

Avian Use Study
Campbell County II Wind Project
Campbell County, South Dakota

Final Report
June 2020 – May 2021



Prepared for:

Campbell County Wind Farm 2, LLC

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EXECUTIVE SUMMARY

Campbell County Wind Farm 2, LLC (Campbell County) is proposing the development of the Campbell County II Wind Project (Project; currently known as Campbell County Wind Farm 2) in South Dakota. Campbell County contracted Western EcoSystems Technology, Inc. (WEST) to conduct a pre-construction avian use study. The objective of the study was to assess the temporal and spatial use of the Project area by large and small birds, with a particular focus on eagles and federal and state-listed species. Study methodology followed the recommendations in the US Fish and Wildlife Service's (USFWS) 2012 *Land-Based Wind Energy Guidelines*, 2013 *USFWS Eagle Conservation Plan Guidance*, and the *USFWS Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests*.

Nine survey point locations were provided to WEST by Campbell County covering approximately 45.9% of the Project area. Each point was centered within a circular plot, with eagles and large birds recorded within 800-meter (m; 2,625-foot [ft]) radius and small birds recorded within a 100-m (328-ft) radius. Surveys were conducted at each survey point once per month from June 21, 2020, to May 19, 2021, with only small birds recorded during the first 10 minute (min) and only large birds recorded for the subsequent 60 minute. Incidental observations made outside of sampling periods were recorded but were limited to species of concern, including eagles.

Twenty-five species of large birds totaling 999 observations were detected during 108 surveys. Overall large bird mean use was approximately 9.24 observations/800-m radius plot/60-min survey. No eagles were recorded during the avian use surveys. Large bird mean use was highest during spring (32.78 observations/800-m radius plot/60-min survey), with comparatively lower use in summer (3.22), fall (0.78), and winter (0.19). Waterfowl accounted for the majority of use during spring (92.7%), doves/pigeons during summer (40.2%), waterbirds during fall (47.6%), and diurnal raptors during winter (60.0%). Diurnal raptors were observed more frequently during the summer (48.1% of surveys) than in other seasons. Large bird use was highest at Point 7 (70.08 observations/60-min survey), due primarily to waterfowl use (66.17).

Twenty-six species of small birds totaling 443 observations were detected during 108 surveys. Overall small bird mean use was 4.11 observations/100-m radius plot/10-min survey. Small bird mean use was highest during summer (6.07), followed by fall (5.33), spring (2.56), and winter (2.44). Small bird mean use in winter was mostly due to grassland/sparrows (90.9%), while use in fall was mostly due to blackbirds/orioles (89.6%). Small bird use was highest at points 7 (10.75 observations/10-min survey) and 3 (7.58), primarily due to use by blackbirds/orioles.

No federally listed threatened or endangered species were recorded during the 2020 – 2021 study. Nine Species of Concern were observed, including one state-listed threatened species (peregrine falcon). Three bald eagles were observed incidentally (i.e., outside the standardized surveys) with one individual on September 27, 2020, approximately four miles east of Point 9 and two on March 25, 2021, in the vicinity of Point 8, which is the closest point to the Missouri River. Franklin's gull, a Bird of Conservation Concern, had the highest number of observations (21 observations in two groups).

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INTRODUCTION

Campbell County Wind Farm 2, LLC (Campbell County 2) is proposing the development of the approximately 98-megawatt Campbell County II Wind Project (Project; currently known as Campbell County Wind Farm 2) in Campbell County, South Dakota (Figure 1). Campbell County 2 contracted Western EcoSystems Technology, Inc. (WEST) to conduct a pre-construction avian use study within the Project area, as defined in May of 2020. Study methodology followed the recommendations in the US Fish and Wildlife Service's (USFWS) 2012 *Land-Based Wind Energy Guidelines* (WEG), Appendix C(1)(a) of the 2013 USFWS *Eagle Conservation Plan Guidance* (ECPG), and the USFWS *Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests* (2016 Final Eagle Rule [81 Federal Register 91494 (December 16, 2016)]).

The objectives of the study were to assess the temporal and spatial use of the Project area by large and small birds, with a particular focus on eagles and federal and state-listed species. This report summarizes results from the 2020–2021 avian use study conducted at the Project.

PROJECT AREA

The Project area encompasses about 8,989.0 acres (ac; 3,637.7 hectares [ha]) in west-central Campbell County, South Dakota. The Project is located about 4.0 miles (mi; 6.4 kilometers [km]) northwest of Mound City, South Dakota (Figure 1), and within the Southern Missouri Coteau Slope of the Level III Northwestern Glaciated Plains (US Environmental Protection Agency 2013). This ecoregion is a transitional region between the generally more level, moist agricultural areas to the east and the generally drier and more irregular landscape to the west.

The landscape within the Project area is nearly flat and along the edge of some relatively steep bluffs towards the Missouri River floodplain on the western edge of the Project. Elevation ranges from 1,689.3–2,121.7 feet (ft; 514.9–646.7 meters [m]) above sea level (US Geological Survey [USGS] 2020). The primary land cover within the Project is cultivated crops (49.2%) and grassland/herbaceous (42.9%; Table 1, Figure 2; National Land Cover Database 2016).

Wetlands, sparsely distributed throughout the Project area (USFWS National Wetlands Inventory 2020), are classified as freshwater emergent and freshwater pond (88.4% and 11.6% of wetlands, respectively). There is one large freshwater emergent wetland (244.0 ac [98.7 ha]) located in the southeast corner of the northern portion of the Project. This wetland is located along either side of an unnamed tributary to Olson Creek; the tributary enters Olson Creek at approximately the west end of Lake Campbell. Olson Creek is the only named creek or river within the Project area (USGS National Hydrography Dataset 2020).

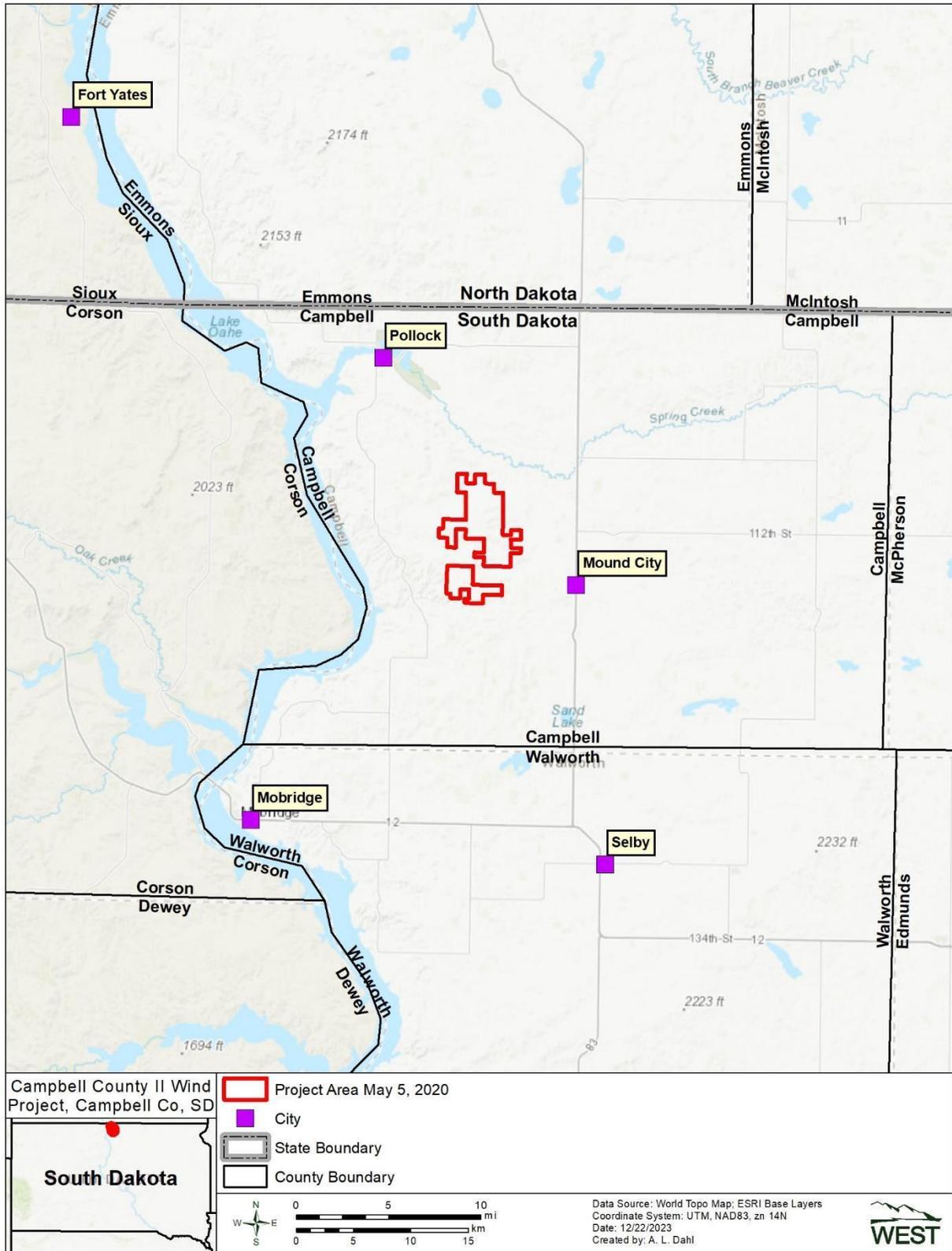


Figure 1. Location of the Campbell County II Wind Project, Campbell County, South Dakota.

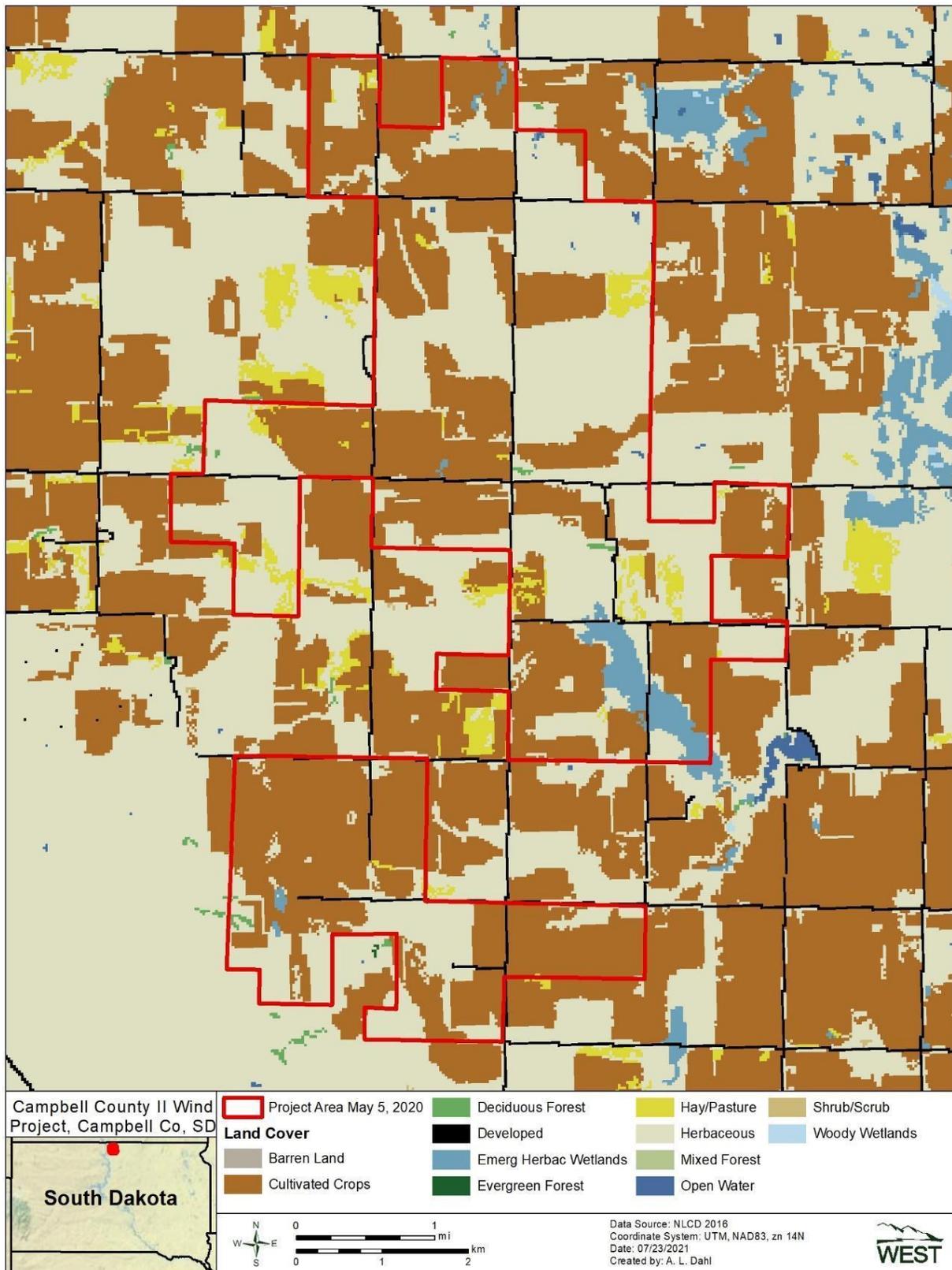


Figure 2. Land cover at the Campbell County II Wind Project, Campbell County, South Dakota.

Table 1. Land cover types, coverage in acres and hectares, and percent composition within the Campbell County II Wind Project, Campbell County, South Dakota.

Land Cover Type	Acres	Hectares	Percent (%) Composition
Cultivated Cropland	4,419.1	1,788.4	49.2
Herbaceous/Grassland	3,855.5	1,560.3	42.9
Developed	281.0	113.7	3.1
Emergent Herbaceous Wetland	207.7	84.0	2.3
Hay/Pasture	201.3	81.4	2.2
Deciduous Forest	16.0	6.5	0.2
Open Water	7.1	2.9	0.1
Woody Wetland	1.3	0.5	0.0
Total	8,989.0	3,637.7	100

Source: National Land Cover Database (2016).

* Sums can differ from total values shown due to rounding.

METHODS

The study design and survey methods for birds recorded in this study primarily follow guidance in the ECPG and the 2016 Final Eagle Rule, because of the need to collect information on eagles, while also following guidance from the WEG to collect information on other species of concern (SOC). Methods described below, therefore, are common for all birds (i.e., large and small birds, and eagles) except as noted. For this report, SOC include federal and state-listed species (endangered, threatened, or candidate), species protected by the BGEPA, species considered Birds of Conservation Concern (BCC) by the USFWS (2021) in Bird Conservation Region 11 (BCR), or state Species of Greatest Conservation Need (South Dakota Department of Game, Fish and Parks 2014, 2018). Eagles are of primary concern for this Project and will be presented first in the *Results* section.

Large birds are defined as waterbirds, waterfowl, shorebirds, gulls/terns, diurnal raptors (e.g., kites, accipiters, buteos, eagles, falcons, and northern harrier), owls, vultures, upland game birds, doves/pigeons, nightjars, and large corvids. Small birds are defined as cuckoos, swifts/hummingbirds, woodpeckers, kingfishers, small corvids, and other passerines.

Study Design

The USFWS (2013) recommends that enough point count locations be placed to cover a minimum of 30% of the minimum convex polygon (MCP) of the proposed turbine layout and hazardous areas (i.e., rotor radius). Following USFWS Guidance, Nine survey plots provided 45.9% coverage of the Project area using the Project boundary as defined in May of 2020, as no turbine layout was available. All survey point locations used in this study (Figure 3) were previously developed by Burns & McDonnell Engineering Company Inc. in June 2019 and were provided to WEST by Campbell County. Each survey point was centered within a circular plot (survey plot) with an 800-m (2,625-ft) radius for large birds (including eagles) and 100-m (328-ft) radius for small birds (Reynolds et al. 1980, ECPG, 2016 Final Eagle Rule).

Standardized avian use surveys (surveys) were conducted once per month from June 21, 2020, to May 19, 2021, during all seasons, as specified in the ECPG and 2016 Final Eagle Rule. Seasons were defined as summer (June 1 – August 31), fall (September 1 – November 30), winter (December 1 – February 28), and spring (March 1 – May 31). Surveys were conducted during daylight hours. To the extent possible, survey times were randomized to cover all daylight hours during a season. Surveys were conducted under all weather conditions except when visibility within the survey plot was compromised or when access to survey locations was limited due to road conditions or other factors.

Survey Methods

Avian Use Surveys

Surveys were conducted at each point for small and large birds. Small bird surveys were conducted during a *survey period* of 10 minutes (min) within a 100-m radius, followed by large bird (including eagles) surveys conducted for a survey period of 60 min within an 800-m radius. Observations of groups of birds (one or more birds) were recorded for each survey, along with the date, start and end time, and weather (i.e., temperature, wind speed, wind direction, precipitation, and percent cloud cover). During surveys, if the biologist lost sight of a group for more than a minute or if the same bird species returned to the survey plot during the survey period, but the biologist was unsure if it was the same group, a new observation was recorded. In addition to the above information, the following data also were recorded for each group of birds observed:

- Observation number
- Species (or best possible identification)
- Number of individuals
- Sex and age class (if possible)
- Distance from survey point
- Flight height above ground level (AGL; first, lowest, and highest)
- Flight direction (first observed)
- Habitat
- Activity (e.g., flying, perched)
- Observation type (visual or aural)
- Flight paths and perch locations of eagles

Eagles

Data were collected, based on the recommendations in the ECPG and the 2016 Final Eagle Rule if a golden (*Aquila chrysaetos*), bald (*Haliaeetus leucocephalus*), or unidentified eagle was observed during the survey period. Biologists recorded eagle behavior (e.g., flight height, distance from observer, activity) each minute (eagle minute), at the top of the minute, to provide an instantaneous count for every eagle observed. Data were recorded whether the eagle was flying at or below 200 m AGL and within 800 m of the survey point at any time during the minute (eagle risk minute). Age class (juvenile [first year], immature or sub-adult [second to fourth year], or adult [fifth year or greater]) was also recorded.

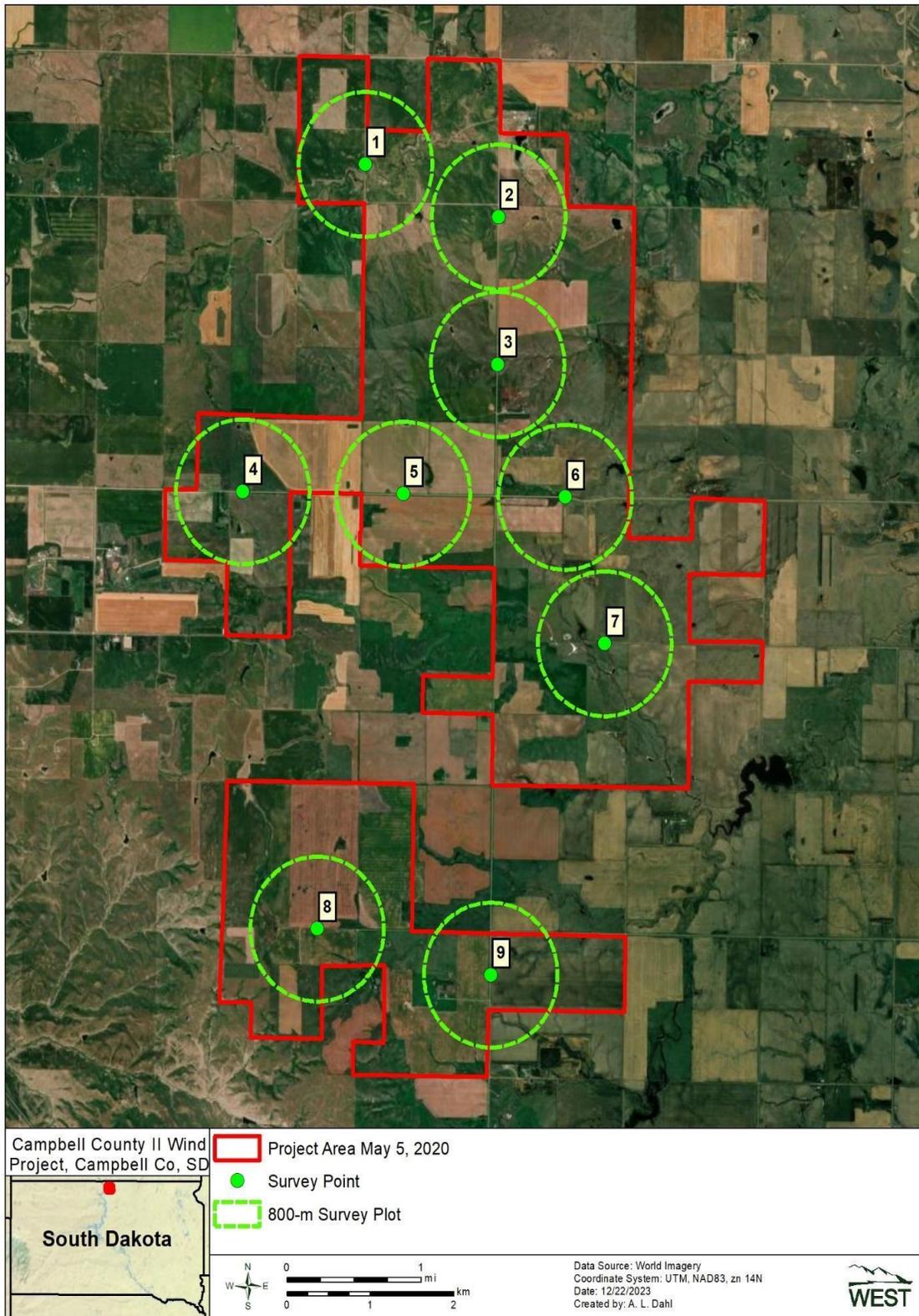


Figure 3. Avian use survey points and plots at the Campbell County II Wind Project, Campbell County, South Dakota.

Incidental Observations

Incidental wildlife observations made outside of the survey periods described above were recorded but were limited to SOC. These data do not represent a systematic sampling of the Project but are useful to document species that may not be observed during avian use surveys. Data collected for incidentally observed non-eagle species were recorded similar to data recorded during standardized surveys. For eagles observed incidentally, no flight paths or perch locations, or eagle minutes were recorded.

Data Management

Quality Assurance and Quality Control

WEST implemented quality assurance and quality control (QA/QC) measures at all stages of the study, including in the field, during data entry and analysis, and report writing. Multiple reviews were conducted as QA/QC measures throughout the study life cycle. Following surveys, biologists were responsible for inspecting data forms for completeness, accuracy, and legibility. If errors or anomalies were found within the data, follow-up measures were implemented and included discussions and review of field data with field biologists and/or Project Managers. If any errors, omissions, or problems were identified in later stages of analysis or report writing, they were traced back to the raw data forms where appropriate and corrections were implemented and documented.

Data Compilation and Storage

A Microsoft® SQL Server database was specifically developed to store, organize, and retrieve survey data. Project data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. WEST retained all data forms and electronic data files for reference.

Statistical Analysis

A *survey* was defined as a single 10-min or 60-min count of birds. In some cases, a count of bird observations may represent repeated observations of the same individual. Only observations within the survey plot were included for statistical analysis.

A *visit* was defined as one sequential survey all survey plots within the Project area, which could occur across multiple dates. Subsequent visits did not overlap, and each full visit was completed within a single season (e.g., spring). If unforeseen conditions prevented all plots from being surveyed during a visit, then a visit may not include a complete survey of all plots.

Species richness was defined as a count of species observed within a survey plot during avian use surveys. Groups of unidentified species were included in species richness if a species from that group was not otherwise recorded.

Mean Use, Percent of Use, and Frequency of Occurrence

Mean use is the average number of birds observed per plot per survey for small or large birds. Small bird use (per 100-m radius plot per 10-min survey) and large bird use (per 800-m radius

plot per 60-min survey) is calculated by: 1) summing birds per plot per visit, 2) averaging number of birds over plots within a visit, and 3) averaging number of birds across visits within a season. Overall mean use was calculated as a weighted average of seasonal values by the number of days in each season. *Percent of use* was calculated as the percentage of small or large bird use that was attributable to a particular bird type or species. *Frequency of occurrence* was calculated as the percent of surveys in which a particular bird type or species was observed.

Mean use and frequency of occurrence describe different aspects of relative abundance. Mean use is based on the number of birds (i.e., large groups of the same type of bird can produce high estimates), whereas frequency of occurrence is based on the number of groups of the same type of bird (i.e., it is not influenced by the group's size). Qualitative comparisons were made with these metrics among bird types, seasons, and survey points to help illustrate temporal and spatial avian use of the Project area. The top five bird groups were depicted graphically to help illustrate the dominant temporal and spatial patterns in mean use, percent of use, and frequency of occurrence.

Flight Height

Flight heights are important metrics to assess relative potential exposure to turbine blades and were used to calculate the percentage of large birds and small birds observed flying within the rotor-swept height (RSH) of proposed turbines. A RSH of 25–150 m (82–492 ft) AGL was assumed for the purpose of the analysis. Flight height recorded during the initial observation was used to calculate the percentage of birds flying within the RSH and mean flight height.

Spatial Variation

Mean use was calculated by survey point for large and small birds to make spatial comparisons among the survey points. Additionally, flight paths and perched locations of eagles and federal and state-listed bird species, if observed, were mapped during large bird use surveys to qualitatively show areas of flight path concentration and potential flight patterns within the Project area compared to environmental or topographic features.

Eagles

Eagle minutes were defined as the number of minutes an eagle was observed during the survey.

Eagle risk minutes were defined as the number of minutes an eagle was observed in flight within the risk cylinder.

The risk cylinder was defined as the area within 800 m of the survey point and below 200 m AGL during the 60-min survey period.

Total minutes were defined as the amount of time eagles were observed inside and outside the risk cylinder during the survey.

Eagle observations during surveys were summarized to provide flight heights (see *Flight Height*) and flight path maps. Data were collected during each minute eagles were observed within the

risk cylinder to count eagle minutes and the time eagles were observed inside and outside the risk cylinder to count total minutes.

The eagle minutes per observation hour were reported by survey plot and month to enable spatial and temporal assessments of eagle minutes recorded in the Study Area. Data collected on perched eagles and those outside of survey plots were not considered eagle minutes; however, they were considered in the total eagle minutes. The perch locations and flight paths of all eagles were mapped to qualitatively assess areas of eagle use within the Study Area (see *Spatial Variation*).

RESULTS

Overall, 108 avian use surveys were conducted for large bird (108 hours of survey) and small birds (18 hours of survey; Table 2). For large birds, 999 observations from 131 groups were recorded and for small birds, 443 observations from 195 groups were recorded. Overall, large bird species richness was 25 species and higher in the spring (17 species), and summer (13) than in fall (six) and winter (two; Table 2). Overall small bird species richness was 26 species, which was higher during summer (21 species) than in spring (10), fall (five), and winter (three; Table 2).

Study results are summarized below and supplemented by the appendices, which present species-level detail on the following: scientific names and numbers of groups and observations seen during surveys, regardless of distance from observer (Appendices A1 and A2); avian use, percent of use, and frequency of occurrence within the survey plot by season (Appendices B1 and B2); and mean use by survey point (Appendix C).

Table 2. Summary of survey effort and species richness^a, by season and overall, during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Season	Number of Visits	Number of Surveys Conducted	Large Bird Species Richness	Small Bird Species Richness
Summer	3	27	13	21
Fall	3	27	6	5
Winter	3	27	2	3
Spring	3	27	17	10
Overall	12	108	25	26

^a Species richness is defined as a count of species observed within 800-meter (m; 2,625-foot [ft]) radius plot and 60-minute (min) survey period for large birds and 100-m (328-ft) radius plot and 10-min survey period for small birds. Groups of unidentified species were included in species richness if a species from that group was not otherwise recorded.

Eagles

No bald, golden, or unidentified eagles were observed during 108 survey hours (108 surveys); therefore, no eagle minute data were recorded.

Large Birds

Mean Use, Percent of Use, and Frequency of Occurrence

Mean use, percent of use, and frequency of occurrence were calculated by season for large bird types (Figures 4a, 4b, 4c) and species (Table 3, Appendix B1). Large bird mean use was highest during spring (32.78 observations/800-m radius plot/60-min survey), with comparatively low use in summer (3.22), fall (0.78), and winter (0.19; Figure 4a, Table 3, Appendix B1). Overall, large bird mean use was approximately 9.24. Waterfowl accounted for the majority of use during spring (92.7%), largely attributed to use by geese. Doves/pigeons accounted for most large bird use during summer (40.2%; mostly due to mourning dove), while waterbirds accounted for most use during fall (47.6%; due exclusively to use by sandhill cranes; Table 3, Appendix B1). Diurnal raptors accounted for 60% of use during winter due exclusively to rough-legged hawk), while shorebirds accounted for the remaining 40% of winter use due exclusively to use by killdeer (Figure 4b, Table 3, Appendix B1).

Large bird frequency of occurrence varied among seasons, with upland game birds the most frequently observed bird type during spring (44.4%; Table 3, Figure 4c, Appendix B1). Diurnal raptors were the most frequently observed bird type during fall and winter (11.1%; Table 3, Figure 4c, Appendix B1). Shorebirds, diurnal raptors, and doves/pigeons were each observed nearly twice as frequently as other bird types, with each bird type observed during 48.1% of summer surveys (Table 3, Figure 4c). Red-tailed hawks (29.6%) and northern harriers (18.5%) were the most frequently observed diurnal raptors during the summer (Appendix B1).

Table 3. Mean large bird use (number of large birds/plot/survey)^a, percent of total use (%), and frequency of occurrence (%) for each large bird type, by season, observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Type/Subtype/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Waterbirds	0.04	0.37	0	0	1.1	47.6	0	0	3.7	3.7	0	0
Waterfowl	0.15	0.04	0	30.37	4.6	4.8	0	92.7	11.1	3.7	0	25.9
Shorebirds	0.67	0.22	0	0.33	20.7	28.6	0	1.0	48.1	7.4	0	18.5
Gulls/Terns	0	0	0	0.78	0	0	0	2.4	0	0	0	7.4
Franklin's gull	0	0	0	0.78	0	0	0	2.4	0	0	0	7.4
Diurnal Raptors	0.63	0.11	0.11	0.33	19.5	14.3	60.0	1.0	48.1	11.1	11.1	22.2
<i>Buteos</i>	0.37	0.11	0.11	0.22	11.5	14.3	60.0	0.7	33.3	11.1	11.1	18.5
<i>Northern Harrier</i>	0.26	0	0	0.07	8.0	0	0	0.2	18.5	0	0	3.7
<i>Falcons</i>	0	0	0	0.04	0	0	0	0.1	0	0	0	3.7
Vultures	0.11	0	0	0.04	3.4	0	0	0.1	11.1	0	0	3.7
Upland Game Birds	0.30	0.04	0	0.85	9.2	4.8	0	2.6	25.9	3.7	0	44.4
Doves/Pigeons	1.30	0	0.07	0.07	40.2	0	40.0	0.2	48.1	0	3.7	7.4
Nightjars	0.04	0	0	0	1.1	0	0	0	3.7	0	0	0
Overall	3.22	0.78	0.19	32.78	100	100	100	100	NA	NA	NA	NA

^a 800-meter (m; 2,625-foot [ft]) radius plot and 60-minute survey for large birds.

Sums of values may not equal totals shown due to rounding.

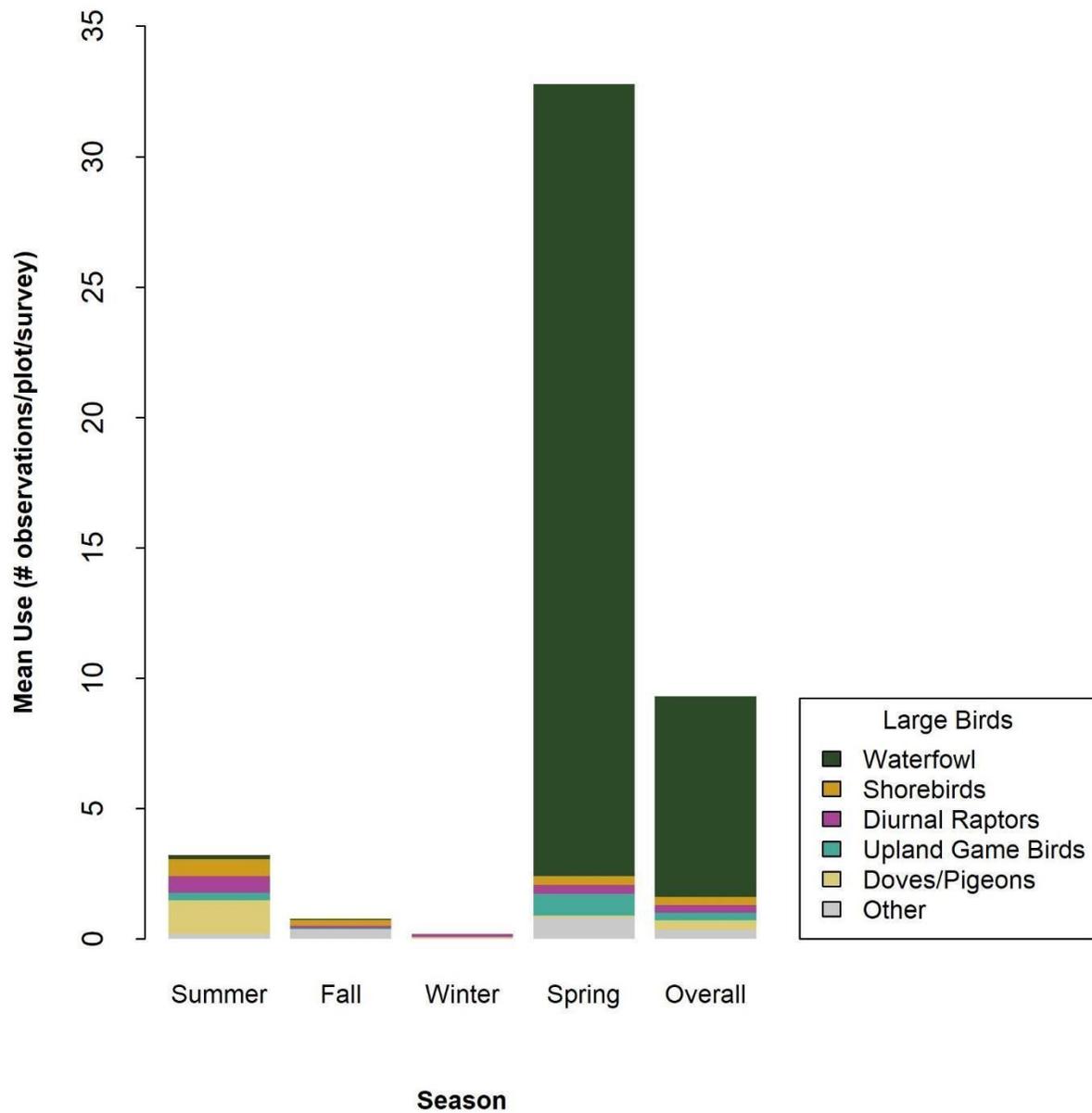


Figure 4a. Large bird mean use by season and bird type observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

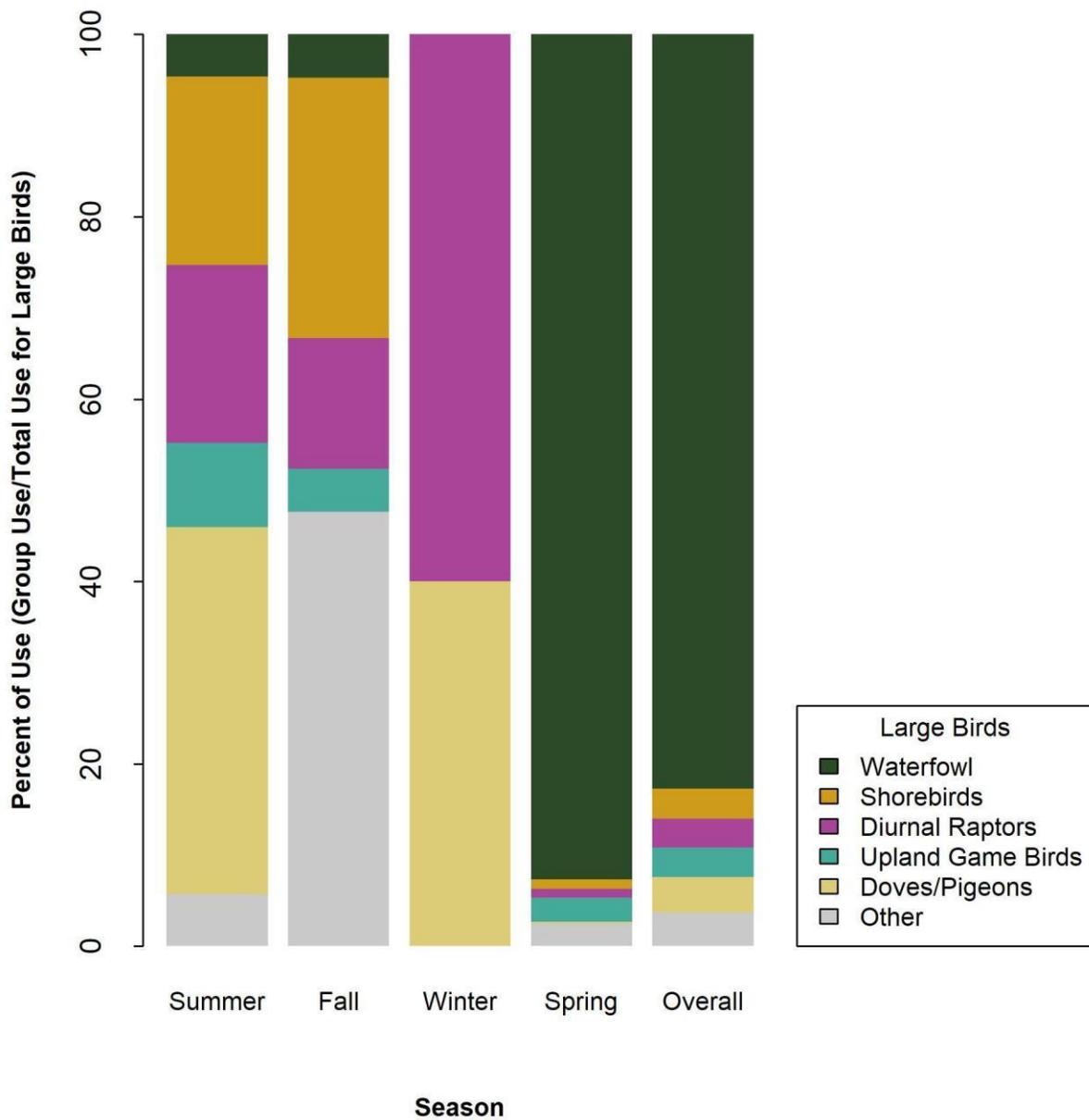


Figure 4b. Large bird percent of use by season and bird type observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

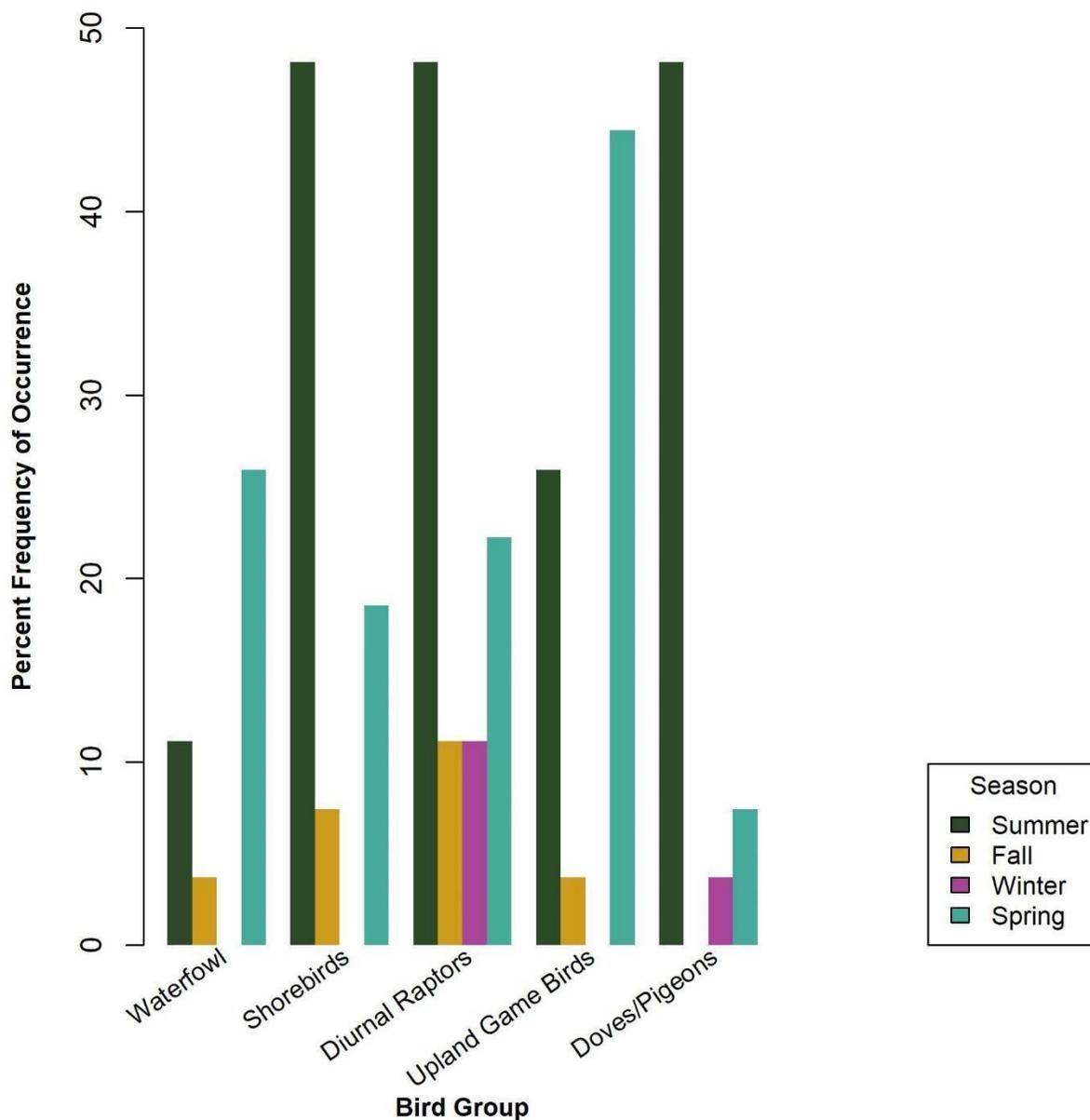


Figure 4c. Large bird frequency of occurrence by season and bird type observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Flight Height

Initial mean large bird flight heights ranged from one m (3 ft) for upland game birds to 125 m (410 ft) for gulls/terns and vultures. All gulls/terns and 95.9% of initial waterfowl flight heights were within the RSH (Table 4). Initial flight heights were generally below the RSH for most bird types (e.g., waterbirds, shorebirds, and upland game birds) and diurnal raptor subtypes (i.e., northern harrier and falcons). Among diurnal raptors, only buteos flew within the RSH (46.4% of the time). Only vultures (25.0%) and diurnal raptors flew above the RSH (Table 4).

Table 4. Group and individual initial observation flight height characteristics by large bird type^a and diurnal raptor subtype observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Bird Type/Subtype	Number of Groups Flying	Number Observed Flying	Percent Observed Flying	Mean Flight Height (meters [m])	Percent within Flight height Categories		
					<25 m	25–150 m ^b	>150 m
Waterbirds	1	1	9.1	10	100	0	0
Waterfowl	10	319	38.7	46	4.1	95.9	0
Shorebirds	9	18	54.5	5	100	0	0
Gulls/Terns	2	21	100	125	0	100	0
Diurnal Raptors	27	28	87.5	41	50.0	46.4	3.6
<i>Buteos</i>	17	18	81.8	61	22.2	72.2	5.6
<i>Northern Harrier</i>	9	9	100	8	100	0	0
<i>Falcons</i>	1	1	100	10	100	0	0
Vultures	4	4	100	125	0	75.0	25.0
Upland Game Birds	3	7	21.9	1	100	0	0
Doves/Pigeons	14	24	61.5	6	100	0	0
Nightjars ^c	0	0	0	-	-	-	-
Large Birds Overall	70	422	42.3	35	18.2	81.3	0.5

^a 800-meter (m; 2,625-foot [ft]) radius plot for large birds.

^b The assumed rotor-swept height for potential collision with a turbine blade, or 25–150 m (82–492 ft) above ground level.

^c Zeroes and “-” values indicate that the bird type was observed but was not flying.

Spatial Variation

Similar to mean use, mean use by point was driven by waterfowl use (Figure 5). Large bird use was highest at Point 7 (70.08 observations/60-min survey) due to use by waterfowl (66.17; Figure 5; Appendix C). A large wetland is found within the plot at Point 7. Large bird use ranged from 0.67 to 3.58 observations/60-min survey across the remaining survey points, and was highest at Point 7. Diurnal raptor use was relatively consistent across survey points, ranging from 0.08 to 0.50 observations/60-min survey, while upland game bird use was higher at Point 7 than other survey points. Additionally, a single group of ten sandhill cranes (waterbirds; *Grus canadensis*) was observed at Point 7 during the fall (Figure 5, Appendix C).

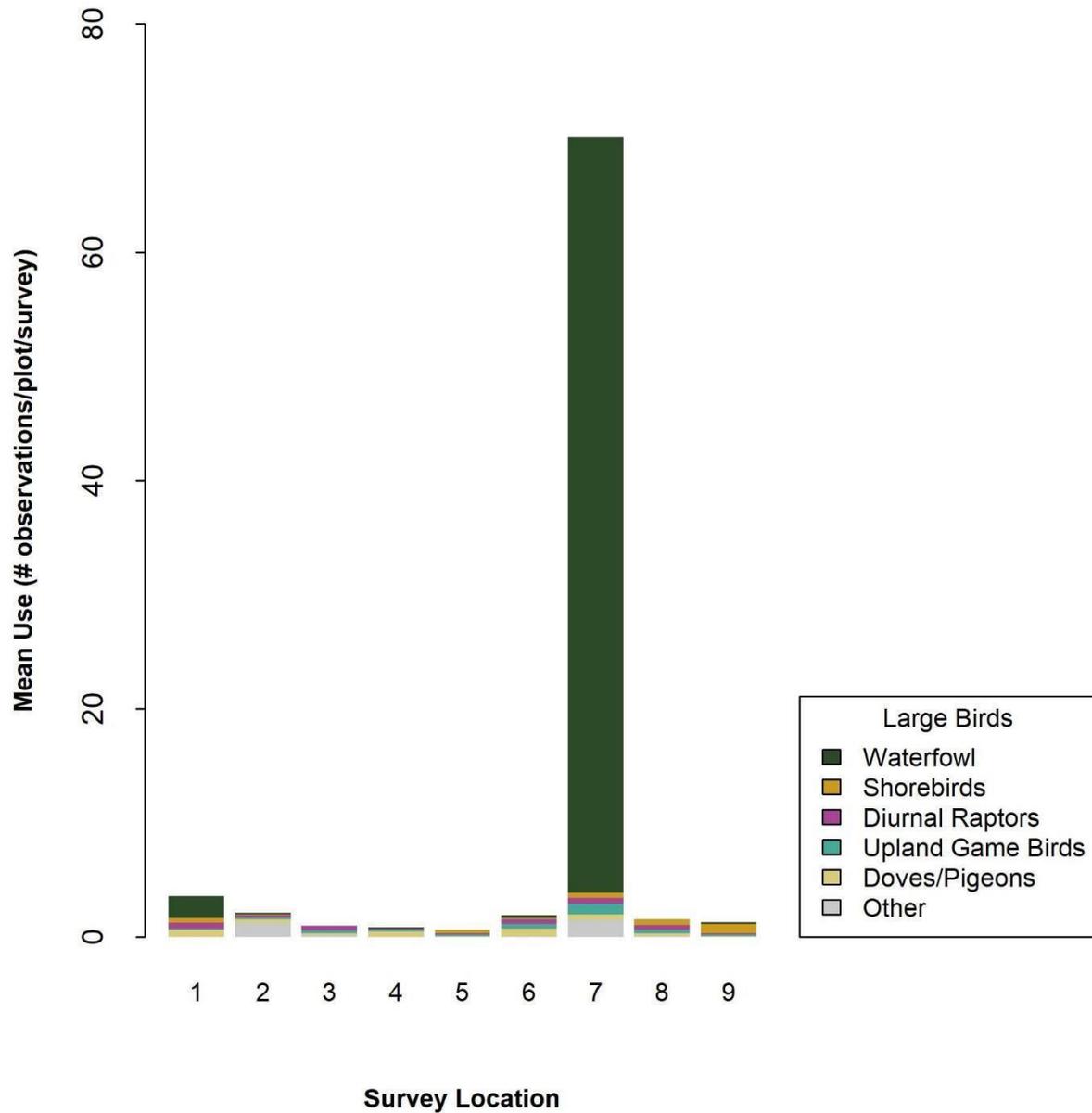


Figure 5. Large bird mean use by point and bird type observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Small Birds

Mean Use, Percent of Use, and Frequency of Occurrence

Mean use, percent of use, and frequency of occurrence were calculated by season for small bird types (Figures 6a, 6b, 6c) and species (Appendix B2). Overall, small bird mean use was approximately 4.10 observations/100-m radius plot/10-min survey. Small bird mean use among seasons ranged from 2.44 to 6.07 observations/100-m radius plot/10-min survey and was highest during summer (6.07), followed by fall (5.33), spring (2.56), and winter (2.44; Table 5, Figure 6a, Appendix B2). Nearly all small bird mean use was associated with passerine species; woodpeckers were only observed in summer, with a mean use of 0.15 observations/plot/10-min survey. Grassland/sparrows accounted for most small bird use during winter (90.9%) and summer (37.8%), with blackbirds/orioles accounting for 32.9% of small bird use in summer. Blackbirds/orioles accounted for the majority of small bird use during fall (89.6%) and spring (84.1%; Table 5, Figure 6b). Grassland/sparrows (horned lark, snow bunting, and American tree sparrow) were the only identified species in the winter (Table 5, Figure 6b, Appendix B2). Three species of blackbird/orioles and two species of grassland/sparrows were the only species recorded during the fall (Table 5, Figure 6b, Appendix B2).

Summer had the highest frequency of occurrence among all small bird types (Figure 6c). Small bird frequency of occurrence varied among seasons with grassland/sparrow the most frequently observed during summer (81.5%) and winter (29.6%) and blackbird/orioles during spring (59.3) and fall (18.5%; Table 5, Figure 6c, Appendix B2).

Table 5. Mean small bird use (number of small birds/plot/survey)^a, percent of total use (%), and frequency of occurrence (%) for each small bird type, subtype, and species by season, observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Type/Subtype/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Passerines	5.93	5.33	2.44	2.56	97.6	100	100	100	96.3	25.9	37.0	63.0
<i>Blackbirds/Orioles</i>	2.00	4.78	0	2.15	32.9	89.6	0	84.1	63.0	18.5	0	59.3
<i>Finches/Crossbills</i>	0.07	0	0	0	1.2	0	0	0	7.4	0	0	0
<i>Flycatchers</i>	0.70	0	0	0.15	11.6	0	0	5.8	37.0	0	0	11.1
<i>Grassland/Sparrows</i>	2.30	0.56	2.22	0.22	37.8	10.4	90.9	8.7	81.5	11.1	29.6	14.8
<i>Mimids</i>	0.07	0	0	0	1.2	0	0	0	7.4	0	0	0
<i>Swallows</i>	0.41	0	0	0.04	6.7	0	0	1.4	14.8	0	0	3.7
<i>Thrushes</i>	0.15	0	0	0	2.4	0	0	0	14.8	0	0	0
<i>Warblers</i>	0.11	0	0	0	1.8	0	0	0	11.1	0	0	0
<i>Unidentified Passerines</i>	0.11	0	0.22	0	1.8	0	9.1	0	11.1	0	7.4	0
Woodpeckers	0.15	0	0	0	2.4	0	0	0	11.1	0	0	0
Overall	6.07	5.33	2.44	2.56	100	100	100	100	NA	NA	NA	NA

^a 100-meter (328-foot) radius plot and 10-minute survey for small birds.

Sums of values may not equal totals shown due to rounding.

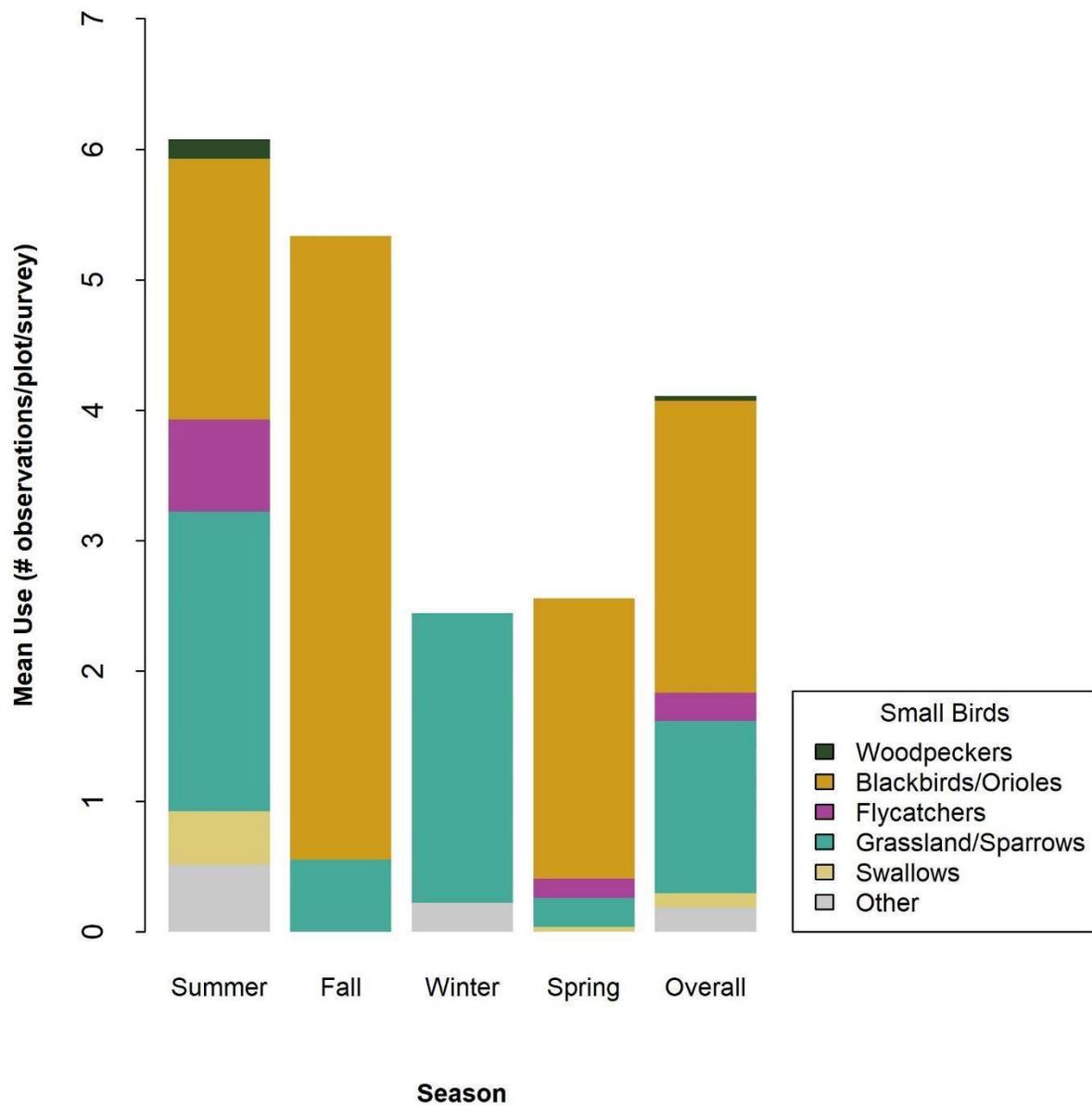


Figure 6a. Small bird^a mean use by season and bird type observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

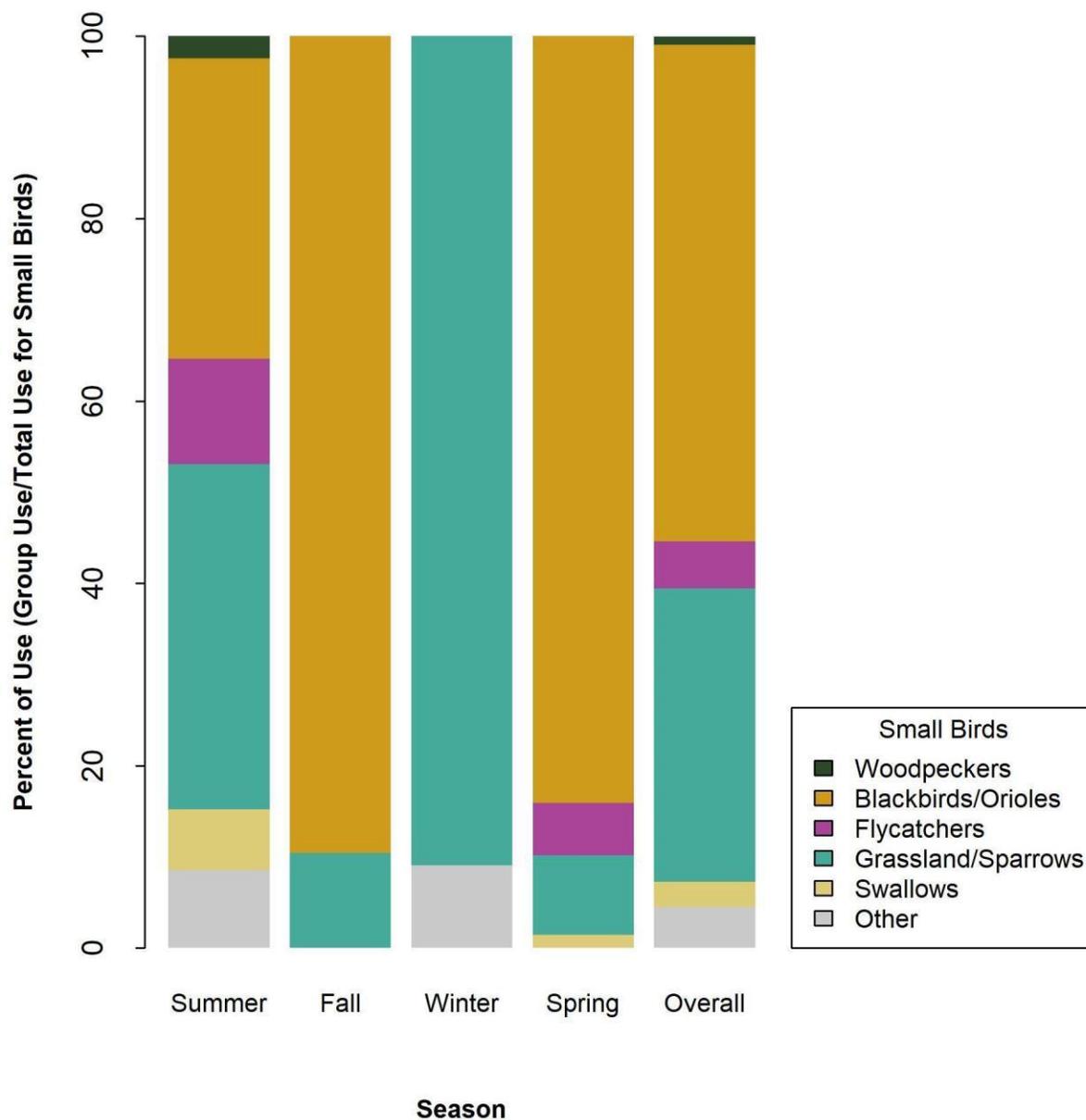


Figure 6b. Small bird percent of use by season and bird type observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

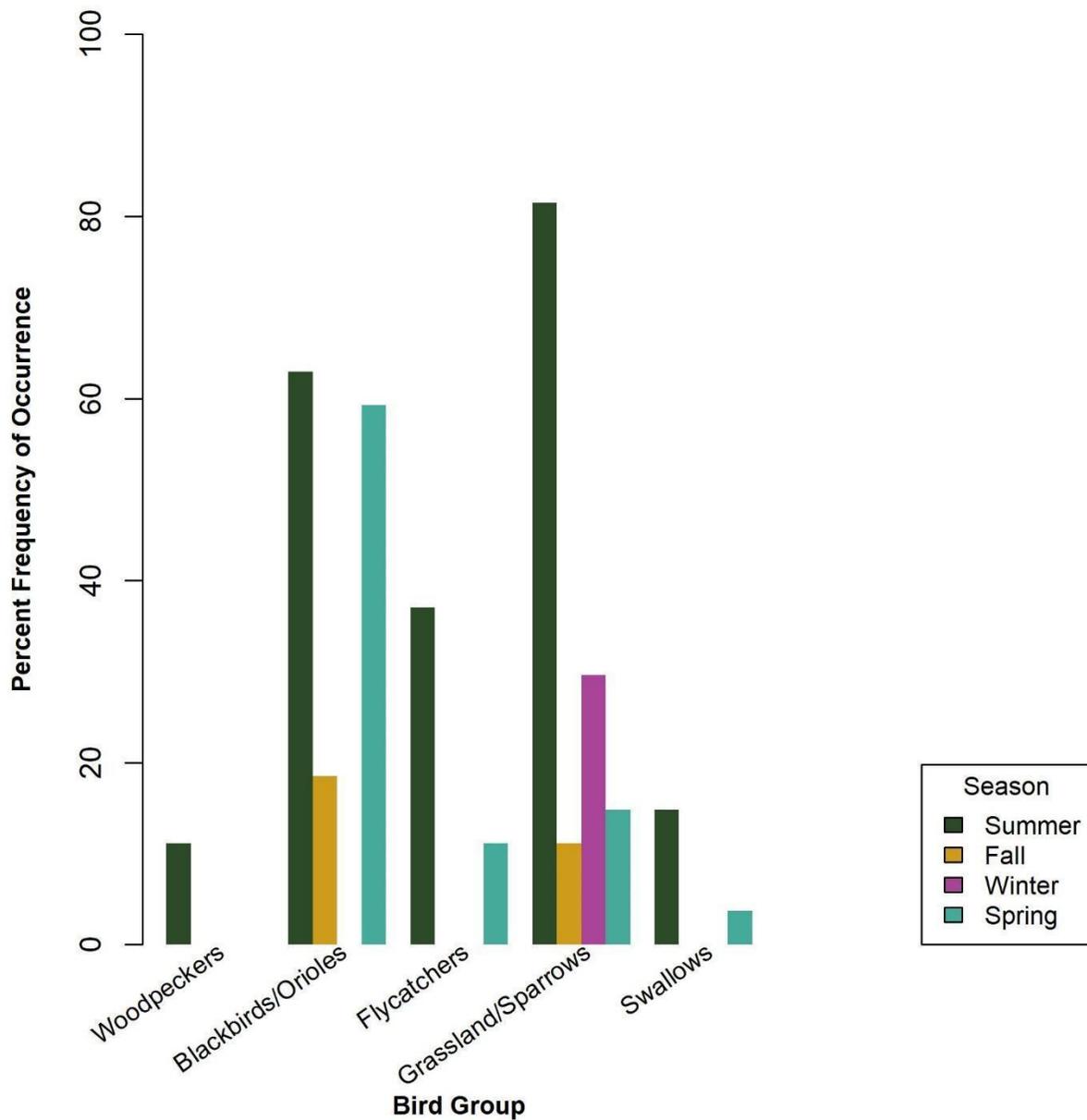


Figure 6c. Small bird frequency of occurrence by season and bird type observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Flight Height

Initial mean small bird flight heights ranged from 1–10 m (3–33 ft) for warblers and finches/crossbills, respectively (Table 6). Small birds were mainly (83.1%) observed below the RSH. Only blackbirds/orioles (26.6%) were recorded flying within the RSH and no small birds were recorded above the RSH (Table 6).

Table 6. Group and individual initial observation flight height characteristics by small bird type and passerine subtype observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Bird Type/Sub-Type	Number of Groups Flying	Number Observed Flying	Percent Observed Flying	Mean Flight Height (meters [m])	Percent within Flight height Categories		
					<25 m	25–150 m ^b	>150 m
Passerines	64	293	66.7	7	82.9	17.1	0
<i>Blackbirds/Orioles</i>	33	188	78.0	8	73.4	26.6	0
<i>Finches/Crossbills</i>	1	1	50.0	10	100	0	0
<i>Flycatchers</i>	6	7	30.4	3	100	0	0
<i>Grassland/Sparrows</i>	13	75	52.4	5	100	0	0
<i>Mimids</i>	1	1	50.0	2	100	0	0
<i>Swallows</i>	5	12	100	7	100	0	0
<i>Thrushes</i>	2	2	50.0	5	100	0	0
<i>Warblers</i>	1	1	33.3	1	100	0	0
<i>Unidentified Passerines</i>	2	6	66.7	5	100	0	0
Woodpeckers	2	2	50.0	5	100	0	0
Small Birds Overall	66	295	66.6	7	83.1	16.9	0

^a 100-meter (m; 328-foot [ft]) radius plot for small birds.

^b The assumed rotor-swept height for potential collision with a turbine blade, or 25–150 m (82–492 ft) above ground level.

Spatial Variation

Small bird mean use by point was higher at points 7 and 3 (10.75 and 7.5 observations/10-min, largely due to use by blackbird/orioles; small bird use at other points ranged from 1.50 to 4.75 (Figure 7; Appendix C). Blackbirds/orioles and grassland/sparrows were seen at all points, while woodpeckers were seen in the northern portion of the Project area (points 1–3; Figure 7).

Species of Concern

Nine SOC were recorded within the Project area, and no federally listed threatened or endangered species were observed (Table 7). One peregrine falcon, state-listed threatened, was observed at Point 6 on April 13, 2021. One group of two bald eagles, which are protected under the Bald and Golden Eagle Protection Act of 1940, was observed incidentally. Franklin's gull, a BCC species, had the highest number of observations among SOC (two groups totaling 21 observations; Table 7).

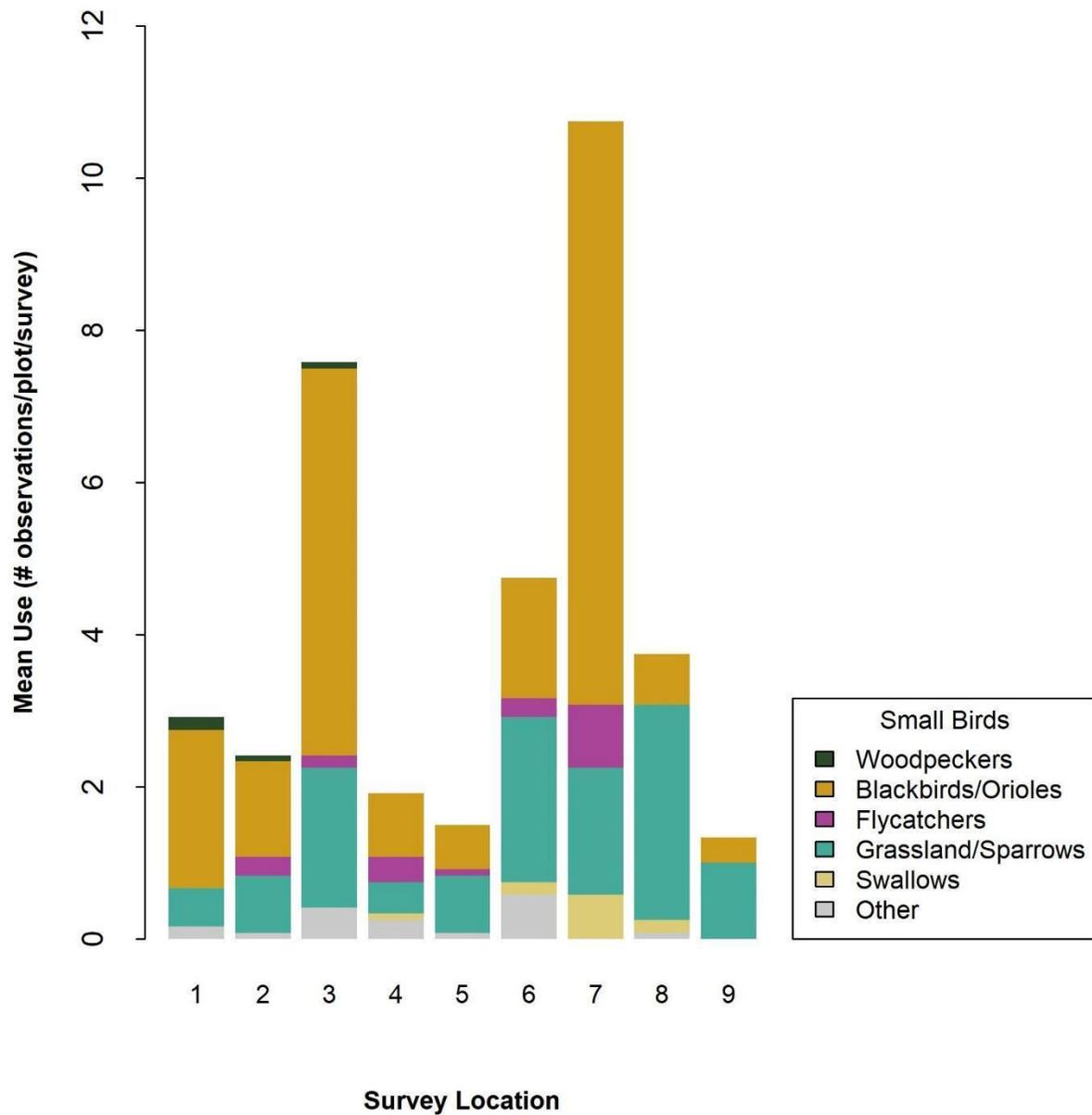


Figure 7. Small bird mean use by survey point observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Incidental Observations

The bald eagle was the only species recorded exclusively as an incidental observation during the Year 1 study (Table 7). Three bald eagles were observed incidentally: one on September 27, 2020, approximately four mi (6.4 kilometers [km]) east of Point 9 and two on March 25, 2021, in the vicinity of Point 8. The red-headed woodpecker, a BCC species also observed during surveys, was also observed incidentally (one observation; Table 7).

Table 7. Species of concern (number of groups [# grps] and individual observations [# obs]) observed during avian use surveys and as incidental observations at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Species	Scientific Name	Status ^a	Surveys		Incidental		Total	
			# grps	# obs	# grps	# obs	# grps	# obs
American white pelican	<i>Pelecanus erythrorhynchos</i>	SGCN	1	1	0	0	1	1
bald eagle	<i>Haliaeetus leucocephalus</i>	SGCN; BGEPA	0	0	2	3	2	3
ferruginous hawk	<i>Buteo regalis</i>	SGCN	1	1	0	0	1	1
Franklin's gull	<i>Leucophaeus pipixcan</i>	BCC	2	21	0	0	2	21
peregrine falcon	<i>Falco peregrinus</i>	ST; SGCN	1	1	0	0	1	1
northern harrier	<i>Circus hudsonius</i>	BCC	9	9	0	0	9	9
Large Birds Overall	6 species		14	33	2	6	16	36
bobolink	<i>Dolichonyx oryzivorus</i>	BCC	2	2	0	0	2	2
grasshopper sparrow	<i>Ammodramus savannarum</i>	BCC	4	4	0	0	4	4
red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	BCC	3	3	1	1	4	4
Small Birds Overall	3 species		9	9	1	1	10	10

^a SE = State Endangered; SGCN = Species of Greatest Conservation Need; BGEPA = Bald and Golden Eagle Protection Act; BCC = Birds of Conservation Concern.

Sources: BGEPA 1940; South Dakota Game, Fish and Parks 2014, 2018, 2021a; US Fish and Wildlife Service 2021.

DISCUSSION AND CONCLUSIONS

The objective of the study was to assess the temporal and spatial use of the Project area by large and small birds, with a particular focus on eagles and federal and state-listed species. The specific objectives of this avian use study were to provide site-specific avian use data to evaluate potential impacts from Project development, provide data that may be used to inform Project planning, and collect data on eagle use following the ECPG.

No eagles were observed during surveys, but three bald eagles were observed incidentally with one on September 27, 2020, approximately four mi (6.4 km) east of Point 9, and two others, on March 25, 2021, in the vicinity of Point 8, located about 4.7 mi (7.6 km) from the Missouri River and is the closest point to this river. Suitable foraging and roosting habitat for eagles occurs within the Project area but does not differ markedly from the surrounding landscape. Based on data collected during surveys, eagle use is likely not widespread throughout the Project area.

Large bird use showed seasonal variation and was highest during spring, largely due to the presence of common geese migrants (e.g., greater white-fronted geese, snow geese, and Canada geese). Waterfowl use was concentrated at Point 7, resulting in high large bird use at that point. A large mixed flock of geese was observed in spring on the ground within the survey plot in a field that was planted to corn in 2020 (US Department of Agriculture National Agricultural Statistics Service 2021), a common source of food for geese in the Midwest. However, corn is a common crop within the Project area and available within other survey plots. Waterbird use, including one group of 10 sandhill cranes recorded in the fall, was observed exclusively at Point 7; it is likely these cranes were also migrating through the Project area. Diurnal raptor use occurred in all seasons but was highest in summer compared to any other season. Red-tailed hawk and northern harrier made up the majority of raptor observations in summer. Most diurnal raptors were initially observed flying below the RSH.

Small bird use primarily consisting of passerines, most of which was due to grassland/sparrows and blackbird/orioles. Small bird use was highest during summer, due mainly to use by grassland/sparrows, particularly the dickcissel. The dickcissel is a common summer breeding bird in South Dakota (SDGFP 2019). Small bird use was highest at Point 7, mainly due to blackbirds/orioles. All small bird species recorded within the Project area during the study are common throughout the region and the results of this study show passerine use is expected year-round, with higher use and species richness in the spring and summer.

No federally listed threatened or endangered species were recorded during the standardized avian use surveys. One state-listed threatened species, the peregrine falcon (also a SGCN in South Dakota), was observed at Point 6 during surveys on April 13, 2021. This observation occurred during the migration timeframe and is likely not a resident bird. According to a review of eBird location data (eBird 2021), no peregrine falcon observations have been reported within Campbell County over the last 15 years, but there have been observations just outside the county boundary. Seven additional SOC were recorded within the Project area. A review of eBird location data (eBird 2021) indicated these SOC have been reported throughout Campbell County, suggesting they are not unique to the Project area. SOC use is likely to occur year-round in the Project area; however, it is likely to be relatively low based on the use observed during this study.

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**Appendix A. Bird Types and Species Observed by Season at the Campbell County II
Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021**

Appendix A1. Numbers of groups (# grps) and observations (# obs) by bird type, subtype, species, and season, regardless of distance from observer, for 60-minute large bird use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs								
Waterbirds		1	1	1	10	0	0	0	0	2	11
sandhill crane	<i>Antigone canadensis</i>	0	0	1	10	0	0	0	0	1	10
American white pelican	<i>Pelecanus erythrorhynchos</i>	1	1	0	0	0	0	0	0	1	1
Waterfowl		3	4	1	1	0	0	12	820	16	825
northern pintail	<i>Anas acuta</i>	0	0	0	0	0	0	1	1	1	1
green-winged teal	<i>Anas crecca</i>	0	0	0	0	0	0	1	22	1	22
mallard	<i>Anas platyrhynchos</i>	0	0	0	0	0	0	3	5	3	5
greater white-fronted goose	<i>Anser albifrons</i>	0	0	0	0	0	0	1	200	1	200
snow goose	<i>Anser caerulescens</i>	0	0	0	0	0	0	2	383	2	383
Canada goose	<i>Branta canadensis</i>	2	3	1	1	0	0	4	209	7	213
northern shoveler	<i>Spatula clypeata</i>	1	1	0	0	0	0	0	0	1	1
Shorebirds		17	18	2	6	0	0	5	9	24	33
upland sandpiper	<i>Bartramia longicauda</i>	3	4	0	0	0	0	2	3	5	7
killdeer	<i>Charadrius vociferus</i>	14	14	2	6	0	0	3	6	19	26
Gulls/Terns		0	0	0	0	0	0	0	0	0	0
Franklin's gull	<i>Leucophaeus pipixcan</i>	0	0	0	0	0	0	2	21	2	21
Diurnal Raptors		17	17	3	3	3	3	9	10	32	33
Buteos		10	10	3	3	3	3	6	7	22	23
red-tailed hawk	<i>Buteo jamaicensis</i>	9	9	1	1	0	0	3	4	13	14
rough-legged hawk	<i>Buteo lagopus</i>	0	0	2	2	3	3	0	0	5	5
ferruginous hawk	<i>Buteo regalis</i>	1	1	0	0	0	0	0	0	1	1
unidentified buteo		0	0	0	0	0	0	1	1	1	1
Swainson's hawk	<i>Buteo swainsoni</i>	0	0	0	0	0	0	2	2	2	2
<u>Northern Harrier</u>		7	7	0	0	0	0	2	2	9	9
northern harrier	<i>Circus hudsonius</i>	7	7	0	0	0	0	2	2	9	9
<u>Falcons</u>		0	0	0	0	0	0	1	1	1	1
peregrine falcon	<i>Falco peregrinus</i>	0	0	0	0	0	0	1	1	1	1
Vultures		3	3	0	0	0	0	1	1	4	4
turkey vulture	<i>Cathartes aura</i>	3	3	0	0	0	0	1	1	4	4
Upland Game Birds		8	8	1	1	0	0	18	23	27	32
ring-necked pheasant	<i>Phasianus colchicus</i>	8	8	1	1	0	0	16	19	25	28
sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	0	0	0	0	0	0	2	4	2	4

Appendix A2. Numbers of groups (# grps) and observations (# obs) by bird type, species, and season, regardless of distance from observer, for 10-minute small bird use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
clay-colored sparrow	<i>Spizella pallida</i>	10	10	0	0	0	0	0	0	10	10
field sparrow	<i>Spizella pusilla</i>	1	1	0	0	0	0	0	0	1	1
American tree sparrow	<i>Spizelloides arborea</i>	0	0	0	0	2	20	1	3	3	23
white-throated sparrow	<i>Zonotrichia albicollis</i>	0	0	1	1	0	0	0	0	1	1
<u>Mimids</u>		2	2	0	0	0	0	0	0	2	2
brown thrasher	<i>Toxostoma rufum</i>	2	2	0	0	0	0	0	0	2	2
<u>Swallows</u>		4	11	0	0	0	0	1	1	5	12
barn swallow	<i>Hirundo rustica</i>	4	11	0	0	0	0	1	1	5	12
<u>Thrushes</u>		4	4	0	0	0	0	0	0	4	4
American robin	<i>Turdus migratorius</i>	4	4	0	0	0	0	0	0	4	4
<u>Warblers</u>		3	3	0	0	0	0	0	0	3	3
common yellowthroat	<i>Geothlypis trichas</i>	2	2	0	0	0	0	0	0	2	2
yellow warbler	<i>Setophaga petechia</i>	1	1	0	0	0	0	0	0	1	1
<u>Unidentified Passerines</u>		3	3	0	0	2	6	0	0	5	9
unidentified passerine		3	3	0	0	2	6	0	0	5	9
Woodpeckers		4	4	0	0	0	0	0	0	4	4
northern flicker	<i>Colaptes auratus</i>	1	1	0	0	0	0	0	0	1	1
red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	3	3	0	0	0	0	0	0	3	3
Overall		136	164	9	144	12	66	38	69	195	443

Appendix B. Bird Use, Percent of Use, and Frequency of Occurrence for Large Birds and Small Birds Observed during Avian Use Surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021

Appendix B1. Mean large bird use (number of large birds/plot/survey)^a, percent of total use (%), and frequency of occurrence (%) for each large bird type, subtype, and species by season, observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Type/Subtype/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Waterbirds	0.04	0.37	0	0	1.1	47.6	0	0	3.7	3.7	0	0
sandhill crane	0	0.37	0	0	0	47.6	0	0	0	3.7	0	0
American white pelican	0.04	0	0	0	1.1	0	0	0	3.7	0	0	0
Waterfowl	0.15	0.04	0	30.37	4.6	4.8	0	92.7	11.1	3.7	0	25.9
northern pintail	0	0	0	0.04	0	0	0	0.1	0	0	0	3.7
green-winged teal	0	0	0	0.81	0	0	0	2.5	0	0	0	3.7
mallard	0	0	0	0.19	0	0	0	0.6	0	0	0	11.1
greater white-fronted goose	0	0	0	7.41	0	0	0	22.6	0	0	0	3.7
snow goose	0	0	0	14.19	0	0	0	43.3	0	0	0	7.4
Canada goose	0.11	0.04	0	7.74	3.4	4.8	0	23.6	7.4	3.7	0	7.4
northern shoveler	0.04	0	0	0	1.1	0	0	0	3.7	0	0	0
Shorebirds	0.67	0.22	0	0.33	20.7	28.6	0	1.0	48.1	7.4	0	18.5
upland sandpiper	0.15	0	0	0.11	4.6	0	0	0.3	11.1	0	0	7.4
killdeer	0.52	0.22	0	0.22	16.1	28.6	0	0.7	48.1	7.4	0	11.1
Gulls/Terns	0	0	0	0.78	0	0	0	2.4	0	0	0	7.4
Franklin's gull	0	0	0	0.78	0	0	0	2.4	0	0	0	7.4
Diurnal Raptors	0.63	0.11	0.11	0.33	19.5	14.3	60.0	1.0	48.1	11.1	11.1	22.2
<i>Buteos</i>	0.37	0.11	0.11	0.22	11.5	14.3	60.0	0.7	33.3	11.1	11.1	18.5
red-tailed hawk	0.33	0.04	0	0.15	10.3	4.8	0	0.5	29.6	3.7	0	11.1
rough-legged hawk	0	0.07	0.11	0	0	9.5	60.0	0	0	7.4	11.1	0
ferruginous hawk	0.04	0	0	0	1.1	0	0	0	3.7	0	0	0
Swainson's hawk	0	0	0	0.07	0	0	0	0.2	0	0	0	7.4
<i>Northern Harrier</i>	0.26	0	0	0.07	8.0	0	0	0.2	18.5	0	0	3.7
northern harrier	0.26	0	0	0.07	8.0	0	0	0.2	18.5	0	0	3.7
<i>Falcons</i>	0	0	0	0.04	0	0	0	0.1	0	0	0	3.7
peregrine falcon	0	0	0	0.04	0	0	0	0.1	0	0	0	3.7
Vultures	0.11	0	0	0.04	3.4	0	0	0.1	11.1	0	0	3.7
turkey vulture	0.11	0	0	0.04	3.4	0	0	0.1	11.1	0	0	3.7
Upland Game Birds	0.30	0.04	0	0.85	9.2	4.8	0	2.6	25.9	3.7	0	44.4
ring-necked pheasant	0.30	0.04	0	0.70	9.2	4.8	0	2.1	25.9	3.7	0	44.4
sharp-tailed grouse	0	0	0	0.15	0	0	0	0.5	0	0	0	3.7

Appendix B1. Mean large bird use (number of large birds/plot/survey)^a, percent of total use (%), and frequency of occurrence (%) for each large bird type, subtype, and species by season, observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Type/Subtype/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Doves/Pigeons	1.30	0	0.07	0.07	40.2	0	40.0	0.2	48.1	0	3.7	7.4
rock pigeon	0	0	0.07	0	0	0	40.0	0	0	0	3.7	0
Eurasian collared-dove	0.04	0	0	0	1.1	0	0	0	3.7	0	0	0
mourning dove	1.26	0	0	0.07	39.1	0	0	0.2	48.1	0	0	7.4
Nightjars	0.04	0	0	0	1.1	0	0	0	3.7	0	0	0
common nighthawk	0.04	0	0	0	1.1	0	0	0	3.7	0	0	0
Overall	3.22	0.78	0.19	32.78	100	100	100	100	NA	NA	NA	NA

^a 800-meter (m; 2,625-foot [ft]) radius plot and 60-minute survey for large birds.

Sums of values may not equal totals shown due to rounding.

Appendix B2. Mean small bird use (number of small birds/plot/survey)^a, percent of total use (%), and frequency of occurrence (%) for each small bird type, subtype, and species by season, observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Type/Subtype/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Passerines	5.93	5.33	2.44	2.56	97.6	100	100	100	96.3	25.9	37.0	63.0
<u>Blackbirds/Orioles</u>	2.00	4.78	0	2.15	32.9	89.6	0	84.1	63.0	18.5	0	59.3
red-winged blackbird	0.41	1.85	0	0.81	6.7	34.7	0	31.9	25.9	3.7	0	25.9
bobolink	0	0	0	0.07	0	0	0	2.9	0	0	0	3.7
Brewer's blackbird	0	2.78	0	0	0	52.1	0	0	0	3.7	0	0
brown-headed cowbird	0.63	0	0	0.33	10.4	0	0	13.0	33.3	0	0	14.8
common grackle	0.19	0	0	0.41	3.0	0	0	15.9	11.1	0	0	11.1
western meadowlark	0.78	0.15	0	0.52	12.8	2.8	0	20.3	51.9	11.1	0	37.0
<u>Finches/Crossbills</u>	0.07	0	0	0	1.2	0	0	0	7.4	0	0	0
American goldfinch	0.07	0	0	0	1.2	0	0	0	7.4	0	0	0
<u>Flycatchers</u>	0.70	0	0	0.15	11.6	0	0	5.8	37.0	0	0	11.1
eastern kingbird	0.41	0	0	0.15	6.7	0	0	5.8	29.6	0	0	11.1
western kingbird	0.30	0	0	0	4.9	0	0	0	14.8	0	0	0
<u>Grassland/Sparrows</u>	2.30	0.56	2.22	0.22	37.8	10.4	90.9	8.7	81.5	11.1	29.6	14.8
grasshopper sparrow	0.15	0	0	0	2.4	0	0	0	14.8	0	0	0
horned lark	0.52	0.52	0.85	0.07	8.5	9.7	34.8	2.9	25.9	7.4	18.5	7.4
song sparrow	0.15	0	0	0	2.4	0	0	0	7.4	0	0	0

Appendix B2. Mean small bird use (number of small birds/plot/survey)^a, percent of total use (%), and frequency of occurrence (%) for each small bird type, subtype, and species by season, observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Type/Subtype/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
snow bunting	0	0	0.63	0	0	0	25.8	0	0	0	3.7	0
vesper sparrow	0.26	0	0	0.04	4.3	0	0	1.4	22.2	0	0	3.7
dickcissel	0.81	0	0	0	13.4	0	0	0	55.6	0	0	0
clay-colored sparrow	0.37	0	0	0	6.1	0	0	0	33.3	0	0	0
field sparrow	0.04	0	0	0	0.6	0	0	0	3.7	0	0	0
American tree sparrow	0	0	0.74	0.11	0	0	30.3	4.3	0	0	7.4	3.7
white-throated sparrow	0	0.04	0	0	0	0.7	0	0	0	3.7	0	0
<u>Mimids</u>	0.07	0	0	0	1.2	0	0	0	7.4	0	0	0
brown thrasher	0.07	0	0	0	1.2	0	0	0	7.4	0	0	0
<u>Swallows</u>	0.41	0	0	0.04	6.7	0	0	1.4	14.8	0	0	3.7
barn swallow	0.41	0	0	0.04	6.7	0	0	1.4	14.8	0	0	3.7
<u>Thrushes</u>	0.15	0	0	0	2.4	0	0	0	14.8	0	0	0
American robin	0.15	0	0	0	2.4	0	0	0	14.8	0	0	0
<u>Warblers</u>	0.11	0	0	0	1.8	0	0	0	11.1	0	0	0
common yellowthroat	0.07	0	0	0	1.2	0	0	0	7.4	0	0	0
yellow warbler	0.04	0	0	0	0.6	0	0	0	3.7	0	0	0
<u>Unidentified Passerines</u>	0.11	0	0.22	0	1.8	0	9.1	0	11.1	0	7.4	0
unidentified passerine	0.11	0	0.22	0	1.8	0	9.1	0	11.1	0	7.4	0
Woodpeckers	0.15	0	0	0	2.4	0	0	0	11.1	0	0	0
northern flicker	0.04	0	0	0	0.6	0	0	0	3.7	0	0	0
red-headed woodpecker	0.11	0	0	0	1.8	0	0	0	7.4	0	0	0
Overall	6.07	5.33	2.44	2.56	100	100	100	100	NA	NA	NA	NA

^a 100-meter (328-foot) radius plot and 10-minute survey for small birds.

Sums of values may not equal totals shown due to rounding.

**Appendix C. Mean Use by Point for All Birds, Bird Types, and Diurnal
Raptor Subtypes Observed during Avian Use Surveys at the Campbell County II Wind
Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021**

Appendix C. Mean use (number of birds/survey) by point for all birds^a, bird types, and diurnal raptor subtypes, observed during avian use surveys at the Campbell County II Wind Project, Campbell County, South Dakota, from June 21, 2020 – May 19, 2021.

Bird Type/Subtype	Survey Point								
	1	2	3	4	5	6	7	8	9
Waterbirds	0	0	0	0	0	0	0.92	0	0
Waterfowl	1.92	0.17	0	0.08	0	0.25	66.17	0	0.17
Shorebirds	0.42	0.08	0	0	0.33	0.08	0.50	0.50	0.83
Gulls/Terns	0	1.25	0	0	0	0	0.50	0	0
Diurnal Raptors	0.50	0.17	0.42	0.08	0.08	0.42	0.50	0.42	0.08
<u>Buteos</u>	0.33	0.08	0.42	0.08	0.08	0.33	0.25	0.17	0.08
<u>Northern Harrier</u>	0.17	0.08	0	0	0	0	0.25	0.25	0
<u>Falcons</u>	0	0	0	0	0	0.08	0	0	0
Vultures	0	0	0.17	0	0	0	0.08	0.08	0
Upland Game Birds	0.08	0.17	0.25	0.17	0.17	0.42	0.92	0.33	0.17
Doves/Pigeons	0.67	0.33	0.17	0.50	0.08	0.67	0.50	0.25	0.08
Nightjars	0	0	0	0	0	0.08	0	0	0
All Large Birds	3.58	2.17	1.00	0.83	0.67	1.92	70.08	1.58	1.33
Passerines	2.75	2.33	7.50	1.92	1.50	4.75	10.75	3.75	1.33
<u>Blackbirds/Orioles</u>	2.08	1.25	5.08	0.83	0.58	1.58	7.67	0.67	0.33
<u>Finches/Crossbills</u>	0	0	0	0.08	0	0.08	0	0	0
<u>Flycatchers</u>	0	0.25	0.17	0.33	0.08	0.25	0.83	0	0
<u>Grassland/Sparrows</u>	0.50	0.75	1.83	0.42	0.75	2.17	1.67	2.83	1.00
<u>Mimids</u>	0	0	0	0.08	0	0.08	0	0	0
<u>Swallows</u>	0	0	0	0.08	0	0.17	0.58	0.17	0
<u>Thrushes</u>	0	0	0	0.08	0	0.25	0	0	0
<u>Warblers</u>	0.08	0	0	0	0.08	0.08	0	0	0
<u>Unidentified Passerines</u>	0.08	0.08	0.42	0	0	0.08	0	0.08	0
Woodpeckers	0.17	0.08	0.08	0	0	0	0	0	0
All Small Birds	2.92	2.42	7.58	1.92	1.50	4.75	10.75	3.75	1.33

^a 800-meter (m; 2,625-foot [ft]) radius plot and 60-minute (min) survey for large birds, 100-m (328-ft) radius plot and 10-min survey for small birds. Sums of values may not equal totals shown due to rounding.

Avian Use Study
Campbell County Wind Farm 2
Campbell County, South Dakota

Final Report
March 2023 – February 2024



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EXECUTIVE SUMMARY

Campbell County Wind Farm 2, LLC contracted Western EcoSystems Technology, Inc. to conduct a pre-construction avian use study at the proposed Campbell County Wind Farm 2. The principal objective of the avian use study was to assess the spatial and temporal use of the January 2024 MCP (i.e., Study Area) by eagles and other large birds. Study design and methodology followed the recommendations in the US Fish and Wildlife Service's 2012 *Land-Based Wind Energy Guidelines* and the 2013 *Eagle Conservation Plan Guidance*.

Ten survey points were established, covering 32.1% of the Study Area. Each survey point was centered within a circular plot with eagles and large birds recorded within an 800-meter (m; 2,625 -foot [ft]) radius. Surveys at each point were conducted for 60 minutes once per month, from March 26, 2023, to February 19, 2024. Incidental observations made outside standardized surveys were recorded but limited to species of concern, including eagles.

Thirty-two species of large birds totaling 6,211 observations were detected over 115 hours of surveys. No federal or state-protected species were recorded within the Study Area during avian use surveys. Large bird mean use was substantially higher in the fall (186.80 observations/800-m radius plot/60-min survey), due to waterfowl use (184.60). Large bird use in other seasons ranged from 1.40 (winter) to 15.29 (spring). Waterfowl also comprised the majority of use in spring (83.6%) and winter (59.5%). Two groups of snow geese observed in fall (5,500 individuals) accounted for 98.1% of all large bird use in this season. Diurnal raptors were most frequently observed during spring (25.2%) and fall surveys (40.0%), shorebirds during summer surveys (43.3%), and upland game birds during winter surveys (26.7%).

Large bird use ranged from 1.33 observations/survey at Point 3 to 418.17 at Point 6. Waterfowl comprised 99.7% of use at Point 6 (416.75). A group of 5,000 snow geese accounted for the high mean use at Point 6. Diurnal raptors had the highest mean use at points 7 and 10 (0.40 and 0.36, respectively) and upland game birds at points 8 and 1 (1.55 and 1.18, respectively).

Mean initial large bird flight heights for waterfowl (99.3%) and vultures (75.0%) were primarily recorded flying within the rotor-swept height (RSH; 28–168 m [92–551 ft]). Diurnal raptors were primarily (77.8%) initially observed flying below the RSH.

No federal or state-protected species were recorded within the Study Area during avian use surveys; however, one bald eagle and one golden eagle were observed incidentally in the southern portion of the Study Area. Two Birds of Conservation Concern species were recorded during surveys: Franklin's gull and northern harrier.

During the 223 total hours of avian use surveys in the Year 1 and Year 2 studies, no federally protected species were observed, no eagle minutes were recorded, and only one state-listed threatened species (peregrine falcon) was observed. Over the two-year study period, four bald

eagles and one golden eagle were observed incidentally near points 8, 9, and 10. Other SOC recorded during the Year 1 and Year 2 avian use surveys were not unique to the Study Area.

STUDY PARTICIPANTS

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REPORT REFERENCE

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Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds during Avian Use Surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Appendix C. Mean Use by Point for Large Birds during Avian Use Surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

INTRODUCTION

Campbell County Wind Farm 2, LLC (Campbell County 2), is proposing the development of the approximately 98-megawatt Campbell County Wind Farm 2 (Project) in Campbell County, South Dakota (Figure 1). Campbell County 2 contracted Western EcoSystems Technology, Inc. (WEST) to conduct a pre-construction avian use study within the Project. Study methodology followed the recommendations in the US Fish and Wildlife Service's (USFWS's) 2012 *Land-Based Wind Energy Guidelines* (WEG) and *Appendix C(1)(a)* of the 2013 *Eagle Conservation Plan Guidance* (ECPG).

The objective of the study was to assess the spatial and temporal use of the study area by large birds, with a focus on eagles. This report summarizes results from the 2023–2024 (Year 2) avian use study conducted at the Project.

STUDY AREA

The Study Area was defined as the minimum convex polygon (MCP) around the January 2024 turbine layout within the previous January 2023 Project Area (Figure 1). The Study Area includes approximately 4,931 hectares (12,184 acres) in west-central Campbell County, South Dakota, approximately six kilometers (km; four miles [mi]) northwest of Mound City (Figure 1). The Study Area is within the Southern Missouri Coteau Slope of the Level III Northwestern Glaciated Plains Ecoregion (US Environmental Protection Agency 2013]), which has a moderately high concentration of semi-permanent and seasonal wetlands, locally referred to as prairie potholes. This ecoregion is a transitional region between the generally more level, moist agricultural areas to the east and the generally drier and more irregular landscape to the west.

The landscape within the Study Area is relatively flat, with elevations ranging from 518–626 meters (m; 1,699–2,054 feet [ft]) above sea level (US Geological Survey [USGS] 2020). Land in the Study Area is privately owned (USGS Gap Analysis Project 2022). According to the National Land Cover Database (NLCD), the Study Area is primarily a mix of cultivated crops (47.5%) and herbaceous (grasslands) land cover (43.4%; NLCD 2021; Table 1, Figure 2). Each remaining land cover type comprises less than 5.0% of the Study Area (Table 1, Figure 2).

Wetlands are evenly but sparsely distributed across the Study Area; less than 4% of the Study Area is wetland (USFWS National Wetlands Inventory 2024). There is a large freshwater emergent wetland in the southeast portion of the Study Area, west of Lake Campbell. Approximately 84% of wetlands in the Study Area are freshwater emergent, 8% are freshwater ponds, 7% are riverine, and the remainder are freshwater forested/shrub wetland (less than 1%).

Table 1. Land cover types, coverage, in hectares and acres, and percent (%) composition within the Study Area of the Campbell County Wind Farm 2 Project in Campbell County, South Dakota.

Land Cover Type	Hectares	Acres	% Composition
Cultivated Crops	2,340.2	5,782.8	47.5
Herbaceous	2,139.4	5,286.7	43.4
Hay/Pasture	213.0	526.4	4.3
Developed	148.4	366.8	3.0
Emergent Herbaceous Wetlands	81.0	200.2	1.6
Deciduous Forest	5.2	12.9	0.1
Open Water	2.1	5.1	<0.1
Woody Wetlands	0.8	2.0	<0.1
Shrub/Scrub	0.5	1.1	<0.1
Total	4,930.6	12,184.0	100

Source: National Land Cover Database (2021).

* Sums can differ from total values shown due to rounding.

METHODS

The study design and survey methods for birds recorded in this study primarily followed guidance in the ECPG, as eagles were the primary focus of this study. Guidance from the WEG was also followed to collect information on other species of concern (SOC). The methods described below are common for all birds (i.e., large birds¹, eagles, and other SOC), except as noted. For this report, SOC include federal or state-listed species (endangered, threatened, or candidate), species protected by the BGEPA, species considered Birds of Conservation Concern (BCC) by the USFWS (2021) in Bird Conservation Region 11 (BCR), or state Species of Greatest Conservation Need (South Dakota Department of Game, Fish and Parks 2014, 2018). Eagles are of primary concern for this Project and will be presented first in the *Results* section.

¹ Large birds are defined as waterbirds, waterfowl, shorebirds, gulls/terns, diurnal raptors (i.e., kites, accipiters, hawks, eagles, falcons, northern harrier, and osprey), owls, vultures, upland game birds, doves/pigeons, nightjars, and large corvids.

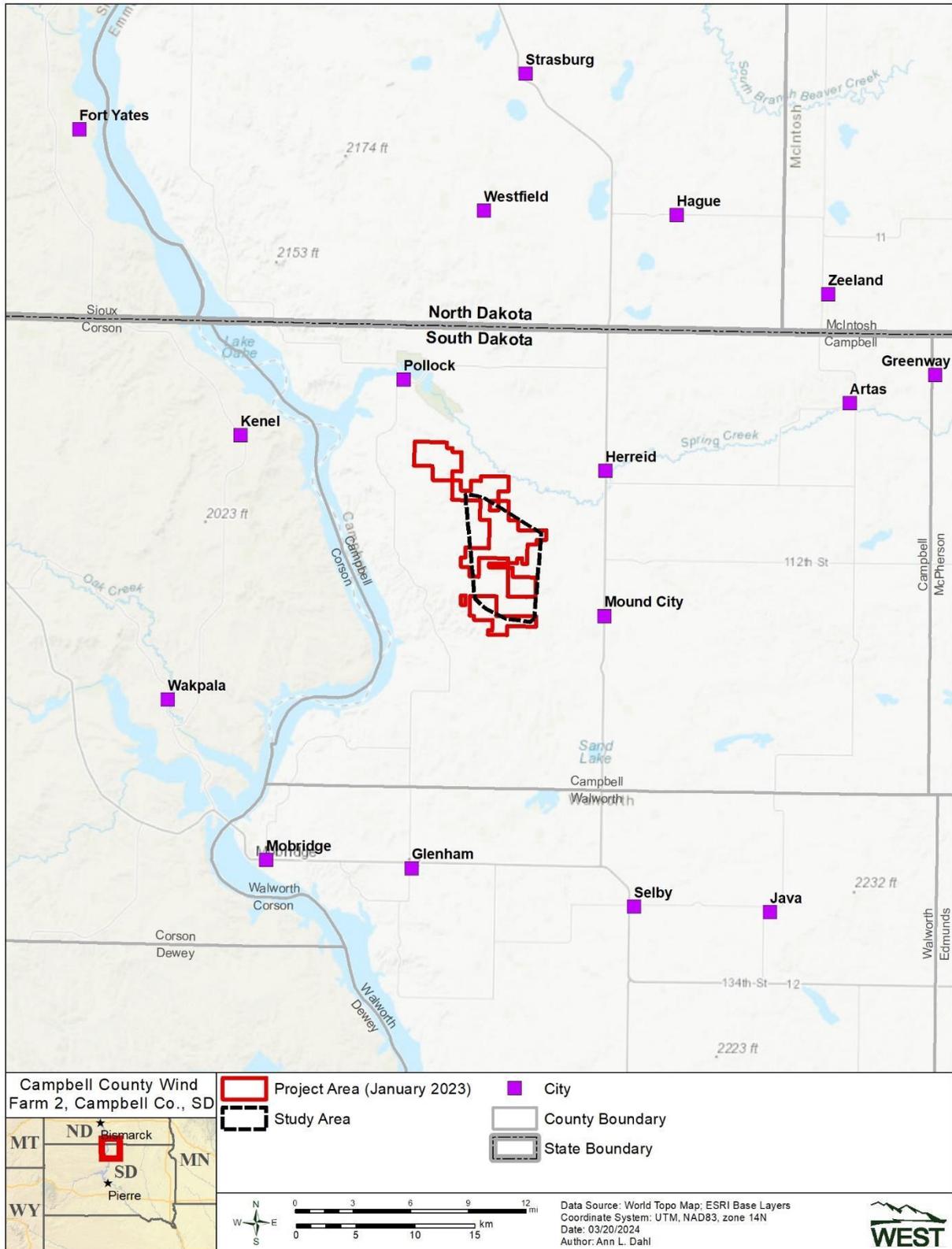


Figure 1. Location of the Campbell County Wind Farm 2 Project in Campbell County, South Dakota.

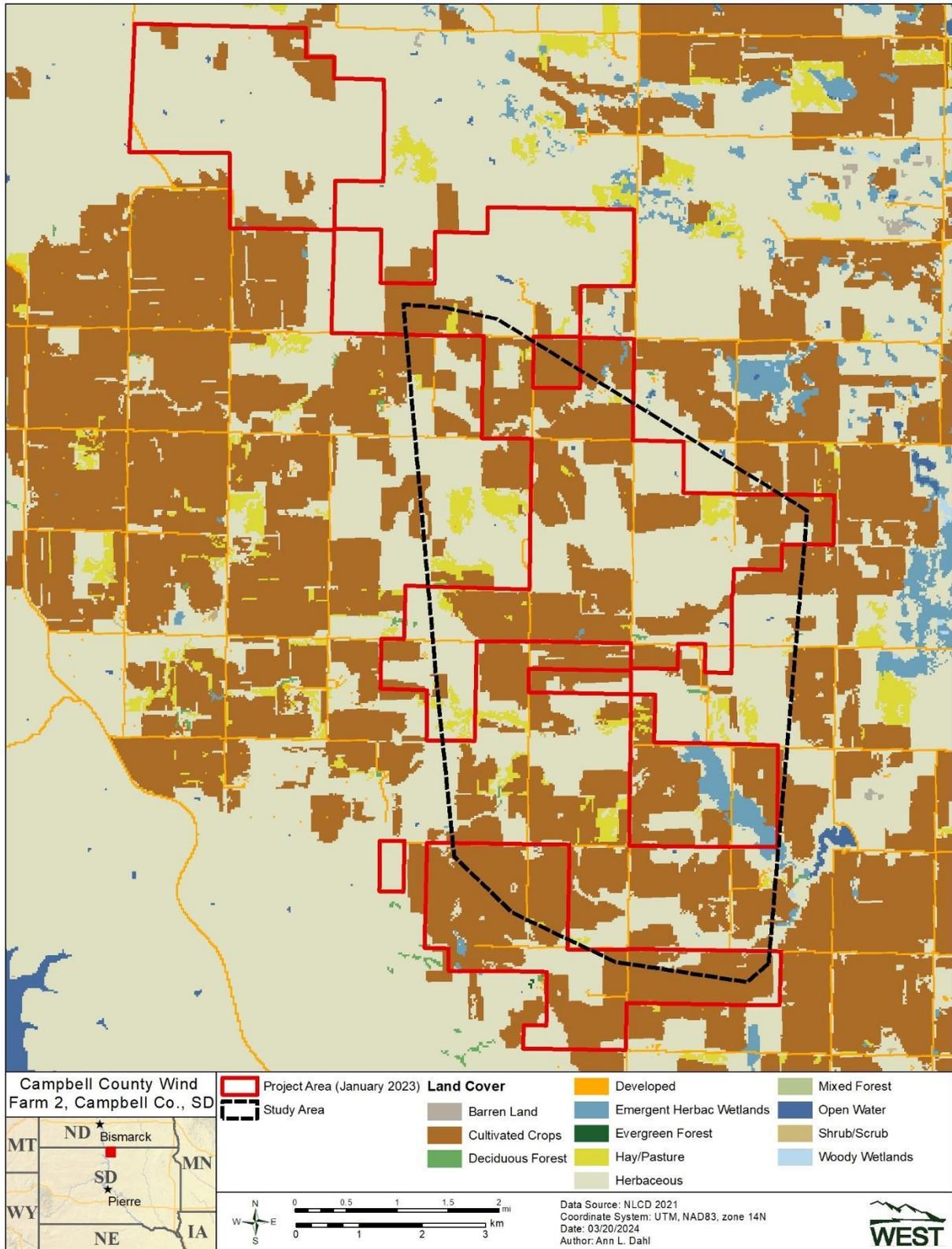


Figure 2. Land cover at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota.

Study Design

The USFWS (2013) recommends that enough point count locations be placed to cover a minimum of 30% of the MCP of the proposed turbine layout and hazardous areas (i.e., rotor radius). Following USFWS guidance, 10 survey points were established, covering 32.1% of the Study Area (Figure 3). Nine survey locations (points) were provided by Campbell County 2 (emailed on June 9, 2020) based on previous survey efforts conducted at the Project, with one additional point that did not overlap with existing survey points added to increase coverage. Each survey point was centered within a circular plot with an 800-m (2,625-ft) radius for large bird observations (Reynolds et al. 1980; USFWS 2013, 2024).

Standardized avian use surveys (surveys) were conducted once per month from March 26, 2023, to February 19, 2024, as specified in the ECPG, during all seasons. Seasons were defined as spring (March 1 – May 31), summer (June 1 – August 31), fall (September 1 – November 30), and winter (December 1 – February 29). Surveys were conducted during daylight hours, as specified in the ECPG. Surveys were conducted under all weather conditions, except when visibility was less than 800 m horizontally and 200 m (656 ft) vertically (USFWS 2024) or when access was limited due to road conditions or other factors.

Survey Methods

Avian Use Surveys

Surveys at each point were conducted for 60 minutes (min), with large birds (including eagles) recorded within an 800-m radius. Observations of groups of birds (one or more birds) were recorded for each survey, along with the date, start and end time, and weather (i.e., temperature, wind speed, wind direction, precipitation, and percent cloud cover). During surveys, if the biologist lost sight of a group for more than a minute or if the same bird species returned to the survey plot during the survey period, but the biologist was unsure if it was the same group, a new observation was recorded. In addition to the above information, the following data also were recorded for each group of birds observed:

- Observation number
- Species (or best possible identification)
- Number of individuals
- Sex and age class (if possible)
- Distance from survey point (first and closest)
- Flight height above ground level (AGL; first, lowest, and highest)
- Flight direction (first observed)
- Habitat
- Activity (e.g., flying, perched)
- Observation type (visual or aural)
- Flight paths and perch locations of eagles and federal and state-listed species, if observed

Eagles

Data were collected, based on the recommendations in the ECPG, if a golden (*Aquila chrysaetos*), bald (*Haliaeetus leucocephalus*), or unidentified eagle was observed during the survey period. Biologists recorded eagle behavior (e.g., flight height, distance from observer, activity) each minute (eagle minute), at the top of the minute, to provide an instantaneous count for every eagle observed. Data were recorded whether the eagle was flying at or below 200 m AGL and within 800 m of the survey point at any time during the minute (eagle risk minute). Age class (juvenile [first year], immature or sub-adult [second to fourth year], or adult [fifth year or greater]) was also recorded.

Incidental Observations

Incidental observations of SOC made outside of the standardized survey periods described above were recorded. These data do not represent a systematic sampling of the Study Area but are useful to document species that may not be observed during avian use surveys. Data recorded for incidental observations were similar to data recorded during standardized surveys. For eagles observed incidentally, no flight paths, perch locations, or eagle minutes were recorded.

Data Management

Quality Assurance and Quality Control

WEST implemented quality assurance and quality control (QA/QC) measures at all stages of the study, including in the field, during data entry and analysis, and report writing. Multiple reviews were conducted as QA/QC measures throughout the study life cycle. Following surveys, biologists were responsible for inspecting data forms for completeness, accuracy, and legibility. If errors or anomalies were found within the data, follow-up measures were implemented and included discussions and review of field data with field biologists and/or Project Managers. If any errors, omissions, or problems were identified in later stages of analysis or report writing, they were traced back to the raw data forms where appropriate and corrections were implemented and documented.

Data Compilation and Storage

A Microsoft® SQL Server database was specifically developed to store, organize, and retrieve survey data. Project data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. WEST retained all data forms and electronic data files for reference.

Statistical Analysis

A *survey* was defined as a single 60-min count of birds. In some cases, a count of bird observations may represent repeated observations of the same individual. Only observations within the survey plot were included for statistical analysis.

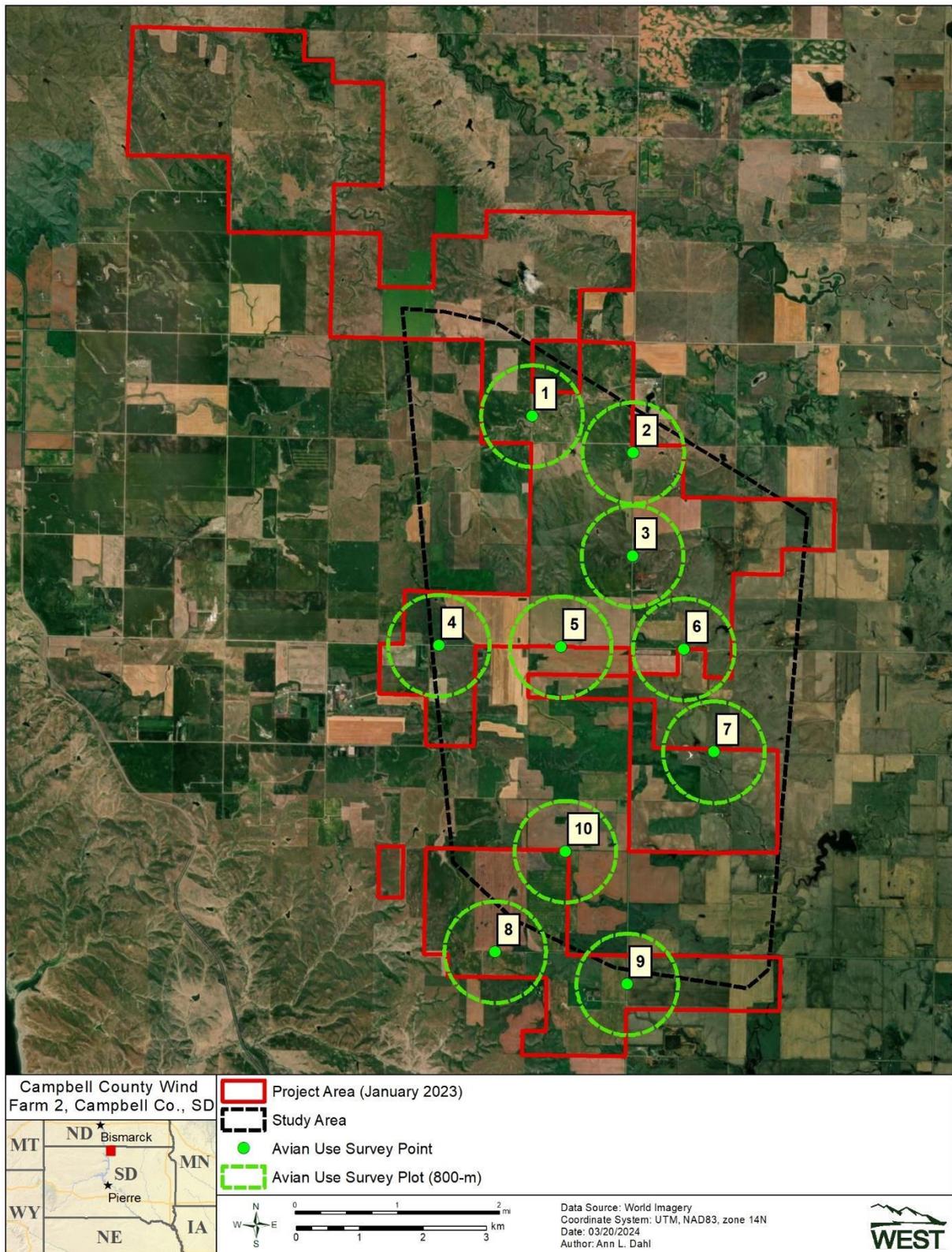


Figure 3. Avian use survey points and plots at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

A *visit* was defined as one sequential survey of all the plots within the Study Area, which could occur across multiple dates. Subsequent visits did not overlap, and each full visit was completed within a single season (e.g., spring). If unforeseen conditions prevented all plots from being surveyed during a visit, then a visit may not include a complete survey of all plots.

Species richness was defined as a count of species observed within a survey plot during avian use surveys. Groups of unidentified species were included in species richness if a species from that group was not otherwise recorded.

Mean Use, Percent of Use, and Frequency of Occurrence

Mean use is the average number of birds observed per plot per survey. Large bird use (i.e., observations per 800-m radius plot per 60-min survey) is calculated by: 1) summing birds per plot per visit, 2) averaging the number of birds across plots within a visit, and 3) averaging the number of birds across visits within a season. Overall mean use was calculated as a weighted average of seasonal values by the number of days in each season. *Percent of use* was calculated as the percentage of large bird use that was attributable to a particular bird type or species. *Frequency of occurrence* was calculated as the percent of surveys in which a particular bird type or species was observed.

Mean use and frequency of occurrence describe different aspects of relative abundance. Mean use is based on the number of birds (i.e., large groups of the same type of bird can produce high estimates), whereas frequency of occurrence is based on the number of groups of the same type of bird (i.e., it is not influenced by the group's size). Qualitative comparisons were made with these metrics among bird types, seasons, and survey points to help illustrate temporal and spatial avian use of the Study Area. The top seven bird types were depicted graphically to show patterns in mean use, percent of use, and frequency of occurrence.

Flight Height

Flight heights are important metrics to assess relative potential exposure to turbine blades and were used to calculate the percentage of large birds observed flying within the rotor-swept height (RSH) of proposed turbines. A RSH of 28–168 m (92–551 ft) AGL was assumed for the purpose of the analysis. Flight height recorded during the initial observation was used to calculate the percentage of birds flying within the RSH and mean flight height.

Spatial Variation

Mean use was calculated by survey point for large birds to make spatial comparisons of bird types among the survey points. Additionally, flight paths and perch locations of eagles and federal and state-listed bird species, if observed, were mapped during large bird use surveys to qualitatively show areas of flight path concentration and potential flight patterns within the Study Area compared to environmental or topographic features.

Eagles

Eagle minutes were defined as the number of minutes an eagle was observed during the survey.

Eagle risk minutes were defined as the number of minutes an eagle was observed in flight within the risk cylinder.

The risk cylinder was defined as the area within 800 m of the survey point and below 200 m AGL during the 60-min survey period.

Total minutes were defined as the amount of time eagles were observed inside and outside the risk cylinder during the survey.

Eagle observations during surveys were summarized to provide flight heights (see *Flight Height above*) and flight path maps. Data were collected during each minute eagles were observed within the risk cylinder to count eagle risk minutes and the time eagles were observed inside and outside the risk cylinder to count total minutes.

The eagle minutes per observation hour were reported by survey plot and month to enable spatial and temporal assessments of eagle minutes recorded in the Study Area. Data collected on perched eagles and those outside of survey plots were not considered eagle risk minutes; however, they were considered in the total eagle minutes. The perch locations and flight paths of all eagles were mapped to qualitatively assess areas of eagle use within the Study Area (see *Spatial Variation above*).

RESULTS

Overall, 115 avian use surveys were conducted for large birds (Table 2). Snow and poor road conditions prevented five surveys in spring. Thirty-two species were detected with species richness highest during spring (19 species), followed by summer (17), fall (15), and winter (three; Table 2).

Study results are summarized below and are supplemented by the appendices, which present species-level detail on the following: scientific names and numbers of groups and observations seen during surveys, but not limited to viewshed (Appendix A); mean use, percent of use, and frequency of occurrence by season within the survey plot (Appendix B); and mean use by survey point (Appendix C).

Table 2. Summary of survey effort and large bird species richness¹, by season and overall, during avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Season	Number of Visits	Number of Surveys Conducted	Species Richness
Spring	3	25	19
Summer	3	30	17
Fall	3	30	15
Winter	3	30	3
Overall	12	115	32

¹ Species richness is defined as a count of species observed within the 800-meter (2,625-foot) radius plots during avian use surveys. Groups of unidentified species were included in species richness if a species from that group was not otherwise recorded.

Eagles

No bald, golden, or unidentified eagles were observed during 115 survey hours; therefore, no eagle minute data were recorded.

Large Birds

Mean Use, Percent of Use, and Frequency of Occurrence

Mean use, percent of use, and frequency of occurrence were calculated, by season, for large bird types (Table 3; Figures 4a, 4b, 4c) and species (Appendix B). Large bird mean use ranged from 1.40 observations/800-m radius plot/60-min survey to 186.80 among seasons and was highest during fall (186.80), followed by spring (15.29), summer (4.97), and winter (1.40; Table 3). Overall, large bird mean use was approximately 52.12. Waterfowl comprised the majority of use during fall (98.8%), spring (83.6%), and winter (59.9%; Table 3; Figure 4a). Two groups of snow geese observed in fall accounted for 5,500 observations (Appendix A), and snow goose accounted for 98.1% of large bird use in fall (Appendix B). Waterfowl also accounted for the majority of use in spring (83.6%) and winter (59.5%); however, upland game birds contributed the remaining 40.5% of use in winter (Table 3; Figures 4a and 4b). Canada goose (waterfowl), ring-necked pheasant (upland game bird), and gray partridge (upland game bird) were the only large bird species observed during winter (Figure 4b; Appendix B). When waterfowl are excluded, mean use was higher in summer, largely due to higher shorebird use in summer than in other seasons (Figure 4a). Shorebirds comprised the majority of use during summer (25.5%; Table 3; Figure 4b).

Large bird frequency of occurrence varied among seasons, with diurnal raptors, upland gamebirds, and waterfowl were the most frequently observed bird type during spring, while shorebirds, doves/pigeons, and upland gamebirds were observed nearly twice as frequently as other bird types during summer surveys (Table 3; Figure 4c). Diurnal raptors were the most frequently observed bird type during fall surveys, and upland game birds were the most frequently observed bird type during winter surveys (Table 3; Figure 4c).

Large Bird Mean Flight Height

Initial large bird mean flight heights ranged from two m (six ft) for owls and upland game birds to 47 m (154 ft) for vultures. Waterfowl (99.3%) and vultures (75.0%) were recorded most frequently within 28–168 m, the assumed RSH (Table 4). Diurnal raptors and gulls/terns were primarily observed below the RSH (77.8% and 85.0%, respectively). Flight heights for all other bird types were below 28 m (Table 4).

Table 3. Mean use (number of birds/plot¹/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each bird type and subtype, by season, during avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Type/Subtype	Mean Use				% of Use				% Frequency			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Diurnal Raptors	0.25	0.20	0.47	0	1.6	4.0	0.2	0	25.2	20.0	40.0	0
<i>Buteos</i>	0.20	0.20	0.30	0	1.3	4.0	0.2	0	19.6	20.0	30.0	0
<i>Falcons</i>	0	0	0.03	0	0	0	<0.1	0	0	0	3.3	0
<i>Northern Harrier</i>	0.06	0	0.13	0	0.4	0	0.1	0	5.6	0	13.3	0
Doves/Pigeons	0.47	1.00	0.77	0	3.1	20.1	0.4	0	20.4	40.0	30.0	0
Gulls/Terns	1.16	0.20	0	0	7.6	4.0	0	0	17.0	6.7	0	0
Large Corvids	0.09	0	0	0	0.6	0	0	0	8.9	0	0	0
Loons/Grebes	0	0	0.03	0	0	0	<0.1	0	0	0	3.3	0
Nightjars	0	0.07	0	0	0	1.3	0	0	0	6.7	0	0
Owls	0	0.03	0	0	0	0.7	0	0	0	3.3	0	0
Rails/Coots	0	0.07	0.30	0	0	1.3	0.2	0	0	6.7	3.3	0
Shorebirds	0.10	1.27	0.03	0	0.7	25.5	<0.1	0	10.4	43.3	3.3	0
Upland Game Birds	0.32	0.80	0.57	0.57	2.1	16.1	0.3	40.5	23.3	40.0	20.0	26.7
Vultures	0.11	0.30	0.03	0	0.7	6.0	<0.1	0	3.7	10.0	3.3	0
Waterbirds	0	0.30	0	0	0	6.0	0	0	0	3.3	0	0
Waterfowl	12.78	0.73	184.60	0.83	83.6	14.8	98.8	59.5	24.4	16.7	23.3	3.3
Large Birds Overall	15.29	4.97	186.80	1.40	100	100	100	100	-	-	-	-

Sums of values may not equal totals shown due to rounding.

¹: 800-meter (2,625-foot) radius plot for large birds.

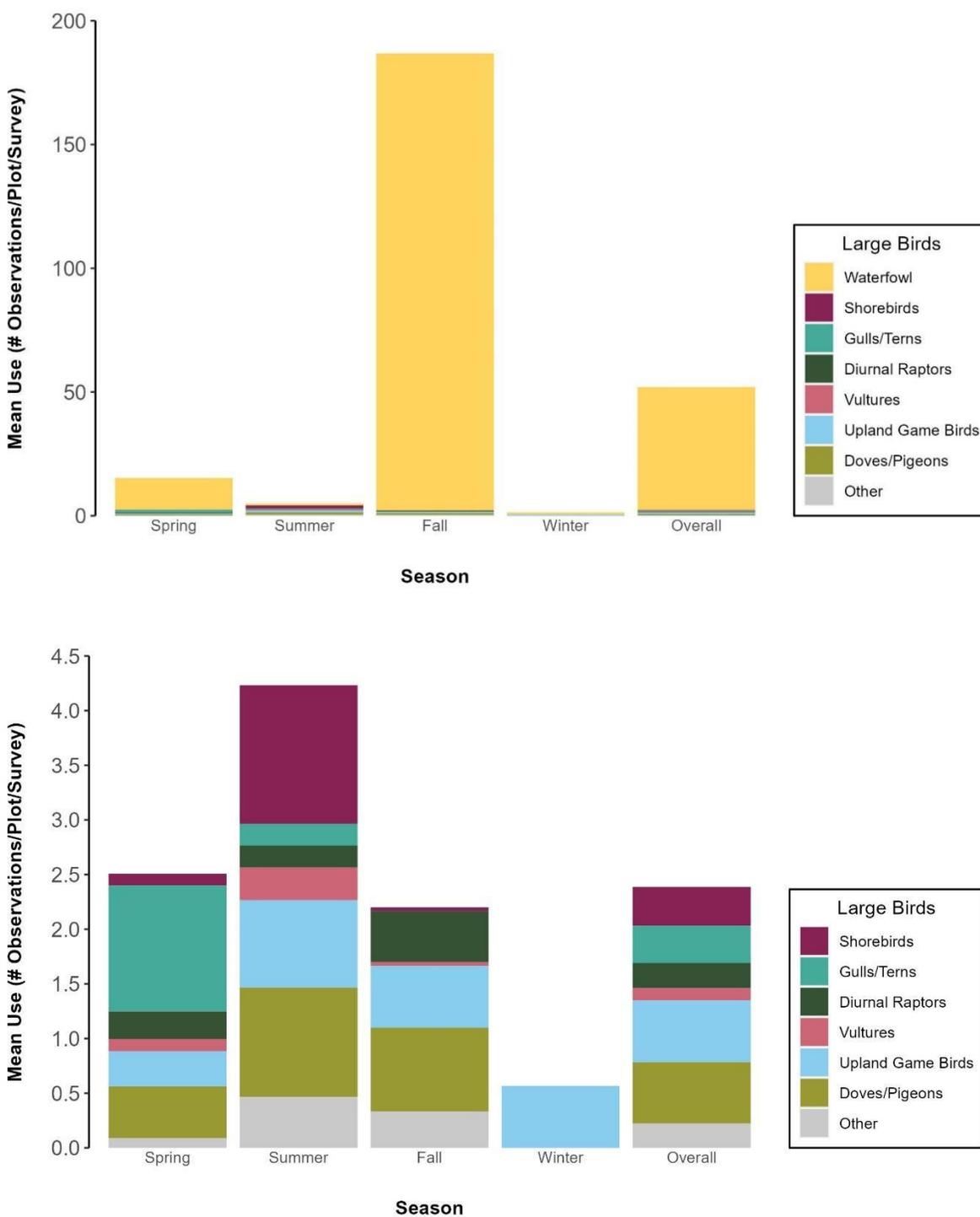


Figure 4a. Large bird mean use (number of observations/plot/60-minute survey), by season and bird type, including (top) and excluding waterfowl (bottom), at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

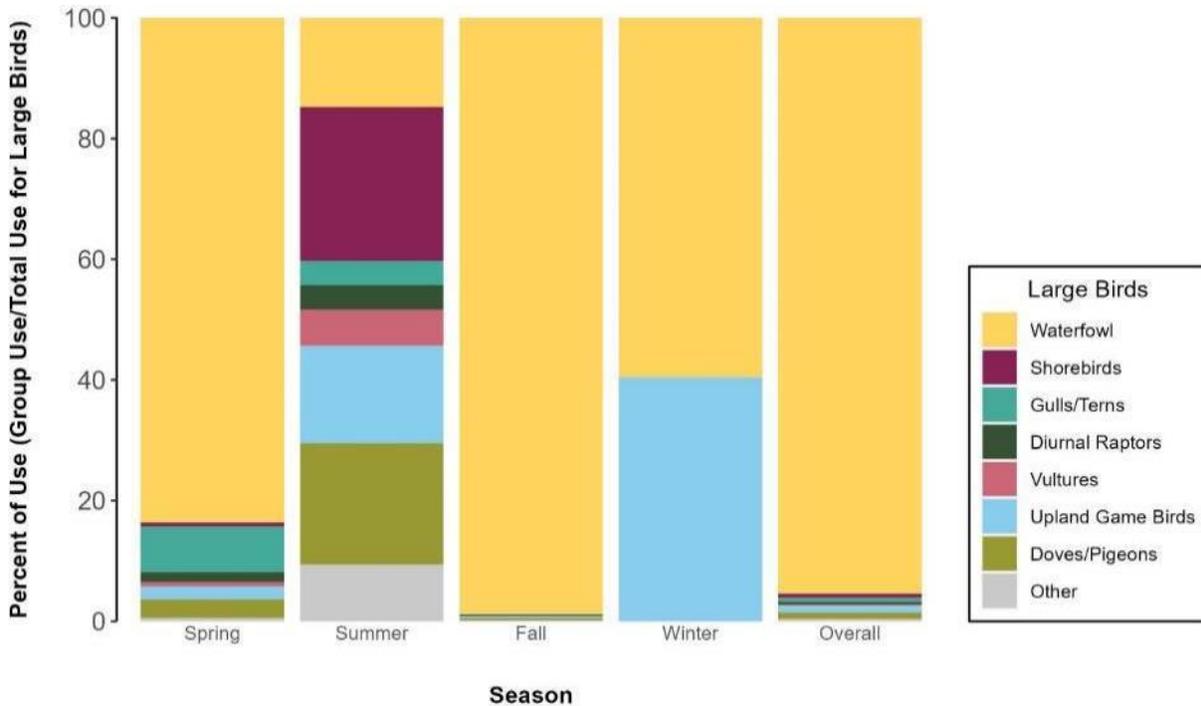


Figure 4b. Large bird percent of use, by season and bird type, at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

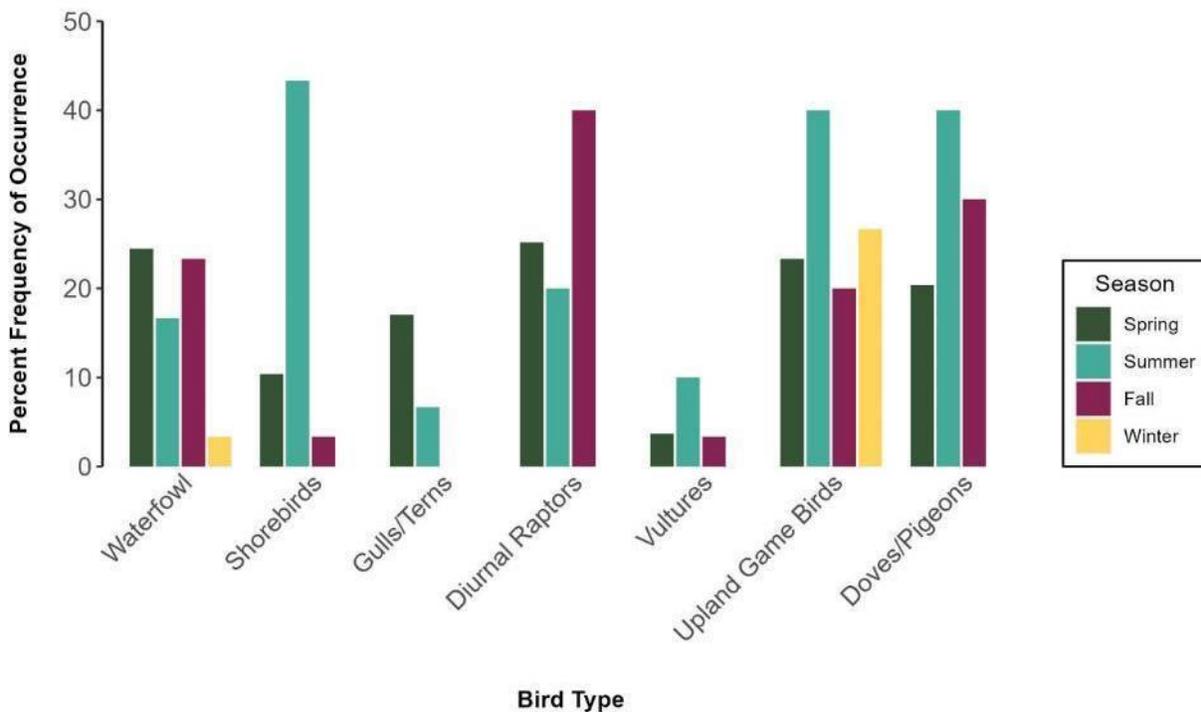


Figure 4c. Large bird frequency of occurrence, by season and bird type, at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Table 4. Group and individual initial observation flight height characteristics, by bird type¹, during avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Bird Type	Number of		Percent of Obs Flying	Mean Flight Height (m)	Percent within Flight Height Categories		
	Groups Flying	Number of Obs Flying			<28 m	28–168 m ²	>168 m
Diurnal Raptors	18	18	69.2	31	77.8	22.2	0
<i>Buteos</i>	12	12	60.0	44	66.7	33.3	0
<i>Falcons</i>	1	1	100	4	100	0	0
<i>Northern Harrier</i>	5	5	100	3	100	0	0
Doves/Pigeons	23	45	67.2	6	100	0	0
Gulls/Terns	9	40	100	25	85.0	15.0	0
Large Corvids	1	1	50.0	19	100	0	0
Loons/Grebes	0	0	0	-	-	-	-
Nightjars	0	0	0	-	-	-	-
Owls	1	1	100	2	100	0	0
Rails/Coots	0	0	0	-	-	-	-
Shorebirds	13	16	38.1	4	100	0	0
Upland Game Birds	12	26	39.4	2	100	0	0
Vultures	5	8	61.5	47	25.0	75.0	0
Waterbirds	0	0	0	-	-	-	-
Waterfowl	18	5,634	95.0	25	0.7	99.3	0
Large Birds Overall	100	5,789	93.2	17	3.1	96.9	0

Zeros- indicate that the bird type was observed but was not flying.

obs = observations.

All metrics are developed based on First Flight Height.

1. 800-meter (m; 2,625-foot [ft]) radius plot for large birds.
2. The assumed rotor-swept height for potential collision with a turbine blade, or 28–168 m (92–551 ft) above ground level.

Spatial Variation

Mean Use by Point

Similar to mean use, mean use by point was driven by waterfowl use (Figure 5). Large bird use ranged from 1.33 observations/survey to 418.17 across points and was highest at Points 6, 2, and 5 (418.17, 50.17, and 23.00, respectively; Figure 5; Appendix C). Moderately sized wetlands are found within the survey plot at points 6, 2, and 5. Large bird use at each of the seven remaining points was 8.50 observations/survey or less (Appendix C). When waterfowl data are excluded, mean use was much less variable and highest at Point 2, largely due to use by shorebirds, gulls/terns, and doves/pigeons (Figure 5). Diurnal raptors had the highest mean use at points 7 and 10 (0.40 observations/survey and 0.36, respectively) and upland game birds at points 8 and 1 (1.55 and 1.18, respectively; Figure 5; Appendix C).

Species of Concern

No federal or state-protected species were recorded within the Study Area during avian use surveys (Table 5). One bald eagle and one golden eagle were observed incidentally. Two BCC were recorded during surveys: Franklin’s gull and northern harrier (Table 5).

Table 5. Sensitive species groups and individuals observed during and outside avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Species	Scientific Name	Status	Surveys		Incidental		Total	
			# grps	# obs	# grps	# obs	# grps	# obs
bald eagle	<i>Haliaeetus leucocephalus</i>	SGCN; BGEPA	0	0	1	1	1	1
Franklin’s gull	<i>Leucophaeus pipixcan</i>	BCC	3	21	0	0	3	21
golden eagle	<i>Aquila chrysaetos</i>	BGEPA	0	0	1	1	1	1
northern harrier	<i>Circus hudsonius</i>	BCC	5	5	0	0	5	5
Total	4 species		8	26	2	2	10	28

SGCN = Species of Greatest Conservation Need; BGEPA = Bald and Golden Eagle Protection Act of 1940; BCC = Birds of Conservation Concern; # = number; grps = groups; obs = observations.

Incidental Observations

Two eagles were incidentally observed at the Project but not during surveys. One bald eagle was observed approximately 0.8 km (0.5 mi) southeast of Point 8 in March 2023. One golden eagle was observed approximately 1.0 km (0.6 mi) east of Point 10 in January 2024.

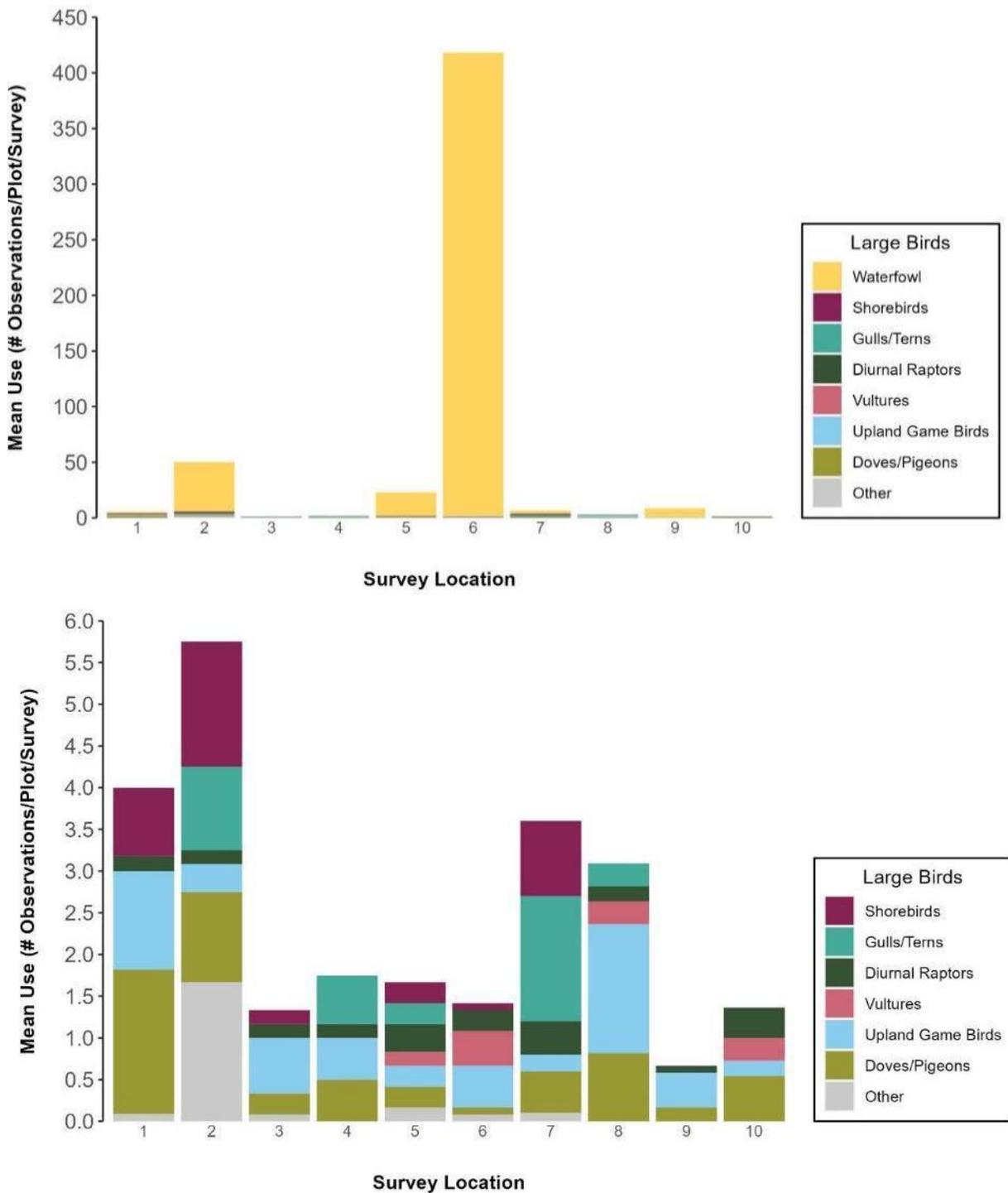


Figure 5. Large bird mean use (number of observations/plot/60-minute survey), by point by bird type, including (top) and excluding waterfowl (bottom) during avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

CONCLUSIONS

The objective of this avian use study was to assess the spatial and temporal use of the Study Area by large birds, with a focus on eagles. The specific objectives of this avian use study were to provide site-specific avian use data to be used in the evaluation of potential impacts from Project development, provide information that may be used to inform Project planning and design of the facility to minimize impacts to birds, and collect data on eagle use, following the ECPG.

Large bird use showed seasonal variation and was highest during fall, due to migrating snow geese. Spatial variation in large bird use was also observed, with the majority of use observed at Point 6, 2, and 5 where wetlands were present. Diurnal raptors and upland gamebirds were among the most frequently observed bird types in each season.

No eagles were observed during avian use surveys; however, one bald eagle was in the vicinity of Point 8 on March 26, 2023, and one golden eagle was observed about 1.0 km (0.6 mi) east of Point 10 on January 25, 2024. Points 8 and 10 are located in the southern portion of the Study Area. The landscape consists of cultivated croplands, grassland/herbaceous vegetation, and wetlands, which could provide suitable foraging and roosting habitat for eagles. Similar to the Year 2 study, no eagle minutes were recorded during the 108 hours of surveys in the 2020–2021 (Year 1) avian use study conducted at the Project and eagle observations were exclusively incidental. Three bald eagles were observed incidentally in Year 1, one on September 27, 2020, east of Point 9 and two on March 25, 2021, near Point 8 (Piorkowski and Agudelo 2021). Bald eagles may be seen throughout the year as they have been observed nesting within the region (Piorkowski 2021) and have the potential to migrate or winter in and around the Study Area. The potential for golden eagle use is likely more constrained to wintering or migration times. Incidental-only eagle observations from both years of studies suggest that infrequent eagle use occurs in the Study Area.

No federal or state-protected bird species were observed during avian use surveys; however, two BCC were recorded during avian use surveys. Franklin's gull was observed in spring and northern harrier was observed in spring and fall. South Dakota's Campbell County falls within the Prairie Potholes BCR 11, an expansive area of mixed grass prairie and shallow wetlands that is important habitat for breeding and migratory passage of these two species. According to a review of eBird location data (eBird 2024), Franklin's gull and northern harrier are not unique to the Study Area. During the Year 1 avian use study at the Project, one peregrine falcon, a state-listed threatened species, was observed during surveys; however, no federally protected species were observed during surveys. Four additional large bird SOC, including Franklin's gull and northern harrier, and three small bird SOC were observed in Year 1 (Piorkowski and Agudelo 2021). A review of eBird location data (eBird 2024) indicated these SOC have been reported throughout Campbell County.

REFERENCES

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**Appendix A. Large Birds Observed, by Season, at the Campbell County Wind Farm 2
Project in Campbell County, South Dakota, during Avian Use Surveys, from
March 26, 2023 – February 19, 2024.**

Appendix A. Summary of all groups and individual observations, regardless of distance from observer, by large bird type and species, during avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Type/Species	Scientific Name	Spring		Summer		Fall		Winter		Total	
		# grps	# obs								
Diurnal Raptors		6	6	6	6	14	14	0	0	26	26
<i>Buteos</i>		5	5	6	6	9	9	0	0	20	20
red-tailed hawk	<i>Buteo jamaicensis</i>	4	4	6	6	8	8	0	0	18	18
Swainson's hawk	<i>Buteo swainsoni</i>	1	1	0	0	1	1	0	0	2	2
<i>Falcons</i>		0	0	0	0	1	1	0	0	1	1
American kestrel	<i>Falco sparverius</i>	0	0	0	0	1	1	0	0	1	1
<i>Northern Harrier</i>		1	1	0	0	4	4	0	0	5	5
northern harrier	<i>Circus hudsonius</i>	1	1	0	0	4	4	0	0	5	5
Doves/Pigeons		6	14	20	30	12	23	0	0	38	67
mourning dove	<i>Zenaida macroura</i>	5	11	20	30	12	23	0	0	37	64
rock pigeon	<i>Columba livia</i>	1	3	0	0	0	0	0	0	1	3
Gulls/Terns		7	34	2	6	0	0	0	0	9	40
Bonaparte's gull	<i>Chroicocephalus philadelphia</i>	3	7	0	0	0	0	0	0	3	7
Forster's tern	<i>Sterna forsteri</i>	0	0	1	2	0	0	0	0	1	2
Franklin's gull	<i>Leucophaeus pipixcan</i>	3	21	0	0	0	0	0	0	3	21
ring-billed gull	<i>Larus delawarensis</i>	1	6	0	0	0	0	0	0	1	6
unidentified tern	-	0	0	1	4	0	0	0	0	1	4
Large Corvids		2	2	0	0	0	0	0	0	2	2
American crow	<i>Corvus brachyrhynchos</i>	2	2	0	0	0	0	0	0	2	2
Loons/Grebes		0	0	0	0	1	1	0	0	1	1
horned grebe	<i>Podiceps auritus</i>	0	0	0	0	1	1	0	0	1	1
Nightjars		0	0	2	2	0	0	0	0	2	2
common nighthawk	<i>Chordeiles minor</i>	0	0	2	2	0	0	0	0	2	2
Owls		0	0	1	1	0	0	0	0	1	1
great horned owl	<i>Bubo virginianus</i>	0	0	1	1	0	0	0	0	1	1
Rails/Coots		0	0	2	2	1	9	0	0	3	11
American coot	<i>Fulica americana</i>	0	0	0	0	1	9	0	0	1	9
sora	<i>Porzana carolina</i>	0	0	2	2	0	0	0	0	2	2
Shorebirds		3	3	30	38	1	1	0	0	34	42
killdeer	<i>Charadrius vociferus</i>	3	3	22	26	1	1	0	0	26	30
unidentified shorebird	-	0	0	1	1	0	0	0	0	1	1
upland sandpiper	<i>Bartramia longicauda</i>	0	0	7	11	0	0	0	0	7	11

Appendix A. Summary of all groups and individual observations, regardless of distance from observer, by large bird type and species, during avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Type/Species	Scientific Name	Spring		Summer		Fall		Winter		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Upland Game Birds		7	8	20	24	9	17	10	17	46	66
gray partridge	<i>Perdix perdix</i>	0	0	0	0	0	0	1	5	1	5
ring-necked pheasant	<i>Phasianus colchicus</i>	7	8	20	24	9	17	9	12	45	61
Vultures		1	3	5	9	1	1	0	0	7	13
turkey vulture	<i>Cathartes aura</i>	1	3	5	9	1	1	0	0	7	13
Waterbirds		0	0	2	9	0	0	0	0	2	9
double-crested cormorant	<i>Phalacrocorax auritus</i>	0	0	2	9	0	0	0	0	2	9
Waterfowl		16	346	13	22	8	5,538	1	25	38	5,931
blue-winged teal	<i>Spatula discors</i>	3	20	2	5	1	2	0	0	6	27
Canada goose	<i>Branta canadensis</i>	4	86	0	0	1	10	1	25	6	121
canvasback	<i>Aythya valisineria</i>	1	65	0	0	0	0	0	0	1	65
gadwall	<i>Mareca strepera</i>	0	0	1	2	1	5	0	0	2	7
mallard	<i>Anas platyrhynchos</i>	4	59	6	7	3	21	0	0	13	87
northern pintail	<i>Anas acuta</i>	1	2	1	3	0	0	0	0	2	5
northern shoveler	<i>Spatula clypeata</i>	2	82	1	1	0	0	0	0	3	83
ring-necked duck	<i>Aythya collaris</i>	1	32	0	0	0	0	0	0	1	32
snow goose	<i>Anser caerulescens</i>	0	0	0	0	2	5,500	0	0	2	5,500
unidentified duck	–	0	0	1	2	0	0	0	0	1	2
wood duck	<i>Aix sponsa</i>	0	0	1	2	0	0	0	0	1	2
Overall		48	416	103	149	47	5,604	11	42	209	6,211

grps = groups; obs = observations.

Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds during Avian Use Surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Appendix B. Mean use (number of large birds/plot¹/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type, subtype, and species, by season, during avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Type/Subtype/Species	Mean Use				% of Use				% Frequency			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Diurnal Raptors	0.25	0.20	0.47	0	1.6	4.0	0.2	0	25.2	20.0	40.0	0
<i>Buteos</i>	0.20	0.20	0.30	0	1.3	4.0	0.2	0	19.6	20.0	30.0	0
red-tailed hawk	0.16	0.20	0.27	0	1.1	4.0	0.1	0	16.3	20.0	26.7	0
Swainson's hawk	0.03	0	0.03	0	0.2	0	<0.1	0	3.3	0	3.3	0
<i>Falcons</i>	0	0	0.03	0	0	0	<0.1	0	0	0	3.3	0
American kestrel	0	0	0.03	0	0	0	<0.1	0	0	0	3.3	0
<i>Northern Harrier</i>	0.06	0	0.13	0	0.4	0	0.1	0	5.6	0	13.3	0
northern harrier	0.06	0	0.13	0	0.4	0	0.1	0	5.6	0	13.3	0
Doves/Pigeons	0.47	1.00	0.77	0	3.1	20.1	0.4	0	20.4	40.0	30.0	0
mourning dove	0.37	1.00	0.77	0	2.4	20.1	0.4	0	17.0	40.0	30.0	0
rock pigeon	0.10	0	0	0	0.7	0	0	0	3.3	0	0	0
Gulls/Terns	1.16	0.20	0	0	7.6	4.0	0	0	17.0	6.7	0	0
Bonaparte's gull	0.23	0	0	0	1.5	0	0	0	3.3	0	0	0
Forster's tern	0	0.07	0	0	0	1.3	0	0	0	3.3	0	0
Franklin's gull	0.70	0	0	0	4.6	0	0	0	10.0	0	0	0
ring-billed gull	0.22	0	0	0	1.5	0	0	0	3.7	0	0	0
unidentified tern	0	0.13	0	0	0	2.7	0	0	0	3.3	0	0
Large Corvids	0.09	0	0	0	0.6	0	0	0	8.9	0	0	0
American crow	0.09	0	0	0	0.6	0	0	0	8.9	0	0	0
Loons/Grebes	0	0	0.03	0	0	0	<0.1	0	0	0	3.3	0
horned grebe	0	0	0.03	0	0	0	<0.1	0	0	0	3.3	0
Nightjars	0	0.07	0	0	0	1.3	0	0	0	6.7	0	0
common nighthawk	0	0.07	0	0	0	1.3	0	0	0	6.7	0	0
Owls	0	0.03	0	0	0	0.7	0	0	0	3.3	0	0
great horned owl	0	0.03	0	0	0	0.7	0	0	0	3.3	0	0
Rails/Coots	0	0.07	0.30	0	0	1.3	0.2	0	0	6.7	3.3	0
American coot	0	0.07	0.30	0	0	1.3	0.2	0	0	6.7	3.3	0
sora	0	0.07	0	0	0	1.3	0	0	0	6.7	0	0
Shorebirds	0.10	1.27	0.03	0	0.7	25.5	<0.1	0	10.4	43.3	3.3	0
killdeer	0.10	1.27	0.03	0	0.7	25.5	<0.1	0	10.4	43.3	3.3	0
unidentified shorebird	0	0.03	0	0	0	0.7	0	0	0	3.3	0	0
upland sandpiper	0	0.37	0	0	0	7.4	0	0	0	20.0	0	0
Upland Game Birds	0.32	0.80	0.57	0.57	2.1	16.1	0.3	40.5	23.3	40.0	20.0	26.7
gray partridge	0	0	0	0.17	0	0	0	11.9	0	0	0	3.3
ring-necked pheasant	0.32	0.80	0.57	0.40	2.1	16.1	0.3	28.6	23.3	40.0	20.0	26.7

Appendix B. Mean use (number of large birds/plot¹/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type, subtype, and species, by season, during avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Type/Subtype/Species	Mean Use				% of Use				% Frequency			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Vultures	0.11	0.30	0.03	0	0.7	6.0	<0.1	0	3.7	10.0	3.3	0
turkey vulture	0.11	0.30	0.03	0	0.7	6.0	<0.1	0	3.7	10.0	3.3	0
Waterbirds	0	0.30	0	0	0	6.0	0	0	0	3.3	0	0
double-crested cormorant	0	0.30	0	0	0	6.0	0	0	0	3.3	0	0
Waterfowl	12.78	0.73	184.60	0.83	83.6	14.8	98.8	59.5	24.4	16.7	23.3	3.3
blue-winged teal	0.73	0.17	0.07	0	4.8	3.4	<0.1	0	10.4	6.7	3.3	0
Canada goose	3.18	0	0.33	0.83	20.8	0	0.2	59.5	14.4	0	3.3	3.3
canvasback	2.41	0	0	0	15.7	0	0	0	3.7	0	0	0
gadwall	0	0.07	0.17	0	0	1.3	0.1	0	0	3.3	3.3	0
mallard	2.18	0.23	0.70	0	14.2	4.7	0.4	0	10.7	13.3	10.0	0
northern pintail	0.07	0.10	0	0	0.4	2.0	0	0	3.3	3.3	0	0
northern shoveler	3.03	0.03	0	0	19.8	0.7	0	0	7.0	3.3	0	0
ring-necked duck	1.19	0	0	0	7.8	0	0	0	3.7	0	0	0
snow goose	0	0	183.33	0	0	0	98.1	0	0	0	6.7	0
unidentified duck	0	0.07	0	0	0	1.3	0	0	0	3.3	0	0
wood duck	0	0.07	0	0	0	1.3	0	0	0	3.3	0	0
Overall	15.29	4.97	186.80	1.40	100	100	100	100	-	-	-	-

Sums of values may not equal totals shown due to rounding.

1. 800-meter (2,625-foot) radius plot for large birds.

**Appendix C. Mean Use by Point for Large Birds during Avian Use Surveys at the
Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from
March 26, 2023 – February 19, 2024.**

Appendix C. Mean use (number of birds/60-minute survey) by point for all birds¹ and bird types observed during avian use surveys at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 26, 2023 – February 19, 2024.

Bird Type	Survey Point									
	1	2	3	4	5	6	7	8	9	10
Diurnal Raptors	0.18	0.17	0.17	0.17	0.33	0.25	0.40	0.18	0.08	0.36
<i>Buteos</i>	0.18	0.17	0.17	0.08	0.25	0.08	0.20	0.18	0.08	0.36
<i>Falcons</i>	0	0	0	0	0	0	0.10	0	0	0
<i>Northern Harrier</i>	0	0	0	0.08	0.08	0.17	0.10	0	0	0
Doves/Pigeons	1.73	1.08	0.25	0.50	0.25	0.08	0.50	0.82	0.17	0.55
Gulls/Terns	0	1.00	0	0.58	0.25	0	1.50	0.27	0	0
Large Corvids	0	0	0.08	0	0	0.08	0	0	0	0
Loons/Grebes	0	0.08	0	0	0	0	0	0	0	0
Nightjars	0	0.08	0	0	0.08	0	0	0	0	0
Owls	0.09	0	0	0	0	0	0	0	0	0
Rails/Coots	0	0.75	0	0	0.08	0	0.10	0	0	0
Shorebirds	0.82	1.50	0.17	0	0.25	0.08	0.90	0	0	0
Upland Game Birds	1.18	0.33	0.67	0.50	0.25	0.50	0.20	1.55	0.42	0.18
Vultures	0	0	0	0	0.17	0.42	0	0.27	0	0.27
Waterbirds	0	0.75	0	0	0	0	0	0	0	0
Waterfowl	1.55	44.42	0	0	21.33	416.75	3.00	0	7.83	0
All Large Birds	5.55	50.17	1.33	1.75	23.00	418.17	6.60	3.09	8.50	1.36

Sums of values may not equal totals shown due to rounding.

¹. 800-meter (2,625-foot) radius plot for large birds.

**Grassland Habitat Assessment
Campbell County Wind Farm 2
Campbell County, South Dakota**

**Final Report
August 2023**

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Appendix A. Representative Photographs of Broken and Unbroken Grassland Sod Types at the Campbell County Wind Farm 2 in Campbell County, South Dakota, August 2023.

INTRODUCTION

RWE Clean Energy, LLC (RWE) is proposing to construct the Campbell County Wind Farm 2 (Project) in Campbell County, South Dakota (Figure 1). RWE contracted Western EcoSystems Technology, Inc. (WEST) to complete a grassland habitat assessment to classify sod types of grasslands as either broken or unbroken. Bauman et al. (2018) defined undisturbed land as soil that has not been mechanically manipulated or has not experienced “iron in the ground” practices and the authors refer to undisturbed grasslands as native prairie. Bauman (2021) later described undisturbed grasslands as ‘unbroken’ grasslands. For this report we refer to native prairie as unbroken sod and other grasslands as broken sod.

The objective of this study was to identify grassland parcels and categorize the sod type of each parcel as either broken or unbroken sod. Results from this assessment can help inform siting of facilities and guide decisions regarding future survey needs within the Project Area.

PROJECT AREA

The Project Area is approximately 11,994 acres (ac; 4,854 hectares; ha) in size (Figure 1). The town of Mound City, South Dakota is located approximately four miles (six kilometers) southeast of the Project Area. The Project is within two Level IV Ecoregions: most of the Project is within the Southern Missouri Coteau Slope of the Level III Northwestern Glaciated Plains, and a small portion is within the Rivers Breaks of the Level III Northwestern Great Plains (US Environmental Protection Agency 2012). The Northwestern Glaciated Plains Ecoregion has a moderately high concentration of semi-permanent and seasonal wetlands, locally referred to as prairie potholes. This ecoregion is a transitional region between the generally level, moister, and more agricultural areas to the east, and the generally drier and variable areas to the west.

The landscape within the Project Area is nearly flat and along the edge of some relatively steep bluffs down to the Missouri River floodplain on the western edge of the Project. Elevation ranges from 1,647 to 2,123 feet (502 to 647 meters) above sea level (US Geological Survey [USGS] National Elevation Dataset 2020). Land in the Project Area is privately owned (USGS Gap Analysis Project 2023). According to the 2019 National Land Cover Database (NLCD), land cover within the Project Area is mainly herbaceous (grasslands) to the north followed by cultivated crops throughout the central and southern portions of the Project Area (Figure 2; NLCD 2019). Wetlands are evenly but sparsely distributed across the Project Area; less than 4% of the Project Area is wetland (US Fish and Wildlife Service National Wetlands Inventory 2023). About 79% of wetlands are freshwater emergent, 11% are freshwater ponds, 10% are riverine, and the remainder are freshwater forested/shrub wetland.

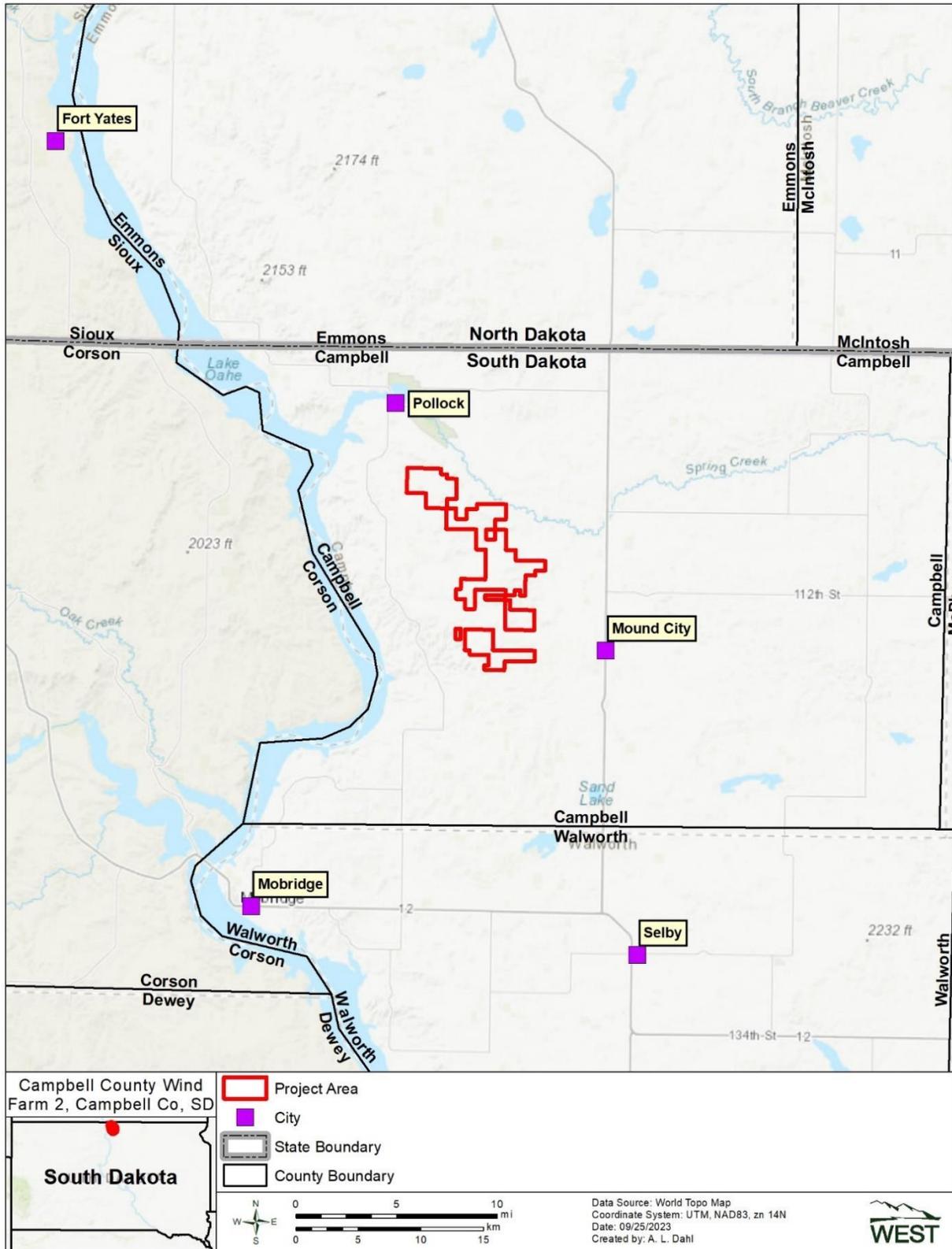


Figure 1. Location of the Campbell County Wind Farm 2 in Campbell County, South Dakota.

METHODS

The grassland habitat assessment was conducted using a 3-stage process: a desktop analysis followed by field surveys. After field surveys were completed a final desktop review was completed reviewing historical imagery and updating data as appropriate.

Desktop Analysis--Pre-Survey

Prior to field surveys, WEST completed a desktop analysis of existing land cover features within the Project Area using current aerial photography (USDA National Agriculture Imagery Program 2023), existing land cover (NLCD 2019) data, and the USDA National Agriculture Statistical Service's (NASS) Crop Data Layer (USDA NASS 2022). The desktop analysis resulted in the creation of a digital grassland parcel layer classified as "grassland" or "other" (i.e., non-grass areas such as cultivated cropland, roads, barren areas, development, wetlands, forests, and shrub/scrub). Each grassland parcel was delineated by noting visual changes in the landscape (e.g., grassland to cropland or forest edges) and given a unique identifier (Grassland ID) used on maps and datasheets. The Geographical Information System specialist provided maps showing all grassland parcels, Grassland ID, roads, cities, and land access information (if available) for the field survey effort.

Field Surveys

Following the desktop review, field surveys were conducted to validate the desktop results including the identification of any new grassland parcels or misidentification of grassland parcels. A biologist conducted visual surveys from August 10 to 11, 2023 from publicly accessible roads only using binoculars and/or a spotting scope. To the extent possible, grassland parcels created from the desktop review were classified as broken or unbroken. For each grassland parcel, the sod type (i.e., broken or unbroken), tree/shrub presence, field edge changes, rock piles, human disturbance such as buildings, and linear features such as disking, harvesting, plowing, or planting were recorded. Representative photographs were taken to document the status and features of the grassland parcels (Appendix A).

WEST implemented quality assurance and quality control (QA/QC) measures at all stages of the assessment, including during the desktop review, in the field, during data entry, and during report writing. Data were reviewed by field staff before they were submitted for data entry; WEST data entry staff were trained on proper data entry procedures, which included an independent review of the field data. If any errors, omissions, or problems were identified, follow-up QA/QC measures were implemented including discussions and review of field data with field staff and/or Project Manager. Upon completion of field surveys, the digital data layer created during the desktop review was updated, as needed.

Desktop Review--Post-Survey

The grassland digital data layer created during the desktop review was updated using results from the field survey data. The datasheets from the field survey were entered into a database and

linked to the grassland features digital data layer based on the Grassland ID. Each grassland parcel categorized as unbroken was rechecked against historical aerial imagery from Historic Aerials (1957 – 2020; Historic Aerials 2023) and a native digital data layer “Quantifying Undisturbed (Native) Lands in Eastern South Dakota: 2013” (Bauman et al. 2016). If evidence of tillage was found in the aerial imagery, the status of the grassland feature was changed to broken.

RESULTS

Field surveys were completed from August 10 and 11, 2023, at each of the grassland parcels identified during the desktop review (Figure 2). Results of field surveys were compared to other grassland layers in September 2023. Approximately, 47% of the Project Area is composed of grasslands (Table 1). The grassland habitat assessment classified 5,108 ac (2,067 ha) of unbroken grassland sod and 508 ac (206 ha) of broken grassland sod (Table 1).

Table 1. Summary of sod type by acres and corresponding percent of total grasslands and Project assessed during field surveys completed in 2023 at the Campbell County Wind Farm 2 in Campbell County, South Dakota.

Sod Type	Acres	% of Total Grassland	% of Project
unbroken sod	5,108	91.0	42.6
broken sod	508	9.0	4.3
Total¹	5,616	100	46.9

¹ Totals may not equal values shown due to number rounding.

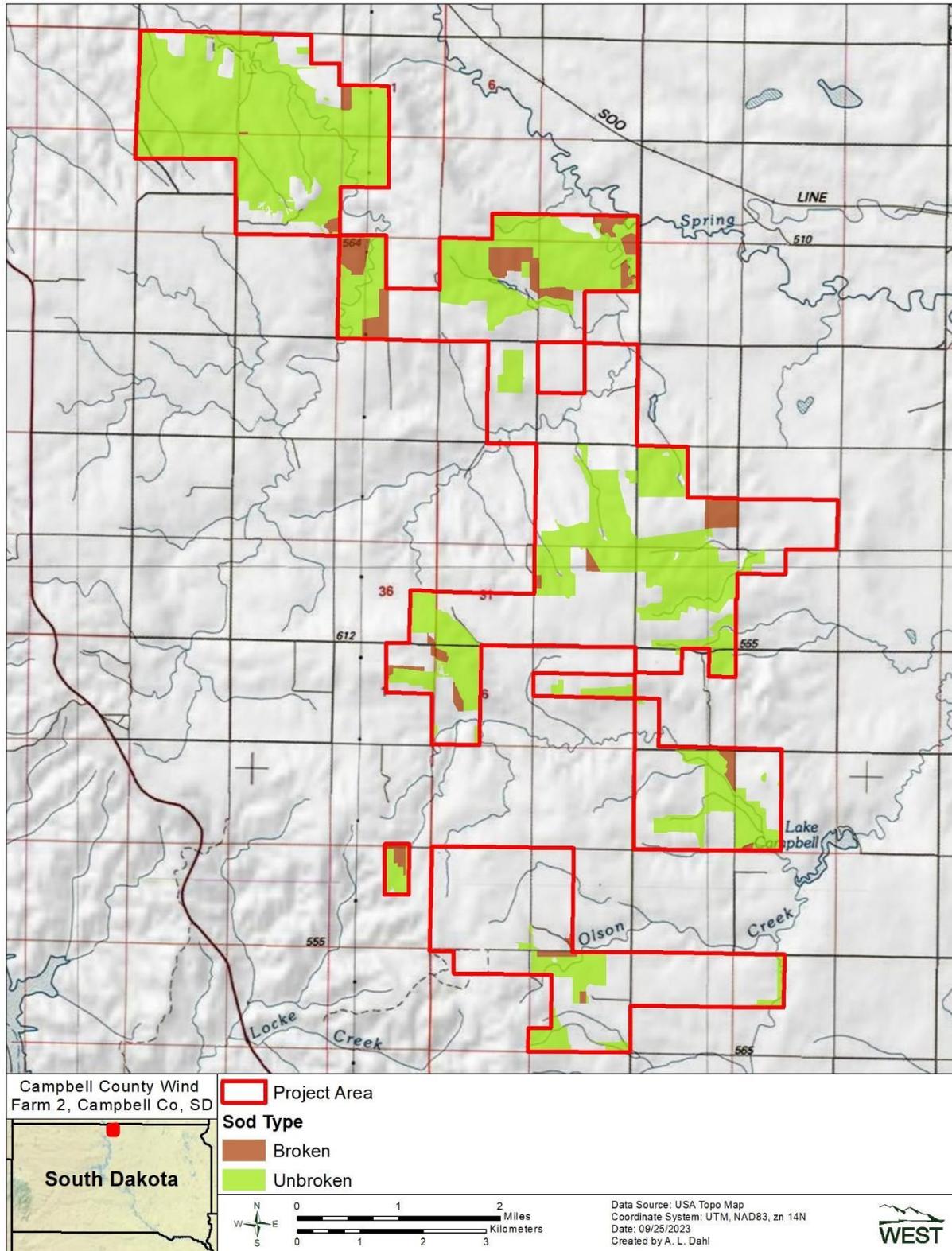


Figure 2. Grassland sod types for grassland parcels assessed during field surveys completed in 2023 at the Campbell County Wind Farm 2 in Campbell County, South Dakota.

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Appendix A. Representative Photographs of Broken and Unbroken Grassland Sod Types at the Campbell County Wind Farm 2 in Campbell County, South Dakota, August 2023.



Appendix A1. Broken grassland sod habitat within the Campbell County Wind Farm 2 Campbell County, South Dakota, August 2023.



Appendix A2. Broken grassland sod habitat within the Campbell County Wind Farm 2 Campbell County, South Dakota, August 2023.



Appendix A3. Unbroken grassland sod habitat within the Campbell County Wind Farm 2 Campbell County, South Dakota, August 2023.



Appendix A4. Unbroken grassland sod habitat within the Campbell County Wind Farm 2 Campbell County, South Dakota, August 2023.

Northern Long-Eared Bat
Desktop Summer Habitat Assessment
Campbell County II Wind Project
Campbell County, South Dakota
Final Draft Report



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INTRODUCTION

ConEdison Clean Energy Business (ConEdison) is considering the development of the Campbell County II Wind Project (Project) in west-central Campbell County, South Dakota. ConEdison contracted Western Ecosystems Technology, Inc. (WEST) to assess the presence of suitable summer habitat for northern long-eared bat (*Myotis septentrionalis*; NLEB) within the Project area. The NLEB is a federally threatened species throughout its range, listed under the Endangered Species Act (1973), but take due to operation of wind projects is exempt under the 4(d) rule (81 Federal Register 9: 1900–1922. [2016]). Results of the habitat assessment could be used to evaluate potential NLEB maternity, roosting and/or foraging habitats within the proposed Project area, and assist in additional Project planning and construction efforts.

This report describes the results of the desktop NLEB summer habitat assessment completed for the Project and 2.5-mi (4.0-km) area around the Project (collectively referred to as the Assessment Area). The desktop assessment was completed in accordance with the 2020 *Range-Wide Indiana Bat Survey Guidelines* (Guidelines; US Fish and Wildlife Service [USFWS] 2020) and *Northern Long-Eared Bat Interim Conference and Planning Guidance* (Guidance; USFWS 2014). USFWS Guidance calls for NLEB surveys to adhere to Indiana bat (*M. sodalis*) survey Guidelines.

PROJECT AREA

The current Project area encompasses about 13,320.0 acres (ac; 5,390 hectares [ha]; 54 square kilometers) in west-central Campbell County, South Dakota. The Project is located about 16.2 miles (mi; 26.0 kilometers [km]) northeast of the city of Mobridge, South Dakota. The Project area spans two Level IV Ecoregions: the Southern Missouri Coteau Slope of the Level III Northwestern Glaciated Plains, and the Rivers Breaks of the Level III Northwestern Great Plains (US Environmental Protection Agency 2017). The landscape within the Project area is nearly flat and along the edge of some relatively steep bluffs sloping toward the Missouri River floodplain on the western edge of the Project area. Elevation ranges from 1,647 to 2,123 feet (ft; 502 to 647 meters [m]) above sea level (US Geological Survey [USGS] National Elevation Dataset 2020).

The primary land cover within the Project area is grassland/herbaceous (56.4%) and cultivated crops (38.2%; National Land Cover Database 2016). Less than 1.0% of the Project area is deciduous forest. Wetlands are relatively sparsely dispersed throughout the Project area (USFWS National Wetlands Inventory 2020) and are classified as freshwater emergent (84.8% of wetlands) and freshwater pond (15.0%). There is one large freshwater emergent wetland (244.0 ac [98.7 ha]) located in the southeast corner of the Project area. This wetland is located along either side of an unnamed tributary to Olson Creek; the tributary enters into Olson Creek at approximately the west end of Lake Campbell. Olson and Spring Creeks are the only named creeks or rivers within the Project area (USGS National Hydrography Dataset 2020).

Northern Long-eared Bat Summer Habitat Requirements

The NLEB is a forest-dependent species that tends to avoid open habitats, generally relying on forest features for both foraging and roosting during the summer months (Owen et al. 2003, Reeves 2017).

The USFWS (2020) defines potentially suitable NLEB summer roost habitat as:

“...forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥ 3 inches dbh [diameter at breast height] that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet (305 meters) of other forested/wooded habitat.”

While NLEB are typically associated with forest habitats, they also have been documented in agricultural settings where forest habitats are highly fragmented. Studies in landscapes dominated by agricultural activities have also found that NLEB may use woodlots and riparian zones with very few acres of actual forest cover as traveling and commuting habitat (Foster and Kurta 1999, Henderson and Broders 2008). Furthermore, Henderson and Broders (2008) found it unlikely NLEB would cross over large open areas (i.e., land lacking suitable habitat) to search for foraging and roosting habitats. Rather, they found NLEB did not travel more than 255.0 ft (77.7 m) from the edge of intact forest structure.

During the summer months, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (USFWS 2014). In general, NLEB are opportunistic in selecting roosts, using tree species that retain bark or provide cavities or crevices. Rarely, NLEB have also been found roosting in structures like barns and sheds (USFWS 2015); however, any structures that may be used as roosts would be expected to be located relatively close to wooded habitat that would be used for foraging. Cooler roost locations such as caves and mines may be used by non-reproductive females and males (Bat Conservation International 2020); no known

NLEB hibernacula exists within the Assessment Area. The nearest known hibernacula for NLEB is located in Meade County approximately 100 mi (161 km) southwest of the Project area (South Dakota Game, Fish, and Parks 2020).

SUMMER HABITAT ASSESSMENT

Methods

Definitions:

1. Assessment Area—the Project and a 2.5-mi (4.0-km) area around the Project.
2. Potential Habitat—all forested areas, consisting of two or more trees (minimum patch size), within the Assessment Area.
3. Suitable Summer Habitat—Step 1) forested patches ≥ 10.0 ac (4.1 ha); Step 2) other forested patches deemed potentially suitable summer habitat by a USFWS-permitted WEST bat biologist; and Step 3) all forested areas, regardless of patch size, within or intersecting the Connected Habitat Buffer (CHB).
4. Connected Habitat Buffer—1,000-ft (305-m) setback placed around Suitable Summer Habitat.

The NLEB Guidance provides an estimate of the average maximum movement distance of 1.5 mi (2.4 km) for NLEB and 2.5 mi for Indiana bats. This desktop habitat assessment utilizes the Assessment Area in order to provide a conservative estimate of the potential for bats to use the Project area. This desktop habitat assessment covers Project area and the 2.5-mi area around the Project area (Assessment Area; Figure 1). Although forested areas exist beyond the edge, the extent of this assessment is constrained to the described Assessment Area.

WEST digitized the boundaries of forested areas containing two or more trees within the Assessment Area based on US Department of Agriculture’s (USDA) National Agricultural Imagery Program (NAIP) imagery (USDA NAIP 2018, 2020) and considered it Potential Habitat. For the purposes of this assessment, WEST defined “patch” as a distinct, contiguous area of trees separated from other distinct, contiguous areas of trees. We also assume a forested patch includes trees with a dbh of at least 3.0 inches (7.6 centimeters). Forested areas within cities were excluded.

We categorized forest patches within the Assessment Area into the following categories based on the USFWS recommendation to use 10.0 ac as the minimum forested patch size for Suitable Summer Habitat (Step 1; WEST 2018):

1. Greater than or equal to 10.0 ac
2. Less than 10.0 ac

A USFWS-permitted WEST bat biologist reviewed all resulting desktop habitat assessment files (Step 2). Using best professional opinion, the bat biologist evaluated the suitability of each digitized patch to ensure all patches deemed Suitable Summer Habitat were biologically valid and

to ensure no patches were excluded that could be ecologically important. During review, the bat biologist may identify areas of smaller patches that they believe should be considered as one “patch”. For example, they may decide that many small adjacent patches should be considered as one patch or that many small patches along a riparian corridor should be considered as one patch.

Although NLEB are a forest-dependent species, the species will use open areas that are adjacent to occupied habitat. The Guidelines state isolated trees or small forest patches might only be suitable as habitat when they are within 1,000 ft of other suitable forested habitats. Therefore, a CHB (1,000-ft) was placed around forested patches (greater than or equal to 10.0 ac) and those patches deemed Suitable Summer Habitat by a WEST bat biologist. All forested areas within or intersecting the CHB (regardless of patch size) were used to calculate the total acreage of potentially Suitable Summer Habitat (Step 3). Isolated trees and isolated small (less than 10.0 ac) forest patches located completely outside the CHB were considered unsuitable habitat for NLEB, as per supporting research (Foster and Kurta 1999, Henderson and Broders 2008, USFWS 2017).

Results

The total area of the CHB was 11,254.9 ac (4,554.7 ha; Figure 1, hashed areas). A small portion (2.4%) of the CHB extended outside of the Assessment Area. Suitable NLEB Summer Habitat (forested areas, regardless of patch size, within and intersecting the CHB [from Step 3]) within the Assessment Area consisted of 592.3 ac (239.7 ha).

Recommendations

The Guidelines describe the minimum survey effort for presence/probably absence surveys associated with non-linear projects to be one survey site per 123.0 ac (49.8 ha) of Suitable Summer Habitat. Because 592.3 ac (239.7 ha) of Suitable Summer Habitat is present within the Assessment Area, WEST recommends surveys be conducted at five sites that intersect the Assessment Area within appropriate habitat.

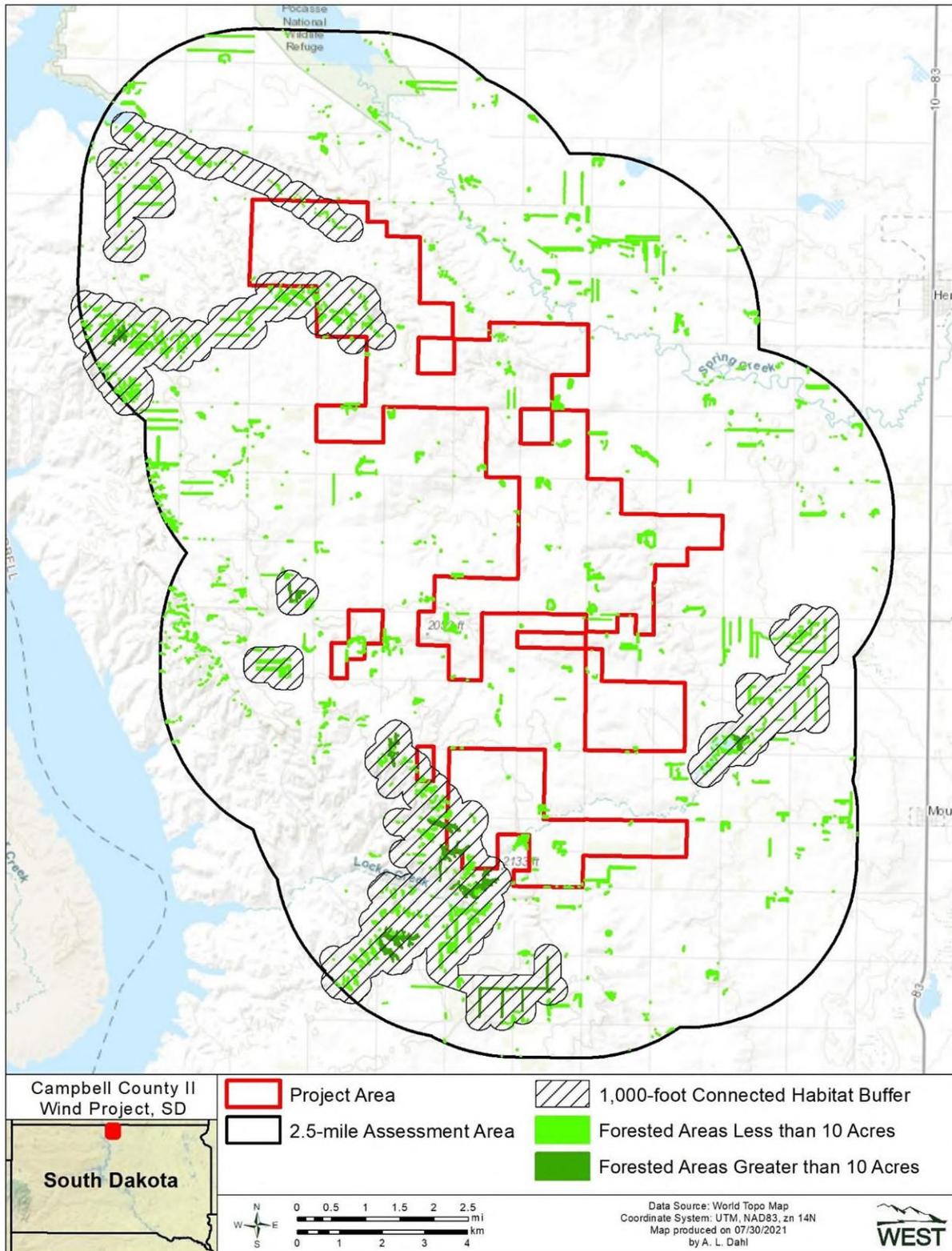


Figure 1. Potential northern long-eared bat summer habitat within the proposed Campbell County II Wind Project and the larger Assessment Area, in Campbell County, South Dakota.

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**Bat Summer Presence/Absence Surveys
Campbell County Wind Farm 2
Campbell County, South Dakota**

**Final Report
July 31 – August 9, 2023**



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Bismark, North Dakota 58503

October 23, 2023



Confidential Business Information

EXECUTIVE SUMMARY

Campbell County Wind Farm 2, LLC (Campbell County) is considering the development of the Campbell County Wind Farm 2 (Project) located in Campbell County, South Dakota. Campbell County requested Western EcoSystems Technology, Inc. (WEST) to conduct mist-net surveys to identify bat species using the Project during the summer maternity season. The objective of the survey was to determine the presence or probable absence of the northern long-eared bat (NLEB) at the Project during the summer.

WEST conducted summer bat presence/probable absence surveys for the federally listed endangered NLEB within the Project area. The Project is approximately 11,993.0 acres (ac; 4,854.0 hectares [ha]). Using a desktop analysis of wooded habitat, WEST determined there to be 27.0 ac (10.9 ha) of suitable habitat for NLEB in the Project area. To meet project requirements and US Fish and Wildlife Service recommendations, Campbell County volunteered WEST to survey two sites instead of the required one site.

A study plan for the survey was provided to the US Fish and Wildlife Service on June 23, 2023, and site-specific authorization was provided on July 28, 2023. WEST conducted mist-net surveys from July 31 – August 9, 2023, following methods described in the *2023 Range-Wide Indiana Bat & Northern Long-eared Bat Survey Guidelines*.

WEST biologists captured 11 bats: five eastern red bats, four hoary bats, and two big brown bats. No northern long-eared bats were captured. No radiotelemetry was conducted during this study because no target species were captured.

STUDY PARTICIPANTS

Martin Piorkowski	Project Manager
Kevin Murray	Senior Bat Review
Kristina Rendon-Hammond	Senior Bat Review
Curtis Hart	Permitted Bat Biologist, Mist-Net Site Lead
Lindsay Hart	Bat Biologist Technician
Pallavi Sirajuddin	Report Writer
Ann Dahl	GIS Specialist
Britten Vincent	Data Manager
Addison Allen	Bat Project Coordinator
Carissa Goodman	Technical Editor

REPORT REFERENCE

Sirajuddin, P. and M. Piorkowski. 2023. Bat Summer Presence/Absence Surveys, Campbell County Wind Farm 2, Campbell County, South Dakota. Final Report: July 31 – August 9, 2023. Prepared for RWE Clean Energy, LLC, Austin, Texas. Prepared by Western EcoSystems Technology, Inc., Bismarck, North Dakota. October 23, 2023.

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BACKGROUND AND PROJECT OVERVIEW

Campbell County Wind Farm 2, LLC (Campbell County) is considering the development of the Campbell County Wind Farm 2 (Project) in Campbell County, South Dakota (Figure 1). Campbell County requested that Western EcoSystems Technology, Inc. (WEST) conduct presence/probable absence mist-net surveys to identify bat species occurring in the Project Area during the 2023 summer maternity season. The objective of the survey was to determine the presence or probable absence of the northern long-eared bat (*Myotis septentrionalis*; NLEB) at the Project during the summer. Mist-net surveys were conducted using methods described in the US Fish and Wildlife Service's (USFWS) *2023 Range-Wide Indiana Bat & Northern Long-eared Bat Survey Guidelines* (Guidelines; USFWS 2023) and following USFWS recommendations in an authorization letter dated July 28, 2023. This report summarizes the results of surveys conducted during summer 2023.

METHODS

A study plan (Hammond and Piorkowski 2023) for the survey effort was provided to the USFWS on June 23, 2023, and site-specific authorization was provided on July 28, 2023 (L. Toso, USFWS North and South Dakota Field Offices, pers. comm.; Appendix A).

Habitat and Survey Effort

The Project encompasses approximately 11,993 acres (ac; 4,854 hectares [ha]) in Campbell County, South Dakota (Figure 1). A desktop analysis using a combination of manually digitized forest areas and land use/land cover data determined 27 ac of potentially suitable habitat was present within the Project (Piorkowski 2021). For non-linear projects, the Guidelines (USFWS 2023) recommend one survey location per 123.0 ac (50.0 ha) of suitable bat habitat within the Project; therefore, WEST proposed mist-net surveys at one site for 10 net-nights over three calendar nights (i.e., 3 or 4 nets deployed on night one and re-surveyed over two additional nights) to meet the minimum survey effort described in the FWS authorized Study Plan (Hammond and Piorkowski 2023). Campbell County volunteered two mist-net sites within the Project (Figure 2) following USFWS recommendations (Appendix A). Sites were selected by a permitted bat biologist (C. Hart; USFWS permit #ES81968B-2). All bat mist-netting surveys were conducted between July 31 and August 9, 2023.

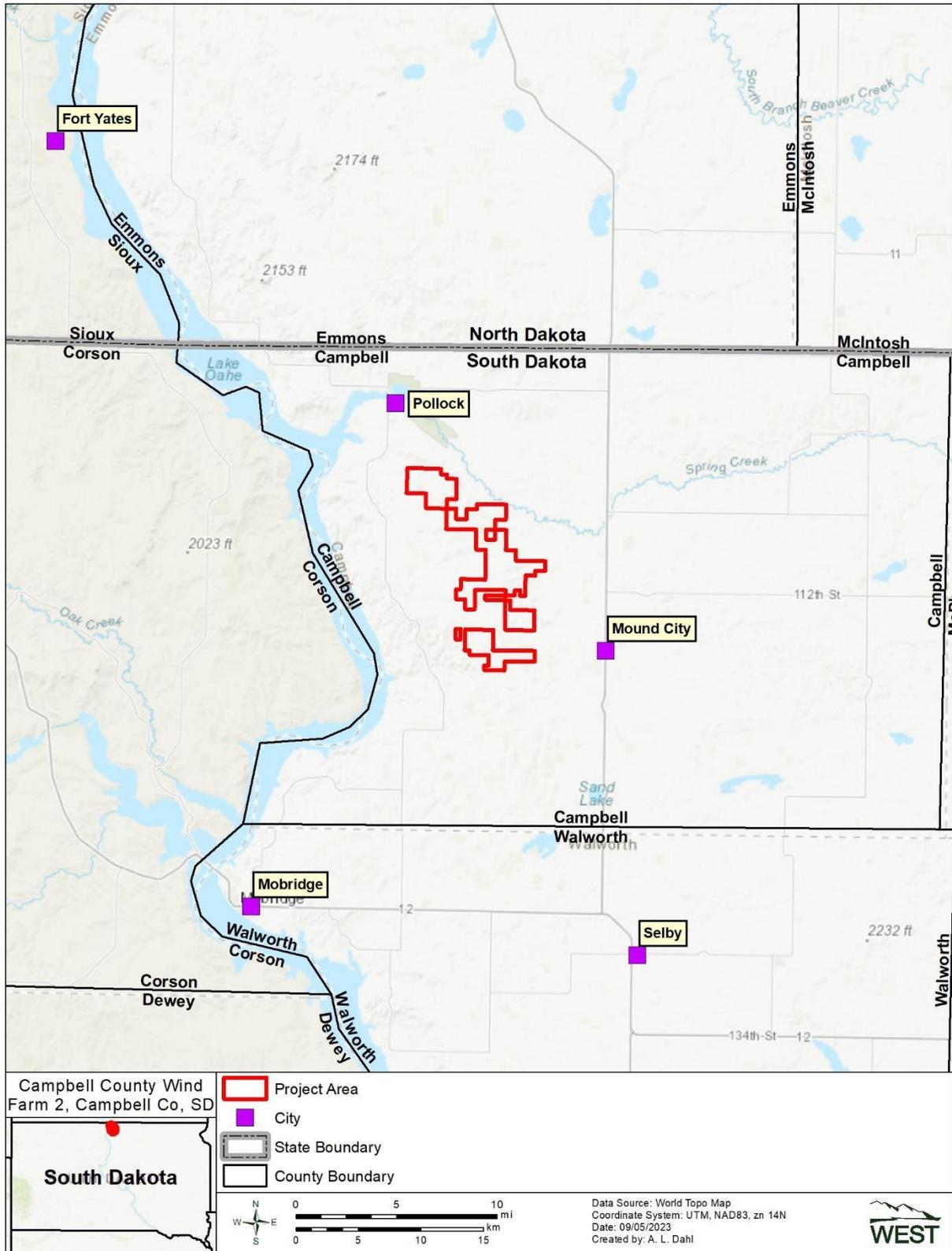


Figure 1. Location of the Campbell County Wind Farm 2, Campbell County, South Dakota.

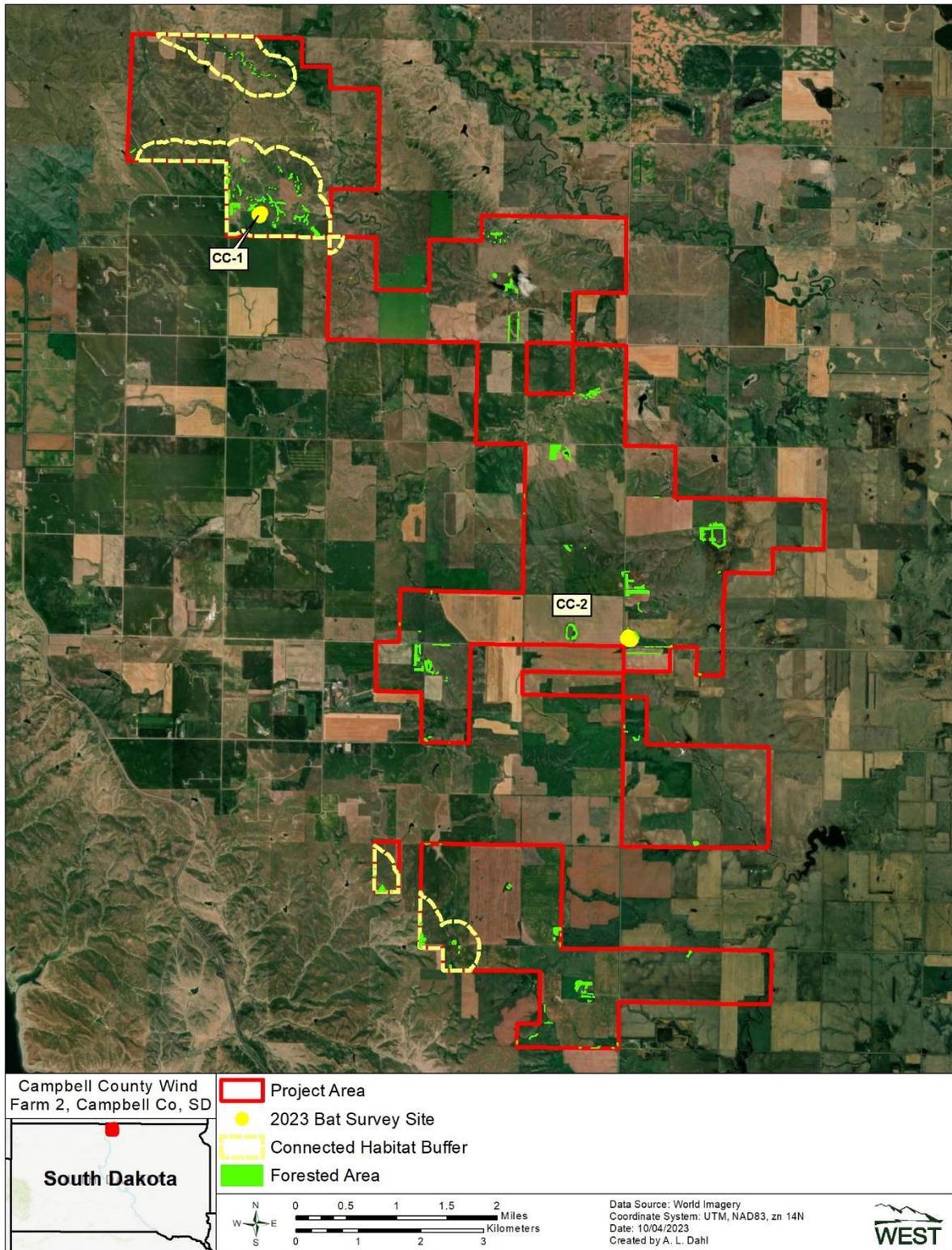


Figure 2. Forested habitat, connected northern long-eared bat habitat buffers and survey locations within the Campbell County Wind Farm 2, Campbell County, South Dakota.

Mist-Net Surveys

Mist-net surveys were performed by individuals holding the proper state and federal endangered species recovery permit (ES81968B-2 [C. Hart]) and surveys were conducted between July 31 and August 9, 2023. WEST surveyed 3 or 4 mist-net locations per site (Figure 2). Mist-nets were placed in the best available habitat for NLEB captures at each site. Each site was surveyed for at least three non-consecutive calendar nights (a minimum of 10 mist-net nights; USFWS 2023). Mist-netting began at sunset and continued for at least five hours.

Standard 2-ply, 50 denier, nylon mist-nets with a mesh size of 38.0 millimeters (mm; 1.3 inches [in]) were used at all mist-net sites. Mist-nets were placed in suitable bat habitat and positioned perpendicularly across flight corridors to fill the corridor from side-to-side and extended from ground-level up to the overhanging canopy, when possible. Each net was spaced approximately 30 meters (98 feet) apart. All mist-net locations occurred within the outlined boundary of the Project (Figure 2).

For each mist-net night, the date, start and end times, site description, site coordinates, mist-net specifics, and weather data (temperature, cloud cover, wind speed, precipitation, and moon phase) were recorded. A permitted bat biologist was present at all mist-net sites to identify all captured bats to species. In addition, sex, age, reproductive condition, body mass (grams), forearm length (mm), and capture status (recapture/new) were recorded.

To assess exposure to WNS in individual bats, a Reichard Index score (0-3) was recorded for all captured bats (Reichard 2009). USFWS WNS decontamination protocols were followed (USFWS 2020) to prevent cross-contamination of captured bats with *Pseudogymnoascus destructans*, the fungus that causes WNS. Captured bats of species other than NLEB were processed and released within 10 minutes. If NLEB were captured, fecal samples were taken for DNA confirmation. If NLEB were captured, they were held no more than 30 minutes to process and obtain any genetic material needed to confirm visual identification.

All species of bats captured were photo-documented with voucher photographs. If any NLEB were captured, photos were taken of all individuals as well as the first 10 little brown bat (*M. lucifugus*; MYLU) captures were collected at each site. WEST-labeled Porzana aluminum clamp bands (size 2.40 mm [0.09 in] or 2.90 mm [0.11 in]) were attached to captured *Myotis* species as described in the authorized Study Plan (Hammond and Piorkowski 2023). All current USFWS- and Centers for Disease Control and Prevention-required measures in terms of COVID-19 were taken, including the usage of proper personal protective equipment. The USFWS standardized permit reporting spreadsheets will be completed for all mist-net data and submitted to the USFWS per permit conditions.

RESULTS

Mist-Net Surveys

WEST biologists captured 11 bats: five eastern red bats (*Lasiurus borealis*), four hoary bats (*L. cinereus*), and two big brown bats (*Eptesicus fuscus*). No NLEB were captured. Mist-net survey site locations, descriptions and results are provided in Tables 1 and 2. Appendices B–F contain the following: map of mist-net locations, photographs of mist-net sites, photographs of captured bats, bat mist-net capture details, and field datasheets, respectively.

Table 1. Locations and site descriptions of mist-net survey at the Campbell County Wind Farm 2, Campbell County, South Dakota, from July 31 – August 9, 2023.

Mist-Net Site ID	Net	UTM*		Site Description
		Easting	Northing	
CC-1	A	402997	5075861	Forested corridor
	B	403007	5075811	Forested corridor
	C	402981	5075832	Forested corridor
	D	403025	5075866	Forested corridor
CC-2	A	408864	5069058	Forested corridor
	B	408904	5069036	Forested corridor
	C	408888	5069098	Forested corridor
	D	408939	5069035	Forested corridor

* Universal Transverse Mercator [UTM] Zone 18, North American Datum 1983

Table 2. Summary of bat mist-net captures at the Campbell County Wind Farm 2, Campbell County, South Dakota, from July 31 – August 9, 2023.

Mist-Net Site ID	EPFU	LABO	LACI	Total
CC-1	0	1	1	2
CC-2	2	4	3	9

EPFU = big brown bat; LABO = eastern red bat; LACI = hoary bat

CONCLUSION

No federally listed threatened or endangered bats were captured during mist-net surveys and no follow up surveys are needed. NLEB are likely absent from the Project area.

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US Fish and Wildlife Service (USFWS). 2023. Range-Wide Indiana Bat & Northern Long-Eared Bat Survey Guidelines. USFWS, Department of the Interior. March 2023. 78 pp. Available online: https://www.fws.gov/sites/default/files/documents/USFWS_Range-wide_IBat_%26_NLEB_Survey_Guidelines_2023.pdf

Appendix A. Site-Specific Authorization



United States Department of the Interior



In Reply Refer to:
CAMPBELL COUNTY WIND
FARM 2 - BAT SURVEYS

FISH AND WILDLIFE SERVICE
Ecological Services
South Dakota Field Office
420 South Garfield Avenue, Suite 400
Pierre, South Dakota 57501-5408

July 28, 2023

Mr. Martin Piorkowski
WEST
415 W. 17th Street
Suite 200
Cheyenne, WY 82001

Dear Mr. Piorkowski:

By way of this letter, the U.S. Fish and Wildlife Service (Service) South Dakota Ecological Services Office authorizes implementation of the proposed presence/probable absence mist net surveys for the endangered northern long-eared bat (*Myotis septentrionalis*) within the proposed Campbell County Wind Farm 2 (CC2), in Campbell County, South Dakota.

With one exception regarding number of survey sites, all surveys shall be done in accordance with *2023 Range-Wide Indiana Bat & Northern Long-eared Bat Survey Guidelines* (most recently updated on May 10, 2023). Your June 23, 2023, study plan was provided with a map identifying the locations of two survey sites (CC-1 and CC-alt1) in the CC2 project area. You had originally proposed to survey just one of these sites (CC-1) as required by the guidelines (1 site per ≤ 123 acres of habitat). However, per email exchanges with our office on July 26, 2023, you have agreed to conduct surveys at both of these locations (CC-1 and CC-alt1). We appreciate the increased coverage; northern long-eared bat habitat characteristics and use differ here in the western portion of the species' range, warranting adjustments to the level of effort to increase confidence in survey results - particularly on large project areas like the CC2 facility.

Pursuant to this letter, the federally permitted bat biologist authorized to conduct the work in South Dakota is Curtis Hart, permit ES81968B-2. Our July 26, 2023, email exchanges also included discussion of genetic sampling methods. You noted that wing punches proposed in your June 23, 2023, study plan will not be conducted at the CC2 project, rather fecal samples will be taken for this purpose. Note that the permittee is currently not authorized to take wing punch samples from northern long-eared bats; we recommend Curtis Hart submit an application for a permit amendment if this activity may be proposed for future surveys.

Additionally, the *2023 Range-Wide Indiana Bat & Northern Long-eared Bat Survey Guidelines* may be applied to the tricolored bat (*Perimyotis subflavus*), a species currently proposed for listing with a final listing decision pending in September 2023. Your proposed study plan

indicates photographs will be taken of all *Myotis* spp.; we recommend photo documentation of any tricolored bats that may be captured as well.

This authorization is contingent upon your acquisition of all applicable State of South Dakota authorization(s) prior to survey implementation. We look forward to seeing the results of your surveys.

If changes are made in the project plans or operating criteria, or if additional information becomes available, the Service should be informed so that the above determinations can be reconsidered. If you have any questions or comments related to this correspondence, please contact Natalie Gates at (605) 220-3881 or natalie_gates@fws.gov.

Sincerely,

**LUKE
TOSO**

Amity Bass

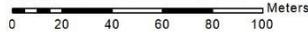
Field Supervisor

North and South Dakota Field Offices

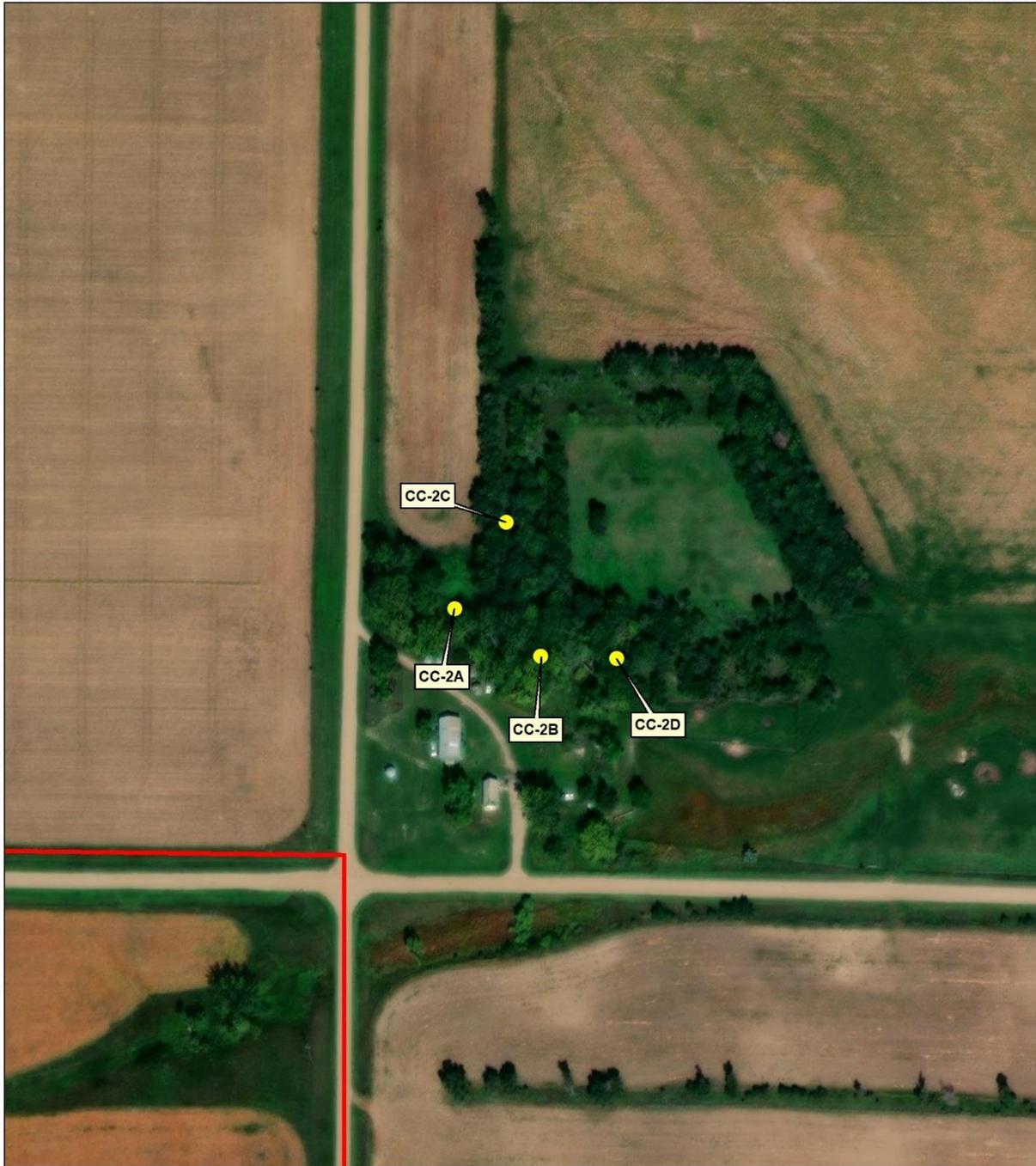
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by LUKE TOSO
Date: 2023.07.28
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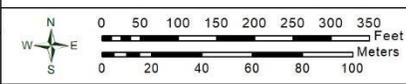
Appendix B. Map of Mist-Net Survey Locations



Campbell County Wind Farm 2, Campbell Co, SD	 Project Area  2023 Bat Survey Site 1		
 <p>South Dakota</p>	  	Data Source: World Imagery Coordinate System: UTM, NAD83, zn 14N Date: 09/05/2023 Created by A. L. Dahl	

Appendix B1. Locations of mist-nets (A–D) at CC-1 at the Campbell County Wind Farm 2.



Campbell County Wind Farm 2, Campbell Co, SD	 Project Area
 <p style="text-align: center;">South Dakota</p>	 2023 Bat Survey Site 2
	Data Source: World Imagery Coordinate System: UTM, NAD83, zn 14N Date: 09/05/2023 Created by A. L. Dahl



Appendix B2. Locations of mist-nets (A–D) at CC-2 at the Campbell County Wind Farm 2.

Appendix C. Photographs of Mist-Net Survey Location



Appendix C1. Photograph of mist-net at net location CC-1-A, surveyed July 31 – August 6, 2023.



Appendix C2. Photograph of mist-net at net location CC-1-B, surveyed July 31 – August 8, 2023.



Appendix C3. Photograph of mist-net at net location CC-1-C, surveyed July 31 – August 6, 2023.



Appendix C4. Photograph of mist-net at net location CC-1-D, surveyed July 31 – August 8, 2023.



Appendix C5. Photograph of mist-net at net location CC-2-A, surveyed August 2 – 9, 2023.



Appendix C6. Photograph of mist-net at net location CC-2-B, surveyed August 2 – 9, 2023.



Appendix C7. Photograph of mist-net at net location CC-2-C, surveyed August 2 – 7, 2023.



Appendix C8. Photograph of mist-net at net location CC-2-D, surveyed August 7 – 9, 2023.

Appendix D. Photographs of Captured Bats



Appendix D1. Male eastern red bat captured at site CC-1, on August 6, 2023.



Appendix D2. Female hoary bat captured at site CC-1, on August 6, 2023.



Appendix D3. Female big brown bat captured at site CC-2, on August 2, 2023.

Appendix E. Bat Mist-Net Capture Details

Appendix E1. Details of Bats Captured at Site CC-1 (August 6, 2023).

Survey Date	Time	Species¹	Sex²	Age³	Reproductive Status⁴	Reichard Score	Forearm Length (mm)	Weight (g)	Re-captured (Yes/No)
8/6/2023	23:09	LABO	M	A	TD	0	38.3	10.75	no
8/6/2023	1:44	LACI	F	A	N	0	54.9	25.75	no

¹ LABO=eastern red bat; LACI=hoary bat

² M=male, F=female

³ A=adult, J=juvenile

⁴ N=non-reproductive, PL=post-lactating, TD=testes descended

Appendix E2. Details of Bats Captured at Site CC-2 (August 2– 9, 2023).

Survey Date	Time	Species¹	Sex²	Age³	Reproductive Status⁴	Reichard Score	Forearm Length (mm)	Weight (g)	Re-captured (Yes/No)
8/2/2023	21:40	LABO	F	A	PL	0	41.3	13.75	no
8/2/2023	22:03	LABO	M	A	TD	0	38.6	10.5	no
8/2/2023	22:21	LACI	F	J	N	0	53	23	no
8/2/2023	22:47	LABO	F	J	N	0	40.8	10.5	no
8/2/2023	23:40	EPFU	F	A	PL	0	46.4	19.5	no
8/2/2023	1:57	LACI*	U	U	U	U			no
8/7/2023	22:19	LACI	M	J	N	0	51	16	no
8/7/2023	0:39	EPFU	F	J	N	0	45.4	17.25	no
8/9/2023	21:32	LABO	M	A	TD	0	38.7	12	no

¹ EPFU=big brown bat; LABO=eastern red bat; LACI=hoary bat

² M=male, F=female

³ A=adult, J=juvenile

⁴ N=non-reproductive, PL=post-lactating, TD=testes descended

U=unknown

* Escaped from net or hand

Appendix F. Mist-Net Survey Datasheets

Bat Capture Data Form



Project: Campbell County State: South Dakota Survey Comments: No captures

Site ID: CC-alt1 County: Campbell

Date: 2023-07-31 Net Night: 1

Biologist(s): C. Hart, L. Hart Night Complete: Yes No

#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Net ID (A, B, ...)	Capture Height In Net (m)	Recapture (Yes / No)	Band #	C Original Transmitter Frequency	D Drifted Transmitter Frequency	Bat ID (Site-Species #)	E Photos (None, Face, Calcus, Toes)	Comments
1	No bats																
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

^A Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
^B Band RIGHT forearm on males, LEFT on females AND include letters.
^C Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
^D Bat ID: write Site ID – Species Code (with the sequential number of individuals of species captured; e.g. MNS-MYSOZ). Only Myotis and target species are given a Bat ID.
^E Take photos of 1) ALL MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.
 * (U) – unknown is used exclusively when a bat escapes before the determination can be made.

Bat Capture Data Form



Project: Campbell County State: South Dakota Survey Comments:
 Site ID: CC-alt2 County: Campbell
 Date: 2023-08-02 Net Night: 1
 Biologist(s): C. Hart, L. Hart Night Complete: Yes No

#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Net ID (A, B, ...)	Capture Height In Net (m)	Recapture (Yes / No)	Band #	C Original Transmitter Frequency	D Drifted Transmitter Frequency	E Bat ID (Site-Species #)	F Photos (None, Face, Calcar, Toes)	G Comments
1	LABO	2140	F	A	PL	0	41.3	13.75	C	3.5	No				CC-alt2 LABO1	Face	
2	LABO	2203	M	A	TD	0	38.6	10.5	B	2.5	No				CC-alt2 LABO2	None	
3	LACI	2221	F	J	N	0	53	23	B	3.5	No				CC-alt2 LAC11	Face	
4	LABO	2247	F	J	N	0	40.8	10.5	B	3.5	No				CC-alt2 LABO3	None	
5	EPFU	2340	F	A	PL	0	46.4	19.5	A	5	No				CC-alt2 EPFU1	Face	
6	LACI	0157	U	U	U	U	.	.	C	3	U				CC-alt2 LAC12	None	Escaped when net was lowered.
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

^A Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
^B Band RIGHT forearm on males, LEFT on females AND include letters.
^C Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
^D Bat ID: write Site ID - Species Code (with the sequential number of individuals of species captured; e.g. MNS5-MYSO2). Only Myotis and target species are given a Bat ID.
^E Take photos of 1) ALL MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.
 * (U) - unknown is used exclusively when a bat escapes before the determination can be made.

Bat Capture Data Form

Project: Campbell County
Site ID: CC-alt1

State: South Dakota
County: Campbell

Survey Comments:
 Survey ended at 2300 due to approaching thunderstorms.
 No captures.



Date: 2023-08-01
Biologist(s): C. Hart, L. Hart
Net Night: 2
Night Complete: Yes No

#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Net ID (A, B, ...)	Capture Height In Net (m)	Recapture (Yes / No)	Band #	C	D	E	Comments	
													Original Transmitter Frequency	Drifted Transmitter Frequency	Bat ID (Site-Species #)	Photos (None, Face, Calcar, Toes)	
1	No bats																
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

^A Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
^B Band RIGHT forearm on males, LEFT on females AND include letters.
^C Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
^D Bat ID: write Site ID – Species Code (with the sequential number of individuals of species captured; e.g. MNS5-MYSO2). Only Myotis and target species are given a Bat ID.
^E Take photos of 1) ALL MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.
 * (U) – unknown is used exclusively when a bat escapes before the determination can be made.

Bat Capture Data Form



Project: Campbell County State: South Dakota Survey Comments: _____
 Site ID: CC-alt2 County: Campbell
 Date: 2023-08-07 Net Night: 2
 Biologist(s): C. Hart, L. Hart Night Complete: Yes No

#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Net ID (A, B, ...)	Capture Height In Net (m)	Recapture (Yes / No)	Band #	C Original Transmitter Frequency	D Drifted Transmitter Frequency	E Bat ID (Site-Species #)	F Photos (None, Face, Calcar, Toes)	G Comments
1	LACI	22:19	M	J	N	0	51	16	A	5.5	No		CC-alt2	LACI3		None	
2	EPFU	00:39	F	J	N	0	45.4	17.25	D	4	No		CC-alt2	EPFU2		None	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

^A Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
^B Band RIGHT forearm on males, LEFT on females AND include letters.
^C Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
^D Bat ID: write Site ID - Species Code (with the sequential number of individuals of species captured; e.g. MNS-MYSO2). Only Myotis and target species are given a Bat ID.
^E Take photos of 1) ALL MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.
 * (U) - unknown is used exclusively when a bat escapes before the determination can be made.

Bat Capture Data Form



Project: Campbell County State: South Dakota Survey Comments: _____
 Site ID: CC-alt1 County: Campbell
 Date: 2023-08-06 Net Night: 3
 Biologist(s): C. Hart, L. Hart Night Complete: Yes No

#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Net ID (A, B, ...)	Capture Height In Net (m)	Recapture (Yes / No)	Band #	C Original Transmitter Frequency	D Drifted Transmitter Frequency	E Bat ID (Site-Species #)	F Photos (None, Face, Calcar, Toes)	G Comments
1	LABO	2309	M	A	TD	0	38.3	10.75	D	1	No				CC-alt1 LABO1	Face	
2	LACI	0144	F	A	N	0	54.9	25.75	D	1	No				CC-alt1 LACI1	Face	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

^A Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
^B Band RIGHT forearm on males, LEFT on females AND include letters.
^C Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
^D Bat ID: write Site ID - Species Code (with the sequential number of individuals of species captured; e.g. MNS5-MYSO2). Only Myotis and target species are given a Bat ID.
^E Take photos of 1) ALL MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.
 * (U) - unknown is used exclusively when a bat escapes before the determination can be made.

Bat Capture Data Form

Project: Campbell County
 Site ID: CC-alt2

State: South Dakota
 County: Campbell

Survey Comments:

Date: 2023-08-09

Net Night: 3

Biologist(s): C. Hart, L. Hart

Night Complete: Yes No



#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Net ID (A, B, ...)	Capture Height In Net (m)	Recapture (Yes / No)	Band #	C	D	E	Comments
													Original Transmitter Frequency	Drifted Transmitter Frequency	Bat ID (Site-Species #)	Photos (None, Face, Calcus, Toes)
1	LABO	2132	M	A	TD	0	38.7	12	B	2.5	No				CC-alt2 LABO4	None
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

^A Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
^B Band RIGHT forearm on males, LEFT on females AND include letters.
^C Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
^D Bat ID: write Site ID - Species Code (with the sequential number of individuals of species captured; e.g. MNS-MYSO2). Only Myotis and target species are given a Bat ID.
^E Take photos of 1) ALL MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.
 * (U) - unknown is used exclusively when a bat escapes before the determination can be made.

Bat Capture Data Form



Project: Campbell County State: South Dakota Survey Comments: No captures
 Site ID: CC-alt1 County: Campbell
 Date: 2023-08-08 Net Night: 4
 Biologist(s): C. Hart, L. Hart Night Complete: Yes No

#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Net ID (A, B, ...)	Capture Height In Net (m)	Recapture (Yes / No)	Band #	C Original Transmitter Frequency	D Drifted Transmitter Frequency	Bat ID (Site-Species #)	E Photos (None, Face, Calcar, Toes)	Comments	
1	No bats																	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

^A Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
^B Band RIGHT forearm on males, LEFT on females AND include letters.
^C Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
^D Bat ID: write Site ID - Species Code (with the sequential number of individuals of species captured; e.g. MNS-MYSO2). Only Myotis and target species are given a Bat ID.
^E Take photos of 1) ALL MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.
 * (U) - unknown is used exclusively when a bat escapes before the determination can be made.

Site Description and Weather Data Form



Location Information	
Site ID: CC-alt2	Project: Campbell County
	State: South Dakota
	County: Campbell
	Datum: NAD 83

Net Locations – Take pictures of each net set and distinguishing characteristics		Net Nights Used (1,2,...)		Canopy Cover (%)	
Net ID (A,B,...)	Net Size (e.g. 3x9)	Easting	Northing	Net Nights Used (1,2,...)	Canopy Cover (%)
A	3 x 12	408864	5069058	1, 2, 3	25
B	3 x 12	408904	5069036	1, 2, 3	35
C	3 x 12	408888	5069098	1, 2	5
D	3 x 9	408939	5069035	2, 3	35



Should be drawn in a top-down view using map to assist with accuracy. Include all streams, roads, trails, and structures. Note all net locations using Net ID.

Net Night	Date (yyy-mm-dd)	Biologists Present	Total Nets Open (#)	Sunset Time (24 Hour)	Moonrise Time	Moonsset Time	Moon Phase	Start Time	Start Temp (°F)	Start Wind Speed (mph)	Start Sky Code	Stop Time	Stop Temp	Stop Wind Speed	Stop Sky Code	Precip. During Survey (Yes/No)	Precip. Duration (min)	Night Complete (Yes/No)
1	2023-08-02	C. Hart, L. Hart	3	2108	2216	0711	F	2108	82	2	2	0208	69	0	2	No	0	Yes
2	2023-08-07	C. Hart, L. Hart	4	2101	-	1355	G	2101	72	6	2	0201	55	3	1	No	0	Yes
3	2023-08-09	C. Hart, L. Hart	3	2058	0027	1623	H	2058	72	4	1	0158	62	5	0	No	0	Yes
4																		
5																		

Habitat Information		Additional Comments:	
Primary Habitat Surveyed: Upland Forest	Dominant Canopy Species: Populus deltoides Ulmus pumila	Estimated Canopy Tree Age (DBH): Mature (>38 cm)	
Forest Type: Deciduous	Preferred Roost Trees Present: Populus deltoides (snag)		

¹New (N), Crescent (C), Half (H), Gibbous (G), Full (F) ²Bridge, Bottomland Forest, Cave Entrance, Creek/Riparian, Field Edge, Mine Portal, Open Field, Pond, Structure, Upland Forest, or Other (Briefly Describe)

**2021 Prairie Grouse Lek Surveys
Campbell County II Wind Project
Campbell County, South Dakota**

April 2021



Prepared for:

Consolidated Edison Development, Inc.

4301 W. 57th Street, Suite 131
Sioux Falls, South Dakota 57108

Prepared by:

Martin Piorkowski and Sofia Agudelo.

Western EcoSystems Technology, Inc.
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July 13, 2021



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REPORT REFERENCE

Piorkowski, M. and S. Agudelo. 2021. 2021 Prairie Grouse Lek Surveys, Campbell County II Wind Project, Campbell County, South Dakota. April 2021. Prepared for Consolidated Edison Development, Inc., Sioux Falls, South Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. July 13, 2021.

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Figure 1. Prairie grouse potential lek locations recorded during aerial surveys conducted in April 2021 for the Campbell County II Wind Project, Campbell County, South Dakota. 3

INTRODUCTION

Consolidated Edison Development, Inc. (CED) is considering the development of the Campbell County II Wind Project (Project) in west-central Campbell County, South Dakota. CED contracted with Western EcoSystems Technology, Inc. (WEST) to conduct aerial prairie grouse (sharp-tailed grouse [*Tympanuchus phasianellus*] and greater prairie-chicken [*T. cupido*]) lek¹ surveys within the Project area and a two-mile buffer (hereafter, Survey Area). The overall objective of the survey was to locate prairie grouse lek locations within the Survey Area to potentially inform wind turbine siting locations. This report presents results of aerial lek surveys conducted by WEST during April 2021 and following recommendations provided by the South Dakota Department of Game, Fish and Parks (SGFP) during a meeting on March 16, 2021.

PROJECT AREA

The approximately 13,775-acres (ac; 5,575-hectares [ha]) Project area is located west of the town of Herreid, in Campbell County, South Dakota (Figure 1). Land ownership is private (US Geological Survey [USGS] Protected Areas Database of the United States 2019). The Project area falls within the Northwestern Glaciated Plains and the Northwestern Great Plains Level III ecoregions (US Environmental Protection Agency 2017). The landscape within the Project area is nearly flat and along the edge of some relatively steep bluffs down to the Missouri River floodplain on the western edge (USGS National Elevation Dataset 2020). The primary land cover within the Project area is grasslands followed by cultivated crops (National Land Cover Database 2016).

Wetlands are generally sparse throughout the area but relatively evenly distributed across the Project area and are classified as freshwater emergent (48.0%), freshwater ponds (16.0%), and freshwater forested/shrub (US Fish and Wildlife Service National Wetlands Inventory 2020). There is one large (230 ac [93 ha]) freshwater emergent wetland located in the southeast portion of the Project. This wetland is located along either side of an unnamed tributary to Olson Creek; the tributary enters into Olson Creek at approximately the west end of Lake Campbell. Olson Creek is located in the southern portion of the Project area and Spring Creek briefly enters the Project area in the northeast (USGS National Hydrography Dataset 2020).

METHODS

The “Survey Area” where prairie grouse lek surveys were conducted was defined as the Project area extending out to two miles (mi; 3.2-kilometer [km]; Figure 1). Surveys were conducted from a small fixed-wing aircraft (e.g., Cessna 172) by two biologists and a pilot, twice during the peak of the grouse lekking period in April (H. Morey *pers. comm.*), flying aerial transects spaced approximately 0.25 mi (400 meters [m]) apart at an altitude of approximately 164 – 328 feet (50 –

¹ Prairie grouse gather at leks during the spring breeding season. Leks are traditional places where male grouse assemble during the mating season and engage in competitive displays to attract females.

100 m) above ground level through the Survey Area (Figure 1). Survey flights occurred during calm weather (wind speeds less than 20 mi [32 km] per hour) with no or very light rain and oriented north and south to reduce glare from the sun and provide safer flying conditions for the pilot.

Surveys were conducted approximately 30 minutes before sunrise until two hours after sunrise. When grouse were observed together on the ground, the location was recorded as well as the number of birds, activity, and lek status (confirmed or potential, see below for definitions). An onboard Global Positioning System (GPS) unit was used to assist the pilot in navigating transects and one of the biologists used a handheld GPS unit to collect lek locations.

“Confirmed leks” were locations where two or more birds were observed in courtship behavior during both survey periods. “Potential leks” were locations where birds were observed engaging in courtship behavior during only one survey period or where birds were observed in two survey periods but not in courtship behavior.

Prior to the first surveys, WEST submitted a data request to the SGFP in early April to identify historically known prairie grouse lek locations in the Survey Area. This data request resulted in no known or documented leks within the Survey Area.

RESULTS

WEST conducted the first survey from April 4 – 8, 2021, and the second survey from April 21 – 29. Four potential leks were observed during aerial surveys (Table 1; Figure 1). As no location appeared to include displaying birds during both survey periods, WEST was not able to formally confirm leks locations during the 2021 prairie grouse breeding season. However, for the purposes of this report, we represent locations of displaying males as leks and recommend additional survey efforts to confirm the activity of these potential leks. All grouse observed on potential leks were identified as sharp-tailed grouse. The range of the maximum number of grouse observed on a potential lek was 7 – 13 individuals.

Table 1. Prairie grouse potential lek locations¹ observed during aerial surveys conducted in April 2021 for the Campbell County II Wind Project, Campbell County, South Dakota.

Lek ID	Maximum Number of		Easting	Northing
	Grouse	Species		
1	12	sharp-tailed grouse	402998	5077639
2	13	sharp-tailed grouse	411275	5067589
3	7	sharp-tailed grouse	409738	5074674
4	7	sharp-tailed grouse	406484	5071168

¹ Easting and Northing are projected in Universal Transverse Mercator, North American Datum 1983, Zone 14 North, units are in meters.

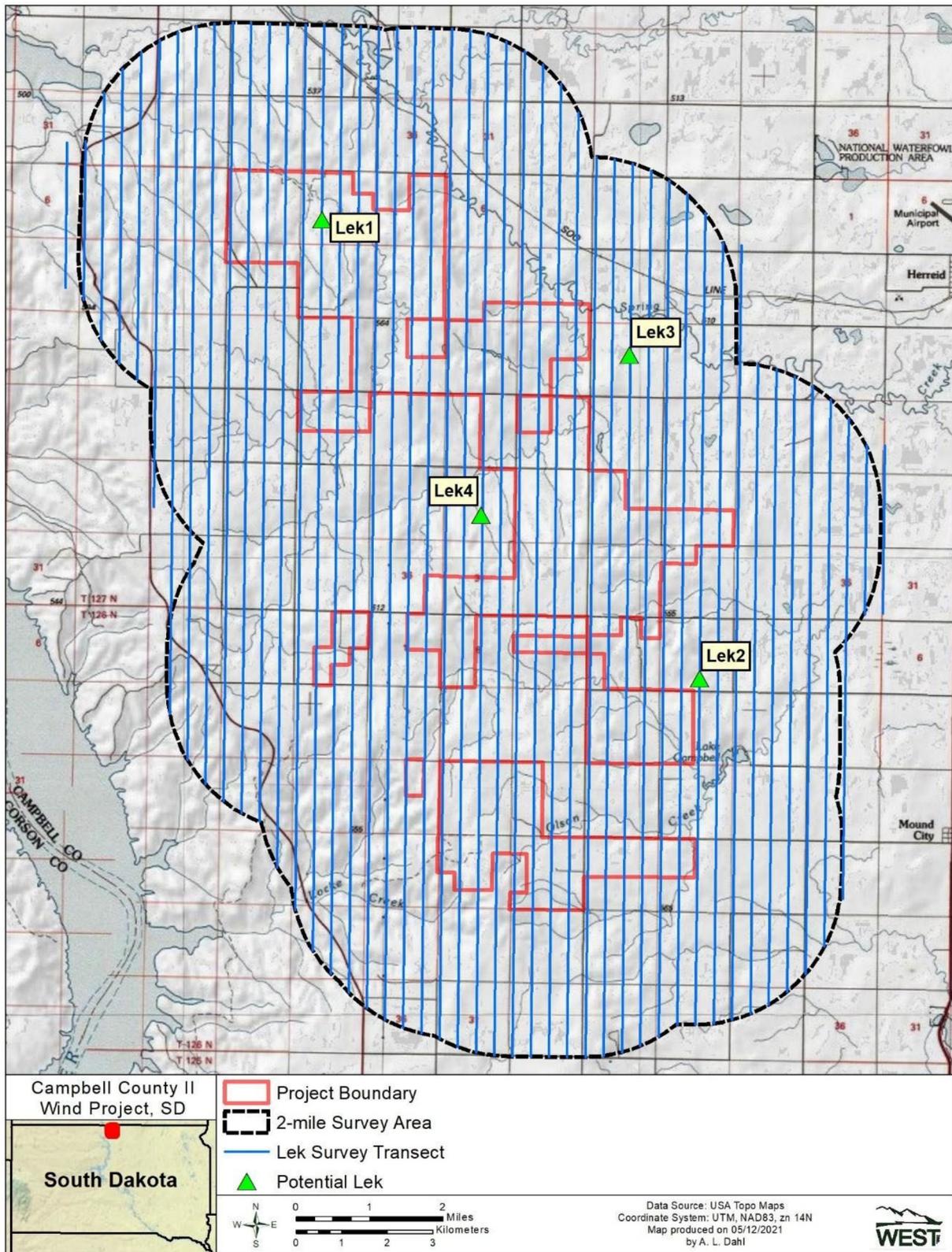


Figure 1. Prairie grouse potential lek locations recorded during aerial surveys conducted in April 2021 for the Campbell County II Wind Project, Campbell County, South Dakota.

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**Prairie Grouse Lek Survey
Campbell County Wind Farm 2
Campbell County, South Dakota**

**Final Report
March – May 2023**

Prepared for:

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Prepared by:

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September 19, 2023



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REPORT REFERENCE

Piorkowski, M. and M. Gerringer. 2023. Prairie Grouse Lek Survey, Campbell County Wind Farm 2, Campbell County, South Dakota. Final Report: April – May 2023. Prepared for RWE Clean Energy, LLC, Austin, TX. Prepared by Western EcoSystems Technology, Inc., Bismarck, North Dakota. September 19, 2023. 8 pages.

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1 INTRODUCTION

RWE Clean Energy, LLC (RWE) is proposing to construct the Campbell County Wind Farm 2 (Project) in Campbell County, South Dakota. RWE contracted Western EcoSystems Technology, Inc. (WEST) to conduct ground-based lek surveys for prairie grouse (sharp-tailed grouse [STGR; *Tympanuchus phasianellus*] and greater prairie-chicken [GRPC; *T. cupido*]) throughout the Project Area and an independently separate Study Area (minimum convex polygon of the turbine layouts excluding the Project Area [Study Area; Figure 1]). Surveys were conducted following guidance from the South Dakota Department of Game, Fish, and Parks (SDGFP) *Management of Prairie Grouse in South Dakota* (SDGFP 2022) and aligned with objectives in the *Prairie Grouse Action Plan for South Dakota 2023 – 2027* (SDGFP 2023a), and verbal guidance provide by SDGFP during agency meetings in March 2021 and September 2022.

Two species of prairie grouse reside within South Dakota, the STGR and GRPC (SDGFP 2023a). Both species are valuable to SDGFP and the public as game birds (SDGFP 2023b). In addition, both species are known for their charismatic breeding behavior in which male prairie grouse congregate at communal mating grounds (leks) to perform elaborate displays for females. Male prairie grouse typically return to the same lek year after year, making counts of leks a useful index for monitoring changes in population abundance from year to year (SDGFP 2022). Lek activity peaks during late March to mid-April, nesting begins early to mid-April and the brood-rearing period is June and July (SDGFP 2022).

Both species require large amounts of grassland in the landscape to persist and are sensitive to habitat fragmentation (Bakker 2020). Grasslands with a diversity of plant types, including grass, shrubs, and forbs, provide the best nesting habitat, whereas broods depend on areas with abundant forbs and insects and a mix of cover types for protection. STGR primarily occupies open grasslands mixed with shrubs. GRPC use areas with taller grass within mixed-grass prairies and pastures. Due in part to their sensitivity to habitat fragmentation, GRPC are designated a Species of Greatest Conservation Need and both GRPC and STGR are considered conservation Priority Level I species by SDGFP (Bakker 2020).

The objective of the survey was to check historical prairie grouse leks and search for potential new leks within the Project and Study areas and, to the extent possible, record the species and number of birds observed at each lek. Results from this survey provide baseline information on the location of prairie grouse leks to inform Project development. This report presents results of the lek surveys conducted for the Project during March – May of 2023.

2 PROJECT AREA

The Project is located approximately four miles northwest of Mound City in Campbell County, South Dakota (Figure 1). The Project Area encompasses approximately 11,994 acres within two level IV ecoregions: the Southern Missouri Coteau Slope and the Missouri Coteau Slope (U.S. Environmental Protection Agency [USEPA] 2012). These ecoregions, historically dominated by grasslands, have been largely converted for agricultural use (e.g., row crops and livestock

grazing; USEPA 2012), and include some wetland and riparian areas. Topography within the Project Area varies from relatively flat to rolling uplands. The land cover is primarily grassland/herbaceous and cultivated crops (National Land Cover Database [NLCD] 2019). Wetland habitat accounts for less than 2% of the Project Area and forested habitat less than 1% of the Project area.

The Study Area surveyed for leks included an MCP around the entire proposed Project Area (Figure 1). The land cover types and topography within the Study Area is similar to those of the Project Area (Figure 2).

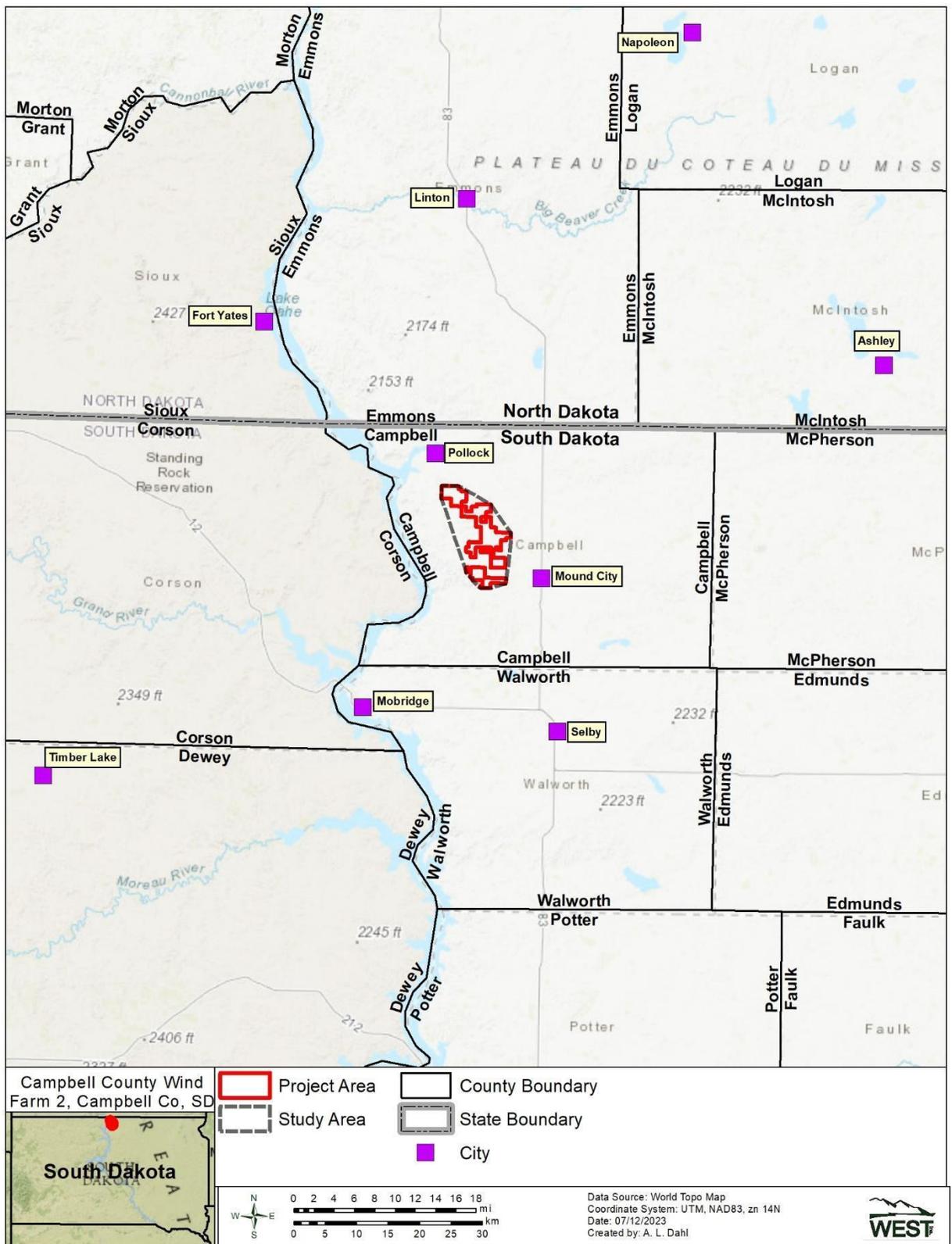


Figure 1. Location of the Campbell County Wind Farm 2 in Campbell County, South Dakota, 2023.

3 METHODS

The methodology used to survey prairie grouse aligned with guidance from SDGFP (SDGFP 2022), and written guidance from SDGFP provided during agency meetings in March 2021 and September 2022. Pre-survey planning included a review of any historical leks within the Project and Study Area. Biologists reviewed aerial imagery (U.S. Department of Agriculture 2022) land cover data (NLCD 2019, Bauman et al. 2020), and previously documented leks (Piorkowski and Agudelo 2021) to identify suitable lek habitat in the Project and Study areas. Leks were surveyed via ground-based surveys during the typical lekking timeframe for prairie grouse, 30 minutes before sunrise until approximately 1.5–2.0 hours after sunrise (SDGFP 2022). To the extent possible, all surveys were conducted on relatively calm mornings (winds less than 15–20 mi per hour) and on days with no precipitation. Historical leks were surveyed if reachable by publicly accessible roads, located on lands currently under easement, or located on land to which access could be obtained.

WEST biologists checked historical prairie grouse leks (located from the air; Piorkowski and Agudelo 2021) and then searched for potential new leks within the Project and Study Areas. The surveys were completed three times between March and May 2023. Prairie grouse lek searches were conducted by driving along publicly accessible roads and stopping between 0.5 mile and 1.0 mile, depending on habitat and topography, to visually scan and listen for up to five minutes to identify any new lek locations.

When grouse were observed at a lek, the location, species, number of birds of each sex, activity, and courtship behavior were recorded. Each lek was assigned a unique identification number and location. Additional data collected for each survey included start and stop time, cloud cover, temperature, and precipitation.

Leks were considered active if two or more displaying male prairie grouse were observed (SDGFP 2022, Runia et al. 2021). Displaying is characterized as inflation of air sacs and associated sounds (including “booming” for GRPC), aggressive face-off behavior between males, and rapid foot stomping and tail vibration (for STGR; SDGFP 2022). For all active leks, lek data was summarized by reporting the maximum count of birds at each lek, across all surveys.

4 RESULTS

Three ground surveys were conducted between March 27 and May 2, 2023. Four historical STGR leks were surveyed within the Project (one lek) and Study Areas (three leks), although only one (Lek 2) of the four historical leks was visible from a public road (Table 1; Figure 2). During each visit, all historical leks were checked and then surveys for new potential leks were conducted. Surveys occurred during the following dates:

- Survey 1 – March 27 – March 28
- Survey 2 – April 22 – April 23

- Survey 3 – May 1 – May 2

During the three surveys, one active STGR grouse lek was located in the Study Area (Table 1; Figure 2). All other historical leks were inactive (Table 1). During the second survey, three STGR grouse were heard at Lek 2 (Figure 2). While grouse were not visible, there were auditory STGR calls heard. No grouse were observed at Lek 2 during the first and third surveys.

Table 1. Maximum count and activity status of prairie grouse surveyed during the ground-based lek surveys conducted at the Campbell County Wind Farm 2 and Survey Area in Campbell County, North Dakota, from March 27 – May 2, 2023.

Lek ID	2021			2023		
	Species	Maximum Number of Grouse	Status	Species	Maximum Number of Grouse	Status
1*	STGR	12	Active	-	0	Inactive
2	STGR	13	Active	STGR	3	Active
3	UNKN	7	Active	-	0	Inactive
4	STGR	7	Active	-	0	Inactive

* Located within the Project boundary.
Species include STGR = sharp-tailed grouse; UNKN = Unknown

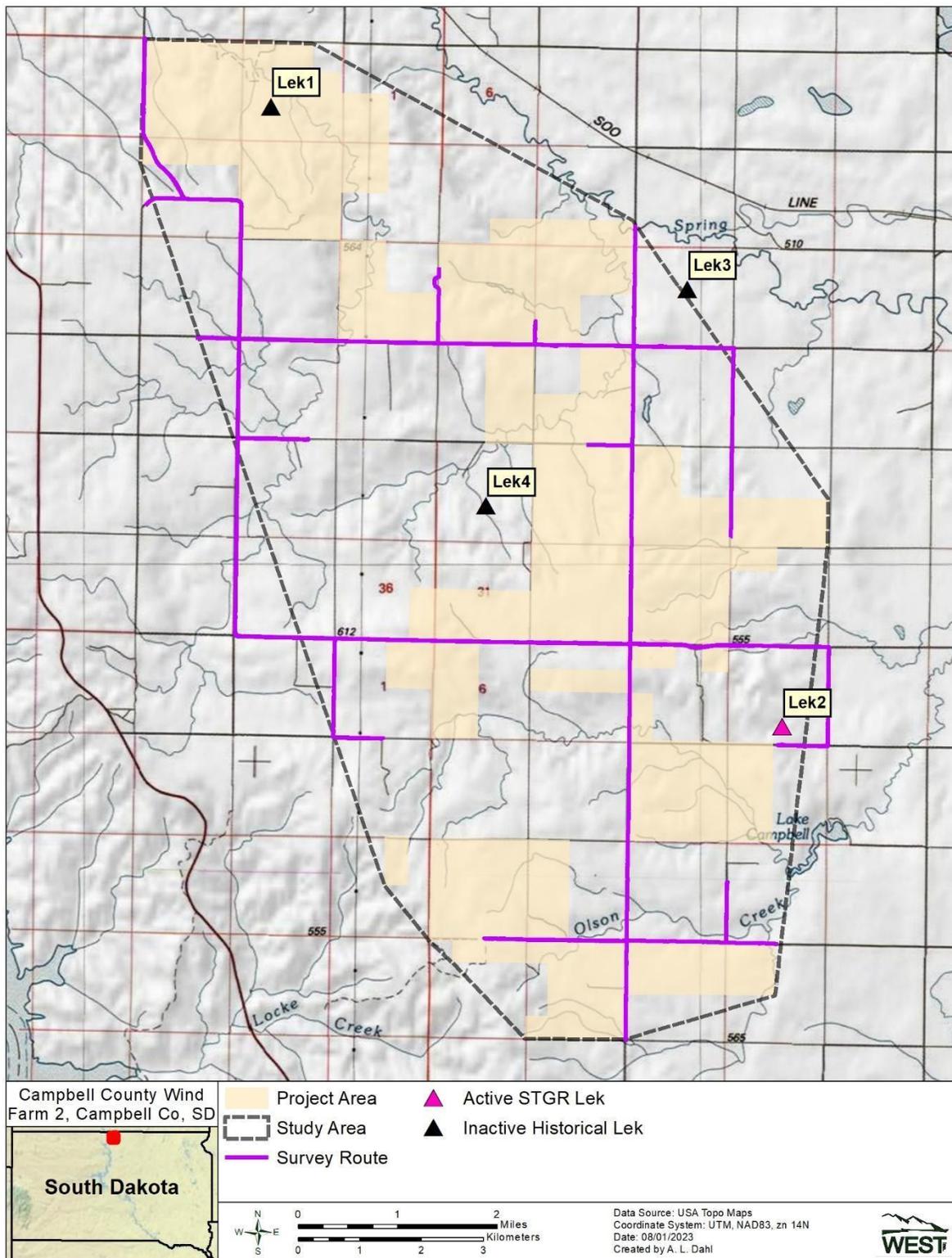


Figure 2. Location of historical prairie grouse leks within the Project and Study areas at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, from March 27 – May 02, 2023.

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**Raptor Nest Survey
Campbell County Wind Farm 2
Campbell County, South Dakota**

**Final Report
March – July 2023**

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1 INTRODUCTION

RWE Clean Energy, LLC (RWE) is proposing to construct the Campbell County Wind Farm 2 (Project) in Campbell County, South Dakota. RWE contracted Western EcoSystems Technology, Inc. (WEST) to conduct aerial and ground-based raptor nest surveys. Surveys were conducted throughout the Project area and a 2.0-mile (mi; 3.2 kilometer [km]) buffer around the Project area (Survey Area; Figure 1).

Raptor nest surveys were conducted in accordance with guidance provided in the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (USFWS 2012), the USFWS *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013), the USFWS *Updated Eagle Nest Survey Protocol* (USFWS 2020) and the USFWS *Region 6 Recommended Protocol for Conducting Pre-construction Eagle Nest Surveys at Wind Energy Projects* (Protocol; USFWS 2021).

The objective of the raptor nest surveys was to provide information on the nesting activity of eagles and other raptor species (e.g., accipiters, buteos, and owls) within the Project area and Survey Area. Results of this survey provide baseline information on the nesting status of all raptor species at the Project.

2 PROJECT AREA

The Project area is approximately 11,994 acres (ac; 4,854 hectares; ha) in size (Figure 1). The town of Mound, South Dakota is located approximately four mi (six km) southeast of the Project area. Land in the Project area is privately owned (US Geological Survey Protected Areas Database of the US 2019). According to the 2019 National Land Cover Database (NLCD), land cover within the Project area is mainly herbaceous (grasslands) to the north followed by cultivated crops through the central and southern portions of the Project area (NLCD 2019; Figure 2). Less than 1% of the Project area is classified as deciduous forest.

Wetlands are evenly but sparsely distributed across the Project area; less than 4% of the Project area is wetland (USFWS National Wetlands Inventory 2022). About 79% of wetlands are freshwater emergent, 11% are freshwater ponds, 10% are riverine, and the remainder are freshwater forested/shrub wetland.

3 METHODS

As recommended in the ECPG and USFWS nest survey protocols (USFWS 2020, 2021), raptor nest surveys were conducted for nests within the Project area and Survey Area. The Protocol recommends a minimum of four ground-based and two aerial surveys to determine nest occupancy, productivity, and nest success.

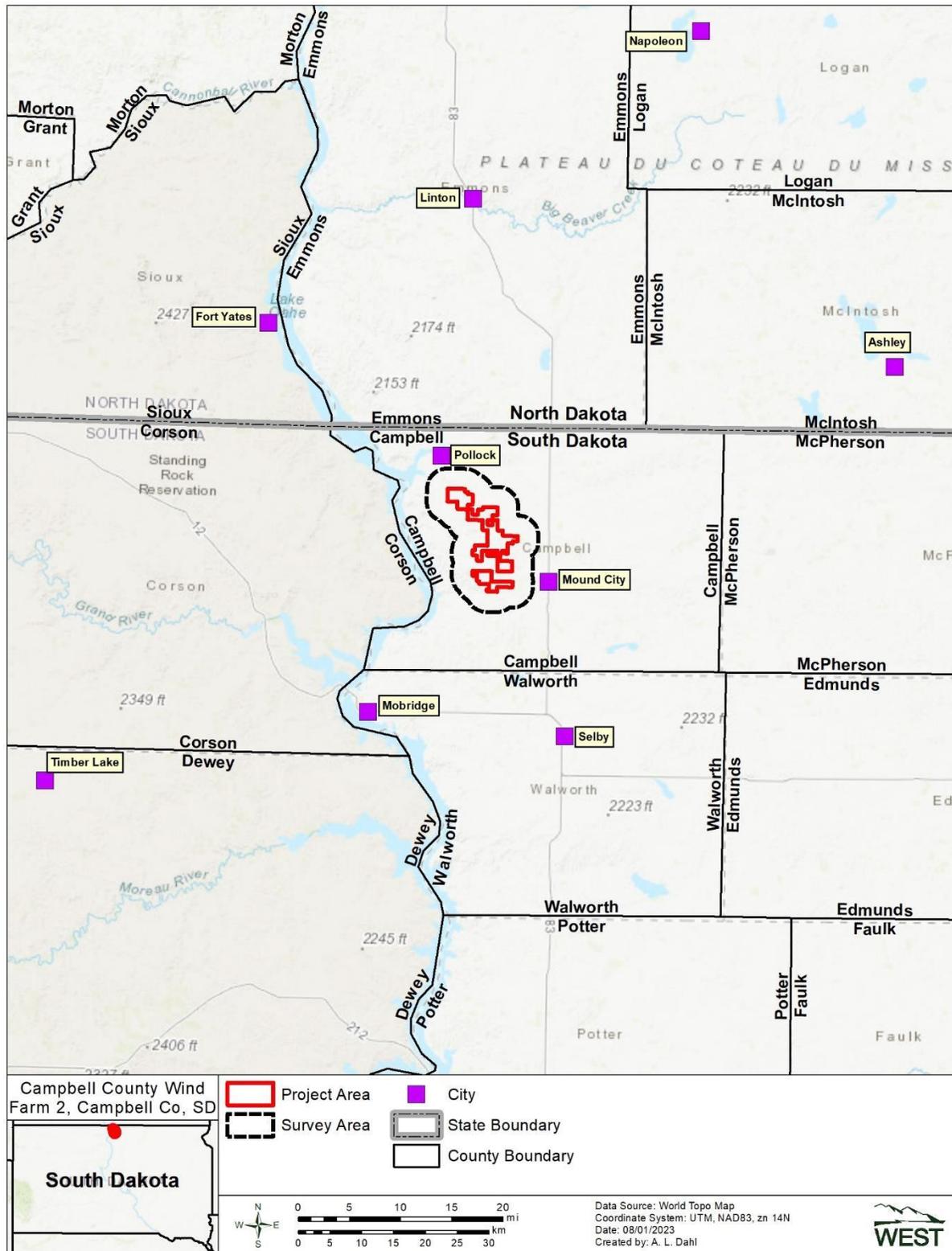


Figure 1. Location of the Campbell County Wind Farm 2 Project in Campbell County, South Dakota.

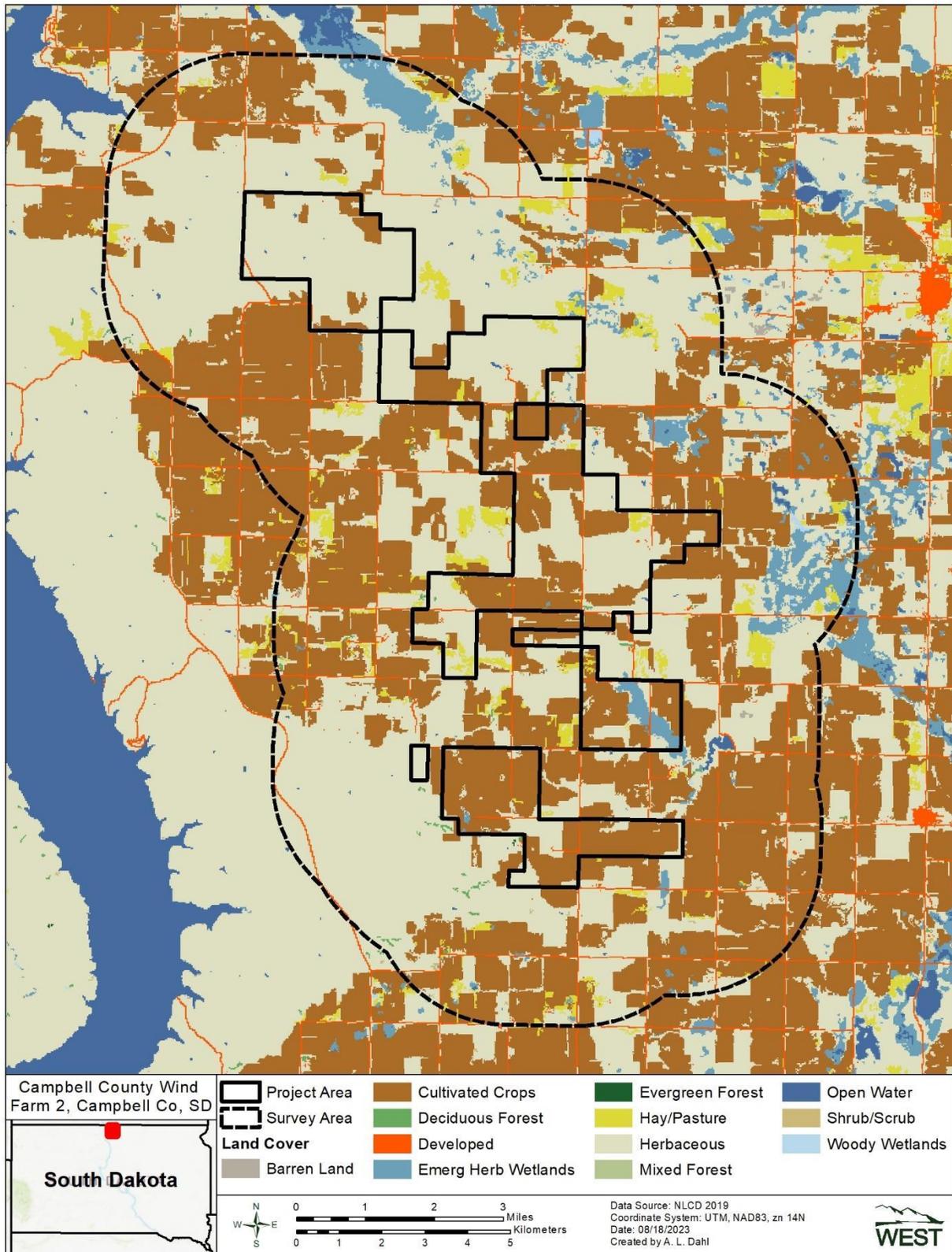


Figure 2. Land cover at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota.

3.1 Ground-based Surveys

The first ground-based survey was used to check or confirm the occupancy status of known eagle nest locations or unknown raptor large and giant stick nests. At least two additional ground surveys were conducted to determine success/productivity. One experienced biologist conducted raptor nest ground surveys. When the biologist observed a nest, they observed the nest with binoculars or a scope and recorded data. The biologist took great care to minimize disturbance to breeding eagles and other raptors. Ground surveys were conducted during daylight hours.

To determine the status of a nest during the first ground survey, the biologist observed the nest for up to four hours and/or until evidence of occupancy was observed (i.e., presence of adults on or near the nest eggs, young, whitewash, or fresh building materials). Ground surveys for success/productivity were conducted until the approximate age of the young could be determined, it was determined that the nest had failed, or the chicks had fledged.

3.2 Aerial Surveys

Two aerial surveys were used to locate nests and to inform occupancy status within the Project area and Survey Area as aerial surveys allowed for a thorough visual inspection of potentially suitable nesting habitats. Potentially suitable nesting habitats for eagles and other raptors included riparian corridors, woodlands, large trees, and anthropogenic structures such as power poles.

An experienced WEST biologist conducted aerial raptor nest surveys from a Robinson R-44 Raven II helicopter with bubble windows that provided good visibility (Pagel et al. 2010, USFWS 2013). The first survey was conducted early in the season prior to deciduous tree leaf-out to ensure easier detection of nests. Conducting the survey early in the breeding season ensured the search effort coincided with the peak of nest occupancy and within the mean egg-laying dates for this region (Pagel et al. 2010, USFWS 2021). The second survey was conducted approximately two months after the first aerial survey and was timed to include other raptors that may initiate nesting later in the breeding season. Methods were consistent between the two aerial surveys.

In general, the helicopter flew at approximately 150–200 feet (ft; 46–61 meters [m]) above ground level at an air speed of approximately 60–70 mi (97–113 km) per hour. All potential habitat was surveyed by flying meandering transects spaced approximately 0.5–1.0 mi (0.8–1.6 km) apart depending on topography and land cover. During each survey, the pilot positioned the helicopter to allow the biologist a thorough visual inspection of giant and large stick nest structures located in suitable nesting habitat. The survey team took great care to minimize disturbance to breeding eagles and raptors. When nests were located, the pilot reduced speed and adjusted the flight path such that the biologist could clearly see the nest to document the nest accurately. The pilot approached the nest slowly from the raptor's field of view and maintained the greatest possible distance (no closer than 492 ft [150 m]) at which point the nest status could be documented. The airspace was occupied for the minimum possible duration, no longer than 15–30 seconds (Pagel et al. 2010, USFWS 2013). The survey flight path was recorded using a hand-held Global

Positioning System (GPS)-enabled tablet running GAIA GPS software (Version: v2023.6) to ensure the Project area and Survey Area were covered adequately.

To determine the status of a nest, the biologist evaluated behavior of adults on or near the nest, the presence of eggs, young, whitewash, or fresh building materials. Species, nest size, nest status, nest condition, and nest substrate were recorded at each nest location to the extent possible.

3.3 Data Collection Methods and Terminology

Each nest was assigned a unique nest identification (ID) number, location was recorded with a GPS, and attribute data including species, substrate, status, condition, location within the Project area or Survey Area, relative nest size, and other nest characteristics were documented. Below are detailed descriptions of nest attributes and applicable definitions and terms. Representative photographs of nests were taken when possible and are presented in Appendix A.

Nest Condition – Nest condition was categorized using descriptions ranging from poor to good, which provided a general sense of when a nest or nest site may have been last used.

- poor: a nest that appeared dilapidated (e.g., in disrepair, sloughing, or sagging heavily) and required major repair to be suitable for successful nesting
- fair: a nest that was in generally good condition with a fairly well-defined bowl, minor sagging, and that may have required some repair in order to be used
- good: a nest that was in excellent condition with a well-defined bowl, no sagging or sloughing, and that was considered suitable for nesting
- unknown: nest condition was unknown

Nest Characteristics – Each nest was recorded according to two general categories: 1) giant and large stick nests (potentially suitable for eagle use) and 2) non-eagle size. Nest size and nest characteristics including structure, location relative to landscape features, and building materials can all be important in distinguishing eagle and potential eagle nests from nests of non-eagle raptors.

Nest Size – Both eagle species build nests that can be from 50% to 200% larger than the nests of other raptors known to nest in the region (Buehler 2020, Katzner et al. 2020). Eagle nests may be used by great horned owls (*Bubo virginianus*) and ferruginous hawk (*Buteo regalis*).

- giant: eagle nests.
 - bald eagle (*Haliaeetus leucocephalus*) nests are approximately 2.0–4.0 ft (0.6–1.2 m) high and approximately 3.0–6.0 ft (0.9–1.8 m) in diameter, and are located high in the tree canopy, which offers good flight access (Buehler 2022). Bald eagles nest in large trees near water bodies containing sufficient foraging opportunities (Isaacs and Anthony 2011, Buehler 2022).

- golden eagle (*Aquila chrysaetos*) nests are 2.0–3.0 ft (0.6–0.9 m) high and approximately 3–5 ft (0.9–1.5 m) in diameter, and are comprised of a few large, several medium, and an abundant number of small sticks (Watson 2010). Golden eagles typically nest along cliffs, in large live trees, and on anthropogenic structures, such as nesting platforms that can bear the weight of the eagle’s large stick nests (Katzner et al. 2020).
- large: nests approximately 2–3 ft in diameter could support eagles but could also be used by species such as great horned owl and ferruginous hawk.
- medium: nests approximately 1–2 ft (0.3–0.6 m) in diameter usually characteristic of Swainson’s (*B. swainsoni*) or red-tailed hawk (*B. jamaicensis*).
- small: nests less than one ft in diameter usually characteristic of small falcons (e.g., American kestrel [*Falco sparverius*], peregrine falcon [*F. peregrinus*]), and accipiters (e.g., northern goshawk [*Accipiter gentilis*] and Cooper’s hawk [*A. cooperii*]).

Nest Status – Nest status was categorized using definitions originally proposed by Postupalsky (1974) and these definitions follow those of the ECPG.

- occupied: nests were classified as occupied if any of the following were observed at the nest structure: 1) an adult in an incubating position; 2) eggs; 3) nestlings or fledglings; 4) presence of an adult (sometimes sub-adults); 5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed earlier in the breeding season; or 6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on the nest rim or underneath.
 - occupied active: nest had eggs, nestlings, and/or an adult in incubating/brooding position at the time of the survey.
 - occupied inactive: nest had evidence of recent tending of the nest or presence by an adult, but there were no eggs, nestlings, or adult in incubating/brooding position.
- inactive: nest with no evidence of nest tending and no eggs, nestlings, or adults present during the first survey.
- unoccupied: a nest classified as inactive for at least two consecutive rounds of surveys.
- missing: the nest was completely missing or could not be found.
- unknown: the nest may or may not have been present; status could not be determined.

Nest Substrate – Nest substrate included anthropogenic structures (e.g., power line poles and nest platforms), cliffs and rock outcrops, and trees.

Raptor Nest – Raptor nests were defined as structures made, or the place used, by raptors for laying their eggs and sheltering their young (Steenhof and Newton 2007).

3.4 Data Management

WEST implemented quality assurance and quality control (QA/QC) measures at all stages of the survey, including in the field, during data entry and analysis, and during report writing. All WEST field staff were trained in proper survey techniques and all data collected were recorded in a tablet and on paper. Data were reviewed before submission for data entry and after data were entered.

If errors or anomalies were found, follow-up measures were implemented including discussions and review of field data with biologists and/or Project Managers.

4 RESULTS

An initial ground survey following USFWS Region 6 guidance was not completed due to the timing of authorization to proceed, however, four ground surveys (one to inform occupancy status and three to inform success/productivity) and two aerial surveys were completed within the Project area and Survey Area (Table 1). No federally or state-listed threatened or endangered species were observed during surveys.

Table 1. Survey timeline for raptor nests completed at the Campbell County Wind Farm 2 Project in Campbell County, South Dakota, 2023.

Survey	Survey Type	Survey Date
Survey 1*	Ground	–
Survey 2	Aerial	March 12
Survey 3	Ground	April 19
Survey 4	Aerial	May 5
Survey 5	Ground	June 2
Survey 6	Ground	June 15
Survey 7	Ground	July 8

* Survey was not completed following US Fish and Wildlife Service Region 6 guidance due to timing of authorization to proceed.

4.1 Nest Status

4.1.1 Eagles

Two historical bald eagle nests (EN-2 and EN-3) located in the Survey Area were identified during previous surveys (Piorkowski and Arellano 2021); EN-2 was missing and could not be located, as was the case in 2021 raptor nest surveys. Nest EN-3, first located in 2021, was located and was classified as occupied and active by a bald eagle pair (Table 2, Figure 3; Appendix A). No other large- or giant-sized stick nests were observed during the surveys.

Eagle nest EN-3 successfully fledged two young eagles during the 2023 breeding season. During Survey 2 (Table 1) there were three eggs identified in the nest. During Survey 4, two nestlings were identified at approximately 24–30 days old. These two eaglets were identified during Surveys 5 and 6, with a recorded approximate and maximum age of 65–71 days old. By Survey 7, there were no eagles observed in the area.

4.1.2 Non-eagle Raptors

Seven non-eagle raptor nests were documented in the Project area and Survey Area (Table 2, Figure 3). Two active great horned owl nests were located, one in the Project area (RN-72) and one within the Survey Area (RN-71; Table 2). One unoccupied unidentified raptor nest (RN-73) was located inside the Project area, and four unoccupied unidentified raptor nests (RN-70, RN-74, RN-75, RN-76) were located inside the Survey Area (Table 2, Figure 3).

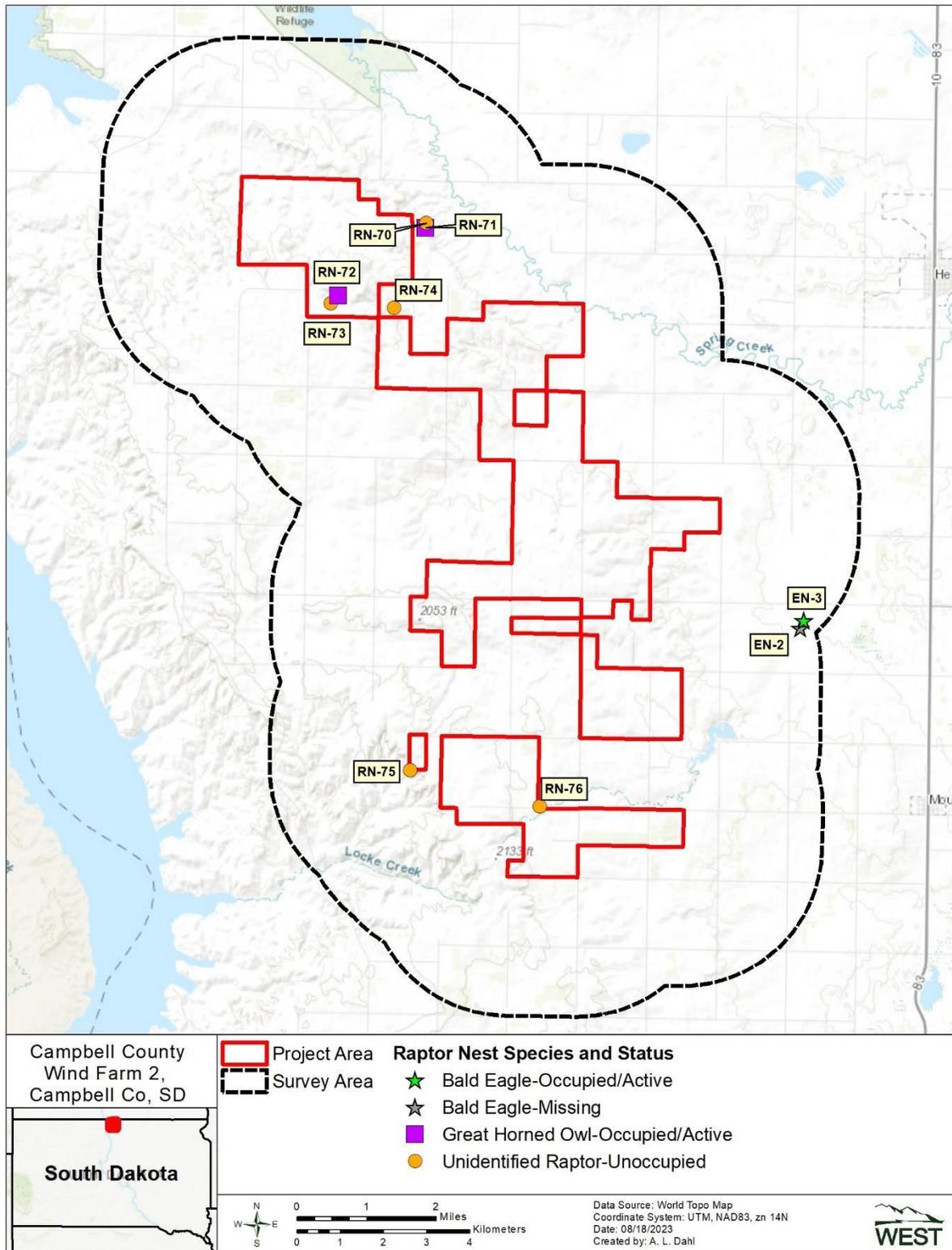


Figure 3. Location of raptor nests at Campbell County Wind Farm 2 Project in Campbell County, South Dakota.

Table 2. Raptor nests identified during the 2023 raptor nest surveys conducted at Campbell County Wind Farm 2 Project in Campbell County, South Dakota.

Nest ID	Species	Nest Status	Nest Size	Nest Condition	Nest Substrate	Location
EN-2 ¹	bald eagle	missing	unknown	unknown	unknown	Survey Area
EN-3 ¹	bald eagle	occupied/active	giant	good	deciduous tree	Survey Area
RN-70	unidentified raptor	unoccupied/inactive	medium	good	deciduous tree	Survey Area
RN-71	great horned owl	occupied/active	medium	good	deciduous tree	Survey Area
RN-72	great horned owl	occupied/active	small	good	deciduous tree	Project area
RN-73	unidentified raptor	unoccupied/inactive	small	poor	deciduous tree	Project area
RN-74	unidentified raptor	unoccupied/inactive	medium	fair	deciduous tree	Survey Area
RN-75	unidentified raptor	unoccupied/inactive	medium	poor	deciduous tree	Survey Area
RN-76	unidentified raptor	unoccupied/inactive	small	poor	deciduous tree	Survey Area

¹: Historic nest.

ID = identification.

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**Appendix A. Photographs of Eagle Nests Documented during the Raptor Nest Surveys
Conducted at the Campbell County Wind Farm 2 Project in Campbell County, South
Dakota.**



Appendix A1. Nest ID EN-3, an active bald eagle nest with eaglets.