Grassland Use Studies for the Crocker Wind Farm Clark County, South Dakota

June 7, 2017 – July 4, 2017

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EXECUTIVE SUMMARY

Crocker Wind Farm, LLC is considering the development of the Crocker Wind Farm (Project) in Clark County, South Dakota. Crocker Wind Farm, LLC contracted Western EcoSystems Technology, Inc. (WEST) to conduct avian use surveys in the Project to estimate levels of use by avian species at the Project. This document provides results of transect grassland bird use surveys conducted from June 7, 2017 – July 4, 2017. Research at the Project was designed to help address the questions posed under Tier 3 of the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines*.

The principal objectives of this grassland breeding bird study were to: 1) provide site-specific bird resource and use data that would be useful in evaluating potential impacts from the proposed wind energy facility, and 2) provide information that could be used in project planning and further coordination with USFWS and South Dakota Game, Fish, and Parks. The studies of habitat and wildlife use during the planning phase can be useful to compare to the results of post-construction studies.

Breeding bird surveys were conducted three times at 30 randomly selected proposed turbine locations, with two transects surveyed each time. Forty-eight bird species were identified during the 176 transect surveys, during which 2,843 individual bird observations and 1,892 separate groups were recorded. Cumulatively, eight species comprised 74% of the individual observations: grasshopper sparrow, western meadowlark, bobolink, dickcissel, brown-headed cowbird, clay-colored sparrow, red-winged blackbird, and chestnut-collared longspur. No federally protected species or state-listed species were recorded during the surveys. No other state-listed species were recorded during the breeding bird surveys. One species of Special Concern (Swainson's hawk), two Species of Greatest Conservation Need (marbled godwit and willet), and four additional species listed as Birds of Conservation Concern (upland sandpiper, chestnut-collared longspur, dickcissel and grasshopper sparrow) were observed.

STUDY PARTICIPANTS

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INTRODUCTION

Crocker Wind Farm, LLC is considering the development of the Crocker Wind Farm (Project) in Clark County, South Dakota. Crocker Wind Farm, LLC contracted Western EcoSystems Technology, Inc. (WEST) to conduct avian use surveys at the Project. This document provides results of transect grassland bird use surveys, conducted from June 7, 2017 – July 4, 2017. Research at the Project was designed to help address the questions posed under Tier 3 of the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (USFWS 2012).

The principal objectives of this grassland breeding bird study were to: 1) provide site-specific bird resource and use data that would be useful in evaluating potential impacts from the proposed wind energy facility; and 2) provide information that could be used in project planning and further coordination with USFWS and South Dakota Game, Fish, and Parks (SDGFP). The studies of habitat and wildlife use during the planning phase can be useful to compare to the results of post-construction studies.

PROJECT AREA

The Project is located in northwestern Clark County, South Dakota (Figure 1). The Project falls within the Northern Glaciated Plains Ecoregion, which covers much of the eastern portion of South Dakota (Bryce et al. 1996). The Northern Glaciated Plains are characterized by a flat to gently rolling landscape composed of glacial drift. This ecoregion serves as a transitional zone between tall and mixed grass prairie with high concentrations of temporary and seasonal wetlands that are favorable for duck nesting and migration. The Project is located on a lobe of the Prairie Couteau between two rivers, the James to the west and the Big Sioux to the east. The landscape is dominated by short grass and tall-grass prairies, interspersed with lakes and herbaceous wetlands. Some grasslands that were once rolling terrain have been converted to agricultural landscapes dominated with row crops such as corn (*Zea mays*) and soybeans (*Glycine max*). The landscape of the Project is characterized by rolling topography. Higher elevations in the couteau run from the north-northwest to south-southeast, gently sloping to lower elevations in the west toward the James River valley.

METHODS

Breeding bird surveys are used to gather information on species presence and relative abundance within an area during the breeding and nesting season. The objectives of these grassland breeding bird surveys were to identify breeding bird presence, relative abundance, and distribution within the study area.

Transect Bird Use Surveys

Study Design

The sample design focused the survey efforts within lands identified for turbine locations in land cover dominated by herbaceous and hay/pasture, as identified by USGS NLCD 2011; additionally, at least 30% of the surveyed areas were located on lands identified as Potentially Undisturbed Lands (SDSU-extension 2016). All potential turbine locations meeting the above criteria were assigned a sampling order using a random number generator. The first 40 turbine sites meeting the above requirements were inspected, sequentially, using satellite imagery to confirm that the sites are biologically appropriate for grassland bird surveys (e.g., do not include non-grassland habitats such as water, emergent wetlands, and are at least approximately 150 meters [m] from existing roads). Sites were excluded from the sample if the requirements were not met, and the next consecutively ordered location considered until the sample of 30 sites was achieved, with 20 backup turbines identified if field conditions (access or safety) precluded sampling. The goal of this selection strategy was to ensure the selected sites represented a random sample of intact grasslands and prairies within the current layout, with the understanding that these areas and their avian communities were most likely to be affected by construction and operation of a wind farm.

At each selected turbine location, three transects were established 250 m apart, and 150 m from the edge of a habitat (i.e., road, woodlot, row crops). For these surveys, WEST defines turbine site to extend within a 200-m radius from the proposed turbine location, with the aim of sampling the proposed turbine site, and at a paired parallel location 250 m away. For each turbine transect location, WEST identified center points for paired transects by measuring 250 m in both directions and perpendicular to the turbine string. Transects were extended 150 m from these center points, approximately parallel to the turbine string azimuth, north-west to south-east. Each turbine (T) transect was sampled, and then one of the two other nearby reference (R) locations. The non-turbine transects were rejected if habitat did not meet habitat requirements identified above (e.g., grassland, proximity to roads, open water). Following sampling, effort was made to return to the same transect locations during each of the three surveys. Occasionally, a paired transect location was rejected during a follow up survey due to unsafe logistical concerns, primarily presences of bulls in open pastures. When the randomly selected paired location was not available or appropriate for sampling, the other R location transect was surveyed. Avian survey biologists were provided detailed maps and transect location coordinates for their Global Positioning System unit.

Each surveyed transect extended 300 m in length, with observations recorded continuously (Bibby et al. 2000, Buckland et al. 2001, and Hill et al. 2005). Observers paused about 1-2 minutes (min) every 100 m to ensure that all observed species were documented before continuing on the established transect route. Surveyed areas extended 75 m in all directions from the transect line, including ahead and behind the observer; effort was made to ensure that surveys documented abundance of individuals without over counting. Walking pace of the observer was kept consistent to standardize effort.

In addition to the species observed and location, WEST recorded the following: date, start and end time of observation period, transect number, species or best possible identification, number of individuals, behavior, and auditory-only observations. Weather information, such as temperature, wind speed, wind direction, precipitation, and cloud cover, was recorded for each transect survey.

It is important to note that the design of this study focused specifically on all grassland habitat, and is not an assessment of all habitats within the proposed Crocker Wind Farm. So, while the design of this study provides an extensive assessment of the grassland breeding bird community at the request of the coordinating agencies, the methods should be evaluated if appropriate for assessing the impact of wind development for either displacement or avoidance.

Observation Schedule

WEST biologists surveyed each of the 30 pairs of transects approximately three times between June 7 – July 4, 2017, for a total of 176 transect surveys. Effort was made to ensure that observations at each site were evenly spaced throughout that period, although weather conditions (fog, rain) did not permit completely even spacing. All surveys were completed from 30 min before sunrise to 10:00 a.m. to maximize auditory detection of singing/calling birds.

Statistical Analysis

Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers were responsible for inspecting data forms for completeness, accuracy, and legibility. A sample of records from an electronic database was compared to the raw data forms and any errors detected were corrected. Irregular codes or data suspected as questionable were discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

Data Compilation and Storage

WEST maintains a relational database for storage, organization, and retrieval of survey data. Data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. All data forms, field notebooks, and electronic data files were retained for reference.

Transect Bird Surveys

WEST standardized survey observations per 300 m transect (hereafter, transect), and the survey site (turbine site T and surrounding area R combined). WEST used these two spatial scales to compare and contrast use levels, frequency, and count among bird types and survey points at the Project.

Bird Diversity and Species Richness

Bird diversity was illustrated by the total number of unique species observed. Species lists (with the number of observations and the number of groups) and included all observations of birds detected, regardless of their distance from the observer. In some cases, the tally of observations may represent repeated sightings of the same individual, although given the duration of the counts there is minimal likelihood of extensive over counts. Species richness was calculated as the count of species observed per plot per survey (i.e., number of species/transect/15-min survey).

Bird Count, Percent of Count, and Frequency of Occurrence

Percent of count was calculated as the proportion of the overall count for a particular bird type or species, and the frequency of occurrence was calculated as the percent of locations in which a particular bird type or species is observed. Frequency of occurrence and percent composition provide relative estimates of species exposure to the wind energy facility. For example, a species may have high mean counts for the study area based on just a few observations of large groups; however, the frequency of occurrence will indicate that the species occurs during very few of the surveys and therefore may be less likely to be affected by the proposed wind energy facility.

RESULTS

Transect Use Surveys

A total of 176 grassland breeding bird transect surveys were conducted among 30 proposed turbine sites within the Project between June 7 and July 4, 2017 (Table 1). Eighteen of the 30 survey sites (60%) were within potentially undisturbed grassland (Figure 2). Summary tables are below, and additional details for specific sites are found in Appendices A and B.

Table 1. Summary of overall bird use (number of birds/transect/15-minute [min] survey), species richness (species/transect/15-min survey), and sample size during the transect bird use surveys within the Crocker Wind Farm, June 7 – July 4, 2017.

Season	# of Visits	Mean Use	Species Richness	# Species	# Surveys Conducted
Overall	**3**	**16.15**	**6.46**	**48**	**176**

Bird Diversity and Species Richness

During the surveys, 48 species were documented with mean richness 6.46 species per transect survey (Table 1). Per transect and visit, abundance of birds ranged from 5 – 48 individuals, and 4 – 25 species.

Bird Use, Composition, and Frequency of Occurrence by Species and Type

A total of 2,843 individual bird observations within 1,892 separate groups were recorded (Table 2). Cumulatively, eight species (17% of all species) comprised 74% of the individual observations: grasshopper sparrow (*Ammodramus savannarum*), western meadowlark (*Sturnella neglecta),* bobolink *(Dolichonyx oryzivorus),* dickcissel (*Spiza americana*), brown-headed cowbird *(Molothrus ater*), clay-colored sparrow (*Spizella pallida),* red-winged blackbird (*Agelaius phoeniceus*), and chestnut-collared longspur (*Calcarius ornatus*). All other species each comprised less than 3% of the observations.

Table 2. Total number of groups and individuals for each bird type and species during the transect bird use surveys within the Crocker Wind Farm, June 7 – July 4, 2017.

Species	Scientific Name	# grps	# obs
Waterbirds		**1**	**4**
cattle egret	*Bubulcus ibis*	1	4
Shorebirds		**61**	**93**
Killdeer	*Charadrius vociferus*	26	49
marbled godwit	*Limosa fedoa*	1	7
upland sandpiper	*Bartramia longicauda*	32	34
Willet	*Tringa semipalmata*	2	3
Diurnal Raptors		**1**	**1**
Swainson's hawk	*Buteo swainsoni*	1	1
Upland Game Birds		**6**	**15**
ring-necked pheasant	*Phasianus colchicus*	2	5
sharp-tailed grouse	*Tympanuchus phasianellus*	2	7
wild turkey	*Meleagris gallopavo*	2	3
Woodpeckers		**2**	**2**
northern flicker	*Colaptes auratus*	2	2
Doves/Pigeons		**31**	**55**
mourning dove	*Zenaida macroura*	31	55
Passerines		**1,790**	**2,673**
Corvids		*1*	*2*
American crow	*Corvus brachyrhynchos*	1	2
Passerines		*19*	*24*
unidentified passerine		19	24
Blackbirds/Orioles		*757*	*1281*
Bobolink	*Dolichonyx oryzivorus*	169	277
Brewer's blackbird	*Euphagus cyanocephalus*	5	6
brown-headed cowbird	*Molothrus ater*	98	224
common grackle	*Quiscalus quiscula*	56	113

Table 2. Total number of groups and individuals for each bird type and species during the transect bird use surveys within the Crocker Wind Farm, June 7 – July 4, 2017.

Species	Scientific Name	# grps	# obs
European starling	*Sturnus vulgaris*	1	6
orchard oriole	*Icterus spurius*	5	5
red-winged blackbird	*Agelaius phoeniceus*	87	186
unidentified blackbird		18	27
western meadowlark	*Sturnella neglecta*	312	428
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	6	9
Finches/Crossbills		*28*	*44*
American goldfinch	*Spinus tristis*	28	44
Flycatchers		*40*	*49*
eastern kingbird	*Tyrannus tyrannus*	34	43
eastern phoebe	*Sayornis phoebe*	1	1
western kingbird	*Tyrannus verticalis*	4	4
willow flycatcher	*Empidonax traillii*	1	1
Grassland/Sparrows		*867*	*1,161*
chestnut-collared longspur	*Calcarius ornatus*	79	147
chipping sparrow	*Spizella passerina*	3	5
clay-colored sparrow	*Spizella pallida*	94	105
dickcissel	*Spiza americana*	155	229
field sparrow	*Spizella pusilla*	4	4
grasshopper sparrow	*Ammodramus savannarum*	394	497
Henslow's sparrow	*Ammodramus henslowii*	20	22
horned lark	*Eremophila alpestris*	15	22
house sparrow	*Passer domesticus*	1	3
Savannah sparrow	*Passerculus sandwichensis*	41	55
song sparrow	*Melospiza melodia*	15	20
unidentified sparrow		38	41
vesper sparrow	*Pooecetes gramineus*	8	11
Mimids		*2*	*3*
brown thrasher	*Toxostoma rufum*	2	3
Swallows		*45*	*66*
barn swallow	*Hirundo rustica*	15	21
cliff swallow	*Petrochelidon pyrrhonota*	1	1
northern rough-winged swallow	*Stelgidopteryx serripennis*	4	5
tree swallow	*Tachycineta bicolor*	21	34
unidentified swallow		4	5
Thrushes		*8*	*13*
American robin	*Turdus migratorius*	8	13
Warblers		*22*	*29*
chestnut-sided warbler	*Setophaga pensylvanica*	11	16
common yellowthroat	*Geothlypis trichas*	4	4
yellow warbler	*Setophaga petechia*	7	9
Waxwings		*1*	*1*
cedar waxwing	*Bombycilla cedrorum*	1	1
Total		**1,892**	**2,843**

Grps = groups, obs = observations

Among the bird types, mean use per transect was dominated by passerines (15.18 birds/ transect; Table 3), with two groupings within passerines dominating mean use: blackbird/orioles (45%) and grassland/sparrows (40.8%). In terms of percent frequency, greater than 98% of all

surveys each had blackbird/orioles and grassland/sparrows. Shorebirds were the next most encountered type of bird, encountered at 27.3% of survey transects.

The following section focuses in more detail on four specific species groupings that were observed within the Project, and are of potential conservation interest: upland game birds, shorebirds, and two of the passerine sub-groups (blackbird/orioles and grassland/sparrows).

Upland Game Birds

Three upland game birds species were observed: sharp-tailed grouse (*Tympanuchus phasianellus*), ring-necked pheasant (*Phasianus colchicus*), and wild turkey (*Meleagris gallopavo*), as listed on Table 4. Upland game species comprised 0.5% of all observed birds (Table 2), and only seen on 2.8% of surveys. Overall, upland game birds were observed at 8.3% of the survey transects, which was also 17% of the survey sites (Figure 3). The two survey sites, documenting sharp-tailed grouse, were sites 14 and 87.

Shorebirds

Shorebirds were observed in 27.3% of the surveys, but comprised only 3.3% of the overall avian counts (Figure 4, Tables 2 and 4). Killdeer (*Charadrius vociferus*) and upland sandpipers (*Bartramia longicauda*) were observed frequently but at relatively low densities, with 0.28 birds/transect and 0.19 birds/transect, respectively. Although seen at low densities, upland sandpipers were observed within 40% of survey sites and 33% of the survey transects (Figure 5, Table 4). Marbled godwits (*Limosa fedoa)* were observed at Site 4 (Figure 6), and willets were observed at Sites 199 and 212 (Figure 7).

Passerines

Among the bird types, the mean count was greatest for passerines (15.18 birds/transect), comprising 94% of all birds documented during the surveys. Within the passerines, the blackbird/oriole family (45% of birds; 7.27 birds/transect) dominated the observations, followed by grassland/sparrows (40.8% of birds; 3.33 birds/point/survey; Figures 8 and 9, Tables 2 and 3).

Among the blackbird/oriole family, western meadowlarks (15.1% of birds, mean use = 2.4 birds/transect) were observed in 100% of survey sites, and 97% of transects (Figure 10, Table 4). The next most observed species within this group was bobolink (9.7% of birds; 1.6 birds/transect) were observed in 87% of the survey sites and 75% of survey transects (Figure 11, Tables 2 and 4). In contrast to the bobolink, brown-headed cowbirds were observed less frequently (7.9% of birds, mean use = 1.27 birds/transect) but were seen at 100% of the survey sites and 75% of survey transects. Red-winged blackbirds accounted for 6.5% of all birds observed (1.27 birds/transect), and were detected at 73% of survey sites, and 57% of survey transects (Tables 2 and 4). Other blackbird/oriole species were documented but counts by species totaled less than 3% of total observations (Table 2).

Among the grassland/sparrow species, grasshopper sparrows were documented the most frequently of all sparrows and all birds. Grasshopper sparrows were documented at 100% of

survey sites, and 98.6% of the survey transects (Figure 12, Table 4), with a mean use of 2.82 birds/transect. Dickcissels were the fourth most observed species (8.1% of birds, 1.3 birds/transect), and were observed within 83% of survey sites, and 74% of the survey transects (Figure 13, Table 4). Chestnut-collared longspurs were the seventh most observed species (5.2% of birds, 0.84 birds/transect), and were documented within 40% of survey sites, and 32% of the survey transects (Figure 14, Table 4).

Other non-passerines and passerines were documented but counts totaled less than 3% of total observations (Table 2).

Table 3. Mean bird use (number of birds/transect), percent of use (%), and frequency of occurrence (%) for each bird type during the transect bird use surveys in the Crocker Wind Farm, June 7 – July 4, 2017.

Bird Type	Mean Use	% of Use	% Frequency
Waterbirds	0.02	0.1	0.6
Shorebirds	0.53	3.3	27.3
Diurnal Raptors	<0.01	<0.1	0.6
Upland Game Birds	0.08	0.5	2.8
Doves/Pigeons	0.31	1.9	14.8
Woodpeckers	0.01	<0.1	1.1
Passerines	15.18	94	100
Corvids	0.01	<0.1	0.6
Passerines , unidentified	0.14	0.8	9.1
Blackbirds/Orioles	7.27	45.0	98.3
Finches/Crossbills	0.25	1.5	13.6
Flycatchers	0.28	1.7	19.3
Grassland/Sparrows	6.60	40.8	98.9
Mimids	0.02	0.1	1.1
Swallows	0.38	2.3	20.5
Thrushes	0.07	0.5	3.4
Warblers	0.16	1	9.1
Waxwings	<0.01	<0.1	0.6
Overall	**16.15**	**100**	

Spatial Use

When considering species distribution across the 30 sites surveyed, there were some species observed at 100% of sites (grasshopper sparrow, western meadowlark, brown-headed cowbirds), all three of which are associated with grassland habitats. Four grassland specialist species were documented at over 70% of surveyed sites: bobolink (87%), dickcissel (83%), common grackle (*Quiscalus quiscula*, 73%) and clay-colored sparrow (73%). Although at lower densities, 40% of surveyed sites had observations of chestnut-collared longspurs and upland sandpipers, which are also grassland specialist species.

Table 4. Presence of bird species across all survey sites and survey transects in the Crocker Wind Farm, June 7 – July 4, 2017.

Common Name	Scientific Name	Count of Sites Where Observed (*n*=30)	% Survey Sites (R & T transects combined per turbine site)	Count of Survey Transects Where Observed (*n*=60)	% Survey Transects
cattle egret	*Bubulcus ibis*	1	3.3	1	1.7
killdeer	*Charadrius vociferus*	13	43.3	19	31.7
marbled godwit	*Limosa fedoa*	1	3.3	1	1.7
upland sandpiper	*Bartramia longicauda*	12	40.0	20	33.3
willet	*Tringa semipalmata*	2	6.7	2	3.3
Swainson's hawk	*Buteo swainsoni*	1	3.3	1	1.7
ring-necked pheasant	*Phasianus colchicus*	2	6.7	2	3.3
sharp-tailed grouse	*Tympanuchus phasianellus*	2	6.7	2	3.3
wild turkey	*Meleagris gallopavo*	1	3.3	1	1.7
mourning dove	*Zenaida macroura*	16	53.3	20	33.3
northern flicker	*Colaptes auratus*	2	6.7	2	3.3
American crow	*Corvus brachyrhynchos*	1	3.3	1	1.7
unidentified passerine		10	33.3	13	21.7
bobolink	*Dolichonyx oryzivorus*	26	86.7	45	75.0
Brewer's blackbird	*Euphagus cyanocephalus*	3	10.0	4	6.7
brown-headed cowbird	*Molothrus ater*	30	100.0	44	73.3
common grackle	*Quiscalus quiscula*	22	73.3	30	50.0
European starling	*Sturnus vulgaris*	1	3.3	1	1.7
orchard oriole	*Icterus spurius*	2	6.7	3	5.0
red-winged blackbird	*Agelaius phoeniceus*	22	73.3	34	56.7
unidentified blackbird	*NA*	11	36.7	14	23.3
western meadowlark	*Sturnella neglecta*	30	100.0	57	95.0
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	6	20.0	6	10.0
American goldfinch	*Spinus tristis*	18	60.0	21	35.0
eastern kingbird	*Tyrannus tyrannus*	15	50.0	20	33.3
eastern phoebe	*Sayornis phoebe*	1	3.3	1	1.7
western kingbird	*Tyrannus verticalis*	4	13.3	4	6.7
willow flycatcher	*Empidonax traillii*	1	3.3	1	1.7
chestnut-collared longspur	*Calcarius ornatus*	12	40.0	19	31.7
chipping sparrow	*Spizella passerina*	1	3.3	1	1.7
clay-colored sparrow	*Spizella pallida*	22	73.3	31	51.7
dickcissel	*Spiza americana*	25	83.3	44	73.3
field sparrow	*Spizella pusilla*	3	10.0	3	5.0

Table 4. Presence of bird species across all survey sites and survey transects in the Crocker Wind Farm, June 7 – July 4, 2017.

Common Name	Scientific Name	Count of Sites Where Observed (*n*=30)	% Survey Sites (R & T transects combined per turbine site)	Count of Survey Transects Where Observed (*n*=60)	% Survey Transects
grasshopper sparrow	*Ammodramus savannarum*	30	100.0	58	96.7
Henslow's sparrow	*Ammodramus henslowii*	9	30.0	10	16.7
horned lark	*Eremophila alpestris*	8	26.7	10	16.7
house sparrow	*Passer domesticus*	1	3.3	1	1.7
Savannah sparrow	*Passerculus sandwichensis*	15	50.0	22	36.7
song sparrow	*Melospiza melodia*	7	23.3	9	15.0
unidentified sparrow		17	56.7	23	38.3
vesper sparrow	*Pooecetes gramineus*	6	20.0	7	11.7
brown thrasher	*Toxostoma rufum*	2	6.7	2	3.3
barn swallow	*Hirundo rustica*	9	30.0	11	18.3
cliff swallow	*Petrochelidon pyrrhonota*	1	3.3	1	1.7
northern rough-winged swallow	*Stelgidopteryx serripennis*	2	6.7	2	3.3
tree swallow	*Tachycineta bicolor*	13	43.3	18	30.0
unidentified swallow		4	13.3	4	6.7
American robin	*Turdus migratorius*	4	13.3	5	8.3
chestnut-sided warbler	*Setophaga pensylvanica*	6	20.0	6	10.0
common yellowthroat	*Geothlypis trichas*	4	13.3	4	6.7
yellow warbler	*Setophaga petechia*	4	13.3	4	6.7
cedar waxwing	*Bombycilla cedrorum*	1	3.3	1	1.7

Sensitive Species Observations

No federally listed or state listed species were observed during the survey. One species, Swainson's hawk (Buteo swainsoni), a South Dakota Species of Special Concern, was observed at Site 42 (Figure 15). The USFWS supports states through the State Wildlife Action Plans with the goal to "prevent future endangered species listings while also keeping common species common" (South Dakota 2014). During this state planning process, Species of Greatest Conservation Need (SGCN) are identified as management priorities for the state. Two SGCN listed by the SDGFP were documented during these surveys: marbled godwit (seven individuals seen in one group at Site 4), and willet (one group each at Sites 199 and 212 totaling three individuals). Through the Fish and Wildlife Conservation Act (as amended 1988), the USFWS established management priorities for avian species in the Birds of Conservation Concern report (USFWS 2008). In this USFWS report, birds are identified by biogeographically determined Bird Conservation Regions (BCR). During these breeding bird surveys, six species from the Prairie Potholes (BCR-11) list were observed including the following: upland sandpiper (34 individuals seen in 32 groups), marbled godwit, Swainson's hawk, chestnut-collared longspur (147 individuals seen in 79 groups), dickcissel (229 individuals seen in 155 groups), and grasshopper sparrow (497 individuals seen in 394 groups; Table 5).

Table 5. Summary of sensitive species observed at the Crocker Wind Farm during avian transect surveys from June 7 – July 4, 2017.

			Total	
Species	**Scientific Name**	**Status**	**# grps**	**# obs**
Upland Sandpiper	*Bartramia longicauda*	CC	32	34
Marbled Godwit	*Limosa fedoa*	SGCN, CC	1	7
Willet	*Tringa semipalmata*	SGCN	2	3
Swainson's Hawk	*Buteo swainsoni*	SSC, CC	1	1
Chestnut-collared Longspur	*Setophaga pensylvanica*	CC	79	147
Dickcissel	*Spiza americana*	CC	155	229
Grasshopper Sparrow	*Ammodramus savannarum*	CC	394	497
Total			**664**	**918**

SGCN = species of greatest conservation need in South Dakota (South Dakota 2014); SSC = South Dakota Species of Special Concern; CC = Birds of Conservation Concern in USFWS Birds Conservation Region 11 (USFWS 2008)

Grps = groups, obs = observations

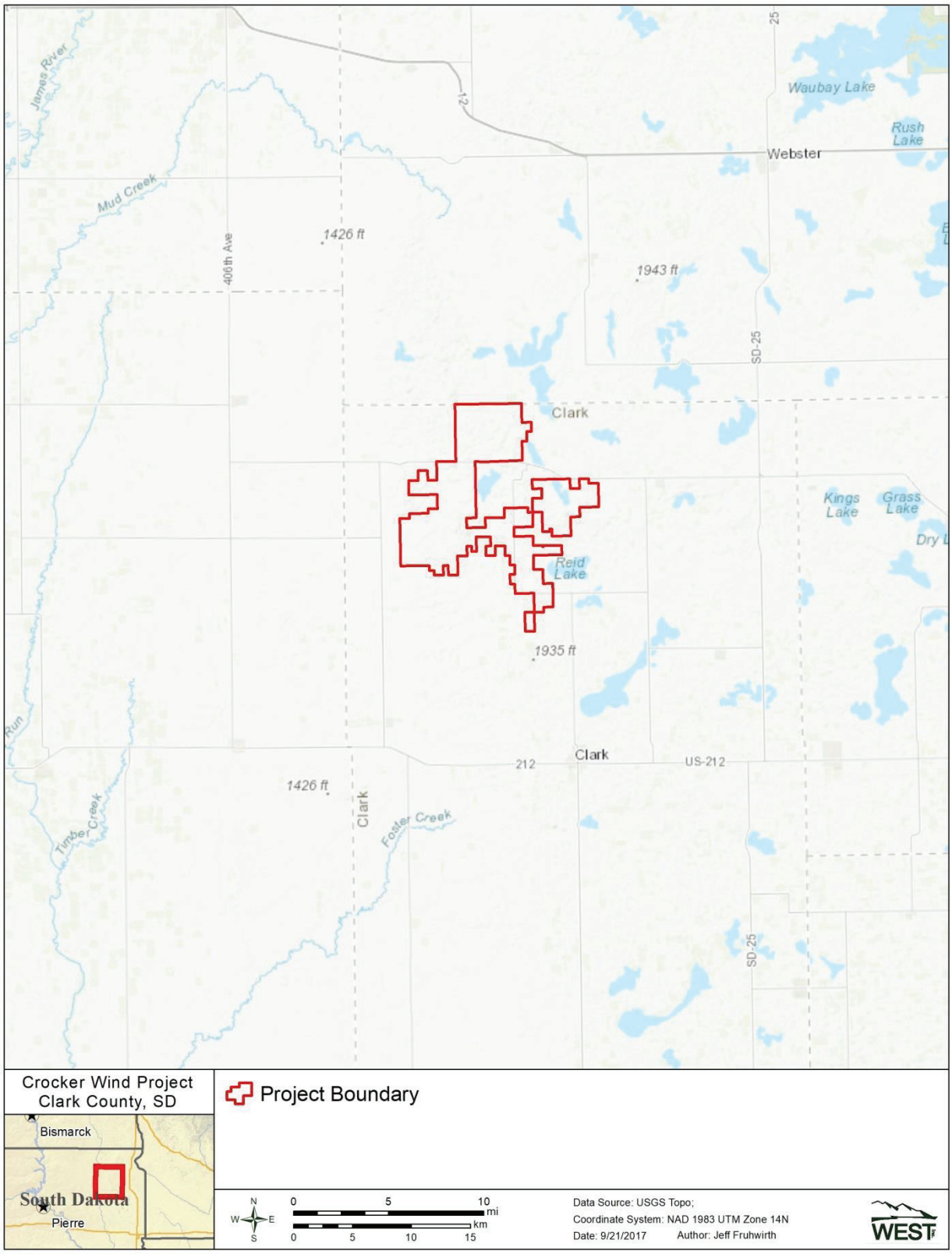

Figure 1. Location of Crocker Wind Farm.

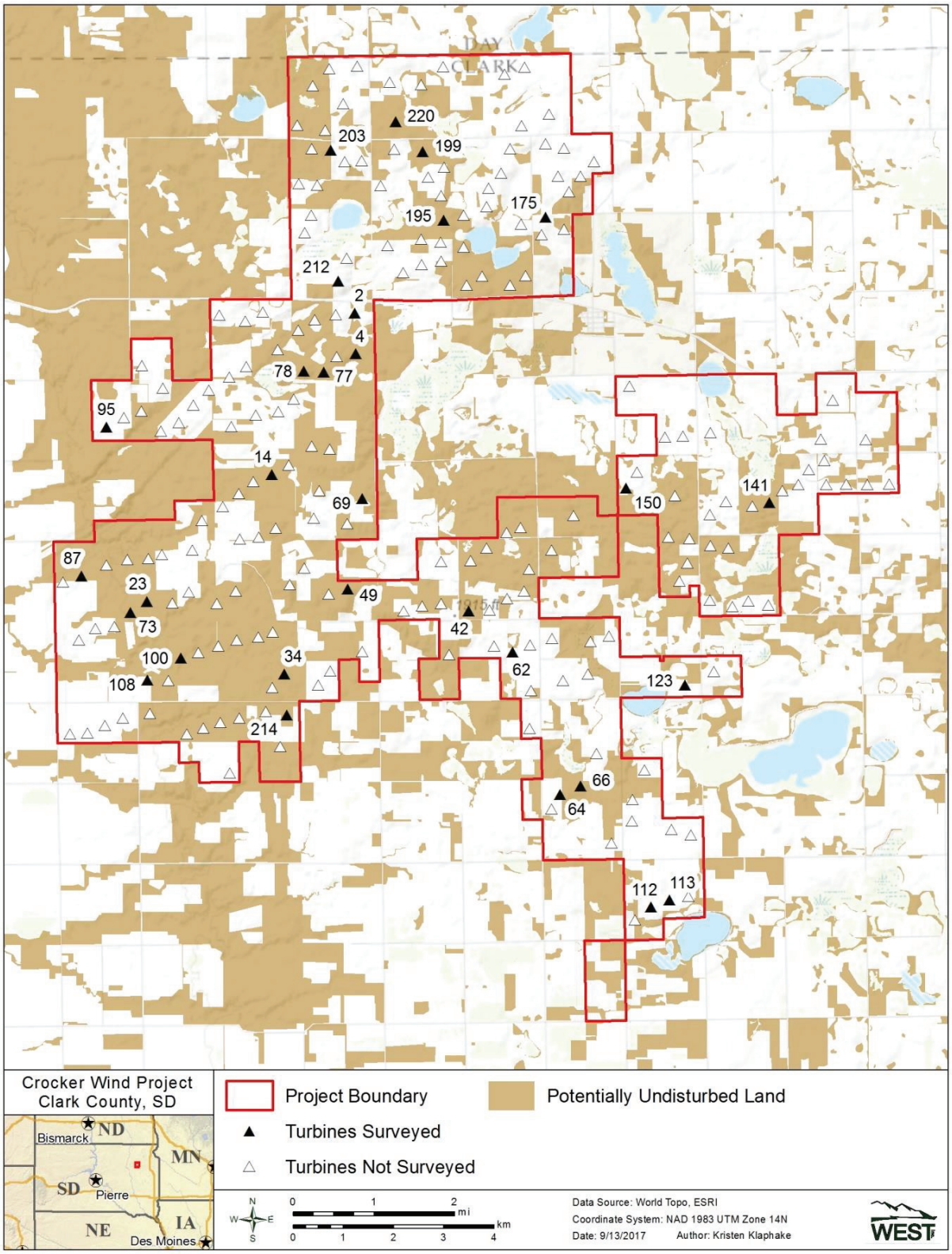

Figure 2. Distribution of surveys, proposed turbines sites, and potentially undisturbed lands at Crocker Wind Farm.

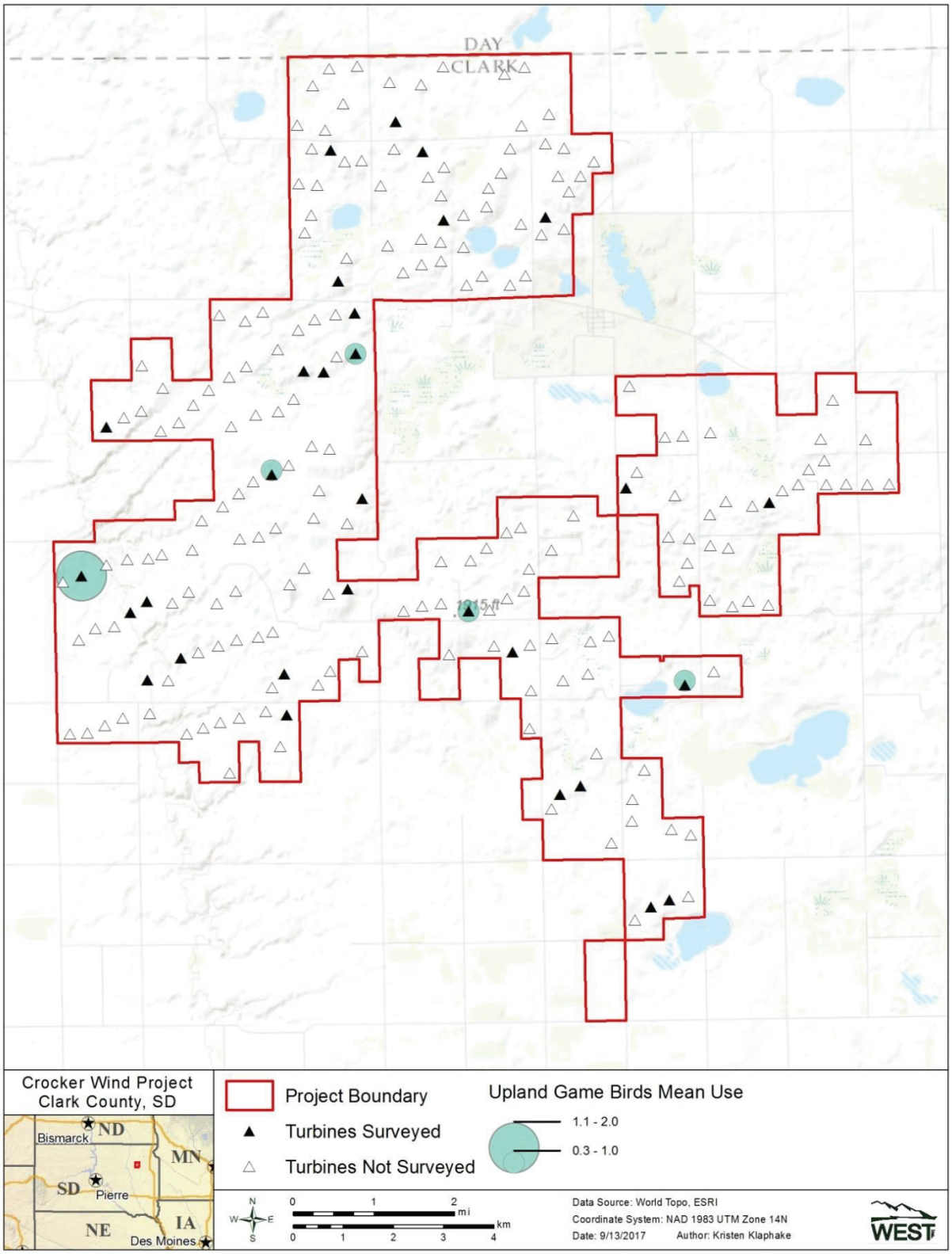

Figure 3. Upland gamebird mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

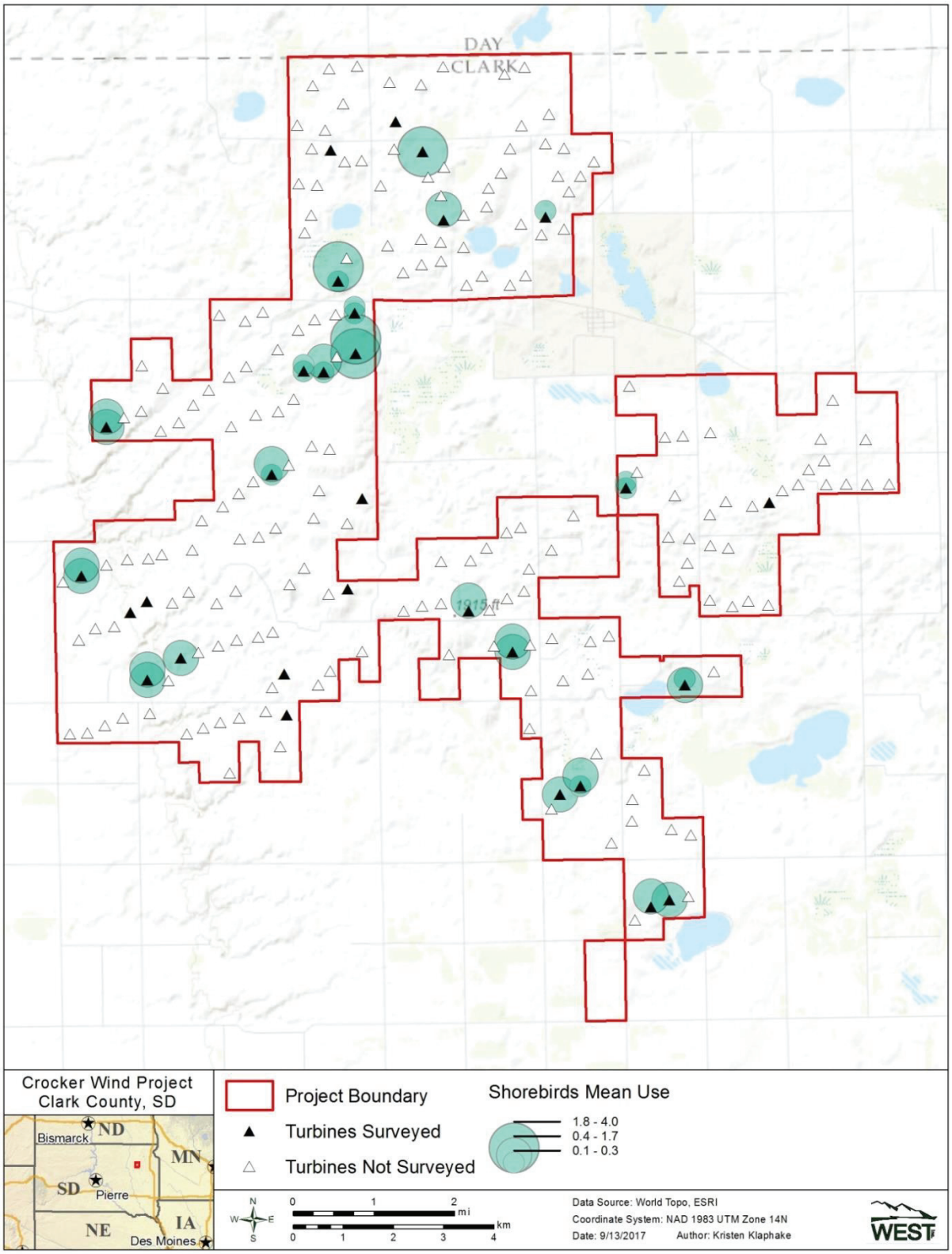

Figure 4. Shorebird mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

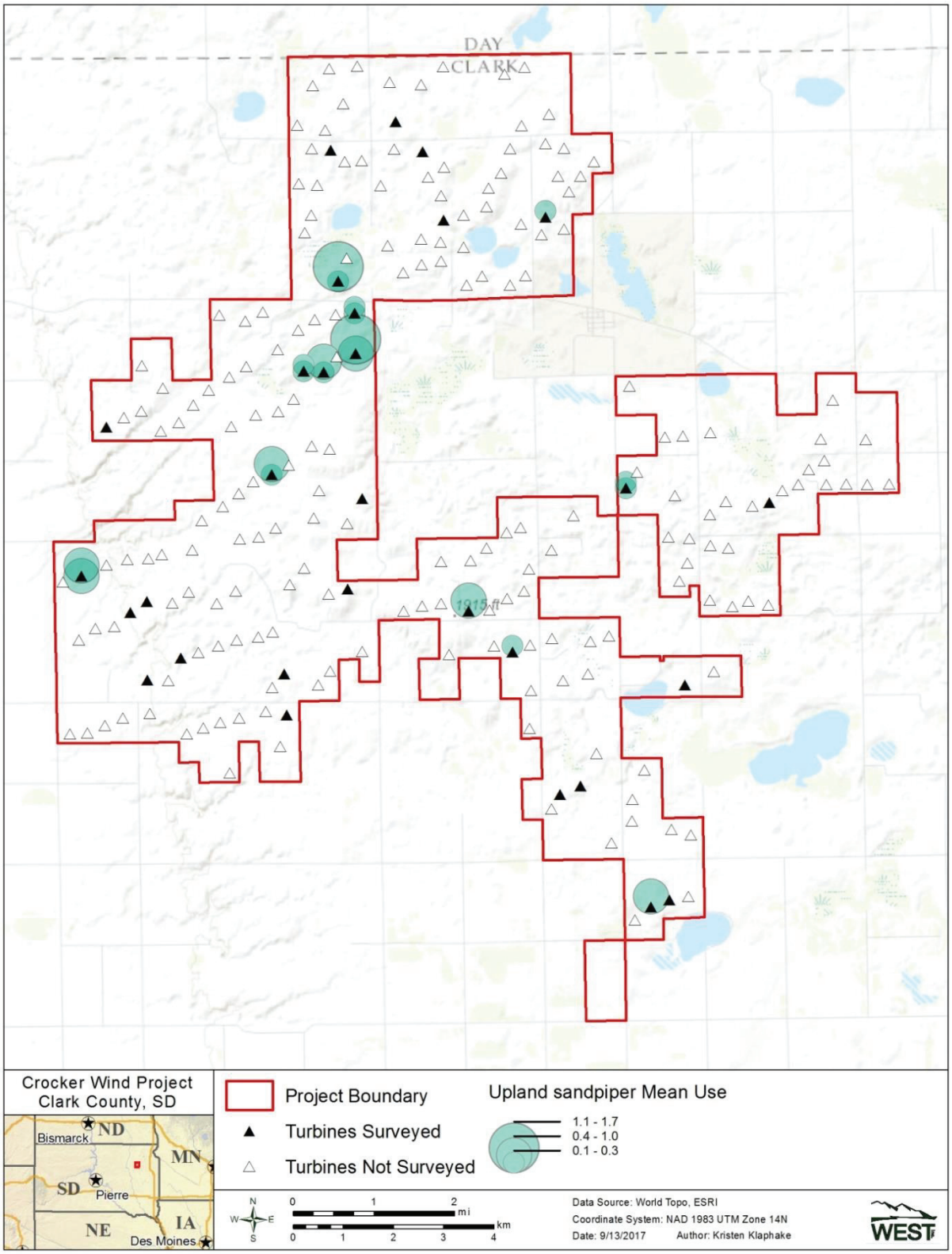

Figure 5. Upland sandpiper mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

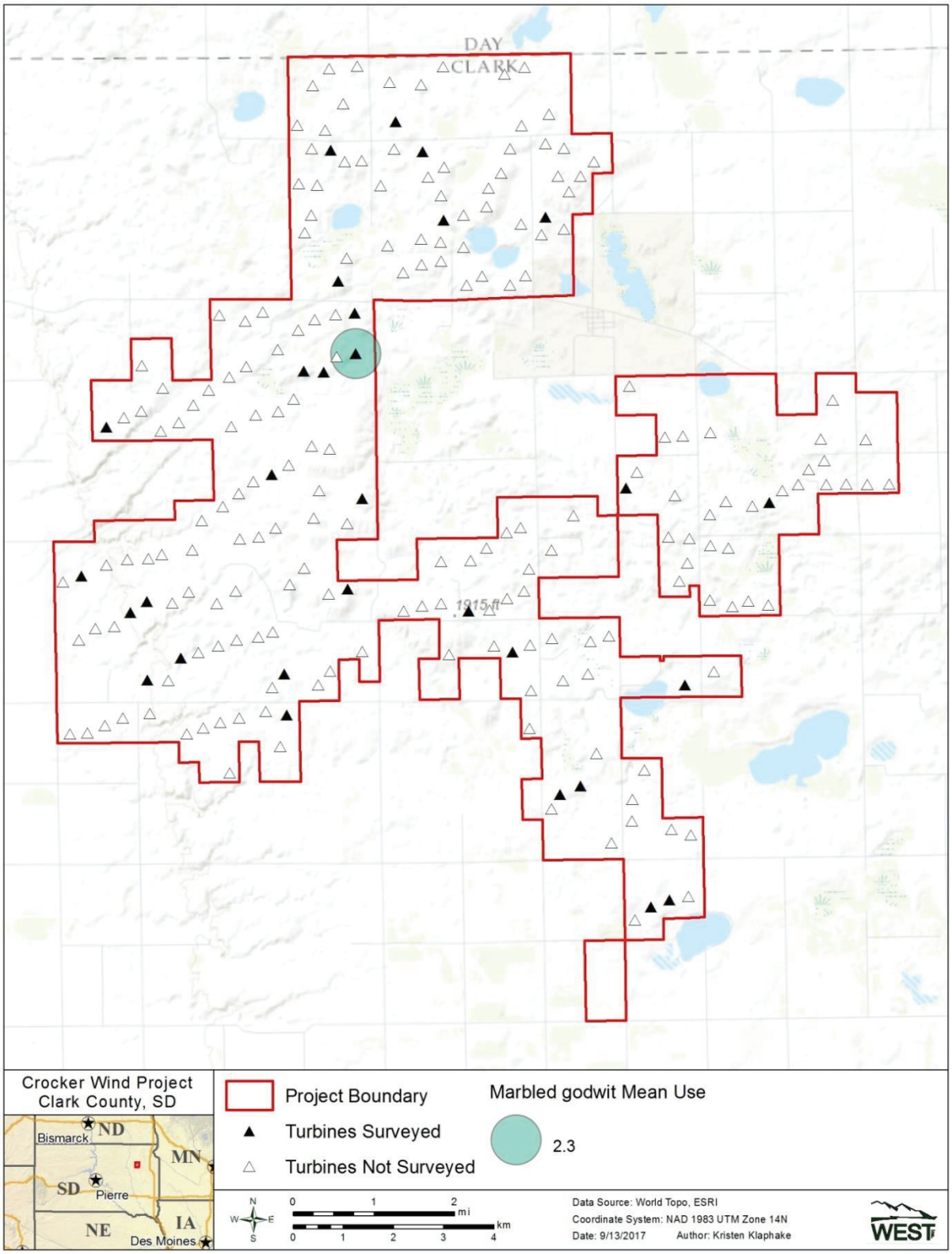

Figure 6. Marbled godwit mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

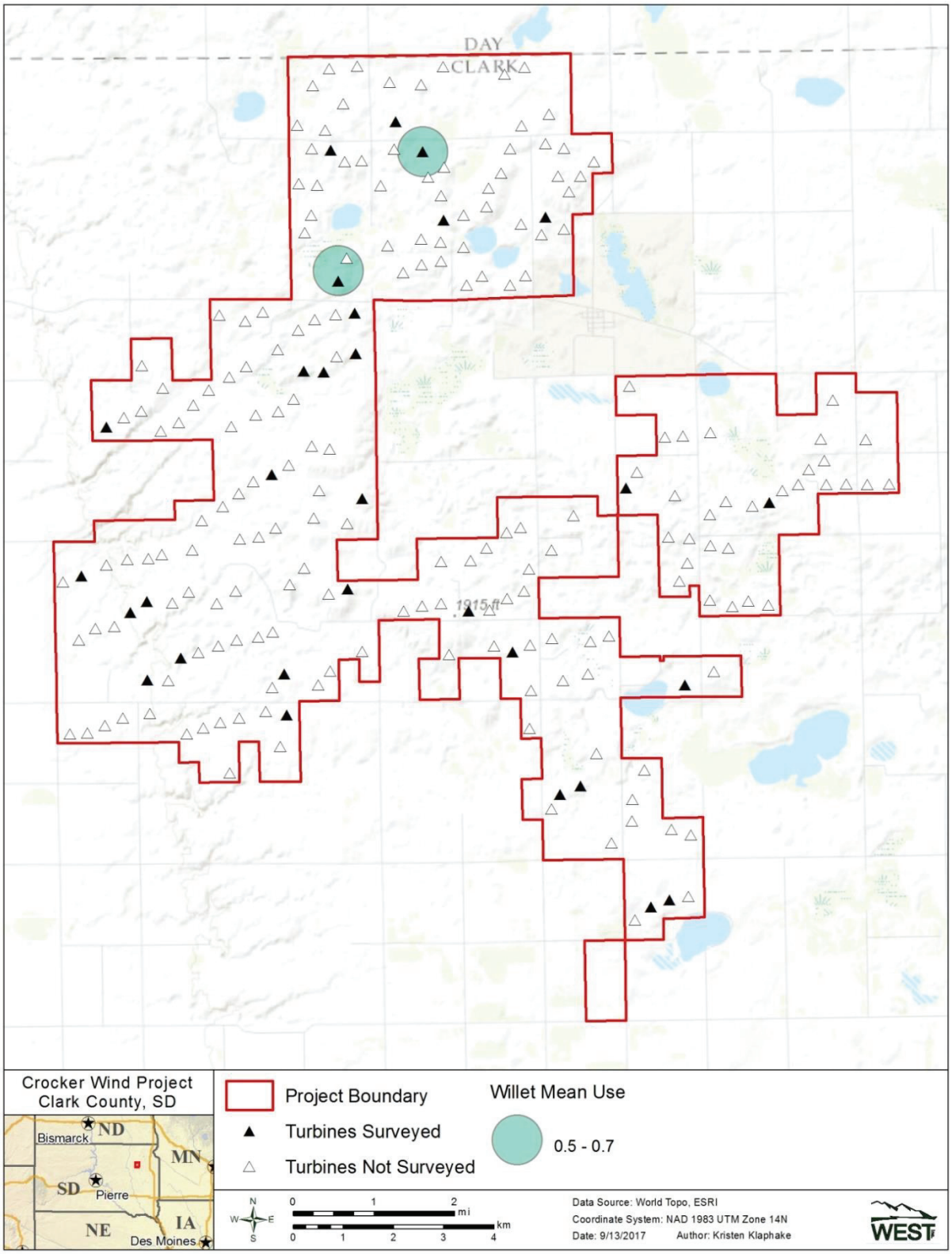

Figure 7. Willet mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

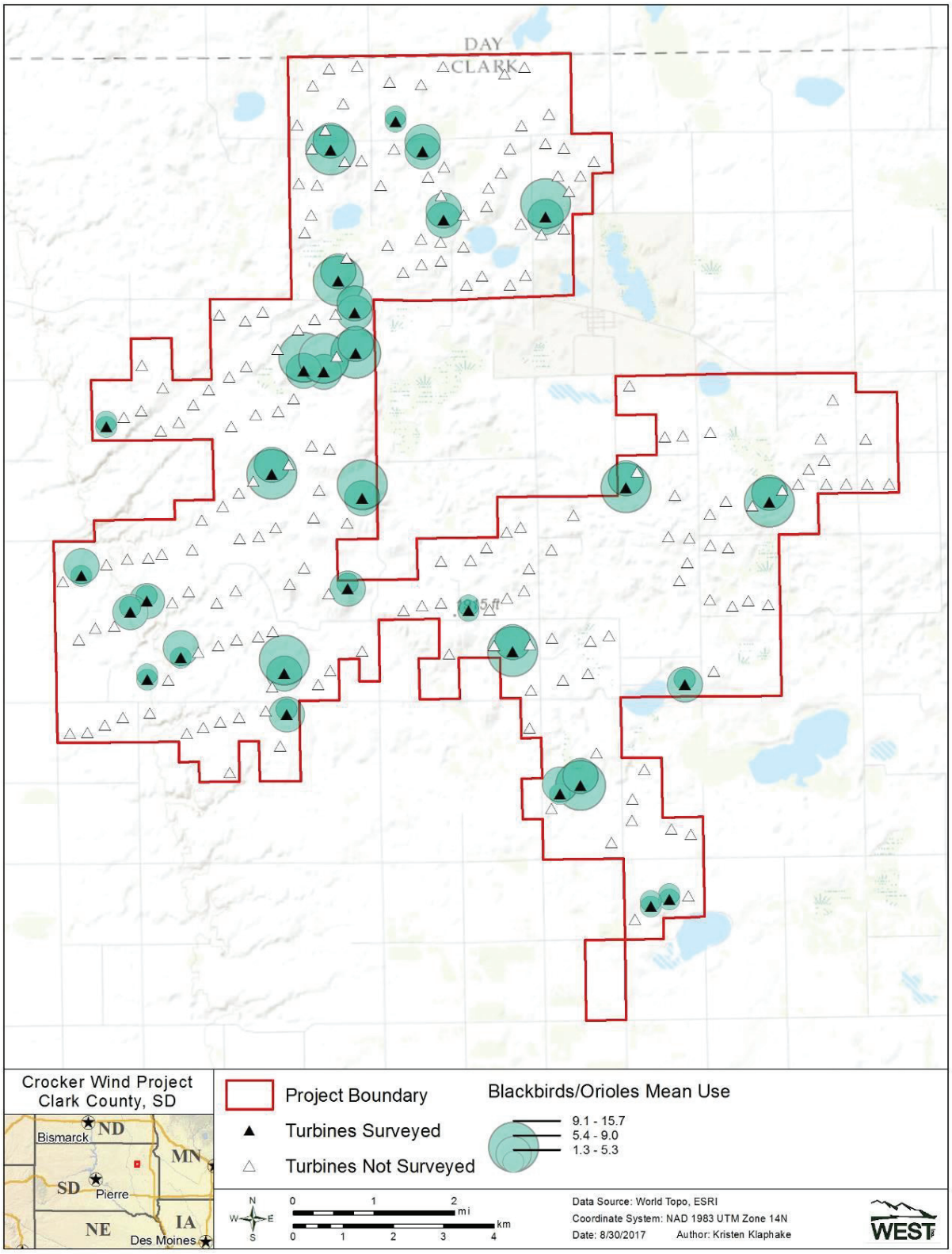

Figure 8. Blackbird/oriole mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

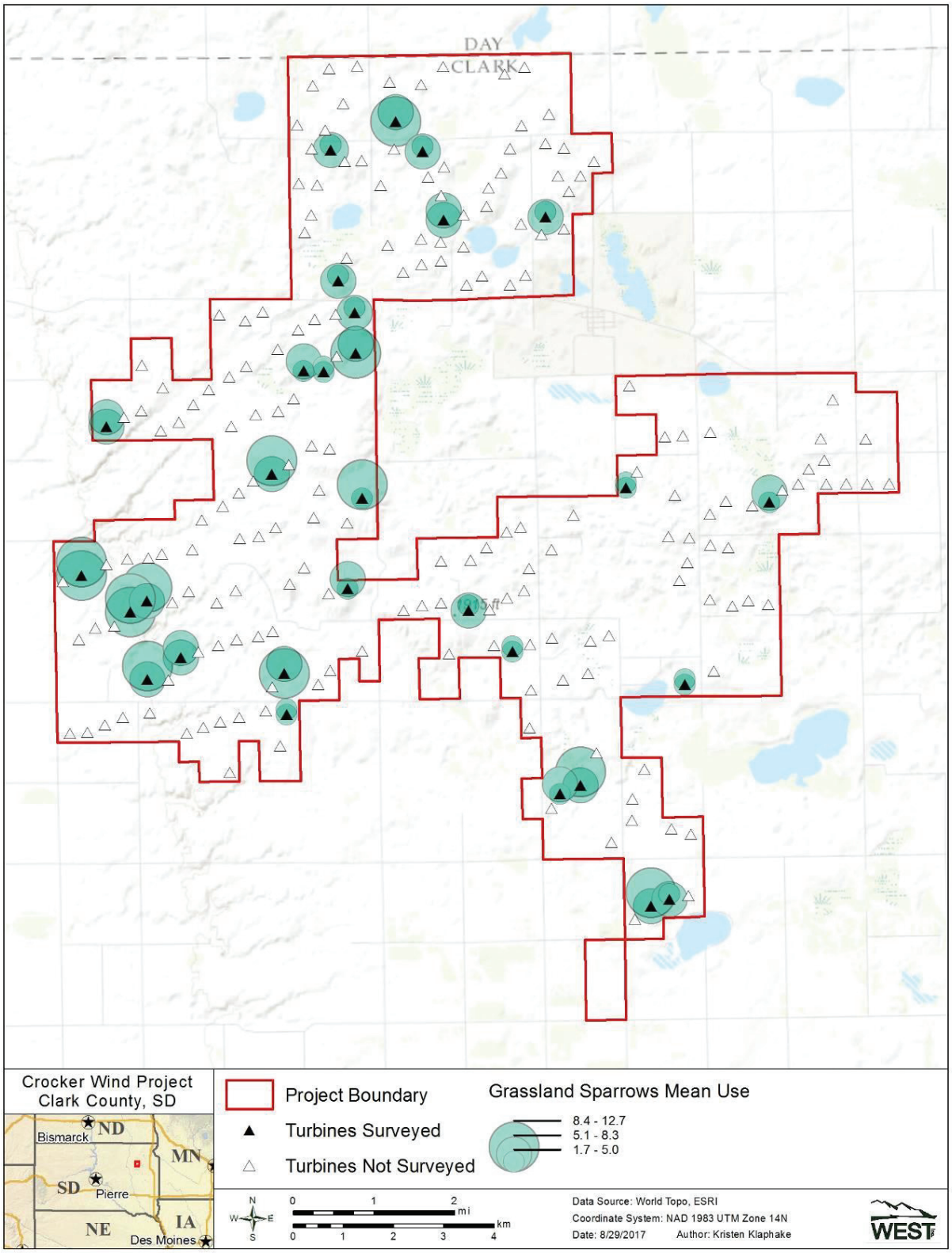

Figure 9. Grassland Sparrows mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

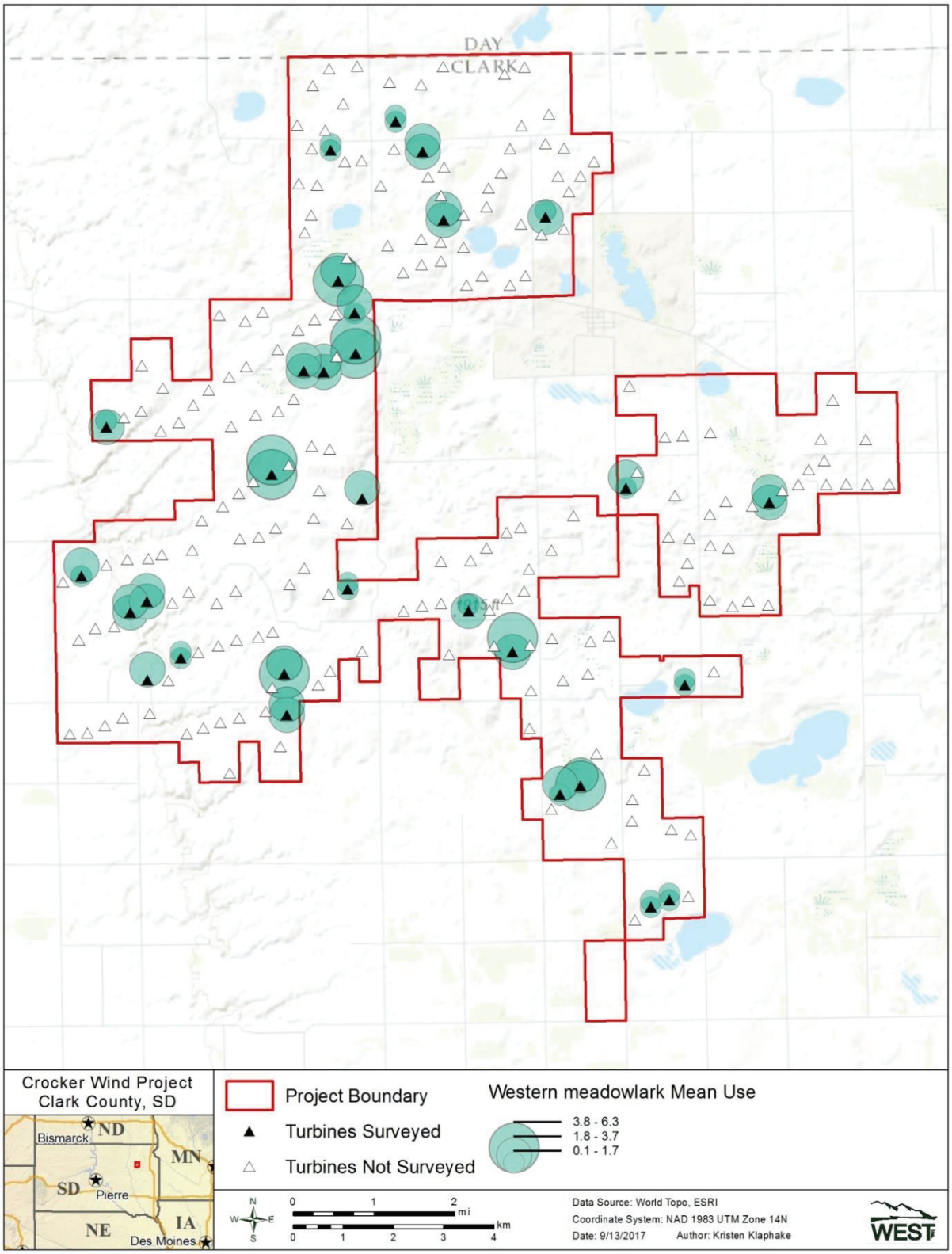

Figure 10. Western meadowlark mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

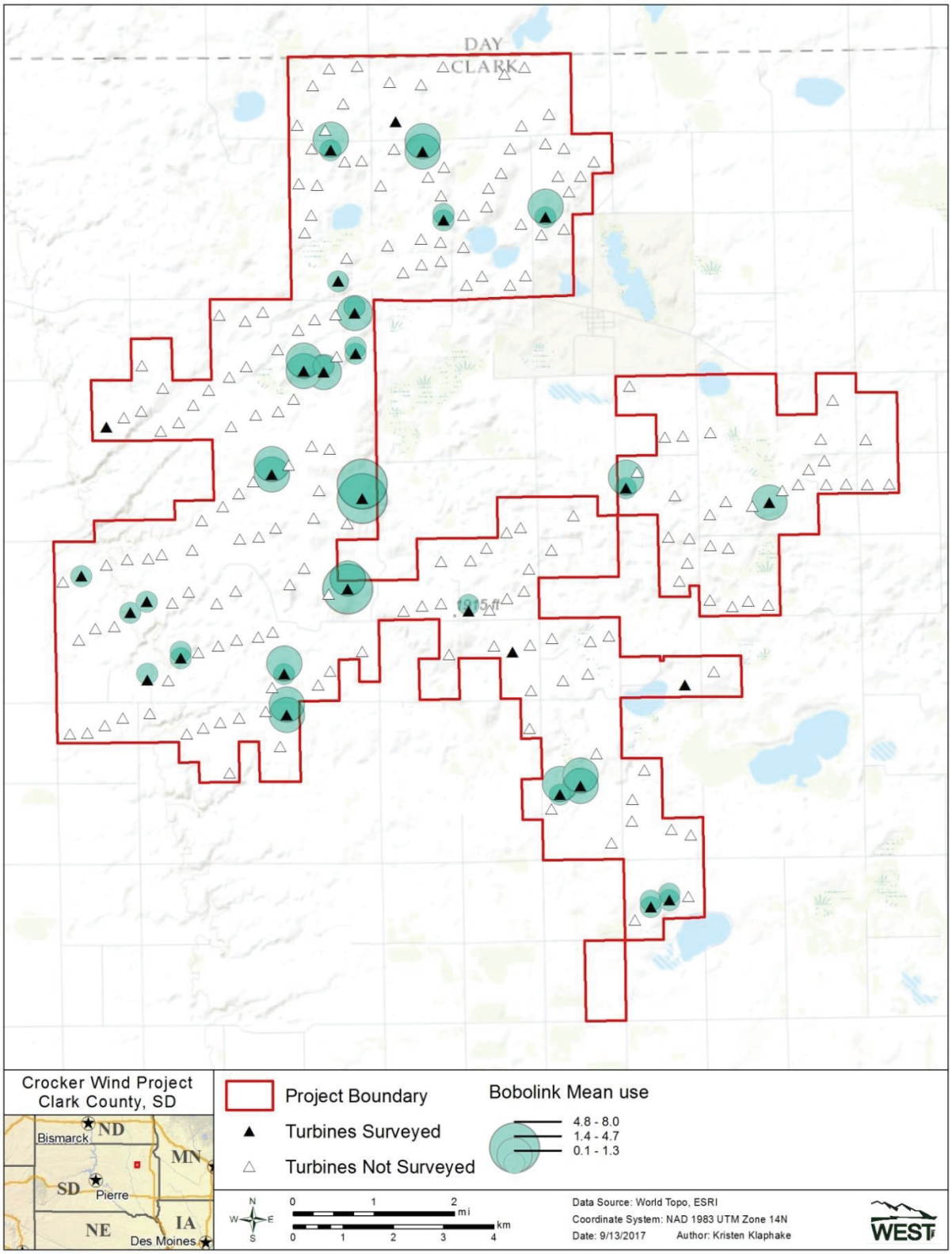

Figure 11. Bobolink mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

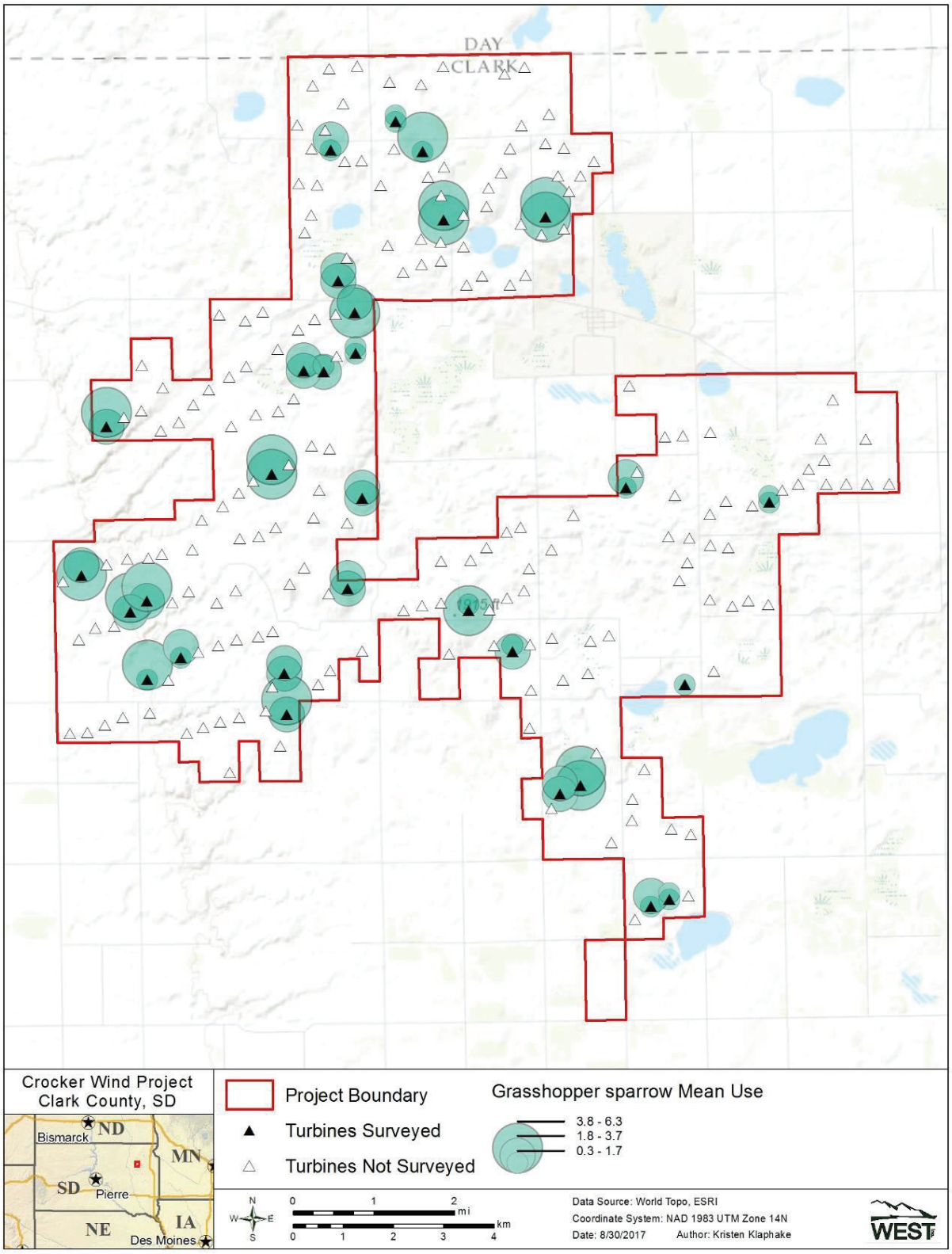

Figure 12. Grasshopper sparrow mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

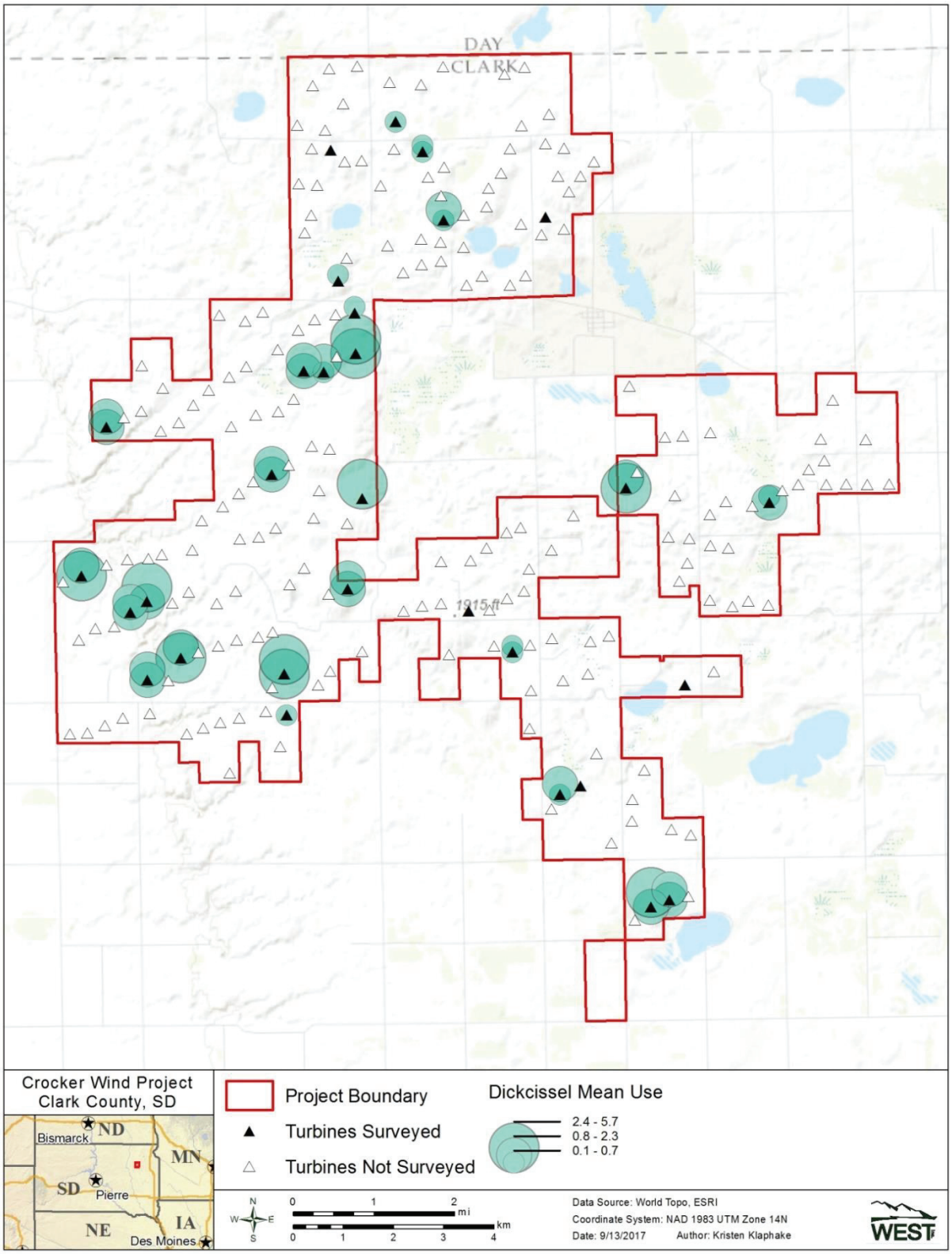

Figure 13. Dickcissel mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

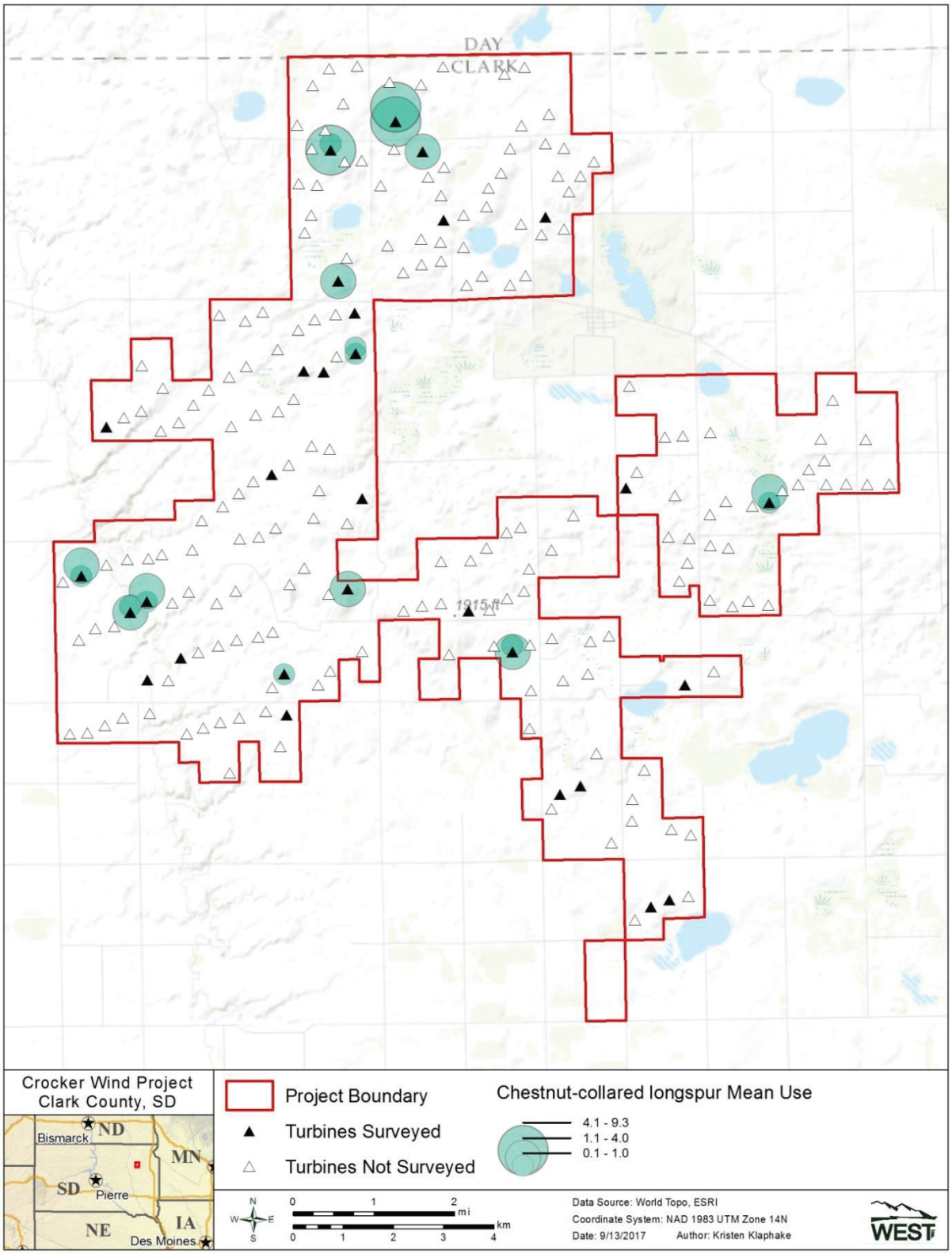

Figure 14. Chestnut-collared longspur mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

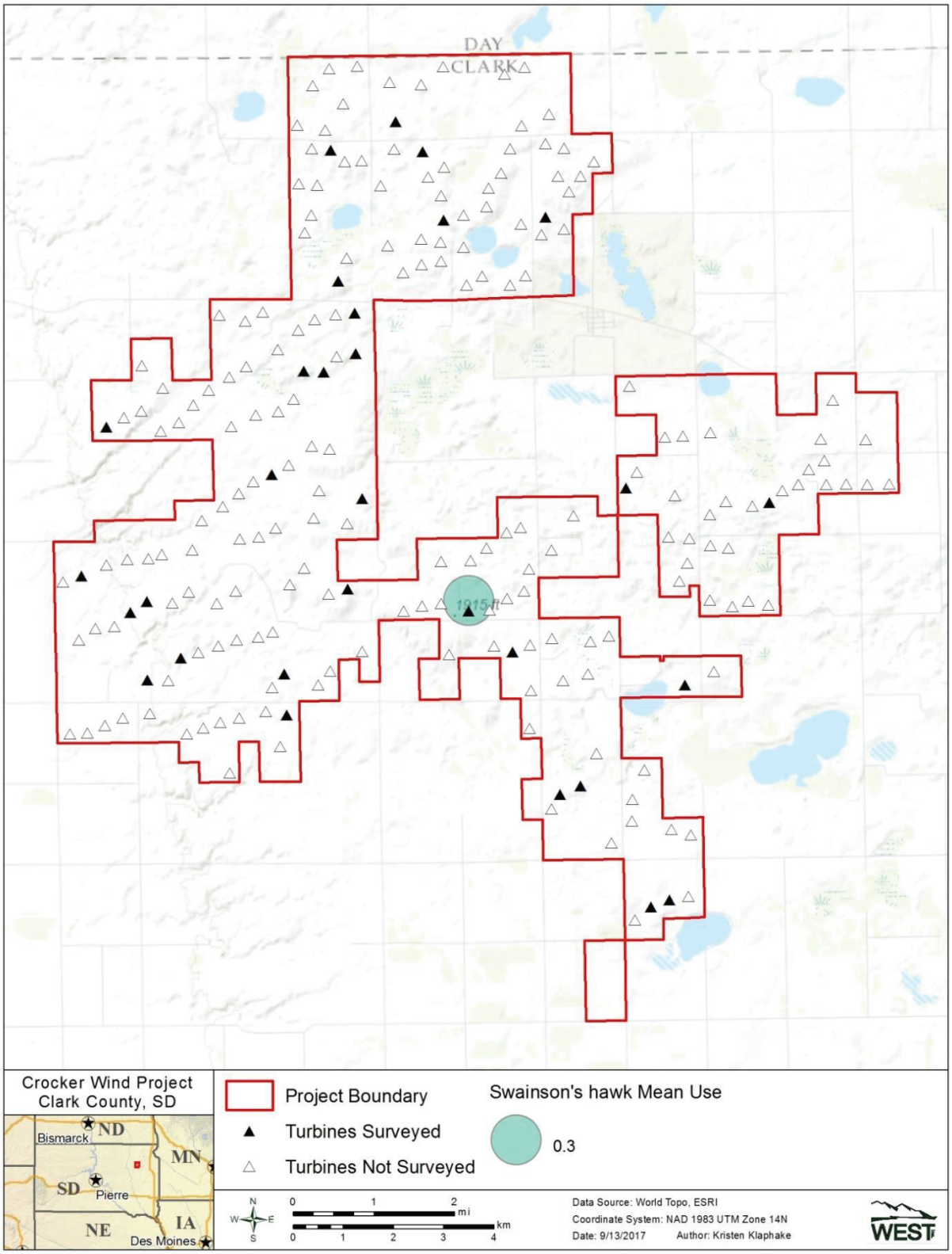

Figure 15. Swainson's hawk mean use from surveyed locations, June 7 - July 4, 2017 at the Crocker Wind Farm, Clark County, South Dakota.

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Appendix A. Species Observed By Survey Site During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

Appendix A. Species observed by survey site during grassland breeding bird surveys at the Crocker Wind Farm, June 7 – July 4, 2017

		Survey Site									
Species	**Scientific Name**	**2**	**4**	**14**	**23**	**34**	**42**	**49**	**62**	**64**	**66**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.	.	.	.	.
killdeer	*Charadrius vociferus*	.	4	2	.	.	.	.	5	3	4
marbled godwit	*Limosa fedoa*	.	7	.	.	.	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	2	7	4	.	.	2	.	1	.	.
willet	*Tringa semipalmata*	.	.	.	.	.	.	.	.	.	.
Swainson's hawk	*Buteo swainsoni*	.	.	.	.	.	1	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	.	3	.	.	.	.	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	1	.	.	.	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	.	.	.	3	.	.	.	.
mourning dove	*Zenaida macroura*	1	2	.	.	6	2	2	2	2	.
northern flicker	*Colaptes auratus*	.	.	.	.	.	1	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.	.	.	.	.
unidentified passerine		3	3	2	.	3	1	.	1	.	.
bobolink	*Dolichonyx oryzivorus*	16	4	13	1	16	1	20	.	17	15
Brewer's blackbird	*Euphagus cyanocephalus*	.	.	.	.	.	.	.	4	.	1
brown-headed cowbird	*Molothrus ater*	9	8	4	13	11	2	1	18	2	20
common grackle	*Quiscalus quiscula*	4	1	5	.	.	2	1	.	2	1
European starling	*Sturnus vulgaris*	.	.	.	.	.	.	.	.	.	.
orchard oriole	*Icterus spurius*	.	.	.	.	.	.	.	.	.	.
red-winged blackbird	*Agelaius phoeniceus*	3	28	1	.	3	.	.	12	1	2
unidentified blackbird		2	2	.	.	5	2	1	1	.	.
western meadowlark	*Sturnella neglecta*	10	25	36	17	23	16	5	23	12	24
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	.	3	.	.	.	1	.	.	.	.
American goldfinch	*Spinus tristis*	.	.	2	.	.	5	2	.	.	1
eastern kingbird	*Tyrannus tyrannus*	.	.	.	.	1	.	.	.	1	.
eastern phoebe	*Sayornis phoebe*	.	.	.	.	.	.	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	.	1	.	1	.	.	.	.	.
willow flycatcher	*Empidonax traillii*	.	.	.	.	.	.	.	.	.	.
chestnut-collared longspur	*Calcarius ornatus*	.	3	.	6	3	.	4	9	.	.
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.	.	.	.	.

Appendix A. (*continued*) Species observed by survey site during grassland breeding bird surveys at the Crocker Wind Farm, June 7 – July 4, 2017

		Survey Site									
Species	**Scientific Name**	**2**	**4**	**14**	**23**	**34**	**42**	**49**	**62**	**64**	**66**
clay-colored sparrow	*Spizella pallida*	1	.	6	10	3	3	4	1	3	1
dickcissel	*Spiza americana*	1	28	9	18	21	.	8	3	4	.
field sparrow	*Spizella pusilla*	.	.	.	.	.	1	.	.	.	.
grasshopper sparrow	*Ammodramus savannarum*	21	7	33	26	18	18	11	11	16	33
Henslow's sparrow	*Ammodramus henslowii*	1	.	.	.	6	2	.	1	.	4
horned lark	*Eremophila alpestris*	.	.	.	.	1	2	.	3	3	.
house sparrow	*Passer domesticus*	.	.	.	.	.	.	.	.	.	.
Savannah sparrow	*Passerculus sandwichensis*	1	4	4	.	.	2	.	.	2	8
song sparrow	*Melospiza melodia*	.	.	1	.	.	3	.	.	.	.
unidentified sparrow		1	3	.	.	4	3	1	.	1	1
vesper sparrow	*Pooecetes gramineus*	.	1	.	.	.	.	.	.	.	.
brown thrasher	*Toxostoma rufum*	.	.	.	.	.	.	2	.	.	.
barn swallow	*Hirundo rustica*	.	.	.	2	.	.	.	.	.	.
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	.	.	1	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	.	.	.	.	.	.	.	.	.	.
tree swallow	*Tachycineta bicolor*	1	.	.	1	.	2	.	8	.	2
unidentified swallow		.	.	1	.	.	1	.	.	.	.
American robin	*Turdus migratorius*	.	.	.	.	.	.	.	.	.	.
chestnut-sided warbler	*Setophaga pensylvanica*	.	4	.	.	4	.	.	.	.	.
common yellowthroat	*Geothlypis trichas*	.	.	.	.	.	.	.	.	.	.
yellow warbler	*Setophaga petechia*	.	.	.	.	.	.	1	.	.	.
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	.	.	.	.	.	.
Total		77	147	125	94	129	76	64	103	69	117
Transects *n* =		6	6	6	6	6	6	5	6	6	6

Appendix A. (*continued*) Species observed by survey site during grassland breeding bird surveys at the Crocker Wind Farm, June 7 – July 4, 2017

		Survey Site									
Species	**Scientific Name**	**69**	**73**	**77**	**78**	**87**	**95**	**100**	**108**	**112**	**113**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.	.	.	.	.
killdeer	*Charadrius vociferus*	.	.	.	.	.	4	5	4	.	4
marbled godwit	*Limosa fedoa*	.	.	.	.	.	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	.	.	3	2	5	.	.	.	1	.
willet	*Tringa semipalmata*	.	.	.	.	.	.	.	.	.	.
Swainson's hawk	*Buteo swainsoni*	.	.	.	.	.	.	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	.	.	.	.	.	.	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	.	.	6	.	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	.	.	.	.	.	.	.	.
mourning dove	*Zenaida macroura*	.	2	.	1	2	21	1	.	.	.
northern flicker	*Colaptes auratus*	.	.	.	.	.	.	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.	.	2	.	.
unidentified passerine		.	.	.	1	.	.	.	5	.	.
bobolink	*Dolichonyx oryzivorus*	32	4	18	19	3	.	6	2	5	5
Brewer's blackbird	*Euphagus cyanocephalus*	.	.	.	.	.	.	.	.	.	1
brown-headed cowbird	*Molothrus ater*	4	6	12	12	10	1	9	3	5	4
common grackle	*Quiscalus quiscula*	.	.	.	2	6	11	8	4	2	.
European starling	*Sturnus vulgaris*	.	.	.	.	.	.	.	.	.	.
orchard oriole	*Icterus spurius*	.	.	.	.	3	.	.	.	2	.
red-winged blackbird	*Agelaius phoeniceus*	1	.	9	2	4	.	.	.	6	11
unidentified blackbird		.	.	1	1	.	.	2	.	.	.
western meadowlark	*Sturnella neglecta*	11	17	17	15	11	10	8	7	3	5
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	.	.	.	.	.	.	.	.	1	.
American goldfinch	*Spinus tristis*	3	2	1	1	1	1	.	3	1	5
eastern kingbird	*Tyrannus tyrannus*	1	.	2	2	.	7	2	.	2	6
eastern phoebe	*Sayornis phoebe*	.	.	.	.	.	.	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	1	.	.	.	.	.	.	.	1
willow flycatcher	*Empidonax traillii*	.	.	.	.	.	.	.	.	.	.
chestnut-collared longspur	*Calcarius ornatus*	.	11	.	.	8	.	.	.	.	.
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.	.	5	.	.

Appendix A. *(continued)* Species observed by survey site during grassland breeding bird surveys at the Crocker Wind Farm, June 7 – July 4, 2017

		Survey Site									
Species	**Scientific Name**	**69**	**73**	**77**	**78**	**87**	**95**	**100**	**108**	**112**	**113**
clay-colored sparrow	*Spizella pallida*	3	8	.	2	14	6	9	2	11	8
dickcissel	*Spiza americana*	17	6	6	9	15	10	17	8	11	11
field sparrow	*Spizella pusilla*	.	.	.	.	.	.	.	.	2	1
grasshopper sparrow	*Ammodramus savannarum*	15	28	16	17	25	21	11	17	7	2
Henslow's sparrow	*Ammodramus henslowii*	1	.	.	2	.	.	1	4	.	.
horned lark	*Eremophila alpestris*	.	.	.	.	2	.	.	5	2	.
house sparrow	*Passer domesticus*	.	.	.	.	.	.	.	.	.	.
Savannah sparrow	*Passerculus sandwichensis*	2	.	3	3	.	.	.	.	2	.
song sparrow	*Melospiza melodia*	.	.	.	.	.	11	.	2	1	.
unidentified sparrow		4	.	3	2	.	.	6	5	2	2
vesper sparrow	*Pooecetes gramineus*	1	.	.	.	.	.	1	.	1	5
brown thrasher	*Toxostoma rufum*	.	.	.	.	.	.	.	.	.	.
barn swallow	*Hirundo rustica*	1	3	.	.	.	.	1	1	.	.
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	.	.	.	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	.	.	.	.	.	.	.	1	.	.
tree swallow	*Tachycineta bicolor*	1	.	.	.	3	.	3	.	1	4
unidentified swallow		2	.	.	.	.	.	.	.	.	.
American robin	*Turdus migratorius*	.	.	.	.	2	1	.	.	.	1
chestnut-sided warbler	*Setophaga pensylvanica*	1	.	.	4	.	.	.	.	1	.
common yellowthroat	*Geothlypis trichas*	1	.	.	1	.	.	.	.	.	.
yellow warbler	*Setophaga petechia*	.	.	.	.	.	.	.	.	.	2
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	.	1	.	.	.	.
Total		101	88	91	98	120	105	90	80	69	78
Transects *n* =		5	6	6	6	6	6	6	6	5	6

Appendix A. (*continued*) Species observed by survey site during grassland breeding bird surveys at the Crocker Wind Farm, June 7 – July 4, 2017

		Survey Site									
Species	**Scientific Name**	**123**	**141**	**150**	**175**	**195**	**199**	**203**	**212**	**214**	**220**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.	4	.	.	.
killdeer	*Charadrius vociferus*	3	.	.	.	4	6	.	1	.	.
marbled godwit	*Limosa fedoa*	.	.	.	.	.	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	.	.	2	1	.	.	.	4	.	.
willet	*Tringa semipalmata*	.	.	.	.	.	2	.	1	.	.
Swainson's hawk	*Buteo swainsoni*	.	.	.	.	.	.	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	2	.	.	.	.	.	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	.	.	.	.	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	.	.	.	.	.	.	.	.
mourning dove	*Zenaida macroura*	3	2	.	.	1	.	5	.	.	.
northern flicker	*Colaptes auratus*	1	.	.	.	.	.	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.	.	.	.	.
unidentified passerine		4	.	.	.	.	.	.	1	.	.
bobolink	*Dolichonyx oryzivorus*	.	10	11	9	6	17	6	4	17	.
Brewer's blackbird	*Euphagus cyanocephalus*	.	.	.	.	.	.	.	.	.	.
brown-headed cowbird	*Molothrus ater*	3	14	2	2	11	13	11	6	1	7
common grackle	*Quiscalus quiscula*	23	3	4	21	4	1	6	1	.	1
European starling	*Sturnus vulgaris*	.	.	.	.	.	.	.	6	.	.
orchard oriole	*Icterus spurius*	.	.	.	.	.	.	.	.	.	.
red-winged blackbird	*Agelaius phoeniceus*	8	6	19	26	8	5	24	6	.	1
unidentified blackbird		.	.	9	1	.	.	.	.	.	.
western meadowlark	*Sturnella neglecta*	5	17	12	13	16	13	10	26	13	8
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	.	2	1	1	.	.	.	.	.	.
American goldfinch	*Spinus tristis*	8	.	.	4	1	.	1	.	2	.
eastern kingbird	*Tyrannus tyrannus*	6	2	3	.	1	.	3	.	4	.
eastern phoebe	*Sayornis phoebe*	1	.	.	.	.	.	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	.	.	.	.	.	.	.	.	.
willow flycatcher	*Empidonax traillii*	.	1	.	.	.	.	.	.	.	.
chestnut-collared longspur	*Calcarius ornatus*	.	13	.	.	.	10	20	12	.	48
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.	.	.	.	.

Appendix A. (*continued*) Species observed by survey site during grassland breeding bird surveys at the Crocker Wind Farm, June 7 – July 4, 2017

		Survey Site									
Species	**Scientific Name**	**123**	**141**	**150**	**175**	**195**	**199**	**203**	**212**	**214**	**220**
clay-colored sparrow	*Spizella pallida*	.	1	.	.	6	.	2	.	.	1
dickcissel	*Spiza americana*	.	5	11	.	5	2	.	1	1	2
field sparrow	*Spizella pusilla*	.	.	.	.	.	.	.	.	.	.
grasshopper sparrow	*Ammodramus savannarum*	3	7	11	27	31	16	12	13	20	4
Henslow's sparrow	*Ammodramus henslowii*	.	.	.	.	.	.	.	.	.	.
horned lark	*Eremophila alpestris*	4	.	.	.	.	.	.	.	.	.
house sparrow	*Passer domesticus*	.	3	.	.	.	.	.	.	.	.
Savannah sparrow	*Passerculus sandwichensis*	.	8	5	4	.	5	.	.	2	.
song sparrow	*Melospiza melodia*	1	1	.	.	.	.	.	.	.	.
unidentified sparrow		1	1	1	.	.	.	.	.	.	.
vesper sparrow	*Pooecetes gramineus*	2	.	.	.	.	.	.	.	.	.
brown thrasher	*Toxostoma rufum*	1	.	.	.	.	.	.	.	.	.
barn swallow	*Hirundo rustica*	6	3	.	.	.	.	.	.	1	3
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	.	.	.	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	4	.	.	.	.	.	.	.	.	.
tree swallow	*Tachycineta bicolor*	4	2	.	.	2	.	.	.	.	.
unidentified swallow		1	.	.	.	.	.	.	.	.	.
American robin	*Turdus migratorius*	9	.	.	.	.	.	.	.	.	.
chestnut-sided warbler	*Setophaga pensylvanica*	.	.	.	.	.	.	.	2	.	.
common yellowthroat	*Geothlypis trichas*	.	.	1	1	.	.	.	.	.	.
yellow warbler	*Setophaga petechia*	5	1	.	.	.	.	.	.	.	.
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	.	.	.	.	.	.
Total		108	102	92	110	96	90	104	84	61	75
Transects *n* =		6	6	6	6	6	6	6	5	6	6

Appendix B. Species Observed By Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

Appendix B. Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**2R**	**2T**	**4R**	**4T**	**14R**	**14T**	**23R**	**23T**	**34R**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.	.	.	.
killdeer	*Charadrius vociferus*	.	.	1	3	2	.	.	.	.
marbled godwit	*Limosa fedoa*	.	.	.	7	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	1	1	5	2	3	1	.	.	.
willet	*Tringa semipalmata*	.	.	.	.	.	.	.	.	.
Swainson's hawk	*Buteo swainsoni*	.	.	.	.	.	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	.	.	.	3	.	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	.	.	1	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	.	.	.	.	.	.	.
mourning dove	*Zenaida macroura*	1	.	.	2	.	.	.	.	2
northern flicker	*Colaptes auratus*	.	.	.	.	.	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.	.	.	.
unidentified passerine		.	3	1	2	2	.	.	.	.
bobolink	*Dolichonyx oryzivorus*	4	12	1	3	5	8	.	1	13
Brewer's blackbird	*Euphagus cyanocephalus*	.	.	.	.	.	.	.	.	.
brown-headed cowbird	*Molothrus ater*	3	6	2	6	.	4	.	13	10
common grackle	*Quiscalus quiscula*	.	4	1	.	1	4	.	.	.
European starling	*Sturnus vulgaris*	.	.	.	.	.	.	.	.	.
orchard oriole	*Icterus spurius*	.	.	.	.	.	.	.	.	.
red-winged blackbird	*Agelaius phoeniceus*	2	1	10	18	.	1	.	.	1
unidentified blackbird		1	1	.	2	.	.	.	.	2
western meadowlark	*Sturnella neglecta*	9	1	12	13	17	19	9	8	9
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	.	.	.	3	.	.	.	.	.
American goldfinch	*Spinus tristis*	.	.	.	.	2	.	.	.	.
eastern kingbird	*Tyrannus tyrannus*	.	.	.	.	.	.	.	.	.
eastern phoebe	*Sayornis phoebe*	.	.	.	.	.	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	.	.	.	.	1	.	.	1
willow flycatcher	*Empidonax traillii*	.	.	.	.	.	.	.	.	.
chestnut-collared longspur	*Calcarius ornatus*	.	.	2	1	.	.	4	2	.
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.	.	.	.

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**2R**	**2T**	**4R**	**4T**	**14R**	**14T**	**23R**	**23T**	**34R**
clay-colored sparrow	*Spizella pallida*	.	1	.	.	5	1	5	5	3
dickcissel	*Spiza americana*	1	.	15	13	6	3	11	7	10
field sparrow	*Spizella pusilla*	.	.	.	.	.	.	.	.	.
grasshopper sparrow	*Ammodramus savannarum*	7	14	2	5	18	15	16	10	9
Henslow's sparrow	*Ammodramus henslowii*	1	.	.	.	.	.	.	.	2
horned lark	*Eremophila alpestris*	.	.	.	.	.	.	.	.	.
house sparrow	*Passer domesticus*	.	.	.	.	.	.	.	.	.
Savannah sparrow	*Passerculus sandwichensis*	.	1	.	4	3	1	.	.	.
song sparrow	*Melospiza melodia*	.	.	.	.	1	.	.	.	.
unidentified sparrow		.	1	.	3	.	.	.	.	.
vesper sparrow	*Pooecetes gramineus*	.	.	.	1	.	.	.	.	.
brown thrasher	*Toxostoma rufum*	.	.	.	.	.	.	.	.	.
barn swallow	*Hirundo rustica*	.	.	.	.	.	.	2	.	.
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	.	.	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	.	.	.	.	.	.	.	.	.
tree swallow	*Tachycineta bicolor*	.	1	.	.	.	.	1	.	.
unidentified swallow		.	.	.	.	1	.	.	.	.
American robin	*Turdus migratorius*	.	.	.	.	.	.	.	.	.
chestnut-sided warbler	*Setophaga pensylvanica*	.	.	4	.	.	.	.	.	.
common yellowthroat	*Geothlypis trichas*	.	.	.	.	.	.	.	.	.
yellow warbler	*Setophaga petechia*	.	.	.	.	.	.	.	.	.
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	.	.	.	.	.
Total		30	47	56	91	67	58	48	46	62
Transects *n* =		3	3	3	3	3	3	3	3	3

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**34T**	**42R**	**42T**	**49R**	**49T**	**62R**	**62T**	**64R**	**64T**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.	.	.	.
killdeer	*Charadrius vociferus*	.	.	.	.	.	2	3	.	3
marbled godwit	*Limosa fedoa*	.	.	.	.	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	.	2	.	.	.	1	.	.	.
willet	*Tringa semipalmata*	.	.	.	.	.	.	.	.	.
Swainson's hawk	*Buteo swainsoni*	.	1	.	.	.	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	.	.	.	.	.	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	.	.	.	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	3	.	.	.	.	.	.
mourning dove	*Zenaida macroura*	4	1	1	2	.	2	.	.	2
northern flicker	*Colaptes auratus*	.	1	.	.	.	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.	.	.	.
unidentified passerine		3	1	.	.	.	.	1	.	.
bobolink	*Dolichonyx oryzivorus*	3	1	.	6	14	.	.	14	3
Brewer's blackbird	*Euphagus cyanocephalus*	.	.	.	.	.	3	1	.	.
brown-headed cowbird	*Molothrus ater*	1	2	.	1	.	7	11	2	.
common grackle	*Quiscalus quiscula*	.	2	.	.	1	.	.	.	2
European starling	*Sturnus vulgaris*	.	.	.	.	.	.	.	.	.
orchard oriole	*Icterus spurius*	.	.	.	.	.	.	.	.	.
red-winged blackbird	*Agelaius phoeniceus*	2	.	.	.	.	1	11	.	1
unidentified blackbird		3	.	2	.	1	1	.	.	.
western meadowlark	*Sturnella neglecta*	14	5	11	3	2	12	11	8	4
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	.	1	.	.	.	.	.	.	.
American goldfinch	*Spinus tristis*	.	3	2	.	2	.	.	.	.
eastern kingbird	*Tyrannus tyrannus*	1	.	.	.	.	.	.	1	.
eastern phoebe	*Sayornis phoebe*	.	.	.	.	.	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	.	.	.	.	.	.	.	.
willow flycatcher	*Empidonax traillii*	.	.	.	.	.	.	.	.	.
chestnut-collared longspur	*Calcarius ornatus*	3	.	.	.	4	2	7	.	.
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.	.	.	.

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**34T**	**42R**	**42T**	**49R**	**49T**	**62R**	**62T**	**64R**	**64T**
clay-colored sparrow	*Spizella pallida*	.	2	1	4	.	1	.	3	.
dickcissel	*Spiza americana*	11	.	.	6	2	2	1	3	1
field sparrow	*Spizella pusilla*	.	1	.	.	.	.	.	.	.
grasshopper sparrow	*Ammodramus savannarum*	9	3	15	7	4	5	6	10	6
Henslow's sparrow	*Ammodramus henslowii*	4	.	2	.	.	.	1	.	.
horned lark	*Eremophila alpestris*	1	.	2	.	.	3	.	.	3
house sparrow	*Passer domesticus*	.	.	.	.	.	.	.	.	.
Savannah sparrow	*Passerculus sandwichensis*	.	2	.	.	.	.	.	2	.
song sparrow	*Melospiza melodia*	.	2	1	.	.	.	.	.	.
unidentified sparrow		4	.	3	1	.	.	.	1	.
vesper sparrow	*Pooecetes gramineus*	.	.	.	.	.	.	.	.	.
brown thrasher	*Toxostoma rufum*	.	.	.	2	.	.	.	.	.
barn swallow	*Hirundo rustica*	.	.	.	.	.	.	.	.	.
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	1	.	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	.	.	.	.	.	.	.	.	.
tree swallow	*Tachycineta bicolor*	.	1	1	.	.	7	1	.	.
unidentified swallow		.	.	1	.	.	.	.	.	.
American robin	*Turdus migratorius*	.	.	.	.	.	.	.	.	.
chestnut-sided warbler	*Setophaga pensylvanica*	4	.	.	.	.	.	.	.	.
common yellowthroat	*Geothlypis trichas*	.	.	.	.	.	.	.	.	.
yellow warbler	*Setophaga petechia*	.	.	.	1	.	.	.	.	.
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	.	.	.	.	.
Total		67	31	45	33	31	49	54	44	25
Transects *n* =		3	3	3	3	2	3	3	3	3

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**66R**	**66T**	**69R**	**69T**	**73R**	**73T**	**77R**	**77T**	**78R**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.	.	.	.
killdeer	*Charadrius vociferus*	3	1	.	.	.	.	.	.	.
marbled godwit	*Limosa fedoa*	.	.	.	.	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	.	.	.	.	.	.	2	1	1
willet	*Tringa semipalmata*	.	.	.	.	.	.	.	.	.
Swainson's hawk	*Buteo swainsoni*	.	.	.	.	.	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	.	.	.	.	.	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	.	.	.	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	.	.	.	.	.	.	.
mourning dove	*Zenaida macroura*	.	.	.	.	2	.	.	.	1
northern flicker	*Colaptes auratus*	.	.	.	.	.	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.	.	.	.
unidentified passerine		.	.	.	.	.	.	.	.	.
bobolink	*Dolichonyx oryzivorus*	9	6	16	16	.	4	4	14	11
Brewer's blackbird	*Euphagus cyanocephalus*	.	1	.	.	.	.	.	.	.
brown-headed cowbird	*Molothrus ater*	.	20	2	2	.	6	11	1	8
common grackle	*Quiscalus quiscula*	1	.	.	.	.	.	.	.	2
European starling	*Sturnus vulgaris*	.	.	.	.	.	.	.	.	.
orchard oriole	*Icterus spurius*	.	.	.	.	.	.	.	.	.
red-winged blackbird	*Agelaius phoeniceus*	2	.	1	.	.	.	5	4	1
unidentified blackbird		.	.	.	.	.	.	.	1	1
western meadowlark	*Sturnella neglecta*	9	15	11	.	6	11	10	7	8
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	.	.	.	.	.	.	.	.	.
American goldfinch	*Spinus tristis*	1	.	3	.	.	2	.	1	.
eastern kingbird	*Tyrannus tyrannus*	.	.	1	.	.	.	.	2	.
eastern phoebe	*Sayornis phoebe*	.	.	.	.	.	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	.	.	.	.	1	.	.	.
willow flycatcher	*Empidonax traillii*	.	.	.	.	.	.	.	.	.
chestnut-collared longspur	*Calcarius ornatus*	.	.	.	.	1	10	.	.	.
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.	.	.	.

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**66R**	**66T**	**69R**	**69T**	**73R**	**73T**	**77R**	**77T**	**78R**
clay-colored sparrow	*Spizella pallida*	.	1	3	.	5	3	.	.	2
dickcissel	*Spiza americana*	.	.	17	.	3	3	5	1	5
field sparrow	*Spizella pusilla*	.	.	.	.	.	.	.	.	.
grasshopper sparrow	*Ammodramus savannarum*	19	14	9	6	18	10	5	11	9
Henslow's sparrow	*Ammodramus henslowii*	4	.	.	1	.	.	.	.	2
horned lark	*Eremophila alpestris*	.	.	.	.	.	.	.	.	.
house sparrow	*Passer domesticus*	.	.	.	.	.	.	.	.	.
Savannah sparrow	*Passerculus sandwichensis*	4	4	1	1	.	.	3	.	3
song sparrow	*Melospiza melodia*	.	.	.	.	.	.	.	.	.
unidentified sparrow		.	1	2	2	.	.	1	2	1
vesper sparrow	*Pooecetes gramineus*	.	.	1	.	.	.	.	.	.
brown thrasher	*Toxostoma rufum*	.	.	.	.	.	.	.	.	.
barn swallow	*Hirundo rustica*	.	.	1	.	1	2	.	.	.
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	.	.	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	.	.	.	.	.	.	.	.	.
tree swallow	*Tachycineta bicolor*	.	2	.	1	.	.	.	.	.
unidentified swallow		.	.	2	.	.	.	.	.	.
American robin	*Turdus migratorius*	.	.	.	.	.	.	.	.	.
chestnut-sided warbler	*Setophaga pensylvanica*	.	.	1	.	.	.	.	.	.
common yellowthroat	*Geothlypis trichas*	.	.	1	.	.	.	.	.	1
yellow warbler	*Setophaga petechia*	.	.	.	.	.	.	.	.	.
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	.	.	.	.	.
Total		52	65	72	29	36	52	46	45	56
Transects *n* =		3	3	3	2	3	3	3	3	3

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**78T**	**87R**	**87T**	**95R**	**95T**	**100R**	**100T**	**108R**	**108T**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.	.	.	.
killdeer	*Charadrius vociferus*	.	.	.	2	2	.	5	2	2
marbled godwit	*Limosa fedoa*	.	.	.	.	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	1	3	2	.	.	.	.	.	.
willet	*Tringa semipalmata*	.	.	.	.	.	.	.	.	.
Swainson's hawk	*Buteo swainsoni*	.	.	.	.	.	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	.	.	.	.	.	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	6	.	.	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	.	.	.	.	.	.	.
mourning dove	*Zenaida macroura*	.	.	2	13	8	.	1	.	.
northern flicker	*Colaptes auratus*	.	.	.	.	.	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.	.	.	2
unidentified passerine		1	.	.	.	.	.	.	2	3
bobolink	*Dolichonyx oryzivorus*	8	.	3	.	.	4	2	2	.
Brewer's blackbird	*Euphagus cyanocephalus*	.	.	.	.	.	.	.	.	.
brown-headed cowbird	*Molothrus ater*	4	7	3	1	.	5	4	3	.
common grackle	*Quiscalus quiscula*	.	3	3	1	10	4	4	.	4
European starling	*Sturnus vulgaris*	.	.	.	.	.	.	.	.	.
orchard oriole	*Icterus spurius*	.	2	1	.	.	.	.	.	.
red-winged blackbird	*Agelaius phoeniceus*	1	4	.	.	.	.	.	.	.
unidentified blackbird		.	.	.	.	.	2	.	.	.
western meadowlark	*Sturnella neglecta*	7	7	4	4	6	5	3	7	.
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	.	.	.	.	.	.	.	.	.
American goldfinch	*Spinus tristis*	1	1	.	.	1	.	.	3	.
eastern kingbird	*Tyrannus tyrannus*	2	.	.	6	1	2	.	.	.
eastern phoebe	*Sayornis phoebe*	.	.	.	.	.	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	.	.	.	.	.	.	.	.
willow flycatcher	*Empidonax traillii*	.	.	.	.	.	.	.	.	.
chestnut-collared longspur	*Calcarius ornatus*	.	5	3	.	.	.	.	.	.
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.	.	.	5

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**78T**	**87R**	**87T**	**95R**	**95T**	**100R**	**100T**	**108R**	**108T**
clay-colored sparrow	*Spizella pallida*	.	8	6	4	2	5	4	2	.
dickcissel	*Spiza americana*	4	6	9	4	6	7	10	5	3
field sparrow	*Spizella pusilla*	.	.	.	.	.	.	.	.	.
grasshopper sparrow	*Ammodramus savannarum*	8	7	18	13	8	7	4	14	3
Henslow's sparrow	*Ammodramus henslowii*	.	.	.	.	.	.	1	4	.
horned lark	*Eremophila alpestris*	.	.	2	.	.	.	.	2	3
house sparrow	*Passer domesticus*	.	.	.	.	.	.	.	.	.
Savannah sparrow	*Passerculus sandwichensis*	.	.	.	.	.	.	.	.	.
song sparrow	*Melospiza melodia*	.	.	.	2	9	.	.	.	2
unidentified sparrow		1	.	.	.	.	3	3	3	2
vesper sparrow	*Pooecetes gramineus*	.	.	.	.	.	.	1	.	.
brown thrasher	*Toxostoma rufum*	.	.	.	.	.	.	.	.	.
barn swallow	*Hirundo rustica*	.	.	.	.	.	1	.	.	1
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	.	.	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	.	.	.	.	.	.	.	.	1
tree swallow	*Tachycineta bicolor*	.	2	1	.	.	.	3	.	.
unidentified swallow		.	.	.	.	.	.	.	.	.
American robin	*Turdus migratorius*	.	2	.	.	1	.	.	.	.
chestnut-sided warbler	*Setophaga pensylvanica*	4	.	.	.	.	.	.	.	.
common yellowthroat	*Geothlypis trichas*	.	.	.	.	.	.	.	.	.
yellow warbler	*Setophaga petechia*	.	.	.	.	.	.	.	.	.
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	1	.	.	.	.
Total		42	57	63	50	55	45	45	49	31
Transects *n* =		3	3	3	3	3	3	3	3	3

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**112R**	**112T**	**113R**	**113T**	**123R**	**123T**	**141R**	**141T**	**150R**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.	.	.	.
killdeer	*Charadrius vociferus*	.	.	.	4	1	2	.	.	.
marbled godwit	*Limosa fedoa*	.	.	.	.	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	1	.	.	.	.	.	.	.	1
willet	*Tringa semipalmata*	.	.	.	.	.	.	.	.	.
Swainson's hawk	*Buteo swainsoni*	.	.	.	.	.	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	.	.	.	.	2	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	.	.	.	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	.	.	.	.	.	.	.
mourning dove	*Zenaida macroura*	.	.	.	.	3	.	.	2	.
northern flicker	*Colaptes auratus*	.	.	.	.	1	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.	.	.	.
unidentified passerine		.	.	.	.	3	1	.	.	.
bobolink	*Dolichonyx oryzivorus*	1	4	2	3	.	.	.	10	7
Brewer's blackbird	*Euphagus cyanocephalus*	.	.	1	.	.	.	.	.	.
brown-headed cowbird	*Molothrus ater*	1	4	.	4	.	3	8	6	.
common grackle	*Quiscalus quiscula*	2	.	.	.	14	9	.	3	1
European starling	*Sturnus vulgaris*	.	.	.	.	.	.	.	.	.
orchard oriole	*Icterus spurius*	2	.	.	.	.	.	.	.	.
red-winged blackbird	*Agelaius phoeniceus*	1	5	7	4	.	8	.	6	9
unidentified blackbird		.	.	.	.	.	.	.	.	1
western meadowlark	*Sturnella neglecta*	1	2	4	1	2	3	11	6	8
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	.	1	.	.	.	.	.	2	.
American goldfinch	*Spinus tristis*	1	.	4	1	7	1	.	.	.
eastern kingbird	*Tyrannus tyrannus*	2	.	3	3	4	2	.	2	1
eastern phoebe	*Sayornis phoebe*	.	.	.	.	1	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	.	1	.	.	.	.	.	.
willow flycatcher	*Empidonax traillii*	.	.	.	.	.	.	1	.	.
chestnut-collared longspur	*Calcarius ornatus*	.	.	.	.	.	.	10	3	.
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.	.	.	.

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**112R**	**112T**	**113R**	**113T**	**123R**	**123T**	**141R**	**141T**	**150R**
clay-colored sparrow	*Spizella pallida*	4	7	3	5	.	.	.	1	.
dickcissel	*Spiza americana*	6	5	5	6	.	.	2	3	3
field sparrow	*Spizella pusilla*	.	2	.	1	.	.	.	.	.
grasshopper sparrow	*Ammodramus savannarum*	4	3	1	1	.	3	4	3	8
Henslow's sparrow	*Ammodramus henslowii*	.	.	.	.	.	.	.	.	.
horned lark	*Eremophila alpestris*	2	.	.	.	2	2	.	.	.
house sparrow	*Passer domesticus*	.	.	.	.	.	.	3	.	.
Savannah sparrow	*Passerculus sandwichensis*	1	1	.	.	.	.	4	4	3
song sparrow	*Melospiza melodia*	1	.	.	.	1	.	1	.	.
unidentified sparrow		.	2	1	1	.	1	1	.	.
vesper sparrow	*Pooecetes gramineus*	.	1	2	3	2	.	.	.	.
brown thrasher	*Toxostoma rufum*	.	.	.	.	1	.	.	.	.
barn swallow	*Hirundo rustica*	.	.	.	.	1	5	.	3	.
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	.	.	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	.	.	.	.	.	4	.	.	.
tree swallow	*Tachycineta bicolor*	.	1	3	1	3	1	2	.	.
unidentified swallow		.	.	.	.	1	.	.	.	.
American robin	*Turdus migratorius*	.	.	.	1	7	2	.	.	.
chestnut-sided warbler	*Setophaga pensylvanica*	1	.	.	.	.	.	.	.	.
common yellowthroat	*Geothlypis trichas*	.	.	.	.	.	.	.	.	1
yellow warbler	*Setophaga petechia*	.	.	2	.	5	.	1	.	.
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	.	.	.	.	.
Total		31	38	39	39	61	47	48	54	43
Transects *n* =		2	3	3	3	3	3	3	3	3

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**150T**	**175R**	**175T**	**195R**	**195T**	**199R**	**199T**	**203R**	**203T**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.	.	.	4
killdeer	*Charadrius vociferus*	.	.	.	4	.	.	6	.	.
marbled godwit	*Limosa fedoa*	.	.	.	.	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	1	1	.	.	.	.	.	.	.
willet	*Tringa semipalmata*	.	.	.	.	.	.	2	.	.
Swainson's hawk	*Buteo swainsoni*	.	.	.	.	.	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	.	.	.	.	.	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	.	.	.	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	.	.	.	.	.	.	.
mourning dove	*Zenaida macroura*	.	.	.	.	1	.	.	1	4
northern flicker	*Colaptes auratus*	.	.	.	.	.	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.	.	.	.
unidentified passerine		.	.	.	.	.	.	.	.	.
bobolink	*Dolichonyx oryzivorus*	4	5	4	2	4	9	8	5	1
Brewer's blackbird	*Euphagus cyanocephalus*	.	.	.	.	.	.	.	.	.
brown-headed cowbird	*Molothrus ater*	2	.	2	8	3	6	7	.	11
common grackle	*Quiscalus quiscula*	3	16	5	2	2	1	.	5	1
European starling	*Sturnus vulgaris*	.	.	.	.	.	.	.	.	.
orchard oriole	*Icterus spurius*	.	.	.	.	.	.	.	.	.
red-winged blackbird	*Agelaius phoeniceus*	10	23	3	5	3	5	.	7	17
unidentified blackbird		8	1	.	.	.	.	.	.	.
western meadowlark	*Sturnella neglecta*	4	2	11	7	9	6	7	5	5
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	1	.	1	.	.	.	.	.	.
American goldfinch	*Spinus tristis*	.	4	.	.	1	.	.	1	.
eastern kingbird	*Tyrannus tyrannus*	2	.	.	1	.	.	.	1	2
eastern phoebe	*Sayornis phoebe*	.	.	.	.	.	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	.	.	.	.	.	.	.	.
willow flycatcher	*Empidonax traillii*	.	.	.	.	.	.	.	.	.
chestnut-collared longspur	*Calcarius ornatus*	.	.	.	.	.	.	10	2	18
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.	.	.	.

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect								
Species	**Scientific Name**	**150T**	**175R**	**175T**	**195R**	**195T**	**199R**	**199T**	**203R**	**203T**
clay-colored sparrow	*Spizella pallida*	.	.	.	4	2	.	.	2	.
dickcissel	*Spiza americana*	8	.	.	3	2	1	1	.	.
field sparrow	*Spizella pusilla*	.	.	.	.	.	.	.	.	.
grasshopper sparrow	*Ammodramus savannarum*	3	13	14	12	19	12	4	9	3
Henslow's sparrow	*Ammodramus henslowii*	.	.	.	.	.	.	.	.	.
horned lark	*Eremophila alpestris*	.	.	.	.	.	.	.	.	.
house sparrow	*Passer domesticus*	.	.	.	.	.	.	.	.	.
Savannah sparrow	*Passerculus sandwichensis*	2	2	2	.	.	.	5	.	.
song sparrow	*Melospiza melodia*	.	.	.	.	.	.	.	.	.
unidentified sparrow		1	.	.	.	.	.	.	.	.
vesper sparrow	*Pooecetes gramineus*	.	.	.	.	.	.	.	.	.
brown thrasher	*Toxostoma rufum*	.	.	.	.	.	.	.	.	.
barn swallow	*Hirundo rustica*	.	.	.	.	.	.	.	.	.
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	.	.	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	.	.	.	.	.	.	.	.	.
tree swallow	*Tachycineta bicolor*	.	.	.	2	.	.	.	.	.
unidentified swallow		.	.	.	.	.	.	.	.	.
American robin	*Turdus migratorius*	.	.	.	.	.	.	.	.	.
chestnut-sided warbler	*Setophaga pensylvanica*	.	.	.	.	.	.	.	.	.
common yellowthroat	*Geothlypis trichas*	.	1	.	.	.	.	.	.	.
yellow warbler	*Setophaga petechia*	.	.	.	.	.	.	.	.	.
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	.	.	.	.	.
Total		49	68	42	50	46	40	50	38	66
Transects *n* =		3	3	3	3	3	3	3	3	3

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect					
Species	**Scientific Name**	**212R**	**212T**	**214R**	**214T**	**220R**	**220T**
cattle egret	*Bubulcus ibis*	.	.	.	.	.	.
killdeer	*Charadrius vociferus*	1	.	.	.	.	.
marbled godwit	*Limosa fedoa*	.	.	.	.	.	.
upland sandpiper	*Bartramia longicauda*	3	1	.	.	.	.
willet	*Tringa semipalmata*	1	.	.	.	.	.
Swainson's hawk	*Buteo swainsoni*	.	.	.	.	.	.
ring-necked pheasant	*Phasianus colchicus*	.	.	.	.	.	.
sharp-tailed grouse	*Tympanuchus phasianellus*	.	.	.	.	.	.
wild turkey	*Meleagris gallopavo*	.	.	.	.	.	.
mourning dove	*Zenaida macroura*	.	.	.	.	.	.
northern flicker	*Colaptes auratus*	.	.	.	.	.	.
American crow	*Corvus brachyrhynchos*	.	.	.	.	.	.
unidentified passerine		.	1	.	.	.	.
bobolink	*Dolichonyx oryzivorus*	.	4	7	10	.	.
Brewer's blackbird	*Euphagus cyanocephalus*	.	.	.	.	.	.
brown-headed cowbird	*Molothrus ater*	2	4	.	1	3	4
common grackle	*Quiscalus quiscula*	.	1	.	.	.	1
European starling	*Sturnus vulgaris*	.	6	.	.	.	.
orchard oriole	*Icterus spurius*	.	.	.	.	.	.
red-winged blackbird	*Agelaius phoeniceus*	6	.	.	.	1	.
unidentified blackbird		.	.	.	.	.	.
western meadowlark	*Sturnella neglecta*	7	19	6	7	4	4
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	.	.	.	.	.	.
American goldfinch	*Spinus tristis*	.	.	2	.	.	.
eastern kingbird	*Tyrannus tyrannus*	.	.	4	.	.	.
eastern phoebe	*Sayornis phoebe*	.	.	.	.	.	.
western kingbird	*Tyrannus verticalis*	.	.	.	.	.	.
willow flycatcher	*Empidonax traillii*	.	.	.	.	.	.
chestnut-collared longspur	*Calcarius ornatus*	.	12	.	.	20	28
chipping sparrow	*Spizella passerina*	.	.	.	.	.	.

Appendix B. (*continued*) Species Observed by Survey Transect During Grassland Breeding Bird Surveys At The Crocker Wind Farm, June 7 – July 4, 2017

		Survey Transect					
Species	**Scientific Name**	**212R**	**212T**	**214R**	**214T**	**220R**	**220T**
clay-colored sparrow	*Spizella pallida*	.	.	.	.	.	1
dickcissel	*Spiza americana*	1	.	.	1	.	2
field sparrow	*Spizella pusilla*	.	.	.	.	.	.
grasshopper sparrow	*Ammodramus savannarum*	7	6	13	7	3	1
Henslow's sparrow	*Ammodramus henslowii*	.	.	.	.	.	.
horned lark	*Eremophila alpestris*	.	.	.	.	.	.
house sparrow	*Passer domesticus*	.	.	.	.	.	.
Savannah sparrow	*Passerculus sandwichensis*	.	.	2	.	.	.
song sparrow	*Melospiza melodia*	.	.	.	.	.	.
unidentified sparrow		.	.	.	.	.	.
vesper sparrow	*Pooecetes gramineus*	.	.	.	.	.	.
brown thrasher	*Toxostoma rufum*	.	.	.	.	.	.
barn swallow	*Hirundo rustica*	.	.	1	.	1	2
cliff swallow	*Petrochelidon pyrrhonota*	.	.	.	.	.	.
northern rough-winged swallow	*Stelgidopteryx serripennis*	.	.	.	.	.	.
tree swallow	*Tachycineta bicolor*	.	.	.	.	.	.
unidentified swallow		.	.	.	.	.	.
American robin	*Turdus migratorius*	.	.	.	.	.	.
chestnut-sided warbler	*Setophaga pensylvanica*	.	2	.	.	.	.
common yellowthroat	*Geothlypis trichas*	.	.	.	.	.	.
yellow warbler	*Setophaga petechia*	.	.	.	.	.	.
cedar waxwing	*Bombycilla cedrorum*	.	.	.	.	.	.
Total		28	56	35	26	32	43
Transects *n* =		2	3	3	3	3	3