

APPENDIX D

WEST PRELIMINARY WILDLIFE STUDY REPORT

**Wildlife Studies for the
PrairieWinds SD1 Crow Lake Wind Resource Area
Aurora, Brule, and Jerauld Counties, South Dakota**

March 19, 2009 – July 7, 2009

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EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. initiated surveys and monitoring of wildlife resources for Basin Electric Power Cooperative in the PrairieWinds SD1 Crow Lake Wind Resource Area in Aurora, Brule, and Jerauld Counties, South Dakota in spring 2009. The surveys implemented during the spring and summer of 2009 are part of a larger one-year study. Seasonal interim reports are designed to give Basin Electric Power Cooperative an early indication if high wildlife use is documented during surveys or if sensitive species are observed within the PrairieWinds SD1 Crow Lake Wind Resource Area.

Fixed-point bird use surveys were conducted from mid-March through late-May. Twenty fixed-point bird use survey plots were established within PrairieWinds SD1 Crow Lake Wind Resource Area. Each point was visited nine times during the spring season, for a total of 174 20-minute surveys. Sixty unique bird species were documented during fixed-point surveys. A total of 2,178 individual birds within 875 separate groups were recorded. Fifty-eight individual raptors in 56 groups were recorded (2.7% of overall bird observations), representing eight species. Waterfowl were by far the most abundant bird type comprising 48.4% of observations. Passerines were the second most abundant bird type, accounting for 24.5% of overall bird observations.

Breeding bird transect surveys were conducted from early-June to early-July, 2009. Thirty transect were surveyed three times during the summer of 2009 for a total of 90 breeding bird transect surveys. A total of 2,824 individual bird observations within 1,885 separate groups were recorded, representing 59 unique species. Cumulatively, four species (6.8% of all species) accounted for 85.4% of observations: brown-headed cowbird, western meadowlark, grasshopper sparrow, and red-winged blackbird, which are species typical of open grassland habitats. Woodland and wetland birds were also observed, but were less abundant than grassland species.

Eight South Dakota state species of concern were recorded within the PrairieWinds SD1 Crow Lake Wind Resource Area, including American white pelican, black-crowned night-heron, broad-winged hawk, Cooper's hawk, prairie falcon, Swainson's hawk, great blue heron, and McCown's longspur.

Prairie grouse lek surveys were conducted using a fixed-wing aircraft and one or two observers starting in late April and were completed in mid-May. Leks were also checked from the ground when possible. Five grouse leks were located, one of which was a greater prairie chicken lek.

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INTRODUCTION

Basin Electric Power Cooperative (BEPC) has proposed development of a wind-energy facility in the PrairieWinds SD1 Crow Lake Wind Resource Area (CLWRA), located in Aurora, Brule, and Jerauld Counties, South Dakota. BEPC requested that Western EcoSystems Technology, Inc. (WEST) develop and implement a standardized protocol for baseline wildlife studies in the CLWRA. The purpose of the studies was to estimate impacts of the proposed wind-energy facility on wildlife and to assist with siting turbines to minimize impacts to wildlife resources. These protocols for the baseline studies are similar to those used at other wind-energy facilities across the nation and follow the guidance of the National Wind Coordinating Collaborative (Anderson et al. 1999). The protocols were designed to help predict potential impacts to bird species, particularly raptors.

The purpose of the interim report is to bring items of biological interest to BEPC's attention, such as seasonal raptor use and the presence of sensitive species. The scope of the spring and summer 2009 wildlife studies included fixed-point bird use surveys, breeding bird transect surveys, grouse lek surveys, and incidental wildlife observations.

STUDY AREA

The proposed CLWRA is located in northwest Aurora, southwestern Jerauld, and northeastern Brule Counties, South Dakota (Figure 1). The overall project boundary as currently planned encompasses about 35,846 acres (14,506 ha) and will have approximately 101 wind turbines. The wind resource area is in the southern Missouri Coteau ecoregion (Bryce et al. 1996), and contains areas of native grasslands, wetlands and lakes, tilled agriculture, and small wooded areas. Immediately to the north is the existing Wessington Springs wind facility, which became operational in late 2008.

METHODS

Spring and summer studies conducted at CLWRA included fixed-point bird use surveys, breeding bird transect surveys, grouse lek surveys, and incidental wildlife observations.

Fixed-Point Bird Use Surveys

The objective of the fixed-point bird use surveys was to estimate the seasonal, spatial, and temporal use of the CLWRA by birds, particularly raptors (defined as kites, accipiters, buteos, harriers, eagles, falcons, or owls). Fixed-point surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980).

Bird Use Survey Plots

Twenty points were selected to include representative habitats and topography within the CLWRA, while achieving relatively even coverage of the study area (Figure 2). Each survey plot was an 800-meter (m) (2,625-feet [ft]) radius circle centered on the point.

Bird Survey Methods

All species of birds observed during 20-minute (min) fixed-point surveys were recorded. All large birds observed perched or flying over the plot were recorded and mapped. Small birds (e.g., sparrows) within 100 m (328 ft) of the point were recorded, but not mapped. Observations of birds beyond the 800-m radius were recorded, but were not included in the statistical analyses. Observations of small birds beyond the 100-m radius were also excluded from analysis.

The date, start and end time of the survey period, and weather information such as temperature, wind speed, wind direction, precipitation, visibility, and cloud cover were recorded for each survey. Species or best possible identification, number of individuals, sex and age class (if possible), distance from plot center and flight direction when first observed, closest distance, altitude above ground, activity (behavior), and habitat(s) were recorded for each observation. Behavior and habitat type were recorded based on the point of first observation. Approximate flight height and distance from plot center at first observation were recorded to the nearest 5-m (16-ft) interval. Other information recorded included whether or not the observation was auditory only and the 10-min interval of the 20-min survey in which the observation was initially noted.

Locations of raptors, other large birds, and species of concern were recorded on field maps by observation number and flight paths and perched locations were digitized using ArcGIS. Any notes or unusual observations were recorded in the comments section of the data sheet.

Observation Schedule

Sampling intensity was designed to document bird use and behavior by habitat and season within the CLWRA. Surveys were conducted approximately once a week during the spring (March 15 to May 31). Surveys were carried out during daylight hours and survey periods varied to approximately cover all daylight hours during a season. To the extent practical, each point was surveyed the same number of times; however, the schedule varied in response to adverse weather conditions (e.g., fog and/or rain), which caused delays and/or missed surveys.

Breeding Bird Surveys

The objectives of the transect bird use surveys were to identify breeding bird use and distribution within the CLWRA and to provide baseline data on breeding bird distribution if post-construction comparisons are conducted in the future.

Survey Methods

Thirty pre-determined 800-m line transects were slowly walked by observers (Figure 3). Transects were oriented east/west and located within the CLWRA based on a random starting point; transects were placed to avoid areas of tilled agriculture. Transects were followed using Global Positioning System (GPS) units and all visual or auditory bird observations were recorded. The distance of each bird along the transect and the perpendicular distance of the bird from the transect were recorded. In addition, the general habitat type in which each bird was observed was recorded.

In addition to GPS coordinates of the observation and species observed, the following data were recorded for each transect survey: date, start and end time of observation period, transect number, species or best possible identification, number of individuals, behavior, first altitude above ground, flight direction, and auditory-only observations. Weather information, such as temperature, wind speed, wind direction, precipitation, and cloud cover also were recorded for each transect survey. Behavior categories recognized included perched, soaring, flapping, breeding/nesting/courtship, gliding, singing, and other.

Observation Schedule

Each transect was surveyed three times from June 2 through July 7, 2009 (first visit: June 2 to June 7; second visit: June 23 to June 30; third visit: June 29 to July 7). Surveys were conducted from sunrise to 10:00 a.m.

Incidental Wildlife Observations

The objective of incidental wildlife observations was to provide a record of wildlife seen outside of the standardized surveys. All raptors, unusual or unique birds, sensitive species, mammals, reptiles, and amphibians were recorded in a similar fashion to standardized surveys. The observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, height above ground (for bird species), and habitat was recorded, and, in the case of sensitive species, the location was recorded using GPS coordinates.

Grouse Lek Surveys

The objective of the lek survey is to locate leks of the greater prairie chicken (*Tympanuchus cupido*) and/or sharp-tailed grouse (*Tympanuchus phasianellus*) in the study area. Lek surveys were conducted three times from April 30 through May 11, 2009 within the proposed boundary of the CLWRA and 400 m (0.25 mi) area outside of the boundary.

North/south transects were spaced approximately 400 m (0.25 mile) apart throughout the CLWRA. The length of each transect varied based on the project boundary but each transect extended 400 m beyond the boundary. A Cessna 172 airplane, with one pilot and one or two observers was used to conduct aerial surveys. Each transect was flown at an approximate height of 30-45 m (100-150 ft). Surveys occurred from approximately 30 min prior to sunrise until two hours after sunrise. Survey methodology was similar to that used for greater prairie chickens in Oklahoma (Martin and Knopf 1981). The location of any prairie grouse observed was marked on a hard copy map and a GPS coordinate was recorded. The number, activity, and lek status was recorded.

RESULTS

The results of the avian use surveys conducted in the CLWRA from March 19 to May 27, lek surveys from April 30 to May 11, and breeding birds from June 2 to July 7, 2009 are presented below.

Fixed-Point Bird Use Surveys

A total of 174 20-min fixed-point bird use surveys were conducted within CLWRA in the course of nine visits from March 19 through May 27, 2009.

Sixty unique species were observed during fixed-point bird use surveys (Table 1). A total of 2,178 individual birds within 875 separate groups were recorded. Fifty-eight individual raptors in 56 groups were recorded (2.7% of overall bird observations), representing eight species. Northern harrier (*Circus cyaneus*) and red-tailed hawk (*Buteo jamaicensis*) were the most frequently observed raptor species (22 and 11 individuals, respectively). Waterfowl were by far the most abundant bird type, comprising 48.4% of observations, primarily due to high numbers of Canada geese (*Branta canadensis*; 666 individuals) and mallards (*Anas platyrhynchos*; 213 individuals). These two species represented only 3.3% of all species, yet they accounted for 40.4% of bird observations. Passerines accounted for 24.5% of overall bird observations, with red-winged blackbird (*Agelaius phoeniceus*) and western meadowlark (*Sturnella neglecta*) being the most commonly observed passerine species (184 individuals and 156, respectively).

Breeding Bird Surveys

Breeding bird transect surveys were conducted at the CLWRA three times during the late spring and summer of 2009 for a total of 90 transect surveys. Fifty-nine species were identified, representing a total of 2,824 individual bird observations within 1,885 separate groups (Table 2). Over half (53.4%) of the birds observed during transect surveys were blackbirds and orioles (1,509 individuals). Cumulatively, four species (6.8% of all species) accounted for 85.4% of observations: brown-headed cowbird (*Molothrus ater*), western meadowlark, grasshopper sparrow (*Ammodramus savannarum*) and red-winged blackbird. Of raptors, only the northern harrier (11 individuals) and great horned owl (*Bubo virginianus*; one individual) were observed.

Incidental Wildlife Observations

Twenty-two bird species were recorded incidentally, totaling 324 birds within 59 separate groups (Table 3). Two state sensitive species, Swainson's hawk and prairie falcon, were observed within the CLWRA. Seven species were only recorded incidentally within the CLWRA: bank swallow (*Riparia riparia*), cattle egret (*Bubulcus ibis*), canvasback (*Aythya valisineria*), American wigeon (*Anas americana*), northern bobwhite (*Colinus virginianus*), redhead (*Aythya americana*), and red-headed woodpecker (*Melanerpes erythrocephalus*).

Eight mammal species were also observed incidentally, with the most abundant mammal being black-tailed prairie dog (*Cynomys ludovicianus*; 150 individuals). One amphibian species, spring peeper (*Pseudacris crucifer crucifer*) was also observed incidentally within the CLWRA (Table 3).

Species of Concern

Eight South Dakota state species of concern were recorded within the CLWRA, including American white pelican (*Pelecanus erythrorhynchos*), black-crowned night-heron (*Nycticorax*

nycticorax), broad-winged hawk (*Buteo platypterus*), Cooper's hawk (*Accipiter cooperii*), prairie falcon (*Falco mexicanus*), Swainson's hawk (*B. swainsoni*), great blue heron (*Ardea herodias*), and McCown's longspur (*Calcarius mccownii*; Table 4). No federally listed species were observed.

Grouse Lek Surveys

Aerial grouse lek surveys began on April 28, 2009 and concluded on May 11, 2009; the CLWRA was surveyed three times within that time period.

Five leks were located; two of those leks were observed incidentally from the ground. Two leks were confirmed to species. One of the leks was verified as a greater prairie chicken lek and one was verified as sharp-tailed grouse (Figure 4). The remaining three could not be identified to species.

DISCUSSION

Wildlife use may vary greatly by season, thus a wind-energy facility may have low use during one season, but may be higher during another. Because of this, rigorous impact assessments are generally based on at least one full year of surveys. The studies implemented at CLWRA during the spring and summer of 2009 are part of a larger one-year study. Seasonal interim reports are designed to give BEPC an early indication if high wildlife use is documented during surveys or if sensitive species are observed.

Passerines are generally the most abundant bird type found during fatality searches at wind-energy facilities (Erickson et al. 2001a). Raptors, however, have received much attention due to high rates of fatalities at the Altamont Pass wind-energy facility in California which has the highest recorded overall raptor fatality rate of any wind-energy facility (Erickson et al. 2002b). Based on the results from other wind resource areas, a ranking of seasonal mean raptor use was developed as: low (0 – 0.5 raptors/plot/20-min survey); low to moderate (0.5 – 1.0); moderate (1.0 – 2.0); high (2.0 – 3.0); and very high (> 3.0). Mean raptor use (number of raptors divided by the number of 800-m plots and the total number of surveys) in the CLWRA during spring of 2009 was low (0.34 raptors/plot/20-min survey), ranking thirty-third relative to data collected at 43 other existing and proposed wind-energy facilities (Figure 5).

Data from breeding birds were collected such that they can be used in a before/after study if the project is constructed and the use surveys are conducted post-construction. This can help investigate the displacement of grassland nesting species, as they were the most common group observed during surveys.

Grouse leks were identified within the project boundary. Prairie grouse, both greater prairie chickens and sharp-tailed grouse, have been identified as a species of concern in South Dakota. Lek locations can be used for siting turbines to minimize impacts. Surveys after construction can also be useful in determining impacts if surveys are completed.

While no federally listed species were observed during surveys, several species of state concern were documented. All state species of concern were birds, with few individuals of any one of these species being observed. No patterns were detected that would indicate areas to be avoided by construction.

Black-tailed prairie dogs were observed incidentally during surveys. Some studies have indicated that prairie dog colonies or other colonies of ground squirrels can locally increase raptor use at those locations (Good et al. 2005), as raptors will use the towns for hunting areas. Overall raptor use was low for the project area (Figure 5).

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Table 1. Summary of individuals and group observations for fixed-point bird use surveys at the PrairieWinds SD1 Crow Lake Wind Resource Area, March 19 – May 27, 2009.

Species	Scientific Name	Spring	
		# grps	# Obs
Waterbirds		29	176
American white pelican	<i>Pelecanus erythrorhynchos</i>	2	49
black-crowned night-heron	<i>Nycticorax nycticorax</i>	1	4
double-crested cormorant	<i>Phalacrocorax auritus</i>	2	40
Forster's tern	<i>Sterna forsteri</i>	1	1
Franklin's gull	<i>Larus pipixcan</i>	6	25
ring-billed gull	<i>Larus delawarensis</i>	12	30
sandhill crane	<i>Grus canadensis</i>	3	24
unidentified gull		2	3
Waterfowl		155	1,053
blue-winged teal	<i>Anas discors</i>	9	29
Canada goose	<i>Branta canadensis</i>	20	666
gadwall	<i>Anas strepera</i>	4	9
green-winged teal	<i>Anas crecca</i>	1	2
mallard	<i>Anas platyrhynchos</i>	86	213
northern pintail	<i>Anas acuta</i>	23	55
northern shoveler	<i>Anas clypeata</i>	8	24
ring-necked duck	<i>Aythya collaris</i>	1	1
snow goose	<i>Chen caerulescens</i>	1	50
unidentified duck		2	4
Shorebirds		87	96
common snipe	<i>Gallinago gallinago</i>	1	1
killdeer	<i>Charadrius vociferous</i>	64	69
marbled godwit	<i>Limosa fedoa</i>	9	12
upland sandpiper	<i>Bartramia longicauda</i>	13	14
Rails/Coots		1	2
American coot	<i>Fulica americana</i>	1	2
Raptors		56	58
American kestrel	<i>Falco sparverius</i>	5	5
broad-winged hawk	<i>Buteo platypterus</i>	3	3
Cooper's hawk	<i>Accipiter cooperii</i>	1	1
great horned owl	<i>Bubo virginianus</i>	1	1
northern harrier	<i>Circus cyaneus</i>	22	22
prairie falcon	<i>Falco mexicanus</i>	1	1
red-tailed hawk	<i>Buteo jamaicensis</i>	11	11
Swainson's hawk	<i>Buteo swainsoni</i>	6	7
unidentified buteo		6	7

Table 1. Summary of individuals and group observations for fixed-point bird use surveys at the PrairieWinds SD1 Crow Lake Wind Resource Area, March 19 – May 27, 2009.

Species	Scientific Name	Spring	
		# grps	# Obs
Upland Gamebirds		162	180
greater prairie-chicken	<i>Tympanuchus cupido</i>	4	5
ring-necked pheasant	<i>Phasianus colchicus</i>	156	173
sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	2	2
Doves/Pigeons		47	62
mourning dove	<i>Zenaida macroura</i>	47	62
Large Corvids		2	2
American crow	<i>Corvus brachyrhynchos</i>	2	2
Passerines		321	533
American goldfinch	<i>Carduelis tristis</i>	1	2
American robin	<i>Turdus migratorius</i>	4	6
baltimore oriole	<i>Icterus galbula</i>	2	2
barn swallow	<i>Hirundo rustica</i>	13	21
bobolink	<i>Dolichonyx oryzivorus</i>	8	9
brown-headed cowbird	<i>Molothrus ater</i>	24	44
chipping sparrow	<i>Spizella passerine</i>	1	1
cliff swallow	<i>Petrochelidon pyrrhonota</i>	2	5
common grackle	<i>Quiscalus quiscula</i>	7	17
dickcissel	<i>Spiza Americana</i>	2	2
eastern kingbird	<i>Tyrannus tyrannus</i>	2	2
European starling	<i>Sturnus vulgaris</i>	3	8
horned lark	<i>Eremophila alpestris</i>	25	56
loggerhead shrike	<i>Lanius ludovicianus</i>	1	1
orchard oriole	<i>Icterus spurius</i>	1	1
red-winged blackbird	<i>Agelaius phoeniceus</i>	62	184
savannah sparrow	<i>Passerculus sandwichensis</i>	5	5
song sparrow	<i>Melospiza melodia</i>	1	1
tree swallow	<i>Tachycineta bicolor</i>	2	2
unidentified sparrow		1	3
unidentified swallow		1	2
western kingbird	<i>Tyrannus verticalis</i>	1	1
western meadowlark	<i>Sturnella neglecta</i>	150	156
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	1	1
yellow warbler	<i>Dendroica petechia</i>	1	1
Other Birds		14	15
common nighthawk	<i>Chordeiles minor</i>	4	4
northern flicker	<i>Colaptes auratus</i>	9	10
unidentified woodpecker		1	1
Unidentified Birds		1	1
unidentified bird		1	1
Overall		875	2,178

Table 2. Total number of groups and individuals for each bird type and species observed during transect bird use surveys at the PrairieWinds SD1 Crow Lake Wind Resource Area, June 2 – July 7, 2009.

Species/Type	Scientific Name	# grps	# obs
Waterbirds		8	12
double-crested cormorant	<i>Phalacrocorax auritus</i>	3	7
Forster's tern	<i>Sterna forsteri</i>	1	1
great blue heron	<i>Ardea herodias</i>	2	2
unidentified tern		2	2
Waterfowl		43	128
blue-winged teal	<i>Anas discors</i>	8	20
Canada goose	<i>Branta canadensis</i>	1	5
gadwall	<i>Anas strepera</i>	1	1
mallard	<i>Anas platyrhynchos</i>	15	44
northern pintail	<i>Anas acuta</i>	5	10
northern shoveler	<i>Anas clypeata</i>	2	10
redhead	<i>Aythya Americana</i>	1	1
ring-necked duck	<i>Aythya collaris</i>	1	1
unidentified duck		9	36
Shorebirds		71	93
common snipe	<i>Gallinago gallinago</i>	3	3
killdeer	<i>Charadrius vociferous</i>	21	24
marbled godwit	<i>Limosa fedoa</i>	5	6
unidentified sandpiper		1	1
upland sandpiper	<i>Bartramia longicauda</i>	40	58
willet	<i>Catoptrophorus semipalmatus</i>	1	1
Rails/Coots		1	1
American coot	<i>Fulica americana</i>	1	1
Raptors		12	12
<u>Northern Harrier</u>		<i>11</i>	<i>11</i>
northern harrier	<i>Circus cyaneus</i>	11	11
<u>Owls</u>		<i>1</i>	<i>1</i>
great horned owl	<i>Bubo virginianus</i>	1	1
Upland Gamebirds		86	118
greater prairie-chicken	<i>Tympanuchus cupido</i>	12	23
ring-necked pheasant	<i>Phasianus colchicus</i>	72	93
sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	2	2
Doves/Pigeons		26	41
mourning dove	<i>Zenaida macroura</i>	25	38
rock pigeon	<i>Columba livia</i>	1	3
Passerines		1,636	2,417
<u>Passerines</u>		<i>9</i>	<i>11</i>
unidentified passerine		9	11

Table 2. Total number of groups and individuals for each bird type and species observed during transect bird use surveys at the PrairieWinds SD1 Crow Lake Wind Resource Area, June 2 – July 7, 2009.

Species/Type	Scientific Name	# grps	# obs
<u>Blackbirds/Orioles</u>		910	1,509
brown-headed cowbird	<i>Molothrus ater</i>	273	544
bobolink	<i>Dolichonyx oryzivorus</i>	70	83
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	1	1
common grackle	<i>Quiscalus quiscula</i>	23	37
European starling	<i>Sturnus vulgaris</i>	2	36
great-tailed grackle	<i>Quiscalus mexicanus</i>	3	3
orchard oriole	<i>Icterus spurius</i>	1	1
red-winged blackbird	<i>Agelaius phoeniceus</i>	120	225
western meadowlark	<i>Sturnella neglecta</i>	396	535
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	21	44
<u>Finches</u>		6	7
American goldfinch	<i>Carduelis tristis</i>	6	7
<u>Flycatchers</u>		42	54
eastern kingbird	<i>Tyrannus tyrannus</i>	32	41
western kingbird	<i>Tyrannus verticalis</i>	10	13
<u>Grassland/Sparrows</u>		585	669
chestnut-collared longspur	<i>Calcarius ornatus</i>	70	83
clay-colored sparrow	<i>Spizella pallid</i>	12	13
chipping sparrow	<i>Spizella passerine</i>	16	17
dickcissel	<i>Spiza Americana</i>	23	26
field sparrow	<i>Spizella pusilla</i>	8	8
grasshopper sparrow	<i>Ammodramus savannarum</i>	282	340
horned lark	<i>Eremophila alpestris</i>	2	2
McCown's longspur	<i>Calcarius mccownii</i>	1	1
savannah sparrow	<i>Passerculus sandwichensis</i>	123	123
song sparrow	<i>Melospiza melodia</i>	1	2
unidentified sparrow		43	50
vesper sparrow	<i>Pooecetes gramineus</i>	4	4
<u>Swallows</u>		75	158
bank swallow	<i>Riparia riparia</i>	10	12
barn swallow	<i>Hirundo rustica</i>	55	128
cliff swallow	<i>Petrochelidon pyrrhonota</i>	5	8
n. rough-winged swallow	<i>Stelgidopteryx serripennis</i>	2	5
unidentified swallow		3	5
<u>Thrushes</u>		4	4
American robin	<i>Turdus migratorius</i>	3	3
unidentified bluebird		1	1
<u>Warblers</u>		3	3
common yellowthroat	<i>Geothlypis trichas</i>	1	1
yellow warbler	<i>Dendroica petechia</i>	2	2

Table 2. Total number of groups and individuals for each bird type and species observed during transect bird use surveys at the PrairieWinds SD1 Crow Lake Wind Resource Area, June 2 – July 7, 2009.

Species/Type	Scientific Name	# grps	# obs
<u>Wrens</u>		2	2
house wren	<i>Troglodytes aedon</i>	1	1
marsh wren	<i>Cistothorus palustris</i>	1	1
Other Birds		1	1
<u>Woodpeckers</u>		1	1
northern flicker	<i>Colaptes auratus</i>	1	1
Unidentified Birds		1	1
unidentified bird		1	1
Overall		1,885	2,824

Table 3. Incidental wildlife observed while conducting all surveys at the PrairieWinds SD1 Crow Lake Wind Resource Area, March 19, 2009 – July 7, 2009.

Species	Scientific Name	# grps	# obs
blue-winged teal	<i>Anas discors</i>	6	65
mallard	<i>Anas platyrhynchos</i>	18	58
bank swallow	<i>Riparia riparia</i>	1	50
northern pintail	<i>Anas acuta</i>	4	38
Franklin's gull	<i>Larus pipixcan</i>	1	30
northern shoveler	<i>Anas clypeata</i>	5	26
sandhill crane	<i>Grus canadensis</i>	2	18
cattle egret	<i>Bubulcus ibis</i>	1	8
red-tailed hawk	<i>Buteo jamaicensis</i>	7	7
canvasback	<i>Aythya valisineria</i>	1	6
American wigeon	<i>Anas americana</i>	1	4
prairie falcon	<i>Falco mexicanus</i>	2	2
northern bobwhite	<i>Colinus virginianus</i>	1	2
redhead	<i>Aythya americana</i>	1	2
American kestrel	<i>Falco sparverius</i>	1	1
great horned owl	<i>Bubo virginianus</i>	1	1
loggerhead shrike	<i>Lanius ludovicianus</i>	1	1
northern harrier	<i>Circus cyaneus</i>	1	1
red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	1	1
sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	1	1
Swainson's hawk	<i>Buteo swainsoni</i>	1	1
upland sandpiper	<i>Bartramia longicauda</i>	1	1
Bird Total	22 Species	59	324
black-tailed prairie dog	<i>Cynomys ludovicianus</i>	3	150
white-tailed deer	<i>Odocoileus virginianus</i>	15	43
unidentified jack rabbit		5	6
cottontail rabbit	<i>Sylvilagus floridanus</i>	2	4
mule deer	<i>Odocoileus hemionus</i>	1	3
coyote	<i>Canis latrans</i>	1	1
mink	<i>Mustela vison</i>	1	1
striped skunk	<i>Mephitis mephitis</i>	1	1
Mammal Total	8 Species	24	203
spring peeper	<i>Pseudacris crucifer crucifer</i>	12	90

Table 4. Summary of sensitive species observed at the PrairieWinds SD1 Crow Lake Wind Resource Area during fixed-point bird use surveys (FP), breeding bird transect surveys (Trans.), and as incidental wildlife observations (Inc.), March 19, 2009 – July 7, 2009.

Species	Scientific Name	Status	FP		Trans.		Inc.		Total	
			# of grps	# of obs	# of grps	# of obs	# of grps	# of obs	# of grps	# of obs
American white pelican	<i>Pelecanus erythrorhynchos</i>	SSC	2	49	0	0	0	0	2	49
Swainson's hawk	<i>Buteo swainsoni</i>	SSC	8	9	0	0	1	1	9	10
black-crowned night-heron	<i>Nycticorax nycticorax</i>	SSC	1	4	0	0	0	0	1	4
broad-winged hawk	<i>Buteo platypterus</i>	SSC	3	3	0	0	0	0	3	3
prairie falcon	<i>Falco mexicanus</i>	SSC	1	1	0	0	2	2	3	3
Cooper's hawk	<i>Accipiter cooperii</i>	SSC	2	2	0	0	0	0	2	2
great blue heron	<i>Ardea herodias</i>	SSC	0	0	2	2	0	0	2	2
McCown's longspur	<i>Calcarius mccownii</i>	SSC	0	0	1	1	0	0	1	1
Total	8 Species		17	68	3	3	3	3	23	74

SSC = State species of concern.

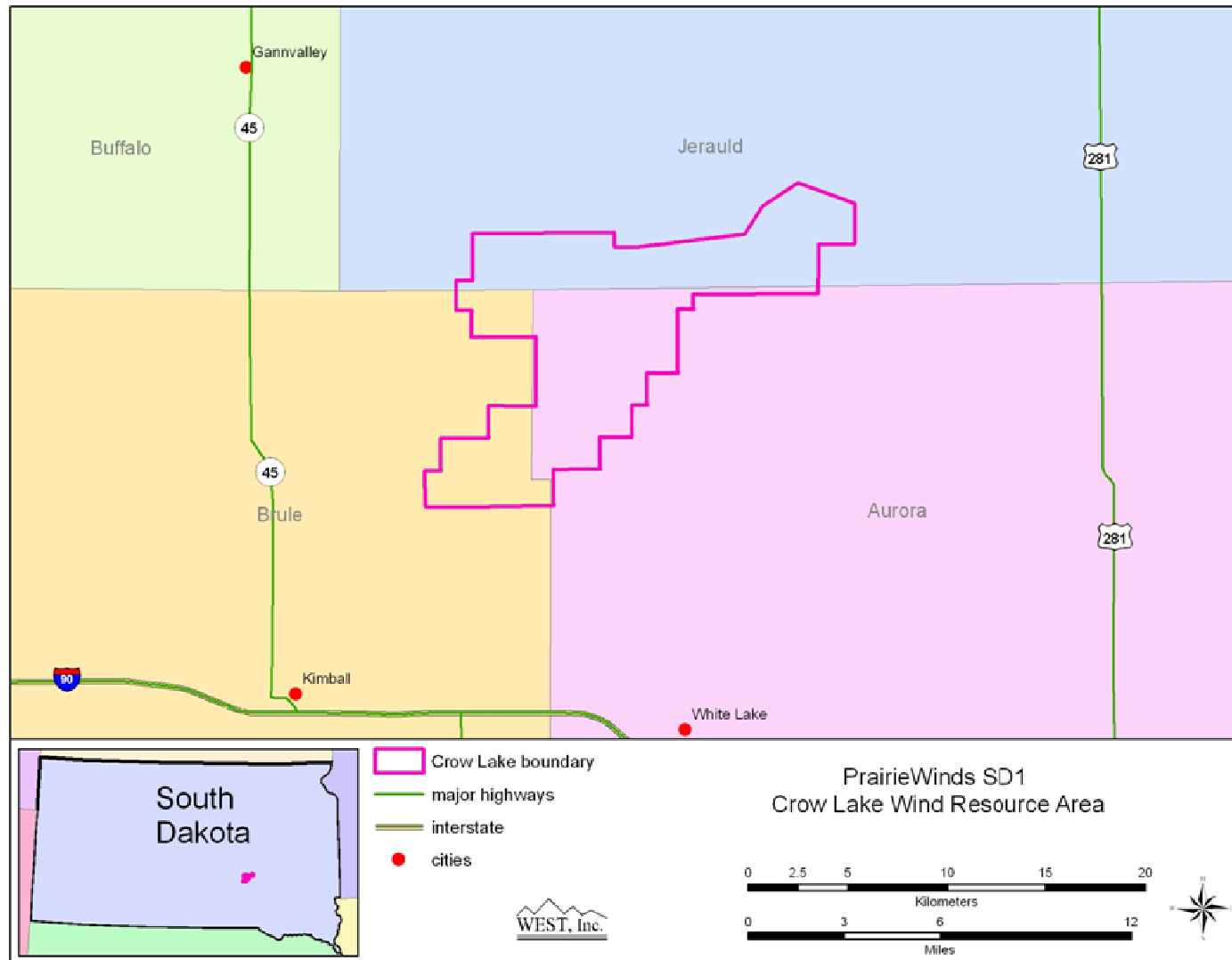


Figure 1. Study area map of the proposed PrairieWinds SD1 Crow Lake Wind Resource Area.

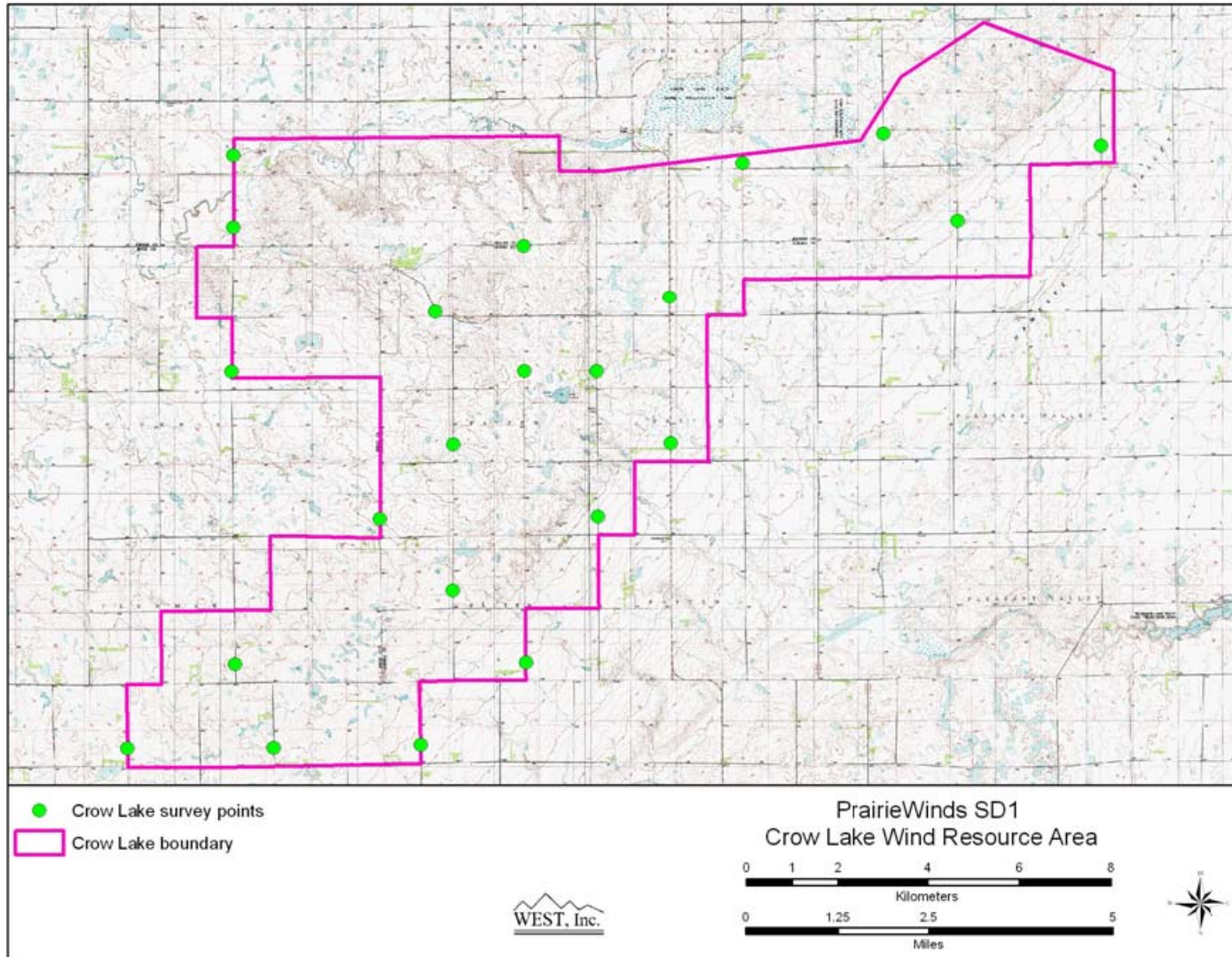


Figure 2. Fixed-point observation locations at the proposed PrairieWinds SD1 Crow Lake Wind Resource Area, spring 2009.

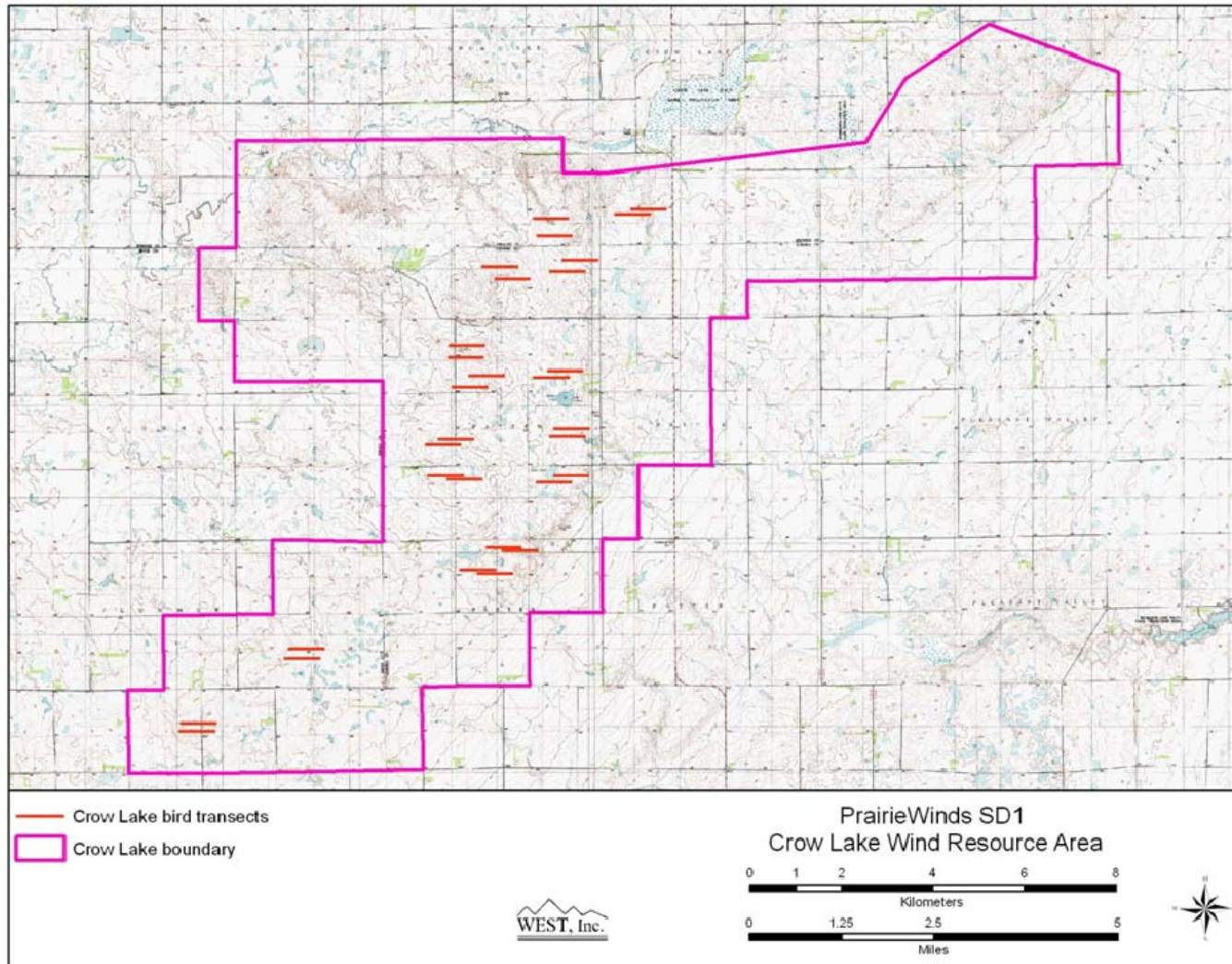


Figure 3. Transects used for breeding bird surveys at the proposed PrairieWinds SD1 Crow Lake Wind Resource Area, summer 2009.

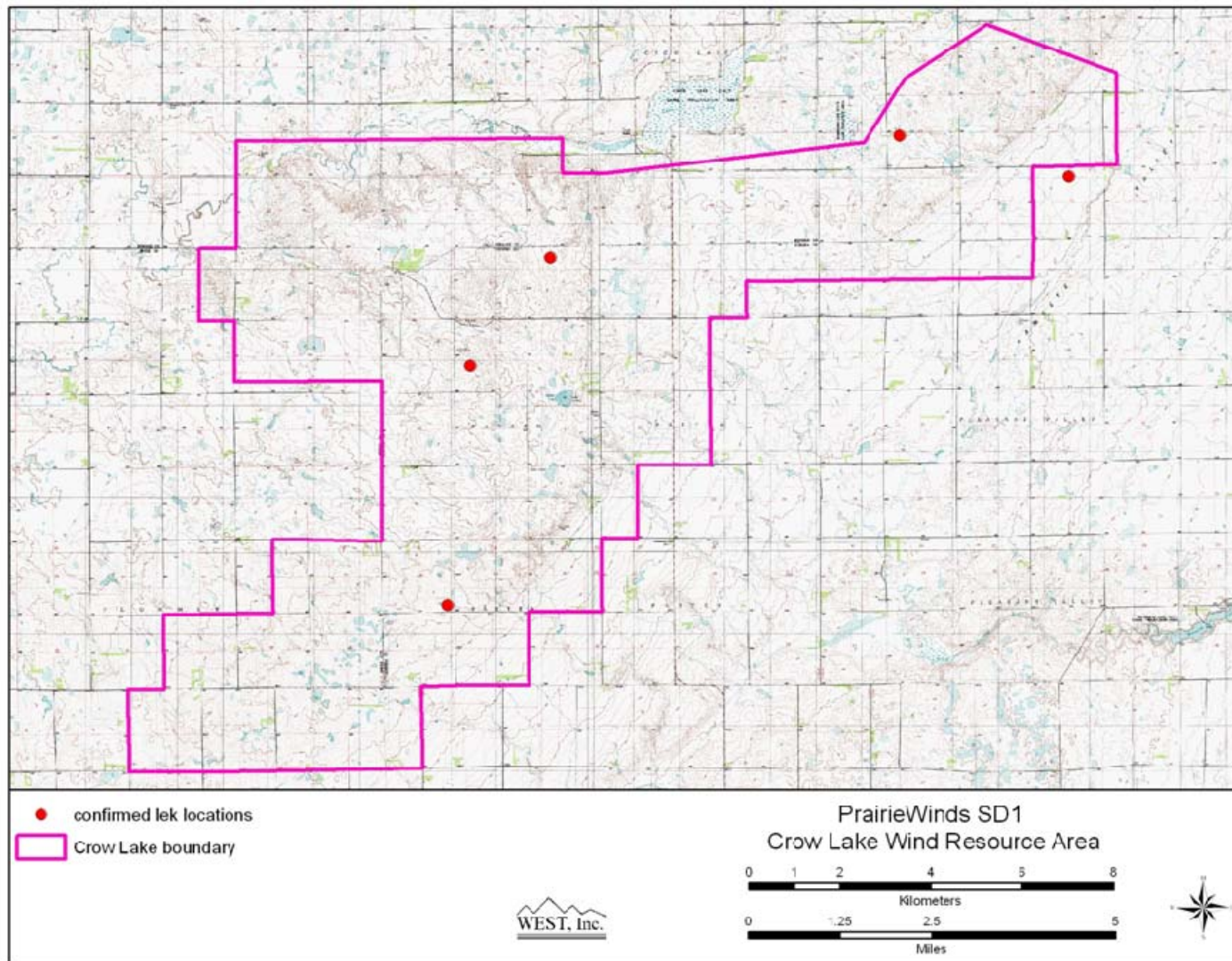


Figure 4. Grouse lek locations at the proposed PrairieWinds SD1 Crow Lake Wind Resource Area.

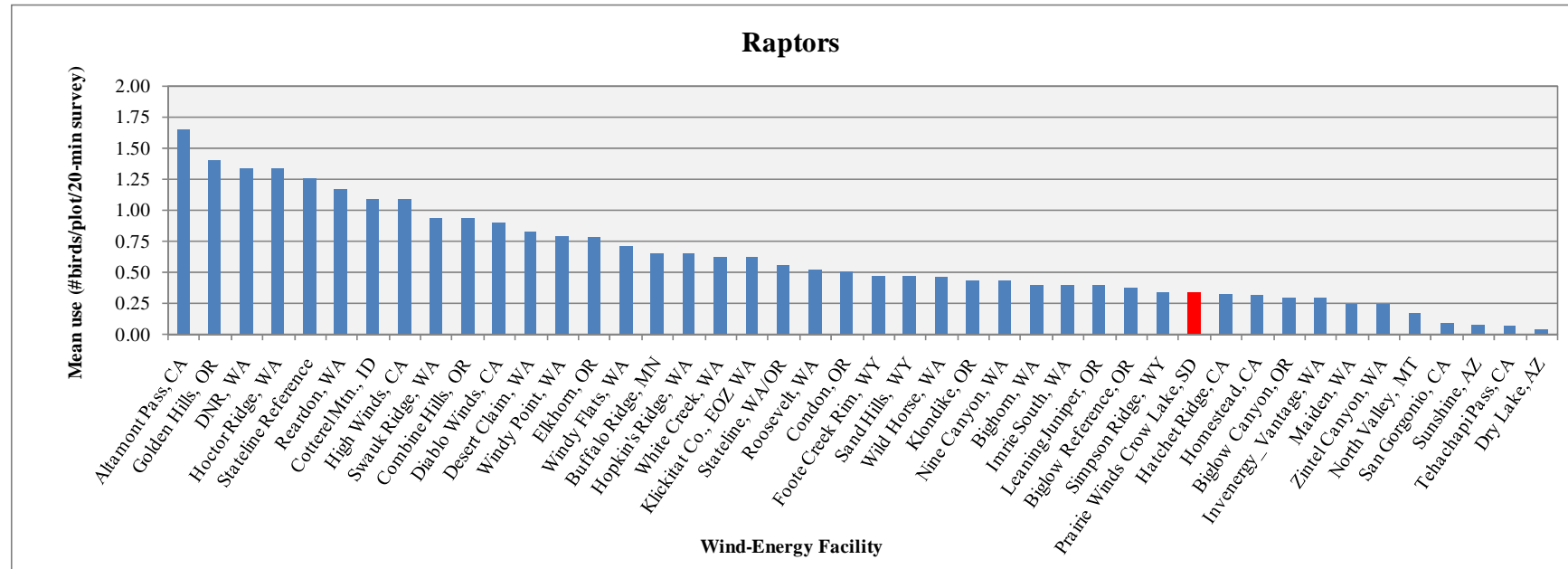


Figure 5. Comparison of spring raptor use between the PrairieWinds SD1 Crow Lake Wind Resource Area and other US wind-energy facilities.

Data from the following sources:

PrairieWinds SD1 Crow Lake, SD	This study				
Altamont Pass, CA	Erickson et al. 2002b	Buffalo Ridge, MN	Erickson et al. 2002b	Leaning Juniper, OR	NWC and WEST 2005b
Golden Hills, OR	Jeffrey et al. 2008	Hopkin's Ridge, WA	Young et al. 2003a	Biglow Reference, OR	WEST 2005c
DNR, WA	Johnson et al. 2006c	White Creek, WA	NWC and WEST 2005a	Simpson Ridge, WY	Johnson et al. 2000
Hocctor Ridge, WA	Johnson et al. 2006d	Klickitat Co., EOZ, WA	WEST and NWC 2003	Hatchet Ridge, CA	Young et al. 2007a
Stateline Reference	URS et al. 2001	Stateline, WA/OR	Erickson et al. 2002b	Homestead, CA	WEST et al. 2007
Reardon, WA	WEST 2005b	Roosevelt, WA	NWC and WEST 2004	Biglow Canyon, OR	WEST 2005c
Cotterel Mtn., ID	Cooper et al. 2004	Condon, OR	Erickson et al. 2002b	Invenergy_Vantage, WA	WEST 2007
High Winds, CA	Kerlinger et al. 2005	Foot Creek Rim, WY	Erickson et al. 2002b	Maiden, WA	Erickson et al. 2002b
Swauk Ridge, WA	Erickson et al. 2003b	Sand Hills, WY	Johnson et al. 2006a	Zintel Canyon, WA	Erickson et al. 2002a
Combine Hills, OR	Young et al. 2003c	Wild Horse, WA	Erickson et al. 2003a	North Valley, MT	WEST 2006b
Diablo Winds, CA	WEST 2006a	Klondike, OR	Johnson et al. 2002	San Gorgonio, CA	Erickson et al. 2002b
					WEST and the CPRS 2006
Desert Claim, WA	Young et al. 2003b	Nine Canyon, WA	Erickson et al. 2001b	Sunshine, AZ	
			Johnson and Erickson 2004	Tehachapi Pass, CA	Erickson et al. 2002b
Windy Point, WA	Johnson et al. 2006b	Bighorn, WA		Dry Lake, AZ	Young et al. 2007b
Elkhorn, OR	WEST 2005a	Imrie, WA	Johnson et al. 2006e		
Windy Flats, WA	Johnson et al. 2007				