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TECHNICAL MEMORANDUM

Date: September 28, 2017

To: Jennie Geiger, Apex Clean Energy Management, LLC

From: Western EcoSystems Technology, Inc.

Subject: Dakota Range I Wind Project – Avian/Eagle Use Summary

INTRODUCTION

Dakota Range I Wind, LLC, an affiliate of Apex Clean Energy Management, LLC (Apex), is developing the Dakota Range I Wind Project (Project), in Codington and Grant counties, South Dakota (Figure 1). General avian use point-count surveys were initiated in December 2015 to evaluate species composition (including small bird species), relative abundance, and seasonal variation for large bird species. Eagle use was evaluated at the same locations using methodology recommended in the US Fish and Wildlife Service (USFWS) *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013). Study periods and methods were developed in coordination with USFWS and South Dakota Game Fish and Parks. In this technical memorandum, Western EcoSystems Technology, Inc. (WEST) summarizes data recorded for small and large bird species, eagles, and species of concern (i.e., federally or state-threatened and endangered species [Endangered Species Act 1973], USFWS Birds of Conservation Concern [BCC; USFWS 2008], and South Dakota Species of Greatest Conservation Need [SGCN; South Dakota Wildlife Action Plan 2017]) recorded during surveys.

Project Area

The Project, about 50,125 acres (20,285 hectares), is located in the Northern Glaciated Plains Level III Ecoregion (US Environmental Protection Agency 2016) with most of the Project in the Big Sioux Basin Level IV Ecoregion and the remainder in the Prairie Coteau. The predominant land cover/use types within the Project are cultivated crops and herbaceous (grassland; US Geological Survey [USGS] National Land Cover Database 2011, Homer et al. 2015; Figure 2). The most common cultivated cropland in 2016 was corn (*Zea mays*) and soybeans (*Glycine max*; US Department of Agriculture National Agricultural Statistics Service 2016).

According to the National Wetlands Inventory (NWI; USFWS NWI 2007), most of the wetlands within the Project are classified as freshwater emergent wetlands. The next most common

wetland type is freshwater pond. Several rivers and streams are within the Project: the Big Sioux River flows southwest through the northwestern portion of the Project, Soo Creek flows southwest through the central area of the Project, Mahoney Creek flows southwest through the south-central portion of the Project, and Mud Creek flows southwest through the southern portion of the Project (Figure 3).

METHODS

Fixed-point avian use surveys were conducted approximately once monthly during winter and spring from between December 3, 2015 – May 30, 2017 at 40 survey points using methods described by Reynolds et al. (1980).

Each survey point was located to maximize visibility for the observer and to enable evaluation of representative habitats within and near the Project. Sampling intensity was designed to document use and behavior of birds during the study period. Surveys were carried out during daylight hours, and survey periods varied to cover approximately all daylight hours during a season. To the extent practical, survey effort was roughly consistent across survey points.

Surveys were conducted for 65 minutes (min), with small birds recorded within 100 meters (m; 328 feet [ft]) for the first five min, large birds (including raptors and eagles) recorded out to 800 m (2,625 ft) for the next 20 min, and eagles and sensitive species only recorded for the remaining 40 mins, resulting in 60-min eagle surveys. Sensitive species, if observed, were recorded at any time during the 65-min survey. The 60-min survey methodology for eagles is consistent with the methods recommended in the USFWS ECPG (USFWS 2013). The survey plots used in this evaluation were representative of potential development areas and encompassed approximately 30% of the area under consideration for development (Figure 3).

The following information was recorded during each survey: date, start and end time, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and cloud cover). Additionally, the following data were recorded for each bird observation: species observed (or best possible identification), number of individuals observed, distance from survey point when first observed, closest distance of bird to observer, flight height above ground, flight direction, and activity of bird. Approximate flight height, flight direction, and distance from plot center were recorded when the bird or birds were first observed; the approximate lowest and highest flight heights were recorded at any time during the bird or birds observation.

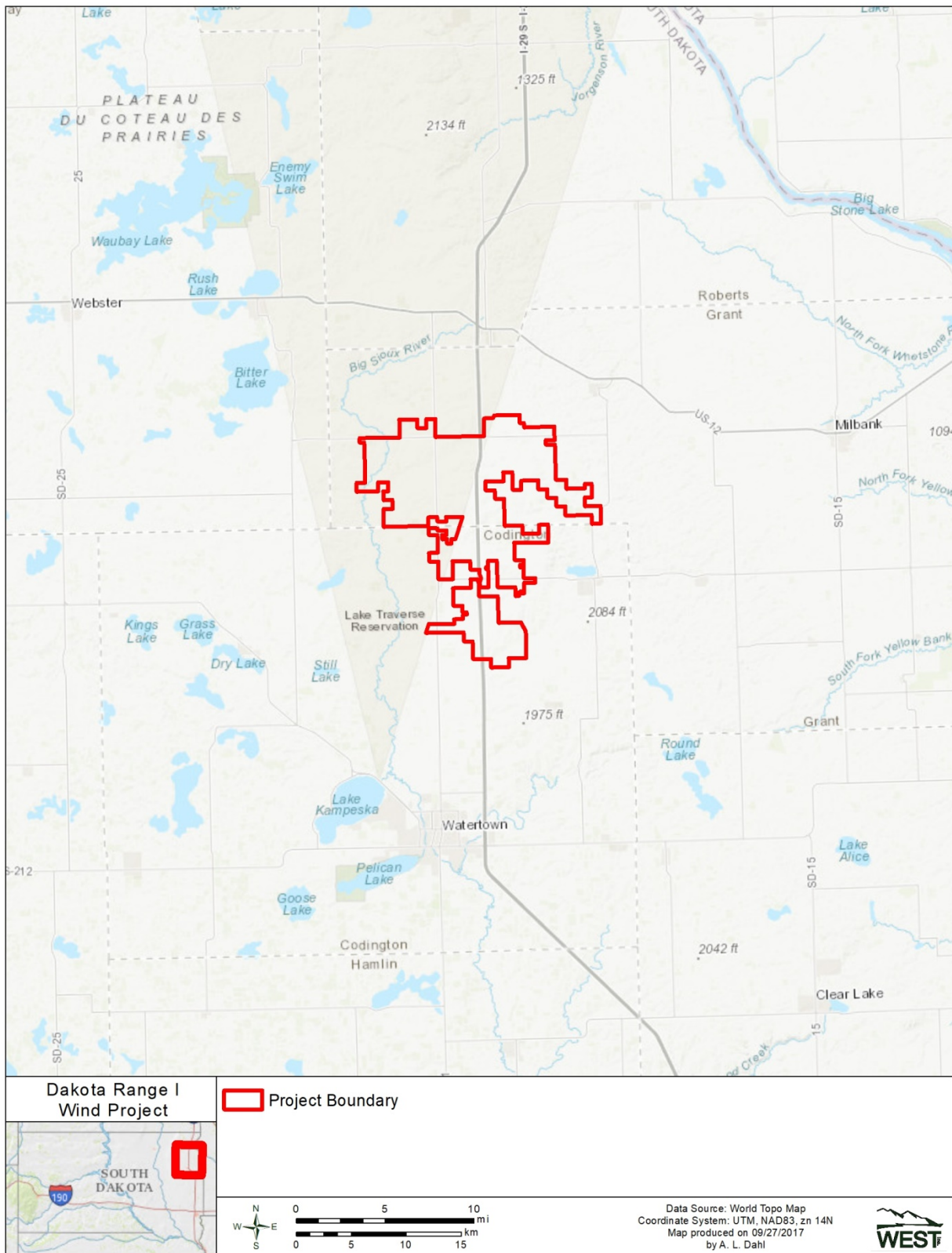


Figure 1. Dakota Range I Wind Project location in Codington and Grant counties, South Dakota.

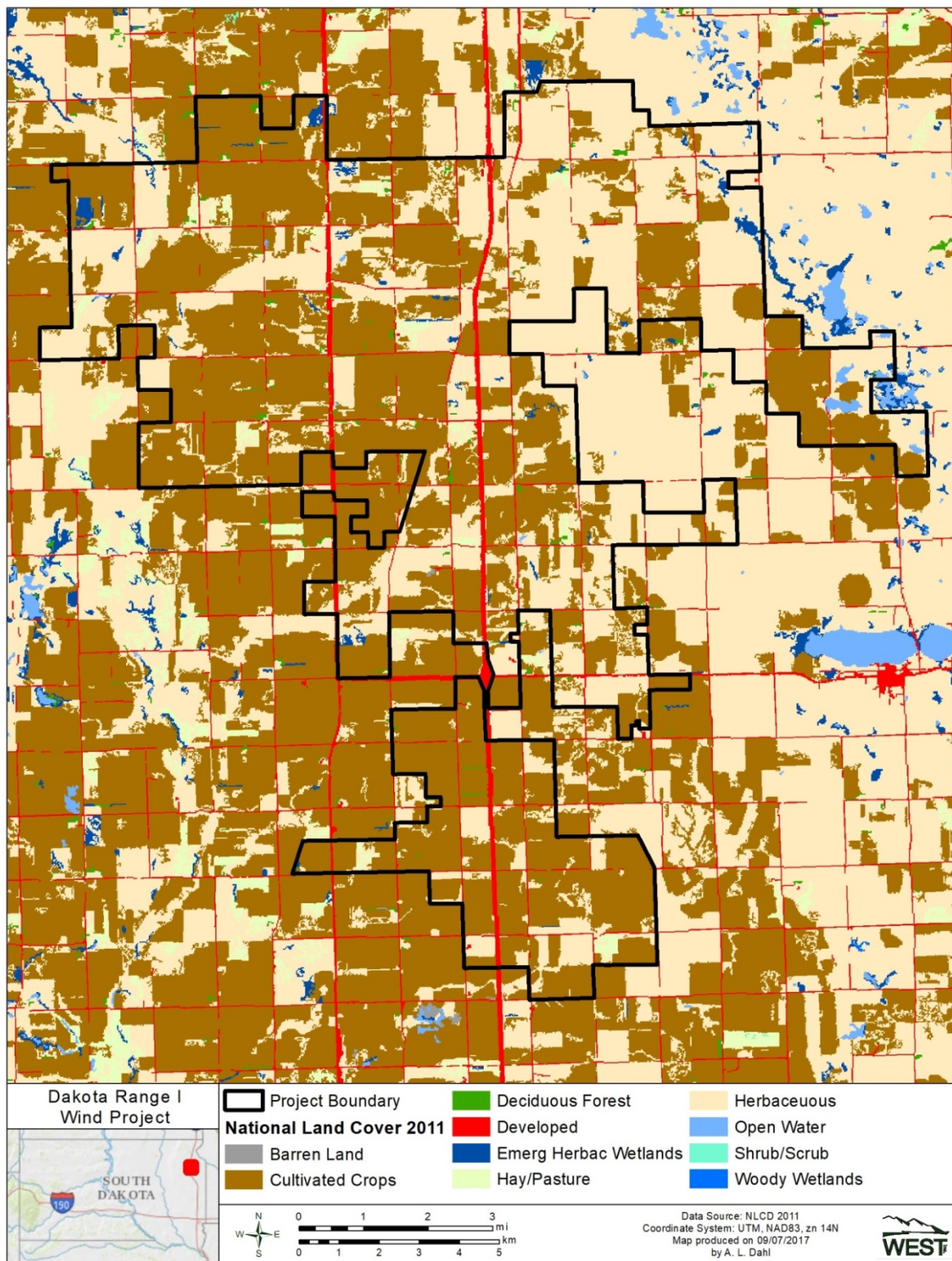


Figure 2. Land cover/use types in and near the Dakota Range I Wind Project in Codington and Grant counties, South Dakota (US Geological Survey National Land Cover Database 2011, Homer et al. 2015).

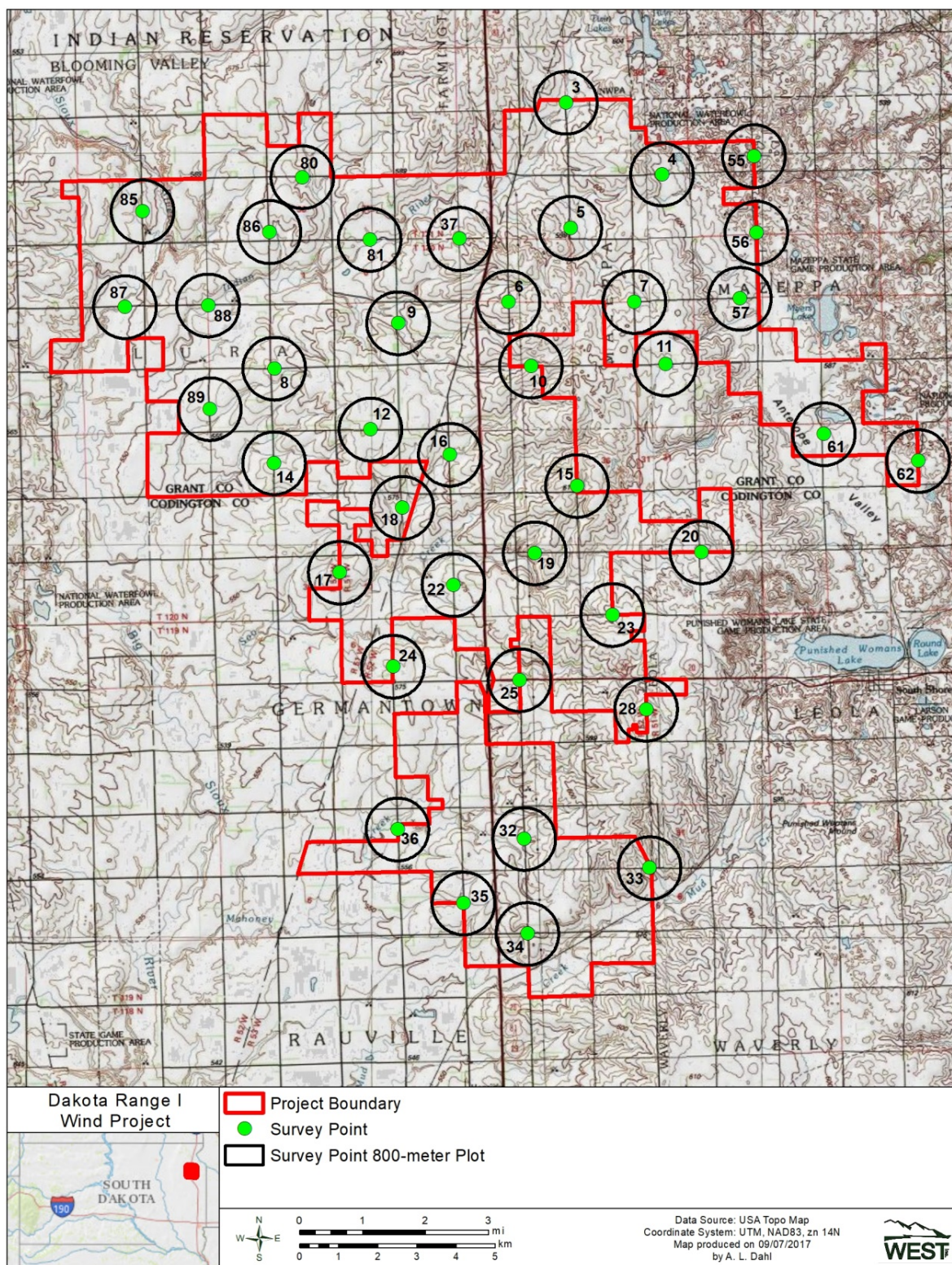


Figure 3. Survey point locations at the Dakota Range I Wind Project in Codington and Grant counties, South Dakota.

Data Analysis

For small birds, a list of species with number of individuals and groups observed during the 5-min survey was compiled.

For large birds, standardized fixed-point bird use estimates were generated based on large birds detected within the 800-m radius plot. Mean bird use was calculated as the number of birds per plot per 20-min survey. These standardized estimates of mean bird use can be used to compare differences between bird types, seasons, survey points, and other studies where similar methods were used. Mean use by season was calculated by summing the total number of birds seen within each plot during a visit, then averaging across plots within each visit, followed by averaging across visits within the season. Frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed. We generated a summary table for large birds, tallying the number of individuals and groups observed by species and season.

A separate summary of eagle minutes (i.e., observations of flying eagles that were recorded within 800-m of the observer and at or below 200 m (656 ft) above ground level), was calculated in accordance with the ECPG (USFWS 2013).

RESULTS

Surveys were conducted in winter and spring from December 3, 2015 – May 30, 2017, resulting in 221 hours of 60-min survey effort (108 hours in winter and 113 hours in spring). Each survey point was surveyed approximately six times, with approximately three surveys during the first winter (25 points from December 3, 2015 – February 25, 2016; 85 survey hours) or second winter (10 points from January 2, 2017 – February 24, 2017; 23 survey hours), followed by approximately three surveys during spring (40 points from March 2, 2017 – May 30, 2017; 113 survey hours).

Small Birds

Twenty small bird species, with 753 observations in 153 groups, were recorded during 5-min surveys (Appendix A). The most commonly observed small bird species were red-winged blackbird (*Agelaius phoeniceus*; 408 observations) and horned lark (*Eremophila alpestris*; 104 observations). No federal or state-listed, BCC, or SGCN small bird species were observed.

Large Birds

Thirty large birds species, with 1,863 observations in 126 groups, were recorded during the 20-min large bird survey (Appendix A). The most commonly recorded species were waterfowl, comprising 84% of the total number of large bird observations (Appendix B). Canada goose (*Branta canadensis*), greater white-fronted goose (*Anser albifrons*), and snow goose (*Chen caerulescens*) accounted for most of those observations. Large bird mean use was somewhat

higher in spring (9.17 birds/800-m plot/20-min survey) than in winter (8.59 birds/800-m plot/20-min survey; Appendix B).

Six diurnal raptor species were identified during the large bird surveys, which accounted for 20 raptor observations (1% of large bird observations; Appendix A). Red-tailed hawk (*Buteo jamaicensis*; 10 observations) was the most commonly observed diurnal raptor, followed by northern harrier (*Circus cyaneus*; four observations). Diurnal raptor use was higher in spring (0.13 birds/800-m plot/20-min survey) than in winter (0.03 birds/800-m plot/20-min survey; Appendix B).

Eagles

One bald eagle (*Haliaeetus leucocephalus*) was observed in winter and one in spring during the 60-min eagle use count surveys. Three eagle minutes were recorded at Point 7 on December 3, 2015, and four were recorded at Point 36 on March 3, 2017 (Table 1). Bald eagle use was 0.006 eagles/800-m plot/60-min survey in winter, and 0.010 eagles/800-m plot /60-min survey in spring (Table 1). Eagle flight paths are shown in Figure 4. No golden eagles (*Aquila chrysaetos*) were observed during surveys.

Table 1. Number of bald eagle observations and minutes where eagles flew below 200 meters (m) above ground level within 800 m of the observer (eagle minutes [min]), survey effort (hours), and eagle use (eagles/800-m plot /60-min survey) observed during large bird surveys at the Dakota Range I Wind Project from December 3, 2015 – May 30, 2017.

Season	Number of Eagle Observations	Eagle Minutes	Survey Effort (hours)	Eagle Use (eagles/plot/60 min)
Winter	1	3	108	0.006
Spring	1	4	113	0.010

Sensitive Species

No federally threatened or endangered species were observed during the study (Endangered Species Act 1973). One state endangered species, peregrine falcon (*Falco peregrinus*; n=1), was documented during surveys (South Dakota Wildlife Action Plan 2017). Four BCC species were documented: (American bittern [*Botaurus lentiginosus*; n=2], bald eagle [n=2], marbled godwit [*Limosa fedoa*; n=6], and peregrine falcon), and four SGCN species were documented (American white pelican [*Pelecanus erythrorhynchos*; n=21], bald eagle, marbled godwit, and peregrine falcon; Table 2).

Table 2. Sensitive species observed during surveys at Dakota Range I Wind Project from December 3, 2015 – May 30, 2017.

Species	Number of Observations	BCC	BGEPA	State	SGCN
American bittern	2	X			
American white pelican	21				X
bald eagle	2	X	X		X
marbled godwit	6	X			X
peregrine falcon	1	X		Endangered	X

BCC-Birds of Conservation Concern (US Fish and Wildlife Service 2008)

BGEPA-Bald and Golden Eagle Protection Act (1940)

SGCN-Species of Greatest Conservation Need (South Dakota Wildlife Action Plan 2017)

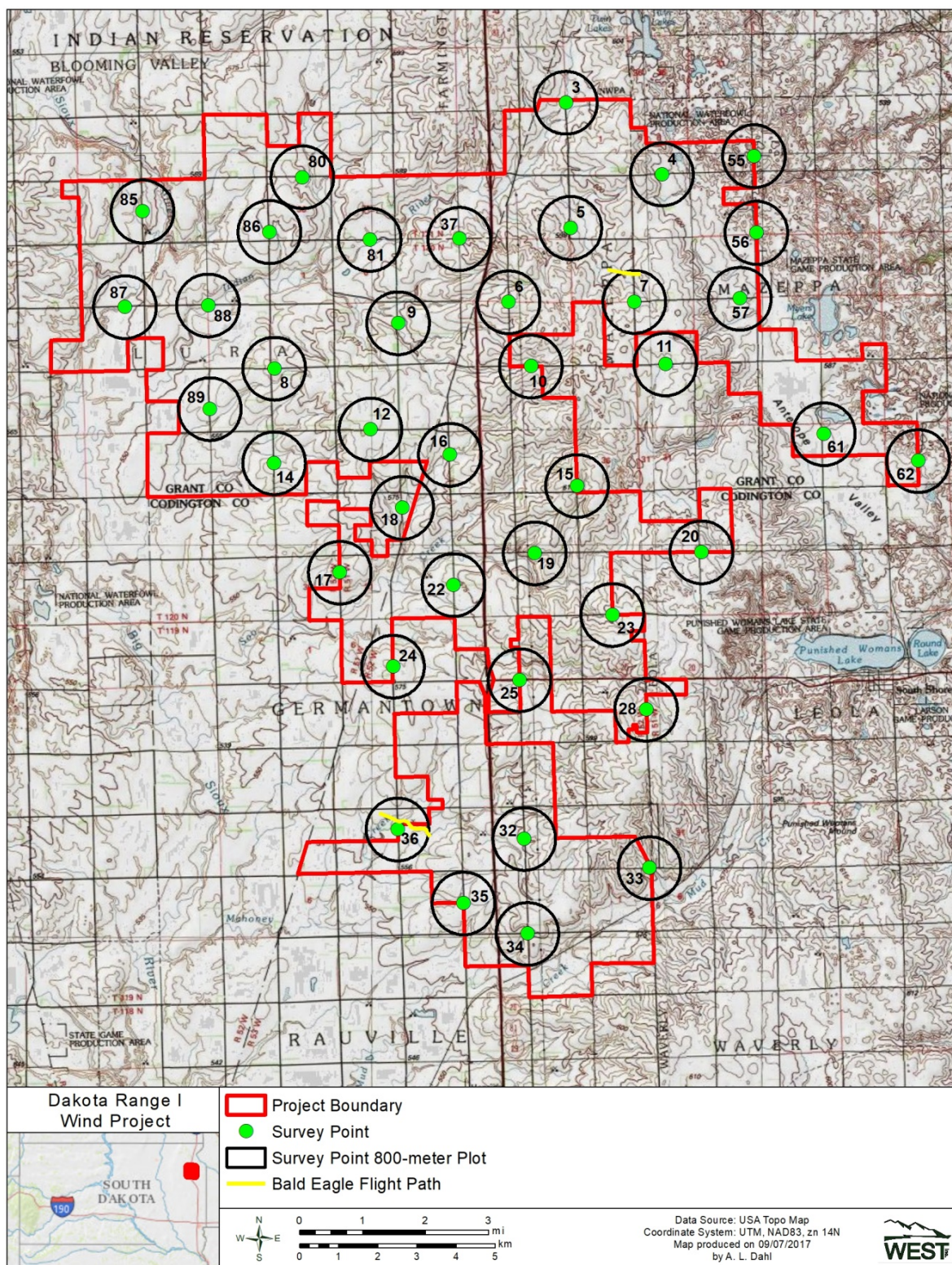


Figure 4. Bald eagle flight paths recorded during surveys at Dakota Range I Wind Project in Codington and Grant counties, South Dakota from December 3, 2015 – May 30, 2017.

DISCUSSION

In general, the bird species observed during the fixed-point bird use surveys at the Project were common species typical of agricultural and grassland environments in this area of South Dakota (Drilling et al. 2016, South Dakota Birds, Birding, and Nature 2017) during winter and spring. No federally threatened or endangered species and one state endangered species (peregrine falcon) were observed during the study. Five BCC and SGCN species were documented in low numbers (American bittern, American white pelican, bald eagle, marbled godwit, peregrine falcon). Direct impacts to avian species are expected to be low as evidenced by data from projects operating in similar habitats (Appendix C).

Diurnal raptors most often observed were relatively common, widespread species and potential impacts from the Project are unlikely to cause significant adverse impacts to local or regional populations. Two bald eagles were observed over 221 hours of surveys. The results of this study combined with other publicly available information within the area (i.e., adjacent Summit Wind project to the north with 231 hrs of study across a full year with no bald eagle and only one golden eagle observation [Derby and Dahl 2014]), suggest that risk to bald eagles is likely to be very low.

Waterfowl use at the Project was mostly comprised of snow geese, white-fronted geese, and Canada geese. In an analysis of 116 studies of bird mortality at over 70 facilities, waterfowl made up 2.7% of 4,975 fatalities (Erickson et al. 2014) suggesting waterfowl are not especially vulnerable to turbine collisions. The presence of similar habitat surrounding the Project suggests any displacement of these species is unlikely to negatively impact their populations.

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**Appendix A. Summary of Individual and Group Observations of Small and Large Bird
Type and Species by Season, Observed During Bird Surveys at the
Dakota Range I Wind Project from December 3, 2015 – May 30, 2017**

Appendix A1. Summary of individual (# obs) and group (# grps) observations of small bird species and type, by season, observed within 100 meters of the observer, during small bird surveys at the Dakota Range I Wind Project from December 3, 2015 – May 30, 2017.

Type/Species	Scientific Name	Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs
Blackbird/Orioles		0	0	80	468	80	468
Baltimore oriole	<i>Icterus galbula</i>	0	0	1	1	1	1
bobolink	<i>Dolichonyx oryzivorus</i>	0	0	3	3	3	3
brown-headed cowbird	<i>Molothrus ater</i>	0	0	11	16	11	16
red-winged blackbird	<i>Agelaius phoeniceus</i>	0	0	26	408	26	408
western meadowlark	<i>Sturnella neglecta</i>	0	0	38	39	38	39
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	0	0	1	1	1	1
Corvids		1	1	4	4	5	5
blue jay	<i>Cyanocitta cristata</i>	1	1	4	4	5	5
Finches/Crossbills		0	0	1	2	1	2
American goldfinch	<i>Spinus tristis</i>	0	0	1	2	1	2
Flycatchers		0	0	4	4	4	4
eastern kingbird	<i>Tyrannus tyrannus</i>	0	0	4	4	4	4
Grassland/Sparrows		4	54	25	156	29	210
clay-colored sparrow	<i>Spizella pallida</i>	0	0	1	1	1	1
horned lark	<i>Eremophila alpestris</i>	4	54	15	50	19	104
Lapland longspur	<i>Calcarius lapponicus</i>	0	0	2	16	2	16
Savannah sparrow	<i>Passerculus sandwichensis</i>	0	0	6	9	6	9
snow bunting	<i>Plectrophenax nivalis</i>	0	0	1	80	1	80
Shorebirds		0	0	11	14	11	14
Wilson's snipe	<i>Gallinago delicata</i>	0	0	11	14	11	14
Swallows		0	0	9	24	9	24
barn swallow	<i>Hirundo rustica</i>	0	0	7	22	7	22
tree swallow	<i>Tachycineta bicolor</i>	0	0	2	2	2	2
Thrushes		0	0	12	24	12	24
American robin	<i>Turdus migratorius</i>	0	0	12	24	12	24
Warblers		0	0	1	1	1	1
yellow-rumped warbler	<i>Setophaga coronata</i>	0	0	1	1	1	1
Woodpeckers		0	0	1	1	1	1
unidentified woodpecker		0	0	1	1	1	1
Overall Small Birds		5	55	148	698	153	753

Appendix A2. Summary of individual (# obs) and group (# grps) observations of large bird species and type, by season, observed within 800 meters of the observer, during 20-minute large bird surveys at the Dakota Range I Wind Project from December 3, 2015 – May 30, 2017.

Type/Species	Scientific Name	Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs
Waterbirds		0	0	2	22	2	22
American white pelican	<i>Pelecanus erythrorhynchos</i>	0	0	1	21	1	21
great blue heron	<i>Ardea herodias</i>	0	0	1	1	1	1
Waterfowl		7	641	56	917	63	1,558
blue-winged teal	<i>Anas discors</i>	0	0	9	57	9	57
Canada goose	<i>Branta canadensis</i>	3	236	17	95	20	331
gadwall	<i>Anas strepera</i>	0	0	3	8	3	8
greater white-fronted goose	<i>Anser albifrons</i>	2	260	2	130	4	390
lesser scaup	<i>Aythya affinis</i>	0	0	1	6	1	6
mallard	<i>Anas platyrhynchos</i>	1	75	15	44	16	119
northern pintail	<i>Anas acuta</i>	0	0	2	4	2	4
northern shoveler	<i>Anas clypeata</i>	0	0	1	1	1	1
ring-necked duck	<i>Aythya collaris</i>	0	0	1	2	1	2
ruddy duck	<i>Oxyura jamaicensis</i>	0	0	1	15	1	15
snow goose	<i>Chen caerulescens</i>	1	70	4	555	5	625
Shorebirds		0	0	1	6	1	6
marbled godwit	<i>Limosa fedoa</i>	0	0	1	6	1	6
Gulls/Terns		0	0	7	9	7	9
ring-billed gull	<i>Larus delawarensis</i>	0	0	7	9	7	9
Rails/Coots		0	0	1	1	1	1
American coot	<i>Fulica americana</i>	0	0	1	1	1	1
Diurnal Raptors		5	5	15	15	20	20
<i>Buteos</i>		4	4	10	10	14	14
broad-winged hawk	<i>Buteo platypterus</i>	0	0	1	1	1	1
red-tailed hawk	<i>Buteo jamaicensis</i>	1	1	9	9	10	10
rough-legged hawk	<i>Buteo lagopus</i>	3	3	0	0	3	3
<i>Northern Harrier</i>		1	1	3	3	4	4
northern harrier	<i>Circus cyaneus</i>	1	1	3	3	4	4
<i>Eagles</i>		0	0	1	1	1	1
bald eagle	<i>Haliaeetus leucocephalus</i>	0	0	1	1	1	1

Appendix A2. Summary of individual (# obs) and group (# grps) observations of large bird species and type, by season, observed within 800 meters of the observer, during 20-minute large bird surveys at the Dakota Range I Wind Project from December 3, 2015 – May 30, 2017.

Type/Species	Scientific Name	Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs
<i>Falcons</i>		0	0	1	1	1	1
peregrine falcon	<i>Falco peregrinus</i>	0	0	1	1	1	1
Owls		1	1	1	1	2	2
great horned owl	<i>Bubo virginianus</i>	0	0	1	1	1	1
snowy owl	<i>Bubo scandiacus</i>	1	1	0	0	1	1
Vultures		0	0	1	1	1	1
turkey vulture	<i>Cathartes aura</i>	0	0	1	1	1	1
Upland Game Birds		9	102	5	6	14	108
ring-necked pheasant	<i>Phasianus colchicus</i>	3	5	0	0	3	5
sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	1	2	1	2	2	4
wild turkey	<i>Meleagris gallopavo</i>	5	95	4	4	9	99
Doves/Pigeons		7	57	0	0	7	57
rock pigeon	<i>Columba livia</i>	7	57	0	0	7	57
Large Corvids		7	72	2	8	9	80
American crow	<i>Corvus brachyrhynchos</i>	7	72	2	8	9	80
Overall Large Birds		36	878	90	985	126	1,863

**Appendix B. Mean Bird Use, Percent of Total Use, and Frequency of Occurrence for Each
Large Bird Type and Species by Season During Surveys at the Dakota Range I Wind
Project from December 3, 2015 – May 30, 2017**

Appendix B. Mean bird use (number of birds/800-meter plot/20-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species, by season, during surveys at the Dakota Range I Wind Project from December 3, 2015 – May 30, 2017.

Type/Species	Mean Use		% of Use		% Frequency	
	Winter	Spring	Winter	Spring	Winter	Spring
Waterbirds	0	0.19	0	2.1	0	1.7
American white pelican	0	0.18	0	2	0	0.9
great blue heron	0	<0.01	0	<0.1	0	0.9
Waterfowl	7.18	8.57	83.6	93.5	3.9	23.8
blue-winged teal	0	0.49	0	5.3	0	6
Canada goose	2	0.86	23.3	9.3	3.3	9.6
gadwall	0	0.07	0	0.7	0	2.6
greater white-fronted goose	3.71	1.24	43.2	13.5	1.4	1
lesser scaup	0	0.05	0	0.6	0	0.9
mallard	1.07	0.4	12.5	4.3	1.4	11.3
northern pintail	0	0.03	0	0.4	0	1.7
northern shoveler	0	<0.01	0	<0.1	0	0.9
ring-necked duck	0	0.02	0	0.2	0	0.9
ruddy duck	0	0.13	0	1.4	0	0.9
snow goose	0.4	5.29	4.7	57.6	0.6	1.9
Shorebirds	0	0.05	0	0.6	0	0.9
marbled godwit	0	0.05	0	0.6	0	0.9
Gulls/Terns	0	0.08	0	0.8	0	4.3
ring-billed gull	0	0.08	0	0.8	0	4.3
Rails/Coots	0	<0.01	0	<0.1	0	0.9
American coot	0	<0.01	0	<0.1	0	0.9
Diurnal Raptors	0.03	0.13	0.3	1.4	2.9	12.1
<i>Buteos</i>	0.02	0.09	0.3	0.9	2.3	8.5
broad-winged hawk	0	<0.01	0	<0.1	0	0.9
red-tailed hawk	<0.01	0.08	<0.1	0.8	0.6	7.7
rough-legged hawk	0.02	0	0.2	0	1.7	0
<i>Northern Harrier</i>	<0.01	0.03	<0.1	0.3	0.6	2.6
northern harrier	<0.01	0.03	<0.1	0.3	0.6	2.6
<i>Eagles</i>	0	<0.01	0	0.1	0	1
bald eagle	0	<0.01	0	0.1	0	1

Appendix B. Mean bird use (number of birds/800-meter plot/20-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species, by season, during surveys at the Dakota Range I Wind Project from December 3, 2015 – May 30, 2017.

Type/Species	Mean Use		% of Use		% Frequency	
	Winter	Spring	Winter	Spring	Winter	Spring
<i>Falcons</i>	0	<0.01	0	<0.1	0	0.9
peregrine falcon	0	<0.01	0	<0.1	0	0.9
<i>Owls</i>	<0.01	<0.01	<0.1	0.1	0.6	1
great horned owl	0	<0.01	0	0.1	0	1
snowy owl	<0.01	0	<0.1	0	0.6	0
<i>Vultures</i>	0	<0.01	0	<0.1	0	0.9
turkey vulture	0	<0.01	0	<0.1	0	0.9
<i>Upland Game Birds</i>	0.62	0.05	7.3	0.6	6.4	4.3
ring-necked pheasant	0.05	0	0.6	0	2.9	0
sharp-tailed grouse	0.01	0.02	0.1	0.2	0.6	0.9
wild turkey	0.56	0.03	6.5	0.4	2.9	3.4
<i>Doves/Pigeons</i>	0.33	0	3.8	0	4	0
rock pigeon	0.33	0	3.8	0	4	0
<i>Large Corvids</i>	0.42	0.08	4.9	0.8	4.8	1.9
American crow	0.42	0.08	4.9	0.8	4.8	1.9
Overall Large Birds	8.59	9.17	100	100		

Appendix C. Raptor and All Bird Fatality Estimates for Wind Facilities in the Midwest

Appendix C. Raptor and all bird fatality estimates (number of fatalities per megawatt [MW] per year) and dominant land cover/use for wind facilities in the Midwest.

Facility/Project Name	All Bird Fatalities/ MW/Year	Raptors Fatalities/ MW/Year	Dominant Land Cover/Use	Reference
Barton I & II, IA (2010-2011)	5.50	0	agriculture	Derby et al. 2011a
Big Blue, MN (2013)	0.60	0	agriculture	Fagen Engineering 2014
Big Blue, MN (2014)	0.37	0	agriculture	Fagen Engineering 2015
Blue Sky Green Field, WI (2008; 2009)	7.17	0	agriculture	Gruver et al. 2009
Buffalo Ridge I, SD (2009-2010)	5.06	0.20	agriculture/grassland	Derby et al. 2010a
Buffalo Ridge II, SD (2011-2012)	1.99	0	agriculture, grassland	Derby et al. 2012a
Buffalo Ridge, MN (Phase I; 1996)	4.14	0	agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase I; 1997)	2.51	0	agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase I; 1998)	3.14	0	agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase I; 1999)	1.43	0.47	agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase II; 1998)	2.47	0	agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase II; 1999)	3.57	0	agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase III; 1999)	5.93	0	agriculture	Johnson et al. 2000
Cedar Ridge, WI (2009)	6.55	0.18	agriculture	BHE Environmental 2010
Cedar Ridge, WI (2010)	3.72	0.13	agriculture	BHE Environmental 2011
Elm Creek II, MN (2011-2012)	3.64	0	agriculture, grassland	Derby et al. 2012b
Elm Creek, MN (2009-2010)	1.55	0	agriculture	Derby et al. 2010b
Fowler I, IN (2009)	2.83	0	agriculture	Johnson et al. 2010
Grand Ridge I, IL (2009-2010)	0.48	0	agriculture	Derby et al. 2010f
Heritage Garden I, MI (2012-2014)	1.30	NA	agriculture	Kerlinger et al. 2014
Kewaunee County, WI (1999-2001)	1.95	0	agriculture	Howe et al. 2002
Moraine II, MN (2009)	5.59	0.37	agriculture/grassland	Derby et al. 2010c
NPPD Ainsworth, NE (2006)	1.63	0.06	agriculture/grassland	Derby et al. 2007
Pioneer Prairie II, IA (2011-2012)	0.27	0	agriculture, grassland	Chodachek et al. 2012
Prairie Winds ND1 (Minot), ND (2010)	1.48	0.05	agriculture	Derby et al. 2011c
Prairie Winds ND1 (Minot), ND (2011)	1.56	0.05	agriculture, grassland	Derby et al. 2012c
Prairie Winds SD1, SD (2011-2012)	1.41	0	grassland	Derby et al. 2012d
Prairie Winds SD1, SD (2012-2013)	2.01	0.03	grassland	Derby et al. 2013
Prairie Winds SD1, SD (2013-2014)	1.66	0.17	grassland	Derby et al. 2014
Rail Splitter, IL (2012-2013)	0.84	0	agriculture	Good et al 2013a
Rugby, ND (2010-2011)	3.82	0.06	agriculture	Derby et al. 2011b
Summerview, Alb (2005-2006)	1.06	0.11	agriculture	Brown and Hamilton 2006
Top Crop I & II (2012-2013)	1.35	NA	agriculture	Good et al 2013b
Top of Iowa, IA (2003)	0.42	0	agriculture	Jain 2005
Top of Iowa, IA (2004)	0.81	0.17	agriculture	Jain 2005
Wessington Springs, SD (2009)	8.25	0.06	grassland	Derby et al. 2010e
Wessington Springs, SD (2010)	0.89	0.07	grassland	Derby et al. 2011d
Winnebago, IA (2009-2010)	3.88	0.27	agriculture/grassland	Derby et al. 2010d