DRAFT ENVIRONMENTAL ASSESSMENT

CAMPBELL COUNTY
WIND FARM

CAMPBELL COUNTY,
SOUTH DAKOTA
DOE/EA 1955

June, 2014

Prepared by: Western Area Power Administration
Upper Great Plains Region

Table of Contents

Tables

Figures

Supporting Documentation

Acronyms

ABPP	Avian and Bat Protection Plan
AGL	Above Ground Level
AIRFA	American Indian Religious Freedom Act
APE	Area of Potential Effect
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	Best Management Practice
CCWF	Campbell County Wind Farm
CFR	Code of Federal Regulations
CRP	Conservation Reserve Program
CWA	Clean Water Act
dBA	Decibels
DENR	Department of Environment and Natural Resources
DOE	Department of Energy
EMF	Electromagnetic Field
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
FR	Federal Register
FSA	Farm Service Agency
GAP	Gap Analysis Program
GPS	Global Positioning System
kV	Kilovolt
Ldn	Average Sound Level
MBTA	Migratory Bird Treaty Act
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHD	National Hydrography Datasets
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O&M	Operations and Maintenance
ONAC	Office of Noise Abatement and Control
ROW	Right of Way
RSA	Rotor Sweep Area

Acronyms (cont.)

SDBWG	South Dakota Bat Working Group
SDGFP	South Dakota Game Fish and Parks
SHPO	State Historical Preservation Office
SRST	Standing Rock Sioux Tribe
SSURGO	Soil Survey Geographic Database
TCP	Traditional Cultural Property
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WUS	Waters of the United States

1.0 Introduction

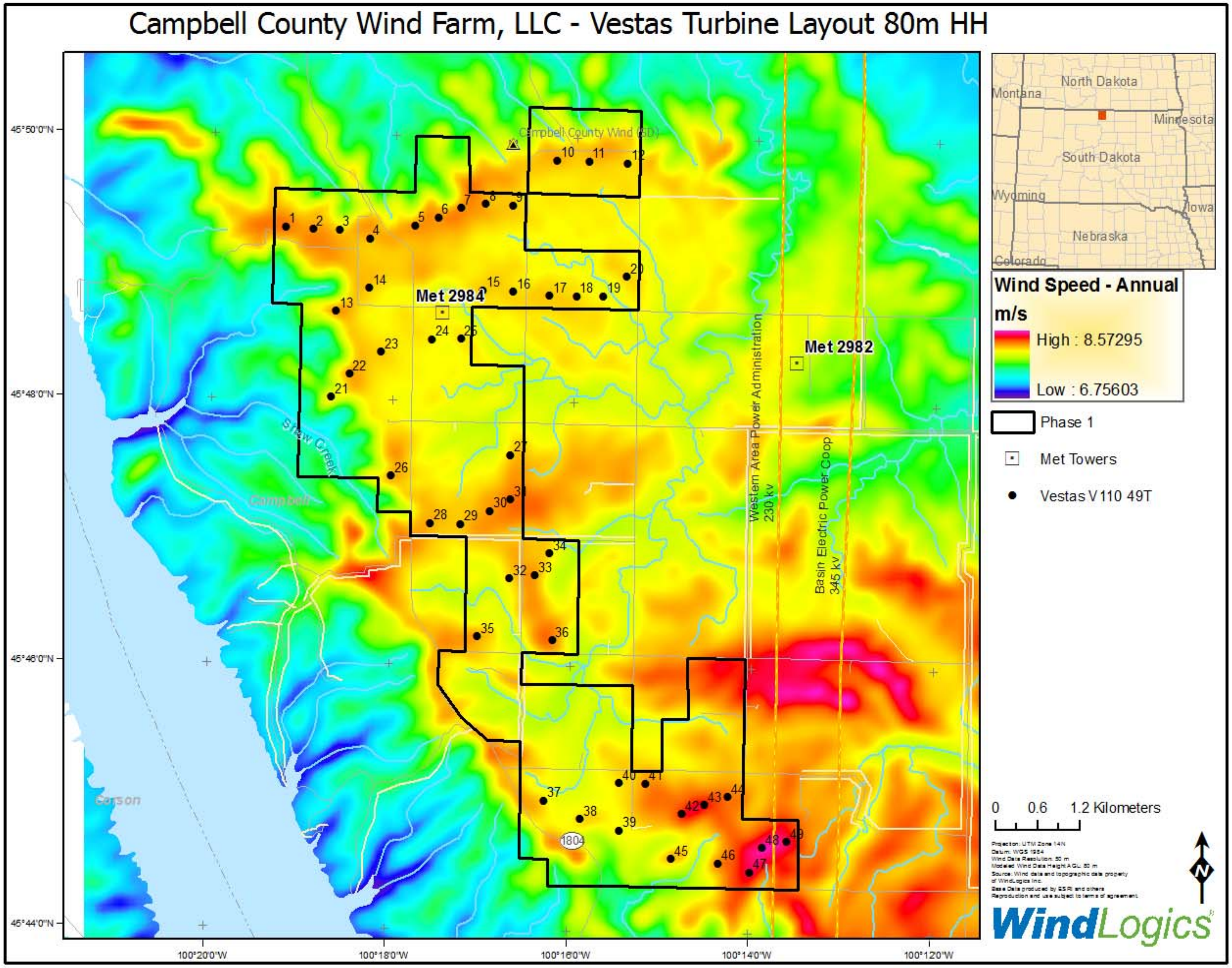
The Campbell County Wind Farm (CCW) is a 99 megawatt (MW) wind generation project being proposed by Dakota Plains Energy, Inc. for the area around Pollock, SD. The proposed project will be wholly located in Campbell County, South Dakota and will supply up to 99 MW of clean energy to the Upper Great Plains region through an existing US Department of Energy, Western Area Power Administration (Western) 230 kilovolt (kV) transmission line**.** (see Figure 1.0-1) The power generated by the CCW will be sold locally and distributed to private and commercial end-users throughout the Upper Great Plains region.

The proposed interconnection is a federal action under the National Environmental Policy Act (NEPA), Section 102(2) (1969), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), DOE NEPA Implementing Procedures (10 CFR Part 1021), and other applicable regulations. This Environmental Assessment (EA) was prepared for Western under these regulations to describe the analysis of environmental effects of the federal action, the proposed Project and alternatives, including the No-Action Alternative.

1.1 Purpose and Need

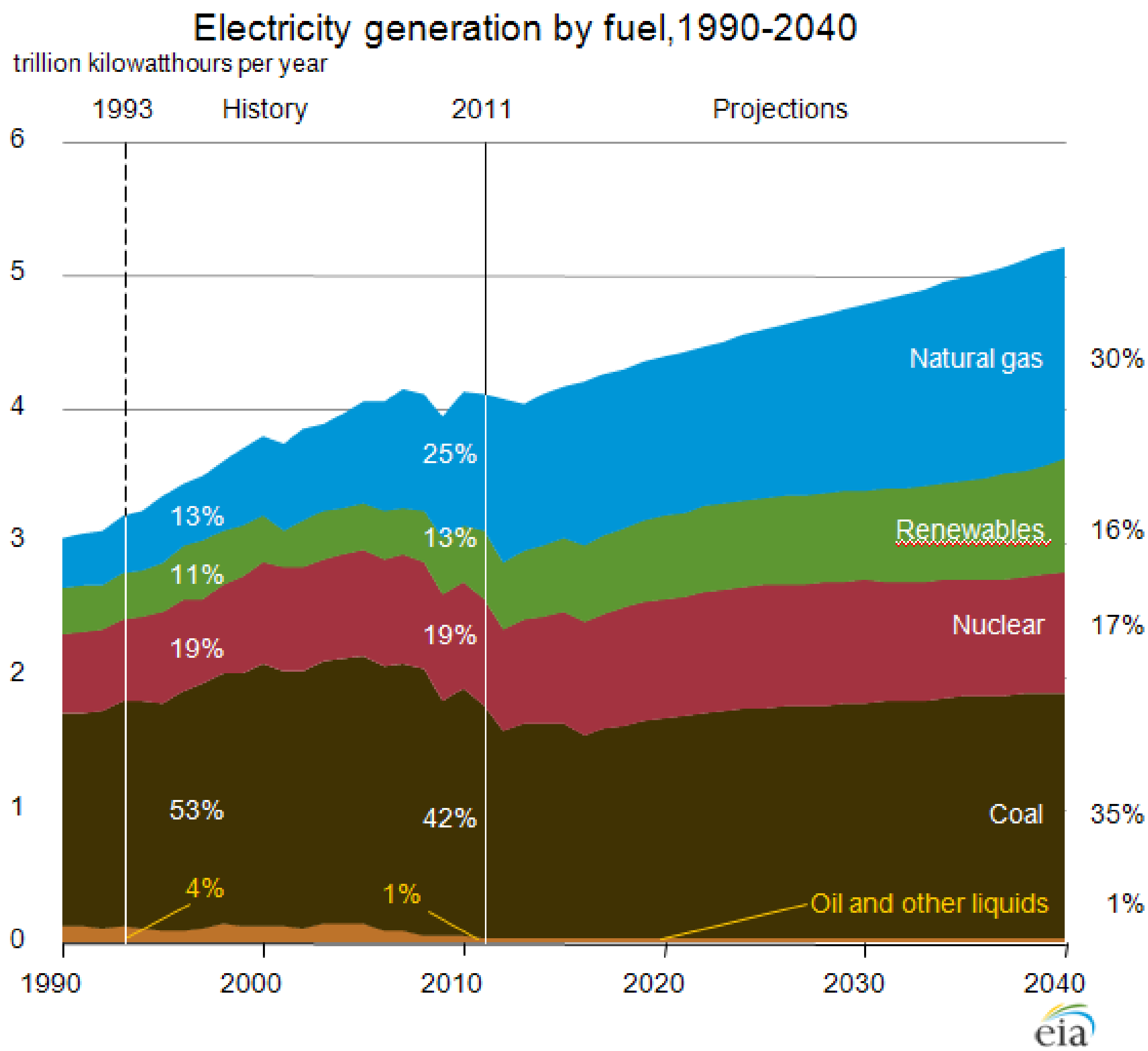
Under NEPA, the purpose and need for a proposed action help define the range of alternatives considered. Only "reasonable" alternatives need be considered (40 CFR 1502.14(A)), and reasonable alternatives must accomplish the underlying purpose and need of the applicant or the public that would be satisfied by the proposed federal action (33 CFR Ch. II, NEPA Deskbook p 138). Consequently, it is important to understand the purpose and need for the Project from the perspective of both the applicant and Western as the NEPA lead agency.

Figure 1.0-1 Project Location and Western Transmission Line



The Department of Energy, Energy Information Administration (DOE-EIA) projects a 0.9% increase in annual electricity consumption through 2040. Coal remains the largest energy source of electricity in the nation, but as retirements outpace new additions, total coal-fired generation capacity will be reduced by more than 10%. Wind and other renewables will play a large part in filling the energy gap left behind as climate change concerns continue to impact fossil fuel projects. (see Figure 1.1-1)

Figure 1.1-1



Additionally, the demand for new sources of electricity in the Upper Great Plains region continues to grow. The regional service area (Figure 1.1-2) includes western North Dakota and Eastern Montana, which have experienced explosive growth in recent years due to the development of the Bakken oil formation. (Figure 1.1-3) The United States Geological Service estimates recoverable oil reserves in the Bakken formation of more than 7.4 billion barrels. Full development of the oil recovery projects is expected to take 20-30 years and will result in continued growth in the region and an increasing demand for electricity for residential and commercial customers.

A study conducted by North Dakota State University concluded that oilfield related employment in the Williston, ND area will exceed 53,000 individuals by 2020. The research team also estimated that for every new job created, a new housing unit will be created.

Figure 1.1-2 – Upper Great Plains Region

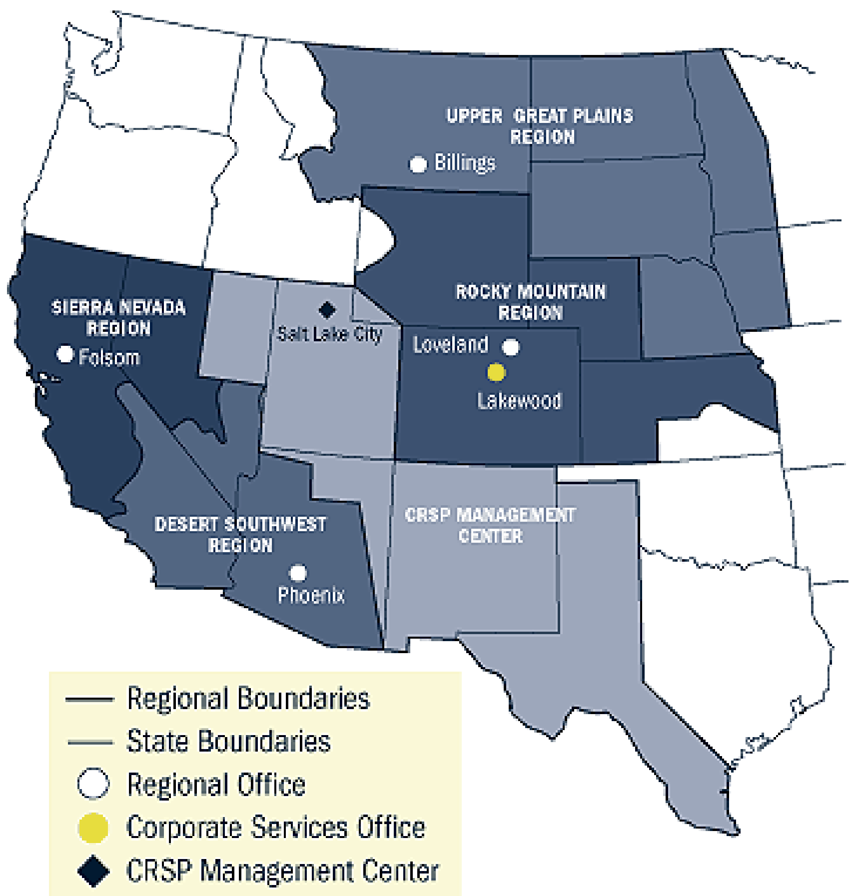
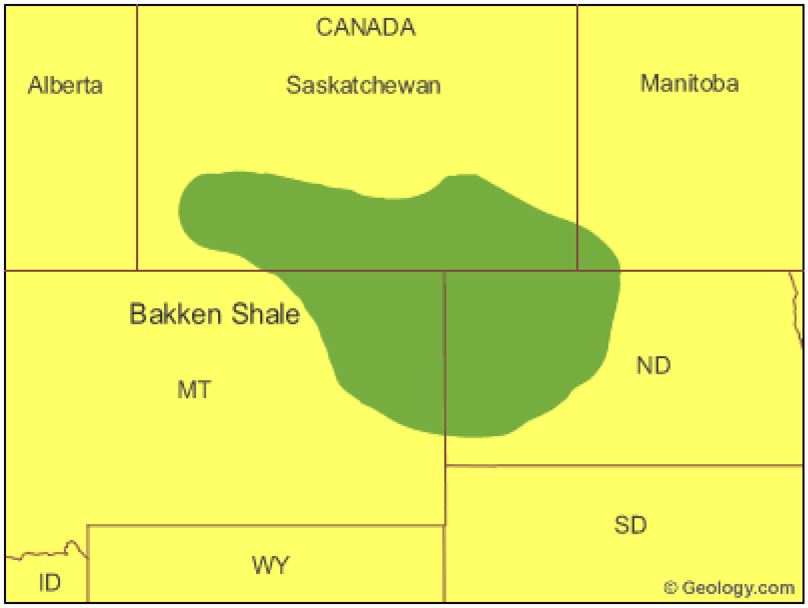


Figure 1.1-3 – Bakken Shale Oil Field



1.1.1 Applicants' Underlying Need

Campbell County Wind needs to develop, operate, and maintain the generation infrastructure in order to develop the renewable wind resource.

1.1.2 Agency Purpose and Need

Campbell County Wind requests to interconnect its proposed Project with Western Area Power Administration's (Western) Bismarck to Glenham transmission line. Western's purpose and need is to consider and respond to the interconnection request in accordance with its Open Access Transmission Service Tariff (Tariff) and the Federal Power Act. Western's Tariff is filed with the Federal Energy Regulatory Commission (FERC) for approval.

Under the Tariff, Western offers capacity on its transmission system to deliver electricity when capacity is available. The Tariff also contains terms for processing requests for the interconnection of generation facilities to Western's transmission system. In reviewing interconnection requests, Western must ensure that existing reliability and service is not degraded. Western's Tariff provides for transmission and system studies to ensure that system reliability and service to existing customers are not adversely affected by new interconnections. These studies also identify system upgrades or additions necessary to accommodate the proposed project and address whether the upgrades/additions are within the project scope.

Because the statements of need and purpose affect the extent to which alternatives are considered reasonable, it is important to understand both the agency's purpose and need and that of Campbell County Wind. This EA provides an interdisciplinary analysis to support the decision to be made by Western to provide interconnection of the Project to the electrical grid. In addition, the DOE must assess whether the Project would comply with all applicable environmental requirements under NEPA, as well as all other applicable federal laws, including the Endangered Species Act, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act.

1.2 Authorizing Actions

Federal, State and local agencies, including Western, have jurisdiction over certain aspects of the proposed action. Table 1.2-1 provides a listing of agencies and their respective permit/ authorizing responsibilities with respect to the proposed Campbell County Wind Farm.

Table 1.2-1 Permit/Authorizing Responsibilities

Authorizing Action/Statute	Responsible Agency
Interconnection Service Agreement	Western
Easement Grants and Road Crossing Permits	SDDOT, Campbell County
National Environmental Policy Act	Western
National Historical Preservation Act	South Dakota State Historical Preservation Officer (SDSHPO), Western
Native American Graves Protection and Repatriation Act	Western
American Indian Religious Freedom Act	Western
Migratory Bird Treaty Act	US Fish and Wildlife Service (USFWS), Western
Bald and Golden Eagle Protection Act	US Fish and Wildlife Service (USFWS), Western
Endangered Species Act	USFWS, South Dakota Department of Environment and Natural Resources (SDDENR) Western
Construction Storm Water Permit	SDDENR
Clean Water Act Compliance	U.S. Army Corps of Engineers, USFWS
Occupational Safety and Health Act	South Dakota Department of Labor, Occupational Safety and Health Administration (OSHA)
Tower Lighting	Federal Aviation Administration (FAA)

1.3 Agency Consultation and Public Participation

Western has consulted with applicable State and Federal Agencies and Tribes in the development of this analysis. In addition, Western will consider comments to the Environmental Assessment from agencies, tribes, landowners and other interested parties.

On March 12, 2013, a public scoping meeting was held in Pollock, S.D. where project details were laid out to interested parties as well as project participants. The meeting was attended by Western personnel, Dakota Plains Energy (CCW Developer) and Fagen Engineering LLC, the project environmental consultant. The project was received favorably by all attendees. No official public comments were received.

2.0 Description Of Proposed Project, Federal Action And Alternatives

2.1 Introduction

Dakota Plains Energy, Inc. proposes to construct, own and operate a 99 MW wind energy project near Pollock, SD (Proposed Project). The Campbell County Wind Farm (CCW), will encompass three ridges just east of the Missouri River and south of Pollock, SD. (Figure 2.1) There are two north/south transmission lines running on the ridges. One is owned by Basin Electric and is full; the other is owned by Western and has sufficient capacity available to allow for interconnection (Proposed Action). Western is a 15-state power administration, and one of four within the US Department of Energy. The CCW project will encompass nearly 25,000 acres and supply the region with 99 megawatts of electricity, enough power for nearly 30,000 American homes.

With a superior wind quality/capacity factor, Campbell County Wind Farm has excellent wind generation potential in the heart of South Dakota. According to the U.S. Department of Energy, South Dakota is ranked #5 in the nation with the potential of 882,000 megawatts (MW) of wind energy production, but is currently ranked only #17 in actual production with nearly 784 MW operational. CCW is on the leading edge of what promises to be a huge addition to that production total.

2.2 Proposed Project

The proposed Campbell County Wind Farm will be located on primarily farm land near the communities of Pollock and Herried, South Dakota. The proposed action would consist of the following components:

- Forty nine (49) 2.0 MW V-100 Vestas turbines
- Approximately 11.5 miles of access roads
- Approximately 38.5 miles of Collection and Transmission Lines
- Collection Substation
- 0.25 mile long 230 kV transmission line from CCW Substation to Western Switchyard
- Office/Maintenance Building

All facilities will be constructed in conformance with applicable laws, regulations and standards. The following sections provide specific details relating to project components, pre-construction planning and construction activities associated with each.

2.2.1 Preconstruction Planning

Preconstruction activities include site surveys and studies, regulatory reviews and consultations, landowner agreements, engineering design, turbine micro-siting and configuring proposed project facilities:

2.2.2 Preconstruction Surveys and Studies

Preconstruction surveys were conducted to evaluate potential environmental impacts related to the proposed project. These surveys included:

- Meteorological surveys were conducted for 3+ years to determine the characteristics of the wind resource in the project vicinity. The results of these studies were used to ensure project feasibility and determine the most efficient locations for the wind turbines.

- A Class I Cultural Resources study (records review) and Traditional Cultural Property (TCP) survey were conducted to evaluate and document the presence or absence of historical resources with respect to the Proposed Project.

- A Class III Cultural Resources survey (intensive cultural resources inventory survey) was conducted on all project areas that are disturbed during construction and operational activities. The locations of all facilities will be adjusted to avoid cultural or historical resources identified by the TCP and Cultural Resources surveys.

- Wetlands surveys were completed for the Proposed Project to determine the presence of jurisdictional and non-jurisdictional wetlands in the project area. The locations of the facilities will be adjusted to avoid and minimize wetland impacts.

- Grassland surveys were completed for the Proposed Project to determine the presence of native grasslands in the project area. The locations of the facilities will be adjusted to avoid and minimize grassland impacts whenever possible.

- Sharp-tail grouse lek surveys were completed for the Proposed Project to determine the presence of sharp-tail grouse leks in the project area. The locations of the facilities will be adjusted to provide a one mile buffer from any identified sharp-tail grouse leks or nests.

- Wildlife surveys were completed in the vicinity of the Proposed Project. These surveys were designed to document wildlife use on the project site and included avian use and raptor nest surveys. The purpose of the surveys was to ensure that the Proposed Project would not be located in an area used extensively by sensitive wildlife species.

2.2.3 Landowner Agreements

The project developers entered into agreements with landowners in order to secure rights and access to the properties for surveys, testing, construction, operation and maintenance of the project components. These agreements were developed in consideration of landowner concerns, and include compensation for disturbance and loss of farming access during project construction, operation and maintenance.

2.2.4 Project Planning and Design

Project planning considered a variety of alternatives for project components, equipment and configuration. The final design was selected as it provided the most effective and efficient design for electricity production, while minimizing potential environmental impacts. A summary of proposed land disturbances are shown in Table 2.1-1.

2.2.5 Access Roads and Turbine Pads

Staging and construction activities associated with the Proposed Project will require construction of temporary and permanent access roads, along with permanent aprons around the turbine pads. Gravel will be used in construction of most of the roads and aprons to allow for travel and access under all weather conditions. Gravel will be sourced locally from a supplier that is in compliance with South Dakota Department of Transportation requirements for cultural resources clearance.

Table 2.1-1 Campbell County Wind Farm Summary of Disturbances

Component	Construction Phase (Tempoary)	Operations Phase (Permanent)
Turbines	160’ radius around turbine (1.85 acres)	15’ radius around turbine base (700 s.f.)
Transformers	Area lies within turbine construction area.	6’ by 6’
Access Roads	10.4 miles @ 35’ wide	10.4 miles @ 16’ wide 1.4 miles @ 12’ wide
Underground Collection System	38.5 miles 30m disturbance corridor 282 acres	Disturbance returned to pre-construction condition. No permanent impact.
Substation	4.6 acres	4.6 acres
Laydown Area/O&M Building Site	7.3 acres	7.3 acres

2.3 Proposed Facilities

The proposed project facilities would consist of the following components and are described sequentially from the wind farm to the point of interconnection with Western's transmission line.

- Wind Turbines – Turbines will be used to convert wind energy into electrical energy.
- Access Roads – Gravel roads will be installed to provide access to each turbine location for construction, operation and maintenance activities.
- Electrical Collection System (underground) – The underground sub-transmission lines will be used to transmit electricity from each wind turbine transformer to the electrical collection substation.
- Electrical Collection Substation – The collection substation will be used to transmit electricity from the turbines to Western's 230 kV Transmission Line.
- CCWF 230 kV Transmission Line – The CCWF transmission line will be used to transfer electrical energy from the CCWF substation to the Western switchyard approximately 0.25 miles away.
- Laydown Yard – The laydown yard will be used for temporary storage of construction materials and equipment.

The following criteria were considered in the planning of project components of the Proposed Action:

- Establish a one thousand foot radius around turbine locations with respect to residences and other public occupancies for the purposes of safety, noise, vibration and shadow flicker.
- Avoid and minimize impacts to avian species through avoidance of high use areas relative to surrounding areas.
- Avoid unnecessary wetland disturbances, including 50-foot buffer from all wetlands not previously converted to agricultural use.
- Avoid cultural and historic resources.
- Comply with permits and applicable Federal, State and local regulations.

2.3.1 Access Roads

Roads will be constructed and upgraded prior to installation of the proposed facilities. Existing and new roads will be used to move equipment, personnel and materials during construction, operation and maintenance of the Proposed Project. Heavy equipment related to the construction phase would gain access to the project site via U.S. Highways 12 and/or 83 and subsequently onto paved County Roads.

New access roads serving all facilities associated with the Proposed Project will be constructed from existing street and avenue routes. Topsoil will be salvaged from road areas and replaced on roadside slopes and other associated areas following construction to provide a reclaimed growth medium. All access roads will be constructed in association with the wind turbines, laydown area and substation. No new access roads are required for the collector or transmission lines.

Roads serving the turbines will be graded and compacted during construction to allow passage of heavy equipment and large materials. Post construction the roads will have a permanent width of 16 feet. The length of new and upgraded roads to access the proposed 49 turbines is approximately 11.5 miles.

2.3.2 Wind Turbines

The Proposed Project will include construction of 49 wind turbines that will be constructed between the 3rd quarter of 2014 and the 4th quarter of 2015 and put into operation within that same timeframe. The proposed turbine arrangement or "array" can be seen in Figure 1.0-1.

Figures 2.3-2 and 2.3-3 show photographs of the Vestas V-100 2.0 MW wind turbines that are proposed for construction at CCW. The turbines will have a hub height of 80 meters and a rotor diameter of 100 meters. The bottom of the swept area above the ground would be approximately 30 meters. These heights are established to allow the turbines to take advantage of more consistent and less turbulent winds.

Figure 2.3-1 Vestas V-100 2.0 MW Wind Turbines

Figure 2.3-2 Vestas V-100 2.0 MW Wind Turbine Array

2.3.2.1 Site Preparation

Site preparation activities are the first step in the wind turbine process. Site preparation activities include surveying, clearing, grubbing, excavating and constructing turbine foundations.

An area approximately 150 feet square will be cleared with a bulldozer and/or road grader and excavated with a backhoe to prepare each concrete foundation. Excess excavated material would be used for road construction or otherwise disposed of in accordance with applicable regulations and permit conditions. An aluminum tube and bolt cage would be installed inside the concrete placed into the hold. Approximately 350 cubic yards of concrete would be needed for each turbine. Concrete spoil would be disposed of offsite by the contractor. Once cured, the foundation would be complete and ready to receive the turbine base.

2.3.2.2 Delivery and Access

Major wind turbine components (including rotor assemblies, towers, power cables and transformers) would be delivered to the site by tractor-trailers on existing access roads. A 500 foot wide construction easement would extend along each turbine access road and turbine foundation allowing for rotor assembly, installation of underground and aboveground electrical facilities and access road construction.

2.3.2.3 Structural

Turbine and tower assembly and erection of the towers onto the turbine foundations will be completed during this task. This work would also include installation of all mechanical and electrical systems associated with the turbines.

2.3.2.4 Testing

The testing period will commence well into the proposed project, typically following completion of the substation and the first mechanically complete turbine. This phase includes all the testing required for the project to become commercially operational. Incrementally, this process would entail energizing the collection substation and bringing each turbine online until the commercial operation date.

2.3.2.5 Restoration and Final Project Completion

The final task in the construction process entails site restoration and cleanup of all project disturbances. Areas of permanent disturbance at each turbine would include those areas occupied by turbines and access roads. Areas temporarily disturbed during construction would be restored to pre-construction conditions.

2.3.2.6 Operation and Maintenance

The Campbell County Wind Farm will be supported by one full time Site Manager and a contract maintenance crew during normal business hours. Maintenance activities will occur periodically throughout the year and involve vehicular traffic along the turbine access roads as well as periodic travel to the substation. Equipment to be stored at the CCW Laydown Yard and used at the project for operation and maintenance may include the following:

- Two service trucks
- One payloader that can be used for road repairs and snow removal
- One forklift

To facilitate site operation and maintenance, project access roads will be graded as necessary. Maintenance activities will be limited to areas accessible by these roads.

Routine maintenance schedules for turbines will be determined by the manufacturer, but would typically include removing the turbine rotor, replacing generators and bearings and deploying personnel to climb the towers to service parts within the turbine nacelle.

2.3.3 Collection System

A sub-transmission line collection system will be used to transmit electricity from each turbine location to the project substation. The project substation will be located near the southeast project boundary. Underground collection line routes and substation location are shown in Figures 2.3-4 and 2.3-5. Individual wind turbine transformers will be contained within the turbine nacelles and all collection lines will be placed in underground trenches to minimize ongoing aboveground impacts, eliminate exposure to weather and mitigate visual impacts.

Figure 2.3-3 Campbell County Wind Farm Substation Location

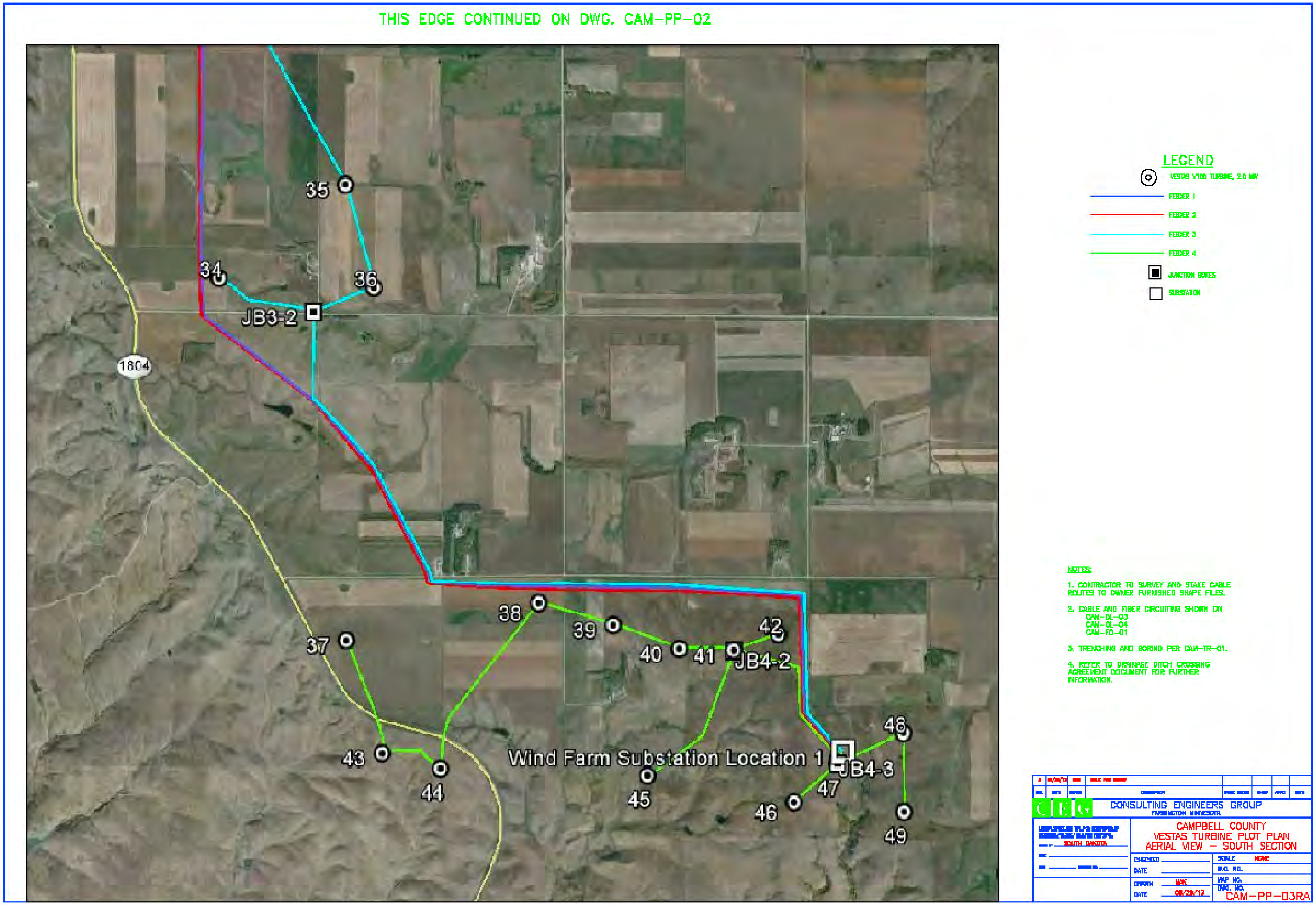
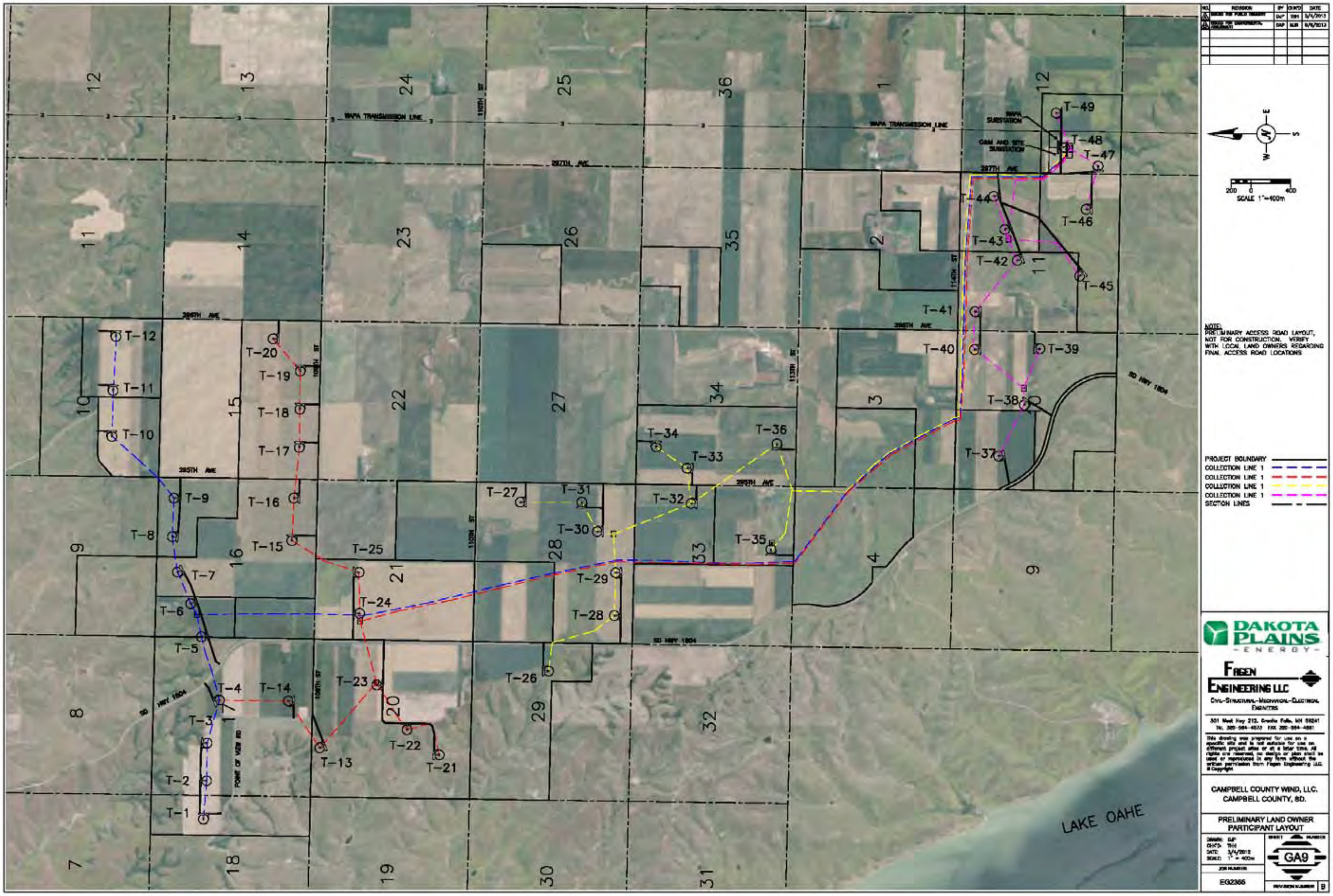


Figure 2.3-4 Campbell County Wind Farm Collection Line Map



Transfer of electricity from the CCW substation to the Western 230 kV transmission line will be facilitated via a newly constructed 0.25 mile long overhead transmission line. The transmission line will be constructed using 90' high wooden poles with an H frame construction.

2.3.3.1 Construction

Underground Collection Lines

Approximately 38.5 miles of sub-transmission collection lines will be installed to transmit electrical energy from the individual turbine locations to the project substation. The collection line cables will be buried at a depth of 42 to 54 inches (nominal depth 48 inches). Trenches are anticipated to be approximately 24 inches wide and 48 inches deep and would generally follow access roads to the extent practicable.

Trenches will be excavated using both a trencher and backhoe. Disturbance associated with all buried collection lines will be confined to a 100' wide construction corridor. Upon completion, all trenches will be filled with compacted material and associated disturbances will be restored to natural contours and vegetative cover. Aboveground utility warning markers will be installed at appropriate intervals along the collection line route.

Overhead Transmission Line

A 230 kV electrical transmission line will be constructed to transfer power from the CCW substation to the Western switchyard. Wooden poles 90' tall will be set into ground using an industrial auger. Power lines will be supported on an H frame construction using 795 ACSR conductors. Line stringing and tensioning will be facilitated by specialized trucks and equipment. The exact route for this line has not yet been determined.

2.3.3.2 Operation and Maintenance

Underground Collection Line

Periodic maintenance of underground collection lines will be required during the life of the project. Maintenance activities are permitted under the landowner agreements and will be conducted within the established easement. Maintenance disturbances would be limited to the 100 foot wide construction corridor. All trenches will be filled with compacted materials and associated disturbances will be restored to natural contours and vegetative cover.

Underground collection lines are relatively maintenance free and maintenance will be conducted on them on an as-needed basis only.

Overhead Transmission Line

Periodic maintenance of overhead transmission lines will be required during the life of the project. Maintenance activities are permitted under the landowner agreements and will be conducted within the established easement. Typical maintenance tasks include, but are not limited to, periodic inspections, structure and hardware replacement and line maintenance activities.

2.3.4 Collection Substation

An electrical collection substation will be constructed to facilitate collection and transfer of project energy into the Western power grid. The substation will be owned by Campbell County Wind Farm and designed and built in compliance with Federal, State and local regulations and prudent industry practices.

At the substation, electric power from the wind turbines will be converted to 230 kV to match the Western Transmission Line. All Supervisory Control And Data Acquisition (SCADA) programming and communications will follow the requirements of Western's Large Generator Interconnection Agreement (LGIA).

The substation will have a gravel base and will contain circuit breakers, transformers, switches, lightning protection, grounding wires, a control building and emergency lighting system and structures. The substation will be fenced with a 6 foot chain link fence topped with barbed wire.

2.3.4.1 Construction

The location of the substation would be surveyed, cleared and graded prior to construction in order to allow for proper equipment configuration and support and provide adequate storm water drainage and erosion control. The site will be gravel covered and leveled prior to construction of surface equipment.

Substation equipment will be delivered via truck and installed on concrete foundations. All power transformers will be installed within secondary containment for spill prevention in accordance with Federal and State SPCC regulations.

2.3.4.2 Operation and Maintenance

The collection substation will be maintained by operations personnel throughout the year. Some facility circuit breakers will contain sodium hexafluoride (SF6), a regulated green house gas. These will be sealed units and the facility will be scanned for detection of leaks and repairs made, as necessary. During use, the equipment will be monitored periodically during substation inspections for indications of leakage. In the event that the SF6 gas must be evacuated for maintenance purposes, it will be transferred into sealed gas containment equipment.

2.3.5 Laydown Yard/Operations and Maintenance Building

An approximate 7 acre parcel will be cleared and leveled for use as a laydown area during the construction phase of the project. The laydown yard will serve as a temporary storage area for construction equipment and supplies.

Following construction completion, a steel frame building will be constructed on a concrete slab to serve as an operations office and maintenance building. Along with typical office furniture and equipment, the building will house specialized tools, oils and greases, and spare parts for the Vestas wind turbines and the collection substation. The O&M building will also house a forklift for moving/lifting heavy equipment.

2.3.5.1 Construction

The site of the O&M building will be cleared and graded prior to construction. Final site grading will allow for storm water runoff and erosion control. The steel frame building will be built on a concrete pad and all contained petroleum products will be stored within secondary containment. Soil stabilization will be provided via a graveled surface and vegetated buffers, as needed.

2.3.5.2 Operation And Maintenance

The O&M building will require periodic maintenance to ensure structural integrity and maintain storm water runoff control. Weed infestation will also require periodic control.

2.4 Construction Waste Management

Debris and waste materials associated with construction may include packing crates and packaging materials, reels and spools, excavated soil, removed vegetation and concrete spoils. Some of these materials have salvage value, including conductor reels, unused conductors and hardware, power poles, etc. These materials will be removed from the site for sale/reuse. Excavated spoils will be back-filled within the area of permanent disturbance and restored in compliance with the Reclamation and Restoration section of this EA and applicable rules and regulations.

If necessary, solid wastes, including topsoil and other excavated materials not otherwise disposed of, will be temporarily stored within the construction corridor and then transported to appropriate offsite disposal facilities in accordance with applicable Federal, State and local regulations.

2.5 Reclamation And Restoration

Following completion of construction activities, areas not utilized for permanent facilities will be reclaimed for their prior land use. Reclamation would initially consist of restoring natural surface contours and drainage patterns to disturbed areas. Grading would include removal of any temporary crossing or drainage control structures.

Following grading, salvaged topsoil will be spread and blended with adjacent areas to provide a growth medium for vegetation. Soil that has been compacted by equipment operation will be tilled to alleviate compaction and prepare a seed bed. Where natural regrowth of vegetation is not anticipated, disturbed areas will be reseeded in accordance with landowner agreements or with regionally native species.

Trees greater than 6 inches in diameter at breast height removed during construction operations will be replaced within the project area at a 3:1 ratio. Noxious weeds will be controlled in accordance with State regulations. Pesticides or herbicides will be used in accordance with label specification and would not be used near aquatic system with out SDDENR approval. Where possible, farming activities would resume in those areas temporarily disrupted by the construction of the CCW. In the event farmable land is lost due to project construction, landowners will be compensated.

2.6 Permits And Compliance Standards

Prior to construction, CCW will ensure compliance with all applicable Federal, State and local environmental permits. Applicable permits include, but are not limited to those listed in Table 2.6-1 below.

Table 2.6-1 Environmental Permits and Approvals

Permit/Approval	Issuing Agency/Entity
Section 404 Clean Water Act – Nationwide Permits 12 and/or 33 (wetlands disturbance)	US Army Corps of Engineers (USACE)
Spill Prevention Control and Countermeasure Plan (SPCC)	Environmental Protection Agency (EPA) and South Dakota Department of Environment and Natural Resources (SDDENR)
Construction Storm Water Permit and Storm Water Pollution Prevention Plan (SWPPP)	EPA, SDDENR
National Historic Preservation Act	South Dakota State Historic Preservation Office
Native American Graves Protection and Repatriation Act	Affected Tribes in Region
Highway Crossing and Hauling Permits	South Dakota Department of Transportation
Zoning, Conditional Use Permit/Approval	Campbell County, Local Townships

2.7 Environmental Protection Measures

Campbell County Wind Farm will comply with the provisions defined in Western's *Construction Standard 13, Environmental Quality Protection.* CCW will also comply with the guidelines in the Avian Power Line Interaction Committee's (APLIC) *Suggested Practices for Raptor Protection on Power Lines* in the design of the overhead portion of the 230 kV transmission line connecting the CCW substation to Western's switchyard.

In addition to the above-mentioned guidelines, CCW will make all reasonable efforts to minimize environmental impacts related to construction and operation of the wind farm. Additional efforts will include the following:

- Unless otherwise permitted or approved, CCW will avoid all sensitive areas and resources during siting, construction, maintenance and operations.

- CCW will consult with interested tribes to develop additional measures to protect TCPs, such as protective easements, in agreement with underlying landowners.

- Construction crews will use silt fencing, straw bales, and/or ditch blocks during access road construction and electrical line trenching on sloped ground or at ephemeral drainage crossings within the project area to further minimize erosion and related environmental impacts.

- Security lighting for on-ground facilities and equipment will be down-shielded to keep light within the boundaries of the site. This will minimize attracting night migrating birds to the substation or turbine locations.

- The overhead 230 kV transmission line linking the CCW substation and the Western switchyard will be marked with state-of-the-art line marking devices to minimize bird collisions.

- Develop and implement an Avian and Bat Protection plan in cooperation with the US Fish and Wildlife Service, the South Dakota Game, Fish and Parks and Western.

- Introduction of noxious weeds would be mitigated through prompt revegetation with regionally native species or restoration of prior land use.

- Wetlands will be marked on construction site drawings to avoid unintended impacts during construction, unless permitted through the USACE.

2.8 Project Alternatives

2.8.1 Alternatives Considered But Eliminated From Detailed Analysis

Alternative project locations were considered in Brown County, Gregory County, Tripp County and Walworth County. The location in Campbell County was selected over any of the alternatives for a variety of reasons, including the following:

- Superior wind regime to provide consumers with strong wind capacity at economic prices

- Opportunity to build the project primarily on already-tilled land, thus minimizing new environmental impacts

- The ability to provide economic benefit to an area in great need
    - Campbell County population has decreased more than 50% over the past 40 years.
    - Per capita income of $14000
    - More than 50% of residents below national poverty level

- Availability of existing transmission capacity via Western 230 kV transmission line less than ¼ mile away from CCW substation

2.8.2 No Action Alternative

Not constructing and operating the Project is the No-Action Alternative. Under the No-Action Alternative, Western would not approve an interconnection agreement to its transmission system. If this alternative is chosen, the Project would not contribute 99 MW of renewable energy to the state's renewable portfolio. Environmental conditions within the Project Area, as described in Section 3.0, would be expected to persist in their existing state.

3.0 Affected Environment and Potential Environmental Consequences

This section provides a description of the affected environment and the potential environmental consequences of constructing and operating the Campbell County Wind Project (CCW) at the proposed location (see Figure 3.1).

The critical elements of the human environment evaluated in this assessment include the following:

- Land Use
- Air Resources
- Water Resources
- Vegetation
- Wetlands
- Wildlife
- Cultural Resources
- Special Status Species
- Visual Resources/Aesthetics
- Noise
- Socioeconomics
- Environmental Justice
- Human Health and Safety
- Native American Religions Concerns

3.1 Land Use

3.1.1 Affected Environment

Campbell County Wind LLC (CCW) intends to build a 99 megawatt wind farm in Campbell County, South Dakota. The project area encompasses approximately 8,000 acres along the east side of Lake Oahe (Missouri River) and is being evaluated through the National Environmental Policy Act (NEPA) environmental analysis process.

Fagen Engineering LLC (Fagen) personnel performed field reconnaissance during July, 2010 for the proposed Campbell County Wind Project, located in Campbell County, South Dakota. Observations were made from established roads and trails. Reference points were established along parcel boundaries using hand-held GPS equipment, and photographs of most parcels were taken and logged. The weather during all field visits was ideal, offering excellent visibility.

Prior to field reconnaissance activities, a desktop analysis was performed. This analysis included a review of historical as well as current aerial photography, a review of the National Land Cover Database (NLCD), National Hydrography Datasets (NHD), National Wetland Inventory (NWI), USDA Farm Service Agency records and the NRCS Web Soil Survey and SSURGO Database.

General Land Use

Field visits during the month of July 2010 by Fagen Engineering personnel were used to verify the data obtained from the numerous agencies. Roads, trails, signs, windbreaks, fences, homesteads, and agricultural activities are some of the features observed. Typical structures in the project area are residences and farm buildings. Nearby communities include Herreid, Mound City, Pollock and Mobridge. Each parcel included in the project was viewed and listed in one of the following five categories: Crop Land, Grass Land, Wet Land, Conservation Reserve Program (CRP) Land and Farm/Homestead.

Crop Land is characterized by active cultivation of crops such as corn, beans, wheat, alfalfa or sunflowers. Parcels identified as being in the process of cultivation, planting, active growing or harvesting were included in this category.

Grass Land includes lands not characterized as Crop Land, and includes native prairie grassland and planted grassland used as pasture for livestock.

Wet Land includes those areas observed to be either saturated or populated with wetland grasses. Only those included in the National Wetland Inventory were observed. Many wetlands listed in the project area have been cultivated or are man-made (excavated or impounded) ponds for livestock.

CRP Land includes those parcels enrolled in the CRP and on file with the USDA Farm Service Agency.

Farm/Homestead includes parcels containing residences and/or agricultural buildings. Many of the mapped parcels were once inhabited and are now vacant.

Table 3.1-1 Pre-Development Land Use Summary

Land Use	**Acres**	**Percent**
Crop Land	4879.1	61%
Grass Land	2600.5	32%
CRP Land	312.9	4%
Farm/Homestead	155.0	2%
Wet Land	66.4	1%
Totals	8013.8	100%

Important Farmland, Prime Forestland, and Prime Rangeland

Congress enacted the Farmland Protection Policy Act (FPPA) to implement programs and policies to protect farmland and combat urban sprawl and the waste of energy and resources that accompanies sprawling development. This act resulted in creating a farmland use classification system which includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. The FPPA does not authorize the Federal Government to regulate the use of private or nonfederal land or, in any way, affect the property rights of owners.

The following table shows the results from a search of the NRCS Soil Survey Geographic (SSURGO) Database (NRCS 2008) for the project area. No prime forestland or prime rangeland is located within the project boundary.

Table 3.1-2 Farmland Summary by Classification

Farmland Rating	Acres	Percent
Prime Farmland	232	3%
Prime Farmland if Irrigated	1,313	54%
Farmland of Statewide Importance	1,272	16%
Not Prime Farmland	2,177	27%
Total Project Acreage	7995	100%

Source: NRCS Soil Survey Geographic (SSURGO) Database (NRCS 2008)

Formally Classified Lands

Formally classified lands may include:

- National Parks and Monuments;
- National Natural Landmarks;
- National Battlefield Park Sites;
- National Historic Sites and Parks;
- Wilderness Areas;
- Wild and Scenic and Recreational Rivers;
- Wildlife Refuges;
- National Seashores, Lake Shores, and Trails;
- State Parks;
- Bureau of Land Management (BLM) Administered Lands;
- National Forests and Grasslands; and
- Native American Owned Lands and Leases Administered by the Bureau of Indian Affairs.

There are no Formally Classified Lands within the project boundary, and will not be discussed further.

Other Lands

Some areas of cropland in the Project Area have been enrolled in the Conservation Reserve Program (CRP). CRP land is removed from crop production for a specific period (usually 10 years) and is planted with cover designed to conserve soil and water. Hay production and livestock grazing are not permitted on CRP land unless specifically allowed during droughts. There are approximately 313 acres of CRP land within the Project Area across 7 sections. CRP Land includes only those parcels listed by the USDA Farm Service Agency as being enrolled in the CRP Program. This information was obtained from the FSA Office in Mound City, SD.

The project boundary is adjacent to but does not contain any lands protected under the USGS Gap Analysis Program. Adjacent lands on the northwest and southwest are shown from USGS GAP data to be Status 3 areas. The USGS Gap Analysis Program (GAP) establishes management categories aimed at ensuring that common animal species and plant communities remain common. Gap Status 3 areas are subject to logging, mining and other extractive uses, but have permanent protection from conversion of natural land cover. Campbell County Registrar of Deeds has no record of these instruments, whether by easement or by fee. These areas are not within the project boundary and will not be directly impacted by turbine or road construction; however, special attention will be given to protect these adjacent parcels from impacts during the construction phase.

3.1.2 Direct and Indirect Effects

The proposed development will not displace any residences or existing or planned industrial facilities. Wind turbines will be sited a minimum of 1,000 feet from occupied residences.

Land use impacts would pertain to physical and operational effects of the project area on existing and future land use. Within the project boundary, these impacts are primarily related to agricultural practices. A significant impact would occur if: 1) the Proposed Action resulted in the uncompensated loss of crop production; or 2) the Proposed Action resulted in the foreclosure of future land uses.

The Project will include 49 wind turbines, one substation, approximately 24 miles of underground collection line, and 11.8 miles of new access roads. Campbell County Wind will also seek to obtain title to approximately five acres for temporary laydown and contractor staging areas, which will be used for the construction of the operations and maintenance building upon project completion. Impact calculations are based on the following assumptions:

- 49 turbine pads: 15 foot permanent impact area for each turbine base
- Service roads: 16 foot wide permanent service road impact
- Access roads: 12 foot wide permanent access road impact
- Underground electrical collection lines: 8 feet wide temporary impact
- Substation: 4.6 acres of permanent impact
- Access road shoulders, service road shoulders and turnarounds: temporary impacts not currently calculated. Any adjustments to road shoulders and radiuses will be returned to pre-construction condition.
- Construction laydown area: 7.3 acres of temporary impact converted to permanent impact for the operations and maintenance (O&M) building.

It is estimated that the proposed Project would require the permanent disturbance of 34.2 acres and the temporary disturbance of 151.4 acres (construction area).

It is possible that landowners may convert non-productive lands, such as CRP or native grasslands into production to offset the loss of acres due to access road and turbine construction. Permanent acreage loss averages 1.54 per landowner, so this is not likely.

General Land Use

The area will retain the rural sense and remote characteristics of the vicinity. At other wind developments in the upper Midwest, landowners frequently plant crops and/or graze livestock to the edge of the access roads and turbine pads. The access roads are 16.5 feet wide and low profile, so they are easily crossed while farming. Campbell County Wind will work closely with the landowners in locating access roads to minimize land use disruptions to the extent possible.

Considerations will be taken in locating access roads to minimize impact on current or future row crop agriculture and environmentally sensitive areas. During the construction, additional areas may be temporarily disturbed for contractor staging areas and underground power lines. These areas will be graded to original contour and returned to pre-construction condition.

Table 3.1-3 Temporary Impact Summary by Land Use

Temporary Impacts	Acres Disturbed	Percent of Temporary Disturbance	Percent of Project Site
Crop Land	107.4	70%	1.34%
Grass Land	37.7	25%	0.47%
CRP Land	6.3	4%	0.08%
Homestead	1.5	1%	0.02%
Wet Land	0.0	0%	0.00%
Totals	152.9	100%	1.91%

Assumes total project area of 8000 acres.

Table 3.1-4 Permanent Impact Summary by Land Use

Permanent Impact Type	Acres Disturbed	Percent of Permanent Disturbance	Percent of Project Site
Crop Land	24.1	70%	0.30%
Grass Land	8.8	26%	0.11%
CRP Land	1.1	3%	0.01%
Homestead	0.2	1%	0.00%
Wet Land	0.0	0%	0.00%
Totals	34.2	100%	0.42%

Assumes total project area of 8000 acres.

Important Farmland, Prime Forestland, and Prime Rangeland

This facility would result in the permanent conversion of 1 acre of cropland and rangeland to wind facilities due to turbine construction, up to 12 acres of cropland and rangeland for the substation and O&M building areas, and approximately 22 acres of access roads for a total of 35 acres of permanent disturbance. Tables 3.1-3 and 3.1-4 show the acres disturbed (temporary and permanent) by land use. Tables 3.1-5 and 3.1-6 detail the temporary and permanent impacts to farmland, by NRCS classification.

Table 3.1-5 Temporary Farmland Impact Summary by Classification

Farmland Rating	Acres	Percent
Prime Farmland	1.25	1%
Prime Farmland if Irrigated	106.81	70%
Farmland of Statewide Importance	21.29	14%
Not Prime Farmland	23.09	15%
Total Project Acreage	152.44	100%

Source: NRCS Soil Survey Geographic (SSURGO) Database (NRCS 2008)

Table 3.1-6 Permanent Farmland Summary by Classification

Farmland Rating	Acres	Percent
Prime Farmland	0.17	1%
Prime Farmland if Irrigated	15.38	70%
Farmland of Statewide Importance	3.51	16%
Not Prime Farmland	2.98	14%
Total Project Acreage	22.04	100%

Source: NRCS Soil Survey Geographic (SSURGO) Database (NRCS 2008)

Formally Classified Lands

There are no Formally Classified Lands within the project boundary; therefore, there would be no impacts.

Other Lands

Project planning, turbine siting and access road layout was done keeping environmentally sensitive areas in mind. Temporary and permanent disturbance of CRP lands was minimal and was calculated based on the preliminary site layout for the site. See Table 3.1-4 for impact area details. If Project facilities are proposed for a parcel enrolled in CRP, landowners will consult with the FSA to determine whether the parcel must be removed from the program and if reimbursement is necessary.

3.1.3 Cumulative Effects

Cumulative impacts may be a concern for the rural communities that have historically made their living from agricultural activities. With the increase in land being used for wind energy generation activities and new transmission lines to support the new facilities, farming may decrease slightly. The additional income from wind development on their land, however, may make up for the loss of income due to farmland conversion. Cumulative impacts from this project would be insignificant because the proportion of the area permanently disturbed would be a small percentage of the total area (34.2 acres out of 471,038 in the county).

3.1.4 Mitigation Measures

During the project design phase, previously disturbed areas, such as Crop Land, were targeted for turbine siting, access road layout and collector line placement. Environmentally sensitive areas, such as Grassland, CRP Land, Wetlands and surface waters were avoided to minimize impact. Project landowners were included in design decisions to minimize effects to agricultural operations.

3.1.5 No Action Alternative

Under the No-Action Alternative, increased disturbance from site clearing, excavation activities, and travel on gravel roads and ROWs would not occur. The overall impacts to soil resources would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.2 Air Resources

The impact analysis for air resources is limited to the vicinity of the project area (Figure 3.1-1).

3.2.1 Affected Environment

There are no areas in South Dakota in nonattainment for any state or Federal air quality standards, according to United States Environmental Protection Agency (EPA) data and the South Dakota Department of Environment and Natural Resources (DENR) (phone conversation, Kyrick Rombough, 8/19/13). In the project area, effects to air quality may be caused by vehicles or farming activities, particularly during spring planting and fall harvest. These effects are not expected to exceed National Ambient Air Quality Standards (NAAQS).

3.2.2 Direct and Indirect Effects

A significant impact to air resources would result if Federal or state air quality standards were exceeded during construction, maintenance, or operation of the Project. Temporary impacts may occur due to vehicle traffic during project construction. Pollutants would include particulate matter, nitrogen oxides, hydrocarbons, carbon monoxide and sulfur dioxide from delivery and construction vehicles. These impacts would be short-term, as construction is expected to last approximately 6 weeks. No pollutants will be emitted at a rate to cause exceedances of state or national air quality standards.

Air quality effects caused by dust would be short-term, limited to the time of construction, and would not exceed NAAQS particulate standards. The DENR Air Quality Program does not require a permit for this project and has stated that the Proposed Action is unlikely to result in the exceedence of air quality standards (phone conversation, Kyrick Rombough, 8/19/13).

3.2.3 Cumulative Impacts

The limited duration of construction, along with implementation of the mitigation measures outlined below, is expected to lessen air quality effects so that Federal and state standards would not be exceeded. Air quality is expected to return to pre-construction conditions upon completion of the project. There would be no cumulative effects on air quality.

3.2.4 Mitigation Measures

Complaints regarding fugitive dust emissions, if any, will be handled quickly and efficiently using an established complaint recording and reporting procedure. Mitigation of fugitive dust emissions include dust suppression with water or dust suppressant.

Project equipment, such as transformers, circuit breakers and switch gear will be sealed and certified to appropriate standards prior to installation. All maintenance will be provided by certified contractors.

3.2.5 No Action Alternative

Under the No-Action Alternative, impacts to air quality from site clearing, excavation activities, and travel on gravel roads and ROWs would not occur. The overall impacts to air resources would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.3 Water Resources

3.3.1 Affected Environment

Surface Waters
The project area is located within the Southern Missouri Coteau Slope physiographic unit. The Coteau du Missouri is part of the Missouri Plateau of the Great Plains Province, separated from the main body of the Missouri Plateau by the Missouri River. This highland area is covered with glacial deposits and underlain by Pierre shale and older formations. Several broad sags traverse the Coteau , which mark the positions of former stream valleys of eastern continuations of the Grand, Moreau, Cheyenne, Bad, and White rivers (Flint, 1955). There is no major stream that drains the Coteau du Missouri today.

Surface water resources within the project boundary are limited and include wetlands, ephemeral drainages (i.e. drainages that only flow for short periods of time during the year), and ponds created by excavation or impoundment for livestock production. The site is located in three watersheds: Vanderlaan Bay, Spring Creek-Lake Oahe, and Lower Spring Creek Watersheds. These drainages are ephemeral and typically maintain flows in the spring of the year or in response to precipitation events. Overland flow during storm events is low due to undulating topography and permeable soil underlying the project area.

Few wetlands within the project boundary offer open water habitat. As mentioned, most are stock ponds, reservoirs and dugouts created for the use of livestock, and are generally less than 1 acre in size. Open water habitats in the vicinity of the project include Lake Oahe (Missouri River) and various small lakes. Many small, isolated wetlands/lakes known as "prairie potholes" are present in the eastern half of Campbell County, approximately 15 miles east of the project.

According to the Federal Emergency Management Agency (FEMA), the site is in an area designated as unmapped. As a result, potential floodplains have not been determined (FEMA, 2013). Consideration was given during the design process to site turbines, access roads and collector lines outside of floodplains. No direct or indirect effects on potential floodplains are anticipated.

Ground Water
Groundwater occurs in the project area from 6 to 70 feet. Well logs recorded within the vicinity of the project area show that the depth to the top of the Grand Aquifer is approximately 50 feet below ground surface (South Dakota DENR Water Well Database). Ten borings were drilled in the project area in support of the Geotechnical Report. Of the ten, ground water was observed in two of the wells at depths of 13 and 49.5 feet below ground surface. Groundwater was not observed in the remaining boreholes while drilling, or for the short duration that the borings were allowed to remain open. However, this does not necessarily mean the borings terminated above ground water.

Subsurface conditions were analyzed by Midwest Testing on June 10, 2013 and can be generally characterized as follows:

Table 3.3-1 Subsurface Conditions

Stratum	Approximate Depth to Bottom of Stratum (ft)	Material Description	Consistency/Density
1	0.5	Topsoil	N/A
2	4-12	Sand, silt and clay	Loose to medium dense or medium stiff to hard
3	Undetermined[1]	Lean clays and fat clays with various amounts of sand	Medium stiff to hard

1. Borings terminated in this stratum with auger/cone refusal or at the planned depth of 51 feet.
2. Source: Preliminary Geotechnical Engineering Report - Campbell County Wind Farm, Midwest Testing Laboratory, Inc. June 2013

Pockets, lenses and stringers of sand are sometimes encountered in the soils found in the vicinity of the project. These sand pockets are normally discontinuous and often contain water of variable quality and quantity. Ground water level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, ground water levels during construction and at other times in the life of the project may be higher or lower than the levels indicated on the boring logs. (Midwest Testing Laboratories, Inc. 2013)

Well logs listed in the SD DENR database were reviewed for ground water depth as well as water quality. Water samples taken from wells in and around the project area indicate water quality is typically poor, with high concentrations of total dissolved solids. Samples were taken from the Grand Aquifer as well as the Spring Creek and Selby Aquifers, all located within Campbell County.

3.3.2 Direct and Indirect Effects

Surface Water
Significant impacts to surface waters would occur if construction activities were to cause a loss or degradation of surface water quality. The project was designed to minimize disturbances to surface waters through implementation of mitigation measures and avoidance of surface waters during turbine, access road and collector line placement. Therefore no direct or indirect effects will occur.

Ground Water
The project does not include the installation of wells for water extraction; therefore, there would be no impact to ground water

3.3.3 Cumulative Effects

Surface Water
Significant impacts to surface waters would occur if construction activities were to cause a loss or degradation of surface water quality. The project was designed to minimize disturbances to surface waters through implementation of mitigation measures and avoidance of surface waters during turbine, access road and collector line placement. Therefore no direct or indirect effects would occur.

3.3.4 Mitigation Measures

Best management practices (BMPs) proposed in the construction storm water pollution prevention plan will be implemented during construction and continued during the operations phase. This will minimize topsoil erosion and protect adjacent surface waters. BMPs may include establishing a protected buffer zone, containing excavated material, use of silt fences, protecting exposed soil, stabilizing restored material, and re-vegetating disturbed areas with native species.

3.3.5 No Action Alternative

Under the No-Action Alternative, significant impacts to surface and/or ground water would not occur. The overall impacts to water resources would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.4 Vegetation

3.4.1 Affected Environment

The project area lies within Ecoregion 9.3.1: Northwestern Glaciated Plains, which covers portions of southwestern Saskatchewan, southeastern Alberta, northern Montana, all along the Missouri River in the central Dakotas, and a small portion of northern Nebraska. The landscape terrain ranges from gently undulating to steeply rolling and hilly plains, with elevations ranging from 2,000 feet to about 1,850 feet above sea level within the project boundary.

This ecoregion has mostly a dry, mid-latitude steppe climate. It is marked by warm to hot summers and cold winters. The mean annual temperatures range from 36.5°F in the north to 44.6°F in the south. The mean summer temperature hovers around 60°F and the mean winter temperature is about 14°F. The frost-free period ranges from 95 days to 170 days. The mean annual precipitation ranges from 9.8 inches to 13.8 inches in drier areas and from 13.8 inches to 21.7 inches in moist areas.

Historically, spear grass, blue grama grass, and wheat grass were dominant native grasses that covered many parts of the landscape. A variety of shrubs and herbs were also common as well as some sagebrush. Scrubby aspen, willow, cottonwood, and box elder occur to a limited extent on shaded slopes of valleys and river terraces. The region can be classified as Mixed Grass Prairie; however alterations to the natural landscape have resulted from human use throughout the project area.

Currently, local vegetation in the area is predominantly pasturelands with corn, beans, small grains, and forage crops, creating a low uniform cover. A mix of deciduous and coniferous trees planted for windbreaks typically surround farmsteads, and are found along some field boundaries. In the swales, there is occasional riparian growth of native willows, cattails, sedges, and rushes associated with wetlands and/or intermittent and permanent streams. Figures 3.4-1 through 3.4-4 shows typical landscape views within the project area.

Figure 3.4-1

Figure 3.4-2

Figure 3.4-3

Figure 3.4-4

3.4.2 Direct and Indirect Effects

The project was designed to minimize disturbances to grass land through avoidance of grass land during turbine, access road and collector line placement. Therefore direct and indirect effects would be minor.

The project would result in both temporary and permanent impacts to vegetation (See Table 3.1-3 and 3.1-4). The area of permanent vegetation loss is small given the size of the project area. Approximately 0.42 percent of the project area would be permanently impacted as a result of construction. These impacts would be associated with clearing, grading, and other associated activities.

Temporary disturbance and removal of vegetation would have the greatest impact. Temporary impacts would be most significant within crop land and grassland. These two communities represent approximately 96 percent of the entire temporary disturbance within the project area.

The vegetation communities that would experience the greatest loss as a result of project implementation would be crop land and the grassland community. Crop land would comprise 70 percent (24.1 acres) of the permanently impacted acres while grassland would represent 26 percent (8.8 acres).

All areas temporarily disturbed will be returned to pre-construction condition within two growing seasons. Invasive species will be controlled during the recovery period with BMPs and weed treatment.

Development of the project would avoid impacts on Plant Species of Concern. Based on the available information on known distribution, the project would not affect these resources.

3.4.3 Cumulative Effects

Most of the sites have already had disturbance of native vegetation and CRP in the form of agriculture and development. The project was designed to minimize disturbances to grass land through avoidance of grass land during turbine, access road and collector line placement. Cumulative impacts from this project would be insignificant because the proportion of the area permanently disturbed would be a small percentage of the total area (34.2 acres out of 471,038 in the county). Of these, only 8.8 acres of Grassland would be impacted.

3.4.4 Mitigation Measures

During the project design phase, previously disturbed areas, such as Crop Land, were targeted for turbine siting, access road layout and collector line placement. Environmentally sensitive areas, such as Grassland, CRP Land, Wetlands and surface waters were avoided to minimize impact.

Construction activities such as clearing and grading will not occur in grasslands during the breeding/nesting season to minimize impacts to ground-nesting avian species.

The following mitigation measures would be implemented to avoid and reduce impacts to vegetation and sensitive plants:

- Temporarily disturbed areas would be reclaimed by replacement of topsoil and seeding;

- Revegetation would occur as soon as possible to establish vegetative cover and avoid establishment of weeds. Agricultural lands will be returned to their original use;

- Noxious weeds would be controlled using appropriate weed control measures;

- Minimize dust emissions during clearing, grading, and other construction activities to avoid adversely affecting vegetation.

- Obtain native plant seed stock from seed sources within 250 miles of the project area to ensure success of revegetation effort.

Appropriate erosion and sediment control BMPs will be used during construction to protect topsoil and nearby wetland resources and to minimize soil erosion. Practices will include stockpiling and re-use of topsoil, use of silt fences, protecting exposed soil, stabilizing restored material, and re-vegetating disturbed areas.

3.4.5 No Action Alternative

Under the No-Action Alternative, impacts from site clearing and excavation activities to native grasslands would not occur. The overall impacts to native grassland would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.5 Wetlands

3.5.1 Affected Environment

Wetlands

Wetland resources were evaluated within the project boundary. The majority of wetlands present within the project area are semipermanently flooded (either diked or excavated) and temporarily or seasonally flooded, palustrine emergent wetlands (Cowardin et al. 1979). Water regimes of these wetlands are highly variable, depending on seasonal climatic conditions, topography, and location. Some of these wetlands form in shallow depressions, although most are located in drainages with minimal flow. The wetlands that are located within drainage bottoms may be connected to the jurisdictional Waters of the U.S. (WUS).

The National Wetland Inventory (NWI) database indicates 7 wetland classification types (Table 6), covering approximately 66.8 acres (0.84%), mapped on the site based on the hydrogeomorphic system.

Table 3.5-1 Wetland Summary by Classification

System	Class	Modifiers	Special Modifiers	Acres	Percent
Palustrine	Aquatic Bed	Semipermanently Flooded	Diked/Impounded	22.80	0.29%
Palustrine	Aquatic Bed	Semipermanently Flooded	Excavated	1.92	0.02%
Palustrine	Emergent	Seasonally Flooded	Diked/Impounded	0.23	0.00%
Palustrine	Emergent	Seasonally Flooded		24.16	0.30%
Palustrine	Emergent	Temporarily Flooded	Partially Drained/Ditched	1.16	0.01%
Palustrine	Emergent	Temporarily Flooded		12.17	0.15%
Palustrine	Forested	Seasonally Flooded		1.49	0.02%
Palustrine	Shrub-Shrub	Seasonally Flooded	Diked/Impounded	2.84	0.04%
			Total Project Wetlands	66.75	0.83%

Source: National Wetland Inventory (NWI)

The occurrence of USACE jurisdictional features across the site was estimated by overlaying the NWI (USFWS 1977) and National Hydrography Dataset (NHD). The NHD provides geographical data for perennial and intermittent drainages, which for the purposes of this analysis were assumed to represent all of the WUS across the site. It was then assumed that each NWI (USFWS 1977) wetland that intersects NHD drainage represents a hydrologically connected wetland, thus identifying the subset that may qualify as jurisdictional wetland WUS. Predominantly, these wetlands are classified as semipermanently flooded (either diked or excavated) and temporarily flooded, palustrine emergent wetlands. This analysis identified 32 NWI wetlands that may be considered jurisdictional wetland WUS (see Table 3.5-2), resulting in an estimated 23.7 acres (less than one percent of the project area). This estimate of USACE jurisdictional wetlands is based on assumptions; therefore, formal wetland delineations are required to confirm the determinations, should a wetland be impacted.

Table 3.5-2 Estimated Waters of the US Summary by Classification

System	Class	Modifiers	Special Modifiers	Acres	Percent
Palustrine	Aquatic Bed	Semipermanently Flooded	Diked/Impounded	11.37	0.14%
Palustrine	Aquatic Bed	Semipermanently Flooded	Excavated	1.06	0.01%
Palustrine	Emergent	Seasonally Flooded	Diked/Impounded	0.23	0.00%
Palustrine	Emergent	Seasonally Flooded		3.51	0.04%
Palustrine	Emergent	Temporarily Flooded	Partially Drained/Ditched	1.16	0.01%
Palustrine	Emergent	Temporarily Flooded		3.54	0.04%
Palustrine	Shrub-Shrub	Seasonally Flooded	Diked/Impounded	2.84	0.04%
			Estimated Project Jurisdictional Wetlands	23.72	0.34%

Source: National Wetland Inventory (NWI) and National Hydraulic Dataset (NHD)

3.5.2 Direct and Indirect Effects

Significant impacts to wetlands would occur if construction activities were to cause a loss or degradation of wetlands in violation of a USACE permit. The project was designed to minimize disturbances to wetlands through implementation of mitigation measures and avoidance of wetland habitats during turbine, access road and collector line placement. Therefore no direct or indirect effects would occur.

3.5.3 Cumulative Effects

Avoidance of wetlands during project design, implementation of the environmental protection measures described below, and compliance with USACE permits, if applicable, would ensure that there would be no unmitigated loss or permanent degradation of wetlands.

3.5.4 Mitigation Measures

Wetlands will be avoided to the extent practicable during construction. If impacts to USACE jurisdictional waters are unavoidable, coverage under a Section 404 USACE Nationwide Wetland Permit will be obtained.

Best management practices (BMPs) proposed in the construction storm water pollution prevention plan will be implemented during construction and continued during the operations phase. This will minimize topsoil erosion and protect nearby wetland resources. BMPs may include establishing a protected wetland buffer zone, containing excavated material, use of silt fences, protecting exposed soil, stabilizing restored material, and re-vegetating disturbed areas with native species.

3.5.5 No Action Alternative

Under the No-Action Alternative, impacts to wetlands would not occur. The overall impacts to wetland resources would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.6 Wildlife

Applicable Regulations

Migratory Bird Treaty Act
The Migratory Bird Treaty Act (MBTA) is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. It is a strictliability statute, meaning that proof of intent, knowledge, or negligence is not an element of an MBTA violation. The statute's language is clear that actions resulting in a "taking" or possession (permanent or temporary) of a protected species, in the absence of a Service permit or regulatory authorization, are a violation of the MBTA. (USFWS, 2012)

Bald and Golden Eagle Protection Act
Under authority of the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668–668d, bald eagles and golden eagles are afforded additional legal protection. BGEPA prohibits the take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof. (USFWS, 2012)

Endangered Species Act
The Endangered Species Act (16 U.S.C. 1531–1544; ESA) was enacted by Congress in 1973 in recognition that many of our Nation's native plants and animals were in danger of becoming extinct. The ESA directs the Service to identify and protect these endangered and threatened species and their critical habitat, and to provide a means to conserve their ecosystems. To this end, federal agencies are directed to utilize their authorities to conserve listed species, and ensure that their actions are not likely to jeopardize the continued existence of these species or destroy or adversely modify their critical habitat. (USFWS, 2012)

The Clean Water Act
The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. The statute employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

3.6.1 Affected Environment

Habitat

The project site can be described as agricultural, with the majority of the project site (61%) in crop production. Corn, beans, wheat, alfalfa and sunflowers provide foraging for many species. Native grasslands as well as planted grasslands provide habitat. Numerous wetlands provide valuable habitat for a wide range of wildlife species, including many migratory birds. See Section 3.5 for more information on Wetlands.

All lands included in the project area are privately owned. There are no state or federally owned lands within the project boundary. Also, there are no lands held under protective easements, such as grassland or wetland easements managed by the USFWS. This means that land use within the project boundary changes periodically, with the exception of lands enrolled in CRP. These remain for the duration of the contract. Numerous homesteads are scattered throughout the project. Some inhabited, others are vacant. Most include a stand of trees that provide valuable roosting habitat to both resident and migratory bird and bat species. Other land uses within the project area that provide habitat include shelterbelts. See Section 3.1 for more information on Land Use.

Mammals

Small mammals that may exist in the project area include opossum, raccoon, weasels, mink, otters, skunks, badger, fox, pocket gopher, ground squirrels, chipmunks, tree squirrels, porcupine, beaver, muskrat, jackrabbits, cottontail rabbits and numerous species of bats. (SD GFP)

Twelve bat species can be found throughout South Dakota. Bat populations are declining locally, and continentally, due to habitat loss and fragmentation, roost disturbances, public lack of awareness, and poor regulatory measures. Depending on the species, bats roost in a variety of sites, such as rock crevices, trees, in buildings, and under bridges. (SDBWG, 2004). Although six species of bats are considered species of concern according to the South Dakota Natural Heritage Program, no state protection beyond their nongame status is provided to these species. Pre-construction bat studies were performed for the project to assess bat use within the project boundary. The following table shows the eight bat species with the potential to occur within the project area.

Table 3.6-1 Bat Species

Species	(Scientific name)	Call Frequency
Little brown bat	(Myotis lucifugus)	High
Northern long-eared bat	(Myotis septentrionalis)	High
Eastern pipistrelle	(Perimyotis subflavus)	High
Eastern red bat	(Lasiurus borealis)	Mid
Evening bat	(Nycticeius humeralis)	Mid
Big brown bat	(Eptesicus fuscus)	Low
Silver haired bat	(Lasionycteris noctivagans)	Low
Hoary bat	(Lasiurus cinereus)	Low

Source: Eco-Tech Consultants, 2011

Total bat activity peaked in late August and no passes were recorded after October 11. Bat activity appears to have come predominately from low frequency bats, such as big brown bats, hoary bats and silver-haired bats. The mean number of bat passes per detector per night was compared to existing data at other wind energy facilities from the region where both bat activity and mortality levels have been measures. The level of bat activity documented at the project site was lower than all other published results.

There was limited information regarding larger mammals that may be observed near the project site; however, white-tailed deer, coyote and mountain lions have been seen in the area. Historically, bison, elk and pronghorn were abundant in the prairies. Hunting and habitat fragmentation have reduced the populations and/or the suitable habitat. These species are no longer found in Campbell County.

Avian Species
The following bird species are known to exist in north central South Dakota (Sand Lake Refuge). Species in bold type were observed during pre-construction avian studies by WPC and Wenck. (Not inclusive. See Avian Studies for complete lists.

Table 3.6-2 Avian Species of Sand Lake Refuge

LOON
Common Loon

GREBE
Horned Grebe
Eared Grebe
Western Grebe
Pied-billed Grebe
Clark's Grebe

PELICANS AND CORMORANT
American White Pelican
Double-crested Cormorant

HERONS & IBI
Great Blue Heron
Green Heron
Little Blue Heron
Cattle Egret
Great Egret
Snowy Egret
Black-crowned Night-Heron
Yellow-crowned Night-Heron
Least Bittern
American Bittern
White-faced Ibis

SWANS, GEESE, AND DUCK
Tundra Swan (Whistling Swan)
Canada Goose
Greater White-fronted Goose
Snow Goose
Ross' Goose
Mallard
American Black Duck
Gadwall
Northern Pintail
Green-winged Teal
Blue-winged Teal
Cinnamon Teal
American Wigeon
Northern Shoveler
Wood Duck*
Redhead
Ring-necked Duck
Canvasback
Lesser Scaup
Greater Scaup
Common Goldeneye
Bufflehead
Ruddy Duck*
Hooded Merganser
Common Merganser
Red-breasted Merganser

VULTURES, HAWKS, AND FALCON
Turkey Vulture
Northern Goshawk
Sharp-shinned Hawk
Cooper's Hawk
Red-tailed Hawk
Broad-winged Hawk
Swainson's Hawk
Rough-legged Hawk
Ferruginous Hawk
Golden Eagle
Bald Eagle
Northern Harrier (Marsh Hawk)
Osprey
Prairie Falcon
Peregrine Falcon
Merlin
American Kestrel

Gyrfalcon

GALLINACEOUS BIRD
Greater Prairie-Chicken
Sharp-tailed Grouse
Ring-necked Pheasant
Gray Partridge

RAIL
Virginia Rail
Sora
American Coot

CRANE
Sandhill Crane

PLOVERS AND TURNSTONE
Semipalmated Plover
Killdeer*
American Golden Plover (Lesser Gol-Pl.)
Black-bellied Plover
Ruddy Turnstone

SANDPIPERS AND STILT
Common Snipe
Long-billed Curlew
Upland Sandpiper
Spotted Sandpiper
Solitary Sandpiper
Willet*
Greater Yellowleg
Lesser Yellowleg
Red Knot
Pectoral Sandpiper
White-rumped Sandpiper
Baird's Sandpiper
Least Sandpiper
Dunlin
Short-billed Dowitcher
Long-billed Dowitcher
Stilt Sandpiper
Semipalmated Sandpiper
Western Sandpiper
Buff-breasted Sandpiper
Whimbrel
Marbled Godwit
Hudsonian Godwit
Sanderling
American Avocet
Wilson's Phalarope
Red-necked Phalarope

GULLS AND TERN
Herring Gull
California Gull
Ring-billed Gull
Franklin's Gull
Bonaparte's Gull
Forster's Tern
Common Tern
Least Tern
Black Tern
Caspian Tern

PIGEONS AND CUCKOO
Rock Dove
Mourning Dove
Yellow-billed Cuckoo
Black-billed Cuckoo

OWL
Eastern Screech-Owl
Great Horned Owl
Snowy Owl
Burrowing Owl
Long-eared Owl
Short-eared Owl
Northern Saw-whet Owl

GOATSUCKERS, SWIFTS, AND
HUMMINGBIRD

Common Nighthawk
Chimney Swift
Ruby-throated Hummingbird

KINGFISHER
Belted Kingfisher

WOODPECKER
Northern Flicker (Common Flicker)
Red-headed Woodpecker
Yellow-bellied Sapsucker
Hairy Woodpecker
Downy Woodpecker
Red-bellied Woodpecker

FLYCATCHER
Eastern Kingbird
Western Kingbird
Great Crested Flycatcher
Eastern Phoebe
Yellow-bellied Flycatcher
Willow Flycatcher
Least Flycatcher
Eastern Wood-Pewee
Olive-sided Flycatcher
Say's Phoebe
Alder Flycatche

LARK
Horned Lark

SWALLOW
Tree Swallow
Bank Swallow
Northern Rough-winged Swallow
Barn Swallow
Cliff Swallow
Purple Martin

JAYS AND CROW
Blue Jay
Black-billed Magpie
American Crow

CHICKADEE, NUTHATCHES, AND CREEPE
Black-capped Chickadee
White-breasted Nuthatch
Red-breasted Nuthatch
Brown Creeper

WREN
House Wren
Winter Wren
Marsh Wren
Sedge Wren

THRUSHES AND KINGLET
American Robin
Hermit Thrush
Swainson's Thrush
Gray-cheeked Thrush
Veery
Eastern Bluebird
Mountain Bluebird
Golden-crowned Kinglet
Ruby-crowned Kinglet

CATBIRDS, THRASHERS, AND PIPIT
Gray Catbird
Brown Thrasher
Northern Mockingbird
American Pipit (Water Pipit)

WAXWING
Bohemian Waxwing
Cedar Waxwing

SHRIKES AND STARLING
Northern Shrike
Loggerhead Shrike
European Starling

VIREO
Red-eyed Vireo
Philadelphia Vireo
Warbling Vireo
Solitary Vireo
Yellow-throated Vireo

WARBLER
Black-and-white Warbler
Tennessee Warbler
Orange-crowned Warbler
Nashville Warbler
Northern Parula
Yellow Warbler
Magnolia Warbler
Cape May Warbler
Yellow-rumped Warbler
Blue-winged Warbler
Golden-winged Warbler
Blackburnian Warbler
Black-throated Green Warbler
Black-throated Blue Warbler
Chestnut-sided Warbler
Blackpoll Warbler
Palm Warbler
Ovenbird
Northern Waterthrush
Connecticut Warbler
Mourning Warbler
Common Yellowthroat
Yellow-breasted Chat
Wilson's Warbler
Canada Warbler
Bay-breasted Warbler
American Redstart
Scarlet Tanager
Western Tanager

CARDINALS, GROSBEAKS, BUNTINGS, AND TOWHEES
Northern Cardinal
Rose-breasted Grosbeak
Indigo Bunting
Dickcissel
Rufous-sided Towhee
Lark Bunting
Lazuli Bunting

SPARROWS, JUNCOS, AND LONGSPUR
Savannah Sparrow
Grasshopper Sparrow
Nelson's Sharp-tailed Sparrow
Vesper Sparrow
Lark Sparrow
Dark-eyed Junco
American Tree Sparrow
Chipping Sparrow
Clay-colored Sparrow
Field Sparrow
Harris' Sparrow
White-crowned Sparrow
White-throated Sparrow
Fox Sparrow
Lincoln's Sparrow
Swamp Sparrow
Song Sparrow
Lapland Longspur
Chestnut-collared Longspur
Snow Bunting

MEADOWLARKS, BLACKBIRDS AND ORIOLE
Bobolink
Western Meadowlark
Yellow-headed Blackbird
Red-winged Blackbird
Orchard Oriole
Northern Oriole
Rusty Blackbird
Brewer's Blackbird

Common Grackle
Brown-headed Cowbird

FINCHES
Purple Finch
Pine Grosbeak
Hoary Redpoll
Common Redpoll
Pine Siskin
American Goldfinch
Red Crossbill
House Finch
Evening Grosbeak
White-winged Crossbill

WEAVER FINCH
House Sparrow

The following species were very rare and only seen once or twice during the history of Sand Lake Refuge.

European Wigeon
Brant
Western Wood-Pewee
Whip-poor-will
MacGillivray's Warbler
Mountain Plover
Worm-eating Warbler
White-winged Scoter
Le Conte's Sparrow
Barred Owl
Oldsquaw
Barrow's Goldeneye
Red-shouldered Hawk
King Rail
Sabine's Gull
Red-necked Grebe
Baird's Sparrow

Source: (USFWS, 1995) (WPC, 2011) (Wenck, 2012)

Raptor nest surveys performed during pre-construction avian studies in 2010 and 2012 identified both occupied and non-occupied nests within the project area. These surveys determined nest activity status and the species using those nests. Raptors are of special concern due to their typical flight pattern being within a turbine's rotor-sweep-area (RSA). Eleven species of raptor were observed during avian use surveys in 2010; six species were identified in 2012 surveys.

Both adult and fledgling raptors are at risk of collision with turbine blades, when turbines are built near nests. During the breeding season, adults spend much of their time flying in the vicinity of the nest to hunt and attend to young. Fledglings rarely venture far from the nest immediately after fledging until they have become capable flyers and hunters. Additionally, construction activity close to active nests may cause adults to abandon them. (Eco-Tech, 20

3.6.2 Direct and Indirect Effects

Direct impact to wildlife habitat may occur during construction activities and includes impacts from clearing and grading. Removal of vegetation and topsoil to install access roads, crane pads and foundations may have more impacts to species that are less mobile, such as small mammals, reptiles and ground-nesting bird species. Medium sized and larger mammals, such as raccoon, fox and white-tailed deer will vacate the immediate area surrounding construction activities and would be expected to return shortly after construction is completed. These impacts will be temporary, lasting only one or two seasons. The majority of disturbed areas will be returned to their pre-construction condition. Permanent impacts to habitat will be minimal, consisting of the access road and turbine base.

Other impacts include construction equipment striking wildlife while traveling along state, county and project access roads. This would impact primarily small mammals and birds. Larger mammals are better equipped to avoid moving vehicles. Disturbances from noise, dust and human activity may drive species to find other foraging and/or nesting areas. These disturbances would also be temporary, and displaced wildlife are expected to return after construction has ended.

Impacts from collisions with turbine blades are a threat to birds and bats that occupy and migrate through the project area.

Direct mortality and /or injury from collisions with wind turbines and/or guy wires, temporary or permanent habitat loss, and displacement of birds from habitats near turbines are possible impacts to avian species from the construction and operation of the project. In addition to mortality associated with wind farms, concerns have been raised that bird species may avoid areas near turbines after the wind farm is in operation. (WPC, 2011; Wenck, 2012)

Bat activity within the project site was lower than all published observations from region-similar facilities in Minnesota, Wyoming, and Iowa (Kunz et al. 2007). Based on the presumed relationship between pre-construction bat activity and post-construction fatalities, we expect that bat mortality rates at Campbell County Wind will be minimal in the context of published observations from other facilities. (Eco-Tech, 2011)

Depending on the location of local sources of gravel and sand, there may also be an impact to habitat if new sources are explored or mined. Currently, there are no contracts in place for the supply of sand and gravel.

3.6.3 Cumulative Effects

Past actions in the area include agricultural activities which contribute to habitat loss and fragmentation. Future actions which may occur in the area are continued agricultural activities as well as future development of wind energy. This project, combined with the described past and future actions, poses challenges for non-listed mammals. There will be impacts to certain bird and bat species; however, these impacts are expected to be low, according to the pre-construction surveys. Also, the extensive mitigation measures described below will lessen these effects; therefore, the cumulative effect on wildlife will be minimal.

3.6.4 Mitigation Measures

CCW will implement the following measures during project planning, construction and post construction (operation) phases to limit the impacts on federally and state listed species and their habitats:

Turbine siting
During the project design phase, previously disturbed areas, such as Crop Land, were targeted for turbine siting, access road layout and collector line placement. Environmentally sensitive areas, such as Grassland, CRP Land, Wetlands and surface waters were avoided to minimize impact to populations and habitats of listed species.

- Turbine placement has been avoided in a one mile radius surrounding existing sharp-tailed grouse leks to avoid disturbance to grouse and possible abandonment of the lek.

- Turbine placement has been avoided in a one mile buffer area surrounding existing raptor nests. This is to avoid potential raptor collisions with turbines during nesting and fledging times.

Turbine and Tower Design
Turbines designated for use at CCW will be state-of-the-art, with large un-guyed tubular towers, slow-moving rotors, and few perching surfaces, reducing the potential for bird collisions.

Buried Collector Line System

All collector lines between turbines will be installed underground, eliminated the potential for bird strikes and electrocutions. The only location of overhead lines will be at the substation, which is located adjacent to Basin Electric's existing 230 kV overhead system.

Construction Phase Measures

- During the construction phase, CCW would require contractors to modify or curtail construction activities within one half-mile of the observation of a whooping crane, leaving birds undisturbed until they are no longer observed within the wind project boundaries to minimize the potential for disturbance, displacement, and harm of roosting and foraging whooping cranes.

- Construction activities in grassland will not take place during breeding and nesting seasons to minimize impacts to species that may be displaced during clearing and grading activities.

- Construction activities will be restricted in a two mile buffer area surrounding existing sharp-tailed grouse leks for three hours, starting at sunrise, from March 1 through June 30. This is to avoid disturbance to grouse attending a lek.

- Construction personnel will be trained to recognize federal and state listed species and immediately report any sightings to construction management.

- Dust emissions during construction activities would be controlled with water applied to roads and pads, as required.

Pollution Prevention

A stormwater runoff permit would be obtained prior to construction. Compliance with this permit and the associated stormwater pollution prevention plan would ensure that surface water is not adversely affected by runoff from disturbances and construction areas.

As with any construction activity, there is a possibility of spilling fuel, hydraulic fluid, or other hazardous substances. The potential of such events would be minimized through implementation of the environmental protection measures described in site pollution prevention plans

Construction equipment would be equipped with spill cleanup kits. Equipment refueling would take place at secure areas, away from wetlands or drainages. These measures would ensure that surface and ground water quality is not degraded through spillage of contaminants.

Avian and Bat Protection Plan

A project -specific Avian and Bat Protection Plan (ABPP) will be developed to document the step taken to avoid and minimize effects to birds and bats. It will also address the post-construction monitoring efforts for mortality and habitat effects, and may use many of the components suggested in the USFWS Avian Protection Plan Guidelines. (USFWS 2012)

Post-Construction Monitoring Plans
Monitoring and training procedures will be developed in coordination with the USFWS and SD GFP and documented in the project operations plan and ABPP;

Operations personnel will be trained to identify federal and state listed species in the field;

Observations of whooping cranes by operations personnel made as a result of monitoring or other incidental sightings in the project area and surrounding vicinity shall be immediately reported to the USFWS and SD GFP;
Post-construction mortality monitoring will help to identify individual turbines that contribute to avian mortality. This information could be used to modify operating procedures as necessary and provide valuable design and layout information for future wind development projects, aiding in the reduction of potential for avian mortality.

3.6.5 No Action Alternative

Under the No-Action Alternative, increased impacts to wildlife would not occur. The overall impacts to wildlife resources would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.7 Cultural Resources

Cultural Resources are physical features, both natural and manmade, associated with human activity. These may include pioneer homes, buildings or old roads; structures with unique architecture; prehistoric village sites; historic or prehistoric artifacts or objects; rock inscription; human burial sites; earthworks, such as battlefield entrenchments, prehistoric canals, or mounds and Traditional Cultural Properties. These nonrenewable resources often yield unique information about past societies and environments, and provide answers for modern day social and conservation problems. Although many have been discovered and protected, there are numerous forgotten, undiscovered, or unprotected cultural resources in rural America. (NRCS, 2013)

Section 106 of the National Historic Preservation Act requires federal agencies (Western) to take into account the effects of their projects on historic properties and give the Advisory Council on Historic Preservation (Council) a reasonable opportunity to comment. The regulations implementing Section 106 requires Western to consult with the State Historic Preservation Officer (SHPO) and appropriate Tribal Historic Preservation Officers (THPO). Even if an Indian tribe has not been certified by the National Park Service to have a THPO that can act for the SHPO on its lands, Indian tribes must be consulted about projects on or affecting their lands. Tribes must also be consulted when projects off tribal lands will impact historic resources of significance to the tribe. These consultations must respect tribal sovereignty and the relationship between the federal government and Indian tribes.

3.7.1 Affected Environment

In accordance with the National Historic Preservation Act (36 CFR Part 800), a search of the South Dakota State Historical Preservation Office database identified four sites, two cemeteries, eight surveys and fourteen standing structure surveys performed in the vicinity of the project site (one-mile buffer). These sites are listed in the following Tables 3.7-1 through 3.7-4.

Table 3.7-1 SD SHPO Search Results – Sites

Site No.	Description	Eligibility
39CA0135	Native American Artifact Scatter	Not Eligible
39CA0115	Farmstead; Euroamerican Artifact Scatter	Unevaluated
39CA0194	Native American Isolated Find; Euroamerican Depression	Not Eligible
39CA0195	Unknown Cairn	Unevaluated

Table 3.7-2 SD SHPO Records Search Results – Cemeteries

Description	Eligibility
Kvernes Cemetery	Not Eligible
Gale Cemetery	Not Eligible

Table 3.7-3 SD SHPO Records Search Results
Cultural Resource Surveys and Investigations

Archive	Author(s)	Report Title
ACA-0006	Haberman	Cultural Resources Survey of Three Grade Stabilization Projects in Campbell County, South Dakota. P.O. 43-6740-8-37. No CIS
ACA-0075	Littlefield	Letter Format Report for a Level III Cultural Resources Inventory for NRCS Project #007CA08 Pipeline and Tanks, T127N, R78W, Section 30, 31, and T127N, R79W, Section 25, Campbell County, South Dakota
ACA-0076	Littlefield	Letter Format Report for a Level III Cultural Resources Inventory for NRCS Project #103CA06-ATF Pipeline, Well and Tank Location Changes, T126N, R78W, Section 15, 21, 22, 26, 27, 28, 34, 35, Campbell County, South Dakota
ASD-0024	Clark, Lamie, Priebe, Busch, Laundry, Kerst, Williams, Fosha, Short, Harms, Williams, Hanenberger, and Martin	An Intensive Cultural Resource Survey of Selected Title VI Lands Located Along Lewis and Clark Lake, Lake Francis Case, Lake Sharpe, and the Oahe Reservoir in South Dakota. Volume V: Lake Oahe, Oahe Dam. CIS No. 2408
ESD-0016	Lueck, Winham, and Butterbrodt	Cultural Resources Survey of the Web Water Pipeline Project in Campbell, Potter, and Walworth Counties, South Dakota
ESD-0422	Buechler	A Cultural Resources Records Search and Inventory Survey of the Herreid and Mound City Exchange Cable Routes in Campbell and Mcpherson Counties, South Dakota. Project No. 08-57
ESD-0476	Buechler	Results of a Stratified Disproportionate Sample Survey of Valley Telecommunications Cooperative Association, Inc.'s Pollock and Glenham Exchange Cable Routes in Campbell and Walworth Counties, South Dakota. Project No. 10-46
MTO-0001	Falk, Pepperl, and McCormick	Cultural Resource Survey of the East Shore of Lake Oahe, South Dakota. Technical Report No. 83-01, Department of Anthropology, University of Nebraska
WSD-0181	Buechler	Cultural Resources Inventory Survey of the Pollock and Glenham Exchange Upgrade Project for Valley Telecommunications Cooperative Association, Inc. in Campbell and Walworth Counties, South Dakota. Project No. 98-9

Table 3.7-4 SD SHPO Records Search Results – Structures

SHPO ID	Roof Style	Construction	Arch. Style	Type	Stories	Est. Const.	Eligibility
47	Hip	Wood Frame	Craftsman	Bungalow	1	1925	Not Eligible
48	Truncated Hip	Wood Frame	No Style	Foursquare	2	1920	Not Eligible
50	Gable	Earth	No Style	Sod House	1.5	1900	NR Eligible
51	Gable	Wood Frame	No Style	Side Gable	2	1902	Not Eligible
52	Gable	Wood Frame	No Style	Side Gable	1	1950	Not Eligible
53	Gable	Wood Frame	No Style	Side Gable	1.5	1949	Not Eligible
54	Pyramidal	Wood Frame	No Style	Foursquare	2	1920	Not Eligible
55	Gable	Wood Frame	Craftsman	Gable Front	1.5	1925	Not Eligible
56	Gable	Wood Frame	No Style	Side Gable	1.5	1925	Not Eligible
58	Gable	Wood Frame	No Style	Gable Front	1	1920	Not Eligible
59	Arch	Wood Frame	No Style	Barn	2	1915	NR Eligible
60	Gable	Wood Frame	No Style	Gable and Wing	1.5	1925	Not Eligible
339	Gable	Wood Frame	No Style	Side Gable	1.5	1920	Not Eligible
340	Hip	Wood Frame	No Style	Not noted	2	1915	Not Eligible

Class III Intensive Survey

A Class III Intensive Cultural Resource Inventory (Beaver Creek Archaeology 2013) was performed at the project site. A summary of the inventory is presented in Tables 3.7-5 and 3.7-6. The inventory examined 49 turbine locations, access roads and underground collector lines which totaled 151 acres. This inventory identified 2 prehistoric sites. The prehistoric sites are stone feature sites. The historic sites include two architectural, neither of which is recommended eligible to the NRHP. See Table 3.7-5 for a list of sites. See the complete Report, which is included in this Environmental Assessment, for more information.

Table 3.7-5 Class III Survey Site Summary

Site No.	Site Type	Site Components	Eligibility Recommendation
39CA285	Stone Feature	Stone circle, cairn	Potentially Eligible
39CA***	Stone Feature	Stone circle	Potentially Eligible

Source: Class III Intensive Cultural Resource Inventory in Campbell County, SD. Beaver Creek Archaeology, September 2013

Table 3.7-6 Class III Survey Stucture Summary

SHPO No.	Site Type	Site Components	NRHP Eligibility
CA538	Architectural	Windmill	Ineligible
CA339	Architectural	Abandoned dwelling	Ineligible

Source: Class III Intensive Cultural Resource Inventory in Campbell County, SD. Beaver Creek Archaeology, September 2013

A Standing Structure Survey and a Traditional Cultural Properties (TCP) Survey are currently under way. Results from this survey will be presented to, and used in consultations with, the SHPO and SRST. Any historic sites or properties identified within the visual APE will be avoided. Consultations with tribes regarding the visual impact of the project is on-going.

3.7.2 Direct and Indirect Effects

To comply with Section 106 of the NHPA, an area of potential effect (APE) for cultural and historical resources must be defined that is specific to the proposed undertaking. Areas of direct effect would be associated with turbine and substation construction, laydown areas, access roads and underground collector lines.

Indirect effects may include the disturbance of untilled land to make up for loss of cultivated acres. In extreme cases this may include removal of vacant farm sites, including structures potentially eligible for listing in the NRHP, or disturbance of Traditional Cultural Properties.

3.7.3 Cumulative Effects

Current industry construction standards include avoidance of all cultural resource sites; therefore, no cumulative effects are anticipated.

3.7.4 Mitigation Measures

Measures would be taken to ensure all identified sites are avoided and protected during construction. The location of the turbine near 39CA285 has been revised to avoid impacts on all cultural and historical features identified in the Class III survey; therefore, no effects would occur.

Potentially eligible site 39CA*** will be protected from disturbance by a 100 foot buffer. Temporary fencing will be placed along the buffer line. No other mitigation measures are planned.

3.7.5 No Action Alternative

Under the No-Action Alternative, increased disturbance to cultural resources sites from site clearing and excavation activities would not occur. The overall impacts to cultural resources would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.8 Special Status Species

3.8.1 Affected Environment

The Endangered Species Act of 1973 (ESA) (16 USC 1531–1544) requires protection of federally listed threatened or endangered species and any habitat designated as essential to maintenance and recovery of a listed species. Critical Habitat areas are designated by the USFWS. No critical habitats are located within 1 mile of the Project area.

A search of the SD GFP Natural Heritage Program database was requested to identify known instances or habitats of threatened, endangered or rare species within one mile of the project boundary. There were 0 records of observed threatened, endangered or rare species or their habitats within 1 mile of the project boundary. Of course, the absence of a species on the database does not preclude its presence from the project area.

Threatened and endangered species were also identified using data obtained from the USFWS South Dakota Ecological Services Field Office in Pierre, SD.

Based on the data received, five federally listed species may occur within the project boundary: Least tern (Sterna antillarum, endangered); Pallid sturgeon (Scaphirhynchus albus, endangered); Piping plover (Charadrius melodus, threatened); Sprague's Pipit (Antus spragueii, Candidate); and Whooping crane (Grus americana, endangered).

Surveys were conducted during field reconnaissance and avian studies; However, none of these species were observed during site visits, although intensive species-specific surveys were not conducted.

Interior Least Tern
The interior population of the least tern presently breeds in the Mississippi, Missouri, and Rio Grande river systems. The birds usually stay in close proximity to the rivers. In 2003, the population of the interior least tern was estimated to be 12,000 individuals. Birds from the interior population winter along the Gulf of Mexico and on Caribbean Islands. In South Dakota, the interior least tern nests primarily on flowing segments of the Missouri River and Cheyenne River (USFWS 1990). Least terns are known to have nested along the shoreline of Lake Oahe in Campbell County in the past (Phone conversation, Silka Kempema. July 2013). No Least Terns were observed during avian studies performed at the project site during 2010 and 2012 (WPC Inc. 2011; Wenck 2012).

The Interior Least Tern Recovery Plan (USFWS 1990) identifies two major causes for the least tern's decline: habitat alteration and destruction, and human disturbance. Much of the least tern's historical sandbar nesting habitat has disappeared as a result of channelization, irrigation, and dam construction. These changes have also led to an altered water flow pattern, resulting in frequent nesting habitat inundation. Sediment deprived water below the dams means that there is less sandbar formation. This problem is compounded by increased recreational use of sandbars, further reducing reproductive success. (SDGFP 2005)

Pallid Sturgeon

The pallid sturgeon was listed as endangered on September 6, 1990 (55 FR 36641). Although the species range is large, catch records are extremely rare. Native to the Missouri and Mississippi Rivers, pallid sturgeon adapted to the pre- development habitat conditions that existed in these large rivers. These conditions generally can be described as large, free-flowing, warm water, turbid habitat with a diverse assemblage of physical habitats that were in a constant state of change. Modification of the pallid sturgeon's habitat by human activities has blocked fish movement, destroyed or altered spawning areas, reduced food sources or ability to obtain food, altered water temperatures, reduced turbidity, and changed the hydrograph of the river system. Overfishing, pollution, and hybridization that occurs due to habitat alterations also have probably contributed to the species' population decline. (USFWS 1993)

Piping Plover

The Piping Plover, one of six North American species of belted plovers, was added to the Federal Endangered Species list in January 1986 (50 FR 50726-34). Piping plovers breed in three regions of North America; the Atlantic Coast from Newfoundland to South Carolina; the beaches throughout the Great Lakes; and river systems and lakes of the Northern Great Plains. Inland piping plovers occupy breeding habitat on the Great Lakes and Northern Great Plains from March until August; they spend the remainder of the year along the Gulf Coast from Florida to Northern Mexico.

Most breeding activity in South Dakota occurs on sandbars along the Missouri River from the Fort Randall Dam to Springfield, and from Yankton to Ponca, Nebraska. Breeding also occurs on silty flats, sandy beaches and gravel parking lots of Lake Oahe from Whitlocks Crossing south. Other isolated nesting locations include sandbars and causeways directly below Oahe Dam, and occasionally on saline wetlands in northeast South Dakota. Breeding season sightings (no documented nesting) have been reported for Campbell, Fall River, Harding, Hyde and Walworth counties (USFWS 1988). No Piping Plovers were observed during avian studies performed at the project site during 2010 and 2012 (WPC Inc. 2011; Wenck 2012).

The USFWS Piping Plover Recovery Plan (USFWS 1988) identifies numerous reasons that the population has declined. In the late 1800's and early 1900's, the population was decimated by hunting (Bent 1929). More recently, population decline has been caused by a number of factors including loss of habitat due to recreational and commercial development, reservoirs and channelization resulting in the elimination of sandbars, change in water flow regimes leading to unpredictable and untimely flows, increase in predation due to higher concentrations of predators, human disturbance, livestock and pet disturbance, and inadequate federal regulation.

Sprague’s Pipit
Sprague's Pipit is a small, secretive, grassland bird that inhabits portions of the Northern Great Plains and parts of Canada. It requires large tracts of native grassland for breeding-preferring ungrazed tracts with vegetation from 4 to 12 inches in height. This species can also be found in planted grasslands (planted grazing land or CRP) if the vegetation is not too dense. It is rarely found on cultivated lands. (Dechant, Sondreal, Johnson, Igl, Goldade, Nenneman and Euliss. 2003)

One of the least-known birds in North America due to its plumage and behaviors, Sprague’s Pipit is one of few birds native to the North American grasslands. This pipit often goes undetected during migration through the Great Plains, and almost nothing is known about its behavior on the wintering grounds in the southwestern and south-central United States and northern Mexico. (Robbins and Dale, 1999)

Population estimates vary, but research has shown that the species has been in decline since its discovery in 1843. Sprague's Pipit is not listed as threatened or endangered, but has been a candidate species since 2009 (USFWS 2013). Sprague’s Pipit was not observed during avian studies performed at the project site during 2010 and 2012. (WPC Inc. 2011; Wenck 2012)

Due to the Sprague’s pipit’s selection of relatively large grassland areas and avoidance of edges, habitat fragmentation is a threat throughout the population’s breeding range. As more development takes place in the Northern Great Plains, the fragmentation of the native prairie is expected to increase, further decreasing the amount of suitable habitat in large enough patches to be used by breeding pairs. Other threats to the habitat of Sprague's Pipit include grazing, fire suppression and mowing. (USFWS 2012)

Whooping Cranes
The whooping crane occurs only in North America and is North America’s tallest bird, with males approaching 1.5 m (5 ft) when standing erect. Whooping cranes currently exist in the wild at 3 locations and in captivity at 12 sites. The July 2010 total wild population was estimated at 383. There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park population, which nests in Wood Buffalo National Park and adjacent areas in Canada, and winters in coastal marshes in Texas at Aransas. The total population of wild and captive whooping cranes in July, 2010, was 535.

The project area is located in the migratory corridor of the Aransas-Wood Buffalo Population of whooping crane. Whooping cranes use a variety of habitats during migration, but primarily have been known to use shallow, seasonally and semipermanently flooded palustrine (marshy) wetlands for roosting, and various cropland and emergent wetlands for feeding. The project area includes numerous seasonally and semipermanently flooded palustrine wetlands, surrounded by croplands that together, may provide attractive feeding and roosting migration habitat.

During migration, whooping cranes often are recorded in riverine habitats, especially in Nebraska. Frequently used riverine habitats include: the South Saskatchewan River in

Saskatchewan; the Platte River, North and Middle Loup Rivers, and Niobrara River in Nebraska; the Missouri River in North Dakota; and the Red River in Texas. Cranes roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance.

Development and conversion of prairie habitat for agricultural usage are responsible for much of the original migration and winter habitat loss for the species. Collisions with power lines are a substantial cause of mortality for fledged whooping cranes (USFWS, 2007). Migrating cranes are most vulnerable to collisions with structures in the early morning or late evening when light levels are diminished, as they fly at very low altitudes between roost and foraging sites, or when flying at low altitude when starting or ending a migration flight.

Historic whooping crane observations do not indicate that the study area is frequently used by whooping cranes for migration, stopover, or foraging (email, C. Mehls, SDGFP to D. Plagge, Fagen Engineering LLC 7/29/13), but whooping cranes have been observed at areas near the Missouri River, approximately 1.75 miles west of the project and in Lake Pocasse National Wildlife Refuge, approximately 5.5 miles north of the project area (USGS 2013). Whooping Crane surveys were conducted in 2010 and 2012 between early April and late April and again from early October to early November, when the highest number of cranes were expected to occur in the project area (USFWS 20074). No whooping cranes were sighted during either the 2010 or the 2012 surveys (WPC Inc. 2011; Wenck 2012). Based on historical records, seven whooping crane observations have been made within 9.2 miles of the proposed Project area, see Table 3.8-1.

Table 3.8-1 Historical Whooping Crane Observations

Observation Number	Date	Distance from Project Area	Latitude	Longitude	Legal Description
73B-3	10/6/1973	3.0	45.866667	-100.350000	S36,T128N, R.79W
69B-1	10/20/1969	4.3	45.900000	-100.250000	S14, T128N, R78W
70B-6	10/20/1970	4.5	45.900000	-100.300000	S17, T128N, R78W
88B-1	10/16/1988	4.7	45.905556	-100.265000	S15, T128N, R78W
64B-4	9/15/1964	7.6	45.933333	-100.283333	S4, T128N R79W
85B-29	10/28/1985	9.0	45.901667	-100.475278	S1, T22N, R29E
03B-11	10/13/2003	9.2	45.774444	-100.038056	S33, T127N, R76W

Assessment of Impacts and Determination of Effects to Threatened and Endangered Species - Campbell County Wind Farm; Wenck and Associates, 10/2013.

South Dakota Listed Species

The SD GFP conducts investigations on nongame, endangered, or threatened wildlife to develop information relating to population, distribution, habitat needs, limiting factors, and other biological and ecological data (SD Codified Law 34A-8-2).

Based on that data the SD GFP compiles a list of those species of wildlife which are determined to be endangered or threatened within the state. They make these determinations on the basis of the best scientific, commercial, and other data available to them and after consultation, as appropriate, with federal agencies, other interested state agencies, other states having a common interest in the species and interested persons and organizations (SD Codified Law 34A-8-3).

This information aids in determining management measures necessary to ensure their perpetuation as viable components of their ecosystem and for human enjoyment. The following table lists those species that have been given Threatened or Endangered status by the SD GFP according to those guidelines (SD GFP 2013).

Table 3.8-2 State Listed Species

Name	Scientific Name	State Status
Fishes:		
Banded killifish	Fundulus diaphanus	Endangered
Blacknose shiner	Notropis heterolepis	Endangered
Finescale dace	Chrosomus neogaeus	Endangered
Longnose sucker	Catostomus catostomus	Threatened
Northern pearl dace	Margariscus nachtriebi	Threatened
Northern redbelly dace	Chrosomus eos	Threatened
Sicklefin chub	Macrhybopsis meeki	Endangered
Sturgeon chub	Macrhybopsis gelida	Threatened
Reptiles and amphibians:		
Eastern hognose snake	Heterodon platirhinos	Threatened
False map turtle	Graptemys pseudogeographica	Threatened
Lined snake	Tropidoclonion lineatum	Endangered
Birds:		
American dipper	Cinclus mexicanus	Threatened
Bald eagle	Haliaeetus leucocephalus	Threatened
Osprey	Pandion haliaetus	Threatened
Peregrine falcon	Falco peregrinus	Endangered
Mammals:		
Black-footed ferret	Mustela nigripes	Endangered
Northern river otter	Lontra canadensis	Threatened
Swift fox	Vulpes velox	Threatened

Greater Prairie-chicken and Sharp-tailed Grouse

Of particular concern to SD GFP was the Greater Prairie-chicken and the Sharp-tailed Grouse. Both species require large tracts of open, contiguous grassland. The Greater Prairie-chicken prefers tall- to mixed-grass prairie. Breeding behavior peaks on leks primarily between late-March through April. Nesting occurs in mid-May to June. Leks are located on barren areas or on areas with minimal cover. This species nest in grasslands (prairies, pastures, hayfields) approximately 2 miles from a lek site. Loss and fragmentation of tall-grass prairie are considered reasons for population declines (letter from S. Kempema,SDGFP, August 2013).

The Sharp-tailed Grouse prefers grassland habitat (mid- to tall-grasses) with brushy draws and thickets. The peak of courtship activity on communal display grounds (leks) occurs between late-March through April. Nesting also begins during this time. Leks are located on hilltops or other elevated sites with minimal vegetation. Nest sites are found within approximately 1 mile of the lek. Nests typically hatch from the last week in May through the first week in June. Degradation of native grasslands, reduction of nesting and brood rearing cover, and variable climatic factors are limiting factors for this species (letter from S. Kempema, SDGFP, August 2013).

No Greater Prairie-chickens or leks were observed in the project area during lek surveys. Three Sharp-tailed Grouse leks were located within the 1 mile buffer area surrounding the project area; none were within the project boundary. The survey area appeared to have areas that contained quality sharp-tailed grouse habitat, particularly in the buffer area to the west and northwest of the project area. However, on a landscape-level, the habitat was fragmented with crop fields and lacked woody cover to support larger populations of sharp-tailed grouse (WPC Inc. 2011; Wenck 2012).

3.8.2 Direct and Indirect Effects

3.8.2.1 Federally Listed Species

Direct and indirect effects to federally listed species vary, and include habitat fragmentation, habitat avoidance and habitat degradation. Construction activities may impact local streams and wetlands during grading activities or through unintended releases of petroleum products or hazardous chemicals. Collisions with construction equipment or erected turbines during construction or during operations are an issue with avian and bat species. The results of an analysis of the known populations, habitats and/or sightings of federally listed species in relation to the project area are shown below:

Interior Least Tern and Piping Plover

The USFWS designated the shoreline of the Missouri River (Oahe Reservoir) from the North Dakota/South Dakota border downstream to Oahe Dam as critical habitat for the piping plover in 2002. (67 FR 57651) There is no designated critical habitat within the Project area (50 CFR Part 17). The nearest designated critical habitat to the Project is along the Missouri River, approximately 1.75 miles west of the westerly project boundary. There are nesting records of the endangered interior least tern and threatened piping plover along the Missouri River in Campbell County; however the project area is located over 4 miles away from the nearest record. (email, C. Mehls, SDGFP to D. Plagge, Fagen Engineering LLC 7/29/13). The project area is outside of breeding and foraging habitats for both species. Impacts with turbines would be rare, and limited to times of bird movements and migration periods. Based on this information, the project may affect, but would not likely adversely affect the Interior Least Tern or the Piping Plover population or their habitat.

Pallid Sturgeon

The nearest large river habitat suitable for pallid sturgeon is located 1.75 miles west of the Project area. Based on this information, the project would have no effect on the pallid sturgeon.

Sprague's Pipit
During the project design phase, previously disturbed areas, such as Crop Land, were targeted for turbine siting, access road layout and collector line placement. Environmentally sensitive areas, such as Grassland were avoided to minimize impact; however there will be impacts to grassland parcels that may contain habitat suitable for Sprague's Pipit. Grading, turbine construction and access road construction will be contributing factors. Of the 2600 acres of grassland inventoried in pre-construction surveys, 1.5% (37.7 acres) will be temporarily impacted. Of that, 76% (28.9 acres) will be returned to pre-construction condition. Considering the past activities that have fragmented the historical range of Sprague's Pipit, the proposed project may affect but is not likely to adversely affect the Sprague's Pipit population (Wenck, 2013).

Whooping Crane
The USFWS has expressed concern over potential impacts to whooping cranes. The whooping crane migrates through South Dakota during spring and fall, within a corridor that is roughly 200 miles wide; the project falls in the center of the corridor where roughly 75% of South Dakota's whooping crane reported sitings have been recorded.

The probability of whooping crane collisions with turbines on the project is unknown. However, due to the small number of whooping cranes, the sporadic nature of stopovers within the 2,500 mile long by 200-mile wide migration corridor, and the small size of the project, the probability of whooping crane collision is presumed low (WPC Inc. 2011; Wenck 2012). Based upon mitigation measures and environmental commitments to minimize the risk of disturbance to whooping cranes, any adverse effects of the proposed action are extremely unlikely. Due to the project area having potential stopover or suitable foraging/roosting sites, the proposed project may affect but is not likely to adversely affect the whooping crane population (Wenck, 2013).

3.8.2.2 South Dakota Listed Species
In consultations with the SD GFP, concern was expressed regarding the impact to native grasslands and wetlands. The results of an analysis of the known populations, habitats and/or sightings of state listed species in relation to the project area are shown below:

Banded Killifish
Banded killifish is a small fish found in streams with shallow, clear water and a sandy or gravelly bottom (Ashton and Dowd, SDGFP 1991). No known populations of the banded killifish exist within the project vicinity. Streams have been avoided during the project planning process. There would be no effect on the population.

Blacknose Shiner
Blacknose shiner requires clear, cool streams with sand and gravel beds, and deep pools with abundant vegetation (Ashton and Dowd, SDGFP 1991). No known populations of the blacknose shiner exist within the project vicinity. Streams have been avoided during the project planning process. There would be no effect on the population.

Finescale Dace
There are no known populations and no suitable habitat within the project area for finescale dace (Ashton and Dowd, SDGFP 1991). There would be no effect on the population.

Longnose Sucker

The longnose sucker is found in cool, spring-fed creeks. South Dakota populations are on the edge of its range and are found in the Belle Fourche River drainage north of the Black Hills (Ashton and Dowd, SDGFP 1991). No known populations of the longnose sucker exist within the project vicinity. There would be no effect on the population.

Northern Pearl Dace
The only areas in South Dakota where northern pearl dace occurs is the Sandhills Region in the southern part of the state (Cunningham, USDA 2006). No known populations of the northern pearl dace exist within the project vicinity. There would be no effect on the population.

Northern Redbelly Dace
Northern Redbelly Dace are present in spring-fed streams in the southern and eastern portions of the state (Ashton and Dowd, SDGFP 1991). There are no known populations and no suitable habitat within the project area for northern redbelly dace. There would be no effect on the population.

Sicklefin Chub
This small bottom-feeder can be found in the main channels of large turbid rivers in areas of strong current over sand or fine gravel. Populations of sicklefin chub are present in the Missouri River along neighboring counties (Ashton and Dowd, SDGFP 1991). The project would have no effect on the sicklefin chub.

Sturgeon Chub
This small bottom-feeder can be found in the main channels of large turbid rivers in areas of strong current over sand or fine gravel. Populations of sturgeon chub are present in the Missouri River along neighboring counties (Ashton and Dowd, SDGFP 1991). The project would have no effect on the sturgeon chub.

Eastern Hognose Snake
The eastern hognose snake can be found in Clay, Union and Yankton Counties in the southeast corner of South Dakota (Ashton and Dowd, SDGFP 1991). There are no known populations and no suitable habitat within the project area for the eastern hognose snake. There would be no effect on the population.

False Map Turtle
Within the project vicinity, the false map turtle has been reported along the Missouri River drainage (Ashton and Dowd, SDGFP 1991). There are no suitable habitats within the project area. There would be no effect on the population.

Lined Snake
The lined snake can be found in Clay, Union and Minnehaha Counties in the southeast corner of South Dakota (Ashton and Dowd, SDGFP 1991). There are no known populations and no suitable habitat within the project area for the lined snake. There would be no effect on the population.

American Dipper
The American dipper is only found in the Black Hills area of South Dakota (Baker, 2005). There is no suitable habitat for the American dipper in the project area. There would be no effect on the population.

Bald Eagle
The bald eagle has recently been removed from the federally endangered list; however it is still listed in South Dakota as a threatened species. The Bald and Golden Eagle Protection Act (16 USC 668-668c), enacted in 1940, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs.

The bald eagle is almost always found near water, primarily on river systems, large lakes, reservoirs and coastal areas. These birds are mainly scavengers, feeding on dead and dying fish, usually early in the morning. Although capable of catching live fish at the water's surface, they also steal fish from other birds, such as osprey. Waterfowl, rabbits, rodents and other animals, taken mostly as carrion, are also eaten. Bald eagles generally roost together in large mature trees surrounded by a buffer of smaller trees. Daytime perches are usually within 180 feet of water. (Ashton and Dowd, SDGFP 1991).

Bald eagles were observed only once during Spring 2010 avian surveys and twice during 2012 avian surveys (WPC 2010; Wenck 2012). No known bald eagle nests exist within the project area. Suitable habitat for foraging is scarce within the project area and few large trees exist within the project area to provide roosting or nesting locations. The proximity of the project to the Missouri River (2-3 miles west of the project site) may explain the rare sightings of birds traveling to and from wintering grounds. There would be no effect on the population.

Osprey
The osprey is a large raptor, habitat includes lakes, large rivers and coastal bays. Ospreys nest at the tops of large living or dead trees, on cliffs, on utility poles or on other tall manmade structures. Few large trees exist within the project area to provide roosting or nesting locations. There were no observations of osprey during avian surveys and no records of osprey nesting in the vicinity of the project. There would be no effect on the population.

Peregrine Falcon
The peregrine falcon is a crow-sized bird with pointed wings, a narrow tail and a rapid wingbeat. It migrates along larger bodies of water, often close to waterfowl and shorebird

concentrations, feeding primarily on birds and rarely small mammals, lizards, fish and insects. Peregrines pursue their prey from a perch or while soaring. Suitable nesting habitat is generally rocky cliffs 200-300 feet high, large stick nests of other species, tree hollows and man-made structures. A peregrine falcon was observed only once during Spring 2010 avian surveys (WPC 2010). There are no records of peregrine falcon nesting in the vicinity of the project (Ashton and Dowd, SDGFP 1991) and no suitable habitat for roosting or nesting within the project area. There would be no effect on the population.

Black Footed Ferret

There are no populations within the project area of the black footed ferret (USFWS 2013). There would be no effect on the population.

Northern River Otter

Within the project vicinity, the northern river otter has been reported along the Missouri River in Hughes County (Ashton and Dowd, SDGFP 1991). There have been no reports of sightings of the river otter within the project area, as there are no suitable habitats available. There would be no effect on the population.

3.8.3 Cumulative Effects

Project planning, construction scheduling and other mitigation measures will limit the various impacts listed above; however, any effects to federal and state-listed species will be amplified due to the already diminished habitat and populations of the species. Development of the project would also add to the existing and proposed future wind development in the state, thus contributing to cumulative effects to habitat and populations.

Based on the analysis above, the cumulative effects on special status species from the project, in combination with past actions, primarily agriculture and associated development would not be expected to result in significant impacts to any species.

3.8.4 Mitigation Measures

CCW will implement the following measures during project planning, construction and post construction (operation) phases to limit the impacts on federally and state listed species and their habitats:

Turbine siting
During the project design phase, previously disturbed areas, such as Crop Land, were targeted for turbine siting, access road layout and collector line placement. Environmentally sensitive native landscapes, such as Grassland, CRP Land, Wetlands and surface waters were avoided to minimize impact to populations and habitats of listed species. Turbines will also be placed outside the 1-mile buffer zone of existing sharp-tailed grouse leks.

Turbine and Tower Design
Turbines designated for use at CCW will be state-of-the-art, with large un-guyed tubular towers, slow-moving rotors, and few perching surfaces, reducing the potential for bird collisions.

Buried Collector Line System
All collector lines between turbines will be installed underground, eliminating the potential for bird strikes and electrocutions. The only location of overhead lines will be at the substation, which is located adjacent to Basin Electric's existing 230 kV overhead system.

Whooping Crane Monitoring
If roosting, foraging, or in-flight whooping cranes are observed within one mile of the project site, construction/operation will cease until the U.S. Fish and Wildlife Service (USFWS) is contacted within 24 hours, or the next business day, whichever comes first, in order to evaluate the level of disturbance risk to the individuals present within the vicinity of the project area. The South Dakota USFWS can be contacted at (605) 224 8693. Following coordination with the USFWS, activities will resume if it is unlikely the birds will be disturbed by the continuation of the activities.

Avian and Bat Protection Plan
A project -specific Avian and Bat Protection Plan (ABPP) has been developed to document the step taken to avoid and minimize effects to birds and bats during the construction phase. It also addresses the post-construction monitoring efforts for mortality and habitat effects, and uses many of the components suggested in the USFWS Avian Protection Plan Guidelines (USFWS 2012). Additional information can be found in the ABPP for the following mitigation measures:

Construction Phase Measures
- Construction Timing
- Avoidance of Native Landscapes – Sharp Tailed Grouse
- Eagle use surveys and monitoring

- Raptor Nest and Eagle Nest Surveys
- Construction Personnel Training

Operations Phase Measures

- Post Construction Fatality Monitoring for Birds and Bats
- Post Construction Eagle Use Monitoring
- Raptor Nest Surveys
- Whooping Crane Monitoring
- Operations Personnel Training
- Adaptive Management – Identification and Minimization of Impacts

Pollution Prevention

A stormwater runoff permit would be obtained prior to construction. Compliance with this permit and the associated stormwater pollution prevention plan would ensure that surface water is not adversely affected by runoff from disturbances and construction areas.

As with any construction activity, there is a possibility of spilling fuel, hydraulic fluid, or other hazardous substances. The potential of such events would be minimized through implementation of the environmental protection measures described in site pollution prevention plans

Construction equipment would be equipped with spill cleanup kits. Equipment refueling would take place at secure areas, away from wetlands or drainages. These measures would ensure that surface and ground water quality is not degraded through spillage of contaminants.

Dust emissions during construction activities would be controlled with water applied to roads and pads, as required.

3.8.5 No Action Alternative

Under the No-Action Alternative, increased disturbance to threatened and endangered species would not occur. The overall impacts to threatened and endangered species would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.9 Visual Resources/ Aesthetics

3.9.1 Affected Environment

The visual setting of the project is rural, with 61 percent of the project area being used for crop production of various kinds (see Figures 3.4-1 through 3.4-4) and 32 percent of the project being used for grassland/pasture. Roads, trails, signs, windbreaks, fences, homesteads, and agricultural activities are some of the visible features. Typical structures in the project area are residences and farm buildings. Many of the residences that were once inhabited are now vacant. Nearby communities include Herreid, Mound City, Pollock and Mobridge.

3.9.2 Direct and Indirect Effects

The turbines will be painted white, stand a total of approximately 443 feet above ground and be visible from 10 miles or more. Selected turbines will have blinking lights that will come on at dusk and will shut off at dawn. The turbines will also cast shadows on the ground and may induce a "flicker" effect during the daylight hours. This will be limited to the immediate area around each turbine.

The project substation will introduce an industrial feeling to the area, however this will be limited as the substation will positioned in a remote area of the project.

Visual impacts from the turbines, lights, and roads will occur from the project; however, the project area will retain the rural sense and remote characteristics of the vicinity.

3.9.3 Cumulative Effects

Visual impacts from the turbines, lights, and roads would occur from the project. This would add to the past impacts of agricultural, residential, and transportation development. However, the sites would retain their rural setting and appearance.

3.9.4 Mitigation Measures

No mitigation measures are anticipated.

3.9.5 No Action Alternative

Under the No-Action Alternative, visual impacts from turbines, lights, and roads would not occur. The overall impacts to visual resources would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.10 Noise

3.10.1 Affected Environment

The project site is in a rural, predominantly agricultural area. Background noise will typically include wind, farming activity and livestock, recreation and vehicles traveling on paved and gravel roads at various speeds. Typical baseline noise levels likely range from approximately 38 to 48 dBA. Potential noise receptors in the vicinity include scattered rural residences. See table 3.10-1 for a comparison of noise levels.

Table 3.10-1 Noise Level Comparison

Source	Sound Level (dB)
Construction Activity[1]	84
Highway at 15 feet[2]	87
Agricultural Cropland[1]	44
Rural Residential[1]	39
Wilderness-Ambient[1]	35

Sources: 1. EPA, 1974
2. Federal Highway Administration, 1997

3.10.2 Direct and Indirect Effects

Noise generated by construction activities would occur intermittently over the construction period and would be generated by an increase in traffic on local roads, as well as heavy equipment operation. Construction on the turbines, access roads and collector lines will be temporary, with the majority of the noise coming from moving the equipment from location to location. This may cause noise levels to increase, but only for a short time, and will only occur during daylight hours.

Operating noise levels for the wind turbines will be in the range of 94 dBa to 105 dBa, depending on wind speed. Turbines will not be located less than 1,000 feet from any residence, therefore noise issues from turbines during the operations phase are not anticipated.

3.10.3 Cumulative Effects

Cumulative effects on noise are the same as those described for direct and indirect effects.

3.10.4 Mitigation Measures

There are no federal noise standards that directly regulate noise from the operation of wind turbines. EPA guidelines recommend a day-night average sound level (Ldn) of 55 dBA in typically quiet outdoor areas, farms and residential areas. In order to achieve the recommended Ldn, wind turbines will be set back at least 1,000 feet from occupied residences.

3.10.5 No-Action Alternative

Under the No-Action Alternative, intermittent increases in noise levels would not occur during the construction period. Also, any increases in noise levels from turbine operations would not occur. The overall impacts to noise levels would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.11 Socioeconomics

3.11.1 Affected Environment

The project site is located in Campbell County, South Dakota, on the east side of Lake Oahe (Missouri River). The project is surrounded by the small towns of Pollock, Herreid and Mound City. South Dakota State Highway 1804 runs through the project, along the river bluff. The area can be characterized as rural, with farm fields, pastures and a number of home sites. The county has a total population of 1,466 and a density of 2 people per square mile.

The major industry in Campbell County is agriculture, with 46% of all jobs in the county being in the agriculture sector. The county has an aging, declining population (see Table 3.11-1). The median age for the county is 50.0 years and the average age of principal farm operators is 56.0 years.

The project is located entirely within the Mobridge-Pollock School District (#62-6). Other area schools include the Herreid Independent School District (#10-1), which serves Herreid and Mound City. The closest city with services is Mobridge (Pop. 3,476), which is 20 miles southwest of the project.

Table 3.11-1 Current Socioeconomic Status

Population Center	Population (2010)	Percent Change (2000)	Percent White	Percent Below Poverty Level	Percent Unemployed	Median Age	Median Home Value	Median Income
Pollock	228	-32.7	97.9	17.7	4.0	52.9	$33,626	$26,672
Herreid	422	-12.4	96.1	6.3	4.0	49.3	$35,902	$31,070
Mound City	67	-20.2	98.6	11.9	4.0	59.3	$20,072	$41,308
Campbell County	1,466	-17.7	98.2	11.2	4.0	50.0	$41,300	$40,385
South Dakota	814,180	+7.8	84.7	13.8	4.3	36.9	$127,000	$48,010
U. S.	308,745,538	+9.7	77.9	14.3	-	37.2	$186,200	$52,762

Source: U.S. Census Data (2000 and 2010) and South Dakota State Data Center

3.11.2 Direct and Indirect Effects

A temporary positive impact would take place during construction. Employees of excavation and turbine erection contractors would spend money on food, lodging and other services for a period of approximately 6 months.

Over the long term, on-site management and skilled technicians would be hired to work at the project. This would add jobs to a depressed economy and increase the need for housing. According to the Campbell County Development Association, a new fourplex is being planned in Pollock to house employees of the project (phone conversation, Ralph Hanson, 8/01/13) which would increase property taxes. Land purchases, lease agreements and royalty payments will create increased income for landowners in an area where options for increased income are limited. Property taxes for the wind farm will be assessed for the life of the project, approximately 25 years, benefiting the local economy. Overall, the socioeconomic effect will be positive.

3.11.3 Cumulative Effects

Cumulative effects on socioeconomic conditions are the same as those described for direct and indirect effects.

3.11.4 Mitigation Measures

No mitigation measures are anticipated.

3.11.5 No Action Alternative

Under the No-Action Alternative, the temporary and long-term positive impacts such as an increased temporary workforce, the need for increased temporary and permanent housing, increased income and increased property values would not occur. The overall impacts to local socioeconomic conditions would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.12 Environmental Justice

The goal of environmental justice is to ensure the fair treatment and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of potentially adverse human health and environmental effects of a Federal agency action, operation, or program. Meaningful involvement means that affected populations have the opportunity to participate in the decision process and their concerns are considered.

Executive Order (EO) 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) is intended to ensure that adverse human health and environmental effects of agency actions would not disproportionately impact minority and low-income populations, including Native American Indian Tribes. For purposes of this section, minority and low-income populations are defined as follows:

Minority Populations – People of Hispanic or Latino origin of any race, Blacks or African Americans, American Indians or Alaska Natives, Asians, and Native Hawaiian and other Pacific Islanders.

Low-Income Populations – People living below the national poverty level. The weighted average poverty threshold in 2010 was $11,137 for a single, unrelated individual and $22,315 for a family of four (U.S. Bureau of the Census).

3.12.1 Affected Environment

The Standing Rock Sioux Tribe represents the closest minority population as well as the closest low income populations. The SRST Reservation lies approximately four miles west of the project and is separated from the project area by the Missouri River. Table 3.12-1 shows minority populations in Campbell County and North Dakota.

Table 3.12-1 Minority and Low Income Populations

Population Group	Population (2010)	Percent Minority	Percent Below Poverty Level
Campbell County	1,466	0.7	11.2
South Dakota	814,180	11	13.8

Source: U.S. Census Bureau

3.12.2 Direct and Indirect Effects

With regard to EO 12898, an impact would be considered significant if a low-income, minority, or subsistence population in the region of the project was disproportionately affected by the development.

Because of the distance of the project site from the Standing Rock Sioux Indian Reservation, no impacts to the economy, environment, or culture of the reservations are anticipated. In addition, Western's interactions with South Dakota Indian tribes are intended to address potentially adverse impacts to tribal interests outside the reservations. Therefore, discrimination toward or disproportionate impacts to low-income, minority, and subsistence populations resulting from the project are not anticipated.

3.12.3 Cumulative Effects

Cumulative effects on minority and low income populations are the same as those described for direct and indirect effects.

3.12.4 Mitigation Measures

No mitigation measures are anticipated.

3.12.5 No Action Alternative

Under the No-Action Alternative, the overall impacts to low-income, minority and subsistence populations would be comparable to those listed above.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.13 Human Health and Safety

Due to the remote location of the project site, the major activities in and around the site are vehicular travel and agricultural activities. State and federal agencies have established safety regulations for these activities, therefore they will not be addressed here. The following four subjects were analyzed for this section: Air Traffic, Electromagnetic Fields, Hazardous Materials/Hazardous Waste and Security.

3.13.1 Affected Environment

Air Traffic

Numerous small airports are located within 50 miles of the project site. The majority of them service small, single-engine private and commercial aircraft. The closest commercial airport is Bismarck Municipal in Bismarck, ND. The nearest regional airport is Aberdeen Regional, approximately 90 miles east of the project site. Pierre Regional Airport is 95 miles south. Table 3.13-1 shows the distance and direction from the project to airports located within 50 miles.

Table 3.13-1 Nearby Airports

Airport Code	Airport Name	Location		Distance from Project	Azimuth from Project
		City	State		
5T4	Herreid Municipal	Herreid	SD	9.32 mi.	108.55°
MBG	Mobridge Municipal	Mobridge	SD	16.3 mi.	17.96°
5P2	Mc Laughlin Municipal	Mc Laughlin	SD	20.91 mi.	88.52°
Y27	Standing Rock	Fort Yates	ND	21.41 mi.	137.28°
7L2	Linton Municipal	Linton	ND	25.02 mi.	176.12°
3W8	Eureka Municipal	Eureka	SD	27.0 mi.	89.16°
5P3	Bowdle Municipal	Bowdle	SD	33.79 mi.	49.26°
9F8	Hoven Municipal	Hoven	SD	38.75 mi.	31.83°
6H8	Hazelton Municipal	Hazelton	ND	40.65 mi.	179.04°
D58	Timber Lake Municipal	Timber Lake	SD	40.91 mi.	54.76°
6L5	Wishek Municipal	Wishek	ND	41.0 mi.	130.1°
ASY	Ashley Municipal	Ashley	ND	41.31 mi.	108.35°
5B5	Napoleon Municipal	Napoleon	ND	46.85 mi.	151.96°

Source: Federal Aviation Administration

Electromagnetic Fields

Commonly associated with power lines, electromagnetic fields (EMF) are invisible lines of force that surround any electrical device that is plugged in and turned on. EMF are made up of waves of electric and magnetic energy moving together (radiating) through space. Electric fields are produced by electric charges and magnetic fields are produced by the flow of current through wires or electrical devices (EPA, 2013). EMFs are present everywhere in our environment but are invisible to the human eye. EMFs are strongest close to their origin and rapidly decrease at greater distances from the source (World Health Organization, 2013).

An electromagnetic interference analysis was performed to identify impacts to AM, FM, TV cellular and microwave signals that intersect the project area. The report found that no AM, FM, Analog or Digital TV, cellular or microwave towers exist in the project area and impacts to those signals, if any, will be minimal (WindLogics, 2010)

Hazardous Materials/Hazardous Waste

As mentioned, the site is located in a rural part of South Dakota with few sources of hazardous materials and hazardous waste. Some possible sources may include old oil or gas tanks, fertilizer or herbicide tanks from farming activities, landfills and other private activities. A search of EPA's RCRA database identified no facilities or sites in the vicinity of the project.

Hazardous materials associated with the operations phase of the project include fluids used in association with turbines and substation/transformer equipment. There will be three types of fluids used in the operation of the wind turbines that are petroleum products: gear box oil, hydraulic fluid, and gear grease. These fluids are necessary for the operation of each turbine.

Site Security

Site security will be maintained during construction working hours by instructing and training site personnel to identify and report unauthorized personnel who might come onsite. Unauthorized personnel will not be allowed within the project boundaries during construction.

The site will be patrolled during non-working hours by professional security personnel.

Site security during the operations phase will be facilitated in much the same fashion, with site employees and contractors trained to identify and report any unauthorized persons or activities. The project Operations and Maintenance building will be locked during non-working hours with a security system installed. All turbine locations will be posted with No-Trespassing signage and will be periodically patrolled by appropriate law enforcement personnel.

3.13.2 Direct and Indirect Effects

Air Traffic

This project will install 49 turbines. Each turbine will be 443 feet above ground level, creating a potential air traffic collision. During the day, the turbines will be visible for up to 10 miles. Select turbines will be marked with lights according to FAA Advisory Circular 70/7460-1K, Obstruction Marking and Lighting, for visibility at night. Collector lines will be buried, eliminating the need for additional suspended transmission/collection lines. In addition, the FAA's review will include evaluation of any potential interference with air traffic. 14 CFR Part 77.9 requires that notice be filed with the Federal Aviation Administration for the construction or alteration of any structure that is more than 200 ft. above ground level (AGL) at its site. Therefore, no direct or indirect effects will occur.

Electromagnetic Fields
The project was designed to minimize disturbances to existing residences during turbine, access road and collector line placement. Turbines will be located a minimum of 1000 feet from any residence, eliminating EMF disturbance. No direct or indirect effects will occur.

Hazardous Materials/Hazardous Waste
The project will not generate hazardous waste other than used oil products during operations. Used oil products will be managed in accordance with state and federal requirements. No direct or indirect effects will occur.

3.13.3 Cumulative Effects

Cumulative effects are the same as those described for direct and indirect effects.

3.13.4 Mitigation Measures

No mitigation measures are planned.

3.13.5 No Action Alternative

Under the No-Action Alternative, the increased potential of an air-traffic collision would not occur. Also, any potential for the development of EMF's would not occur. The overall impacts to human health and safety would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action Alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.14 Native American Religions Concerns

In addition to NEPA, NHPA, and DOE American Indian and Alaska Native tribal consultation policy (DOE 2000), other regulations that pertain to consideration of Native American religious concerns include the American Indian Religious Freedom Act (AIRFA) and the Native American Graves Protection and Repatriation Act (NAGPRA). AIRFA provides that agencies consider the effects of their actions on Native American religious practices. NAGPRA provides that if native human remains, funerary objects, sacred objects, and objects of cultural patrimony are found on Federal land, the Federal agency (Western) is responsible for disposition of these remains and objects. This can include tribal consultation to identify potential affiliation and repatriation needs. NHPA, AIRFA, and NAGPRA all mandate consultation with affected native groups.

3.14.1 Affected Environment

Research of cultural resources indicates that Native Americans who inhabited the region throughout prehistoric and historic times typified the culture of the North American Plains Indians. Subsistence was focused on hunting, gathering, and small-scale agriculture. However, Native American hunting parties likely frequented uplands including the site of the proposed Campbell County Wind Farm..

Beaver Creek Archaeology conducted a Phase III survey of traditional cultural properties within the immediate vicinity of both phases of the project. This survey was conducted to identify the existence of traditional cultural properties within the project area that would be directly impacted by project implementation and in locations within the area of potential effect (APE) that may be secondarily affected (i.e. view shed, changing land use, etc.). The results of this survey identified one stone circle. The report recommends avoidance of this site.

Western has initiated, and will continue consultations with tribal representatives from the Standing Rock Sioux Tribe (SRST). This consultation will continue throughout planning and construction of the project, including addressing comments to the EA and meeting with tribal representatives.

3.14.2 Direct and Indirect Effects

A significant impact would occur if the Proposed Action caused an unmitigated, adverse effect to a traditional cultural property (TCPs) or a burial site. To mitigate the potential for significant effects from activities associated with the Proposed Action, Western will address concerns expressed by the SRST during the course of project planning and construction in accordance with Section 106 of the National Historic Preservation Act of 1966.

If TCPs are identified within the survey area, project planning would continue to consider and avoid these sites. If burials or cultural sites with Native American religious values are identified during construction of the Proposed Action, work would halt within 200 feet of the site until Native Americans are notified and consulted about mitigation measures.

Consultations between Western and interested tribes would continue and recommendations resulting from these consultations would be considered and implemented to the extent practicable. Campbell County Wind, in cooperation with Native American representatives and agreements with landowners, would also implement additional measures and agreements to protect these resources.

3.14.3 Cumulative Effects

Cumulative effects are the same as those described for direct and indirect effects.

3.14.4 Mitigation Measures

If TCPs are identified within the survey area, project planning would continue to consider and avoid these sites. If burials or cultural sites with Native American religious values are identified during construction of the Proposed Action, work would halt within 200 feet of the site until Native Americans are notified and consulted about mitigation measures.

3.14.5 No Action Alternative

Under the No-Action Alternative, the potential for impact to a TCP or burial site would not occur. The overall impacts to Native American Religious resources would be less under the No-Action Alternative.

The need for the Project would still exist if the No-Action alternative is chosen. If this project is not approved it may result in another project being constructed that would not require an interconnect agreement with Western.

3.15 Potential Impacts of Accidents, Sabotage, and Terrorism

The Project proponent is responsible for ensuring the operability and reliability of their systems. To do so, they must evaluate the potential risks from all credible events, including natural disasters (earthquakes, storms, etc.) as well as mechanical failure, human error, sabotage, cyber-attack, or deliberate destructive acts, recognizing intrinsic system vulnerabilities, the realistic potential for each event/threat, and the potential consequences. The proposed Project is not anticipated to be at any unusual risk for accidents or acts of sabotage or terrorism.

Appendix A

Campbell County Wind Farm: A Class III Intensive Cultural Resource Inventory in Campbell County, South Dakota

By
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Prepared for:
Fagen Engineering

On behalf of:
Dakota Plains Energy

Beaver Creek Archaeology, Inc.
Bismarck, North Dakota

BCA Project #: 2013 – 1079

September, 2013

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Abstract

Fagen Engineering contracted Beaver Creek Archaeology, Inc. (BCA) to complete a Class III Cultural Resource Inventory for the proposed Campbell County Wind Farm (Project), in Campbell County, South Dakota. In August and September 2013, BCA conducted the Class III Inventory in the sections for proposed Project location. The Project consists of 49 wind turbine locations and 43 miles of associated collection lines and access roads. Each wind turbine location was centered on a 5 acre pad, while the collection lines and access roads were inventoried at a 200 foot corridor. The Project covers approximately 943 acres.

The APE consists of pasture land, native prairie and agricultural fields. The Class III proposed Project locations were identified using topographic and aerial maps as well as Global Positioning System (GPS) hardware. Survey methods included intensive pedestrian survey.

During the field inventory, BCA archaeologists identified three (3) previously unrecorded cultural resources and one (1) previously recorded site. Resources included two Native American Stone Feature sites (39CA285 and 39CA286) and two (2) Historic Architectural Sites (CA538 and CA339). The Native American Stone Feature Sites have been recommended potentially eligible to the National Register of Historic Places (NRHP) by BCA, and is recommended to be avoided during construction. The two Historic Architectural Sites have been recommended not eligible to the NRHP.

Table of Contents

Page

List of Tables

Table **Page**

List of Figures

Figure **Page**

Introduction

Fagen Engineering contacted Beaver Creek Archaeology, Inc. (BCA) to complete a Class III Cultural Resource Inventory of the Campbell County Wind Farm (Project), in Campbell County, South Dakota (Figure 1 and Appendix C: Maps). The Project originally consisted of 43 wind turbine locations, but due to turbine location resiting the Project now consists of proposed 49 turbine locations. Each wind turbine location is 5 acres in size. The Project also consists of 200 foot wide, 43 mile long corridor of collection lines and access roads. The total Area of Potential Effect (APE) is approximately 943 acres in size.

Location of Class III Inventoried proposed Project are shown below in Table 1.

Table 1. Surveyed Proposed Project Location.

Township	Range	Sections
126N	78W	9, 10, 14-18, 20-22, 27-29, 33, 34
127N	78W	1-4, 9-12

In August and September 2013, BCA conducted a Class III inventory of the entire proposed Project area. Turbine locations were inventoried for cultural resources. During the inventory, two Native American Stone Feature Sites (39CA285 and 39CA286) and an Historic Architectural Site (CA538) were found and recorded. One previously recorded Historic Architectural Site (CA339) was noted. Land use throughout the APE consisted of native prairie, pasture, and agricultural lands. Ground visibility in these areas did not go below 30 percent, so no shovel probes were excavated.

The proposed Project location was identified using Trimble Juno Global Positioning System (GPS), topographic maps, and aerial photos georeferenced in ESRI ArcView Geographic Information System (GIS).

Project Background and Inventory Methodology

The Campbell County Wind Farm Project consists of 49 proposed wind turbines. The 49 wind turbine locations were inventoried, with associated access roads and collection lines. Originally, there were 43 wind turbine locations; however, due to site changes, additional survey was conducted. This is represented in the map as APE and Survey area (see Map in Appendix B). The entire Project area, or APE was inventoried to a Class III Cultural Inventory standard.

BCA cultural resource staff conducted the Class III Cultural Resource Inventory of the proposed Project location in August and September 2013. The field crew consisted of Christina Burns (P.I.), Lindsey Reiners (Field Director), Kevin Merias (Archaeological Assistant), Tara Friend (Archaeological Assistant), and Erica Kramer (Archaeological Assistant). Mary Mortensen prepared site forms, site form maps, and prepared the project map. The report and fieldwork preparation included a review of previously identified cultural resources, and intensive pedestrian surveys of the APE.

The pedestrian survey was performed by lining crew members 10-15 meter apart walking in parallel transects across the APE. In areas with 30 percent or more ground surface visibility, pedestrian survey was deemed sufficient. During the Project, no area fell below 30 percent ground surface visibility.

When an archaeological feature was identified, the location was marked with pin-flags and the surrounding area was intensely surveyed for additional cultural resources to determine the size and nature of the resource. When the nature of the resource was determined, the appropriate site forms were filled out, and site boundaries and features were plotted with a GPS. These GPS points were later brought into a GIS software, where site maps and sketch maps were created.

The sites and general APE were photographed with a digital camera. Site forms were submitted to the South Dakota State Historic Preservation Office. Throughout the survey, field notes were taken. Copies of maps, field notes, site forms, and photographs are located at the BCA main office in Bismarck, North Dakota.

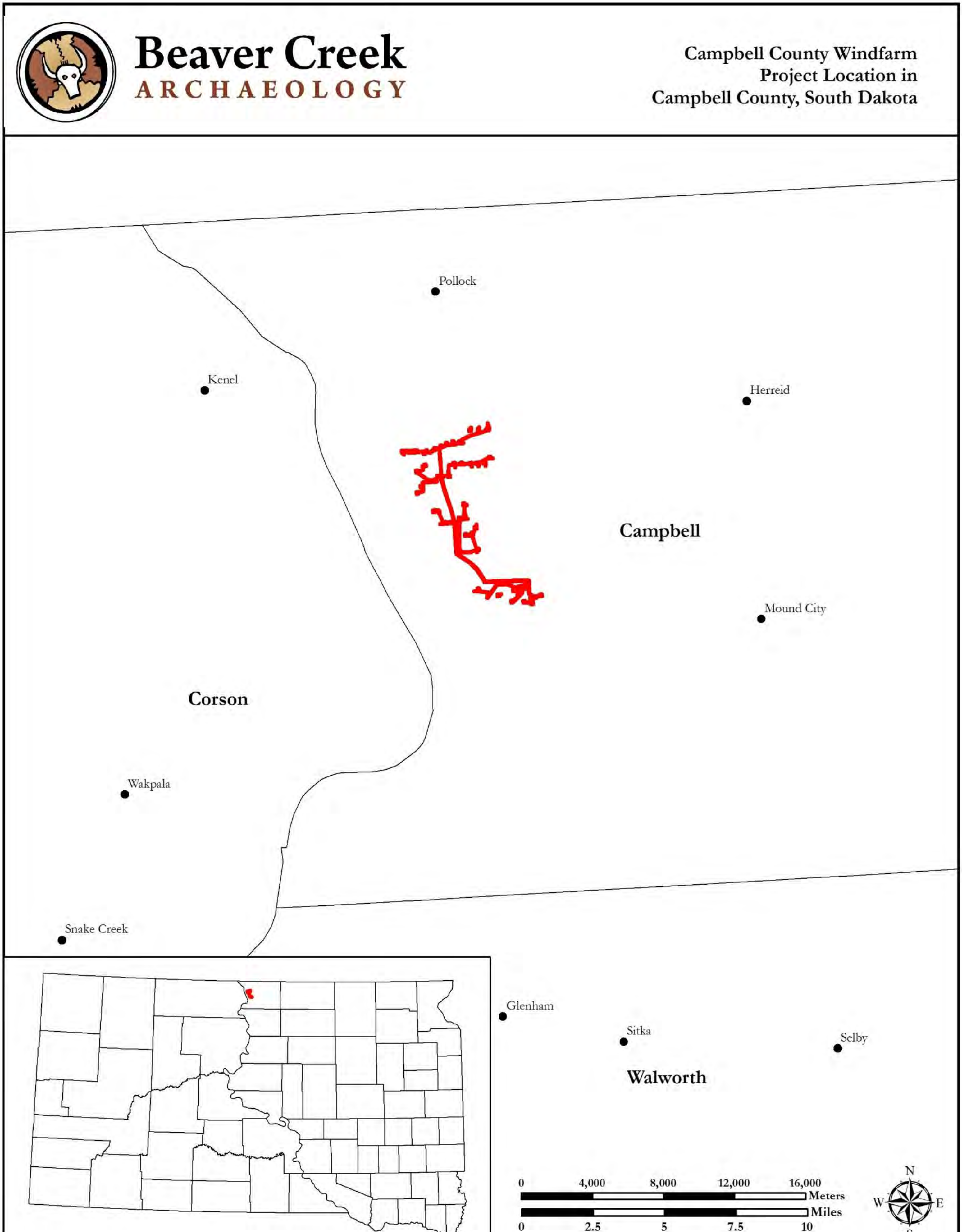


Figure 1. Location of APE in Campbell County.

Environment

The Project area is situated in the Glaciated Missouri Plateau subsection, of the Missouri Plateau section, of the Great Plains physiographic province. There are several drainages and creeks within Campbell County including Decker Creek, Locke Creek, No Sweat Creek, Olson Creek, Shaw Creek, and Spring Creek. The Oahe Reservoir is to the west of the Project area.

"Much of this region has been topographically smoothed by continental glaciations and is blanketed by undulating till and level to gently rolling lacustrine deposits" (NRCS 2006: 137). The geology in the Project as is comprised of Pierre Shale (Kp), Fox Hills Sandstone (Kfn), and Eolian Deposits (Qe) (SDGS 2013). The dominant soils in the area are Mollisols, Ustolls, Aquolls, and Orthents (NRCS 2006: 137-138).

The climate in the area is dry and continental with long, cold winters and short, hot summers. Precipitation averages around 14-17 inches annually, most of which occurs as snow during the winter months.

This area of South Dakota is primarily privately owned agricultural land with crops including spring wheat and other spring planted grains, corn, sunflower, flax, soy beans, potatoes, sugar beets, and hay. The native vegetation consists mainly of mixed and tall grass prairie including western wheat grass, blue grama, little bluestem, prairie cordgrass, northern reedgrass, needle-and-thread grass, green needlegrass, and slim sedge. Other flora resources in the region include prairie rose, stiff goldenrod, snowberry, and Echinacea. White-tail deer, mule deer, coyote, fox, skunk, raccoon, jackrabbit, prairie dogs, frogs, prairie rattlesnakes, bull snakes, garter snakes, sharp-tailed grouse, prairie chickens, Canadian geese, walleye, northern pike, channel catfish, and smallmouth bass are some of the major wildlife species (NRCS 2006: 138, 143).

Cultural Background

The Project area is in the Grand-Moreau Region (Region 11), which consists of the Missouri River Valley trench and adjacent breaks in north-central South Dakota and includes portions of Carson, Campbell, Dewey, Walworth, and Potter Counties (Winham and Hannus 1990: 34-2). From a regional perspective material culture from any time period (Paleo-Indian to modern) could be expected to be encountered in any area. Most sites in the Grand Moreau Region are located on terraces, ridges, hills, knolls, or bluffs, and bottomlands.

Evidence of Paleo-Indian hunting and gathering adaptation is very sparse in this area, with only a few Paleo-Indian points found. Other periods include the Plains Archaic Period, where hunting and gathering involved modern flora and fauna; Plains Woodland Period, where routine ceramic processing, burial mound mortuary practices, and possibly some gardening first is evident; Plains Village Period, where the Plains Village lifeways with horticulture and subsequent storage of surplus foods is developed, with diagnostic artifacts such as styles and designs of ceramic vessels; Early Historic Period, where hunting and foraging modern fauna and flora took place with the introduction of the horse and Euro-American trade goods. Toward the end of the fur trade, military occupation of the area began. During the Late Historic Period, Euro-American settlement of the area began and reservations were formed to hold subjugated Indian groups (Lueck, *et al.* 1989 49-56).

Research Goals

The Campbell County Wind Farm Project, when completed, will generate 99 megawatts (MW) of electricity, and will consist of 49 2.0-MW wind turbine generators. Dakota Plains Energy is seeking a Certificate of Site Compatibility from the Western Area Power Administration (WAPA). The Project area was inventoried to comply with state and federal regulations to locate any cultural resources within the Project area. This allows Dakota Plains Energy to plan construction to minimize impact to any National Register of Historic Places (NRHP) - eligible cultural resources.

Result

File Search

Fagen Engineering requested a literature search at the South Dakota State Historical Society Archaeological Research Center (SD SHSARC) and received it on June 4, 2013, which was then forwarded to BCA. A one-mile radius search surrounding the APE was implemented to provide an indication of the types, distribution, and density of cultural resources in the locality of the Project area. The search revealed 17 cultural resources sites in a one-mile radius. There were three manuscripts on file for the sections the APE is located in. There is a scant amount of cultural resources in the area, but this is possibly due to the lack of Cultural Resource Inventories that have been performed here.

Table 2. Manuscripts on File at the South Dakota State Historical Society Archaeological Research Center in or near the APE.

Year	Archive #	Author	Location			Title
			Twp	R	S	
2010	ESD-0476	Buechler, J.	126	78	4	Results of a Stratified Disproportionate Sample Survey of Valley Telecommunications Cooperative Association, Inc.'s Pollock and Glenham Exchange Cable Routes in Campbell and Walworth Counties, South Dakota. Project No. 10-46
			127	78	17 20-22 33	
1998	WSD-0181	Buechler, J.	126	78	3-4 10-11	Cultural Resources Inventory Survey of the Pollock and Glenham Exchange Upgrade Project for Valley Telecommunications Cooperative Association, Inc. in Campbell and Walworth Counties, South Dakota. Project No. 98-9
			127	78	16-18 21	
1984	ESD-0016	Lueck, E., *et al.*	126	78	4	Cultural Resources Survey of the Web Water Pipeline Project in Campbell, Potter, and Walworth Counties, South Dakota

Table 3. Cultural Resources found during the File Search located within one mile of the APE**.**

Site Number/ SHPO ID	Legal Location			Affiliation	Cultural Material	NRHP Status
	Twp	R	S			
32CA135	127	78	17	Unknown	Native America Artifact Scatter	Not Eligible
32CA194	129	78	4	Unknown/ Historic	Native America Isolated Find; Euro-American Depression	Not Eligible
32CA195	126	78	4	Unknown	Cairn	Unevaluated
CA47	126	78	3	Architecture	Quentin Larson Farmstead	Not Eligible
CA48	126	78	11	Architecture	Orland Geigle Farmstead	Not Eligible
CA49	126	78	3	Historic	Kvernes Cemetery (ca. 1891)	Not Eligible
CA50	126	78	2	Architecture	Martin Ankerson Farmstead	NR Eligible
CA51	126	78	1	Architecture	Larry Odde Farmstead	Not Eligible
CA53	127	78	34	Architecture	Gary Sjomeling Farmstead	Not Eligible
CA54	127	78	27	Architecture	Abandoned Farmstead	Not Eligible
CA56	127	78	23	Architecture	Earl Fjeldheim Farmstead	Not Eligible
CA57	127	78	27	Historic	Gale Cemetery (ca. 1888)	Not Eligible
CA58	127	78	21	Architecture	Abandoned Dwelling	Not Eligible
CA59	127	78	28	Architecture	Martha Kluckman Farmstead	NR Eligible
CA60	127	78	33	Architecture	Gary Larson Farmstead	Not Eligible
CA339	127	78	16	Architecture	Abandoned Dwelling	Not Eligible
CA340	127	78	21	Architecture	Abandoned Farm	Not Eligible

Intensive Pedestrian Survey

The Class III Inventory covered approximately 943 acres. Location of the APE can be seen in Figure 1 and in the maps located in Appendix C.

The inventory resulted in the identification of four sites (Tables 4 and 5). They include two Stone Feature sites (39CA285 and 39CA286) and two Historic Architectural Sites (CA538 and CA339). Although none of these sites have formally been evaluated for NRHP eligibility, BCA has recommended the Stone Feature sites to be potentially eligible. The Historic Architectural Sites have been recommended not eligible to the NRHP. As the potentially eligible site 32CA285 was found during the initial inventory, the routes were changed for the final lay-out of the proposed project, and the Project will therefore avoid this site. The potentially eligible site 39CA286 was found during the second inventory and additional acreage was inventoried to the north and east of the wind turbine location to allow for wind turbine resiting.

Table 4. Summary of Archaeological Sites Identified during the Class III Intensive Survey

Site Number	Site Type	Features	Condition	Recommendation	NRHP Evaluation
39CA285	Stone Feature	Stone Circle, Cairn	Extant	Avoidance	Unevaluated
39CA286	Stone Feature	Stone Circle	Extant	Avoidance	Unevaluated

Table 5. Summary of Historic Sites Identified during the Class III Intensive Survey.

SHPO ID	Site Type	Features	Condition	Recommendation	NRHP Evaluation
CA538	Architectural	Windmill	Disturbed	No Further Work	Ineligible
CA339	Architectural	Abandoned Dwelling	Disturbed	No Further Work	Ineligible

Archaeological Sites

<u>39CA285</u>

The site consists of four Stone Circles, one Arc, and three Cairns (Table 6). The site is located on the top and east facing slope of a hill in rangeland within 139m of an intermittent stream. The site condition is fair, as little disturbance seems to have occurred. The pasture consists of native and non-native plants.

Table 6. Stone Feature Data

Stone Feature	Type	Visible Rocks	Width	Length	Notes
1	Stone Circle	88	5m	5m	Well sodded, no gaps, multi-coursed
2	Stone Circle	23	5m	5m	Well sodded, no gaps, single coursed
3	Stone Circle	60	6m	6m	Well sodded, no gaps, single coursed
4	Stone Circle	43	5m	5m	Well sodded, no gaps, multi-coursed
5	Cairn	22	2m	2m	Well sodded, deflated
6	Arc	20	2m	5m	Well sodded, well defined
7	Cairn	29	2m	2m	Well sodded, deflated
8	Cairn	27	2m	2m	Well sodded, deflated

Although the site has not been formally evaluated for eligibility, the site is BCA has recommended the site potentially eligible as it has potential to provide an existing context that can allow for the interpretation of scientific data.

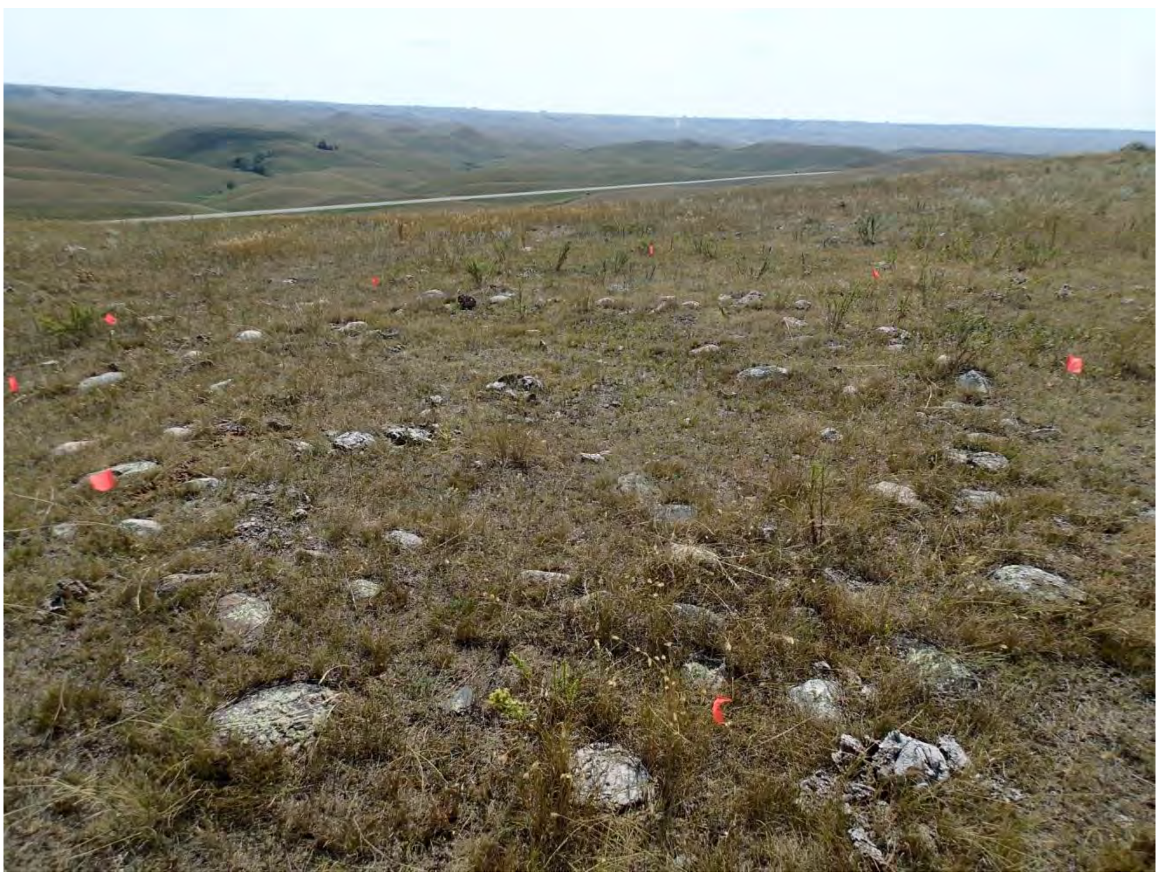
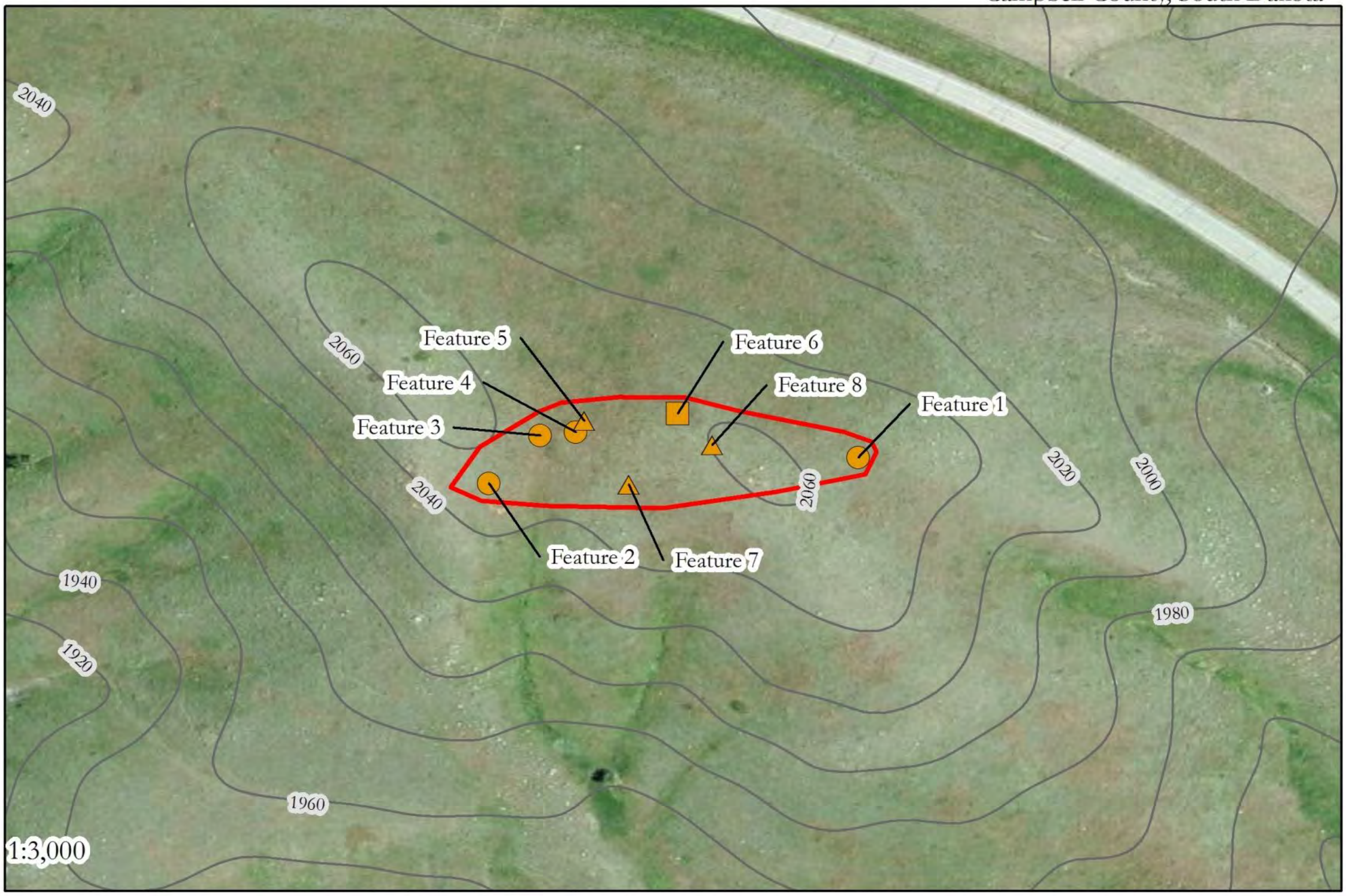


Figure 2. Overview of Figure 1 at 39CA285. View to the south.

BCA13-1079-Site1
UTM: 401589E 5066251N
T126N R78W Section 10, Mobridge NE Quad. Map
Upper Lake Oahe Drainage, Grand-Moreau Archaeological Region
Campbell County, South Dakota



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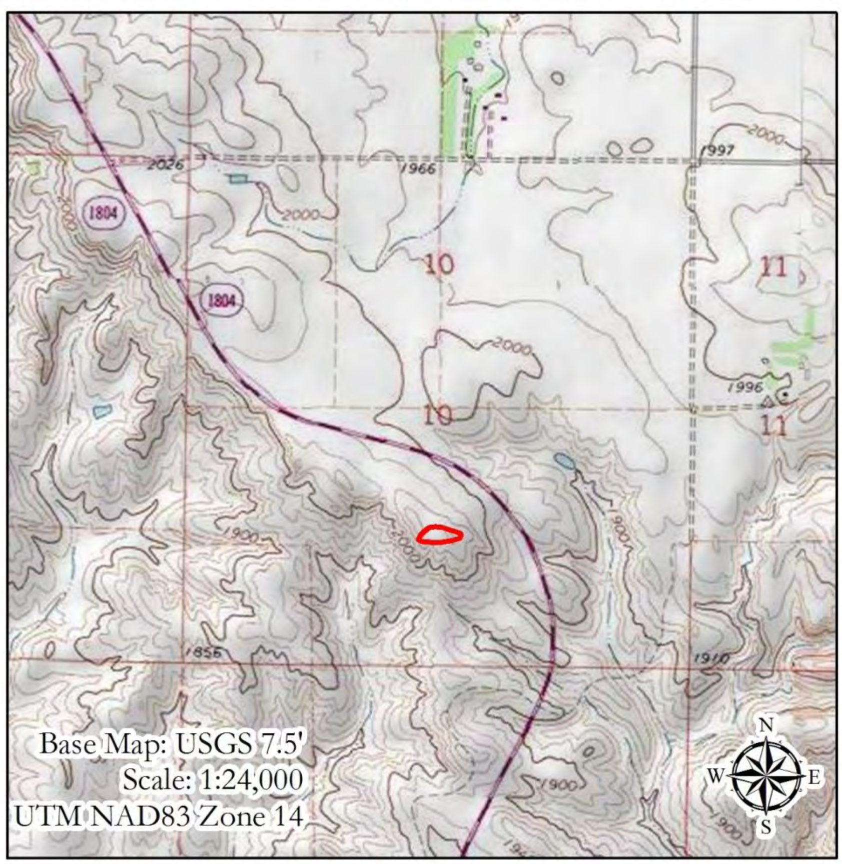


Legend

Features

- Cairn
- Stone Arc
- Stone Circle
- Site Boundary (.48 Hectares)

Figure 3. Sketch Map of 39CA285.

0 0.25 0.5 0.75 1 Miles

MM

39CA286

The site consists of one Stone Circle (Table 7). The site is located on the top and south facing slope of a hill in rangeland within 292m of an intermittent stream. The site condition is fair, as little disturbance seems to have occurred. The pasture consists of native and non-native plants.

Table 7. Stone Feature Data

Stone Feature	Type	Visible Rocks	Width	Length	Notes
1	Stone Circle	50	5m	5m	Well sodded, northeast gap, small stones

Although the site has not been formally evaluated for eligibility, the site is BCA has recommended the site potentially eligible as it has potential to provide an existing context that can allow for the interpretation of scientific data.

Figure 4. Overview of Figure 1 at 39CA286. View to the south.

Beaver Creek ARCHAEOLOGY

BCA13-1079-Site3
UTM: 403111E 5066778N
T126N R78W Section 11, Selby NW Quad. Map
Upper Lake Oahe Drainage, Grand-Moreau Archaeological Region
Campbell County, South Dakota

Meters
0 50 100 150 200

Legend

Stone Circle

Site Boundary (0.0465 Ha.)

Figure 5. Sketch Map of 39CA286.

0 0.25 0.5 0.75 1
Miles

NT

Historic Sites

<u>CA538</u>

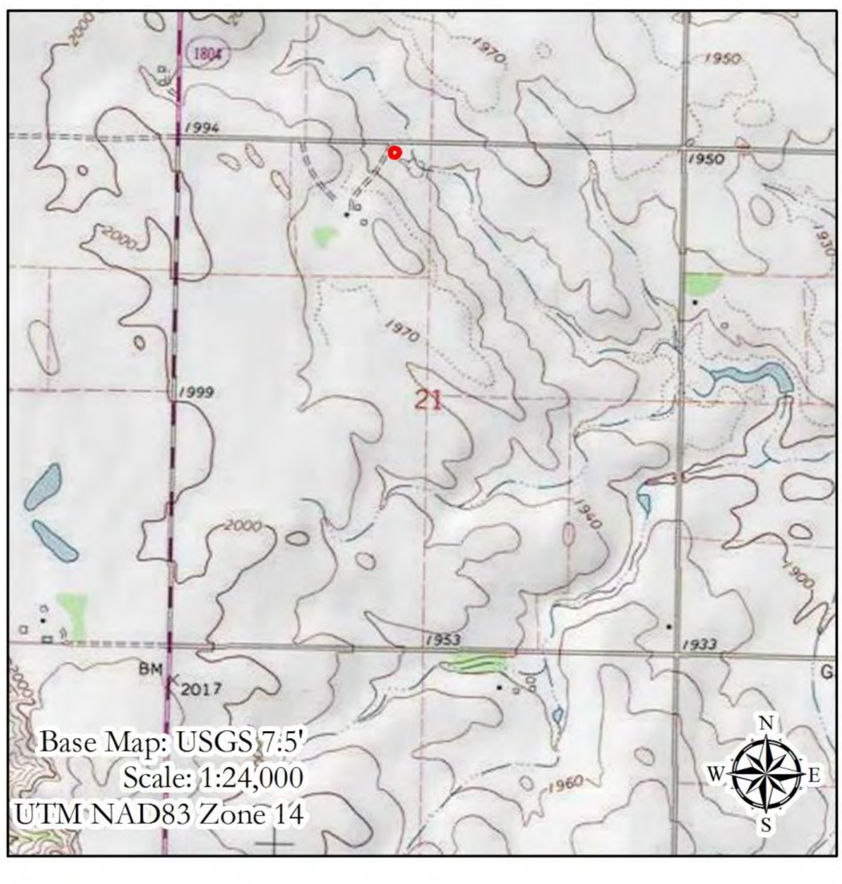
The site consists of an abandoned windmill and is situated in an agricultural field. The windmill has the maker of "N.W. Wind Engine Co." on the tail. The condition of the windmill is poor as the wind wheel connector, pump rod, drop pipe, and well casing are missing. From the looks of this windmill it appears to have been manufactured in the late 1920's. Due to the poor condition of the site, and the lack of unique architectural characteristics, the site is deemed not eligible to the NRHP. No further cultural resource work is recommended for the site.

Figure 6. View of Feature 1 at site CA538. View to the north.

Beaver Creek
ARCHAEOLOGY

BCA13-1079-Site2
UTM: 399973E 5073892N
T127N R78W Section 21, Pollock SE Quad. Map
Upper Lake Oahe Drainage, Grand-Moreau Archaeological Region
Campbell County, South Dakota

0 50 100 150 200 Meters



Legend

Site Boundary (639 sq. meters)

Figure 7. Sketch Map of CA583

0 0.25 0.5 0.75 1 Miles

MM

CA339

This previously recorded site consists of an abandoned dwelling, ca. 1920, and is situated next to a shelter belt and agricultural field. The structure is a 1.5 story single unit, domestic dwelling that is comprised of a wood frame with wood siding and a side gable roof. The structure is in poor condition with missing windows, doors, and roof material. Due to the poor condition of the site, and the lack of unique architectural characteristics, the site is deemed not eligible to the NRHP. No further cultural resource work is recommended for the site.

Conclusion and Recommendation

In August and September 2013, BCA conducted a Class III Cultural Resource Inventory of the proposed Campbell County Wind Farm.

During the field inventory, BCA archaeologists identified three (3) previously unrecorded cultural resources and one (1) previously recorded cultural resource. Resources included two (2) Native American Stone Feature Sites (39CA285 and 39CA286) and two (2) Historic Architectural Sites (CA538 and CA339). The Native American Stone Feature Sites have been recommended unevaluated/potentially eligible to the National Register of Historic Places (NRHP) by BCA, and is recommended to be avoided during construction. The turbine location where site 39CA285 is located was removed during the resiting and the site will not be impacted by the proposed project. The turbine location where site 39CA286 is located was expanded to the north and east to allow for wind turbine resiting. The Historic Architectural Sites have been recommended not eligible to the NRHP and no avoidance necessary is recommended.

Due to the surrounding area being a high agricultural production area, relatively few cultural resource sites were found. BCA recommends that unevaluated/potentially eligible site 39CA286 be buffered 100 feet, and that temporary fencing be placed along the buffer line. Consequently, Beaver Creek Archaeology, Inc. recommends that the Project proceed under a *No Significant Historic Properties Affected* as surveyed, mapped and described herein.

References Cited

Lueck, Edward J., Kerry Lippincott, and R. Peter Winham
1989 Cultural Resource Reconnaissance in Dewey County, South Dakota, From Below the Moreau River to the Forest City Recreation Area. Contract Series Number 46. Archaeology Laboratory, Augustana College Archaeological, Sioux Falls.

NRCS
2006 Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin, USDA, Natural Resources Conservation Service.

SDGS
2013 South Dakota Geology. http://www.sdgs.usd.edu/, accessed August 23, 2013.

Winham, R. Peter and L. Adrien Hannus
1990 South Dakota State Plan for Archaeological Resources: Introduction and Overview to Historic Context and Archaeological Management Regions for Research and Planning: A Working Draft. Prepared for South Dakota Archaeological Research Center, Rapid City.

Appendix A: Site Forms

SD STATE ARCHAEOLOGICAL RESEARCH CENTER

Site No 39CA285

County	Campbell	**Site Name**		**Other No**	BCA13-1079-Site1
NR Status recom.	Unevaluated	SHPO Determination			
NR District					
Map Reference	Mobridge NE	**Owner**	Private		
Arch. Region	Grand-Moreau	**Topo pos**	Hill Top, Hill Slope		
Vegetation	Short Grass	**Substrate**	Clay	**Land Use**	Pasture

UTM centroid: coord. system NAD83 **zone** 14 / 401589 **E/** 5066251 **N**

Surf. visibility 30 **%** **Site elevation** 627 **m** **Condition** Extant

Site Dim. N-S 51 **E-W** 131 **m** **Area** 0.48 **ha** **Depth** **cm**

Nearest Water Type Intermittent Stream **Name**

Distance 139 **m** **Elevation** 609 **m** **Direction** S **Bank** N

LOCATIONS

Legal Locations	Section	Twp	Rg
NE1/4, NE1/4, SE1/4 ,SW1/4; SE1/4, SE1/4 ,NE1/4 ,SW1/4;	10	126	78
SW1/4, SW1/4, NW1/4, SE1/4; NW1/4, NW1/4, SW1/4, SE1/4	10	126	78

COMPONENTS

Site Type	Time Period	Cultural Affiliation
Cairn, Stone Circle		

COMMENTS

Comments/site description (i.e. artifacts/features observed)

The site consists of four stone circles, three cairns and one stone arc. (See continuation page for feature details)
The site is located on the top and east facing slope of a hill in rangeland. Further work including tribal consultation is recommended to determine eligibility.

Evaluation/collection methods

No collection or testing was conducted.

Owner name/address/attitude Unknown

Name K. Mieras, M. Mortensen **Date** 8/23/2013

Project Campbell County Windfarm

SD STATE ARCHAEOLOGICAL RESEARCH CENTER

Site No

CONTINUATION SHEET

Item	Particulars
Feature 1	Stone Circle: 5x5 meters, 88 stones, Well Sodded, No Gaps, Multiple Course
Feature 2	Stone Circle: 5x5 meters, 23 stones, Well Sodded, No Gaps, Single Course
Feature 3	Stone Circle: 6x6 meters, 60 stones, Well Sodded, No Gaps, Single Course
Feature 4	Stone Circle: 5x5 meters, 43 stones, Well Sodded, No Gaps, Multiple Course
Feature 5	Cairn: 2x2 meters, 22 stones, Well Sodded, Deflated
Feature 6	Stone Arc: 2x5 meters, 20 stones
Feature 7	Cairn: 2x2 meters, 29 stones, Well Sodded, Deflated
Feature 8	Cairn: 2x2 meters, 27 stones, Well Sodded, Deflated

Figure 1: Feature 1 View South

Figure 2: Feature 5

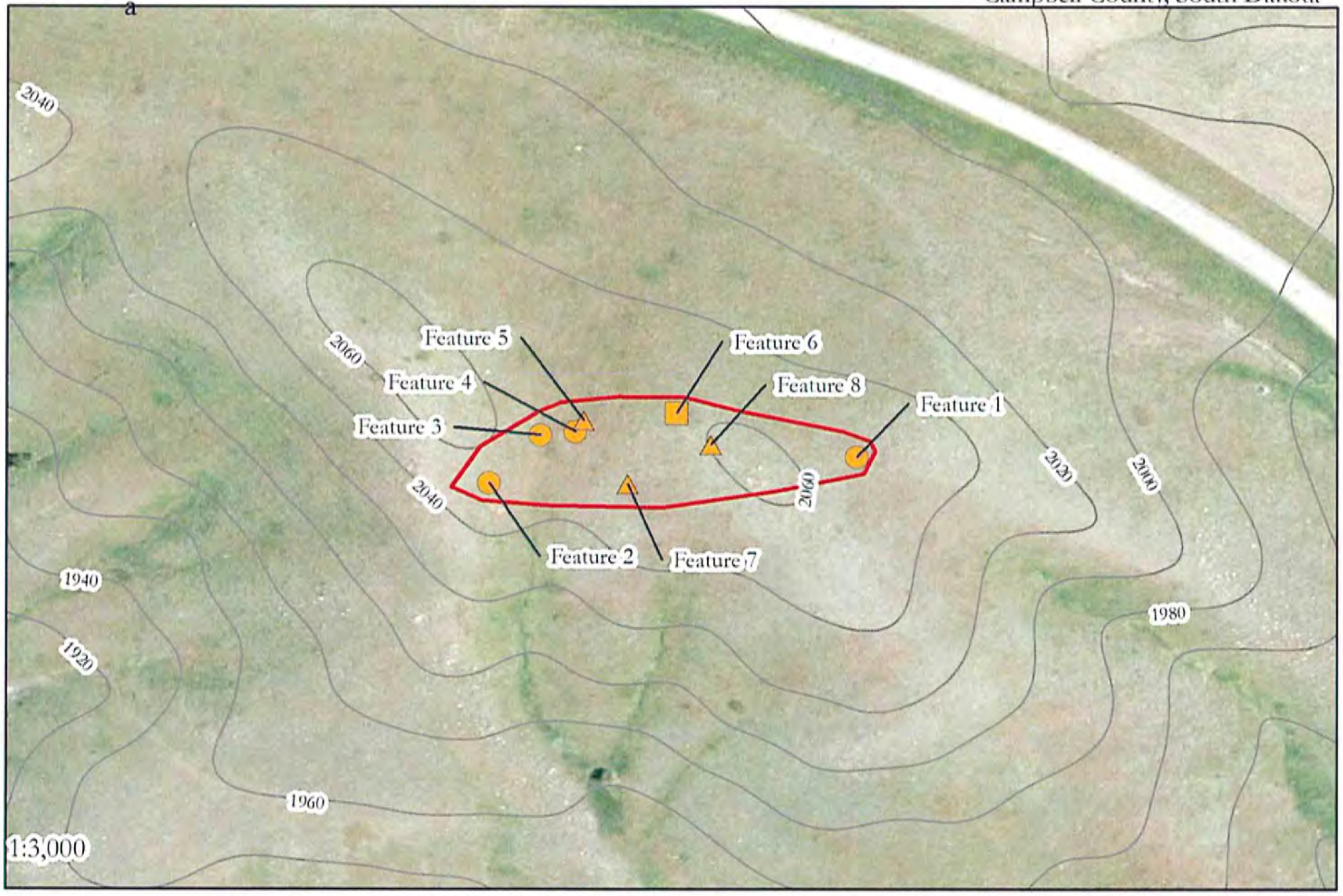
Figure 3: Feature 6

Figure 4: Site Overview Northeast

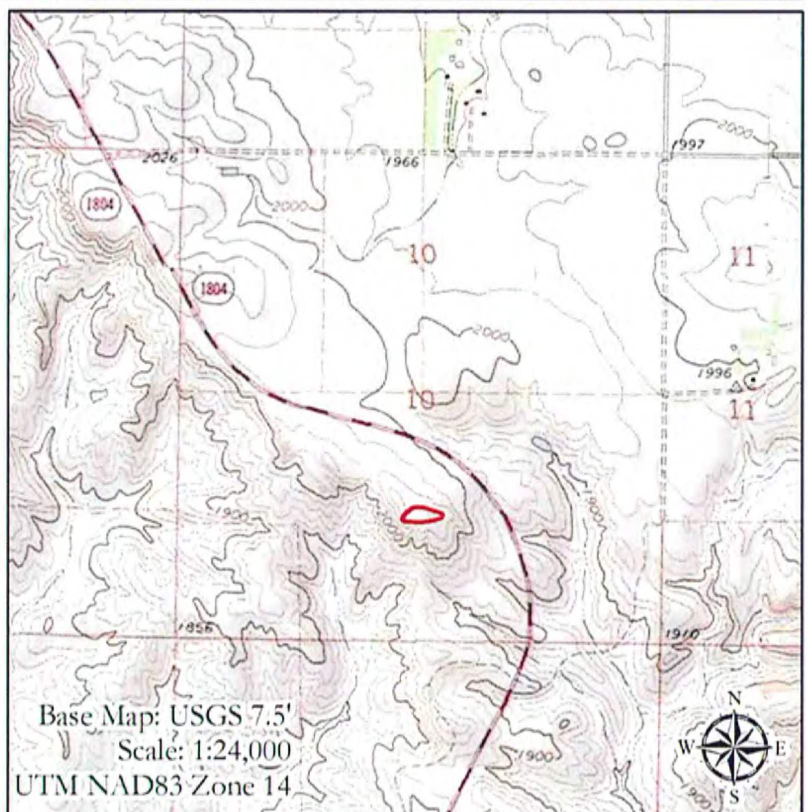
Beaver Creek
ARCHAEOLOGY

BCA13-1079-Site1
UTM: 401589E 5066251N
T126N R78W Section 10, Mobridge NE Quad. Map
Upper Lake Oahe Drainage, Grand-Moreau Archaeological Region
Campbell County, South Dakota

a



0 50 100 150 200 Meters



Legend

Features

- Cairn
- Stone Arc
- Stone Circle
- Site Boundary (.48 Hectares)

0 0.25 0.5 0.75 1 Miles

MM

SD STATE ARCHAEOLOGICAL RESEARCH CENTER

Site No 39CA286

County	Campbell	**Site Name**		**Other No**	BCA13-1079-Site3
NR Status recom.	Unevaluated	SHPO Determination			
NR District					
Map Reference	Selby NW	**Owner**	Private		
Arch. Region	Grand-Moreau	**Topo pos**	Hill Top, Hill Slope		
Vegetation	Short Grass	**Substrate**	Clay	**Land Use**	Pasture

UTM centroid: coord. system NAD83 **zone** 14 **/** 403111 **E/** 5066778 **N**

Surf. visibility 30 **%** **Site elevation** 624 **m** **Condition** Extant

Site Dim. N-S 24 **E-W** 24 **m** **Area** 0.0465 **ha** **Depth** **cm**

Nearest Water Type Intermittent Stream **Name**

Distance 292 **m** **Elevation** 600 **m** **Direction** SW **Bank** N

LOCATIONS

Legal Locations	Section	Twp	Rg
NE1/4, SE 1/4, SE1/4, NW1/4	11	126	78

COMPONENTS

Site Type	Time Period	Cultural Affiliation
Stone Circle		

COMMENTS

Comments/site description (i.e. artifacts/features observed)

The site consists of one stone circle. The stone circle is 5x5 meters with 50+ stones. The circle has a gap in the northeast and the stones are well sodded. The site is located on the top and south facing slope of a hill in rangeland. Further work, including tribal consultation is recommended to determine eligibility.

Evaluation/collection methods

No collection or testing was conducted.

Owner name/address/attitude Unknown

Name L. Rieners, B. Brooks **Date** 9/3/2013

Project Campbell County Wind Farm

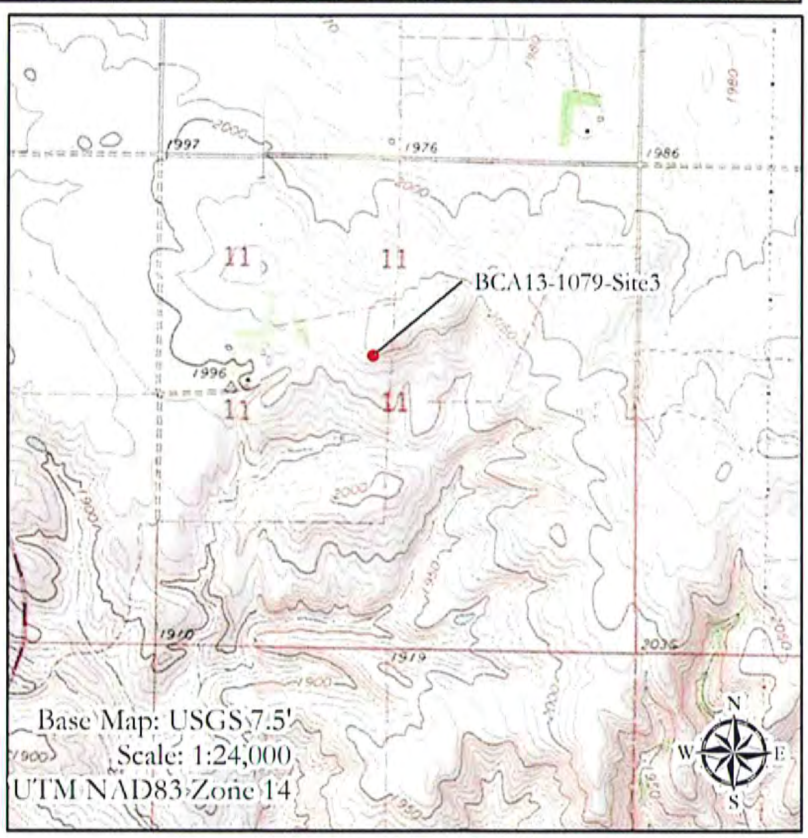
Figure 1: Feature View South.

Figure 2: Site Overview.

Beaver Creek
ARCHAEOLOGY

BCA13-1079-Site3
UTM: 403111E 5066778N
T126N R78W Section 11, Selby NW Quad. Map
Upper Lake Oahe Drainage, Grand-Moreau Archaeological Region
Campbell County, South Dakota

0 50 100 150 200 Meters



Legend

- Stone Circle
- Site Boundary (0.0465 Ha.)

0 0.25 0.5 0.75 1 Miles

NT

SOUTH DAKOTA STATE HISTORIC PRESERVATION OFFICE

HISTORIC SITES SURVEY STRUCTURE FORM 08-29-2013

SHPOID	SiteID	StructureID
CA00000538	55830	58006

SITE INFORMATION

***Survey Date:** 8/23/2013 12:00:00 AM

***Surveyor:** Lindsey Rieners

***Property Address:** 109th St

***County:** ca

***City:** Pollock

***Quarter1:** NE

***Quarter2:** NW

***Township:** 127N

***Range:** 78W

***Section:** 21

Acres:

Quadname:

Legal Description:

Location Description:

Owner Code1:

Owner Code2:

Owner Code3:

Owner Name:

Owner Address:

Owner City:

Owner State:

Owner Zip:

HISTORIC SIGNIFICANCE

***DOE:** Not Eligible

***DOE Date:** 8/23/2013 12:00:00 AM

Nomination Status:

Listed Date:

Ref Num:

Period:

Category:

Historic District Rating:

Register Name:

Multiple Property Name

SignificanceLevel1:

SignificanceLevel2:

NR Criteria 1:

NR Criteria 2:

NR Criteria 3:

NR Criteria 4:

Significance Notes : SHPO agrees DOE Not Eligible. JB. 8-29-13.

STRUCTURE DETAILS

***Structure Name:** BCA13-1079-Site2

Other Name: windmill

Date Of Construction: Late 1920's

Significant Person:

Cultural Affiliation:

Type: Windmill

Walls:

Style:

Stories:

Roof Shape:

Foundataion:

Roof Material:

***UTM Zone:** 14

Occupied:

***UTM Easting:** 399973.0000

Accessible:

***UTM Northing:** 5073892.0000

Structural System: Metal

Restricted: N

Altered/Moved Notes:

Interior Notes:

Physical Notes: The structure is a windmill that has the maker of "N.W. Wind Engine Co." o the tail. This is a sub company of the A.S. Baker Company. According the company's website the Minneapolis branch was open from 1889 to 1939 until it was renamed the "Baker Manufacturing Company." The blades of the windmill have fallen off. From the looks of this windmill it appears to have been manufactured in the late 1920's.

Other Notes:

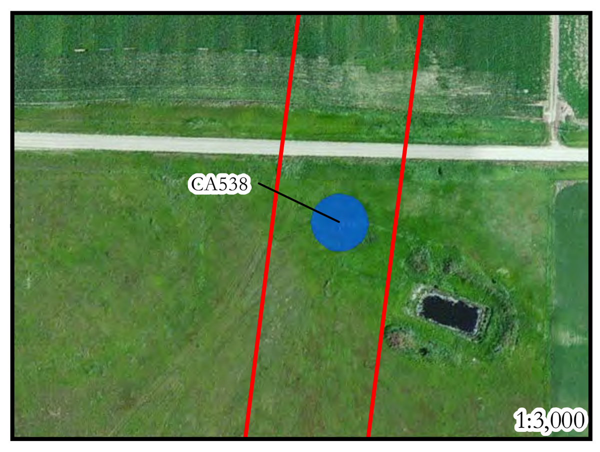
Link to National Register Nomination:

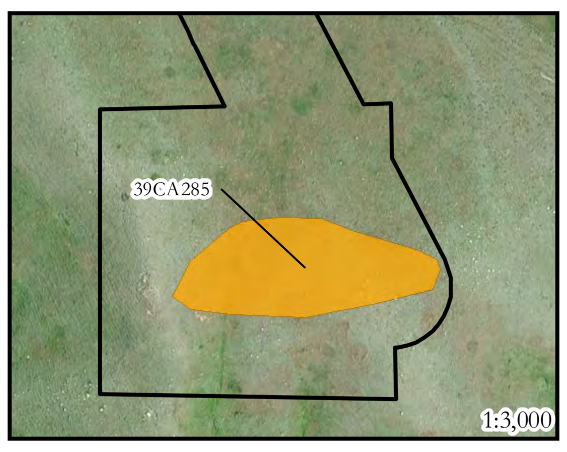
No National Register Nomination Available

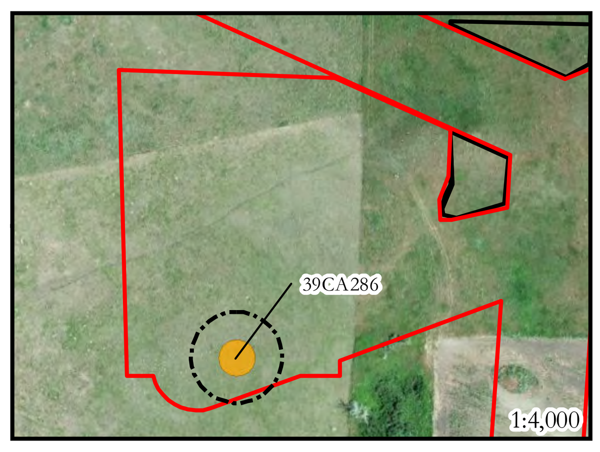
Appendix B: Map


Campbell County Windfarm
For: Fagen Engineering
Map 1 of 4
Legend
APE (943 acres)
Area Surveyed Not in the APE (139 acres)
100' Avoidance Buffer
Cultural Resources
Eligible/Unevaluated Site
Ineligible Site
Base Map: USGS 7.5'
Scale: 1:24,000
UTM NAD83 Zone 14
0 400 800 1,600 Meters
0 0.25 0.5 1 Miles
Legal Locations:
T127N R78W Sections 9, 10, 15-18, 20, 21, 28, 29, 33, 34
T126N R78W Sections 3,4,10,11,12
Pollock SE, Herreid SW, Mobridge NE and Selby NW Quad. Maps
Zahl-Vida loams, Linton silt loam, Grassna silt loam, Sansarc-Opal clays, Opal-Sansarc clays, Sutley-Linton silt loams, Linton-Sutley silt loams, Cavour-Miranda loams, Vida-Zahl loams, Bryant-Grassna silt loams, Williams-Vida loams, Promise clay, Williams-Bowbells loams, Promise-Opal clays, Tonka silt loam, Opal clay, Sully-Zahl complex Soils
Grand Moreau Archaeology Region
Campbell County, South Dakota
Beaver Creek
ARCHAEOLOGY
CA339
CA538
39CA283
39CA286
39CA135
CA340
32CA115
CA56
CA58
CA57
CA59
CA55
CA54
CA60
CA53
CA52
CA49
CA51
39CA194
39CA195
CA47
CA50
CA48
STANDING ROCK
MISSOURI RIVER
OAHE
LAKE

Campbell County Windfarm
For: Fagen Engineering
Map 2 of 4
Legend
APE (943 acres)
Area Surveyed Not in the APE (139 acres)
Previous Surveys
Base Map: USGS 7.5'
Scale: 1:24,000
UTM NAD83 Zone 14
0 400 800 1,600 Meters
0 0.25 0.5 1 Miles
Legal Locations:
T127N R78W Sections 9, 10, 15-18, 20, 21, 28, 29, 33, 34
T126N R78W Sections 3,4,10,11,12
Pollock SE, Herreid SW, Mobridge NE and Selby NW Quad. Maps
Zahl-Vida loams, Linton silt loam, Grassna silt loam, Sansarc-Opal clays, Opal-Sansarc clays, Sutley-Linton silt loams, Linton-Sutley silt loams, Cavour-Miranda loams, Vida-Zahl loams, Bryant-Grassna silt loams, Williams-Vida loams, Promise clay, Williams-Bowbells loams, Promise-Opal clays, Tonka silt loam, Opal clay, Sully-Zahl complex Soils
Grand Moreau Archaeology Region
Campbell County, South Dakota
Beaver Creek ARCHAEOLOGY
STANDING ROCK
MISSOURI RIVER
LAKE OAHE
ACA-0006
ESD-0476
WSD-0181
ESD-0422
ASD-0024
MTO-0001
ESD-0016
ACA-0075
ASD-0024
MTO-0001
ACA-0076







Campbell County Windfarm

For: Fagen Engineering

Map 3 of 4

Legend

- APE (943 acres)
- Area Surveyed Not in the APE (139 acres)
- Previous Surveys
- 100' Avoidance Buffer

Cultural Resources

- Eligible/Unevaluated Site
- Ineligible Site

Base Map: USGS 7.5'
Scale: 1:24,000
UTM NAD83 Zone 14

0 400 800 1,600 Meters
0 0.25 0.5 1 Miles

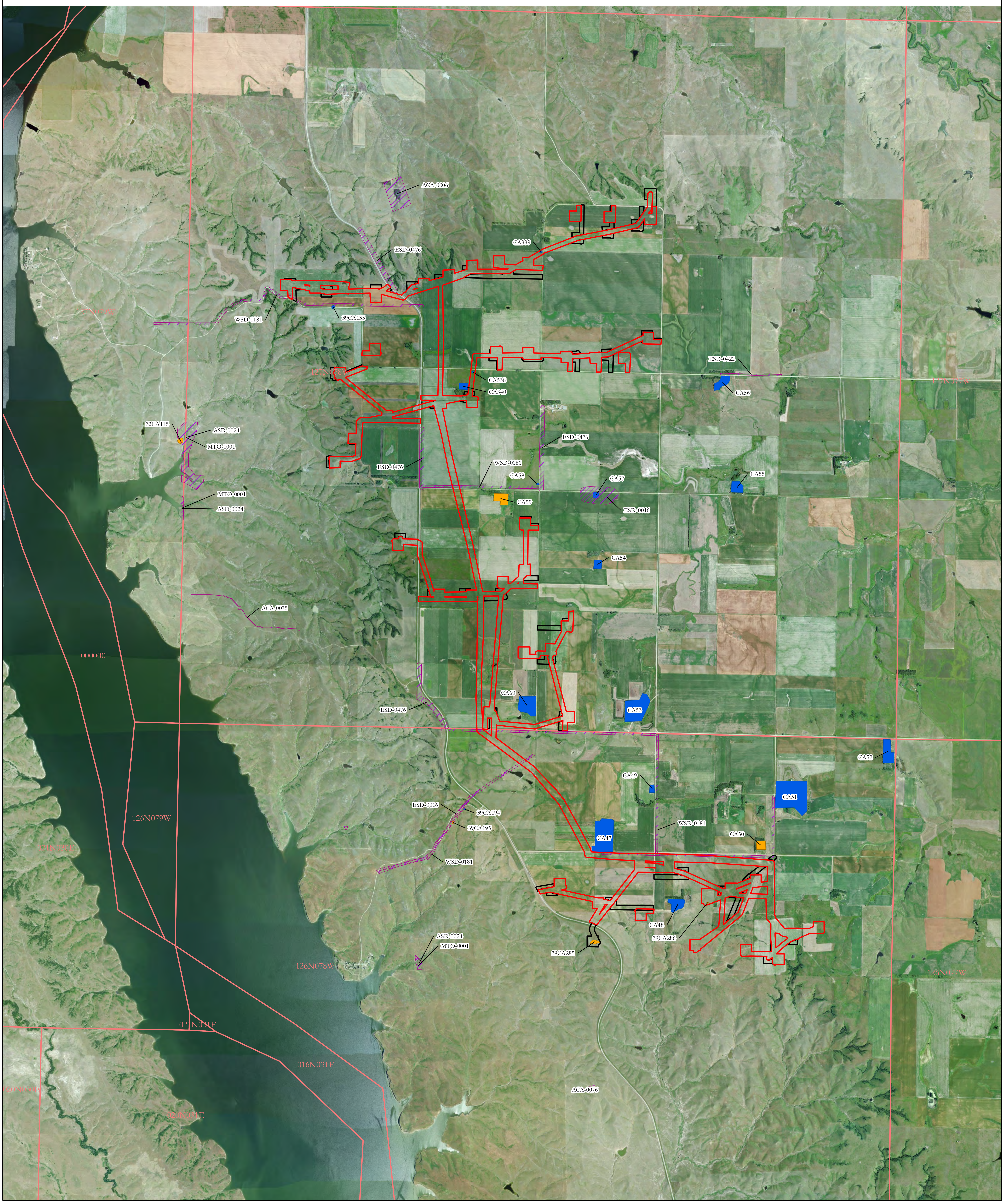
Legal Locations:
T127N R78W Sections 9, 10, 15-18, 20, 21, 28, 29, 33, 34
T126N R78W Sections 3,4,10,11,12

Pollock SE, Herreid SW, Mobridge NE and Selby NW Quad. Maps

Zahl-Vida loams, Linton silt loam, Grassna silt loam, Sansarc-Opal clays, Opal-Sansarc clays, Sutley-Linton silt loams, Linton-Sutley silt loams, Cavour-Miranda loams, Vida-Zahl loams, Bryant-Grassna silt loams, Williams-Vida loams, Promise clay, Williams-Bowbells loams, Promise-Opal clays, Tonka silt loam, Opal clay, Sully-Zahl complex Soils

Grand Moreau Archaeology Region

Campbell County, South Dakota




Campbell County Windfarm
For: Fagen Engineering
Map 4 of 4
Legend
APE (943 acres)
Area Surveyed Not in the APE (139 acres)
Legal Locations:
T127N R78W Sections 9, 10, 15-18, 20, 21, 28, 29, 33, 34
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Grand Moreau Archaeology Region
Campbell County, South Dakota
Base Map: USGS 7.5'
Scale: 1:24,000
UTM NAD83 Zone 14
0 400 800 1,600 Meters
0 0.25 0.5 1 Miles
Beaver Creek
ARCHAEOLOGY
Fox Hills Sandstone
Pierre Shale
Outwash, Terrace
Outwash, Collapsed
water
Alluvium
Eolian Deposits
Terrace Deposits
STANDING ROCK
MISSOURI RIVER
OAHE
LAKE

Appendix B

Wenck
Engineers • Scientists
Business Professionals

Wenck File #2759-03
June 2014

Assessment of Impacts and Determination of Effects to Threatened and Endangered Species

Campbell County Wind Farm

Prepared for:

FAGEN ENGINEERING, LLC.
Michael Rutledge
P.O. Box 159
180 8th Avenue
Granite Falls, MN 56241

Prepared by:

WENCK ASSOCIATES, INC.
301 1st Street NE, Suite 202
Mandan, ND 58554
(701) 751-3370

Table of Contents

1.0 Introduction and Background

1.1 INTRODUCTION

The U.S. Department of Energy, Western Area Power Administration's Upper Great Plains Regional Office (Western) received an interconnection request for system access in South Dakota from Dakota Plains Energy (Dakota Plains). Dakota Plains proposes to develop the Campbell County Wind Farm, a 99 megawatt (MW) wind energy facility located on approximately 8,000 acres of private land in western Campbell County, South Dakota (CCWF, or Project).

1.2 LOCATION

The proposed Campbell County Wind Farm (CCWF) is located in western Campbell County, South Dakota in north-central South Dakota (**Figure 1 and Figure 2**).

1.3 FEDERALLY LISTED RESOURCES IN CAMPBELL COUNTY

Five federally listed species under the Endangered Species Act (ESA) may occur in Campbell County, SD (USFWS 2013a): Whooping crane, piping plover and its Designated Critical Habitat, interior least tern and pallid sturgeon. The Sprague's pipit, a candidate species for listing, may also occur in this county (USFWS 2013a).

1.4 PROJECT DESCRIPTION

1.4.1 Western's Federal Proposed Action

Western's federal proposed action is to consider the execution of an interconnection agreement based on a generation interconnection request for the proposed Project filed by Dakota Plains under Western's Open Access Transmission Tariff (OATT). More information on Western's OATT can be found at:

http://www.oasis.oati.com/WAPA/WAPAdocs/WAPA-Tariff-Docs.htm.

The interconnection request filed by Dakota Plains is for access to Western's 230kv transmission line, approximately 15 miles north of Western's existing Glenham Substation, east of Glenham, South Dakota which is presently in place and operating.

Dakota Plains is filing the interconnection request as a result of their proposed Campbell County Wind Farm. Modifications to Western's facilities would include the construction of a switching station and substation in the general vicinity of the Project.

Therefore, the effects of the execution of the interconnection agreement would be the construction, operation, maintenance, and decommissioning of the proposed Project, switching station and substation.

This Biological Assessment (BA) contains a discussion of these effects for the purpose of Section 7 of the Endangered Species Act (ESA), and considers direct effects from the Federal Action (the execution of an interconnection agreement) as well as the indirect effects that would be expected to occur from the construction, operation, maintenance, and decommissioning of the proposed Project, switching station and substation.

1.4.2 Dakota Plain's Proposed Project

The proposed interconnection Project is a wind turbine generation facility consisting of 49 wind turbine generators, with a total nameplate capacity of approximately 99 MW. The Project area encompasses approximately 12.5 square miles (8,000 acres) south of Pollock, South Dakota (**Figure 1**). Additional facilities would include a collection substation, a switching yard, a construction laydown area, access roads, and electrical collection systems and cabling. All collection lines would be underground. Approximately 500-foot long overhead tie line would be constructed to connect the Project substation with an existing Western transmission line.

1.4.3 Wind Project Construction Activities

Dakota Plain's proposed Project is anticipated to have a nameplate capacity of approximately 99 megawatts (MW) consisting of 49 Vestas V100 2.0 MW wind turbine generators. Additional facilities include a meteorological (met) tower, a Project collection substation, construction laydown area, access roads, and electrical collection systems with underground cabling. Overhead transmission would be limited to the approximately 500 feet of 230-kV overhead tie line to connect the proposed Project substation with an existing transmission line.

Several activities would need to be completed prior to the proposed commercial production date. The majority of the activity would relate to equipment ordering lead-time, as well as design and construction of the facility. Below is a preliminary chronological list of activities necessary to develop the proposed Project. Pre-construction, construction, and post-construction activities for the proposed Project would include:

- Ordering of all necessary components including towers, nacelles, blades, foundations, and transformers;
- Final turbine micrositing;
- Complete survey to microsite locations of structures and roadways;
- Soil borings, testing and analysis for proper foundation design and materials;
- Complete construction of access roads, to be used for construction and maintenance;
- Trenching of underground collection lines;
- Design and construction of the Project substation and 230-kV tie line;
- Design and construction of Western's substation and switching yard
- Installation of tower foundations;
- Installation of underground and aboveground cables and 230-kV tie line;
- Tower placement and wind turbine setting;
- Acceptance testing of facility; and
- Commencement of commercial production date.

The Project area encompasses approximately 12.5 square miles (8,000 acres) south of Pollock, and approximately 8 miles west of Herreid, South Dakota (**Figure 1**). The proposed Project would consist of an array of wind turbines, each with its associated transformer. It would consist of up to 49 2.0-MW turbines. Each turbine generator would have a hub height of 262 feet and be up to 423 feet tall from the base of the tower to the tip of the upright blade. Turbines would begin operation in wind speeds of 3.0 meters per second (m/s, or 6.7 miles per hour [mph]) and reach their rated capacity (2.0 MW) at a wind speed of 12 m/s (26.8 mph).

The turbines would be connected to the Operations and Maintenance (O&M) facility by an underground fiber optic communication cable and to the collection substation by a power collection cable network. The Project layout includes approximately 24 miles of collection lines connecting turbine arrays to the collector substation located in the southeast corner of the Project area.

Turbine access roads would be built adjacent to the towers, allowing access to the turbines during and after construction. The proposed Project would include approximately 12 linear miles of new service roads. Service roads will be aggregate-surfaced and up to 16 feet wide. Temporary roads required to support crane access to turbines during operation would remain up to 40 feet wide; the project also includes turbine access roads built 12 feet wide. The specific turbine placement would determine the extent of access roadway that would need to be constructed for the Project.

The collector substation would be connected to the Western Substation Line via approximately 500 feet of 230-kV overhead tie line. The Western Substation would be located between towers 79/4 and 80/1 on Western's existing 230 kV line. The static wire on the transmission line will be marked with bird diverters.

A permanent met tower is proposed for the Project. The proposed met tower would be 80 meters (164 feet) high when installed. The tower pole would be 8–10 inches wide and would be secured with several guy wires anchored up to 165 feet away. The guy wires would be marked with diverter balls (for aircraft), which also serve as bird diverters.

During the construction phase, several types of light, medium and heavy-duty construction vehicles would travel to and from the site, as well as private vehicles used by construction personnel. Dakota Plains estimates that there would be approximately 50 additional trips per day in the area during peak construction periods. That volume would occur during the peak time when the majority of the road, foundation and tower assembly are taking place. At the completion of each construction phase this equipment would be removed from the site or reduced in number.

Construction is scheduled to begin in December 2013. Dakota Plains would anticipate testing and operation to begin in late fall of 2014, and commercial operation of the Project to begin producing energy by the end of 2014.

1.5 ASSESSMENT METHODOLOGY

The proposed project was evaluated for potential impacts to the federally listed species in Campbell County based on historical records; species range information, presence/absence of individuals during surveys, and availability of appropriate habitat within or near the Project area. Determinations were assigned to assessed/evaluated species as defined by the USFWS (Section 2.1.1).

2.0 Results and Determinations

2.1 DETERMINATION OF EFFECTS TO THREATENED AND ENDANGERED SPECIES

2.1.1 Summary of Effects

Determination	Species/Critical Habitat
No Effect: This determination is appropriate when the proposed project will not directly or indirectly affect (neither negatively nor beneficially) individuals of listed, proposed species or designated/proposed critical habitat of such species. **No concurrence from USFWS required.**	Pallid Sturgeon
May Affect but Not Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to cause insignificant, discountable, or wholly beneficial effects to individuals of listed species and/or designated critical habitat. **Concurrence from USFWS required.**	Interior Least Tern, Whooping Crane, Piping Plover and Piping Plover Designated Critical Habitat
May Affect and Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to adversely impact individuals of listed species and/or designated critical habitat. **Formal consultation with USFWS required.**	
May affect but Not Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project may affect, but is not expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Concurrence from USFWS optional.**	Sprague's Pipit
Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project is reasonably expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Conferencing with USFWS required.**	

Source: USFWS 2012

2.1.2 Description of Effects Determinations

Interior Least Tern (*Sterna antillarum*)
Status: Endangered

Interior least terns are generally restricted to larger meandering rivers with a broad floodplain, slow currents and greater sedimentation rates, which allow for the formation of suitable habitat. The interior least tern is known to nest on midstream sandbars along the Yellowstone and Missouri River systems in South Dakota. The species constructs bowl-shaped depression nests on sparsely vegetated sandbars and sandy beaches during the nesting period, which occurs between mid-May through mid-August (USFWS, 2013b). Least terns nesting at sandpits and other off-river sites often fly up to two miles to forage at river sites. Least terns nesting on riverine sandbars usually forage close to the nesting colony (NGP 2013).

Suitable nesting habitat is not present within the Project boundary (**Figure 3**). The closest potential habitat is west of the project area along the Missouri River, approximately 0.5 to 1.0 miles from the west boundary of the project. Under the proposed action, no construction is planned for areas within known interior least tern nesting habitat. Noise from at least some of the construction equipment and human presence adjacent to nesting least terns could cause adults to abandon nests or to leave the nests long enough that the eggs or chicks become chilled or are preyed upon. However, the project is, at its closest, over 2,500 ft away and would be on an upland plateau considerably higher in elevation than the shoreline and outside the line-of-sight from potential nesting areas. Additionally, if distant noise from construction activities would reach nesting habitat, it would be of short duration and minimal. Therefore, disturbance of nesting terns due to Project activities is highly unlikely.

The potential exists for interior least tern to collide with the wind turbines, including the blades and towers during breeding, staging, and migration periods. The results of available mortality studies conducted primarily in terrestrial environments for general avian species indicate that the majority of collisions with man-made structures take place at night during periods of inclement weather (Gehring, 2009). Birds that fly within the rotor zone of the proposed turbines during periods of low visibility would be at the greatest risk of collision. The risk of collision of least terns during migration movements would be based on flight frequency through the proposed project area, height of flight, visibility conditions, and turbine avoidance behaviors, which are not known. This would be particularly true as young inexperienced fledglings begin to leave the nest. Additionally, the met tower and the static wire on the transmission line will be marked with diverter balls to minimize collision risk.

In summary, the closest potential tern nesting habitat is approximately 0.5 to 1.0 miles from the west boundary of the project area along the Missouri River. Construction activity poses no risk to destroying any active nests. However, it is possible that least tern mortality may result from collisions with the operational wind farm; therefore, the proposed project **may affect, but is not likely to adversely affect** the interior least tern.

Whooping Crane (*Grus americana*)
Status: Endangered

The Aransas-Wood Buffalo Population (AWBP) of whooping cranes is the only self-sustaining migratory population of whooping cranes remaining in the wild. The individuals representing the AWBP comprise one of the rarest and most imperiled self-sustaining avian populations in the world, with a population size of less than 300 individuals. The species breeds in wetland habitat associated with Wood Buffalo National Park in Alberta and the Northwest Territories of northern Canada, and overwinters on the Texas coast. The migration period for the AWBP whooping cranes in South Dakota generally spans from April 1 through May 15 in the spring and from September 10 through October 31 in the fall each year (NPWRC 2013).

Endangered whooping cranes are frequently documented using roosting/feeding habitat in South Dakota each year within the species migration corridor, where 95% of all confirmed whooping crane sightings occur. The project area is located within the migration corridor where 75% of whooping crane observations have been made (Tacha et al. 2010) (**Figure 4**). Based on historical records, eight whooping crane observations have been made within 9.2 miles of the proposed Project area (Tacha 2010, **Figure 4 and Table 1**).

Table 1. Historical Whooping Crane Observations

Observation Number	Date	Distance From Project Area	Latitude	Longitude	Legal Description
73B-3	10/6/1973	3.0	45.866667	-100.350000	T128N,R79W,S36
69B-1	10/20/1969	4.3	45.900000	-100.250000	T128N,R78W,S14
70B-6	10/20/1970	4.5	45.900000	-100.300000	T128N,R78W,S17
88B-1	10/16/1988	4.7	45.905556	-100.265000	T128N,R78W,S15
64B-4	9/15/1964	7.6	45.933333	100.283333	T128N,R79W,S4
85B-29	10/28/1985	9.0	45.901667	-100.47527	T22N,R29E,S1
03B-11	10/13/2003	9.2	45.774444	-100.038056	T127N,R76W,S33
76A-34	5/29/1976	9.1	45.666667	-100.066667	T125N,R76W,S5

The cause of most whooping crane fatalities is unknown since the migratory corridor is vast and fatalities may occur in remote areas. Of the documented causes of fatality during migration, powerline collision fatalities may be in the range of approximately 33% to 38% (APLIC 2012). Since 1956, 46 whooping cranes have been killed (91% of collisions) or seriously injured (9% of collisions) as a result of collisions with powerlines (Stehn and Wassenich 2008). There is the potential for whooping cranes to collide with tall structures such as transmission lines and poles when moving between foraging and roosting sites (CWS and USFWS 2007, Stehn and Wassenich 2006). As a result of that potential, the USFWS' whooping crane recovery plan lists construction of power lines and other structures in the migration corridor as a threat to the species (CWS and USFWS 2007).

To minimize potential impacts to the whooping crane due to transmission lines, all collection lines associated with the project would be buried to reduce the potential collisions. An overhead tie line will be used to connect the proposed Project substation with an existing transmission line. Additionally, the met tower and the static wire on the transmission line will be marked with diverter balls to minimize collision risk.

Suitable migratory stopover habitat for whooping cranes includes wetlands with areas of shallow water without visual obstructions (i.e., high or dense vegetation). Armbruster (1990) found that horizontal visibility (straight-line distance to the nearest obstruction greater than 1 m in height) must be greater than 20 m before a site can be considered as potential habitat, and a zone of influence (activity) of 100 m is avoided around permanent structures, including roads, overhead utility lines, commercial buildings and houses. Whooping cranes have been documented to utilize a wide range of wetland sizes for roosting, from some of the smallest natural palustrine wetlands and manmade stock ponds (≈ 0.10 ha or 0.25 ac) to large lacustrine lakes and rivers. Foraging and roosting sites are typically less than 1 km (0.6 mi) apart but can occasionally be separated by more than 8 km (~5 mi). Potential stopover habitat and suitable foraging/roosting sites does occur within the project area (**Figure 5**).

A landscape-scale analysis to assess the potential occurrence and risk to whooping cranes was conducted by evaluating the biological landscape features of a ten-mile buffer surrounding the Project area (Study Area). The analysis involved: 1) determining the acreage of wetlands within the Study Area, and 2) comparing the proportion of the Study Area wetlands to the proportion of wetlands within a ten-mile-wide buffer zone around the Study Area (Buffer Zone), 3) determining the proportion of wetlands on the Study Area within 1 km (0.62 mile) of an agricultural field (Wetland-Agricultural Matrix), and 4) comparing the proportion of wetland-agricultural matrix within the Study Area to the proportion within the Buffer Zone.

United States Fish and Wildlife (USFWS) National Wetlands Inventory (NWI) data for North Dakota was used to determine the total acreage of wetlands of any size within the Study Area and within the Buffer Zone. The percent of wetland acreage within the Study Area and the percent of wetland acreage within the Buffer Zone around the Study Area was compared to determine whether the Study Area contains more wetlands than the Buffer Zone.

The United States Department of Agriculture (USDA) 2006 National Land Cover Dataset (NLCD) was used to quantify the amount of foraging habitat in the Study Area and Buffer Zone. A U.S. Geological Survey (USGS) study found that agricultural crops, especially corn, sorghum, and winter wheat, were the habitats most often contiguous to whooping crane roosting areas (Austin and Richert 2001). Most whooping cranes traveled 0.62 miles from a roosting site to a foraging site. Therefore, wetlands within 0.62 miles of agricultural crops form the wetland-agriculture habitat matrix that is often used by whooping cranes during migration (USFWS 2009). The proportion of the Study Area that was comprised of a wetland-agricultural matrix was determined. Riparian areas (notably the Missouri River corridor) are not large enough for whooping crane use and were not used in the analysis, but all wetlands were included because whooping cranes use a variety of wetland sizes, devoid of emergent zones, for roosting (Austin and Richert 2001). The analysis included cropland of a minimum one-acre area, since areas less than one-acre are not utilized by whooping cranes (Austin and Richert 2001).

The Study Area and Buffer zone were each analyzed for total acres, total acres of wetlands, total acres of agricultural land, and total acres of wetland-agricultural matrix (**Figure 5**). The Study Area is 7,998 acres in size and consists of 1,737 total acres of agricultural land (21.7 percent), 59 acres of wetland (0.7 percent), and 7,793 acres of wetland-agricultural matrix (97.4 percent) (**Table 2**). The Buffer Zone is 329,634 acres in size and consists of 47,522 total acres of agricultural land (14.4 percent), 11,376 acres of wetland (3.4 percent), and 225,255 acres of wetland-agricultural matrix (68.3 percent) (**Table 2**).

The Study Area is characterized by approximately 97.4 percent wetland-agriculture matrix, indicating that whooping cranes could find suitable roosting and foraging habitat and could therefore fly at low altitudes in the area. The red hatched areas in Figure 4 indicate areas that are **not** ideal foraging habitat for whooping cranes within the Study Area and the Buffer Zone.

	Table 2. Wetland-Agriculture Matrix Results					
	Study Area		**Buffer Zone**		**Total Area**	
Wetlands	59	0.74%	11,376	3.45%	11,435	3.39%
Cropland	1,737	21.72%	47,522	14.42%	49,259	14.59%
Exclusion	205	2.56%	104,379	31.67%	104,584	30.98%
Attractive	7,793	97.44%	225,255	68.33%	233,048	69.02%
Total	**7,998**		**329,634**		**337,632**	

If roosting, foraging, or in-flight whooping cranes are observed within one mile of the project site, construction/operation should cease until the U.S. Fish and Wildlife Service (USFWS) is contacted within 24 hours, or the next business day, whichever comes first, in order to evaluate the level of disturbance risk to the individuals present within the vicinity of the project area. The South Dakota USFWS can be contacted at (605) 224-8693. Following coordination with the USFWS, activities will resume if it is unlikely the birds will be disturbed by the continuation of the activities or after the bird(s) relocate to a new site beyond the disturbance area of the project site.

The project area includes potential stopover or suitable foraging/roosting sites for whooping cranes. However, based upon the above-described conservation measures and environmental commitments to minimize the risk of disturbance to whooping cranes, any adverse effects of the proposed action are unlikely and if any effects may occur, they are expected to be negligible. Therefore, the proposed project ***may affect, but is not likely to adversely affect*** the whooping crane.

Pallid sturgeon (*Scaphirhynchus albus*)
Status: Endangered

Pallid sturgeons prefer turbid, main stem shallow river channels with sand and gravel bars. They are present but scarce in the upper Missouri River and lower Yellowstone Rivers between the Garrison Dam and Fort Peck Dam. They are very scarce in other Missouri River reservoir reaches, except downstream of Gavins Point Dam where they are slightly more common (USFWS, 2013c).

There is no suitable pallid sturgeon habitat with the project area. The Missouri River/Lake Oahe would be the closest potentially suitable habitat for this species, which is 1.2 miles from the west boundary of the project area. Upland intermittent drainages within the project area would eventually drain into the Missouri River during heavy precipitation events. Construction activities have the potential to cause sedimentation to waterways, which could impact water quality of pallid sturgeon habitat in the Missouri River. However, erosion control BMPs would be used during any soil-disturbing activities to prevent soil erosion and sedimentation. With these practices in use, the proposed project would not increase sedimentation that could impact the pallid sturgeon. Therefore, the proposed project would have ***no effect*** to the pallid sturgeon.

Piping Plover (*Charadrius melodus*) **and Designated Critical Habitat**
Status: Threatened

Suitable nesting habitat for piping plovers in the Missouri River system is characterized as sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and island margins that interface with the river channel. Nearly all natural lakes used by plovers in South Dakota are alkaline in nature and have salt-encrusted, white beaches, likely selected due to their sparse vegetation. Breeding piping plover rarely travel more than one mile from their nest sites during the breeding season (USFWS, 2002a). Critical habitat for the Northern Great Plains piping plover has been designated on alkali lakes and wetlands, and the Missouri River System in South Dakota (**Figure 3**; USFWS, 2002b).

Height of flight is an important factor to consider when assessing the risk of collision to piping plover. During the breeding season piping plover are mainly sedentary as they forage on invertebrates on the shorelines near nest sites. During this period, plovers mainly travel by walking or running between proximal foraging and breeding sites, however, some plovers may undertake short flights to foraging areas, flying low over the water (or adjacent land), typically less than 10 meters (33 feet), but sometimes at higher, unknown altitudes (Cape Wind Associates, 2007). Their regular daily movements are not expected to result in crossings of the proposed project area. Unusual crossings of project area during the breeding season could include the crossings of failed breeders or unpaired birds seeking alternate habitat or a mate.

Under the proposed action, no construction is planned for areas within known piping plover nesting habitat. Noise from at least some of the construction equipment and human presence adjacent to nesting piping plover could cause adults to abandon nests or to leave the nests long enough that the eggs or chicks become chilled or are preyed upon. However, the project is, at its closest, over 2,500 ft away and would be on an upland plateau considerably higher in elevation than the shoreline and outside the line-of-sight from potential nesting areas. Additionally, if distant noise from construction activities would reach nesting habitat, it would be of short duration and minimal. Therefore, disturbance of nesting piping plovers due to Project activities is highly unlikely.

The potential exists for piping plovers to collide with the wind turbines, including the blades and towers during breeding, staging, and migration periods. The results of available mortality studies conducted primarily in terrestrial environments for general avian species indicate that the majority of collisions with man-made structures take place at night during periods of inclement weather (Gehring, 2009). Birds that fly within the rotor zone of the proposed turbines during periods of low visibility would be at the greatest risk of collision. The risk of collision of piping plovers during migration movements would be based on flight frequency through the proposed project area, height of flight, visibility conditions, and turbine avoidance behaviors, which are not known. This would be particularly true as young inexperienced fledglings begin to leave the nest. Additionally, the met tower and the static wire on the transmission line will be marked with diverter balls to minimize collision risk.

The risk of collision of piping plover during migration movements would be based on flight frequency through the proposed project area, height of flight, visibility conditions, and turbine avoidance behaviors (which are not known). Cape Wind Associates (2007) used the Band model to estimate a 91 to 99 percent plover avoidance rate based on a range of known avoidance rates calculated for other species. These avoidance rates are consistent with rates calculated at a few existing wind farms in the U.S. where mainly geese and raptor species were estimated to have avoidance rates greater than 95 percent.

In summary, the closest potential piping plover nesting habitat is approximately 0.5 to 1.0 miles from the west boundary of the project area along the Missouri River. Construction activity poses no risk to destroying any active nests. However, it is possible that piping plover mortality may result from collisions with the operational wind farm; therefore, the proposed project ***may affect, but is not likely to adversely affect*** to the piping plover.

Candidate Species:

Sprague's Pipit (*Anthus spragueii*)
Status: Candidate

The Sprague's pipit is a ground nesting bird that breeds and winters on open grasslands. It feeds mostly on insects, spiders and some seeds. The Sprague's pipit is closely tied with native grassland habitat and breeds in the north-central United States in Minnesota, Montana, North Dakota and South Dakota, as well as south-central Canada (USFWS 2010). During the breeding season, Sprague's pipits prefer large patches of native grassland with a minimum size requirement thought to be approximately 145 ha (358.3 ac) (range 69 to 314 ha or 170 to 775 ac), though other research states that Sprague's pipits were not found in patches in less than 29 ha (71.6 ac) (USFWS 2010). Davis (2004) discussed the ratio of patch size to edge area was actually a better indicator of Sprague's pipit presence, rather than patch size alone. Sprague's pipits prefer areas with a low edge to patch size ratio. The species prefers to breed in well-drained, open grasslands and avoids grasslands with excessive shrubs. Preferred grass height is estimated to be between 10 and 30 cm. Sprague's pipits have not been documented to nest in cropland (Owens and Myers 1973; Koper et al. 2009). They may avoid roads, trails, and habitat edges. Sprague's pipits avoid roads, vertical structures including wind towers, and oil and gas well pads by 350 m (1148 ft) (USFWS 2010). Sprague's pipits avoid features in the landscape that are structurally different than grassland.

Due to the avoidance habits of this species, large patch size requirements, and no observations of the species during past avian surveys of the project area, it is believed the presence of the Sprague's pipit within the project area is possible, but unlikely.

Areas of the site provide suitable native grassland habitat that could support the Sprague's pipit (USFWS2010) (**Figure 6**). However, some of these native prairie remnants may not be sufficient to support Sprague's pipit due to their small size, proximity of wooded patches, and presence of other features. Potential impacts to the species could occur by directly removing, altering, or fragmenting habitat during the construction of Project facilities. To minimize impacts to the Sprague's Pipit, to the extent possible, turbines would be sited in agricultural fields, within 350m of existing roads, and/or construction would be done outside of the nesting season. The proposed project ***may affect, but is not likely to adversely affect*** to the Sprague's pipit.

3.0 Conclusion

The proposed project could have impacts to three endangered species (Whooping Crane, Interior Least Tern and Piping Plover) and one candidate species (Sprague's Pipit). Several measures would be taken to minimize the identified potential impacts. Potential impacts to the Whooping Crane would be minimized by burying collection lines, minimizing the length of overhead lines, and ceasing construction/operation if roosting, foraging, or in-flight whooping cranes are observed within one mile of the project site during migration. Potential impacts to the least tern and piping plover and their habitat would be minimized by since the Project area is at a higher elevation and away from shoreline, and if construction occurs outside of the nesting/breeding periods. Potential impacts to the Sprague's Pipit would be minimized by placing turbines in agricultural fields, within 350m of existing roads if possible, and/or conducting construction outside of the nesting season. Due to the project areas close proximity to Interior Least Tern and Piping Plover habitat, mortality may result as a consequence of collisions when the wind farm is operational. Therefore adverse effects to federally listed or candidate species from the proposed project would be unlikely.

4.0 Signatures

The services performed by Wenck scientists for this project have been conducted in a manner consistent with the degree of care and technical skill appropriately exercised by professionals currently practicing in this area under similar time and budget constraints. Recommendations and findings contained in this report represent our professional judgment and are based upon available information and technically accepted practices at the present time and location. Other than this, no warranty is implied or expressed.

Wenck Wildlife Biologist, Justin Askim, and Certified Wildlife Biologist, John Schulz prepared this report.

___________________________________ 6/5/2014

Justin Askim, Associate — Date

Wildlife Biologist/Natural Resources Specialist

___________________________________ 6/5/2014

John Schulz, Principal — Date

Certified Wildlife Biologist

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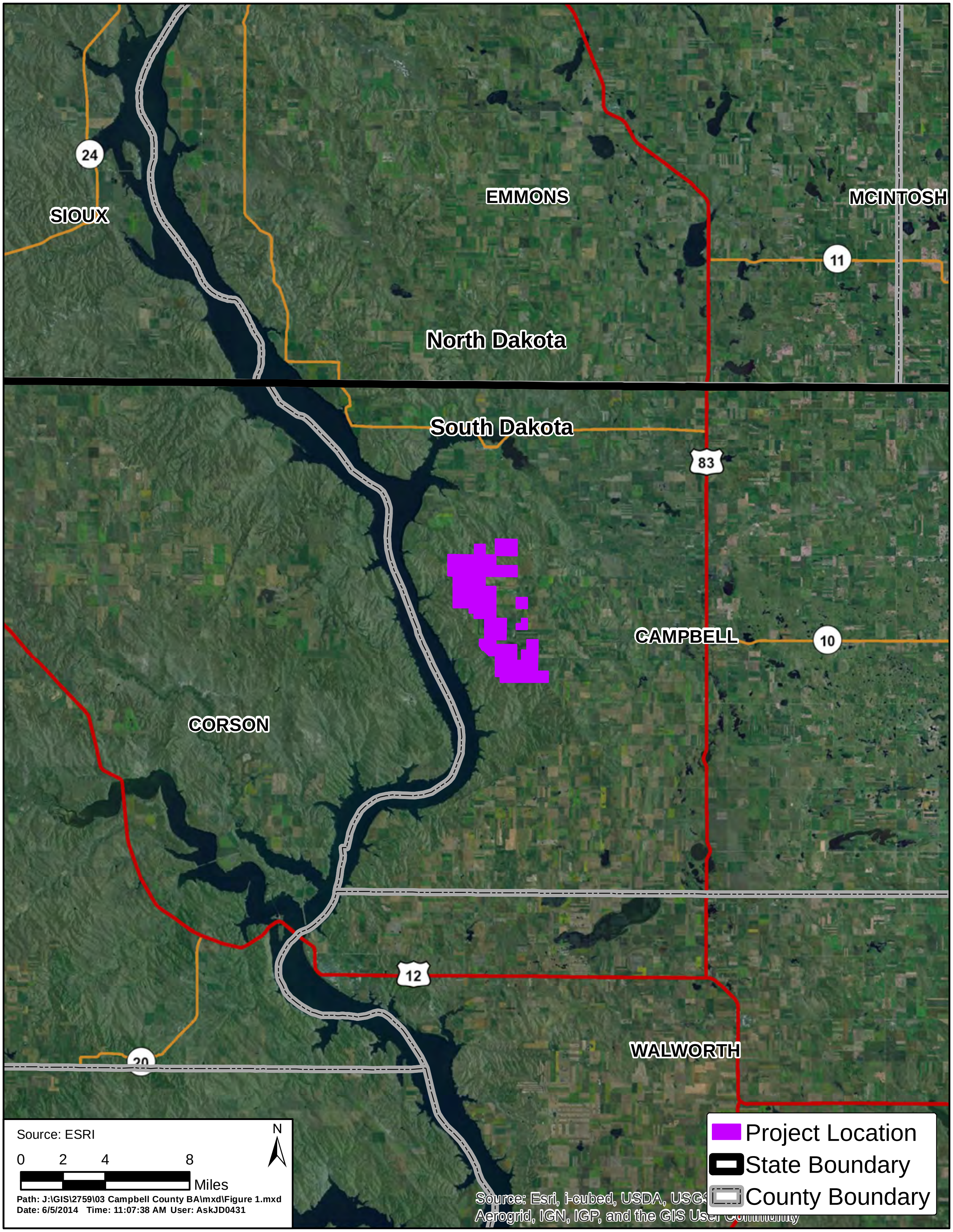
Figures



Fagen Engineering, LLC

Campbell County Wind Farm-Campbell County, South Dakota
Site Location Map

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701-751-3370

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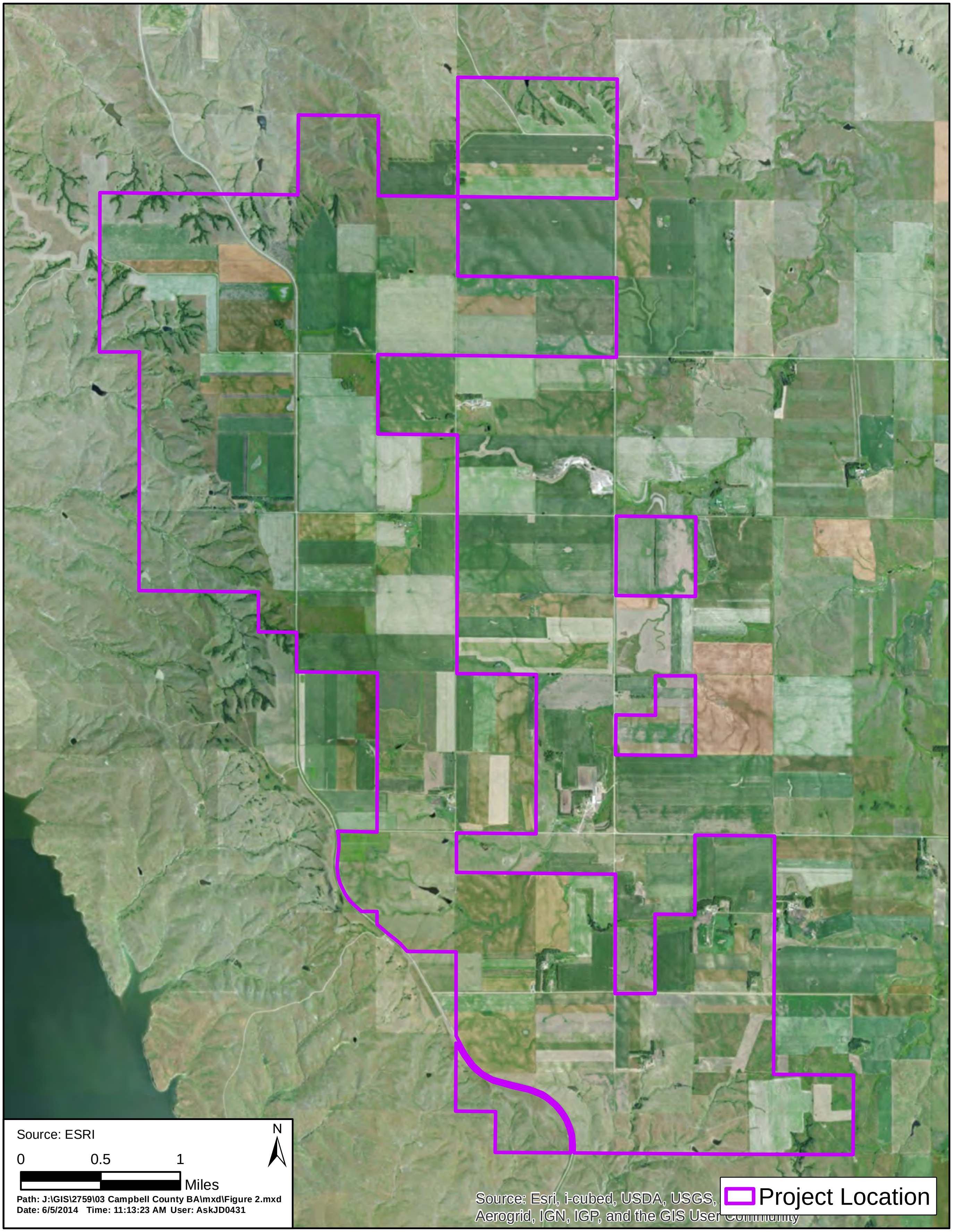
Figure 1



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Campbell County Wind Farm-Campbell County, South Dakota
Site Detail Map

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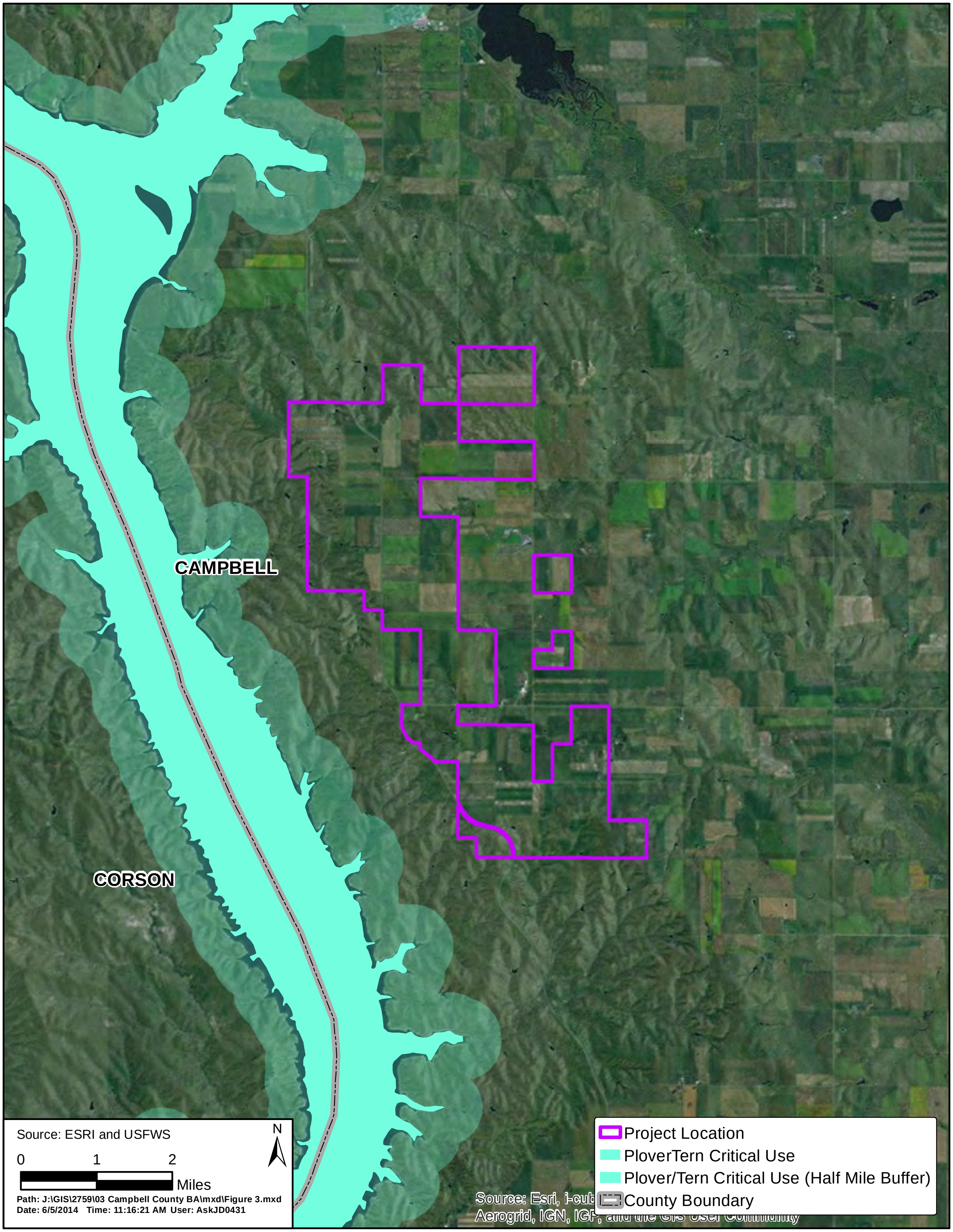
Figure 2



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Campbell County Wind Farm-Campbell County, South Dakota
USFWS Plover/Tern Critical Habitat

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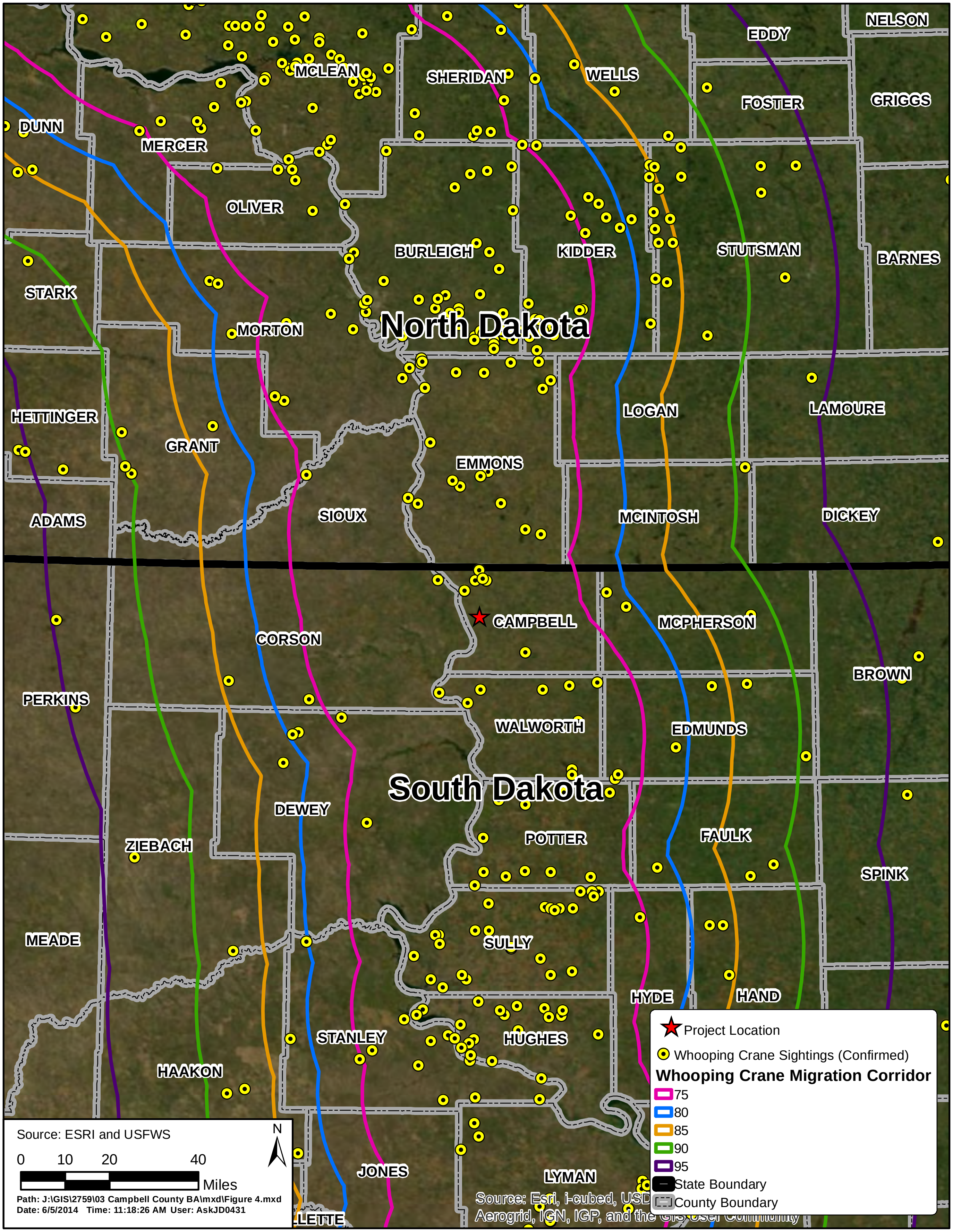
Figure 3



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Campbell County Wind Farm-Campbell County, South Dakota
Whooping Crane Migration Corridor

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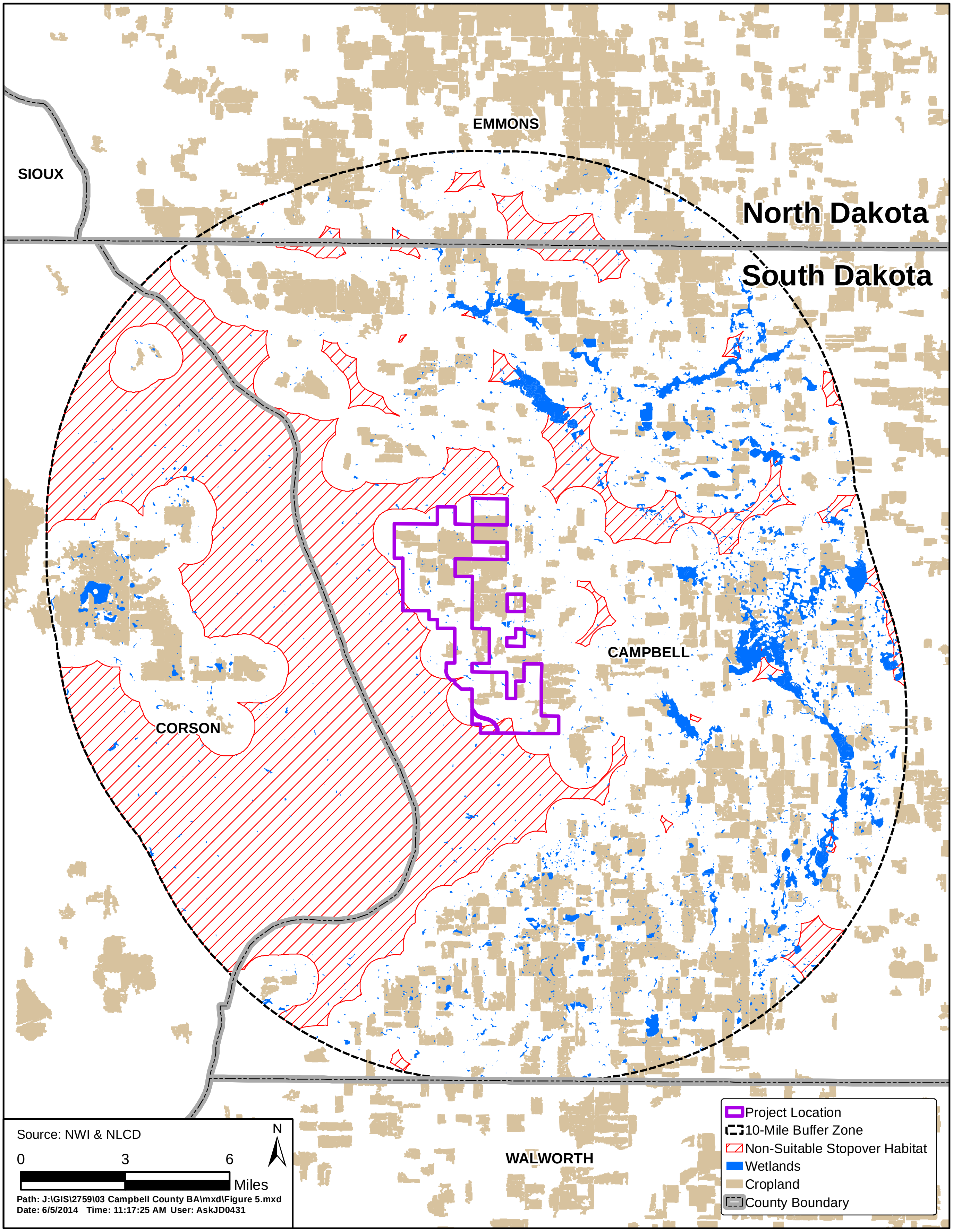
Figure 4



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Campbell County Wind Farm-Campbell County, South Dakota
Project Area and 10-Mile Buffer Wetland-Agricultural Matrix

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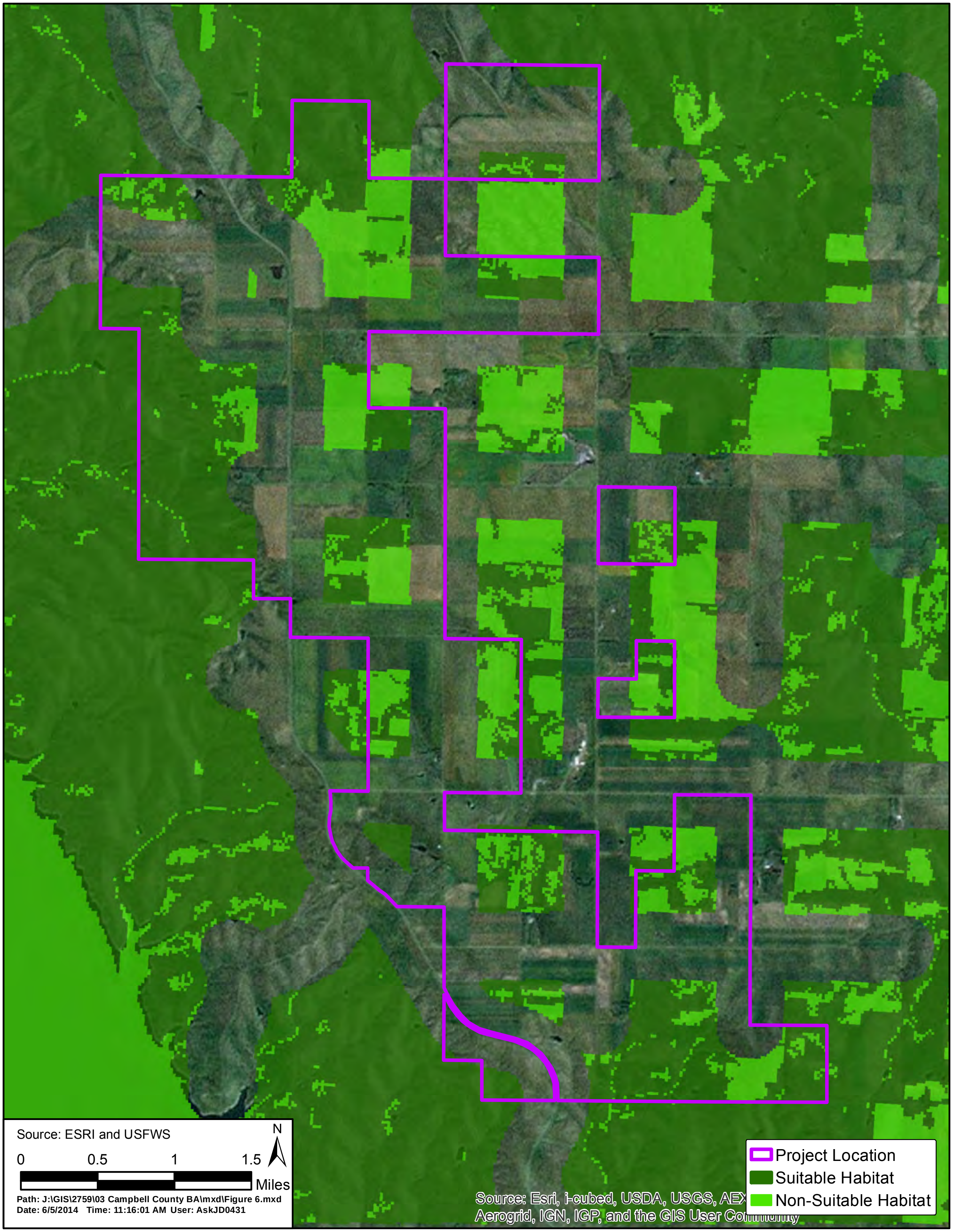
Figure 5



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Campbell County Wind Farm-Campbell County, South Dakota
Potential USFWS Sprague's Pipit Habitat

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Figure 6

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United States Department of the Interior

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

September 6, 2013

David Plagge, Environmental Coordinator
Fagen Engineering, LLC
501 West Highway 212
Granite Falls, Minnesota 56241

Re: Campbell County Wind Farm, South Dakota

Dear Mr. Plagge:

This letter is in response to your request dated September 4, 2013, for environmental comments regarding the above referenced project involving the establishment by Dakota Plains Energy of a 99 MW wind farm with 49 turbines adjacent to the Missouri River. According to maps included with your proposal, the project is situated in various sections within Townships 126 and 127 North, Range 78 West, Campbell County, South Dakota.

Herein we provide information regarding important wildlife habitats and U.S. Fish and Wildlife Service (Service) trust resources, including federally listed species, eagles, birds of conservation concern, and other migratory birds that may occur on the project area. We have included recommended measures to be applied to various components of a wind farm, including meteorological towers, power lines, and the turbines themselves in order to minimize impacts to Service trust resources and to assist the development company in achieving compliance with Federal laws.

Wind Turbine Guidelines

Among the Service's primary concerns regarding wind turbines are avian collision mortality and the loss of habitat/habitat avoidance behaviors by wildlife. While there is still much to be learned regarding wind turbine-wildlife interactions, we do know that wind turbines can have adverse impacts on some species. Turbine location, spacing, aspect, lighting, size, and design are all potential factors related to the risk posed to resident and migratory wildlife as are the types of surrounding habitats, their use by various species of wildlife, landscape features, prey base, migration corridors, and behavioral patterns. Direct collision mortality is a concern, as is loss of habitat caused by the footprint of the turbines and associated roads and structures along with impacts that can occur with encroachment of invasive weeds as a result of these disturbances. Recent studies of grassland nesting birds have shown a tendency for avoidance of areas immediately surrounding turbines, causing indirect habitat loss as well. Currently, perhaps the best means of avoiding impacts to wildlife is to avoid placing wind farms within high wildlife use areas. Placement of turbines within existing cropland is recommended for this reason. The *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines* designed to help wind energy project developers avoid and minimize impacts of land-based wind projects on wildlife and their habitats are available online at: http://www.fws.gov/windenergy/. Some preconstruction wildlife survey information has already been collected and shared with our office. We request the results of any ongoing or future pre-/post-construction wildlife monitoring, including any incidental mortality detected. The Before-After-Control-Impact (BACI) method for avian studies is recommended and described further in the guidelines.

Threatened/Endangered Species

Your project proposal included a species list obtained from our website. That list is accurate and considered valid for 90 days. It includes the following threatened and endangered species:

Species	Status	Expected Occurrence
Least tern (*Sterna antillarum*)	Endangered	Migration, nesting
Piping plover (*Charadrius melodus*)	Threatened	Migration, nesting
Whooping crane (*Grus americana*)	Endangered	Migration
Pallid sturgeon (*Scaphirhynchus albus*)	Endangered	Resident in Missouri River

Additionally, as noted in your letter, a candidate species may occur in the project area:

Species	Status	Expected Occurrence
Sprague's pipit (*Anthus Spragueii*)	Candidate	Possible breeding/migration

Your project proposal included a draft Biological Assessment (BA) developed by Wenck Associates, Inc. that contained determinations of effects to the above species. However, it is our understanding that the BA has not yet been shared with/adopted by the Western Area Power Administration (WAPA), the Federal nexus for this project. It is the responsibility of Federal agencies, or their designated representatives, to determine potential impacts to federally listed species under section 7 of the Endangered Species Act (ESA), as amended, 16 U.S.C. 1531 et seq. Thus, we anticipate future coordination via section 7 consultation with the WAPA regarding the impacts of this project; we are not providing a response to the determinations in the draft BA at this time.

Least terns and piping plovers use sparsely vegetated interchannel sandbars, islands, and shorelines for nesting, foraging, and brood-rearing. Breeding habitat exists adjacent to the proposed project area along the Missouri River, and Lake Pocasse located just northeast of the project site also provides habitat for these species. Thus, it may be possible for the birds to occur in the project area as they navigate between these habitats. Additionally, since specific migration habits of the least tern and piping plover in South Dakota are not known, the birds may move through the project area as they fly to/from their breeding grounds during migration. The birds typically breed in South Dakota between the dates of May 1 and August 15.

The proposed Campbell County Wind facility is within the documented migration corridor of the Aransas/Wood Buffalo population of whooping cranes - the only self-sustaining migratory population of whooping cranes in existence (see enclosed map and associated required reading for map users). These birds migrate through South Dakota twice annually on their way to northern breeding grounds and southern wintering areas. They occupy numerous habitats such as cropland and pastures; wet meadows; shallow marshes; shallow portions of rivers, lakes, reservoirs, and stock ponds; and both freshwater and alkaline basins for feeding and loafing. Overnight roosting sites frequently require shallow water in which to stand and rest. The species is known to use Campbell County habitats during migration. Whooping cranes are large birds with low maneuverability. Line strike mortality is the greatest known threat to fledged whooping cranes; thus, new overhead power lines within the species' migration corridor pose a risk to the birds. We have enclosed our *Region 6 Guidance for Minimizing Effects from Power Line Projects Within the Whooping Crane Migration Corridor* which provide recommendations on means to reduce the overall risk of take of this species. While whooping crane interactions with wind turbines are not well known, the species has been documented to utilize habitats in the vicinity of wind turbines, and sandhill cranes (*Grus canadensis*), a surrogate species for the whooping crane, have been documented as colliding with wind turbines. Thus, whooping crane mortality via turbine strikes may pose a risk to the birds. Loss of stopover habitat in the migration corridor is another concern that may be realized if whooping cranes instead avoid the wind farm. Regarding project construction, any birds occurring in the area during these activities (spring and fall migration) may be subjected to disturbance which stresses them at critical times of the year and should be avoided. These issues should be addressed prior to wind farm development. Sightings of whooping cranes at any time should be reported to this office.

The pallid sturgeon is a resident of the Missouri River; we would not expect any impacts to the species as a result of the wind farm.

Sprague's pipit was determined to be a candidate species in September of 2010. As a candidate, the Sprague's pipit is not currently afforded Federal protection under the ESA. Its candidate status defines this bird as a species in decline that the Service believes needs to be listed as threatened or endangered, but listing is currently precluded by other priorities. Sprague's pipit is a grassland songbird currently common only in remnant large grassland patches in the northern mixed-grass native prairie of North America. In the United States, the species' breeding range includes north-central and eastern Montana, central and western North Dakota, and northwestern and north-central South Dakota. The Sprague's pipit is likely influenced by the size of grassland patches and the amount of grassland in the landscape. This species also negatively responds to shrub and tree densities, and it is likely that it exhibits negative responses to other vertical structures in their habitat (e.g., wind turbines, telecommunication towers, power line towers, etc.), although specific data are limited. Sprague's pipit is among the species named within the Service's 2008 Birds of Conservation Concern publication (see "Birds of Conservation Concern" below for the website to obtain the document). Birds of Conservation Concern are species which have been identified as in need of conservation efforts to stem population declines. Habitat loss, degradation, fragmentation, inappropriate management, nest predation and parasitism, energy development, climate change, and drought are threats that currently or potentially affect Sprague's pipit populations throughout its range. Management for this species consists of protecting, maintaining, and restoring mixed grass prairie in suitably large blocks. To view the Sprague's Pipit (*Anthus spragueii*) Conservation Plan from which the above information was obtained and for additional information, including the 12-month finding that established the Sprague's pipit as a candidate species, please access the following website online at: http://www.fws.gov/mountain-prairie/species/birds/spraguespipit/.

Bald Eagles

Bald eagles (*Haliaeetus leucocephalus*) occur throughout South Dakota in all seasons, and new nests are appearing each year. While ESA protection for the bald eagle has been removed, the species will continue to be protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). These laws protect eagles from a variety of harmful actions and impacts. Our agency has developed guidance for the public regarding means to avoid take of the eagle under these laws. The *National Bald Eagle Management Guidelines* are available online at: http://www.fws.gov/migratorybirds/baldeagle.htm. We recommend reviewing these guidelines as they advise of circumstances where these laws may apply and assist in avoiding potential violations on future projects. Additionally, permit regulations have been published for eagles. These regulations may be found in the Federal Register (Volume 74, No. 175, Friday, September 11, 2009) online at: http://www.gpoaccess.gov/fr/index.html. *Eagle Conservation Plan Guidance* has also been developed by the Service. This document provides interpretive guidance in applying the regulatory permit standards as specified by the BGEPA and other Federal laws. It is available online at: http://www.fws.gov/windenergy/PDF/Eagle%20Conservation%20Plan%20Guidance-Module%201.pdf. Please note that bald eagles have been documented to nest at Lake Pocasse, within three to four miles of the proposed Campbell County Wind Farm.

Birds of Conservation Concern

The Migratory Birds Division of the Service has published *Birds of Conservation Concern* (BCC) *2008*, which may be found online at:
http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf. This document is intended to identify species in need of coordinated and proactive conservation efforts among State, Federal, and private entities, with the goals of precluding future evaluation of these species for ESA protections and promoting/conserving long-term avian diversity. In accordance with Executive Order 13186 regarding migratory bird protection, we recommend avoidance, minimization, and habitat offsets to reduce the impacts to species protected by the MBTA. Compliance with this law may be partially addressed in a Bird and Bat Conservation Strategy (see Chapter 9 of the Service's Land-based Wind Energy Guidelines); however, a separate mitigation plan that specifically addresses direct and indirect take of birds during and after construction is also recommended. Primary threats to many grassland species that occur in South Dakota are habitat loss and fragmentation. Grassland areas within the boundaries of the Campbell County Wind Farm may harbor some species identified in the 2008 BCC document. Placement of facilities within intact native grasslands should be avoided. If it must occur, we strongly recommend development of mitigative/offsetting measures for this habitat and its associated wildlife. These measures may include, but not be limited to, restoration of degraded grassland habitats or purchase of easements or fee title lands.

Wetlands

According to National Wetlands Inventory maps (available online at: http://wetlands.fws.gov/), wetlands exist within the proposed project area. If a project may impact wetlands or other important fish and wildlife habitats, the Service, in accordance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347) and other environmental laws and rules, recommends complete avoidance of these areas, if possible; then minimization of any adverse impacts; and finally, replacement of any lost acres; in that order. Alternatives should be examined and the least damaging practical alternative selected. If wetland impacts are unavoidable, a mitigation plan addressing the number and types of wetland acres to be impacted and the methods of replacement should be prepared and submitted to the resource agencies for review. The Service recommends these actions regardless of jurisdiction determinations by the U.S. Army Corps of Engineers under the Clean Water Act.

Meteorological Towers

Meteorological towers constructed in association with wind turbines are often similar in design to typical communication towers: tall, lighted, lattice structured, and guyed. These types of towers can be problematic for birds, particularly during inclement weather, as they enter the lighted area, become reluctant to leave it, and suffer mortality as they circle the structure and collide with the guy wires or the lattice tower itself. It is our understanding that meteorological towers currently exist at the site. We recommend application of the guidance set forth in *U.S. Fish and Wildlife Service Interim Guidelines for Recommendations on Communications Tower Siting, Constructions, Operation and Decommissioning,* found online at: http://www.fws.gov/habitatconservation/communicationtowers.html, to minimize the threat of avian mortality at these towers and any future towers at the site. Monitoring at these towers would provide insight to the effectiveness of the minimization measures. We request the results of any wildlife monitoring and any data obtained regarding wildlife mortality at towers associated with this project.

In order to obtain information on the usefulness of the communications tower guidelines in preventing birds strikes and to identify any recurring problems with their implementation which may necessitate modifications, please advise us of the final location and specifications of any towers associated with the wind turbine project and which of the measures recommended for the protection of migratory birds were implemented. If any of the recommended measures cannot be implemented, please explain why they were not feasible. A Tower Site Evaluation Form is also available via the above communication tower website online at: http://www.fws.gov/habitatconservation/communicationtowers.html. Please complete this form and forward it to our office.

Power Lines

The construction of additional overhead power lines associated with wind farms creates the threat of avian electrocution, particularly for raptors. Thousands of these birds, including endangered species, are killed annually as they attempt to utilize overhead power lines as nesting, hunting, resting, feeding, and sunning sites. The Service recommends the installation of underground, rather than overhead, power lines whenever possible/appropriate to minimize environmental disturbances. For all new overhead lines or modernization of old overhead lines, we recommend incorporating measures to prevent avian electrocutions. The publication entitled *Suggested Practices for Avian Protection on Power Lines - The State of the Art in 2006* has many good suggestions, including pole extensions, modified positioning of live phase conductors and ground wires, placement of perch guards and elevated perches, elimination of cross arms, use of wood (not metal) braces, and installation of various insulating covers. You may obtain this publication by contacting the Edison Electric Institute via their website online at: www.eei.org or by calling 1-800-334-5453.

Please note that utilizing just one of the "Suggested Practices . . ." methods may not entirely remove the threat of electrocution to raptors. In fact, improper use of some methods may increase electrocution mortality. Perch guards, for example, may be only partially effective as some birds may still attempt to perch on structures with misplaced or small-sized guards and suffer electrocution as they approach too close to conducting materials. Among the most dangerous structures to raptors are poles that are located at a crossing of two or more lines, exposed above-ground transformers, or dead end poles. Numerous hot and neutral lines at these sites, combined with inadequate spacing between conductors, increase the threat of raptor electrocutions. Perch guards placed on other poles have, in some cases, served to actually shift birds to these more dangerous sites, increasing the number of mortalities. Thus, it may be necessary to utilize other methods or combine methods to achieve the best results. The same principles may be applied to substation structures.

Please also note that the spacing recommendation within the "Suggested Practices . . ." publication of at least 60 inches between conductors or features that cause grounding may not be protective of larger raptors such as eagles. This measure was based on the fact that the skin-to-skin contact distance on these birds (i.e., talon to beak, wrist to wrist, etc.) is less than 60 inches. However, an adult eagle's wingspan (distance between feather tips) may vary from 66 to 96 inches depending on the species (golden or bald) and gender of the bird. Unfortunately, wet feathers in contact with conductors and/or grounding connections can result in a lethal electrical surge. Thus, the focus of the above precautionary measures should be to a) provide more than 96 inches of spacing between conductors or grounding features, b) insulate exposed conducting features so that contact will not cause raptor electrocution, and/or c) prevent raptors from perching on the poles in the first place.

Additional information regarding simple, effective ways to prevent raptor electrocutions on power lines is available in video form. *Raptors at Risk* may be obtained by contacting EDM International, Inc. at 4001 Automation Way, Fort Collins, Colorado 80525-3479, Telephone No. (970) 204-4001, or by visiting their website online at: http://www.edmlink.com/raptorvideo.htm.

In addition to electrocution, overhead power lines also present the threat of avian line strike mortality. Particularly in situations where these lines are adjacent to wetlands or where waters exist on opposite sides of the lines, we recommend marking them in order to make them more visible to birds. For more information on bird strikes, please see *Reducing Avian Collisions with Power Lines; The State of the Art in 2012* which may be obtained by contacting the Edison Electric Institute online at: http://www.eei.org/resourcesandmedia/products/Pages/reducingaviancollisions.aspx. While marking of power lines reduces line strike mortality, it does not preclude it entirely. Thus, marking of additional, existing, overhead lines is recommended to further offset the potential for avian line strike mortality.

Migratory Bird Treaty Act

Although adherence to the Service's recommendations will provide some protection for migratory birds, implementation of these measures alone will not remove any liability should violations of the law occur. The MBTA prohibits the taking, killing, possession, and transportation (among other actions) of migratory birds, their eggs, parts, and nests, except when specifically permitted by regulations. While the MBTA has no provision for allowing unauthorized take, the Service realizes that some birds may be killed during construction or operation of a wind energy facility even if all known reasonable and effective measures to protect birds are used. The Service's Office of Law Enforcement carries out its mission to protect migratory birds through investigations and enforcement as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to avoid take of migratory birds and by encouraging others to implement measures to avoid take of migratory birds. It is not possible to absolve individuals, companies, or agencies from liability even if they implement bird mortality avoidance or other similar protective measures. However, the Office of Law Enforcement focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without identifying and implementing all reasonable, prudent, and effective measures to avoid that take. Companies are encouraged to work closely with Service biologists to identify available protective measures when developing project plans and/or Avian Protection Plans and to implement those measures prior to/during construction, operation, or similar activities.

Summary

The following items are pertinent to the proposed project, and we recommend addressing these issues if/when the project progresses:

- Wind turbines: *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*

- Potential impacts to listed and candidate species:
    - Least tern
    - Piping plover
    - Pallid sturgeon
    - Whooping crane
    - Sprague's pipit

- Bald eagle impacts (MBTA and BGEPA):
    - Service's *National Bald Eagle Management Guidelines*
    - Service's *Eagle Conservation Plan Guidance*

- Migratory bird impacts (MBTA):
    - *Birds of Conservation Concern 2008*
    - Pre-/post-construction monitoring and mortality data
    - Mitigative/offsetting measures to be coordinated with and reported to the Service

- Wetland impacts: avoid, minimize, and mitigate

- Existing guidelines for various project components:
    - Meteorological towers: Service's *Interim Guidelines for Recommendations on Communications Tower Siting, Constructions, Operation and Decommissioning* and the associated *Tower Site Evaluation Form.*

- Overhead power lines: Avian Power Line Interaction Committee's *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and *Reducing Avian Collisions with Power Lines, the State of the Art in 2012.*

If changes are made in the project plans or operating criteria, or if additional information becomes available, the Service should be informed so that the above determinations can be reconsidered.

We appreciate the opportunity to provide comments on this project. If you have any questions on these comments, please contact Natalie Gates of this office at (605) 224-8693, Extension 227.

Sincerely,

Natalie Gates

Acting ~~Scott V. Larson~~
Field Supervisor
South Dakota Field Office

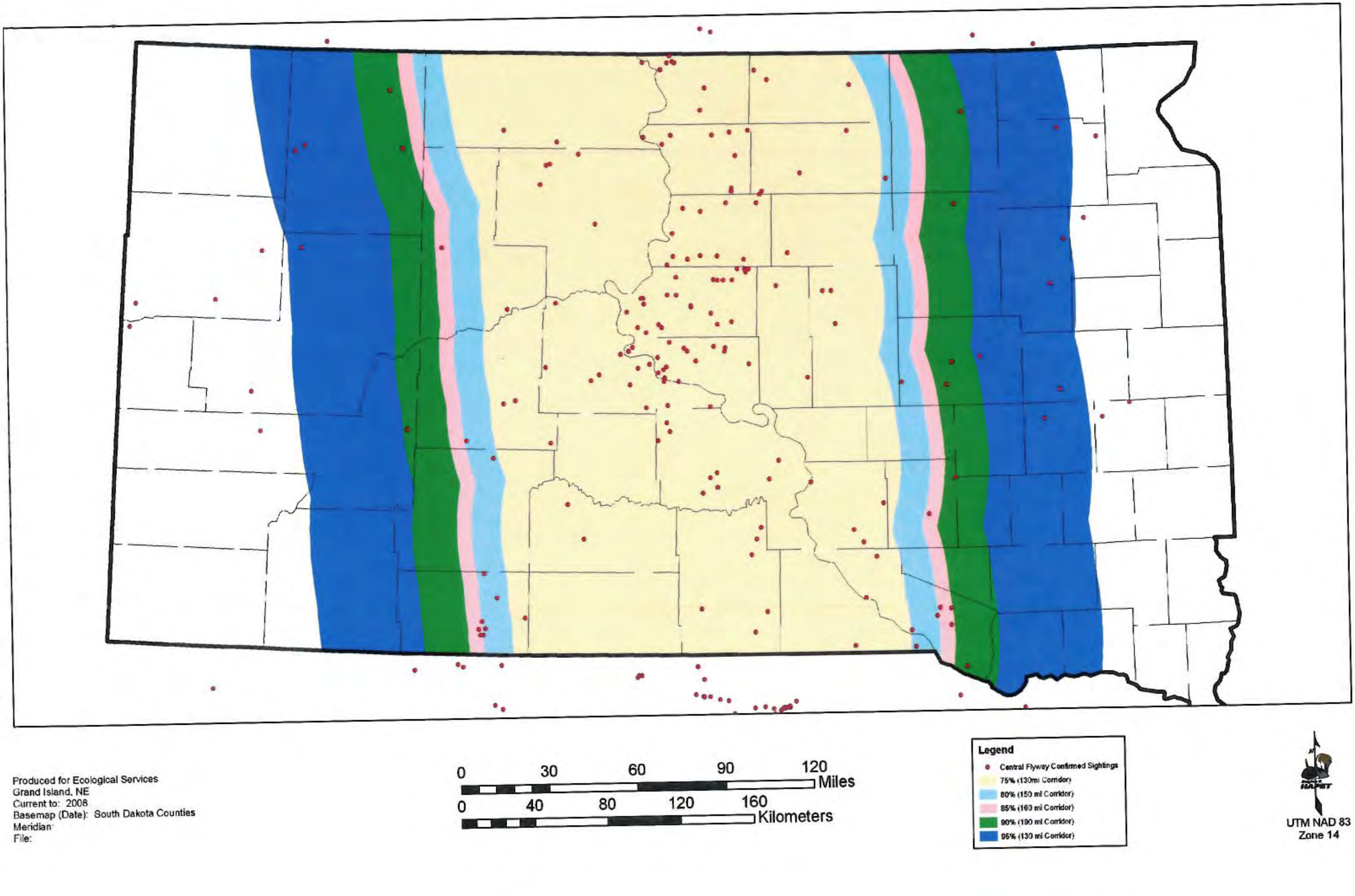
Enclosures

cc: WAPA; Billings, MT
(Attention: Matt Marsh)

U.S. Fish & Wildlife Service

South Dakota Whooping Crane Migration Corridor Using State Sightings

Central Flyway of the United States



Produced for Ecological Services
Grand Island, NE
Current to: 2008
Basemap (Date): South Dakota Counties
Meridian:
File:

Required Reading for Users of the Whooping Crane Tracking Project Database

CWCTP-GIS data or derivatives thereof (e.g., shape files, jpegs) may not be distributed or posted on the Internet without inclusion of this explanatory document.

The Cooperative Whooping Crane Tracking Project (CWCTP) was initiated in 1975 to collect a variety of information on whooping crane migration through the U.S. portion of the Central Flyway. Since its inception in 1975, a network of Federal and State cooperating agencies has collected information on whooping crane stopovers and funneled it to the U.S. Fish and Wildlife Service (Service) Nebraska Field Office where a database of sighting information is maintained. The WCTP database includes a hardcopy file of whooping crane sighting reports and a digital database in various formats based on those sighting reports. A subset of the database along with sight evaluation (habitat) information collected between 1975 and 1999 was summarized by Austin and Richert (2001).*

In the Fall of 2007, the CWCTP database was converted to a GIS format (ArcGIS 9.2) to facilitate input, updates, and provide output options in a spatial context. During this process, inconsistencies between the digital database and sighting report forms were identified and corrected. Location information in various formats was derived from data in the corrected database, and new fields were added to the corrected database (e.g., latitude and longitude in decimal degrees, an accuracy field, and location comment field). The attached updated file contains observation data through the 2008 Spring migration and is referred to as the CWCTP-GIS (2008a).

The appropriate use of the CWCTP-GIS is constrained by limitations inherent in both the GIS technology and bias inherent in any database comprised of incidental observations. Without an understanding of the assumptions and limitations of the data, analyses and output from the spatial database can result in faulty conclusions. The following assumptions and characteristics of the database are crucial to interpreting output correctly. Other, unknown biases also may exist in the data.

- First and foremost, the database is comprised of incidental sightings of whooping cranes during migration. Whooping cranes are largely opportunistic in their use of stopover sites along the Central Flyway, and will use sites with available habitat when weather or diurnal conditions require a break in migration. Because much of the Central Flyway is sparsely populated, only a small percent of stopovers are observed, those observed may not be identified, those identified may not be reported, and those reported may not be confirmed (only confirmed sightings are included in the database). Based on the crane population and average flight distances, as little as 4 percent of crane stopovers are reported. *Therefore, absence of documented whooping crane use of a given area in the Central Flyway does NOT mean that whooping cranes do not use that area or that various projects in the vicinity will not potentially adversely affect the species.*

- In the database, the location of each sighting is based on the first observation of the crane group even though, in many cases, the group was observed at multiple locations in a local area. For this and other reasons described below, only broad-scale analyses of whooping crane occurrences are appropriate. GIS **cannot** be legitimately used with this database for measurements of distance of whooping crane groups from various habitat types or geographic entities (i.e., using various available GIS data layers). In addition, point locations of whooping crane groups known to roost in various wetlands or rivers may not coincide with those wetlands. The user needs to refer to the attribute table or contact the Nebraska Field Office, USFWS, for more specific information on individual observations.

- Precision of the data: When a "Cadastral" location (Township, Range, Section, ¼-Section) was provided on the original sighting form, the geographic point representing that sighting was placed in the center of the indicated Section or ¼-Section and the latitude and longitude of that point were recorded in degrees, minutes, and seconds (DMS). These records are indicated by "Cadastral" in the accuracy field. When Cadastral information was lacking, DMS latitude and longitude were derived by adding seconds (00) to the degrees and minutes of latitude and longitude originally estimated and recorded on the observation form. These observations are identified by "Historic" in the accuracy field. GPS latitude and longitude were used when available, but when none of the above were reported, the point was placed based on text description of location (e.g., 3 miles N of Denton), and identified in the accuracy field with "Landmark". DMS latitude and longitude were converted to decimal degrees, which were used to populate the GIS data layer.

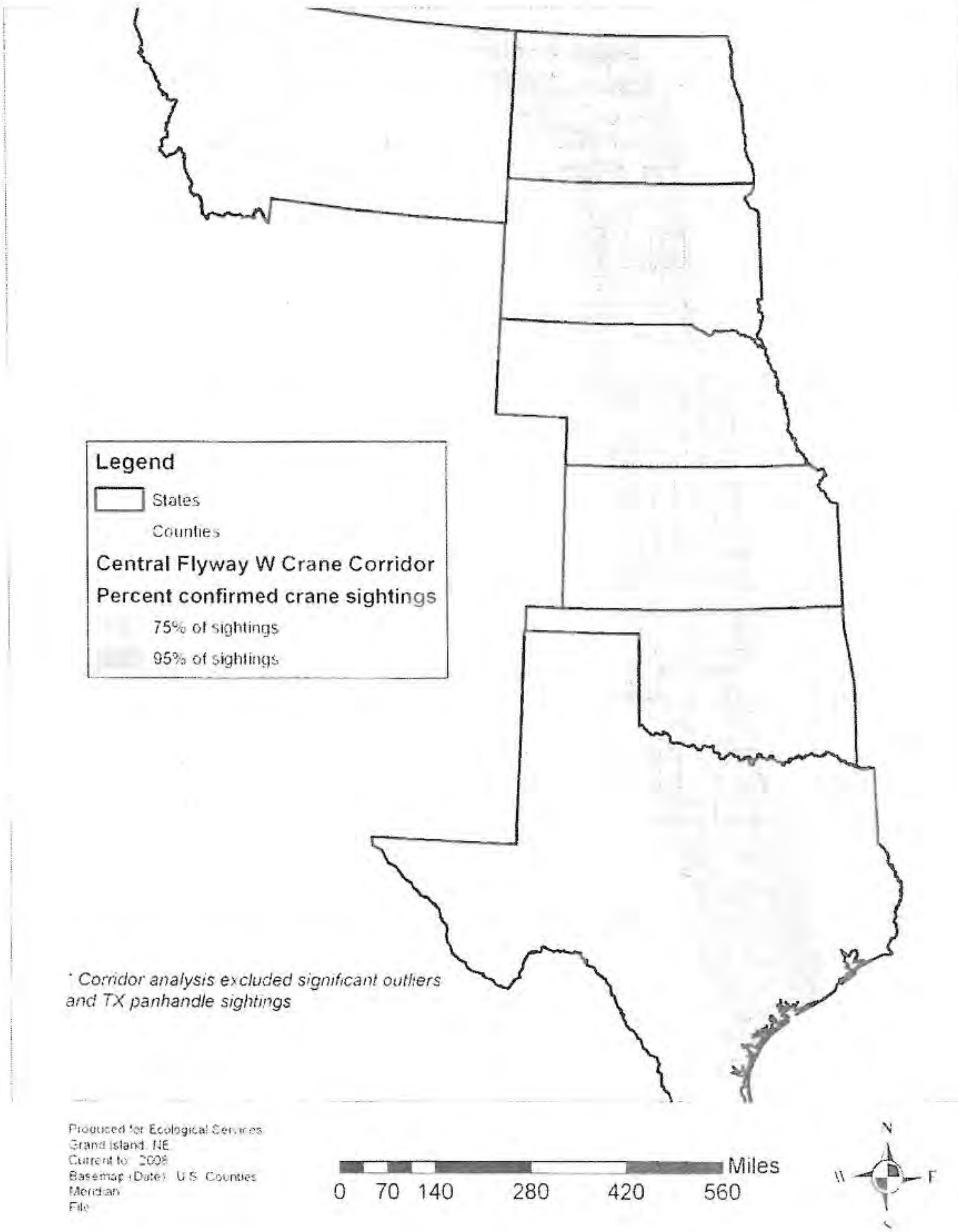
- Bias: Bias is an inherent characteristic of any data obtained through incidental sightings. That is, for the subset of crane use that is recorded, relatively more sightings are recorded in areas such as national wildlife refuges where knowledgeable observers are available to look for cranes and report their presence. Conversely, areas of high use may not be documented due to the absence of observers. However, use of areas such as national wildlife refuges is also determined to some extent by habitat management on the areas and availability of alternative habitat in the region. For these reasons, representations of the crane migration corridor based on percent of confirmed sightings should be interpreted conservatively, particularly in Oklahoma and Kansas where a high percent of sightings occur on a few national wildlife refuges. Whooping crane migration patterns and subsequent observations were also likely influenced by regional weather patterns such as wind and precipitation, as well as local farming practices which influence food availability. Factors such as these vary among regions and years and were not considered in this database.

The CWCTP-GIS will be updated annually following the Fall migration and distributed to State cooperators and Fish and Wildlife Service Ecological Services Field Offices in the Central Flyway. Contact information for these offices can be found at http://www.fws.gov. Federal regulatory agencies and project proponents should contact the appropriate Fish and Wildlife Service for help in evaluating potential project impacts to the endangered whooping crane.

* Austin, E.A. and A.L. Richert. 2001. A comprehensive review of observational and site evaluation data of migrant whooping cranes in the United States, 1943-99. U.S. Geological Survey. Northern Prairie Wildlife Research Center, Jamestown, North Dakota, and State Museum, University of Nebraska, Lincoln, Nebraska. 157 pp.

U.S. Fish & Wildlife Service

United States Central Flyway Whooping Crane Migration Corridor *



Produced for Ecological Services
Grand Island, NE
Current to: 2008
Basemap (Date): U.S. Counties
Meridian
File

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6
ES

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

FEB 04 2010

Memorandum

To: Field Office Project Leaders, Ecological Services, Region 6
Montana, North Dakota, South Dakota, Nebraska, Kansas

From: Assistant Regional Director, Ecological Services, Region 6

Subject: Region 6 Guidance for Minimizing Effects from Power Line Projects Within the Whooping Crane Migration Corridor

This document is intended to assist Region 6 Ecological Services (ES) biologists in power line (including generation lines, transmission lines, distribution lines, etc.) project evaluation within the whooping crane migration corridor. The guidance contained herein also may be useful in planning by Federal action agencies, consultants, companies, and organizations concerned with impacts to avian resources, such as the Avian Power Line Interaction Committee (APLIC). We encourage action agencies and project proponents to coordinate with their local ES field office early in project development to implement this guidance.

The guidance includes general considerations that may apply to most, but not every, situation within the whooping crane migratory corridor. Additional conservation measures may be considered and/or discretion may be applied by the appropriate ES field office, as applicable. We believe that in most cases the following measures, if implemented and maintained, could reduce the potential effects to the whooping crane to an insignificant and/or discountable level. Where a Federal nexus is lacking, we believe that following these recommendations would reduce the likelihood of a whooping crane being taken and resulting in a violation of Endangered Species Act (ESA) section 9. If non-Federal actions cannot avoid the potential for incidental take, the local ES field office should encourage project proponents to develop a Habitat Conservation Plan and apply for a permit pursuant to ESA section 10(a)(1)(B).

Finally, although this guidance is specific to impacts of power line projects to the whooping crane within the migration corridor, we acknowledge that these guidelines also may benefit other listed and migratory birds.

If you have any questions, please contact Sarena Selbo, Section 7 Coordinator, at (303) 236-4046.

Region 6 Guidance for Minimizing Effects from Power Line Projects Within the Whooping Crane Migration Corridor

1) Project proponents should avoid construction of overhead power lines within 5.0 miles of designated critical habitat and documented high use areas (these locations can be obtained from the local ES field office).

2) To the greatest extent possible, project proponents should bury all new power lines, especially those within 1.0 mile of potentially suitable habitat[1].

3) If it is not economically or technically feasible to bury lines, then we recommend the following conservation measures be implemented:

   a) Within the 95-percent sighting corridor (see attached map)

      i) Project proponents should mark[2] new lines within 1.0 mile of potentially suitable habitat and an equal amount of existing line within 1.0 mile of potentially suitable habitat (preferably within the 75-percent corridor, but at a minimum within the 95-percent corridor) according to the U.S. Fish and Wildlife Service (USFWS) recommendations described in APLIC 1994 (or newer version as updated).

      ii) Project proponents should mark replacement or upgraded lines within 1.0 mile of potentially suitable habitat according to the USFWS recommendations described in APLIC 1994 (or newer version as updated).

   b) Outside the 95-percent sighting corridor within a State's borders

      Project proponents should mark new lines within 1.0 mile of potentially suitable habitat at the discretion of the local ES field office, based on the biological needs of the whooping crane.

   c) Develop compliance monitoring plans

      Field offices should request written confirmation from the project proponent that power lines have been or will be marked and maintained (i.e., did the lines recommended for marking actually get marked? Are the markers being maintained in working condition?)

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[1] Potentially suitable migratory stop over habitat for whooping cranes includes wetlands with areas of shallow water without visual obstructions (i.e., high or dense vegetation) (Austin & Richert 2001; Johns et al. 1997; Lingle et al. 1991; Howe 1987) and submerged sandbars in wide, unobstructed river channels that are isolated from human disturbance (Armbruster 1990). Roosting wetlands are often located within 1 mile of grain fields. As this is a broad definition, ES field office biologists should assist action agencies/applicants/companies in determining what constitutes potentially suitable habitat at the local level.

[2] Power lines are cited as the single greatest threat of mortality to fledged whooping cranes. Studies have shown that marking power lines reduces the risk of a line strike by 50 to 80 percent (Yee 2008; Brown & Drewien 1995; Morkill & Anderson 1991). Marking new lines and an equal length of existing line in the migration corridor maintains the baseline condition from this threat.

South Dakota
Wildlife Division
Department of Game, Fish and Parks

Foss Building
523 East Capitol
Pierre, South Dakota 57501-3182

27 August 2013

Dave Plagge, Environmental Coordinator
180 8th Avenue
Granite Falls, MN 56241

RE: Environmental comments for proposed Campbell County wind farm

Dear Dave Plagge:

This is in response to your request dated 25 July 2013 for environmental comments regarding the proposed Campbell County wind farm and its relevance to SD listed species of concern.

The proposed siting and operation of a wind power project has potential to directly and indirectly impact area wildlife. This may occur by altering important and declining habitats and influencing both breeding and movement behavior of wildlife and/or by killing bats and birds through wind turbine and power line strikes. The South Dakota Game, Fish and Parks (SDGFP), in coordination with the South Dakota Bat Working Group (SDBWG), has developed Siting Guidelines for Wind Power Projects in South Dakota. This document addresses many of the environmental concerns involved with siting wind power projects in South Dakota and may be found on the web (http://gfp.sd.gov/wildlife/docs/wind-power-siting-guidelines.pdf).

While we applaud efforts to provide renewable energy sources, we provide the following information on wildlife habitats and associated species that contribute to South Dakota's natural heritage and that may be impacted by the Campbell County wind farm. In addition, we provide recommendations on ways to lessen impacts and provide contact information to pursue additional needed information. Part of responsible sighting includes conducting appropriately-timed pre-construction wildlife surveys to help assess any potential impacts to wildlife followed by post-construction studies to evaluate those predictions. If major impacts are predicted, we recommend avoidance. If minor impacts are anticipated, we recommend mitigation to lessen these impacts. Our agency respectfully requests a written summary of these surveys.

HABITAT

Grasslands

Native, untilled grasslands have decreased at an alarming rate. Remnant prairie areas have high conservation value, especially those that contain a high diversity of both plant and animal species with non-native, invasive plant species being rare or absent. The proposed project area should be surveyed for high quality untilled tracts of native

Phone: (605) 773-4193 FAX: (605) 773-6245

prairie. Every effort should be made to avoid placement of turbines and roads in high quality, untilled native prairie. Emphasis should be placed on siting turbines in areas already disturbed by cultivation. Mitigating impacted high quality native prairie should be considered.

There is also conservation value in large contiguous blocks of grassland, regardless of quality, current management or cropping history. This includes rangeland, hayland, pasture and undisturbed areas (e.g. Conservation Reserve Program lands; CRP). Large, contiguous grasslands occur along the northern, western and southern edge of the proposed project area. Some grassland wildlife species have been shown to be sensitive to the loss degradation, and fragmentation of native prairie and other grassland types. Those that are sensitive to habitat fragmentation means that the separation of habitat into smaller blocks (by roads or vertical structures) reduces habitat quality in that a species may be affected by lower survival or reproduction rates and/or decreased distribution or use of an area.

To reduce grassland degradation and fragmentation, place turbines and roads in areas already disturbed by cultivation, limit the amount of ground disturbance as much as possible by limiting the length and width of both temporary and permanent access roads. Use native seed sources to stabilize any soil disturbance to reduce non-native, invasive plant species encroachment. Ground disturbance and increased road access increases the opportunity for introduction and establishment of non-native, invasive plant species and can also increase human disturbance to wildlife. Pesticide used to control non-native, invasive plant species can negatively impact rare prairie invertebrates.

The Natural Resource Conservation Service Plant Materials Center in Bismarck, ND may serve as a good source of information on native plantings. Additional information on sources of native seed can be found at the following links:

- Conservation Seed/Plant Vendors List
    - http://plant-materials.nrcs.usda.gov/pubs/ndpmcmt8152.pdf
- Prairie Landscaping Seed/Plant Vendors List
    - http://plant-materials.nrcs.usda.gov/pubs/ndpmcmt8151.pdf
- Origins of Native Grass and Forb Releases
    - http://www.plant-materials.nrcs.usda.gov/pubs/ndpmctn6786.pdf

Public Land

Extensive public lands owned by the SDGFP and US Army Corp of Engineers border the Missouri River. Placement of public lands is often done so in areas with existing and potential wildlife habitat. Management of these lands is for wildlife and conducted in the public interest. Wildlife that use these areas may be affected by the placement of a wind power project in the area. The location of these and other public lands can be found on line at http://gfp.sd.gov/images/WebMaps/Viewer/WILMA/ .

WILDLIFE

Grassland Birds

In North America, grassland birds have experienced consistent and long term declines (Peterjohn and Sauer 1999). Placement of a wind farm in the proposed project area may reduce habitat suitability for grassland birds (increase habitat fragmentation and invasive species) and modify behavior (e.g. avoidance). Some grassland bird species have been shown to favor large grassland patches or are sensitive to habitat fragmentation.

Two grassland bird species of particular management interest to SDGFP include the Greater Prairie-chicken and Sharp-tailed Grouse both of which require large tracts of open, contiguous grassland. The Greater Prairie-chicken prefers tall- to mixed-grass prairie. Breeding behavior peaks on leks primarily between late-March through April. Nesting occurs in mid-May to June. Leks are located on barren areas or on areas with minimal cover. This species nests in grasslands (prairies, pastures, hayfields) approximately 2 miles from a lek site. Loss and fragmentation of tall-grass prairie are considered reasons for population declines.

The Sharp-tailed Grouse prefers grassland habitat (mid- to tall-grasses) with brushy draws and thickets. The peak of courtship activity on communal display grounds (leks) occurs between late-March through April. Nesting also begins during this time. Leks are located on hilltops or other elevated sites with minimal vegetation. Nest sites are found within approximately 1 mile of the lek. Nests typically hatch from the last week in May through the first week in June. Degradation of native grasslands, reduction of nesting and brood rearing cover, and variable climatic factors are limiting factors for this species.

We recommend that properly timed, species-appropriate surveys for breeding grassland birds be conducted pre-and post- construction. Many privately-owned areas in South Dakota have not been surveyed for grassland songbirds or prairie grouse. Grassland songbird surveys are best conducted in June, although mid-May through early July is acceptable. Breeding ground (lek) surveys for prairie grouse species should be conducted in the spring (late March through April). If a lek is present, we recommend a minimum one-mile buffer be maintained between the lek and structures. We also recommend that a timing restriction on construction activity be adhered to within a two mile buffer of leks. This means that construction activity would not occur during a three hour period starting at sunrise from 1 March through 30 June. This is to avoid disturbance to birds attending a lek. Post-construction surveys monitoring lek presence and numbers of grouse attending each lek should be conducted after the project has been built.

Northern Prairie Wildlife Research Center, a part of the US Geological Survey is conducting research evaluating the influence of wind generators on breeding grassland bird density and species composition in the Dakotas. Please contact Jill Shaffer (701-253-5547 or jshaffer@usgs.gov) for the most up-to-date information and results from this effort.

Bats
Thirteen species of bats are currently known to be found in South Dakota, some of which are summer residents, year-round residents, or migratory. Construction of a wind farm may interfere with daily and seasonal bat movements, including direct mortality. South Dakota Department of Game, Fish and Parks in cooperation with the South Dakota Bat Working Group (SDBWG), developed the *South Dakota Bat Management Plan* specific to bats and their habitats in South Dakota (http://gfp.sd.gov/wildlife/management/plans/bat-management-plan). Please review this document for additional species-specific information.

Because of limited, project-specific data we suggest pre-construction surveys of the area for potential bat habitat and species. Pre-construction surveys should establish vertical arrays of bat detectors that encompass the rotor swept area (Kunz et al. 2007). Surveys for species should be conducted for at least one full year, preferably two, before construction with an emphasis on the spring and fall migration seasons. If using acoustic detectors, surveys should last for more than three nights. This amount of effort is not adequate to conclude that bats are absent from an area and that the site is appropriate for siting a wind farm (Kunz et al 2007).

Raptors
Improperly sighted wind farms are known to cause significant mortality to raptors. Raptors known to breed in the area include: Considering the soaring behavior of raptors, placement of turbines in areas of elevation (e.g. ridges) should be avoided. Pre-construction surveys should be conducted for these high-raptor use areas as well as nest locations for these and other raptor species.

Bald Eagle
Our records indicate no nesting bald eagles within the proposed project area. However, one nest has been documented 2 miles to the north of the project boundary. In addition, other pair(s) may be nesting in the area without our knowledge. Migrant bald eagles also are possible in the spring and fall. Please know that the bald eagle is state protected as a threatened species. This species also is protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act which are both administered by the USFWS. As such, I recommend contacting the U.S. Fish and Wildlife (USFWS) Ecological Services Field Office in Pierre, SD for further information (605-224-8693 or southdakotafieldoffice@fws.gov).

Piping Plover and Least Tern
The piping plover is an uncommon migrant and summer resident found primarily along the Missouri River. The piping plover is protected as threatened under both state and federal laws. The plover prefers sandbar and shoreline habitat. This species consumes invertebrates. It arrives in April, with the peak breeding season in May and June. This species has been known to breed in Campbell County. It is considered a migrant in Campbell County, but limited information is known about how and where.

The least tern is an uncommon migrant and local summer resident found primarily along the Missouri and Cheyenne rivers. The least tern is protected as endangered under both state and federal laws. Similarly, the least tern is found on sandbars, beaches and islands. Small fish make up this species' prey base. Least terns begin arriving in South Dakota in mid-April to late-May with the peak of breeding in May and June. Least terns are colony nesters, often associated with piping plovers. Fall migration can extend until early September. The least tern is a documented breeder along the Missouri River in Campbell County.

We are concerned about the direct impacts a potential wind power project may have on both the piping plover and least tern. The federal Endangered Species Act is administered by the US Fish and Wildlife Service. As such, I recommend contacting the U.S. Fish and Wildlife (USFWS) Ecological Services Field Office in Pierre.

Whooping Crane
This proposed project location is within the primary migration route of the 'Aransas National Wildlife Refuge to Wood Buffalo National Park' population of whooping cranes. Several reports of migrating whooping cranes have been made fron Campbell County, north of the proposed project area. Placement of turbines in this area could very likely increase the chances of wind turbine and power line strikes and electrocutions. We are concerned about the direct impacts a potential wind power project may have on this population of whooping cranes. The federal Endangered Species Act is administered by the US Fish and Wildlife Service. As such, I recommend contacting the U.S. Fish and Wildlife (USFWS) Ecological Services Field Office in Pierre, SD for further information (605-224-8693 or southdakotafieldoffice@fws.gov).

Bird strikes and electrocutions
Strikes with above ground power lines are a known cause of bird mortality (Erickson et al. 2005). New power lines should be buried. If this is not possible, placement of above-ground transmission lines should avoid spanning large wetlands nor should they be placed between wetlands or wetland complexes. We also recommend placing new transmission lines along existing corridors such as within existing disturbed areas such as road right-of-ways that do not currently intersect wetlands or run along narrow pieces of land between wetlands or wetland complexes.

Electrocution of birds that perch, roost, or nest on power lines continues to be a source of mortality especially for eagles, hawks, and owls ((APLIC) 2006). The Avian Power Line Interaction Committee (APLIC) has developed two documents that provide useful information on how to reduce power line strikes and electrocutions:

- *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and
- *Mitigating Bird Collisions with Power Lines.*

Both of these documents are available from the Edison Institute (http://www.aplic.org).

Wildlife surveys
At least two years of pre-construction surveys should be conducted to determine the species that comprise the wildlife community in the project area and to estimate wildlife populations. This baseline estimate should be used during recommended post-constructions surveys to evaluate any potential impacts to wildlife species in the project area. Protocols should allow data to be comparable to data collected at other wind power project sites in the region. A repeat of these surveys should be done post-construction. Mortality surveys should also be conducted at least two years post-construction. Example survey protocols can be found in (Anderson et al. 1999), (Erickson et al. 2007), and (Kunz et al. 2007). Reports of surveys should be shared with our agency.

Please be aware that the American Wind and Wildlife Institute (http://www.awwi.org/) is working on an initiative to establish a data repository that would provide the opportunity to conduct landscape scale evaluations of wind energy effects on wildlife through the use of a nation-wide database. Participation in their Research Information System is encouraged.

PERMIT REQUIREMENTS

Please note that if survey and monitoring activities include live trapping or the collection of wildlife species, you must first obtain a collection permit from our agency. If these activities include bats, specific sampling and collection protocols must be followed for a collectors permit to be issued. More information can be found at the following websites:

- Scientific Collectors Permit
    - https://gfp.sd.gov/licenses/other-permits/scientific-collectors.aspx
- Bat Sampling and Collection Protocol Guidelines and Requirements
    - https://gfp.sd.gov/wildlife/docs/bat-protocol.pdf.

If during your survey and monitoring activities you or your associates observe any of the animal or plant species monitored by the Natural Heritage Program, we request that reports of these observations be provided. A list of monitored species can be found at http://gfp.sd.gov/wildlife/threatened-endangered.

South Dakota codified law 34A-8-8 allows for only limited and specific authorized take of threatened and endangered species for scientific, zoological, or educational purposes. For more information, please visit https://gfp.sd.gov/licenses/other-permits/endangered-species-permit.aspx.

The South Dakota Public Utilities Commission (PUC) requires a siting permit for wind energy projects 100 MW and greater. Please contact the PUC by mail or phone at 500 E. Capitol Ave in Pierre, SD 57501-5070 or (605) 773-3201.

SUMMARY

As outlined above, our agency has concerns regarding direct and indirect impacts to wildlife and habitats in association with the siting of the proposed project. The Proposed Project Area may contain quality habitats with a variety of wildlife species important to the natural heritage of South Dakota. If this proposed project is developed, I would recommend a site visit with a representative from our agency and the U.S. Fish and Wildlife Service to assist in siting turbine such that wildlife impacts are lessened.

The SDGFP appreciates the opportunity to provide comments. If you have any questions on the above comments, please feel free to contact me at 605-773-2742 or Silka.Kempema@state.sd.us.

Regards,

Silka Kempema

Silka L. F. Kempema
Terrestrial Wildlife Biologist

CC: SD Game, Fish and Parks, Pierre, SD (Attention Casey Mehls)
SD Game, Fish and Parks, Ft. Pierre, SD (Attention Nathan Baker)
U.S. Fish and Wildlife Service, Pierre, SD (Attention Natalie Gates)
U.S. Geological Survey, Jamestown, ND (Attention Jill Shaffer)

Literature Cited

(APLIC), A. P. L. I. C. 2006. Suggested Practices for Avian Protections on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC and the California energy Commission, Washington, D.C. and Sacramento, CA.

Anderson, R., M. Morrison, K. Sinclair, and D. Strickland. 1999. Studying wind energy/bird interactions: A guidance document. National Wind Coordinating Committee.

Erickson, W., D. Strickland, J. A. Shaffer, and D. H. Johnson. 2007. Protocol for investigating displacement effects of wind facilities on grassland songbirds. National Wind Coordinating Collaborative. Wind Wildlife Workgroup.

Erickson, W. P., G. D. Johnson, and D. P. Young Jr. 2005. A summary and comparison of bird mortality from anthropogenic causes with an emphasis on collisions. U.S. Department of Agriculture. General Technical Report General Technical Report PSW-GTR-191.

Kunz, T. H., E. B. Arnett, B. M. Cooper, W. P. Erickson, R. P. Larkin, T. Mabee, M. L. Morrison, M. D. Strickland, and J. M. Szewczak. 2007. Assessing impacts of wind-energy development on nocturnally active birds and bats: A guidance document. Journal of Wildlife Management 71:2449-2486.

Peterjohn, B. G., and J. R. Sauer. 1999. Populations status of North American grassland birds from the North American breeding bird survey. Studies in Avian Biology No. 19:27-44.

Official Species-list: *Campbell County Wind*

South Dakota Ecological Services Field Office

Following is an official U.S. Fish and Wildlife Service species-list from the South Dakota Ecological Services Field Office. The species-list identifies listed and proposed species and designated and proposed critical habitat that may be affected by the project "Campbell County Wind". You may use this list to meet the requirements of section 7(c) of the Endangered Species Act of 1973, as amended (ESA).

This species-list has been generated by the Service's on-line Information, Planning, and Conservation (IPaC) decision support system based on project type and location information you provided on May 9, 2012, 3:17 PM. This information is summarized below.

Please reference our tracking number, 06E14000-2012-SLI-0146, in future reference to this project to assist in expediting the process.

Newer information based on updated surveys, changes in the abundance and distribution of listed species, changed habitat conditions, or other factors could change this list. Please feel free to contact the office(s) identified below if you need more current information or assistance regarding the potential presence of federally proposed, listed, or candidate species, or proposed or designated critical habitat. Please note that under the ESA, a species-list is valid for 90 days. Therefore, the Service recommends that you visit the IPaC site at regular intervals during project planning and implementation for updates to species-lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive this list. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

`http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF`

This list below only addresses federally proposed, listed, or candidate species and federally designated critical habitat. Please contact the appropriate State agencies for information regarding State species of special designation. Also, please feel free to contact the office(s) identified below if you would like information on other important trust resources (such as migratory birds) in your project area.

This Species-list document is provided by:

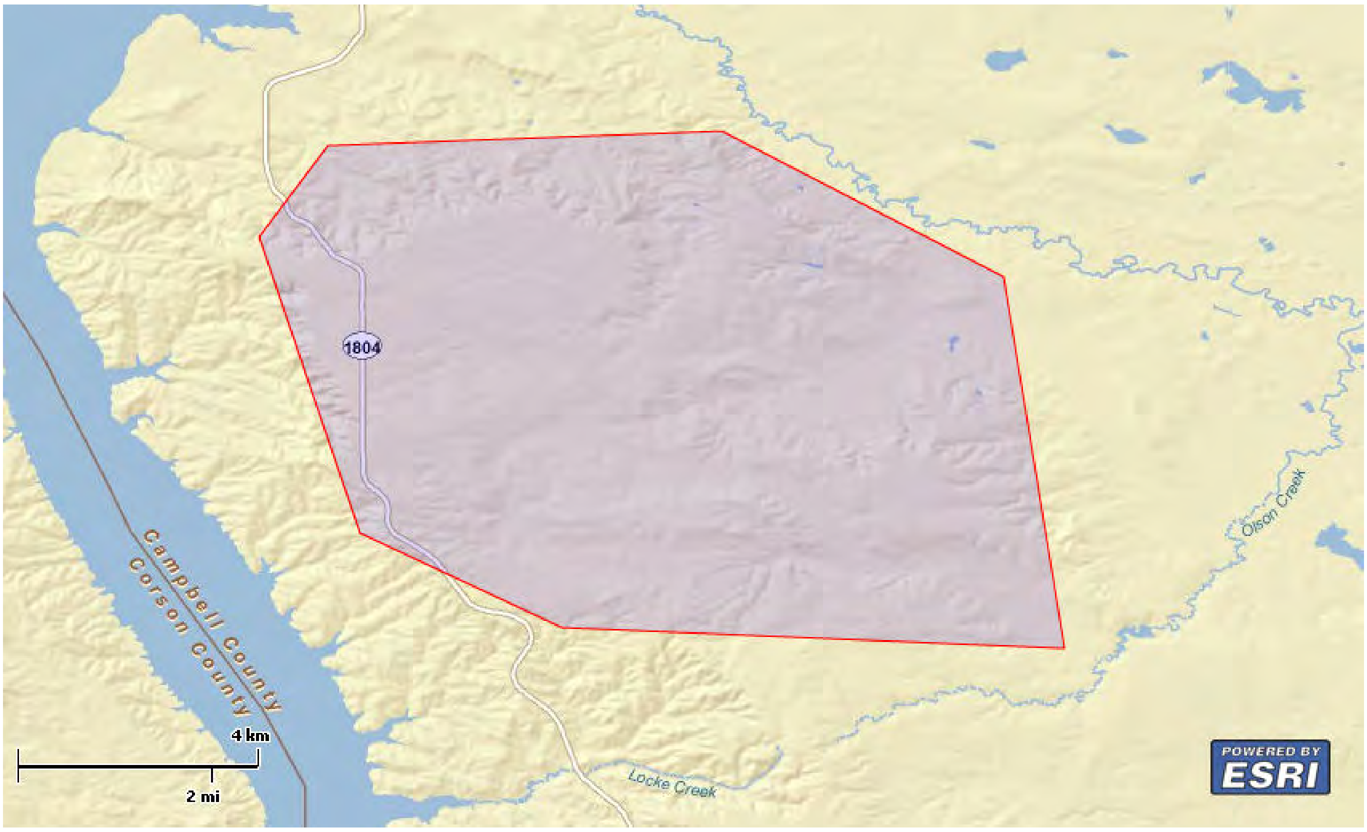
SOUTH DAKOTA ECOLOGICAL SERVICES FIELD OFFICE
420 SOUTH GARFIELD AVENUE, SUITE 400
PIERRE, SD 57501
(605) 224-8693
http://www.fws.gov/southdakotafieldoffice/

TAILS consultation code: 06E14000-2012-SLI-0146

Project type: Power Generation

Project Description: 99 MW wind power generation project located south of Pollock and west of Herreid and Mound City in Campbell County, SD.

Project location map:



Project coordinates: MULTIPOLYGON (((-100.3183632 45.8256264, -100.3036003 45.8451958, -100.2191429 45.8482857, -100.1587181 45.8170433, -100.1456718 45.7373924, -100.2534752 45.7418556, -100.2967339 45.7621117, -100.3183632 45.8256264)))

Project counties: Campbell, SD

Endangered Species Act Species-list

Least tern *(Sterna antillarum)*

Population: interior pop.

Listing Status: Endangered

Pallid sturgeon *(Scaphirhynchus albus)*

Listing Status: Endangered

Piping Plover *(Charadrius melodus)*

Population: except Great Lakes watershed

Listing Status: Threatened

Sprague's Pipit *(Anthus spragueii)*

Listing Status: Candidate

Whooping crane *(Grus americana)*

Population: except where EXPN

Listing Status: Endangered

RE: Natural Heritage Data Request
Mehls, Casey to: 'Dave Plagge' 07/29/2013 11:56 AM

From: "Mehls, Casey" <Casey.Mehls@state.sd.us>
To: 'Dave Plagge' <DPlagge@fageneng.com>
History: This message has been replied to.

Hi Dave,

I actually just conducted a search, and there were no records of threatened, endangered or rare species in the Natural Heritage Database within 1 mile of your project boundary. There are nesting records of the endangered Interior least tern and threatened piping plover along the Missouri River in Campbell county, however your project area is located over 4 miles away from the nearest record. Whooping cranes have also been documented traveling throughout Campbell county during their spring and fall migration. The nearest documented sighting was approximately 3 miles from the project boundary, however their locations are unpredictable from year to year.

Please note that we do not conduct annual surveys for the plant and animal species that are tracked in the NHD, and the absence of a species does not preclude its presence from your proposed project area.

Please let me know if you would like any further information regarding the records I mentioned. Otherwise currently there will be no fee for this search.

Thanks,

~Casey

-----Original Message-----
From: Dave Plagge [mailto:DPlagge@fageneng.com]
Sent: Monday, July 29, 2013 11:41 AM
To: Mehls, Casey
Subject: RE: Natural Heritage Data Request

Thanks, Casey.

I think that limiting the search to a 1 mile boundary around the project would work well for us.

Please include the rare species, also.

Both tabular and maps would be great.

Dave Plagge P
Environmental Coordinator
FAGEN ENGINEERING, LLC.
180 8TH Avenue
Granite Falls, MN 56241
320-564-4573 Main
320-564-2622 Direct/VM
320-564-4861 Fax

From: "Mehls, Casey" <Casey.Mehls@state.sd.us>
To: 'Dave Plagge' <DPlagge@fageneng.com>
Date: 07/29/2013 11:37 AM
Subject: RE: Natural Heritage Data Request

Hi Dave,

I started your data request this morning and realized I have a couple more questions for you, sorry I forgot to mention these earlier.

I opened up your project boundary shapefile. I see you have requesting information for Campbell County, but I can also restrict the database search to only records either occurring within the project boundary or a defined distance away. Doing so would reduce your database search fees.

It looks like you also requested T&E species records. In addition to T&E, the Natural Heritage Database also tracks rare species that are not currently listed. Would you like me to include these records or have them filter out?

Finally, if you prefer I can provide you with both tabular and shapefile records if you like, or just a map if you prefer as listed on your request form.

Thanks,

~Casey

-----Original Message-----
From: Dave Plagge [mailto:DPlagge@fageneng.com]
Sent: Thursday, July 25, 2013 10:00 AM
To: Mehls, Casey
Cc: silka.kempema@state.se.us
Subject: Natural Heritage Data Request

Hello. I have attached my completed Natural Heritage Data Request form, along with a .shp file of the boundary of Campbell County Wind Farm.
Please let me know if this is not the correct way to submit this request, and I'll resubmit.

Thank you-

(See attached file: Completed Heritage Data Request.pdf)(See attached file: CCWF.zip)

Dave Plagge P
Environmental Coordinator
FAGEN ENGINEERING, LLC.

180 8TH Avenue
Granite Falls, MN 56241
320-564-4573 Main
320-564-2622 Direct/VM
320-564-4861 Fax

Appendix C

Wenck
Engineers • Scientists
Business Professionals

Wenck File #2634-03

December 2012

Avian Surveys
Campbell County Wind Farm

Prepared for:

FAGEN ENGINEERING, LLC
Dave Plagge
180 8th Avenue
Granite Falls, MN 56241

Prepared by:

WENCK ASSOCIATES, INC.
301 1st Street NE, Suite 202
Mandan, ND 58554
(701) 751-3370

Table of Contents

Table of Contents (Cont.)

APPENDICES

Appendix A

Appendix B

1.0 Introduction

1.1 PROJECT OVERVIEW

Dakota Plains Energy is planning to develop a wind energy facility in Campbell County, South Dakota. The proposed Campbell County Wind Farm is located on private land in north-central South Dakota. Wenck Associates, Inc. (Wenck) was contracted by Fagen Engineering to conduct a variety of wildlife surveys associated with building and/or operating the proposed facility.

The data from these studies were used to identify species, species groups or species of concern that are present in the project area and that may be at a higher risk of mortality and/or displacement. Data is presented in several categories, and highlight federally listed species, state listed species, and species of concern.

1.2 DIURNAL FIXED-POINT AND INCIDENTAL AVIAN USE SURVEYS

Spring and fall are migration periods for non-resident avian species. During the spring, birds move north from wintering grounds to summer breeding grounds. In the fall, birds move south to wintering grounds. Spring and fall are prime periods to conduct avian surveys on potential wind farm areas to observe migratory species and resident species.

Avian surveys focus on inventory and monitoring with specific objectives that include: 1) an inventory of bird species in a specific project area; 2) determining the relative abundance of species; and 3) monitoring seasonal changes in species composition and relative abundance (Whitworth et al. 2007). Diurnal fixed-point surveys are one of the most common methods used to determine avian composition and abundance. Point counts not only focus on visual cues but also on auditory cues to give the observer an advantage in rough terrain. For some species, vocal cues may be the only reliable means of detection (Whitworth et al. 2007).

Incidental avian surveys are used to obtain bird distribution and composition information between point count locations. Larger birds, such as game birds, raptors, and waterfowl, large flocks of smaller birds, and birds that are a rarity in the area are typically recorded during incidental surveys.

1.3 SHARP-TAILED GROUSE

Male sharp-tailed grouse (*Tympanuchus phasianellus*) congregate at historical/communal leks in the spring to compete for breeding opportunities. Both sexes return to their natal breeding grounds annually for their entire life. Leks are typically found in areas with low vegetation growth on a hill, knoll or other point of high visibility. Fidelity to these locations is extremely high for sharp-tailed grouse. Sharp-tailed grouse require nesting habitat within close proximity to the lek that is comprised of dense or residual vegetative cover to conceal and protect their nest from predators (Vodehnal and Haufler 2007).

Since sharp-tailed grouse typically fly low to the ground, mortality from turbine collisions is low. Fences and power lines, however, may be a significant cause of direct mortality by collision (Bidwell et al. 2003). Disturbance of prairie grouse during the lekking and nesting season may occur from the construction of turbines, location of turbines, turbine noise, and physical movement of turbines during operation. Loss of habitat and fragmentation related to wind energy development may affect local prairie grouse populations by decreasing the area of habitat available for lekking, nesting and brood-rearing and by increasing predation (Pittman et al. 2005). Therefore, federal and state wildlife agencies are concerned about the placement of turbines in areas with known prairie grouse populations. Sharp-tailed grouse leks need to be detected to ensure that wind turbines and/or associated roads are sited so as not to directly impact the lek.

1.4 RAPTOR NESTS

Raptors spend much of their time hunting and soaring within elevation ranges that correspond to the wind turbine rotor-sweep-area (RSA), making them susceptible to turbine blades (Erickson et al. 2002). Because raptors are long-lived species with low reproduction rates, potential population impacts from collision-related mortality are of concern (Erickson et al. 2002). Although specific studies are lacking, adults and recently fledged young could be at particular risk of collision with turbines because of their higher use of areas near nest sites. Adult raptors often fly near nest sites during the breeding season to attend to young and deliver prey. After young raptors fledge, fledglings often spend significant amounts of time flying and roosting near nest locations until they become capable flyers and hunters. Additionally, construction activities near active nests during the breeding season may potentially result in disturbance or abandonment of nest sites.

1.5 WHOOPING CRANES

The whooping crane (*Grus americana*) is a federally listed endangered species. Whooping crane injury or death caused by any wind energy project feature would be considered "take" under the Endangered Species Act. Avoidance of habitat by the cranes due to the construction and operation of turbines can be considered habitat loss and "take" under ESA.

It is unknown how whooping cranes would respond to the presence of wind turbines. Avoidance of wind farms by whooping cranes may reduce the probability of collision, but could amount to loss of stopover habitat. The construction and operation of wind turbines could result in direct mortality from collision with the turbines or by avoidance of habitat in areas where turbines are located.

Power lines located in the vicinity of foraging or roosting habitat pose a threat to whooping cranes due to individual birds often flying at low altitudes (33 to 49 feet above ground) when moving among foraging and roosting sites (Canadian Wildlife Service and United States Fish and Wildlife Service 2005, Stehn and Wassenich 2006). Since 1956, at least 46 whooping cranes have been killed or seriously injured as a result of collisions with power lines (Stehn and Wassenich 2006).

2.0 Methodology

2.1 DIURNAL FIXED-POINT AND INCIDENTAL AVIAN USE SURVEYS

2.1.1 Fixed-point Surveys

Avian point count (PC) surveys were conducted in winter 2011-2012 December 2011 to February 2012), spring 2012 (March 2012 to June 2012) and fall 2012 (August 2012 to November 2012) to capture migrating and resident species at the Campbell County Wind Farm (Table 1). Survey data was used to evaluate avian use, behavior, and species composition during spring and fall migration and to determine summer resident species at the Campbell County Wind Farm. Diurnal fixed-point count surveys were conducted at seven circular plots. Point counts were selected to capture a diverse range of habitats and at locations with the best possible viewshed. .

All observations within an 800-meter radius at each point count were recorded; any observations outside the 800-meter radius were considered incidental. Each PC survey lasted for 20 minutes; all audio and visual observations were recorded. Surveys were conducted by an experience ornithologist. Surveys were rotated to cover all daylight hours to ensure each PC was surveyed at various times of the day. Data recorded for each observation included species, number of individuals, time, height above ground, behavior, and flight direction. A range finder and topographic maps were used as references to determine bird distances to the observer and flight heights. Birds not easily identifiable due to low light conditions and distance were identified to the lowest taxonomic level possible.

The data collected from this study can be used to project the potential effects of wind turbines on avian species at the project area. This survey protocol estimates avian use throughout the day and captures a variety of bird species. Songbirds are most active in the morning during the breeding season and can be difficult to detect during the afternoon, compared to raptors which become more active as the sunlight heats the air and creates thermals, which individuals use for soaring.

Twenty-minute survey periods provide adequate time to detect both raptors and non-raptors. Double counting may occur during the 20 minute survey because individuals may appear and disappear from view. Double-counting of birds is not problematic for this type of survey because the objective is to document use in terms of number of birds noted per 20-minute survey, not number of distinct individual birds.

The ability to detect all species within the 800-meter survey radius varies among species and potentially not all individuals within the survey area are counted. This variation in detectability results in an overestimate of mean use in conspicuous species and an underestimate of mean use in reclusive species (Thompson 2002).

2.1.2 Incidental Observations

Incidental observations included observations that occurred while traveling between PC locations, pre- and post-PC survey time period, and outside the 800-meter radius circular plot. These observations were recorded but not used in the formal analysis. Incidental observations are presented in Table 8.

2.1.3 Species Groupings

The data is presented in two primary groups of interest: raptors and non-raptors. Raptors were defined as vultures, hawks, eagles, falcons, and owls. Non-raptors were defined as all other avian species.

2.1.4 Mean Avian Use

Mean use was calculated by dividing the total number of birds per species observed by the total number of surveys conducted. Mean use was also calculated for each individual point count location to determine if there were areas with a higher mean use compared to other areas. The number of observations is also presented. This information helps depict whether a high mean use is driven by a single observation.

2.1.5 Flight Behavior

Flight behavior was evaluated by calculating the proportion of flying birds that were observed flying below, within, or above the turbine RSA. Fagen Engineering is proposing turbines with a hub height of 80 meters with a 77 meter diameter RSA. Therefore, an RSA between 41.5 and 118.5 meters above the ground was used.

2.1.6 Encounter Rate

The encounter rate is the rate in which a species was observed flying through the RSA during the avian point count surveys at the Campbell County Wind Farm project area and suggests potential mortality risk from flight behavior.

To estimate the rate at which a species flies through the RSA, the following equation was applied to every species observed in the Campbell County Wind Farm:
Encounter Rate = $A*Pf*Pt$

- A is the mean use of birds/20 minutes for a given species
- P*f* is the proportion of all activity observations for a given species that were flying
- P*t* is the proportion of flying observations that were within the turbine RSA

The encounter rate index is relative to the observations of species during the surveys and within the study area and cannot be extrapolated to the species that may use the Campbell County Wind Farm in the future. The encounter rate index from this study does not take into consideration behavior (e.g. foraging, courtship), habitat use, and turbine avoidance differences between species.

2.2 SHARP-TAILED GROUSE

Sharp-tailed grouse surveys were conducted in early April through early May 2010 and 2012, from ½ hour before sunrise to two hours after sunrise. Peak attendance by females on leks typically occurs from April 15 to 25, but these dates vary by up to a week depending on weather conditions (Schroeder and Robb 1993). Listening stops were made throughout the project area and within 1-mile from the project boundary to identify lek locations. Sharp-tailed grouse males may be heard at a distance of up to 0.5 mile. Listening stops were not conducted if winds exceeded 10 miles per hour (mph) or during precipitation events. After a lek was located, the birds were observed and the number of males and females were counted. Lek locations were documented using Global Positioning System (GPS) coordinates. Given the sensitive nature of this species, and the fact that females may be nesting near the lek, disturbance to breeding prairie grouse was kept to a minimum.

2.3 RAPTOR NESTS

A raptor nest survey was conducted to locate raptor nests and determine nest activity status and the species using those nests. The initial surveys were conducted in early April 2010 and 2012, before trees leafed out, to locate nests and to identify early breeding species. The project area and a 1-mile buffer area were surveyed from a vehicle using binoculars and spotting scopes. All raptor nest locations were documented with GPS coordinates. Raptor species, height of nest, nest activity status, nest condition, substrate, and other relevant data were recorded for each nest. An additional visit was conducted in May 2012 to document the activity status of nests located during the initial survey and to identify nesting attempts by late nesting raptors such as Swainson's hawks. Raptors may use nests intermittently among years as well as re-nest after a nest failure; therefore, early and late-season nest surveys allow for a more accurate summary of breeding raptors.

2.4 WHOOPING CRANES

Sandhill/Whooping crane surveys were conducted between early April and late April 2012 and again from early October to early November 2012, when the highest numbers of cranes are expected to occur in the project area (USFWS 2007). Sandhill/Whooping crane surveys were conducted by driving a vehicle along the roads within the project area. Stops were made at good vantage points and the biologist glassed and listened for the presence of cranes. On calm mornings sandhill cranes may be heard at a distance of 2.5 miles (Tacha et al. 1992). Each stop consisted of listening and using binoculars and/or spotting scopes to scan the surrounding terrain to visually identify sandhill and/or whooping cranes. Listening stops were conducted at, but not limited to, established avian point count locations. Stops were not conducted during excessively harsh weather conditions.

3.0 Results

3.1 CAMPBELL COUNTY WIND FARM

Of the approximately 11,750 acres that comprise the Campbell County Wind Farm, approximately 2,253 acres were surveyed within the project area boundary during PC surveys, covering 19.2 percent of the total project area. Seven point count locations were surveyed at the Campbell County Wind Farm (Figure 1). The winter 2011-2012 surveys were conducted six times while the spring and fall 2012 surveys were done 13 times at all of the seven PC locations, which resulted in a total of 224, 20-minute surveys (Table 1).

3.2 SPECIES COMPOSITION

The winter 2011-2012 survey consisted of 346 avian individuals (14 different species) that were recorded during the 6 fixed-PC surveys (Table 2). The most frequently observed birds were Lapland longspur (*Calcarius lapponicus*) (69.94 percent of all birds observed), European starling (*Sturnus vulgaris*) (7.51 percent), house sparrow (*Passer domesticus*) (6.36 percent) and ring-necked pheasant (*Phasianus colchicus*) (5.20 percent) (Table 3). The remaining 10 species comprised 10.99 percent of the total number of birds observed.

The spring 2012 survey consisted of 7,250 avian individuals (93 different species) that were recorded during the 13 fixed-PC surveys (Table 2). The most frequently observed birds were common grackle (*Quiscalus quiscula*) (35.79 percent of all birds observed), cliff swallow (*Petrochelidon pyrrhonota*) (16.21 percent) and red-winged blackbird (*Agelaius phoeniceus*) (9.10 percent) (Table 3). The remaining 90 species comprised 38.90 percent of the total number of birds observed.

The fall 2012 survey consisted of 23,665 avian individuals (69 different species) that were recorded during the 13 fixed-PC surveys (Table 2). The most frequently observed birds were Brewer's blackbird (*Euphagus cyanocephalus*), (69.97 percent of all birds observed), red-winged blackbird (14.56 percent) and European starling (4.34 percent) (Table 3). The remaining 66 species comprised 11.13 percent of the total birds observed.

3.3 AVIAN USE

Winter 2011-2012 overall mean bird use was 8.24 birds/20 min (Table 2). The overall mean use by non-raptors was 7.81 birds/20 min; the highest were Lapland longspur (5.76 birds/20 min), European starling (0.62 birds/20 min) and house sparrow (0.52 birds/20 min) (Table 2). The highest mean use at a point count was at PC #16 (approximately 26.00 birds/20 min) and observations at this point included high numbers of Lapland longspur (142 individuals) (Table 4).

Spring 2012 overall mean bird use was 79.67 birds/20 min (Table 2). The overall mean use by non-raptors was 78.81 birds/20 min; the highest were common grackle (28.52 birds/20 min), cliff swallow (12.91 birds/20 min) and red-winged blackbird (7.25 birds/20 min) (Table 2). The highest mean use at a point count was at PC #2 (approximately 270.77 birds/20 min) and observations at this point included high numbers of common grackle (2,045 individuals) and cliff swallow (1,175 individuals) (Table 4).

Fall 2012 overall mean bird use was 260.07 birds/20 min (Table 2). The overall mean use by non-raptors was 259.45 birds/20 min; the highest mean use species were Brewer's blackbird (181.97 birds/20 min), red-winged blackbird (37.86 birds/20 min) and European starling (11.29 birds/20 min) (Table 2). The highest mean use at a point count was at PC #1 (1,298.46 birds/20 min) and observations at this point included high numbers of Brewer's blackbirds (1,550 individuals) (Table 4).

For the winter 2011-2012 species groups, overall mean use was highest for songbirds (7.31 birds/20 min) followed by gamebirds (0.45 birds/ 20 min) (Table 2).

For the summer 2012 species groups, overall mean use was highest for songbirds (69.43 birds/20 min) followed by gamebirds (4.30 birds/ 20 min) (Table 2).

For the fall 2012 species groups, overall mean use was highest for songbirds (246.38 birds/20 min) followed by waterfowl (5.07 birds/ 20 min) (Table 2).

Raptors are a group of special interest because of their propensity to fly at heights within a turbine RSA. Overall winter 2011-2012 mean use for raptors was 0.43 birds/20 min. Six raptor species were identified during the winter 2011-2012 PC surveys: golden eagle (*Aquila chrysaetos*) and rough-legged hawk (*Buteo lagopus*) (0.12 birds/20 min); northern harrier (*Circus cyaneus*) (0.10 birds/20 min); bald eagle (*Haliaeetus leucocephalus*) (0.05 birds/20 min); prairie falcon (*Falco mexicanus*) and snowy owl (*Bubo scandiacus*) (0.02 birds/20 min) (Table 2).

Overall spring 2012 mean use for raptors was 0.95 birds/20 min. Eight raptor species were identified during the PC survey. The top three observed were: red-tailed hawk (*Buteo jamaicensis*) (0.40 birds/20 min), northern harrier (0.26 birds/20 min) and turkey vulture (*Cathartes aura*) (0.12 birds/20 min) (Table 2).

Overall fall 2012 mean use for raptors was 0.62 birds/20 min. Eight raptor species were identified during the PC survey. The top three observed were: red-tailed hawk (0.43 birds/20 min), turkey vulture (0.07 birds/20 min) and northern harrier (0.04 birds/20 min) (Table 2).

3.4 FREQUENCY OF OCCURRENCE

The ring-necked pheasant was the most common species present (14.29 percent of all surveys) and was most widely distributed throughout the Campbell County Wind Farm project area in the winter 2011-2012 surveys (Tables 2 and 4). Other frequently occurring species included golden eagle (11.90 percent of all surveys), and rough-legged hawk (9.52 percent of all surveys) (Table 3).

Western meadowlark was the most common species present (97.80 percent of all surveys) and most widely distributed throughout the project area in the spring 2012 surveys (Tables 2 and 4). Other frequently occurring species included ring-necked pheasant (79.12 percent of all surveys), horned lark (65.93 percent of all surveys) and common grackle (56.04 percent of all surveys) (Table 3).

Western meadowlark was the most common species present (42.86 percent of all surveys) and most widely distributed throughout the project area in the fall 2012 surveys (Tables 2 and 4). Other frequently occurring species included mourning dove (*Zenaida macroura*) (38.46 percent of all surveys) and red-tailed hawk (34.07 percent of all surveys) (Table 3).

3.5 FLIGHT HEIGHT AND ENCOUNTER RATE

During the winter 2011-2012 avian use surveys 89.90 percent of all individuals observed were flying (Table 6). Flight height and flight direction data was recorded for most of the flying birds observed (Table 7a). Approximately 69.23 percent of flying raptor species flew below the RSA, 23.08 percent flew within the RSA, and 7.69 percent flew above the RSA. For all other species, approximately 78.19 percent flew below the RSA, 21.81 percent flew within the RSA, and 0.00 percent flew above the RSA (Table 5).

During winter 2011-2012 surveys, golden eagles had the highest raptor species encounter rate (0.05 birds flying within the RSA/20 min). This was followed by bald eagle (0.02 birds flying within the RSA/20 min) (Table 6).

Lapland longspur had the highest non-raptor winter 2011-2012 encounter rate (1.52 birds flying within the RSA/20 min), followed by sharp-tailed grouse (0.02 birds flying within the RSA/20 min) (Table 6).

During the spring 2012 avian use surveys, 79.99 percent of all individuals observed were flying (Table 6). Flight height and flight direction data was recorded for most of the flying birds (Table 7b). One hundred percent of flying raptor species flew below the RSA. For all other species, 99.30 percent flew below the RSA, 0.70 percent flew within the RSA, and 0.00 percent flew above the RSA (Table 5).

During spring 2012 surveys no raptors were observed flying within or above the RSA (Table 6).

Lapland longspur had the highest non-raptor spring 2012 encounter rate (0.44 birds flying within the RSA/20 min) (Table 6).

During the fall 2012 avian use surveys, 97.00 percent of all individuals observed were flying (Table 6). Flight height and flight direction data was recorded for most of the flying birds (Table 7c). Approximately 88.10 percent of flying raptor species flew below the RSA, 9.52 percent flew within the RSA, and 2.38 percent flew above the RSA. For all other species, 99.99 percent flew below the RSA, <0.01 percent flew within the RSA, and <0.01 percent flew above the RSA (Table 5).

During fall 2012 surveys, red-tailed hawk was the only raptor species with an encounter rate (0.04 birds flying within the RSA/20 min) (Table 6).

Eastern Kingbird (*Tyrannus tyrannus*) was the only non-raptor fall 2012 species with an encounter rate (0.01 birds flying within the RSA/20 min) (Table 6).

3.6 SENSITIVE SPECIES OBSERVATIONS

A total of twelve sensitive avian species of concern for South Dakota were recorded during the winter 2011-2012, spring 2012 and fall 2012 PC and incidental surveys (South Dakota Natural Heritage Program, 2012) (Tables 4 and 8). This included the great blue heron (*Ardea herodias*) (12 individuals), bufflehead (*Bucephala albeola*) (8 individuals), hooded merganser (*Lophodytes cucullatus*) (1 individual), bald eagle (*Haliaeetus leucocephalus*) (2 individuals), sharp-shinned hawk (*Accipiter striatus*) (1 individual), Cooper's hawk (*Accipiter cooperii*) (2 individuals), broad-winged hawk (*Buteo platypterus*) (3 individuals), Swainson's hawk (*Buteo swainsoni*) (19 individuals), Ferruginous hawk (*Buteo regalis*) (8 individuals), golden eagle (*Aquila chrysaetos*) (5 individuals), merlin (*Falco columbarius*) (2 individuals) and prairie falcon (*Falco mexicanus*) (2 individuals). The golden and bald eagle are also legally protected under the Bald and Golden Eagle Protection Act (BGEPA 1940), while the others are protected under the Migratory Bird Treaty Act (MBTA 1919).

3.7 FLIGHT DIRECTION

Birds observed flying during the winter 2011-2012 surveys were generally flying in north, west and northwest directions (20.00 percent each). This was followed by northeast and south (15.00 percent each and southwest (10.00 percent) (Table 7a).

During the spring 2012 surveys, birds were generally flying in a southerly direction (73.71 percent). This was followed by west (11.14 percent), east (7.37 percent), north (6.65 percent), northwest (0.75 percent), southeast (0.21 percent), northeast (0.14 percent), and southwest (0.03 percent) (Table 7b).

During the fall 2012 surveys birds were generally flying in a southerly direction (43.13 percent). This was followed by east (22.94 percent), west (13.52 percent), southeast (12.46 percent), north (6.82 percent), northeast (0.96 percent), northwest (0.10 percent), and southwest (0.06 percent) (Table 7c).

3.8 INCIDENTAL SURVEYS

Cumulative incidental observations for all three surveys periods included 93 different species, which included 495 observations and 13,885 individuals (Table 8).

During the winter 2011-2012 incidental survey, staff documented 11 species and a total of 76 individuals over 6 survey periods (Table 8). Six species were detected during incidental surveys, but not during the winter 2011-2012 point count surveys, including American goldfinch (*Carduelis tristis*), blue jay (*Cyanocitta cristata*), black-capped chickadee (*Poecile atricapillus*), red-tailed hawk, sharp-shinned hawk (*Accipiter striatus*), and yellow shafted flicker (*Colaptes auratus*), (Table 8).

During the spring 2012 incidental survey, staff documented 74 species and a total of 2,525 individuals over 13 survey periods (Table 8). Twenty species were detected during incidental surveys, but not during the spring 2012 point count surveys, including American avocet (*Recurvirostra americana*), American wigeon (*Anas americana*), American coot (*Fulica americana*), bank swallow (*Riparia riparia*), blue grosbeak (*Passerina caerulea*), broad-winged hawk (*Buteo platypterus*), bufflehead (*Bucephala albeola*), Canada goose (*Branta canadensis*), Franklin's gull (*Leucophaeus pipixcan*), hooded merganser (*Lophodytes cucullatus*), house finch (*Haemorhous mexicanus*), lesser scaup (*Aythya affinis*), lesser yellowlegs (*Tringa flavipes*), merlin (*Falco columbarius*), redhead (*Aythya americana*), ring-necked phalarope (*Phalaropus lobatus*), ring-necked duck (*Aythya collaris*), short-eared owl (*Asio flammeus*), willet (*Tringa semipalmata*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*) (Table 8).

During the fall 2012 incidental survey, staff documented 48 species and a total of 11,315 individual birds over 13 survey periods (Table 8). Seventeen species were detected during incidental surveys, but not during the fall 2012 point count surveys, including American coot , bank swallow, canvasback (*Aythya valisineria*), Cooper's hawk (*Accipiter cooperii*), gadwall (*Anas strepera*), grasshopper sparrow (*Ammodramus savannarum*), gray partridge (*Perdix perdix*), green-winged teal (*Anas carolinensis*), loggerhead shrike (*Lanius ludovicianus*), mountain bluebird (*Sialia currucoides*), northern pintail (*Anas acuta*), northern shoveler (*Anas clypeata*), pie-billed grebe (*Podilymbus podiceps*), prairie falcon, redhead, ring-billed gull (*Larus delawarensis*), and short-eared owl (Table 8).

3.9 SHARP-TAILED GROUSE

Three sharp-tailed grouse leks were located within the survey area (Figure 2). All of the leks were located in native or tame pasture land in the 1-mile buffer area; none were within the project boundary. The survey area appeared to have areas that contained quality sharp-tailed grouse habitat, particularly in areas of contiguous grassland within the east and northeast portions of the project area and within the buffer area to the west and northwest of the project area. However, on a landscape-level, the habitat was fragmented with crop fields and lacked woody cover to support larger populations of sharp-tailed grouse. Lek number, date, number of birds present, habitat and GPS coordinates were recorded (Table 10).

3.10 RAPTOR NESTS

Eleven raptor nests were located within the survey area (Figure 2). Two species of nesting raptors were identified: red-tailed hawk and Swainson's hawk (Table 9). Nesting substrates were limited to trees or bushes associated with unoccupied and occupied farm yards. No cliff or bluff nesting substrate exists in the survey area. Prey base habitat appeared limited because of the fragmented landscape which consists mostly of agricultural land.

3.11 WHOOPING CRANES

No whooping cranes were sighted during the spring or fall 2012 survey. Three sandhill crane groups with a total of 130 individuals were observed during the spring and fall 2012 survey.

4.0 Discussion and Impact Assessment

4.1 RAPTOR USE AND ENCOUNTER RATE

During the winter 2011-2012 survey 18 individual raptors were observed for a mean use of 0.43 raptors/20 min; during the spring 2012 survey 86 individual raptors were observed for a mean use of 0.95 raptors/20 min; and during the fall 2012 survey 56 individual raptor observations were made for a mean use of 0.62 raptors/20 min (Table 2).

The overall raptor mean use rate at the Campbell County Wind Farm was 0.71 raptors/20 min (winter 2011-2012, spring 2012 and fall 2012). This rate was compared to a study of 37 other wind energy facilities that implemented similar protocols. The raptor annual mean use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/20 min survey. Based on the results from these wind energy facilities, as summarized by Derby et al. 2010, a ranking of seasonal raptor mean use was developed: low (0-0.5 raptors/20 min. survey); low to moderate (0.5-1.0 raptors/20 min); moderate (1.0-2.0 raptors/20 min); high (2.0-3.0 raptors/20 min); and very high (> 3.0 raptors/20 min). Under this ranking, mean raptor use at the Campbell County Wind Farm is considered to be low to moderate.

Encounter rate analysis may also suggest which species may be at risk to become turbine casualties. The encounter rate is an index and only considers probability of exposure based on abundance, number of individuals flying, and flight height of each species within the RSA for turbines to be used at the wind-energy facility.

Raptor encounter rates at the Campbell County Wind Farm are considered low, with 0.07 individuals flying within the RSA/20 min during the winter 2011-2012 survey, 0.00 individuals flying within the RSA/20 min during the spring 2012 survey and 0.04 individuals flying within the RSA/20 min during the spring 2012 survey (Table 6). Approximately 6.4 percent of all raptor observations were within the RSA. The highest raptor encounter rate was golden eagle with 0.05 individuals flying within the RSA/20 min during the winter 2011-2012 survey. Red-tailed hawk was second with an encounter rate of 0.04 individuals flying within the RSA/20 min during the fall 2012 survey (Table 6). The winter 2011-2012, spring 2012, fall 2012 and annual raptor encounter rate is relatively low, and the percentage of raptor observations within the RSA during the surveys and the low to moderate annual mean use rate (raptors/20 minutes) indicates a low potential for mortality at the Campbell County Wind Farm.

High numbers of raptor fatalities have been documented at wind-energy facilities (e.g. Altamont Pass); however other studies at wind-energy facilities in the United States found that 3.2% of the total casualties were raptors (Erickson et al. 2001). Results from Altamont Pass in California suggest that species mortality is not all related to abundance (Orloff and Flanery 1992). Golden eagles, red-tailed hawks and American kestrels were casualties more often than predicted based on abundance. Based on species occurrence/abundance within the Campbell County Wind Farm, golden eagles and red-tailed hawks may constitute the highest proportion of potential raptor fatalities at Campbell County Wind Farm.

Raptor nest density within the Campbell County Wind Farm and within one mile of the project boundary was one nest per 4.0 square miles (Figure 2). Few raptor species that have been identified as nesting at wind energy facilities have been observed as fatalities at wind energy facilities (Derby et al. 2010); therefore, the relationship is low between the number of collision fatalities and raptor nests within or near project facilities. However, it is assumed that raptors nesting close to turbines would likely have a greater chance of being impacted from collision with turbines, though the data is not available at this time to determine the impact (Derby et al. 2010).

4.2 NON-RAPTOR USE AND ENCOUNTER RATE

Migratory bird species in the United States are protected by the Migratory Bird Treaty Act (MBTA). Passerine species have been the most abundant bird fatality at wind energy facilities outside California (Erickson et al. 2001 and Erickson et al. 2002), often comprising more than 80% of the bird fatalities. Both migrant and resident passerine fatalities have been observed (Erickson et al. 2001 and Erickson et al. 2002). Passerines make up a large proportion of the birds observed during the avian surveys at the Campbell County Wind Farm and would be expected to make up the largest proportion of fatalities. Encounter rate indices for both winter 2011-2012 and spring 2012 PC surveys indicate that the Lapland longspur is likely to be exposed to collisions from wind turbines at the Campbell County Wind Farm (Table 6). There were other species that flew through the RSA during the PC surveys, but encounter rates were not high enough to warrant significant collision exposure (Table 6).

4.3 SHARP-TAILED GROUSE

The sharp-tailed grouse inhabits steppe, grassland and mixed grass habitats. Sharp-tailed grouse serve as indicators of grassland ecosystem health and provide recreational and aesthetic value. Three known sharp-tailed grouse leks were located within the surrounding area in 2010 and 2012; none of these leks were located within the project area.

Native prairie is used by sharp-tailed grouse for seasonal habitat needs such as lekking, nesting, brood rearing, and wintering. The area surrounding the lek site contains habitat for reproduction and year round survival of sharp-tailed grouse. Loss of native prairie may affect the availability of habitat for grouse lekking and reproduction. Concerns that sharp-tailed grouse may avoid lek activity and nesting near human-made structures have heightened this issue for siting wind farms (Pitman et al. 2005). Establishing new roads in areas of native prairie increases habitat fragmentation and could provide better access for nesting predators such as skunks, raccoons, coyotes and feral cats. Reproductive success could be reduced if native prairie areas are more accessible to predators. Turbine setbacks from leks and minimizing grouse habitat disturbance may reduce the direct and indirect effect of wind development on grouse.

South Dakota Game Fish and Parks (SDGFP) recommends a No Surface Occupancy (NSO) setback of 1.0 mile from leks in which no turbines should be constructed (Figure 2). They also recommend a timing limitation from March 1st to June 30th, within a distance of 2.0 miles, in order to protect leks and nests. No activity/construction within this buffer during this time is recommended. It is also recommended to avoid placing wind developments in large, contiguous blocks of grassland. Blocks are considered fragmented by any human-derived feature (e.g., agricultural uses, fences, transmission lines, roads, burned areas) that subdivides them. Maintaining habitat connectivity between leks is important because both males and females use multiple leks throughout the breeding season. Setbacks from leks would help further minimize any potential displacement impacts to sharp-tailed grouse.

4.4 LISTED AND SENSITIVE SPECIES RISK

All sensitive species observed at the Campbell County Wind Farm are summarized in Section 3.6. No federally listed threatened, endangered or candidate species were observed at the Campbell County Wind Farm during this study. One state listed threatened/endangered species, the bald eagle, was observed during fixed-point surveys at the Campbell County Wind Farm.

The U.S. Fish & Wildlife Service (USFWS) has expressed concern over potential impacts to whooping cranes. The whooping crane migrates through South Dakota during spring and fall, within a corridor that is roughly 200-miles wide; the Campbell County Wind Farm falls within the center of the corridor where 75% of South Dakota's whooping crane reported sittings have been recorded (Figure 3). No whooping cranes were observed during the study, however several groups of sandhill cranes were observed during the spring and fall PC surveys which often travel with whooping cranes.

Whooping crane stopover habitat in South Dakota is variable, but can be described as wetlands (roosting areas) that are greater than ¼ acre in size with water depths in the range of five to eight inches with minimal surrounding vegetation. Harvested cereal grain fields in close proximity to wetlands are used for foraging by whooping cranes, however cranes will also forage in wetlands and other crops such as alfalfa. See the "Avian Survey-Campbell County Wind Farm" submitted January of 2011 for the whooping crane attractiveness of the Campbell County Wind Farm and surrounding area.

The probability of whooping crane collisions with turbines on the Campbell County Wind Farm is unknown. However, the sporadic nature of stopovers within the 2,500 mile long by 200-mile wide migration corridor, and the small size of the proposed Campbell County Wind Farm, the probability of whooping crane collisions is presumed to be low.

5.0 Conclusion

Differences in bird use were detected between the winter 2011-2012, spring 2012 and fall 2012 PC survey points. It appeared that birds were using specific areas of the Campbell County Wind Farm, especially point counts #1 and #2 in which large numbers of common grackles, cliff swallows and Brewer's blackbirds were observed. No strong associations with topographic features within the Campbell County Wind Farm were noted for raptors or other large avian species. No flyways or concentration areas were observed.

Based on research conducted at wind farms throughout the United States, raptor use at the Campbell County Wind Farm is generally lower than use levels recorded at other wind farms. To date, no relationships have been determined between overall use by other bird species, and fatality rates of those bird groups at wind farm facilities. Flight characteristics and foraging habits of some species may result in additional exposure for these species at the Campbell County Wind Farm. The surveys for this proposed wind farm did not address the impacts to nocturnal migrants. Generally, overall fatality rates for birds (including nocturnal migrants) at wind farm facilities in the Midwest portion of the United States have been relatively low and consistent. The range of overall bird fatality estimates at three Midwest wind farm facilities has ranged from 0.7 to 3.4 fatalities/MW/year (Derby, et al. 2010).

Wildlife and plants which are closely associated with grasslands, primarily native, may be affected by the potential construction and operation of this wind farm facility. Wildlife species may avoid these habitats during siting of turbines. Plants will be permanently removed by turbine placement and access road construction. No federally listed endangered, threatened, or candidate species were observed within the Campbell County Wind Farm. However, twelve sensitive state avian species of concern were recorded within the project area. These avian species are generally not associated with agricultural habitats and occur in grassland/native prairie, wetlands, or woodland habitats. The potential exists for these species to be temporarily or permanently displaced from these habitats.

The Campbell County Wind Farm is located within the center of the whooping crane migration corridor, and a similar species, sandhill crane, was documented to occur during both the spring and fall PC surveys. Adequate stop-over habitat exists for the whooping crane to use Campbell County Wind Farm.

Sharp-tailed grouse were observed throughout the surveys, and three leks were located during the spring lekking season. South Dakota Game Fish and Parks (SDGFP) recommend avoiding placing turbines within 1.0 mile of sharp-tailed grouse leks and a construction timing limitation from March 1st to June 30th, for a distance of 2.0 miles from leks.

Direct mortality and/or injury from collisions with wind turbines and/or guy wires, temporary or permanent habitat loss, and displacement of birds from habitats near turbines are possible impacts to avian species from the construction and operation of the Campbell County Wind Farm (Drewitt and Langston 2006). In addition to mortality associated with wind farms, concerns have been raised that bird species may avoid areas near turbines after the wind farm is in operation (Drewitt and Langston 2006).

6.0 General and Signatures

The services performed by Wenck scientists for this project have been conducted in a manner consistent with the degree of care and technical skill appropriately exercised by professionals currently practicing in this area under similar time and budget constraints. Recommendations and findings contained in this report represent our professional judgment and are based upon available information and technically accepted practices at the present time and location. Other than this, no warranty is implied or expressed.

Wenck Wildlife Biologist Justin Askim prepared the report.

Justin Askim, Wildlife Biologist

12/26/2012
Date

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Table 1. Campbell County Wind Farm Point Count Dates	
Winter 2011-2012	
Survey Number	**Date**
1	12/14/2011
2	12/27/2011
3	1/9/2012
4	1/26/2012
5	2/8/2012
6	2/21/2012
Spring 2012	
Survey Number	**Date**
1	3/19/2012
2	3/28/2012
3	4/3/2012
4	4/10/2012
5	4/17/2012
6	4/24/2012
7	4/30/2012
8	5/8/2012
9	5/14/2012
10	5/21/2012
11	5/28/2012
12	6/5/2012
13	6/14/2012
Fall 2012	
Survey Number	**Date**
1	8/17/2012
2	8/23/2012
3	8/30/2012
4	9/5/2012
5	9/12/2012
6	9/18/2012
7	9/24/2012
8	10/2/2012
9	10/10/2012
10	10/16/2012
11	10/22/2012
12	10/30/2012
13	11/6/2012

Table 2. Campbell County Wind Farm Point Count Avian Species by Group

Species	Winter 2011-2012			Spring 2012			Fall 2012		
	Number of Birds	Number of Observations	Mean Use (# birds/20 min.)	Number of Birds	Number of Observations	Mean Use (# birds/20 min.)	Number of Birds	Number of Observations	Mean Use (# birds/20 min.)
Songbirds									
Alder Flycatcher	0	0	0.00	1	1	0.01	0	0	0.00
American Goldfinch	0	0	0.00	24	20	0.26	64	36	0.70
American Robin	0	0	0.00	27	22	0.30	114	17	1.25
American Tree Sparrow	7	1	0.17	13	5	0.14	9	4	0.10
Baltimore Oriole	0	0	0.00	2	2	0.02	0	0	0.00
Barn Swallow	0	0	0.00	38	24	0.42	58	26	0.64
Black-capped Chickadee	0	0	0.00	2	2	0.02	8	6	0.09
Blue Grosbeak	0	0	0.00	0	0	0.00	2	2	0.02
Blue-winged Warbler	0	0	0.00	1	1	0.01	0	0	0.00
Bobolink	0	0	0.00	44	14	0.48	6	1	0.07
Brewer's Blackbird	0	0	0.00	3	2	0.03	16,559	6	181.97
Brown Thrasher	0	0	0.00	34	24	0.37	5	3	0.05
Brown-headed Cowbird	0	0	0.00	118	38	1.30	1	1	0.01
Cedar Waxwing	0	0	0.00	335	5	3.68	0	0	0.00
Chestnut-collared Longspur	0	0	0.00	10	9	0.11	1	1	0.01
Chipping Sparrow	0	0	0.00	28	7	0.31	2	1	0.02
Clay-colored Sparrow	0	0	0.00	62	9	0.68	21	5	0.23
Cliff Swallow	0	0	0.00	1,175	5	12.91	2	2	0.02
Common Grackle	0	0	0.00	2,595	56	28.52	342	14	3.76
Common Yellowthroat	0	0	0.00	6	6	0.07	0	0	0.00
Dark-eyed Junco	0	0	0.00	9	3	0.10	151	15	1.66
Dickcissel	0	0	0.00	20	8	0.22	0	0	0.00
Eastern Bluebird	0	0	0.00	3	3	0.03	6	3	0.07
Eastern Kingbird	0	0	0.00	29	20	0.32	40	15	0.44
European Starling	26	1	0.62	295	24	3.24	1,027	25	11.29
Field Sparrow	0	0	0.00	0	0	0.00	4	2	0.04
Grasshopper Sparrow	0	0	0.00	1	1	0.01	0	0	0.00
Grays Catbird	0	0	0.00	1	1	0.01	1	1	0.01
Harris's Sparrow	0	0	0.00	4	2	0.04	14	5	0.15
Horned Lark	10	3	0.24	127	71	1.40	50	17	0.55
House Finch	0	0	0.00	0	0	0.00	7	2	0.08
House Sparrow	22	1	0.52	11	5	0.12	12	7	0.13
House Wren	0	0	0.00	27	20	0.30	1	1	0.01
Lapland Longspur	242	3	5.76	60	2	0.66	100	1	1.10
Lark Bunting	0	0	0.00	1	1	0.01	0	0	0.00
Lark Sparrow	0	0	0.00	2	2	0.02	16	4	0.18
Least Flycatcher	0	0	0.00	8	8	0.09	0	0	0.00
Loggerhead Shrike	0	0	0.00	2	2	0.02	0	0	0.00
Orchard Oriole	0	0	0.00	15	13	0.16	2	2	0.02
Pine Siskin	0	0	0.00	3	1	0.03	0	0	0.00
Red-eyed Vireo	0	0	0.00	1	1	0.01	0	0	0.00
Red-winged Blackbird	0	0	0.00	660	54	7.25	3,445	21	37.86
Ruby-crowned Kinglet	0	0	0.00	1	1	0.01	0	0	0.00
Savannah Sparrow	0	0	0.00	8	7	0.09	98	18	1.08
Say's Phoebe	0	0	0.00	9	9	0.10	3	3	0.03
Sedge Wren	0	0	0.00	5	4	0.05	0	0	0.00
Song Sparrow	0	0	0.00	20	20	0.22	11	8	0.12
Spotted Towhee	0	0	0.00	1	1	0.01	0	0	0.00
Swainson's Thrush	0	0	0.00	1	1	0.01	0	0	0.00
Tree Swallow	0	0	0.00	23	16	0.25	6	4	0.07
Vesper Sparrow	0	0	0.00	51	32	0.56	23	13	0.25
Warbling Vireo	0	0	0.00	14	12	0.15	0	0	0.00
Western Kingbird	0	0	0.00	36	24	0.40	42	11	0.46
Western Meadowlark	0	0	0.00	330	125	3.63	164	49	1.80
White-Crowned Sparrow	0	0	0.00	5	2	0.05	0	0	0.00
White-throated Sparrow	0	0	0.00	0	0	0.00	1	1	0.01
Willow Flycatcher	0	0	0.00	6	6	0.07	2	2	0.02
Yellow Warbler	0	0	0.00	11	9	0.12	0	0	0.00
Totals	**307**	**9**	**7.31**	**6,318**	**763**	**69.43**	**22,420**	**355**	**246.38**
Waterfowl									
Blue-winged Teal	0	0	0.00	57	15	0.63	6	2	0.07
Canada Goose	0	0	0.00	5	3	0.05	266	4	2.92
Cinnamon Teal	0	0	0.00	1	1	0.01	0	0	0.00
Gadwall	0	0	0.00	12	5	0.13	0	0	0.00
Green-winged Teal	0	0	0.00	7	3	0.08	0	0	0.00
Greater White-fronted Goose	0	0	0.00	0	0	0.00	150	1	1.65
Mallard	0	0	0.00	65	25	0.71	14	2	0.15
Northern Pintail	0	0	0.00	13	7	0.14	0	0	0.00
Northern Shoveler	0	0	0.00	17	5	0.19	0	0	0.00
Ruddy Duck	0	0	0.00	8	1	0.09	0	0	0.00
Wood Duck	0	0	0.00	14	7	0.15	25	5	0.27
Totals	**0**	**0**	**0.00**	**199**	**72**	**2.19**	**461**	**14**	**5.07**
Raptors/Vultures/Owls									
American Kestrel	0	0	0.00	1	1	0.01	3	3	0.03
Bald Eagle	2	2	0.05	0	0	0.00	0	0	0.00
Cooper's Hawk	0	0	0.00	1	1	0.01	0	0	0.00
Ferruginous Hawk	0	0	0.00	5	4	0.05	1	1	0.01
Golden Eagle	5	5	0.12	0	0	0.00	0	0	0.00
Great-horned Owl	0	0	0.00	2	2	0.02	1	1	0.01
Merlin	0	0	0.00	0	0	0.00	1	1	0.01
Northern Harrier	4	4	0.10	24	23	0.26	4	4	0.04
Prairie Falcon	1	1	0.02	0	0	0.00	0	0	0.00
Red-tailed Hawk	0	0	0.00	36	34	0.40	39	37	0.43
Rough-legged Hawk	5	5	0.12	0	0	0.00	0	0	0.00
Snowy Owl	1	1	0.02	0	0	0.00	0	0	0.00
Swainson's Hawk	0	0	0.00	6	4	0.07	1	1	0.01
Turkey Vulture	0	0	0.00	11	8	0.12	6	3	0.07
Totals	**18**	**18**	**0.43**	**86**	**77**	**0.95**	**56**	**51**	**0.62**
Shorebirds									
Killdeer	0	0	0.00	46	31	0.51	37	11	0.41
Marbled Godwit	0	0	0.00	3	2	0.03	0	0	0.00
Spotted Sandpiper	0	0	0.00	0	0	0.00	2	2	0.02
Upland Sandpiper	0	0	0.00	21	16	0.23	1	1	0.01
Wilson's Phalarope	0	0	0.00	2	2	0.02	0	0	0.00
Wilson's Snipe	0	0	0.00	3	3	0.03	0	0	0.00
Totals	**0**	**0**	**0.00**	**75**	**54**	**0.82**	**40**	**14**	**0.44**
Woodpeckers									
Downy Woodpecker	0	0	0.00	1	1	0.01	1	1	0.01
Harly Woodpecker	0	0	0.00	0	0	0.00	2	2	0.02
Northern Flicker	0	0	0.00	4	4	0.04	20	10	0.22
Red-headed Woodpecker	0	0	0.00	4	4	0.04	10	4	0.11
Yellow-shafted Flicker	0	0	0.00	11	10	0.12	0	0	0.00
Totals	**0**	**0**	**0.00**	**20**	**19**	**0.22**	**33**	**17**	**0.36**
Waterbirds									
Double-crested Cormorant	0	0	0.00	4	1	0.04	1	1	0.01
Great Blue Heron	0	0	0.00	2	2	0.02	5	5	0.05
Pied-billed Grebe	0	0	0.00	3	3	0.03	0	0	0.00
Totals	**0**	**0**	**0.00**	**9**	**6**	**0.10**	**6**	**6**	**0.07**
Crows and Allies									
American Crow	2	1	0.05	9	7	0.10	85	4	0.93
Black-billed Magpie	0	0	0.00	3	3	0.03	0	0	0.00
Blue Jay	0	0	0.00	11	11	0.12	18	12	0.20
Totals	**2**	**1**	**0.05**	**23**	**21**	**0.25**	**103**	**16**	**1.13**
Pigeons/Doves									
Mourning Dove	0	0	0.00	123	54	1.35	282	43	3.10
Rock Pigeon	0	0	0.00	3	2	0.03	12	2	0.13
Totals	**0**	**0**	**0.00**	**126**	**56**	**1.38**	**294**	**45**	**3.23**
Gamebirds									
Ring-necked Pheasant	18	7	0.43	391	85	4.30	119	40	1.31
Sharp-tailed Grouse	1	1	0.02	0	0	0.00	3	1	0.03
Totals	**19**	**8**	**0.45**	**391**	**85**	**4.30**	**122**	**41**	**1.34**
Cranes/Rails									
Sandhill Crane	0	0	0.00	1	1	0.01	129	2	1.42
Totals	**0**	**0**	**0.00**	**1**	**1**	**0.01**	**129**	**2**	**1.42**
Goatsuckers									
Common Nighthawk	0	0	0.00	1	1	0.01	1	1	0.01
Totals	**0**	**0**	**0.00**	**1**	**1**	**0.01**	**1**	**1**	**0.01**
Gulls/Terns									
Ring-billed Gull	0	0	0.00	1	1	0.01	1	1	0.01
Totals	**0**	**0**	**0.00**	**1**	**1**	**0.01**	**1**	**1**	**0.01**
Grand Totals	**346**	**36**	**8.24**	**7,250**	**1156**	**79.67**	**23,666**	**563**	**260.07**

Table 3. Campbell County Wind Farm Point Count Percent Composition and Frequency by Species Group

Species	Winter 2011-2012 Percent (%) Composition	Winter 2011-2012 Percent (%) Frequency	Spring 2012 Percent (%) Composition	Spring 2012 Percent (%) Frequency	Fall 2012 Percent (%) Composition	Fall 2012 Percent (%) Frequency
Songbirds						
Alder Flycatcher	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
American Goldfinch	0.00%	0.00%	0.33%	19.78%	0.27%	32.97%
American Robin	0.00%	0.00%	0.37%	24.18%	0.48%	17.58%
American Tree Sparrow	2.02%	2.38%	0.18%	5.49%	0.04%	4.40%
Baltimore Oriole	0.00%	0.00%	0.03%	2.20%	0.00%	0.00%
Barn Swallow	0.00%	0.00%	0.52%	24.18%	0.25%	21.98%
Black-capped Chickadee	0.00%	0.00%	0.03%	2.20%	0.03%	6.59%
Blue Grosbeak	0.00%	0.00%	0.00%	0.00%	0.01%	2.20%
Blue-winged Warbler	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Bobolink	0.00%	0.00%	0.61%	15.38%	0.03%	1.10%
Brewer's Blackbird	0.00%	0.00%	0.04%	2.20%	69.97%	6.59%
Brown Thrasher	0.00%	0.00%	0.47%	20.88%	0.02%	3.30%
Brown-headed Cowbird	0.00%	0.00%	1.63%	39.56%	0.00%	1.10%
Cedar Waxwing	0.00%	0.00%	4.62%	5.49%	0.00%	0.00%
Chestnut-collared Longspur	0.00%	0.00%	0.14%	8.79%	0.00%	1.10%
Chipping Sparrow	0.00%	0.00%	0.39%	7.69%	0.01%	1.10%
Clay-colored Sparrow	0.00%	0.00%	0.86%	9.89%	0.09%	5.49%
Cliff Swallow	0.00%	0.00%	16.21%	5.49%	0.01%	2.20%
Common Grackle	0.00%	0.00%	35.79%	56.04%	1.45%	13.19%
Common Yellowthroat	0.00%	0.00%	0.08%	5.49%	0.00%	0.00%
Dark-eyed Junco	0.00%	0.00%	0.12%	3.30%	0.64%	14.29%
Dickcissel	0.00%	0.00%	0.28%	6.59%	0.00%	0.00%
Eastern Bluebird	0.00%	0.00%	0.04%	3.30%	0.03%	3.30%
Eastern Kingbird	0.00%	0.00%	0.40%	18.68%	0.17%	13.19%
European Starling	7.51%	2.38%	4.07%	25.27%	4.34%	25.27%
Field Sparrow	0.00%	0.00%	0.00%	0.00%	0.02%	2.20%
Grasshopper Sparrow	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Grays Catbird	0.00%	0.00%	0.01%	1.10%	0.00%	1.10%
Harris's Sparrow	0.00%	0.00%	0.06%	2.20%	0.06%	3.30%
Horned Lark	2.89%	7.14%	1.75%	65.93%	0.21%	15.38%
House Finch	0.00%	0.00%	0.00%	0.00%	0.03%	2.20%
House Sparrow	6.36%	2.38%	0.15%	5.49%	0.05%	7.69%
House Wren	0.00%	0.00%	0.37%	20.88%	0.00%	1.10%
Lapland Longspur	69.94%	7.14%	0.83%	2.20%	0.42%	1.10%
Lark Bunting	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Lark Sparrow	0.00%	0.00%	0.03%	2.20%	0.07%	4.40%
Least Flycatcher	0.00%	0.00%	0.11%	8.79%	0.00%	0.00%
Loggerhead Shrike	0.00%	0.00%	0.03%	2.20%	0.00%	0.00%
Orchard Oriole	0.00%	0.00%	0.21%	12.09%	0.01%	2.20%
Pine Siskin	0.00%	0.00%	0.04%	1.10%	0.00%	0.00%
Red-eyed Vireo	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Red-winged Blackbird	0.00%	0.00%	9.10%	54.95%	14.56%	19.78%
Ruby-crowned Kinglet	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Savannah Sparrow	0.00%	0.00%	0.11%	7.69%	0.41%	17.58%
Say's Phoebe	0.00%	0.00%	0.12%	8.79%	0.01%	2.20%
Sedge Wren	0.00%	0.00%	0.07%	4.40%	0.00%	0.00%
Song Sparrow	0.00%	0.00%	0.28%	18.68%	0.05%	8.79%
Spotted Towhee	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Swainson's Thrush	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Tree Swallow	0.00%	0.00%	0.32%	17.58%	0.00%	0.00%
Vesper Sparrow	0.00%	0.00%	0.70%	30.77%	0.03%	4.40%
Warbling Vireo	0.00%	0.00%	0.19%	13.19%	0.10%	14.29%
Western Kingbird	0.00%	0.00%	0.50%	24.18%	0.18%	9.89%
Western Meadowlark	0.00%	0.00%	4.55%	97.80%	0.69%	42.86%
White-Crowned Sparrow	0.00%	0.00%	0.07%	2.20%	0.00%	0.00%
White-throated Sparrow	0.00%	0.00%	0.00%	0.00%	0.00%	1.10%
Willow Flycatcher	0.00%	0.00%	0.08%	4.40%	0.01%	2.20%
Yellow Warbler	0.00%	0.00%	0.15%	9.89%	0.00%	0.00%
Totals	**88.73%**		**87.14%**		**94.74%**	
Waterfowl						
Blue-winged Teal	0.00%	0.00%	0.79%	14.29%	0.03%	2.20%
Canada Goose	0.00%	0.00%	0.07%	3.30%	1.12%	4.40%
Cinnamon Teal	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Gadwall	0.00%	0.00%	0.17%	5.49%	0.00%	0.00%
Green-winged Teal	0.00%	0.00%	0.10%	3.30%	0.00%	0.00%
Greater White-fronted Goose	0.00%	0.00%	0.00%	0.00%	0.63%	1.10%
Mallard	0.00%	0.00%	0.90%	24.18%	0.06%	2.20%
Northern Pintail	0.00%	0.00%	0.18%	6.59%	0.00%	0.00%
Northern Shoveler	0.00%	0.00%	0.23%	5.49%	0.00%	0.00%
Ruddy Duck	0.00%	0.00%	0.11%	1.10%	0.00%	0.00%
Wood Duck	0.00%	0.00%	0.19%	7.69%	0.11%	5.49%
Totals	**0.00%**		**2.74%**		**1.95%**	
Raptors/Vultures/Owls						
American Kestrel	0.00%	0.00%	0.01%	1.10%	0.01%	3.30%
Bald Eagle	0.58%	4.76%	0.00%	0.00%	0.00%	0.00%
Cooper's Hawk	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Ferruginous Hawk	0.00%	0.00%	0.07%	4.40%	0.00%	1.10%
Golden Eagle	1.45%	11.90%	0.00%	0.00%	0.00%	0.00%
Great-horned Owl	0.00%	0.00%	0.03%	2.20%	0.00%	1.10%
Merlin	0.00%	0.00%	0.00%	0.00%	0.00%	1.10%
Northern Harrier	1.16%	7.14%	0.33%	21.98%	0.02%	4.40%
Prairie Falcon	0.29%	2.38%	0.00%	0.00%	0.00%	0.00%
Red-tailed Hawk	0.00%	0.00%	0.50%	32.97%	0.16%	34.07%
Rough-legged Hawk	1.45%	9.52%	0.00%	0.00%	0.00%	0.00%
Snowy Owl	0.29%	2.38%	0.00%	0.00%	0.00%	0.00%
Swainson's Hawk	0.00%	0.00%	0.08%	4.40%	0.00%	1.10%
Turkey Vulture	0.00%	0.00%	0.15%	7.69%	0.03%	3.30%
Totals	**5.20%**		**1.19%**		**0.24%**	
Shorebirds						
Killdeer	0.00%	0.00%	0.63%	32.97%	0.16%	8.79%
Marbled Godwit	0.00%	0.00%	0.04%	2.20%	0.00%	0.00%
Spotted Sandpiper	0.00%	0.00%	0.00%	0.00%	0.01%	2.20%
Upland Sandpiper	0.00%	0.00%	0.29%	14.29%	0.00%	1.10%
Wilson's Phalarope	0.00%	0.00%	0.03%	2.20%	0.00%	0.00%
Wilson's Snipe	0.00%	0.00%	0.04%	3.30%	0.00%	0.00%
Totals	**0.00%**		**1.03%**		**0.17%**	
Woodpeckers						
Downy Woodpecker	0.00%	0.00%	0.01%	1.10%	0.00%	1.10%
Hariy Woodpecker	0.00%	0.00%	0.00%	0.00%	0.01%	2.20%
Northern Flicker	0.00%	0.00%	0.06%	4.40%	0.08%	9.89%
Red-headed Woodpecker	0.00%	0.00%	0.06%	3.30%	0.04%	2.20%
Yellow-shafted Flicker	0.00%	0.00%	0.15%	10.99%	0.00%	0.00%
Totals	**0.00%**		**0.28%**		**0.14%**	
Waterbirds						
Double-crested Cormorant	0.00%	0.00%	0.06%	1.10%	0.00%	1.10%
Great Blue Heron	0.00%	0.00%	0.03%	2.20%	0.02%	4.40%
Pied-billed Grebe	0.00%	0.00%	0.04%	3.30%	0.00%	0.00%
Totals	**0.00%**		**0.12%**		**0.03%**	
Crows and Allies						
American Crow	0.58%	2.38%	0.12%	7.69%	0.36%	4.40%
Black-billed Magpie	0.00%	0.00%	0.04%	3.30%	0.00%	0.00%
Blue Jay	0.00%	0.00%	0.15%	10.99%	0.08%	12.09%
Totals	**0.58%**		**0.32%**		**0.44%**	
Pigeons/Doves						
Mourning Dove	0.00%	0.00%	1.70%	46.15%	1.19%	38.46%
Rock Pigeon	0.00%	0.00%	0.04%	2.20%	0.05%	2.20%
Totals	**0.00%**		**1.74%**		**1.24%**	
Gamebirds						
Ring-necked Pheasant	5.20%	14.29%	5.39%	79.12%	0.50%	32.97%
Sharp-tailed Grouse	0.29%	2.38%	0.00%	0.00%	0.01%	1.10%
Totals	**5.49%**		**5.39%**		**0.52%**	
Cranes/Rails						
Sandhill Crane	0.00%	0.00%	0.01%	1.10%	0.55%	2.20%
Totals	**0.00%**		**0.01%**		**0.55%**	
Goatsuckers						
Common Nighthawk	0.00%	0.00%	0.01%	1.10%	0.00%	1.10%
Totals	**0.00%**		**0.01%**		**0.00%**	
Gulls/Terns						
Ring-billed Gull	0.00%	0.00%	0.01%	1.10%	0.00%	0.00%
Totals	**0.00%**		**0.01%**		**0.00%**	
Grand Totals	**100.00%**		**100.00%**		**100.00%**	

Table 4. Avian Species Observed by Point Count at Campbell County Wind Farm

Species	Number of Birds	Number of Occurrences	Winter 2011-2012							Spring 2012							Fall 2012						
			Points							Points							Points						
			1	2	3	4	14	15	16	1	2	3	4	14	15	16	1	2	3	4	14	15	16
Songbirds																							
Alder Flycatcher	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
American Goldfinch	56	88	0	0	0	0	0	0	0	1	1	5	2	5	1	9	7	3	3	12	18	7	14
American Robin	39	141	0	0	0	0	0	0	0	3	1	5	3	7	1	7	1	1	17	27	16	0	52
American Tree Sparrow	10	29	0	0	0	0	0	0	7	10	0	0	1	0	0	2	0	0	0	4	0	0	5
Baltimore Oriole	2	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Barn Swallow	50	96	0	0	0	0	0	0	0	4	10	2	4	6	5	7	21	18	2	2	1	9	5
Black-capped Chickadee	8	10	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	3	0	5
Blue Grosbeak	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Blue-winged Warbler	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Bobolink	15	50	0	0	0	0	0	0	0	3	11	2	27	0	1	0	0	0	6	0	0	0	0
Brewer's Blackbird	8	16,562	0	0	0	0	0	0	0	2	0	0	0	0	1	0	15,500	5	1,000	0	4	0	50
Brown Thrasher	27	39	0	0	0	0	0	0	0	12	0	12	0	2	1	7	0	0	0	0	0	3	2
Brown-headed Cowbird	39	119	0	0	0	0	0	0	0	31	20	7	22	3	17	18	1	0	0	0	0	0	0
Cedar Waxwing	5	335	0	0	0	0	0	0	0	0	0	2	0	0	0	333	0	0	0	0	0	0	0
Chestnut-collared Longspur	10	11	0	0	0	0	0	0	0	9	0	0	1	0	0	0	1	0	0	0	0	0	0
Chipping Sparrow	8	30	0	0	0	0	0	0	0	0	0	26	0	0	0	2	0	0	0	0	2	0	0
Clay-colored Sparrow	14	83	0	0	0	0	0	0	0	14	0	44	3	0	0	1	6	0	0	0	0	4	11
Cliff Swallow	7	1,177	0	0	0	0	0	0	0	0	1,175	0	0	0	0	0	0	2	0	0	0	0	0
Common Grackle	70	2,937	0	0	0	0	0	0	0	107	2,045	32	231	28	12	140	0	8	13	15	301	0	5
Common Yellowthroat	6	6	0	0	0	0	0	0	0	0	0	1	1	0	1	3	0	0	0	0	0	0	0
Dark-eyed Junco	18	160	0	0	0	0	0	0	0	2	0	0	0	0	0	7	0	119	0	6	9	5	12
Dickcissel	8	20	0	0	0	0	0	0	0	0	1	3	4	0	4	8	0	0	0	0	0	0	0
Eastern Bluebird	6	9	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	2	0	1
Eastern Kingbird	35	69	0	0	0	0	0	0	0	14	1	3	2	5	4	0	3	2	6	2	8	17	2
European Starling	51	1,374	26	0	0	0	0	0	0	43	39	17	100	31	5	60	462	81	323	2	102	57	0
Field Sparrow	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0
Grasshopper Sparrow	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Grays Catbird	2	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Harris's Sparrow	7	18	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	12	2	0	0
Horned Lark	94	197	9	0	1	0	0	0	0	19	8	20	4	19	30	27	1	2	18	0	5	21	3
House Finch	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	2
House Sparrow	14	67	0	22	0	0	0	0	0	2	0	8	0	1	0	0	0	2	7	0	3	0	0
House Wren	21	28	0	0	0	0	0	0	0	0	1	8	5	8	0	5	0	0	0	0	0	0	1
Lapland Longspur	8	502	0	0	64	0	0	36	142	0	0	0	0	0	0	60	0	0	100	0	0	0	0
Lark Bunting	5	17	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	15	1
Lark Sparrow	2	2	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Least Flycatcher	8	8	0	0	0	0	0	0	0	0	0	1	0	3	0	4	0	0	0	0	0	0	0
Loggerhead Shrike	2	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Orchard Oriole	15	17	0	0	0	0	0	0	0	1	3	1	2	3	1	4	0	0	0	1	1	0	0
Pine Siskin	1	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-eyed Vireo	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Red-winged Blackbird	75	4,105	0	0	0	0	0	0	0	54	30	4	123	8	9	432	625	260	608	1,401	241	250	60
Ruby-crowned Kinglet	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Savannah Sparrow	25	106	0	0	0	0	0	0	0	6	1	1	0	0	0	0	29	22	0	11	21	11	4
Say's Phoebe	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	9	2	0	0	0	0	0	1
Sedge Wren	4	5	0	0	0	0	0	0	0	2	0	0	2	0	0	1	0	0	0	0	0	0	0
Song Sparrow	28	31	0	0	0	0	0	0	0	15	0	0	5	0	0	0	6	1	0	0	0	0	4
Spotted Towhee	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Swainson's Thrush	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Tree Swallow	20	29	0	0	0	0	0	0	0	2	4	4	9	1	0	3	0	0	0	2	4	0	0
Vesper Sparrow	45	74	0	0	0	0	0	0	0	24	0	1	4	6	6	10	3	0	0	1	4	14	1
Warbling Vireo	12	14	0	0	0	0	0	0	0	0	0	3	0	7	2	2	0	0	0	0	0	0	0
Western Kingbird	35	78	0	0	0	0	0	0	0	7	4	5	2	8	9	1	29	3	1	2	5	2	0
Western Meadowlark	174	494	0	0	0	0	0	0	0	72	55	51	45	28	44	35	65	12	32	4	34	16	1
White-Crowned Sparrow	2	5	0	0	0	0	0	0	0	1	0	0	0	0	0	4	0	0	0	0	0	0	0
White-throated Sparrow	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Willow Flycatcher	8	8	0	0	0	0	0	0	0	1	0	0	2	0	0	3	1	0	0	0	0	0	1
Yellow Warbler	9	11	0	0	0	0	0	0	0	1	1	1	1	7	0	0	0	0	0	0	0	0	0
Waterfowl																							
Blue-winged Teal	17	63	0	0	0	0	0	0	0	30	8	0	19	0	0	0	0	4	0	2	0	0	0
Canada Goose	7	271	0	0	0	0	0	0	0	2	1	0	2	0	0	0	35	0	0	80	1	150	0
Cinnamon Teal	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Gadwall	5	12	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0
Green-winged Teal	3	7	0	0	0	0	0	0	0	4	2	0	1	0	0	0	0	0	0	0	0	0	0
Greater White-fronted Goose	1	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0
Mallard	27	79	0	0	0	0	0	0	0	25	16	0	19	0	0	5	2	0	0	12	0	0	0
Northern Pintail	7	13	0	0	0	0	0	0	0	0	9	0	4	0	0	0	0	0	0	0	0	0	0
Northern Shoveler	5	17	0	0	0	0	0	0	0	0	1	0	16	0	0	0	0	0	0	0	0	0	0
Ruddy Duck	1	8	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood Duck	12	39	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	10	0	15	0	0	0
Raptors/Vultures/Owls																							
American Kestrel	4	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	1	0
Bald Eagle	4	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cooper's Hawk	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Ferruginous Hawk	5	6	0	0	0	0	0	0	0	1	0	2	2	0	0	0	1	0	0	0	0	0	0
Golden Eagle	10	10	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Great-horned Owl	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Merlin	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Northern Harrier	35	36	1	2	0	1	0	0	0	2	0	7	7	0	4	4	0	1	0	1	1	1	0
Prairie Falcon	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-tailed Hawk	71	75	0	0	0	0	0	0	0	2	3	2	13	3	3	10	2	8	2	9	8	4	6
Rough-legged Hawk	10	10	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Snowy Owl	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Swainson's Hawk	5	7	0	0	0	0	0	0	0	2	0	0	1	0	0	3	0	0	0	0	1	0	0
Turkey Vulture	11	17	0	0	0	0	0	0	0	2	2	1	0	0	4	2	0	0	0	0	4	0	2
Shorebirds																							
Killdeer	42	83	0	0	0	0	0	0	0	24	6	2	7	0	1	6	0	1	0	30	6	0	0
Marbled Godwit	2	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Sandpiper	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Upland Sandpiper	17	22	0	0	0	0	0	0	0	3	8	0	3	2	1	4	0	0	0	0	0	1	0
Wilson's Phalarope	2	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Wilson's Snipe	3	3	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0
Woodpeckers																							
Downy Woodpecker	2	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Hariy Woodpecker	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Northern Flicker	14	24	0	0	0	0	0	0	0	0	1	2	0	1	0	0	9	2	6	0	3	0	0
Red-headed Woodpecker	8	14	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	10	0	0
Yellow-shafted Flicker	10	11	0	0	0	0	0	0	0	3	0	1	1	2	1	3	0	0	0	0	0	0	0
Waterbirds																							
Double-crested Cormorant	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0
Great Blue Heron	7	7	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	2	0	1	0	0	0
Pied-billed Grebe	3	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Crows and Allies																							
American Crow	12	96	0	0	0	0	0	0	2	4	1	1	0	0	3	0	0	0	0	0	0	2	83
Black-billed Magpie	3	3	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0
Blue Jay	23	29	0	0	0	0	0	0	0	0	0	0	0	3	0	8	0	0	3	0	6	0	9
Pigeons/Doves																							
Mourning Dove	97	405	0	0	0	0	0	0	0	11	10	26	11	28	17	20	36	20	6	149	41	19	11
Rock Pigeon	4	15	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	0	0	0	10
Gamebirds																							
Ring-necked Pheasant	136	542	13	1	0	0	0	0	4	85	35	39	75	28	24	105	29	26	15	14	8	9	18
Sharp-tailed Grouse	3	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Cranes/Rails																							
Sandhill Crane	3	130	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	128	0	0	0
Goatsuckers																							
Common Nighthawk	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Gulls/Terns																							
Ring-billed Gull	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Totals	**1,783**	**31,451**	**50**	**29**	**65**	**3**	**5**	**38**	**156**	**678**	**3,520**	**356**	**819**	**263**	**214**	**1,400**	**16,880**	**621**	**2,171**	**1,951**	**883**	**774**	**385**
Mean Use			**8.33**	**4.83**	**10.83**	**0.50**	**0.83**	**6.33**	**26.00**	**52.15**	**270.77**	**27.38**	**63.00**	**20.23**	**16.46**	**107.69**	**1,298.46**	**47.77**	**167.00**	**150.08**	**67.92**	**59.54**	**29.62**

Table 5. Avian Flight Heights at Campbell County Wind Farm	**Winter 2011-2012**				**Spring 2012**				**Fall 2012**			
	Observation		**Individuals**		**Observation**		**Individuals**		**Observation**		**Individuals**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Non-Raptors												
Above RSA (>118.5m)	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1	0.28%	1	0.00%
Below RSA (<41.4m)	10	83.33%	233	78.19%	456	99.78%	5,693	99.30%	361	99.45%	22,914	99.99%
Within RSA (≥41.5m and ≤118.5m)	2	16.67%	65	21.81%	1	0.22%	40	0.70%	1	0.28%	1	0.00%
Raptors/Vultures/Owls												
Above RSA (>118.5m)	1	7.69%	1	7.69%	0	0.00%	0	0.00%	1	2.50%	1	2.38%
Below RSA (<41.4m)	9	69.23%	9	69.23%	57	100.00%	66	100.00%	35	87.50%	37	88.10%
Within RSA (≥41.5m and ≤118.5m)	3	23.08%	3	23.08%	0	0.00%	0	0.00%	4	10.00%	4	9.52%

Table 6. Point Count Individuals and RSA at Campbell County Wind Farm

Species	Winter 2011-2012						Spring 2012						Spring 2013					
	Encounter Rate	Mean Use (# birds/20 min)	Flying (%)	Percent (%) Flying Below RSA	Percent (%) Flying Within RSA	Percent (%) Flying Above RSA	Encounter Rate	Mean Use (# birds/20 min)	Flying (%)	Percent (%) Flying Below RSA	Percent (%) Flying Within RSA	Percent (%) Flying Above RSA	Encounter Rate	Mean Use (# birds/20 min)	Flying (%)	Percent (%) Flying Below RSA	Percent (%) Flying Within RSA	Percent (%) Flying Above RSA
Songbirds																		
Alder Flycatcher	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
American Goldfinch	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.26	41.67%	100.00%	0.00%	0.00%	0.00	0.70	53.13%	100.00%	0.00%	0.00%
American Robin	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.30	48.15%	100.00%	0.00%	0.00%	0.00	1.25	75.44%	100.00%	0.00%	0.00%
American Tree Sparrow	0.00	0.17	0.00%	0.00%	0.00%	0.00%	0.00	0.14	92.31%	100.00%	0.00%	0.00%	0.00	0.10	100.00%	100.00%	0.00%	0.00%
Baltimore Oriole	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Barn Swallow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.42	94.74%	100.00%	0.00%	0.00%	0.00	0.64	94.83%	100.00%	0.00%	0.00%
Black-capped Chickadee	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	0.00%	0.00%	0.00%	0.00%	0.00	0.09	50.00%	100.00%	0.00%	0.00%
Blue Grosbeak	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	50.00%	100.00%	0.00%	0.00%
Blue-winged Warbler	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Bobolink	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.48	43.18%	100.00%	0.00%	0.00%	0.00	0.07	100.00%	100.00%	0.00%	0.00%
Brewer's Blackbird	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.03	100.00%	100.00%	0.00%	0.00%	0.00	181.97	99.70%	100.00%	0.00%	0.00%
Brown Thrasher	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.37	70.59%	100.00%	0.00%	0.00%	0.00	0.05	80.00%	100.00%	0.00%	0.00%
Brown-headed Cowbird	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	1.30	89.83%	100.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Cedar Waxwing	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	3.68	100.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Chestnut-collared Longspur	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.11	40.00%	100.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Chipping Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.31	89.29%	100.00%	0.00%	0.00%	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Clay-colored Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.68	96.77%	100.00%	0.00%	0.00%	0.00	0.23	100.00%	100.00%	0.00%	0.00%
Cliff Swallow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	12.91	100.00%	100.00%	0.00%	0.00%	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Common Grackle	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	28.52	97.46%	100.00%	0.00%	0.00%	0.00	3.76	98.83%	100.00%	0.00%	0.00%
Common Yellowthroat	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.07	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Dark-eyed Junco	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.10	88.89%	100.00%	0.00%	0.00%	0.00	1.66	97.35%	100.00%	0.00%	0.00%
Dickcissel	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.22	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Eastern Bluebird	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.03	0.00%	0.00%	0.00%	0.00%	0.00	0.07	50.00%	100.00%	0.00%	0.00%
Eastern Kingbird	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.32	58.62%	100.00%	0.00%	0.00%	0.01	0.44	85.00%	97.06%	2.94%	0.00%
European Starling	0.00	0.62	100.00%	100.00%	0.00%	0.00%	0.00	3.24	81.69%	100.00%	0.00%	0.00%	0.00	11.29	69.62%	100.00%	0.00%	0.00%
Field Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.04	100.00%	100.00%	0.00%	0.00%
Grasshopper Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Grays Catbird	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Harris's Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.04	0.00%	0.00%	0.00%	0.00%	0.00	0.15	50.00%	100.00%	0.00%	0.00%
Horned Lark	0.00	0.24	10.00%	100.00%	0.00%	0.00%	0.00	1.40	34.65%	100.00%	0.00%	0.00%	0.00	0.55	96.00%	100.00%	0.00%	0.00%
House Finch	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.08	28.57%	100.00%	0.00%	0.00%
House Sparrow	0.00	0.52	100.00%	100.00%	0.00%	0.00%	0.00	0.12	72.73%	100.00%	0.00%	0.00%	0.00	0.13	58.33%	100.00%	0.00%	0.00%
House Wren	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.30	0.00%	0.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Lapland Longspur	1.52	5.76	100.00%	73.55%	26.45%	0.00%	0.44	0.66	100.00%	33.33%	66.67%	0.00%	0.00	1.10	100.00%	100.00%	0.00%	0.00%
Lark Bunting	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Lark Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	50.00%	100.00%	0.00%	0.00%	0.00	0.18	81.25%	100.00%	0.00%	0.00%
Least Flycatcher	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.09	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Loggerhead Shrike	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	100.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Orchard Oriole	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.16	40.00%	100.00%	0.00%	0.00%	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Pine Siskin	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.03	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Red-eyed Vireo	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Red-winged Blackbird	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	7.25	99.09%	100.00%	0.00%	0.00%	0.00	37.86	99.97%	100.00%	0.00%	0.00%
Ruby-crowned Kinglet	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Savannah Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.09	50.00%	100.00%	0.00%	0.00%	0.00	1.08	95.92%	100.00%	0.00%	0.00%
Say's Phoebe	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.10	22.22%	100.00%	0.00%	0.00%	0.00	0.03	66.67%	100.00%	0.00%	0.00%
Sedge Wren	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.05	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Song Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.22	20.00%	100.00%	0.00%	0.00%	0.00	0.12	90.91%	100.00%	0.00%	0.00%
Spotted Towhee	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Swainson's Thrush	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Tree Swallow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.25	95.65%	100.00%	0.00%	0.00%	0.00	0.07	100.00%	100.00%	0.00%	0.00%
Vesper Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.56	37.25%	100.00%	0.00%	0.00%	0.00	0.25	100.00%	100.00%	0.00%	0.00%
Warbling Vireo	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.15	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Western Kingbird	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.40	86.11%	100.00%	0.00%	0.00%	0.00	0.46	97.62%	100.00%	0.00%	0.00%
Western Meadowlark	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	3.63	7.27%	100.00%	0.00%	0.00%	0.00	1.80	89.02%	100.00%	0.00%	0.00%
White-Crowned Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.05	100.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
White-throated Sparrow	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Willow Flycatcher	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.07	0.00%	0.00%	0.00%	0.00%	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Yellow Warbler	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.12	18.18%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Waterfowl																		
Blue-winged Teal	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.63	26.32%	100.00%	0.00%	0.00%	0.00	0.07	66.67%	100.00%	0.00%	0.00%
Canada Goose	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.05	40.00%	100.00%	0.00%	0.00%	0.00	2.92	99.62%	100.00%	0.00%	0.00%
Cinnamon Teal	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Gadwall	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.13	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Green-winged Teal	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.08	85.71%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Greater White-fronted Goose	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	1.65	100.00%	100.00%	0.00%	0.00%
Mallard	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.71	44.62%	100.00%	0.00%	0.00%	0.00	0.15	14.29%	100.00%	0.00%	0.00%
Northern Pintail	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.14	23.08%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Northern Shoveler	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.19	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Ruddy Duck	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.09	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Wood Duck	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.15	0.00%	0.00%	0.00%	0.00%	0.00	0.27	16.00%	100.00%	0.00%	0.00%
Raptors/Vultures/Owls																		
American Kestrel	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.03	100.00%	100.00%	0.00%	0.00%
Bald Eagle	0.02	0.05	100.00%	50.00%	50.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Cooper's Hawk	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Ferruginous Hawk	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.05	80.00%	100.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Golden Eagle	0.05	0.12	80.00%	25.00%	50.00%	25.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Great-horned Owl	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	100.00%	100.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Merlin	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Northern Harrier	0.00	0.10	100.00%	100.00%	0.00%	0.00%	0.00	0.26	95.83%	100.00%	0.00%	0.00%	0.00	0.04	100.00%	100.00%	0.00%	0.00%
Prairie Falcon	0.00	0.02	100.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Red-tailed Hawk	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.40	55.56%	100.00%	0.00%	0.00%	0.04	0.43	74.36%	86.21%	13.79%	0.00%
Rough-legged Hawk	0.00	0.12	40.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Snowy Owl	0.00	0.02	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Swainson's Hawk	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.07	83.33%	100.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Turkey Vulture	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.12	100.00%	100.00%	0.00%	0.00%	0.00	0.07	33.33%	100.00%	0.00%	0.00%
Shorebirds																		
Killdeer	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.51	39.13%	100.00%	0.00%	0.00%	0.00	0.41	24.32%	100.00%	0.00%	0.00%
Marbled Godwit	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.03	66.67%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Spotted Sandpiper	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	0.00%	0.00%	0.00%	0.00%
Upland Sandpiper	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.23	33.33%	100.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Wilson's Phalarope	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	50.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Wilson's Snipe	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.03	33.33%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Woodpeckers																		
Downy Woodpecker	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Hariy Woodpecker	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Northern Flicker	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.04	100.00%	100.00%	0.00%	0.00%	0.00	0.22	75.00%	100.00%	0.00%	0.00%
Red-headed Woodpecker	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.04	50.00%	100.00%	0.00%	0.00%	0.00	0.11	100.00%	100.00%	0.00%	0.00%
Yellow-shafted Flicker	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.12	81.82%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Waterbirds																		
Double-crested Cormorant	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.04	100.00%	100.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Great Blue Heron	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.02	100.00%	100.00%	0.00%	0.00%	0.00	0.05	80.00%	100.00%	0.00%	0.00%
Pied-billed Grebe	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.03	0.00%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Crows and Allies																		
American Crow	0.00	0.05	100.00%	100.00%	0.00%	0.00%	0.00	0.10	44.44%	100.00%	0.00%	0.00%	0.00	0.93	100.00%	100.00%	0.00%	0.00%
Black-billed Magpie	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.03	100.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Blue Jay	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.12	9.09%	100.00%	0.00%	0.00%	0.00	0.20	83.33%	100.00%	0.00%	0.00%
Pigeons/Doves																		
Mourning Dove	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	1.35	60.98%	100.00%	0.00%	0.00%	0.00	3.10	88.65%	100.00%	0.00%	0.00%
Rock Pigeon	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.03	100.00%	100.00%	0.00%	0.00%	0.00	0.13	100.00%	100.00%	0.00%	0.00%
Gamebirds																		
Ring-necked Pheasant	0.00	0.43	0.00%	100.00%	0.00%	0.00%	0.00	4.30	8.44%	100.00%	0.00%	0.00%	0.00	1.31	23.53%	100.00%	0.00%	0.00%
Sharp-tailed Grouse	0.02	0.02	100.00%	0.00%	100.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.03	100.00%	100.00%	0.00%	0.00%
Cranes/Rails																		
Sandhill Crane	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	0.00%	0.00%	0.00%	0.00%	0.00	1.42	99.22%	100.00%	0.00%	0.00%
Goatsuckers																		
Common Nighthawk	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Gulls/Terns																		
Ring-billed Gull	0.00	0.00	0.00%	0.00%	0.00%	0.00%	0.00	0.01	100.00%	100.00%	0.00%	0.00%	0.00	0.00	0.00%	0.00%	0.00%	0.00%
Totals	**1.62**	**8.24**	**89.88%**				**0.44**	**79.67**	**79.99%**				**0.05**	**260.05**	**97.00%**			

Table 7a. Point Count Observations and Flight Direction at Campbell County Wind Farm, Winter 2011-2012										
Species	**Number Flying**	**Number of Observations**	**Percentage of Flights in Various Flight Directions**							
			N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Songbirds										
American Tree Sparrow	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
European Starling	26	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Horned Lark	1	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
House Sparrow	22	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Lapland Longspur	242	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Raptors/Vultures/Owls										
Bald Eagle	2	2	50.00%	0.00%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%
Golden Eagle	4	5	25.00%	25.00%	0.00%	0.00%	25.00%	0.00%	25.00%	0.00%
Northern Harrier	4	4	0.00%	0.00%	0.00%	0.00%	25.00%	0.00%	50.00%	0.00%
Prairie Falcon	1	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Rough-legged Hawk	2	5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%	50.00%
Snowy Owl	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Gamebirds										
Ring-necked Pheasant	4	7	0.00%	25.00%	0.00%	0.00%	0.00%	25.00%	0.00%	50.00%
Sharp Tailed Grouse	1	1	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Crows and Allies										
American Crow	2	1	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TOTALS	**311**	**36**	**20.00%**	**15.00%**	**0.00%**	**0.00%**	**15.00%**	**10.00%**	**20.00%**	**20.00%**

Table 7b. Point Count Observations and Flight Direction at Campbell County Wind Farm, Spring 2012

Species	Number Flying	Number of Observations	Percentage of Flights in Various Flight Directions							
			N	NE	E	SE	S	SW	W	NW
Songbirds										
Alder Flycatcher	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
American Goldfinch	10	20	10.00%	0.00%	10.00%	0.00%	10.00%	0.00%	20.00%	0.00%
American Robin	13	22	7.69%	0.00%	0.00%	0.00%	30.77%	0.00%	23.08%	0.00%
American Tree Sparrow	12	5	0.00%	0.00%	0.00%	0.00%	58.33%	0.00%	33.33%	0.00%
Baltimore Oriole	0	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Barn Swallow	36	24	36.11%	0.00%	0.00%	0.00%	27.78%	0.00%	33.33%	0.00%
Black-capped Chickadee	0	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Blue-winged Warbler	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Bobolink	19	14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.53%	0.00%
Brewer's Blackbird	3	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	66.67%	0.00%
Brown Thrasher	24	24	4.17%	0.00%	0.00%	0.00%	4.17%	0.00%	8.33%	0.00%
Brown-headed Cowbird	106	38	5.66%	0.00%	17.92%	0.00%	0.00%	0.00%	8.49%	0.00%
Cedar Waxwing	335	5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.60%	0.00%
Chestnut-collared Longspur	4	9	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chipping Sparrow	25	7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Clay-colored Sparrow	60	9	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cliff Swallow	1175	5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Common Grackle	2529	56	1.38%	0.00%	1.94%	0.08%	82.64%	0.00%	5.69%	0.71%
Common Yellowthroat	0	6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dark-eyed Junco	8	3	0.00%	0.00%	0.00%	0.00%	25.00%	0.00%	0.00%	0.00%
Dickcissel	0	8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Eastern Bluebird	0	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Eastern Kingbird	17	20	0.00%	0.00%	5.88%	0.00%	0.00%	0.00%	5.88%	0.00%
European Starling	241	24	0.00%	0.00%	0.41%	0.00%	2.49%	0.00%	6.22%	0.00%
Grasshopper Sparrow	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Gray Catbird	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Harris's Sparrow	0	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Horned Lark	44	71	4.55%	0.00%	2.27%	0.00%	4.55%	0.00%	4.55%	0.00%
House Sparrow	8	5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
House Wren	0	20	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Lapland Longspur	60	2	66.67%	0.00%	0.00%	0.00%	0.00%	0.00%	33.33%	0.00%
Lark Bunting	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Lark Sparrow	1	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Least Flycatcher	0	8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Loggerhead Shrike	2	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%	0.00%
Orchard Oriole	6	13	0.00%	0.00%	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%
Pine Siskin	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Red-eyed Vireo	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Red-winged Blackbird	654	54	6.88%	0.00%	11.16%	0.00%	0.00%	0.00%	7.19%	0.00%
Ruby-crowned Kinglet	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Savannah Sparrow	4	7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Say's Phoebe	2	9	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sedge Wren	0	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Song Sparrow	4	20	0.00%	0.00%	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Spotted Towhee	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Swainson's Thrush	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Tree Swallow	22	16	9.09%	0.00%	13.64%	0.00%	4.55%	0.00%	13.64%	0.00%
Vesper Sparrow	19	32	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Warbling Vireo	0	12	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Western Kingbird	31	24	0.00%	0.00%	0.00%	0.00%	9.68%	0.00%	3.23%	0.00%
Western Meadowlark	24	125	4.17%	0.00%	8.33%	0.00%	4.17%	0.00%	0.00%	0.00%
White-Crowned Sparrow	5	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Willow Flycatcher	0	6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Yellow Warbler	2	9	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Waterfowl										
Blue-winged Teal	15	15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	73.33%	0.00%
Canada Goose	2	3	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cinnamon Teal	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Gadwall	0	5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Green-winged Teal	6	3	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Mallard	29	25	20.69%	0.00%	44.83%	0.00%	13.79%	0.00%	13.79%	0.00%
Northern Pintail	3	7	33.33%	0.00%	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%
Northern Shoveler	0	5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Ruddy Duck	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Wood Duck	0	7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Raptors/Vultures/Owls										
American Kestrel	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cooper's Hawk	1	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Ferruginous Hawk	4	4	75.00%	0.00%	0.00%	0.00%	0.00%	0.00%	25.00%	0.00%
Great-horned Owl	2	2	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Northern Harrier	23	23	30.43%	4.35%	13.04%	0.00%	17.39%	0.00%	17.39%	8.70%
Red-tailed Hawk	20	34	20.00%	10.00%	0.00%	10.00%	0.00%	0.00%	20.00%	0.00%
Swainson's Hawk	5	4	40.00%	0.00%	0.00%	0.00%	40.00%	0.00%	0.00%	0.00%
Turkey Vulture	11	8	63.64%	0.00%	0.00%	0.00%	0.00%	9.09%	9.09%	18.18%
Shorebirds										
Killdeer	18	31	5.56%	0.00%	0.00%	11.11%	11.11%	0.00%	16.67%	0.00%
Marbled Godwit	2	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Upland Sandpiper	7	16	28.57%	0.00%	14.29%	0.00%	0.00%	0.00%	14.29%	0.00%
Wilson's Phalarope	1	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Wilson's Snipe	1	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Woodpeckers										
Downy Woodpecker	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Northern Flicker	4	4	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	25.00%	0.00%
Red-headed Woodpecker	2	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Yellow-shafted Flicker	9	10	11.11%	0.00%	11.11%	0.00%	0.00%	0.00%	44.44%	0.00%
Waterbirds										
Double-crested Cormorant	4	1	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Great Blue Heron	2	2	0.00%	50.00%	0.00%	0.00%	0.00%	0.00%	50.00%	0.00%
Pied-billed Grebe	0	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Crows and Allies										
American Crow	4	7	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	50.00%	0.00%
Black-billed Magpie	3	3	33.33%	0.00%	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%
Blue Jay	1	11	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Pigeons/Doves										
Mourning Dove	75	54	4.00%	0.00%	21.33%	0.00%	6.67%	0.00%	18.67%	0.00%
Rock Pigeon	3	2	0.00%	0.00%	0.00%	0.00%	33.33%	0.00%	66.67%	0.00%
Gamebirds										
Ring-necked Pheasant	33	85	3.03%	0.00%	45.45%	0.00%	12.12%	0.00%	0.00%	0.00%
Cranes/Rails										
Sandhill Crane	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Goatsuckers										
Common Nighthawk	1	1	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Gulls/Terns										
Ring-billed Gull	1	1	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TOTALS	**5,799**	**1,156**	**6.65%**	**0.14%**	**7.37%**	**0.21%**	**73.71%**	**0.03%**	**11.14%**	**0.75%**

Table 7c. Point Count Observations and Flight Direction at Campbell County Wind Farm, Fall 2012

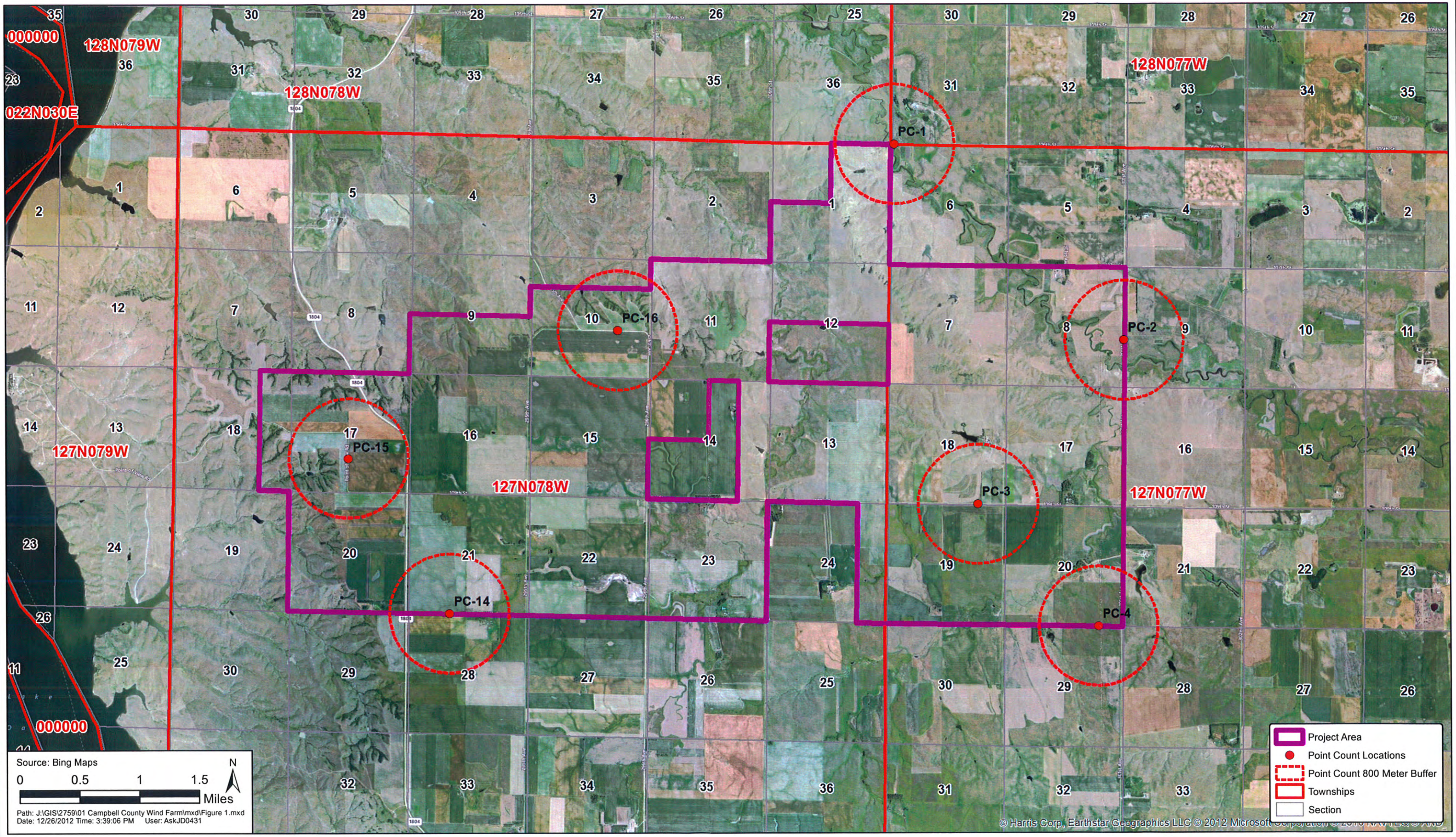
Species	Number Flying	Number of Observations	Percentage of Flights in Various Flight Directions							
			N	NE	E	SE	S	SW	W	NW
Songbirds										
American Goldfinch	34	36	0.00%	0.00%	0.00%	0.00%	8.82%	0.00%	50.00%	0.00%
American Robin	86	17	0.00%	0.00%	1.16%	0.00%	20.93%	0.00%	9.30%	0.00%
American Tree Sparrow	9	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Barn Swallow	55	26	25.45%	0.00%	9.09%	0.00%	18.18%	0.00%	27.27%	0.00%
Black-capped Chickadee	4	6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Blue Grosbeak	1	2	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Bobolink	6	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Brewer's Blackbird	16,509	6	0.00%	0.00%	3.03%	0.00%	0.03%	0.00%	0.00%	0.00%
Brown Thrasher	4	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Brown-headed Cowbird	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chestnut-collared Longspur	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Chipping Sparrow	2	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Clay-colored Sparrow	21	5	0.00%	0.00%	0.00%	0.00%	9.52%	0.00%	0.00%	0.00%
Cliff Swallow	2	2	0.00%	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Common Grackle	338	14	2.37%	0.00%	0.30%	1.18%	0.89%	0.00%	1.78%	0.30%
Dark-eyed Junco	147	15	0.00%	0.00%	0.00%	0.00%	50.34%	0.00%	0.00%	0.00%
Eastern Bluebird	3	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Eastern Kingbird	34	15	2.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
European Starling	715	25	0.00%	3.64%	0.00%	41.96%	1.40%	0.00%	23.78%	0.00%
Field Sparrow	4	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Grays Catbird	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Harris's Sparrow	7	5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Horned Lark	48	17	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
House Finch	2	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
House Sparrow	7	7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
House Wren	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Lapland Longspur	100	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Lark Sparrow	13	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Orchard Oriole	2	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Red-winged Blackbird	3,444	21	4.36%	0.00%	0.00%	0.03%	19.60%	0.00%	0.29%	0.00%
Savannah Sparrow	94	18	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.26%	0.00%
Say's Phoebe	2	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Song Sparrow	10	8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.00%	0.00%
Tree Swallow	6	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Vesper Sparrow	23	13	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Western Kingbird	41	11	0.00%	0.00%	0.00%	0.00%	17.07%	0.00%	0.00%	0.00%
Western Meadowlark	146	49	11.64%	0.00%	0.00%	0.00%	0.00%	0.00%	9.59%	0.00%
White-throated Sparrow	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Willow Flycatcher	2	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Waterfowl										
Blue-winged Teal	4	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Canada Goose	265	4	0.00%	0.00%	13.21%	0.00%	86.79%	0.00%	0.00%	0.00%
Greater White-fronted Goose	150	1	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Mallard	2	2	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Wood Duck	4	5	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Raptors/Vultures/Owls										
American Kestrel	3	3	33.33%	0.00%	33.33%	0.00%	0.00%	0.00%	33.33%	0.00%
Ferruginous Hawk	1	1	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Great-horned Owl	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Merlin	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Northern Harrier	4	4	25.00%	0.00%	25.00%	0.00%	25.00%	0.00%	25.00%	0.00%
Red-tailed Hawk	29	37	20.69%	0.00%	10.34%	6.90%	31.03%	6.90%	10.34%	6.90%
Swainson's Hawk	1	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Turkey Vulture	2	3	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Shorebirds										
Killdeer	9	11	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	22.22%	0.00%
Spotted Sandpiper	0	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Upland Sandpiper	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Woodpeckers										
Downy Woodpecker	1	1	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hariy Woodpecker	2	2	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	50.00%	0.00%
Northern Flicker	15	10	6.67%	0.00%	6.67%	13.33%	6.67%	0.00%	13.33%	0.00%
Red-headed Woodpecker	10	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Waterbirds										
Double-crested Cormorant	1	1	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Great Blue Heron	4	5	0.00%	0.00%	25.00%	0.00%	25.00%	0.00%	50.00%	0.00%
Crows and Allies										
American Crow	85	4	0.00%	0.00%	0.00%	94.12%	2.35%	0.00%	3.53%	0.00%
Blue Jay	15	12	6.67%	20.00%	0.00%	0.00%	20.00%	0.00%	6.67%	0.00%
Pigeons/Doves										
Mourning Dove	250	43	0.80%	0.00%	2.40%	0.00%	23.20%	0.00%	60.40%	0.00%
Rock Pigeon	12	2	83.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Gamebirds										
Ring-necked Pheasant	28	40	0.00%	0.00%	0.00%	0.00%	14.29%	0.00%	0.00%	0.00%
Sharp-tailed Grouse	3	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Cranes/Rails										
Sandhill Crane	128	2	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Goatsuckers										
Common Nighthawk	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
TOTALS	**22,956**	**562**	**6.82%**	**0.96%**	**22.94%**	**12.46%**	**43.13%**	**0.06%**	**13.52%**	**0.10%**

Table 8. Campbell County Wind Farm Incidental Observations

Species	Winter 2011-2012		Spring 2012		Fall 2012		TOTALS	
	Observations	Individuals	Observations	Individuals	Observations	Individuals	Observations	Individuals
Alder Flycatcher	0	0	1	1	0	0	1	1
American Avocet	0	0	2	3	0	0	2	3
American Coot	0	0	0	0	1	1	1	1
American Crow	1	2	2	3	3	9	6	14
American Goldfinch	1	12	0	0	0	0	1	12
American Kestrel	0	0	17	19	7	8	24	27
American Tree Sparrow	0	0	1	4	2	8	3	12
American Wigeon	0	0	7	13	0	0	7	13
Ammerican Coot	0	0	2	2	0	0	2	2
Bank Swallow	0	0	3	18	2	13	5	31
Barn Swallow	0	0	3	9	2	4	5	13
Black-billed Magpie	0	0	1	1	0	0	1	1
Blue Grosbeak	0	0	1	1	0	0	1	1
Blue Jay	4	24	2	2	0	0	6	26
Black-capped Chickadee	1	1	0	0	0	0	1	1
Blue-winged Teal	0	0	15	72	8	47	23	119
Blue-winged Warbler	0	0	1	1	0	0	1	1
Bobolink	0	0	0	0	1	5	1	5
Brewer's Blackbird	0	0	3	252	3	3,300	6	3,552
Broad-winged Hawk	0	0	1	3	0	0	1	3
Bufflehead	0	0	3	8	0	0	3	8
Canada Goose	0	0	2	19	0	0	2	19
Canvasback	0	0	0	0	1	2	1	2
Cedar Waxwing	0	0	1	1	0	0	1	1
Chestnut-collared Longspur	0	0	3	4	0	0	3	4
Clay-colored Sparrow	0	0	1	1	0	0	1	1
Cliff Swallow	0	0	5	1,250	0	0	5	1,250
Common Grackle	0	0	3	280	2	1,540	5	1,820
Common Yellowthroat	0	0	1	1	0	0	1	1
Cooper's Hawk	0	0	0	0	1	1	1	1
Dark-eyed Junco	0	0	1	4	1	6	2	10
Dickcissel	0	0	5	13	0	0	5	13
Double-crested Cormorant	0	0	2	6	0	0	2	6
European Starling	0	0	0	0	3	550	3	550
Ferruginous Hawk	0	0	1	1	1	1	2	2
Franklin's Gull	0	0	3	53	0	0	3	53
Gadwall	0	0	10	23	5	28	15	51
Grasshopper Sparrow	0	0	2	2	1	2	3	4
Gray Partridge	0	0	0	0	1	2	1	2
Great Blue Heron	0	0	3	3	2	2	5	5
Great-horned Owl	0	0	6	9	1	1	7	10
Green-winged Teal	0	0	1	2	2	3	3	5
Harris's Sparrow	0	0	1	1	4	21	5	22
Hooded Merganser	0	0	1	1	0	0	1	1
Horned Lark	9	16	0	0	2	26	11	42
House Finch	0	0	1	1	0	0	1	1
House Sparrow	0	0	2	11	2	11	4	22
House Wren	0	0	1	1	0	0	1	1
Lapland Longspur	0	0	1	2	0	0	1	2
Lark Sparrow	0	0	1	1	1	6	2	7
Lesser Scaup	0	0	3	11	0	0	3	11
Lesser Yellowlegs	0	0	1	6	0	0	1	6
Loggerhead Shrike	0	0	11	12	1	2	12	14
Mallard	0	0	20	54	2	6	22	60
Marbled Godwit	0	0	2	2	0	0	2	2
Merlin	0	0	1	1	0	0	1	1
Mountain Bluebird	0	0	0	0	1	1	1	1
Mourning Dove	0	0	0	0	3	190	3	190
Northern Flicker	0	0	0	0	4	6	4	6
Northern Harrier	0	0	31	32	2	2	33	34
Northern Pintail	0	0	10	18	1	1	11	19
Northern Shoveler	0	0	7	21	1	3	8	24
Pied-billed Grebe	0	0	6	6	7	50	13	56
Prairie Falcon	0	0	0	0	1	1	1	1
Redhead	0	0	1	2	6	38	7	40
Red-necked Phalarope	0	0	1	1	0	0	1	1
Red-tailed Hawk	1	1	20	20	44	48	65	69
Red-winged Blackbird	0	0	1	50	16	5,229	17	5,279
Ring-billed Gull	0	0	2	4	1	2	3	6
Ring-necked Duck	0	0	1	1	0	0	1	1
Ring-necked Pheasant	0	0	1	50	2	80	3	130
Rock Pigeon	0	0	4	50	2	33	6	83
Ruby-crowned Kinglet	0	0	1	1	0	0	1	1
Rough-legged Hawk	2	2	0	0	0	0	2	2
Savannah Sparrow	0	0	2	3	1	2	3	5
Say's Phoebe	0	0	5	5	1	1	6	6
Sharp-tailed Grouse	3	15	0	0	3	9	6	24
Sharp-shinned Hawk	1	1	0	0	0	0	1	1
Short-eared Owl	0	0	1	1	1	1	2	2
Snowy Owl	1	1	0	0	0	0	1	1
Swainson's Hawk	0	0	8	10	2	2	10	12
Tundra Swan	0	0	0	0	0	0	0	0
Turkey Vulture	0	0	3	9	3	10	6	19
Upland Sandpiper	0	0	2	10	0	0	2	10
Vesper Sparrow	0	0	0	0	1	1	1	1
Warbling Vireo	0	0	1	1	0	0	1	1
Western Kingbird	0	0	1	1	0	0	1	1
Willet	0	0	4	4	0	0	4	4
Wilson's Phalarope	0	0	6	20	0	0	6	20
Wilson's Snipe	0	0	2	3	0	0	2	3
Wood Duck	0	0	1	2	0	0	1	2
Yellow-headed Blackbird	0	0	2	11	0	0	2	11
Yellow-shafted Flicker	1	1	1	1	0	0	2	2
Totals	**25**	**76**	**286**	**2,525**	**165**	**11,315**	**465**	**13,885**

Table 9. Raptor Nest Observations at Campbell County Wind Farm				
Raptor Nest Number	**Species**	**Activity**	**Lat**	**Long**
1	Swainson's Hawk	Inactive	45.79916011	-100.2039864
2	Red-tailed Hawk	Active	45.80605092	-100.2764625
3	Red-tailed Hawk	Inactive	45.81246727	-100.1837823
4	Red-tailed Hawk	Active	45.79927381	-100.2462607
5	Red-tailed Hawk	Inactive	45.79857987	-100.2988624
6	Red-tailed Hawk	Inactive	45.78346464	-100.2703123
7	Red-tailed Hawk	Active	45.79503927	-100.1875049
8	Red-tailed Hawk	Inactive	45.8177952	-100.1786046
9	Red-tailed Hawk	Inactive	45.81279426	-100.1973169
10	Red-tailed Hawk	Active	45.83409427	-100.1836162
11	Red-tailed Hawk	Active	45.83040345	-100.2542095

Table 10. Sharp-tailed Grouse Lek Observations at Campbell County Wind Farm					
Lek Number	**Date**	**Number of Birds Observed**	**Habitat**	**Lat**	**Long**
1	5/14/2010 4/9/2012 4/17/2012	6 1 1	Grassland/Alfalfa	45.790497	-100.177643
2	4/9/2012 4/17/2012	1 5	Grassland	45.812489	-100.339138
3	4/9/2012 4/17/2012 4/24/2012	22 10 17	Grassland	45.842823	-100.279962



Fagen Engineering, LLC

Campbell County Wind Farm-Campbell County, South Dakota
Project Boundary and Point Count Locations

Wenck

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301 1st Street NE Suite 202
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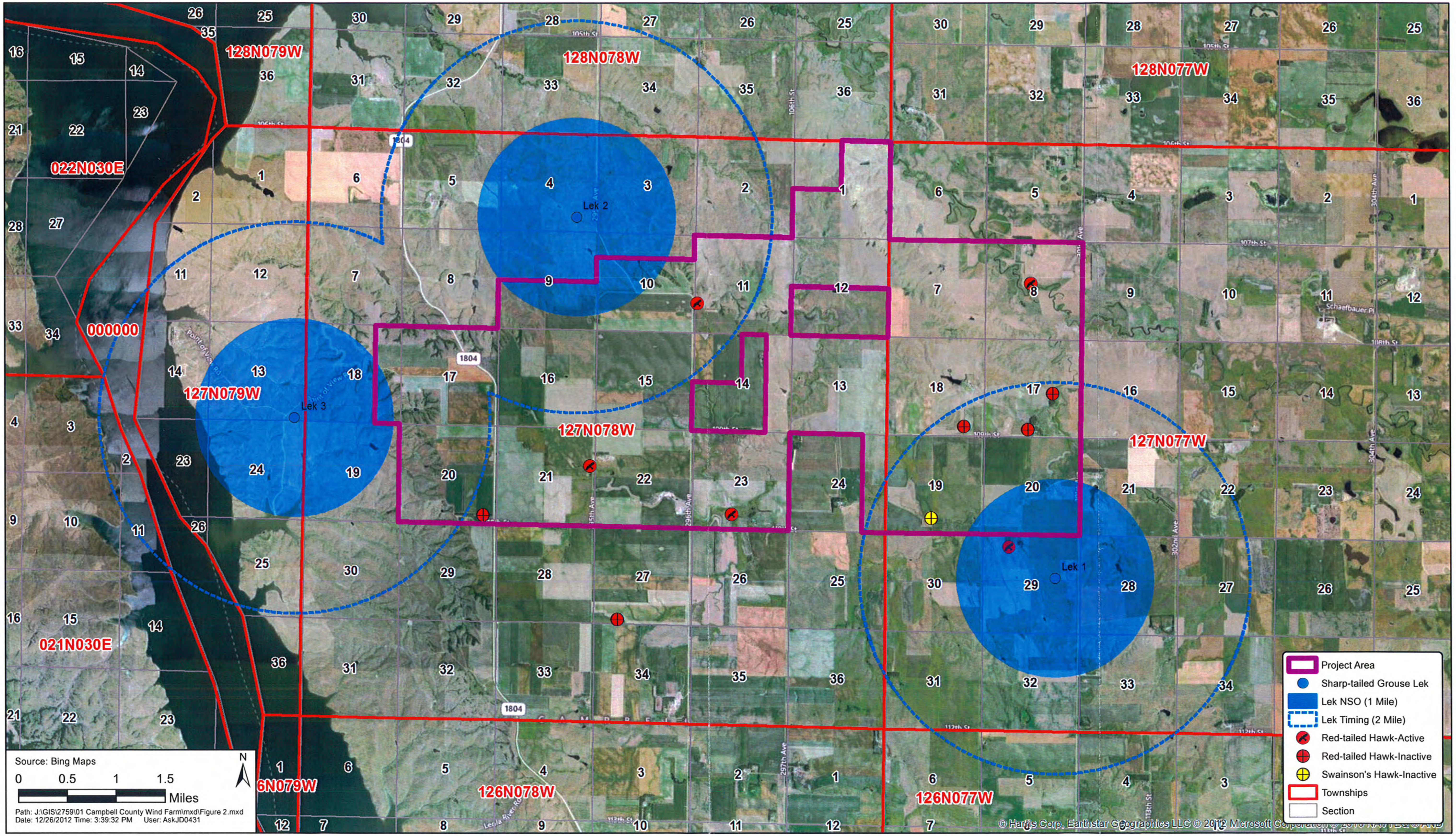
701-751-3370

DEC 2012

FIGURE 1



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Campbell County Wind Farm-Campbell County, South Dakota
Raptor Nest and Sharp-tailed Grouse Lek Locations

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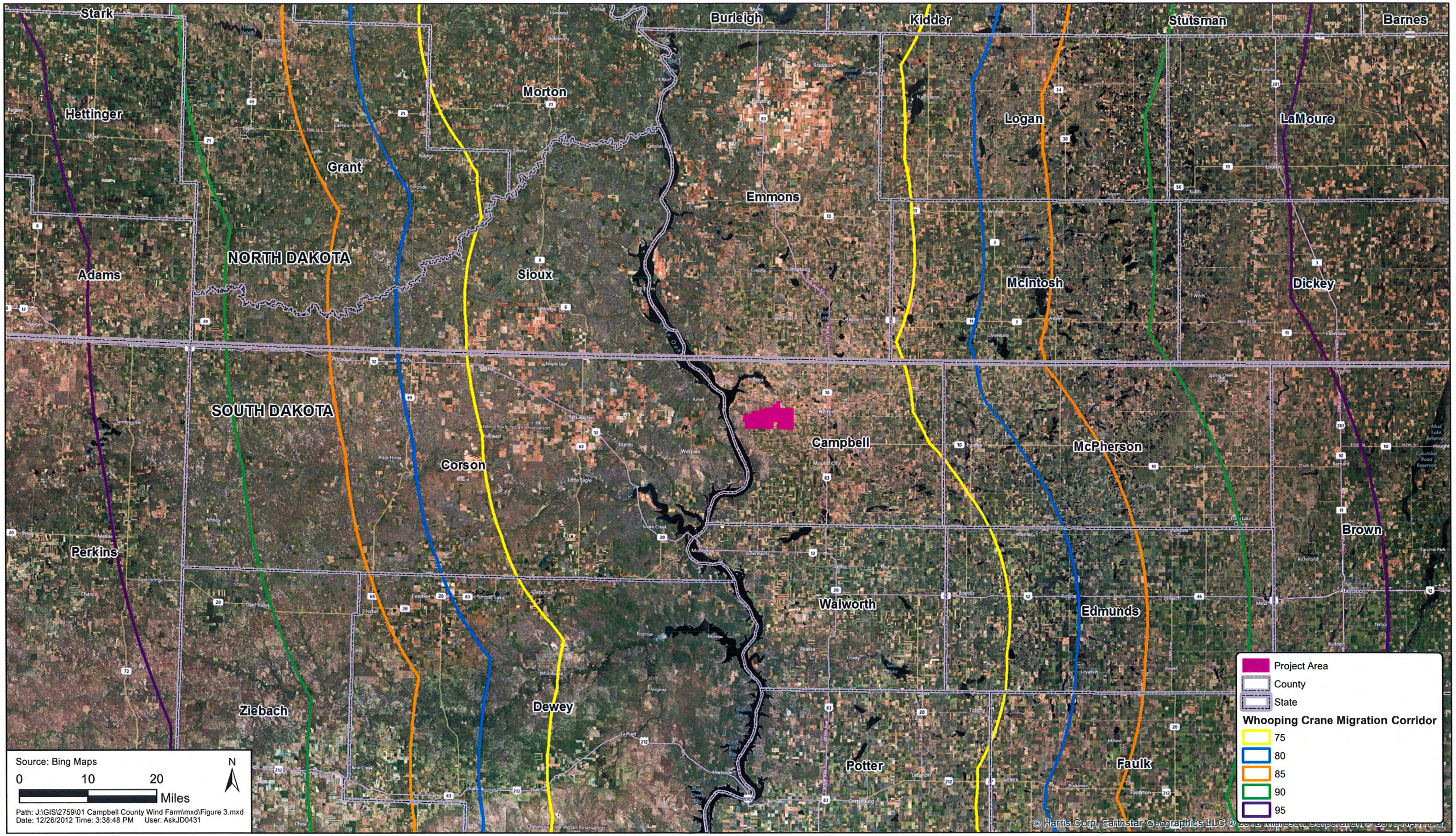
FIGURE 2



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Campbell County Wind Farm-Campbell County, South Dakota
Whooping Crane Migration Corridor

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DEC 2012

FIGURE 3

Avian Survey
Campbell County Wind Farm

Campbell County, South Dakota

January 2011

Prepared for:
Dave Plagge
Environmental Coordinator
Fagen Engineering, LLC.
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WPC, Inc.

Campbell County Wind Farm

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX

1.0 INTRODUCTION

Dakota Plains Energy, Inc. is planning to develop a wind energy facility in Campbell County, South Dakota. The Campbell County Wind Farm (CCWF) is located on private land in north central South Dakota, 5 miles west of Herreid, SD (Figure 1). Western Plains Consulting (WPC) was contracted by Fagen Engineering Inc. to conduct a variety of wildlife surveys at the proposed facility location.

This data from this report will be used to identify wildlife species or species groups of concern that may be at a higher mortality risk and/or displacement from wind farm development. Data in this report are presented in species groupings, and highlight federally listed species, state listed species, and other species of concern.

1.1 Diurnal Fixed-Point and Incidental Avian Use Surveys

Spring and fall are migration periods for non-resident avian species. During the spring, birds are moving north from wintering grounds to summer breeding grounds. In the fall, birds are moving south to wintering grounds. Spring and fall are prime time periods to conduct avian surveys on potential wind farm areas to observe migratory species and resident species.

Avian surveys focus on inventory and monitoring with specific objectives that include: 1) an inventory of all the bird species in a specific project area; 2) determining the relative abundance of species; and 3) monitoring seasonal changes in species composition and relative abundance (Whitworth et al. 2007). Diurnal fixed-point surveys are one of the most common methods used to determine avian composition and abundance. Point counts not only focus on visual cues but also on auditory cues to give the observer an advantage in rough terrain. For some species, vocal cues may be the only reliable means of detection; for example, most counts of secretive rails in heavily vegetated marshes have relied on vocal cues for determining their presence and abundance (Whitworth et al. 2007).

Incidental avian surveys are used to determine bird distribution and composition between point count locations. Larger birds, such as game birds, raptors, and waterfowl, large flocks of smaller birds, and birds that are a rarity in the area are commonly recorded during incidental surveys.

1.2 Sharp-tailed Grouse

Male sharp-tailed grouse congregate at historical/communal leks in the spring to compete for breeding opportunities. Both sexes return to their natal breeding grounds yearly for their entire life. Leks are typically found in areas with low vegetative growth on a hill, knoll or other point of high visibility. Fidelity to these locations is extremely high for sharp-tailed grouse. Sharp-tailed grouse require nesting habitat within close proximity the lek that is comprised of dense or residual vegetative cover to conceal and protect their nest from predators (Vodehnal and Haufler 2007).

Due to the fact that sharp-tailed grouse typically fly low to the ground, mortality from a turbine collision is low. Fences and power lines, however, may be a significant cause of direct mortality by collision (Bidwell et al. 2003). Disturbance of nesting prairie grouse may occur from the construction of turbines, turbine noise, and physical movement of turbines during operation (Robel et al. 2004). Loss of habitat and fragmentation related to wind energy development may affect local prairie grouse populations by decreasing the area of habitat available for nesting and brood-rearing and by increasing predation (Pittman et al. 2005). Therefore, federal and state wildlife agencies are concerned about the placement of turbines in areas with known prairie grouse populations. Turbine setbacks from leks and minimizing grouse habitat disturbance may reduce the direct and indirect effect of wind development on grouse.

1.3 Whooping Cranes

The whooping crane (*Grus americana*) is a federally listed endangered species. Whooping crane injury or death caused by any wind energy project feature would be considered "take" under the Endangered Species Act. Avoidance of habitat by the cranes due to the construction and operation of turbines can be considered habitat loss and 'take" under ESA.

It is unknown how whooping cranes would respond to the presence of wind turbines. Avoidance of wind farms by whooping cranes may reduce the probability of collision, but could amount to loss of stopover habitat. The construction and operation of wind turbines could result in direct mortality from collision with the turbines or by avoidance of habitat in areas where turbines are located.

Power lines located in the vicinity of foraging or roosting habitat pose a threat to whooping cranes due to individual birds often flying at low altitudes (33 to 49 feet above ground) when moving among foraging and roosting sites (Canadian Wildlife Service and United States Fish and Wildlife Service 2005, Stehn and Wassenich 2006). Since 1956, at least 46 whooping cranes have been killed or seriously injured as a result of collisions with power lines (Stehn and Wassenich 2006).

1.4 Raptor Nests

Raptors spend much of their time hunting and soaring within elevation ranges that correspond to the wind turbine rotor-sweep-area (RSA), making them susceptible to turbine blades (Erickson et al. 2002). Because raptors are long-lived species with low reproduction rates, potential population impacts from significant collision-related facilities are of concern (Erickson et al. 2002). Although specific studies are lacking, adults and recently fledged young could be at risk of collision with turbines because of their increased use of the areas near nest sites. Adult raptors often fly near nest sites during the breeding season to attend to young and deliver prey. After young raptors fledge, fledglings often spend significant amounts of time flying and roosting near nest locations until they become capable flyers and hunters. Additionally, construction activities near active nests during the breeding season may potentially result in disturbance or abandonment of nest sites.

2.0 METHODS

2.1 Diurnal Fixed-point and Incidental Avian Use Surveys

Fixed-point Surveys

Avian point count surveys were conducted in the spring and fall, 2010 to capture both migration periods. Survey data was used to evaluate avian use, behavior, and species composition during fall and spring migration at the CCWF. Diurnal fixed-point count surveys were conducted for 20 minutes at 16 circular plots (Figure 2). Point counts (PC) were selected in diverse habitats and at locations with the best possible view shed (Appendix I). Spring surveys were conducted weekly between March 31 and June 20, 2010, and fall surveys between August 17 and November 2, 2010 (Table 1).

All observations within the 800-meter radius circle at each PC were recorded. Any observation outside the 800-meter-radius was considered an incidental observation. The time duration of each PC survey was 20 minutes during which all audio and visual observations were recorded. Surveys were conducted weekly by one observer. Surveys were conducted during all daylight hours of the day and survey schedules were rotated to ensure each PC was surveyed at various times of the day each week. Data was recorded for each observation, including species, number of individuals, time, and height above ground, behavior, and flight direction. Flight heights and distances from the observer were estimated by an experienced field ornithologist by using a range finder and topographic maps.

The data collected provides results that can be used to potentially project the effects of wind turbines at CCWF on avian species. This survey protocol allows an estimate of the avian use throughout the day and captures a variety of bird species. Songbirds are most active in the morning during the breeding season and can be difficult to detect during the afternoon, whereas raptors become more active several hours after sunrise when the sunlight heats the air and creates thermals, which individuals use for soaring.

Twenty-minute (20) survey periods provide adequate time to detect both raptors and non-raptors. Double counting may occur during the 20 minute survey because individuals may appear and disappear from view. Double-counting of birds is not problematic for this type of survey because the objective is to document use in terms of number of birds noted per 20-minutes, not number of distinct individual birds.

The ability to detect all species within the 800-meter survey varies among species and potentially not all individuals within the 800-meter survey were counted. This variation in detectability results in an overestimate of mean use in conspicuous species and an underestimate of mean use in reclusive species (Thompson 2002). Birds not easily identifiable due to low light conditions and distance were identified to the lowest taxonomic level possible.

Incidental Observations

Incidental observations included observations that occurred while traveling between PC locations, pre-and post-PC survey, and outside the 800-meter radius circular plot. These observations were recorded but not used in the formal analysis. Incidental observations are presented in Table 8.

Species Groupings

The data is presented in two primary groups of interest: raptors and non-raptors. Raptors were defined as vultures, hawks, eagles, falcons, and owls. Non-raptors were defined as all other avian species.

Mean Avian Use

Mean use was calculated by dividing the total number of birds per species observed by the total number of surveys conducted. Mean use was also calculated for each individual point count location to determine if there are areas with a higher mean use than other areas. The number of observations is also presented, this information helps depict whether a high mean use is driven by a single observation.

Flight Behavior

Flight behavior was evaluated by calculating the proportion of flying birds that were observed flying below, within, or above the turbine RSA. Dakota Plains Energy, Inc. is proposing GE 1.5 MW turbines; these turbines have a hub height of 80 meters with a 77 meter diameter RSA. Therefore, a RSA between 41.5 and 118.5 meters above the ground was used in the analysis.

Encounter Rate

The encounter rate is the rate in which a species was observed flying through the RSA during the avian point count surveys at CCWF and suggests potential mortality risk from flight height behavior.

To estimate the rate at which a species flies through the RSA, the following equation was applied to every species observed in the CCWF:

$$Encounter\ Rate = A * P_f * P_t$$

- A is the mean use of birds/20 minutes for a given species.
- P_f is the proportion of all activity observations for a given species that were flying
- P_t is the proportion flying observations that were within the turbine RSA

2.2 Sharp-tailed Grouse

Sharp-tailed grouse surveys were conducted in early April through early May 2010, from ½ hour before sunrise to two hours after sunrise. Peak attendance by females on leks typically occurs from April 15 to 25, but these dates vary by up to a week depending on weather conditions (Schroeder and Robb 1993). Listening stops were made throughout the project area to identify lek locations. Sharp-tailed grouse males may be heard at a distance of up to 0.50 mile. Listening stops were not conducted if winds exceeded 10 miles per hour (mph) or during precipitation events. After a lek was located, the birds were observed and the number of males and females were counted. Lek locations were documented using Global Positioning System (GPS) coordinates. Given the sensitive nature of this species, and the fact that females may be nesting near the lek, disturbance to breeding prairie grouse was kept to a minimum.

2.3 Whooping Cranes

Sandhill/Whooping crane surveys were conducted between early April and the end of April 2010 and again from early October to early November 2010 when the highest numbers of cranes are expected to occur in the project area (USFWS 2007). Ground searches were conducted throughout the day starting ½ hour before sunrise and ending at sunset. Sandhill/Whooping crane surveys were conducted by driving a vehicle along the roads within the vicinity of the project area. Stops were made at good vantage points and the biologist glassed and listened for the presence of cranes. On calm mornings sandhill cranes may be heard at a distance of 2.5 miles (Tacha et al. 1992). Each stop consisted of listening and using binoculars and/or spotting scopes to scan the surrounding terrain to visually identify sandhill and/or whooping cranes. Listening stops were conducted but not limited to established avian point count locations. Stops were not conducted during excessively harsh weather conditions.

Determination of the Attractiveness of the CCWF to Whooping Cranes

A landscape scale analysis to assess the potential occurrence of and risk to whooping cranes was conducted by evaluating the wetland/agricultural landscape features at CCWF and surrounding area. The potential risk to the whooping crane is related to the potential for the cranes to occur on the ground. The analysis involved: 1) determining the acreage of wetlands on the CCWF, 2) comparing the proportion of the CCWF in wetlands to the proportion of wetlands within a 10-mile-wide buffer zone around the CCWF, and 3) determining the proportion of land cover on the CCWF within 1 km (0.62 miles) of an agricultural field. The proportion of the CCWF containing a wetland-agricultural matrix and within a 10-mile buffer zone of the CCWF was indentified in order to assess the relative attractiveness of the CCWF to whooping cranes.

The United States Department of Agriculture (USDA) National Land Cover Dataset (NLCD) data for North Dakota and South Dakota was used to determine the total acreage of wetlands of any size within the CCWF and within 10 miles in each direction of the CCWF (Figure 4). The percentage of total acreage of the CCWF that was comprised of wetlands and the percentage of the total acreage of a 10-mile-wide buffer zone around the CCWF that was wetlands were calculated and compared to determine whether the CCWF contained more wetlands than the surrounding area (Tetra Tech 2008).

2.4 Raptor Nests

A raptor nest survey was conducted to locate raptor nests and determine nest activity status and the species using those nests. The initial surveys were conducted in early April, before trees leaf out, to locate nests and to identify early breeding species. The project area was surveyed from a vehicle using binoculars and spotting scopes. All raptor nest locations were documented with GPS coordinates. Raptor species, height of nest, nest activity status, nest condition, substrate, and other relevant data were recorded for each nest. An additional visit was conducted in May 2010 to document the activity status of nests located during the initial survey and identify nesting attempts by late nesting raptors such as Swainson's hawks. Raptors may use nests intermittently among years as well as re-nest after a nest failure; therefore, early and late-season nest surveys allow for a more accurate summary of breeding raptors.

3.0 RESULTS (Spring and Fall 2010)

3.1 Campbell County Wind Farm

Of the approximately 20,120 acres that comprise the CCWF, approximately 7,900 acres were surveyed during PC surveys, covering 26.3 percent of the total area. Eleven point count locations were partially outside the CCWF (Figure 2). The spring and fall 2010 surveys were conducted 12 times, each season at 16 PC locations, which resulted in a total of 192, 20-minute spring 2010 surveys and 192 20-minute fall 2010 surveys (Table 1).

3.2 Species Composition

The spring 2010 survey consisted of 13,337 avian individuals (83 different species) that were recorded during the 192 fixed-PC surveys (Table 2). The most frequently observed birds were unidentified blackbird *(Icteridae)* (34.56 percent of all birds observed), red-winged blackbird *(Agelaius phoeniceus)* (13.59 percent), Franklin's gull *(Larus pipixcan)* (7.81 percent) and ring-necked pheasant (*Phasianus colchicus),* (5.59 percent), (Table 3). The remaining 79 species comprised 38.45 percent of the total number of birds observed.

The fall 2010 survey consisted of 8,698 avian inividuals (75 different species) that were recorded during the 192 fixed PC surveys (Table 2). The most frequently observed birds were unidentified blackbirds, (36.80 percent of all birds observed), brewer's blackbird (*Euphagus cyanocephalus)* (23.35 percent), western meadowlark (*Sturnella neglecta* (8.93 percent) and ring-necked pheasant (4.61 percent) (Table 3). The remaining 71 species comprised 26.31 percent of the total birds observed.

3.3 Avian Use

Spring 2010 overall mean bird use within the CCWF was 69.46 birds/20 min (Table 4a). The overall mean use by non-raptors was 68.76 birds/20 min; the highest were unidentified blackbirds (24.01 birds/20 min), red-winged blackbird (9.44 birds/20 min), Franklin's gull (5.42 birds/20 min) and ring-necked pheasant (3.88 birds/20 min) (Table 2). Mean use for non-raptors was the highest at PC #7 (approximately 26.43 birds/20 min) and observations at this point included high numbers of unidentified blackbird's (4,445 individuals) and Franklin's gull (331 individuals) (Table 4a).

Fall 2010 overall mean bird use within the CCWF was 45.30 birds/20 min (Table 4b). The overall mean use by non-raptors was 44.88 birds/20 min; the highest mean use species were unidentified blackbird (16.67 birds/20 min), Brewer's blackbird (10.58 birds/20 min), western meadowlark (4.05 birds/20 min) and ring-necked pheasant (2.09 birds/20 min) (Table 2). Mean use for non-raptors was the highest at PC #12 (11.56 birds/20 min) and observations at this point included high numbers of Brewer's blackbird (2,013 individuals) and rock pigeon (72 individuals) (Table 4b).

Among spring 2010 species groups, overall mean use was highest for songbirds (52.44 birds/20 min) and included unidentified blackbird (24.01 birds/20 min), red-winged blackbird (9.44 birds/ 20 min), western meadowlark (3.47 birds/20 min), and horned lark *Eremophila alpestris* (3.17 birds/20 min). Gulls/terns had the second highest mean use (5.55 birds/20 min).

For fall 2010 species groups, overall mean use was highest for songbirds (37.03 birds/20 min) and included unidentified blackbird (16.67 birds/20 min), Brewer's blackbird (10.58 birds/20 min), western meadowlark (4.05 birds/20 min) and unidentified sparrow (*Emberizidae*) (3.17 birds/20 min). Game birds had the second highest mean use (2.33 birds/20 min).

Raptors are a group of special interest avian species because of their propensity to fly at heights within a turbine RSA. Overall spring 2010 mean use for raptors was 0.70 birds/20 min. Eleven raptor species were identified during the spring PC survey: red-tailed hawk (*Buteo jamaicensis*) (0.30 birds/20 min), northern harrier (*Circus cyaneus*) (0.17 birds/20 min); turkey vulture (*Carthartes aura*), American kestrel (*Falco sparverius*), Swainson's hawk (*Buteo swainsoni*) and burrowing owl (*Athene cunicularia*) each had a mean use of 0.05 birds/20 min; and golden eagle (*Aquila chrysaetos*), merlin (*Falco columbarius*), bald eagle (*Haliaeetus leucocephalus*), Cooper's hawk (*Accipiter cooperii*) and great-horned owl (*Bubo virginianus*) each had a mean use of 0.05 birds/20 min (Table 2).

Overall fall 2010 mean use for raptors was 0.40 birds/20 min. Ten raptor species were identified during the PC survey: northern harrier (0.14 birds/20 min), red-tailed hawk (0.13 birds/20 min), turkey vulture (0.06 birds/20 min), American kestrel (0.03 birds/20 min), Swainson's hawk, golden eagle, Cooper's hawk, unidentified buteo (*Buteo* sp.), rough-legged hawk (*Buteo lagopus*), sharp-shinned hawk (*Accipiter striatus*) each had a mean use of 0.01 birds/20 min (Table 2).

3.4 Frequency of Occurrence

The ring-necked pheasant was the most common species present (92.19 percent of all surveys) and was most widely distributed throughout CCWF in the spring 2010 surveys (Table 4a). Other frequently occurring species included western meadowlark (91.15 percent of all surveys), horned lark (78.65 percent of all surveys), red-winged blackbird (73.44 percent of all surveys), brown-headed blackbird (*Molothrus ater*) (48.96 percent of all surveys) and mourning dove (*Zenaida macroura*) (46.88 percent of all surveys) (Table 3).

Western meadowlark was the most common species present (44.79 percent of all surveys) and most widely distributed throughout CCWF (Table 4b) in the fall 2010 surveys. Other frequently occurring species included ring-necked pheasant (40.63 percent of all surveys), mourning dove (32.29 percent of all surveys), horned lark (30.21 percent of all surveys), and American goldfinch (*Carduelis tristis*) (22.40 percent) (Table 3).

3.5 Flight Height and Encounter Rate

During the spring 2010 avian use surveys 80.69 percent of all individuals observed were flying (Table 6a). Flight height and flight direction data was recorded for 100 percent of flying birds (Table 7a). Approximately 44.34 percent of flying raptor species flew below the RSA, 52.83 percent flew within the RSA, and 2.83 percent flew above the RSA. For all other species, approximately 65.76 percent flew below the RSA, 31.74 percent flew within the RSA, and 2.51 percent flew above the RSA (Table 5).

During spring 2010, red-tailed hawks had the highest raptor species encounter rate (0.16 birds flying within the RSA/20 min), this was followed by turkey vulture (0.05 birds flying within the RSA/20 min), American kestrel (0.03 birds flying within the RSA/20 min), northern harrier (0.03 birds flying within the RSA/20 min), Swainson's hawk (0.02 birds flying within the RSA/20 min), and golden eagle (0.01 birds flying within the RSA/20 min) (Table 6a).

Unidentified blackbird had the highest non-raptor spring 2010 encounter rate (5.13 birds flying within the RSA/20 min), followed by Franklin's gull (4.15 birds flying within the RSA/20 min), and barn swallow (*Hirundo rustica*) (2.09 birds flying within the RSA/20 min) (Table 6a).

During the fall 2010 avian use surveys, 94.92 percent of all individuals observed were flying (Table 6b) Flight height and flight direction data was recorded for 100 percent of flying birds (Table 7b). Approximately 35.71 percent of flying raptor species flew below the RSA, 57.14 percent flew within the RSA, and 7.14 percent flew above the RSA. For all other species, approximately 50.26 percent flew below the RSA, 42.23 percent flew within the RSA, and 7.51 percent flew above the RSA (Table 5).

During fall 2010, red-tailed hawks had the highest raptor species encounter rate (0.09 birds flying within the RSA/20 min), turkey vulture (0.05 birds flying within the RSA/20 min), northern harrier (0.05 birds flying within the RSA/20 min), rough-legged hawk (0.01 birds flying within the RSA/20 min), sharp-shined hawk (0.01 birds flying within the RSA/20 min), Cooper's hawk (0.01 birds flying within the RSA/20 min), Swainson's hawk (0.01 birds flying within the RSA/20 min), and golden eagle (0.01 birds flying within the RSA/20 min.) (Table 6b).

Unidentified blackbird had the highest non-raptor fall 2010 encounter rate (13.96 birds flying within the RSA/20 min). This was followed by Franklin's gull (1.18 birds flying within the RSA/20 min), unidentified sparrow (1.04 birds flying within the RSA/20 min), and western meadowlark (0.62 birds flying within the RSA/20 min) (Table 6b).

3.6 Sensitive Species Observations

A total of 11 sensitive species were recorded during the spring and fall 2010 PC and incidental surveys. This included a state endangered species, peregrine falcon (*Falco peregrinis;* one individual), and a state threatened species, bald eagle (one individual). Nine (9) state sensitive species were also observed at the CCWF, bobolink (*Dolichonyx orysivorus;* 199 individuals), marbled godwit (*Limosa fedoa;* 23 individuals), Swainson's hawk (11 individuals), burrowing owl (nine individuals), dicksissel (*Spiza americana;* six individuals), golden eagle (three individuals), Loggerhead shrike (*Lanius ludovicianus;* two individuals), and long-billed curlew (*Numenius americanus;* two individuals). Additionally, both bald eagles and golden eagles are protected under the Bald and Golden Eagle Protection Act.

3.7 Flight Direction

Birds observed flying during the spring 2010 surveys were generally flying in a southerly direction (36.28 percent). This was followed by variable directions (19.77 percent), northwest (10.43 percent), north (10.92 percent), southeast (9.71 percent), east (4.08 percent), west (3.55 percent), northeast (3.35 percent), and southwest (1.90 percent) (Table 7a).

Birds during the fall 2010 surveys were observed flying in a southerly direction (66.67 percent). This was followed by directions of southeast (8.26 percent), variable directions (6.43 percent), east (4.80 percent), north (4.54 percent), west (4.53 percent), northeast (2.43 percent), northwest (1.89 percent), and southwest (0.45 percent) (Table 7b).

3.8 Incidental Surveys

During the spring 2010 incidental survey, staff documented 26 species and a total of 1,529 individuals over 12 survey periods (Table 8). European starling (*Sturnus vulgaris*) was the most commonly recorded species during the incidental surveys within the CCWF (633 individuals). This was followed by red-winged blackbird (436 individuals), and Franklin's gull (126 individuals). Two species, blue jay (*Cyanocitta cristata*) and common tern (*Sterna hirundo*), were detected during incidental surveys, but not during spring 2010 point count surveys (Table 8).

During the fall 2010 incidental survey, staff documented 14 species and a total of 90 birds over 12 survey periods (Table 8). Red-tailed hawk was the most commonly recorded species during the incidental surveys within the CCWF (32 individuals). This was followed by American crow (*Corvus caurinus*) (12 individuals), northern harrier (10 individuals) and Swainson's hawk (9 individuals). Four species including bald eagle, northern pintail (*Anas acuta*), burrowing owl and peregrine falcon (*Falco peregrines*) were detected during incidental surveys, but not during fall 2010 point count surveys (Table 8).

3.9 Sharp-tailed Grouse Leks

One (1) sharp-tailed grouse lek was located during the spring 2010 survey (Figure 3). Lek number, date, sex and number of birds present, habitat and GPS coordinates were recorded (Table 10). The lek was visited twice during the spring lekking season. The lek was located in at T127N-R077W-Section 29, S ½ of the NE ¼. Five (5) males and 1 female sharp-tailed grouse were observed.

3.10 Whooping Crane

No whooping cranes were sighted during the spring or fall 2010 survey. Two (2) sandhill crane groups with a total of 153 individuals were observed during the spring 2010 survey. Five (5) sandhill crane groups with a total of 110 individuals were observed during the fall 2010 survey.

Attractiveness of the CCWF to Whooping Cranes

The CCWF and the 10-mile buffer zone were analyzed for total acres, total acres of wetlands and total acres of agricultural land (Figure 4). The CCWF is 20,120 acres in size and consists of 3,733 acres of agricultural land (18.5 percent), 276 acres of wetlands (1.4 percent), and 18,328 acres of wetland-agricultural matrix (91.1 percent) (Figure 4). The 10-mile buffer zone is 392,060 acres and it consists of 61,106 acres of agricultural land (15.6 percent), 14,306 acres of wetlands (3.7 percent), and 280,960 acres of wetland-agricultural matrix (71.7 percent) (Figure 4).

The analysis suggests that 91.1 percent of the CCWF contains ideal habitat for whooping cranes, while 71.7 percent of the 10-mile buffer contains ideal habitat. The red hatched areas in Figure 4 indicate the areas that are not ideal habitat for sandhill and/or whooping cranes for foraging and loafing on the CCWF and 10-mile buffer zone.

3.11 Raptor Nests

Seventeen (17) raptor nests were observed and mapped within CCWF (Figure 3). Fifteen of the nests were red-tailed hawk (eleven active, four inactive), one unknown (inactive) and one Swainson's hawk active (Table 9). See below for nest locations:

- Nest 1 Swainson's hawk Active SE ¼ SW ¼ 127-077-19
- Nest 2 Red-tailed hawk Active SE ¼ SW ¼ 127-077-32
- Nest 3 Red-tailed hawk Active SE ¼ NE ¼ 127-078-21

- Nest 4 Red-tailed hawk Active SE ¼ SW ¼ 127-077-17
- Nest 5 Red-tailed hawk Active NE ¼ SE ¼ 126-078-3
- Nest 6 Red-tailed hawk Active SE ¼ SW ¼ 127-078-23
- Nest 7 Red-tailed hawk Active SE ¼ SE ¼ 127-078-20
- Nest 8 Red-tailed hawk Inactive SW ¼ SW ¼ 127-078-27
- Nest 9 Red-tailed hawk Inactive SW ¼ NE ¼ 127-078-34
- Nest 10 Unknown Inactive NW ¼ SE ¼ 126-078-2
- Nest 11 Red-tailed hawk Active SW ¼ NW ¼ 127-077-31
- Nest 12 Red-tailed hawk Inactive SE ¼ SW ¼ 126-077-18
- Nest 13 Red-tailed hawk Inactive SW ¼ SW ¼ 127-077-33
- Nest 14 Red-tailed hawk Active NE ¼ NW ¼ 127-077-29
- Nest 15 Red-tailed hawk Active NW ¼ SE ¼ 127-077-17
- Nest 16 Red-tailed hawk Active SW ¼ NE ¼ 126-078-2
- Nest 17 Red-tailed hawk Active SE ¼ SE ¼ 127-077-18

4.0 DISCUSSION AND IMPACT ASSESSMENT

4.1 Raptor Use and Encounter Rate

During the spring 2010 survey 135 individual raptors were observed for a mean use of 0.70 raptors/20 min, compared to the fall 2010 survey where 77 raptor observations were made for a mean use of 0.40 raptors/20 min (Table 2).

The raptor annual mean use rate at CCWF of 0.55 raptors/20 min (combining spring and fall values) was compared with 37 other wind energy facilities that implemented similar protocols. The raptor annual mean use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/20 min survey. Based on the results from these wind energy facilities, as summarized by Derby et al. 2010, a ranking of seasonal raptor mean use was developed: low (0-0.5 raptors/20 min. survey); low to moderate (0.5-1.0 raptors/20 min); moderate (1.0-2.0 raptors/20 min); high (2.0-3.0 raptors/20 min); and very high (> 3.0 raptors/20 min). Under this ranking, mean raptor use at the CCWF is considered to be low to moderate. The annual raptor use at CCWF would rank 11th compared to 37 other wind-energy facilities (Derby et al. 2010).

Raptor encounter rates of 0.29 individuals flying within the RSA/20 min during the spring 2010 survey and 0.21 individuals flying within the RSA/20 min during the fall 2010 survey was low at CCWF (Tables 6a and 6b). Fifty-three (53) percent of all raptor observations were within the RSA. The spring and fall 2010 surveys altogether, had an annual raptor encounter rate of 0.25 flying within the RSA/20 min. The highest raptor encounter rate was red-tailed hawk with 0.16 individuals (spring) flying within the RSA/20 min. Turkey vultures were second with a encounter rate of 0.05 individuals (spring and fall) flying within the RSA/20 min (Table 6a and 6b). The spring and fall and annual raptor encounter rate calculated is relatively low, however the percentage of raptor observations within the RSA during the spring and fall surveys and the low to moderate annual mean use rate (raptors/20 minutes) shows potential for mortality at CCWF.

High numbers of raptor fatalities have been documented at wind-energy facilities (e.g. Alamont Pass), however other studies at wind-energy facilities in the United States suggest that 3.2% of the total casualties were raptors (Erickson et al. 2001). Results from Alamont Pass in California suggest that species mortality is not all related to abundance (Orloff and Flanery 1992). Golden eagles, red-tailed hawks and American kestrels were casualties more often than predicted based on abundance. Based on species occurrence/abundance within CCWF, red-tailed hawk and turkey vultures may constitute the highest proportion of raptor fatalities at CCWF.

Encounter rate analysis may also determine which species might become turbine casualties. The encounter rate is an index and only considers probability of exposure based on abundance, number of individuals flying, and flight height of each species within the RSA for turbines to be used at the wind-energy facility. The encounter rate index is relative to the observations of species during the surveys and within the study area and cannot be extrapolated to the species that may use CCWF in the future. The encounter rate index from this study does not take into consideration behavior (e.g. foraging, courtship), habitat use, and turbine avoidance differences between species. At CCWF, the raptor species with the highest encounter rate indices were red-tailed hawk and turkey vulture.

Raptor nest density within CCWF and within one mile of the boundary of CCWF was 0.54 nests per square mile (Figure 4). Few raptor species that have been identified as nesting at wind energy facilities have been observed as fatalities at wind-energy facilities (Derby et al. 2010), therefore, the relationship is very low between the number of collision fatalities and raptor nests within or near project facilities, however, it is assumed that raptors nesting close to turbines would likely have a greater chance of being impacted from collision with turbines, but the data is not available at this time to determine the impact (Derby et al. 2010).

4.2 Non-Raptor Use and Encounter Rate

Migratory bird species in the United States are protected by the Migratory Bird Treaty Act (MBTA). Passerine species have been the most abundant bird fatality at wind energy facilities outside California (Erickson et al. 2001 and Erickson et al. 2002), often comprising more than 80% of the bird fatalities. Both migrant and resident passerine fatalities have been observed (Erickson et al. 2001 and Erickson et al. 2002). Passerines make up a large proportion of the birds observed during the spring and fall 2010 avian surveys at CCWF and would be expected to make up the largest proportion of fatalities at the CCWF. Encounter rate indices for both spring and fall PC surveys indicate that unidentified blackbirds and Franklin's gulls are likely to be exposed to collisions from wind turbines at CCWF (Tables 6a & 6b). There were other passerine and waterfowl species that flew through the RSA during spring and fall PC surveys, but encounter rates are not high enough to warrant significant collision exposure (Tables 6a & 6b).

4.3 Sharp-tailed Grouse

The sharp-tailed grouse inhabits steppe, grassland and mixed grass habitats. Sharp-tailed grouse require grasslands with residual cover for nesting and utilize agricultural areas seasonally for food. Males congregate on communal display grounds called leks, which are often located on a knoll or ridge, beginning in early spring and extending into June. Sharp-tailed grouse serve as indicators of grassland ecosystem health and provide recreational and aesthetic value (SDGFP 2008). One known sharp-tailed grouse lek was located within the project area in 2010, however there are landlocked areas within the project area that were not surveyed. Potential lek surveys in the spring of 2011 may find additional leks in these native prairie areas.

Native prairie is used by sharp-tailed grouse for seasonal habitat needs such as lekking, nesting, brood rearing, and wintering. The area surrounding the lek site contains habitat for reproduction and year round survival of sharp-tailed grouse. Loss of native prairie may affect the availability of habitat for grouse lekking and reproduction. Concerns that sharp-tailed grouse may avoid nesting near human-made structures have heightened this issue for siting wind farms (Pitman et al. 2005). Establishing new roads in areas of native prairie increases habitat fragmentation and could provide better access for nesting predators such as skunks, raccoons, coyotes and feral cats. These animals are predators of sharp-tailed grouse nests and reproductive success could be reduced if native prairie areas are more accessible to predators.

South Dakota Game Fish and Parks (SDGFP) does not mandate specific distances turbines should be constructed from leks, but does recommend avoidance of construction and maintenance activities (including mowing) during the ground nesting bird breeding season (April to July). Although the SDGFP does not mandate specific distances turbines should be constructed from leks, it is recommended that no turbines be constructed within ¼-mile of the lek (Figure 3). Setbacks from leks would help further minimize any potential displacement impacts to sharp-tailed grouse.

4.4 Listed and Sensitive Species Risk

All sensitive species observed at the CCWF are summarized in Section 3.6. No federally listed threatened, endangered or candidate species were observed at the CCWF during this study. One state threatened species, bald eagle, was observed during fixed-point surveys at the CCWF (one observation). A state endangered species, peregrine falcon, was also observed during incidental surveys at the CCWF (one observation). The bald eagle is also legally protected under the Bald and Golden Eagle Protection Act (BGEPA 1940), while the others are further protected under the Migratory Bird Treaty Act (MBTA 1919).

The U.S. Fish & Wildlife Service (USFWS) and the SDGFP have expressed concern over potential impacts to whooping cranes that are being considered within the migration corridor of whooping cranes, such as the CCWF. The whooping crane migrates through South Dakota during spring and fall, within a corridor that is roughly 200-miles wide; the CCWF falls within the center of the corridor where 75% of South Dakota's whooping crane reported sittings have been recorded (Figure 5). No whooping cranes were observed during the study, however several groups of sandhill cranes were observed during the spring and fall PC surveys.

Whooping crane stopover habitat in South Dakota is variable, but can be described as wetlands (roosting areas) that are greater than ¼ acre in size with water depths in the range of five to eight inches with minimal surrounding vegetation. Harvested cereal grain fields in close proximity to the wetlands are used for foraging by whooping cranes, however cranes will forage in wetlands and other crops such as alfalfa. The wetland density and wetland-agricultural analyses indicate that stop-over habitat is available on the CCWF and within a 10-mile vicinity of CCWF. The presence of stop-over habitat within the 10-mile vicinity of CCWF minimizes the impact of potential lost habitat if whooping cranes avoid the wind farm, due to availability of adequate surrounding habitat.

The probability of whooping crane collisions with turbines on the CCWF is unknown. However, due to the small number of whooping cranes, the sporadic nature of stopovers within the 2,500 mile long by 200-mile wide migration corridor, the small size of the proposed CCWF, the probability of whooping crane collision is presumed low.

4.5 Potential Impacts to Avian Species – Direct and Indirect Effects

Direct mortality and/or injury from collisions with wind turbines and/or guy wires, temporary or permanent habitat loss, and displacement of birds from habitats near turbines are possible impacts to avian species from the construction and operation of the CCWF (Drewitt and Langston 2006). In addition to mortality associated with wind farms, concerns have been raised that bird species may avoid areas near turbines after the wind farm is in operation (Drewitt and Langston 2006).

5.0 CONCLUSIONS AND RECOMMENDATIONS

Differences in bird use were detected between spring and fall PC survey points, though it does not appear that birds were disproportionally using specific areas of the CCWF. No strong association with topographic features within the CCWF was noted for raptors or other large avian species. No flyways or concentration areas were observed.

Based on research conducted at wind farms throughout the United States, raptor use at CCWF is generally lower than use levels recorded at other wind farms. To date, no relationships have been determined between overall use by other bird species, and fatality rates of those bird groups at wind farm facilities. Flight characteristics and foraging habits of some species may result in additional exposure for these species at CCWF. The surveys for this proposed wind farm did not address the impacts to nocturnal migrants. Generally, overall fatality rates for birds (including nocturnal migrants) at wind farm facilities in the Midwest portion of the United States have been relatively low and consistent. The range of overall bird fatality estimates at three Midwest wind farm facilities has ranged from 0.7 to 3.4 fatalities/MW/year (Derby, et al. 2010).

Approximately 60% of the CCWF is grassland (native and tame) habitat. Wildlife and plants which are closely associated with grasslands, primarily native, may be affected by the potential construction and operation of this wind farm facility. Wildlife species may avoid these habitats during siting of turbines and plants will be permanently removed by turbine placement and access road construction. No federally listed endangered, threatened, or candidate species were located within the CCWF. However, 11 sensitive state avian species of concern were recorded within the project area. These avian species are generally not associated with agricultural habitats and occur in grassland/native prairie, wetlands, or woodland habitats. The potential exists for these species to be temporarily or permanently displaced from these habitats.

The CCWF is located within the whooping crane migration corridor, and a similar species, sandhill crane, was documented to occur during both the spring and fall PC surveys. Adequate stop-over habitat exists for the whooping crane to use CCWF, but to what extent is not known.

Sharp-tailed grouse were observed both during the spring and fall PC surveys, and one lek was located during the spring lekking season. Additional lekking and reproductive habitat is present within the CCWF. A more comprehensive sharp-tailed grouse lek survey is recommended to determine the extent of sharp-tailed grouse use of CCWF.

6.0 GENERAL AND SIGNATURES

The services performed by WPC scientists for this project have been conducted in a manner consistent with the degree of care and technical skill appropriately exercised by professionals currently practicing in this area under similar time and budget constraints. Recommendations and findings contained in this report represent our professional judgment and are based upon available information and technically accepted practices at the present time and location. Other than this, no warranty is implied or expressed.

WPC, Inc. Wildlife Biologist and Project Manager, Justin Askim and Certified Wildlife Biologist, John W. Schulz, prepared the report. Wildlife Biologist and Project Manager, Daniel Ackerman completed the fieldwork.

Justin Askim, Wildlife Biologist	Daniel Ackerman, Wildlife Biologist
Project Manager	Project Manager
1/11/11	1/11/2011
Date	Date

John W, Schulz, Certified Wildlife Biologist

01/11/11

Date

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8.0 ACRONYMS AND ABBREVIATIONS

ac	Acre
BGEPA	Bald and Golden Eagle Protection Act
CCWF	Campbell County Wind Farm
ESA	Endangered Species Act
ha	hectare
M	meter
MBTA	Migratory Bird Treaty Act
Mph	miles per hour
NAIP	National Imagery Program
NLCD	National Land Cover Dataset
PC	Point Count
RSA	Rotor Sweep Area
SDGFP	South Dakota Game Fish and Parks
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WPC	Western Plains Consulting

Tables

Table 1. CCWF PC Dates, Spring 2010 and Fall 2010	
Spring 2010	
Survey Number	**Date**
1	3/31-4/1/2010
2	4/8-4/9/2010
3	4/15-4/16/2010
4	4/22-4/23/2010
5	4/29-4/30/2010
6	5/3-5/4/2010
7	5/13-14/2010
8	5/21/2010
9	5/26/2010
10	6/1/2010
11	6/9/2010
12	6/20/2010
Fall 2010	
Survey Number	**Date**
1	8/17-18/2010
2	8/23/2010
3	8/31/2010
4	9/7/2010
5	9/13/2010
6	9/20/2010
7	9/28-29/2010
8	10/4/2010
9	10/12-13/2010
10	10/18/2010
11	10/25/2010
12	11/2/2010

Table 2. CCWF Point Count Avian Species by Group, Spring 2010 and Fall 2010

Species	Spring 2010			Fall 2010		
	Number of Birds	Number of Observations	Mean Use (# birds/20 min.)	Number of Birds	Number of Observations	Mean Use (# birds/20 min.)
Songbirds						
Western Meadowlark	667	349	3.47	777	142	4.05
Horned Lark	609	271	3.17	183	75	0.95
Savannah Sparrow	15	15	0.08	0	0	0.00
Chestnut-collared Longspur	2	1	0.01	0	0	0.00
Vesper Sparrow	135	80	0.70	23	5	0.12
Brown-headed Cowbird	582	209	3.03	44	2	0.23
Barn Swallow	462	30	2.41	71	33	0.37
Tree Swallow	2	1	0.01	19	4	0.10
Grasshopper Sparrow	33	27	0.17	1	1	0.01
American Robin	72	41	0.38	87	16	0.45
Common Grackle	280	87	1.46	0	0	0.00
Western Kingbird	48	30	0.25	19	15	0.10
Eastern Kingbird	51	28	0.27	80	33	0.42
Gray Catbird	4	3	0.02	0	0	0.00
Loggerhead Shrike	1	1	0.01	1	1	0.01
Red-winged Blackbird	1,812	284	9.44	3	2	0.02
House Sparrow	3	3	0.02	1	1	0.01
European Starling	13	7	0.07	127	9	0.66
Field Sparrow	28	17	0.15	12	8	0.06
Unidentified Blackbird	4,609	7	24.01	3,201	17	16.67
American Tree Sparrow	9	6	0.05	3	2	0.02
Unidentified Warbler	12	7	0.06	1	1	0.01
White-Crowned Sparrow	1	1	0.01	5	3	0.03
Bobolink	197	85	1.03	2	2	0.01
Yellow-headed Blackbird	23	15	0.12	4	1	0.02
Clay-colored Sparrow	20	14	0.10	14	2	0.07
Bank Swallow	322	15	1.68	7	1	0.04
Brown Thrasher	12	9	0.06	3	3	0.02
Swainson's Thrush	2	2	0.01	0	0	0.00
Chipping Sparrow	12	10	0.06	4	3	0.02
Baltimore Oriole	1	1	0.01	0	0	0.00
Pine Grosbeak	1	1	0.01	0	0	0.00
Orchard Oriole	3	2	0.02	0	0	0.00
Red-eyed Vireo	3	3	0.02	0	0	0.00
Least Flycatcher	6	4	0.03	0	0	0.00
Northern Rough-winged Swallow	3	2	0.02	0	0	0.00
Song Sparrow	3	3	0.02	0	0	0.00
American Goldfinch	5	3	0.03	0	0	0.00
Marsh Wren	1	1	0.01	0	0	0.00
Eastern Bluebird	1	1	0.01	0	0	0.00
Cliff Swallow	1	1	0.01	0	0	0.00
Yellow-breasted Chat	1	1	0.01	0	0	0.00
Yellow-rumped Warbler	0	0	0.00	1	1	0.01
Brewer's blackbird	0	0	0.00	2,031	4	10.58
Snow Bunting	0	0	0.00	19	1	0.10
Red-eyed Vireo	0	0	0.00	1	1	0.01
Least Flycatcher	0	0	0.00	5	3	0.03
Song Sparrow	0	0	0.00	1	1	0.01
American Goldfinch	0	0	0.00	107	52	0.56
Dickcissel	0	0	0.00	4	2	0.02
Unidentified Sparrow	0	0	0.00	228	20	1.19
Blue Grosbeak	0	0	0.00	1	1	0.01
Yellow-breasted Chat	0	0	0.00	2	2	0.01
Bullock's Oriole	0	0	0.00	2	1	0.01
Ruby-crowned Kinglet	0	0	0.00	1	1	0.01
Brown Creeper	0	0	0.00	1	1	0.01
Dark-eyed Junco	0	0	0.00	13	3	0.07
Totals	**10,067**	**1,678**	**52.44**	**7,109**	**476**	**37.03**
Raptors/Vultures/Owls						
Golden Eagle	2	2	0.01	1	1	0.01
Red-tailed Hawk	58	54	0.30	25	23	0.13
Northern Harrier	33	33	0.17	27	25	0.14
American Kestrel	10	9	0.05	6	4	0.03
Marlin	1	1	0.01	0	0	0.00
Turkey Vulture	10	6	0.05	12	11	0.06
Swainson's Hawk	9	7	0.05	2	2	0.01
Great-horned Owl	1	1	0.01	0	0	0.00
Burrowing Owl	9	6	0.05	0	0	0.00
Unidentified Buteo	0	0	0.00	1	1	0.01
Sharp-shinned Hawk	0	0	0.00	1	1	0.01
Rough-legged Hawk	0	0	0.00	1	1	0.01
Bald Eagle	1	1	0.01	0	0	0.00
Cooper's Hawk	1	1	0.01	1	1	0.01
Totals	**135**	**121**	**0.70**	**77**	**70**	**0.40**
Waterfowl						
Canada Goose	19	9	0.10	20	2	0.10
Ring-necked Duck	10	1	0.05	0	0	0.00
Mallard	189	93	0.98	36	2	0.19
Wood Duck	1	1	0.01	0	0	0.00
Northern Pintail	69	20	0.36	0	0	0.00
Redhead	4	1	0.02	0	0	0.00
Blue-winged teal	20	9	0.10	2	1	0.01
Northern Shoveler	18	8	0.09	0	0	0.00
Gadwell	10	5	0.05	0	0	0.00
Totals	**340**	**147**	**1.77**	**58**	**5**	**0.30**
Shorebirds						
Killdeer	181	82	0.94	8	6	0.04
Wilson's Snipe	7	6	0.04	0	0	0.00
Upland Sandpiper	161	98	0.84	1	1	0.01
Willet	5	4	0.03	0	0	0.00
Marbled Godwit	24	14	0.13	0	0	0.00
Long-billed Curlew	0	0	0.00	2	1	0.01
Baird's Sandpiper	4	1	0.02	0	0	0.00
Wilson's Phalarope	2	1	0.01	0	0	0.00
Totals	**384**	**206**	**2.01**	**11**	**8**	**0.06**
Gamebirds						
Wild Turkey	4	4	0.02	1	1	0.01
Ring-necked Pheasant	745	477	3.88	401	159	2.09
Gray Partridge	0	0	0.00	33	3	0.17
Sharp Tailed Grouse	1	1	0.01	12	5	0.06
Totals	**750**	**482**	**3.91**	**447**	**168**	**2.33**
Pigeons/Doves						
Mourning Dove	302	176	1.57	234	121	1.22
Rock Pigeon	53	24	0.28	96	17	0.50
Eurasian Collared Dove	2	1	0.01	0	0	0.00
Totals	**357**	**201**	**1.86**	**330**	**138**	**1.72**
Gulls/Terns						
Ring-billed Gull	25	9	0.13	0	0	0.00
Franklin's Gull	1,041	19	5.42	234	4	1.22
Totals	**1,066**	**28**	**5.55**	**234**	**4**	**1.22**
Woodpeckers and Allies						
Yellow-shafted Flicker	19	15	0.10	4	4	0.02
Northern Flicker	0	0	0.00	16	11	0.08
Red-headed Woodpecker	0	0	0.00	1	1	0.01
Unidentified Woodpecker	1	1	0.01	0	0	0.00
Totals	**20**	**16**	**0.11**	**21**	**16**	**0.11**
Goatsuckers						
Common Nighthawk	1	1	0.01	1	1	0.01
Totals	**1**	**1**	**0.01**	**1**	**1**	**0.01**
Crows and Allies						
American Crow	61	28	0.32	26	14	0.14
Black-billed Magpie	0	0	0.00	1	1	0.01
Blue Jay	0	0	0.00	17	13	0.09
Totals	**61**	**28**	**0.32**	**44**	**28**	**0.23**
Waterbirds						
Great Blue Heron	3	3	0.02	3	3	0.02
Double-crested Cormorant	0	0	0.00	251	2	1.31
Cattle Egret	0	0	0.00	1	1	0.01
Great Egret	0	0	0.00	1	1	0.01
Totals	**3**	**3**	**0.02**	**256**	**7**	**1.33**
Cranes/Rails						
Sandhill Crane	153	2	0.80	110	5	0.57
Totals	**153**	**2**	**0.80**	**110**	**5**	**0.57**
Grand Totals	13,337	2,913	69.46	8,698	926	45.30

Table 3. CCWF Point Count Percent Composition and Frequency by Species Group, Spring 2010 and Fall 2010				
	Spring 2010		Fall 2010	
Species	Percent (%) Composition	Percent (%) Frequency	Percent (%) Composition	Percent (%) Frequency
Songbirds				
American Goldfinch	0.04%	1.56%	0.00%	0.00%
American Goldfinch	0.00%	0.00%	1.23%	22.40%
American Robin	0.54%	17.71%	1.00%	7.81%
American Tree Sparrow	0.07%	2.60%	0.03%	1.04%
Baltimore Oriole	0.01%	0.52%	0.00%	0.00%
Bank Swallow	2.41%	7.29%	0.08%	0.52%
Barn Swallow	3.46%	10.94%	0.82%	11.98%
Blue Grosbeak	0.00%	0.00%	0.01%	0.52%
Bobolink	1.48%	29.17%	0.02%	1.04%
Brewer's blackbird	0.00%	0.00%	23.35%	1.56%
Brown Creeper	0.00%	0.00%	0.01%	0.52%
Brown Thrasher	0.09%	4.69%	0.03%	1.56%
Brown-headed Cowbird	4.36%	48.96%	0.51%	1.04%
Bullock's Oriole	0.00%	0.00%	0.02%	0.52%
Chestnut-collared Longspur	0.01%	0.52%	0.00%	0.00%
Chipping Sparrow	0.09%	5.21%	0.05%	1.56%
Clay-colored Sparrow	0.15%	6.77%	0.16%	1.04%
Cliff Swallow	0.01%	0.52%	0.00%	0.00%
Common Grackle	2.10%	31.25%	0.00%	0.00%
Dark-eyed Junco	0.00%	0.00%	0.15%	1.56%
Dickcissel	0.00%	0.00%	0.05%	1.04%
Eastern Bluebird	0.01%	0.52%	0.00%	0.00%
Eastern Kingbird	0.38%	10.94%	0.92%	13.54%
European Starling	0.10%	3.65%	1.46%	3.65%
Field Sparrow	0.21%	8.33%	0.14%	4.17%
Grasshopper Sparrow	0.25%	12.50%	0.01%	0.52%
Gray Catbird	0.03%	1.56%	0.00%	0.00%
Horned Lark	4.57%	78.65%	2.10%	30.21%
House Sparrow	0.02%	1.56%	0.01%	0.52%
Least Flycatcher	0.04%	2.08%	0.06%	1.56%
Loggerhead Shrike	0.01%	0.52%	0.01%	0.52%
Marsh Wren	0.01%	0.52%	0.00%	0.00%
Northern Rough-winged Swallow	0.02%	1.04%	0.00%	0.00%
Orchard Oriole	0.02%	1.04%	0.00%	0.00%
Pine Grosbeak	0.01%	0.52%	0.00%	0.00%
Red-eyed Vireo	0.02%	1.56%	0.00%	0.00%
Red-eyed Vireo	0.00%	0.00%	0.01%	0.52%
Red-winged Blackbird	13.59%	73.44%	0.03%	1.04%
Ruby-crowned Kinglet	0.00%	0.00%	0.01%	0.52%
Savannah Sparrow	0.11%	7.29%	0.00%	0.00%
Snow Bunting	0.00%	0.00%	0.22%	0.52%
Song Sparrow	0.02%	1.56%	0.00%	0.00%
Song Sparrow	0.00%	0.00%	0.01%	0.52%
Swainson's Thrush	0.01%	1.04%	0.00%	0.00%
Tree Swallow	0.01%	0.52%	0.22%	2.08%
Unidentified Blackbird	34.58%	3.65%	36.80%	6.77%
Unidentified Sparrow	0.00%	0.00%	2.62%	7.29%
Unidentified Warbler	0.09%	3.65%	0.01%	0.52%
Vesper Sparrow	1.01%	30.21%	0.26%	2.60%
Western Kingbird	0.36%	11.98%	0.22%	6.25%
Western Meadowlark	5.00%	91.15%	8.93%	44.79%
White-Crowned Sparrow	0.01%	0.52%	0.06%	1.56%
Yellow-breasted Chat	0.00%	0.00%	0.02%	1.04%
Yellow-breasted Chat	0.01%	0.52%	0.00%	0.00%
Yellow-headed Blackbird	0.17%	7.81%	0.05%	0.52%
Yellow-rumped Warbler	0.00%	0.00%	0.01%	0.52%
Totals	75.48%		81.73%	
Raptors/Vultures/Owls				
Golden Eagle	0.01%	1.04%	0.01%	0.52%
Red-tailed Hawk	0.43%	23.96%	0.29%	10.42%
Northern Harrier	0.25%	16.67%	0.31%	11.46%
American Kestrel	0.07%	4.17%	0.07%	2.08%
Merlin	0.01%	0.52%	0.00%	0.00%
Turkey Vulture	0.07%	3.13%	0.14%	5.73%
Swainson's Hawk	0.07%	3.65%	0.02%	1.04%
Great-horned Owl	0.01%	0.52%	0.00%	0.00%
Burrowing Owl	0.07%	3.13%	0.00%	0.00%
Unidentified Buteo	0.00%	0.00%	0.01%	0.52%
Sharp-shinned Hawk	0.00%	0.00%	0.01%	0.52%
Rough-legged Hawk	0.00%	0.00%	0.01%	0.52%
Bald Eagle	0.01%	0.52%	0.00%	0.00%
Cooper's Hawk	0.01%	0.52%	0.01%	0.52%
Totals	1.01%		0.01%	
Waterfowl				
Canada Goose	0.14%	4.17%	0.23%	1.04%
Ring-necked Duck	0.07%	0.52%	0.00%	0.00%
Mallard	1.42%	31.25%	0.41%	1.04%
Wood Duck	0.01%	0.52%	0.00%	0.00%
Northern Pintail	0.52%	7.29%	0.00%	0.00%
Redhead	0.03%	0.52%	0.00%	0.00%
Blue-winged teal	0.15%	3.65%	0.02%	0.52%
Northern Shoveler	0.13%	4.17%	0.00%	0.00%
Gadwell	0.07%	2.60%	0.00%	0.00%
Totals	2.55%		0.67%	
Shorebirds				
Killdeer	1.36%	30.73%	0.09%	2.60%
Wilson's Snipe	0.05%	3.13%	0.00%	0.00%
Upland Sandpiper	1.21%	34.90%	0.01%	0.52%
Willet	0.04%	2.08%	0.00%	0.00%
Marbled Godwit	0.18%	6.25%	0.00%	0.00%
Long-billed Curlew	0.00%	0.00%	0.02%	0.52%
Baird's Sandpiper	0.03%	0.52%	0.00%	0.00%
Wilson's Phalarope	0.01%	0.52%	0.00%	0.00%
Totals	2.88%		0.13%	
Gamebirds				
Wild Turkey	0.03%	2.08%	0.01%	0.52%
Ring-necked Pheasant	5.59%	92.19%	4.61%	40.63%
Gray Partridge	0.00%	0.00%	0.14%	2.60%
Sharp Tailed Grouse	0.01%	0.52%	0.38%	1.56%
Totals	5.62%		5.14%	
Pigeons/Doves				
Mourning Dove	2.26%	46.88%	2.69%	32.29%
Rock Pigeon	0.40%	11.98%	1.10%	7.29%
Eurasian Collared Dove	0.01%	0.52%	0.00%	0.00%
Totals	2.68%		3.79%	
Gulls/Terns				
Ring-billed Gull	0.19%	2.60%	0.00%	0.00%
Franklin's Gull	7.81%	4.17%	2.69%	1.04%
Totals	7.99%		2.69%	
Woodpeckers and Allies				
Yellow-shafted Flicker	0.14%	7.29%	0.05%	2.08%
Northern Flicker	0.00%	0.00%	0.18%	4.69%
Red-headed Woodpecker	0.00%	0.00%	0.01%	0.52%
Unidentified Woodpecker	0.01%	0.52%	0.00%	0.00%
Totals	0.15%		0.24%	
Goatsuckers				
Common Nighthawk	0.01%	0.52%	0.01%	0.52%
Totals	0.01%		0.01%	
Crows and Allies				
American Crow	0.46%	11.98%	0.30%	6.77%
Black-billed Magpie	0.00%	0.00%	0.01%	0.52%
Blue Jay	0.00%	0.00%	0.20%	6.77%
Totals	0.46%		0.51%	
Waterbirds				
Great Blue Heron	0.02%	1.56%	0.03%	1.56%
Double-crested Cormorant	0.00%	0.00%	2.89%	1.04%
Cattle Egret	0.00%	0.00%	0.01%	0.52%
Great Egret	0.00%	0.00%	0.01%	0.52%
Totals	0.02%		2.94%	
Cranes/Rails				
Sandhill Crane	1.15%	1.04%	1.26%	2.60%
Totals	1.15%		1.26%	
Grand Totals	100.00%		100.00%	

Table 4a. Avian Species Observed by Point Count at CCWF, Spring 2010																		
Species	Number of Birds	Number of Occurrences	Points															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Western Meadowlark	667	349	74	71	58	45	43	34	23	32	26	44	55	23	27	30	42	40
Horned Lark	609	271	28	10	25	17	21	21	84	20	39	30	35	39	78	42	71	49
Savannah Sparrow	15	15	0	1	2	1	1	4	0	0	0	4	2	0	0	0	0	0
Chestnut-collared Longspur	2	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Vesper Sparrow	135	80	4	0	6	3	3	14	9	0	8	5	15	17	6	30	6	9
Brown-headed Cowbird	582	209	68	51	35	33	32	60	20	61	11	28	53	23	9	46	30	22
Barn Swallow	462	30	50	367	0	5	1	2	0	10	7	2	4	0	1	0	0	13
Tree Swallow	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grasshopper Sparrow	33	27	0	1	5	5	2	6	0	0	3	4	2	0	0	3	1	1
American Robin	72	41	1	0	0	0	6	5	0	0	3	3	12	23	8	8	3	0
Common Grackle	280	87	27	11	3	8	36	3	0	5	5	26	91	30	4	17	2	12
Western Kingbird	48	30	1	1	2	0	7	2	1	0	3	2	5	8	2	3	4	7
Eastern Kingbird	51	28	13	1	5	0	1	8	0	3	2	15	1	2	0	0	0	0
Gray Catbird	4	3	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0
Loggerhead Shrike	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Red-winged Blackbird	1,812	284	52	83	139	57	25	24	28	46	16	85	841	81	46	42	40	207
House Sparrow	3	3	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0
European Starling	13	7	0	0	1	0	1	1	0	0	0	0	4	0	2	3	0	1
Field Sparrow	28	17	0	0	1	0	3	2	1	1	0	0	14	0	5	0	0	1
Unidentified Blackbird	4,609	7	0	0	0	0	0	0	4,445	0	40	0	49	0	0	0	0	75
American Tree Sparrow	9	6	0	0	4	0	1	0	0	0	0	2	2	0	0	0	0	0
Unidentified Warbler	12	7	0	0	0	0	3	2	0	0	1	0	2	0	1	0	0	3
White-Crowned Sparrow	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Bobolink	197	85	14	16	10	37	10	24	4	31	5	14	6	5	8	4	4	5
Yellow-headed Blackbird	23	15	3	5	2	2	0	0	0	2	1	1	0	0	0	0	7	0
Clay-colored Sparrow	20	14	2	0	4	2	0	1	0	2	1	0	0	3	0	1	2	2
Bank Swallow	322	15	6	298	0	0	0	0	0	2	2	6	1	1	4	0	2	0
Brown Thrasher	12	9	0	0	0	0	0	3	0	1	1	3	0	2	0	2	0	0
Swainson's Thrush	2	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Chipping Sparrow	12	10	0	0	1	0	0	0	1	0	2	0	0	1	3	1	3	0
Baltimore Oriole	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Pine Grosbeak	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Orchard Oriole	3	2	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0
Red-eyed Vireo	3	3	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0
Least Flycatcher	6	4	0	0	0	0	0	0	1	0	0	2	0	0	0	3	0	0
Northern Rough-winged Swallow	3	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Song Sparrow	3	3	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0
American Goldfinch	5	3	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	3
Marsh Wren	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eastern Bluebird	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cliff Swallow	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-breasted Chat	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Golden Eagle	2	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Red-tailed Hawk	58	54	3	3	5	11	5	3	3	5	2	1	1	4	3	2	3	4
Northern Harrier	33	33	1	2	1	4	0	3	1	3	3	2	0	1	1	4	5	2
American Kestrel	10	9	1	1	1	2	1	2	0	1	0	0	1	0	0	0	0	0
Merlin	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Turkey Vulture	10	6	0	0	0	0	2	2	0	0	0	0	0	1	0	5	0	0
Swainson's Hawk	9	7	0	0	3	1	0	0	1	0	1	0	0	0	1	0	2	0
Great-horned Owl	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Burrowing Owl	9	6	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bald Eagle	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Cooper's Hawk	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Canada Goose	19	9	2	9	2	2	0	0	0	0	2	0	0	0	2	0	0	0
Ring-necked Duck	10	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallard	189	93	18	23	5	11	2	12	21	11	14	1	5	2	20	17	11	16
Wood Duck	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Pintail	69	20	1	34	0	5	4	0	0	0	0	0	8	0	3	0	12	2
Redhead	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
Blue-winged teal	20	9	1	12	0	0	0	0	2	0	0	0	0	0	0	0	5	0
Northern Shoveler	18	8	10	3	0	0	0	0	3	0	0	0	0	0	0	2	0	0
Gadwell	10	5	0	2	0	0	0	0	4	2	0	2	0	0	0	0	0	0
Wilson's Snipe	7	6	0	0	1	1	0	2	0	0	1	0	0	0	0	0	1	1
Killdeer	181	82	41	20	3	4	4	10	11	0	6	2	13	8	25	10	17	7
Upland Sandpiper	161	98	22	18	1	10	2	9	11	2	0	11	7	7	10	21	17	13
Willet	5	4	0	3	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Marbled Godwit	24	14	2	12	2	0	0	3	0	0	0	0	0	1	0	0	1	3
Baird's Sandpiper	4	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0
Wilson's Phalarope	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Mourning Dove	302	176	9	2	18	3	21	7	11	3	35	26	38	74	10	22	11	12
Rock Pigeon	53	24	0	0	0	0	4	0	6	0	14	4	6	10	0	8	0	1
Eurasian Collared Dove	2	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Wild Turkey	4	4	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0
Ring-necked Pheasant	745	477	28	34	55	42	50	81	43	49	52	74	49	26	36	35	29	62
Sharp Tailed Grouse	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Ring-billed Gull	25	9	1	18	2	0	0	0	0	0	0	0	3	1	0	0	0	0
Franklin's Gull	1,041	19	7	4	0	0	0	0	331	11	432	166	0	0	0	0	0	90
Yellow-shafted Flicker	19	15	0	1	2	0	3	1	0	0	0	0	2	5	3	0	2	0
Unidentified Woodpecker	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Common Nighthawk	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sandhill Crane	153	2	0	0	0	0	0	0	0	0	0	0	0	85	68	0	0	0
American Crow	61	28	1	3	2	0	2	3	8	0	6	31	0	0	0	4	0	1
Great Blue Heron	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13,337	2,913	520	1,122	412	311	301	358	5,075	305	747	598	1,330	486	395	369	341	667
Mean Use	69.46		2.71	5.84	2.15	1.62	1.57	1.86	26.43	1.59	3.89	3.11	6.93	2.53	2.06	1.92	1.78	3.47

Table 4b. Avian Species Observed by Point Count at CCWF, Fall 2010																		
Species	Number of Birds	Number of Occurrences	Points															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Western Meadowlark	777	142	55	29	290	13	37	109	10	7	22	7	56	38	28	24	35	17
Horned Lark	183	75	5	6	15	2	8	9	8	9	10	8	15	6	13	8	41	20
Vesper Sparrow	23	5	20	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	44	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	1
Barn Swallow	71	33	16	9	4	6	0	4	5	3	6	2	10	0	4	0	2	0
Tree Swallow	19	4	0	9	0	0	0	0	1	0	9	0	0	0	0	0	0	0
Grasshopper Sparrow	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-rumped Warbler	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
American Robin	87	16	3	1	0	0	27	14	6	18	0	6	5	7	0	0	0	0
Brewer's blackbird	2,031	4	0	0	0	0	0	16	0	0	0	0	2	2,013	0	0	0	0
Western Kingbird	19	15	2	3	0	1	0	1	0	0	5	0	0	1	0	4	0	2
Eastern Kingbird	80	33	6	1	0	2	5	3	0	6	8	3	2	6	1	24	9	4
Loggerhead Shrike	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Snow Bunting	19	1	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0
Red-winged Blackbird	3	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
House Sparrow	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
European Starling	127	9	5	0	0	0	0	38	1	0	1	0	65	17	0	0	0	0
Field Sparrow	12	8	2	0	0	0	0	1	1	0	4	0	0	2	0	0	2	0
Unidentified Blackbird	3,201	17	1,003	2,000	0	0	1	0	3	80	0	0	0	0	25	52	37	0
American Tree Sparrow	3	2	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
Unidentified Warbler	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
White-Crowned Sparrow	5	3	3	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
Bobolink	2	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Yellow-headed Blackbird	4	1	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Clay-colored Sparrow	14	2	0	0	0	0	0	13	1	0	0	0	0	0	0	0	0	0
Bank Swallow	7	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown Thrasher	3	3	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0
Chipping Sparrow	4	3	0	0	0	0	1	2	0	0	0	1	0	0	0	0	0	0
Red-eyed Vireo	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Least Flycatcher	5	3	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Song Sparrow	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
American Goldfinch	107	52	19	10	5	5	21	5	1	1	8	6	15	1	2	1	1	6
Dickcissel	4	2	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Unidentified Sparrow	228	20	0	0	8	1	3	2	11	3	190	1	1	0	7	0	1	0
Blue Grosbeak	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Yellow-breasted Chat	2	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Bullock's Oriole	2	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Ruby-crowned Kinglet	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Brown Creeper	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Dark-eyed Junco	13	3	0	0	0	0	7	0	0	0	0	6	0	0	0	0	0	0
Golden Eagle	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Red-tailed Hawk	25	23	4	4	1	4	2	2	1	1	1	0	3	1	0	0	1	0
Northern Harrier	27	25	2	6	0	0	1	0	7	3	0	0	0	3	1	0	3	1
American Kestrel	6	4	0	0	0	0	2	1	0	0	0	0	0	2	0	1	0	0
Turkey Vulture	12	11	0	0	0	1	0	0	0	0	1	0	1	1	1	4	1	2
Swainson's Hawk	2	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
Cooper's Hawk	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Unidentified Buteo	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Sharp-shinned Hawk	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rough-legged Hawk	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wild Turkey	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Ring-necked Pheasant	401	159	10	16	24	6	17	19	4	44	18	35	149	11	15	18	3	12
Sharp Tailed Grouse	12	5	0	0	0	1	0	0	1	3	0	1	0	0	0	0	6	0
Gray Partridge	33	3	0	0	0	0	0	0	2	0	0	0	31	0	0	0	0	0
Great Blue Heron	3	3	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Double-crested Cormorant	251	2	0	1	0	0	0	250	0	0	0	0	0	0	0	0	0	0
Cattle Egret	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Egret	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-shafted Flicker	4	4	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0
Northern Flicker	16	11	1	0	0	0	4	0	1	0	2	1	1	6	0	0	0	0
Red-headed Woodpecker	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Canada Goose	20	2	0	0	0	0	0	0	0	0	19	1	0	0	0	0	0	0
Mallard	36	2	0	0	0	0	0	9	0	0	0	0	0	0	0	27	0	0
Blue-winged teal	2	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Killdeer	8	6	5	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Upland Sandpiper	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Long-billed Curlew	2	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
American Crow	26	14	0	1	0	0	0	1	7	2	1	0	5	0	5	2	0	2
Blue Jay	17	13	1	0	0	0	2	0	0	0	3	1	3	2	0	1	2	2
Black-billed Magpie	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Mourning Dove	234	121	15	25	5	7	16	11	10	1	13	6	21	28	11	6	48	11
Rock Pigeon	96	17	0	0	0	0	11	0	1	0	5	0	1	72	0	6	0	0
Franklin's Gull	234	4	8	0	226	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Nighthawk	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Sandhill Crane	110	5	1	1	0	105	0	0	0	0	0	0	0	0	0	0	3	0
Totals	**8,698**	**926**	**1,202**	**2,133**	**578**	**156**	**178**	**517**	**105**	**184**	**336**	**88**	**387**	**2,220**	**115**	**178**	**240**	**81**
Mean Use	**45.30**		**6.26**	**11.11**	**3.01**	**0.81**	**0.93**	**2.69**	**0.55**	**0.96**	**1.75**	**0.46**	**2.02**	**11.56**	**0.60**	**0.93**	**1.25**	**0.42**

Table 5. Avian Flight Heights at CCWF, Spring 2010 and Fall 2010	**Spring 2010**				**Fall 2010**			
	Observation		**Individuals**		**Observation**		**Individuals**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Non-Raptors								
Above RSA (>118.5m)	7	0.40%	267	2.51%	8	1.32%	615	7.51%
Below RSA (<41m)	1,443	83.46%	7,007	65.76%	526	87.09%	4,114	50.26%
Within RSA (between 41.5m and 118.5m)	279	16.14%	4,583	31.74%	70	11.59%	3,457	42.23%
Raptors/Vultures/Owls								
Above RSA (>118.5m)	3	3.16%	3	2.83%	4	6.35%	5	7.14%
Below RSA (<41m)	44	46.32%	47	44.34%	23	36.51%	25	35.71%
Within RSA (between 41.5m and 118.5m)	48	50.53%	56	52.83%	36	57.14%	40	57.14%

Table 6a. Point Count Individuals and RSA at CCWF, Spring 2010						
Species	Encounter Rate	Mean Use (# birds/20 min)	Flying (%)	Percent (%) Flying Below RSA	Percent (%) Flying Within RSA	Percent (%) Flying Above RSA
Western Meadowlark	0.01	3.47	69.87%	99.79%	0.21%	0.00%
Horned Lark	0.06	3.17	89.16%	97.97%	2.03%	0.00%
Savannah Sparrow	0.00	0.08	20.00%	100.00%	0.00%	0.00%
Chestnut-collared Longspur	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Vesper Sparrow	0.01	0.70	25.93%	94.29%	5.71%	0.00%
Brown-headed Cowbird	0.30	3.03	90.38%	89.16%	10.84%	0.00%
Barn Swallow	2.09	2.41	100.00%	12.99%	87.01%	0.00%
Tree Swallow	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Grasshopper Sparrow	0.01	0.17	3.03%	0.00%	100.00%	0.00%
American Robin	0.00	0.38	59.72%	100.00%	0.00%	0.00%
Common Grackle	0.25	1.46	92.14%	81.40%	18.60%	0.00%
Western Kingbird	0.01	0.25	93.75%	97.78%	2.22%	0.00%
Eastern Kingbird	0.02	0.27	100.00%	92.16%	7.84%	0.00%
Gray Catbird	0.00	0.02	25.00%	100.00%	0.00%	0.00%
Loggerhead Shrike	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Red-winged Blackbird	1.61	9.44	46.25%	63.13%	36.87%	0.00%
House Sparrow	0.00	0.02	33.33%	100.00%	0.00%	0.00%
European Starling	0.00	0.07	92.31%	100.00%	0.00%	0.00%
Field Sparrow	0.00	0.15	17.86%	100.00%	0.00%	0.00%
Unidentified Blackbird	5.13	24.01	99.57%	78.54%	21.46%	0.00%
American Tree Sparrow	0.00	0.05	88.89%	100.00%	0.00%	0.00%
Unidentified Warbler	0.00	0.06	25.00%	100.00%	0.00%	0.00%
White-Crowned Sparrow	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Bobolink	0.08	1.03	85.79%	91.12%	8.88%	0.00%
Yellow-headed Blackbird	0.02	0.12	86.96%	80.00%	20.00%	0.00%
Clay-colored Sparrow	0.00	0.10	25.00%	100.00%	0.00%	0.00%
Bank Swallow	1.42	1.68	100.00%	15.22%	84.78%	0.00%
Brown Thrasher	0.00	0.06	75.00%	100.00%	0.00%	0.00%
Swainson's Thrush	0.01	0.01	100.00%	50.00%	50.00%	0.00%
Chipping Sparrow	0.00	0.06	16.67%	100.00%	0.00%	0.00%
Baltimore Oriole	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Pine Grosbeak	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Orchard Oriole	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Red-eyed Vireo	0.00	0.02	33.33%	100.00%	0.00%	0.00%
Least Flycatcher	0.02	0.03	100.00%	50.00%	50.00%	0.00%
Northern Rough-winged Swallow	0.01	0.02	100.00%	33.33%	66.67%	0.00%
Song Sparrow	0.00	0.02	33.33%	100.00%	0.00%	0.00%
American Goldfinch	0.00	0.03	100.00%	100.00%	0.00%	0.00%
Marsh Wren	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Eastern Bluebird	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Cliff Swallow	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Yellow-breasted Chat	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Golden Eagle	0.01	0.01	100.00%	0.00%	100.00%	0.00%
Red-tailed Hawk	0.16	0.30	67.24%	15.38%	76.92%	7.69%
Northern Harrier	0.03	0.17	90.91%	83.33%	16.67%	0.00%
American Kestrel	0.03	0.05	90.00%	44.44%	55.56%	0.00%
Merlin	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Turkey Vulture	0.05	0.05	100.00%	0.00%	100.00%	0.00%
Swainson's Hawk	0.02	0.05	55.56%	20.00%	80.00%	0.00%
Great-horned Owl	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Burrowing Owl	0.00	0.05	88.89%	100.00%	0.00%	0.00%
Bald Eagle	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Cooper's Hawk	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Canada Goose	0.03	0.10	84.21%	62.50%	37.50%	0.00%
Ring-necked Duck	0.00	0.05	100.00%	100.00%	0.00%	0.00%
Mallard	0.65	0.98	90.48%	25.15%	72.51%	2.34%
Wood Duck	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Northern Pintail	0.21	0.36	94.20%	36.92%	63.08%	0.00%
Redhead	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Blue-winged teal	0.04	0.10	65.00%	46.15%	53.85%	0.00%
Northern Shoveler	0.06	0.09	88.89%	31.25%	68.75%	0.00%
Gadwell	0.04	0.05	90.00%	0.00%	100.00%	0.00%
Killdeer	0.05	0.94	91.16%	94.55%	5.45%	0.00%
Wilson's Snipe	0.01	0.04	14.29%	0.00%	100.00%	0.00%
Upland Sandpiper	0.03	0.84	47.20%	92.11%	7.89%	0.00%
Willet	0.01	0.03	40.00%	0.00%	100.00%	0.00%
Marbled Godwit	0.05	0.13	66.67%	37.50%	62.50%	0.00%
Baird's Sandpiper	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Wilson's Phalarope	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Mourning Dove	0.21	1.57	76.49%	82.25%	17.75%	0.00%
Rock Pigeon	0.13	0.28	88.68%	46.81%	53.19%	0.00%
Eurasian Collared Dove	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Wild Turkey	0.00	0.02	0.00%	0.00%	0.00%	0.00%
Ring-necked Pheasant	0.00	3.88	10.34%	100.00%	0.00%	0.00%
Sharp Tailed Grouse	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Ring-billed Gull	0.02	0.13	100.00%	84.00%	16.00%	0.00%
Franklin's Gull	4.15	5.42	99.90%	0.87%	76.54%	22.60%
Yellow-shafted Flicker	0.00	0.10	57.89%	100.00%	0.00%	0.00%
Unidentified Woodpecker	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Common Nighthawk	0.01	0.01	100.00%	0.00%	100.00%	0.00%
Sandhill Crane	0.80	0.80	100.00%	0.00%	100.00%	0.00%
Great Blue Heron	0.01	0.02	100.00%	66.67%	33.33%	0.00%
American Crow	0.09	0.32	83.61%	11.76%	33.33%	54.90%
Totals	17.90	69.46	80.69%			

Table 6b. Point Count Individuals and RSA at CCWF, Fall 2010						
Species	Encounter Rate	Mean Use (# birds/20 min)	Flying (%)	Percent (%) Flying Below RSA	Percent (%) Flying Within RSA	Percent (%) Flying Above RSA
Western Meadowlark	0.62	4.05	94.47%	83.79%	16.21%	0.00%
Horned Lark	0.02	0.95	84.70%	98.06%	1.94%	0.00%
Vesper Sparrow	0.00	0.12	78.26%	100.00%	0.00%	0.00%
Brown-headed Cowbird	0.00	0.23	100.00%	100.00%	0.00%	0.00%
Barn Swallow	0.12	0.37	100.00%	67.61%	32.39%	0.00%
Tree Swallow	0.05	0.10	100.00%	52.63%	47.37%	0.00%
Grasshopper Sparrow	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Yellow-rumped Warbler	0.00	0.01	100.00%	100.00%	0.00%	0.00%
American Robin	0.04	0.45	100.00%	91.95%	8.05%	0.00%
Brewer's blackbird	0.15	10.58	100.00%	98.57%	1.43%	0.00%
Western Kingbird	0.00	0.10	84.21%	100.00%	0.00%	0.00%
Eastern Kingbird	0.04	0.42	86.25%	89.86%	10.14%	0.00%
Loggerhead Shrike	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Snow Bunting	0.10	0.10	100.00%	0.00%	100.00%	0.00%
Red-winged Blackbird	0.00	0.02	0.00%	0.00%	0.00%	0.00%
House Sparrow	0.00	0.01	100.00%	100.00%	0.00%	0.00%
European Starling	0.02	0.66	97.64%	96.77%	3.23%	0.00%
Field Sparrow	0.00	0.06	83.33%	100.00%	0.00%	0.00%
Unidentified Blackbird	13.96	16.67	100.00%	9.09%	83.72%	7.19%
American Tree Sparrow	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Unidentified Warbler	0.00	0.01	0.00%	0.00%	0.00%	0.00%
White-Crowned Sparrow	0.00	0.03	100.00%	100.00%	0.00%	0.00%
Bobolink	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Yellow-headed Blackbird	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Clay-colored Sparrow	0.00	0.07	100.00%	100.00%	0.00%	0.00%
Bank Swallow	0.00	0.04	100.00%	100.00%	0.00%	0.00%
Brown Thrasher	0.00	0.02	100.00%	100.00%	0.00%	0.00%
Chipping Sparrow	0.00	0.02	50.00%	100.00%	0.00%	0.00%
Red-eyed Vireo	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Least Flycatcher	0.00	0.03	100.00%	100.00%	0.00%	0.00%
Song Sparrow	0.00	0.01	0.00%	0.00%	0.00%	0.00%
American Goldfinch	0.03	0.56	90.65%	93.81%	6.19%	0.00%
Dickcissel	0.00	0.02	50.00%	100.00%	0.00%	0.00%
Unidentified Sparrow	1.04	1.19	100.00%	12.28%	87.72%	0.00%
Blue Grosbeak	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Yellow-breasted Chat	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Bullock's Oriole	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Ruby-crowned Kinglet	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Brown Creeper	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Dark-eyed Junco	0.00	0.07	100.00%	100.00%	0.00%	0.00%
Golden Eagle	0.01	0.01	100.00%	0.00%	100.00%	0.00%
Red-tailed Hawk	0.09	0.13	88.00%	13.64%	77.27%	9.09%
Northern Harrier	0.05	0.14	100.00%	66.67%	33.33%	0.00%
American Kestrel	0.00	0.03	66.67%	100.00%	0.00%	0.00%
Turkey Vulture	0.05	0.06	100.00%	0.00%	75.00%	25.00%
Swainson's Hawk	0.01	0.01	50.00%	0.00%	100.00%	0.00%
Cooper's Hawk	0.01	0.01	100.00%	0.00%	100.00%	0.00%
Unidentified Buteo	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Sharp-shinned Hawk	0.01	0.01	100.00%	0.00%	100.00%	0.00%
Rough-legged Hawk	0.01	0.01	100.00%	0.00%	100.00%	0.00%
Wild Turkey	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Ring-necked Pheasant	0.00	2.09	44.64%	100.00%	0.00%	0.00%
Sharp Tailed Grouse	0.00	0.06	91.67%	100.00%	0.00%	0.00%
Gray Partridge	0.00	0.17	66.67%	100.00%	0.00%	0.00%
Great Blue Heron	0.01	0.02	66.67%	0.00%	100.00%	0.00%
Double-crested Cormorant	0.00	1.31	99.60%	0.00%	0.00%	100.00%
Cattle Egret	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Great Egret	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Yellow-shafted Flicker	0.00	0.02	75.00%	100.00%	0.00%	0.00%
Northern Flicker	0.00	0.08	62.50%	100.00%	0.00%	0.00%
Red-headed Woodpecker	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Canada Goose	0.10	0.10	95.00%	0.00%	100.00%	0.00%
Mallard	0.19	0.19	100.00%	0.00%	100.00%	0.00%
Blue-winged teal	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Killdeer	0.00	0.04	87.50%	100.00%	0.00%	0.00%
Upland Sandpiper	0.00	0.01	0.00%	0.00%	0.00%	0.00%
Long-billed Curlew	0.00	0.01	0.00%	0.00%	0.00%	0.00%
American Crow	0.02	0.14	50.00%	76.92%	23.08%	0.00%
Black-billed Magpie	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Blue Jay	0.00	0.09	5.88%	100.00%	0.00%	0.00%
Mourning Dove	0.10	1.22	84.62%	90.40%	9.60%	0.00%
Rock Pigeon	0.24	0.50	100.00%	32.29%	47.92%	19.79%
Franklin's Gull	1.18	1.22	100.00%	0.00%	96.58%	3.42%
Common Nighthawk	0.00	0.01	100.00%	100.00%	0.00%	0.00%
Sandhill Crane	0.00	0.57	98.18%	0.00%	0.00%	100.00%
Totals	**18.21**	**45.30**	**94.92%**			

Table 7a. Point Count Observations and Flight Direction at CCWF, Spring 2010

Species	Number Flying	Number of Observations	Percentage of Flights in Various Flight Directions								
			N	NE	E	SE	S	SW	W	NW	Var
Western Meadowlark	466	349	12.23%	4.29%	8.80%	1.93%	5.15%	0.64%	4.29%	2.36%	60.30%
Horned Lark	543	271	20.44%	3.31%	9.21%	4.24%	6.45%	0.18%	6.63%	3.50%	46.04%
Savannah Sparrow	3	15	0.00%	0.00%	0.00%	0.00%	33.33%	0.00%	0.00%	0.00%	66.67%
Chestnut-collared Longspur	2	1	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Vesper Sparrow	35	80	0.00%	5.71%	17.14%	0.00%	14.29%	2.86%	2.86%	0.00%	57.14%
Brown-headed Cowbird	526	209	13.50%	5.32%	7.41%	4.56%	13.31%	4.18%	7.22%	7.03%	37.45%
Barn Swallow	462	30	0.00%	0.00%	0.65%	1.08%	2.60%	0.00%	0.43%	0.00%	95.24%
Tree Swallow	2	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Grasshopper Sparrow	1	27	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
American Robin	43	41	13.95%	2.33%	4.65%	2.33%	9.30%	6.98%	18.60%	4.65%	37.21%
Common Grackle	258	87	20.93%	14.34%	8.53%	2.33%	7.75%	3.10%	12.40%	6.98%	23.64%
Western Kingbird	45	30	6.67%	0.00%	4.44%	4.44%	20.00%	0.00%	11.11%	4.44%	48.89%
Eastern Kingbird	51	28	3.92%	0.00%	3.92%	13.73%	5.88%	0.00%	27.45%	1.96%	43.14%
Gray Catbird	1	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Loggerhead Shrike	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Red-winged Blackbird	838	284	19.33%	5.13%	15.51%	3.10%	6.21%	2.27%	10.38%	17.66%	20.41%
House Sparrow	1	3	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
European Starling	12	7	16.67%	0.00%	0.00%	0.00%	0.00%	0.00%	33.33%	16.67%	33.33%
Field Sparrow	5	17	0.00%	0.00%	0.00%	0.00%	40.00%	0.00%	0.00%	0.00%	60.00%
Unidentified Blackbird	4,589	7	0.00%	1.63%	0.00%	18.52%	76.27%	2.07%	0.00%	0.87%	0.63%
American Tree Sparrow	8	6	0.00%	0.00%	0.00%	0.00%	50.00%	12.50%	0.00%	12.50%	25.00%
Unidentified Warbler	3	7	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
White-Crowned Sparrow	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Bobolink	169	85	3.55%	0.00%	9.47%	5.92%	5.92%	1.18%	4.73%	0.59%	68.64%
Yellow-headed Blackbird	20	15	5.00%	0.00%	5.00%	0.00%	5.00%	0.00%	15.00%	55.00%	15.00%
Clay-colored Sparrow	5	14	60.00%	0.00%	0.00%	0.00%	0.00%	40.00%	0.00%	0.00%	0.00%
Bank Swallow	322	15	0.00%	0.00%	0.00%	0.62%	0.31%	0.62%	1.86%	0.62%	95.96%
Brown Thrasher	9	9	0.00%	0.00%	0.00%	33.33%	11.11%	0.00%	0.00%	0.00%	55.56%
Swainson's Thrush	2	2	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%
Chipping Sparrow	2	10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%	50.00%
Baltimore Oriole	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Pine Grosbeak	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Orchard Oriole	3	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Red-eyed Vireo	1	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Least Flycatcher	6	4	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%
Northern Rough-winged Swallow	3	2	0.00%	0.00%	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%	66.67%
Song Sparrow	1	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
American Goldfinch	5	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Marsh Wren	1	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Eastern Bluebird	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%
Cliff Swallow	1	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Yellow-breasted Chat	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Golden Eagle	2	2	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%
Red-tailed Hawk	39	54	12.82%	7.69%	15.38%	12.82%	12.82%	5.13%	5.13%	17.95%	10.26%
Northern Harrier	30	33	10.00%	10.00%	10.00%	6.67%	6.67%	0.00%	23.33%	23.33%	10.00%
American Kestrel	9	9	22.22%	0.00%	11.11%	0.00%	44.44%	11.11%	11.11%	0.00%	0.00%
Merlin	1	1	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Turkey Vulture	10	6	0.00%	0.00%	40.00%	20.00%	0.00%	0.00%	40.00%	0.00%	0.00%
Swainson's Hawk	5	7	0.00%	0.00%	0.00%	0.00%	20.00%	0.00%	60.00%	20.00%	0.00%
Great-horned Owl	1	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Burrowing Owl	8	6	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	75.00%
Bald Eagle	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cooper's Hawk	1	1	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Canada Goose	16	9	12.50%	25.00%	0.00%	25.00%	0.00%	12.50%	12.50%	12.50%	0.00%
Ring-necked Duck	10	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Mallard	171	93	18.13%	8.77%	13.45%	8.19%	15.20%	2.92%	11.70%	19.30%	2.34%
Wood Duck	1	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Northern Pintail	65	20	16.92%	44.62%	10.77%	10.77%	7.69%	6.15%	3.08%	0.00%	0.00%
Redhead	4	1	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Blue-winged teal	13	9	53.85%	0.00%	30.77%	0.00%	15.38%	0.00%	0.00%	0.00%	0.00%
Northern Shoveler	16	8	0.00%	0.00%	25.00%	0.00%	56.25%	0.00%	6.25%	12.50%	0.00%
Gadwell	8	5	0.00%	25.00%	0.00%	0.00%	0.00%	25.00%	0.00%	25.00%	25.00%
Killdeer	165	82	18.18%	9.70%	9.09%	0.61%	3.64%	1.21%	4.85%	7.88%	44.85%
Wilson's Snipe	1	6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Upland Sandpiper	76	98	30.26%	1.32%	5.26%	1.32%	5.26%	2.63%	6.56%	2.63%	44.74%
Willet	2	4	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Marbled Godwit	16	14	25.00%	6.25%	20.00%	0.00%	12.50%	0.00%	12.50%	18.75%	0.00%
Baird's Sandpiper	4	1	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Wilson's Phalaropa	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Mourning Dove	231	176	16.02%	10.82%	15.58%	6.93%	11.69%	8.66%	8.23%	13.85%	8.23%
Rock Pigeon	47	24	12.77%	0.00%	8.51%	21.28%	12.77%	0.00%	2.13%	27.66%	14.89%
Eurasian Collared Dove	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Wild Turkey	0	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Ring-necked Pheasant	77	477	10.39%	9.09%	2.60%	11.69%	25.97%	7.79%	9.09%	23.38%	0.00%
Sharp Tailed Grouse	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Ring-billed Gull	25	9	20.00%	56.00%	0.00%	0.00%	12.00%	0.00%	0.00%	12.00%	0.00%
Franklin's Gull	1,040	19	41.44%	0.67%	0.00%	0.10%	0.00%	0.00%	0.00%	57.79%	0.00%
Yellow-shafted Flicker	11	15	18.18%	45.45%	0.00%	0.00%	36.36%	0.00%	0.00%	0.00%	0.00%
Unidentified Woodpecker	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Common Nighthawk	1	1	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sandhill Crane	153	2	44.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	55.56%	0.00%
Great Blue Heron	3	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	66.67%	33.33%	0.00%
American Crow	51	28	15.69%	1.96%	9.80%	3.92%	7.84%	0.00%	58.82%	1.96%	0.00%
TOTALS	10,762	2,913	10.92%	3.35%	4.08%	9.71%	36.28%	1.90%	3.55%	10.43%	19.77%

Table 7b. Point Count Observations and Flight Direction at CCWF, Fall 2010

Species	Number Flying	Number of Observations	Percentage of Flights in Various Flight Directions								
			N	NE	E	SE	S	SW	W	NW	Var
Western Meadowlark	734	142	10.35%	0.82%	4.50%	3.81%	59.54%	0.00%	3.27%	4.09%	13.62%
Horned Lark	155	75	3.87%	0.65%	14.84%	3.23%	30.32%	0.00%	7.74%	3.87%	35.48%
Vesper Sparrow	18	5	0.00%	5.56%	0.00%	0.00%	94.44%	0.00%	0.00%	0.00%	0.00%
Brown-headed Cowbird	44	2	0.00%	2.27%	0.00%	0.00%	0.00%	0.00%	97.73%	0.00%	0.00%
Barn Swallow	71	33	8.45%	1.41%	9.86%	2.82%	1.41%	4.23%	18.31%	4.23%	49.30%
Tree Swallow	19	4	0.00%	0.00%	0.00%	47.37%	0.00%	5.26%	42.11%	0.00%	5.26%
Grasshopper Sparrow	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Yellow-rumped Warbler	1	1	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
American Robin	87	16	0.00%	0.00%	4.60%	5.75%	29.89%	1.15%	0.00%	1.15%	57.47%
Brewer's blackbird	2,031	4	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Western Kingbird	16	15	37.50%	6.25%	6.25%	0.00%	0.00%	0.00%	18.75%	0.00%	31.25%
Eastern Kingbird	69	33	11.59%	0.00%	10.14%	0.00%	8.70%	0.00%	5.80%	0.00%	63.77%
Loggerhead Shrike	1	1	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Snow Bunting	19	1	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Red-winged Blackbird	0	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
House Sparrow	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
European Starling	124	9	66.13%	0.00%	0.81%	0.00%	0.00%	0.00%	5.65%	26.61%	0.81%
Field Sparrow	10	8	0.00%	0.00%	20.00%	0.00%	50.00%	0.00%	20.00%	10.00%	0.00%
Unidentified Blackbird	3,201	17	0.25%	0.00%	7.40%	0.78%	86.82%	0.00%	0.00%	1.03%	3.72%
American Tree Sparrow	3	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Unidentified Warbler	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
White-Crowned Sparrow	5	3	60.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	40.00%
Bobolink	2	2	0.00%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	50.00%
Yellow-headed Blackbird	4	1	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Clay-colored Sparrow	14	2	0.00%	0.00%	92.86%	7.14%	0.00%	0.00%	0.00%	0.00%	0.00%
Bank Swallow	7	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Brown Thrasher	3	3	0.00%	33.33%	0.00%	0.00%	0.00%	0.00%	33.33%	0.00%	33.33%
Chipping Sparrow	2	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Red-eyed Vireo	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Least Flycatcher	5	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	60.00%	0.00%	40.00%
Song Sparrow	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
American Goldfinch	97	52	26.80%	5.15%	14.43%	7.22%	9.28%	1.03%	26.80%	6.19%	3.09%
Dickcissel	2	2	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Unidentified Sparrow	228	20	0.00%	0.00%	4.39%	86.40%	3.95%	0.00%	0.88%	2.19%	2.19%
Blue Grosbeak	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Yellow-breasted Chat	0	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Bullock's Oriole	2	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Ruby-crowned Kinglet	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Brown Creeper	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Dark-eyed Junco	13	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Golden Eagle	1	1	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Red-tailed Hawk	22	23	4.55%	9.09%	4.55%	4.55%	18.18%	0.00%	9.09%	13.64%	36.36%
Northern Harrier	27	25	7.41%	0.00%	11.11%	11.11%	7.41%	11.11%	22.22%	7.41%	22.22%
American Kestrel	4	4	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Turkey Vulture	12	11	8.33%	16.67%	0.00%	8.33%	8.33%	0.00%	8.33%	0.00%	50.00%
Swainson's Hawk	1	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Cooper's Hawk	1	1	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Unidentified Buteo	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sharp-shinned Hawk	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Rough-legged Hawk	1	1	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Wild Turkey	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Ring-necked Pheasant	179	159	57.54%	6.15%	2.79%	0.00%	13.97%	0.00%	14.53%	1.12%	3.91%
Sharp Tailed Grouse	11	5	9.09%	0.00%	0.00%	63.64%	0.00%	0.00%	27.27%	0.00%	0.00%
Gray Partridge	22	3	0.00%	9.09%	0.00%	0.00%	90.91%	0.00%	0.00%	0.00%	0.00%
Great Blue Heron	2	3	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Double-crested Cormorant	250	2	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cattle Egret	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Great Egret	1	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Yellow-shafted Flicker	3	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	66.67%	0.00%	33.33%
Northern Flicker	10	11	10.00%	0.00%	0.00%	50.00%	30.00%	0.00%	0.00%	0.00%	10.00%
Red-headed Woodpecker	1	1	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Canada Goose	19	2	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Mallard	36	2	0.00%	75.00%	0.00%	0.00%	0.00%	25.00%	0.00%	0.00%	0.00%
Blue-winged teal	2	1	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Killdeer	7	6	14.29%	0.00%	0.00%	0.00%	14.29%	0.00%	14.29%	0.00%	57.14%
Upland Sandpiper	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Long-billed Curlew	0	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
American Crow	13	14	46.15%	0.00%	0.00%	23.08%	7.69%	0.00%	0.00%	0.00%	23.08%
Black-billed Magpie	1	1	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Blue Jay	1	13	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Mourning Dove	198	121	19.19%	4.04%	6.57%	3.54%	14.14%	9.09%	29.80%	3.03%	10.61%
Rock Pigeon	96	17	0.00%	3.13%	0.00%	25.00%	3.13%	0.00%	26.04%	26.04%	16.67%
Franklin's Gull	234	4	0.00%	53.42%	3.42%	0.00%	0.00%	0.00%	43.16%	0.00%	0.00%
Common Nighthawk	1	1	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sandhill Crane	108	5	0.00%	0.00%	0.00%	90.74%	9.26%	0.00%	0.00%	0.00%	0.00%
TOTALS	**8,256**	**926**	**4.54%**	**2.43%**	**4.80%**	**8.26%**	**66.67%**	**0.45%**	**4.53%**	**1.89%**	**6.43%**

Table 8. CCWF Incidental Observations, Spring 2010 and Fall 2010				
Species	**Spring 2010**		**Fall 2010**	
	Observations	**Individuals**	**Observations**	**Individuals**
Red-tailed Hawk	44	52	31	32
Unidentified Hawk	1	1	0	0
Sharp-tailed Grouse	3	3	1	1
American Kestrel	12	12	5	5
Bald Eagle	5	5	1	1
Canada Goose	3	85	0	0
Red-winged Blackbird	4	436	0	0
Great-horned Owl	1	2	0	0
Northern Harrier	14	15	8	10
Northern Pintail	1	8	1	1
Swainson's Hawk	5	7	7	9
Franklin's Gull	5	126	1	1
Northern Shoveler	1	10	0	0
Mallard	1	1	0	0
Marbled Godwit	1	2	0	0
Blue Jay	1	2	0	0
Turkey Vulture	5	8	3	9
European Starling	4	633	0	0
Common Grackle	1	39	0	0
Horned Lark	1	2	0	0
Unidentified Blackbirds	3	68	0	0
Barn Swallow	1	3	0	0
Great Blue Heron	1	1	1	1
Common Tern	1	4	0	0
Burrowing Owl	1	2	2	4
American Crow	1	2	3	12
Cooper's Hawk	0	0	3	3
Peregrine Falcon	0	0	1	1
Totals	**121**	**1,529**	**68**	**90**

Table 9. Raptor Nest Observations at CCWF				
Raptor Nest Number	**Date**	**Species**	**Activity**	**Raptor Nest Location (NAD 83 UTM14)**
1	5/4/2010	Swainson's Hawk	Active	14T 0406436 5072438
2	4/8/2010	Red-tailed Hawk	Active	14T 0408011 5069264
3	4/8/2010	Red-tailed Hawk	Active	14T 0400816 5073291
4	4/8/2010	Red-tailed Hawk	Active	14T 0408028 5073893
5	4/15/2010	Red-tailed Hawk	Active	14T 402341 5068092
6	4/16/2010	Red-tailed Hawk	Active	14T 403151 5072501
7	4/22/2010	Red-tailed Hawk	Active	14T 399062 5072489
8	4/23/2010	Red-tailed Hawk	Inactive	14T 401254 5070774
9	4/22/2010	Red-tailed Hawk	Inactive	14T 401804 5069869
10	4/23/2010	Unknown	Inactive	14T 403586 5068048
11	4/22/2010	Red-tailed Hawk	Active	14T 405803 5069878
12	4/22/2010	Red-tailed Hawk	Inactive	14T 406113 5064222
13	4/22/2010	Red-tailed Hawk	Inactive	14T 408980 5069152
14	4/22/2010	Red-tailed Hawk	Active	14T 407710 5071961
15	4/22/2010	Red-tailed Hawk	Active	14T 408439 5074479
16	4/23/2010	Red-tailed Hawk	Active	14T 403288 5068324
17	5/3/2010	Red-tailed Hawk	Active	14T 406977 5073945

Table 10. Sharp-tailed Grouse Lek Observations at CCWF, Spring 2010						
Lek Number	**Date**	**Total Number of Birds Observed**			**Habitat**	**Lek Location (NAD 83 UTM14)**
		Males	**Female**	**Unknown**		
1	5/14/2010	5	1	0	Grassland/Alfalfa	14T 408469 5071445

Figures

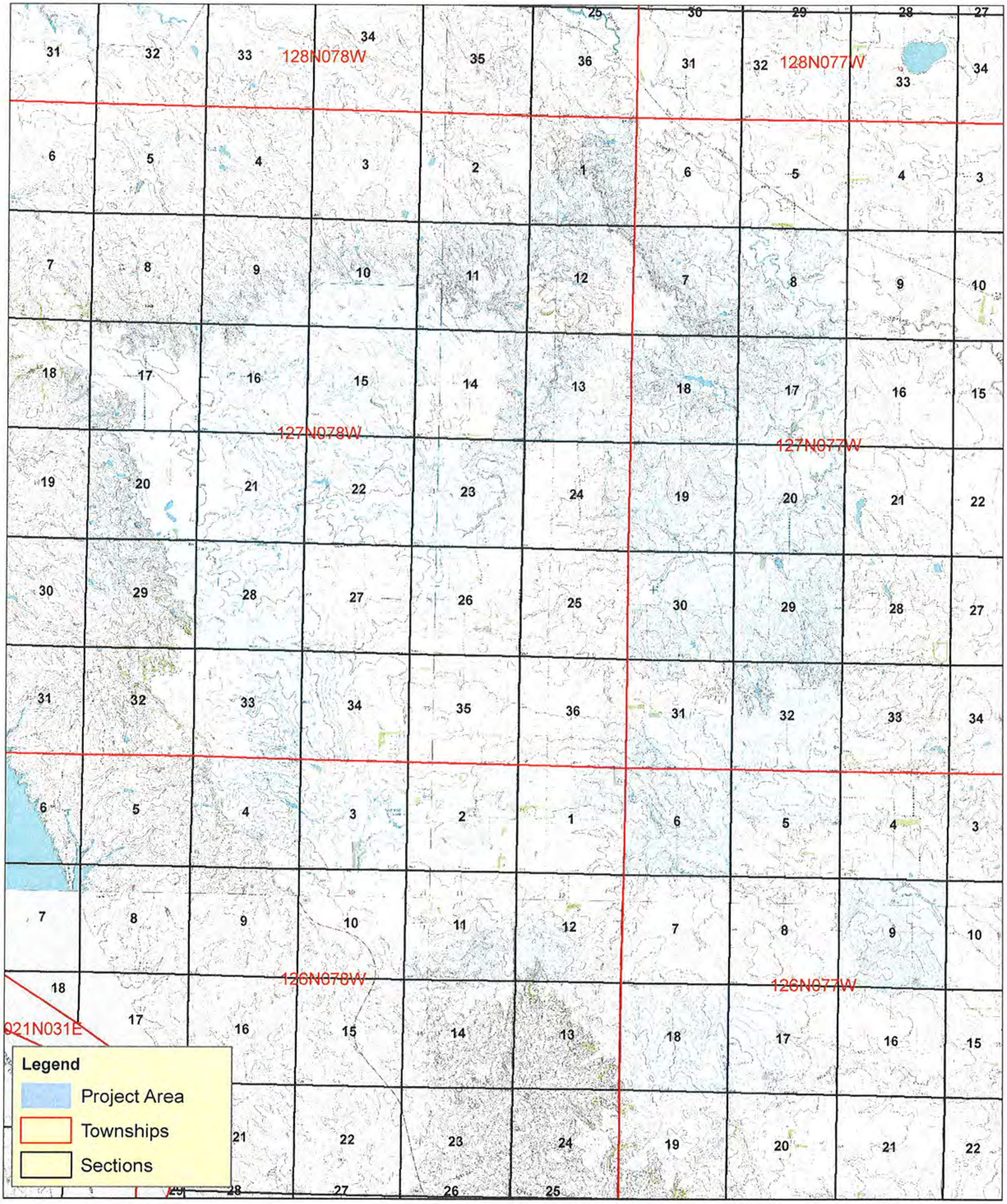

Figure 1. Campbell County Wind Farm Boundary
Fagen Engineering Inc.
Campbell County, South Dakota

1:72,000
WPC Project 211-01-JA/DA
Sources: USGS topo map

N

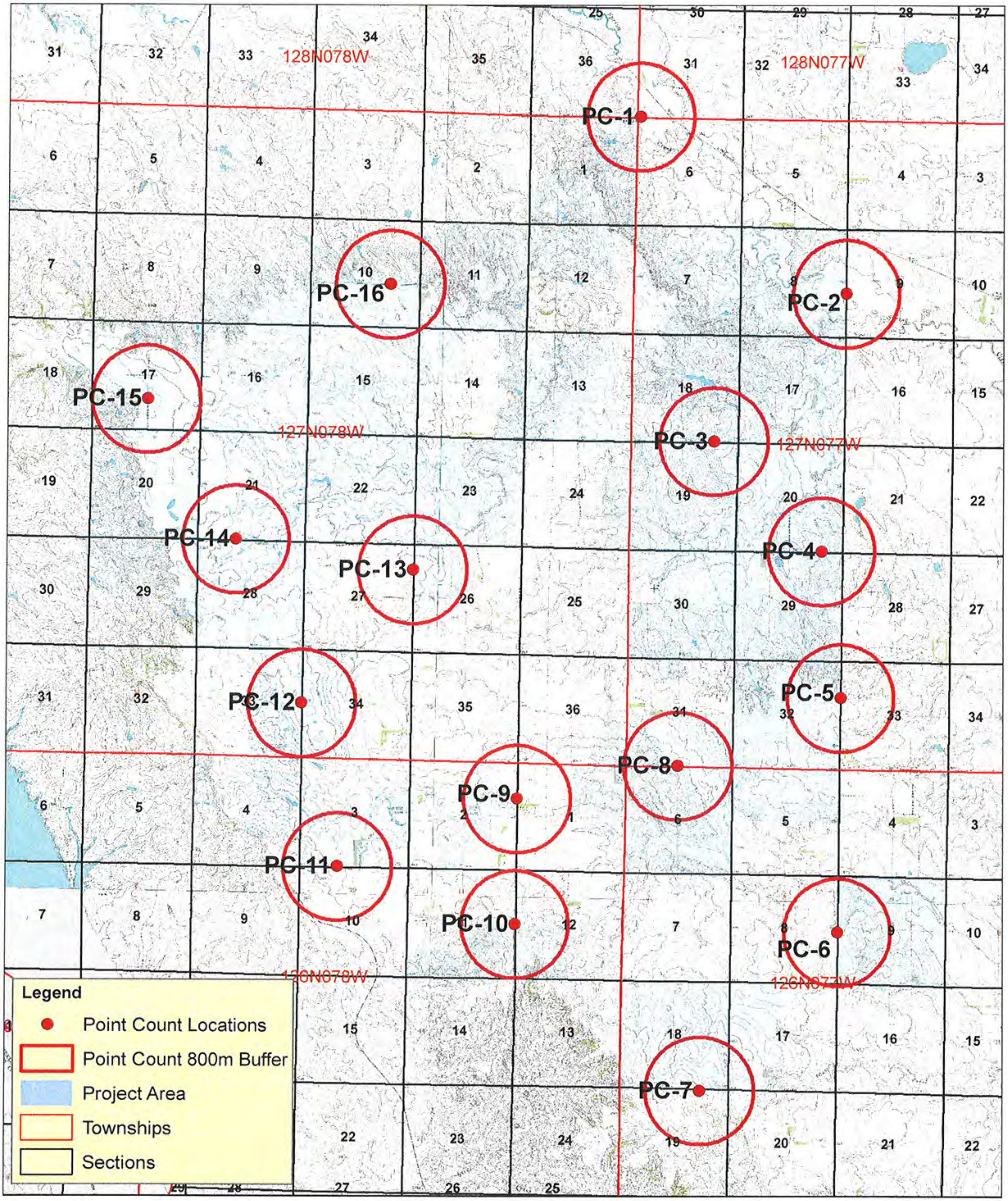

Figure 2. Campbell County Wind Farm Boundary and Point Count Locations
Fagen Engineering Inc.
Campbell County, South Dakota

1:72,000

WPC Project 211-01-JA/DA
Sources: USGS topo map

N

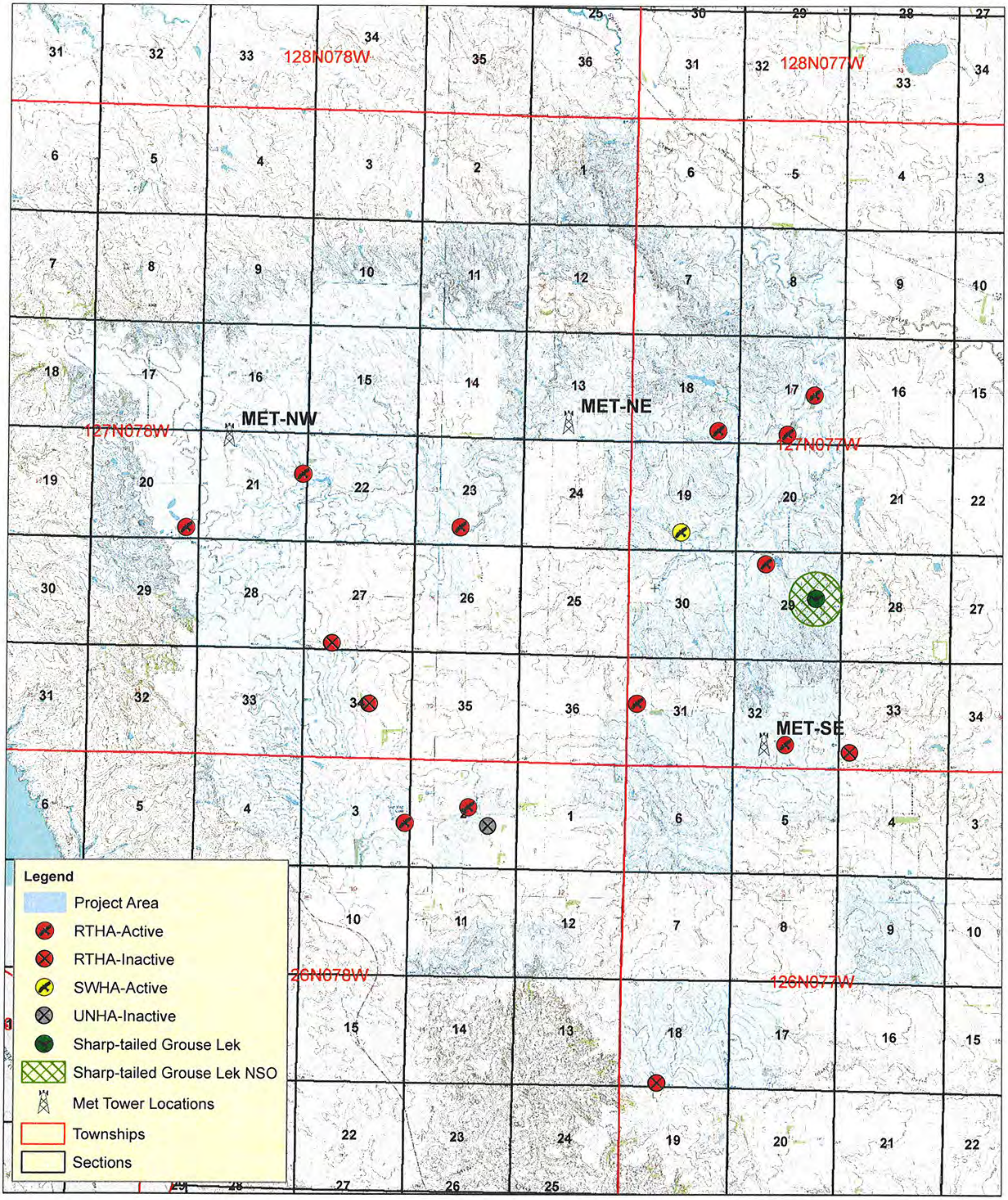

Figure 3. Raptor Nest and Lek Locations at Campbell County Wind Farm
Fagen Engineering Inc.
Campbell County, South Dakota

1:72,000

N

WPC Project 211-01-JA/DA
Sources: USGS topo map

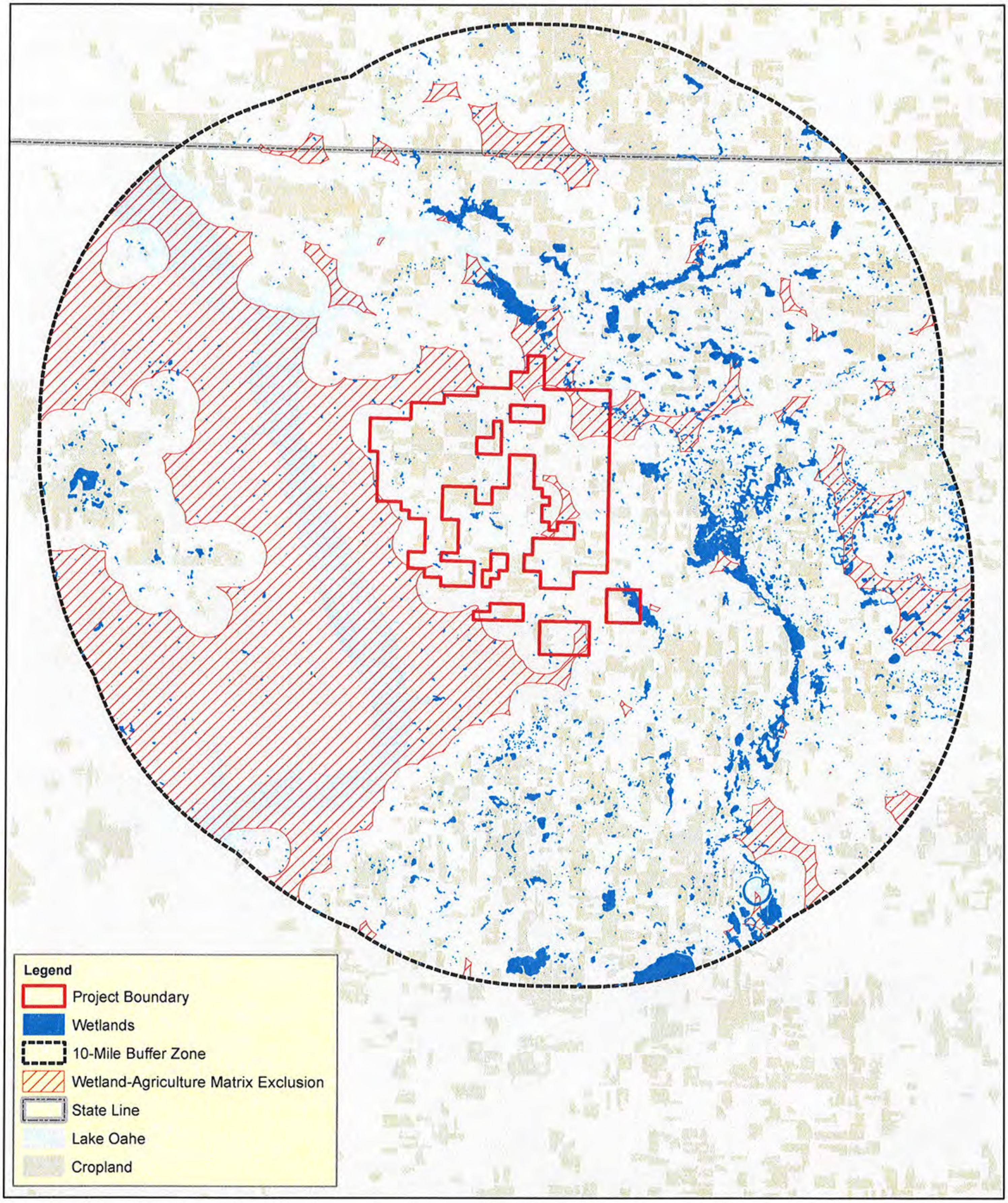

Figure 4. Project Area and 10-Mile Buffer Wetland-Agricultural Matrix
Fagen Engineering Inc.
Campbell County, South Dakota

1:235,000

WPC Project 211-01-JA/DA
Sources: USGS topo map

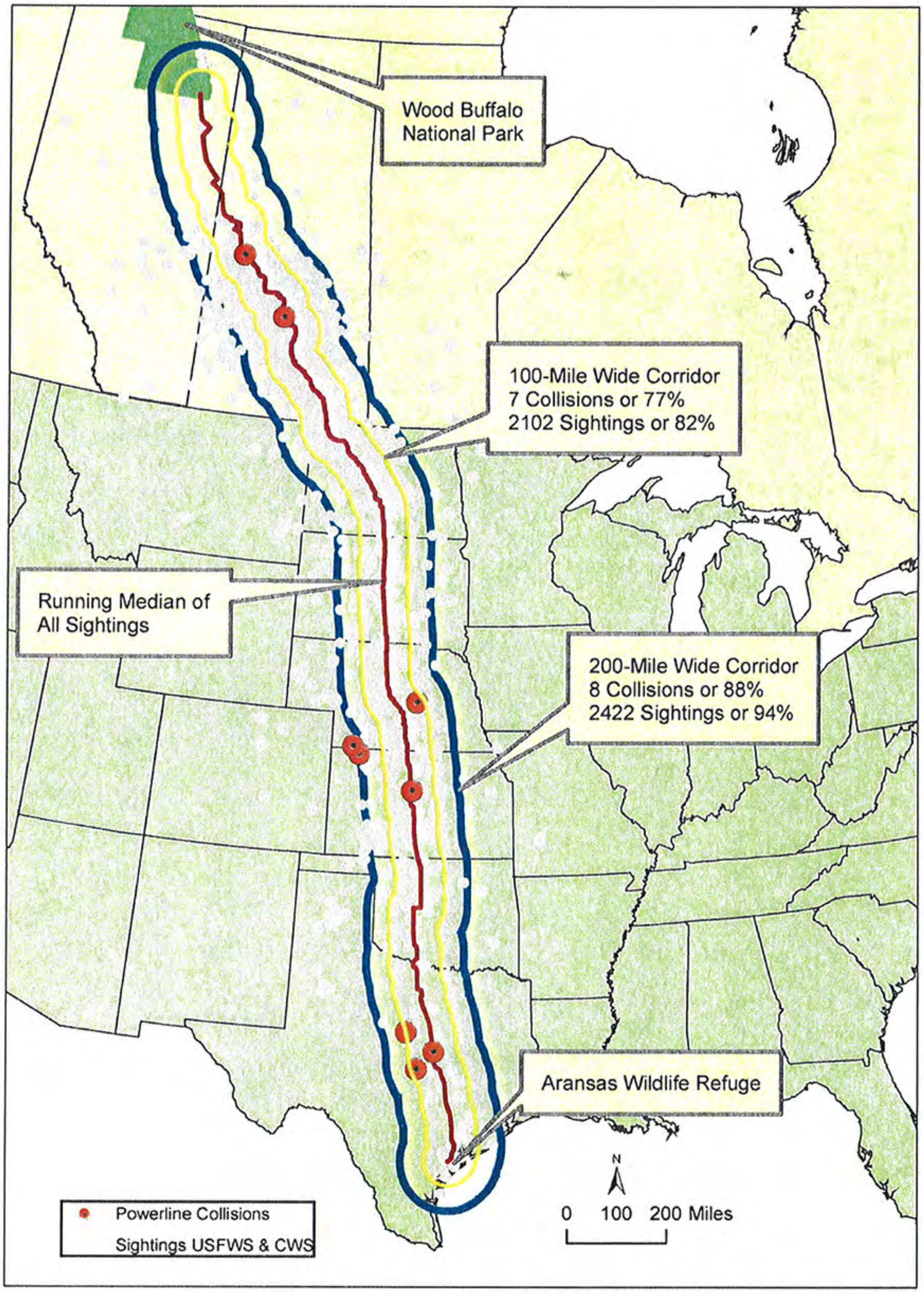

Figure 5. Whooping Crane Migration Distribution and Sightings

Appendix I

Appendix I. Point Count Photos

Photo 1: Point Count 1 looking east.

Photo 2: Point Count 1 looking north.

Photo 3: Point Count 1 looking west.

Photo 4: Point Count 1 looking south.

Photo 5: Point Count 2 looking east.

Photo 6: Point Count 2 looking north.

Photo 7: Point Count 2 looking west.

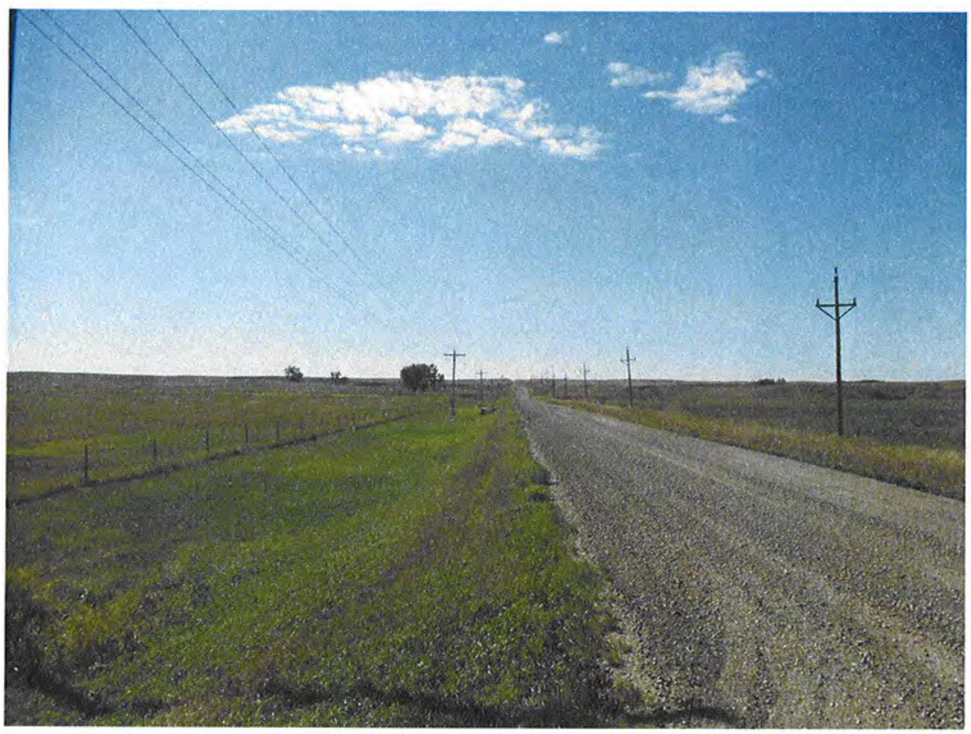

Photo 8: Point Count 2 looking south.

Photo 9: Point Count 3 looking east.

Photo 10: Point Count 3 looking north.

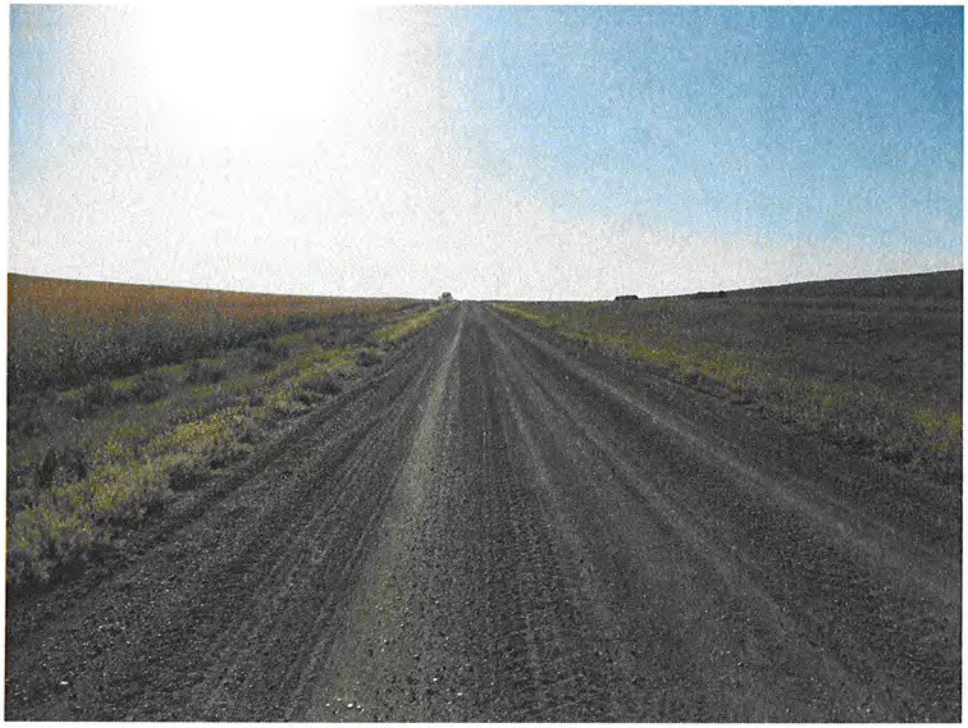

Photo 11: Point Count 3 looking west.

Photo 12: Point Count 3 looking south.

Photo 13: Point Count 4 looking east.

Photo 14: Point Count 4 looking north.

Photo 15: Point Count 4 looking west.

Photo 16: Point Count 4 looking south.

Photo 17: Point Count 5 looking east.

Photo 18: Point Count 5 looking north.

Photo 19: Point Count 5 looking west.

Photo 20: Point Count 5 looking south.

Photo 21: Point Count 6 looking east.

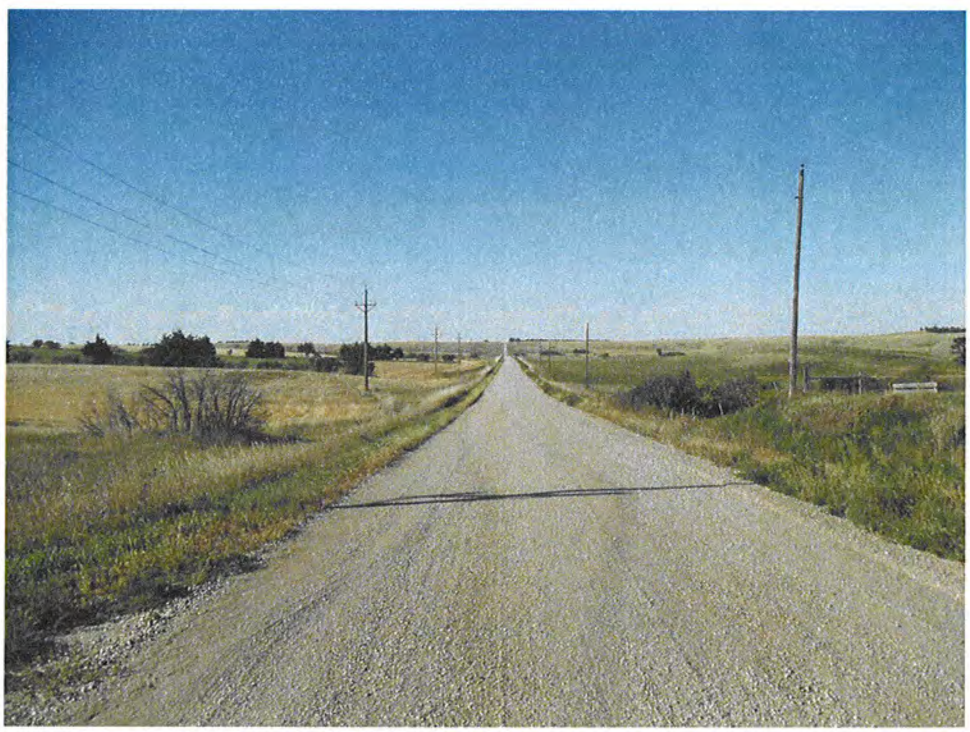

Photo 22: Point Count 6 looking north.

Photo 23: Point Count 6 looking west.

Photo 24: Point Count 6 looking south.

Photo 25: Point Count 7 looking east.

Photo 26: Point Count 7 looking north.

Photo 27: Point Count 7 looking west.

Photo 28: Point Count 7 looking south.

Photo 29: Point Count 8 looking east.

Photo 30: Point Count 8 looking north.

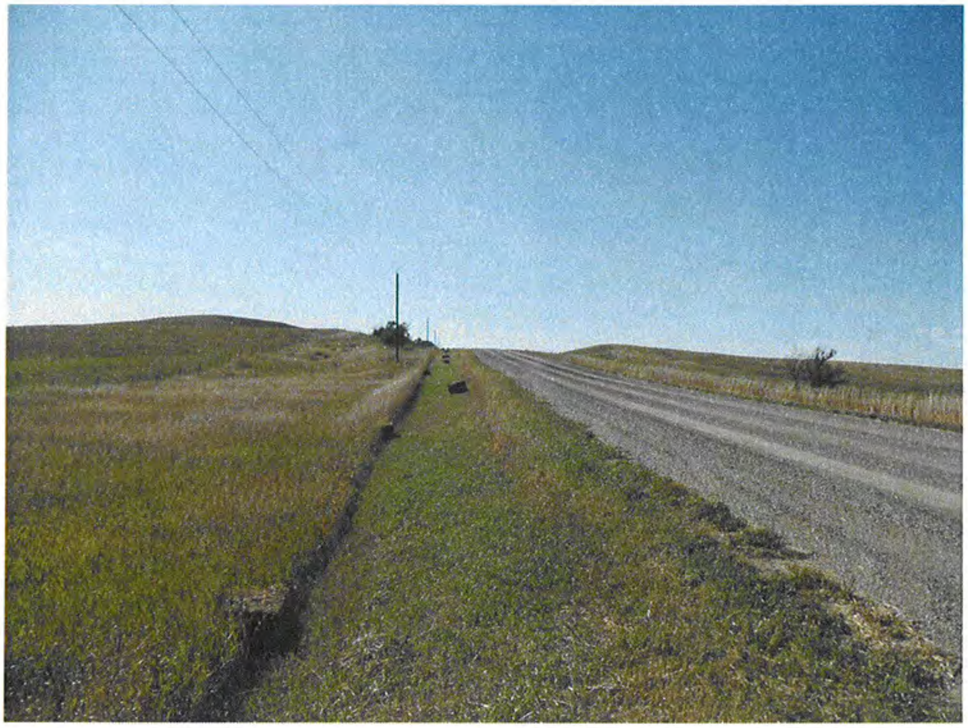

Photo 31: Point Count 8 looking west.

Photo 32: Point Count 8 looking south.

Photo 33: Point Count 9 looking east.

Photo 34: Point Count 9 looking north.

Photo 35: Point Count 9 looking west.

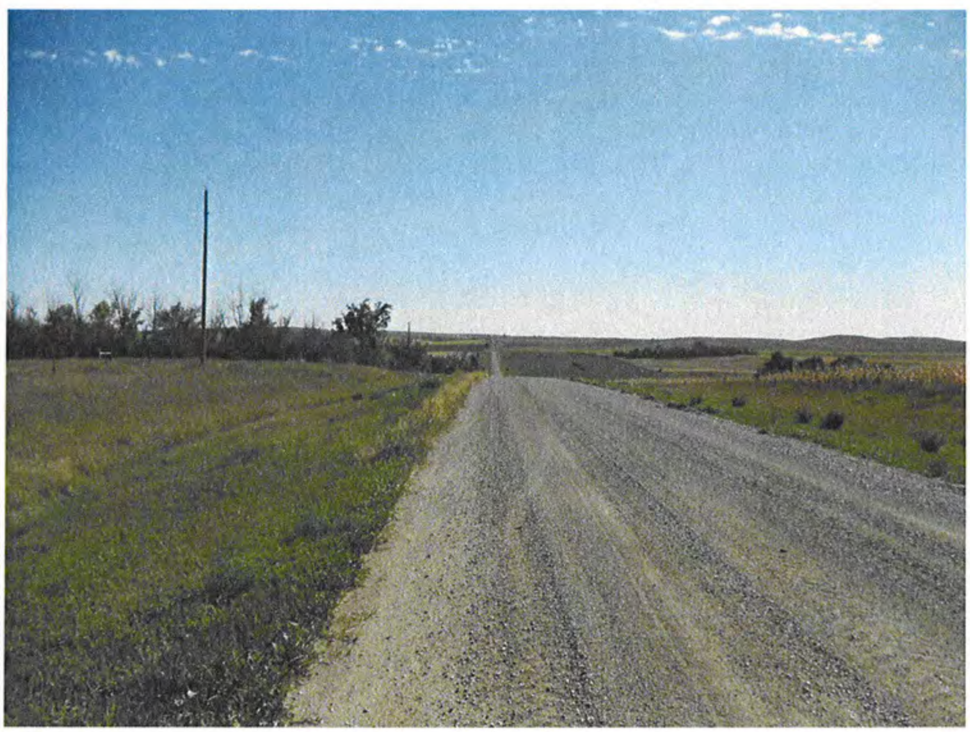

Photo 36: Point Count 9 looking south.

Photo 37: Point Count 10 looking east.

Photo 38: Point Count 10 looking north.

Photo 39: Point Count 10 looking west.

Photo 40: Point Count 10 looking south.

Photo 41: Point Count 11 looking east.

Photo 42: Point Count 11 looking north.

Photo 43: Point Count 11 looking west.

Photo 44: Point Count 11 looking south.

Photo 45: Point Count 12 looking east.

Photo 46: Point Count 12 looking north.

Photo 47: Point Count 12 looking west.

Photo 48: Point Count 12 looking south.

Photo 49: Point Count 13 looking east.

Photo 50: Point Count 13 looking north.

Photo 51: Point Count 13 looking west.

Photo 52: Point Count 13 looking south.

Photo 53: Point Count 14 looking east.

Photo 54: Point Count 14 looking north.

Photo 55: Point Count 14 looking west.

Photo 56: Point Count 14 looking south.

Photo 57: Point Count 15 looking east.

Photo 58: Point Count 15 looking north.

Photo 59: Point Count 15 looking west.

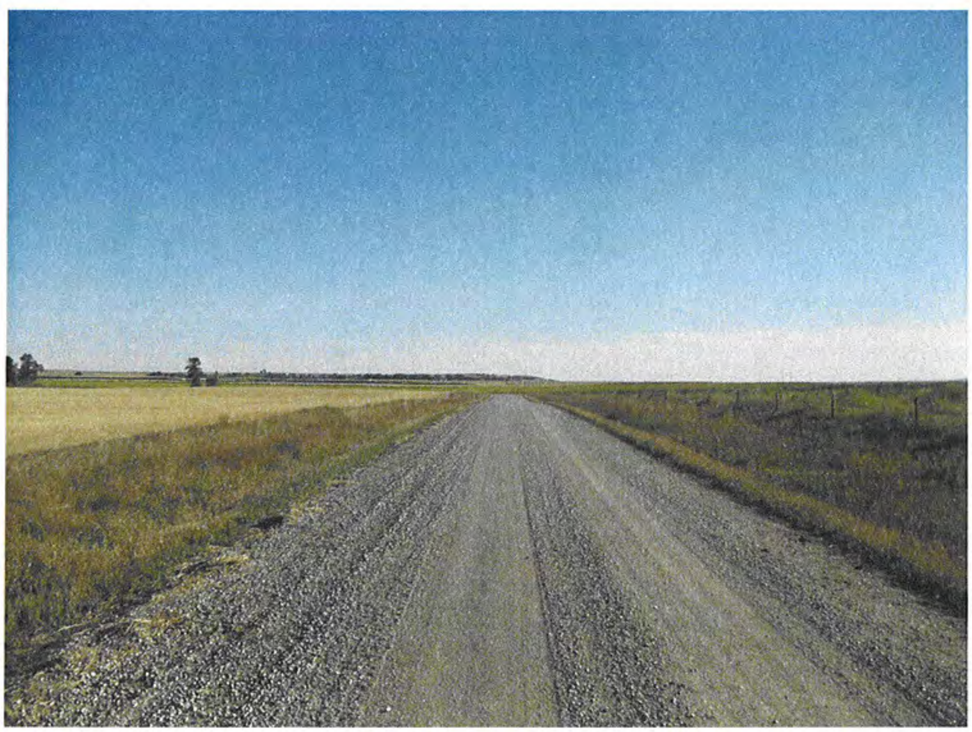

Photo 60: Point Count 15 looking south.

Photo 61: Point Count 16 looking east.

Photo 62: Point Count 16 looking north.

Photo 63: Point Count 16 looking west.

Photo 64: Point Count 16 looking south.

BAT ACOUSTIC STUDIES FOR THE CAMPBELL COUNTY WIND FARM
SOUTH DAKOTA

August 18 - October 24, 2010

Prepared for:

Western Plains Consulting, Inc.
Bismarck, ND

Project Owner:
Dakota Plains Energy
Aberdeen, SD

Prepared by:

Eco-Tech Consultants, Inc.
Jeffersonville, Indiana

January, 2011

ETC ECOLOGICAL
Eco-Tech Consultants, Inc.

EXECUTIVE SUMMARY

Eco-Tech Consultants, Inc. (ETC) initiated surveys in August 2010 designed to assess bat use within the proposed Campbell County Wind Farm, South Dakota. Acoustic surveys for bats using Anabat® SD-2 ultrasonic detectors at two MET towers at 2 m and 45 m microphone heights were conducted from August 18 to October 24, 2010. The objective of the surveys was to estimate the seasonal and spatial use of the study area by bats, as well as to estimate total bat activity, defined here as number of bat passes. In total, 379 bat passes were recorded during 264 detector nights. Averaging bat passes across locations, we detected a mean of 1.4 bat passes per detector-night, with a range of 0 to 59 total passes per night.

Total bat activity peaked in late August and no passes were recorded after October 11. Bat activity appears to have come predominately from low frequency (<30 kHz) bats (72% of passes). This species group is comprised of big brown bats, hoary bats and silver-haired bats. Bats with echolocation calls in the <30 kHz range, especially silver-haired and hoary bats, have comprised the majority of fatalities at other wind power projects. Passes by medium frequency (MF) and high-frequency (HF) bats totaled 11% and 16% respectively. Red bats, whose calls typically are 30-40 kHz, have predominated fatalities at some eastern wind energy projects. This species appears to have a limited presence within the project area.

The mean number of bat passes per detector per night was compared to existing data at other wind energy facilities from the region where both bat activity and mortality levels have been measured. The level of bat activity documented at the Campbell County Wind Farm was lower than all other published results. Assuming that the general relationship between bat activity and bat mortality observed at these sites is broadly applicable to other locations, we expect that levels of turbine-related bat mortality at the Campbell County Wind Farm will be on the lower end of the spectrum, and on par with others from the region. Assuming that activity patterns by bats are relatively consistent from year to year, we expect most fatalities to occur from mid- August to mid-September.

Table of Contents

TABLES

FIGURES

PHOTOGRAPHS

1. INTRODUCTION

Western Plains Consulting, Inc. (WPC) contracted Eco-Tech Consultants, Inc (ETC) to conduct acoustic studies for fall migrating bats for the proposed Dakota Plains Energy's Campbell County Wind Farm (CCWF), South Dakota. ETC was requested to affix passive high/low acoustic monitoring systems at two existing meteorological towers already present at the development site. WPC biologists assisted ETC with the collection of data and maintenance of the monitoring systems.

While still in the initial design phases, CCWF ultimately has the potential for power production on the order of 300+ MW, from currently-held leases across 17,000 acres. At this time we are not aware of the turbine size or type to be employed by the developer. Generally, most modern turbines are capable of generating 1.5-2.5 MW of electricity, and reach 100 m (328 ft) or more into the sky. The construction of the CCWF is scheduled to commence in the fall of 2012.

As the nation's installed capacity of wind-energy has increased, so have concerns about the impacts to the birds and bats that sometimes collide with the turbines. As a result, both pre- and post-operations surveys for bats are recommended for most new wind-energy facilities. The purpose of this report is to summarize and describe the results of pre-construction bat acoustic surveys during the fall of 2010. This period coincides with the migration of certain bat species known to be the predominant fatalities of wind power projects across the nation. The intent is to highlight any items of biological interest and to describe levels of bat activity in the context of similar studies conducted regionally and nationally.

2. STUDY AREA

The Campbell County Wind Farm, located in north central South Dakota, will encompass 17,000 acres across three ridges just east (>4 km) of the Missouri River and south of Pollock, SD (Figure 1). The project is located in the USEPA Level IV Ecoregion described as the Southern Missouri Coteau Slope of the Northwestern Plains (Bryce et al. 1998). This ecoregion has level to rolling uplands sloping westward to the Missouri River. Elevation ranges from 1400-2200 m asl.

Grain croplands dominate the land-use. Soils are derived from loess and Wisconsin glacial till and are suited for the production of sunflowers, wheat, millet, barley, and some corn. Natural vegetation is comprised of western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), big bluestem (*Andropogon gerardii*), and needle and thread (*Hesperostipa comata*). Stream drainages are typically cleared, but may support small pockets of willows (*Salix* sp.), green ash (*Fraxinus pennsylvanica*), and elm (*Ulmus* sp.)

This ecoregion has a mean annual precipitation total of 19-21 in. Mean July minimum and maximum temperatures are 64 and 89°F, and there are typically 130-150 frost free days. The site is located on the western edge of the Central Time Zone. On September 1 sunset occurred at 20:22 (twilight 20:53) and sunrise was 07:01 (twilight 06:30).

The Missouri River to the west of the site exists as a large reservoir, Lake Oahe, and is impounded just north of Pierre, SD by Oahe Dam. Tributaries leading to the reservoir are heavily incised and are frequently dry.

3. METHODS

3.1. Bat Acoustic Survey

The objective of the acoustic survey was to estimate the seasonal and spatial use of the CCWF by bats. Bats were surveyed using Anabat SD2™ detectors (Titley Electronics Pty Ltd., NSW, Australia). Acoustic detectors are a recommended method to index and compare habitat use by bats. The use of this technology for calculating an index to bat impacts has been used at several wind-energy facilities (Kunz et al. *2007a),* and is an economically feasible bat risk assessment tool (Arnett 2007). Anabat detectors record echolocation calls with a broadband microphone. The echolocation sounds are then translated into frequencies audible to humans by dividing the frequencies by a predetermined ratio. A division ratio of 16, which is appropriate for all species of bats in South Dakota, was used for the study.

Bat activity was surveyed using 4 detectors from August 18 to October 24, 2010, a period corresponding to likely fall bat migration at this site, and which corresponds to the period when the majority of bat fatalities have been recorded at other wind energy projects (Arnett et al. 2008). Two meteorological towers were chosen to conduct acoustic monitoring. Each tower was positioned along ridge tops within cleared agriculture fields. At the time of sampling, the NW tower was a cleared fallow field while the SE tower was planted with corn. At each tower, Anabat detectors were established at 2m (low mic) and at 45m (high mic). This spacing along each tower was essential to sample air space from the vicinity of the presumed rotor-swept region of a turbine (>30m) and additional air space just over the existing surface vegetation (Kunz et al. 2007a).

Anabat detector loggers were placed inside plastic weather-tight containers and connected to the microphones via a coaxial cable. The microphones were encased in a Bat-Hat weatherproof housing systems (EME Systems, Berkeley, California). A 45° PVC elbow with the opening positioned parallel to the ground was employed to protect the electronics from moisture. The high mic was raised with a mounted pulley system, and the low mic was affixed directly to the met tower using hose clamps. All acoustic equipment was powered by 12V 12Ah closed cell batteries (Photos 1-6).

All units were programmed to turn on each night an approximate half-hour before sunset and turn off approximately a half-hour after sunrise. Calls were recorded to a compact flash memory card with large storage capacity. Bat echolocation detectors also detect other ultrasonic sounds made by insects, raindrops hitting vegetation, and other sources. A sensitivity level of six was used to reduce interference from these other sources of ultrasonic noise. Maintenance visits were conducted approximately every week to collect data cards and replace depleted 12V batteries.

3.2. Data Analysis

Potential call files were extracted from data files using CFCread© software (www.hoarybat.com, Version 4.3.18). The default settings for CFCread© were used during this file extraction process, as these settings are recommended for the calls that are characteristic of eastern bats. This software screens all data recorded by the bat detector and extracts call files using a filter. Using the default settings for this initial screen also ensures comparability between data sets. Settings used by the filter include a max TBC (time between calls) of 5 seconds, a minimum line length of 5 milliseconds, and a smoothing factor of 50. The smoothing factor refers to whether or not adjacent pixels can be connected with a smooth line. The higher the smoothing factor, the less restrictive the filter is and the more noise files and poor quality call sequences are retained within the data set. The units of activity were number of bat passes (Hayes, 1997). A pass was defined as a continuous series of greater than or equal to two call pulses produced by an individual bat with no pauses between call pulses of less than one second (White and Gehrt 2001, Gannon et al. 2003). In this report, the terms bat pass and bat sequence are used interchangeably.

Following extraction of files, each data set was further filtered in AnalookW© (www.hoarybat.com, Version 3.8g) to remove/reduce extraneous environmental and insect noise specific to a certain frequency range. With each filter run, files not passing filters were visually inspected for missed bat calls and moved by hand to the appropriate directory. Bat calls typically include a series of pulses characteristic of normal flight or prey location ("search phase" calls) and capture periods (feeding "buzzes"). In contrast, static typically forms a diffuse band of dots at either a constant frequency or widely varying frequency, caused by wind, vibration, or other interference.

The number of bat passes was determined by downloading the data files to a computer and tallying the number of echolocation passes recorded. Total number of passes was corrected for effort by dividing by the number of detector nights. Because of the inherent difficulty in identifying bat calls to the species level with passive monitoring methods, all recorded bat calls were classified by their characteristic frequency range and taxonomic group (species guild). We chose to use three species guilds for bats known from the South Dakota region (Table 1). They include high-frequency calls (>40 kHz), which are generally given by small bats (*e.g.*, *Myotis* sp.); medium-frequency (30-40 kHz) which are comprised of the red bat [*Lasiurus borealis*] and evening bat [*Nyctisceius humeralis*]; or low-frequency (<30 kHz), which are generally given by the largest bats (*e.g.*, silver-haired bat [*Lasionycteris noctivagans*], big brown bat [*Eptesicus fuscus*], hoary bat [*Lasiurus cinereus*). Data determined to be noise (produced by a source other than a bat) or call notes that did not meet the pre-specified criteria to be termed a pass were removed from the analysis.

Once all of the call files were identified and categorized in appropriate guilds, nightly tallies of detected calls were compiled. Mean detection rates (number of passes/detector-night) for the entire sampling period were calculated for each detector and for all detectors combined. It is important to note that detection rates indicate only the number of calls detected and do not necessarily reflect the number of individual bats in an area. For example, a single individual can produce one or many call files recorded by the bat detector, but the bat detector cannot differentiate between individuals of the same species producing those calls. The results of the acoustic monitoring survey are most applicable for determining bat activity patterns and probable species composition of migrant individuals and the local bat community. The magnitude of the community and the number of migrants occurring within the study area is not accurately measurable with the acoustic methods. Although, intuitively, if a specific detector records a high number of call sequences, it is likely that the level of activity near that detector is higher.

Additional analysis was conducted to assess potential associations between bat activity levels and environmental variables such as wind speed and temperature. This data was obtained from anemometry equipment affixed to the MET towers and is represented as a nightly mean of measurements obtained every ten minutes from approximately sundown to sunup throughout the survey period.

4. RESULTS

4.1. Acoustic Survey

Bat activity was monitored at two MET tower locations on a total of 264 nights during the 272-night sampling period (4 detectors for 68 nights), and resulted in the collection of 379 bat passes (Table 2, Figure 2). Averaging across stations, we detected 1.4 bat passes per night. Overall, passes by low frequency bats (LF: 72%) outnumbered passes by medium frequency (MF: 11%) and high frequency bats (HF: 16%) (Figure 3). We additionally recorded 204,693 files that were characterized as noise, with the sources primarily coming from insects, rain, wind, birds, and mechanical equipment.

In all, acoustic equipment was operational 97% of the monitoring period, with 3.88 detectors, on average, operating on any given night (range: 3-4). Failures occurred at SE02 (Southeast MET tower, 2m mic) for 6 nights because of a blown fuse and at SE45 for two nights due to an insufficiently charged battery.

4.2. Spatial Variation

Bat activity varied considerably between stations (Figures 4-6). Approximately 80% of all calls recorded from the two locations came from the NW MET tower. Bat activity was greater at the 2 m height than the 45 m height, with 62% of all calls coming from the low mics.

LF bats at the NW tower (2 m and 45 m combined) comprised 58% of the total calls recorded in the study area (Figure 5). LF was the only group with activity levels greater than one pass per detector night (1.46 at NW45 and 1.76 at NW02) at any given detector location. All others were 0.65 passes per night or less (Table 2).

We did not observe a sunstantial relationship between species groups and the vertical sampling profile. The relative proportion of LF, MF, and HF bat calls was nearly equal at 2 m and 45 m heights, with a maximum proportional separation no greater than 10%.

4.3. Temporal Variation

Bat activity was variable on any given night, but there was a general trend toward a peak in activity in late August (Figure 2). Bat activity was highest (22 total passes per night) during the week of August 25. Overall bat activity declined substantially in the following weeks, particularly after mid-September, influenced perhaps by decreasing temperatures and increasing wind speeds. Only 6 bat passes were recorded in October, with no bat passes occurring after October 11. Bat activity was positively correlated with temperature over the course of the study (Figure 7), but the relationship displayed weak correlation (R^2 = 0.27) (Figure 8)

Bat activity in relation to wind speed was examined during the primary activity period of August 18 to August 31. In general a trend was observed with activity being negatively correlated to wind speed (Figure 9), but the relationship was not strong (R^2 = 0.18) (Figure 10). The three peak activity nights occurred when mean nightly wind speed was below 7 m/s, and very low activity nights did occur when wind speed were elevated (8.8-14.5 m/s).

Activity by HF, MF and LF species, while differing in magnitude, showed similar relative activity levels by date. In all three guilds, the week of August 25th represented the peak of weekly activity for the entire study period (Figure 2). Interestingly, the night of August 28th in particular was the peak night for all three groups (42 LF, 6 MF, and 11 HF passes). This night was nearly the last night with temperatures above 20°C. It was preceded by three nights around 16°C (Figure 7). Following this cool stretch, August 28th was the first night with wind speeds under 7 m/s. For the study period, nightly temperature averaged 13.1°C, and nightly wind speed averaged 7.9 m/s (Figures 7 and 9).

5. DISCUSSION

To date, monitoring studies of wind projects in the eastern U.S. suggest that migratory tree-roosting species (hoary, red and silver-haired bats) comprise almost 75% of reported bats killed, and the majority of fatalities occur during the post-breeding or fall migration season (roughly August and September) (Arnett et al. 2008, Johnson et al. 2003, Kunz et al. *2007b)*. A few studies of wind projects across the east have recorded both bat mortality and Anabat detections per night (Kunz et al. 2007b). The number of bat calls per night as determined from bat detectors shows a rough correlation with bat mortality. This allows for some qualitative comparison of risk across regions. However, extrapolation of these trends to other sites must be done cautiously because effort, timing of sampling, species recorded, and detector settings (equipment and locations) all vary among studies (Kunz et al. *2007b).* Nonetheless, our best available estimate of potential mortality levels at a proposed wind project involves evaluation of our on-site bat acoustic data in terms of activity levels, seasonal variation and species composition, and topographic features of the project area.

Bat activity within the CCWF (1.4 bat passes per detector-night) was lower than all published observations from region-similar facilities in Minnesota (2.1 passes/nt), Wyoming (2.2 passes/nt), and Iowa (34.9 passes/nt) (Kunz et al. 2007b). Based on the presumed relationship between pre-construction bat activity and post-construction fatalities, we expect that bat mortality rates at CCWF will be minimal in the context of published observations from other facilities.

We are not aware of any large, known bat colonies or other landscape features that are likely to attract large numbers of bats in the vicinity of the project. Activity was low at the NW MET tower and very low at the SE tower. Both towers are located in large agricultural and grassland landscapes with only small woodlots and forested riparian zones scattered throughout. There are no substantial travel corridors or north/south broad migration corridors running through the site. The Missouri River (Lake Oahe) does provide such a corridor to the west, however it is 5.5 km from the nearest MET tower and the habitat is sparse between these features.

The vertical distribution of recorded calls was not wholly reflective of trends observed for other acoustic monitoring studies (Arnett et al. 2006). Typically LF calls are concentrated at the high mic stations while MF and HF occur at the lower ones. We observed a fairly uniform distribution among species groups at both the high and low locations. At all locations and elevations, LF bats showed the highest levels of activity.

All species groups showed relatively consistent activity in mid-August, a peak in late August, and then a gradual decline into mid-September. By the beginning of October bat activity was sporadic but never more than a few bats observed on any given night.

Fatality studies of bats at wind projects in the US have shown a peak in mortality in August and September and generally lower mortality earlier in the summer (Johnson 2005, Arnett et al. 2008). While the survey efforts vary, the studies that combine Anabat surveys and fatality surveys show a general association between the timing of increased bat call rates and timing of mortality, with both call rates and mortality peaking during the fall (Kunz et al. *2007b).* Based on the available data, it is expected that bat mortality at the CCWF will follow the same temporal patterns seen at other sites, but the risk for elevated mortality is low.

As has been observed in other studies (Arnett et al. 2005, Kunz et al. 2007a), bat activity is frequently negatively correlated with wind speed. In particular, wind speeds greater than 6 m/s tend to inhibit bats flying above canopy or in the open. Data collected at CCWF seems to support this hypothesis.

Based on the observed activity of species groups at the CCWF and the known bat distributions from central South Dakota east of the Missouri River, we can make some assumptions about the species assemblage in the vicinity and the likelihood of post-construction mortality. With the higher level of activity from the LF group, hoary bats and silver-haired bats are the species most likely to be at risk during fall migration periods. Both of these species are tree-roosting bats and undertake continental scale migrations in spring and autumn (Cryan 2003). Both are known to be substantial components of the observed bat strikes from wind turbine blades. The big brown bat, also from the LF group, is likely a more-permanent summer resident. While big brown bats have been recorded in post-construction studies, they are less probable to incur high levels of mortality as other LF bats. Red bats from the MF group are also tree-roosting migratory bats known as a species often struck by turbine blades. Their abundance/activity, however, appears to be low at this site. HF Myotis are present at the site during the summer and fall, but their numbers appear to very low and therefore the probability of strike is also low.

6. CONCLUSION

In general, bat activity in the Campbell County Wind Farm during the fall survey period is similar to other acoustic studies throughout the region. The LF group represented the majority of calls that were identifiable, followed by the MF and HF groups. There was an observed association with temperature and wind speed patterns. Overall, bat detection rates were on the lower end of the scale when compared to projects across the Eastern U.S., and the risk for post-construction bat mortality is relatively low.

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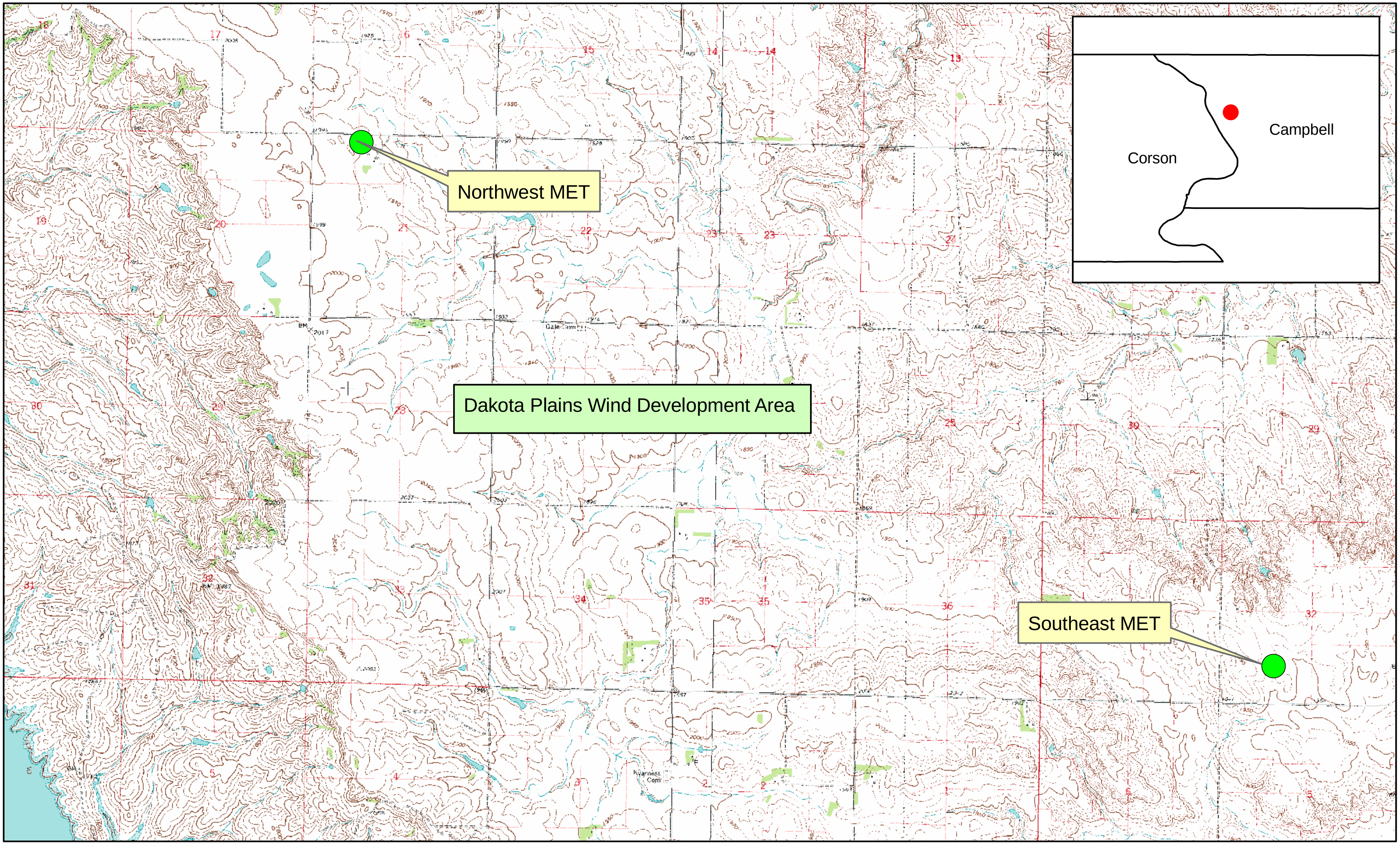
Table 1. Bat species with the potential to occur within the project area (South Dakota Bat Working Group Website 2009), sorted by call frequency.

Common Name	Scientific Name
High-frequency (> 40 kHz)	
little brown bat	*Myotis lucifugus*
northern long-eared bat	*Myotis septentrionalis*
eastern pipistrelle	*Perimyotis subflavus*
Mid-frequency (30-40 kHz)	
eastern red bat[1]	*Lasiurus borealis*
evening bat	*Nycticeius humeralis*
Low-frequency (< 30 kHz)	
big brown bat	*Eptesicus fuscus*
silver-haired bat	*Lasionycteris noctivagans*
hoary bat[1]	*Lasiurus cinereus*
1 = long-distance migrant	

Table 2. Results of acoustic bat surveys conducted at the Campbell County Wind Farm, SD, August 18-Octbober 24, 2010, separated by call frequency (HF = high frequency, MF = mid frequency, LF = low frequency).

Station	MET Tower	Height (m)	LF	MF	HF	Total Bat Files	Noise Files	Total Files	Detector Nights	Passes/ Night
NW02	NW	45	120	27	44	191	72,065	72,256	68	2.81
NW45	NW	45	99	5	7	111	15,484	15,595	68	1.63
SE02	SE	2	29	7	7	43	45,171	45,214	62	0.69
SE45	SE	2	26	4	4	34	71,973	72,007	66	0.52
			274	43	62	379	204,693	205,072	264	1.41



N

1:48,000

Dakota Plains
Campbell County, SD

0 315 630 1,260 1,890 2,520 Meters

Imagery Source: USGS Pollock SE

FIGURE 1

PROJECT LOCATION MAP

ETC ECOLOGICAL
Eco-Tech Consultants, Inc.

Drawn by: PLD	Print Date: 12/30/10
Prepared For: WPC	
ETC File: JV2010012	

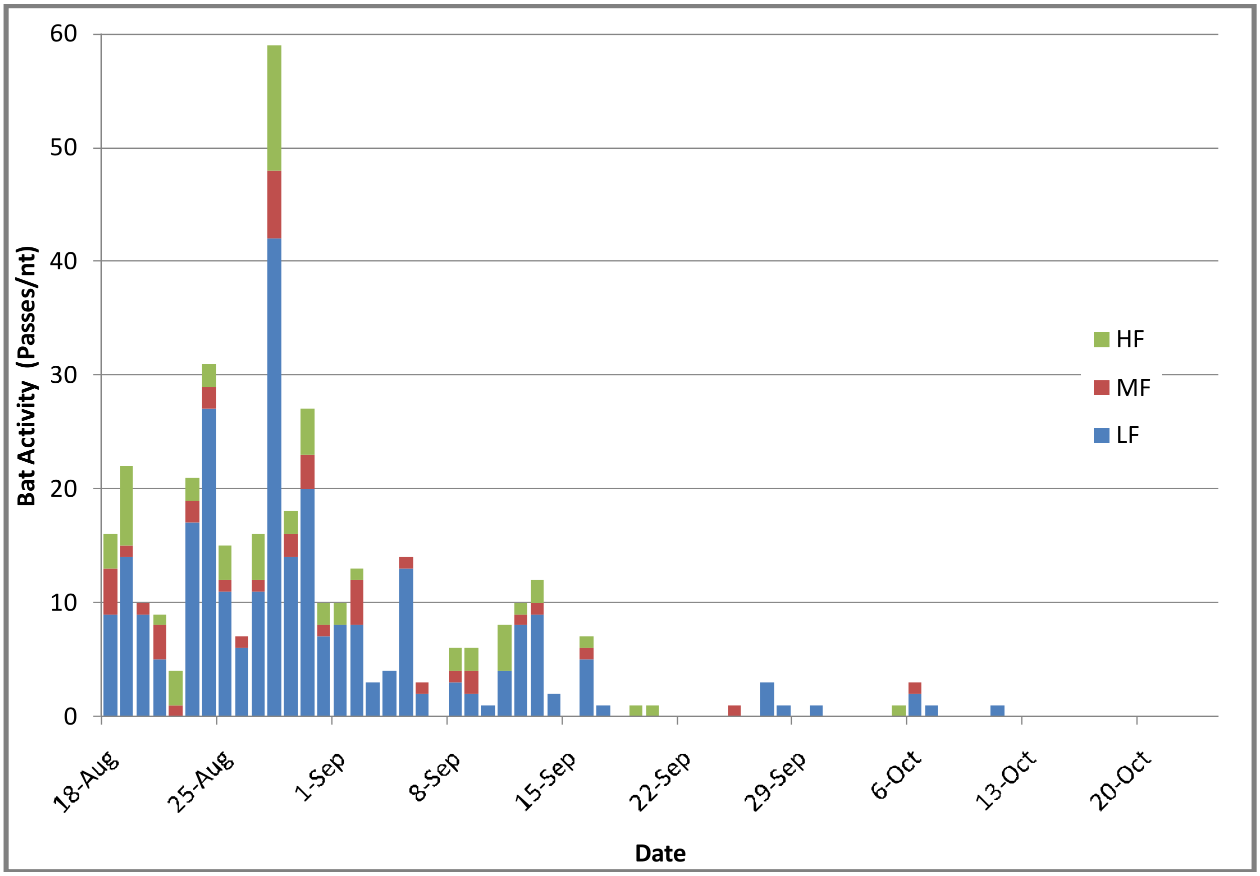


Figure 2. Total nightly bat activity between August 18 and October 24, 2010 at the Campbell County Wind Farm, South Dakota. Passes per night are comprised of acoustic recordings from four monitoring stations at two MET towers (2m, 45m).

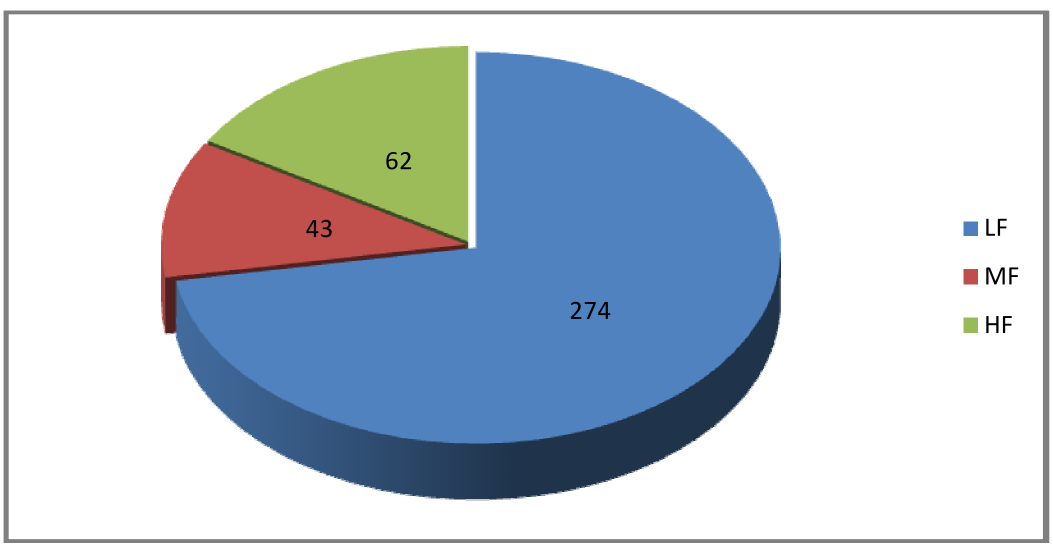


Figure 3. Proportion of high, medium, and low-frequency bats passes recording between August 18 and October 24, 2010 at the Campbell County Wind Farm, South Dakota.

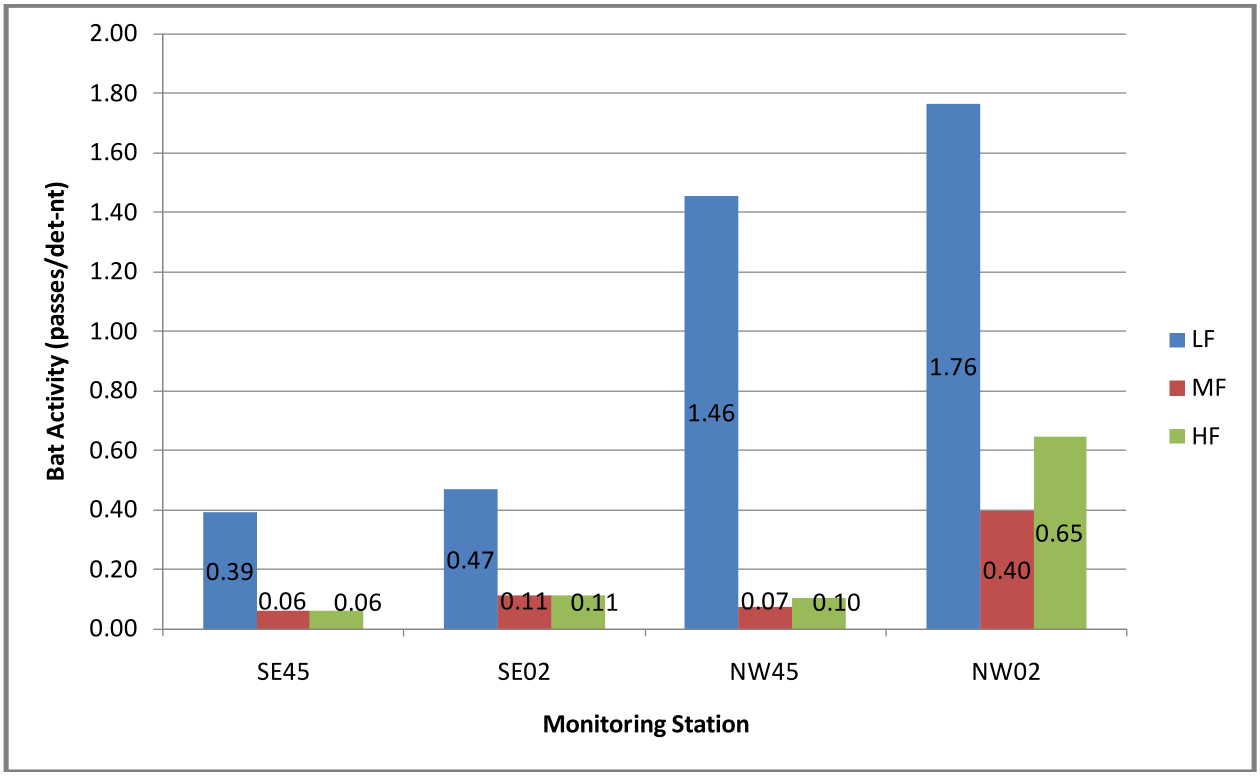


Figure 4. Number of bat passes per detector night for each monitoring station between August 18 and October 24, 2010 at the Campbell County Wind Farm, South Dakota. Average across all stations is 1.4 bat passes per night.

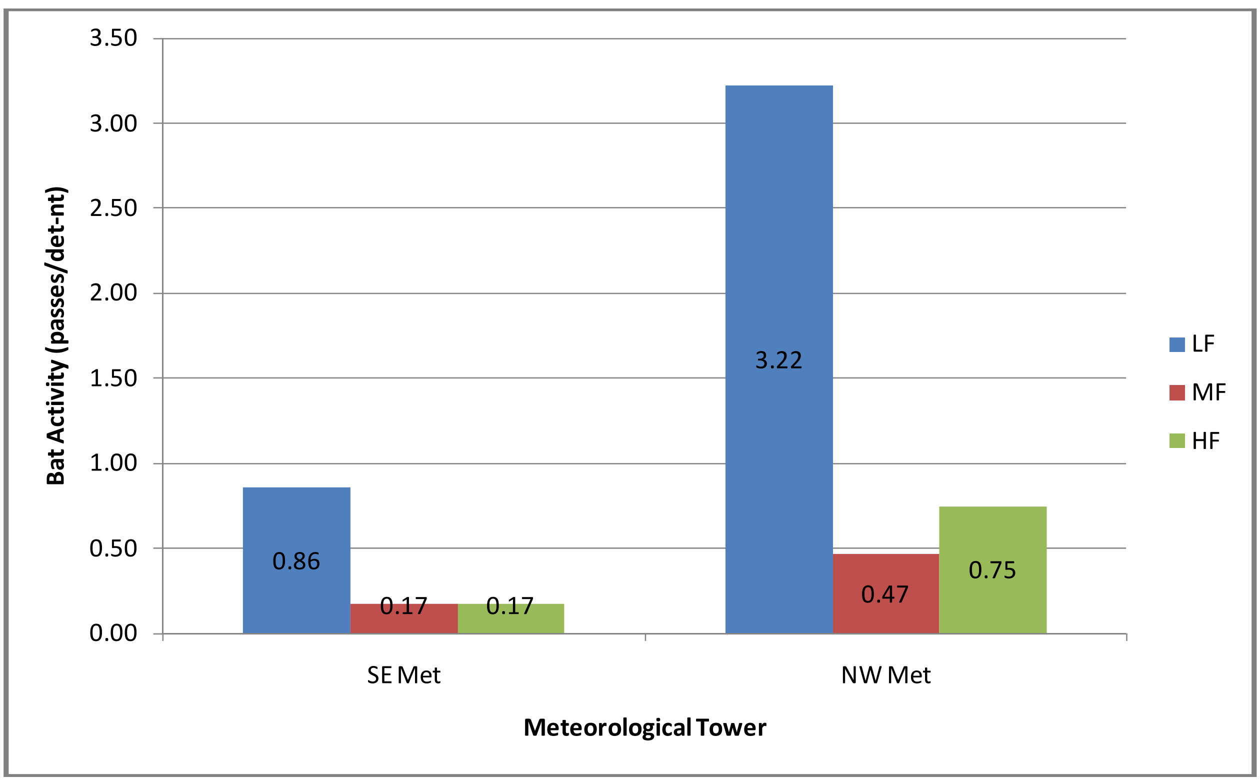


Figure 5. Number of bat passes per detector night by MET tower between August 18 and October 24, 2010 at the Campbell County Wind Farm, South Dakota.

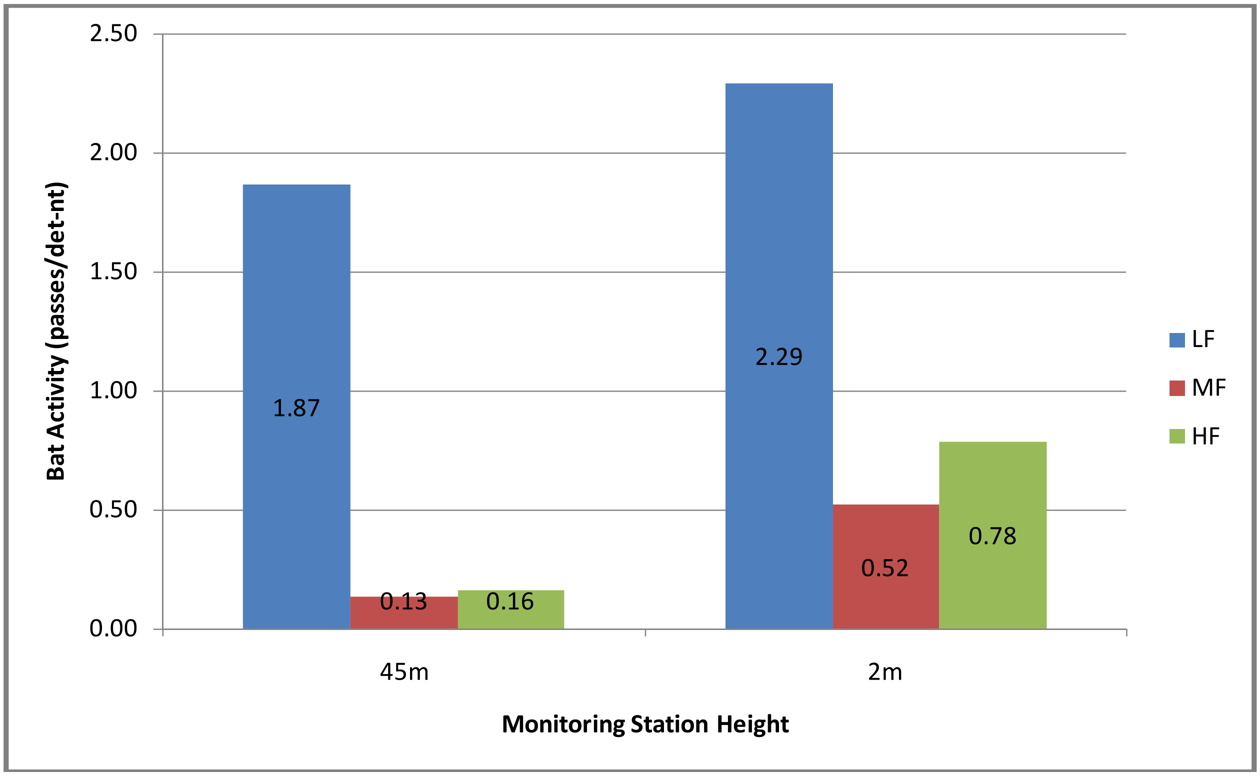


Figure 6. Number of bat passes per detector night at 2m and 45 vertical strata between August 18 and October 24, 2010 at the Campbell County Wind Farm, South Dakota.

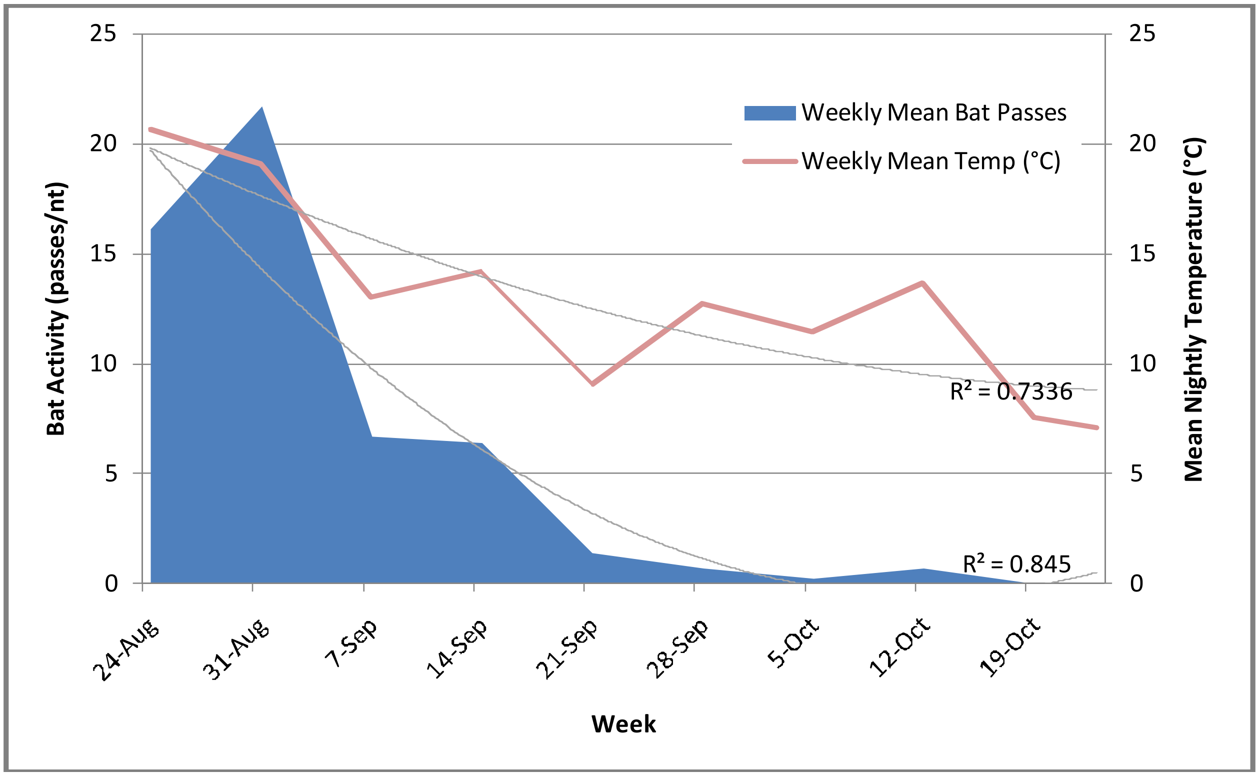


Figure 7. Weekly mean bat passes per night and weekly mean nightly temperature between August 18 and October 24, 2010 at the Campbell County Wind Farm, South Dakota.

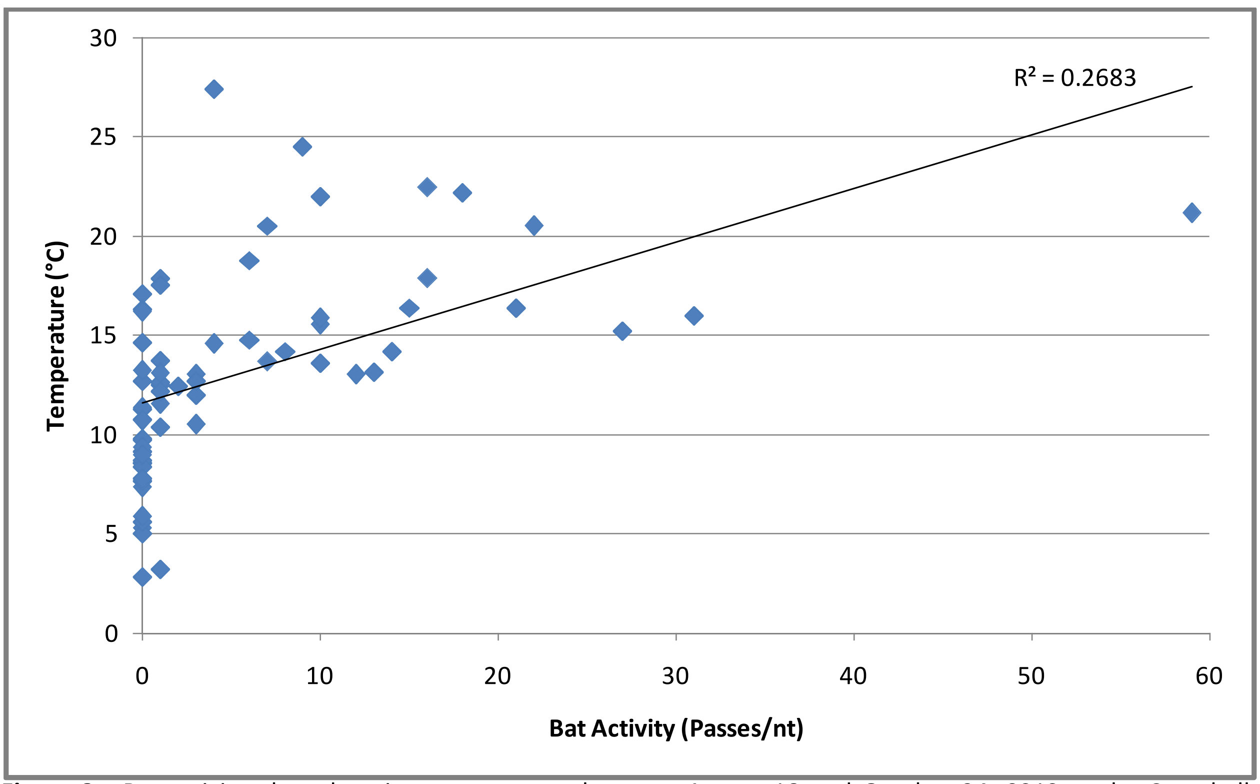


Figure 8. Bat activity plotted against temperature between August 18 and October 24, 2010 at the Campbell County Wind Farm, South Dakota.

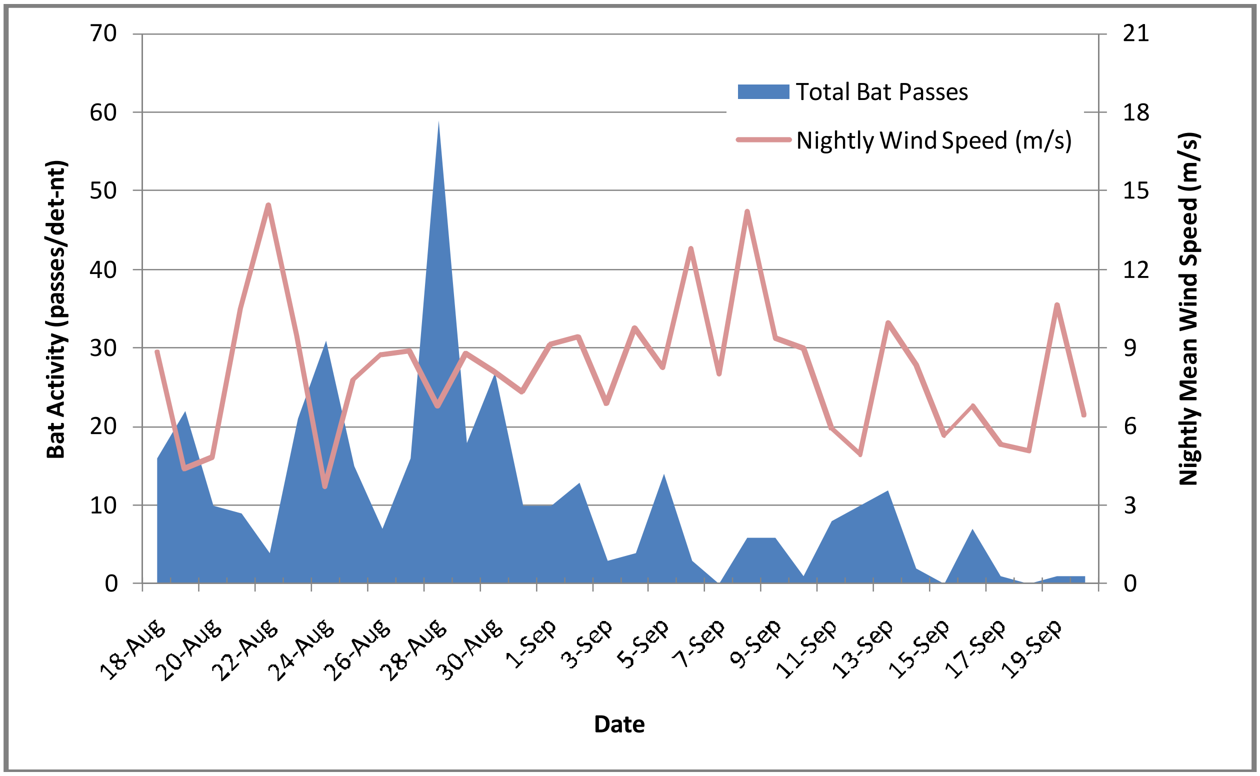


Figure 9. Mean bat passes per night and nightly wind speed between August 18 and October 19, 2010 at the Campbell County Wind Farm, South Dakota.

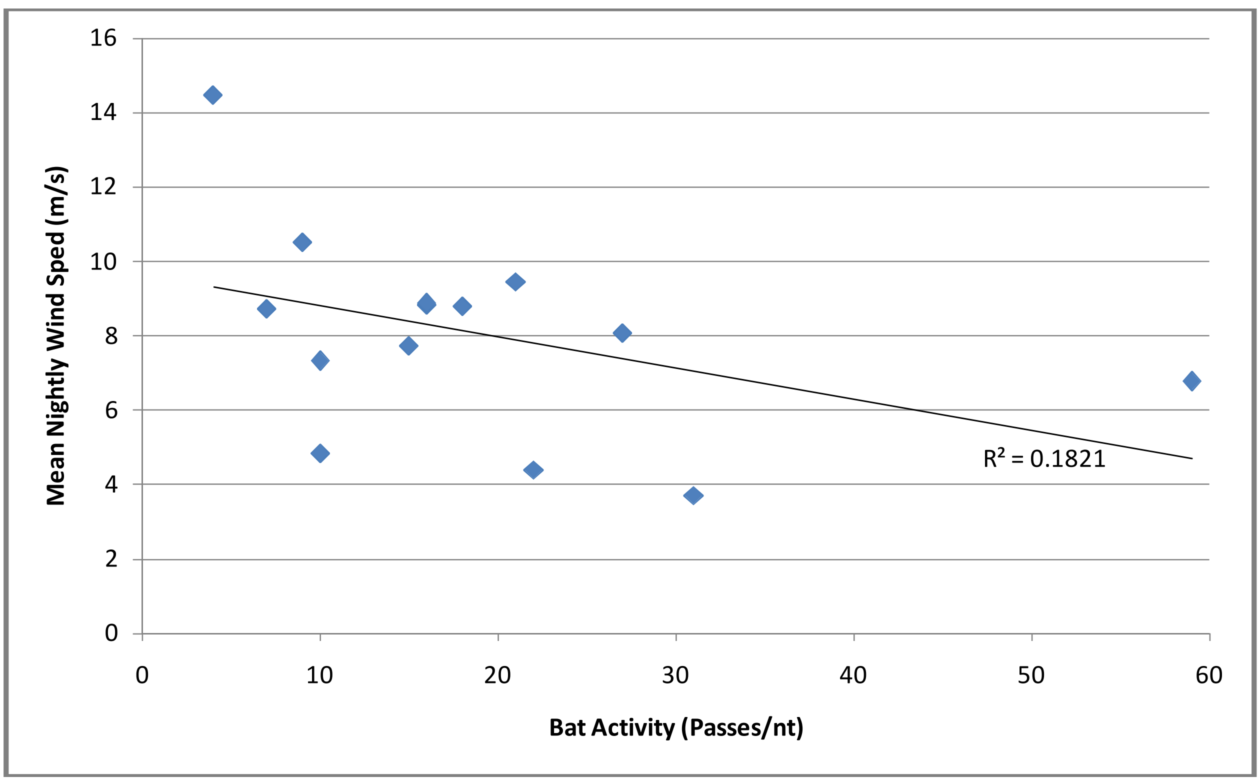


Figure 10. Bat activity plotted against mean nightly wind speed between August 18 and October 24, 2010 at the Campbell County Wind Farm, South Dakota.

Photo 1. WPC and ETC staff raising 45m microphone on MET tower

Photo 2. ETC design weatherproof housing for 2m and 45m Anabat systems

Photo 3. Low microphone (2m) set-up.

Photo 4. Anabat housing at base of MET tower.

Photo 5. High microphone (45m) being raised to pulley bracket.

Photo 6. Campbell County MET tower

Appendix D

Radio Ad

KOLY-AM, KOLY-FM & KNDR

Campbell County Wind Farm Project:

Western Area Power Administration invites you to attend a public scoping meeting, to help define the scope of an Environmental Assessment of Campbell County Wind Farm, a proposed wind energy project in Campbell County, South Dakota.

The proposed project will include up to 58 wind turbine generators, an underground power collection system, access roads, and a maintenance and operation center. Construction of the Campbell County Wind Farm energy project is proposed to begin in December of 2013.

The public meeting will be held Tuesday, March 12th from 5 to 8pm at the Pollock Community Center.

For more information, please call Tom Atkinson at 1-800-422-0828.

(Please run three times daily on each station beginning now through March 12, 2013, as discussed.)

Thank you.

Public Input Encouraged!

Public comments are sought to define the scope and alternatives for an Environmental Assessment of a proposed wind facility in Campbell County, along the Missouri River, south of Pollock and west of Herreid. The proposed project, called Campbell County Wind Farm, will include up to 58 wind turbine generators and the associated access roads and underground power collection system. An operations and maintenance facility will also be part of this project. Construction of the Campbell County energy project is proposed to begin in December 2013.

Western Area Power Administration will hold a public scoping meeting to define the scope of the Campbell County Wind Environmental Assessment. The meeting location is handicapped accessible.

To learn more about this project and to share your ideas, join us at:

5 to 8 pm Tuesday, March 12, 2013

Pollock Community Center

916 F Avenue, Pollock, SD 57648

For more information about the proposed project or to be added to the project mailing list, please contact:

Tom Atkinson, Environmental Protection Specialist

Western Power Administration

PO Box 1173

Bismarck, ND 58102-1173

Phone: (800)422-0828

Email: tatkinson@wapa.gov

Appendix E

Wenck

Engineers • Scientists
Business Professionals

Wenck File #2759-04
December 2013

Avian and Bat Protection Plan

Campbell County Wind Farm

Prepared for:

FAGEN ENGINEERING, LLC.
Michael Rutledge
P.O. Box 159
180 8th Avenue
Granite Falls, MN 56241

Prepared by:

WENCK ASSOCIATES, INC.
301 1st Street NE, Suite 202
Mandan, ND 58554
(701) 751-3370

Table of Contents

1.0 Introduction and Corporate Policy

Dakota Plains Energy (Dakota Plains) is planning to develop a wind energy facility in Campbell County, South Dakota (Campbell County Wind Farm (CCWF, Project). The proposed CCWF is located on private land in north-central South Dakota. Wenck Associates, Inc. (Wenck) was contracted by Fagen Engineering to conduct a variety of wildlife surveys associated with building and/or operating the proposed facility, and to write this Avian and Bat Protection Plan (ABPP).

Dakota Plains is committed to its responsibility to be a good steward of the environment and to adhere to federal, state, and local laws and ordinances. Dakota Plains' wind project policy calls for wind projects to be designed, constructed, and operated in an environmentally sensitive manner and, either avoid or minimize potential avian and bat impacts. Dakota Plains understands that even with diligent design, construction and operation activities, avian and bat fatalities may occur, including species that are protected under federal and state laws. As part of this commitment, Dakota Plains has developed an ABPP for the CCWF. The development and application of this ABPP will ensure that:

- All Project-related actions comply with federal and state regulations;
- All Project-related actions comply with permit conditions;
- Project-specific species concerns are included in the ABPP, including avoidance and minimization measures;
- Public and private organizations are included in programs and research that minimize detrimental effects of bird and bat interactions with wind projects.
- The procedures described in this ABPP are followed;
- The Dakota Plains' staff and all relevant subcontractors will receive the appropriate training pursuant to wildlife monitoring and reporting protocols; and,
- The documentation of bird and bat injuries and fatalities may provide the basis for future modifications to the ABPP.

This ABPP continues Dakota Plains' regulatory compliance concerning bird and bat interactions with its wind projects through a proactive approach to reducing risk to birds and bats and their habitats.

1.1 PROJECT DESCRIPTION

The U.S. Department of Energy, Western Area Power Administration's Upper Great Plains Regional Office (Western) received an interconnection request for system access in South Dakota from Dakota Plains Energy. Dakota Plains proposes to develop the Campbell County Wind Farm (CCWF, or Project) located on approximately 8,000 acres (ac; 32.4 square kilometers [km^2]; 12.5 square miles [mi^2]) of private land in western Campbell County, South Dakota (**Figures 1 and 2, Site Location Map and Site Detail Map**, respectively). The Project will have a total of 49 Vestas V100 2-megawatt (MW) turbines with a nameplate of 99 MW. Additional facilities would include a meteorological (met) tower, a collection substation, a switching yard, a construction laydown area, access roads, and electrical collection systems and cabling. All collection lines would be underground. A 230 kilovolt (kV) overhead tie line would be constructed to connect the Project substation with an existing Western transmission line.

1.2 PROJECT SITING

The Project was sited in an area offering low risk for potential environmental impacts (i.e., place turbines in areas previously disturbed through extensive agricultural cultivation, Project situated above and outside of critical habitat of protected species), a good wind resource, close to available transmission capacity and in relatively close proximity to the load center of Minneapolis-St. Paul. This region has also been previously disturbed through extensive agricultural cultivation, minimizing potential negative wildlife impact and corresponding to direction provided by the US Fish and Wildlife Service (USFWS) and many other wildlife agencies (i.e., site projects in previously disturbed areas). Further, to minimize potential negative impacts to wildlife, the Project is situated higher in elevation and outside of critical habitat of protected species who live along the shores of Lake Oahe; collection lines will be buried, length of overhead transmission line ties will be minimized, and turbines will be placed in areas near previously disturbed areas of existing roads, thus minimizing fragmentation of wildlife habitat.

1.3 PROJECT LAYOUT AND ASSOCIATED FACILITIES

1.3.1 Wind Farm Construction Activities

Dakota Plain's proposed Project is anticipated to have a nameplate capacity of approximately 99 MW consisting of 49 Vestas V100 2.0 MW wind turbine generators. Additional facilities include a meteorological (met) tower, a Project collection substation, construction laydown area, access roads, and electrical collection systems with underground cabling. Overhead transmission would be limited to the approximately 1,320 feet of 230-kV overhead tie line to connect the proposed Project substation with an existing transmission line.

Several activities would need to be completed prior to the proposed commercial production date. The majority of the activity would relate to equipment ordering lead-time, as well as design and construction of the facility. Below is a preliminary chronological list of activities necessary to develop the proposed Project. Pre-construction, construction, and post-construction activities for the proposed Project would include:

- Ordering of all necessary components including towers, nacelles, blades, foundations, and transformers;
- Final turbine micrositing;
- Complete survey to microsite locations of structures and roadways;
- Soil borings, testing and analysis for proper foundation design and materials;
- Complete construction of access roads, to be used for construction and maintenance;
- Trenching of underground collection lines;
- Design and construction of the Project substation and 230-kV tie line;
- Design and construction of Western's substation and switching yard
- Installation of tower foundations;
- Installation of underground and aboveground cables and 230-kV tie line;
- Tower placement and wind turbine setting;
- Acceptance testing of facility; and
- Commencement of commercial production date.

The Project area encompasses approximately 12.5 square miles (8,000 acres) south of Pollock, and approximately 8 miles west of Herreid, South Dakota (**Figure 1, Site Location Map**). The proposed Project consists of an array of wind turbines, each with its associated transformer. The Project consists of up to 49 2.0-MW turbines. Each turbine generator will have a hub height of 262 feet and be up to 423 feet tall from the base of the tower to the tip of the upright blade. Turbines would begin operation at wind speeds of 3.0 meters per second (m/s, or 6.7 miles per hour [mph]) and reach their rated capacity (2.0 MW) at a wind speed of 12 m/s (26.8 mph).

The turbines would be connected to the Operations and Maintenance (O&M) facility by an underground fiber optic communication cable and to the collection substation by a power collection cable network. The Project layout includes approximately 24 miles of collection lines connecting turbine arrays to the collector substation located in the southeast corner of the Project area.

Turbine access roads would be built adjacent to the towers, allowing access to the turbines during and after construction. The proposed Project would include approximately 12 linear miles of new service roads. Service roads will be aggregate-surfaced and up to 16 feet wide. Temporary roads required to support crane access to turbines during operation would remain up to 40 feet wide; the Project also includes turbine access roads built 12 feet wide. The specific turbine placement would determine the extent of access roadway that would need to be constructed for the Project.

The collector substation would be connected to the Western Substation Line via approximately 1,320 feet of 230-kV overhead tie line. The Western Substation would be located between towers 79/4 and 80/1 on Western's existing 230 kV line.

A permanent met tower is proposed for the Project. The proposed met tower would be 80 meters (164 feet) high when installed. The tower pole would be 8–10 inches wide and would be secured with several guy wires anchored up to 165 feet away. The guy wires would be marked with diverter balls (for aircraft), which also serve as bird diverters.

During the construction phase, several types of light, medium and heavy-duty construction vehicles would travel to and from the site, as well as private vehicles used by construction personnel. Dakota Plains estimates that there would be approximately 50 additional trips per day in the area during peak construction periods. That volume would occur during the peak time when the majority of the road, foundation and tower assembly are taking place. At the completion of each construction phase this equipment would be removed from the site or reduced in number.

Construction is scheduled to begin in December 2013. Dakota Plains would anticipate testing and operation to begin in late fall of 2014, and commercial operation of the Project to begin producing energy by the end of 2014.

1.3.2 Operations and Maintenance

Once the wind farm is commercially operational, a crew consisting of two to five personnel will service and maintain the wind turbine generators. The primary responsibility of the operations crew is to perform troubleshooting and preventative maintenance. Service crews, consisting of two to three people, troubleshoot non-operational wind turbine generators. Depending on the complexity of the issue, troubleshooting may require a few minutes or several days. Preventative maintenance will be conducted throughout the wind turbine generator lifespan at intervals of six months to a year.

1.4 REGULATORY FRAMEWORK AND SUMMARY OF AGENCY CONSULTATIONS

Avian, bat and raptor surveys were begun voluntarily at the beginning of the permitting process. All pre-construction avian and bat survey results were submitted to the USFWS and South Dakota Game, Fish and Parks Department (SDGFP). A Biological Assessment has recently been submitted and is awaiting concurrence.

This ABPP was ordered from Western as part of the permitting process for the Project. Specifically, Western's biologist stated "A completed ABPP was needed prior to a formal consultation" in an email to the applicant.

1.5 KEY AVIAN AND BAT REGULATIONS

1.5.1 Federal Endangered Species Act

The federal Endangered Species Act (ESA 1973) defines and lists species as "endangered" and "threatened" and provides regulatory protection for the listed species. The federal ESA provides a program for conservation and recovery of threatened and endangered species; it also ensures the conservation of designated critical habitat that the USFWS has determined is required for the survival and recovery of these listed species. Section 9 of the federal ESA prohibits the take of species listed by USFWS as threatened or endangered. Take is defined as follows: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct." In recognition that take cannot always be avoided, Section 10(a) of the federal ESA includes provisions for take that is incidental to, but not the purpose of, otherwise lawful activities. Section 10(a)(1)(B) permits (Incidental Take Permits) may be issued if take is incidental and does not jeopardize the survival and recovery of the species.

Section 7(a)(2) of the federal ESA requires that all federal agencies, including the USFWS, evaluate projects with respect to any species proposed for listing or already listed as endangered or threatened and any proposed or designated critical habitat for the species. Federal agencies are prohibited from authorizing, funding, or carrying out any action that will jeopardize the continued existence of a listed species or destroy or modify its critical habitat. As defined in the federal ESA, individuals, organizations, states, local governments, and other non-federal entities are affected by the designation of critical habitat only if their actions occur on federal lands; require a federal permit, license, or other authorization, or involve federal funding (ESA 1973).

1.5.2 Bald and Golden Eagle Protection Act

The federal Bald and Golden Eagle Protection Act of 1940 (BGEPA; 16 USC 668–668c, as amended) is administered by the USFWS and was enacted to protect bald and golden eagles, their nests, eggs, and parts (e.g., feathers or talons). The BGEPA states that no person shall take, possess, sell, purchase, barter, offer for sale, purchase or barter, transport, export, or import any bald or golden eagle alive or dead, or any part, nest or egg without a valid permit to do so (USFWS, n.d). The BGEPA also prohibits the take of bald and golden eagles unless pursuant to regulations. Take is defined by the BGEPA as an action "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." Disturb is defined in the BGEPA as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (USFWS, n.d.). In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles were not present. Permits are issued to Native Americans to possess eagle feathers for religious purposes, and salvaged eagle carcasses can be sent to the National Eagle Repository in Colorado where they are redistributed to Native Americans. This effort is coordinated by a local USFWS office. Although the bald eagle was removed from the Endangered Species List in June 2007, it is still federally protected under the BGEPA and Migratory Bird Treaty Act as described in the following section. In addition, the *National Bald Eagle Management Guidelines* were published in conjunction with delisting by the USFWS in May 2007 to provide provisions to continue to protect bald eagles from harmful actions and impacts.

Under the BGEPA, a final rule was published in May 2008, in the Federal Register (FR) that proposed authorization for take of bald eagles for those with existing authorization under the federal ESA where the bald eagle is covered in a Habitat Conservation Plan (HCP) or the golden eagle is covered as a non-listed species. The final rule also established a new permit category to provide expedited permits to entities authorized to take bald eagles through Section 7 incidental take permits. A proposed rule will later address authorization of take of (1) disturbance-type take of bald and golden eagles due to otherwise lawful activities and (2) eagle nests in rare cases where their location poses a risk to human safety or the eagles themselves.

In 2009, the USFWS issued a final rule on new permit regulations that would allow some disturbance of eagles "in the course of conducting lawful activities" (74 FR 46836–46879). USFWS's description of its 2009 rule suggests that physical take of an eagle will only be authorized if every avoidance measure has been exhausted. Removal of nests will still generally be permitted only in cases where the nest poses a threat to human health, or where the removal would protect eagles. Explanations of the rule on USFWS's website specify that take permits may be issued when "necessary for the protection of…other interests in any particular locality" (USFWS 2009). The discussion expands the definition of such public and private interests to include utility infrastructure development and maintenance. The website states that due to concerns about population declines, permits for take of golden eagles are likely to be restricted throughout the eagle's range (USFWS 2009). Considerations for issuing take permits include the health of the local and regional eagle populations, availability of suitable nesting and foraging habitat for any displaced eagles, and whether the take and associated mitigation provides a net benefit to eagles (74 FR 46836–46879, USFWS 2009). In April 2013, USFWS issued *Eagle Conservation Plan Guidance Module 1: Land-based Wind Energy (Version 2)* to address these new regulatory matters (USFWS 2013).

1.5.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) makes it unlawful to pursue, capture, kill, or possess any migratory bird or part, nest, or egg of any such bird listed in wildlife protection treaties between the United States, Great Britain, Mexico, Japan, and Russia (and other countries of the former Soviet Union). Most birds (outside of introduced species and non-migratory game birds) within the US and the Project area are protected under the MBTA. The birds, occupied nests and the contents of the nest (eggs or chicks) within the Project property are afforded protection pursuant to the MBTA. Unlike ESA and BGEPA, no permits are available to authorize incidental take of birds under the MBTA. Due to the potential for resident and migratory birds within the Project, development of this ABPP was done to assist in complying with the MBTA.

1.5.4 State Threatened and Endangered Species Laws

According to several laws and regulations written by the South Dakota Legislature (2013), the SDGFP shall conduct investigation on nongame, endangered, or threatened wildlife to develop information relating to population, distribution, habitat needs, limiting factors, and other biological and ecological data to determine management measures necessary to ensure their perpetuation as viable components of their ecosystem and for human enjoyment. The SDGFP shall promulgate a list of those species of wildlife which are determined to be endangered or threatened within the state. The SDGFP shall make these determinations on the basis of the best scientific, commercial, and other data available to them and after consultation, as appropriate, with federal agencies, other interested state agencies, other states having a common interest in the species and interested persons and organizations. The SDGFP and the Department of Agriculture shall perform those acts necessary for the conservation, management, protection, restoration, and propagation of endangered, threatened, and nongame species of wildlife. No person may take, possess, transport, import, export, process, sell, or offer for sale, buy, or offer to buy, nor may a common or contract carrier transport or receive for shipment, any species of wildlife or plants appearing on the following lists: The list of wildlife and plants indigenous to the state determined to be endangered or threatened within the state, The US list of endangered or threatened native wildlife, The US list of endangered or threatened foreign wildlife, and The US list of endangered or threatened plants.

No bat species are listed on the threatened, endangered, and candidate species of South Dakota (SDGFP 2012). Several bird species are listed on the threatened, endangered, and candidate species list (SDGFP 2012). These species include the American dipper (*Cinclus mexicanus*, State Threatened), bald eagle (*Haliaeetus leucocephalus*, State Threatened), Eskimo curlew (*Numenius borealis*, Federal and State Endangered), Interior least tern (*Sterna antillarum athalassos*, Federal and State Endangered), osprey (*Pandion haliaetus*, State Threatened), peregrine falcon (*Falco peregrinus*, State Endangered), piping plover (*Charadrius melodus*, Federal and State Threatened), whooping crane (*Grus americana*, Federal and State Endangered), greater sage grouse (*Centrocercus urophasianus*, Federal Candidate), and Sprague's pipit (*Anthus spragueii*, Federal Candidate).

2.0 Pre-Construction Site Specific Wildlife Surveys and Risk Assessments

2.1 VEGETATION TYPES

The Project area studied for avian use, raptor nests, bat use is approximately 8,000 acres (**Figure 2, Site Detail Map**). The Project lies within two Level IV Ecoregions, Southern Missouri Coteau Slope and River Breaks (Bryce et al. 1996). The Southern Missouri Coteau Slope ecoregion differs from the Missouri Coteau Slope to the north; it has mesic soils rather than frigid soils and a substantial cap of rock-free loess. To the south, the coteau areas east of the Coteau Slope ecoregions become progressively narrower and more eroded. The levels to rolling uplands of the Southern Missouri Coteau Slope are planted in sunflowers, wheat, millet, and barley. Corn is a marginal crop that does well in wet years. The stream drainages tend to be grazed. Willows, green ash, and elm grow in the riparian areas. The River Breaks ecoregion form broken terraces and uplands that descend to the Missouri River and its major tributaries. They have formed particularly in soft, easily erodible strata, such as Pierre shale. The dissected topography, wooded draws, and uncultivated areas provide a haven for wildlife. Riparian gallery forests of cottonwood and green ash persist along major tributaries such as the Moreau and Cheyenne rivers, but they have largely been eliminated along the Missouri River by impoundments.

The approximately 8,000 acre CCWF is dominated by grassland and agricultural habitats (USDA 2008). See **Table 1, Vegetation Cover Types with the Campbell County Wind Farm and Figure 3, Land Cover Map**.

Table 1. Vegetation Cover Types within the Campbell County Wind Farm.

Land Cover Class	Area (acres)	Percent (%) of Project Area
Agriculture	2,890	36.13%
Forest	17	0.21%
Grassland	4,718	58.99%
Urban/Developed	359	4.49%
Wetlands	14	0.18%
Total	**7,998**	**100.00%**

Source: US Department of Agricultural Statistical Service (NASS) 2008 data coverage for landcover types.

2.2 AVIAN USE SURVEYS

Wenck Associates, Inc. was contracted by Fagen Engineering, LLC to conduct several avian and bat studies. The data from these studies were used to identify species, species groups or species of concern that are present in the project area and that may be at a higher risk of mortality and/or displacement. Passerine species have been the most abundant bird fatality at wind energy facilities outside California (Erickson et al. 2001 and Erickson et al. 2002), often comprising more than 80% of the bird fatalities. Both migrant and resident passerine fatalities have been observed (Erickson et al. 2001 and Erickson et al. 2002). Data are presented in several categories, and highlight federally listed species, state listed species, and species of concern (See **Avian Surveys-Campbell County Wind Farm 2010 and 2012**, available at Fagen Engineering).

2.2.1 Diurnal Fixed-Point and Incidental Avian Use

Avian surveys focus on inventory and monitoring with specific objectives that include: 1) an inventory of bird species in a specific project area; 2) determining the relative abundance of species; and 3) monitoring seasonal changes in species composition and relative abundance (Whitworth et al. 2007). Diurnal fixed-point surveys are one of the most common methods used to determine avian composition and abundance. Point counts not only focus on visual cues but also on auditory cues to give the observer an advantage in rough terrain. For some species, vocal cues may be the only reliable means of detection (Whitworth et al. 2007).

Avian point count surveys were conducted weekly in the Spring 2010 (March 31-June 20) and Fall 2010 (August 17-November 2); and Winter 2011-2012 (December 2011 to February 2012), Spring 2012 (March 2012 to June 2012) and Fall 2012 (August 2012 to November 2012).

Survey data was used to evaluate avian use, behavior, and species composition during Spring and Fall migration and to determine Summer resident species at the CCWF.

Point counts were selected to capture a diverse range of habitats and at locations with the best possible viewshed. Sixteen PC locations were utilized in 2010 and seven were utilized in 2012 (**Figures 4 and 5, 2010 Project Area and Point Count Locations and 2012 Project Area and Point Count Locations**, respectively).

All observations within an 800-meter radius at each point count were recorded; any observations outside the 800-meter radius were considered incidental. Each PC survey lasted for 20 minutes; all audio and visual observations were recorded. Surveys were conducted by an experience ornithologist. Surveys were rotated to cover all daylight hours to ensure each PC was surveyed at various times of the day. Data recorded for each observation included species, number of individuals, time, height above ground, behavior, and flight direction. A range finder and topographic maps were used as references to determine bird distances to the observer and flight heights. Birds not easily identifiable due to low light conditions and distance were identified to the lowest taxonomic level possible.

Twenty-minute survey periods provide adequate time to detect both raptors and non-raptors. Double counting may occur during the 20-minute survey because individuals may appear and disappear from view. Double-counting of birds is not problematic for this type of survey because the objective is to document use in terms of number of birds noted per 20-minute survey, not number of distinct individual birds.

The ability to detect all species within the 800-meter survey radius varies among species and potentially not all individuals within the survey area are counted. This variation in detectability results in an overestimate of mean use in conspicuous species and an underestimate of mean use in reclusive species (Thompson 2002).

Incidental avian surveys are used to obtain bird distribution and composition information between point count locations. Larger birds, such as game birds, raptors, and waterfowl, large flocks of smaller birds, and birds that are a rarity in the area are typically recorded during incidental surveys.

Incidental observations included observations that occurred while traveling between PC locations, pre-and post-PC survey time period, and outside the 800-meter radius circular plot. These observations were recorded but not used in the formal analysis.

Flight behavior was evaluated by calculating the proportion of flying birds that were observed flying below, within, or above the turbine RSA. Fagen Engineering is proposing turbines with a hub height of 80 meters with a 77 meter diameter RSA. Therefore, an RSA between 41.5 and 118.5 meters above the ground was used.

The encounter rate is the rate in which a species was observed flying through the RSA during the avian point count surveys at the CCWF project area and suggests potential mortality risk from flight behavior.

To estimate the rate at which a species flies through the RSA, the following equation was applied to every species observed in the CCWF:

Encounter Rate = A*P*f**P*t*

- A is the mean use of birds/20 minutes for a given species
- P*f* is the proportion of all activity observations for a given species that were flying
- P*t* is the proportion of flying observations that were within the turbine RSA

The encounter rate index is relative to the observations of species during the surveys and within the study area and cannot be extrapolated to the species that may use the CCWF in the future. The encounter rate index from this study does not take into consideration behavior (e.g. foraging, courtship), habitat use, and turbine avoidance differences between species.

Raptor Use and Encounter Rate – 2010

During the Spring 2010 survey, 135 individual raptors were observed for a mean use of 0.70 raptors/20 min, compared to the Fall 2010 survey where 77 raptor observations were made for a mean use of 0.40 raptors/20 min.

The raptor annual mean use rate at CCWF of 0.55 raptors/20 min (combining Spring and Fall values) was compared with 37 other wind energy facilities that implemented similar protocols. The raptor annual mean use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/20 min survey. Based on the results from these wind energy facilities, as summarized by Derby et al. 2010, a ranking of seasonal raptor mean use was developed: low (0-0.5 raptors/20 min. survey); low to moderate (0.5-1.0 raptors/20 min); moderate (1.0-2.0 raptors/20 min); high (2.0-3.0 raptors/20 min); and very high (> 3.0 raptors/20 min). Under this ranking, mean raptor use at the CCWF is considered to be low to moderate. The annual raptor use at CCWF would rank 11th compared to 37 other wind-energy facilities (Derby et al. 2010).

Raptor encounter rates of 0.29 individuals flying within the RSA/20 min during the Spring 2010 survey and 0.21 individuals flying within the RSA/20 min during the Fall 2010 survey was low at CCWF. Fifty-three (53) percent of all raptor observations were within the RSA. The Spring and Fall 2010 surveys altogether, had an annual raptor encounter rate of 0.25 flying within the RSA/20 min. The highest raptor encounter rate was red-tailed hawk with 0.16 individuals (Spring) flying within the RSA/20 min. Turkey vultures were second with an encounter rate of

0.05 individuals (Spring and Fall) flying within the RSA/20 min. The Spring and Fall and annual raptor encounter rate calculated is relatively low, however the percentage of raptor observations within the RSA during the spring and fall surveys and the low to moderate annual mean use rate (raptors/20 minutes) shows potential for mortality at CCWF.

High numbers of raptor fatalities have been documented at wind-energy facilities (e.g. Alamont Pass), however other studies at wind-energy facilities in the United States suggest that 3.2% of the total casualties were raptors (Erickson et al. 2001). Results from Alamont Pass in California suggest that species mortality is not all related to abundance (Orloff and Flanery 1992). Golden eagles, red-tailed hawks and American kestrels were casualties more often than predicted based on abundance. Based on species occurrence/abundance within CCWF, red-tailed hawk and turkey vultures may constitute the highest proportion of raptor fatalities at CCWF.

At CCWF, the raptor species with the highest encounter rate indices were red-tailed hawk and turkey vulture.

Non-raptor Use and Encounter Rate – 2010

Passerines make up a large proportion of the birds observed during the Spring and Fall 2010 avian surveys at CCWF and would be expected to make up the largest proportion of fatalities at the CCWF. Encounter rate indices for both spring and fall PC surveys indicate that unidentified blackbirds and Franklin's gulls are likely to be exposed to collisions from wind turbines at CCWF. There were other passerine and waterfowl species that flew through the RSA during Spring and Fall PC surveys, but encounter rates are not high enough to warrant significant collision exposure.

Raptor Use and Encounter Rate – 2012

Avian point count (PC) surveys were conducted in Winter 2011-2012 (December 2011 to February 2012), Spring 2012 (March 2012 to June 2012) and Fall 2012 (August 2012 to November 2012) to capture migrating and resident species at the CCWF. Diurnal fixed-point count surveys were conducted at seven circular plots.

During the Winter 2011-2012 survey, 18 individual raptors were observed for a mean use of 0.43 raptors/20 min; during the Spring 2012 survey 86 individual raptors were observed for a mean use of 0.95 raptors/20 min; and during the Fall 2012 survey 56 individual raptor observations were made for a mean use of 0.62 raptors/20 min.

The overall raptor mean use rate at the CCWF was 0.71 raptors/20 min (Winter 2011-2012, Spring 2012 and Fall 2012). This rate was compared to a study of 37 other wind energy facilities that implemented similar protocols. The raptor annual mean use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/20 min survey. Based on the results from these wind energy facilities, as summarized by Derby et al. (2010), a ranking of seasonal raptor mean use was developed: low (0-0.5 raptors/20 min. survey); low to moderate (0.5-1.0 raptors/20 min); moderate (1.0-2.0 raptors/20 min); high (2.0-3.0 raptors/20 min); and very high (> 3.0 raptors/20 min). Under this ranking, mean raptor use at the CCWF is considered to be low to moderate.

Encounter rate analysis may also suggest which species may be at risk to become turbine casualties. The encounter rate is an index and only considers probability of exposure based on abundance, number of individuals flying, and flight height of each species within the rotor sweet area (RSA) for turbines to be used at the wind-energy facility.

Raptor encounter rates at the CCWF are considered low, with 0.07 individuals flying within the RSA/20 min during the Winter 2011-2012 survey, 0.00 individuals flying within the RSA/20 min during the Spring 2012 survey and 0.04 individuals flying within the RSA/20 min during the Spring 2012 survey. Approximately 6.4 percent of all raptor observations were within the RSA. The highest raptor encounter rate was golden eagle with 0.05 individuals flying within the RSA/20 min during the Winter 2011-2012 survey. Red-tailed hawk was second with an encounter rate of 0.04 individuals flying within the RSA/20 min during the Fall 2012 survey. The Winter 2011-2012, Spring 2012, Fall 2012 and annual raptor encounter rate is relatively low, and the percentage of raptor observations within the RSA during the surveys and the low to moderate annual mean use rate (raptors/20 minutes) indicates a low potential for mortality at the CCWF.

Golden eagles, red-tailed hawks and American kestrels were casualties more often than predicted based on abundance. Based on species occurrence/abundance within the CCWF, golden eagles and red-tailed hawks may constitute the highest proportion of potential raptor fatalities.

Few raptor species that have been identified as nesting at wind energy facilities have been observed as fatalities at wind energy facilities (Derby et al. 2010); therefore, the relationship is low between the number of collision fatalities and raptor nests within or near project facilities. However, it is assumed that raptors nesting close to turbines would likely have a greater chance of being impacted from collision with turbines, though the data is not available at this time to determine the impact (Derby et al. 2010).

Non-raptor Use and Encounter Rate – 2012

Passerines make up a large proportion of the birds observed during the avian surveys at the CCWF and would be expected to make up the largest proportion of fatalities. Encounter rate indices for both Winter 2011-2012 and Spring 2012 PC surveys indicate that the Lapland longspur is likely to be exposed to collisions from wind turbines at the CCWF. There were other species that flew through the RSA during the PC surveys, but encounter rates were not high enough to warrant significant collision exposure.

Sensitive Species

A total of 11 sensitive species were recorded during the Spring and Fall 2010 PC and incidental surveys. This included a state endangered species, peregrine falcon (*Falco peregrinis;* one individual), and a state threatened species, bald eagle (one individual). Nine (9) state sensitive species were also observed at the CCWF, bobolink (*Dolichonyx orysivorus;*199 individuals), marbled godwit (*Limosa fedoa;* 23 individuals), Swainson's hawk (11 individuals), burrowing owl (nine individuals), dicksissel (*Spiza americana;* six individuals), golden eagle (three individuals), Loggerhead shrike (*Lanius ludovicianus;* two individuals), and long-billed curlew (*Numenius americanus;* two individuals).

A total of 12 sensitive avian species of concern for South Dakota were recorded during the Winter 2011-2012, Spring 2012 and Fall 2012 PC and incidental surveys. This included the great blue heron (*Ardea herodias*) (12 individuals), bufflehead (*Bucephala albeola*) (8 individuals), hooded merganser (*Lophodytes cucullatus*) (1 individual), bald eagle (*Haliaeetus leucocephalus*) (2 individuals), sharp-shinned hawk (*Accipiter striatus*) (1 individual), Cooper's hawk (*Accipiter cooperii*) (2 individuals), broad-winged hawk (*Buteo platypterus*) (3 individuals), Swainson's hawk (*Buteo swainsoni*) (19 individuals), Ferruginous hawk (*Buteo regalis*) (8 individuals), golden eagle (*Aquila chrysaetos*) (5 individuals), merlin (*Falco columbarius*) (2 individuals) and prairie falcon (*Falco mexicanus*) (2 individuals).

2.2.2 Raptor Nest Surveys

Raptors spend much of their time hunting and soaring within elevation ranges that correspond to the wind turbine rotor-sweep-area (RSA), making them susceptible to turbine blades (Erickson et al. 2002). Because raptors are long-lived species with low reproduction rates, potential population impacts from collision-related mortality are of concern (Erickson et al. 2002). Although specific studies are lacking, adults and recently fledged young could be at particular risk of collision with turbines because of their higher use of areas near nest sites. Adult raptors often fly near nest sites during the breeding season to attend to young and deliver prey. After young raptors fledge, fledglings often spend significant amounts of time flying and roosting near nest locations until they become capable flyers and hunters. Additionally, construction activities near active nests during the breeding season may potentially result in disturbance or abandonment of nest sites.

Few raptor species that have been identified as nesting at wind energy facilities have been observed as fatalities at wind-energy facilities (Derby et al. 2010), therefore, the relationship is very low between the number of collision fatalities and raptor nests within or near project facilities. However, it is assumed that raptors nesting close to turbines would likely have a greater chance of being impacted from collision with turbines, but the data is not available at this time to determine the impact (Derby et al. 2010).

A raptor nest survey was conducted to locate raptor nests and determine nest activity status and the species using those nests. The initial surveys were conducted in early April 2010 and 2012, before trees leafed out, to locate nests and to identify early breeding species. The project area and a 1-mile buffer area were surveyed from a vehicle using binoculars and spotting scopes. All raptor nest locations were documented with Global Positioning System (GPS) coordinates. Raptor species, height of nest, nest activity status, nest condition, substrate, and other relevant data were recorded for each nest. An additional visit was conducted in May 2012 to document the activity status of nests located during the initial survey and to identify nesting attempts by late nesting raptors such as Swainson's hawks. Raptors may use nests intermittently among years as well as re-nest after a nest failure; therefore, early and late-season nest surveys allow for a more accurate summary of breeding raptors.

Seventeen (17) raptor nests were observed and mapped within CCWF in 2010. Fifteen of the nests were red-tailed hawk (eleven active, four inactive), one unknown (inactive) and one active Swainson's hawk nest. Eleven raptor nests were located within the survey area in 2012. Two species of nesting raptors were identified: red-tailed hawk and Swainson's hawk. Nesting substrates were limited to trees or bushes associated with unoccupied and occupied farm yards. No cliff or bluff nesting substrate exists in the survey area. Prey base habitat appeared limited because of the fragmented landscape which consists mostly of agricultural land.

Raptor nest density within CCWF and within one mile of the boundary of CCWF was 0.54 nests per square mile during the 2010 surveys. Raptor nest density within the CCWF and within one mile of the project boundary was one nest per 4.0 square miles during the 2012 surveys.

2.2.3 Sharp-tailed Grouse Lek Surveys

The sharp-tailed grouse inhabits steppe, grassland and mixed grass habitats. Sharp-tailed grouse require grasslands with residual cover for nesting and utilize agricultural areas seasonally for food. Males congregate on communal display grounds called leks, which are often located on a knoll or ridge, beginning in early spring and extending into June. Sharp-tailed grouse serve as indicators of grassland ecosystem health and provide recreational and aesthetic value.

Native prairie is used by sharp-tailed grouse for seasonal habitat needs such as lekking, nesting, brood rearing, and wintering. The area surrounding the lek site contains habitat for reproduction and year round survival of sharp-tailed grouse. Loss of native prairie may affect the availability of habitat for grouse lekking and reproduction. Concerns that sharp-tailed grouse may avoid nesting near human-made structures have heightened this issue for siting wind farms (Pittman et al. 2005). Establishing new roads in areas of native prairie increases habitat fragmentation and could provide better access for nesting predators such as skunks, raccoons, coyotes and feral cats. These animals are predators of sharp-tailed grouse nests and reproductive success could be reduced if native prairie areas are more accessible to predators.

Sharp-tailed grouse surveys were conducted in early April through early May 2010 and 2012, from ½-hour before sunrise to two hours after sunrise. Peak attendance by females on leks typically occurs from April 15 to 25, but these dates vary by up to a week depending on weather conditions (Schroeder and Robb 1993). Listening stops were made throughout the project area and within 1-mile from the project boundary to identify lek locations. Sharp-tailed grouse males may be heard at a distance of up to 0.5 mile. Listening stops were not conducted if winds exceeded 10 miles per hour (mph) or during precipitation events. After a lek was located, the birds were observed and the number of males and females were counted. Lek locations were documented using Global Positioning System (GPS) coordinates. Given the sensitive nature of this species, and the fact that females may be nesting near the lek, disturbance to breeding prairie grouse was kept to a minimum.

Three known sharp-tailed grouse leks were located within the surrounding area in 2010 and 2012; none of these leks were located within the project area (**Figures 6 and 7, 2010 Raptor Nest and Sharp-tailed Grouse Lek Locations and 2012 Raptor Nest and Sharp-tailed Grouse Lek Locations**, respectively).

2.2.4 Whooping Crane Surveys

The whooping crane (*Grus americana*) is a federally listed endangered species. Whooping crane injury or death caused by any wind energy project would be considered “take” under the Endangered Species Act. Avoidance of habitat by the cranes due to the construction and operation of turbines can be considered habitat loss and “take” under ESA.

It is unknown how whooping cranes would respond to the presence of wind turbines. Avoidance of wind farms by whooping cranes may reduce the probability of collision, but could amount to loss of stopover habitat. The construction and operation of wind turbines could result in direct mortality from collision with the turbines or by avoidance of habitat in areas where turbines are located.

Power lines located in the vicinity of foraging or roosting habitat pose a threat to whooping cranes due to individual birds often flying at low altitudes (33 to 49 feet above ground) when moving among foraging and roosting sites (Canadian Wildlife Service and United States Fish and Wildlife Service 2005, Stehn and Wassenich 2006). Since 1956, at least 46 whooping cranes have been killed or seriously injured as a result of collisions with power lines (Stehn and Wassenich 2006).

The U.S. Fish & Wildlife Service (USFWS) has expressed concern over potential impacts to whooping cranes. The whooping crane migrates through South Dakota during spring and fall, within a corridor that is roughly 200-miles wide; the CCWF falls within the center of the corridor where 75% of South Dakota's whooping crane reported sittings have been recorded (**Figure 8, Whooping Crane Migration Corridor**).

Whooping crane stopover habitat in South Dakota is variable, but can be described as wetlands (roosting areas) that are greater than ¼ acre in size with water depths in the range of five to eight inches with minimal surrounding vegetation. Harvested cereal grain fields in close proximity to wetlands are used for foraging by whooping cranes; however cranes will also forage in wetlands and other crops such as alfalfa. See the "Avian Survey-Campbell County Wind Farm" submitted January of 2011 for the whooping crane attractiveness of the Campbell County Wind Farm and surrounding area.

The probability of whooping crane collisions with turbines on the CCWF is unknown. However, the sporadic nature of stopovers within the 2,500 mile long by 200-mile wide migration corridor, and the small size of the proposed CCWF, the probability of whooping crane collisions is presumed to be low.

Sandhill/Whooping crane surveys were conducted between early April and the end of April 2010 and again from early October to early November 2010 and between early April and late April 2012 and again from early October to early November 2012, when the highest numbers of cranes are expected to occur in the project area (USFWS 2007b). Sandhill/Whooping crane surveys were conducted by driving a vehicle along the roads within the project area. Stops were made at good vantage points and the biologist glassed and listened for the presence of cranes. On calm mornings sandhill cranes may be heard at a distance of 2.5 miles (Tacha et al. 1992). Each stop consisted of listening and using binoculars and/or spotting scopes to scan the surrounding terrain to visually identify sandhill and/or whooping cranes. Listening stops were conducted at, but not limited to, established avian point count locations. Stops were not conducted during excessively harsh weather conditions.

No whooping cranes were observed during the study, however several groups of sandhill cranes were observed during the Spring and Fall PC surveys.

2.3 ACOUSTIC BAT SURVEYS

Eco-Tech Consultants, Inc. (ETC) initiated surveys in August 2010 designed to assess bat use within the proposed Campbell County Wind Farm, South Dakota. Acoustic surveys for bats using Anabat® SD-2 ultrasonic detectors at two MET towers at 2 m and 45 m microphone heights were conducted from August 18 to October 24, 2010. The objective of the surveys was to estimate the seasonal and spatial use of the study area by bats, as well as to estimate total bat activity, defined here as number of bat passes. In total, 379 bat passes were recorded during 264 detector nights. Averaging bat passes across locations, we detected a mean of 1.4 bat passes per detector-night, with a range of 0 to 59 total passes per night.

Total bat activity peaked in late August and no passes were recorded after October 11. Bat activity appears to have come predominately from low frequency (<30 kHz) bats (72% of passes). This species group is comprised of big brown bats, hoary bats and silver-haired bats. Bats with echolocation calls in the <30 kHz range, especially silver-haired and hoary bats, have comprised the majority of fatalities at other wind power projects. Passes by medium frequency (MF) and high-frequency (HF) bats totaled 11% and 16% respectively. Red bats, whose calls typically are 30-40 kHz, have predominated fatalities at some eastern wind energy projects. This species appears to have a limited presence within the project area.

The mean number of bat passes per detector per night was compared to existing data at other wind energy facilities from the region where both bat activity and mortality levels have been measured. The level of bat activity documented at the Campbell County Wind Farm was lower than all other published results. Assuming that the general relationship between bat activity and bat mortality observed at these sites is broadly applicable to other locations, we expect that levels of turbine-related bat mortality at the Campbell County Wind Farm will be on the lower end of the spectrum, and on par with others from the region. Assuming that activity patterns by bats are relatively consistent from year to year, we expect most fatalities to occur from mid- August to mid-September.

3.0 Construction Phase Wildlife Measures

3.1 CONSTRUCTION TIMING

Project construction will commence in Winter 2013-2014. Testing and operation will begin in late Fall 2014. Energy production will begin in late 2014. It is anticipated that the majority of the turbines will be placed in agricultural fields, thus minimizing or eliminating most construction related wildlife impacts. Starting construction activities during the Fall and Winter will help minimize potential direct and indirect impacts.

3.2 AVOIDANCE OF NATIVE LANDSCAPES

It is anticipated the majority of the Project will not be constructed in native landscapes (native prairie or wetlands); therefore minimal impacts to these habitats will incur.

3.2.1 Sharp-tailed Grouse

Although the SDGFP does not mandate specific distances turbines should be constructed from leks, they recommend a No Surface Occupancy (NSO) setback of 1.0 mile from leks in which no turbines should be constructed (**Figure 7, 2012 Raptor Nest and Sharp-tailed Grouse Lek Locations**). They also recommend a timing limitation from March 1st to June 30th, within a distance of 2.0 miles, in order to protect leks and nests. No activity/construction within this buffer during this time is recommended. It is also recommended to avoid placing wind developments in large, contiguous blocks of grassland. Blocks are considered fragmented by any human-derived feature (e.g., agricultural uses, fences, transmission lines, roads, burned areas) that subdivides them. Maintaining habitat connectivity between leks is important because both males and females use multiple leks throughout the breeding season. Setbacks from leks would help further minimize any potential displacement impacts to sharp-tailed grouse.

3.3 RAPTOR NEST AND EAGLE NEST SURVEYS

Concerns have been raised regarding potential impacts of construction activities on eagles as this Project is situated approximately two miles east of the Lake Oahe/Missouri River. Though there were no eagle nests that were observed during pre-construction avian surveys, a raptor and eagle nest survey will be conducted to locate raptor and eagle nests and determine nest activity status and the species using those nests. The initial surveys will be conducted as near February 15 and continue until leaf out, to locate nests and to identify early breeding species. The Project area and a 1-mile buffer area will be surveyed from a vehicle using binoculars and spotting scopes. All raptor and eagle nest locations will be documented with Global Positioning System (GPS) coordinates. Raptor species, height of nest, nest activity status, nest condition, substrate, and other relevant data will be recorded for each nest.

If an eagle nest is found, USFWS will be contacted immediately and construction activities will be halted until an agreement with USFWS can be attained as to when construction activities can resume.

Should eagle nests be identified, a biological monitor will survey the Project area if construction occurs between February 15 and August 15 for 2 days per week, 8 hours per day. Monitors will document flight paths, flight heights, flight directions, and record nesting activities.

In addition, if the biological monitor documents direct displacement of eagles by wind facility construction, the site manager will be immediately notified and construction will be halted until the birds return to their normal patterns. Construction will be halted until normal eagle behavior is observed again or for one day, whichever is longer. The USFWS will be contacted if disturbance is documented and construction is halted. A specific plan of action for shut down and restarting will be determined in consultation with the USFWS that considers the site characteristics and construction levels at the time of disturbances (i.e., if five pieces of machinery were being used and the eagles were disturbed, fewer machines may be used to lower the noise and other disturbance levels).

3.4 CONSTRUCTION PERSONNEL TRAINING

All construction personnel will be trained to identify potential wildlife conflict situations and conduct proper responses. This training will include sensitivity to nesting birds and other wildlife that may be encountered. For example, if an unknown raptor nest is encountered by construction personnel, they will be instructed to stop work in the area and contact the biological monitor. The biological monitor will assess the situation and work with construction personnel to implement a plan for continuing construction to avoid impact to the nest. If other wildlife resources are encountered, a similar course of action will be followed; construction will cease until the biological monitor can determine an appropriate plan to allow construction to continue without causing an impact.

A trained biologist will conduct the training and work with Dakota Plains to develop the communications plan. The training and communications plan will be developed prior to any construction activities.

If roosting, foraging, or in-flight whooping cranes are observed within one mile of the project site, construction/operation should cease until the U.S. Fish and Wildlife Service (USFWS) is contacted within 24 hours, or the next business day, whichever comes first, in order to evaluate the level of disturbance risk to the individuals present within the vicinity of the project area. The South Dakota USFWS can be contacted at (605) 224-8693. Following coordination with the USFWS, activities will resume if it is unlikely the birds will be disturbed by the continuation of the activities or after the bird(s) relocate to a new site beyond the disturbance area of the project site.

4.0 Operations Phase Wildlife Measures

Once the Project is constructed, monitoring will occur to determine direct impacts of the facility on birds and bats. Monitoring will be designed to determine if actual fatality rates are realized as predicted.

4.1 POST-CONSTRUCTION FATALITY MONITORING FOR BIRDS AND BATS

Post-construction fatality monitoring for avian and bat species will be conducted to determine impacts to species from the operation of the Project. These studies will provide data for development of an adaptive management strategy. Impacts to avian and bat species are anticipated to be similar to other Midwestern wind farms (National Wind Coordinating Collaborative, NWCC 2010). The overall purpose of the monitoring will be to determine if the avian or bat fatality rates are lower, similar to, or higher than other regional and national studies.

Qualified biologists will conduct the post-construction fatality surveys for one year following the commercial operations date. Parameters used for the studies will be consistent with avian and bat mortality monitoring studies completed at other wind farms. Study results will be compiled into a final report by biologists conducting the surveys and will be supplied to the wind farm owners, operators, USFWS, SDGFP and Western Area Power Administration (Western).

4.1.1 Monitoring Protocol

Final maps of wind turbine arrays will assist qualified biologists to select a subset (~13) of the 49 turbines to be sampled for mortality surveys, starting once CCWF is operational. The selected turbines to be sampled will be distributed across the CCWF in different habitats and viewsheds. Searches will be conducted every other week from March 1 through October 31 and once per month from November 1 through February 28. This schedule results in approximately 20 surveys for the one year following operation. An area extending 200 m square will be traversed on transects spaced every 10 m where accessible. In areas where portions of the survey square are inaccessible, a circle survey directly around the turbine and its access road will be surveyed for mortalities. Exact survey methods will be established prior to implementation of surveys but will follow guidance from other survey efforts from across the Midwest. Protocols for fatality monitoring will be provided to the USFWS, SDGFP and Western prior to implementing the monitoring efforts. Any additional fatality monitoring specific to eagles beyond the initial bird and bat monitoring will necessitate a change in methods. A monitoring effort specific to eagles will result in a decrease in survey timing and transect spacing as eagles are more persistent and larger.

4.1.2 Searcher Efficiency Trials

The objective of searcher efficiency trials is to determine the percentage of carcasses found by searchers. Results of these trials are used to adjust annual fatality rate estimates for detection bias. These trials will be conducted throughout the year. A minimum of 52 carcasses will be used for each year of trials. Approximately 20 trials will be conducted to overlap with timing of the searcher efficiency trials. Thirteen of the 49 turbines will be sampled. Carcasses will be randomly placed on turbine plots. Placement of carcasses will be recorded with a handheld GPS unit and will be discretely marked (e.g., with thread tied around one leg) to ensure that the carcass can be identified as part of the efficiency trial. Carcasses will include large and small birds and bats to best represent species that may be encountered in the field.

4.1.3 Carcass Removal Trials

The objective of carcass removal trails is to estimate the average length of time a carcass remains in the study area and is available for detection. The results of these trials will be used to adjust estimates of annual fatality rates for removal bias. Removal trials will be conducted a total of three times (once during the Spring, Summer, and Fall seasons) throughout the year and a minimum of 52 bird and bat carcasses will be used during each monitoring year. Carcasses will be placed in random positions under turbines and checked on a daily basis for the first four days after placement then on day 7, 10, 14, 21, 30, and 40. At the end of each trial, all remains will be removed.

4.1.4 Reporting

Complete reporting of avian and bat fatality monitoring and estimated fatality rates will occur at the end of each monitoring year. The reports will include turbine specific information on found causalities along with an estimated fatality rate for birds and bats. Fatality estimates will be calculated for bats, all birds, small birds, large birds, and raptors. Seasonal estimates for both birds and bats will also be reported. Estimated fatality rates will be calculated using the total number of carcasses found along with data from searcher efficiency and carcass removal trials. Reports documenting the actual number of carcasses found will be submitted at the end of each month throughout the monitoring year.

In addition to one fatality monitoring report, Western, USFWS, and SDGFP will be notified within 24 hours of the discovery of any of the following:

(a) five or more dead or injured non-listed avian or bat species within a reporting period;
or
(b) one or more dead or injured state threatened, endangered, or species of special concern; or
(c) one or more dead or injured federally listed species; or
(d) one or more dead or injured bald or golden eagles; or
(e) one or more dead or injured whooping cranes.

If roosting, foraging, or in-flight whooping cranes are observed within one mile of the project site, construction/operation should cease until the U.S. Fish and Wildlife Service (USFWS) is contacted within 24 hours, or the next business day, whichever comes first, in order to evaluate the level of disturbance risk to the individuals present within the vicinity of the project area. The South Dakota USFWS can be contacted at (605) 224-8693. Following coordination with the USFWS, activities will resume if it is unlikely the birds will be disturbed by the continuation of the activities or after the bird(s) relocate to a new site beyond the disturbance area of the project site.

4.2 POST-CONSTRUCTION EAGLE USE MONITORING

Eagle nest and use monitoring will occur for one year post construction utilizing third party contractor biologists. Monitoring efforts will occur throughout the Project and one mile buffer. Any eagle nest located will be monitored a minimum of 2 days per week, 8 hours per day, until a pattern is established for the adult flight and feeding schedule. Surveys will continue from the time an occupied nest is discovered until the chicks fledge. Data recorded will include flight paths, flight heights, times of observations, habitats used, number of chicks, etc. These data will track post-construction eagle use and help determine if they are using areas within the Project for foraging or other activities. If eagle use patterns significantly change so that they are utilizing areas within the wind farm itself, appropriate actions will be taken as outlined in Section 4.6.

After the one year of nest surveys and monitoring, operations personnel will continue to survey for eagle nests for the life of the CCWF. If a new eagle nest is located, appropriate monitoring and other actions will be implemented per the discussion in Section 4.6.

4.3 RAPTOR NEST SURVEYS

A raptor nest survey will be conducted to locate raptor nests and determine nest activity status and the species using those nests. The initial surveys will be conducted as near February 15 and continue until leaf out (approximately mid-May), to locate nests and to identify early breeding species. The Project area and a 1-mile buffer area will be surveyed from a vehicle using binoculars and spotting scopes. All raptor nest locations will be documented with Global Positioning System (GPS) coordinates. Raptor species, height of nest, nest activity status, nest condition, substrate, and other relevant data will be recorded for each nest.

4.4 WHOOPING CRANE MONITORING

To avoid impacts to whooping cranes during construction and operation of the CCWF, Dakota Plains will implement monitoring programs and curtail Project activities within one mile of any whooping crane sighting until the crane leaves the Project area.

During construction and the first year of operation, a whooping crane monitor will be on site during whooping crane Spring and Fall migration:

- Monitor will document whooping crane use of Project, and ensure rapid identification and response if a whooping crane is present.

- During construction, procedures will be established for shutting down construction activities within one mile of any whooping crane sighting.

- During operations, a Central Call Center will be established that will implement turbine shut-downs within one mile of any whooping crane sighting.

- The monitor or operations and maintenance staff will be instructed to notify the Central Call Center via radio or cell phone if whooping cranes are present within one mile of a turbine, so that specific turbines can be shut down rapidly.

- The necessary instruments and control systems will be incorporated into the turbine and electrical specifications to allow for rapid shut down of turbines.

If roosting, foraging, or in-flight whooping cranes are observed within one mile of the project site, construction/operation should cease until the U.S. Fish and Wildlife Service (USFWS) is contacted within 24 hours, or the next business day, whichever comes first, in order to evaluate the level of disturbance risk to the individuals present within the vicinity of the project area. The South Dakota USFWS can be contacted at (605) 224-8693. Following coordination with the USFWS, activities will resume if it is unlikely the birds will be disturbed by the continuation of the activities or after the bird(s) relocate to a new site beyond the disturbance area of the project site.

4.5 OPERATIONS PERSONNEL TRAINING

Similar to construction personnel, all operations personnel will be trained to identify potential wildlife conflicts and the proper response. This training will include sensitivity to birds and terrestrial wildlife. For operations, Dakota Plains will develop an incidental reporting process by which operations personnel document bird or bat casualties during routine maintenance work and at other times that they are within the Project. Incidentally found wildlife will be reported monthly to Western, USFWS and SDGFP.

In addition to the monthly reports, for the life of the CCWF, Western, USFWS, and SDGFP will be notified within 24 hours of the discovery of any of the following:

(a) five or more dead or injured non-listed avian or bat species within a reporting period; or

(b) one or more dead or injured state threatened, endangered, or species of special concern; or

(c) one or more dead or injured federally listed species; or

(d) one or more dead or injured bald or golden eagle; or

(e) one or more dead or injured whooping cranes.

In addition to incidental fatality reporting, operations personnel will be trained to identify eagles and whooping cranes and to be sensitive to relative use rates of eagles and whooping cranes and to look for eagle and whooping crane casualties during driving between turbines and conducting turbine maintenance. This information will be used for the life of the CCWF to continually maintain a relative sense of eagle/crane use in the Project area so that modifications can be implemented as necessary (see Section 4.5).

4.6 ADAPTIVE MANAGEMENT – IDENTIFICATION & MINIMIZATION OF IMPACTS

Based on Project siting (cultivated agriculture landscape), response to pre-construction monitoring actions (turbines sited greater than two miles from eagle nests, site turbines greater than one mile from active sharp-tailed grouse leks), follow a construction timing limitation (no activity/construction) from March 1st to June 30th, within a distance of 2.0 miles to protect sharp-tailed grouse leks and nests, placement of bird diverters on guy wires of met towers, all collection lines associated with the Project would be buried to reduce the potential collisions, an overhead tie line will be used to connect the proposed Project substation with an existing transmission line (rather than a new line), results to date of overall biological monitoring (e.g., low raptor use rates), whooping crane monitoring, the anticipated impact from the Project on birds and bats is expected to be low, and consistent with most other projects in the region. As such, the Project is avoiding and minimizing impacts to birds and bats in general through siting. To confirm predicted impacts, Dakota Plains will implement post-construction fatality monitoring for one year after the Project becomes operational utilizing trained biologists and for the life of the CCWF utilizing trained operations personnel.

This section outlines what the responses may be if post-construction efforts determine that impact to wildlife is greater than anticipated. The main focus for adaptive management during operations will be for eagles and whooping cranes.

During operations, biologists, for one year, and operations personnel, for the life of CCWF, will survey for new eagle nests. If a new nest is located a biologist will be contacted to monitor the nest for two days per week, 8 hours per day, until an established foraging area is identified or until it is determined that the adults are not using the Project area extensively.

If, during operations, the biologist or operations personnel document increased eagle use or from new nesting birds within the Project, the following actions will be implemented:

1) Immediately contact the USFWS's Pierre Field Office of the increased use and plans to implement monitoring activities.
2) Document use locations of the eagles. Are the eagles flying through the area, are the eagles foraging within the Project, are the eagles roosting within the Project, etc.?
3) If eagles are found to be foraging within the Project, the source of the prey base will be located and removed if possible. This could include working with local farmers to cover or remove dead livestock, development of a road kill management plan to remove road kill quickly, removal of fish if trapped in low level lakes/ponds, or other such actions.
4) Use monitoring will continue to document that the eagles discontinue using the Project area.

If roosting, foraging, or in-flight whooping cranes are observed within one mile of the project site, construction/operation should cease until the U.S. Fish and Wildlife Service (USFWS) is contacted within 24 hours, or the next business day, whichever comes first, in order to evaluate the level of disturbance risk to the individuals present within the vicinity of the project area. The South Dakota USFWS can be contacted at (605) 224-8693. Following coordination with the USFWS, activities will resume if it is unlikely the birds will be disturbed by the continuation of the activities or after the bird(s) relocate to a new site beyond the disturbance area of the project site.

The above is an example of how biological monitoring or operations monitoring will document use and what the responses to that information will be. There may be other scenarios, finding a roost location, for example, that dictate a need for individual turbines to be monitored more closely for use and fatalities. The intent of monitoring is to document changes in use (e.g., higher use) in a timely manner such that management changes (e.g., removal of prey sources) or operations changes (e.g., curtailment) can be implemented and potential impact to eagles, whooping cranes, and other wildlife continues to be minimized.

While this adaptive management section focuses primarily on eagles and whooping cranes, the same general concepts will apply if there is significantly higher than expected bird or bat fatalities or if current or future listed species are observed in the Project area. This includes identification of the issue or problem, notification to the USFWS, development of a specific plan or course of action dictated by the circumstances, implementation of the actions, and monitoring to confirm that actions are sufficiently avoiding or minimizing the potential or realized impacts.

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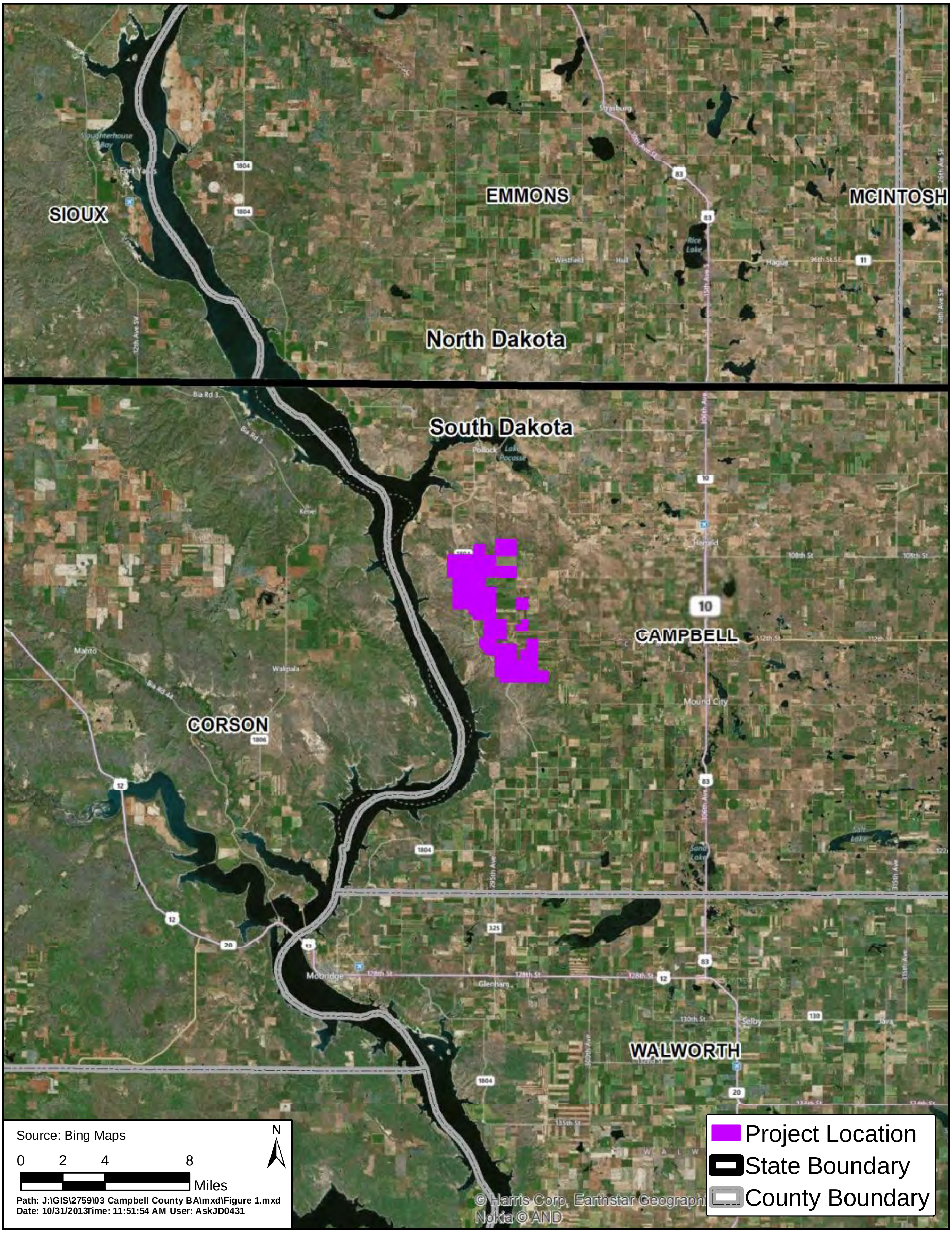
Figures



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Campbell County Wind Farm-Campbell County, South Dakota
Site Location Map

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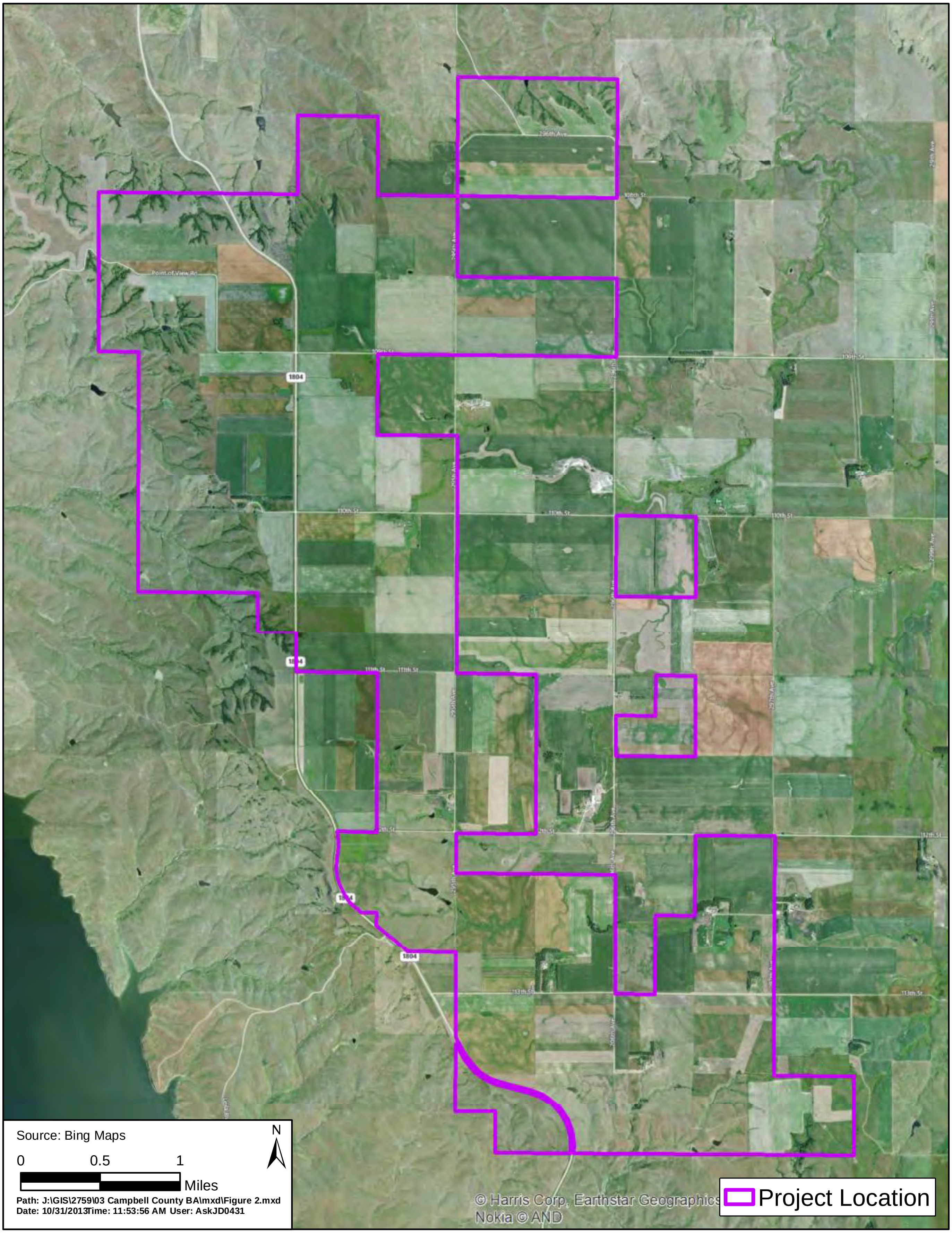
Figure 1



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Site Detail Map

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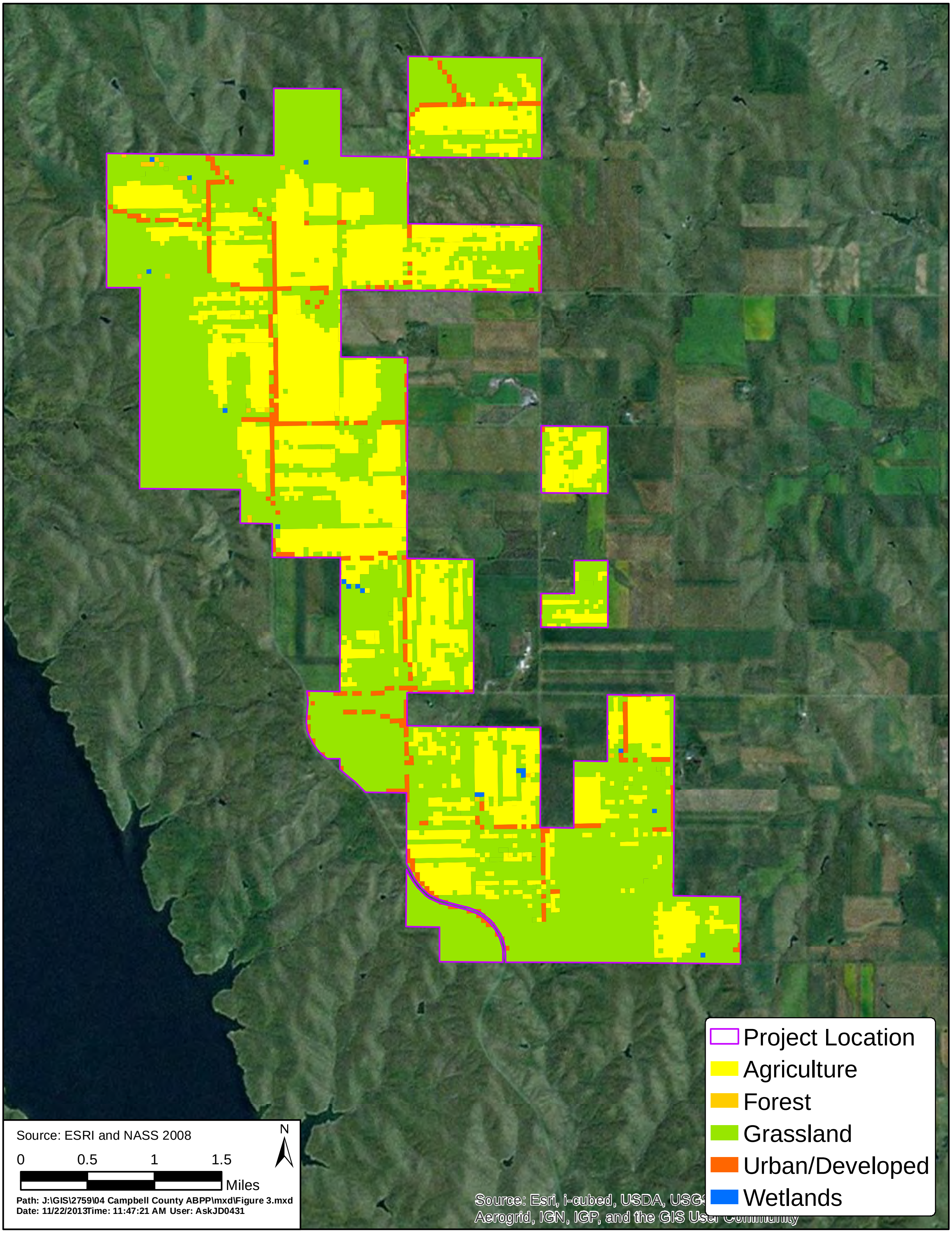
Figure 2



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Land Cover Map

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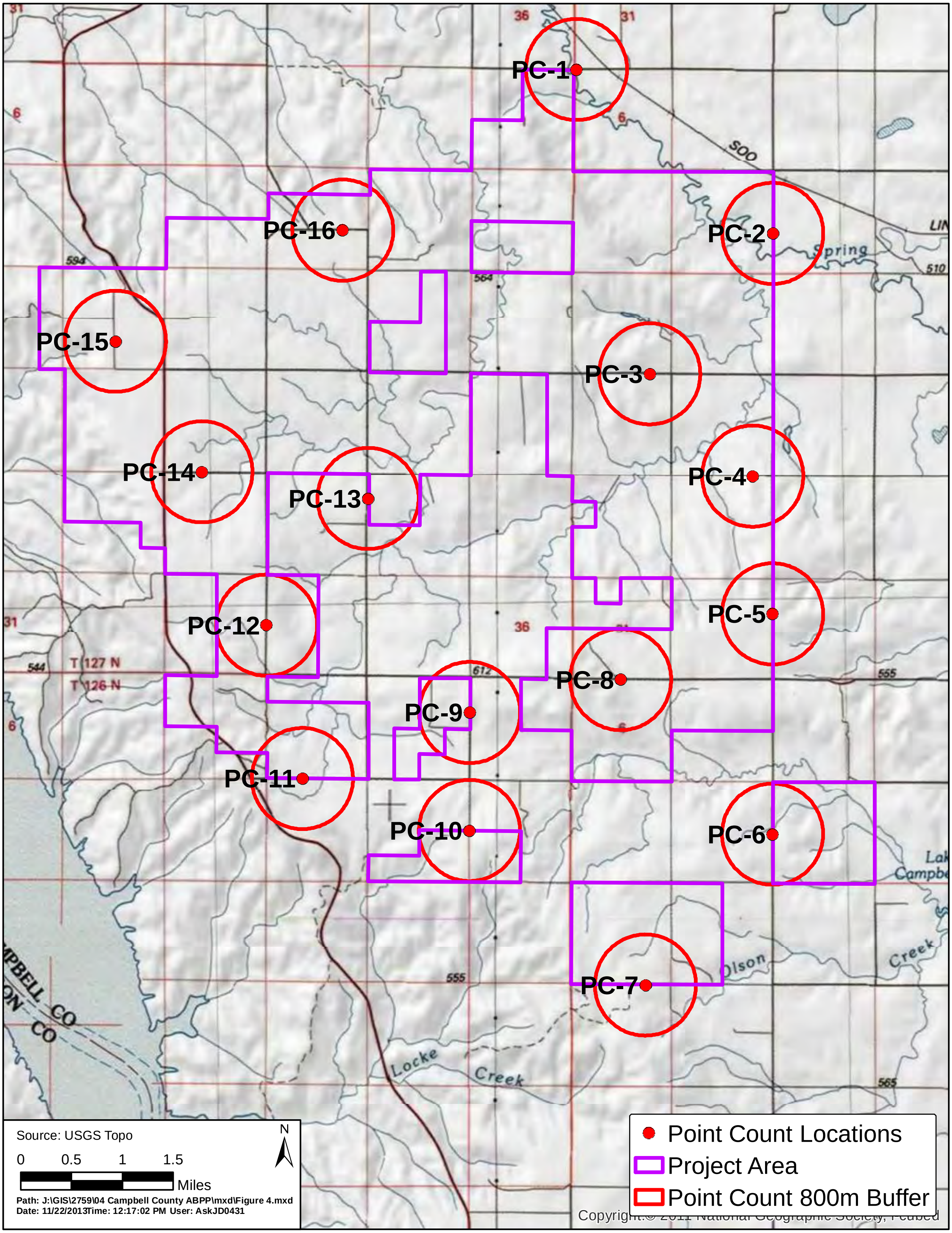
Figure 3



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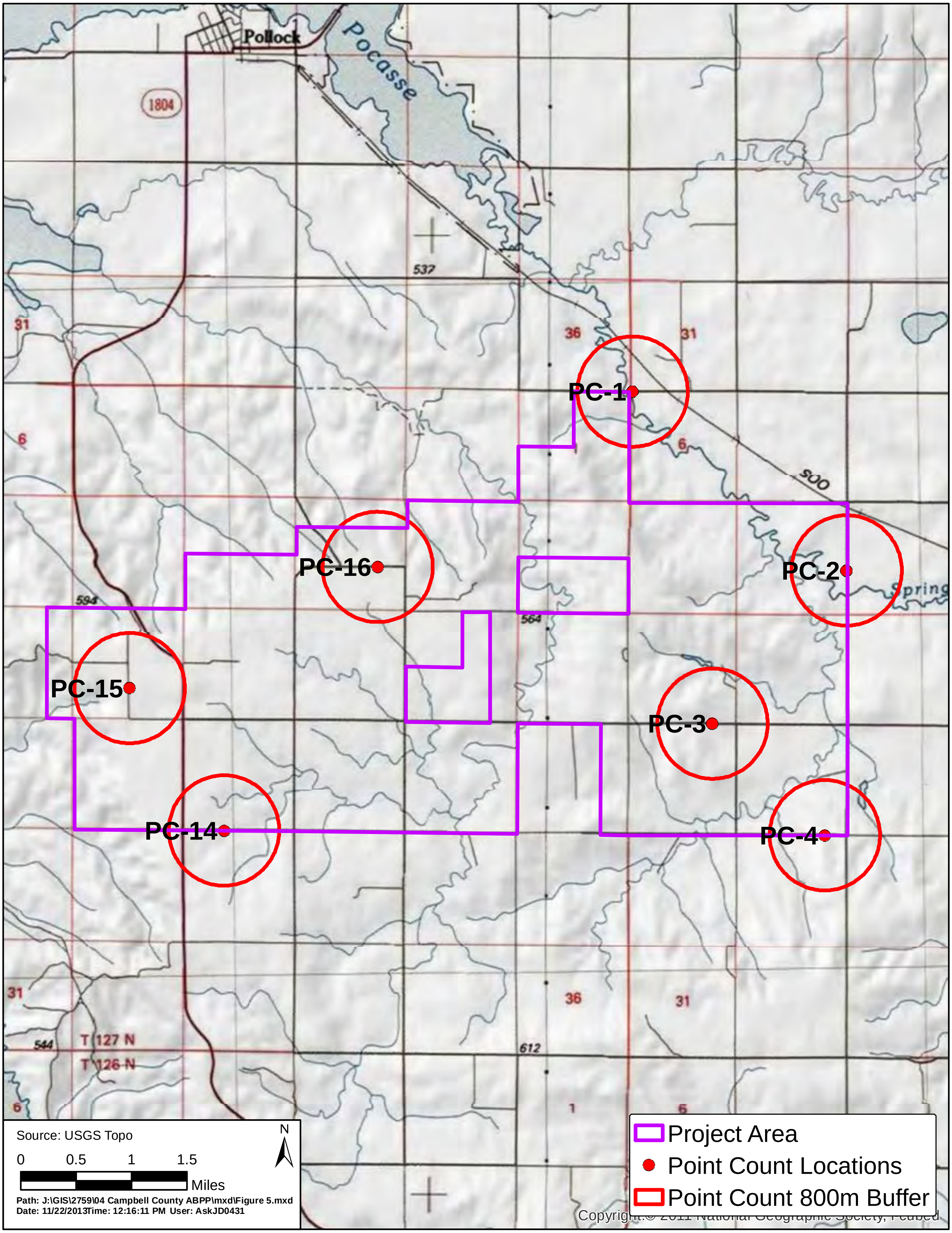

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Figure 5

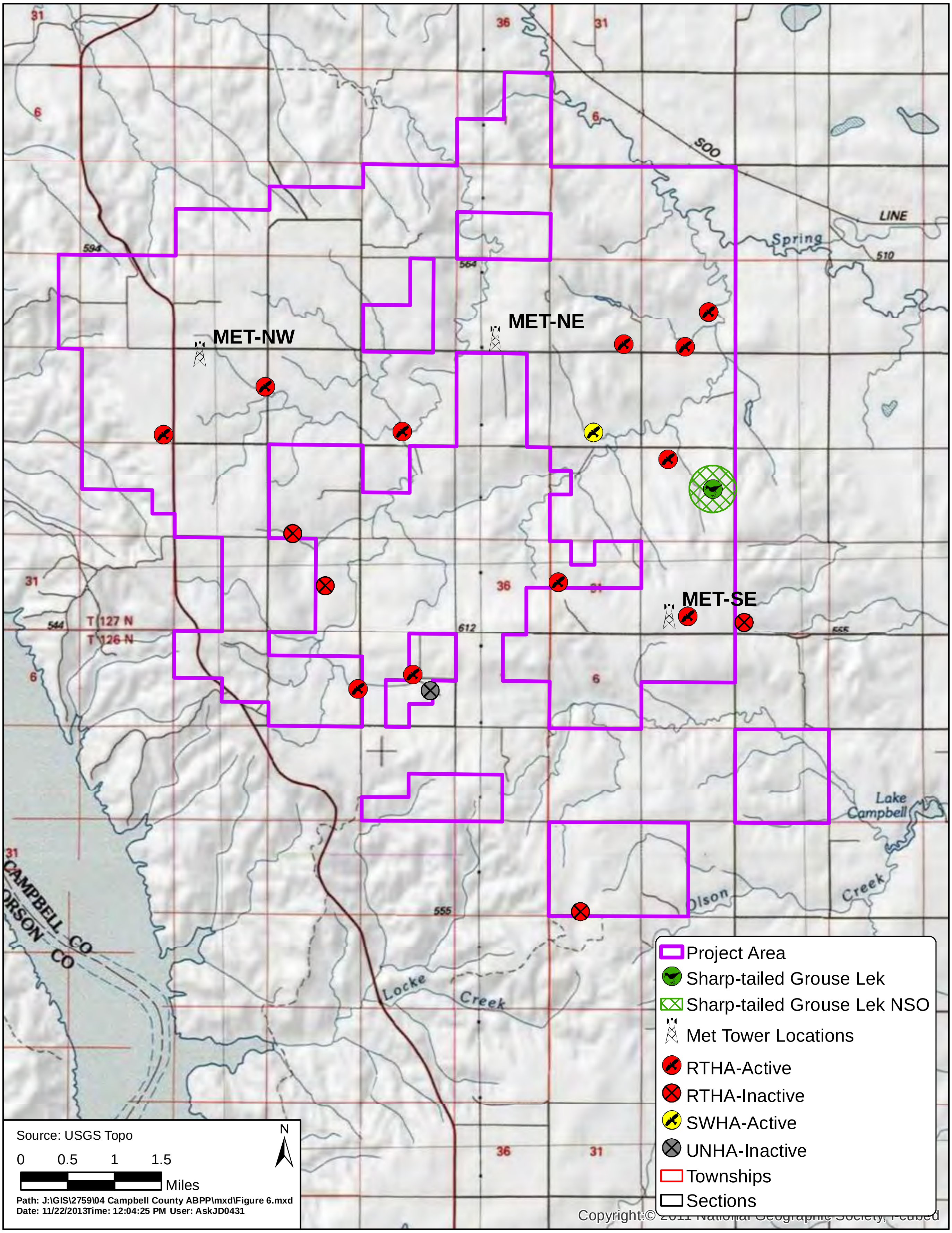

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Figure 6

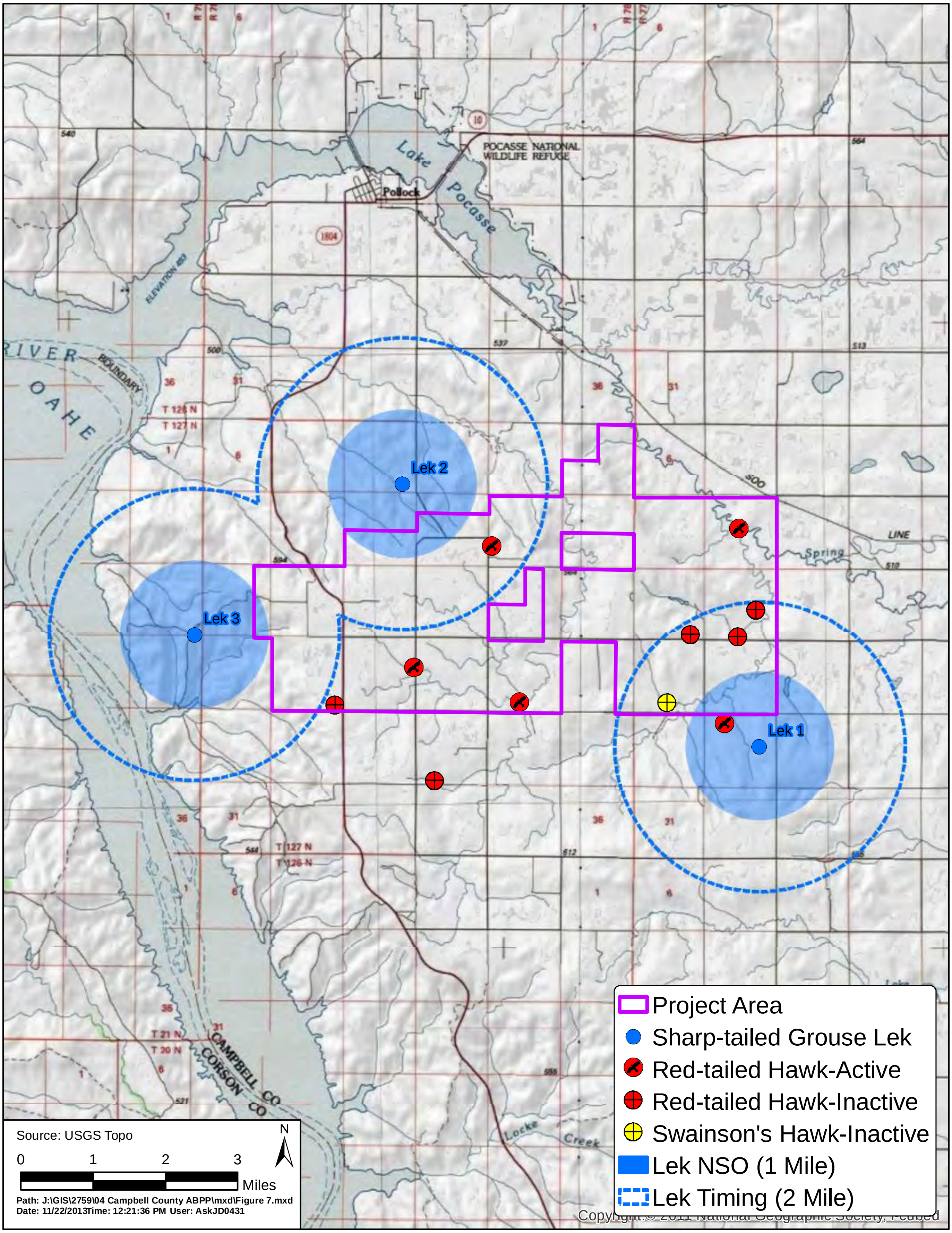

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Figure 7

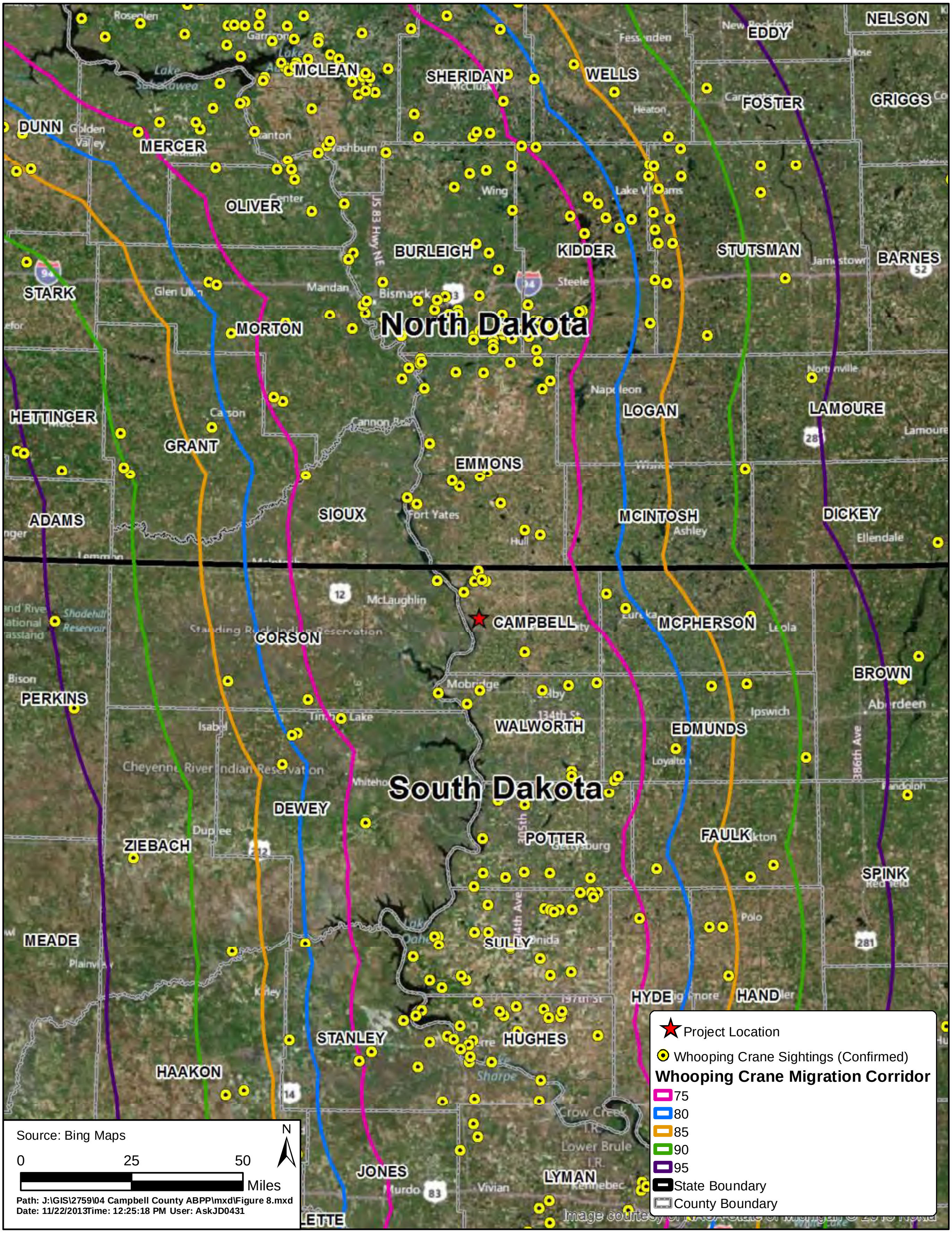

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Figure 8