologist) conducted 20-minute (min) point-count surveys at 16 locations within the Project Area to evaluate avian use, behavior, and species composition (Figure 2). The biologist conducted 12 weekly surveys from August 20th through November 6th, 2014, and 13 weekly surveys from March 17th through June 11th, 2015 (Table 1), thereby encompassing the spring and fall migration seasons. Tetra Tech distributed the survey locations throughout the Project Area and chose locations that maximized the 360-degree sight distance for the observer while covering a diversity of habitats (Figure 2).

The biologist collected data on all birds detected within an 800-meter (m; 2,625-foot) radius of the point-count locations. Surveys at each point-count location lasted for 20 minutes, during which time the biologist continuously recorded any visual or auditory observations of birds. The biologist recorded data including: species, number of individuals, time of observation, height above ground, and behavior. The biologist estimated flight heights and distances using existing reference points such as meteorological towers and local transmission lines, as well as landscape

contours shown on topographic maps. Flight direction was recorded for individuals making directional flights, but was not recorded for individuals making localized movements.

The survey protocol used in this study is designed to collect data on all bird species and to provide results that are comparable with other studies at wind farms, rather than to target specific taxa. The benefit of using this protocol is that it estimates avian use throughout the day and captures activity by a variety of bird species. During the breeding season, and to a lesser extent in the spring, fall and winter, songbirds are most active in the morning and can be difficult to detect during the afternoon. In contrast, raptors become active as the sunlight heats the air and creates thermals, which individual raptors use for soaring (Ballam 1984). Thus, raptors are more readily detected several hours after sunrise. Therefore, this protocol is appropriate for characterizing the entire avian community using the Project Area. It should be noted that this survey protocol can only detect nocturnal migrants should they be local breeders within the Project Area or if they utilize the Project during the day as stopover habitat.

Tetra Tech chose 20-min survey periods because they provide adequate time to detect both raptors and non-raptors. (Strickland et al. 2011, USFWS, 2012) However, time periods of 20 minutes may lead to double-counting of songbirds (i.e., counting the same individual more than once) because individuals may appear and disappear from view. For example, if a horned lark is detected perched on a fence then disappears from view and, 6 minutes later, a horned lark is seen flying, these birds are recorded as separate observations because it is not possible to distinguish individuals. Double-counting of birds is not problematic for this type of survey because the objective is to document use in terms of number of birds noted per 20-min survey, not number of distinct individual birds.

Detectability varies among species and potentially not all individuals within the 800-m radius were counted. This variation in detectability could result in an overestimate of mean use for conspicuous species and an underestimate of mean use for reclusive species (Thompson 2002). Birds not easily identifiable, such as those seen under low light conditions or small birds seen at a distance were identified to the lowest taxonomic level possible. Hence, unidentified birds are included in the results.

2.1.2 Raptor Nest Surveys

Raptor nest surveys were conducted with the primary objective of documenting the presence of bald eagle, golden eagle, and other large raptor nests within and adjacent to the Project. The surveys were conducted in accordance with recommendations of the Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy: Version 2 (ECP Guidance; USFWS 2013a).

The biologist conducted an early season aerial survey prior to leaf-out (before April) to increase visibility of raptor nests. The aerial survey consisted of searches of suitable habitat for all raptors

within the Project Boundary plus a 1-mile buffer (Raptor Nest Survey Area) and for eagles only out to 10-miles from the Project Boundary (Eagle Nest Survey Area). Within the Eagle Nest Survey Area, surveys primarily focused on potentially suitable nesting habitat along large bodies of water and other areas with large trees sufficient to support nesting by large raptors. Prior to the survey, information on known eagle nests was requested from the USFWS and the North Dakota Game and Fish Department (NDGFD); no eagle nests were known to exist within the Eagle Nest Survey Area.

The biologist conducted follow-up ground-based surveys from mid-April to Mid-May 2015 to locate any late-nesting raptors within 1 mile of the Project Area and check on the status of raptor nests located during the aerial survey. The surveys were conducted from public roadways by a biologist equipped with a spotting scope. The biologist collected data on species, location, and activity status. Nests were classified as follows:

- **Occupied** – a nest in which observers detected either recent repairs (i.e., addition of greenery), two adults perched near a nest, copulating adults, an incubating adult on a nest, eggs in a nest, or young in or near a nest.
- **Unoccupied** – a nest lacking any of the indications of breeding listed above.

In addition, the biologist determined the nest condition and substrate. Data collected within the Raptor Nest Survey Area included an inventory of all stick nests (occupied or unoccupied), status of nests, numbers of eggs or nestlings, and any observations of bald or golden eagles. Data collected within the Eagle Nest Survey Area was limited to potential eagle nests and any observations of bald or golden eagles. Ground-nesting raptor species, such as northern harriers, were not surveyed.

2.1.3 Lek Location Surveys

A biologist conducted grouse lek surveys to identify areas of use by breeding prairie grouse within the Project and surrounding area within a 1-mile buffer of the Project Boundary. The biologist conducted lek surveys on eight days from mid-March through mid-May to coincide with the breeding season, with initiation date selected based on predicted daily wind speeds. Although surveys were generally conducted according to state protocol (Pitman 2011), from approximately an hour before sunrise to 2.5 hours after sunrise, some data were recorded later in the day if prairie-grouse were audibly detected when the biologist was in the Project Area. The biologist drove county roads through areas identified as potential lek habitat: open, short grass vegetation with minimal amounts of agriculture. When conducting lek surveys, the biologist stopped every half mile and listened for a minimum of five minutes for vocalizations of displaying males. Locating leks using these methods assumes that on a calm morning, sharp-tailed grouse males may be heard at a distance of up to 0.75 miles and prairie-chickens can be heard from up to one mile away (Davis et al. 2008). The biologist did not conduct listening stops when winds exceeded

10 mph or if there was any type of precipitation. If a lek was located and visible, the biologist observed the lek for at least 10 minutes to count the number of males and females. If displaying grouse were heard, but the lek was not visible, the biologist attempted to pinpoint the location by driving county roads. Each detected lek was visited three times to determine activity level. Leks with 3 or fewer displaying males, or leks which were only detectable on the initial survey were considered satellite leks.

2.1.4 Incidental Observations

Incidental observations included observations that occurred 1) during travel between point-count locations, 2) before or after the official 20-min survey period, 3) outside of the 800-m radius circular plot, and 4) during the raptor nest survey. The biologist recorded these observations on separate data sheets and these data were not used in the formal analysis; however, a summary of incidentally observed species is presented to provide additional information about species found in the local area.

2.2 Protected Species Information

Results in this report highlight any protected species including federal and state-listed species and eagles detected during surveys.

The federal Endangered Species Act (ESA), administered by the USFWS, mandates protection of species federally listed as threatened or endangered and their associated habitats. The ESA makes it unlawful to "take" a listed species. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct" (USFWS 2013b). A current list of endangered, threatened and candidate species for Dickey County can be found at: http://www.fws.gov/northdakotafieldoffice/SEtable.pdf (last updated January 2015, Appendix 2).

The Bald and Golden Eagle Protection Act (BGEPA) prohibits the take of any bald or golden eagle, alive or dead, including any part, nest, or egg. "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" a bald or golden eagle. "Disturb" means to agitate or bother an eagle to a degree that causes, or is likely to cause, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. The USFWS promulgated regulations in 2009, subsequently revised in 2016, which provided for permits for incidental take of bald and golden eagles associated with otherwise lawful activities, including wind energy (50 Code of Federal Regulations § 22.26; USFWS 2016). Applications for incidental take permits under BGEPA are being considered by USFWS for bald eagles throughout the contiguous U.S. Incidental take

permits for golden eagles are available only to projects located west of the 100th meridian, thus this project would not qualify (USFWS 2013a). However, since 2009, only one incidental take permit for golden eagles has been granted to a wind energy project, and no permits for incidental take of bald eagles at a wind energy facility have been issued.

In addition to federal listing, some states also list species that are declining and in danger of becoming extinct within the state's border. The North Dakota Game and Fish Department maintains a list of Species of Conservation Priority (Hagen et al. 2005, NDGFD 2015) but these species are not afforded any formal protection by the state of North Dakota and there are no state permitting requirements for them. Only species protected by the ESA are considered threatened or endangered in North Dakota.

2.3 Data Quality Assurance/Quality Control

Tetra Tech implemented quality assurance and quality control measures during all stages of data collection, analysis, and report preparation. To ensure legibility and completeness of data sheets, each biologist reviewed all data sheets, providing clarification as needed, before data entry into a relational database for data storage and analysis. Prior to analysis, an independent reviewer conducted a 100-percent quality review of the data entries. Any questions that arose at this time were directed toward and answered by the biologist.

2.4 Analysis

2.4.1 Species Groupings

Tetra Tech considered two primary groups of interest: raptors and non-raptors. Tetra Tech defined raptors as vultures, hawks, eagles, falcons, kestrels, kites, harriers, and owls. All other species groups are defined as non-raptors. Non-raptors were further subdivided into species groups including cranes/rails, gamebirds, gulls/terns, pigeons/doves, songbirds, waterbirds, waterfowl, and woodpeckers.

2.4.2 Avian Use

Tetra Tech derived avian use (mean use) of the Project by calculating the average number of birds observed per 20-min (birds/20 min) survey at each point-count location. To evaluate the diversity and composition of avian species using the Project Area, Tetra Tech summarized the number of individuals and frequency (percentage of surveys where a species was detected) for species observed. Tetra Tech also calculated a measure of variability (90 percent confidence intervals) for all mean use values. In addition, the number of observations is also presented, where an observation can be either an individual bird or a discrete flock of birds. This information helps evaluate whether Project relative high mean use values are driven by a single event (e.g., a large

flock of birds moving through the Project Area on migration) or the result of more sustained use of the area by species. Because individual birds are not uniquely marked and easy to distinguish from one another, actual population size or abundance cannot be determined. One individual may be counted multiple times during a survey period or across survey periods. Although mean use of a given species does not equate to abundance, it does provide an index that is likely proportional to abundance and activity within the Project Area for species with similar detectability.

2.4.3 Flight Behavior

Tetra Tech evaluated flight behavior by calculating the proportion of flying birds observed below, within, or above the height of the anticipated turbine rotor swept area (RSA). Tetra Tech considered a bird to have flown within the height range of the anticipated RSA if any of its recorded heights fell within the upper or lower limits of the anticipated RSA. Foxtail originally considered General Electric (GE) 1.85 megawatt (MW) *Xle* model turbines, and the analysis below is based on the dimensions of this turbine model. Currently, Foxtail plans to develop the Project using both Hybrid Vestas V-116 and V-110 model turbines. These turbines will have a hub height of 80 meters (262.5 feet) and rotor diameter of up to 116 meters (381 feet). With these specifications, the anticipated RSA is estimated to be between approximately 22 m (72 feet) and 138m (453 feet) above ground. These dimensions are equal to or slightly smaller than the GE 1.85 MW turbines; therefore, the encounter rate and risk assessment presented below is assumed to also apply to the Vestas turbine models.

2.4.4 Encounter Rate

To estimate the rate at which a given species flew at the height of the anticipated RSA, Tetra Tech applied the following equation to every species observed in the Project Area:

$$\boldsymbol{Encounter\ Rate} = \boldsymbol{A} \times \boldsymbol{P_f} \times \boldsymbol{P_t}$$

$\boldsymbol{A}$ is the mean number of birds/20 min for a given species, $\boldsymbol{P_f}$ is the proportion of all activity observations for a given species that were flying; and $\boldsymbol{P_t}$ is the proportion of flying observations that were within the height range of a turbine RSA for a given species. The encounter rate provides information on the rate at which a species may move at a height that is consistent with the RSA of the proposed turbines. This information is an important component in evaluating risk of collisions; however, this number alone does not indicate potential project-related impact to a species. Species with a high encounter rate are considered potentially at a higher risk of collision than species with a low encounter rate, but it does not mean that turbine-related mortality is certain. Other factors such as turbine location or a species ability to detect turbine blades, flight maneuverability, and habitat selection also influence mortality (Orloff and Flannery 1992,

Drewitt and Langston 2008, Martin 2011, Garvin et al. 2011, Nagy et al. 2011). Encounter values are sensitive to large flocks of birds flying within the RSA height; that is, a species will have a high encounter rate even if only observed once as a large flock in flight.

2.4.5 Mortality Risk

The regional nature of avian mean use across North America and the scarce data on avian mortality at wind farms in many parts of the continent, combined with other risk factors such as individual species behavior and weather, contribute to uncertainty in predicting fatality rates (Arnett et al. 2007, Strickland et al. 2011). A recent meta-analysis suggests that pre-construction studies provide poor indicators of post-construction mortality (Ferrer et al. 2012). WEST (2011) suggests that the most accurate predictors of mortality at a wind project are records of species-specific fatalities detected at nearby wind projects. As a result of uncertainty in predicting fatality rates, Tetra Tech did not attempt to derive mortality estimates from mean use data, but instead highlights those species or species groups with high use values that may experience Project-related mortality or whose regional population could be impacted by the Project development. Additionally, in this report, Tetra Tech highlights species with high frequencies (greater than 50 percent) of observation, high encounter rates (greater than 0.99 birds flying at RSA height/20 min), and those with records of turbine-related fatality at other wind projects, as these variables may also indicate potential collision risk at the Project.

3 Results

3.1 Avian Use and Frequency of Occurrence

The biologist surveyed 7,945 acres of the Project Area during point-count surveys, covering 39.7 percent of the total Project Area (20,029 acres). Between the fall and spring point-count surveys, point-count locations 1, 3, 4, and 14 were dropped and 17, 18, 19, and 20 were added in order to accommodate Project layout changes and provide more thorough coverage of the interior of the Project Area. Sixteen point-count locations were surveyed 12 times in the fall (resulting in 120 20-minute surveys) and 13 times in the spring (resulting in 130 20-minute surveys). An overall total of 24,418 birds from 99 species and 1,420 birds that could not be identified to species were observed during point-count surveys at the Project over the course of the spring and fall migratory seasons. During the fall survey, a total of 10,462 birds from 65 species with 1,057 birds that could not be identified to species were recorded and during the spring survey, a total of 13,956 birds from 87 species with 363 birds that could not be identified to species were recorded (Table 2). A total of nine species groups were identified within the Project Area during the spring and fall point-count surveys: cranes/rails, gamebirds, gulls/terns, pigeons/doves, raptors, songbirds, waterbirds, waterfowl, and woodpeckers (Table 2). Overall mean bird use for study

duration at the Project was 61.05 birds/20 min (Table 2). The number of birds observed per survey ranged among seasons from 0 to 1,577 birds/20 minutes.

Fall Survey

Fall mean use by non-raptors was 53.78 birds/20 min (90 percent CI = 41.27–66.29). Waterfowl was the group with the highest mean use (25.89 birds/20 min) among non-raptor species groups. Waterfowl comprised 47.5 percent of all birds observed (Table 3). The waterfowl species with the highest mean use was the snow goose (15.79 birds/20 min; observed in 5.2 percent of all surveys), followed by the Canada goose (6.32 birds/20 min; observed in 32.8 percent of all surveys; Tables 2 and 3). Both of these waterfowl species were generally observed in large flocks moving through the Project Area. Overall, the snow goose and Canada goose accounted for 40.6 percent of all birds observed in the Project Area during the fall survey (Table 3). The remaining waterfowl species had mean use of 1.84 birds/20 min or less for the fall survey.

Songbirds had the second highest mean use (14.37 birds/20 min), representing 26.4 percent of all birds observed during the fall survey. The songbird species with the highest mean use during the fall survey was the horned lark (2.83 birds/20min; observed in 27.6 percent of all surveys), the brown-headed cowbird (1.54 birds/20 min; observed in 6.3 percent of all surveys), and the common grackle (1.41 birds/20 min; observed in 10.9 percent of all surveys; Tables 2 and 3). Additionally, blackbirds unidentifiable to species had a relatively high mean use (2.06 birds/20min; observed in 2.6 percent of all surveys). The remaining songbird species had mean use of 1.06 birds/20 min or less for the fall survey.

Gulls/terns and waterbirds were the taxonomic groups with the third and fourth highest mean uses (6.10 birds/20 min and 5.58 birds/20 min, respectively) during the fall survey. These groups comprised 11.2 percent and 10.2 percent of all birds observed, respectively (Table 3). For both gulls/terns and waterbirds, a single species was the primary driver of the group's mean use value; the ring-billed gull for gulls/terns (3.66 birds/20 min; observed in 20.3 percent of all surveys) and the double-crested cormorant for waterbirds (3.69 birds/20 min; observed in 20.8 percent of surveys; Tables 2 and 3). The remaining gulls/terns and waterbird species had mean use values of 1.77 birds/20 min or less for the fall survey.

The remaining non-raptor species groups: pigeons/doves, gamebirds, cranes/rails and woodpeckers had mean use values of 0.92 birds/20 min or less.

Non-raptor mean use was highest on November 5-6th (211.5 birds/20 min; Figure 3a). The primary contributors to the high mean use during this survey were observations of snow geese (2,935 individuals; 86 percent of observations). Mean use for non-raptors was highest at point-count location 13 (167.25 birds/20 min) and 2 (108.25 birds/20 min; Figure 4a), primarily driven by observations of large flocks swimming on open water or flying overhead. Snow goose (975

individuals), ring-billed gull (315 individuals), and Canada goose (256 individuals) were the species primarily contributing to the high mean use at point-count location 13 (Table 4a). Snow goose (350 individuals), unidentified gull (307 individuals), and unidentified blackbird (270 individuals) were the most common species observed at point-count location 2 (Table 4a). The habitat at point-count location 13 consists of several large wetlands and open water areas interspersed with grassland and agriculture fields (Figure 2). Although the size of the water features at point 13 is unique, water features themselves are not unique on the landscape and are present at point-count location 2 as well.

Raptors are a group of special interest because of their propensity to fly at heights similar to a turbine RSA. Raptor mean use was 0.71 birds/20 min (90 percent CI = 0.55–0.87; Table 2); the seventh highest value among the nine species groups for the fall survey. The raptor species with the highest mean use were the Swainson's hawk (0.24 birds/20 min; observed in 16.1 percent of all surveys), red-tailed hawk (0.16 birds/20 min; observed in 13.5 percent of all surveys), and northern harrier (0.13 birds/20 min; observed in 12.0 percent of all surveys; Tables 2 and 3). Unidentified buteos had a mean use of 0.11 birds/ 20 min and were observed in 15.4 percent of all surveys (Tables 2 and 3). Other raptor species detected included the American kestrel, prairie falcon, turkey vulture, merlin, great horned owl, broad-winged hawk, and bald eagle. Each of these raptor species had mean use values equal to or less than 0.03 birds/20 min and observed in less than 2.6 percent of all surveys (Tables 2 and 3).

Mean use by raptors was highest on September 26th (2.00 birds/20 min; Figure 5a). Raptor species observed on this date included Swainson's hawk (17 individuals), red-tailed hawk (5 individuals), unidentified buteo (3 individuals), northern harrier (3 individuals), American kestrel (2 individuals), prairie falcon (1 individual), and bald eagle (1 individual). Mean use for raptors was 1.56 birds/20 min or less for all other survey dates (Figure 5a). Mean use for raptors was highest at point count locations 9 and 15 (1.42 birds/20 min; Figure 6a). Species contributing to the high mean use at these point count locations included Swainson's hawk, red-tailed hawk, northern harrier, American kestrel, and prairie falcon (Table 4a). Raptor mean use was equal to or less than 0.92 birds/20 min at all other point count locations. The habitat at point count location 9 consists of grasslands and wheat fields with shelterbelts dominated by cottonwood while point count location 15 consists of short shrub (less than 1 meter tall), grassland, and shelterbelt dominated by box elder. Point count location 15 is also located along a north-south oriented ridgeline which may receive increased raptor use during the raptor migration while raptors utilize the updraft and thermals present with these landscape features. Other point count locations that experienced increased activity along this ridgeline during raptor migration included points 5, 4, 9, and 6.

Spring Survey

Spring mean use by non-raptors was 66.77 birds/20 min (90 percent CI = 47.63–82.90; Table 2). Waterfowl was the group with the highest mean use (44.96 birds/20 min) among the non-raptor species groups (Table 2). Similar to fall, the majority of birds observed during the spring survey were comprised of waterfowl (67.0 percent of all birds observed), most of which were observed in flocks moving through the Project Area or on open water. The waterfowl species with the highest mean use was the Canada goose (20.62 birds/20 min; observed in 51.9 percent of all surveys) followed by the snow goose (17.78 birds/20 min; observed in 6.3 percent of surveys; Tables 2 and 3). These two species comprised 57.2 percent of all bird observations during the spring survey (Table 3). The remaining waterfowl species observed had mean use values of 1.84 birds/20 min or less.

Songbirds had the second highest mean use (15.84 birds/20 min) and comprised 23.6 percent of all birds observed during the spring survey. The songbird species with the highest mean use was the red-winged blackbird (4.83 birds/20 min; observed in 61.5 percent of all surveys) and brown-headed cowbird (3.69 birds/20 min; observed in 33.2 percent of all surveys; Tables 2 and 3). All other songbirds had a mean use of 1.41 birds/20 min or less. Notably, western meadowlark had a high frequency of observation, but relatively low mean use (observed in 68.3 percent of all surveys; 1.25 birds/20 min; Tables 2 and 3).

The remaining non-raptor species groups, waterbirds, cranes/rails, gulls/terns, gamebirds, pigeons/doves, and woodpeckers, each had mean use values of 2.46 birds/20 min or less for the spring survey (Table 2).

Non-raptor mean use was highest on March 26th and March 30th (280.06 birds/20 min and 213.13 birds/20 min, respectively; Figure 3b). The primary contributors to the high mean use on both survey dates were observations of Canada goose (2,833 individuals in 35 flocks and 414 individual in 16 flocks, respectively) and snow goose (1,299 individuals in 9 flocks and 2,199 individuals in 11 flocks, respectively). Mean use for non-raptors was highest at point count location 13 (207.85 birds/20min; Figure 4b). Again, Canada goose and snow goose were the species primarily contributing to the high mean use at point count location 13 (974 and 944 individuals observed, respectively; Table 4b). The habitat at point count location 13 is described above under fall surveys (Figure 2).

For raptors, spring mean use was 0.33 birds/20 min (90 percent CI = 0.26–0.40; Table 2); the eight lowest value among the nine species groups. The raptor species with the highest mean use was the red-tailed hawk (0.17 birds/20 min; observed in 14.4 percent of all surveys; Tables 2 and 3). Other raptor species detected included the northern harrier, American kestrel, Swainson's hawk, rough-legged hawk, bald eagle, great horned owl and unidentified hawk each with mean use

values equal to or less than 0.06 birds/20 min and observed in less than 6.0 percent of all surveys (Tables 2 and 3).

Mean use by raptors was highest on April 13 and 14th (1.13 birds/20 min; Figure 5b). Raptor species observed on these date included red-tailed hawk (8 individuals observed), northern harrier (4 individuals), American kestrel (4 individuals), and rough-legged hawk (2 individuals). Mean use for raptors was 0.56 birds/20 min or less for all other survey dates (Figure 5b). Mean use for raptors was highest at point-count location 17 (0.85 birds/20 min; Figure 6b). Species contributing to the high mean use at this point-count location included red-tailed hawk (7 individuals), American kestrel (3 individuals), and northern harrier (1 individual; Table 4b). Raptor mean use was equal to or less than 0.62 birds/20 min at all other point-count locations. The habitat at point-count location 17 is dominated by native prairie with some tame hay fields which may provide foraging opportunities for raptors. Additionally, a shelterbelt is captured within this point-count location which contained an active red-tailed hawk nest.

3.2 Flight Height and Encounter Rate

Fall Survey

During the fall avian use survey, the biologist collected behavioral data for all birds observed during point-count surveys of which 78.5 percent were observed flying. The biologist collected flight height data for 99.9 percent and flight direction for 60.1 percent of the individuals observed flying. Of non-raptor individuals observed flying, 53.7 percent flew below the height of the anticipated RSA, 40.2 percent flew at the height of the anticipated RSA and 6.1 percent flew above the height of the anticipated RSA (Table 5). Of raptor individuals observed flying, 71.4 percent flew below the height of the anticipated RSA, 27.7 percent flew at the height of the anticipated RSA, and 0.9 percent flew above the height of the anticipated RSA (Table 5). Data on flight direction are located in Appendix 1a. Generally, birds observed in flight were moving in a southeasterly direction (42.8 percent).

For the fall survey, snow goose had the highest encounter rate (13.42 birds flying at RSA height/20 min; Table 6b), followed by unidentified blackbird and double-crested cormorant (1.43 and 1.09 birds flying at RSA height/20 min, respectively; Table 6b). All other species had an encounter rate at or below 0.35 birds flying at RSA height/20 min.

Spring Survey

During spring avian use survey, the biologist collected behavioral data for 99.9 percent of birds observed during point-count surveys of which 76.7 percent were observed flying. The biologist collected flight height data for 99.8 percent and flight direction for 74.5 percent of the individuals observed flying. Of non-raptor individuals observed flying, 50.1 percent flew below the height of

the anticipated RSA, 32.8 percent flew at the height of the anticipated RSA and 17.1 percent flew above the height of the anticipated RSA (Table 5). Of raptor individuals observed flying, 69.2 percent flew below the height of the anticipated RSA and 30.8 percent flew at the height of the anticipated RSA. Data on flight direction are located in Appendix 1b. Generally, birds observed in flight were moving in a northwesterly direction (55.0 percent).

For the spring survey, Canada goose had the highest encounter rate (8.36 birds flying at RSA height/20 min; Table 6c), followed by snow goose (6.86 birds flying at RSA height/20 min, Table 6c). All other species had an encounter rate at or below 0.85 birds flying at RSA height/20 min.

Overall

Over the course of both survey seasons, snow goose had the highest encounter rate (10.01 birds flying at RSA height/20 min), followed by Canada goose 4.52 birds flying at RSA height/20 min). All other species had an encounter rate at or below 0.69 birds flying at RSA height/20 min (Table 6c).

3.3 Raptor Nest Surveys

The early season aerial survey was conducted on March 18th, followed by the ground-based surveys from mid-April to mid-May. Twenty-six (26) raptor nests were observed within 1 mile of the Project Area (Figure 7). No bald or golden eagle nests were observed during the surveys. Raptor nests detected within the Project Area included 4 Occupied red-tailed hawk nests, 2 Occupied Swainson's hawk nests, 1 Occupied great-horned owl nest, and 7 Unoccupied nests (Figure 7). Raptor nests found outside of the Project Area but within the 1-mile buffer included 4 Occupied red-tailed hawk nests, 1 Occupied Swainson's hawk nest, 1 Occupied great-horned owl nest, and 6 Unoccupied nests (Figure 7). All of the unoccupied nests were classified in the field as small nests, indicating that they are unlikely to be used by eagles.

3.4 Lek Surveys

Three rounds of grouse lek surveys were conducted within the Project Area and a surrounding 1-mile buffer (study area) from mid-March to mid-May. After the initial detection, each lek was observed again on 2 separate dates to determine activity and status. Fifteen active sharp-tailed grouse leks were detected (14 within the study area, and 1 immediately adjacent to the northern boundary of the Project Area; Figure 8). A total of 9 active sharp-tailed grouse leks with 4 or more males were detected and distributed throughout the study area. Leks that only had activity noted on the first observation date, or that had 3 or fewer displaying males, were considered satellite leks; a total of 6 active sharp-tailed grouse leks with reduced activity (satellite leks) were detected within the survey area, distributed primarily in the northern portion of the study area. The

number of displaying males ranged from 2 to 23 (average of 14 displaying males across all identified leks). No other grouse species were detected during the surveys.

3.5 Incidental Observations

Fall Survey

The biologist documented incidental observations of 18 species during fall point-count surveys (Table 7). Of the 18 species documented incidentally, 1 non-raptor species was not detected during fall point-count surveys: belted kingfisher. A singe belted kingfisher was detected flying below anticipated RSA over open water near point count location 13.

The biologist documented 5 raptor species incidentally, 1 of which was not detected during fall point count surveys: rough-legged hawk. This species was observed on 3 separate occasions. Other raptors documented incidentally that were detected during the fall point-count surveys include Swainson's hawk, red-tailed hawk, northern harrier, and American kestrel.

Spring Survey

The biologist documented incidental observations of 26 species during spring point-count surveys (Table 7), all of which were also detected during spring point-count surveys. A total of 412 birds of all species were observed, 1 of which was a bald eagle.

Raptor Nest Surveys

The biologist observed 43 individual bald eagles within the Eagle Survey Area during aerial raptor nest surveys. Most of the bald eagle observations occurred to the east of the Project Area. Only two bald eagles were observed within or adjacent to the Project Area; one bald eagle was observed within the Project Area and one was approximately 100 m to the west of the Project Area. Most of the bald eagles were observed flying, but 3 groups composed of 4-8 individuals were perched in trees at distances greater than 4 miles from the Project boundary.

3.6 Protected Species

No federally threatened or endangered birds were observed during avian point-count surveys or as an incidental observation. Three bald eagles were detected during avian point-count surveys. Observations included one immature (i.e., lacking adult plumage) bald eagle during the fall point-count survey, flying at the anticipated RSA height at point- count location 4, and two observations of bald eagle of unknown age during the spring point-count survey, flying below the anticipated RSA height at point- count locations 8 and 20 (Tables 4a and 4b). Additionally, one individual bald eagle was observed incidentally during the spring point-count surveys. No active eagle nests were found during the raptor nest surveys, although as noted above 43 bald eagles were observed

during the aerial raptor nest survey. No golden eagles were observed during the 2014 fall, 2015 spring, or raptor nest surveys or incidentally.

3.7 Comparison of the Fall and Spring Point-Count Surveys

Numbers of detections and species richness were greater in the spring (13,956 birds from 87 species including 363 unidentified to species) compared to fall (10,462 birds from 65 species including 1,057 unidentified to species; Table 2). There were 20 species detected in the fall (10 songbird, 5 raptor, 3 waterfowl, 1 tern, and 1 woodpecker species) that were not detected in the spring, and 31 species detected in the spring that were not detected in the fall (11 songbird, 7 waterfowl, 7 waterbird, 2 woodpecker, 2 raptor, 1 tern, and 1 crane/rail species), suggesting that the community of migrants using the area may differ between the two seasons.

Overall mean use in the spring was higher at 67.10 birds/20 min (90 percent CI = 47.89–86.30) compared to the 54.49 birds/20 min (90 percent CI = 41.82–67.16) in the fall although the seasonal mean use is not statically different given the overlap of the confidence intervals. Waterfowl had the highest mean use in both the fall and the spring. Within the waterfowl species group; snow goose and Canada goose were consistently the top two most common waterfowl species for both the spring and the fall surveys. The third most common waterfowl species was mallard in the fall and lesser scaup in the spring. The songbird species group had the second highest mean use among species groups for both the fall and spring surveys.

Raptor mean use varied from the 6th highest mean use among species groups in the fall to 8th highest mean use among species groups in the spring. The raptors with the highest mean use values were Swainson's hawk, red-tailed hawk, and northern harrier during fall surveys, and red-tailed hawk and northern harrier during spring surveys. Four raptor species (prairie falcon, turkey vulture, merlin, and broad-winged hawk) were only seen in the fall and two raptor species (rough-legged hawk and unidentified hawk) were only seen in the spring. Two other raptor species (great-horned owl and bald eagle) were observed in both seasons.

Flight behavior remained relatively consistent between seasons (Table 5). Waterfowl species had the highest encounter rate in both seasons (snow goose in fall, Canada goose in spring; Tables 6a and 6b). Over the course of both seasons, snow goose had the highest encounter rate, with the majority of the snow goose observations occurring in the spring (Tables 2 and 6c).

Spatial patterns in use were relatively consistent among seasons. Point count locations 13 and 2 had the highest rates of non-raptor use in both seasons mostly due to the proximity to open water which attracted migratory waterfowl and waterbirds (Tables 4a and 4b; Figure 4a and 4b). For raptors, point-count location 9 had the highest mean use rate in both seasons followed by point count location 15 in the fall (Table 4a and 4b; Figures 6a and 6b). Neither of these points

have features unique to the Project Area but both provide foraging and perching opportunities as well as shelterbelts for nesting opportunities.

4 Discussion

The avian community detected within the Project Area during fall and spring surveys was characterized by species associated with prairie potholes, agricultural lands, and grassland prairie vegetation typical of this part of North Dakota. Open flat lands that were suitable for development within the Project Area and vicinity have been developed for agricultural use, specifically crops such as wheat, sunflower, and alfalfa. Additional lands that were not suitable for active agriculture include fenced parcels devoted to tame pastureland with remnants of native grassland prairie that are used for cattle grazing or harvest hayfields, as well as wetlands of various sizes. Within this combination of disturbed habitats and wetlands, the greatest potential impact of wind facilities to avian species is collisions with turbines rather than disturbance or displacement.

Erickson et al. (2014) reported wind facilities within the prairie biome, including the northern Great Plains and agricultural regions of Minnesota and Iowa, with all- bird estimates ranging from 0.81 – 5.59 birds/MW/year.). Annual avian fatality rates at the Project, should fatalities occur, are expected to fall within this range.

4.1 Non-Raptor Use and Collision Risk

Fall Survey

During fall surveys, snow geese were identified as having potential risk of collision due to high encounter rates within the Project Area. Eleven snow goose fatalities have been recorded at wind facilities in the United States (Tetra Tech, 2013; Anderson et al. 2005). The snow goose is highly migratory in this region of North Dakota and would be at the greatest fatality risk for Project-related mortality during the spring and the fall migration periods. The low numbers of documented fatalities of this species at wind facilities within the Central Flyway (e.g., Jain 2005), and the fact that snow goose population in the Central Flyway region (Mid-continent population) that includes the Project Area is large (greater than 2 million; USFWS 2015b), suggests that Project-related fatalities would not have any population-level impacts for this species.

Songbirds were another species group that contained species demonstrating a number of collision risk factors. Mean use was highest for horned lark, but this species had a low encounter rate (0.00 birds flying at RSA height/20 min). Unidentified blackbirds had a relatively high encounter rate at 1.43 birds flying at RSA height/20 min). Horned larks and common blackbird species that are likely to comprise the unidentifiable group of blackbirds observed are local year-

round resident and transient migrant species within North Dakota that are commonly associated with the open pastureland-grassland prairie and row-crop agriculture habitats commonly found throughout the Project Area. Each of these species are widely distributed across North America. Horned lark and blackbird species have been documented as fatalities at other wind energy projects (Derby et al. 2007, ICF International 2014), particularly the horned lark, which exhibits breeding flight displays that may bring them into the height of the RSA (Johnson and Erickson 2011). Thus, risk of turbine-related fatalities exists for these species at the Project. The horned lark has experienced statistically significant decline in the North Dakota region between 1966 and 2013 (Sauer 2014). However, Project-related fatalities of horned lark and common blackbird species, should they occur, are unlikely to have population-level impacts due to the generally large populations for these species (80, and 5–120 million depending on blackbird species, respectively; PIFSC 2015).

Double-crested cormorants were identified as having potential risk of collision due to relatively high encounter rates. Based on publically available fatality data there has been only 1 recorded fatality of a double-crested cormorant (Kerlinger et al. 2006) at operational wind facilities. The double-crested cormorant is breeding resident in this region of North Dakota and would be at the greatest fatality risk during spring and fall migration. However, the lack of documented fatalities of this species at wind facilities within the Central Flyway (e.g., Jain 2005) and the fact that this species' population is stable and shows significant signs of increasing in North Dakota (Sauer 2014), suggests that Project-related fatalities are unlikely to have population-level impacts.

The remaining non-raptor species detected during the fall surveys have a low risk of turbine collisions at the Project due to a combination of relatively low mean use rates or low encounter rates.

Spring Survey

During spring surveys, 2 waterfowl species were identified as having potential risk of collision due to high encounter rates within the Project Area: Canada goose and snow goose. Similar to snow geese, few Canada goose fatalities have been detected as fatalities at wind energy facilities (Erickson et al. 2004, Jain et al 2007). The Canada goose is both a transient migrant species and local year-round resident in this region of North Dakota and the likely collision risk to this species would be highest in spring and fall. Again, similar to the snow goose, the low numbers of documented fatalities of this species at wind facilities within the Central Flyway suggests a low risk for Project-related fatalities. The Canada goose population in the Central Flyway region (Western Prairie and Great Plains Populations) that includes the Project Area is large (greater than 1 million; USFWS 2015b) and should Project-related fatalities occur, they should not have population-level impacts for this species.

Songbirds identified during the spring survey were similar to the fall survey in terms of risk for collisions. Mean use was highest for red-winged blackbird and brown-headed cowbird, and the red-winged blackbird had the third highest spring encounter rate of 0.85 birds flying at RSA height/20 min respectively. Red-winged blackbird is a local year-round resident and transient migrant species and is widely distributed across North America. The red-winged blackbird, and brown-headed cowbird, have all been documented as fatalities at other wind energy projects (Derby et al. 2007, Jain et al. 2011, Johnson and Erickson 2011). Thus, risk of turbine-related fatalities exists for each of these species at the Project. However, Project-related fatalities of red-winged blackbird and brown-headed cowbird, should they occur, are unlikely to have population-level impacts because populations for each species are large (8.2 and 12 million, respectively; PIFSC 2015).

4.2 Raptor Use and Collision Risk

A meta-analysis published in 2012 suggests that pre-construction studies provide poor indicators of post-construction mortality (Ferrer et al. 2012). Prior to this analysis, high raptor use (> 2.0 birds/20 min) had been thought to be associated with high raptor mortality at wind farms (Strickland et al. 2011). Conversely, raptor mortality often appears to be low when raptor use is low (< 1.0 birds/20 min; Strickland et al. 2011), which is the case for raptor use at the Project. As more wind energy facilities complete both pre- and post-construction studies, a better understanding of the relationship between bird use and fatality rates could be gained should the results become publicly available.

Fall and Spring Survey

Raptor species showing the highest mean uses and encounter rates were similar during both seasons. Red-tailed hawk, Swainson's hawk, and northern harrier had the highest overall mean use (0.17, 0.13, 0.10 birds/20 min, respectively) for the raptor species over the course of both survey seasons. These species were amongst the most frequently detected raptor species. Each of these three species are commonly associated with agricultural and grassland prairie habitats, which provide opportunities for foraging, an activity associated with increased susceptibility to turbine-collisions (Thelander et al. 2003). Additionally, all three raptor species have been recorded as fatalities at wind energy facilities in North America with publically available fatality results, including 214 records of red-tailed hawk, 12 records of Swainson's hawk, and 7 records of northern harrier (Erickson et al 2004, Jain 2005, BHE Environmental 2011, Grodsky and Drake 2011, Johnson and Erickson 2011 Downes and Gritski 2012a). Thus, risk of turbine-related mortality at the Project exists for each of these species.

In a study of raptor response to wind farms, red-tailed hawks were observed engaging in high-risk flight behaviors at operational wind facilities (Garvin et al. 2011). Project-related fatalities of

red-tailed hawk, however, are unlikely to have population-level impacts as the species is common throughout its range and experiencing population-wide increases, including in North Dakota (Sauer et al. 2014). Given the low overall encounter rates for Swainson's hawk (0.01 birds flying at the RSA height/20 mins; Table 6a), collision risk appears low for this species and the stable to increasing population in North Dakota (Sauer et al. 2014) suggests that project-related fatalities of Swainson's hawk, should they occur, are unlikely to have population-level impacts.

Risk of collision by northern harriers is believed to be low because the majority of foraging flights typically occur below RSA heights (Whitfield and Madders 2006). Thus, risk of turbine-related fatalities of northern harriers at the Project are expected to be low given the typical flight behavior exhibited by the species and the low encounter rate of 0.01 birds flying at the RSA height/20 min within the Project Area. Project-related fatalities of northern harrier, should they occur, are unlikely to have population-level impacts because northern harriers are common throughout their range and the North Dakota population is currently stable (Sauer et al. 2014).

Raptor Nest Surveys

Eight occupied red-tailed hawk nests, 3 Swainson's hawk nests, and 2 great horned owl nests were found within the Project Area and a 1-mile buffer. Drewitt and Langston (2008) suggested that bird activity in general is typically higher near active nests than areas without active nests; as a result, these species may have increased potential for collision as they repeatedly fly within the Project Area during nesting activities and during the time when young begin to fledge from the nests. As discussed above, Project-related fatalities, should they occur, are unlikely to have population-level impacts for red-tailed hawk or Swainson's hawk.

Fatalities of great horned owls have been recorded at wind energy facilities with publically available data (Miller 2008, Downes and Gritski 2012b). Given that the great horned owl is widespread and common throughout its range, with a stable population in North Dakota (Sauer 2014), Project-related fatalities, should they occur, are unlikely to have population-level effects.

Lek survey

The sharp-tailed grouse is considered a gamebird by the NDGFD and is afforded no special protection by the state. However, this species has experienced population declines linked to landscape-level land use changes, primarily due to habitat loss through the conversion of grasslands to cropland. Habitat loss, fragmentation, and degradation were the primary factors behind historic declines of federally-listed and candidate grouse species, and are considered the primary threats to existing prairie grouse populations, including sharp-tailed grouse (Hoffman and Thomas 2007). State and federal wildlife agencies have regularly expressed concern about the locations of wind turbines with respect to prairie grouse leks. Although generally considered at low risk of collision with turbines because of their low flight heights, sharp-tailed grouse

species may be susceptible to habitat fragmentation and displacement caused by development of wind facilities. Winder et al. (2015) observed a reduced probability of greater prairie-chicken lek persistence within proximity to turbines (the probability that a lek persisted was about 50 percent when distance between turbines and lek sites is less than 1-km). Nine active sharp-tailed grouse leks were observed within the Project Area and one-mile buffer, with 6 additional leks with reduced activity (satellite leks) observed within the same survey area. Based on the high density of leks and availability of grassland habitat, there is the potential for Project-related impacts to displace sharp-tailed grouse.

4.3 Protected Species

No federally-listed threatened or endangered species were detected during avian point-count surveys; however, the observations of bald eagles indicate this species has the potential to occur in the Project Area during the spring and fall. Bald eagles are ubiquitous in areas of North America with large water bodies. Although no historic bald eagle nests are known to occur within the Project area and 10-mile radius, the James River system to the east of the Project Area may provide suitable habitat for nesting bald eagles and may attract wintering bald eagles to the vicinity of the Project Area. Additionally, seasonally high use of the area by waterfowl may support a seasonal influx of bald eagles to the Project Area, as waterfowl are a major prey item for bald eagles. Bald eagles had an overall low encounter rate at the Project (<0.01 birds flying at the RSA height/20 min; Table 6c) and Pagel et.al. (2013) found that only six individuals had been found as fatalities at North American wind facilities through 2012, suggesting risk of turbine-related collision at the Project is low.

5 Foxtail Wind Energy Center Conclusions

Results of the fall 2014 and spring 2015 avian surveys at the Foxtail Wind Energy Center suggest an overall low impact of the Project development on the local avian community. The overall mean-use rate at the Project by non-raptors is primarily driven by observations of large flocks of a few common migratory/residential waterfowl species, such as snow goose and Canada goose, and migratory/residential songbirds, such as red-winged blackbird, brown headed cowbird, and horned lark. Although there is a potential for greater risk of turbine-related fatalities of snow goose and Canada goose in the Project Area, as noted in the high encounter rates, fatalities of these species are not expected to have population-level impacts. Proper siting of Project facilities away from wetland habitats such as at point 13 may help to further reduce the risk of fatalities to waterfowl and songbirds. Additionally, the potential for turbine-related fatalities exists for nocturnal migrant species not identifiable by the methods used in this study.

No federally-listed threatened or endangered species were detected during avian point-count surveys. Low numbers of bald eagles were observed during the spring and fall surveys.

6 References

Anderson, R., J. Tom, N. Neumann, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay and K.J. Semka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area: Phase I and Phase II Field Work. Prepared for the National Renewable Energy Laboratory, Golden, CO. Subcontract No(s). TAM-7-16454-01, ZAT-6-15179-02. 138 pgs.

Arnett, E.B., D.B. Inkley, D.H. Johnson, R.P. Larkin, S. Manes, A.M. Manville, J.R. Mason, M.L. Morrison, M.D. Strickland, and R. Thresher. 2007. Impacts of wind energy facilities on wildlife and wildlife habitat. Wildlife Society Technical Review 07-2. The Wildlife Society, Bethesda, MD.

Ballam, J.M. 1984. The use of soaring by the red-tailed hawk (*Buteo jamaicensis*). Auk 3:519-524.

Beveridge, L.J. 2005. The Migratory Bird Treaty Act and wind development. North American Wind Power September: 36-38.

Bryce, S., J. M. Omernik, D. E. Pater, M. Ulmer, J. Schaar, J. Freeouf, R. Johnson, P. Kuck, and S. H. Azevedo. 1998. Ecoregions of North Dakota and South Dakota. Jamestown, N. D.: North Prairie Wildlife Research Center Online. Available at: http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/46k.htm.

BHE Environmental, Inc. (BHE). 2011. Post-Construction Bird and Bat Mortality Study: Cedar Ridge Wind Farm, Fond Du Lac County, Wisconsin. Final Report. Prepared for Wisconsin Power and Light, Madison, Wisconsin. Prepared by BHE Environmental, Inc. Cincinnati, Ohio. February 2011.

Davis, D.M., R.E. Horton, E.A. Odell, R.D. Rodgers, and H.A. Whitlaw. 2008. Lesser Prairie Chicken Conservation Initiative. Lesser Prairie Chicken Interstate Working Group. Unpublished Report. Colorado Division of Wildlife, Fort Collins, CO. USA. Online at: http://www.wafwa.org/documents/LPCCI_FINAL.pdf.

Devereux, C.L., M.J.H. Denny, and M.J. Whittingham. 2008. Minimal effects of wind turbines on the distribution of wintering farmland birds. Journal of Applied Ecology 45:1689-1694.

Derby, C., A. Dahl, W. Erickson, K. Bay, and J. Hoban. 2007. Post-Construction Monitoring Report for Avian and Bat Mortality at the NPPD Ainsworth Wind Farm. Prepared for Nebraska Public Power District, Columbus, NE. 24 pgs.

Downes, S.D., and B. Gristki. 2012a. White Creek Wind I wildlife monitoring report, November 2007- November 2011. Prepared for White Creek Wind I, LLC. Roosevelt, Washington. May 1, 2012

Downes, S.D., and B. Gristki. 2012b. Harvest Wind Project Wildlife Monitoring Report, January 2010 - January 2012. Prepared for Harvest Wind Project, Roosevelt, Washington. May 1, 2012.

Drewitt, A.L. and R.H.W. Langston. 2008. Collision effects of wind-power generators and other obstacles on birds. Pages 233-266 *in* R. S. Ostfeld and W. H. Schlesinger, editors. Year in Ecology and Conservation Biology 2008. Blackwell Publishing, Oxford.

Drewitt, A.L. and R.H.W. Langston. 2006. Assessing the impacts of wind farms on birds. Ibis 148:29-42.

Erickson, W.P., M. Wolf, K. Bay., D. Johnson, and J. Gehring. 2014. A Comprehensive Analysis of Small-Passerine Fatalities from Collision with Turbines at Wind Energy Facilities. Plos One (9:9): e107491, pp.1-17.

Erickson, W.P., G.D. Johnson and D.P. Young Jr. 2005. A summary and comparison of bird mortality from anthropogenic causes with an emphasis on collision. USDA Forest Service Gen. Tech. Rep PSWGTR(191): 1029-1042.

Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Annual Report. July 2001 - December 2003. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee. Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. December 2004.

Erickson, W.P., 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. Technical report prepared by WEST, Inc., for Bonneville Power Administration, Portland, OR.

Ferrer, M., M. de Lucas, G.F.E. Janss, E. Casado, A.R. Muñoz, M.J. Bechard, and C.P. Calabuig. 2012. Weak relationship between risk assessment studies and recorded mortality in wind farms. Journal of Applied Ecology. 49(1): 38-46. Available online at http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2011.02054.x/pdf.

Garvin, J.C., Jennelle, C.S., Drake, D. and Grodsky, S. M. 2011, Response of raptors to a windfarm. Journal of Applied Ecology, 48: 199–209.

Grodsky, S.M. and D. Drake. 2011. Assessing Bird and Bat Mortality at the Forward Energy Center. Final Report. Public Service Commission (PSC) of Wisconsin. PSC REF#:152052. Prepared for Forward Energy LLC. Prepared by Department of Forest and Wildlife Ecology, University of Wisconsin-Madison, Madison, Wisconsin. August 2011.

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.

Hoffman, R.and A.Thomas. 2007. Columbian Sharp-tailed Grouse (Tympanuchus phasianellus columbianus): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/columbiansharptailedgrouse.pdf.

ICF International. 2014. Fatality detection data from monitoring at the Altamont Pass Wind Resource Area from 1998 - 2013. Data downloaded on May 29, 2014. Data available online at https://ecosystems.icfwebservices.com/#/WindData.

Jain, A.A., R.R. Koford, A.W. Hancock, and G.G. Zenner. 2011. Bat Mortality and Activity at a Northern Iowa Wind Resource Area. Am. Mid. Natur. 165: 185-200.

Jain, A., P. Kerlinger, R. Curry, and L. Slobodnik. 2007. Annual report for the Maple Ridge wind power project post-construction bird and bat fatality study—2006. Prepared by Curry and Kerlinger, LLC for PPM Energy, Horizon Energy, and Technical Advisory Committee for the Maple Ridge Project.

Jain, A.A. 2005. Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm. Thesis submitted to Iowa State University, Ames, IA. 113 pgs.

Johnson, G.D. and W.P. Erickson. 2011. Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon. Prepared by West, Inc. for Klickitat County, Washington

Johnson, G.D., C. LeBeau, R. Neilsen, T. Rintz and J. Eddy. 2012. Greater Sage-Grouse Habitat Use and Population Demographics at the Simpson Ridge Wind Resource Area, Carbon County, Wyoming. Final Report prepared for EBP Renewables, Houston, Texas.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, and S.A. Sarappo. 2002. Collision mortality of local and migrant birds at a large-scale wind power development on Buffalo Ridge, Minnesota. Wildlife Society Bulletin 30:879-887.

Kerlinger, P., R. Curry, L. Culp, A. Jain, C. Wilkerson, B. Fischer, and A. Hasch. 2006. Post-Construction Avian and Bat Fatality Monitoring for the High Winds Wind Power Project, Solano County, California: Two Year Report. Prepared for High Winds LLC, FPL Energy by Curry and Kerlinger, LLC. April 2006.

Kerns, J. and P. Kerlinger. 2004. A study of bird and bat collision fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual report for 2003. Technical report prepared by Curry and Kerlinger, LLC for FPL Energy and Mountaineer Wind Energy Center Technical Review Committee.

Leddy, K.L., K.F. Higgins, and D.E. Naugle. 1999. Effects of wind turbines on upland nesting birds in CRP grasslands. Wilson Bulletin 111:100-104.

Manville, A.M., II. 2004. Prairie grouse leks and wind turbines: U.S. Fish and Wildlife Service justification for a 5-mile buffer from leks; additional grassland songbird recommendations. Division of Migratory Bird Management, USFWS, Arlington, VA, peer-reviewed briefing paper.

Martin, G.R. 2011. Understanding bird collisions with man-made objects: a sensory ecology approach. Ibis 153(2):239-254.

Miller, A. 2008. Patterns of Avian and Bat Mortality at a Utility-scaled Wind Farm on the Southern High Plains. Masters Thesis. Wildlife Biology. Texas Tech University, Lubbock, TX.

Nagy, L., B. Gibson, K.L. Kosciuch, and J. Taylor. 2011. Whooping and Sandhill Crane Behavior at an Operating Wind Farm. Poster presented at American Wind Energy Association Annual Meeting, Pasadena, CA.

NDGFD (North Dakota Game and Fish Department). 2015. Threatened and Endangered Species. Available online at http://www.gf.nd.gov/wildlife/fish-wildlife/threatened-and-endangered-species.

Nature Worldwide. 2015. Birds: World Institute for Conservation and Environment, WICE. Birds of North Dakota. Available online at http://www.birdlist.org/checklists_of_the_birds_of_the_united_states/birds_of_north_dakota.htm.

Orloff, S. and A. Flannery. 1992. Wind turbine effects on avian activity, habitat use, and mortality in Altamont Pass and Solano County Wind Resource Areas, 1989-1991. Final report prepared by Biosystems Analysis, Inc. for Alameda, Contra Costa, and Solano Counties and the California Energy Commission.

Pagel, J.E, K.J. Kritz, B.A. Millsap and R.K. Murphy, E.L. Kershner and S. Covington. 2013. Bald Eagle and Golden Eagle Mortalities at Wind Energy Facilities in the Contiguous United States. J. of Raptor Research, 47(3):311-315.

Pearce-Higgins, J.W., L. Stephen, A. Douse, and R.H.W. Langston. 2012. Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology 49: 386-394.

PIFSC (Partners in Flight Science Committee) 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates.

Pitman, J.C. 2011 Prairie Chicken Lek Survey- 2011. Performance report. Prepared for Kansas Department of Wildlife and Parks.

Pitman, J.C., C.A. Hagen, R.J. Robel, T.M. Loughin, and R.D. Applegate. 2005. Location and success of lesser prairie-chicken nests in relation to vegetation and human disturbance. Journal of Wildlife Management 69:1259-1269.

Pruett, C.L., M.A. Patten and D.H. Wolfe. 2009. Avoidance Behavior by Prairie Grouse: Implications for Development of Wind Energy. Conservation Biology 23:1253-1259.

Sandercock, B., S. Wisely, L. McNew, A. Gregary, V. Winder, L. Hunt. 2013. Environmental Impacts of Wind Power Development on the Population Biology of Greater Prairie-Chickens. Final Technical Report for Department of Energy: DE-EE0000526.

Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015 USGS Patuxent Wildlife Research Center, Laurel, MD

Shaffer, J.A. and D.H. Johnson. 2009. Displacement effects of wind developments on grassland birds in the northern Great Plains. NWCC Wind Wildlife Conference [Presentation], October 2008. Milwaukee, WI. Prepared for NWCC by S.S Schwartz and Published 2009. Available online at: https://www.nationalwind.org/assets/research_meetings/Research_Meeting_VII_Shaffer.pdf.

Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Shaffer, and W. Warren-Hicks. 2011. Comprehensive Guide to Studying Wind Energy/Wildlife Interactions. Prepared for the National Wind Coordinating Collaborative, Washington, D.C. http://www.nationalwind.org/assets/publications/Comprehensive_Guide_to_Studying_Wind_Energy_Wildlife_Interactions_2011_Updated.pdf.

Tetra Tech. 2013. Database of publicly available post-construction fatality rates and records of bird and bat fatality at North American wind projects. Unpublished report.

Thelander, C.G., K.S. Smallwood, and L. Rugge. 2003. Bird Risk Behaviors and Fatalities at the Altamont Pass Wind Resource Area: Period of Performance: March 1998-December 2000.

Thompson, W.L. 2002. Towards reliable bird surveys: accounting for individuals present but not detected. Auk 119:18-25.

USFWS. 2016. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests. Final Rule. Federal Register 81(242): 91494-91554.

USFWS (United States Fish and Wildlife Service). 2015a. Flyways. Retrieved from: http://flyways.us/flyways/info.

USFWS. 2015. Waterfowl population status, 2015. U.S. Department of the Interior, Washington, D.C. USA. Available online at: http://www.fws.gov/migratorybirds/pdf/surveys-and-data/Population-status/WaterfowlPopulationStatusReport.pdf .

USFWS. 2013a. Eagle Conservation Plan Guidance. Module 1 – Land-based Wind Energy. Version 2. USFWS Division of Migratory Bird Management. April 2013.

USFWS. 2013b. ESA Basics: More Than 30 Years of Conserving Endangered Species. Retrieved from: http://www.fws.gov/endangered/esa-library/pdf/ESA_basics.pdf.

USFWS. 2012. U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines. Available from: http://www.fws.gov/windenergy/docs/WEG_final.pdf

WEST (Western EcoSystems Technology, Inc.). 2011. Presentation at the Northwest Wind Energy and Wildlife Workshop. June 7-8, 2011, Portland, Oregon.

Whitfield, D.P. and M. Madders. 2006. Flight height in the hen harrier *Circus cyaneus* and its incorporation in wind turbine collision risk modeling. Natural Research Information Note 2. Natural Research Ltd, Banchory, UK.

Winder, V., A. Gregory, L. McNew, B. Sandercock. 2015. Responses of male Greater Prairie-Chickens to wind energy development. DOI: 10.1650/Condor: 14-98.1.

Tetra Tech staff who contributed to the writing of this report

Jennifer Taylor	July 13, 2015
Report Author	**Date**
Jim Kowalsky	August 2, 2015
Peer Review #1	**Date**
Michael Thompson	August, 14, 2015
Peer Review #2	**Date**
Dale Bennett	August 20, 2015
Project Manager	**Date**
Kristina Dick	July 13, 2015
GIS	**Date**

FIGURES

This page intentionally left blank

Logan County
La Moure County
McIntosh County
Dickey County
McPherson County
Brown County

Cottonwood Creek
Maple Creek
Maple River
South Fork Maple River
Elm River
Dry Branch
Dry Run Creek
Willow Creek
Foot Creek

Miller Lake
Coldwater Lake
Pheasant Lake
Elm Lake
Long Lake
Alkali Lake

34
62
66
13
64
281
56
2
9
11
3A
21
6
23
5
19
7
10
8

1:250,000 NAD 1983 StatePlane North Dakota South FIPS 3302 Feet

0 0.5 1 2 3 4 5 6 7 8 9 10 Miles

Figure 1

Foxtail Wind Energy Center

NEXTera ENERGY RESOURCES

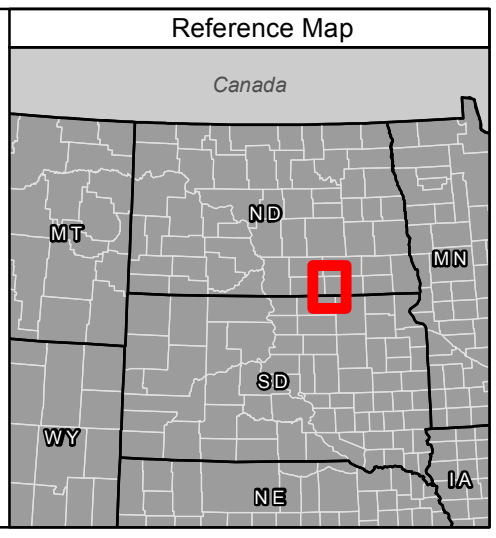
Vicinity Map

DICKEY COUNTY, ND

- Proposed Project Boundary (01-03-2017)
- Secondary Highway
- Secondary Road
- County Boundary
- River/Stream
- Lake/Pond

TETRA TECH

Reference Map



P:\GIS_PROJECTS\NextEra\Foxtail\MXDs\2017\ReportUpdates\NextEra_Foxtail_AvianSurvey_Figure1_Vicinty_17i11i_20150727_Updated20170828.mxd

PC 13
PC 14
PC 07
PC 01
PC 02
PC 03
PC 16
PC 17
PC 12
PC 18
PC 09
PC 19
PC 08
PC 04
PC 20
PC 10
PC 11
PC 05
PC 06
PC 15

Copyright:© 2013 National Geographic Society, i-cubed

1:50,000 NAD 1983 StatePlane North Dakota South FIPS 3302 Feet

0 0.5 1 2 3 Miles

Figure 2

Foxtail Wind Energy Center

NEXTera ENERGY RESOURCES

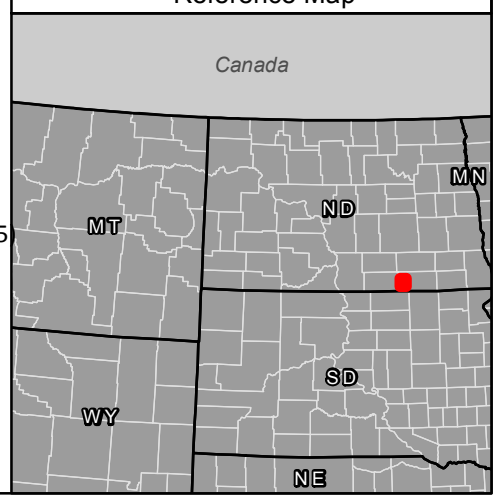
Point-Count Location Map (Fall 2014 and Spring 2015)

DICKEY COUNTY, ND

- Proposed Project Boundary (01-03-2017)
- Secondary Road
- Avian Survey Point (Fall 2014 Only)
- Avian Survey Point (Spring 2015 Only)
- Avian Survey Point (Fall 2014 and Spring 2015)
- Avian Survey Point 800-m Radius (Fall 2014)
- Avian Survey Point 800-m Radius (Spring 2015)
- Avian Survey Point 800-m Radius (Fall 2014 and Spring 2015)

TETRA TECH

Reference Map



P:\GIS_PROJECTS\NextEra\Foxtail\MXDs\2017\ReportUpdates\NextEra_Foxtail_AvianSurvey_Figure2_PClocation_17i11i_20150727_Updated20170828.mxd

Figure 3a. Non-raptor mean use by survey date in Fall 2014 at the Foxtail Wind Energy Center.

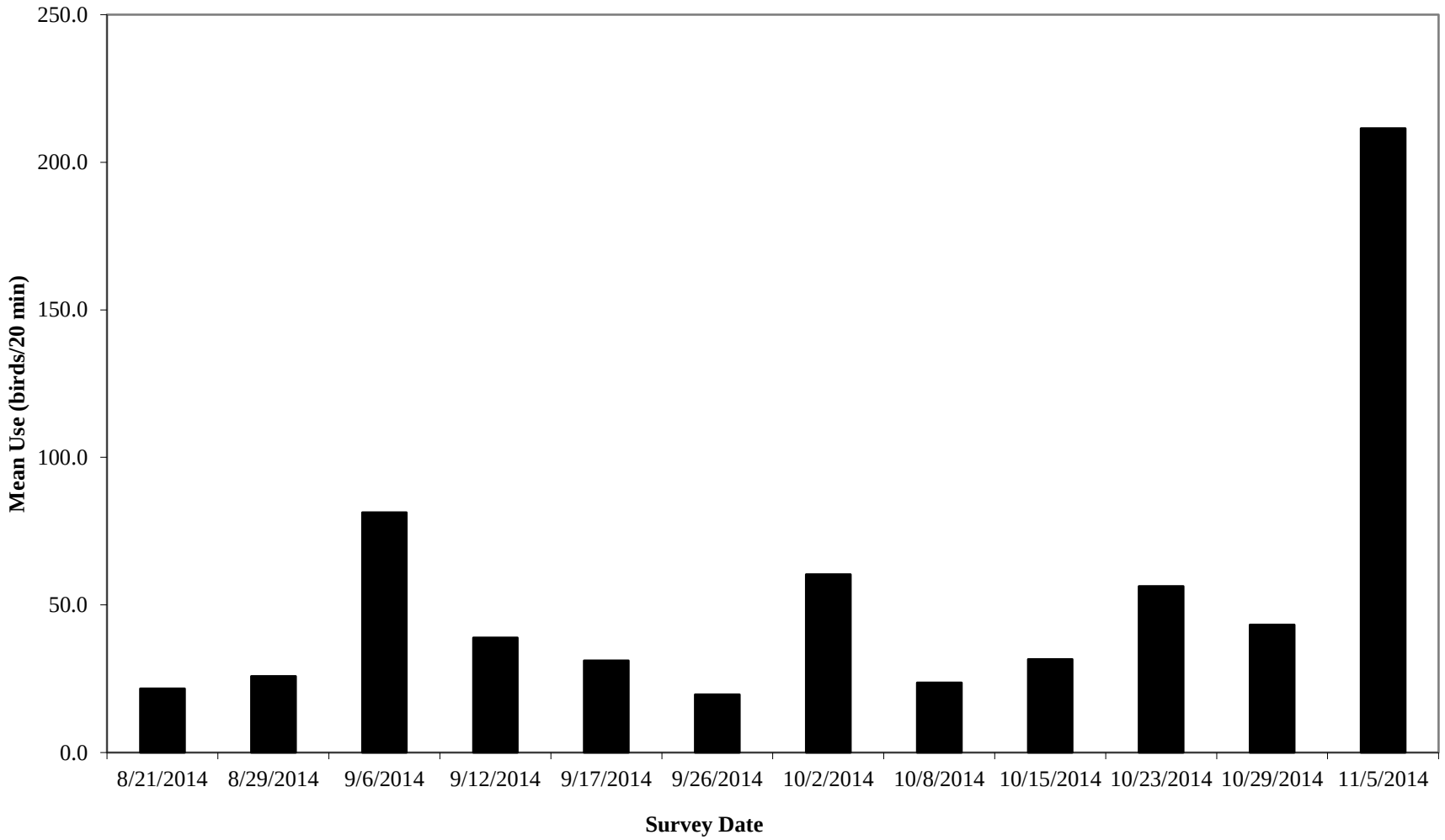
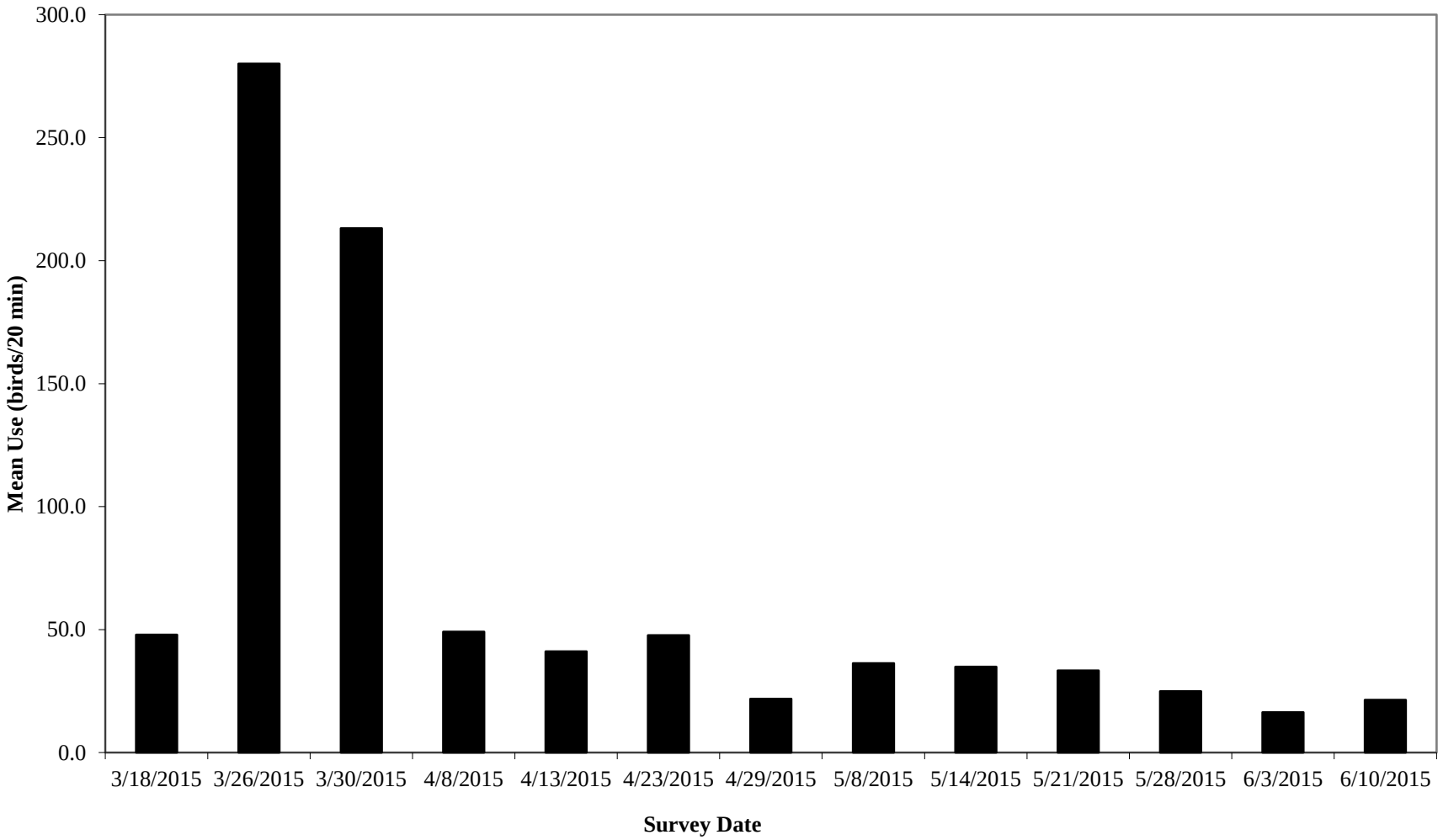


Figure 3b. Non-raptor mean use by survey date in Spring 2015 at the Foxtail Wind Energy Center.



167.25
PC 13
42.31
PC 14
108.25
PC 02
42.31
PC 03
34.42
PC 16
42.31
PC 01
44.50
PC 07
31.58
PC 12
34.75
PC 08
49.58
PC 09
42.31
PC 04
31.25
PC 10
74.17
PC 11
32.92
PC 05
23.25
PC 06
59.33
PC 15

Copyright:© 2013 National Geographic Society, i-cubed

1:50,000 NAD 1983 StatePlane North Dakota South FIPS 3302 Feet

0 0.5 1 2 3 Miles

Figure 4a

Foxtail Wind Energy Center

NEXTera ENERGY RESOURCES

Non-raptor mean use by point count location (Fall 2014)

DICKEY COUNTY, ND

Proposed Project Boundary (01-03-2017)

Secondary Road

Non-raptors Per 20 Minutes

0.01- 40.00

40.01 - 80.00

80.01 - 120.00

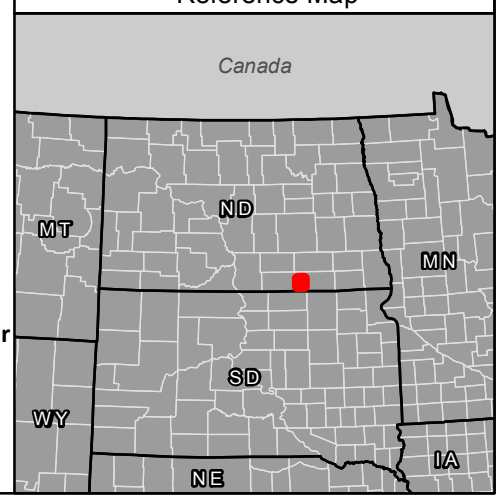
160.01 - 200.00

Mean use value

PC# Point count number

TETRA TECH

Reference Map



P:\GIS_PROJECTS\NextEra\Foxtail\MXDs\2017\ReportUpdates\NextEra_Foxtail_AvianSurvey_Figure4a_NonRapMU_17i11i_20150925_20170828.mxd

207.85
PC 13
84.85
PC 02
21.85
PC 16
52.92
PC 07
32.00
PC 17
158.38
PC 12
52.92
PC 18
28.08
PC 09
32.31
PC 19
73.54
PC 08
65.08
PC 20
31.31
PC 10
22.38
PC 11
38.15
PC 05
96.00
PC 06
70.69
PC 15

WHITESTONE
WHITESTONE HILLS
WHITESTONE
GERMAN VALLEY
GERMAN VALLEY
GRAND VALLEY
GRAND VALLEY
WHITESTONE HILLS
WHITESTONE

56
11

Copyright:© 2013 National Geographic Society, i-cubed

1:50,000 NAD 1983 StatePlane North Dakota South FIPS 3302 Feet

0 0.5 1 2 3 Miles

Figure 4b

Foxtail Wind Energy Center

NEXTera ENERGY RESOURCES

Non-raptor mean use by point count location (Spring 2015)

DICKEY COUNTY, ND

Proposed Project Boundary (01-03-2017)

Secondary Road

Non-raptors Per 20 Minutes

0.01 - 50.00

50.01 - 100.00

100.01 - 150.00

150.01 - 200.00

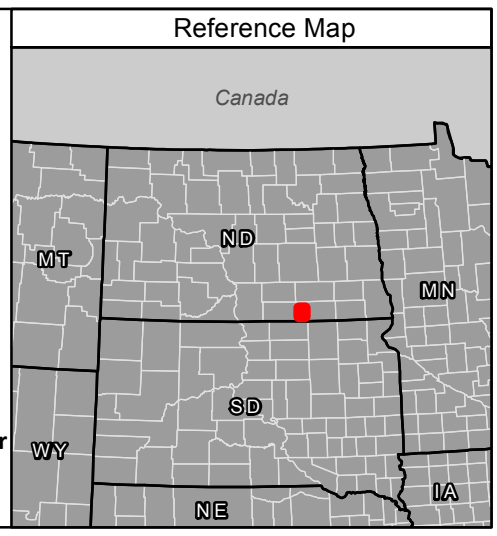
200.01 - 250.00

Mean use value

PC# Point count number

TETRA TECH

Reference Map



P:\GIS_PROJECTS\NextEra\Foxtail\MXDs\2017\ReportUpdates\NextEra_Foxtail_AvianSurvey_Figure4b_NonRapMU_17i11i_20150925_20170828.mxd

Figure 5a. Raptor mean use by survey date in Fall 2014 at the Foxtail Wind Energy Center.

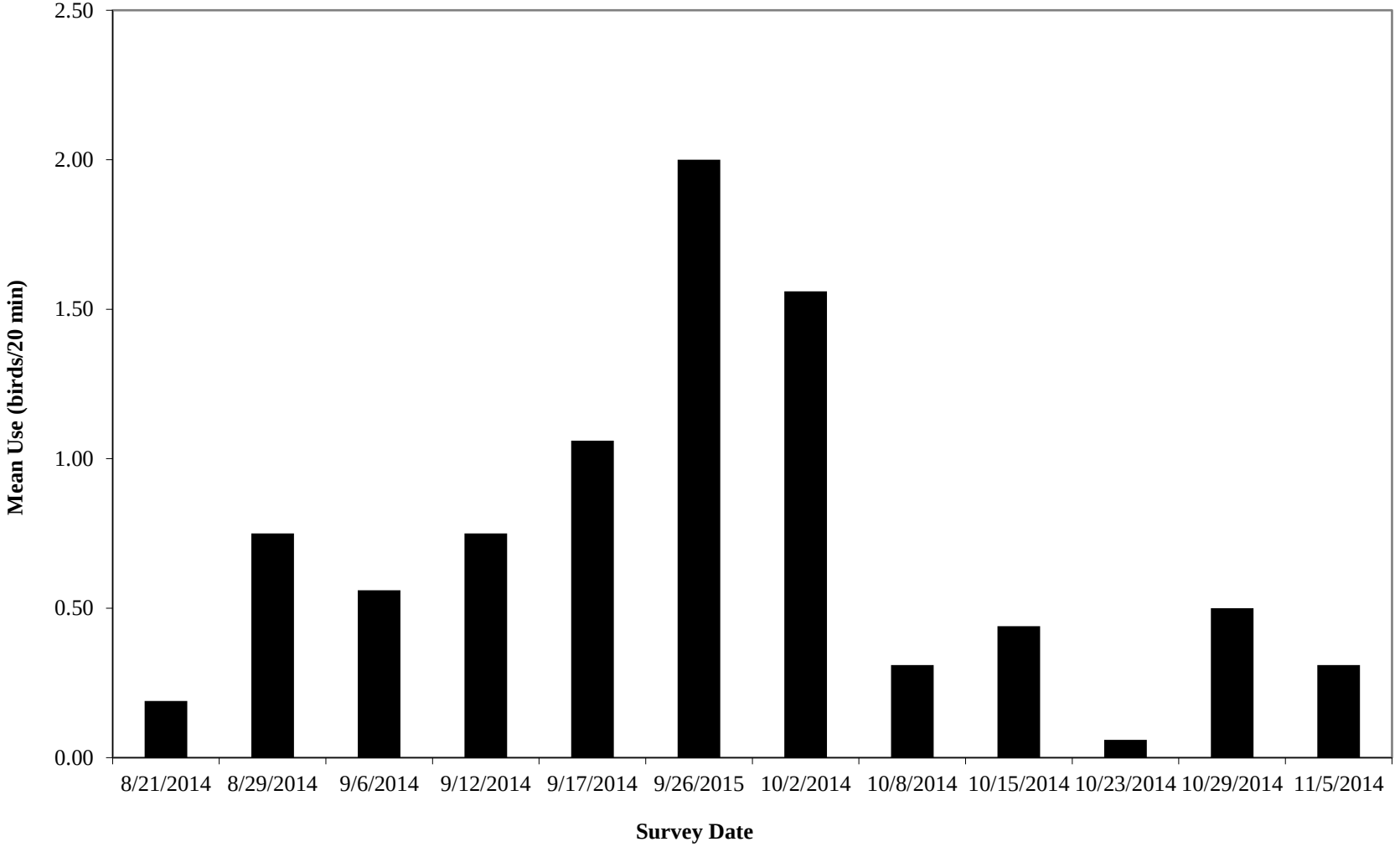
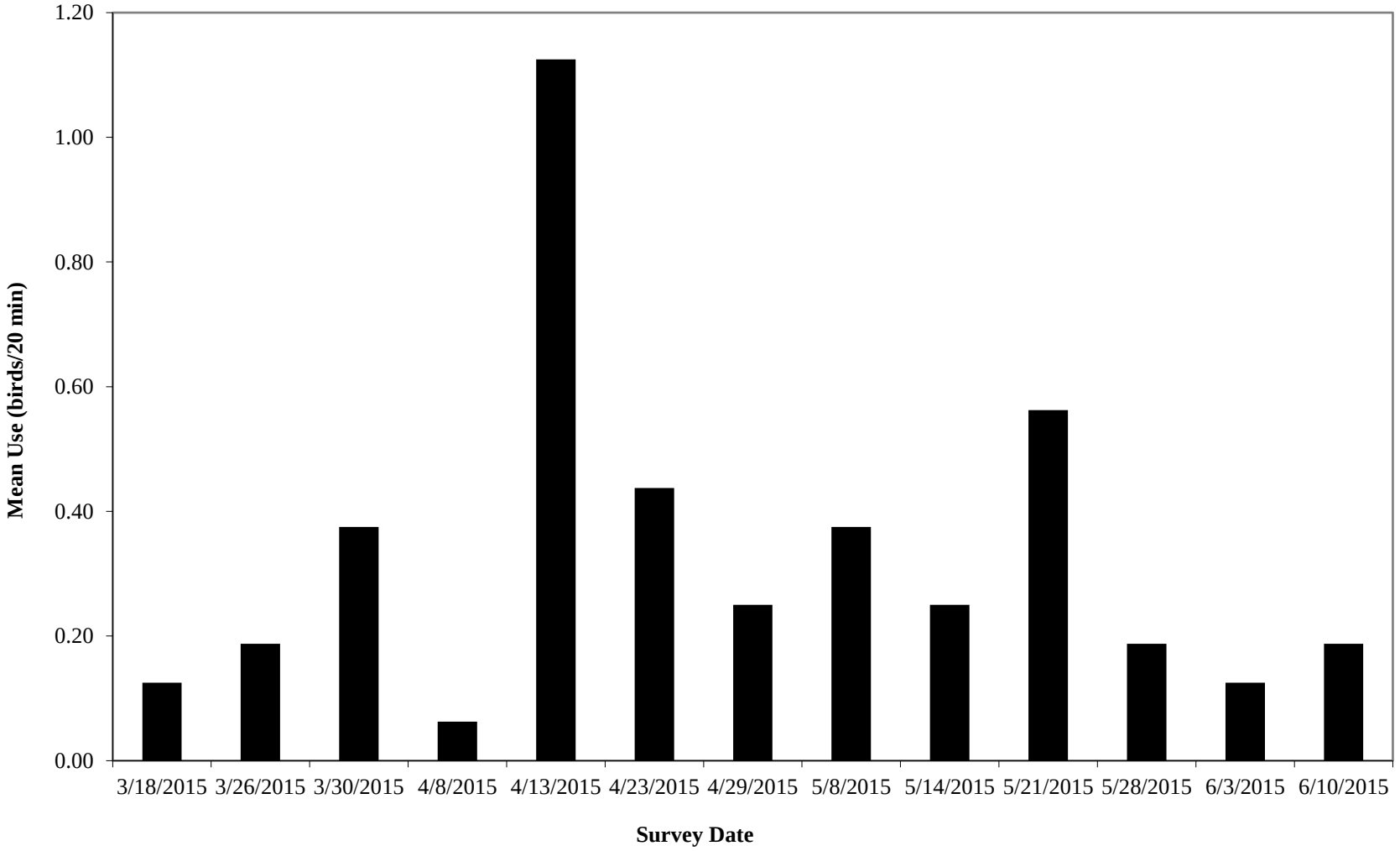


Figure 5b. Raptor mean use by survey date in Spring 2015 at the Foxtail Wind Energy Center.



0.33
PC 13
0.67
PC 14
0.83
PC 07
0.67
PC 01
0.58
PC 02
0.67
PC 03
0.50
PC 16
0.83
PC 12
0.25
PC 08
0.58
PC 10
0.42
PC 11
1.42
PC 09
0.67
PC 04
0.92
PC 05
0.58
PC 06
1.42
PC 15

1:50,000 NAD 1983 StatePlane North Dakota South FIPS 3302 Feet

0 0.5 1 2 Miles

Figure 6a

Foxtail Wind Energy Center

NEXTera ENERGY RESOURCES

Raptor Mean Use by Point-Count Location (Fall 2014)

DICKEY COUNTY, ND

Proposed Project Boundary (01-03-2017)

Secondary Road

Raptors Per 20 Minutes

0.01 - 0.30

0.31 - 0.60

0.61 - 0.90

0.91 - 1.20

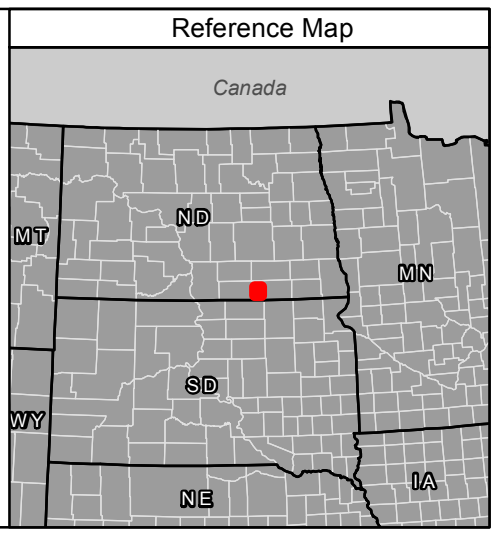
1.21 - 1.50

Mean use value

PC# Point count number

TETRA TECH

Reference Map



P:\GIS_PROJECTS\NextEra\Foxtail\MXDs\2017\ReportUpdates\NextEra_Foxtail_AvianSurvey_Figure6a_RaptorMU_17i11i_20150925_Updated20170828.mxd

0.00
PC 13
0.08
PC 02
0.00
PC 16
0.46
PC 07
0.85
PC 17
0.54
PC 12
0.38
PC 18
0.62
PC 09
0.23
PC 19
0.54
PC 08
0.54
PC 20
0.08
PC 10
0.31
PC 11
0.31
PC 05
0.08
PC 06
0.23
PC 15

1:50,000 NAD 1983 StatePlane North Dakota South FIPS 3302 Feet

0 0.5 1 2 Miles

Figure 6b

Foxtail Wind Energy Center

NEXTera ENERGY RESOURCES

Raptor Mean Use by Point Count Location (Spring 2015)

DICKEY COUNTY, ND

Proposed Project Boundary (01-03-2017)

Secondary Road

Raptors Per 20 Minutes

Zero

0.01- 0.30

0.31 - 0.60

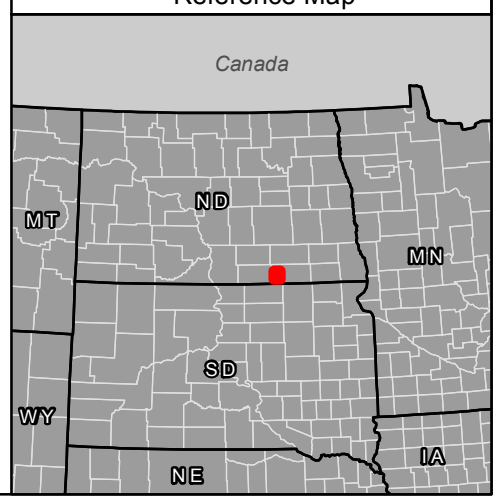
0.61 - 0.90

 # Mean use value

PC# Point count number

TETRA TECH

Reference Map



P:\GIS_PROJECTS\NextEra\Foxtail\MXDs\2017\ReportUpdates\NextEra_Foxtail_AvianSurvey_Figure6b_RapMU_17i11i_20150925_Updated20170828.mxd

66
13
64
281
56
19
2
22
23
21
8
20
1
25
3
9
7
6
24
14
18
15
17
5
4
16
10
13
11
26
12
9
2
11
23
3A
21
6
8
19
5

1:175,000 NAD 1983 StatePlane North Dakota South FIPS 3302 Feet

0 0.5 1 2 3 4 Miles

Figure 7

Foxtail Wind Energy Center

NEXTera ENERGY RESOURCES

Raptor Nest Location Map (Spring 2015)

DICKEY COUNTY, ND

Proposed Project Boundary (01-03-2017)

1-mile Buffer

10-mile Buffer

Secondary Highway

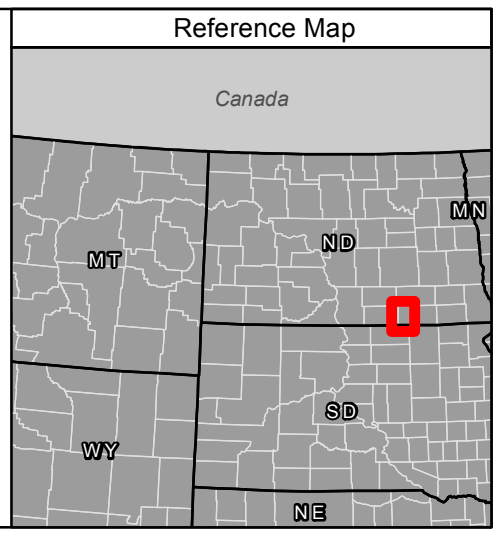
Secondary Road

Species, Status

- Great Horned Owl, Occupied
- Red-tailed hawk, Occupied
- Swainson's hawk, Occupied
- Unknown, Unoccupied

TETRA TECH

Reference Map



P:\GIS_PROJECTS\NextEra\Foxtail\MXDs\2017\ReportUpdates\NextEra_Foxtail_AvianSurvey_Figure7a_Raptor_17i11i_20150925_Updated20170828.mxd

1:55,000 NAD 1983 StatePlane North Dakota South FIPS 3302 Feet

0 0.5 1 2 3 Miles

Figure 8
Foxtail Wind Energy Center

NEXTera ENERGY RESOURCES

Lek Location Map (Spring 2015)

DICKEY COUNTY, ND

Proposed Project Boundary (01-03-2017)

1-mile Buffer

Secondary Road

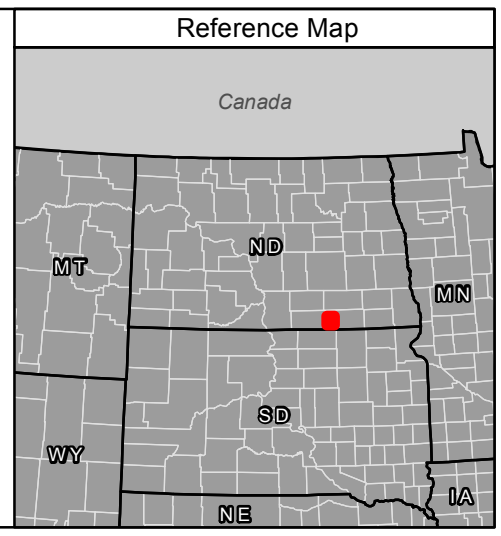
Lek Locations

Active Lek

Reduced Activity (Satellite) Lek

TETRA TECH

Reference Map



P:\GIS_PROJECTS\NextEra\Foxtail\MXDs\2017\ReportUpdates\NextEra_Foxtail_AvianSurvey_Figure8_Lek_17i11i_20150803_Updated20170828.mxd

TABLES

This page intentionally left blank

Table 1. Foxtail Wind Energy Center point-count survey dates.

	Survey Number	Date(s)
Fall 2014		
	1	8/20-8/23
	2	8/29
	3	9/6-9/7
	4	9/12
	5	9/17-9/18
	6	9/26
	7	10/2-10/3
	8	10/8
	9	10/15-10/16
	10	10/23
	11	10/29-10/30
	12	11/5-11/6
Spring 2015		
	1	3/17-3/18
	2	3/26
	3	3/30
	4	4/8
	5	4/13-4/14
	6	4/23
	7	4/29-4/30
	8	5/8
	9	5/14-5/15
	10	5/21
	11	5/27-5/28
	12	6/3
	13	6/10-6/11

Table 2. Avian mean use, by species group, observed during point-count surveys at the Foxtail Wind Energy Center 2014-2015.

Species Group Species	Fall 2014			Spring 2015			Overall		
	# Birds	# Obs.	Mean Use # birds/ 20 min.	# Birds	# Obs.	Mean Use # birds/20 min.	# Birds	# Obs.	Mean Use # birds/ 20 min.
Waterfowl									
snow goose	3031	15	15.79	3698	21	17.78	6729	36	16.82
Canada goose	1213	91	6.32	4288	158	20.62	5501	249	13.75
mallard	332	34	1.73	305	90	1.47	637	124	1.59
unidentified duck	215	16	1.12	345	20	1.66	560	36	1.40
lesser scaup	0	0	0.00	382	30	1.84	382	30	0.96
tundra swan	83	12	0.43	19	2	0.09	102	14	0.26
gadwall	36	4	0.19	60	18	0.29	96	22	0.24
blue-winged teal	18	4	0.09	69	29	0.33	87	33	0.22
redhead	0	0	0.00	73	21	0.35	73	21	0.18
common goldeneye	0	0	0.00	46	5	0.22	46	5	0.12
northern pintail	4	1	0.02	21	12	0.10	25	13	0.06
ruddy duck	0	0	0.00	19	6	0.09	19	6	0.05
bufflehead	15	3	0.08	4	3	0.02	19	6	0.05
greater white-fronted goose	18	1	0.09	0	0	0.00	18	1	0.05
northern shoveler	2	1	0.01	15	7	0.07	17	8	0.04
green-winged teal	0	0	0.00	4	2	0.02	4	2	0.01
American black duck	0	0	0.00	3	1	0.01	3	1	0.01
trumpeter swan	2	1	0.01	0	0	0.00	2	1	0.01
hooded merganser	2	1	0.01	0	0	0.00	2	1	0.01
ring-necked duck	0	0	0.00	1	1	0.00	1	1	0.00
Group Total	**4971**	**184**	**25.89**	**9352**	**426**	**44.96**	**14323**	**610**	**35.81**
Songbirds									
red-winged blackbird	240	9	1.25	1004	159	4.83	1244	168	3.11
brown-headed cowbird	295	15	1.54	768	79	3.69	1063	94	2.66

Table 2. Avian mean use, by species group, observed during point-count surveys at the Foxtail Wind Energy Center 2014-2015.

Species Group Species	Fall 2014			Spring 2015			Overall		
	# Birds	# Obs.	Mean Use # birds/ 20 min.	# Birds	# Obs.	Mean Use # birds/20 min.	# Birds	# Obs.	Mean Use # birds/ 20 min.
horned lark	544	63	2.83	86	34	0.41	630	97	1.58
common grackle	270	23	1.41	294	85	1.41	564	108	1.41
European starling	204	10	1.06	280	7	1.35	484	17	1.21
western meadowlark	138	98	0.72	261	192	1.25	399	290	1.00
unidentified blackbird	395	7	2.06	0	0	0.00	395	7	0.99
barn swallow	159	43	0.83	88	28	0.42	247	71	0.62
American goldfinch	195	56	1.02	22	13	0.11	217	69	0.54
American tree sparrow	0	0	0.00	108	11	0.52	108	11	0.27
snow bunting	88	5	0.46	0	0	0.00	88	5	0.22
dark-eyed junco	39	5	0.20	44	4	0.21	83	9	0.21
yellow-headed blackbird	7	3	0.04	72	37	0.35	79	40	0.20
unidentified swallow	72	9	0.38	0	0	0.00	72	9	0.18
eastern kingbird	30	15	0.16	34	27	0.16	64	42	0.16
bobolink	0	0	0.00	60	54	0.29	60	54	0.15
American crow	0	0	0.00	42	11	0.20	42	11	0.11
Brewer's blackbird	35	1	0.18	0	0	0.00	35	1	0.09
unidentified sparrow	14	5	0.07	15	4	0.07	29	9	0.07
American robin	13	7	0.07	15	12	0.07	28	19	0.07
cliff swallow	7	3	0.04	12	5	0.06	19	8	0.05
grasshopper sparrow	2	2	0.01	14	14	0.07	16	16	0.04
song sparrow	2	2	0.01	9	9	0.04	11	11	0.03
clay-colored sparrow	0	0	0.00	9	6	0.04	9	6	0.02
western kingbird	4	2	0.02	4	4	0.02	8	6	0.02
vesper sparrow	1	1	0.01	7	7	0.03	8	8	0.02
tree swallow	0	0	0.00	7	5	0.03	7	5	0.02

Table 2. Avian mean use, by species group, observed during point-count surveys at the Foxtail Wind Energy Center 2014-2015.

Species Group Species	Fall 2014			Spring 2015			Overall		
	# Birds	# Obs.	Mean Use # birds/ 20 min.	# Birds	# Obs.	Mean Use # birds/20 min.	# Birds	# Obs.	Mean Use # birds/ 20 min.
savannah sparrow	0	0	0.00	7	6	0.03	7	6	0.02
yellow warbler	0	0	0.00	6	1	0.03	6	1	0.02
yellow-rumped warbler	0	0	0.00	6	1	0.03	6	1	0.02
house sparrow	4	1	0.02	2	2	0.01	6	3	0.02
eastern bluebird	0	0	0.00	4	2	0.02	4	2	0.01
sedge wren	0	0	0.00	3	2	0.01	3	2	0.01
least flycatcher	0	0	0.00	3	3	0.01	3	3	0.01
dickcissel	0	0	0.00	3	3	0.01	3	3	0.01
northern cardinal	0	0	0.00	2	1	0.01	2	1	0.01
bank swallow	0	0	0.00	2	1	0.01	2	1	0.01
orchard oriole	0	0	0.00	1	1	0.00	1	1	0.00
marsh wren	1	1	0.01	0	0	0.00	1	1	0.00
common yellowthroat	0	0	0.00	1	1	0.00	1	1	0.00
Group Total	**2759**	**386**	**14.37**	**3295**	**831**	**15.84**	**6054**	**1217**	**15.14**
Waterbirds									
double-crested cormorant	709	51	3.69	44	11	0.21	753	62	1.88
American white pelican	219	36	1.14	177	16	0.85	396	52	0.99
killdeer	63	34	0.33	148	83	0.71	211	117	0.53
great egret	47	34	0.24	8	4	0.04	55	38	0.14
Wilson's snipe	0	0	0.00	32	31	0.15	32	31	0.08
western grebe	2	2	0.01	25	6	0.12	27	8	0.07
great blue heron	15	13	0.08	4	3	0.02	19	16	0.05
black-crowned night-heron	3	1	0.02	16	6	0.08	19	7	0.05
upland sandpiper	0	0	0.00	16	15	0.08	16	15	0.04
greater yellowlegs	2	2	0.01	13	9	0.06	15	11	0.04

Table 2. Avian mean use, by species group, observed during point-count surveys at the Foxtail Wind Energy Center 2014-2015.

Species Group Species	Fall 2014			Spring 2015			Overall		
	# Birds	# Obs.	Mean Use # birds/ 20 min.	# Birds	# Obs.	Mean Use # birds/20 min.	# Birds	# Obs.	Mean Use # birds/ 20 min.
pied-billed grebe	10	3	0.05	2	1	0.01	12	4	0.03
willet	0	0	0.00	10	9	0.05	10	9	0.03
marbled godwit	0	0	0.00	8	6	0.04	8	6	0.02
common snipe	0	0	0.00	6	6	0.03	6	6	0.02
American bittern	1	1	0.01	1	1	0.00	2	2	0.01
unidentified shorebird	0	0	0.00	1	1	0.00	1	1	0.00
American avocet	0	0	0.00	1	1	0.00	1	1	0.00
Group Total	**1071**	**177**	**5.58**	**512**	**209**	**2.46**	**1583**	**386**	**3.96**
Gulls/Terns									
ring-billed gull	702	52	3.66	183	50	0.88	885	102	2.21
unidentified gull	340	4	1.77	1	1	0.00	341	5	0.85
Franklin's gull	104	9	0.54	26	3	0.13	130	12	0.33
common tern	26	2	0.14	0	0	0.00	26	2	0.07
black tern	0	0	0.00	8	2	0.04	8	2	0.02
Group Total	**1172**	**67**	**6.10**	**218**	**56**	**1.05**	**1390**	**123**	**3.48**
Cranes/Rails									
American coot	69	4	0.36	225	22	1.08	294	26	0.74
sandhill crane	10	1	0.05	29	2	0.14	39	3	0.10
sora	0	0	0.00	10	10	0.05	10	10	0.03
Group Total	**79**	**5**	**0.41**	**264**	**34**	**1.27**	**343**	**39**	**0.86**
Pigeons/Doves									
mourning dove	149	46	0.78	58	31	0.28	207	77	0.52
rock pigeon	28	4	0.15	18	4	0.09	46	8	0.12
Group Total	**177**	**50**	**0.92**	**76**	**35**	**0.37**	**253**	**85**	**0.63**

Table 2. Avian mean use, by species group, observed during point-count surveys at the Foxtail Wind Energy Center 2014-2015.

Species Group Species	Fall 2014			Spring 2015			Overall		
	# Birds	# Obs.	Mean Use # birds/ 20 min.	# Birds	# Obs.	Mean Use # birds/20 min.	# Birds	# Obs.	Mean Use # birds/ 20 min.
Gamebirds									
sharp-tailed grouse	50	12	0.26	80	17	0.38	130	29	0.33
ring-necked pheasant	27	21	0.14	79	77	0.38	106	98	0.27
gray partridge	14	2	0.07	2	1	0.01	16	3	0.04
Group Total	**91**	**35**	**0.47**	**161**	**95**	**0.77**	**252**	**130**	**0.63**
Raptors									
red-tailed hawk	31	28	0.16	36	31	0.17	67	59	0.17
Swainson's hawk	47	35	0.24	4	4	0.02	51	39	0.13
northern harrier	25	25	0.13	13	12	0.06	38	37	0.10
unidentified buteo	21	9	0.11	0	0	0.00	21	9	0.05
American kestrel	5	5	0.03	7	5	0.03	12	10	0.03
rough-legged hawk	0	0	0.00	4	4	0.02	4	4	0.01
bald eagle	1	1	0.01	2	2	0.01	3	3	0.01
prairie falcon	2	2	0.01	0	0	0.00	2	2	0.01
great horned owl	1	1	0.01	1	1	0.00	2	2	0.01
unidentified hawk	0	0	0.00	1	1	0.00	1	1	0.00
turkey vulture	1	1	0.01	0	0	0.00	1	1	0.00
merlin	1	1	0.01	0	0	0.00	1	1	0.00
broad-winged hawk	1	1	0.01	0	0	0.00	1	1	0.00
Group Total	**136**	**109**	**0.71**	**68**	**60**	**0.33**	**204**	**169**	**0.51**
Woodpeckers									
northern flicker	5	5	0.03	7	5	0.03	12	10	0.03
hairy woodpecker	0	0	0.00	2	2	0.01	2	2	0.01
red-headed woodpecker	0	0	0.00	1	1	0.00	1	1	0.00
downy woodpecker	1	1	0.01	0	0	0.00	1	1	0.00

Table 2. Avian mean use, by species group, observed during point-count surveys at the Foxtail Wind Energy Center 2014-2015.

Species Group Species	Fall 2014			Spring 2015			Overall		
	# Birds	# Obs.	Mean Use # birds/ 20 min.	# Birds	# Obs.	Mean Use # birds/20 min.	# Birds	# Obs.	Mean Use # birds/ 20 min.
Group Total	**6**	**6**	**0.03**	**10**	**8**	**0.05**	**16**	**14**	**0.04**
Grand Total	**10462**	**1019**	**54.49**	**13956**	**1754**	**67.10**	**24418**	**2773**	**61.05**

Table 3. Avian percent composition and frequency, sorted by species group, observed during point-count surveys at the Foxtail Wind Energy Center, 2014-2015.

Species Group Species	Fall 2014		Spring 2015		Overall	
	Percent Composition	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected
Waterfowl						
snow goose	29.0	5.2	26.5	6.3	27.6	5.8
Canada goose	11.6	32.8	30.7	51.9	22.5	42.8
mallard	3.2	15.6	2.2	37.5	2.6	27.0
unidentified duck	2.1	7.3	2.5	8.7	2.3	8.0
lesser scaup	0.0	0.0	2.7	14.4	1.6	7.5
tundra swan	0.8	4.7	0.1	1.0	0.4	2.8
gadwall	0.3	2.1	0.4	8.7	0.4	5.5
blue-winged teal	0.2	2.1	0.5	11.5	0.4	7.0
redhead	0.0	0.0	0.5	10.1	0.3	5.3
common goldeneye	0.0	0.0	0.3	2.4	0.2	1.3
northern pintail	0.0	0.5	0.2	5.8	0.1	3.3
ruddy duck	0.0	0.0	0.1	2.9	0.1	1.5
bufflehead	0.1	1.6	0.0	1.4	0.1	1.5
greater white-fronted goose	0.2	0.5	0.0	0.0	0.1	0.3
northern shoveler	0.0	0.5	0.1	3.4	0.1	2.0
green-winged teal	0.0	0.0	0.0	1.0	0.0	0.5
American black duck	0.0	0.0	0.0	0.5	0.0	0.3
trumpeter swan	0.0	0.5	0.0	0.0	0.0	0.3
hooded merganser	0.0	0.5	0.0	0.0	0.0	0.3
ring-necked duck	0.0	0.0	0.0	0.5	0.0	0.3
Group Total	**47.5**	**50.0**	**67.0**	**75.5**	**58.7**	**63.3**
Songbirds						
red-winged blackbird	2.3	3.6	7.2	61.5	5.1	33.8
brown-headed cowbird	2.8	6.3	5.5	33.2	4.4	20.3
horned lark	5.2	27.6	0.6	14.4	2.6	20.8
common grackle	2.6	10.9	2.1	30.3	2.3	21.0
European starling	1.9	5.2	2.0	3.4	2.0	4.3

Table 3. Avian percent composition and frequency, sorted by species group, observed during point-count surveys at the Foxtail Wind Energy Center, 2014-2015.

Species Group Species	Fall 2014		Spring 2015		Overall	
	Percent Composition	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected
western meadowlark	1.3	34.4	1.9	68.3	1.6	52.0
unidentified blackbird	3.8	2.6	0.0	0.0	1.6	1.3
barn swallow	1.5	19.8	0.6	12.0	1.0	15.8
American goldfinch	1.9	24.5	0.2	5.3	0.9	14.5
American tree sparrow	0.0	0.0	0.8	4.3	0.4	2.3
snow bunting	0.8	2.6	0.0	0.0	0.4	1.3
dark-eyed junco	0.4	2.6	0.3	1.9	0.3	2.3
yellow-headed blackbird	0.1	1.6	0.5	15.9	0.3	9.0
unidentified swallow	0.7	3.6	0.0	0.0	0.3	1.8
eastern kingbird	0.3	6.8	0.2	10.6	0.3	8.8
bobolink	0.0	0.0	0.4	17.3	0.2	9.0
American crow	0.0	0.0	0.3	5.3	0.2	2.8
Brewer's blackbird	0.3	0.5	0.0	0.0	0.1	0.3
unidentified sparrow	0.1	2.6	0.1	1.9	0.1	2.3
American robin	0.1	3.1	0.1	5.8	0.1	4.5
cliff swallow	0.1	1.6	0.1	2.4	0.1	2.0
grasshopper sparrow	0.0	1.0	0.1	5.8	0.1	3.5
song sparrow	0.0	1.0	0.1	4.3	0.0	2.8
clay-colored sparrow	0.0	0.0	0.1	2.4	0.0	1.3
western kingbird	0.0	1.0	0.0	1.9	0.0	1.5
vesper sparrow	0.0	0.5	0.1	3.4	0.0	2.0
tree swallow	0.0	0.0	0.1	2.4	0.0	1.3
savannah sparrow	0.0	0.0	0.1	2.9	0.0	1.5
yellow warbler	0.0	0.0	0.0	0.5	0.0	0.3
yellow-rumped warbler	0.0	0.0	0.0	0.5	0.0	0.3
house sparrow	0.0	0.5	0.0	1.0	0.0	0.8
eastern bluebird	0.0	0.0	0.0	1.0	0.0	0.5
sedge wren	0.0	0.0	0.0	1.0	0.0	0.5

Table 3. Avian percent composition and frequency, sorted by species group, observed during point-count surveys at the Foxtail Wind Energy Center, 2014-2015.

Species Group Species	Fall 2014		Spring 2015		Overall	
	Percent Composition	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected
least flycatcher	0.0	0.0	0.0	1.4	0.0	0.8
dickcissel	0.0	0.0	0.0	1.0	0.0	0.5
northern cardinal	0.0	0.0	0.0	0.5	0.0	0.3
bank swallow	0.0	0.0	0.0	0.5	0.0	0.3
orchard oriole	0.0	0.0	0.0	0.5	0.0	0.3
marsh wren	0.0	0.5	0.0	0.0	0.0	0.3
common yellowthroat	0.0	0.0	0.0	0.5	0.0	0.3
Group Total	**26.4**	**79.7**	**23.6**	**94.7**	**24.8**	**87.5**
Waterbirds						
double-crested cormorant	6.8	20.8	0.3	5.3	3.1	12.8
American white pelican	2.1	16.7	1.3	7.7	1.6	12.0
killdeer	0.6	14.6	1.1	35.1	0.9	25.3
great egret	0.4	9.9	0.1	1.9	0.2	5.8
Wilson's snipe	0.0	0.0	0.2	13.5	0.1	7.0
western grebe	0.0	1.0	0.2	2.9	0.1	2.0
great blue heron	0.1	6.3	0.0	1.4	0.1	3.8
black-crowned night-heron	0.0	0.5	0.1	2.9	0.1	1.8
upland sandpiper	0.0	0.0	0.1	5.8	0.1	3.0
greater yellowlegs	0.0	1.0	0.1	3.8	0.1	2.5
pied-billed grebe	0.1	1.6	0.0	0.5	0.0	1.0
willet	0.0	0.0	0.1	4.3	0.0	2.3
marbled godwit	0.0	0.0	0.1	2.9	0.0	1.5
common snipe	0.0	0.0	0.0	2.9	0.0	1.5
American bittern	0.0	0.5	0.0	0.5	0.0	0.5
unidentified shorebird	0.0	0.0	0.0	0.5	0.0	0.3
American avocet	0.0	0.0	0.0	0.5	0.0	0.3
Group Total	**10.2**	**39.1**	**3.7**	**55.8**	**6.5**	**47.8**

Table 3. Avian percent composition and frequency, sorted by species group, observed during point-count surveys at the Foxtail Wind Energy Center, 2014-2015.

Species Group Species	Fall 2014		Spring 2015		Overall	
	Percent Composition	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected
Gulls/Terns						
ring-billed gull	6.7	20.3	1.3	17.8	3.6	19.0
unidentified gull	3.2	1.6	0.0	0.5	1.4	1.0
Franklin's gull	1.0	4.2	0.2	1.4	0.5	2.8
common tern	0.2	1.0	0.0	0.0	0.1	0.5
black tern	0.0	0.0	0.1	1.0	0.0	0.5
Group Total	**11.2**	**21.9**	**1.6**	**20.2**	**5.7**	**21.0**
Cranes/Rails						
American coot	0.7	2.1	1.6	10.6	1.2	6.5
sandhill crane	0.1	0.5	0.2	1.0	0.2	0.8
sora	0.0	0.0	0.1	4.8	0.0	2.5
Group Total	**0.8**	**2.6**	**1.9**	**13.5**	**1.4**	**8.3**
Pigeons/Doves						
mourning dove	1.4	18.2	0.4	13.0	0.8	15.5
rock pigeon	0.3	2.1	0.1	1.9	0.2	2.0
Group Total	**1.7**	**19.8**	**0.5**	**14.9**	**1.0**	**17.3**
Gamebirds						
sharp-tailed grouse	0.5	5.2	0.6	7.7	0.5	6.5
ring-necked pheasant	0.3	9.9	0.6	32.2	0.4	21.5
gray partridge	0.1	1.0	0.0	0.5	0.1	0.8
Group Total	**0.9**	**15.1**	**1.2**	**38.5**	**1.0**	**27.3**
Raptors						
red-tailed hawk	0.3	13.5	0.3	14.4	0.3	14.0
Swainson's hawk	0.4	16.1	0.0	1.9	0.2	8.8
northern harrier	0.2	12.0	0.1	5.8	0.2	8.8
unidentified buteo	0.2	4.2	0.0	0.0	0.1	2.0
American kestrel	0.0	2.6	0.1	2.4	0.0	2.5

Table 3. Avian percent composition and frequency, sorted by species group, observed during point-count surveys at the Foxtail Wind Energy Center, 2014-2015.

Species Group Species	Fall 2014		Spring 2015		Overall	
	Percent Composition	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected	**Percent Composition**	**Frequency** % of surveys detected
rough-legged hawk	0.0	0.0	0.0	1.9	0.0	1.0
bald eagle	0.0	0.5	0.0	1.0	0.0	0.8
prairie falcon	0.0	1.0	0.0	0.0	0.0	0.5
great horned owl	0.0	0.5	0.0	0.5	0.0	0.5
unidentified hawk	0.0	0.0	0.0	0.5	0.0	0.3
turkey vulture	0.0	0.5	0.0	0.0	0.0	0.3
merlin	0.0	0.5	0.0	0.0	0.0	0.3
broad-winged hawk	0.0	0.5	0.0	0.0	0.0	0.3
Group Total	**1.3**	**40.1**	**0.5**	**24.0**	**0.8**	**31.8**
Woodpeckers						
northern flicker	0.0	2.6	0.1	2.4	0.0	2.5
hairy woodpecker	0.0	0.0	0.0	1.0	0.0	0.5
red-headed woodpecker	0.0	0.0	0.0	0.5	0.0	0.3
downy woodpecker	0.0	0.5	0.0	0.0	0.0	0.3
Group Total	**0.1**	**3.1**	**0.1**	**3.8**	**0.1**	**3.5**

Table 4a Avian species observed by point during Fall 2014 point count surveys at the Foxtail Wind Energy Center.

Species	Number of Birds	Number of Observations	Points															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
snow goose	3031	15	120	350	0	0	95	25	0	0	30	0	495	0	975	400	500	41
Canada goose	1213	91	21	39	87	38	2	15	51	144	214	88	45	59	256	11	38	105
double-crested cormorant	709	51	93	0	197	0	90	17	26	30	40	4	1	30	69	0	2	110
ring-billed gull	702	52	4	16	134	0	14	52	58	1	0	64	0	15	316	0	26	2
horned lark	544	63	15	76	86	7	15	41	7	145	17	1	16	65	3	35	13	2
unidentified blackbird	395	7	0	270	0	0	0	0	0	30	0	0	60	0	0	30	5	0
unidentified gull	340	4	0	307	0	0	0	0	0	0	0	0	3	0	0	0	30	0
mallard	332	34	2	15	6	0	16	33	110	1	1	29	2	1	94	2	7	13
brown-headed cowbird	295	15	4	0	0	0	0	0	0	0	43	0	175	12	0	9	0	52
common grackle	270	23	0	7	26	21	30	0	65	1	45	0	0	58	9	7	1	0
red-winged blackbird	240	9	0	0	95	30	40	0	20	0	0	0	0	55	0	0	0	0
American white pelican	219	36	57	7	21	0	0	14	33	4	0	10	7	0	49	17	0	0
unidentified duck	215	16	8	18	33	0	0	15	39	0	7	31	0	0	49	15	0	0
European starling	204	10	0	60	2	0	0	0	0	0	0	35	35	19	0	5	45	3
American goldfinch	195	56	10	2	2	3	7	7	22	2	66	4	3	3	1	31	4	28
barn swallow	159	43	2	15	14	10	6	1	1	11	16	11	20	7	0	13	6	26
mourning dove	149	46	28	9	8	7	16	0	6	4	32	6	1	6	0	11	15	0
western meadowlark	138	98	3	7	18	3	3	7	10	7	19	2	13	4	3	11	7	21
Franklin’s gull	104	9	0	7	1	0	0	0	40	0	0	15	0	2	39	0	0	0
snow bunting	88	5	6	0	35	0	15	25	0	0	7	0	0	0	0	0	0	0
tundra swan	83	12	14	4	5	0	0	0	9	22	0	14	0	0	4	11	0	0
unidentified swallow	72	9	0	0	7	0	15	0	0	4	3	37	0	1	0	0	5	0
American coot	69	4	0	8	16	0	0	0	0	0	0	0	0	0	45	0	0	0
killdeer	63	34	4	26	3	3	1	0	2	0	7	1	2	0	5	1	2	6
sharp-tailed grouse	50	12	0	7	0	3	0	3	0	6	0	1	9	18	0	3	0	0
great egret	47	34	3	0	5	0	1	3	5	2	0	1	0	0	27	0	0	0
Swainson’s hawk	47	35	0	6	0	3	3	1	4	0	5	0	1	7	0	4	9	4
dark-eyed junco	39	5	14	1	0	0	15	0	0	0	0	1	0	0	0	8	0	0
gadwall	36	4	0	0	0	0	0	0	6	0	0	0	0	0	30	0	0	0
Brewer's blackbird	35	1	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
red-tailed hawk	31	28	1	0	7	4	2	1	0	1	1	2	2	2	2	2	3	1
eastern kingbird	30	15	1	3	1	4	1	1	10	0	0	0	0	4	0	2	0	3
rock pigeon	28	4	0	0	0	0	0	0	2	0	26	0	0	0	0	0	0	0
ring-necked pheasant	27	21	4	1	0	6	1	1	0	1	7	1	0	1	2	0	1	1
common tern	26	2	0	0	25	0	0	0	0	0	0	0	0	0	1	0	0	0
northern harrier	25	25	1	1	3	1	1	5	2	2	1	2	0	1	1	2	2	0

Table 4a Avian species observed by point during Fall 2014 point count surveys at the Foxtail Wind Energy Center.

Species	Number of Birds	Number of Observations	Points															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
unidentified buteo	21	9	0	0	1	1	4	0	2	0	9	2	0	0	0	1	0	1
blue-winged teal	18	4	0	7	0	0	0	2	7	0	0	0	0	0	2	0	0	0
greater white-fronted goose	18	1	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0
bufflehead	15	3	0	0	5	0	0	7	0	0	0	0	0	0	3	0	0	0
great blue heron	15	13	0	0	5	0	0	1	0	0	1	1	0	0	4	2	1	0
gray partridge	14	2	0	0	0	0	1	0	0	0	0	0	0	13	0	0	0	0
unidentified sparrow	14	5	1	0	0	0	8	3	0	0	0	0	0	2	0	0	0	0
American robin	13	7	0	0	0	2	1	0	0	0	0	0	0	0	0	8	2	0
pied-billed grebe	10	3	0	0	0	0	0	1	0	0	0	0	0	0	9	0	0	0
sandhill crane	10	1	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0
cliff swallow	7	3	2	2	0	0	0	0	0	0	0	0	3	0	0	0	0	0
yellow-headed blackbird	7	3	0	0	0	1	0	0	1	0	0	0	0	0	5	0	0	0
American kestrel	5	5	0	0	0	0	1	0	1	0	0	1	0	0	0	0	2	0
northern flicker	5	5	0	0	0	0	1	1	2	0	0	0	0	0	0	0	1	0
house sparrow	4	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
northern pintail	4	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
western kingbird	4	2	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
black-crowned night-heron	3	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
grasshopper sparrow	2	2	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
greater yellowlegs	2	2	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
hooded merganser	2	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
northern shoveler	2	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
prairie falcon	2	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
song sparrow	2	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
trumpeter swan	2	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
western grebe	2	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
American bittern	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
bald eagle	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
broad-winged hawk	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
downy woodpecker	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
great horned owl	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
marsh wren	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
merlin	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
turkey vulture	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
vesper sparrow	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Grand Total	**10462**	**1019**	**418**	**1306**	**854**	**149**	**406**	**286**	**544**	**420**	**612**	**382**	**895**	**389**	**2011**	**642**	**729**	**419**

Table 4b. Avian species observed by point during Spring 2015 point count surveys at the Foxtail Wind Energy Center.

Species	Number of Birds	Number of Observations	Points															
			2	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20
Canada goose	4288	158	382	0	408	288	306	60	138	24	6	974	463	88	251	353	192	355
snow goose	3698	21	212	200	391	3	37	0	53	42	1760	944	56	0	0	0	0	0
red-winged blackbird	1004	159	129	25	15	89	159	60	18	17	67	106	16	46	14	111	39	93
brown-headed cowbird	768	79	119	21	13	36	52	158	28	34	38	4	172	24	36	5	24	4
lesser scaup	382	30	3	0	79	37	5	0	0	0	2	153	0	0	0	25	0	78
unidentified duck	345	20	13	0	125	2	57	0	45	4	0	50	0	3	1	0	6	39
mallard	305	90	40	11	14	19	19	0	8	22	25	73	5	0	2	13	13	41
common grackle	294	85	27	25	6	20	0	10	21	16	33	7	49	8	9	11	38	14
European starling	280	7	0	0	0	0	221	0	1	0	13	0	0	0	0	40	0	5
western meadowlark	261	192	11	14	19	15	20	15	19	28	14	4	20	22	17	14	25	4
American coot	225	22	14	0	33	0	4	0	0	2	0	66	0	0	0	17	0	89
ring-billed gull	183	50	9	7	8	52	7	11	10	4	3	28	18	0	2	5	0	19
American white pelican	177	16	0	0	6	52	1	0	5	0	17	45	0	33	0	13	0	5
killdeer	148	83	12	3	5	4	3	7	8	26	11	6	30	18	6	1	2	6
American tree sparrow	108	11	0	98	0	0	0	0	0	0	0	0	0	0	2	1	7	0
barn swallow	88	28	0	4	9	0	8	5	2	14	7	0	13	0	0	23	3	0
horned lark	86	34	37	3	0	9	1	7	0	1	8	0	1	9	8	2	0	0
sharp-tailed grouse	80	17	0	0	35	3	0	0	6	4	0	0	0	0	21	11	0	0
ring-necked pheasant	79	77	7	9	3	2	5	9	2	3	3	2	8	4	5	5	7	5
redhead	73	21	16	0	16	0	2	0	0	0	0	22	0	0	0	0	0	17
yellow-headed blackbird	72	37	13	0	8	1	11	0	0	5	2	25	0	2	1	1	1	2
blue-winged teal	69	29	17	0	10	9	1	0	5	8	1	5	0	2	0	0	0	11
bobolink	60	54	3	8	2	0	5	3	7	5	3	2	5	5	8	1	3	0
gadwall	60	18	0	0	15	8	2	0	0	2	0	24	0	2	0	0	2	5
mourning dove	58	31	0	9	0	0	0	4	2	0	3	4	5	0	9	9	0	13
common goldeneye	46	5	0	0	0	0	13	0	2	0	0	22	0	0	0	0	0	9
dark-eyed junco	44	4	0	28	0	0	0	0	0	0	0	0	0	0	0	0	10	6
double-crested cormorant	44	11	0	0	10	14	0	0	0	0	0	19	0	0	0	0	0	1
American crow	42	11	0	2	0	5	0	0	0	0	1	0	2	0	0	0	31	1
red-tailed hawk	36	31	0	2	0	5	1	5	0	2	3	0	3	0	7	3	1	4
eastern kingbird	34	27	0	6	1	1	0	1	4	6	0	0	4	3	5	3	0	0
Wilson's snipe	32	31	3	2	3	0	2	1	6	7	2	1	1	1	0	1	2	0
sandhill crane	29	2	0	0	1	0	0	0	0	0	0	0	28	0	0	0	0	0
Franklin’s gull	26	3	0	0	1	0	0	0	0	0	9	16	0	0	0	0	0	0
western grebe	25	6	0	0	0	0	0	0	0	0	0	24	0	0	0	0	1	0
American goldfinch	22	13	0	3	0	2	0	2	0	0	0	0	9	1	2	3	0	0

Table 4b. Avian species observed by point during Spring 2015 point count surveys at the Foxtail Wind Energy Center.

Species	Number of Birds	Number of Observations	Points															
			2	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20
northern pintail	21	12	2	0	0	0	2	0	0	0	5	6	1	0	2	2	0	1
ruddy duck	19	6	3	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0
tundra swan	19	2	13	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
rock pigeon	18	4	0	0	0	7	0	0	0	0	11	0	0	0	0	0	0	0
black-crowned night-heron	16	6	0	0	0	1	0	0	0	0	0	15	0	0	0	0	0	0
upland sandpiper	16	15	0	0	2	0	0	1	4	6	0	0	0	1	0	0	1	1
American robin	15	12	2	0	0	3	0	2	4	1	0	0	0	1	1	0	0	1
northern shoveler	15	7	3	0	5	0	0	0	2	2	0	0	1	0	0	0	0	2
unidentified sparrow	15	4	0	0	0	0	0	4	0	0	0	0	0	5	0	6	0	0
grasshopper sparrow	14	14	0	2	0	0	0	0	3	2	0	2	4	0	0	0	1	0
greater yellowlegs	13	9	0	0	0	0	0	0	0	5	1	5	0	0	0	0	0	2
northern harrier	13	12	0	2	1	0	2	0	0	1	2	0	0	0	1	2	2	0
cliff swallow	12	5	7	1	0	0	0	0	0	0	1	0	3	0	0	0	0	0
sora	10	10	3	0	0	0	1	0	0	0	1	0	0	0	1	1	2	1
willet	10	9	0	1	0	0	0	0	0	0	2	6	0	0	0	1	0	0
clay-colored sparrow	9	6	0	2	0	0	0	2	0	0	0	0	0	0	5	0	0	0
song sparrow	9	9	0	2	1	1	0	1	0	0	1	1	1	1	0	0	0	0
black tern	8	2	0	0	0	0	0	1	0	0	0	7	0	0	0	0	0	0
great egret	8	4	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	2
marbled godwit	8	6	0	0	1	0	0	0	0	0	0	2	0	0	0	0	5	0
American kestrel	7	5	0	0	0	0	2	2	0	0	0	0	0	0	3	0	0	0
northern flicker	7	5	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	4
savannah sparrow	7	6	0	0	0	0	0	1	0	0	1	0	1	0	4	0	0	0
tree swallow	7	5	0	1	0	0	0	0	1	0	0	1	0	1	0	0	0	3
vesper sparrow	7	7	0	0	0	1	2	0	0	0	0	0	2	0	0	0	2	0
common snipe	6	6	0	0	0	1	1	0	0	0	1	1	0	0	0	0	1	1
yellow warbler	6	1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
yellow-rumped warbler	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0
bufflehead	4	3	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0
eastern bluebird	4	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
great blue heron	4	3	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0
green-winged teal	4	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
rough-legged hawk	4	4	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0
Swainson’s hawk	4	4	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1
western kingbird	4	4	1	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0
American black duck	3	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0

Table 4b. Avian species observed by point during Spring 2015 point count surveys at the Foxtail Wind Energy Center.

Species	Number of Birds	Number of Observations	Points															
			2	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20
dickcissel	3	3	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0
least flycatcher	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
sedge wren	3	2	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
bald eagle	2	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
bank swallow	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
gray partridge	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
hairy woodpecker	2	2	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
house sparrow	2	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
northern cardinal	2	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
pied-billed grebe	2	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
American avocet	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
American bittern	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
common yellowthroat	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
great horned owl	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
orchard oriole	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
red-headed woodpecker	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
ring-necked duck	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
unidentified gull	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unidentified hawk	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
unidentified shorebird	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Grand Total	**13956**	**1754**	**1104**	**500**	**1249**	**694**	**963**	**373**	**408**	**295**	**2066**	**2702**	**922**	**284**	**427**	**693**	**423**	**853**

Table 5. Summary of avian flight heights (includes flying birds only) in relation to the turbine rotor swept area (RSA)[1] during point-count surveys at Foxtail Wind Energy Center, 2014-2015.

	Fall 2014		Spring 2015		Overall	
	Number of Birds	Percentage of Birds	Number of Birds	Percentage of Birds	Number of Birds	Percentage of Birds
Non-raptors						
Above RSA height (>138m)	490	6.1%	1815	17.1%	2305	12.3%
At RSA height (22m–138m)	3254	40.2%	3487	32.8%	6741	36.0%
Below RSA height (<22m)	4350	53.7%	5329	50.1%	9679	51.7%
Raptors						
Above RSA height (>138m)	1	0.9%	0	0.0%	1	0.6%
At RSA height (22m–138m)	31	27.7%	16	30.8%	47	28.7%
Below RSA height (<22m)	80	71.4%	36	69.2%	116	70.7%

[1]These values assume a rotor diameter of 116 (m) and a hub height of 80 (m)

Table 6a. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] during Fall 2014 point-count surveys at the Foxtail Wind Energy Center.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
snow goose	13.42	15.79 (4.57 - 27.01)	100.0	13.2	85.0	1.8
unidentified blackbird	1.43	2.06 (0.00 - 4.45)	92.4	0.0	75.3	24.7
double-crested cormorant	1.09	3.69 (1.93 - 5.45)	60.2	21.1	49.2	29.7
Canada goose	0.35	6.32 (4.39 - 8.25)	57.7	0.0	9.7	90.3
unidentified gull	0.17	1.77 (0.00 - 4.41)	100.0	0.0	9.7	90.3
tundra swan	0.09	0.43 (0.16 - 0.70)	79.5	0.0	27.3	72.7
ring-billed gull	0.08	3.66 (2.24 - 5.08)	58.3	0.0	3.9	96.1
American white pelican	0.07	1.14 (0.67 - 1.61)	35.2	0.0	18.2	81.8
red-tailed hawk	0.07	0.16 (0.11 - 0.21)	80.6	0.0	52.0	48.0
mallard	0.06	1.73 (0.90 - 2.56)	48.2	0.0	6.9	93.1
unidentified buteo	0.05	0.11 (0.02 - 0.20)	95.2	0.0	50.0	50.0
sandhill crane	0.05	0.05 (0.00 - 0.14)	100.0	0.0	100.0	0.0
rock pigeon	0.04	0.15 (0.02 - 0.28)	100.0	0.0	25.0	75.0
yellow-headed blackbird	0.03	0.04 (0.00 - 0.08)	100.0	0.0	71.4	28.6
Swainson’s hawk	0.02	0.24 (0.15 - 0.33)	70.2	3.0	12.1	84.8
bufflehead	0.02	0.08 (0.00 - 0.16)	20.0	0.0	100.0	0.0
western meadowlark	0.01	0.72 (0.53 - 0.91)	39.1	0.0	3.7	96.3
northern harrier	0.01	0.13 (0.08 - 0.18)	100.0	0.0	8.0	92.0
European starling	0.01	1.06 (0.29 - 1.83)	74.5	0.0	1.3	98.7
Franklin’s gull	0.01	0.54 (0.10 - 0.98)	100.0	0.0	1.9	98.1
bald eagle	0.01	0.01 (0.00 - 0.02)	100.0	0.0	100.0	0.0
turkey vulture	0.01	0.01 (0.00 - 0.02)	100.0	0.0	100.0	0.0
northern flicker	<0.01	0.03 (0.01 - 0.05)	20.0	0.0	100.0	0.0
unidentified swallow	<0.01	0.38 (0.03 - 0.73)	100.0	0.0	1.4	98.6
American bittern	0.00	0.01 (0.00 - 0.02)	100.0	0.0	0.0	100.0
American coot	0.00	0.36 (0.00 - 0.77)	0.0	0.0	0.0	0.0
American goldfinch	0.00	1.02 (0.41 - 1.63)	92.8	0.0	0.0	100.0
American kestrel	0.00	0.03 (0.01 - 0.05)	60.0	0.0	0.0	100.0
American robin	0.00	0.07 (0.01 - 0.13)	69.2	0.0	0.0	100.0

Table 6a. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] during Fall 2014 point-count surveys at the Foxtail Wind Energy Center.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
barn swallow	0.00	0.83 (0.57 - 1.09)	97.5	0.0	0.0	100.0
black-crowned night-heron	0.00	0.02 (0.00 - 0.05)	0.0	0.0	0.0	0.0
brown-headed cowbird	0.00	1.54 (0.53 - 2.55)	90.2	0.0	0.0	100.0
Brewer's blackbird	0.00	0.18 (0.00 - 0.48)	100.0	0.0	0.0	100.0
broad-winged hawk	0.00	0.01 (0.00 - 0.02)	100.0	0.0	0.0	100.0
blue-winged teal	0.00	0.09 (0.00 - 0.18)	0.0	0.0	0.0	0.0
cliff swallow	0.00	0.04 (0.00 - 0.08)	100.0	0.0	0.0	100.0
common grackle	0.00	1.41 (0.64 - 2.18)	95.2	0.0	0.0	100.0
common tern	0.00	0.14 (0.00 - 0.35)	100.0	0.0	0.0	100.0
dark-eyed junco	0.00	0.20 (0.01 - 0.39)	97.4	0.0	0.0	100.0
downy woodpecker	0.00	0.01 (0.00 - 0.02)	100.0	0.0	0.0	100.0
eastern kingbird	0.00	0.16 (0.06 - 0.26)	63.3	0.0	0.0	100.0
gadwall	0.00	0.19 (0.03 - 0.35)	0.0	0.0	0.0	0.0
great blue heron	0.00	0.08 (0.04 - 0.12)	73.3	0.0	0.0	100.0
great horned owl	0.00	0.01 (0.00 - 0.02)	0.0	0.0	0.0	0.0
gray partridge	0.00	0.07 (0.00 - 0.18)	0.0	0.0	0.0	0.0
great egret	0.00	0.24 (0.10 - 0.38)	23.4	0.0	0.0	100.0
grasshopper sparrow	0.00	0.01 (0.00 - 0.02)	0.0	0.0	0.0	0.0
greater yellowlegs	0.00	0.01 (0.00 - 0.02)	0.0	0.0	0.0	0.0
greater white-fronted goose	0.00	0.09 (0.00 - 0.24)	100.0	0.0	0.0	100.0
horned lark	0.00	2.83 (1.30 - 4.36)	96.9	0.0	0.0	100.0
hooded merganser	0.00	0.01 (0.00 - 0.03)	0.0	0.0	0.0	0.0
house sparrow	0.00	0.02 (0.00 - 0.05)	0.0	0.0	0.0	0.0
killdeer	0.00	0.33 (0.17 - 0.49)	71.4	0.0	0.0	100.0
marsh wren	0.00	0.01 (0.00 - 0.02)	0.0	0.0	0.0	0.0
merlin	0.00	0.01 (0.00 - 0.02)	100.0	0.0	0.0	100.0
mourning dove	0.00	0.78 (0.47 - 1.09)	67.1	0.0	0.0	100.0
northern pintail	0.00	0.02 (0.00 - 0.05)	100.0	0.0	0.0	100.0
northern shoveler	0.00	0.01 (0.00 - 0.03)	0.0	0.0	0.0	0.0

Table 6a. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] during Fall 2014 point-count surveys at the Foxtail Wind Energy Center.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
pied-billed grebe	0.00	0.05 (0.00 - 0.12)	0.0	0.0	0.0	0.0
prairie falcon	0.00	0.01 (0.00 - 0.02)	100.0	0.0	0.0	100.0
ring-necked pheasant	0.00	0.14 (0.07 - 0.21)	0.0	0.0	0.0	0.0
red-winged blackbird	0.00	1.25 (0.37 - 2.13)	74.6	0.0	0.0	100.0
snow bunting	0.00	0.46 (0.06 - 0.86)	92.0	0.0	0.0	100.0
song sparrow	0.00	0.01 (0.00 - 0.02)	50.0	0.0	0.0	100.0
sharp-tailed grouse	0.00	0.26 (0.11 - 0.41)	70.0	0.0	0.0	100.0
trumpeter swan	0.00	0.01 (0.00 - 0.03)	0.0	0.0	0.0	0.0
unidentified duck	0.00	1.12 (0.56 - 1.68)	30.7	0.0	0.0	100.0
unidentified sparrow	0.00	0.07 (0.00 - 0.14)	78.6	0.0	0.0	100.0
vesper sparrow	0.00	0.01 (0.00 - 0.02)	100.0	0.0	0.0	100.0
western grebe	0.00	0.01 (0.00 - 0.02)	0.0	0.0	0.0	0.0
western kingbird	0.00	0.02 (0.00 - 0.05)	75.0	0.0	0.0	100.0

[1]These values assume a rotor diameter of 116 (m) and a hub height of 80 (m)

Table 6b. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] during Spring 2015 point-count surveys at the Foxtail Wind Energy Center.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
Canada goose	8.36	20.62 (12.27 - 28.97)	80.6	1.4	50.3	48.3
snow goose	6.86	17.78 (3.47 - 32.09)	99.4	47.6	38.8	13.6
red-winged blackbird	0.85	4.83 (3.65 - 6.01)	84.9	0.0	20.8	79.2
American white pelican	0.26	0.85 (0.45 - 1.25)	67.2	0.0	46.2	53.8
sandhill crane	0.14	0.14 (0.00 - 0.36)	96.6	0.0	100.0	0.0
ring-billed gull	0.11	0.88 (0.55 - 1.21)	92.9	0.0	12.9	87.1
mallard	0.07	1.47 (1.06 - 1.88)	56.1	7.6	8.2	84.2
red-tailed hawk	0.07	0.17 (0.12 - 0.22)	75.0	0.0	51.9	48.1
Wilson's snipe	0.06	0.15 (0.10 - 0.20)	37.5	0.0	100.0	0.0
blue-winged teal	0.03	0.33 (0.20 - 0.46)	42.0	0.0	24.1	75.9
unidentified duck	0.01	1.66 (0.63 - 2.69)	26.4	0.0	3.3	96.7
American black duck	0.01	0.01 (0.00 - 0.03)	100.0	0.0	100.0	0.0
rough-legged hawk	<0.01	0.02 (0.00 - 0.04)	100.0	0.0	25.0	75.0
brown-headed cowbird	<0.01	3.69 (2.04 - 5.34)	95.1	0.0	0.1	99.9
American crow	<0.01	0.20 (0.02 - 0.38)	95.2	0.0	2.5	97.5
northern harrier	<0.01	0.06 (0.03 - 0.09)	100.0	0.0	7.7	92.3
American avocet	0.00	0.00 (0.00 - 0.01)	0.0	0.0	0.0	0.0
American bittern	0.00	0.00 (0.00 - 0.01)	0.0	0.0	0.0	0.0
American coot	0.00	1.08 (0.55 - 1.61)	0.0	0.0	0.0	0.0
American goldfinch	0.00	0.11 (0.03 - 0.19)	90.9	0.0	0.0	100.0
American kestrel	0.00	0.03 (0.00 - 0.06)	57.1	0.0	0.0	100.0
American robin	0.00	0.07 (0.03 - 0.11)	46.7	0.0	0.0	100.0
American tree sparrow	0.00	0.52 (0.17 - 0.87)	51.9	0.0	0.0	100.0
bald eagle	0.00	0.01 (0.00 - 0.02)	100.0	0.0	0.0	100.0
bank swallow	0.00	0.01 (0.00 - 0.03)	0.0	0.0	0.0	0.0
barn swallow	0.00	0.42 (0.24 - 0.60)	100.0	0.0	0.0	100.0
black-crowned night-heron	0.00	0.08 (0.02 - 0.14)	93.8	0.0	0.0	100.0
black tern	0.00	0.04 (0.00 - 0.10)	100.0	0.0	0.0	100.0
bobolink	0.00	0.29 (0.21 - 0.37)	98.3	0.0	0.0	100.0

Table 6b. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] during Spring 2015 point-count surveys at the Foxtail Wind Energy Center.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
bufflehead	0.00	0.02 (0.00 - 0.04)	25.0	0.0	0.0	100.0
clay-colored sparrow	0.00	0.04 (0.01 - 0.07)	77.8	0.0	0.0	100.0
cliff swallow	0.00	0.06 (0.01 - 0.11)	100.0	0.0	0.0	100.0
common goldeneye	0.00	0.22 (0.01 - 0.43)	4.3	0.0	0.0	100.0
common grackle	0.00	1.41 (0.94 - 1.88)	93.9	0.0	0.0	100.0
common snipe	0.00	0.03 (0.01 - 0.05)	0.0	0.0	0.0	0.0
common yellowthroat	0.00	0.00 (0.00 - 0.01)	0.0	0.0	0.0	0.0
double-crested cormorant	0.00	0.21 (0.09 - 0.33)	6.8	0.0	0.0	100.0
dark-eyed junco	0.00	0.21 (0.02 - 0.40)	36.4	0.0	0.0	100.0
dickcissel	0.00	0.01 (0.00 - 0.03)	0.0	0.0	0.0	0.0
eastern bluebird	0.00	0.02 (0.00 - 0.04)	100.0	0.0	0.0	100.0
eastern kingbird	0.00	0.16 (0.10 - 0.22)	91.2	0.0	0.0	100.0
European starling	0.00	1.35 (0.00 - 3.12)	19.6	0.0	0.0	100.0
Franklin's gull	0.00	0.13 (0.00 - 0.28)	100.0	0.0	0.0	100.0
gadwall	0.00	0.29 (0.11 - 0.47)	10.0	0.0	0.0	100.0
great blue heron	0.00	0.02 (0.00 - 0.04)	100.0	0.0	0.0	100.0
great horned owl	0.00	0.00 (0.00 - 0.01)	0.0	0.0	0.0	0.0
gray partridge	0.00	0.01 (0.00 - 0.03)	0.0	0.0	0.0	0.0
great egret	0.00	0.04 (0.00 - 0.08)	75.0	0.0	0.0	100.0
grasshopper sparrow	0.00	0.07 (0.04 - 0.10)	14.3	0.0	0.0	100.0
greater yellowlegs	0.00	0.06 (0.02 - 0.10)	38.5	0.0	0.0	100.0
green-winged teal	0.00	0.02 (0.00 - 0.04)	0.0	0.0	0.0	0.0
hairy woodpecker	0.00	0.01 (0.00 - 0.02)	50.0	0.0	0.0	100.0
horned lark	0.00	0.41 (0.18 - 0.64)	82.6	0.0	0.0	100.0
house sparrow	0.00	0.01 (0.00 - 0.02)	100.0	0.0	0.0	100.0
killdeer	0.00	0.71 (0.49 - 0.93)	79.1	0.0	0.0	100.0
least flycatcher	0.00	0.01 (0.00 - 0.02)	33.3	0.0	0.0	100.0
lesser scaup	0.00	1.84 (0.94 - 2.74)	0.5	0.0	0.0	100.0
marbled godwit	0.00	0.04 (0.01 - 0.07)	100.0	0.0	0.0	100.0

Table 6b. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] during Spring 2015 point-count surveys at the Foxtail Wind Energy Center.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
mourning dove	0.00	0.28 (0.19 - 0.37)	86.2	0.0	0.0	100.0
northern cardinal	0.00	0.01 (0.00 - 0.03)	100.0	0.0	0.0	100.0
northern flicker	0.00	0.03 (0.00 - 0.06)	85.7	0.0	0.0	100.0
northern pintail	0.00	0.10 (0.05 - 0.15)	38.1	50.0	0.0	50.0
northern shoveler	0.00	0.07 (0.02 - 0.12)	20.0	0.0	0.0	100.0
orchard oriole	0.00	0.00 (0.00 - 0.01)	100.0	0.0	0.0	100.0
pied-billed grebe	0.00	0.01 (0.00 - 0.03)	0.0	0.0	0.0	0.0
redhead	0.00	0.35 (0.20 - 0.50)	0.0	0.0	0.0	0.0
red-headed woodpecker	0.00	0.00 (0.00 - 0.01)	100.0	0.0	0.0	100.0
ring-necked duck	0.00	0.00 (0.00 - 0.01)	100.0	0.0	0.0	100.0
ring-necked pheasant	0.00	0.38 (0.31 - 0.45)	5.1	0.0	0.0	100.0
rock pigeon	0.00	0.09 (0.01 - 0.17)	100.0	0.0	0.0	100.0
ruddy duck	0.00	0.09 (0.02 - 0.16)	0.0	0.0	0.0	0.0
savannah sparrow	0.00	0.03 (0.01 - 0.05)	42.9	0.0	0.0	100.0
sedge wren	0.00	0.01 (0.00 - 0.03)	0.0	0.0	0.0	0.0
sora	0.00	0.05 (0.03 - 0.07)	0.0	0.0	0.0	0.0
song sparrow	0.00	0.04 (0.02 - 0.06)	0.0	0.0	0.0	0.0
sharp-tailed grouse	0.00	0.38 (0.21 - 0.55)	81.3	0.0	0.0	100.0
Swainson's hawk	0.00	0.02 (0.00 - 0.04)	25.0	0.0	0.0	100.0
tree swallow	0.00	0.03 (0.00 - 0.06)	100.0	0.0	0.0	100.0
tundra swan	0.00	0.09 (0.00 - 0.20)	100.0	0.0	0.0	100.0
unidentified gull	0.00	0.00 (0.00 - 0.01)	100.0	0.0	0.0	100.0
unidentified hawk	0.00	0.00 (0.00 - 0.01)	100.0	0.0	0.0	100.0
unidentified shorebird	0.00	0.00 (0.00 - 0.01)	100.0	0.0	0.0	100.0
unidentified sparrow	0.00	0.07 (0.01 - 0.13)	100.0	0.0	0.0	100.0
upland sandpiper	0.00	0.08 (0.04 - 0.12)	18.8	0.0	0.0	100.0
vesper sparrow	0.00	0.03 (0.01 - 0.05)	28.6	0.0	0.0	100.0
western grebe	0.00	0.12 (0.02 - 0.22)	0.0	0.0	0.0	0.0
western kingbird	0.00	0.02 (0.00 - 0.04)	100.0	0.0	0.0	100.0

Table 6b. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] during Spring 2015 point-count surveys at the Foxtail Wind Energy Center.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
western meadowlark	0.00	1.25 (1.10 - 1.40)	29.9	0.0	0.0	100.0
willet	0.00	0.05 (0.02 - 0.08)	40.0	0.0	0.0	100.0
yellow-headed blackbird	0.00	0.35 (0.20 - 0.50)	51.4	0.0	0.0	100.0
yellow-rumped warbler	0.00	0.03 (0.00 - 0.08)	100.0	0.0	0.0	100.0
yellow warbler	0.00	0.03 (0.00 - 0.08)	100.0	0.0	0.0	100.0

[1]These values assume a rotor diameter of 116 (m) and a hub height of 80 (m)

Table 6c. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] at the Foxtail Wind Energy Center, from 8/20/2014-6/11/2015.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
snow goose	10.01	16.82 (11.23 - 22.42)	99.7	32.0	59.7	8.3
Canada goose	4.52	13.75 (8.16 - 19.35)	75.5	1.2	43.5	55.4
unidentified blackbird	0.69	0.99 (0.00 - 6.81)	92.4	0.0	75.3	24.7
double-crested cormorant	0.52	1.88 (0.00 - 7.48)	57.1	20.9	48.8	30.2
red-winged blackbird	0.44	3.11 (0.00 - 8.70)	82.9	0.0	17.2	82.8
American white pelican	0.17	0.99 (0.00 - 6.58)	49.5	0.0	35.2	64.8
sandhill crane	0.10	0.10 (0.00 - 5.69)	97.4	0.0	100.0	0.0
ring-billed gull	0.09	2.21 (0.00 - 7.81)	65.4	0.0	6.6	93.4
unidentified gull	0.08	0.85 (0.00 - 6.45)	100.0	0.0	9.7	90.3
Wilson's snipe	0.08	0.08 (0.00 - 5.67)	96.9	0.0	100.0	0.0
red-tailed hawk	0.07	0.17 (0.00 - 5.76)	77.6	0.0	51.9	48.1
mallard	0.06	1.59 (0.00 - 7.19)	52.0	3.9	7.6	88.5
tundra swan	0.04	0.26 (0.00 - 5.85)	83.3	0.0	21.2	78.8
unidentified buteo	0.03	0.05 (0.00 - 5.88)	95.2	0.0	50.0	50.0
rock pigeon	0.02	0.12 (0.00 - 5.71)	100.0	0.0	15.2	84.8
blue-winged teal	0.02	0.22 (0.00 - 5.81)	33.3	0.0	24.1	75.9
yellow-headed blackbird	0.01	0.20 (0.00 - 5.79)	55.7	0.0	11.4	88.6
Swainson’s hawk	0.01	0.13 (0.00 - 5.72)	66.7	2.9	11.8	85.3
American black duck	<0.01	0.01 (0.00 - 5.60)	100.0	0.0	100.0	0.0
northern harrier	<0.01	0.10 (0.00 - 5.69)	100.0	0.0	7.9	92.1
bufflehead	<0.01	0.05 (0.00 - 5.64)	21.1	0.0	75.0	25.0
unidentified duck	<0.01	1.40 (0.00 - 6.99)	28.0	0.0	1.9	98.1
Franklin’s gull	<0.01	0.33 (0.00 - 5.92)	100.0	0.0	1.5	98.5
European starling	<0.01	1.21 (0.00 - 6.80)	42.8	0.0	1.0	99.0
western meadowlark	<0.01	1.00 (0.00 - 6.59)	33.1	0.0	1.5	98.5
American crow	<0.01	0.11 (0.00 - 5.70)	95.2	0.0	2.5	97.5

Table 6c. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] at the Foxtail Wind Energy Center, from 8/20/2014-6/11/2015.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
rough-legged hawk	<0.01	0.01 (0.00 - 5.60)	100.0	0.0	25.0	75.0
turkey vulture	<0.01	0.00 (0.00 - 5.83)	100.0	0.0	100.0	0.0
unidentified swallow	<0.01	0.18 (0.00 - 6.00)	100.0	0.0	1.4	98.6
bald eagle	<0.01	0.01 (0.00 - 5.60)	100.0	0.0	33.3	66.7
brown-headed cowbird	<0.01	2.66 (0.00 - 8.25)	93.7	0.0	0.1	99.9
northern flicker	<0.01	0.03 (0.00 - 5.62)	58.3	0.0	14.3	85.7
American avocet	0.00	0.00 (0.00 - 5.60)	0.0	0.0	0.0	0.0
American bittern	0.00	0.01 (0.00 - 5.60)	50.0	0.0	0.0	100.0
American coot	0.00	0.74 (0.00 - 6.33)	0.0	0.0	0.0	0.0
American goldfinch	0.00	0.54 (0.00 - 6.14)	95.9	0.0	0.0	100.0
American kestrel	0.00	0.03 (0.00 - 5.62)	58.3	0.0	0.0	100.0
American robin	0.00	0.07 (0.00 - 5.66)	57.1	0.0	0.0	100.0
American tree sparrow	0.00	0.27 (0.00 - 5.86)	51.9	0.0	0.0	100.0
bank swallow	0.00	0.01 (0.00 - 5.60)	0.0	0.0	0.0	0.0
barn swallow	0.00	0.62 (0.00 - 6.21)	98.4	0.0	0.0	100.0
black-crowned night-heron	0.00	0.05 (0.00 - 5.64)	78.9	0.0	0.0	100.0
black tern	0.00	0.02 (0.00 - 5.61)	100.0	0.0	0.0	100.0
bobolink	0.00	0.15 (0.00 - 5.74)	98.3	0.0	0.0	100.0
Brewer's blackbird	0.00	0.09 (0.00 - 5.91)	100.0	0.0	0.0	100.0
broad-winged hawk	0.00	0.00 (0.00 - 5.83)	100.0	0.0	0.0	100.0
clay-colored sparrow	0.00	0.02 (0.00 - 5.62)	77.8	0.0	0.0	100.0
cliff swallow	0.00	0.05 (0.00 - 5.64)	100.0	0.0	0.0	100.0
common goldeneye	0.00	0.12 (0.00 - 5.71)	4.3	0.0	0.0	100.0
common grackle	0.00	1.41 (0.00 - 7.00)	94.5	0.0	0.0	100.0
common snipe	0.00	0.02 (0.00 - 5.61)	100.0	0.0	0.0	0.0
common tern	0.00	0.07 (0.00 - 5.89)	100.0	0.0	0.0	100.0

Table 6c. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] at the Foxtail Wind Energy Center, from 8/20/2014-6/11/2015.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
common yellowthroat	0.00	0.00 (0.00 - 5.60)	0.0	0.0	0.0	0.0
dark-eyed junco	0.00	0.21 (0.00 - 5.80)	65.1	0.0	0.0	100.0
dickcissel	0.00	0.01 (0.00 - 5.60)	0.0	0.0	0.0	0.0
downy woodpecker	0.00	0.00 (0.00 - 5.83)	100.0	0.0	0.0	100.0
eastern bluebird	0.00	0.01 (0.00 - 5.60)	100.0	0.0	0.0	100.0
eastern kingbird	0.00	0.16 (0.00 - 5.75)	78.1	0.0	0.0	100.0
gadwall	0.00	0.24 (0.00 - 5.83)	6.3	0.0	0.0	100.0
great blue heron	0.00	0.05 (0.00 - 5.64)	78.9	0.0	0.0	100.0
great horned owl	0.00	0.01 (0.00 - 5.60)	0.0	0.0	0.0	0.0
gray partridge	0.00	0.04 (0.00 - 5.63)	0.0	0.0	0.0	0.0
great egret	0.00	0.14 (0.00 - 5.73)	30.9	0.0	0.0	100.0
grasshopper sparrow	0.00	0.04 (0.00 - 5.63)	12.5	0.0	0.0	100.0
greater yellowlegs	0.00	0.04 (0.00 - 5.63)	33.3	0.0	0.0	100.0
greater white-fronted goose	0.00	0.05 (0.00 - 5.87)	100.0	0.0	0.0	100.0
green-winged teal	0.00	0.01 (0.00 - 5.60)	0.0	0.0	0.0	0.0
hairy woodpecker	0.00	0.01 (0.00 - 5.60)	50.0	0.0	0.0	100.0
horned lark	0.00	1.58 (0.00 - 7.17)	95.2	0.0	0.0	100.0
hooded merganser	0.00	0.01 (0.00 - 5.83)	0.0	0.0	0.0	0.0
house sparrow	0.00	0.02 (0.00 - 5.61)	33.3	0.0	0.0	100.0
killdeer	0.00	0.53 (0.00 - 6.12)	76.8	0.0	0.0	100.0
least flycatcher	0.00	0.01 (0.00 - 5.60)	33.3	0.0	0.0	100.0
lesser scaup	0.00	0.96 (0.00 - 6.55)	0.5	0.0	0.0	100.0
marbled godwit	0.00	0.02 (0.00 - 5.61)	100.0	0.0	0.0	100.0
marsh wren	0.00	0.00 (0.00 - 5.83)	0.0	0.0	0.0	0.0
merlin	0.00	0.00 (0.00 - 5.83)	100.0	0.0	0.0	100.0
mourning dove	0.00	0.52 (0.00 - 6.11)	72.5	0.0	0.0	100.0

Table 6c. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] at the Foxtail Wind Energy Center, from 8/20/2014-6/11/2015.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
northern cardinal	0.00	0.01 (0.00 - 5.60)	100.0	0.0	0.0	100.0
northern pintail	0.00	0.06 (0.00 - 5.66)	48.0	33.3	0.0	66.7
northern shoveler	0.00	0.04 (0.00 - 5.64)	17.6	0.0	0.0	100.0
orchard oriole	0.00	0.00 (0.00 - 5.60)	100.0	0.0	0.0	100.0
pied-billed grebe	0.00	0.03 (0.00 - 5.62)	0.0	0.0	0.0	0.0
prairie falcon	0.00	0.01 (0.00 - 5.83)	100.0	0.0	0.0	100.0
redhead	0.00	0.18 (0.00 - 5.78)	0.0	0.0	0.0	0.0
red-headed woodpecker	0.00	0.00 (0.00 - 5.60)	100.0	0.0	0.0	100.0
ring-necked duck	0.00	0.00 (0.00 - 5.60)	100.0	0.0	0.0	100.0
ring-necked pheasant	0.00	0.27 (0.00 - 5.86)	3.8	0.0	0.0	100.0
ruddy duck	0.00	0.05 (0.00 - 5.64)	0.0	0.0	0.0	0.0
savannah sparrow	0.00	0.02 (0.00 - 5.61)	42.9	0.0	0.0	100.0
sedge wren	0.00	0.01 (0.00 - 5.60)	0.0	0.0	0.0	0.0
snow bunting	0.00	0.22 (0.00 - 6.04)	92.0	0.0	0.0	100.0
sora	0.00	0.03 (0.00 - 5.62)	0.0	0.0	0.0	0.0
song sparrow	0.00	0.03 (0.00 - 5.62)	9.1	0.0	0.0	100.0
sharp-tailed grouse	0.00	0.33 (0.00 - 5.92)	76.9	0.0	0.0	100.0
tree swallow	0.00	0.02 (0.00 - 5.61)	100.0	0.0	0.0	100.0
trumpeter swan	0.00	0.01 (0.00 - 5.83)	0.0	0.0	0.0	0.0
unidentified hawk	0.00	0.00 (0.00 - 5.60)	100.0	0.0	0.0	100.0
unidentified shorebird	0.00	0.00 (0.00 - 5.60)	100.0	0.0	0.0	100.0
unidentified sparrow	0.00	0.07 (0.00 - 5.67)	89.7	0.0	0.0	100.0
upland sandpiper	0.00	0.04 (0.00 - 5.63)	18.8	0.0	0.0	100.0
vesper sparrow	0.00	0.02 (0.00 - 5.61)	37.5	0.0	0.0	100.0
western grebe	0.00	0.07 (0.00 - 5.66)	0.0	0.0	0.0	0.0
western kingbird	0.00	0.02 (0.00 - 5.61)	87.5	0.0	0.0	100.0

Table 6c. Avian flight height characteristics in relation to the turbine rotor swept area (RSA)[1] at the Foxtail Wind Energy Center, from 8/20/2014-6/11/2015.

Species	Encounter Rate	Mean Use # birds/ 20 min. (90% confidence interval)	Percent Flying	Percent Above RSA Height	Percent At RSA Height	Percent Below RSA Height
willet	0.00	0.03 (0.00 - 5.62)	40.0	0.0	0.0	100.0
yellow-rumped warbler	0.00	0.02 (0.00 - 5.61)	100.0	0.0	0.0	100.0
yellow warbler	0.00	0.02 (0.00 - 5.61)	100.0	0.0	0.0	100.0

[1]These values assume a GE 1.85 turbine with a rotor diameter of 116 (m) and a hub height of 80 (m)

Table 7. Incidental observations of birds during point counts at the Foxtail Wind Energy Center, 2014-2015.

Species	Fall 2014	Spring 2015	Overall
	Number of birds	Number of birds	Number of birds
snow goose	500	0	500
Canada goose	102	174	276
western meadowlark	150	0	150
American white pelican	123	9	132
Swainson's hawk	61	7	68
red-tailed hawk	39	29	68
western grebe	1	55	56
northern harrier	27	18	45
sharp-tailed grouse	20	20	40
unidentified duck	0	33	33
tundra swan	17	14	31
sandhill crane	30	0	30
great egret	24	0	24
gray partridge	14	0	14
double-crested cormorant	0	13	13
great blue heron	8	4	12
American kestrel	8	2	10
rough-legged hawk	3	4	7
northern pintail	0	6	6
ring-billed gull	0	4	4
mallard	0	4	4
marbled godwit	0	3	3
ring-necked pheasant	0	2	2
ring-necked duck	0	2	2
gadwall	0	2	2

Table 7. Incidental observations of birds during point counts at the Foxtail Wind Energy Center, 2014-2015.

Species	Fall 2014	Spring 2015	Overall
	Number of birds	Number of birds	Number of birds
American crow	0	2	2
ruddy duck	0	1	1
northern flicker	0	1	1
great horned owl	0	1	1
belted kingfisher	1	0	1
black-crowned night-heron	1	0	1
bald eagle	0	1	1
American bittern	0	1	1
Grand Total	**1129**	**412**	**1541**

This page intentionally left blank

APPENDICES

This page intentionally left blank

Appendix 1a. Flight directions of birds observed during Fall 2014 point-count surveys at the Foxtail Wind Energy Center

This page intentionally left blank

Appendix 1a. Flight directions of birds observed during Fall 2014 point-count surveys at the Foxtail Wind Energy Center.

Species	Number of Birds[1]	Number of Observations	Percentage of Flights								
			N	NE	E	SE	S	SW	W	NW	Variable
snow goose	3031	15	23.6	0.0	14.7	56.7	1.4	0.0	0.0	3.6	0.0
Canada goose	526	39	10.5	25.1	4.8	10.3	5.7	0.4	14.8	28.5	0.0
unidentified gull	340	4	0.0	0.9	88.2	0.0	10.9	0.0	0.0	0.0	0.0
double-crested cormorant	305	10	0.3	0.7	0.0	85.2	13.1	0.0	0.3	0.3	0.0
unidentified blackbird	275	4	1.8	0.0	25.5	0.0	0.0	72.7	0.0	0.0	0.0
American goldfinch	67	2	0.0	0.0	0.0	0.0	20.9	0.0	79.1	0.0	0.0
American white pelican	60	11	0.0	36.7	0.0	43.3	5.0	15.0	0.0	0.0	0.0
tundra swan	55	6	0.0	0.0	14.5	32.7	0.0	0.0	0.0	52.7	0.0
European starling	45	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
mourning dove	25	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
mallard	22	6	40.9	31.8	0.0	0.0	9.1	0.0	18.2	0.0	0.0
Swainson's hawk	21	13	9.5	28.6	0.0	9.5	38.1	9.5	0.0	4.8	0.0
unidentified buteo	19	7	5.3	0.0	0.0	15.8	52.6	21.1	0.0	5.3	0.0
greater white-fronted goose	18	1	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
red-tailed hawk	17	16	5.9	17.6	17.6	23.5	17.6	5.9	0.0	5.9	5.9
unidentified duck	16	3	0.0	0.0	6.3	0.0	43.8	0.0	50.0	0.0	0.0
ring-billed gull	15	2	93.3	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0
northern harrier	14	14	7.1	7.1	28.6	14.3	28.6	7.1	7.1	0.0	0.0
western meadowlark	13	3	0.0	7.7	7.7	0.0	0.0	0.0	84.6	0.0	0.0
sandhill crane	10	1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
sharp-tailed grouse	9	2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
rock pigeon	7	2	71.4	0.0	0.0	28.6	0.0	0.0	0.0	0.0	0.0
great egret	6	5	0.0	0.0	33.3	0.0	33.3	16.7	0.0	16.7	0.0
yellow-headed blackbird	5	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
northern pintail	4	1	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0

Appendix 1a. Flight directions of birds observed during Fall 2014 point-count surveys at the Foxtail Wind Energy Center.

Species	Number of Birds[1]	Number of Observations	Percentage of Flights								
			N	NE	E	SE	S	SW	W	NW	Variable
bufflehead	3	1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
prairie falcon	2	2	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0
great blue heron	2	2	50.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
turkey vulture	1	1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
northern flicker	1	1	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
merlin	1	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
horned lark	1	1	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
bald eagle	1	1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
American kestrel	1	1	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
Grand Total	**4938**	**181**	**16.9**	**3.6**	**18.6**	**42.8**	**4.4**	**4.5**	**3.2**	**6.0**	**0.0**

[1] Includes only flying birds with flight directions

Appendix 1b. Flight directions of birds observed during Spring 2015 point-count surveys at the Foxtail Wind Energy Center

This page intentionally left blank

Appendix 1b. Flight directions of birds observed during Spring 2015 point-count surveys at the Foxtail Wind Energy Center.

Species	Number of Birds[1]	Number of Observations	Percentage of Flights								
			N	NE	E	SE	S	SW	W	NW	Variable
snow goose	3675	20	13.5	16.1	0.1	0.0	0.4	0.0	0.0	70.0	0.0
Canada goose	3394	96	35.9	2.5	1.4	0.5	0.7	0.9	9.7	48.4	0.0
red-winged blackbird	204	13	88.2	0.0	1.0	0.0	3.4	0.0	7.4	0.0	0.0
mallard	133	44	19.5	12.8	4.5	4.5	15.8	5.3	2.3	35.3	0.0
American white pelican	103	10	27.2	12.6	1.0	0.0	0.0	0.0	31.1	28.2	0.0
unidentified duck	79	12	15.2	0.0	15.2	0.0	15.2	0.0	1.3	53.2	0.0
common grackle	65	12	9.2	7.7	18.5	0.0	29.2	0.0	30.8	4.6	0.0
ring-billed gull	59	29	18.6	5.1	3.4	6.8	15.3	0.0	11.9	39.0	0.0
American crow	38	7	47.4	2.6	0.0	0.0	2.6	0.0	2.6	44.7	0.0
killdeer	36	9	30.6	0.0	2.8	0.0	0.0	0.0	63.9	2.8	0.0
sharp-tailed grouse	30	5	23.3	36.7	16.7	16.7	0.0	0.0	6.7	0.0	0.0
sandhill crane	28	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
brown-headed cowbird	26	4	76.9	0.0	0.0	3.8	0.0	0.0	0.0	19.2	0.0
tundra swan	19	2	0.0	0.0	31.6	0.0	68.4	0.0	0.0	0.0	0.0
red-tailed hawk	17	16	5.9	5.9	11.8	5.9	11.8	11.8	17.6	29.4	0.0
blue-winged teal	10	2	0.0	0.0	0.0	30.0	0.0	0.0	70.0	0.0	0.0
northern harrier	9	9	33.3	22.2	11.1	0.0	11.1	0.0	22.2	0.0	0.0
Franklin's gull	9	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
northern pintail	6	3	83.3	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0
rock pigeon	5	2	0.0	0.0	0.0	0.0	80.0	0.0	20.0	0.0	0.0
western meadowlark	3	2	33.3	0.0	0.0	0.0	66.7	0.0	0.0	0.0	0.0
northern shoveler	3	2	66.7	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
great blue heron	3	2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
American black duck	3	1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
rough-legged hawk	2	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0

Appendix 1b. Flight directions of birds observed during Spring 2015 point-count surveys at the Foxtail Wind Energy Center.

Species	Number of Birds[1]	Number of Observations	Percentage of Flights								
			N	NE	E	SE	S	SW	W	NW	Variable
lesser scaup	2	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
gadwall	2	1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
common goldeneye	2	1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
bald eagle	2	2	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
American robin	2	2	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0
American kestrel	2	2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
unidentified gull	1	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Swainson's hawk	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0
ring-necked pheasant	1	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
ring-necked duck	1	1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
mourning dove	1	1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
marbled godwit	1	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
hairy woodpecker	1	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
greater yellowlegs	1	1	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
great egret	1	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
double-crested cormorant	1	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grand Total	**7981**	**325**	**26.2**	**9.2**	**1.4**	**0.5**	**1.7**	**0.5**	**5.7**	**55.0**	**0.0**

[1] Includes only flying birds with flight directions

Appendix 2. County Occurrence of Endangered, Threatened, Proposed and Candidate Species Designated and Proposed Critical Habitat in North Dakota

This page intentionally left blank

County Occurrence of Endangered, Threatened, Proposed and Candidate Species
Designated and Proposed Critical Habitat in North Dakota

January 2015

Species	Adams	Barnes	Benson	Billings	Bottineau	Bowman	Burke	Burleigh	Cass	Cavalier	Dickey	Divide	Dunn	Eddy	Emmons	Foster	Go. Valley	Gr. Forks	Grant	Griggs	Hettinger	Kidder	Lamoure	Logan	McHenry	McIntosh	McKenzie
Interior Least Tern - E								X					X		X												X
Whooping Crane - E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Black-Footed Ferret - E	X			X		X							X				X		X		X						X
Pallid Sturgeon – E								X					X		X												X
Gray Wolf - E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poweshiek Skipperling – E																											
Piping Plover - T			X				X	X				X	X	X	X							X		X	X	X	X
Western Prairie Fringed Orchid - T																											
Dakota Skipper - T		X			X		X						X	X						X					X		X
Rufa Red Knot - T			X				X	X				X	X	X	X							X		X	X	X	X
Northern Long-Eared Bat - P	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sprague's Pipit – C	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
Greater Sage-Grouse - C						X											X										

Critical Habitat																											
Piping Plover - D			X				X	X				X	X	X	X							X		X	X	X	X
Dakota Skipper - P																									X		X
Poweshiek Skipperling – P																											

E – Endangered **T – Threatened** **P – Proposed** **C – Candidate** **D - Designated**

County Occurrence of Endangered, Threatened, Proposed and Candidate Species and Designated Critical Habitat in North Dakota

January 2015

Species	McLean	Mercer	Morton	Mountrail	Nelson	Oliver	Pembina	Pierce	Ramsey	Ransom	Renville	Richland	Rolette	Sargent	Sheridan	Sioux	Slope	Stark	Steele	Stutsman	Towner	Traill	Walsh	Ward	Wells	Williams
Interior Least Tern - E	X	X	X	X		X										X										X
Whooping Crane - E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Black-footed Ferret - E		X	X			X										X	X	X								
Pallid Sturgeon - E	X	X	X	X		X										X										X
Gray Wolf - E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poweshiek Skipperling – E												X		X												
Piping Plover - T	X	X	X	X		X		X			X				X	X				X				X	X	X
Western Prairie Fringed Orchid - T										X		X														
Dakota Skipper - T	X			X		X		X		X		X		X						X				X	X	
Rufa Red Knot - T	X	X	X	X		X		X			X				X	X				X				X	X	X
Northern Long-Eared Bat - P	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sprague=s Pipit - C	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X		X	X		X	X	X	X
Greater Sage-Grouse – C																	X									
Critical Habitat																										
Piping Plover - D	X	X	X	X		X		X			X				X	X				X				X		X
Dakota Skipper - P										X		X	X												X	
Poweshiek Skipperling – P												X		X												

E – Endangered **T – Threatened** **P – Proposed** **C – Candidate** **D - Designated**