APPENDIX K – SECOND YEAR LARGE BIRD USE STUDY

Second Year Large Bird Use Study for the Deuel Harvest North Wind Farm

Deuel Harvest Wind Energy LLC

Deuel Harvest North Wind Farm
11/29/2018

Second Year Large Bird Use Study for the Deuel Harvest North Wind Farm

prepared for

Deuel Harvest Wind Energy LLC
Deuel Harvest North Wind Farm
Deuel County, South Dakota

11/29/2018

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

TABLE OF CONTENTS

Page No.

LIST OF TABLES

Page No.

LIST OF FIGURES

Page No.

LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
BGEPA	Bald and Golden Eagle Protection Act
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
Deuel Harvest	Deuel Harvest Wind Energy LLC
ECPG	Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2
ESA	Endangered Species Act
MBTA	Migratory Bird Treaty Act
MET	Meteorological
MW	Megawatt
Project	Deuel Harvest North Wind Farm
RSH	Rotor-swept Height
SDGFP	South Dakota Game, Fish and Parks
SGCN	South Dakota Game, Fish and Parks Species of Greatest Conservation Need
USFWS	U.S. Fish & Wildlife Service

1.0 INTRODUCTION

Deuel Harvest Wind Energy LLC (Deuel Harvest) plans to construct the Deuel Harvest North Wind Farm (Project), an up to 310.1-megawatt (MW) wind farm in Deuel County, South Dakota. The proposed Project would include construction of up to 112 wind turbines, associated access roads and underground collection lines, a Project substation, an interconnection substation, an Operations and Maintenance building, up to 4 meteorological (MET) towers, laydown areas, and other appurtenant facilities. The Project is located approximately 5 miles north of Clear Lake, South Dakota (Figure A-1, in Appendix A).

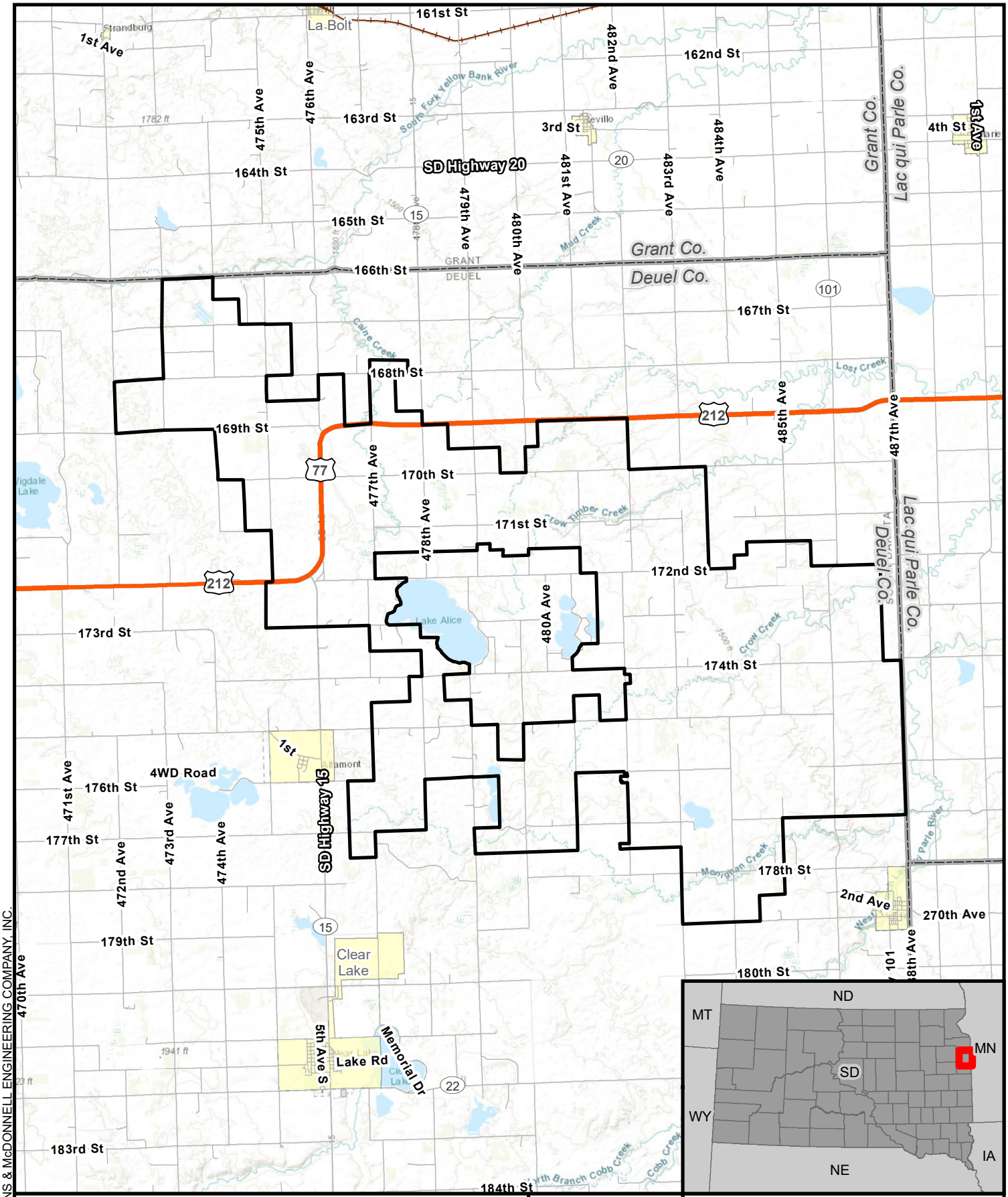
Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) conducted the second year of large bird use surveys described in this report. The methods for this study are consistent with the U.S. Fish and Wildlife Service (USFWS) *Land-based Wind Energy Guidelines* (USFWS, 2012), *Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2* (ECPG) (USFWS, 2013), and *Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests* (USFWS, 2016).

Study objectives were to assess species composition and temporal and spatial use of large birds, including eagles, in the Project Area (Figure 1-1). Additional objectives were to document use of the Project Area by federally or state-listed threatened, endangered, and sensitive avian species.

1.1 Project Area

The Project Area includes approximately 48,743 acres and is located within Ecoregion 46k, the Prairie Coteau region of the Northern Glaciated Plains, which spans across the eastern edge of South Dakota (U.S. Environmental Protection Agency, 2016). This ecoregion has historically supported both tallgrass and shortgrass prairies. These native grasslands, however, have been predominantly converted to croplands (Bryce et al., 1996), with soybeans (*Glycine max*) and corn (*Zea mays*) as the dominant crops (Miller, 1997).

Several named streams are present within the Project Area, including portions of Caine Creek, Crow Creek, Crow Timber Creek, Lost Creek, and Monighan Creek. Lake Alice, as well as a few smaller unnamed bodies of water, are located in or adjacent to the Project Area. The topography is generally flat to gently rolling hills.



2018 Project Area

NORTH

0 1.25 2.5

Miles

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Figure 1-1
General Location Map
Deuel Harvest North Wind Farm
Deuel Harvest Wind Energy LLC
Deuel County, South Dakota

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Source: USGS, ESRI, Burns & McDonnell Engineering Company, Inc.

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2.0 METHODS

2.1 Survey Methods

Burns & McDonnell biologists conducted 12 large bird use surveys consisting of 33 to 46 plots surveyed for one hour once per month between May 2017 and April 2018, the survey period (Table 2-1). The original 33 plots (DCN2 through DCN 34) were the same as Point 2 through Point 34 surveyed in the first year of avian use surveys in the Project Area. In the first year of avian use surveys, 24 survey plots (Point 1 through Point 24) were surveyed April 2016 through December 2016. Ten survey plots were added in January 2017, so that 34 plots (Point 1 through Point 34) were surveyed January 2017 through March 2017. Point 1 from the first year of avian use studies was outside the updated Project area and was eliminated before the beginning of the second year of surveys. The reason for changes in the number of survey plots in the second year of avian use surveys was due to a dynamic Project Area, resulting in the addition of 19,788 acres during 2017. From May 2017 to July 2017, 33 plots were surveyed within the Project Area. Fifteen plots were added and two plots were removed in August 2017, so that 46 plots were surveyed from August 2017 through March 2018. For April 2018, one plot was inaccessible, resulting in a total of 45 survey plots for that month.

Table 2-1: Large Bird Use Surveys Conducted in the Project Area in 2017 - 2018

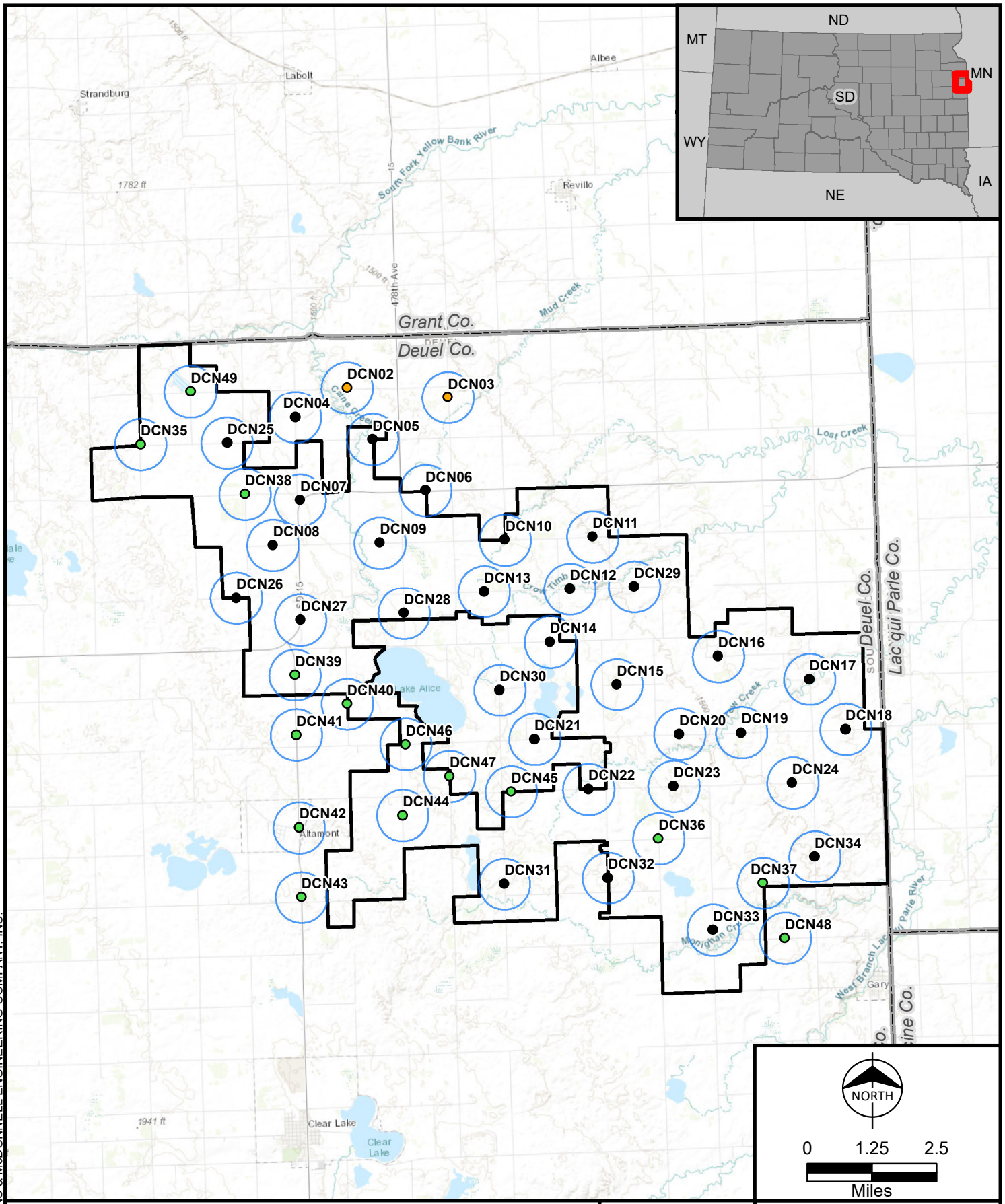
Sample Event	Month	Total Hours of Large Bird and Raptor Surveys
1	May 2017	33
2	June 2017	33
3	July 2017	33
4	August 2017	46
5	September 2017	46
6	October 2017	46
7	November 2017	46
8	December 2017	46
9	January 2018	46
10	February 2018	46
11	March 2018	46
12	April 2018	45
Total		**512**

A total of 48 unique survey plots were included across the study period (Figure 2-1), as survey plots were also removed after July 2017 due to changes in the Project Area. All plots were located on public roads and were selected to provide broad coverage of the Project Area and to document large bird use of the full range of habitats occurring within the Project Area. The order of plots surveyed varied for each survey event, but also minimized travel time between survey locations. Seasons were defined as spring (March 1 – May 31), summer (June 1 – August 31), fall (September 1 – November 30), and winter (December 1 – February 28), which were consistent with seasons in 2016-2017.

Survey plots, which were cylindrical with an estimated 800-meter radius, and up to 200 meters in height, were established throughout the Project Area. During each survey, information on large birds (i.e., approximately greater than the size of an American crow [*Corvus brachyrhynchos*]) flying within the survey plot was recorded on paper datasheets. Information recorded during each large bird use survey included date, start and end time for each survey location, and weather conditions (temperature, wind speed, precipitation, and cloud cover). Data recorded for each large bird observation included species (or lowest identifiable taxonomic unit), number of individuals (if more than one), distance from the observer when first observed, distance from the observer when last observed, minimum and maximum flight height, and approximated flight path. This survey methodology differed from the first year survey, during which all observations were recorded, even beyond 800 meters and above 200 meters in height, and additional species types were considered "large birds" (e.g. crows, nighthawks, shorebirds, and pigeons).

Bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) observations were recorded at one-minute intervals documenting when an eagle was within the 800-meter plot and at or below 200 meters above ground level, per the ECPG (i.e., eagle minutes). Other data recorded for each eagle observation included species, distance from the observer when first observed, distance from the observer when last observed, minimum and maximum flight height, and approximated flight path. Eagles observed outside the survey plot were included as incidental observations.

Incidental observations were recorded when large birds were noted while the observer was driving between plots, or when large birds were noted outside the survey plot. Incidental observations focused on sensitive species. Sensitive species included species protected or listed under the Endangered Species Act (ESA), Bald and Golden Eagle Protection Act (BGEPA), or as South Dakota Game, Fish and Parks (SDGFP) Species of Greatest Conservation Need (SGCN) (SDGFP, 2014).



2018 Project Area

Survey Plots (DCN)

Survey Points

- Added August 2017
- Removed August 2017
- Continued from Previous Study

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Figure 2-1
Large Bird Survey Points
Deuel Harvest North
Wind Farm
Deuel Harvest
Wind Energy LLC

Source: ESRI, Burns & McDonnell Engineering Company, INC.

Issued: 11/5/2018

Path: \\bmcdfs\Clients\ENS\Invenergy\99578_DeuelAvian\Studies\Geospatial\DataFiles\ArcDocs\Avian Report\Figure 2-1 DCN Avian Survey Points.mxd brichards 11/5/2018

2.2 Data Analysis

Analysis was conducted on data collected during the one-hour surveys of established survey plots. Incidental observations were not included in these analyses but are further discussed in Section 3.7.

2.2.1 Species Composition, Relative Abundance, and Diversity

Species composition information was compiled as tables of avian species and types. Information on relative abundance (number of observations for each species/type) and diversity (total number of species) was also assessed for data collected during the surveys. These results can be found in Section 3.1.

2.2.2 Bird Use, Percent of Use, and Frequency of Occurrence

Bird use (number of birds per hour of survey) was calculated for each species and bird type overall and by season. Percent of use was calculated as the percent of bird use attributable to a particular species or bird type. Frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed. These results can be found in Section 3.2.

2.2.3 Flight Height Characteristics

Flight height data recorded for each observation were categorized relative to an estimated rotor-swept height (RSH) of 25 – 150 meters. The three designated height categories were below the RSH at 0 – 24 meters, in the RSH at 25 – 150 meters, and above the RSH at 151 meters or higher. These results can be found in Section 3.3.

2.2.4 Spatial Use

Bird use among the survey plots was analyzed for each bird type to assess spatial use of the Project Area by various bird types. These results can be found in Section 3.4.

2.2.5 Eagle Minutes

Eagle minutes, defined as the number of minutes eagles were observed in flight within the three-dimensional survey plot up to 200 meters in height, were compiled and mapped to show eagle use of the Project Area among plots, seasons, and months, in accordance with the ECPG. These results can be found in Section 3.5.

3.0 RESULTS

3.1 Large Bird Species Composition, Relative Abundance, and Diversity

During the large bird use surveys, a total of 3,528 large bird observations of 29 species in 539 separate groups (i.e., flocks; Appendix A; Table 3-1) were recorded in the 800-meter radius plots. More birds were generally observed in spring (61.1 percent of observations) than in summer (7.5 percent), fall (26.2 percent), or winter (5.2 percent). Fewer observations were recorded in this study than in the first year of large bird use surveys (30,640 observations in 1,039 groups). In the first year, all observations, even those beyond the 800-meter survey plot and above 200 meters in height, were recorded, and additional species were considered large birds. There were also more waterfowl observations.

Waterfowl accounted for 86.5 percent of observations (3,051 observations; Appendix A), with most observations (2,064) recorded during spring. The most frequently observed waterfowl species was Canada goose (*Branta canadensis*), with 2,347 observations, which accounted for 67 percent of all large bird observations. Other frequently observed waterfowl species were snow goose (*Chen caerulescens*; 600 observations) and mallard (*Anas platyrhynchos*; 39 observations). In the first year study, the vast majority of observations were waterfowl (95.7 percent). Most of the waterfowl observed in the first year were unidentified geese.

Raptors accounted for 6.3 percent of large bird observations (223 observations; Appendix A). The most common raptor species identified was red-tailed hawk (*Buteo jamaicensis*), with 130 observations. Eagles accounted for 6.7 percent of raptor observations (15 observations). Eagles were observed more often in winter (6 observations; 40 percent of all eagle observations) than other seasons. Eagles were observed least often in summer (2 observations; 13.3 percent of all eagle observations). More raptors were observed in this study than in the first year study (209 observations). Species composition was similar in the first year, with red-tailed hawk being the most frequently observed raptor. Eagle observations in the first year study accounted for 19.6 percent of raptor observations (41 observations).

Table 3-1: Large Bird Use, Percent of Total Use, and Frequency of Occurrence for Each Bird Type Observed by Season During the Second Year Large Bird Use Surveys in the Project Area

	Mean Use[a]				Percent of Total Use[b]				Frequency of Occurrence[c]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Waterbirds	<0.1	0.9	0.1	0	0.2%	38.7%	1.3%	0.0%	4.0%	17.9%	2.9%	0.0%
Waterfowl	16.6	0.4	5.6	1.2	95.8%	16.9%	83.7%	91.4%	53.2%	8.9%	13.0%	2.9%
Gulls/Terns	0.1	0.0	0.1	0.0	0.3%	0.0%	2.1%	0.0%	3.2%	0.0%	1.4%	0.0%
Raptors	0.4	0.5	0.8	0.1	2.3%	19.2%	11.8%	7.6%	30.6%	28.6%	44.2%	8.7%
Buteos	0.3	0.3	0.5	0.1	1.6%	13.9%	7.9%	3.8%	17.7%	21.4%	29.7%	5.1%
Harrier	<0.1	<0.1	0.2	0.0	2.3%	11.0%	2.5%	0.0%	3.2%	2.7%	12.3%	0.0%
Eagles	<0.1	<0.1	<0.1	<0.1	0.2%	0.8%	0.3%	3.2%	2.4%	1.8%	2.2%	2.9%
Falcons	<0.1	0.0	<0.1	0.0	0.1%	0.0%	0.1%	0.0%	1.6%	0.0%	0.7%	0.0%
Other Raptors	<0.1	0.1	0.1	<0.1	0.2%	3.4%	1.0%	0.5%	3.2%	7.1%	5.8%	0.7%
Vultures	0.2	0.6	0.1	0.0	0.3%	25.2%	1.1%	0.0%	4.0%	8.9%	1.4%	0.0%
Upland Game Birds	0.0	0.0	0.0	<0.1	0.0%	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.7%
Overall	17.4	2.4	6.7	1.3								

[a]Mean Use: the number of observations per hour of survey
[b]Percent of Total Use: the mean use for each bird type as a percentage of the overall mean use
[c]Frequency of Occurrence: the percentage of one-hour surveys when a bird type was observed

3.2 Large Bird Seasonal Use, Percent of Use, and Frequency of Occurrence

Large bird use across the entire study period was 6.9 observations per hour of survey, with the highest use recorded during spring (17.4), relative to fall (6.7), winter (1.3), and summer (2.4) (Table 3-1; Appendix B). Large bird use was lower in the second year surveys than in the first year surveys, when large bird use was 78.9 observations per hour of survey. Seasonal bird use in the first year was also highest in spring (250.3 observations per hour of survey) relative to fall (34.9), winter (30.7), and summer (7.0). During the first year of surveys, large birds were recorded beyond 200 meters in height, and additional bird types were classified as "large birds."

3.2.1 Waterfowl

Waterfowl use over the study period averaged 6.0 observations per survey hour, with highest use during the spring (16.6), followed by fall (5.6), winter (1.2), and summer (0.4). Waterfowl accounted for 95.8 percent of large bird use in the spring, 91.4 percent in winter, 83.7 percent in fall, and 16.9 percent in summer. Waterfowl were observed during 53.2 percent of spring surveys, 13.0 percent of fall surveys, 8.9 percent of summer surveys, and 2.9 percent of winter surveys (Table 3-1). Waterfowl use was lower in the second year study than in the first year study, when waterfowl use was 74.5 observations per survey hour.

3.2.2 Raptors

Raptor use over the study period averaged 0.4 observations per survey hour, with highest use during the fall (0.8), followed by summer (0.5), spring (0.4), and winter (0.1). Raptor observations accounted for 19.2 percent of large bird use in the summer, 11.8 percent in fall, 7.6 percent in winter, and 2.3 percent in spring. Raptors were observed during 44.2 percent of fall surveys, 30.6 percent of spring surveys, 28.6 percent of summer surveys, and 8.7 percent of winter surveys (Table 3-1). Raptor use was lower in the second year study than in the first year study, when raptor use was 0.7 observations per survey hour.

Combined bald eagle and golden eagle use was less than 0.1 observations per survey hour over the study period. Eagle use was highest in winter and lowest in summer but was less than 0.1 observations per survey hour during each of the four seasons. Eagles accounted for 3.2 percent of bird use in the winter, 0.8 percent of bird use in summer, 0.3 percent of bird use in fall, and 0.2 percent of bird use in spring. Eagles were observed during 3.2 percent of winter surveys, 2.4 percent of spring surveys, 2.2 percent of fall surveys, and 1.8 percent of summer surveys. More specifically, bald eagles were observed during 2.7 percent of winter surveys, 0.4 percent of summer surveys, 0.2 percent of fall surveys, and 0.1 percent of spring surveys. Golden eagles were observed during 0.5 percent of winter surveys, 0.4 percent of summer surveys, 0.1 percent of fall surveys, and less than 0.1 percent of spring surveys. Eagle use was lower in

the second year surveys than in the first year surveys, when 0.1 eagle observations were recorded per survey hour.

3.3 Flight Height Characteristics

A total of 204 groups (i.e., flocks) (45.8 percent) of birds were observed flying within the estimated RSH of 25 – 150 meters (Table 3-2). Waterfowl were the most frequently observed within the RSH (57.9%). A total of 70 groups (i.e., flocks) of 71 raptor observations were within the RSH, representing 35.7 percent of raptor observations. Eagles were the raptor type most frequently observed within the RSH (50.0 percent of eagle observations), followed by Buteos (41.6 percent of Buteo spp. observations). In the first year large bird study, 51.5 percent of observations were within the RSH, with 34.9 percent of raptor observations within the RSH.

Table 3-2: Flight Height Characteristics for Each Bird Type Observed During the Large Bird Use Surveys for the Project Area

	Mean Flight Height (Meters)	Percent of Groups in Flight Categories		
		0 - 25 Meters	25 - 150 Meters	>150 Meters
Waterbirds	56.8	56.4%	34.5%	9.1%
Waterfowl	85.9	22.6%	57.9%	19.5%
Gulls/Terns	209.4	12.5%	50.0%	37.5%
Raptors	71.1	51.8%	35.9%	12.3%
Buteos	82.8	43.0%	41.6%	15.4%
Northern Harrier	17.7	87.1%	12.9%	0.0%
Eagles	53.0	50.0%	50.0%	0.0%
Falcons	18.3	66.7%	33.3%	0.0%
Other Raptors	85.2	60.9%	21.7%	17.4%
Vulture	71.9	41.2%	50.0%	8.8%
Upland Game Birds	0.5	100.0%	0.0%	0.0%
Overall	77.7	39.1%	45.8%	15.0%

3.4 Spatial Use

Across the 46 large bird use survey plots, large bird use (total number of birds observed in a plot divided by the number of survey hours at that plot) ranged from 0 to 56.8 observations per hour of survey. Bird use was highest at survey plot DCN07, and was lowest at DCN02, which was only surveyed 4 times because the location was eliminated from surveys due to Project boundary refinements. In the first year study, bird use was highest at Point 32 (2,758.0 observations per survey hour), primarily due to waterfowl observations. Relative to the first year report, DCN32 is the same as Point 32.

3.4.1 Waterfowl

Waterfowl were observed at 43 of the 48 survey plots. Waterfowl use ranged from 0 to 55.8 observations per survey hour across the survey plots. Waterfowl use was highest at DCN07 (55.8 observations per survey hour), followed by DCN32 (34.0 observations per hour of survey). In the first year study, waterfowl use was highest at DCN32 (2,756.0 observations per survey hour), followed by DCN28 (2,022.0 observations per survey hour).

3.4.2 Raptors

Raptors were observed at 47 of the 48 survey plots. Raptor use ranged from 0 to 1.0 observations per survey hour across the survey plots. Raptor use was highest at DCN04 (1.0 observations per survey hour), followed by DCN44 (0.9 observations per survey hour) and DCN47 (0.9 observations observed per hour of survey). Buteos were observed at 43 plots, with highest use at DCN17, DCN40, and DCN46 (0.7 observations per hour of survey each). Eagles were observed at 11 survey plots, with highest use observed at DCN28 (0.3 observations per hour of survey), followed by DCN45 (0.2 observations per hour of survey). Bald eagles were observed at plots DCN08, DCN11, DCN14, DCN16, DCN23, DCN28, DCN32, DCN45, and DCN48, while golden eagles were observed at plots DCN14, DCN19, DCN26, and DCN28. In the first year study, raptor use was highest at DCN32 (2.0 observations per survey hour). All raptors observed at DCN32 in the first year study were eagles. Eagles were also observed at 21 other survey plots in the first year study. No golden eagles were observed in the first year study.

3.5 Eagle Minutes

A total of 15 eagles (11 bald eagles and 4 golden eagles) were observed during the 30,720 minutes (512 hours) spent surveying between May 2017 and April 2018 for a collective total of 54 eagle minutes (Table 3-3; Table 3-4). The number of eagles and eagle minutes peaked in December 2017 (Figure 3-1). Eagles were observed across several survey plots (Figure 3-2). Both bald eagles and golden eagles were observed in all four seasons (Appendix A).

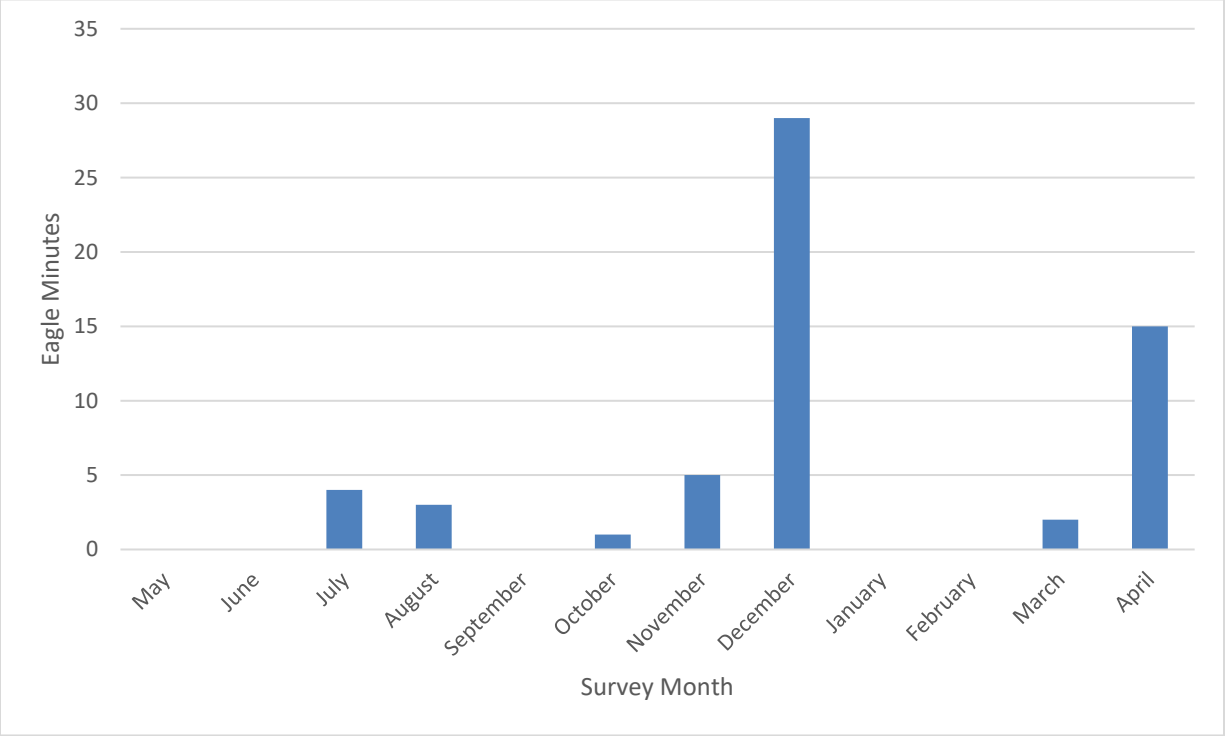
Table 3-3: Eagle Minutes Documented by Season during the Second Year Large Bird Use Surveys for the Project Area

Season	Eagle Minutes	Survey Effort (hours)	Survey Effort (minutes)	Eagle Minutes per Minute Survey
Spring	12	124	7,440	0.0016
Summer	7	112	6,720	0.0010
Fall	6	138	8,280	0.0007
Winter	29	138	8,280	0.0035
Total	**54**	**512**	**30,720**	**0.0068**

Table 3-4: Monthly Eagle Observations and Minutes during the Second Year Large Bird Use Surveys for the Project Area

Month	Eagle Observations	Eagle Minutes
May 2017	0	0
June 2017	0	0
July 2017	1	4
August 2017	1	3
September 2017	0	0
October 2017	1	1
November 2017	2	5
December 2017	6	29
January 2018	0	0
February 2018	0	0
March 2018	1	2
April 2018	3	15
Total	**15**	**54**

Figure 3-1: Graph of Monthly Eagle Minutes during the Second Year Large Bird Use Surveys for the Project Area



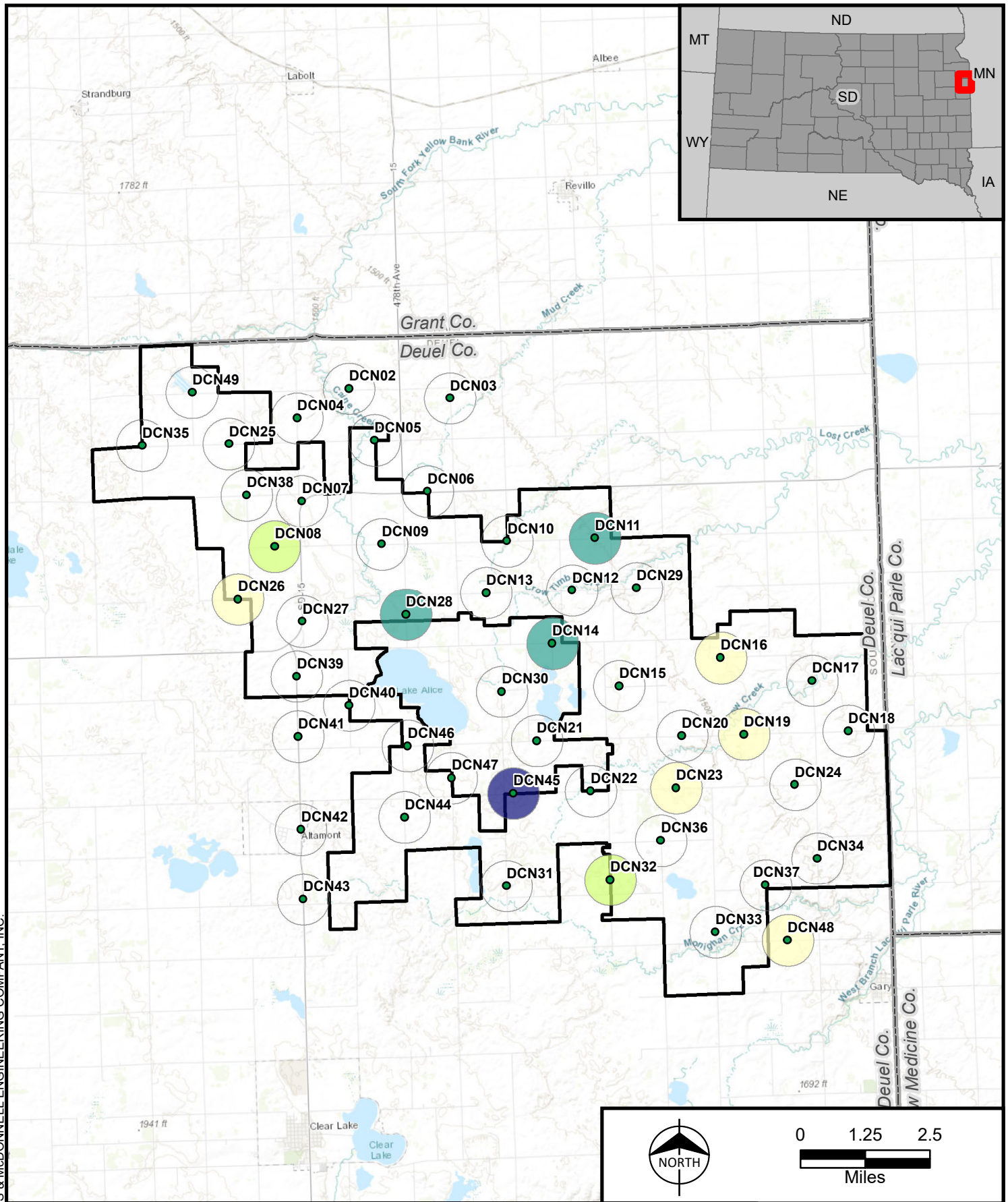


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Figure 3-3
Eagle-minute Map
Deuel Harvest North
Wind Farm
Deuel Harvest
Wind Energy LLC

Source: ESRI, Burns & McDonnell Engineering Company, INC.

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3.6 Sensitive Species

No federally threatened or endangered species were observed during the second year surveys. The only state-listed species observed was the osprey (*Pandion haliaetus*). Two osprey observations were recorded at survey plot DCN18, four minutes apart on September 27th, 2017. Osprey are rare in the Project Area, and other than this specific observation, no sightings have been reported in Deuel County in the last 10 years (eBird, 2018). The American white pelican (*Pelecanus erythrorhynchos*), while not threatened or endangered, is listed as one of South Dakota's Species of Greatest Conservation Need. These were observed mostly in large flocks using ponds as stop-over plots during migration. Bald eagles and golden eagles are protected under the BGEPA. A total of 11 bald eagles and 4 golden eagles were observed during the large bird use surveys. In the first year surveys, a slightly different composition of sensitive species was observed: American white pelican, bald eagle, marbled godwit (*Limosa fedoa*), and willet (*Tringa semipalmata*).

Table 3-5: Sensitive Species Observed during the 2017 – 2018 Large Bird Use Surveys for the Project Area

Common Name	Scientific Name	Status[a]	Groups Observed	Observations
American white pelican	*Pelecanus erythrorhynchos*	SGCN	32	96
Bald eagle	*Haliaeetus leucocephalus*	BGEPA	10	11
Golden eagle	*Aquila chrysaetos*	BGEPA	4	4
Osprey	*Pandion haliaetus*	State-threatened	2	2

[a]BGEPA: Bald and Golden Eagle Protection Act; SGCN: South Dakota Game, Fish and Parks Species of Greatest Conservation Need

3.7 Incidental Observations

A total of 723 birds were observed outside the survey plot radius, height, or survey timeframe. These observations are therefore not included in the results above. One bald eagle was observed outside of plot DCN12 in November 2017 and one bald eagle was observed outside plot DCN43 in September 2017. One golden eagle was observed incidentally in December 2017, flying above the 200-meter height of plot DCN13. No other sensitive species was recorded as an incidental observation. Other species observed incidentally included Canada goose, Franklin's gull (*Leucophaeus pipixcan*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), red-tailed hawk, Swainson's hawk (*Buteo swainsoni*), turkey vulture (*Cathartes aura*), and wild turkey (*Meleagris gallopavo*).

3.8 Yearly Comparison

The data collection methods of this study, conducted May 2017 to April 2018, differed from the methods of the first year study, conducted April 2016 to March 2017. During the first year, all observations were recorded beyond 800 meters and above 200 meters, to account for species composition, diversity, and frequency. As a result, more species were observed in the first year study (42) than in the second year study (29). Large bird use was higher in the first year study (78.9 observations per survey hour) than in the second year study (6.9 observations per survey hour), partly because observations were recorded above 200 meters, and also due to large numbers of waterfowl observed in the first year study. Waterfowl use in the first year was 74.5 observations per survey hour, compared to 6.0 observations per survey hour in the second year. Eagle use also differed between years, with 0.1 observations per survey hour recorded in the first year compared to less than 0.1 observations per survey hour in the second year. In both years, spatial use of eagles did not follow any distinct pattern. Eagles were observed in both years at plots DCN08, DCN11, DCN14, DCN19, DCN26, and DCN32.

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APPENDIX A - SPECIES OBSERVED DURING THE SECOND YEAR LARGE BIRD USE SURVEYS CONDUCTED AT DEUEL HARVEST NORTH WIND FARM

Appendix A: Species Observed during the Second Year Large Bird Surveys Conducted at Deuel Harvest North

		Spring			Summer			Fall			Winter		
Common name	**Scientific name**	**Grps[a]**	**Ind[b]**	**% Ind[c]**	**Grps[a]**	**Ind[b]**	**% Ind[c]**	**Grps[a]**	**Ind[b]**	**% Ind[c]**	**Grps[a]**	**Ind[b]**	**% Ind[c]**
Waterbirds		**5**	**5**	**0.2%**	**46**	**103**	**38.7%**	**4**	**12**	**1.3%**	**0**	**0**	**0.0%**
American white pelican	*Pelecanus erythrorhynchos*	0	0	0.0%	31	87	32.7%	1	9	1.0%	0	0	0.0%
Double-crested cormorant	*Phalacrocorax auritus*	0	0	0.0%	1	1	0.4%	0	0	0.0%	0	0	0.0%
Great blue heron	*Ardea Herodias*	4	4	0.2%	10	11	4.1%	3	3	0.3%	0	0	0.0%
Great egret	*Ardea alba*	0	0	0.0%	4	4	1.5%	0	0	0.0%	0	0	0.0%
Sandhill crane	*Grus canadensis*	1	1	0.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%
Waterfowl		**167**	**2064**	**95.8%**	**12**	**45**	**16.9%**	**33**	**773**	**83.7%**	**9**	**169**	**91.4%**
Cackling goose	*Branta hutchinsii*	1	1	0.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%
Canada goose	*Branta canadensis*	162	1453	67.5%	6	17	6.4%	28	708	76.7%	9	169	91.4%
Greater white-fronted goose	*Anser albifrons*	0	0	0.0%	0	0	0.0%	1	12	1.3%	0	0	0.0%
Hooded merganser	*Lophodytes cucullatus*	0	0	0.0%	1	1	0.4%	0	0	0.0%	0	0	0.0%
Lesser snow goose	*Chen caerulescens*	3	600	27.9%	0	0	0.0%	0	0	0.0%	0	0	0.0%
Mallard	*Anas platyrhynchos*	0	0	0.0%	2	4	1.5%	2	35	3.8%	0	0	0.0%
Northern pintail	*Anas acuta*	0	0	0.0%	1	1	0.4%	0	0	0.0%	0	0	0.0%
Ring-necked duck	*Aythya collaris*	0	0	0.0%	0	0	0.0%	1	12	1.3%	0	0	0.0%
Unidentified duck	*Anatidae*	1	10	0.5%	1	21	7.9%	1	6	0.7%	0	0	0.0%
Wood duck	*Aix spinosa*	0	0	0.0%	1	1	0.4%	0	0	0.0%	0	0	0.0%
Gulls/Terns		**5**	**7**	**0.3%**	**0**	**0**	**0.0%**	**3**	**19**	**2.1%**	**0**	**0**	**0.0%**
Franklin's gull	*Leucophaeus pipixcan*	0	0	0.0%	0	0	0.0%	3	19	2.1%	0	0	0.0%
Ring-billed gull	*Larus delawarensis*	4	5	0.2%	0	0	0.0%	0	0	0.0%	0	0	0.0%
Unidentified gull	*Laridae*	1	2	0.1%	0	0	0.0%	0	0	0.0%	0	0	0.0%
Raptors		**47**	**49**	**2.3%**	**51**	**51**	**19.2%**	**108**	**109**	**11.8%**	**14**	**14**	**7.6%**
Buteos		**33**	**34**	**1.6%**	**37**	**37**	**13.9%**	**72**	**73**	**7.9%**	**7**	**7**	**3.8%**
Broad-winged hawk	*Buteo platypterus*	0	0	0.0%	0	0	0.0%	1	1	0.1%	0	0	0.0%

Appendix A: Species Observed during the Second Year Large Bird Surveys Conducted at Deuel Harvest North

		Spring			Summer			Fall			Winter		
Common name	**Scientific name**	**Grps[a]**	**Ind[b]**	**% Ind[c]**	**Grps[a]**	**Ind[b]**	**% Ind[c]**	**Grps[a]**	**Ind[b]**	**% Ind[c]**	**Grps[a]**	**Ind[b]**	**% Ind[c]**
Red-tailed hawk	*Buteo jamaicensis*	31	32	1.5%	30	30	11.3%	61	62	6.7%	6	6	3.2%
Rough-legged hawk	*Buteo lagopus*	1	1	0.0%	0	0	0.0%	3	3	0.3%	1	1	0.5%
Swainson's hawk	*Buteo swainsoni*	1	1	0.0%	7	7	2.6%	7	7	0.8%	0	0	0.0%
Northern harrier		**5**	**5**	**0.2%**	**3**	**3**	**1.1%**	**23**	**23**	**2.5%**	**0**	**0**	**0.0%**
Northern harrier	*Circus cyaneus*	5	5	0.2%	3	3	1.1%	23	23	2.5%	0	0	0.0%
Eagles		**3**	**4**	**0.2%**	**2**	**2**	**0.8%**	**3**	**3**	**0.3%**	**6**	**6**	**3.2%**
Bald eagle	*Haliaeetus leucocephalus*	2	3	0.1%	1	1	0.4%	2	2	0.2%	5	5	2.7%
Golden eagle	*Aquila chrysaetos*	1	1	0.0%	1	1	0.4%	1	1	0.1%	1	1	0.5%
Falcons		**2**	**2**	**0.1%**	**0**	**0**	**0.0%**	**1**	**1**	**0.1%**	**0**	**0**	**0.0%**
American kestrel	*Falco sparverius*	0	0	0.0%	0	0	0.0%	1	1	0.1%	0	0	0.0%
Merlin	*Falco columbarius*	2	2	0.1%	0	0	0.0%	0	0	0.0%	0	0	0.0%
Other Raptors		**4**	**4**	**0.2%**	**9**	**9**	**3.4%**	**9**	**9**	**1.0%**	**1**	**1**	**0.5%**
Long-eared owl	*Asio otus*	0	0	0.0%	0	0	0.0%	0	0	0.0%	1	1	0.5%
Osprey	*Pandion haliaetus*	0	0	0.0%	0	0	0.0%	2	2	0.2%	0	0	0.0%
Unidentified hawk	*Accipitridae*	4	4	0.2%	9	9	3.4%	7	7	0.8%	0	0	0.0%
Vulture		**7**	**29**	**1.3%**	**23**	**67**	**25.2%**	**4**	**10**	**1.1%**	**0**	**0**	**0.0%**
Turkey vulture	*Cathartes aura*	7	29	1.3%	23	67	25.2%	4	10	1.1%	0	0	0.0%
Upland Game Birds		**0**	**0**	**0.0%**	**0**	**0**	**0.0%**	**0**	**0**	**0.0%**	**1**	**2**	**1.1%**
Ring-necked pheasant	*Phasianus colchicus*	0	0	0.0%	0	0	0.0%	0	0	0.0%	1	2	1.1%
		231	**2154**	**100.0%**	**132**	**266**	**100.0%**	**152**	**923**	**100.0%**	**24**	**185**	**100.0%**

[a]Number of groups observed for each bird type by season
[b]Number of individuals observed for each bird type by season
[c]Percentage of total individuals observed for the season

APPENDIX B - MEAN USE, PERCENT OF USE, AND FREQUENCY OF OCCURRENCE FOR EACH BIRD TYPE AND SPECIES OBSERVED DURING THE SECOND YEAR LARGE BIRD USE SURVEYS FOR DEUEL HARVEST NORTH WIND FARM

Appendix B: Mean Use, Percent of Use, and Frequency of Occurrence for Each Bird Type and Species Observed During the Second Year Large Bird Surveys for Deuel Harvest North

	Mean Use[a]					Percent of Total Use[b]				Frequency of Occurrence[c]			
	Study Period	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Waterbirds	**0.2**	**<0.1**	**0.9**	**0.1**	**0.0**	**0.2%**	**38.7%**	**1.3%**	**0.0%**	**4.0%**	**17.9%**	**2.9%**	**0.0%**
American white pelican	0.2	0.0	0.8	0.1	0.0	0.0%	32.7%	1.0%	0.0%	0.0%	11.6%	0.7%	0.0%
Double-crested cormorant	<0.1	0.0	<0.1	0.0	0.0	0.0%	0.4%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%
Great blue heron	<0.1	<0.1	<0.1	<0.1	0.0	0.2%	4.1%	0.3%	0.0%	0.8%	7.1%	2.2%	0.0%
Great egret	<0.1	0.0	<0.1	0.0	0.0	0.0%	1.5%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%
Sandhill crane	<0.1	<0.1	0.0	0.0	0.0	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%
Waterfowl	**6.0**	**16.6**	**0.4**	**5.6**	**1.2**	**95.8%**	**16.9%**	**83.7%**	**91.4%**	**53.2%**	**8.9%**	**13.0%**	**2.9%**
Cackling goose	<0.1	<0.1	0.0	0.0	0.0	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%
Canada goose	4.6	11.7	0.2	5.1	1.2	67.5%	6.4%	76.7%	91.4%	52.4%	4.5%	12.3%	2.9%
Greater white-fronted goose	<0.1	0.0	0.0	0.1	0.0	0.0%	0.0%	1.3%	0.0%	0.0%	0.0%	0.7%	0.0%
Hooded merganser	<0.1	0.0	<0.1	0.0	0.0	0.0%	0.4%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%
Lesser snow goose	1.2	4.8	0.0	0.0	0.0	27.9%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%	0.0%
Mallard	0.1	0.0	<0.1	0.3	0.0	0.0%	1.5%	3.8%	0.0%	0.0%	1.8%	1.4%	0.0%
Northern pintail	<0.1	0.0	<0.1	0.0	0.0	0.0%	0.4%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%
Ring-necked duck	<0.1	0.0	0.0	0.1	0.0	0.0%	0.0%	1.3%	0.0%	0.0%	0.0%	0.7%	0.0%
Unidentified duck	0.1	0.1	0.2	<0.1	0.0	0.5%	7.9%	0.7%	0.0%	0.8%	0.9%	0.7%	0.0%
Wood duck	<0.1	0.0	<0.1	0.0	0.0	0.0%	0.4%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%
Gulls/Terns	**0.1**	**0.1**	**0.0**	**0.1**	**0.0**	**0.3%**	**0.0%**	**2.1%**	**0.0%**	**3.2%**	**0.0%**	**1.4%**	**0.0%**
Franklin's gull	<0.1	0.0	0.0	0.1	0.0	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	1.4%	0.0%
Ring-billed gull	<0.1	<0.1	0.0	0.0	0.0	0.2%	0.0%	0.0%	0.0%	3.2%	0.0%	0.0%	0.0%
Unidentified gull	<0.1	<0.1	0.0	0.0	0.0	0.1%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%
Raptors	**0.4**	**0.4**	**0.5**	**0.8**	**0.1**	**2.3%**	**19.2%**	**11.8%**	**7.6%**	**30.6%**	**28.6%**	**44.2%**	**8.7%**
Buteos	**0.3**	**0.3**	**0.3**	**0.5**	**0.1**	**1.6%**	**13.9%**	**7.9%**	**3.8%**	**17.7%**	**21.4%**	**29.7%**	**5.1%**
Broad-winged hawk	<0.1	0.0	0.0	<0.1	0.0	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.7%	0.0%
Red-tailed hawk	0.3	0.3	0.3	0.4	<0.1	1.5%	11.3%	6.7%	3.2%	20.2%	16.1%	26.1%	4.3%
Rough-legged hawk	<0.1	<0.1	0.0	<0.1	<0.1	0.0%	0.0%	0.3%	0.5%	0.8%	0.0%	2.2%	0.7%
Swainson's hawk	<0.1	<0.1	0.1	0.1	0.0	0.0%	2.6%	0.8%	0.0%	0.8%	8.0%	3.6%	0.0%

Appendix B: Mean Use, Percent of Use, and Frequency of Occurrence for Each Bird Type and Species Observed During the Second Year Large Bird Surveys for Deuel Harvest North

	Mean Use[a]					Percent of Total Use[b]				Frequency of Occurrence[c]			
	Study Period	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Harrier	**0.1**	**<0.1**	**<0.1**	**0.2**	**0.0**	**2.3%**	**11.0%**	**2.5%**	**0.0%**	**3.2%**	**2.7%**	**12.3%**	**0.0%**
Northern harrier	0.1	<0.1	<0.1	0.2	0.0	0.1%	0.8%	2.5%	0.0%	3.2%	2.7%	12.3%	0.0%
Eagles	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**0.2%**	**0.8%**	**0.3%**	**3.2%**	**2.4%**	**1.8%**	**2.2%**	**2.9%**
Bald eagle	<0.1	<0.1	<0.1	<0.1	<0.1	0.1%	0.4%	0.2%	2.7%	1.6%	0.9%	1.4%	2.9%
Golden eagle	<0.1	<0.1	<0.1	<0.1	<0.1	0.0%	0.4%	0.1%	0.5%	0.8%	0.9%	0.7%	0.7%
Falcons	**<0.1**	**<0.1**	**0.0**	**<0.1**	**0.0**	**0.1%**	**0.0%**	**0.1%**	**0.0%**	**1.6%**	**0.0%**	**0.7%**	**0.0%**
American kestrel	<0.1	0.0	0.0	<0.1	0.0	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.7%	0.0%
Merlin	<0.1	<0.1	0.0	0.0	0.0	0.1%	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	0.0%
Other Raptors	**<0.1**	**<0.1**	**0.1**	**0.1**	**<0.1**	**0.2%**	**3.4%**	**1.0%**	**0.5%**	**3.2%**	**7.1%**	**5.8%**	**0.7%**
Long-eared owl	<0.1	0.0	0.0	0.0	<0.1	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.7%
Osprey	<0.1	0.0	0.0	<0.1	0.0	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.7%	0.0%
Unidentified hawk	<0.1	<0.1	0.1	0.1	0.0	0.2%	3.4%	0.8%	0.0%	3.2%	7.1%	5.1%	0.0%
Vultures	**0.2**	**0.2**	**0.6**	**0.1**	**0.0**	**0.3%**	**25.2%**	**1.1%**	**0.0%**	**4.0%**	**8.9%**	**1.4%**	**0.0%**
Turkey vulture	0.2	0.2	0.6	0.1	0.0	1.3%	25.2%	1.1%	0.0%	4.0%	8.9%	1.4%	0.0%
Upland Game Birds	**<0.1**	**0.0**	**0.0**	**0.0**	**<0.1**	**0.0%**	**0.0%**	**0.0%**	**1.1%**	**0.0%**	**0.0%**	**0.0%**	**0.7%**
Ring-necked pheasant	<0.1	0.0	0.0	0.0	<0.1	0.0%	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.7%
Overall	**6.9**	**17.4**	**2.4**	**6.7**	**1.3**								

[a]Mean use: the number of individuals observed per hour of survey
[b]Percent of total use: the mean use for each bird type as a percentage of the overall mean use
[c]Frequency of occurrence: the percentage of one-hour surveys when a bird type was observed

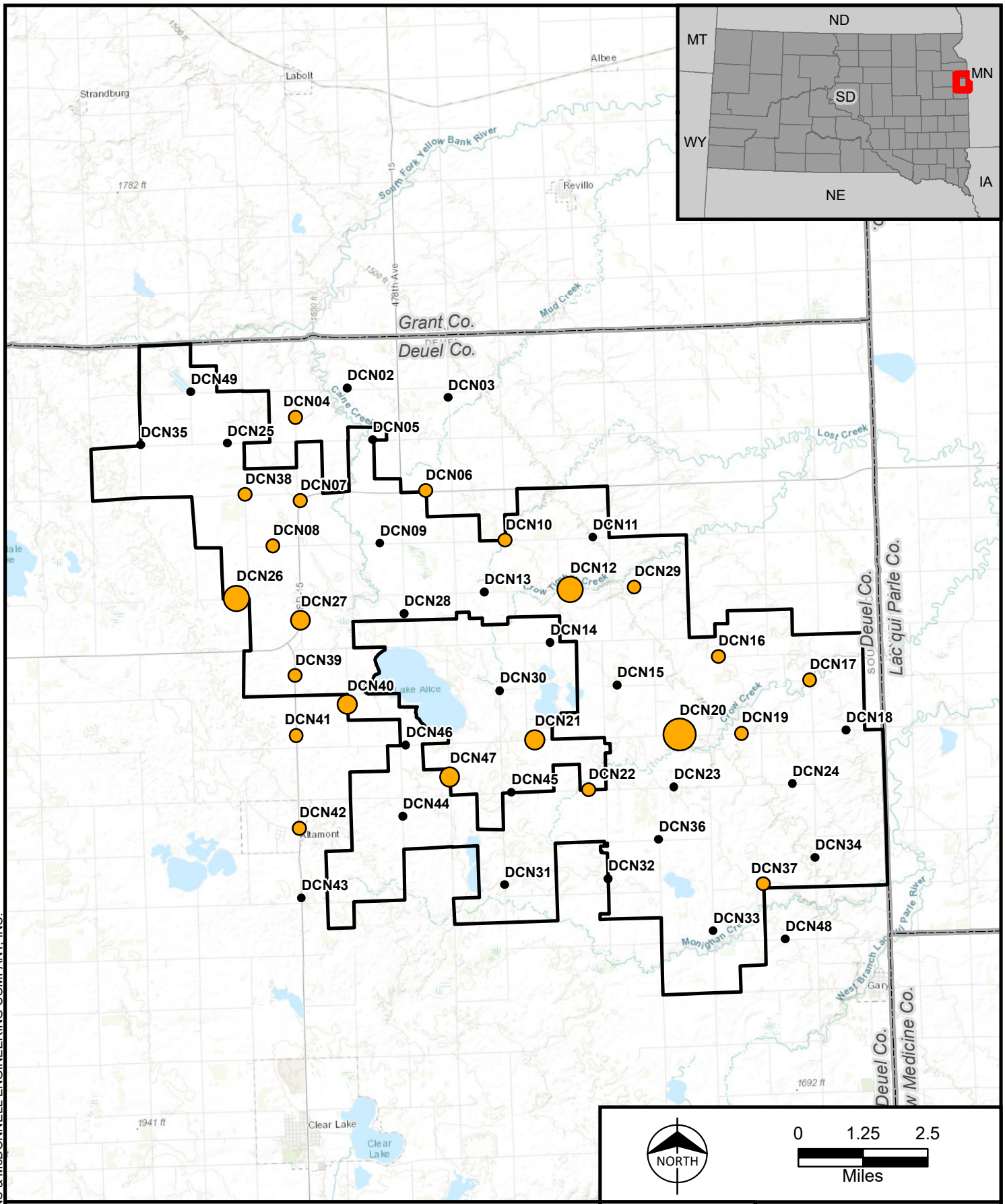
APPENDIX C - LARGE BIRD USE BY PLOT FOR EACH BIRD TYPE

Table C-1: Large Bird Use by Point for Each Bird Type

	All Birds	**Waterbirds**	**Waterfowl**	**Gulls/Terns**	**Raptors**	Buteos	Northern Harriers	Eagles	Falcons	Other Raptors	**Vultures**	**Upland Game Birds**
DCN02	0.3	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
DCN03	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0
DCN04	13.3	0.3	11.0	0.0	1.0	0.6	0.3	0.0	0.0	0.1	1.0	0.0
DCN05	2.3	0.0	1.0	0.0	0.7	0.5	0.1	0.0	0.0	0.1	0.6	0.0
DCN06	1.6	0.1	0.4	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.9	0.0
DCN07	56.8	0.1	55.8	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.8	0.0
DCN08	6.7	0.2	3.8	0.5	0.4	0.3	0.0	0.1	0.0	0.0	1.8	0.0
DCN09	1.8	0.0	0.3	0.0	0.1	0.0	0.1	0.0	0.0	0.0	1.3	0.0
DCN10	4.1	0.3	3.1	0.0	0.7	0.6	0.1	0.0	0.0	0.0	0.0	0.0
DCN11	2.8	0.0	2.5	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.0
DCN12	4.6	1.4	2.2	0.0	0.8	0.6	0.2	0.0	0.0	0.0	0.3	0.0
DCN13	2.4	0.0	2.2	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0
DCN14	25.8	0.0	25.5	0.0	0.3	0.2	0.0	0.2	0.0	0.0	0.0	0.0
DCN15	3.4	0.0	2.9	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
DCN16	3.3	0.1	2.8	0.0	0.4	0.2	0.1	0.1	0.0	0.1	0.1	0.0
DCN17	1.5	0.1	0.5	0.1	0.8	0.7	0.0	0.0	0.0	0.1	0.1	0.0
DCN18	1.8	0.0	0.7	0.2	0.7	0.4	0.1	0.0	0.0	0.2	0.1	0.2
DCN19	12.2	0.2	11.2	0.1	0.5	0.3	0.0	0.1	0.1	0.1	0.3	0.0
DCN20	5.4	2.3	2.7	0.0	0.3	0.2	0.0	0.0	0.0	0.1	0.3	0.0
DCN21	12.9	0.9	11.3	0.0	0.8	0.6	0.2	0.0	0.0	0.0	0.0	0.0
DCN22	11.8	0.1	11.3	0.0	0.5	0.3	0.0	0.0	0.0	0.2	0.0	0.0
DCN23	0.8	0.0	0.6	0.0	0.2	0.0	0.0	0.1	0.0	0.1	0.0	0.0
DCN24	3.1	0.0	3.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
DCN25	0.8	0.0	0.6	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0
DCN26	2.3	1.3	0.6	0.0	0.3	0.2	0.0	0.1	0.0	0.1	0.0	0.0
DCN27	3.3	0.6	2.2	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.1	0.0
DCN28	13.8	0.0	13.1	0.0	0.7	0.3	0.0	0.3	0.0	0.1	0.0	0.0

Table C-1: Large Bird Use by Point for Each Bird Type

	All Birds	**Waterbirds**	**Waterfowl**	**Gulls/Terns**	**Raptors**	Buteos	Northern Harriers	Eagles	Falcons	Other Raptors	**Vultures**	**Upland Game Birds**
DCN29	3.9	0.1	3.3	0.0	0.3	0.2	0.1	0.0	0.1	0.0	0.3	0.0
DCN30	5.7	0.0	5.3	0.0	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0
DCN31	9.8	0.0	9.3	0.0	0.5	0.4	0.1	0.0	0.0	0.0	0.0	0.0
DCN32	34.6	0.0	34.0	0.0	0.6	0.5	0.0	0.1	0.0	0.0	0.0	0.0
DCN33	0.8	0.0	0.4	0.0	0.4	0.3	0.0	0.0	0.0	0.1	0.0	0.0
DCN34	0.5	0.0	0.3	0.0	0.3	0.2	0.0	0.0	0.0	0.1	0.0	0.0
DCN35	1.4	0.0	1.3	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
DCN36	2.2	0.0	2.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
DCN37	6.3	0.3	5.7	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0
DCN38	2.7	0.1	0.7	1.4	0.4	0.3	0.0	0.0	0.0	0.1	0.0	0.0
DCN39	1.8	0.3	1.2	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
DCN40	16.0	0.8	14.6	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0
DCN41	10.3	0.4	9.6	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0
DCN42	1.2	0.1	0.7	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0
DCN43	0.8	0.0	0.2	0.0	0.6	0.3	0.1	0.0	0.0	0.1	0.0	0.0
DCN44	4.1	0.0	3.2	0.0	0.9	0.6	0.1	0.0	0.0	0.2	0.0	0.0
DCN45	0.7	0.0	0.0	0.0	0.7	0.1	0.3	0.2	0.0	0.0	0.0	0.0
DCN46	0.8	0.0	0.0	0.0	0.8	0.7	0.1	0.0	0.0	0.0	0.0	0.0
DCN47	2.0	0.6	0.6	0.0	0.9	0.3	0.2	0.0	0.0	0.3	0.0	0.0
DCN48	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0
DCN49	1.8	0.0	1.1	0.0	0.7	0.3	0.1	0.0	0.1	0.1	0.0	0.0



Path: \\bmcdfs\Clients\ENS\Invenergy\99578_DeuelAvianStudies\GeospatialDataFiles\ArcDocs\Avian Report\Figure C-1 North Waterbird Use.mxd brichards 11/5/2018

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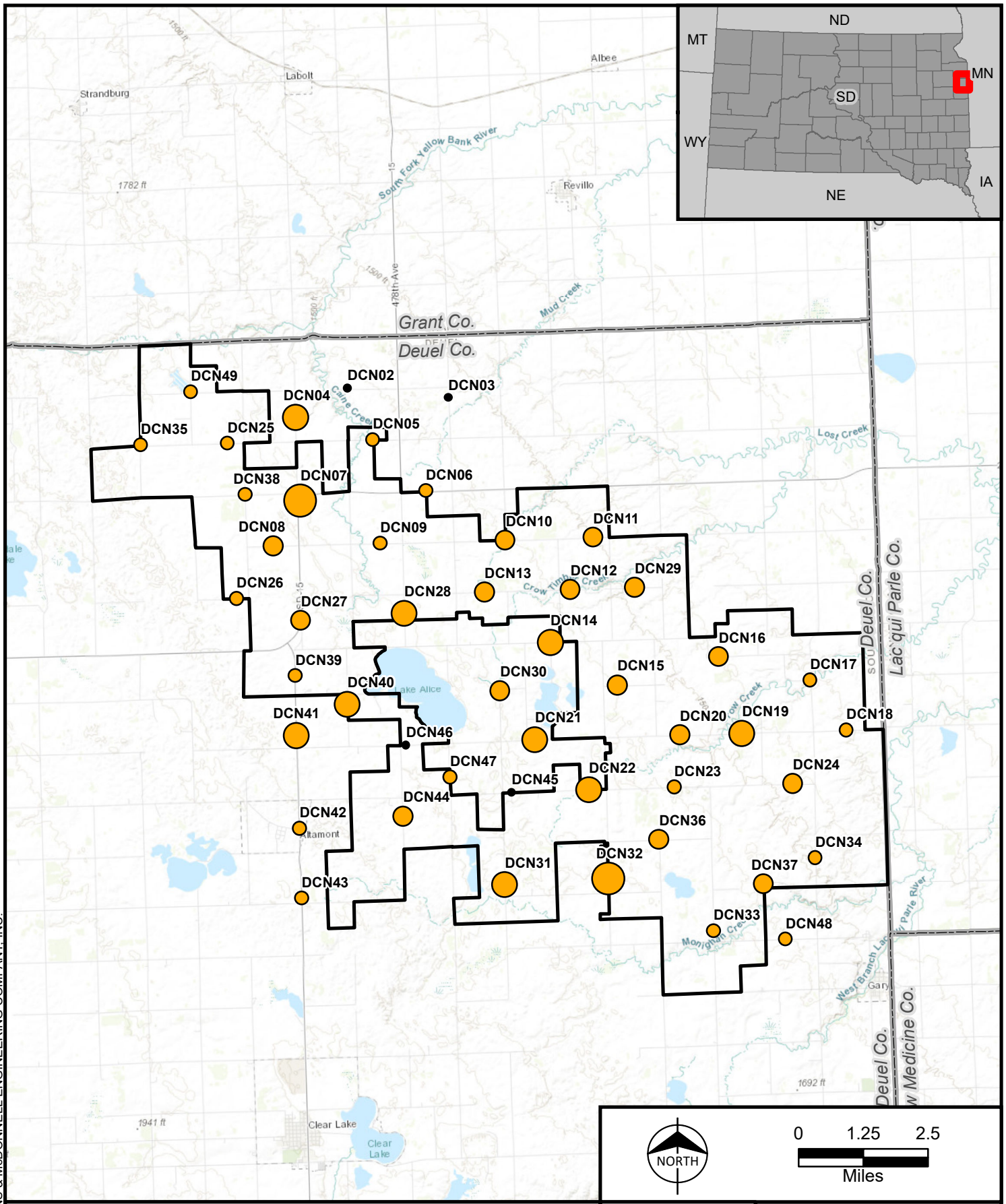

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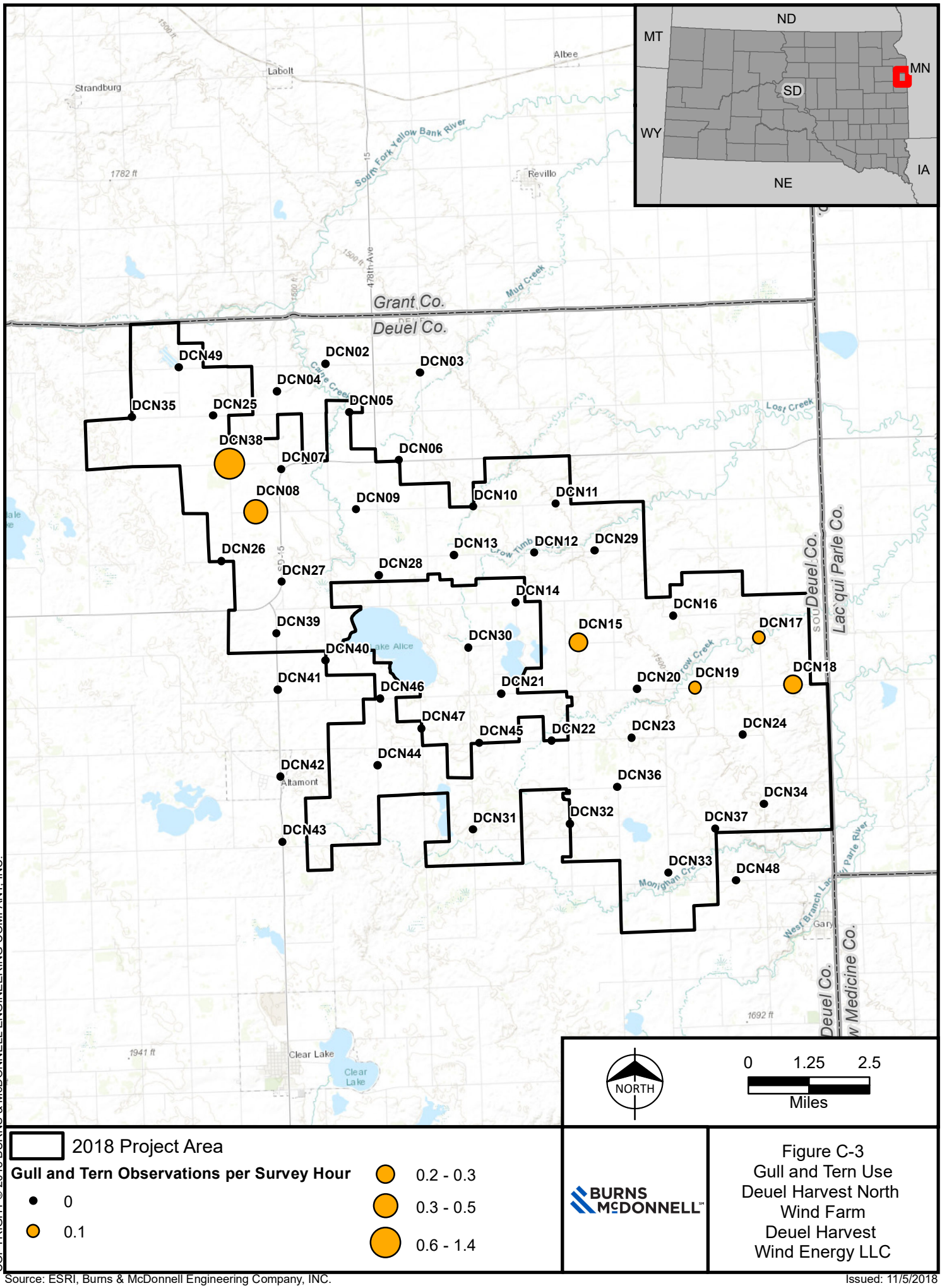

Path: \\bmcdfs\Clients\ENS\Invenergy\99578_DeuelAvianStudies\GeospatialDataFiles\ArcDocs\Avian Report\Figure C-3 North Gull and Tern Use.mxd brsalupo 11/5/2018

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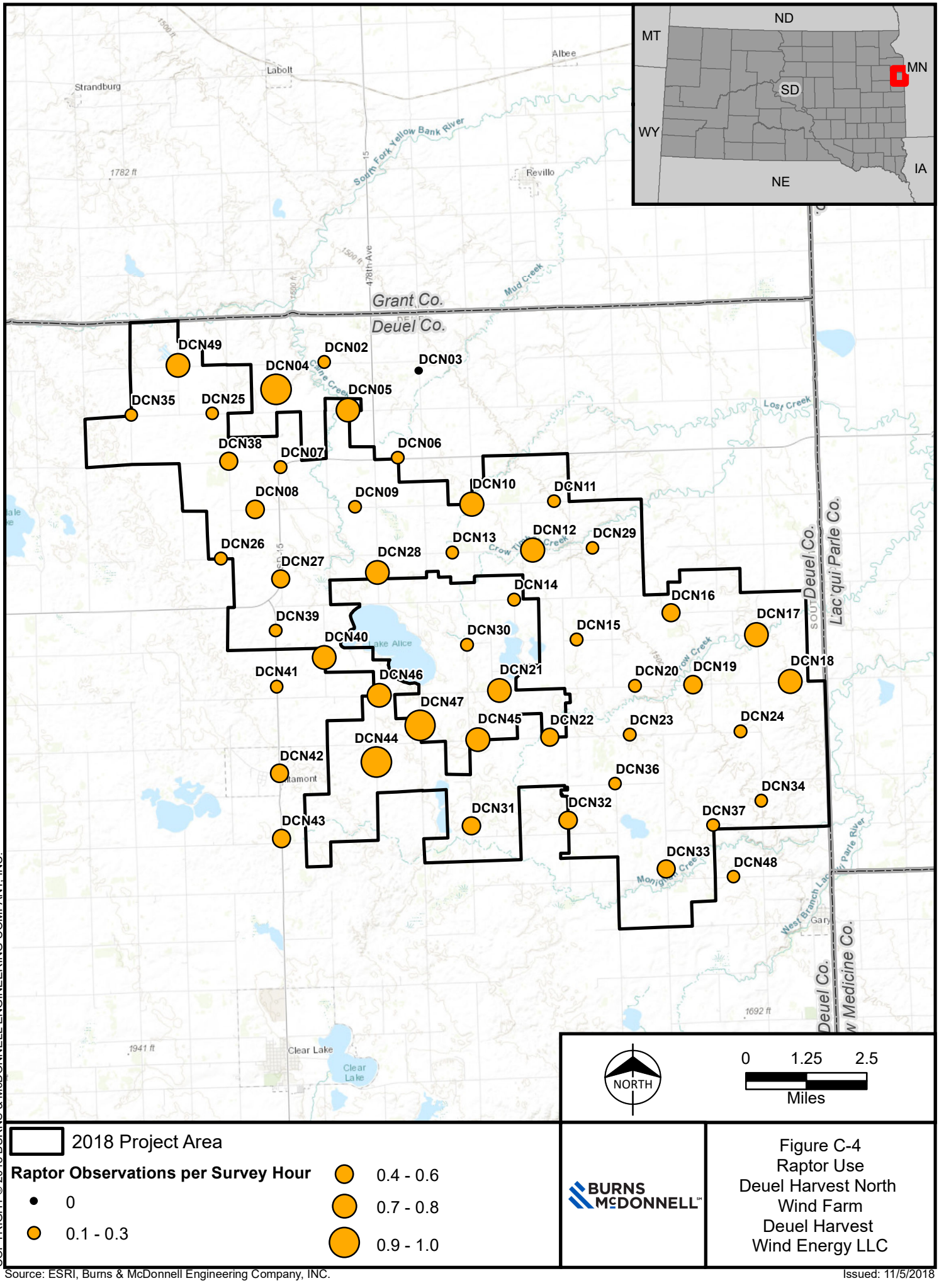

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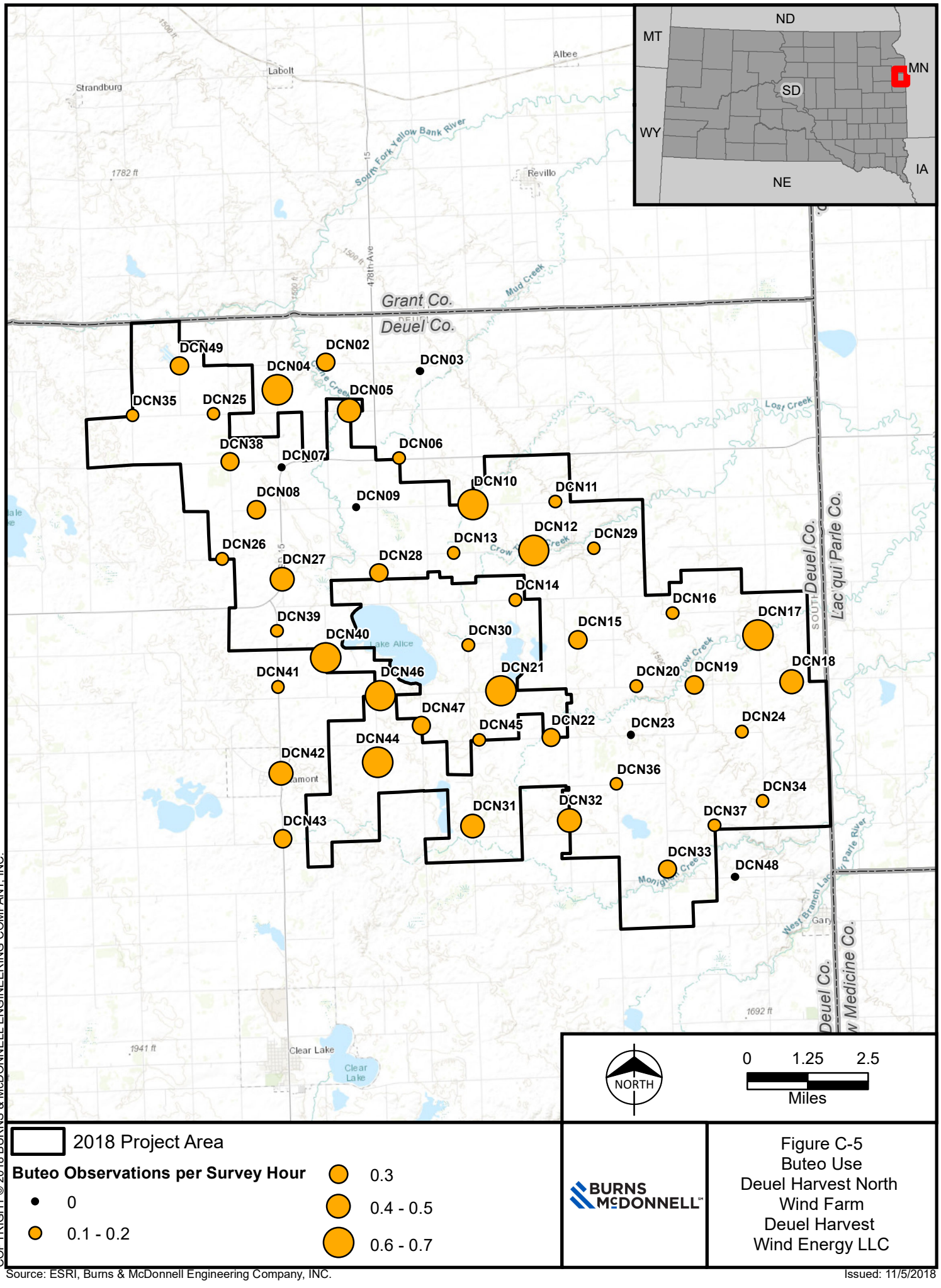

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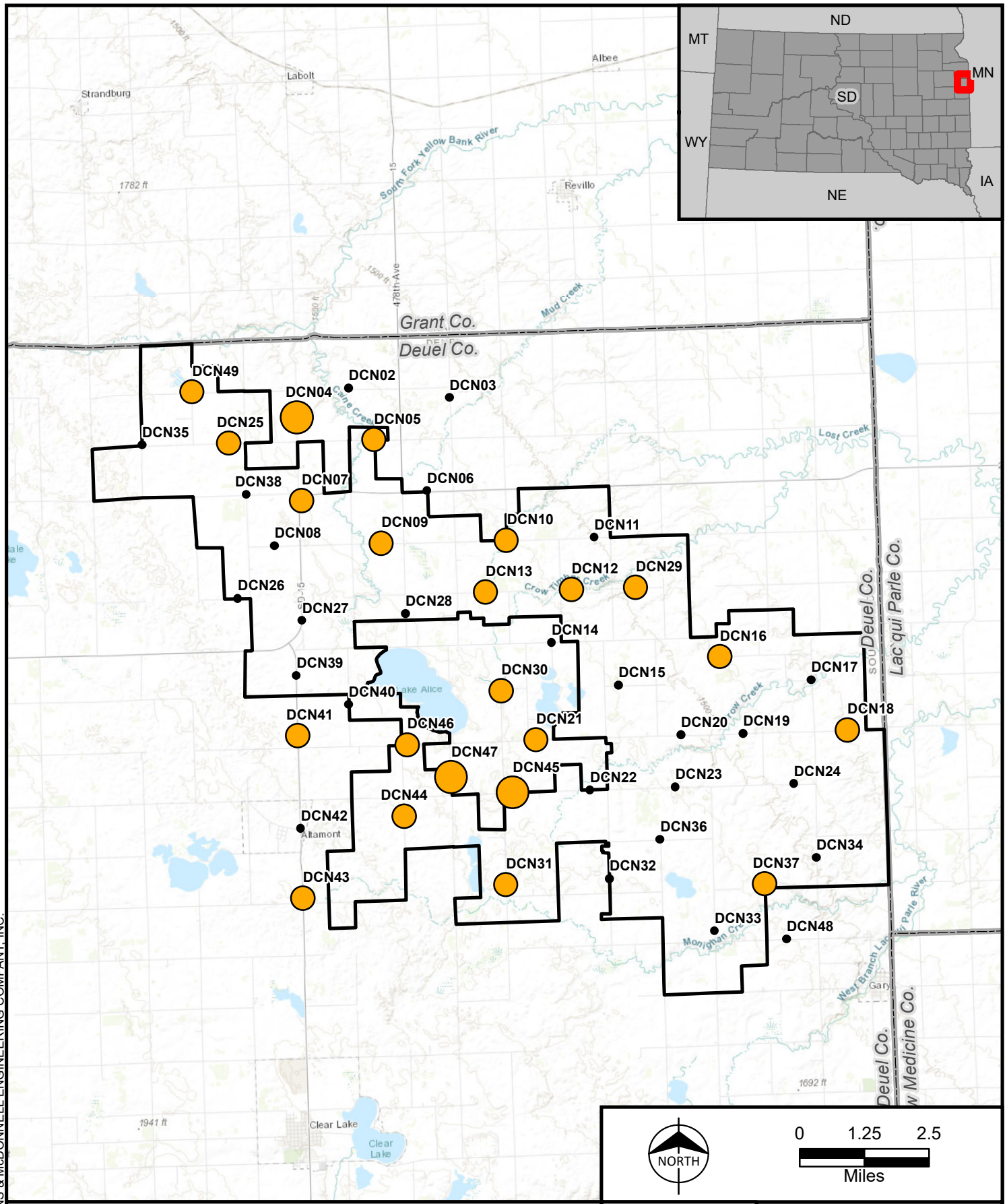

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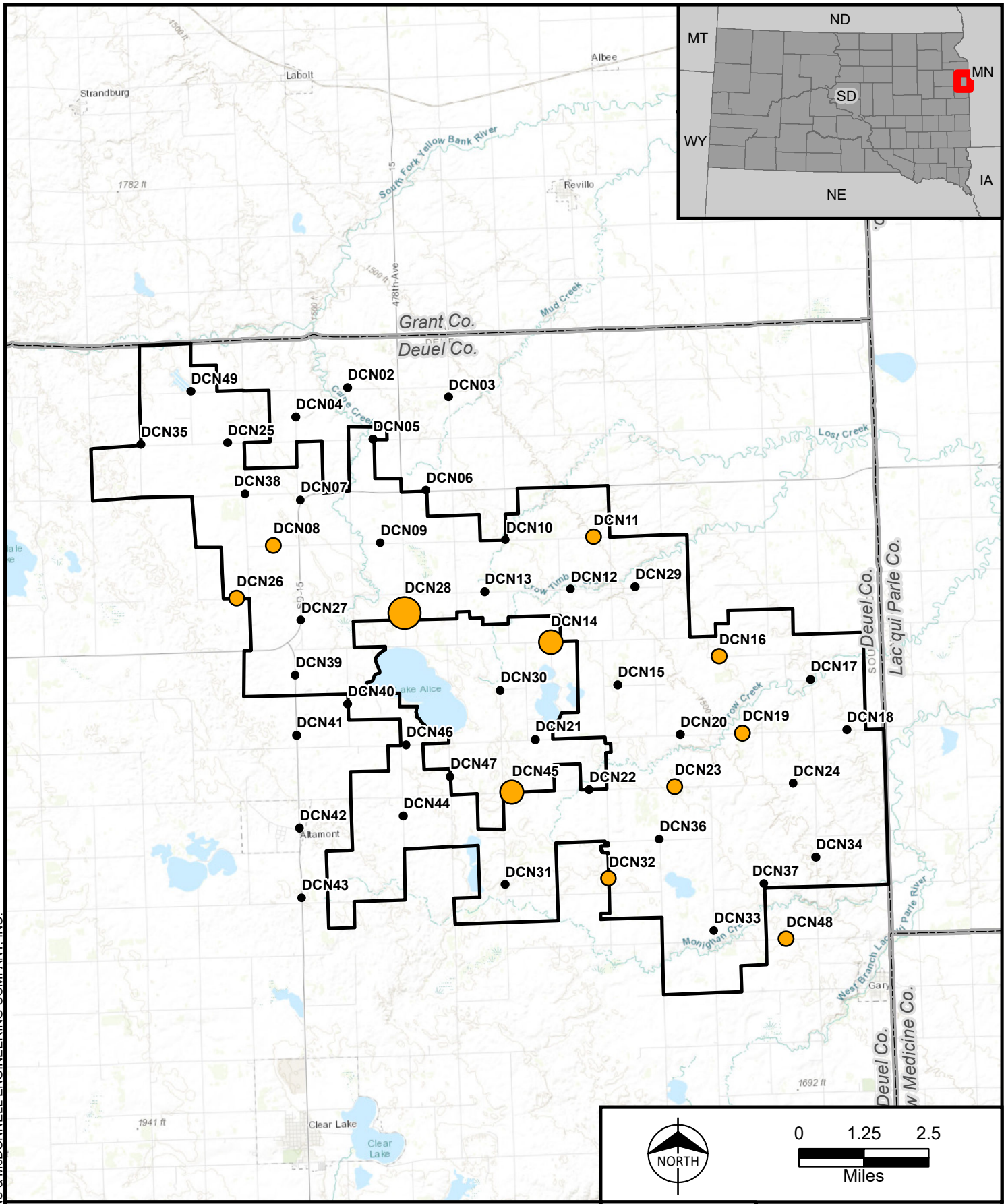

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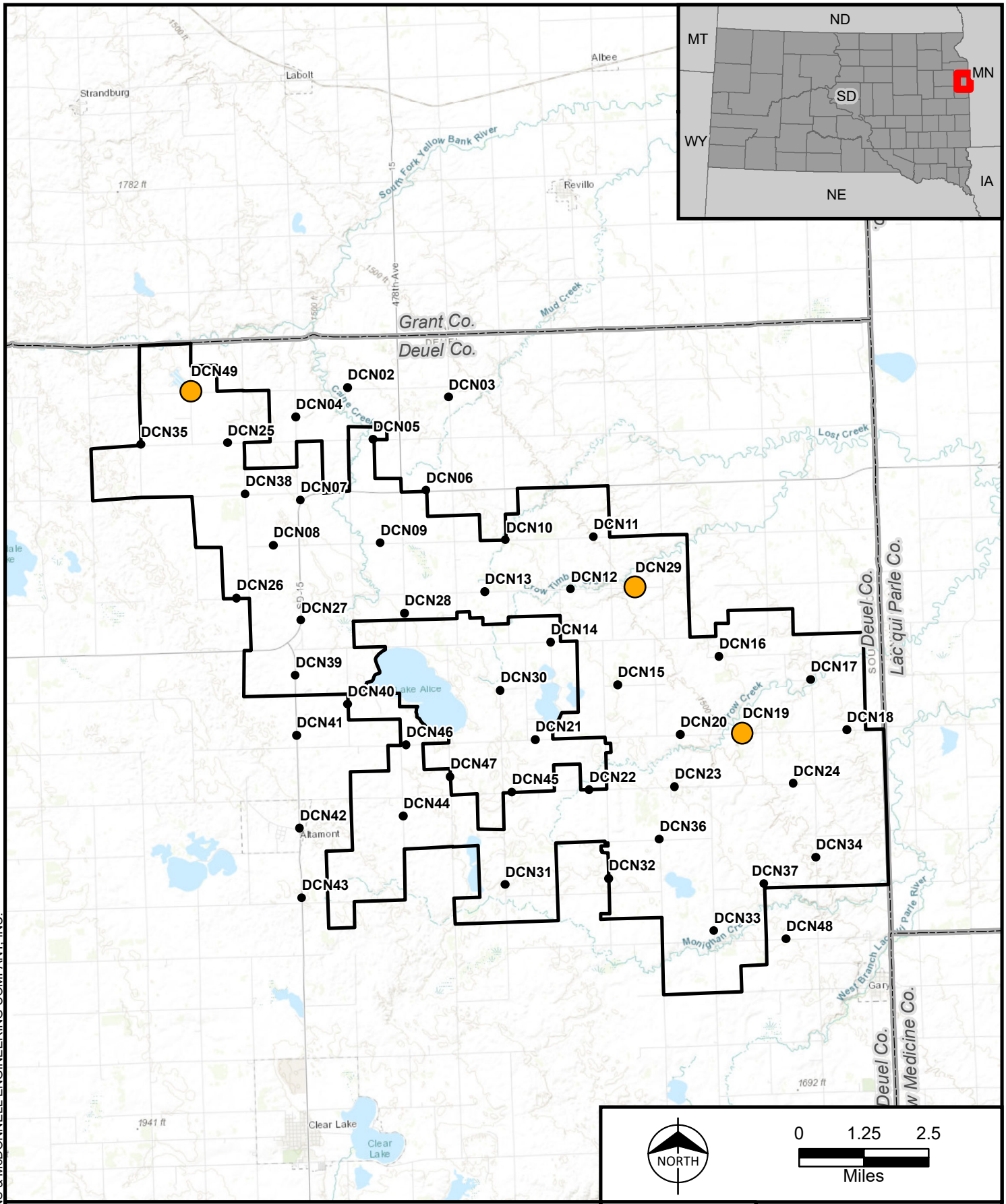

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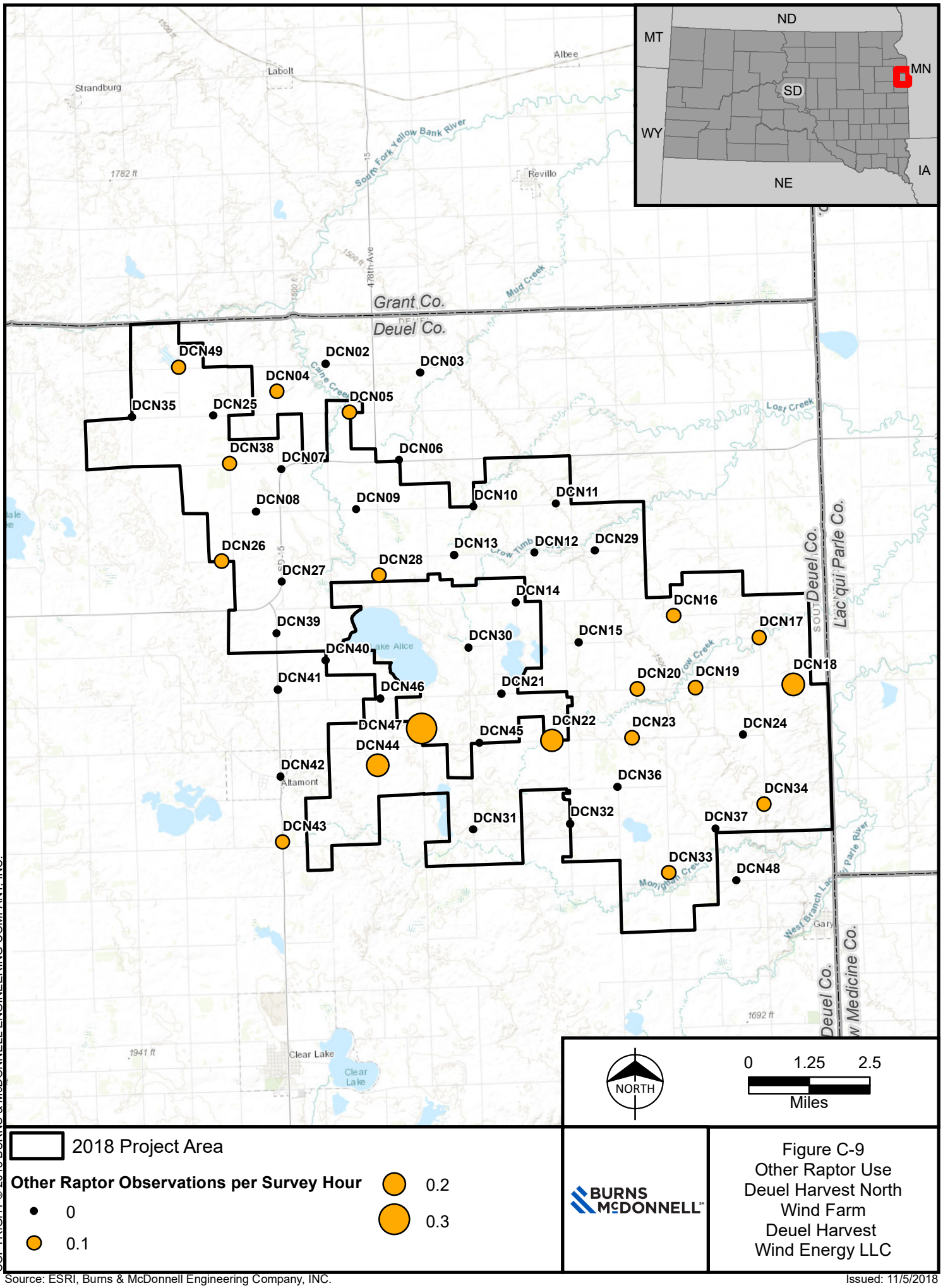

Path: \\bmcdfs\Clients\ENS\Invenergy\99578_DeuelAvianStudies\GeospatialDataFiles\ArcDocs\Avian Report\Figure C-9 North Other Raptor Use.mxd brichards 11/5/2018

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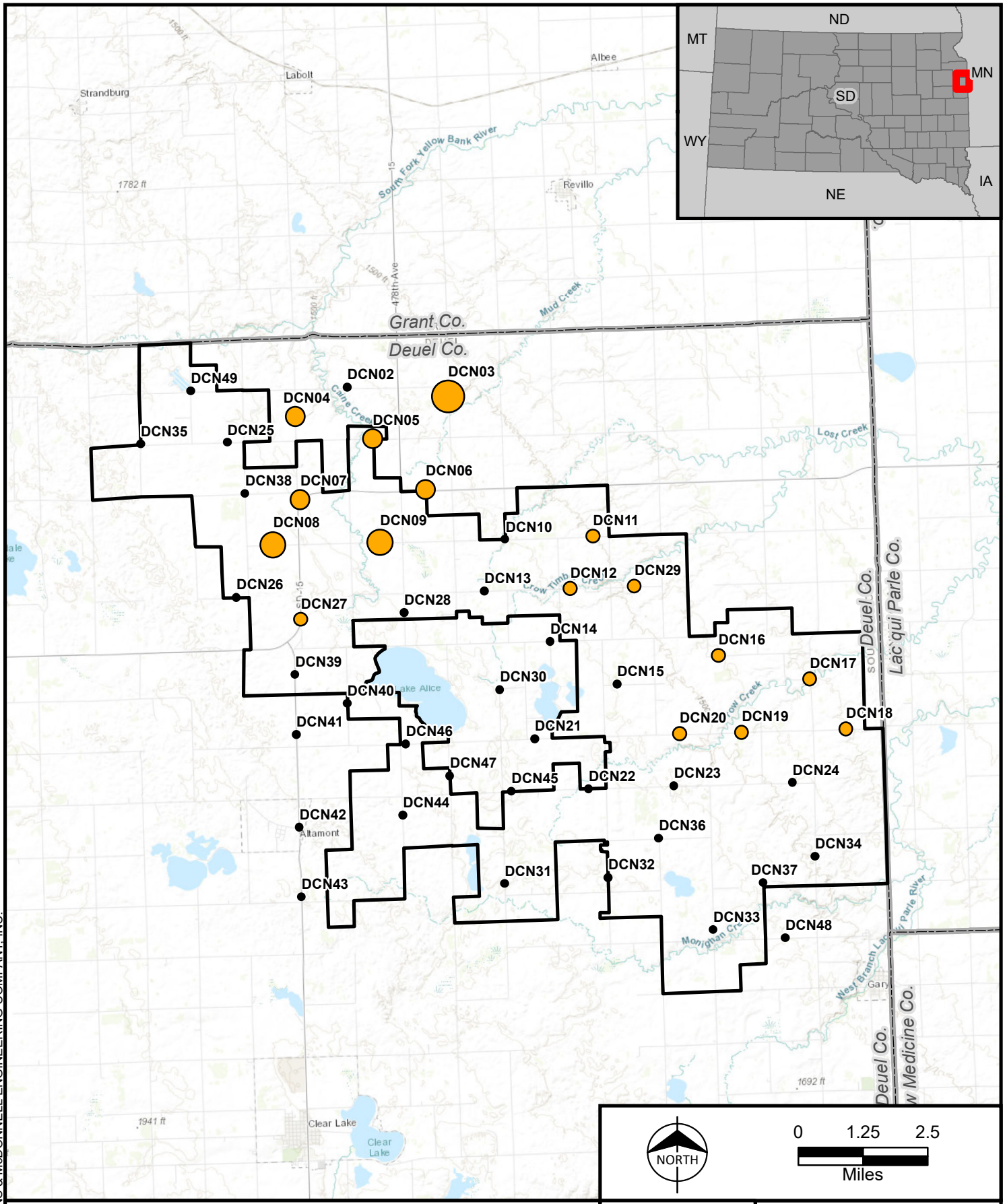

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Figure C-10
Vulture Use
Deuel Harvest North
Wind Farm
Deuel Harvest
Wind Energy LLC

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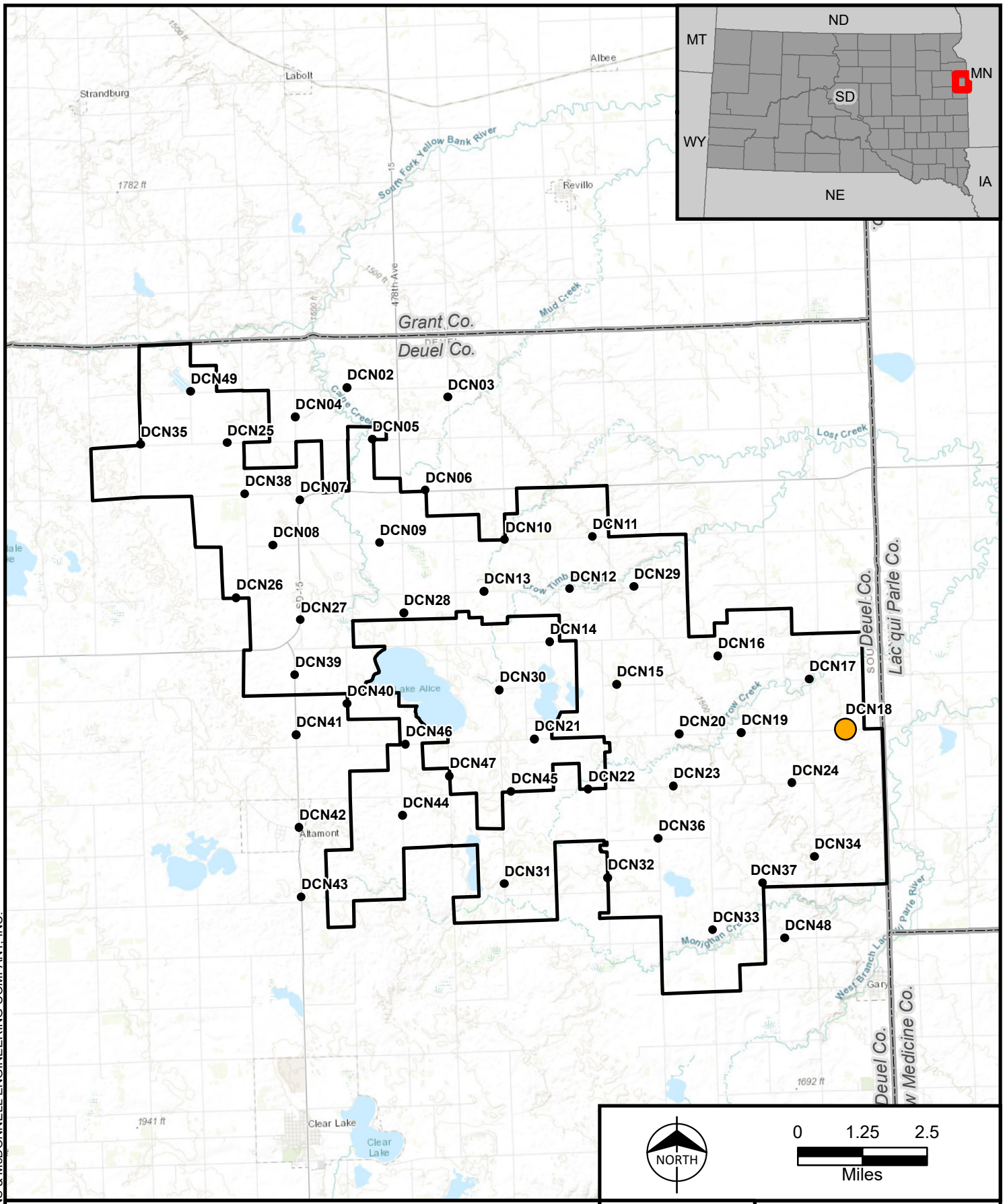

2018 Project Area

Upland Game Bird Observations per Survey Hour

- 0.0
- 0.1 - 0.2

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Figure C-11
Upland Game Bird Use
Deuel Harvest North
Wind Farm
Deuel Harvest
Wind Energy LLC

Source: ESRI, Burns & McDonnell Engineering Company, INC.

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