

## **Appendix H – Crocker Wind Farm Agency Correspondence**

Crocker Wind Farm, LLC provided project notifications on April 18, 2016 and October 24, 2016 to the following agencies and contacts. An example of these project notifications follows.

Crocker Wind Farm – South Dakota Facility Permit Agency Notification List		
Agency	Name	Address
SD Department of Game, Fish, and Parks	Silk Kempema	Foss Building 523 East Capitol Pierre, SD 57501-3182
SD Department of Game, Fish, and Parks	Leslie Petersen	Foss Building 523 East Capitol Pierre, SD 57501-3182
SD Department of Environment and Natural Resources	John Miller	Foss Building 523 East Capitol Pierre, SD 57501-3182
SD Department of Transportation Office of Project Development	Dean VanDeWiele	700 East Broadway Pierre, SD 57501-2586
SD Aeronautics Commission	Bruce Lindholm	Becker Hanson Building 700 East Broadway Pierre, SD 57501
SD State Historical Society	Paige Hoskinson Olson	Cultural Heritage Center 900 Governors Drive Pierre, SD 57501-2217
USACE	Steve Naylor	28563 Powerhouse Road, Room 118 Pierre, SD 57501
USACE	Cathy Juhas	28563 Powerhouse Road, Room 118 Pierre, SD 57501
USDA-NRCS	Jason Hermann	Clark Service Center 101 Warren Road Clark, SD 57225
USFWS	Peter Gober	420 South Garfield Ave, Suite 400 Pierre, SD 57501-5408
USFWS	Connie Mueller	Waubay NWR Complex 44401 134 A Street Waubay, SD 57273
USFWS	Natalie Gates	420 South Garfield Ave, Suite 400 Pierre, SD 57501-5408
Interstate Telecommunications Cooperative	Terry Peterson	312 Fourth Street West Clear Lake, SD 57226
DOC – NTIA	Joyce Henry	<a href="mailto:jhenry@ntia.doc.gov">jhenry@ntia.doc.gov</a>
Clark County	Jarvis Reidburn	200 North Commercial Street Clark, SD 57225





April 18, 2016

John Miller  
SD Dept of Environment and Natural Resources  
Joe Foss Building  
523 East Capitol  
Pierre, SD 57501-3182

RE: Requesting Comments on Crocker Wind Farm in Clark County, South Dakota

Dear Mr. Miller:

Crocker Wind Farm, LLC (“Crocker Wind Farm”), a wholly owned subsidiary of Geronimo Energy, LLC, is gathering information and requesting agency comments for a proposed wind energy project in Clark County, South Dakota.

Crocker Wind Farm will be submitting a Facility Permit Application to the South Dakota Public Utilities Commission (“PUC”).

The planned output for the Project is up to 200 megawatts of nameplate wind energy capacity. The Project’s permanent facilities will include:

- wind turbines and related equipment;
- new gravel access roads and improvements to existing roads;
- underground electrical collection lines;
- an operations and maintenance (“O&M”) building;
- a substation facility;
- up to four permanent meteorological towers (up to 80 meters tall); and
- an associated transmission line.

A transmission line route has not yet been determined. A separate notification describing the proposed route will be distributed once a corridor has been established.

The Project’s temporary facilities will include:

- temporary batch plant area;
- staging/lay down area for construction of the Project;
- staging area for delivery trucks;
- temporary meteorological towers before and after construction; and
- temporary improvements to public roads including wide-turn radii.



The turbine locations, access roads and electrical connections have not been finalized at this time. Table 1 provides the sections of land Crocker Wind Farm is evaluating for siting the wind energy project.

**Table 1: Sections within the Crocker Wind Farm Project Boundary**

State	County	Civil Township Name	Township	Range	Sections
SD	Clark	Spring Valley	119	58	19-22, 26-36
SD	Clark	Warren	119	59	23-27, 34-36
SD	Clark	Ash	118	59	1-3, 10-15
SD	Clark	Woodland	118	58	1-12, 14-16, 22, 23, 26

To facilitate your review, we have enclosed a map of Crocker Wind Farm's location and the associated project boundary.

We welcome any comments your agency may have at this time and throughout the permit application process. Any written agency comments provided in response to this letter will be incorporated into the PUC's review process.

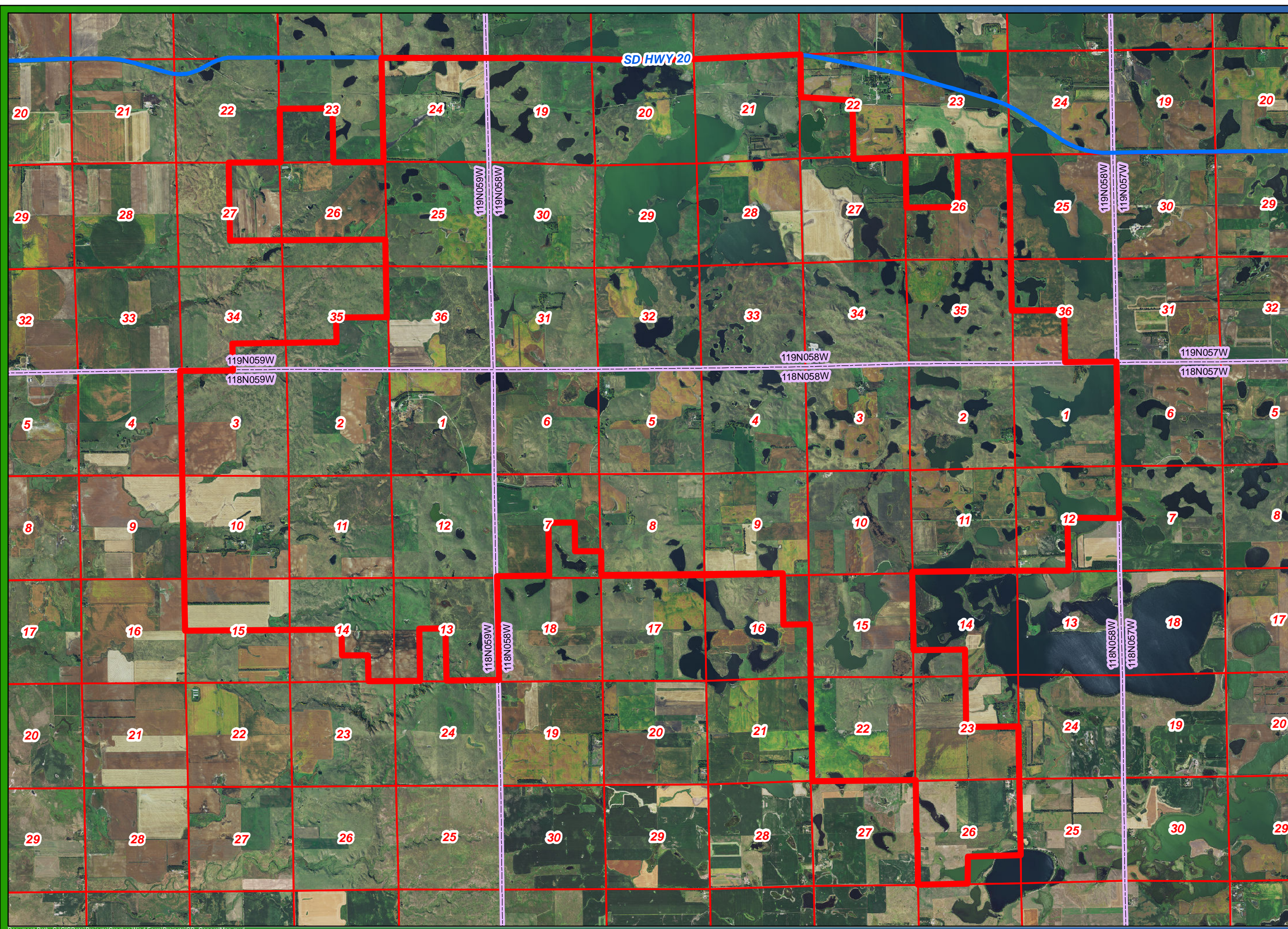
If you require further information or have questions regarding this matter, please contact me at 952-988-9000 or at [melissa@geronimoenergy.com](mailto:melissa@geronimoenergy.com).

Sincerely,

Melissa Schmit  
Senior Permitting Specialist

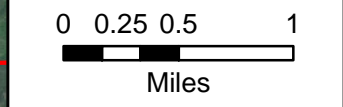
Enclosure:  
Crocker Wind Farm Location Map



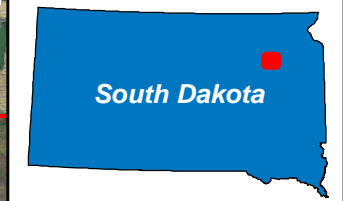
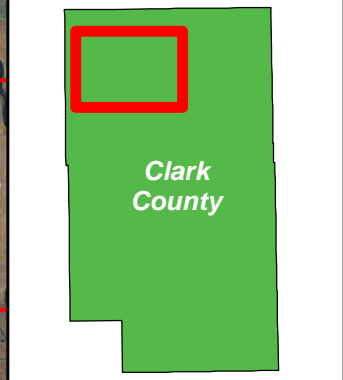


# Map Exhibit 1 Crocker Location Map

- Crocker Project Boundary
- County
- Major Road
- Townships
- Sections



45.066510, -97.827911







October 25, 2016

John Miller  
South Dakota Department of Environment and Natural Resources  
Joe Foss Building  
523 East Capitol  
Pierre, SD 57501-3182

RE: Requesting Comments on Crocker Wind Farm Revised Project Boundary in Clark County, South Dakota

Dear John Miller,

Crocker Wind Farm, LLC (“Crocker Wind Farm”), a wholly owned subsidiary of Geronimo Energy, LLC, requested agency comments in a letter dated April 18th for a proposed wind energy project in Clark County, South Dakota. The temporary and permanent facilities outlined in the previous letter remain the same; however, as project development continued, additional constraints were identified warranting a boundary modification (refer to attached map). In addition, the Crocker Wind Farm will have up to 226 turbines which would result in a higher nameplate capacity than 200 MW as previously stated.

The turbine locations, access roads and electrical connections have not been finalized at this time. Table 1 provides the revised sections of land Crocker Wind Farm is evaluating for siting of the wind energy project.

**Table 1: Sections within the Crocker Wind Farm Project Boundary**

State	County	Civil Township Name	Township	Range	Sections
SD	Clark	Warren	119	59	23-27, 34-36
SD	Clark	Spring Valley	119	58	3-10, 15-19, 25, 26, 30, 31, 33-36
SD	Clark	Cottonwood	119	57	29-32
SD	Clark	Ash	118	59	1-3, 10-15
SD	Clark	Woodland	118	58	1-12, 14-16, 21-23, 26, 34

An associated transmission line route has not yet been finalized. A separate notification describing the proposed route will be distributed once a corridor has been established.

Crocker Wind Farm will be submitting an application to the South Dakota Public Utilities Commission (“PUC”) for a Facility Permit. We welcome any comments your agency may have at this time and throughout the permit application process. Any written agency comments provided in response to this letter will be incorporated into the PUC’s review process.

If you require further information or have questions regarding this matter, please contact me at 952-988-9000 or at [melissa@geronimoenergy.com](mailto:melissa@geronimoenergy.com).

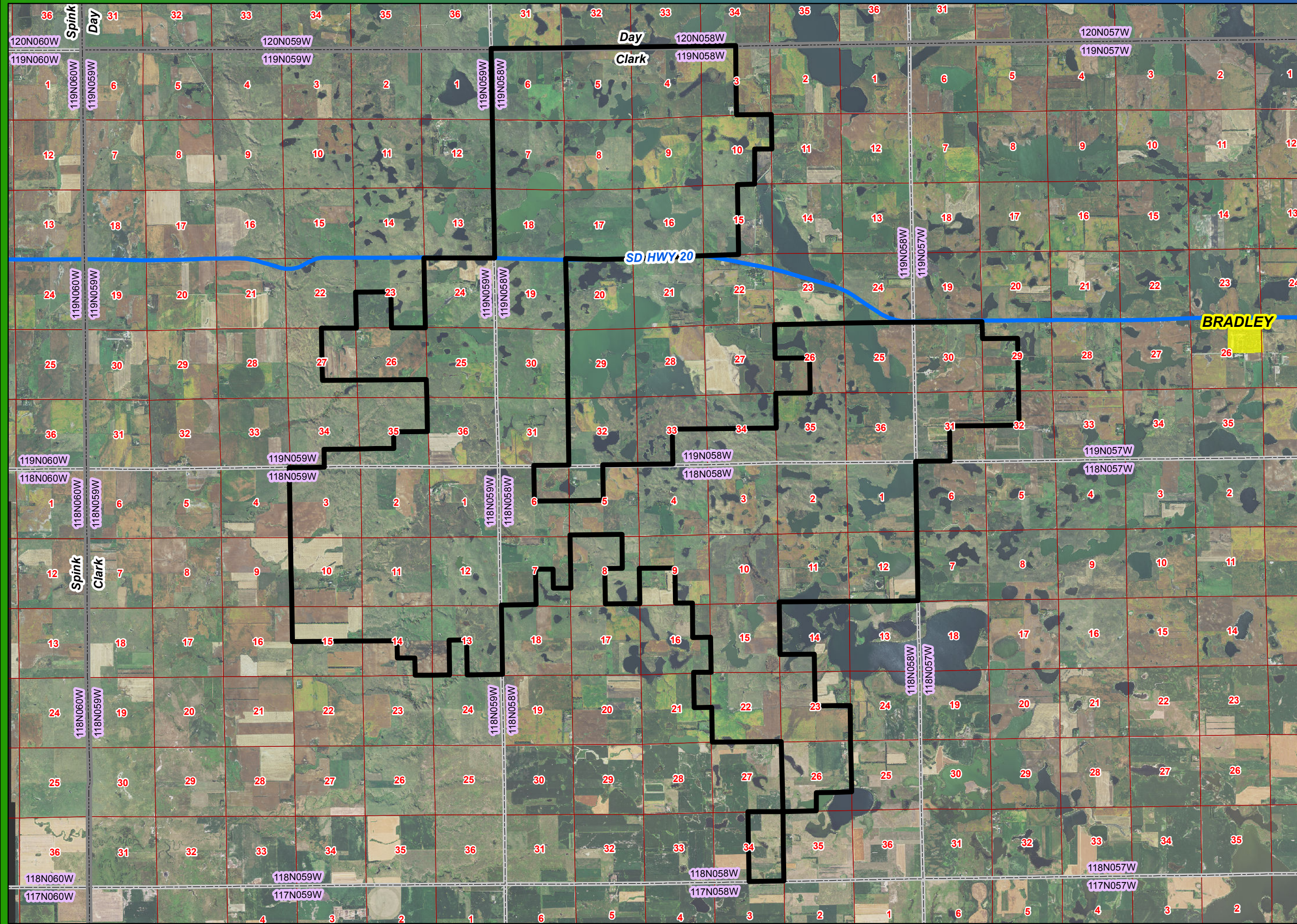
Sincerely,

A handwritten signature in cursive script, appearing to read "Melissa Schmit".

Melissa Schmit  
Senior Permitting Specialist

Enclosure:  
Updated Crocker Wind Farm Location Map





# Map Exhibit 1

## Crocker Location Map

Crocker Project Area

County

Municipality

Major Road

Townships

Sections

45.066510, -97.827911

Clark County

South Dakota

0 1 2

Miles

Document Path: G:\GISData\Projects\Crocker Wind Farm\Projects\CR\_GeneralMapv2.mxd

cjenson Date: 10/24/2016





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

14 March 2016

Heather Wayne, Permitting Associate  
Geronimo Wind Energy, LLC  
7650 Edinborough Way; Suite 725  
Edina, MN 55435

RE: Crocker wind farm in northwestern Clark County, South Dakota.

Dear Heather:

This is in response to your request for information on potential effects to wildlife and their associated habitats from the proposed Crocker wind farm in northwestern Clark County, South Dakota.

The proposed siting and operation of a wind farm has the potential to directly and indirectly impact area wildlife. This may occur by altering habitats, influencing behavior and directly killing individuals. The South Dakota Game, Fish and Parks (SDGFP), in coordination with the South Dakota Bat Working Group (SDBWG), developed *Siting Guidelines for Wind Power Projects in South Dakota*. This document addresses many of the environmental concerns involved with siting wind farms in South Dakota (<http://gfp.sd.gov/wildlife/docs/wind-power-siting-guidelines.pdf>).

Part of responsible energy development includes conducting appropriately-timed pre-construction wildlife surveys to document current conditions and help assess any potential impacts to wildlife. At least two years of the pre-construction surveys should be conducted. This baseline information should be used to evaluate any potential impacts to wildlife. If major impacts are predicted, avoid development in this area. If less serious impacts are anticipated, we recommend mitigation to reduce these impacts. Post-construction studies should be conducted to assess actual impacts, evaluate mitigation effectiveness and evaluate predictions. Bird and bat mortality surveys should be conducted at least two years post-construction. Survey protocols should allow data to be comparable to data collected at other wind farms in the region. Example survey protocols can be found in (Anderson et al. 1999), (Erickson et al. 2007), and (Kunz et al. 2007).

Our agency respectfully requests a written summary of these surveys.

The following contains information on wildlife habitats and associated species that contribute to South Dakota's natural heritage and may be impacted by this proposed wind farm.

## HABITAT

### *Grasslands*

The majority of the proposed project area lies within the Prairie Coteau ecoregion. This ecoregion is unique to South Dakota. Created by glaciers and lacking a drainage pattern, the hilly landscape has abundant seasonal, semi-permanent and permanent wetlands. The latter were formed in areas with little ice shear; many of these wetlands form a dense chain of lakes in this ecoregion. Precipitation levels (20-22 inches average annual) allow for woody (oak) growth around wetland margins increasing habitat and wildlife species diversity in the area. Potential natural vegetation includes big and little bluestem, switchgrass, Indian grass, and blue grama. Many remaining native prairie tracts are found in the Prairie Coteau ecoregion.

Remnant prairie tracts 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 untilled tracts of native prairie. Every effort should be made to avoid placement of turbines and new roads in untilled native prairie. Turbines should be placed in areas currently disturbed by cultivation. Any loss of native prairie should be avoided or mitigated.

Contiguous blocks of grassland (including native prairie, pasture, hayland, etc.) regardless of cropping history, quality or current management also have conservation value. Many grassland wildlife species are sensitive to habitat fragmentation. 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. Effort should be made to avoid placement of turbines and new roads in contiguous blocks of grassland. Turbines should be placed in areas currently disturbed by cultivation. Fragmentation of contiguous blocks of grassland should be avoided or mitigated.

Ground disturbance and increased road access increases the opportunity for introduction and establishment of non-native, invasive plant species and can also increase human access to areas. Any ground disturbance should be limited as much possible by reducing 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. 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>



### *Wetlands*

The proposed project area is located within the Prairie Pothole region. This glaciated region, characterized by high densities of wetland basins of various depths and sizes, is the major waterfowl production area in North America. Wetland losses in the Prairie Pothole region are staggering and range from 99% in Iowa to 35% in South Dakota (Johnson and Higgins 1997). Wetland basins are found throughout most of the proposed project area. Turbines should not be placed in or near wetland basins and special care should be made to avoid areas with high concentrations of wetlands.

### *Public Land*

Public lands owned by the SDGFP are located both with the proposed project area or adjacent to it. Placement of public lands is done in areas with existing and potential wildlife habitat. Management of these lands is for wildlife and conducted in the public interest. Wildlife use of these areas may be negatively affected by the placement of a wind farm 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/>. Establishing a buffer between public land boundaries and turbine locations is recommended.

## **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. We recommend that properly timed, species-appropriate surveys for breeding grassland birds (songbirds and grouse) be conducted. Many privately-owned areas in South Dakota have not been surveyed for grassland songbirds or prairie grouse leks. Post-construction surveys should monitor lek presence and document the number of grouse attending each lek.

### *Raptors*

Improperly sighted wind farms are known to cause significant mortality to raptors. 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 high-raptor use areas as well as nest locations for these and other raptor species.

### *Whooping Crane*

This proposed project location is within the 200-mile wide portion of the whooping crane migratory route. We are concerned about direct mortality of whooping cranes. The whooping crane is state and federally protected as an endangered species. Cranes begin to migrate into South Dakota as early as late March through mid- to late-May. In the fall they pass through South Dakota beginning in September and can be observed through early November.

### *Bats*

Operating wind turbines are known to kill bats especially those that migrate in the fall. Hoary, silver-haired and Eastern red bat species occur in South Dakota. Because of limited, project-specific data we suggest pre-construction surveys of the area for potential bat habitat and species followed by post-construction mortality surveys.

### **POWER LINES**

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 and they should not 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 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 (Avian Power Line Interaction Committee 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>).

### **PERMIT REQUIREMENTS**

#### *State Threatened and Endangered Species*

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>.

#### *Facility Siting Permit*

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.

#### *Scientific Collector's Permit*

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>

## SUMMARY

Our agency has concerns regarding direct and indirect impacts to wildlife and habitats in association with the siting of the proposed project. If development of this project continues to be pursued, I recommend scheduling a meeting with SDGFP and U.S. Fish and Wildlife Service representatives to further discuss wildlife concerns as well as a site visit to assist with microsites.

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](mailto:Silka.Kempema@state.sd.us).

Regards,



Silka L. F. Kempema  
Terrestrial Wildlife Biologist

CC: SD Game, Fish and Parks, Pierre, SD (Attention Casey Heimerl)  
SD Game, Fish and Parks, Sioux Falls, SD (Attention Jacquie Ermer)  
U.S. Fish and Wildlife Service, Pierre, SD (Attention Natalie Gates)

## Literature Cited

- Anderson, R., M. Morrison, K. Sinclair, and D. Strickland. 1999. Studying wind energy/bird interactions: A guidance document. National Wind Coordinating Committee.
- Avian Power Line Interaction Committee. 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.
- 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.
- Johnson, R. R., and K. F. Higgins. 1997. Wetland resources of eastern South Dakota. South Dakota State University.
- 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.

# MAY ADAM

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DOUGLAS A. ABRAHAM  
KARA C. SEMMLER  
KATIE J. HRUSKA  
TERRA M. FISHER

December 1, 2017

Writer's E-mail: [brett@mayadam.net](mailto:brett@mayadam.net)

OF COUNSEL  
CHARLES M. THOMPSON  
GLENN W. MARTENS 1881-1963  
KARL GOLDSMITH 1885-1966  
BRENT A. WILBUR 1949-2006  
TELEPHONE  
605 224-8803  
FAX  
605 224-6289

Jack Hieb/Zach Peterson  
Richardson, Wyly, Wise, Sauck & Hieb  
One Court Street  
Aberdeen, SD 57402

## RE: Crocker Wind Farm, LLC vs. Clark County

Dear Jack and Zach:

It's been some time since we've corresponded about this matter. As I write, the project planning has matured to the point where the economics have come into a more tightly focused field of view. Given where negotiations have gone with potential customers and with the desire to move forward, we find ourselves at a place where we can see our way clear to accept the setbacks set by the Board of Adjustment.

We do have some less contentious but remaining issues with the permit which we would like to resolve.

Those issues include the inclusion of language in the permit requiring the specific agreement proposed at the hearing by ITC be signed and the condition needs to be updated so any agreement with ITC would meet the condition. We've been in contact with ITC and our engineers have spoken to theirs. We think we're at a place where the two parties can reach agreement on some new language to replace the original version provided at the hearing. We have no intentions of interfering with ITC facilities, and think that technology has evolved since their claimed issues from the 1990's. We would want to finalize some proposed language with ITC before offering it to the county for consideration.

We also have concerns about the lack of a clear definition of "residence" as it is not defined in the permit or the zoning ordinance. "Residence" affects the setbacks. Some homes in the project area are currently, perhaps permanently, unoccupied. We do note that established residence is defined in a section of the zoning ordinance on CAFO and that sort of clarification would be appreciated. We'd like it to read that homes currently occupied as domiciles of the occupants, as of the date of the permit are residences, and that other homes occupied or constructed later are not residences for purposes of the setbacks.

The expiration of the conditional use permit is also a concern. The conditions simply list a permit expiration in 3 years. We take that to mean that the project has 3 years to start

MAY, ADAM, GERDES & THOMPSON LLP  
503 SOUTH PIERRE STREET • P.O. Box 160  
PIERRE, SOUTH DAKOTA 57501-0160

significant construction from the date when all permit conditions have been met as was listed in the Crocker permit application, but that once constructed the permit to operate the facility extends indefinitely. However, it could be read differently, and thus it's a concern for both the project and its financiers. We'd like it to read that the project has three years to begin construction under the permit, and that once constructed, there is no expiration of the permit.

Finally, the condition providing for an updated project map illustrating the movement of towers 56 and 58 was not recorded accurately and should reflect the movement of tower 56 and removing tower 58.

We feel like if we could reach agreement or understanding on these 3 issues that the lawsuit could be resolved and dismissed. We would look forward to your thoughts on how to resolve these matters.

Very truly yours,

MAY, ADAM, GERDES & THOMPSON LLP



BRETT KOENECKE

BK/amc

Enclosures

Cc: Client

Brian Donahoe

## Melissa Schmit

---

**From:** Henry, Joyce <JHenry@ntia.doc.gov>  
**Sent:** Monday, May 16, 2016 10:19 AM  
**To:** Melissa Schmit  
**Subject:** \*\*WindMill Response Letter\*\* Crocker Project: Clark County, SD  
**Attachments:** Crocker\_R.pdf



Dear Melissa:

Please see attached the NTIA Response Letter for the Crocker Wind Energy Project, located in Clark County, South Dakota.

After a 45+ day period of review, we received responses from **DOA (Agriculture)**, and **DOJ (Justice)**, stating **No Harmful Interference Anticipated (NHIA)**.

Two federal agencies, **DOC (Commerce)** and **DOE (Energy)**, had issues with turbine placement in these particular areas, and have included their comments in the attached letter.

In the event that an agency has expressed concerns, we encourage you to work with the agency representatives directly to resolve all issues. If issues cannot be resolved, you may contact our office via phone or e-mail for resolution.

*Joyce C. Henry*  
*DOC/NTIA/OSM HQ*  
*Admin Assistant*  
*202-482-2215*  
*[jhenry@ntia.doc.gov](mailto:jhenry@ntia.doc.gov)*



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Telecommunications and**  
**Information Administration**  
Washington, D.C. 20230

MAY 13 2016

Ms. Melissa Schmit  
Senior Permitting Specialist  
GERONIMO ENERGY  
7650 Edinborough Way, Ste. 725  
Edina, MN 55435

Re: Crocker Project: Clark County, SD

Dear Ms. Schmit:

In response to your request on March 14, 2016, the National Telecommunications and Information Administration provided to the federal agencies represented in the Interdepartment Radio Advisory Committee (IRAC) the plans for Crocker Wind Energy Project, located in Clark County, South Dakota.

After a 45+ day period of review, two federal agencies, the Department of Commerce (DOC), and the Department of Energy (DOE), identified concerns regarding blockage of their radio frequency transmissions. Please see the attached Impact Analysis Reports from DOC and DOE for further information.

While the other IRAC agencies did not identify any concerns regarding radio frequency blockage, this does not eliminate the need for the wind energy facilities to meet any other requirements specified by law related to these agencies. For example, this review by the IRAC does not eliminate any need that may exist to coordinate with the Federal Aviation Administration concerning flight obstruction.

Thank you for the opportunity to review this proposal.

Sincerely,

Peter A. Tenhula  
Deputy Associate Administrator  
Office of Spectrum Management

Attachments



The Crocker Wind Project to be located in Clark County, South Dakota, has the potential to interfere with Department of Energy Western Area Power Administration operations. Western has three paths that run right through the proposed project area from the Clark Repeater. Exact turbine placement will be critical, and we request that the project representative contact our Western Spectrum Manager for coordination purposes:

Scott E. Johnson  
Senior Telecom Engineer  
Spectrum Program Manager  
DOE/Western Area Power Administration  
720-962-7380 (Phone)  
720-962-4080 (Fax)  
[sjohnson@wapa.gov](mailto:sjohnson@wapa.gov)

Very respectfully,

Pamela E. Main  
Energy FAS Representative  
Spectrum Management Team  
Office of Technology and Innovation  
Office of the Chief Information Officer  
(301) 903-4261 Office  
(240) 449-6207 Mobile  
(301) 903-7045 Fax  
[pamela.main@hq.doe.gov](mailto:pamela.main@hq.doe.gov)



## Crocker Wind Project – Impact Analysis NOTIFICATION OF CHANGES REQUESTED



### WSR-88D Impact Analysis Overview

A portion (32%) of the Crocker Wind Project development area in Clark County, SD would be in the Aberdeen Weather Surveillance Radar-1988 Doppler (WSR-88D) line-of-sight and cause visible clutter in the radar data. That portion of the project is within the WSR-88D's designated Notification Zone (olive green areas in Figure 1). Due to the proximity to the radar, NOAA's Radar Operations Center would like to reevaluate the project when turbines are sited, and track the project to completion. This will allow us to fully understand and anticipate the potential impacts. Please provide project updates/changes directly to the Radar Operations Center via email at [wind.energy.matters@noaa.gov](mailto:wind.energy.matters@noaa.gov).

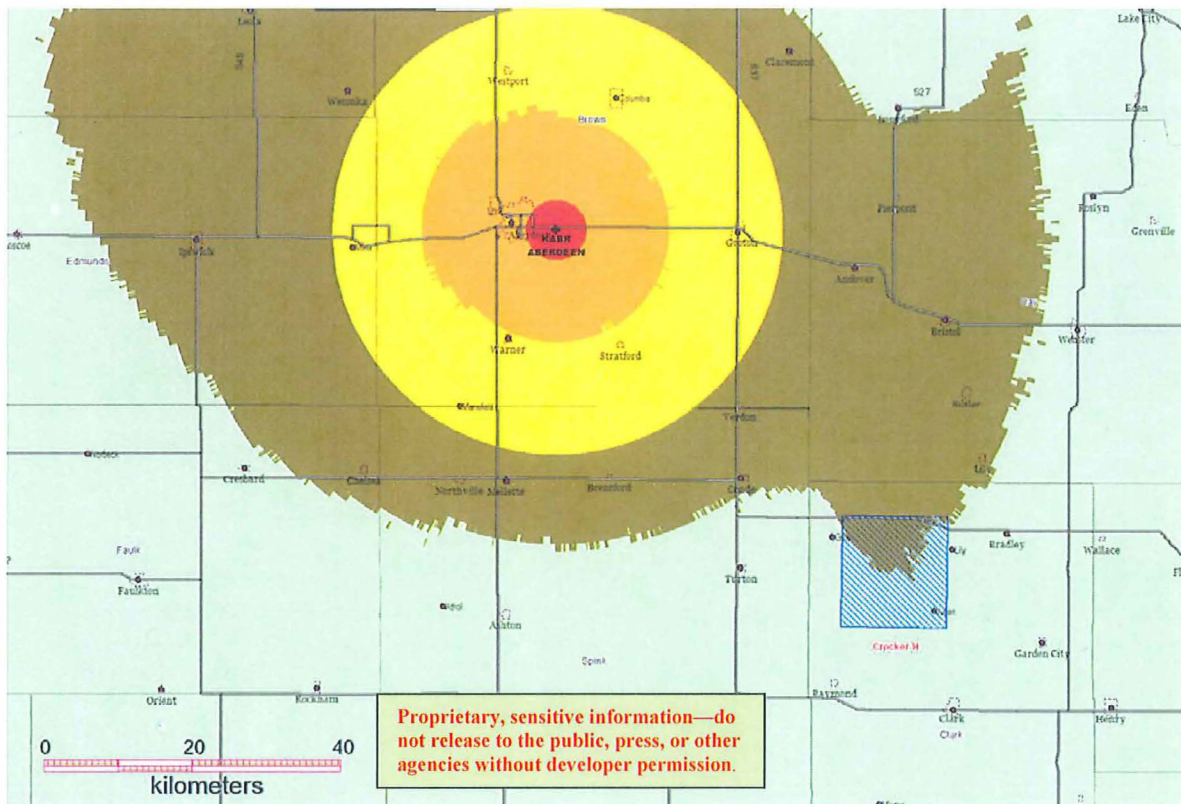


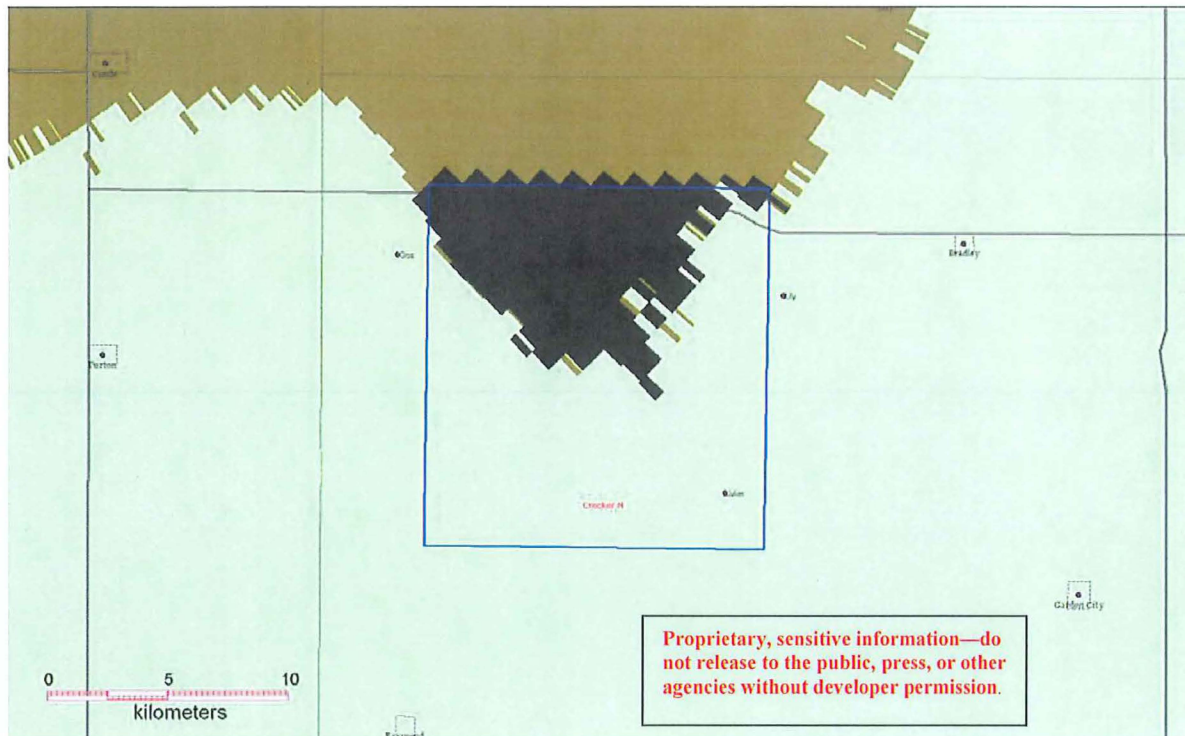
Figure 1: Aberdeen WSR-88D's Radar-Line-of-Site (RLOS) and impact zone map showing proposed Crocker Wind Project (blue hatched area). The red area is the 4-km radius "No-Build" Zone around the radar, the orange RLOS area is the Mitigation Zone, the yellow RLOS area is the Consultation Zone, and the olive green RLOS area is the Notification Zone.

### Crocker Wind Project Impact Analysis

The proposed project would install up to 125 wind turbines, each up to 150-meters maximum blade-tip height, in a 234.1 sq km area as close as 54 km southeast of the Aberdeen WSR-88D. Wind turbines placed in 32 percent of the project area (70.5 sq km) would protrude into the radar's 1<sup>st</sup> elevation scanning angle (0.5 deg) under standard atmospheric conditions, up to 6% of the beam width (Figure 2). Wind turbines placed in this portion of the project area would be continuously visible in the WSR-88D radar data in radar azimuths 126-137° (11 degrees of azimuth). Since the project area is at least 25 km from the radar, and beam penetration is less than 30% of the beam width, multipath scattering is not anticipated.



and any impacts would be confined to the project area. Turbine clutter contamination is likely to impact the radar's precipitation estimates over the Northern portion of the wind farm area. However, we do not anticipate impacts to critical mesocyclone / tornado detection algorithms. NOAA will not request mitigation of impacts for this project configuration.



**Figure 2: Close up of proposed Crocker Wind Project area (blue polygon). Black shaded area designates where 150-meter tall turbines would penetrate the radar beam during the lowest scan angle (0.5 deg).**

#### **Mitigation Strategies to Reduce Impacts to the Radar**

We would like the developer to consider the following mitigation strategies as they site the turbines:

- Align turbines so that rows of turbines point towards/away from the radar (along radar azimuths).
- Avoid siting turbines in the most Northwest corner of the development area (black-shaded area in Fig 2), where impacts would be greatest.

**Report date: April 4, 2016**

For more information, please visit the Radar Operations Center Wind Farm Interaction Web Page at [http://www.roc.noaa.gov/WSR88D/WindFarm/WindFarm\\_Index\\_GreatFalls.aspx?wid=\\*](http://www.roc.noaa.gov/WSR88D/WindFarm/WindFarm_Index_GreatFalls.aspx?wid=*)

## Melissa Schmit

---

**From:** Johnson, Scott <SJohnson@WAPA.GOV>  
**Sent:** Friday, December 01, 2017 12:23 PM  
**To:** Melissa Schmit  
**Subject:** RE: [EXTERNAL] Crocker Wind Farm - WAPA Microwave Path Review  
**Attachments:** Crocker Wind - Clark Cty SD.png

Melissa,

Attached is the GIS aerial of the Crocker Wind Farm (and the Groton wind farm just north of it) with respect to our Clark Repeater (south) and Bristol Substation (north). I am still awaiting feedback regarding further analysis as required for Basin and ERC, I will let you know if either foresees this project as an issue. This project will not cause problems for WAPA.

Thanks,

**Scott E. Johnson | Sr. Telecommunications Engineer | Spectrum Management**  
Western Area Power Administration | Headquarters | Lakewood, CO  
Department of Energy  
(O) 720.962.7380 | (F) 720.962.4080 | [sjohnson@wapa.gov](mailto:sjohnson@wapa.gov)



---

**From:** Johnson, Scott  
**Sent:** Thursday, November 30, 2017 7:36 AM  
**To:** 'Melissa Schmit'  
**Subject:** RE: [EXTERNAL] Crocker Wind Farm - WAPA Microwave Path Review

Melissa,

Thank you for the information on the Crocker project, it is in the hands of our GIS folks now to get uploaded alongside our telecommunications systems. I should be able to provide you some answers in relatively short order depending on how quickly the upload occurs. We will also be looking at the impact on systems owned by Basin Electric and East River Electric in that area, at their request. I will provide you the results of our analysis as soon as it is completed.

Please contact me with any questions or concerns.

Regards,

**Scott E. Johnson | Senior Telecom Engineer | Spectrum Program Manager**  
Western Area Power Administration | Headquarters | Lakewood, CO  
Department of Energy  
(O) 720.962.7380 | (F) 720.962.4080 | [sjohnson@wapa.gov](mailto:sjohnson@wapa.gov)



---

**From:** Melissa Schmit [<mailto:melissa@geronimoenergy.com>]  
**Sent:** Wednesday, November 29, 2017 4:13 PM  
**To:** Johnson, Scott  
**Subject:** [EXTERNAL] Crocker Wind Farm - WAPA Microwave Path Review

Hello Scott,

Thank you for the call earlier this week on WAPA's process for evaluating microwave paths. As we discussed, I have attached shapefiles of the Crocker Wind Farm (located in Clark County, SD) preliminary turbine locations and a KMZ of the project boundary. Turbine locations have the potential to shift within 500 feet or so pending the completion of environmental studies. The maximum rotor diameter for the turbines would be 136 meters.

Please let me know if you foresee any issues with the three paths that cross the project boundary from the Clark Repeater.

Thank you,

## Melissa Schmit

*Senior Permitting Specialist*

7650 Edinborough Way, Suite 725

Edina, MN 55435

Main: 952.988.9000

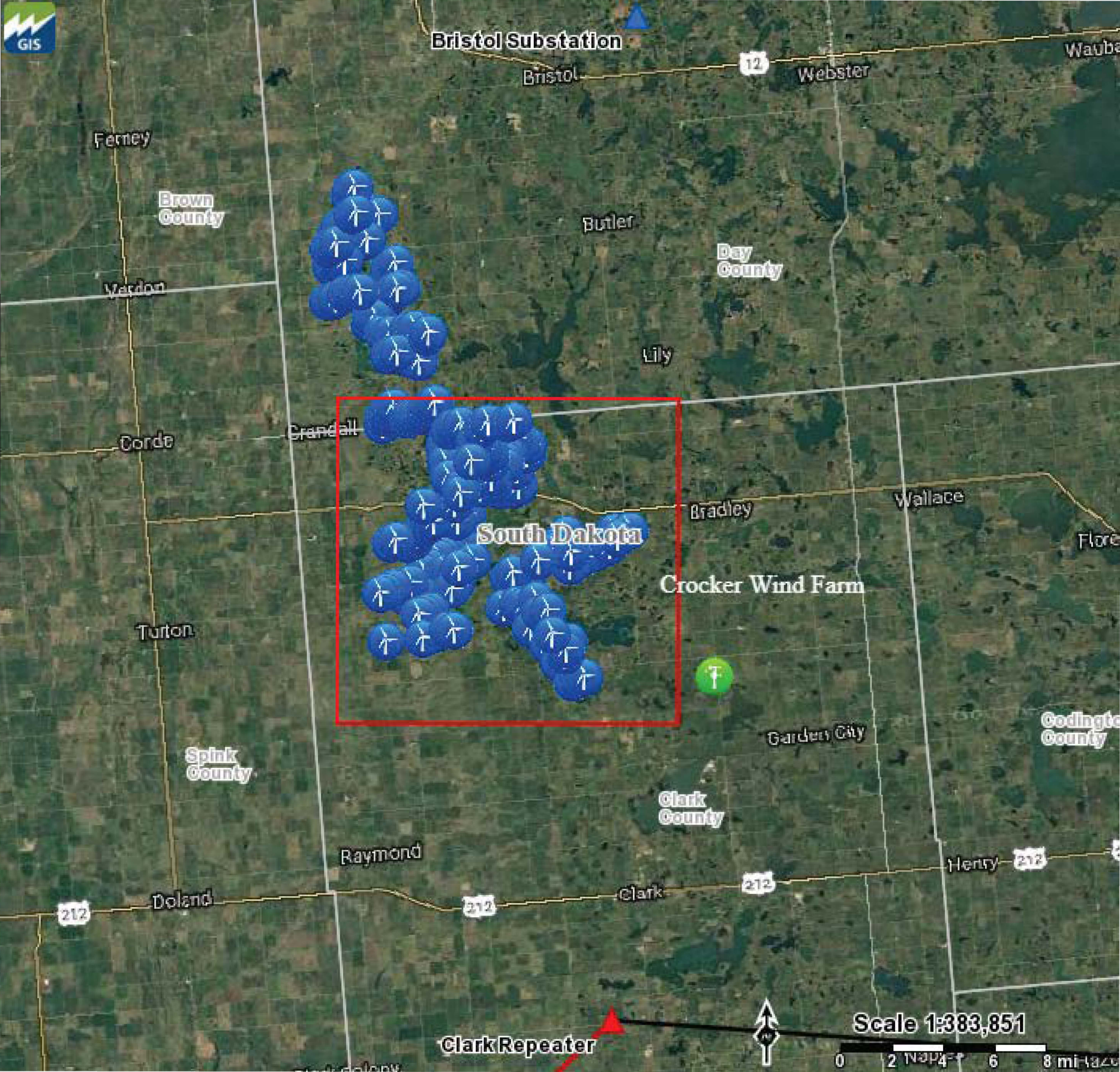
Direct: 612.259.3095

Cell: 952.237.3656

[Geronimo Energy](#)







Bristol Substation

Bristol

12

Webster

Wauba

Ferney

Brown  
County

Wardon

Butler

Day  
County

Lily

Corde

Grandall

South Dakota

Bradley

Wallace

Flore

Crocker Wind Farm

Turton

Spink  
County

Garden City

Codington  
County

Clark  
County

Raymond

Clark

Henry

212

212

Doland

212

212

Clark Repeater

Scale 1:383,851

0 2 4 6 8 mi





Interstate Telecommunications Cooperative, Inc.  
312 4<sup>th</sup> Street West, PO Box 920, Clear Lake, SD 57226

---

Melissa Schmit  
Geronimo Energy  
Senior Permitting Specialist  
7650 Edinborough Way, Suite 725  
Edina, MN 55435

10/26/16

Melissa,

Please see the attached shape and pdf files of our facilities in the areas you requested to assist in your design and crossing agreements. We greatly appreciate being contacted at this early stage in the process to help alleviate inductive interference. ITC has experienced inductive interference on our customer's copper lines with other wind farm projects that put them in an out of service condition. Therefore we have very heightened concerns when these wind farms are proposed in our service areas.

When telephone lines parallel power lines, magnetic fields from the power system couple to the telephone circuits and longitudinal currents are induced into the cable pairs. Some of this current is converted to telephone circuit noise. In reviewing your wind farm electrical grid layouts there are numerous areas that this will occur. We have listed these sections for your reference.

Inductive interference will happen to some extent on all telephone circuits that parallel power facilities, transmission or distribution. It is the intensity of the magnetic field that determines the amount of interference. In order to estimate a reasonable buffer distance in parallel we would need to know the maximum load on your lines. Although there are formulas to try and determine the amount of interference it cannot be substantial. Therefore our engineering firm recommends avoiding paralleling in the same or adjacent Right of Ways. We have conducted testing using Ground Return IT to determine the interference levels but this is after the lines are in place. Crossings have not proven to have the same effect as paralleling.

It is common for telephone and power companies to work together to mitigate these problems. There are known techniques that the telephone company and the power company can implement to mitigate the noise but the best practice is to avoid the issue all together if at all possible. We look forward to working with Geronimo Energy upfront to reduce the exposure lengths which will help to mitigate circuit noise.

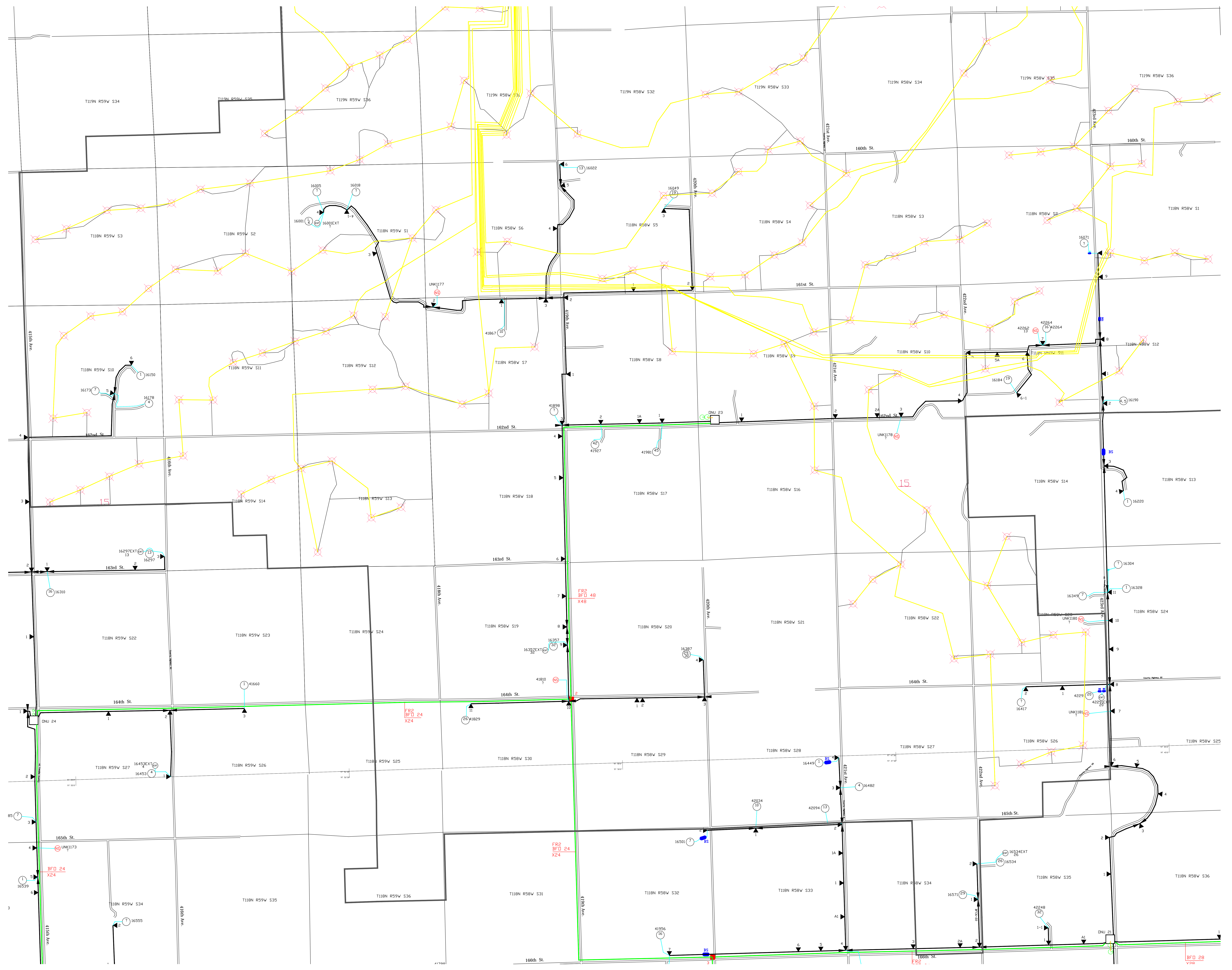
If you have any questions on our facilities map, please give myself or Terry a call at 605 874-2181. We look forward to hearing from you to address our concerns.

Sincerely,

Ren Preheim  
Network Operations Manager  
Interstate Telecommunications Coop.

Cc: Terry Pederson – ITC  
Barry Dardis – Dardis.com







Potential Impact Areas for ITC Facilities					
Areas where the proposed routes may cross, run parallel or be in close proximity to ITC facilities					
Sections within the Crocker Wind Farm Project Boundary					
State	County	Civil Township Name	Township	Range	Sections
SD	Clark	Ash	118 N	59 W	1, 10
SD	Clark	Woodland	118 N	58 W	1, 2, 5-12, 23, 26



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182

[denr.sd.gov](http://denr.sd.gov)

April 25, 2016

Ms. Melissa Schmit  
Crocker Wind Farm, LLC  
7650 Edinborough Way, Suite 725  
Edina, MN 55435

Dear Melissa Schmit:

The air quality review for the proposed wind energy project in Clark County, South Dakota has been completed by our program. Based on the information provided the proposed project will not cause a significant impact on the air quality in South Dakota and the project is approved.

However, South Dakota air quality regulations do require temporary batch plants to have a general permit to operate. Please contact Samantha Olmstead in the department's Air Quality Program in Pierre at 605-773-3151 for more information on how to comply with the air quality requirements if the project is approved.

Thank you for supplying the information to the Air Quality Program for review.

Sincerely,

A handwritten signature in blue ink that reads 'Rick Boddicker'.

Rick Boddicker  
Environmental Scientist III  
SD Air Quality Program  
605-773-6706

cc: Samantha Olmstead, DENR Pierre Air Quality Program



RECEIVED

APR 20 2016

April 18, 2016

SURFACE WATER PROGRAM

John Miller  
SD Dept of Environment and Natural Resources  
Joe Foss Building  
523 East Capitol  
Pierre, SD 57501-3182

**DRINKING WATER QUALITY DETERMINATION**

It appears, based on the information provided, that this project will not have adverse environmental effects to drinking water in this area. This project is approved.

Approved by: Mark Mayan

Date: 4/27/16

ID No.: 2816046

(605) 773-3754

Fax (605) 773-5286

**SOUTH DAKOTA DEPARTMENT OF  
ENVIRONMENT & NATURAL RESOURCES**

\* COORDINATE W/ LOCAL RURAL  
WATER SYSTEM TO ENSURE NO

RE: Requesting Comments on Crocker Wind Farm in Clark County, South Dakota

IMPACT TO  
EXISTING LINES.

Dear Mr. Miller:

Crocker Wind Farm, LLC ("Crocker Wind Farm"), a wholly owned subsidiary of Geronimo Energy, LLC, is gathering information and requesting agency comments for a proposed wind energy project in Clark County, South Dakota.

Crocker Wind Farm will be submitting a Facility Permit Application to the South Dakota Public Utilities Commission ("PUC").

The planned output for the Project is up to 200 megawatts of nameplate wind energy capacity. The Project's permanent facilities will include:

- wind turbines and related equipment;
- new gravel access roads and improvements to existing roads;
- underground electrical collection lines;
- an operations and maintenance ("O&M") building;
- a substation facility;
- up to four permanent meteorological towers (up to 80 meters tall); and
- an associated transmission line.

A transmission line route has not yet been determined. A separate notification describing the proposed route will be distributed once a corridor has been established.

The Project's temporary facilities will include:

- temporary batch plant area;
- staging/lay down area for construction of the Project;
- staging area for delivery trucks;
- temporary meteorological towers before and after construction; and
- temporary improvements to public roads including wide-turn radii.



The turbine locations, access roads and electrical connections have not been finalized at this time. Table 1 provides the sections of land Crocker Wind Farm is evaluating for siting the wind energy project.

**Table 1: Sections within the Crocker Wind Farm Project Boundary**

State	County	Civil Township Name	Township	Range	Sections
SD	Clark	Spring Valley	119	58	19-22, 26-36
SD	Clark	Warren	119	59	23-27, 34-36
SD	Clark	Ash	118	59	1-3, 10-15
SD	Clark	Woodland	118	58	1-12, 14-16, 22, 23, 26

To facilitate your review, we have enclosed a map of Crocker Wind Farm's location and the associated project boundary.

We welcome any comments your agency may have at this time and throughout the permit application process. Any written agency comments provided in response to this letter will be incorporated into the PUC's review process.

If you require further information or have questions regarding this matter, please contact me at 952-988-9000 or at [melissa@geronimoenergy.com](mailto:melissa@geronimoenergy.com).

Sincerely,

Melissa Schmit  
Senior Permitting Specialist

Enclosure:  
Crocker Wind Farm Location Map





**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

May 2, 2016

Melissa Schmidt  
Senior Permitting Specialist  
Crocker Wind Farm, LLC  
7650 Edinborough Way  
Suite 725  
Edina, MN 55435

Re: Crocker Wind Farm

Dear Ms. Schmidt:

The South Dakota Department of Environment and Natural Resources' (DENR) Ground Water Quality Program has reviewed the above-referenced project for potential impacts to ground water quality. Based on the information submitted in your letter, dated April 18, 2016, DENR does not anticipate adverse impacts to ground water quality by this project.

If construction for this project disturbs one or more acre(s) of soil, a storm water permit may be required. For more information or to obtain a storm water permit, please contact the Department at 1-800-SD-Storm or visit:  
<http://denr.sd.gov/des/sw/StormWaterandConstruction.aspx>.

There have been numerous petroleum and other chemical releases throughout the state. Of the releases reported to DENR, we have identified one release case potentially in the vicinity of your project. A list of releases in or near your project area is enclosed in Table 1. However, the locational information provided to us regarding releases is sometimes inaccurate or incomplete. If you would like to do more research, additional information on reported releases in South Dakota may be obtained at the following website: <http://arcgis.sd.gov/server/denr/spillsviewer/>.

In the event that contamination is encountered during construction activities or is caused by the construction activity, Crocker Wind Farm, LLC, or its designated representative, must report the contamination to DENR at 605-773-3296. Any contaminated soil encountered or caused by the construction must be temporarily stockpiled and sampled to determine disposal requirements.

CrockerWindFarm(DB1623).docx

Please notify the Department again after a specific route for transmission lines has been established.

Thank you for providing DENR the opportunity to comment on this project. If you have any questions regarding the information provided, please contact me at 605-773-3296.

Sincerely,



Kayla Fawcett, Engineer II  
Ground Water Quality Program

Enclosure

c: Michael Gravning, Clark County Emergency Manager, Clark, SD

Table 1 - Known releases that may impact the Crocker Wind Farm as of April 28, 2016.

DENR ID	Site Name	City	County	Street	Material	Status	R1	Latitude	Longitude
2013.049	Tank Leak - Compressor Station #10	Bradley	Clark	42135 160th Street	Lube Oil	C	KM	45.067542	-97.796997

DENR ID = DENR Case Number

Status: C = Closed, NFA = No Further Action, O/M = Open/Monitoring, I=Inactive, T=Tracking, W=Withdrawn

R1 = DENR reviewer's initials



DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES

JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

May 9, 2016

Melissa Schmit  
Crocker Wind Farm, LLC  
7650 Edinborough Way  
Suite 725  
Edina, MN 55435

Dear Ms. Schmit:

The South Dakota Department of Environment and Natural Resources (DENR) reviewed the proposed Crocker Wind Farm project in Clark County, SD. The DENR finds that this construction, using conventional construction techniques, should not cause violation of any statutes or regulations administered by the DENR based on the following comments:

1. At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site. Any construction activity that disturbs an area of one or more acres of land must have authorization under the General Permit for Storm Water Discharges Associated with Construction Activities. Contact the Department of Environment and Natural Resources for additional information or guidance at 1-800-SDSTORM (737-8676) or <http://denr.sd.gov/des/sw/StormWaterandConstruction.aspx>.
2. A Surface Water Discharge (SWD) permit may be required if any construction dewatering should occur as a result of this project. Please contact this office for more information.
3. Impacts to tributaries and wetlands should be avoided or minimized if possible. These water bodies are considered waters of the state and are protected under the South Dakota Surface Water Quality Standards. The discharge of pollutants from any source, including indiscriminate use of fill material, may not cause destruction or impairment except where authorized under Section 404 of the Federal Water Pollution Control Act. Please contact the U.S. Army Corps of Engineers concerning these permits.

If you have any questions concerning these comments, please contact me at the (605) 773-3351.

Sincerely,

John Miller  
Environmental Scientist  
Surface Water Quality Program





RECEIVED

APR 20 2016

SURFACE WATER PROGRAM

April 18, 2016

John Miller  
SD Dept of Environment and Natural Resources  
Joe Foss Building  
523 East Capitol  
Pierre, SD 57501-3182

**Waste Management Determination  
Hazardous Waste/Solid Waste/Asbestos**

It appears, based on the information provided, that this project will have little or no impact on the waste management in this area.

Approved By: Dawn Kalberg  
Date: 4-22-16

**South Dakota Department of  
Environment & Natural Resources**  
Phone: (605) 773-3153 Fax: (605) 773-6035

RE: Requesting Comments on Crocker Wind Farm in Clark County, South Dakota

Dear Mr. Miller:

Crocker Wind Farm, LLC ("Crocker Wind Farm"), a wholly owned subsidiary of Geronimo Energy, LLC, is gathering information and requesting agency comments for a proposed wind energy project in Clark County, South Dakota.

Crocker Wind Farm will be submitting a Facility Permit Application to the South Dakota Public Utilities Commission ("PUC").

The planned output for the Project is up to 200 megawatts of nameplate wind energy capacity. The Project's permanent facilities will include:

- wind turbines and related equipment;
- new gravel access roads and improvements to existing roads;
- underground electrical collection lines;
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- a substation facility;
- up to four permanent meteorological towers (up to 80 meters tall); and
- an associated transmission line.

A transmission line route has not yet been determined. A separate notification describing the proposed route will be distributed once a corridor has been established.

The Project's temporary facilities will include:

- temporary batch plant area;
- staging/lay down area for construction of the Project;
- staging area for delivery trucks;
- temporary meteorological towers before and after construction; and
- temporary improvements to public roads including wide-turn radii.



The turbine locations, access roads and electrical connections have not been finalized at this time. Table 1 provides the sections of land Crocker Wind Farm is evaluating for siting the wind energy project.

**Table 1: Sections within the Crocker Wind Farm Project Boundary**

State	County	Civil Township Name	Township	Range	Sections
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SD	Clark	Woodland	118	58	1-12, 14-16, 22, 23, 26

To facilitate your review, we have enclosed a map of Crocker Wind Farm's location and the associated project boundary.

We welcome any comments your agency may have at this time and throughout the permit application process. Any written agency comments provided in response to this letter will be incorporated into the PUC's review process.

If you require further information or have questions regarding this matter, please contact me at 952-988-9000 or at [melissa@geronimoenergy.com](mailto:melissa@geronimoenergy.com).

Sincerely,

Melissa Schmit  
Senior Permitting Specialist

Enclosure:  
Crocker Wind Farm Location Map





May 9, 2016

Ms. Melissa Schmit  
Crocker Wind Farm, LLC  
7650 Edinborough Way, Suite 725  
Edina, MN 55435

Dear Ms. Schmit:

Thank you for the opportunity to comment on the proposed Crocker Wind Farm in Clark County, South Dakota. Based on the information provided in your letter, it is unclear if your project will be a federal undertaking as defined by 36 CFR part 800, the implementing regulations for Section 106 of the National Historic Preservation Act of 1966, or if your project will be subject to South Dakota Codified Law: SDCL 1-19A-11.1.

However, based on a brief review of our records, very little archaeological survey has been conducted in the proposed project area. We recommend your company complete an on-the ground archaeological survey (Level III Cultural Resource Survey) of the project area prior to any ground disturbing activities and seek to avoid all identified cultural properties.

In addition, given the general height of each wind tower, we recommend properties within a two mile buffer of your project area be taken into consideration for visual effects. A search of all known properties (archaeological and structures), and previous surveys can be obtained by contacting the Archaeological Research Center at (605)394-1936.

We also recommend contacting the Tribal Historic Preservation Officers in South Dakota concerning the effects of the project on properties of religious and cultural significance. A list of Tribal Historic Preservation Officers in South Dakota can be found on our website at <http://history.sd.gov/preservation/TechAssist/SDChairsTHPOs.pdf>.

More information about Section 106 of the National Historic Preservation Act, SDCL 1-19A-11.1 and the Level III Cultural Resource Survey can be found on our website at <http://history.sd.gov/Preservation/>.

Please note that this letter does not relieve any federal agency of their responsibility for compliance with the Section 106 of NHPA.

Once the Level III Cultural Resource Survey is complete, we would appreciate the opportunity to comment on the project's effects to cultural resources. Should you require additional information, please contact Paige Olson at [Paige.Olson@state.sd.us](mailto:Paige.Olson@state.sd.us) or (605) 773-6004.

Sincerely,

Jay D. Vogt  
State Historic Preservation Officer

A handwritten signature in dark ink, appearing to read "P. Olson", with a stylized flourish at the end.

Paige Olson  
Review & Compliance Coordinator



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
CORPS OF ENGINEERS, OMAHA DISTRICT  
SOUTH DAKOTA REGULATORY OFFICE  
28563 POWERHOUSE ROAD, ROOM 118  
PIERRE, SOUTH DAKOTA 57501-6174

June 22, 2016

South Dakota Regulatory Office  
28563 Powerhouse Road, Room 118  
Pierre, South Dakota 57501

Crocker Wind Farm, LLC  
Attn: Melissa Schmit  
7650 Edinborough Way, Suite 725  
Edina, Minnesota 55435

Dear Ms. Schmit,

Reference is made to the preliminary information received April 20, 2016, concerning Department of the Army authorization requirements for a proposed wind energy project, in Clark County, South Dakota.

The Corps' jurisdiction is derived from Section 404 of the Clean Water Act which calls for Federal regulation of the discharge of dredged or fill material into certain waterways, lakes and/or wetlands, (i.e. waters of the United States). If the project involves either the discharge of dredged or fill material into waters subject to Federal regulation, it is requested that the project proponent submit an application for a Department of the Army permit.

Regarding your request for comment relative to environmental impacts, this office assesses project impacts, including environmental impacts, after receipt of the detailed, site specific information required via our permit application process.

You can obtain additional information about the Regulatory Program and download forms from our website: <http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/SouthDakota.aspx>

If you have any questions or need any assistance, please feel free to contact this office at the above Regulatory Office address or telephone at (605) 224-8531.

Sincerely,

A handwritten signature in black ink, reading "Steven E. Naylor", is positioned above the typed name.

Steven E. Naylor  
Regulatory Program Manager,  
South Dakota



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Ecological Services  
420 South Garfield Avenue, Suite 400  
Pierre, South Dakota 57501-5408



May 18, 2016

Melissa Schmidt  
Crocker Wind Farm, LLC  
7650 Edinborough Way, Suite 725  
Edina, Minnesota 55435

Re: Crocker Wind Farm, Clark County, South  
Dakota

Dear Ms. Schmidt:

This letter is in response to your request dated April 18, 2016, for environmental comments regarding the above referenced project involving a proposed wind farm located south and west of the town of Crocker in northern Clark County, South Dakota.

We note in your letter that Crocker Wind Farm, LLC, is a wholly owned subsidiary of Geronimo Energy, LLC. We previously submitted environmental comments regarding this project to Geronimo Energy, dated December 1, 2010. It appears the proposed project footprint has expanded since then. Per your letter, the project output would be up to 200 megawatts and include turbines with related equipment, roads, underground collection lines, an O & M building, substation, up to four meteorological towers and a (presumed overhead) transmission line (with exact route yet to be determined). Many of the comments provided in our December 1, 2010, letter (enclosed) still apply and are reiterated herein, with some updated information.

In this letter, 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 you in achieving compliance with Federal laws.

### **U.S. Fish and Wildlife Service Easements**

The location of the proposed Crocker Wind Farm falls within an area under the jurisdiction of the Service's Waubay Wetland Management District (WMD). Our initial examination reveals that numerous Service easements and fee title properties exist in Clark County, including the proposed project area. This is a testament to the high wildlife value of the area and relatively greater environmental impacts that may be anticipated if the proposed project is constructed there. To determine the exact locations of these properties and any additional restrictions that



may apply regarding those sites, please contact Ms. Connie Mueller at: U.S. Fish and Wildlife Service, Waubay Wetland Management District, 44401 134A Street, Waubay, South Dakota, 57273, phone: (605) 947-4521.

### Threatened/Endangered Species

In accordance with section 7(c) of the Endangered Species Act (ESA), as amended, 16 U.S.C. 1531 et seq., we have determined that the following federally listed species may occur in the project area (this list is considered valid for 90 days):

<u>Species</u>	<u>Status</u>	<u>Expected Occurrence</u>
Whooping Crane ( <i>Grus americana</i> )	Endangered	Migration
Rufa Red Knot ( <i>Calidris canutus rufa</i> )	Threatened	Rare seasonal migrant
Northern Long-eared Bat ( <i>Myotis septentrionalis</i> )	Threatened	Summer resident, seasonal migrant, known winter resident in Black Hills
Poweshiek Skipperling ( <i>Oarisma poweshiek</i> )	Endangered	Resident in native prairie, northeastern SD

#### Whooping Crane:

The proposed wind farm location 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. A map of the portion of the migration corridor that exists in South Dakota and an associated "required reading" document for that corridor map are enclosed. 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. Whooping cranes are large birds with low maneuverability. Line strike mortality is the greatest known threat to fledged whooping cranes; more information on this topic is provided herein (see enclosure dated February 4, 2010, and Power Lines section below). While whooping crane interactions with wind turbines are not currently known, mortality via turbine strikes may also pose a risk if the birds utilize habitat at/near wind farm sites. Also, loss of stopover habitat in the migration corridor is a concern that may be realized if whooping cranes tend to avoid wind farms in this area. Additionally, should construction occur during spring or fall migration, the potential for disturbances to whooping cranes exists. Disturbance (flushing the birds) 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. Please note that use of the proposed project area by sandhill cranes may be indicative of the potential presence of whooping cranes since the two species are often observed utilizing the

same habitats and migrating together.

#### Rufa Red Knot:

The rufa red knot is a robin-sized shorebird listed as threatened under the Endangered Species Act (see: <http://www.gpo.gov/fdsys/pkg/FR-2014-12-11/pdf/2014-28338.pdf> for more information). The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States, the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. Although it is primarily a coastal species, small numbers of rufa red knots are reported annually across the interior United States (i.e., greater than 25 miles from the Gulf or Atlantic Coasts) during spring and fall migration. These reported sightings are concentrated along the Great Lakes, but multiple reports have been made from nearly every interior State, including South Dakota. The species does not breed in this state.

#### Northern Long-eared Bat:

The northern long-eared bat is a medium-sized brown bat listed as threatened under the Endangered Species Act. Northern long-eared bats are known to be present in South Dakota during the summer months, primarily roosting singly or in colonies underneath bark, in cavities or in crevices of both live and dead trees. Some hibernacula have been documented in caves/mines in the Black Hills. The species has been documented in other forested areas in the state during the summer months and along the Missouri River during migration. White nose syndrome - a fungus affecting hibernating bats - is considered a significant threat to this species, but individuals may be harmed by other activities such as modifications to hibernacula, timber harvest, human disturbance, and collisions with wind turbines. Currently, feathering turbine blades and increasing cut-in speeds are recommended measures to reduce the risk of bat mortality at wind generation facilities. A 4(d) rule has been published that exempts take of Northern long-eared bats in certain circumstances. For more information, see: <https://www.fws.gov/Midwest/Endangered/mammals/nleb/index.html>.

#### Poweshiek Skipperling:

The Poweshiek skipperling is a small prairie butterfly listed as endangered under the Endangered Species Act (see: <http://www.gpo.gov/fdsys/pkg/FR-2014-10-24/pdf/2014-25190.pdf>). The habitat of Poweshiek skipperlings includes prairie fens, grassy lake and stream margins, moist meadows, and wet-mesic to dry tallgrass prairie. Preferred nectar plants for adult Poweshieks include smooth ox-eye (*Heliopsis helianthoides*) and purple coneflower (*Echinacea angustifolia*), but they also use stiff tickseed (*Coreopsis palmate*), black-eyed susan (*Rudbeckia hirta*), and palespike lobelia (*Lobelia spicata*). Larval food plants are assumed to include spike-rush, sedges, prairie dropseed (*Sporobolus heterolepis*) and little bluestem (*Schizachyrium scoparium*). Poweshiek skipperlings have one flight per year from about the middle of June through the end of July (depending upon weather). They have a low dispersal capability, and may not cross areas that are not structurally similar to native prairies. Extirpation from fragmented and isolated prairie remnants may be permanent unless it occurs within about 0.6 miles of an inhabited site that generates a sufficient number of emigrants. They are vulnerable to extreme weather conditions, dormant season fire, and other disturbances (e.g., intense cattle grazing). Avoidance of impacts to native prairie habitat is recommended to reduce the risk of adverse effects to this species. Critical habitat has been designated for the Poweshiek skipperling



in South Dakota; for details and locations see the following website:  
<http://www.fws.gov/midwest/endangered/insects/dask/finalch.html>.

If a Federal nexus exists for this project and the Federal action agency (or their designated representative) determines that the project "may adversely affect" listed species in South Dakota, formal consultation with this office under section 7 of the ESA is required. If a "may affect - not likely to adversely affect" determination is made for this project, it should be submitted to this office for concurrence. If a "no effect" determination is made, further consultation may not be necessary; however, a copy of the determination should be sent to this office.

If no Federal agency is involved with the proposed project and adverse impacts to federally listed species may occur, ESA compliance may be achieved by private entities via coordination with this office and development of a Habitat Conservation Plan (HCP). Our website provides more information on HCPs at: <http://www.fws.gov/endangered/what-we-do/hcp-overview.html>.

### **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: <http://www.fws.gov/northeast/ecologicalservices/eaglenationalguide.html>. 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, and facilitates the process of obtaining an eagle take permit. It is available online at: <https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf>. South Dakota is part of the Service's Region 6, therefore we have enclosed a document intended to further assist wind companies working in this region as they develop Eagle Conservation Plans: *Final Outline and Components of an Eagle Conservation Plan (ECP) for Wind Development: Recommendations from USFWS Region 6*.

### **Wetlands**

According to National Wetlands Inventory maps (available online at <http://wetlands.fws.gov/>), numerous wetlands exist within the proposed project area, including several relatively large water bodies which may attract high numbers of migratory birds. 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.

### **Birds of Conservation Concern and Other Grassland Birds**

The Migratory Birds Division of the Service has published *Birds of Conservation Concern 2008*, which may be found online at:

<https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.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. Primary threats impacting grassland species that occur in South Dakota are habitat loss and fragmentation. As mentioned above, the area proposed for construction of this wind development appears to be in an area of intact grassland with numerous associated wetlands - a highly valuable area for prairie wildlife. In accordance with Executive Order 13186 regarding migratory bird protection, we recommend avoidance, minimization, and finally compensation 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 (BBCS) (identified within our *Land-Based Wind Energy Guidance* – and explained further below). However, a separate mitigation plan that specifically addresses direct and indirect take of birds during and after construction is also recommended, particularly if placement must occur within intact native grasslands. Some species of grassland nesting birds are known to exhibit avoidance behavior relative to wind turbines on the prairie landscape, out to a distance of 300 m or more (Shaffer and Buhl 2015), which equates to an area approximately 70 acres in size around each turbine. If prairie habitat impacts are unavoidable, we recommend implementing offsetting measures for this impact, such as prairie restoration, establishment of easements, or purchase of fee title lands. We can provide further guidance in this regard if the project progresses.

### **Wind Turbine Guidelines**

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. 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* are designed to help wind energy project developers avoid and minimize impacts of land-based wind projects on wildlife and their habitats are available at: <http://www.fws.gov/windenergy/>. If the proposed project is to be constructed, we request the

results of any 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.

### **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. Of primary concern are the collision mortality risks posed to migratory birds as towers are currently estimated to kill 6.8 million birds per year in the United States and Canada (Longcore et al. 2012). We have enclosed Service guidance on this issue, our *2013 U.S. Fish and Wildlife Service (USFWS) Revised Voluntary Guidelines for Communication Tower Design, Siting, Construction, Operation, Retrofitting, and Decommissioning*. Among the primary concerns addressed within our guidelines are the establishment of new towers on the landscape, the heights of these towers, their lighting scheme, and means of structural support. Collocation of communications tower facilities on an existing structure is strongly recommended to avoid any additional impacts to migratory birds. If a new tower is necessary, placement of the new tower near other existing structures is recommended to concentrate the risk posed by the towers to relatively small areas. Minimization of tower height (below 200 feet to preclude the need for Federal Aviation Administration lighting requirements), use of only strobe or flashing lights (no steady-burning lights), and avoidance of guy wires (a great deal of avian mortality is a result of collisions with supporting guy wires) are important components intended to minimize potential impacts to migratory birds.

### **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 at: <http://www.eei.org/resourcesandmedia/products/Pages/products.aspx>, or by calling 202-508-5000.

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 has, 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, and 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 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, again, may be obtained by contacting the Edison Electric Institute via their website at <http://www.eei.org/resourcesandmedia/products/Pages/products.aspx>, or by calling 202-508-5000.

Please note that, 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. As noted above, the whooping crane is particularly susceptible to this type of mortality, and your project occurs within the whooping crane migratory corridor. This region of the Service (Region 6) has developed *Guidance for Minimizing Effects From Power Line Projects Within the Whooping Crane Migration Corridor* (copy enclosed). Marking of existing lines elsewhere in the species’ corridor is recommended. As indicated previously, a copy of the migration corridor of the Aransas-Wood Buffalo Population of whooping cranes is also enclosed for your information.

## **Bird and Bat Conservation Strategy**



As with Eagle Conservation Plans for wind projects in this region, we have developed a document to further assist companies in following our established national guidance on BBCSs. We have enclosed our Region 6 *Outline for a Bird and Bat Conservation Strategy: Wind Energy Projects*. As stated in the introduction of that document: a BBCS “...is a life-of-a-project framework for identifying and implementing actions to conserve birds and bats during wind energy project planning, construction, operation, maintenance, and decommissioning. It is the responsibility of wind energy project developers and operators to effectively assess project-related impacts to birds, bats and their habitats, and to work to avoid and minimize those impacts.” A BBCS explains the actions taken by developers as they progress through the tiers of our Land-Based Wind Energy Guidelines, describing the analyses, studies, and reasoning implemented with the purpose of mitigating for potential avian and bat impacts. It also addresses postconstruction monitoring and habitat impacts. We recommend you develop a BBCS as this project progresses.

### **Migratory Bird Treaty Act**

The Migratory Bird Treaty Act 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 as a result of wind farm operations, 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**

Below we reiterate the items discussed above that are pertinent to the proposed project, any associated recommended guidance or related information and suggested actions.

- Service easement properties and high value grassland/wetland habitats exist onsite:
  - Contact Waubay WMD
- Wind farm guidance:
  - *Land-Based Wind Energy Guidelines*
    - *Bird and Bat Conservation Strategy*
      - USFWS Region 6 *Outline for a Bird and Bat Conservation Strategy: Wind Energy Projects*

- Address potential impacts to federally listed (ESA) species:
  - Whooping crane
  - Rufa red knot
  - Northern long-eared bat
  - Poweshiek skipperling
- Address potential impacts to eagles:
  - MBTA and BGEPA
  - *National Bald Eagle Management Guidelines*
  - *Eagle Conservation Plan Guidance*
    - *Final Outline and Components of an Eagle Conservation Plan (ECP) for Wind Development: Recommendations from USFWS Region 6*
- Address potential impacts to wetlands
- Address migratory bird impacts:
  - MBTA
  - *Birds of Conservation Concern 2008*
  - Mitigative/offsetting measures for habitat avoidance/loss
  - Meteorological Towers:
    - *2013 USFWS Revised Voluntary Guidelines for Communication Tower Design, Siting, Construction, Operation, Retrofitting, and Decommissioning*
  - Overhead Power Lines:
    - *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*
    - *Raptors at Risk* video
    - *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.

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

Sincerely,



Scott Larson  
Field Supervisor  
South Dakota Field Office

Enclosures

Cc: Waubay Wetland Management District; Waubay, SD  
(attn.: Connie Mueller)  
SD Game, Fish, and Parks; Pierre, SD  
(attn.: Silka Kempema)

#### LITERATURE CITED:

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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



December 1, 2010

Karyn O'Brien, Environmental Planning Specialist  
Geronimo Wind Energy, LLC  
7650 Edinborough Way, Suite 725  
Edina, Minnesota 55435

Re: Wind Project in Clark County, South  
Dakota

Dear Ms. O'Brien:

This letter is in response to your request dated October 28, 2010, for environmental comments regarding the above referenced project involving a potential wind energy project. The proposed project area includes Sections 1, 2, and 12 in Township 118 North, Range 59 West; Sections 19-23 and 27-34 in Township 119 North, Range 58 West; Sections 25, 35, and 36 in Township 119 North, Range 59 West; and Sections 5-7 in Township 118 North, Range 58 West; all in Clark County South Dakota.

Herein we provide information regarding U.S. Fish and Wildlife Service (Service) trust resources including Service properties, 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. We have also provided contact details for U.S. Geological Survey (USGS) and South Dakota Department of Game, Fish and Parks (SDDGFP) personnel so that further pertinent information for this project may be obtained.

### U.S. Fish and Wildlife Service Easements

The proposed project area is located immediately west and south of the town of Crocker, South Dakota. This location falls within an area under the jurisdiction of the Service's Waubay National Wildlife Refuge Complex. The Wetland Management District staff at the Waubay Complex administer easements and fee title properties in several counties in this area, including Clark County. Our records indicate that the Service holds numerous easements on properties in the vicinity of the proposed project; a testament to the high wildlife value of the area and relatively greater environmental impacts that may be anticipated if the proposed project is



constructed there. To determine the exact locations of these properties and any additional restrictions that may apply regarding these sites, please contact Mr. Larry Martin at the Service's Waubay Wetland Management District at 44401 134A Street, Waubay, South Dakota 57273, Telephone No. (605) 947-4521.

### **Threatened/Endangered Species**

In accordance with section 7(c) of the Endangered Species Act (ESA), as amended, 16 U.S.C. 1531 et seq., we have determined that the following federally listed species may occur in the project area (this list is considered valid for 90 days):

<u>Species</u>	<u>Status</u>	<u>Expected Occurrence</u>
Whooping crane ( <i>Grus americana</i> )	Endangered	Migration.

The proposed wind farm location 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. A map of the migration corridor and an associated "required reading" document are enclosed. 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. Whooping cranes are large birds with low maneuverability. Line strike mortality is the greatest known threat to fledged whooping cranes; more information on this topic is provided herein (see enclosure dated February 4, 2010, and Power Lines section below). While whooping crane interactions with wind turbines are not currently known, mortality via turbine strikes may also pose a risk if the birds utilize habitat at/near wind farm sites. Also, loss of stopover habitat in the migration corridor is a concern that may be realized if whooping cranes tend to avoid wind farms in this area. Additionally, should construction occur during spring or fall migration, the potential for disturbances to whooping cranes exists. Disturbance (flushing the birds) 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. Please note that use of the proposed project area by sandhill cranes may be indicative of the potential presence of whooping cranes since the two species are often observed utilizing the same habitats and migrating together.

Your letter states that action may be required of the Western Area Power Administration relative to the proposed wind energy development. If a Federal nexus exists for this project and the Federal action agency (or their designated representative) determines that the project "may adversely affect" listed species in South Dakota, formal consultation with this office under section 7 of the ESA is required. If a "may affect - not likely to adversely affect" determination is made for this project, it should be submitted to this office for concurrence. If a "no effect" determination is made, further consultation may not be necessary; however, a copy of the determination should be sent to this office.



If no Federal agency is involved with the proposed project and adverse impacts to federally listed species may occur, ESA compliance may be achieved by private entities via coordination with this office and development of a Habitat Conservation Plan (HCP). Our website provides more information on HCPs at: <http://www.fws.gov/endangered/what-we-do/hcp-overview.html>.

### **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, effective August 8, 2007, 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>.

### **Wetlands**

According to National Wetlands Inventory maps (available online at <http://wetlands.fws.gov/>), numerous wetlands exist within the proposed project area, including several relatively large water bodies. 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.

### **Birds of Conservation Concern**

The Migratory Birds Division of the Service has published *Birds of Conservation Concern 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. A primary threat to many grassland species that occur in South Dakota is habitat loss and fragmentation. The area proposed for construction of this wind development appears to be in an area of intact grassland with associated wetland complex - i.e., a highly valuable area for prairie wildlife. In accordance with Executive Order 13186 regarding migratory bird protection, we recommend avoidance, minimization, and finally compensation to reduce the impacts to species protected by the MBTA. Compliance with this law may be partially addressed in an



Avian and Bat Protection Plan (see below); however, a separate mitigation plan that specifically addresses direct and indirect take of birds during and after construction is also recommended. Particularly if placement must occur within intact native grasslands (as appears to be probable if development occurs in the proposed project area), we strongly recommend development of mitigative/offsetting measures for this habitat and its associated wildlife. These measures may include, but not be limited to, purchase of easements or fee title lands.

### 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, including federally listed species as indicated above. 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 Service has developed voluntary *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* to assist energy companies in accomplishing the goal of reducing the risk posed by turbines to wildlife. These guidelines may be accessed on the internet at: <http://www.fws.gov/habitatconservation/Service%20Interim%20Guidelines.pdf>. The guidelines stress the importance of proper evaluation of potential wind turbine development sites (via development of a Potential Impact Index score for the proposed site and a reference area), appropriate location and design of turbines and related facilities, and pre- and post-construction research and monitoring. If the proposed project is to be constructed, we request the results of any pre-/post-construction wildlife monitoring, including any incidental mortality detected.

As you may know, a Wind Federal Advisory Committee spent considerable time and effort developing a recommended scientifically based approach to assessing potential risk to wildlife and their habitats from wind energy development. The tiered approach set forth in the committee's recommendations is a biologically sound risk assessment approach that includes: (1) formulating appropriate questions regarding potential wildlife impacts, (2) collecting data in ever increasing detail to answer those questions, (3) making risk assumptions based on sufficient data prior to construction of wind facilities, (4) using best management practices during construction, operation, and decommissioning, (5) testing assumptions after construction and during wind facility operations, and (6) adjusting operations and/or mitigation as needed. The tiered approach is complementary with strategic habitat conservation by looking first at landscapes and then focuses on the most appropriate sites for wind energy development, with a goal of avoiding and minimizing wildlife impacts. The committee's recommendations are



available at:

[http://www.fws.gov/habitatconservation/windpower/wind\\_turbine\\_advisory\\_committee.html](http://www.fws.gov/habitatconservation/windpower/wind_turbine_advisory_committee.html).

The Service is aware of industry embracing the recommendations developed by the Wind Turbine Guidelines Advisory Committee. It is very encouraging to have industry coming to us voluntarily as they plan future wind energy projects. We recognize that the committee's recommendations to the Secretary are, at this point, just recommendations. Despite the fact that the Service cannot advocate for the use of the recommendations for wind energy development at this point in time, we recognize that the recommendations represent a new and comprehensive effort to address the wildlife impacts of wind energy development. It is, of course, expected that a wind energy developer would want to consider using the recommendations in its assessment of a wind project on the potential impacts to wildlife. Once the Service receives a direction from the Secretary and develops its guidelines, developers will have an official document endorsed by the Service to follow while developing their projects.

### **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. We recommend following the guidance set forth in *U.S. Fish and Wildlife Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation and Decommissioning*, found online at: <http://www.fws.gov/habitatconservation/communicationtowers.html>, to minimize the threat of avian mortality at these towers. 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 (<http://www.fws.gov/habitatconservation/communicationtowers.html>). If meteorological towers are to be constructed, 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 at [www.eei.org](http://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 has, 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 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 *Mitigating Bird Collisions With Power Lines: The State of the Art in 1994* which may be obtained by contacting the Edison Electric Institute at the same website and telephone number listed above. Please note that, 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. As noted above, the whooping crane is particularly susceptible to this



type of mortality, and your project occurs within the whooping crane migratory corridor. This region of the Service (Region 6) has developed *Guidance for Minimizing Effects From Power Line Projects Within the Whooping Crane Migration Corridor* (copy enclosed). Marking of existing lines elsewhere in the species' corridor is recommended. As indicated previously, a copy of the migration corridor of the Aransas-Wood Buffalo Population of whooping cranes is also enclosed for your information.

### **Avian Protection Plans**

As a means to address some of the above issues, the Service has coordinated with the Avian Power Line Interaction Committee (APLIC) to develop guidelines to assist companies in formulating Avian (and Bat) Protection Plans (APP). APPs are utility-specific and designed to reduce avian and operational risks that result from avian interactions with electric utility facilities, but they may be adapted to wind energy facilities as well and include consideration of bat species which are known to suffer mortality at wind farms. We encourage project developers to investigate the formulation of an APP for specific projects and perhaps generate APPs at the company level. The APP guidelines may be accessed at:

<http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/BirdHazards.html>.

The Service has developed an online reporting system for mortalities. Instructions for our *Bird Fatality/Injury Reporting Program* may be found online at:

[http://www.aplic.org/USFWS\\_BirdFatality\\_FilerInstructions.pdf](http://www.aplic.org/USFWS_BirdFatality_FilerInstructions.pdf), and the reporting site itself is located online at: <https://birdreport.fws.gov/>. Migratory bird mortalities or injuries located by your company, by contractors, or other individuals should be recorded to this online site within 30 days of discovery. Use of this reporting program will benefit migratory birds by increasing our tracking capability of activities impacting migratory birds. This program may be used to complement an APP.

### **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 APPs and to implement those measures prior to/during construction, operation, or similar activities.

### **U.S. Geological Survey Research**

The USGS's Northern Prairie Wildlife Research Center in Jamestown, North Dakota, has initiated studies of avian responses to wind turbines in both North Dakota and South Dakota. Their research may be relevant to your project, depending on habitat within the project area. We recommend that you contact Ms. Jill Shaffer of the USGS's Northern Prairie Wildlife Research Center at (701) 253-5547 for more information and the possibility of participation in that research.

### **South Dakota Department of Game, Fish and Parks**

**Wind Power Guidelines.** Please note that the SDDGFP has coordinated with the South Dakota Public Utilities Commission (SDPUC) regarding distribution of SDDGFP's *Siting Guidelines for Wind Power Projects in South Dakota* to wind developers intending to construct projects within the state of South Dakota. You may wish to contact the SDPUC and/or the Wildlife Diversity Division of the SDDGFP in Pierre for more information. Contact information may be found on their respective websites: <http://puc.sd.gov/> and <http://www.sdgifp.info/Wildlife/Diversity/index.htm>. The guidelines themselves may be found online at: <http://www.sdgifp.info/wildlife/diversity/windpower.htm>.

**Bats.** Bats are known to suffer mortality due to direct collisions with wind turbines, and it has been recently determined that many also die as a result of air pressure changes at the turbine blades that cause internal injuries. The SDDGFP has completed a State Management Plan for bats (see: <http://gfp.sd.gov/wildlife/management/plans/bat-management-plan.aspx>) and may be able to provide additional information and/or recommendations on bats relative to this project.

**State Game Production Area.** The SDDGFP also owns properties immediately adjacent to the proposed project area that serve as wildlife habitat and may be impacted indirectly by the proposed project.

If you have not already done so, please contact Silka Kempema at the SDDGFP-Wildlife Division, Joe Foss Building, 523 East Capitol Avenue, Pierre, South Dakota 57501, Telephone No. (605) 773-2742, for more information regarding the above SDDGFP related issues and other concerns that fall under that agency's purview.

### **Summary**

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

- Service easement properties and high value grassland/wetland habitats.
- Impacts to the whooping crane.

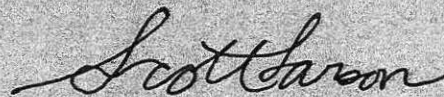


- Bald eagle impacts (MBTA and BGEPA).
- Migratory bird impacts (MBTA), including Birds of Conservation Concern, with application of pre-/post-construction monitoring and mortality data and mitigative/offsetting measures to be coordinated with and reported to the Service.
- Existing guidelines for various project components:
  - a) Wind Farm Siting: Service's *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines*.
  - b) Meteorological Towers: Service's *Interim Guidelines for Recommendations on Communications Tower Siting, Constructions, Operation and Decommissioning* and the associated *Tower Site Evaluation Form*.
  - c) Overhead Power Lines: APLIC's *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and *Mitigating Bird Collisions With Power Lines: The State of the Art in 1994* and the Service's *Bird Fatality/Injury Reporting Program*.
  - d) Overall Development: Service's *National Bald Eagle Management Guidelines* and APLIC's *Avian Protection Plan Guidelines*.
- USGS's avian/wind information and potential participation in their ongoing research.
- SDDGFP wind siting guidelines, bat issues, and adjacent property ownership.

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.

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

Sincerely,



Scott Larson  
Field Supervisor  
South Dakota Field Office

Enclosures



cc: Secretary, SDDGFP; Pierre, SD  
(Attention: Silka Kempema)  
USGS/NPWRC; Jamestown, ND  
(Attention: Jill Shaffer)  
USFWS/Waubay WMD; Waubay, SD  
(Attention: Larry Martin)

*NAG:se*



## 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.

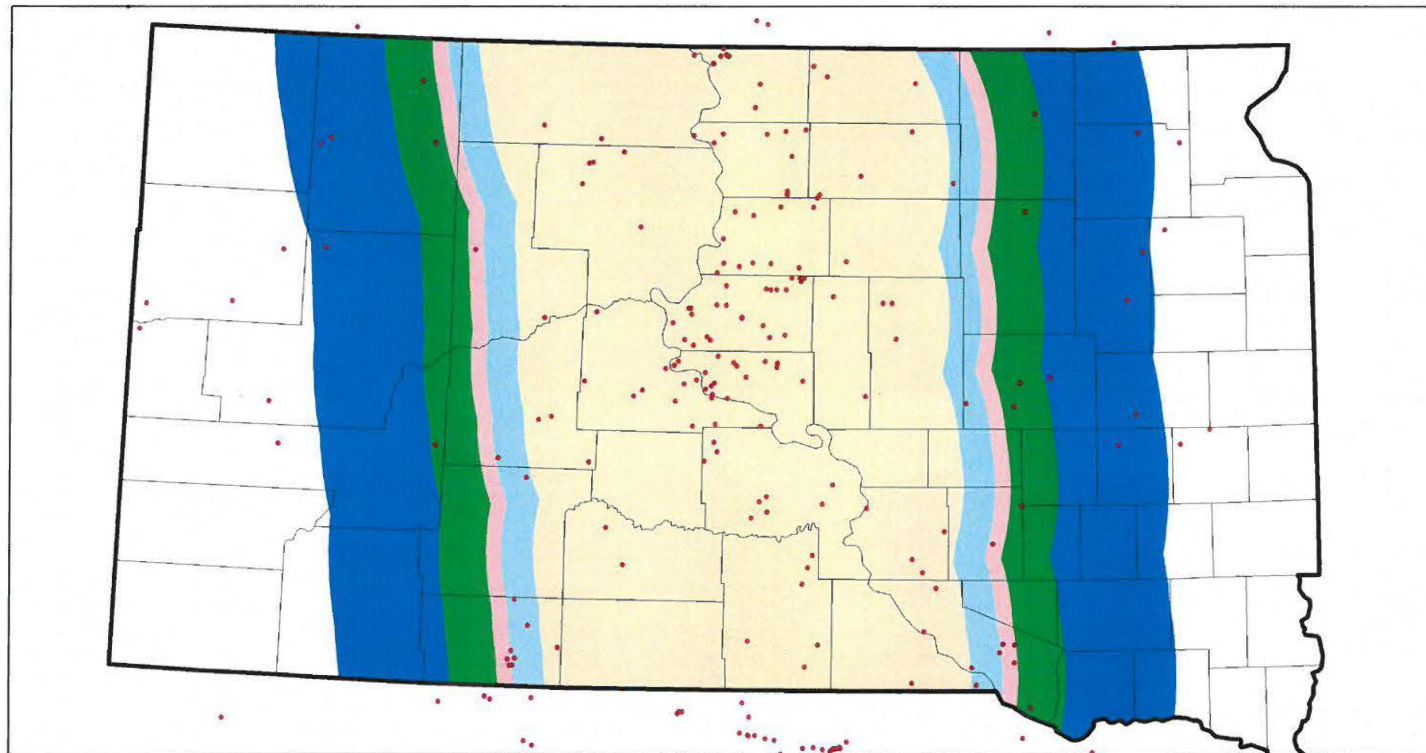
\* Austin, E.A. and A.L. Richert. 2001. A comprehensive review of observational and site evaluation data of migrant whooping cranes in the United States, 1943-99. U.S. Geological Survey. Northern Prairie Wildlife Research Center, Jamestown, North Dakota, and State Museum, University of Nebraska, Lincoln,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



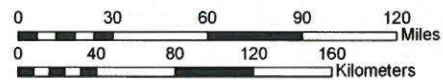
U.S. Fish & Wildlife Service

### 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:





## **U.S. Fish and Wildlife Service, Region 6, Mountain-Prairie Region**

### **Final Outline and Components of an Eagle Conservation Plan (ECP) for Wind Development: Recommendations from USFWS Region 6**

#### **Purpose and Expectations:**

The U.S. Fish and Wildlife Service (USFWS) Eagle Conservation Plan Guidance, Module 1, Land-based Wind Energy, Version 2 (ECPG)<sup>1</sup> provides specific in-depth guidance for developing an Eagle Conservation Plan (ECP) for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities. The ECP describes and documents how the project developer and/or operator intends to comply with the regulatory requirements for programmatic eagle take permits and the associated NEPA process by avoiding and minimizing the risk of taking eagles by evaluating possible alternatives in siting, configuration, construction, and operation of wind projects. The ECP should provide detailed information on siting, configuration, construction, and operational alternatives that avoid and minimize eagle take to the point where any remaining take is unavoidable and, if required, mitigates that remaining take to meet the statutory preservation standard. An ECP provides support for an application for a programmatic eagle take permit.

This Region 6 document provides recommendations, in an outline format, for developing and organizing the content of an ECP, and includes additional details on topics that should be addressed in an ECP. This guidance applies equally to both bald and golden eagles. While developing an ECP and applying for a programmatic eagle take permit is voluntary, take of eagles under the Bald and Golden Eagle Protection Act is prohibited without a permit; therefore, we encourage developers/operators of wind projects that may take eagles to develop an ECP and apply for a programmatic eagle take permit. Throughout the process of developing an ECP there should be regular communication between the project developer and/or operator and USFWS personnel (Ecological Services and Migratory Bird Management Offices). This can include emails, conference calls, and meetings involving review of survey data, review and editing of draft documents, joint development of avoidance and minimization measures, review and discussion on model runs, joint work on calculations for compensatory mitigation when required, etc.

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<sup>1</sup> Available at <http://www.fws.gov/windenergy/PDF/Eagle%20Conservation%20Plan%20Guidance-Module%201.pdf>

## **ECP Outline Recommendations:**

- I. Introduction and Purpose: Include an explanation of the relationship between the ECP and other related documents, such as NEPA reviews for the project (EA or EIS), Bird and Bat Conservation Strategy (BBCS), etc.

- II. Regulatory Framework

- A. Laws and Regulations- Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA) – Use applicable default language taken from the USFWS Wind Energy Guidelines (WEG; USFWS 2012, pp. 2-3)

- B. State or Tribal Wildlife laws and other Federal laws that apply

- III. Project Description

- A. Describe all project components, including structures and infrastructure (wind turbines, roads, buildings, met towers, distribution and transmission lines, substations, etc.).

- B. Provide a map of project area with project area boundary delineated.

- C. Provide a map of topographic relief for the project area.

- D. Provide a map of proposed final wind turbine layout, roads, distribution and transmission lines, substations, buildings, met towers (permanent), etc.

- E. Provide a map of vegetation classes and aquatic features for the project, including a summary table with information on the acreage or linear miles of each class or feature present and how many acres/miles will be lost or degraded by project development.

- IV. Initial Site Assessment (ECPG Stage 1)

- A. Brief summary of available sources reviewed for the project site relative to eagles, including reports, publications, GIS maps, agency files, species experts, on-line databases, and initial site visit(s).

- B. Were alternate sites considered/evaluated, and if so what criteria were used to compare sites?

C. Address all questions in ECPG Appendix B on page 51. Clearly identify the process used to address these questions. Based on the responses to these questions develop a map that categorizes eagle risk for all sites initially considered for development.

D. Categorize Eagle Risk for Stage 1 (ECPG Appendix B) using ECPG criteria on pp. 25-26.

V. Site-specific Surveys and Assessment (ECPG Stage 2): This section should address the questions in ECPG Appendix C, page 53.

A. Eagle Use

1. Thoroughly describe what types of eagle-use surveys were conducted, the survey protocols used, the number of surveys completed, and when surveys were conducted (years, seasonal coverage, time of day, etc.). Survey types may include, but are not limited to, eagle point count surveys, flight paths, migration monitoring, behavioral studies, and telemetry. If any survey protocols changed during these surveys, explain the changes and provide a rationale for them. If survey types and protocols differed from Appendix C in the ECPG, describe what the differences were and provide a rationale.
2. Include a map of points used for eagle use surveys and an estimate of the percentage of the project area and project footprint they cover.
3. Provide results and thorough details on all pre-construction site-specific surveys that were conducted by year and/or season. Summarize survey results in the ECP. If annual monitoring reports are available for the project, they may be included in an Appendix.
4. Provide results from any other field work to identify migration corridors, roost sites, foraging areas, wintering areas, etc., not mentioned above.

B. Eagle Nests

1. Describe what is known about eagle nesting in the project area prior to any project-related surveys; include a map showing the locations of all historic eagle nests.
2. Thoroughly describe all raptor/eagle nest surveys conducted (i.e. aerial, ground searches, etc.), including methodology, timing and frequency of the surveys; provide a map of the area searched for nests (i.e., how far out from the project area and project footprint did you survey for nests); describe condition of all eagle nests, provide photographs of eagle nest sites, provide outcomes for each eagle nest by species (i.e., tending, occupancy, productivity, and nest success); and provide project-area mean inter-nest distance for eagles by species (if calculated, provide methods used for that calculation).



### C. Eagle Prey Base Assessment

1. Thoroughly describe methodologies/protocols used to assess the eagle prey base (especially areas with concentrated prey resources).
2. Provide map(s) indicating areas with concentrated prey resources (e.g., prairie dog towns, leks, ungulate wintering/parturition areas, etc.) in relation to proposed final turbine layout. Map rivers, lakes and reservoirs where bald eagles forage on fish and waterfowl, and map areas of open water available during winter, if any.
3. Describe potential anthropogenic sources of eagle prey for the project area including cattle or sheep grazing operations, road kill carcasses on roads, gut piles from hunting seasons, etc.

### D. Eagle Risk Categorization for Stage 2

1. Describe how the eagle use, eagle nest, and eagle prey base assessment data were used to assess the eagle risk category. Use ECPG criteria on pgs. 25-26.

## VI. Avoidance and Minimization of Risks in Project Siting (ECPG Stage 4)

### A. Project Planning/Design Phase: site selection

1. Were alternative sites considered for development and was there consideration for reducing eagle/raptor/migratory bird risk in this process?
2. Were wind turbines removed and/or relocated from the initial project design, and if so, why?
3. Were any project roads, power lines, or buildings removed or relocated from the initial project design, and if so, why?
4. Document all key adjustments made to the initial project design, why they were made, what information was used to make changes, and any subsequent draft designs. Thorough descriptions should accompany any maps.
5. Were the USFWS Region 6 Recommendations for Avoidance and Minimization of Impacts to Golden Eagles at Wind Energy Facilities (April, 2013) followed in the project design phase? If not, provide a rationale.

## VII. Predicting Eagle Fatalities (ECPG Stage 3)

A. Describe the methods and assumptions used. If these differ from Appendix D in the ECPG, describe the differences and provide a rationale.

1. Provide all input data used.
2. Present results from Eagle Modeling by Eagle Species
  - a. USFWS eagle fatality model
  - b. Outcomes from other models (if any)

B. Other Eagle Risk Assessment

1. Disturbance/Displacement Assessment
2. Assessment of Project-level Take: Complete this analysis consistent with ECPG Appendix F.
3. Local Area Population (LAP) Analysis
4. Cumulative Impacts Analysis – Comprehensive assessment of known factors impacting eagles, eagle habitat, prey base, etc., within the sphere of the LAP. This includes known eagle mortality from all other factors within the LAP, including existing wind facilities, power lines, poisoning, etc. Proponent will need to work jointly with USFWS on this section. Refer to ECPG Appendix F.

C. Eagle Risk Categorization for Stage 3. Use ECPG criteria on pp. 25-26.

VIII. Additional Avoidance and Minimization of Risks, ACP's, and Compensatory Mitigation (ECPG Stage 4)

A. Construction Phase Best Management Practices (all that apply from USFWS 2012, WEG Chapter 7)

B. Operational Phase

1. Best Management Practices (Including, at a minimum, those from USFWS 2012, WEG Chapter 7 which apply to eagles)
2. Experimental Advanced Conservation Practices, per ECPG Appendix E.

C. Compensatory Mitigation

1. Calculations of needed mitigation for your project using Appendix G of ECPG; thoroughly describe calculations that were used to generate results.



2. Present a plan for the implementation of compensatory mitigation, including the type of compensatory mitigation that will be implemented. How was the type of compensatory mitigation being proposed actually selected? The plan should demonstrate the project developer's/operator's ability to complete it. Where will the compensatory mitigation be completed relative to relevant Local Area Population, Bird Conservation Regions (ECPG pg. 38), Eagle Management Units (ECPG pg. 39), etc.? What is the expected life of the compensatory mitigation action(s)?

3. Effectiveness monitoring: describe monitoring approach, duration, etc.

4. Adaptive Management, including commitments to change operations in response to monitoring outcomes as applicable. (See ECPG pg. 28 and ECPG Appendix A)

#### IX. Calibration and Updating of the Fatality Prediction and Continued Risk Assessment (ECPG Stage 5)

##### A. Post-construction monitoring (eagle/avian surveys)

1. Describe the methodology/protocols to be used for carcass surveys for eagles/migratory birds (including searcher efficiency trials and carcass persistence trials). These will be developed jointly by the developer/operator and the USFWS per ECPG Appendix H.

Note: General considerations for design of the fatality monitoring program include:

- Kunz et al. (2007). Assessing impacts of wind-energy development on nocturnally active birds and bats: a guidance document. *Journal of Wildlife Management* 71: 2449-2486.
- Strickland et al. (2011). *Studying Wind Energy/Wildlife Interactions: a Guidance Document*. Prepared for the National Wind Coordinating Collaborative, Washington, D.C., USA, and relevant points from USFWS WEG pp. 35-37.

##### 2. Surveys of eagle/raptor nests (occupancy, productivity, and success)

- Describe methods to be used, number of years surveys will be conducted, area to be surveyed, etc.

3. Disturbance Monitoring: Document any post-construction monitoring of eagle nesting territories and communal roost sites to evaluate disturbance effects. (See ECPG Appendix H, pg. 98). Provide details of the protocols and methods to be used for such monitoring.

4. Describe eagle use/migratory bird surveys that will be conducted post-construction. Provide methodology, timing and frequency of survey effort, location of survey points,

percent of area that will be surveyed, number of surveys, etc. If such surveys will not be conducted, provide a rationale.

5. If there will be an incidental (i.e., informal) wildlife monitoring system established, describe the system, including personnel that will implement it, data forms to be used, how the reporting process will work, and how conflicts with informal monitoring and formal carcass surveys will be avoided.

#### X. Permits

- A. For USFWS programmatic eagle take permits, conditions will be provided by USFWS.
- B. Other USFWS Permit Types: Other Migratory Bird Treaty Act (MBTA) permits may be required for project management. These include, but are not limited to, nest relocation, temporary possession, depredation, salvage/disposal, and scientific collection.
  - 1. Identify MBTA permit types the project is likely to apply for. Also describe the process which will be used to obtain and comply with all necessary MBTA take permits for the project.
  - 2. Other State or Tribal wildlife permits

#### XI. References/Literature Cited

##### **What not to include in your ECP:**

- Literature review or summary of effects of wind turbines on eagles/migratory birds/wildlife
- Comparisons of predicted eagle take at your project with other on-line wind energy facilities



***2013 U.S. Fish and Wildlife Service (USFWS) Revised Voluntary Guidelines for Communication Tower Design, Siting, Construction, Operation, Retrofitting, and Decommissioning –***

**Suggestions Based on Previous USFWS Recommendations to FCC Regarding WT Docket No. 03-187, FCC 06-164, Notice of Proposed Rulemaking, "Effects of Communication Towers on Migratory Birds" (2007), Docket No. 08-61, FCC's Antenna Structure Registration Program (2011), Service 2012 Wind Energy Guidelines, and Service 2013 Eagle Conservation Plan Guidance**

Submitted by:

Albert M. Manville, II, Ph.D., C.W.B.  
Senior Wildlife Biologist & Avian-Structural Lead  
Division of Migratory Bird Management, U.S. Fish & Wildlife Service  
4401 N. Fairfax Dr. -- MBSP-4107  
Arlington, VA 22203  
703/358-1963, [albert\\_manville@fws.gov](mailto:albert_manville@fws.gov)

Last updated: September 27, 2013

[Comm Tower 2013 Revised Guidance-to FCC-AMM.docx]

1. Collocation of the communications equipment on an existing communication tower or other structure (e.g., billboard, water and transmission tower, distribution pole, or building mount) is strongly recommended. Depending on tower load factors and communication needs, from 6 to 10 providers should collocate on an existing tower or structure provided that frequencies do not overlap/"bleed" or where frequency length or broadcast distance requires higher towers. New towers should be designed structurally and electronically to accommodate the applicant's antenna, and antennas of at least 2 additional users – ideally 6 to 10 additional users, if possible – unless the design would require the addition of lights and/or guy wires to an otherwise unlit and/or unguyed tower. This recommendation is intended to reduce the number of towers needed in the future.

2. If collocation is not feasible and a new tower or towers are to be constructed, it is strongly recommended that the new tower(s) should be not more than 199 feet above ground level (AGL), and that construction techniques should not require guy wires. Such towers should be unlighted if Federal Aviation Administration (FAA) regulations and lighting standards (FAA 2007, Patterson 2012, FAA 2013 lighting circular anticipated update) permit. Additionally, the Federal Communications Commission (FCC) through recent rulemaking now requires that new towers  $\geq$  450 ft AGL contain no red-steady lights. FCC also recommends that new towers 350-450 ft AGL also contain no red-steady lights, and they will eventually recommend that new towers  $<$  350 ft AGL convert non-flashing lights to flash with existing flashing lights. LED lights are being suggested as replacements for all new construction and for retrofits, with the intent of future synchronizing the flashes. Given these dynamics, the Service recommends using lattice tower or monopole structures for all towers  $<$  200 ft AGL and for taller towers where feasible. The Service considers the less than 200 ft AGL option the "gold standard" and suggests that this



is the environmentally preferred industry standard for tower placement, construction and operation – i.e., towers that are unlit, unguyed, monopole or lattice, and less than 200 ft AGL.

3. If constructing multiple towers, the cumulative impacts of all the towers to migratory birds – especially to Birds of Conservation Concern (FWS 2008) and threatened and endangered species, as well as the impacts of each individual tower, should be considered during the development of a project.

4. The topography of the proposed tower site and surrounding habitat should be clearly noted, especially in regard to surrounding hills, mountains, mountain passes, ridge lines, rivers, lakes, wetlands, and other habitat types used by raptors, Birds of Conservation Concern, and state and federally listed species, and other birds of concern. Active raptor nests, especially those of Bald and Golden Eagles, should be noted, including known or suspected distances from proposed tower sites to nest locations. Nest site locations for Golden Eagles may vary between years, and unoccupied, inactive nests and nest sites may be re-occupied over multiple years. The Service's 2013 Eagle Conservation Plan Guidance, Module 1, Land-based Wind Energy, Version 2, available on our website, is a useful document (USFWS 2013).

5. If at all possible, new towers should be sited within existing "antenna farms" (i.e., clusters of towers), in degraded areas (e.g., strip mines or other heavily industrialized areas), in commercial agricultural lands, in Superfund sites, or other areas where bird habitat is poor or marginal. Towers should not be sited in or near wetlands, other known bird concentration areas (e.g., state of federal refuges, staging areas, rookeries, and Important Bird Areas), in known migratory, daily movement flyways, areas of breeding concentration, in habitat of threatened or endangered species, or key habitats for Birds of Conservation Concern (FWS 2008). Disturbance can result in effects to bird populations which may cumulatively affect their survival. The Service has recommended some disturbance-free buffers, e.g., 0.5 mi around raptor nests during the nesting season, and 1-mi disturbance free buffers for Ferruginous Hawks and Bald Eagles during nesting season in Wyoming (FWS WY Ecological Services Field Office, referenced in Manville 2007:23). The effects of towers on "prairie grouse," "sage grouse," and grassland and shrub-steppe bird species should also be considered since tall structures have been shown to result in abandonment of nest site areas and leks, especially for "prairie grouse" (Manville 2004). The issue of buffers is currently under review, especially for Bald and Golden Eagles. Additionally, towers should not be sited in areas with a high incidence of fog, mist, and low cloud ceilings.

6. If taller (> 199 ft AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. Unless otherwise required by the FAA, only white strobe or red strobe lights (red preferable since it is generally less displeasing to the human eye at night), or red flashing incandescent lights should be used at night, and these should be the minimum number, minimum intensity (< 2,000 candela), and minimum number of flashes per minute (i.e., longest duration between flashes/"dark phase") allowable by the FAA. The use of solid (non-flashing) warning lights at night should be avoided (Patterson 2012, Gehring et al. 2009) – see recommendation #2 above. Current research indicates that solid red lights attract night-migrating birds at a much higher rate than flashing lights (Gehring et al. 2009, Manville 2007, 2009). Recent research



indicates that use of white strobe, red strobe, or red flashing lights alone provides significant reductions in bird fatalities (Patterson 2012, Gehring et al. 2009).

7. Tower designs using guy wires for support, which are proposed to be located in known raptor or waterbird concentrations areas, daily movement routes, major diurnal migratory bird movement routes, staging areas, or stopover sites, should have daytime visual markers or bird deterrent devices installed on the wires to prevent collisions by these diurnally moving species. The efficacy of bird deterrents on guy wires to alert night migrating species has yet to be scientifically validated. For guidance on markers, see Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines -- State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC, and Sacramento, CA. 207 pp, and APLIC. 2012. *Reducing Avian Collisions with Power Lines -- the State of the Art in 2012*. Edison Electric Institute and APLIC. Washington, DC. 159 pp. Also see [www.aplic.org](http://www.aplic.org), [www.energy.ca.gov](http://www.energy.ca.gov), or call 202-508-5000.

8. Towers and appendant facilities should be designed, sited, and constructed so as to avoid or minimize habitat loss within and adjacent to the tower "footprint." However, a larger tower footprint is preferable to the use of guy wires in construction. Several shorter, un-guyed towers are preferable to one, tall guyed, lighted tower. Road access and fencing should be minimized to reduce or prevent habitat fragmentation, disturbance, and the creation of barriers, and to reduce above ground obstacles to birds in flight.

9. If, prior to tower design, siting and construction, if it has been determined that a significant number of breeding, feeding and roosting birds, especially of Birds of Conservation Concern (FWS 2008), state or federally-listed bird species, and eagles are known to habitually use the proposed tower construction area, relocation to an alternate site is highly recommended. If this is not an option, seasonal restrictions on construction are advised in order to avoid disturbance, site and nest abandonment, especially during breeding, rearing and other periods of high bird activity.

10. Security lighting for on-ground facilities, equipment and infrastructure should be motion- or heat-sensitive, down-shielded, and of a minimum intensity to reduce nighttime bird attraction and eliminate constant nighttime illumination, but still allow safe nighttime access to the site (USFWS 2012, Manville 2011).

11. Representatives from the USFWS or researchers from the Research Subcommittee of the Communication Tower Working Group should be allowed access to the site to evaluate bird use; conduct dead-bird searches; place above ground net catchments below the towers (Manville 2002); and to perform studies using radar, Global Position System, infrared, thermal imagery, and acoustical monitoring, as necessary. This will allow for assessment and verification of bird movements, site use, avoidance, and mortality. The goal is to acquire information on the impacts of various tower types, sizes, configurations and lighting protocols.

12. Towers no longer in use, not re-licensed by the FCC for use, or determined to be obsolete should be removed from the site within 12 months of cessation of use, preferably sooner.



13. In order to obtain information on the usefulness of these guidelines in preventing bird strikes and better understanding impacts from habitat fragmentation, please advise USFWS personnel of the final location and specifications of the proposed tower, and which measures recommended in these guidelines were implemented. If any of these recommended measures cannot be implemented, please explain why they are not feasible. This will further advise USFWS in identifying any recurring problems with the implementation of the guidelines, which may necessitate future modifications.

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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<sup>1</sup>.
- 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<sup>2</sup> 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?)

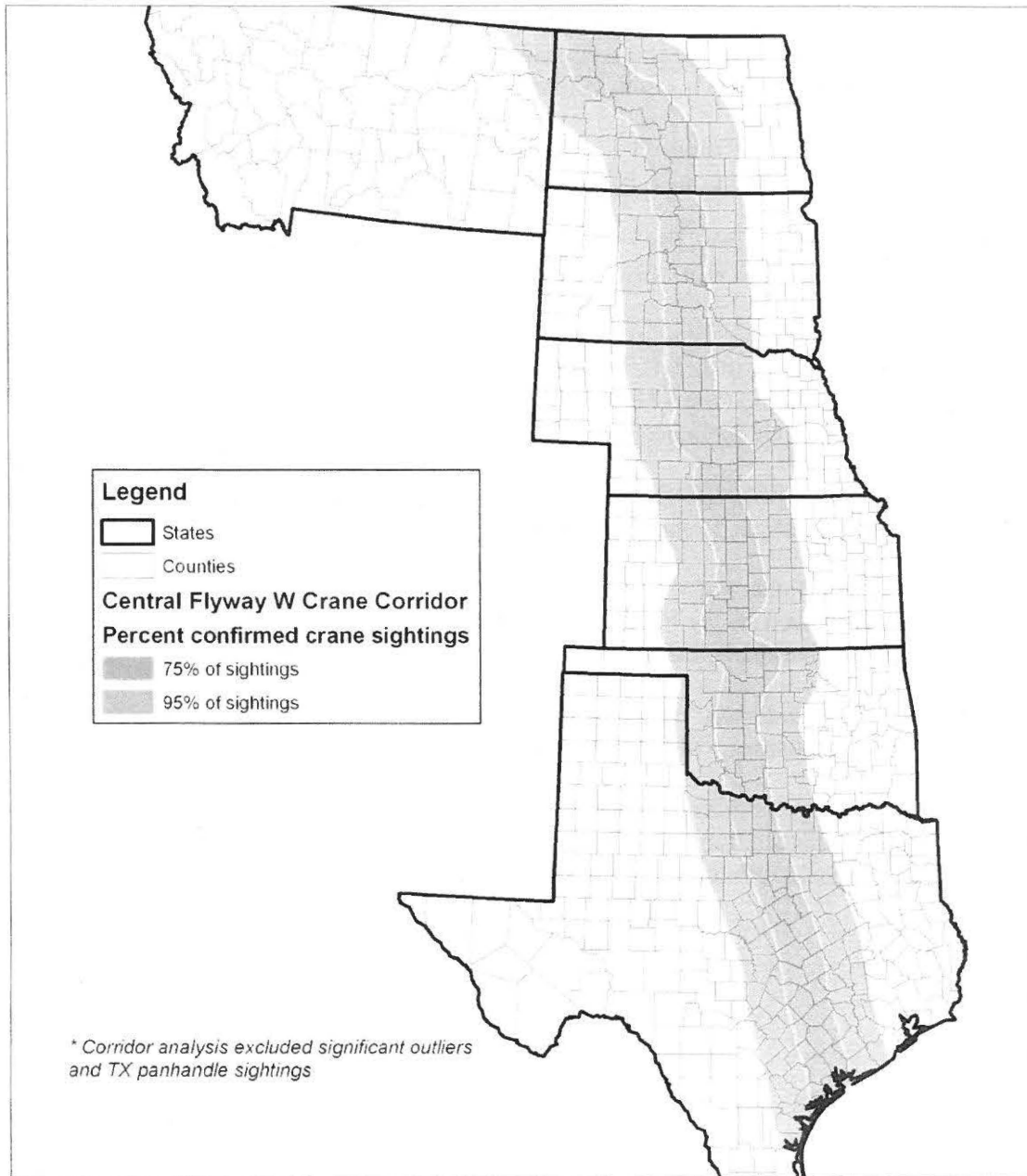
<sup>1</sup> Potentially suitable migratory stop over habitat for whooping cranes includes wetlands with areas of shallow water without visual obstructions (i.e., high or dense vegetation) (Austin & Richert 2001; Johns et al. 1997; Lingle et al. 1991; Howe 1987) and submerged sandbars in wide, unobstructed 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.

<sup>2</sup> 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.



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

0 70 140 280 420 560 Miles





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U.S. Fish and Wildlife Service, Region 6, Mountain-Prairie Region

Outline for a Bird and Bat Conservation Strategy: Wind Energy Projects

A Bird and Bat Conservation Strategy (BBCS) is a life-of-a-project framework for identifying and implementing actions to conserve birds and bats during wind energy project planning, construction, operation, maintenance, and decommissioning. It is the responsibility of wind energy project developers and operators to effectively assess project-related impacts to birds, bats and their habitats, and to work to avoid and minimize those impacts.

A wind project BBCS should be updated regularly as new information, including monitoring of project impacts and technical advancements, becomes available. A BBCS is a strategy for assessing impacts, avoiding/minimizing impacts, guiding current actions, and planning future impact assessments and actions to conserve birds and bats. It provides reference to project history and previous impact assessments and actions. A BBCS contains the studies, analyses, and reasoning leading to project-specific decisions and implementation of actions. The 2012 U.S. Fish and Wildlife Service (USFWS) Land-Based Wind Energy Guidelines (WEG) provides comprehensive guidance on the process for addressing bird and bat conservation at all stages of wind energy development.

Decisions made through the BBCS framework include determining if there is a need to develop other bird and bat conservation plans such as an Eagle Conservation Plan (2013 USFWS Eagle Conservation Plan Guidance) or Habitat Conservation Plan (Endangered Species Act, section 10(a)(1)(B)). Specific surveys needed to support those plans may be most effectively conducted in tandem with surveys to develop the BBCS.

Wind energy projects currently in operation which have not been planned, developed, or operated following a BBCS framework, will, at a minimum, need to supplement assessments of impacts to birds and bats with Post-Construction Assessments and Adaptive Management Studies, working closely with the USFWS.

The following outline is provided by USFWS Region 6 as a guide for developing and organizing a BBCS.



## Outline

### I. Statement of Purpose

Identify how the BBCS functions as a strategy to address bird and bat conservation during all project phases.

### II. Regulatory Framework

#### A. Fish and Wildlife Laws, Regulations, and Policies

Include the language provided and do not reference USFWS law enforcement or prosecutorial discretion in the BBCS.

##### 1. Migratory Bird Treaty Act (MBTA)

The 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 strict liability 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 USFWS permit or regulatory authorization, are a violation. The MBTA states, "Unless and except as permitted by regulations ... it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill ... possess, offer for sale, sell ... purchase ... ship, export, import ... transport or cause to be transported... any migratory bird, any part, nest, or eggs of any such bird ..." 16 U.S.C. 703. The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" 50 CFR 10.12. The USFWS maintains a list of all species protected by the MBTA at 50 CFR 10.13. This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines.

##### 2. Bald and Golden Eagle Protection Act (Eagle Act)

Under authority of the Eagle Act, 16 U.S.C. 668–668d, bald eagles and golden eagles are afforded additional legal protection. The Eagle Act 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, 16 U.S.C. 668. The Eagle Act also defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," 16 U.S.C. 668c, and includes criminal and civil penalties for violating the statute. See 16 U.S.C. 668. The term "disturb" is defined as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury to an eagle, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior, 50 CFR 22.3.

##### 3. Endangered Species Act (ESA)

The ESA directs the USFWS to identify and protect endangered and threatened species and their critical habitat, and to provide a means to conserve their ecosystems. Among its other provisions, the ESA requires the USFWS to assess civil and criminal penalties for violations of the Act or its regulations. Section 9 of the ESA prohibits take of federally-listed species. Take is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" 16 U.S.C. 1532. The term "harm" includes significant habitat alteration which kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering, 50 CFR 17.3. Projects involving Federal lands, funding or authorizations will require consultation between the Federal agency and the USFWS, pursuant to section 7 of the ESA. Projects without a

Federal nexus should work directly with USFWS to avoid adversely impacting listed species and their critical habitats.

B. Other Federal, State, County, Local and Tribal Laws, Regulations, and Policies

III. Project Description

Provide descriptions and maps of all project elements (e.g., roads, power lines, met towers) during all phases of pre-construction, construction, operation, maintenance, and decommissioning. Describe and provide maps of the project impact area (inside and outside project area boundary) where the project may potentially impact birds, bats and their habitats..

IV. Project History of Bird and Bat Presence, and Risk Assessments

A. Preliminary Site Evaluation (WEG Tier 1)

1. Site Description

Describe proposed wind energy site(s) within the broader geographic landscape of bird and bat distribution, use, and habitats.

2. Decision to Abandon Site(s) or Select Site(s) for Additional Assessments in WEG Tier 2

Describe evaluations of sites by answering questions in WEG Tier 1, Chapter 2: (1) Are species or habitats of concern present? (2) Does the landscape contain areas precluded by law or areas that are designated as sensitive? (3) Are there critical areas of wildlife congregation? (4) Is there potential to fragment large intact habitats for species that are sensitive to habitat fragmentation? Based on the answers to these questions, describe the decision to abandon sites or identify project modifications to effectively avoid and minimize potential adverse impacts.

B. Site-specific Characterization and Decisions (WEG Tier 2)

Continue landscape-scale assessments and include site reconnaissance evaluations.

1. Site Description

Provide additional site information obtained through more detailed Tier 2 assessment.

2. Evaluation and Decisions

(a) Abandon Site or Advance to Field Surveys to Support a BBCS

Describe evaluations of sites by answering the four questions from WEG Tier 1, plus questions from WEG Tier 2, Chapter 3: (5) Are plant communities or vegetation habitats of conservation concern present? (6) What species of birds and bats are likely to use the proposed site? (7) Is there potential for significant adverse impacts to those species? If there is a high probability of significant adverse impacts that cannot be avoided or minimized, the site should be abandoned.

(b) Determine Need for Other Bird or Bat Conservation Plans

Describe determination of need, and reference field surveys, for an Eagle Conservation Plan) or Habitat Conservation Plan.

C. Field Studies to Document Wildlife and Habitat, and Predict Project Impacts (WEG Tier 3)

Describe the goals, methods, results, analyses and conclusions of field studies, and include maps to assess the presence of, and project risks to, birds and bats and their habitats. Describe potential project impacts by answering the seven questions from WEG Tier 1 and Tier 2, plus questions



from WEG Tier 3, Chapter 4: (8) What are the distributions, abundance, behaviors and site-use of birds and bats, and what project elements expose these species to risk? (9) What are the potential risks to individuals and local populations of birds and bats and their habitats? (10) How can impacts to birds and bats be avoided and minimized? (11) What studies should be initiated and continued post-construction to evaluate predictions of impacts to birds and bats? Describe the level of scientific rigor of studies, and coordination and sharing of data with USFWS field offices.

1. Bird and Bat Status Assessments

Describe how assessment studies were of sufficient duration and intensity to ensure adequate data were collected to accurately characterize bird and bat use of the area.

(a) Bird and Bat Species Presence

(i) Species Presence by Season

(ii) Species of Concern (WEG, p. 63)

(iii) Species of Habitat Fragmentation Concern (WEG, p. 63)

(b) Bird and Bat Habitats

Describe, quantify, and map.

(c) Bird and Bat Use Patterns

Describe, quantify and map survey data (e.g., from point counts, acoustic surveys, and migration surveys).

(d) Baseline (Pre-construction) Habitat Management

Describe the management of habitat at the proposed site prior to construction.

2. Bird and Bat Risk Assessment and Decisions Based on Assessments

Describe assessment methods and assumptions.

(a) Project Risk Assessment

(i) Direct Impacts:

Describe direct project impacts on birds and bats (e.g., wind turbine collisions, powerline electrocutions and collisions, vehicle collisions, barotrauma, disturbance, displacement, behavioral changes, and habitat loss, degradation and fragmentation).

(ii) Indirect Impacts

Describe indirect project impacts on birds and bats (e.g., loss of population vigor, attraction to modified habitats, and increased exposure to predation).

(iii) Cumulative Impacts

(b) Risk Assessment Decisions

(i) Decision Criteria to either Abandon Site or Advance Project

(ii) Decision of Need for Other Bird and Bat Conservation Plans

Describe decision to develop other plans such as an Eagle Conservation Plan, Habitat Conservation Plan, Candidate Conservation Plan with Assurances, or a plan to address state-managed species.

- V. Conservation Measures to Avoid and Minimize Adverse Impacts (during project construction, operation, maintenance, and decommissioning)
- Describe conservation measures and when and how each measure will be applied. Some measures will apply to all project phases, but other measures will only apply to specific phases of the project (e.g., construction versus operation). See WEG Chapter 7 for examples. While the following topics in the outline should all be included, the organization of this section may be modified (e.g., conservation measures may be organized by project phase, project elements, or category of conservation action).
- A. Measures to Avoid/Minimize Direct Impacts
1. Fatalities
  2. Disturbance/Displacement/Behavioral Changes
    - (a) Nest/Roost/Hibernacula Management  
Describe how impacts to nests and nesting attempts will be avoided or minimized during all phases of the project. For example, constructing outside the breeding season or using nest buffers may be appropriate during construction, but measures to discourage or prevent birds from nesting in a sub-station may be needed during operation.
    - (b) Management of Other Habitat-use Areas (e.g., Foraging Areas)
  3. Habitat Loss/Degradation/Fragmentation
- B. Measures to Avoid/Minimize Indirect Impacts  
For example, address measures to avoid loss of population vigor and increased exposure to predation.
- C. Measures to Offset and/or Compensate for Habitat-Related Impacts
- D. Measures to Avoid and Minimize Other Identified Project-Specific Risks
- VI. Post-construction Studies to Estimate Impacts (WEG Tier 4)
- Provide assessments of ongoing project risks to birds and bats and the effectiveness of conservation measures. Describe study methods and the level of survey effort (i.e., how many of each survey type was conducted, over what time period and seasons, and location and geographic coverage).
- A. Carcass Surveys
- B. Nest/Roost/Hibernacula Surveys
- C. Habitat Surveys
- D. Other Surveys  
A need for surveys, such as point counts, acoustic surveys, mist net surveys, may be identified through measuring project impacts.
- VII. Other Post-construction Studies and Adaptive Management (WEG Tier 5)
- Describe adaptive management studies which may (1) be planned during development of the BBCS via measuring impacts during post-construction and the discovery that conservation measures are not adequate to avoid and minimize impacts, or may (2) address unplanned or unforeseen impacts. Describe the actions taken during the following steps.



- A. Evaluate need for action (1) based on assessing effectiveness of conservation measures through post-construction monitoring of impacts, or (2) as determined by unforeseen impacts or circumstances.
- B. Identify potential technical/operational option(s) to avoid and minimize impacts (e.g., via scientific literature or industry innovation).
- C. Present technical/operational option(s) to agency/authority for review to determine if it merits field testing or application. If, after review, field testing or application is not merited, go to step B. If field testing or application is merited, go to step D.
- D. Field test or apply technical/operational option(s), with agency/authority concurrence of methods, in settings which will not increase adverse impacts to birds and bats nor will result in impacts exceeding those allowable in permits or other project-related plans.
- E. Evaluate and report effectiveness of technical/operational option(s) with review by agency/authority. If ineffective, go to step B. If effective go to step F.
- F. Apply effective avoidance and minimization measures.
- G. Monitor effectiveness (update post-construction monitoring in BBCS, if necessary, with agency/authority review).
- H. Update BBCS Section on Conservation Measures, return to step A to evaluate need for further action.

#### VIII. Project Permits Addressing Birds and Bats

Identify need for permits. For example, migratory bird permits would be required for active nest relocation, temporary possession, depredation, salvage/disposal, and scientific collection.

- A. Bird and Bat Permits  
Identify permits needed for project construction, operation, and/or maintenance.
- B. Agency and Process for Permit Issuance  
Identify the responsive agency and processes to apply for and comply with permits.

#### IX. Reporting Formats and Schedule

Describe formats and schedule for reporting data and study results to responsive agencies.

- A. Preconstruction Survey Data
- B. Operation/Post-construction Monitoring
- C. Adaptive Management
- D. Permits

#### X. Personnel Training

Describe process and curriculum for providing personnel and contractors with education about wildlife laws; processes to follow upon finding injured birds, bats or carcasses; and actions they can take to avoid impacts to birds and bats.

- XI. Contacts/Key Resources
  - A. List of Contacts and Key Resources
  - B. Coordination Processes
    - Who/when/where a company should initiate contact and under what circumstances.
- XII. References and Literature Cited
- XIII. Appendices
  - A. Baseline Survey Reports
  - B. Post Construction Reports
    - 1. Carcass Monitoring
    - 2. Nest/Roost/Hibernacula Surveys
    - 3. Habitat Surveys
    - 4. Other Surveys: For example, point counts, acoustic surveys, mist net surveys
  - C. Adaptive Management Studies
  - D. Other Plans Guiding Bird and Bat Conservation (e.g., ECP)
  - E. Permits Related to Birds and Bats





Clark County, SD

RECEIVED

OCT 27 2016

SURFACE WATER PROGRAM

October 25, 2016

John Miller

South Dakota Department of Environment and Natural Resources

Joe Foss Building

523 East Capitol

Pierre, SD 57501-3182

DRINKING WATER QUALITY DETERMINATION  
It appears, based on the information provided,  
that this project will not have adverse  
environmental effects to drinking water in  
this area. This project is approved.

Approved by: *Mark S. Hoyer*

Date: *10/28/16* ID No.: *2016102*

605-773-3764 Fax 605-773-5286

SOUTH DAKOTA DEPARTMENT OF  
ENVIRONMENT & NATURAL RESOURCES

*\*COORDINATE W/ ANY  
LOCAL RURAL WATER  
INFRASTRUCTURE*

RE: Requesting Comments on Crocker Wind Farm Revised Project Boundary in Clark County, South Dakota

Dear John Miller,

Crocker Wind Farm, LLC ("Crocker Wind Farm"), a wholly owned subsidiary of Geronimo Energy, LLC, requested agency comments in a letter dated April 18th for a proposed wind energy project in Clark County, South Dakota. The temporary and permanent facilities outlined in the previous letter remain the same; however, as project development continued, additional constraints were identified warranting a boundary modification (refer to attached map). In addition, the Crocker Wind Farm will have up to 226 turbines which would result in a higher nameplate capacity than 200 MW as previously stated.

The turbine locations, access roads and electrical connections have not been finalized at this time. Table 1 provides the revised sections of land Crocker Wind Farm is evaluating for siting of the wind energy project.

Table 1: Sections within the Crocker Wind Farm Project Boundary

State	County	Civil Township Name	Township	Range	Sections
SD	Clark	Warren	119	59	23-27, 34-36
SD	Clark	Spring Valley	119	58	3-10, 15-19, 25, 26, 30, 31, 33-36
SD	Clark	Cottonwood	119	57	29-32
SD	Clark	Ash	118	59	1-3, 10-15
SD	Clark	Woodland	118	58	1-12, 14-16, 21-23, 26, 34

An associated transmission line route has not yet been finalized. A separate notification describing the proposed route will be distributed once a corridor has been established.

Crocker Wind Farm will be submitting an application to the South Dakota Public Utilities Commission ("PUC") for a Facility Permit. We welcome any comments your agency may have at this time and throughout the permit application process. Any written agency comments provided in response to this letter will be incorporated into the PUC's review process.



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

November 10, 2016

Melissa Schmidt  
Senior Permitting Specialist  
Crocker Wind Farm, LLC  
7650 Edinborough Way  
Suite 725  
Edina, MN 55435

Re: Crocker Wind Farm Revised Project Boundary

Dear Ms. Schmidt:

The South Dakota Department of Environment and Natural Resources' (DENR) Ground Water Quality Program has reviewed the above-referenced project for potential impacts to ground water quality. Based on the information submitted in your revised letter, dated October 25, 2016, DENR does not anticipate adverse impacts to ground water quality by this project.

If construction for this project disturbs one or more acre(s) of soil, a storm water permit may be required. For more information or to obtain a storm water permit, please contact the Department at 1-800-SD-Storm or visit:

<http://denr.sd.gov/des/sw/StormWaterandConstruction.aspx>.

There have been numerous petroleum and other chemical releases throughout the state. Of the releases reported to DENR, we have identified two release cases potentially in the vicinity of your project. A list of releases in or near your project area is enclosed in Table 1. However, the locational information provided to us regarding releases is sometimes inaccurate or incomplete. If you would like to do more research, additional information on reported releases in South Dakota may be obtained at the following

website: <http://arcgis.sd.gov/server/denr/spillviewer/>.

In the event that contamination is encountered during construction activities or is caused by the construction activity, Crocker Wind Farm, LLC, or its designated representative, must report the contamination to DENR at 605-773-3296. Any contaminated soil encountered or caused by the construction must be temporarily stockpiled and sampled to determine disposal requirements.

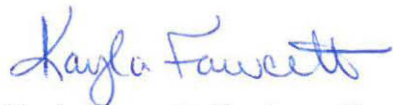
CrockerWindFarmRevised(DB1677).docx



Please notify the Department again after a specific route for transmission lines has been established.

Thank you for providing DENR the opportunity to comment on this project. If you have any questions regarding the information provided, please contact me at 605-773-3296.

Sincerely,



Kayla Fawcett, Engineer II  
Ground Water Quality Program

Enclosure

c: Michael Gravning, Clark County Emergency Manager, Clark, SD

Table 1 - Known releases that may impact the Crocker Wind Farm as of November 10, 2016.

DENR ID	Site Name	City	County	Street	Material	Status	R1	Latitude	Longitude
2013.049	Tank Leak - Compressor Station #10	Bradley	Clark	42135 160th Street	Lube Oil	C	KM	45.067542	-97.796997
9999.255	Withdrawn ATP – Handke Property	Turton	Clark	16173 415th Avenue		W		45.041697	-97.910977

DENR ID = DENR Case Number

Status: C = Closed, NFA = No Further Action, O/M = Open/Monitoring, I=Inactive, T=Tracking, W=Withdrawn

R1 = DENR reviewer's initials





October 25, 2016

John Miller  
South Dakota Department of Environment and Natural Resources  
Joe Foss Building  
523 East Capitol  
Pierre, SD 57501-3182

**RECEIVED**  
OCT 27 2016  
SURFACE WATER PROGRAM

**RECEIVED**  
OCT 28 2016  
Dept. of Environment  
Natural Resources  
Waste Management  
**Waste Management Determination**  
**Hazardous Waste/Solid Waste/Asbestos**  
It appears, based on the information provided, that this project will have little or no impact on the waste management in this area.  
Approved By: Vonni Kallenayn  
Date: 11-4-16

**South Dakota Department of**  
**Environment & Natural Resources**  
Phone: (605) 773-3153 Fax: (605) 773-6035

*Changes OK - VIK*

RE: Requesting Comments on Crocker Wind Farm Revised Project Boundary in Clark County, South Dakota

Dear John Miller,

Crocker Wind Farm, LLC ("Crocker Wind Farm"), a wholly owned subsidiary of Geronimo Energy, LLC, requested agency comments in a letter dated April 18th for a proposed wind energy project in Clark County, South Dakota. The temporary and permanent facilities outlined in the previous letter remain the same; however, as project development continued, additional constraints were identified warranting a boundary modification (refer to attached map). In addition, the Crocker Wind Farm will have up to 226 turbines which would result in a higher nameplate capacity than 200 MW as previously stated.

The turbine locations, access roads and electrical connections have not been finalized at this time. Table 1 provides the revised sections of land Crocker Wind Farm is evaluating for siting of the wind energy project.

**Table 1: Sections within the Crocker Wind Farm Project Boundary**

State	County	Civil Township Name	Township	Range	Sections
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SD	Clark	Woodland	118	58	1-12, 14-16, 21-23, 26, 34

An associated transmission line route has not yet been finalized. A separate notification describing the proposed route will be distributed once a corridor has been established.

Crocker Wind Farm will be submitting an application to the South Dakota Public Utilities Commission ("PUC") for a Facility Permit. We welcome any comments your agency may have at this time and throughout the permit application process. Any written agency comments provided in response to this letter will be incorporated into the PUC's review process.

Waste Management Determination  
Hazardous Waste? Solid Waste? Best  
If you require further information or have questions regarding this matter, please contact me at  
952.988.9000 or at [melissa@geronimoenergy.com](mailto:melissa@geronimoenergy.com).  
If a project is approved, that project will have little or no  
impact on the waste management in this area.

Sincerely,

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

South Dakota Department of  
Environment & Natural Resources  
Phone (605) 773-6032 Fax (605) 773-6032

Melissa Schmit  
Senior Permitting Specialist

Enclosure:  
Updated Crocker Wind Farm Location Map





November 7, 2016

Ms. Melissa Schmit  
Crocker Wind Farm, LLC  
7650 Edinborough Way, Suite 725  
Edina, MN 55435

Dear Ms. Schmit:

Thank you for the opportunity to comment on the revised project area for the Crocker Wind Farm in Clark County, South Dakota. A brief review of our records indicates that a number of previously recorded stone features and one burial associated with American Indian Tribes are located within the project area.

Since South Dakota Codified Law 1-20-21.2 does not allow my office to provide information pertaining to the location of archaeological resources, we recommend the following steps be taken in order to identify cultural resources located within the project area.

- Please obtain a record search from the Archaeological Research Center, which is the official repository for all archaeological information in South Dakota. The record search will provide locational information about known cultural resources and previous archaeological surveys in the project area. More information about obtaining a records search can be found at <http://history.sd.gov/Archaeology/recordsearches.aspx> or (605) 394-1936.
- A Level III Intensive Survey of the project area should be conducted prior to any ground disturbing activities.
- An analysis of the visual effects on cultural resources, such as buildings and structures, should be completed. We recommend establishing a buffer of no less than one mile around the project area to assess the effects.
- Contact the Tribal Historic Preservation Officers in South Dakota concerning the effects of the project on Traditional Cultural Properties and/or places of religious and cultural significance. For your convenience, a list of Tribal contacts has been included.

Once this information is gathered we appreciate the opportunity to review the results and consult further with your organization on the treatment of identified cultural resources.

Please note that South Dakota Codified Law 34-27-26 states that no person unless authorized by the state archaeologist may knowingly disturb or knowingly permit disturbance of human skeletal remains or funerary objects except a law enforcement officer, coroner or other official designed by law in performance of official duties.

Should you require additional information, please contact Paige Olson at [Paige.Olson@state.sd.us](mailto:Paige.Olson@state.sd.us) or (605) 773-6004. Your organization's concern for the non-renewable cultural heritage of South Dakota is appreciated.

Sincerely,

Jay D. Vogt  
State Historic Preservation Officer

A handwritten signature in cursive script, appearing to read "P. Olson".

Paige Olson  
Review & Compliance Coordinator

Enclosure: *Tribal Chairs and Tribal Historic Preservation Offices/ Cultural Resource management Offices*



# **Tribal Chairs and Tribal Historic Preservation Offices/Cultural Resource Management Offices**

Subject to change without notice.

## **South Dakota**

### **Cheyenne River Sioux Tribe**

**Chair:** Harold Frazier  
Cheyenne River Sioux Tribe  
PO Box 590  
Eagle Butte, SD 57625-0590  
Phone: (605) 964-4155  
Fax: (605) 964-4151  
[www.sioux.org](http://www.sioux.org)

**THPO:** Steve Vance  
Tribal Historic Preservation Office  
Cheyenne River Sioux Tribe  
PO Box 590  
Eagle Butte, SD 57625-0590  
Phone: (605) 964-7554  
Fax: (605) 964-7552  
[Stevev.crstpres@outlook.com](mailto:Stevev.crstpres@outlook.com)

**Cultural Resources Office:** Donna Rae Petersen  
PO Box 590  
Eagle Butte, SD 57625  
Phone: 605-964-7554  
[Donnarae.petersen@crst-nsn.gov](mailto:Donnarae.petersen@crst-nsn.gov)

### **Crow Creek Sioux Tribe**

**Chair:** Roxanne Sazue  
Crow Creek Sioux Tribe  
PO Box 50  
Ft. Thompson, SD 57339-0050  
Phone: (605) 245-2221  
Fax: (605) 245-2470  
[www.crowcreekconnections.org](http://www.crowcreekconnections.org)

**THPO:** Bonnie McGhee  
Tribal Historic Preservation Office  
Crow Creek Sioux Tribe  
PO Box 50  
Ft. Thompson, SD 57339-0050  
Phone: (605) 245-2221 (ext. 110)  
Fax: (605) 245-2470

### **Flandreau-Santee Sioux Tribe**

**President:** Anthony Reider  
Flandreau-Santee Sioux Tribe  
PO Box 283  
Flandreau, SD 57028-0283  
603 W. Broad Ave.  
Phone: (605) 997-3512  
Fax: (605) 997-3878  
[www.santeesioux.com](http://www.santeesioux.com)

**THPO:** Garrie KILLSAHUNDRED  
Tribal Historic Preservation Office  
Flandreau Santee Sioux Tribe  
PO Box 283  
Flandreau, SD 57028-0283  
603 W. Broad Ave.  
Phone: (605) 997-1240  
Fax: (605) 997-3878  
[garrie.killsahundred@FSST.org](mailto:garrie.killsahundred@FSST.org)

**Cultural Resources Office:** Carol Robertson  
PO Box 283  
Flandreau, SD 57028-0283  
603 West Broad Street  
Phone: 605-997-3891 ext. 1226  
[carol.robertson@fsst.org](mailto:carol.robertson@fsst.org)

### **Lower Brule Sioux Tribe**

**Chair:** Lewis Grass Rope  
Lower Brule Sioux Tribe  
PO Box 187  
Lower Brule, SD 57548-0187  
187 Oyate Circle  
Phone: (605) 473-5561  
Fax: (605) 473-5606  
[www.lbst.org](http://www.lbst.org)

**Cultural Resources:** Clair Green  
Cultural Resources Office  
Lower Brule Sioux Tribe  
PO Box 187  
Lower Brule, SD 57548-0187  
Phone: (605) 473-5561  
Fax: (605) 473-5606  
Clair Green - (605) 730-1935  
[clairsgreen@yahoo.com](mailto:clairsgreen@yahoo.com)

### **Oglala Sioux Tribe**

**President:** John Yellow Bird Steele  
Oglala Sioux Tribe  
PO Box 2070  
Pine Ridge, SD 57770-2070  
Phone: (605) 867-5821  
Fax: (605) 867-1449  
[www.oglalalakotanation.org](http://www.oglalalakotanation.org)

**THPO:** Trina Lone Hill  
Tribal Historic Preservation Office  
Oglala Sioux Tribe  
PO Box 108  
Porcupine, SD 57772-0108  
101 Main St.  
Phone: (605) 867-2098  
Fax: (605) 867-2179  
[trinaLH@oglala.org](mailto:trinaLH@oglala.org)

### **Rosebud Sioux Tribe**

**President:** William Kindle  
Rosebud Sioux Tribe  
PO Box 430  
Rosebud, SD 57570-0430  
11 Legion Ave.  
Phone: (605) 747-2381  
Fax: (605) 747-2243  
[www.rosebudsiouxtribe-nsn.gov](http://www.rosebudsiouxtribe-nsn.gov)

**THPO:** Russell Eagle Bear  
Tribal Historic Preservation Office  
Rosebud Sioux Tribe  
PO Box 809  
Rosebud, SD 57570-0809  
Phone: (605) 747-4255  
Fax: (605) 747-4211  
[rst.thpo@rst-nsn.gov](mailto:rst.thpo@rst-nsn.gov)  
[reaglebear@yahoo.com](mailto:reaglebear@yahoo.com)  
**Alternate:** Kathy Arcoren



### **Sisseton-Wahpeton Oyate**

**Chair:** Dave Flute  
Sisseton-Wahpeton Oyate  
PO Box 509  
Agency Village, SD 57262-0509  
100 Veterans Memorial Dr.  
Phone: (605) 698-3911  
Fax: (605) 742-0265  
[www.swo-nsn.gov](http://www.swo-nsn.gov)

**THPO:** Dianne Desrosiers  
Tribal Historic Preservation Office  
Sisseton-Wahpeton Oyate  
PO Box 907  
Sisseton, SD 57262-0907  
205 Oak St. E. Ste. 121  
Phone: (605) 698-3584  
Fax: (605) 698-4283  
[DianneD@swo-nsn.gov](mailto:DianneD@swo-nsn.gov)  
**Alternate:** Jim Whitted  
[jmswhitted@yahoo.com](mailto:jmswhitted@yahoo.com)

### **Standing Rock Sioux Tribe**

**Chair:** David Archambault II  
Standing Rock Sioux Tribe  
PO Box D  
Ft. Yates, ND 58538-0522  
Phone: (701) 854-7560  
Fax: (701) 854-7299  
[www.standingrock.org](http://www.standingrock.org)

**THPO:** Jon Eagle  
Tribal Historic Preservation Office  
Standing Rock Sioux Tribe  
PO Box D  
Fort Yates, ND 58538-0522  
North Standing Rock Ave.  
Phone: (701) 854-8645  
Fax: (701) 854-2138  
[jeagle@standingrock.org](mailto:jeagle@standingrock.org)

### **Yankton Sioux Tribe**

**Chair:** Robert Flying Hawk  
Yankton Sioux Tribe  
PO Box 1153  
Wagner, SD 57380-1153  
Phone: (605) 384-3641  
Fax: (605) 384-5687

**THPO:** Kip Spotted Eagle  
Tribal Historic Preservation Office  
Yankton Sioux Tribe  
PO Box 1153  
Wagner, SD 57380-1153  
Phone: (605) 384-3641  
Fax: (605) 384-5687  
[yst.thpo@gmail.com](mailto:yst.thpo@gmail.com)

## **Kansas**

### **Iowa Tribe of Kansas and Nebraska**

**Chair:** Tim Rhodd  
Iowa Tribe of Kansas and Nebraska  
3345 B Thrasher Rd.  
White Cloud, KS 66094  
Telephone: (785) 595-3258  
Fax: (785) 595-6610  
[iowatribeofkansasandnebraska.com](http://iowatribeofkansasandnebraska.com)

**THPO:** Lance Foster  
Tribal Historic Preservation Office  
Iowa Tribe of Kansas and Nebraska  
3345 B Thrasher Rd.  
White Cloud, KS 66094  
Phone: (785) 595-3258  
Fax: (785) 595-6610  
[lfoster@iowas.org](mailto:lfoster@iowas.org)

## **Minnesota**

### **Lower Sioux Indian Community**

**President:** Robert Larson  
Lower Sioux Indian Community  
PO Box 308  
39527 Res Hwy 1  
Morton, MN 56270-0308  
Phone: (507) 697-6185  
Fax: (507) 697-8617  
[www.lowersioux.com](http://www.lowersioux.com)

**THPO:** Grace Goldtooth-Campos  
Tribal Historic Preservation Office  
Lower Sioux Indian Community  
32469 Cty Hwy  
Morton, MN 56270  
Phone: (507) 697-6321  
Fax: (507) 697-6310  
[lowersiouxthpo@gmail.com](mailto:lowersiouxthpo@gmail.com)

## **Montana**

### **Blackfeet Tribe**

**Chair:** Harry Barnes  
Blackfeet Tribe  
PO Box 850  
Browning, MT 59417-0850  
Phone: (406) 338-7521  
Fax: (406) 338-7530  
[www.blackfeetnation.com](http://www.blackfeetnation.com)

**Cultural Resources:** John Murray  
Cultural Resources Office  
Blackfeet Tribe  
PO Box 850  
Browning, MT 59417-0850  
Phone: (406) 338-7521  
Fax: (406) 338-7530  
[john.murray@blackfeetplanning.org](mailto:john.murray@blackfeetplanning.org)  
[jmflysdown@gmail.com](mailto:jmflysdown@gmail.com)

### **Crow Nation**

**Chair:** Darrin Old Coyote  
Crow Nation  
PO Box 159  
Crow Agency, MT 59022-0159  
Phone: (406) 638-3708  
Fax: (406) 638-3881  
[www.crowtribe.com](http://www.crowtribe.com)

**Cultural Resources:** Emerson Bull Chief  
Cultural Resources Office  
Crow Nation  
PO Box 159  
Crow Agency, MT 59022-0159  
Phone: (406) 638-4439  
Fax: (406) 638-3169  
[ebullchief@crownations.net](mailto:ebullchief@crownations.net)

### **Fort Peck Assiniboine and Sioux Tribes**

**Chair:** Floyd Azure  
Fort Peck Assiniboine & Sioux Tribes  
PO Box 1027  
Poplar, MT 59255-1027  
501 Medicine Bear Rd.  
Phone: (406) 768-2300  
Fax: (406) 768-5478  
[www.fortpecktribes.org](http://www.fortpecktribes.org)

**THPO:** Darrell "Curley" Youpee  
Tribal Historic Preservation Office  
Fort Peck Assiniboine & Sioux Tribes  
PO Box 1027  
Poplar MT 59255-1027  
501 Medicine Bear Rd.  
Phone: (406) 768-2382  
Fax: (406) 768-3054  
[cultres@nemontel.net](mailto:cultres@nemontel.net)



## Northern Cheyenne Tribe

**Tribal President:** Llevando Fisher  
Northern Cheyenne Tribe  
PO Box 128  
Lame Deer, MT 59043-0128  
Phone: (406) 477-6284  
Fax: (406) 477-6210  
[www.cheyennenation.com](http://www.cheyennenation.com)

**THPO:** James Walksalong  
Tribal Historic Preservation Office  
Northern Cheyenne Tribe  
PO Box 128  
Lame Deer, MT 59043-0128  
Phone: (406) 477-4839  
Fax: (406) 477-6491  
[ncthpo@mail.cheyenne.net](mailto:ncthpo@mail.cheyenne.net)  
[James.walksalong@cheyennenation.com](mailto:James.walksalong@cheyennenation.com)

## Nebraska

### Omaha Tribe of Nebraska

**Chair:** Vernon Miller  
Omaha Tribe of Nebraska  
P.O. Box 368  
Macy, NE 68039-0368  
100 Main St.  
Phone: (402) 837-5391  
Fax: (402) 837-5308  
[omaha-nsn.gov](http://omaha-nsn.gov)

**THPO:** Tom Parker  
Tribal Historic Preservation Office  
Omaha Tribe of Nebraska  
P.O. Box 368  
Macy, NE 68039-0368  
Phone: (402) 837-5391 ext. 201  
Fax: (402) 837-5308  
[tom.parker@omahatribe.com](mailto:tom.parker@omahatribe.com)

### Ponca Tribe of Nebraska

**Chair:** Larry Wright Jr.  
Ponca Tribe of Nebraska  
PO Box 288  
Niobrara, NE 68760-0288  
Phone: (420) 857-3391  
Fax: (402) 857-3736  
[www.poncatribene.org](http://www.poncatribene.org)

**THPO:** Shannon Wright  
Tribal Historic Preservation Office  
Ponca Tribe of Nebraska  
PO Box 288  
Niobrara, NE 68760-0288  
88915 521<sup>st</sup> Ave.  
Phone: (402) 857-3519  
Cell: (402) 750-8121  
Fax: (402) 857-3652  
[swright@poncatribene.org](mailto:swright@poncatribene.org)

### Santee Sioux Tribe of Nebraska

**Chair:** Roger Trudell  
Santee Sioux Tribe of Nebraska  
108 Spirit Lake Ave. W.  
Niobrara, NE 68760-7207  
Phone: (402) 857-2302  
Fax: (402) 857-2307  
[www.santeedakota.org](http://www.santeedakota.org)

**THPO:** Richard Thomas  
Tribal Historic Preservation Office  
Santee Sioux Tribe of Nebraska  
108 Spirit Lake Ave. W.  
Niobrara, NE 68760-7207  
Phone: (402) 857-3346  
Fax: (402) 857-2307  
[rthomas@santeedakota.org](mailto:rthomas@santeedakota.org)

## **Winnebago Tribe**

**Chair:** Darla LaPointe  
Winnebago Tribe  
PO Box 687  
Winnebago, NE 68701-0687  
100 Bluff St.  
Phone: (402) 878-2272  
Fax: (402) 878-2963  
[www.winnebago-tribe.com](http://www.winnebago-tribe.com)

**Cultural Resources:** Emily DeLeon  
Cultural Resources Office  
Winnebago Tribe  
PO Box 687  
Winnebago, NE 68701-0687  
100 Bluff St.  
Phone: (402) 878-2272  
Fax: (402) 878-2963

## **North Dakota**

### **Spirit Lake Tribe**

**Chair:** Myra Pearson  
Spirit Lake Tribe  
PO Box 359  
Fort Totten, ND 58335-0359  
Phone: (701) 766-4221  
Fax: (701) 766-4126  
[www.spiritlakenation.com](http://www.spiritlakenation.com)

**THPO:** Gerald Thompson  
Tribal Historic Preservation Office  
Spirit Lake Tribe  
PO Box 359  
Fort Totten, ND 58335-0359  
Phone: (701) 766-1240  
Fax: (701) 766-4592

### **Three Affiliated Tribes (Mandan, Hidatsa & Arikara Nation)**

**Chair:** Mark Fox  
Three Affiliated Tribes  
404 Frontage Road  
New Town, ND 58763-9404  
Phone: (701) 627-4781  
Fax: (701) 627-3503  
[www.mhanation.com](http://www.mhanation.com)

**THPO:** Elgin Crows Breast  
Tribal Historic Preservation Office  
Three Affiliated Tribes  
404 Frontage Road  
New Town, ND 58763-9404  
Phone: (701) 862-2474  
Fax: (701) 627-2490  
[redhawk@mhanation.com](mailto:redhawk@mhanation.com)

### **Turtle Mountain Band of Chippewa**

**Chair:** Richard McCloud  
Turtle Mountain Band of Chippewa  
PO Box 900  
Belcourt, ND 58316-0900  
Phone: (701) 477-2600  
Fax: (701) 477-6836  
[tmbci.org](http://tmbci.org)

**THPO:** Bruce Nadeau  
Tribal Historic Preservation Office  
Turtle Mountain Band of Chippewa  
PO Box 900  
Belcourt, ND 58316-0900  
Phone: (701) 477-2640  
Fax: (701) 477-5393  
[brucefnadeau@gmail.com](mailto:brucefnadeau@gmail.com)



## Oklahoma

### **Cheyenne & Arapaho Tribes of Oklahoma**

**Governor:** Eddie Hamilton  
Cheyenne & Arapaho Tribes of Oklahoma  
PO Box 38  
Concho, OK 73022-0038  
100 Red Moon Circle  
Phone: (405) 262-0345  
Fax: (405) 262-6872  
[www.c-a-tribes.org/](http://www.c-a-tribes.org/)

**THPO:** Andrew Willey  
Tribal Historic Preservation Office  
Cheyenne & Arapaho Tribes of Oklahoma  
PO Box 38  
Concho, OK 73022-0038  
Phone: (405) 262-0345  
Fax: (405) 262-6872  
[awilley@c-a-tribes.org](mailto:awilley@c-a-tribes.org)

### **Pawnee Nation of Oklahoma**

**President:** W. Bruce Pratt  
Pawnee Nation of Oklahoma  
PO Box 470  
Pawnee, OK 74058-0470  
881 Little Dee Dr.  
Phone: (918) 762-3621  
Fax: (918) 762-6446  
[www.pawneenation.org](http://www.pawneenation.org)

**THPO:** Kellie Poolaw  
Tribal Historic Preservation Office  
Pawnee Nation of Oklahoma  
PO Box 470  
Pawnee, OK 74058-0470  
Phone: (918) 762-3227  
Fax: (918) 762-6446  
[kpoolaw@pawneenation.org](mailto:kpoolaw@pawneenation.org)

## Wyoming

### **Eastern Shoshone Tribe of Wind River Indian Reservation**

**Chair:** Darwin St. Clair Jr.  
Eastern Shoshone Tribe  
PO Box 538  
Fort Washakie, WY 82514-0538  
Phone: (307) 332-3532  
Fax: (307) 332-3055  
[www.shoshoneindian.com](http://www.shoshoneindian.com)

**THPO:** Wilfred Ferris  
Tribal Historic Preservation Office  
Eastern Shoshone Tribe  
PO Box 538  
Fort Washakie, WY 82514-0538  
Phone: (307) 332-2081  
Fax: (307) 332-3055  
[wjferriiii@yahoo.com](mailto:wjferriiii@yahoo.com)

### **Northern Arapaho Tribe of Wind River Indian Reservation**

**Chair:** Dean Goggles  
Northern Arapaho Nation  
PO Box 396  
Fort Washakie, WY 82514-0396  
Phone: (307) 332-6120  
Fax: (307) 332-7543  
[www.northernarapaho.com](http://www.northernarapaho.com)

**THPO:** Corrine Headley  
Tribal Historic Preservation Office  
Northern Arapaho Nation  
PO Box 676  
St. Stephens, WY 82524-0676  
Phone: (307) 856-1628  
Fax: (307) 856-4611  
[northernarapahothpo@gmail.com](mailto:northernarapahothpo@gmail.com)



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Ecological Services  
420 South Garfield Avenue, Suite 400  
Pierre, South Dakota 57501-5408



November 29, 2016

Melissa Schmit  
Crocker Wind Farm, LLC  
7650 Edinborough Way  
Suite 725  
Edina, Minnesota 55435

Re: Crocker Wind Farm Revised Project  
Boundary, Clark County, South Dakota

Dear Ms. Schmit:

This letter is in response to your request dated October 27, 2016, for environmental comments regarding the above referenced boundary expansion of the proposed Crocker Wind Farm project. As mapped, the expansion is an approximately 3 x 4 mile area immediately north of South Dakota Highway 20, Clark County, South Dakota, immediately adjacent to the previous project area's northern boundary.

The information and recommendations provided in our letter to you dated May 18, 2016 regarding the Crocker Wind Farm also apply to the project expansion area.

In that May 2016 letter, we raised concern regarding the existence of numerous U.S. Fish and Wildlife Service (Service) easements at the project site, which are an indication of relatively high wildlife value of the habitat in this area. The expansion area also contains contiguous Service easements. It appears, based on aerial photo review of the expansion area, that the habitat is comprised mainly of grasslands with a high number of wetlands intermixed, as is the case in much of the remaining Crocker Wind Farm proposed project area. We have estimated, based on turbine layouts you have provided that 41% of turbines comprising the Crocker Wind Farm are proposed to be installed on native prairie. Some wildlife species can adapt to a variety of grassland types, but native prairies are of particular importance due to their increasing rarity; the continued loss of native prairies imperils many species, including crucial pollinators like the Dakota skipper (see below), that cannot survive without intact prairie ecosystems. Additionally, true restoration of these areas post-disturbance is highly difficult if not impossible, thus native prairie impacts cannot fully be rectified.

We reiterate our foremost recommendation regarding wind projects in South Dakota, relayed to you during our initial meeting and in several contacts and correspondences thereafter: avoid and minimize impacts to grasslands to the greatest extent possible.



Recommendations from our office, the Waubay Wetland Management District office, and our agency guidelines (Land-based Wind Energy Guidelines and Eagle Conservation Plan Guidance) are intended to provide means to evaluate wind energy projects for the risk of potentially adverse impacts. The resulting wildlife and habitat information are to be used during project planning to avoid and minimize those impacts. In some cases, it is appropriate to abandon project areas due to high risk to wildlife.

The Crocker Wind Farm is located in a grassland/wetland complex used by numerous grassland nesting species, and has been identified as a high-use area for waterfowl with more than 100 breeding birds per square mile. Grassland nesting species, including species identified in our *2008 Birds of Conservation Concern*

(<https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf>) will be directly and indirectly impacted by placement of turbines, access roads and other project facilities on the landscape. As you know, we recommend offsetting measures for any turbines placed within grasslands to compensate for avoidance behavior by grassland nesting birds, which may avoid the structures by 300 m or more (approximately a 70 acre circle around each turbine) (Shaffer and Buhl 2015). The area also attracts many shorebird and waterbird species due to the high number of basins in the area, and while project facilities may not directly impact these habitats, they are likely to negatively affect wildlife that uses the wetlands.

Risks posed to eagles nesting near the Crocker project area may increase if the proposed expansion area is developed. Per your 2016 raptor nest survey report, two active bald eagle nests were located during preconstruction surveys: one 5.4 miles northeast and the other 6.2 miles north of the old project boundary. Expanding the project area into the 3 x 4 mile area north of the old boundary places turbines closer to those nests, and the revised boundary also expands the 10-mile buffer within which we recommend surveying for eagle nests. Additional surveys would be needed to detect any eagle nests within the new 10 mile buffer.

Listed species may be at risk as well. Although surveys have not been conducted in the area to detect Dakota skippers or Poweshiek skipperlings, a minimum of 62 areas totaling 162.5 acres of suitable habitat for these species were documented during preconstruction habitat surveys, and many portions of the project area have yet to be evaluated for suitability. As noted above, Dakota skippers – as well as the Poweshiek skipperlings – rely on native prairie habitats.

Federally endangered whooping cranes have been documented moving through the area. The Aransas/Wood Buffalo flock that migrates through South Dakota each spring and fall is the only self-sustaining wild population of these birds in existence. The birds do not breed in South Dakota. Although they are most often sighted in counties near the Missouri River, whooping cranes are known to occur in both far eastern and western portions of the South Dakota. We currently recommend that spring and fall monitoring for migrating whooping cranes occur at wind projects within the whooping crane migration corridor (which widens in South Dakota based on state-specific records – see enclosed map). If cranes are sighted near the project, turbine operations are then shut down to preclude collision mortality. This is described in the Upper Great Plains Programmatic Environmental Impact Statement which may be utilized for development of the Crocker Wind Farm.

In short, the Crocker Wind Farm appears to be in a high wildlife use area and the proposed boundary expansion appears to exacerbate, rather than alleviate, direct and indirect risks posed to wildlife should the project be constructed as currently proposed.

We reiterate from our May 2016 letter, our policy relative to migratory birds: the Migratory Bird Treaty Act 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 operation of the Crocker Wind Farm 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.

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.

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

Sincerely,



*For* Scott Larson  
Field Supervisor  
South Dakota Field Office

Enclosure

Cc: Waubay WMD; Waubay, SD  
(Attn: Connie Mueller)  
SDGFP; Pierre, SD  
(Attn: Silka Kempema)



## LITERATURE CITED:

Shaffer, J. A. and D. A. Buhl. 2015. Effects of wind-energy facilities on breeding grassland bird distributions. *Conservation Biology*. 30(1):59-71.

## 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

# South Dakota Whooping Crane Migration Corridor Using State Sightings

Central Flyway of the United States

