Appendix G

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Appendix G

Biological Documents

- Potential Impact Index (PII)
- February 18, 2010, RUS letter to USFWS
- Biological Assessment (BA)
- March 16, 2010, USFWS response
- Operations and Monitoring Plan (OMP)

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November 24, 2008

Terracon
Consulting Engineers & Scientists

Terracon Consultants, Inc.
2026 Samco Road, Suite 101
Rapid City, South Dakota 57702
Phone 605.716.2924
Fax 605.716.2926

Ms. Erin Dukart
Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, North Dakota 58503-0564

Phone: (701) 223-0441
Email: edukart@bepc.com

Re: Potential Impact Index for Prairiewinds SD1
Reference (Lake Andes), Crow Lake, Winner, and Fox Ridge Project Sites
Central, South Dakota
Terracon Project No. B4087002

Dear Ms. Dukart;

Terracon Consultants, Inc. (Terracon) has prepared a Potential Impact Index (PII) for the Prairiewinds SD1. The PII was performed in accordance with the Basin Electric Power Cooperative (Basin) Agreement No. 546856 dated April 2, 2008 and Change Order No. 01 dated August 13, 2008, and the U.S. Fish & Wildlife Service (USFWS) Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines dated May 13, 2003.

Terracon has prepared the following narrative which summarizes the PII. The following is for inclusion into the Basin PrairieWinds – SD 1, Alternative Evaluation Analysis and Site Selection Study dated November 2008.

POTENTIAL IMPACT INDEX ASSESSMENT

At the request of the U.S. Department of Agriculture (USDA) Rural Utility Service (RUS), Basin Electric commissioned a Potential Impact Index (PII) Assessment for the Crow Lake, Winner, and Fox Ridge project sites.

The PII Assessment was performed in general accordance with the USFWS Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines dated May 13, 2003 (2003 USFWS Guidance). The PII represents a “first cut” analysis of the suitability of sites proposed for development. It does so by estimating use of the site by selected wildlife species as an indicator of potential impact. Emphasis of the PII is on initial site evaluation and is intended to provide more objectivity than simple reconnaissance surveys.

Although the PII protocol is designed primarily to evaluate potential impacts on aerial wildlife from collision with turbines and infrastructure, potential impacts to fish, other aquatic life, and mammals were also considered.

The PII Assessment utilized the following steps in ranking sites by their potential impact on wildlife:

1. Identification of potential Reference Sites within the general geographic area of the potential project sites being considered for development (Crow Lake, Winner, and Fox Ridge) were evaluated.

2. Selection of a Reference site in an area where wind development would likely result in the maximum negative impact on wildlife, resulting in a high PII score.

3. Evaluation of the potential project sites to assess the risk to wildlife, and to rank the sites relative to each other using the Reference Site as a standard.

Evaluations were conducted by qualified geologist/biologists who were familiar with local and regional geology and wildlife. The final selection of the Reference Site was reviewed and approved by the USFWS. A Site Location Map indicating the approximate location of the Reference, Crow Lake, Winner, and Fox Ridge Sites is included with the PII, attached.

The PII was derived from the results of three checklists (attached) generally following the PII Checklist and Forms provided in the 2003 USFWS Guidance. The checklists were developed and applied as follows:

1. The Physical Attribute checklist considered topographic, meteorological, and site characteristics that may influence bird and bat occurrence and movements.

2. The Species Occurrence and Status checklist includes: Birds of Conservation Concern at the Bird Conservation Region level; federally-listed Endangered, Threatened, and Candidate Species; bird species of high recreational or other value (e.g., waterfowl, prairie grouse); and State Endangered, Threatened, and Rare species listed by the State Natural Heritage Program.

3. The Ecological Attractiveness checklist evaluated the presence and influence of ecological magnets and other conditions that would draw birds or bats to the site or vicinity.

The checklists were developed from readily available public information. References for information utilized in completion of the checklists are included in the References section of the PII Checklists.

Each checklist has boxes that were checked for a particular attribute or species found at the Reference Site or a potential project site. The number of boxes in each checklist was based on variations in the number of physical attributes and species of concern in the region. Each checklist was assigned a divisor (p), which was developed by dividing the number of boxes in a checklist by the total number of boxes in all three checklists. Boxes in a checklist were checked if the condition or species was known or strongly suspected to occur. The PII was calculated from the checklist totals for each of the Potential Project Sites and the Reference Site.

Based on the results of the PII, the Reference Site had a total score of 331 compared to a total score of 269 for the Winner Site, 239 for the Crow Lake Site, and 214 for the Fox Ridge Site. The conclusion of the PII Checklist includes the need for additional site specific environmental analysis and site reconnaissance for the selected potential project sites.

Closure

The PII is not intended to be all-inclusive relative to objectives, methods, and analysis nor to serve as the definitive reference or directive for any step in wind power related investigations. No adequate and defensible information exists regarding the appropriateness of the potential project site being evaluated relative to impacts to wildlife. Terracon does not warrant the work of regulatory agencies or other parties supplying information, which may have been used during the preparation of the PII. Information obtained for the PII was received from several sources that we believe to be reliable; nonetheless, the authenticity or reliability of these sources cannot and is not warranted hereunder. No warranties, express or implied, are intended or made.

Please contact us if you have questions regarding this information or if we can provide any other services.

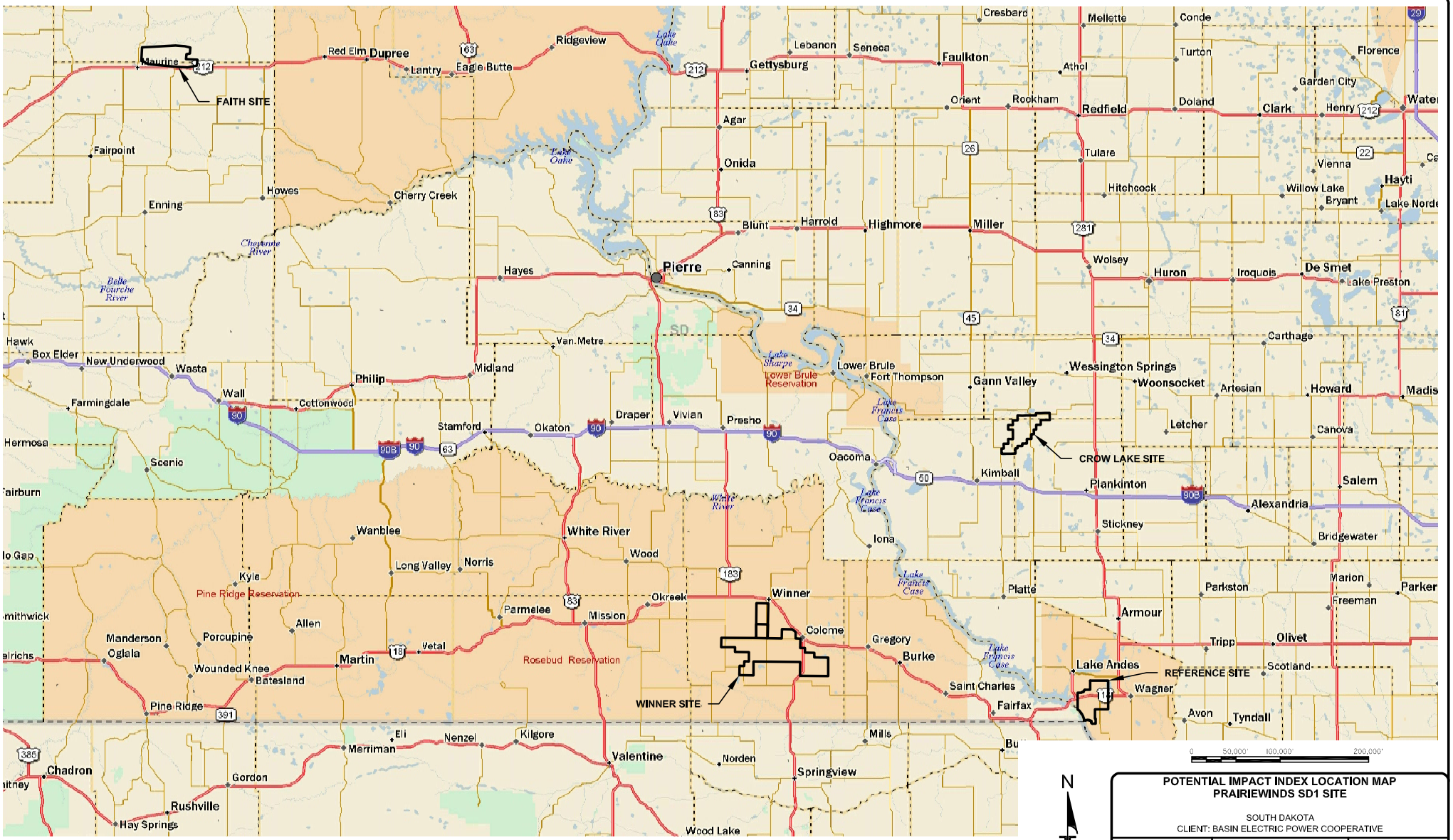
Sincerely,
TERRACON CONSULTANTS, INC.

James I. Van Blaricon
Senior Environmental Biologist

Mary E. Wells, P.E.
Principal

Attachments: Potential Impact Index

C:\Terracon\Projects\2008\B4087002\Report\PII\PII_Cover_112408.doc



NOTE
MAP PROVIDED BY DELORME STREET ATLAS USA.

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. LOCATIONS ARE APPROXIMATE.

POTENTIAL IMPACT INDEX LOCATION MAP
PRAIRIEWINDS SD1 SITE

SOUTH DAKOTA
CLIENT: BASIN ELECTRIC POWER COOPERATIVE

Project Mngr: JIV	Terracon	Scale: SHOWN	
Designed By: JIV	1815 S. Eisenhower	Date: 11/24/08	
Checked By: JIV	Wichita, Kansas 67209	Project No. B4087002	
Approved By: JIV	Phone: (316) 262-0171	File Name: 7002FI.DWG	
Drawn By: BCB	Fax: (316) 262-6997	Figure No. 1	

PHYSICAL ATTRIBUTE CHECKLIST

		REFERENCE SITE	CROW LAKE, SD	WINNER, SD	FOX RIDGE, SD
	Physical Attribute	Northwestern Glaciated Plains: Southern Missouri Coteau Slope and Southern River Breaks	Northwestern Glaciated Plains: Southern Missouri Coteau	Northwestern Great Plains: Subhumid Pierre Shale Plains, Northwestern Great Plains: Keya Paha Tablelands, Northwestern Glaciated Plains: Ponca Plains	Northwestern Great Plains: Moreau Prairie
Topography	Gulch	X			
	Ridge	X	X	X	X
	Saddle	X		X	
	Butte	X		X	X
	Plateau	X		X	
	Canyon	X			X
	Plain	X	X	X	
	Bluff	X	X	X	X
	Valley	X	X	X	X
	Ground Moraine	X			
	Hummock	X			
	Potholes	X	X	X	
	Hill	X	X	X	X
Wind Direction	S	X	X	X	
	N				X
	E				
	W				
	Updrafts	X	X	X	X
Migratory Corridor Potential	Latitudinal (N <-> S)	X	X	X	X
	Longitudinal (E <-> W)	X			
	Wide Approaches (>30 km)	X	X	X	X
	Funnel Effect - Horizontal		X	X	
	Funnel Effect - Vertical	X		X	X
Site Size (acres) & Configuration	<640	X	X	X	X
	>640<1000	X	X	X	X
	>1000<1500	X	X	X	X
	Turbine Rows not Parallel to				
Infrastructure to Build	Transmission	X	X	X	X
	Roads	X	X	X	X
	Buildings	X	X	X	X
	Maintenance	X	X	X	X
	Daily Activity	X	X	X	X
	Substation	X	X	X	X
Increased Activity		X	X	X	X
Totals		29	21	25	21

AVIAN SPECIES OF CONCERN

	REFERENCE SITE			CROW LAKE, SD			WINNER, SD			FOX RIDGE, SD		
Birds (n=)												
Occurrence	**B**	**M/W**	**∑**	**B**	**M/W**	**∑**	**B**	**M/W**	**∑**	**B**	**M/W**	**∑**
Upland Sandpiper (*Bartramia longicauda*), FBCC	X		1	X		1	X		1	X		1
Solitary Sandpiper (*Tringa solitaria*), FBCC		X	1		X	1		X	1		X	1
Buff-breasted Sandpiper (*Tryngites subruficollis*), FBCC		X	1		X	1		X	1		X	1
Wilson's Phalarope (*Phalaropus tricolor*), FBCC	X		1	X		1	X		1	X		1
Common Loon (*Gavia immer*), SR								X	1			
Horned Grebe (*Podiceps auritus*), SR												
Red-Necked Grebe (*Podiceps grisegena*), SR												
Clark's Grebe (*Aechmophorus clarkii*), SR												
Least Bittern (*Ixobrychus exilis*), SR												
Bufflehead (*Bucephala albeola*), SR												
Hooded Merganser (*Lophodytes cucullatus*), SR												
Common Merganser (*Mergus merganser*), SR												
Yellow Rail (*Coturnicops noveboracensis*), SR, FBCC												
King Rail (*Rallus elegans*), SR												
Black-Necked Stilt (*Himantopus mexicanus*), SR												
Brewer's Sparrow (*Spizella breweri*), SR, FBCC												
Henslow's Sparrow (*Ammodramus henslowii*), SR, FBCC												
Sharp-Tailed Sparrow (*Ammodramus nelsoni*), SR, FBCC												
Marbled Godwit (*Limosa fedoa*), FBCC	X		1	X		1	X		1	X		1
Black-billed Cuckoo (*Coccyzus erythropthalmus*), FBCC	X		1	X		1	X		1	X		1
Grashopper Sparrow (*Ammodramus savannarum*), FBCC	X		1	X		1	X		1	X		1
Amercian Golden Plover (*Pluvialis dominica*) FBCC												
Snowy Plover (*Charadrius alexandrinus*), FBCC												
Mountain Plover (*Charadrius montanus*), SR, FBCC												
Mccown's Longspur (*Calcarius mccownii*), SR, FBCC												
Chestnut-collared Longspur (*Calcarius ornatus*), FBCC	X		1	X		1	X		1	X		1
Eastern Meadowlark (*Sturnella magna*), SR												
Cassin's Finch (*Carpodacus cassinii*), SR, FBCC												
Le Conte's Sparrow (*Ammodramus leconteii*), SR, ,FBCC		X	1		X	1		X	1		X	1
Baird's Sparrow (*Ammodramus bairdii*), SR, FBCC										X		1
Dickcissel (*Spiza americana*), FBCC	X		1	X		1	X		1	X		1
Long-Billed Curlew (*Numenius americanus*), SR, FBCC							X		1	X		1
American White Pelican (*Pelecanus erythrorhynchos*), SR	X	X	2	X	X	2	X	X	2		X	1
Great Blue Heron (*Ardea herodias*), SR	X	X	2		X	1		X	1			

AVIAN SPECIES OF CONCERN

	REFERENCE SITE			CROW LAKE, SD			WINNER, SD			FOX RIDGE, SD		
Little Blue Heron (*Egretta caerulea*), SR					X	1						
Tricolored Heron (*Egretta tricolor*), SR												
Green-Backed Heron (*Butorides virescens*), SDR												
Great Egret (*Casmerodius albus*), SR	X		1									
Snowy Egret (*Egretta thula*), SR	X		1									
Yellow-Crowned Night-Heron (*Nycta)nassa violacea),* SR												
Black-Crowned Night-Heron *(Nycticorax nycticorax),* SR	X		1									
White-Faced Ibis (*Plegadis chihi*), SR												
Cooper's Hawk *(Accipiter cooperii), SR*	X	X	2					X	1			
Swainson's Hawk *(Buteo swainsoni),* SR, FBCC	X		1	X		1	X		1	X		1
Ferruginous Hawk (*Buteo regalis*), SR, FBCC	X		1	X		1	X		1	X		1
Sharp-Shinned Hawk (*Accipiter striatus*), SR												
Northern Goshawk (*Accipiter gentilis*), SR												
Broad-Winged Hawk (*Buteo platypterus*), SR												
Merlin (*Falco columbarius*), SR												
Prairie Falcon (*Falco mexicanus*), SR, FBCC								X	1			
Northern Harrier (*Circus cyaneus*), FBCC	X	X	2	X	X	2	X		1	X		1
Golden Eagle (*Aquila chrysaetos*), SR, FBCC	X		1					X	1	X	X	2
Gunnison Sage-Grouse (*Centrocercus minimus*), FBCC												
Barn Owl (*Tyto alba*), SR												
Burrowing Owl *(Athene cunicularia),* SR, FBCC	X		1	X		1	X		1	X		1
Northern Saw-Whet Owl (*Aegolius acadicus*), SR												
Flammulated Owl (*Otus flammeolus*), SR, FBCC												
Long-Eared Owl (*Asio otus*), SR												
Short-eared Owl (*Asio flammeus*), FBCC	X	X	2	X	X	2	X	X	2	X	X	2
Red-headed Woodpecker (*Melanerpes erythrocephalus*), FBCC	X		1									
Lewis' Woodpecker (*Melanerpes lewis*), SR, FBCC												
Three-Toed Woodpecker (*Picoides tridactylus*), SR												
Black-Backed Woodpecker (*Picoides arcticus*), SR												
Pileated Woodpecker (*Dryocopus pileatus*), SR												
Olive-Sided Flycatcher (*Contopus cooperi*), SR												
Cassin's Kingbird (*Tyrannus vociferans*), SR												
Clark's Nutcracker (*Nucifraga columbiana*), SR												
Pygmy Nuthatch (*Sitta pygmaea*), SR												
Brown Creeper (*Certhia americana*), SR												
Blue-Gray Gnatcatcher (*Polioptila caerulea*), SR												

AVIAN SPECIES OF CONCERN

	REFERENCE SITE			CROW LAKE, SD			WINNER, SD			FOX RIDGE, SD		
Veery (*Catharus fuscescens*), SR												
Wood Thrush (*Hylocichla mustelina*), SR												
American Woodcock *(Scolopax minor), SR*	X		1									
California Gull (*Larus californicus*), SR					X	1						
Common Tern (*Sterna hirundo*), SR												
Black Tern *(Chlidonias niger),* SR	X		1	X		1	X		1	X		1
Loggerhead Shrike (*Lanius ludovicianus*), FBCC	X		1	X		1	X		1	X		1
Common Poorwill (*Phalaenoptilus nuttallii*), SR							X		1	X		1
Chuck-will's-widow (*Caprimulgus caronlinensis*), SR												
Whip-Poor-Will *(Caprimulgus vociferus), SR*	X		1									
Ruby-Throated Hummingbird (*Archilochus colubris*), SR												
Northern Mockingbird (*Mimus polyglottos*), SR	X		1	X		1	X		1	X		1
Sage Thrasher (*Oreoscoptes montanus*), SR										X	X	2
Sprague's Pipit (*Anthus spragueii*), SR, FBCC												
Bobolink (*Dolichonyx oryzivorus*), FBCC	X		1	X		1	X		1	X		1
Black-And-White Warbler (*Mniotilta varia*), SR												
Cerulean Warbler (*Dendroica cerulea*), SR												
Virginia's Warbler (*Vermivora virginiae*), SR, FBCC												
Scarlet Tanager (*Piranga olivacea*), SR												
Bewick's Wren (*Thryomanes bewickii*), FBCC												
Gray Vireo (*Vireo vicinior*), FBCC												
Bell's Vireo (*Vireo bellii*), FBCC	X		1	X		1	X		1	X		1
Yellow -Throated Vireo *(Vireo flavifrons),* SR	X		1									
Subtotals	28	8	36	18	9	27	20	10	30	22	7	29
		Total	36			27			30			29

BAT SPECIES OF CONCERN

	REFERENCE SITE			CROW LAKE, SD			WINNER, SD			FOX RIDGE, SD		
Bats (n =)												
Occurrence	**B**	**M/W**	**∑**	**B**	**M/W**	**∑**	**B**	**M/W**	**∑**	**B**	**M/W**	**∑**
Northern myotis (*Myotis septentrionalis*), SR	X	X	2									
Silver-haired bat (*Lasionycteris noctivagans*), SR	X	X	2									
Long-Eared Myotis (*Myotis evotis*), SR												
Fringe-Tailed Myotis (*Myotis thysanodes pahasapensis*), SR												
Townsend's Big-Eared Bat (*Corynorhinus townsendii*), SR												
Evening Bat (*Nycticeius humeralis*), SR												
Subtotals	2	2	4									
		Total	4									

SPECIES OCCURRENCE & STATUS

		REFERENCE SITE			CROW LAKE, SD			WINNER, SD			FOX RIDGE, SD		
	Occurrence	**B**	**M/W**	**∑**	**B**	**M/W**	**∑**	**B**	**M/W**	**∑**	**B**	**M/W**	**∑**
Threatened & Endangered (includes wildlife, fish, and plants)	Whooping Crane (*Grus americana*), FE, SE		X	1		X	1		X	1		X	1
	Piping Plover (*Charadrius melodus*), FT, ST	X		1	X		1						
	Bald Eagle (*Haliaeetus leucocephalus*), ST	X	X	2				X	X	2			
	Osprey (*Pandion haliaetus*), ST								X	1			
	Eskimo Curlew (*Numenius borealis*), FE, SE												
	Least Tern (*Sterna antillarum*), FE, SE	X		1									
	American Dipper (*Cinclus mexicanus*), ST												
	Peregrine Falcon (*Falco peregrinus*), SE, SR, FBCC												
	Topeka Shiner (*Notropis topeka*), FE	X		1									
	Northern Redbelly Dace (*Phoxinus eos*), ST	X		1				X		1			
	Blacknose shiner (*Notropis heterolepis*) SE							X		1			
	Sturgeon chub (*Macrhybopsis gelida*), ST				X		1	X		1			
	Finescale Dace (*Phoxinus neogaeus*), SE	X		1	X		1	X		1			
	Pallid Sturgeon (*Scaphirhynchus albus*), FE, SE	X		1									
	American burying beetle (*Nicrophorus americanus*), FE	X		1				X		1			
	Gray Wolf (*Canis lupus*), FE												
	Black-Footed Ferret (*Mustela nigripes*), SE, FE												
	Swift Fox (*Vulpes velox*), ST	X		1									
	Northern River Otter (*Lontra canadensis*), ST												
	Lynx (*Lynx canadensis*), FT												
	False Map Turtle (*Graptemys pseudogeographica*), ST	X		1	X		1						
	Lined Snake (*Tropidoclonion lineatum*), SE												
	Eastern Hognose Snake (*Heterodon platirhinos*), ST	X		1									
Candidate													
Special Concern	Birds (max ∑=)	28	8	36	18	9	27	20	10	30	22	7	29
	Bats (max ∑=)	2	2	4									
Subtotals		41	12	53	22	10	32	26	13	39	22	8	30
Total				53			32			39			30

ECOLOGICAL ATTRACTIVENESS

			REFERENCE SITE		CROW LAKE, SD		WINNER, SD		FOX RIDGE, SD	
		Ecological Attractor		Within 5 miles		Within 5 miles		Within 5 miles		Within 5 miles
Migration Route		Local	X		X		X		X	
	Continental	N	X		X		X		X	
		S	X		X		X		X	
		E								
		W								
Ecological Magnets		Lotic System	X		X		X		X	
		Lentic System	X		X		X		X	
		Wetlands	X		X		X			
		Native Grassland	X		X		X		X	
		Forest	X		X		X			
		Food Concentrated								
		Energetic Foraging								
	Vegetation / Habitat	Unique		X						
		Diverse								
Significant Ecological Event										
Site of Special Conservation Status				X						
		Total		10		8		8		6

POTENTIAL IMPACT INDEX

	REFERENCE SITE		CROW LAKE, SD		WINNER, SD		FOX RIDGE, SD	
Checklist (p)	∑	∑/p	∑	∑/p	∑	∑/p	∑	∑/p
Physical (0.20)	29	145	21	105	25	125	21	105
Species Occurrence & Status (0.71)	53	75	32	45	39	55	30	42
Ecological (0.09)	10	111	8	89	8	89	6	67
Totals		331		239		269		214

REFERENCE SITE COMMENTS

Physical	Site considerations should also include land use, historical/archeological significance and socioeconomics.
	The Missouri River bourders the site to the southwest and the Prairie Pothole region to the north.
Species Occurrence	Potential additional study needs should include additional site specific environmental analysis and site reconnaissance of the selected potential project site. In the case of federally listed threatened, endangered, or candidate species of wildlife, fish, or plants, consultation with the Fish and Wildlife Service under the Endangered Species Act is required.
Ecological	Lake Andres National Wildlife Refuge located 3 miles to the North
	Karl E. Mundt National Wildlife Refuge located directly across the Missouri River to the Southwest
	Karl E. Mundt NWR is a habitat for 100-300 bald eagles and protects a critical winter roost habitat for bald eagles.
	Karl E. Mundt NWR is in the southern end of the prairie pothole region and is critical waterfowl habitat.

WINNER SITE COMMENTS

Physical	Site considerations should also include land use, historical/archeological significance and socioeconomics.
Species Occurrence	Potential additional study needs should include additional site specific environmental analysis and site reconnaissance of the selected potential project site. In the case of federally listed threatened, endangered, or candidate species of wildlife, fish, or plants, consultation with the Fish and Wildlife Service under the Endangered Species Act is required.
Ecological	Beaulieu Lake State Game Production Area
	McLaughlin Dam State Game Production Area
	Dog Ear Lake State Game Production Area
	Little Dog Ear Lake State Game Production Area

CROW LAKE COMMENTS

Physical	Site considerations should also include land use, historical/archeological significance and socioeconomics.
Species Occurrence	Potential additional study needs should include additional site specific environmental analysis and site reconnaissance of the selected potential project site. In the case of federally listed threatened, endangered, or candidate species of wildlife, fish, or plants, consultation with the Fish and Wildlife Service under the Endangered Species Act is required.
Ecological	USFWS Grassland Easements:
	E/2 and SW/4 of Sec. 36, Township 105 N, Range 67 W in Brule County
	W/2 of Sec. 3, Township 105 N, Range 66 W in Aurora County
	Sec. 4, Township 105 N, Range 66 W in Aurora County
	SW/4 SW/4 of Sec. 31, Township 105 N, Range 66 W in Aurora County
	Crow Lake State Game Production Area <1 mile from site

FOX RIDGE SITE COMMENTS

Physical	Site considerations should also include land use, historical/archeological significance and socioeconomics.
	The northwestern corner of the state has produced most of the dinosaurs found in South Dakota. Areas of Paleontological significance include Meade County.
Species Occurrence	Potential additional study needs should include additional site specific environmental analysis and site reconnaissance of the selected potential project site. In the case of federally listed threatened, endangered, or candidate species of wildlife, fish, or plants, consultation with the Fish and Wildlife Service under the Endangered Species Act is required.
Ecological	

References

U.S. Fish & Wildlife Service, South Dakota Field Office Website, Endangered Species by County List, http://www.fws.gov/southdakotafieldoffice/endsppbycounty.htm

South Dakota Wildlife Diversity Program, South Dakota Falcons Website, Eileen Dowd Stukel, http://www.sdgfp.info/Wildlife/Diversity/Digest%20Articles/falcons.htm

NatureServe Explorer Website Database, http://www.natureserve.org/explorer/servlet/NatureServe?post_processes=PostReset&loadTemplate=nameSearchSpecies.wmt&Type=Reset

U.S. Fish & Wildlife Service, Lake Andes National Wildlife Refuge Complex Website, Birds of the Lake Andes National Wildlife Refuge Complex, http://www.fws.gov/lakeandes/birdlist.html

South Dakota Wildlife Diversity Program, Threatened, Endangered, and Candidate Species of South Dakota, http://www.sdgfp.info/Wildlife/Diversity/TES.htm

South Dakota Wildlife Diversity Program, Rare, Threatened or Endangered Animals Tracked by the South Dakota Natural Heritage Program, http://www.sdgfp.info/Wildlife/Diversity/RareAnimal.htm

U.S. Geological Survey, Northern Prairie Wildlife Research Center Website, Ecoregions of North Dakota and South Dakota, http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/42h.htm

U.S. Geological Survey, Northern Prairie Wildlife Research Center Website, Fragile Legacy, Endangered, Threatened & Rare Animals of South Dakota, http://www.npwrc.usgs.gov/resource/wildlife/sdrare/index.htm#contents

U.S. Geological Survey, Northern Prairie Wildlife Research Center Website, The South Dakota Breeding Bird Atlas, http://www.npwrc.usgs.gov/resource/birds/sdatlas/toc.htm#podicipedidae

Terraserver – www.terraserver.com

National Climatic Data Center (NCDC) NOAA Satellite and Information Center Wind Maps http://cdo.ncdc.noaa.gov/cgi-bin/climaps/climaps.pl

South Dakota State University, Climate and Weather, http://climate.sdstate.edu/climate_site/HTML/climate_page_html.htm

Google Maps, http://maps.google.com/

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USDA Rural Development

United States Department of Agriculture
Rural Development

February 18, 2010

Mr. Pete Gober, Field Supervisor
U.S. Fish and Wildlife Service
South Dakota Field Office
420 South Garfield Ave., Suite 400
Pierre, South Dakota 57501-5408

RE: Endangered Species Act Section 7 Consultation, Proposed South Dakota Prairie Winds Facility, Aurora, Brule, and Jerauld Counties, South Dakota

Dear Mr. Gober:

The U. S. Department of Agriculture, Rural Utilities Service (RUS), and the Western Area Power Administration, an agency of the U.S. Department of Energy (Western) [the Agencies] are currently considering whether to provide financing and a transmission interconnection, respectively, for the construction of a 150-MW wind turbine generating facility on mixed prairie/rangeland in Aurora, Brule and Jerauld Counties, South Dakota. The proposed South Dakota Prairie Winds Facility (SDPW, project), would be developed, constructed, and operated by PrairieWinds SD1, Inc., a subsidiary of Basin Electric Power Cooperative, Inc. (Basin), of Bismarck, North Dakota.

RUS' and Western's proposed actions are considered federal actions under the National Environmental Policy Act (NEPA) and related statutes (including the Endangered Species Act of 1973 (ESA)), and according to their regulations, the Agencies have prepared an environmental impact statement (EIS) for the proposed project. As agreed to by RUS and Western, RUS has led consultation with your office under Section 7(a) of the ESA; the information and conclusions herein, including the Biological Assessment (BA), support the joint determinations of the Agencies. We seek your concurrence with our determinations of effect to federally-listed species.

The BA describes the proposal in more detail and provides species accounts and related information to support our determinations of effect. The BA was prepared by Basin and its contractor, Heritage Environmental Consultants. We have reviewed and revised the BA and consider it to properly represent the Agencies' views.

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Project Description

The proposed project would consist of a wind-powered electricity generation facility with a nameplate rating of up to 151.5 MW. The project area is located approximately 15 miles north of White Lake and 17 miles south of Wessington Springs, South Dakota. The site discussed in the BA is the current preferred alternative; the draft EIS fully discusses the alternatives and site selection analyses. Proposed plans include the installation of up to 101 1.5-MW wind turbines within an area of approximately 37,000 acres (58 square miles).

Turbines would be located on hills and ridges in an area predominated by mixed-grass prairie (rangeland, pastureland and CRP/prairie), along with some cultivated cropland and scattered farmsteads. Wetland basin density in the Project area is nine to 10 basins per square mile which is relatively low for the Prairie Pothole Region. Based on field verification and aerial photography, wetlands account for 517 acres of the Project area. The density of wetlands within the Project area is comparable to adjacent areas

Project infrastructure would include 101 wind turbine generators (General Electric 1.5 SLE model), two substations, a temporary laydown yard, access roads, buried collector lines, fiber optic communication lines, a 230-kV transmission line, and an O&M building. Power would be delivered to the grid via a new interconnection point at the existing Western Wessington Springs Substation. Eleven miles of new 230kV transmission line would connect the facility to the substation. Project planning and analysis included 10 additional turbine locations to allow for limited grid re-arrangement as necessary. Late in the planning process, a separate proposal for 7 turbines was accepted by Basin for location in the extreme northeast portion of the project area. It is considered that, *de facto*, the EIS and BA analyses included these turbines.

Each wind turbine would have a hub height of 262 feet (80 meters) and a wind turbine rotor diameter of 252 feet (77 meters). The rotor swept area is 49,876 square feet (1.14 acres). The total height of each wind turbine would be 389 feet (118.5 meters) with a blade in the vertical position. The wind turbine tower would be constructed of tubular steel, approximately 15 feet in diameter at the base, with internal flanges. The color of the towers and rotors would be standard white or off-white. During construction, a work/staging area at each wind turbine would include the crane pad and rotor assembly area. This would temporarily disturb an area of approximately 500 x 500 feet, and permanently disturb a 25-foot radius around each turbine. The wind turbine foundations would typically be mat foundations or a concentric ring shell foundation. The excavated area for the wind turbine foundations would typically be approximately 70 x 70 feet. Pad mounted transformers would be placed next to the each wind turbine, with the pedestal 17 feet in diameter, and crushed rock apron extending 10 feet wide around the pedestal. For step-and-touch voltage compliance, an area around

each wind turbine and transformer would be covered in gravel four inches deep and ten feet in all directions.

Consultation History

Western and RUS (co-lead agencies) sent a letter to the South Dakota Field Office on April 9, 2009 to inform the USFWS of the Notice of Intent (NOI) to prepare an EIS for the proposed project and received a letter of response with formal comments on May 13, 2009. The response provided information on three federally listed species that may occur in the Project area. The response also referenced the Service's 2003 *Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines* and other guidance for non-listed species.

The Agencies determined that RUS would be the lead agency for Section 7 consultation, assisted by Western and its third party contractor. RUS sent a letter on October 14, 2009 notifying the USFWS of its strategy, requesting an updated species list for the Project, and designating Mr. Patrick Golden of Heritage Environmental Consultants as our agent for consultation. A response letter was received by RUS on November 12, 2009.

A field tour of the Crow Lake site was conducted on November 23, 2009 with representatives from the USFWS South Dakota Field Office, USFWS Huron and Lake Andes Wetland Management Districts, SDGFP, RUS, Western, Heritage Environmental Consultants, Western Ecosystems Technology, and Basin Electric. A meeting was held on the same day to discuss issues surrounding the EIS and Section 7 consultation.

An informal review draft of the BA was provided to Ms. Natalie Gates of your office on December 18, 2009, and Ms. Gates' comments and supporting material on whooping cranes were received on January 15, 2010. A subsequent conference call between Ms. Gates, RUS, Western and the contractor was held to discuss the comments, and they have been incorporated to the fullest extent into the final BA.

Summary

Based on information obtained from your office, the following federally-listed species were addressed for the project counties:

Piping Plover (*Charadrius melodus*) - Threatened
Whooping Crane (*Grus americana*) – Endangered
Topeka Shiner (*Notropis topeka*) - Endangered

Complete discussions of species biology, potential impacts, and rationale for our effect determinations are found in the BA. We wish to emphasize our commitment to the completion of a fully developed operational plan for the proposed facility. The BA provides a level of detail regarding operations and proposed monitoring, focusing on the whooping crane, that we believe is

commensurate with currently available information, and is appropriate at this juncture in the S. 7 consultation process.

Determinations

Based on the informal consultation activities undertaken thus far, the information presented in this letter, and supported by the Biological Assessment, the Agencies make the following determinations:

Piping plover – May affect, not likely to adversely affect

Whooping crane – May affect, likely to adversely affect

Topeka Shiner – No effect

There is no designated critical habitat for any of the species in or near the project area.

The Agencies request your opinion as to our conclusions of effect, and specifically seek concurrence on the "may affect, likely to adversely affect" determination for the whooping crane, thus making formal consultation necessary per 50 CFR§402.14(b). We request that you inform us as soon as possible should you require additional information necessary to facilitate your response.

Questions or requests for information may be addressed to: For RUS, Mr. Richard Fristik, tel. (202) 720-5093, e-mail richard.fristik@wdc.usda.gov, or Mr. Dennis Rankin, tel. (202) 720-1953, e-mail dennis.rankin@wdc.usda.gov; for Western, Mr. Rod O'Sullivan, tel. (406) 247-7492, e-mail osullivan@wapa.gov, or Ms. Misti Schriner, tel. (720) 962-7239, e-mail mschriner@wapa.gov.

Sincerely,

Mark S. Plank

MARK S. PLANK
Director
Engineering and Environmental Staff
USDA, Rural Utilities Service

Enclosure (BA)

South Dakota PrairieWinds Project
Final Biological Assessment

Prepared by:

Heritage Environmental Consultants
Denver, Colorado

for

U.S. Department of Agriculture,
Rural Utilities Service
Washington, D.C.

and

U.S. Department of Energy,
Western Area Power Administration
Billings, Montana

February 2010

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ACRONYMS AND ABBREVIATIONS

ANWR	Aransas National Wildlife Refuge
Applicants	Basin Electric Power Cooperative and PrairieWinds SD1, Inc.
APM	Applicants' Proposed Measures
AWBP	Aransas Wood Buffalo Population
BA	Biological Assessment
Basin Electric	Basin Electric Power Cooperative
BMP	Best Management Practices
CRP	Conservation Reserve Program
CWS	Canadian Wildlife Service
DOE	U.S. Department of Energy
EIA	Energy Information Administration
EIS	Environmental Impact Statement
ESA	Endangered Species Act
GAP	GAP Analysis Program
GhG	Greenhouse gas(es)
kV	Kilovolt
kWh	Kilowatt-hour
MW	Megawatt
NEPA	National Environmental Policy Act
NWI	National Wetlands Inventory
PII	Potential Impact Index
RUS	Rural Utilities Service
SCADA	Supervisory Control and Data Acquisition
SDGFP	South Dakota Game, Fish, and Parks
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
Western	Western Area Power Administration
WTG	Wind Turbine Generator

1.0 SUMMARY OF DETERMINATION

This Biological Assessment (BA) evaluates the possible effects to federally-listed threatened and endangered species from implementation of the proposed South Dakota PrairieWinds Project (SDPW Project) at the Crow Lake Alternative site (Project area) in Aurora, Brule, and Jerauld Counties, South Dakota. This BA addresses three species that may occur within the Project area: two endangered (whooping crane, *Grus americana*; Topeka shiner, *Notropis topeka*) and one threatened (piping plover, *Charadrius melodus*).

Piping plover nesting and foraging habitat does not occur within the Project area, so plover use of the area, and any impacts, are considered insignificant or highly unlikely to occur. Designated piping plover critical habitat is not found near the Project area. Implementation of the proposal **may affect, but is not likely to adversely affect** the piping plover.

The whooping crane may utilize the Project area during their spring and fall migration. Impacts would occur primarily from the avoidance of suitable stopover habitat as the project occurs within the migration corridor of the whooping crane [Aransas-Wood Buffalo Population (AWBP)]. Based on voluntary conservation measures and other proposed avoidance and minimization measures, implementation of the proposal **may affect, is likely to adversely affect** the whooping crane.

Topeka shiners are not known to occur in the Project area, although they are known to occur approximately 25 miles downstream of the Project area. Implementation of the proposal will have **no effect** on the Topeka shiner.

2.0 INTRODUCTION

PrairieWinds SD1, Inc. (PrairieWinds), a subsidiary of Basin Electric Power Cooperative (Basin Electric), and Basin Electric (Applicants) have proposed to develop the SDPW wind-powered generating facility in south-central South Dakota, near the Town of Wessington Springs. Basin Electric has submitted an application for funding to the U.S. Department of Agriculture (USDA), Rural Utilities Service (RUS), and has made a transmission interconnection request to the Western Area Power Administration (Western), an agency of the U.S. Department of Energy, for the proposed SDPW in Aurora, Brule, and Jerauld Counties, South Dakota. Basin Electric is a consumer-owned, regional cooperative headquartered in Bismarck, North Dakota, and provides service to more than 126 member rural electric systems in nine states. RUS and Western (the Agencies) are preparing an Environmental Impact Statement (EIS) for the proposal under the National Environmental Policy Act (NEPA), per their respective NEPA implementing regulations at 7 CFR 1794 and 10 CFR 1021. The Agencies are also responsible for compliance with other applicable environmental statutes, including the Endangered Species Act (ESA), and this document supports the Agencies' efforts to meet their responsibilities under Section 7(a) of the ESA. The EIS addresses two site alternatives, the Crow Lake Alternative and Winner Alternative. The Agencies have not determined a preferred alternative at this time. In order to expedite the Section 7 process, this BA addresses the Crow Lake Alternative site referred to as the Project area. If the Winner Alternative is chosen as the preferred alternative, RUS will submit a BA addressing that site. The reader is referred to the EIS for a full discussion of the alternatives and site selection analyses.

Based on information received from the U.S. Fish and Wildlife Service (USFWS), South Dakota Field Office, three federally-listed species may occur in the proposed Project area: whooping crane (*Grus americana* - endangered); Topeka shiner (*Notropis topeka* - endangered); and piping plover (*Charadrius melodus* – threatened). The species list was updated by the USFWS on November 12, 2009 (Gober 2009). The BA provides a description of the proposal, species summaries and assessment of effects, and Agency determinations of effect. The following definitions apply:

- **Direct effects** are those that are caused by the proposed action and occur at the time of the action, including construction and operation and maintenance activities;
- **Indirect effects** are those that are caused by the proposed action and occur later in time, but are reasonably certain to occur; and
- **Cumulative effects** may result from the addition of potential project effects to those from non-federal actions that are reasonably certain to occur in the action area considered in this biological assessment. Future federal actions that are unrelated to the proposed plan are not considered because they would be subject to separate Section 7 consultation.

The BA is based largely on existing information and extensive informal discussions with the USFWS; however, some primary data was collected from the site through habitat mapping, aerial photography, completion of a Potential Impact Index (PII)(based on USFWS 2003), and the preparation of the following documents: *Potential Impact Index for PrairieWinds SD1 Reference (Lake Andes), Crow Lake, Winner, and Fox Ridge Project Sites in Central South Dakota* (Terracon 2008); PrairieWinds SD1, Inc. Project Compilation of Resource Technical Memorandums (Terracon 2009); *Wildlife Studies for the PrairieWinds SD1 Crow Lake Wind Resource Area Aurora, Brule, and Jerauld Counties, South Dakota* (WEST 2009a); *Prairie Winds Vegetation Mapping Report, Portions of Jerauld, Aurora, Brule and Tripp Counties, South Dakota* (Tierra EC 2009); and, the draft EIS for the proposed project. Sources of existing information included published literature (including internet resources); a search of the South Dakota Game, Fish and Parks (SDGFP) information; query of the National Wetland Inventory (NWI) database; data available from the USFWS; and, communication with resource experts and agency personnel.

3.0 CONSULTATION HISTORY

Western and RUS (co-lead agencies) sent a letter to the South Dakota Field Office on April 9, 2009 to inform the USFWS of the Notice of Intent (NOI) to prepare an EIS for the proposed project and received a letter of response with formal comments on May 13, 2009. The response provided information on three federally listed species that may occur in the Project area. The response also references the Service's *Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines* (USFWS 2003) and other guidance for non-listed species.

The Agencies determined that RUS would be the lead agency for Section 7 consultation, assisted by Western and its third party contractor. RUS sent a letter on October 14, 2009 notifying the USFWS of its strategy and requesting an updated species list for the SDPW Project. A response letter was received by RUS on November 12, 2009.

A field tour of the Crow Lake site was conducted on November 23, 2009 with representatives from the USFWS South Dakota Field Office, USFWS Huron and Lake Andes Wetland Management Districts, SDGFP, RUS, Western, Heritage Environmental Consultants, Western Ecosystems Technology, and Basin Electric. A meeting was held on the same day to discuss issues with the EIS and Section 7 consultation.

4.0 DESCRIPTION OF PROPOSED ACTION

The proposed SDPW project would consist of a wind-powered electricity generation facility with a nameplate rating of up to 151.5-megawatts (MW) that would feature 101 wind turbine generators (WTG). Ten additional WTG locations were identified and analyzed in the DEIS. These WTGs may be utilized as contingent WTG locations for the proposed SDPW Project if specific WTG locations are eliminated as a result of additional resource surveys and engineering siting; or they may be installed within the selected site at a later date, pending future load, transmission availability, and renewable

production standard requirements. The Project area is located approximately 15 miles north of White Lake, and 17 miles southwest of Wessington Springs, South Dakota (Figure 1). From White Lake, access to the Project area is provided by Aurora County Road 11 and numerous gravel county and section line roads. From Wessington Springs, access is provided by State Highway 34 and 373 Avenue. Proposed plans include the installation of up to 101 General Electric 1.5-MW WTGs within an area of approximately 37,000 acres (58 square miles). The Project area is located in all or portions of:

- Township 104 North, Range 66 West, Section 6
- Township 104 North, Range 67 West, Sections 1, 2, 3, 4
- Township 105 North, Range 65 West, Sections 3, 4, 5, 6
- Township 105 North, Range 66 West, Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33
- Township 105 North, Range 67 West, Sections 1, 2, 3, 11, 10, 12, 23, 24, 25, 26, 27, 33, 34, 35, 36
- Township 106 North, Range 65 West, Sections 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34
- Township 106 North, Range 66 West, Sections 25, 26, 27, 28, 29, 30, 32, 31, 33, 34, 35, 36
- Township 106 North, Range 67 West, Sections 25, 26, 34, 35, 36

WTGs would be located on hills and ridges in a mix of mixed-grass prairie (rangeland, pastureland and CRP/prairie), cultivated cropland, and scattered farmsteads. Mixed-grass prairie is the most prevalent vegetation cover within the Project area (64 percent), while cropland accounts for 33 percent. Wetlands account for 1 percent of the Project area, and farmsteads, shelterbelts, and deciduous forest account for less than 1 percent each (Figure 2). The wetland basin density in the Project area is nine to 10 basins per square mile which is relatively low for the Prairie Pothole Region (PPR) (Figure 3). Based on field verification and aerial photography, wetlands account for 517 acres of the Project area. The density of wetlands within the Project area is comparable to adjacent areas to the South that are not located in the PPR and less than areas to the North that are within the PPR. None of the wetlands were found to be alkaline in nature, indicating that they generally are not suitable as piping plover nesting habitat.

SDPW Project infrastructure would include 101 WTGs, two substations, a temporary laydown yard, access roads, buried collector lines, fiber optic communication lines, a 230-kilovolt (kV) transmission line, and an O&M building (Figure 1). Power would be delivered to the grid via an existing Western 230-kV transmission line within the Project area.

Each WTG would be connected by a service road for access and a 34.5-kV underground electrical collection system that would ultimately route the power from each WTG to one central collector substation, where voltage would be increased for interconnection to Western's transmission system. Approximately 30 to 40 miles of new access roads would be built to facilitate construction and maintenance of the WTGs. Approximately 25 to 35 miles of existing roads would be used and, where appropriate, improved. The underground collector system trench would be approximately 60 miles long and would be collocated in access roads where feasible.

The SDPW project would require a new 34.5-kV to 230-kV collector substation as well as a 230-kV transmission line to interconnect to a new 230-kV interconnection point at Western's existing Wessington Springs Substation, in Jerauld County. The Wessington Springs Substation is approximately nine miles from the proposed collector substation. Regardless of route, the transmission line length would be approximately 11 miles. The proposed line would be built using steel single-pole structures. The structures would be between 85 and 95 feet high with a span of about 800 feet. The next section describes the proposed project components in detail:

WTGs: The Applicants' plan to install 101 General Electric 1.5 super long extreme (sle) model WTGs for the proposed SDPW Project. Each WTG would have a nameplate capacity output of 1.5-MW of

power, with a combined nameplate capacity of 151.5 MW. Each WTG would have a hub height of 262 feet and a WTG rotor diameter of 252 feet. The rotor swept area is 49,876 square feet (1.14 acres). The total height of each WTG would be 389 feet with a blade in the vertical position. The WTG tower would be constructed of tubular steel, approximately 15 feet in diameter at the base, with internal flanges. The color of the towers and rotors would be standard white or off-white. During construction, a work/staging area at each WTG would include the crane pad and rotor assembly area. This would temporarily disturb an area of approximately 500 feet by 500 feet; and permanently disturb a 25-foot radius around each WTG. The WTG foundations would typically be mat foundations or a concentric ring shell foundation. The excavated area for the WTG foundations would typically be approximately 70 feet by 70 feet. Pad mounted transformers would be placed next to the each WTG, with the pedestal 17 feet in diameter, and crushed rock apron four inches deep and extending 10 feet wide around the pedestal.

Roads: New access roads would be built to facilitate construction and maintenance of the WTGs. This road network would include approximately 75 miles of new or upgraded roads. These roads would be designed to minimize length and construction impact. The new and upgraded roads would temporarily disturb a corridor up to 40 feet wide to allow movement of WTG assembly cranes. Upon completion of construction, the WTG access roads would be narrowed to an extent allowing for the routine maintenance of the facility, anticipated to be a permanent 16-foot-wide corridor. Temporary portions of the access roads would be reclaimed.

Existing roads, state and county roads, and section line roads would be improved to aid in servicing the WTG sites. Approximately 30 to 40 miles of new WTG access roads would be built and 25 to 35 miles of existing roads would be used and where appropriate, improved. Private WTG access roads would be built to the towers. The specific WTG placement would determine the amount of private roadway needed.

Transmission: For the Crow Lake Alternative, a new 230-kV transmission line would be required to deliver the power from the collector substation to a 230-kV interconnection point at Western's Wessington Springs Substation. The Wessington Springs Substation is located approximately nine miles from the collector substation.

The Applicants have identified three alternate transmission line corridors. Each of the three transmission line corridors are approximately 11 miles in length. The transmission line would be built using steel single-pole structures. The structures would be about 85 to 95 feet high and span about 800 feet; the right-of-way for the transmission line would be 125 feet wide. Each transmission line structure construction area would have temporary impacts encompassing 100-feet by 125-feet, and there would be a permanent impact of a 20-foot radius around each structure. The transmission line corridor would include a 12-feet wide centerline area to allow for the movement of equipment along the route of the transmission line and include six to eight structures per mile. In addition, pulling sites for each of the alternative transmission line corridor options would include two 125-foot by 300-foot areas for each of the turning locations.

4.1 Construction

If approved, construction would begin in mid-2010 and be completed by the end of 2010. Construction activities would include the following phases, listed in approximate order of occurrence, although some of the activities would be carried out concurrently:

- Road clearing for access roads for construction and maintenance;
- Construction of WTG foundations (grading, excavation, reinforcing steel placement, and concrete pouring);

- Grading, trenching, and placement of underground utilities and collector substation (including electric and communication lines);
- Overhead transmission line construction;
- Tower assembly, nacelle installation, rotor assembly, rotor installation, and equipment installation including installation of the communication system, supervisory control and data acquisition (SCADA) software and hardware, and telephone or fiber-optic cables;
- Final road grading, erosion control and reclamation.

The following measures would be implemented during construction:

- All temporary meteorological towers associated with the Proposed Project would be removed as soon as construction begins. Any permanent meteorological tower would be freestanding and have no guy wires;
- To the extent possible within FAA requirements, towers would be lit according to current USFWS guidance regarding reduction of avian mortality associated with WTG tower lights;
- Whooping Crane Monitoring Plan/Sightings**:** The Proponent will develop a Whooping Crane Monitoring Plan before construction begins in coordination with the USFWS and SDGFP. The plan will include, but will not be limited to, training project personnel in: the identification of whooping cranes and sandhill cranes (*Grus canadensis*), USFWS reporting requirements; construction requirements; post-construction survey and reporting requirements; mortality monitoring; and, adaptive management practices.
- Observations of whooping cranes by project personnel made as a result of monitoring or other incidental sightings in the Project area and surrounding vicinity shall be immediately reported to the USFWS;
- Construction activities would be suspended within one mile of the observation of a whooping crane, leaving birds undisturbed until they are no longer observed, with the intent to minimize the potential for disturbance, displacement, and harm to roosting and foraging whooping cranes;
- During the construction phase, trained personnel acceptable to the USFWS would monitor whooping crane use of the Project area during the spring and fall migrations.

The EIS describes other best management practices (BMPs) and Applicants' proposed measures in more detail. These would be implemented to minimize general environmental impacts during construction, but they also would help to avoid and minimize impacts on Federally-listed species. Examples include:

- Temporarily disturbed areas would be reclaimed by replacement of topsoil and seeding. Revegetation would occur as soon as possible to establish vegetative cover and avoid establishment of weeds. Agricultural lands would be returned to their original use. Regionally native seed or seed mix approved by the county and landowners would be used. If native prairie areas are disturbed they would also be reseeded with a native seed mix;
- The Applicants would develop a post-construction noxious weed monitoring program and would conduct surveys according to that program for three years post-construction, with follow-up surveys in problem areas.
- Dust emissions would be minimized during clearing, grading and other construction activities to avoid adversely affecting vegetation;
- Avoidance of wetlands such that there are no direct impacts from project components (footprint only);
- The Applicants would use BMPs during construction and operation to protect topsoil and water resources and to minimize soil erosion. Practices may include containing excavated material, applying water, use of silt fences, protecting exposed soil with fabrics (especially near

wetlands), stabilizing restored material, and revegetating disturbed areas with native grasses and forbs.

4.2 Operation and Maintenance

Each WTG would communicate directly with the SCADA system for the purposes of operation performance monitoring, energy reporting and trouble-shooting. Under normal conditions each WTG operates autonomously, making its own control decisions. PrairieWinds proposes to construct, own, operate, and maintain the proposed SDPW Project.

The Applicants and the appropriate supplier would control, monitor, operate, and maintain the Proposed Project by means of a SCADA computer software program. In addition to regularly scheduled on-site visits, the wind facility could be monitored via computer. The primary functions of the SCADA system are to:

- Monitor status;
- Allow for autonomous WTG operation;
- Alert operations personnel to conditions requiring resolution;
- Provide a user/operator interface for controlling and monitoring WTGs;
- Monitor field communications;
- Provide diagnostic capabilities of WTG performance for operators and maintenance personnel;
- Collect WTG, material and labor resource information;
- Provide information archive capabilities;
- Provide inventory control capabilities; and
- Provide information reporting on a regular basis.

There would be a full-time operation and maintenance crew of 10 to 12 people that work in teams of two. If possible, the crews may work in staggered shifts. The two person crews would make trips to the WTGs with an average of two WTGs per day. With that schedule, the six crews conducting two trips per day would enable 12 WTG visits in a typical day.

During operations, larger sites may be attended during business hours by a small maintenance crew. Consequently, transportation activities would be limited to a small number of daily trips by pickup trucks, medium-duty vehicles, or personal vehicles. It is possible that large components may be required for equipment replacement in the event of a major mechanical breakdown. Such shipments would be expected to be infrequent.

In coordination with the Service and the Agencies, an operations plan will be developed that describes monitoring procedures and other actions directed at the conservation and protection of listed species. Complete development and agreement on the plan will be concluded prior to construction. At a minimum, the plan would include the following components:

4.2.1 Whooping Crane Monitoring

The **purposes** of whooping crane monitoring are:

1) To document use of the Project area and two-mile buffer surrounding the wind farm by whooping cranes during the spring and fall migration periods, such that WTG operation can be curtailed if whooping cranes are seen in or near the Project area.

2) To document use of the Project area and two-mile buffer surrounding the wind farm by sandhill cranes.

3) To document any mortality of whooping cranes or sandhill cranes.

Monitoring **components**:

1) Facility operation (curtailment), training, monitoring, and reporting:

- Trained personnel acceptable to the USFWS would be on site during spring and fall migration seasons to observe whooping cranes and sandhill cranes post-construction. Migration seasons are generally: April 1 to May 15 (spring) and September 10 to October 31 (fall); however, the Applicants will rely on real time migration tracking data provided by the USFWS. If whooping cranes are observed, WTGs located within two miles of the observation would be shut down until such time as the cranes are no longer observed in the area;
- Monitoring procedures for whooping crane/sandhill crane mortality would be developed in coordination with the Service, and any crane mortality would be reported immediately to the USFWS, Ecological Services, South Dakota Field Office Supervisor. In the event of whooping crane mortality, all WTGs would be shut down and the Agencies would request re-initiation of consultation with the USFWS. WTG operations will not be resumed until completion of the re-initiated section 7 consultation;
- Basin Electric would provide annual reports to the SDGFP and USFWS until such time as further reports are deemed unnecessary, in coordination with SDGFP and USFWS. Reports would address compliance with the whooping crane monitoring and any other avian protection measures developed as part of the operating plan;
- Basin Electric commits to develop training and management practices for all SDPW Project staff. The training would focus on sandhill and whooping crane identification as well as background biology on habitat, foraging, and other relevant ecological characteristics as recommended by an experienced biologist; The whooping crane contingency plan will be provided to anyone trained to observe cranes.
- At the end of the three year post-construction whooping crane monitoring period, the USFWS and the Agencies will consult to determine whether additional monitoring is needed and any modifications deemed necessary in the monitoring or operational protocols, such as extending the post-construction whooping crane monitoring period.

The USFWS published *Whooping Cranes and Wind Development – An Issue Paper* in April, 2009 (USFWS 2009b). This document provides recommendations to avoid and minimize the "take" of whooping cranes and mitigate unavoidable impacts. The Applicants considered these recommendations during project siting and development and will follow the recommendations as described below:

- Build in areas away from traditional stopover sites. Project site selection for this wind farm took into account numerous factors. The wind resource in this part of South Dakota is best within the whooping crane migration corridor and project economics dictated its placement within the corridor.
- Build as far away from the corridor centerline as possible. The project area is located within the 75 percent to 80 percent bands of the corridor and is approximately 60 miles east of the centerline.
- Avoid wetland mosaic areas. The project area includes wetland mosaics, however, wetland density in the project area is relatively low compared to the wetland density in the region.
- Place turbines as far away from wetlands as possible. The wind resource largely determines turbine placement and micro-siting. The Applicants have designed the project to avoid as many wetlands as possible.

- Shut down turbines and/or construction activities within 2 miles of whooping crane sightings and leave cranes undisturbed. The Applicants have agreed to implement this protocol as described in the monitoring components section above.
- Report any whooping crane sightings to the USFWS. The Applicants have agreed to implement this protocol as described in the monitoring components section above.
- Monitor whooping cranes in the area during daylight hours.
- Bury all powerlines, if possible. The Applicants have agreed to bury all collector lines.
- Mark new overhead lines that are located in the migration corridor. The transmission line connecting the project to the grid will be above ground but will be marked as described in Section 4.3 Line Marking.

4.2.2 Bird and Bat Fatality Monitoring

Bird and bat fatality monitoring would continue for three years post-construction. The fatality monitoring has three main **purposes**:

1) To document bird and bat fatalities by species.
2) To estimate annual bird and bat fatalities attributable to the wind farm.
3) To evaluate spatial and temporal patterns of fatalities.

Monitoring **components**:

1) Standardized Carcass Searches – A set schedule of search effort will be established for sampling all WTGs systematically during the year. This effort will be quantifiable such that estimates of total bird and bat fatality can be determined.
2) Removal Trials – Removal trials will be conducted as one means to correct total number of carcasses found to total number of fatalities. Carcasses will be planted in the wind farm and checked on a regular schedule to determine how long carcasses remain available for searchers to find.
3) Searcher Efficiency Trials – Efficiency trials, in conjunction with removal trials, also are used to estimate total fatalities attributable to the wind farm. This effort will test field biologists by conducting blind trials on how many carcasses of varying size classes are found and how many are missed.

4.2.3 Avian Use Monitoring

This portion of the post-construction monitoring effort would continue for three years post-construction, and would consist of:

1) Fixed Point Bird Use Surveys - This effort would estimate the seasonal, spatial, and temporal use of the study area by birds, in particular raptors.
2) Breeding Bird Use Surveys – This effort would investigate the displacement impacts of WTGs on breeding grassland birds using line transects to measure bird use at varying distances from WTGs.

4.3 Line Marking

Basin Electric will mark the new transmission line with line marking devices to reduce the risk to whooping cranes and piping plovers Line marking would benefit all avian species, including the whooping crane and piping plover, by increasing the visibility of the transmission line and thereby reducing the risk of collisions. Marking would occur before or during construction, but no later than one year after construction is commenced. Line marking efforts and locations will be reported to the USFWS, and the Applicants will ensure long-term maintenance of the marking devices.

5.0 SPECIES ACCOUNTS, EFFECTS, AND DETERMINATIONS

5.1 Piping Plover

The U.S. range of the Great Plains population includes New Mexico, Colorado, Wyoming, Montana, Iowa, Minnesota, North Dakota, South Dakota, and Nebraska, with most of the birds currently nesting in North Dakota, South Dakota, Montana, and Nebraska (USFWS 2003b). Most breeding activity in South Dakota occurs on sandbars along the Missouri River from Fort Randall Dam to Springfield, and from Yankton to Ponca, Nebraska (USFWS 1988). Piping plovers winter primarily along the southern Gulf Coast and Pacific Ocean.

The Great Plains population was estimated to be between 2,137 and 2,684 adults in the early 1980's and 2,953 in a 2001 census (USFWS 2003b). The historical decline is often attributed to reservoir and river operations, marina development, drought and other factors that impact the species' breeding and wintering habitats. Plovers prefer to nest in sand/gravel substrates on the shorelines of wetlands and rivers, and tend to forage in the same substrates. There is a preference for alkali wetlands, likely due to their lack of shoreline vegetation. Typical freshwater wetlands are more vegetated, and often have a high degree of silt and detritus in the substrate, further precluding use as nesting by piping plovers even in dry years (C. Derby, pers. comm.).

The piping plover was listed as threatened on December 11, 1985 (50 FR 50726-50734) in its entire range except for the Great Lakes watershed, where it was listed as endangered. In 2002, the USFWS designated critical habitat for the Northern Great Plains breeding population of the piping plover (50 CFR Part 17, Federal Register, Volume 67, Number 176 / September 11, 2002 / Final Rule)(USFWS 2002). Critical habitat includes prairie alkali wetlands and surrounding shoreline, including 200 feet of uplands above the high water mark; river channels and associated sandbars, and islands; reservoirs and their sparsely vegetated shorelines, peninsulas, and islands; and inland lakes and their sparsely vegetated shorelines and peninsulas. In South Dakota, critical habitat includes the Missouri River Fort Randall Reach (36 miles), approximately 56 miles south of the Project area; Lewis and Clark Lake (32.9 miles), approximately 84 miles southeast of the Project area, Gavins Point Reach (58.9 miles), approximately 84 miles southeast of the Project area, and Lake Oahe (159.7 miles), approximately 88 miles northwest of the Project area (USFWS 2002). There is no designated piping plover critical habitat within the Project area boundary.

According to the USGS Breeding Birds of South Dakota Database, there have been no documented occurrences of the piping plover in Jerauld, Brule and Aurora counties (including the Crow Lake Project area) to date (USGS 2009); however, piping plovers may fly through the area during migration.

Since piping plovers primarily occur along river corridors, they are unlikely to occur in the Project area. Piping plovers may migrate through the area during spring and fall migration; however, due to the absence of rivers, reservoirs, and alkali wetlands within or near the Project area, they would be infrequent visitors to the area, mostly in spring and fall, and would likely avoid the project area in search of suitable habitat.

5.1.1 Effects of the Action

5.1.1.1 Direct Effects

While there are approximately 517 acres of wetlands in the Project area, none are alkaline in nature. While not suitable for nesting, it is possible, but unlikely, that plovers would use these areas for resting or feeding. Because it is not known how piping plovers migrate—for example it is unknown if they take a straight north-south flight path, or migrate along major river corridors— there is the possibility of

plovers flying through the Project area and being subject to WTG strike. Plovers using designated critical habitat in South Dakota, particularly young birds, generally remain in or close to the nesting areas, so would not be at risk due to the facility. While the possibility remains that piping plovers may be directly affected by the proposed SDPW Project, they are highly unlikely to occur based on the lack of suitable habitat within the project area, and this effect would also be highly unlikely. The voluntary transmission line marking described in Section 4.3 will also help avoid possible direct effects to plovers.

5.1.1.2 Indirect Effects

The Project would not indirectly affect piping plover populations through loss or displacement of habitat, since suitable nesting and feeding habitat is not found in the Project area. The nearest designated critical habitat is 56 miles away, so would not be affected by the project.

5.1.1.3 Cumulative Effects

Please refer to the cumulative effects discussion for the whooping crane for a summary of factors that may also impact piping plovers. Implementation of the proposal would have discountable direct effects, and no indirect effects, so would not contribute to cumulative effects to piping plovers.

5.1.1.4 Determination

Based on the preceding discussion, it is determined that implementation of the proposal **may affect, but is not likely to adversely affect** the piping plover.

5.2 Whooping Crane

Whooping cranes are currently listed as endangered except where nonessential experimental populations exist. In the U.S., the whooping crane was listed as threatened with extinction in 1967 and endangered in 1970 – both listings were “grandfathered” into the Endangered Species Act of 1973. Migration areas within the U.S. designated as critical habitat are the Platte River between Lexington and Denman, Nebraska; Cheyenne Bottoms State Waterfowl Management Area and Quivira National Wildlife Refuge, Kansas; and Salt Plains National Wildlife Refuge, Oklahoma. The Aransas National Wildlife Refuge (ANWR), Texas and vicinity has been designated by the FWS as critical wintering grounds for the conservation of the species. A species recovery plan was completed in 2005 and revised in 2007. No critical habitat has been designated in South Dakota (CWS and USFWS 2007).

Life History and Habitat Requirements

The whooping crane occurs at three locations in the wild and at nine captive sites (CWS and USFWS 2007). The only self-sustaining wild population is the AWBP, which migrates more than 2,400 miles twice annually between summer nesting grounds in Wood Buffalo National Park in Canada and winter habitat in the coastal marshes of Aransas National Wildlife Refuge in Texas. Spring migration begins in late March to early April and is completed within two to four weeks, while their fall migration south begins in mid-September (Austin and Richert 2001).

The migration corridor follows an approximate straight path, with the cranes traveling through Alberta, Saskatchewan, extreme eastern Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. The migration route approximately follows the Missouri River corridor through the midwestern United States. The primary migration corridor can be over 200 miles wide as cranes are pushed east or west by winds, and occasionally cranes have been documented in Colorado, Missouri, Wyoming, Minnesota, Iowa, and Illinois.

The cranes usually migrate in small groups primarily during daylight hours, relying heavily on tailwinds and thermal currents to aid their flight. They stop nightly to roost in shallow wetlands and may fly out of wetlands during the morning to feed in agricultural fields. If weather is unfavorable for migration, the cranes will stay in place for several days until conditions improve.

Whooping cranes use a variety of habitats during migration, but feed primarily in croplands and sub-irrigated wet meadows. They typically roost in shallow, seasonally and semi-permanently flooded palustrine wetlands (Lewis 1995; Austin and Richert 2001; Stehn 2007). Most of the roosting wetlands are less than 10 acres in size and are within ½ mile of a feeding area (refer to Section 5.2.1.2 for calculations in the Project area). Heavily vegetated wetlands are used less frequently than less dense wetlands areas. Riverine habitats are also used during migration, particularly large rivers such as the Platte and Loup in Nebraska, and the Missouri River in South Dakota. Cranes roost on submerged sandbars in wide, unobstructed channels that have little human disturbance (CWS and USFWS 2007).

The Project area has seen conversion of native prairie and wetlands into agricultural land use beginning with 19th-century settlement, negatively impacting the quality and quantity of migration habitat for numerous migratory birds. Construction of utility lines and roads has also negatively affected whooping cranes and migration habitat.

Current Population Trend

The most recent count of the AWBP (December 2009) revealed 230 individuals with a total of 238 individuals accounted for. The flock may experience a “break even” year based on the number of juveniles counted in the August 2009 fledging survey with a total of 247 individuals (Stehn 2009a); the current estimated population of 247 is down from a winter peak count of 270 in 2008. The population will continue to lose genetic material with each generation until the downlisting target of 1,000 individuals is reached because the gene pool is so small with only 247 individuals in the population . Recovery objectives call for establishing two additional self-sustaining populations with 1,000 individuals each within portions of the historic range (CWS and USFWS 2007). Reintroductions, which began in 1975, have continued to the present. Of the three reintroductions attempted, one in the Rocky Mountains failed with all birds becoming extirpated. The non-migratory flock in Florida started in 1993 is declining in size with high mortality rates and low productivity, casting significant doubts on its ability to become self-sustaining (CWS and USFWS 2007). The eastern migratory population started in 2001 between Wisconsin and Florida has showed some promise, but early productivity has been relatively low and mortality is considerable (USFWS 2008). Thus, it is imperative that all efforts continue to promote growth of the AWBP by reducing mortality, increasing productivity and reducing threats to the population.

Threats

While numerous historic factors have led to the decline of the whooping crane, major current threats include limited genetic diversity, loss and degradation of migration stopover habitat, construction of additional utility infrastructure, degradation of coastal habitat, and the threat of chemical spills in Texas. Whooping cranes are faced with various natural obstacles and risks during their annual migration and at wintering grounds, primarily severe weather events (including hurricanes). Loss of migration habitat can concentrate a variety of wetland birds, including waterfowl and cranes, into remaining areas and increase the spread of disease. Migrating cranes are also exposed to a variety of physical hazards such as collisions with structures, predation of young cranes, disease, and illegal shooting (CWS and USFWS 2007). Degradation of wintering grounds at and around ANWR have continued to worsen, ranging from land development decreasing suitable habitat, reduced freshwater inflows from the Guadalupe and San Antonio Rivers affecting blue crab populations, spread of black mangrove, and sea level rise on lands where whooping cranes are known to occur. (Stehn 2009b).

Breeding grounds in Canada are also being degraded by changing weather patterns and reduced permafrost resulting in wetter soils and changes in the prey base.

Status of the Species in the Action Area

Stopover occurrence during migration is common throughout South Dakota; there were 570 observations of whooping cranes in South Dakota between 1957 and April 2009. The majority of sightings were in the central portion of the state along the Missouri River corridor (USFWS 2009a). Whooping cranes have not been observed in Jerauld County, although they have been sighted in Brule and Aurora counties, but the percentage of this flock that might pass within the vicinity of the Project area is unknown.

The Project area occurs within the portion of the migration corridor in which 75 to 80 percent of the recorded whooping cranes sightings have occurred, and the Whooping Crane Tracking Database maintained by the USFWS (USFWS 2009a) reports two sightings in Aurora County (16 and 18 miles from the Project area) and four sightings in Brule County (6.5, 17, 21, and 22 miles from the Project area). These whooping cranes were observed flying and using grassland, cropland, and wetland habitats. Figure 4 shows these and all documented whooping crane sightings in South Dakota. Because much of the Central Flyway is sparsely populated by people, only a small proportion of actual stopovers are observed or reported. Based on the crane population and the average flight distances, as little as four percent of crane stopovers are reported (USFWS 2009a). Therefore, the absence of documented whooping crane use of a given area does not mean that whooping cranes do not use the area or that various projects in the vicinity will not adversely affect the species (Austin and Richert 2001; USFWS 2009a).

No whooping cranes or sandhill cranes were observed during the avian use surveys conducted in the Project area in 2009 (WEST 2009). The Project area contains suitable whooping crane roosting and feeding habitat consisting of rolling hills intermixed with wetlands (1 percent of Project area, 9-10 lacustrine and palustrine wetland basins per square mile, ranging from temporary to semi-permanent flooding regimes), mixed grass prairie (64% of Project area), and cropland (33% of the Project area). Crow Lake is the largest body of water in the project vicinity. Nielson North is the closest Waterfowl Production Area (WPA), and emergent and submergent wetland vegetation is present in the lake at the Nielson North WPA. Historical occurrence, location of the site within the migration corridor, and the presence of suitable foraging, roosting and stopover habitat indicate that whooping cranes may occur in the Project area (Stehn 2007).

Qualitatively, the site appears to represent suitable stopover habitat for whooping cranes; however, it is of lower quality than habitats at the adjacent Wessington Springs Wind Farm. The Wessington Springs site contains higher quality whooping crane roosting and feeding habitat consisting of rolling hills intermixed with wetlands (7% of Project area, 21 lacustrine and palustrine wetland basins per square mile, ranging from temporary to semi-permanent flooding regimes), mixed grass prairie (70% of Project area), and cropland (13% of the Project area). The Project area is more disturbed by human activities, mainly farming. Although sandhill cranes were not documented in the Project area in 2009, they have been documented to use the adjacent Wessington Springs site in relatively high numbers (approximately 1,400 observed onsite in 2007) (USFWS 2008); this information may indicate potential use of the Project area by sandhill and whooping cranes. This species is considered to be a surrogate species for whooping crane habitat use and behavior. Whooping cranes are often observed within flocks of sandhill cranes. Preliminary anecdotal observations (USFWS 2008) suggest that sandhill cranes avoid wind farms. Birds observed in the past, using habitat that is now occupied by wind farms, appear to be using other suitable sites away from the wind farms, however this could also be due to changed habitat conditions (e.g. precipitation variations) unrelated to the wind farms. It is uncertain whether whooping cranes would react to wind farms similarly to sandhill cranes. Whooping cranes have been observed at stopover sites that large groups of sandhill cranes likely would not use,

including farmsteads and sites close to residences (USFWS 2008). Regardless, confirmed sightings of whooping cranes do exist within the counties in the Project area.

5.2.1 Effects of the Action

Stehn (2007) identified the following as influencing stopover habitat choices by whooping cranes during migration:

- Every whooping crane makes approximately 12-15 stopovers during each migration;
- Cranes use migration stopover habitat opportunistically, stopping wherever they happen to be late in the day when conditions are no longer suitable for migration; hence individual birds may stop at a site only once over the course of their lives.
- Flight usually occurs between about 0930 and 1700. The birds use thermals in the morning to climb to their migratory height for the day, and as thermals die out, begin to look for suitable stopover habitat;
- Migrating cranes are most vulnerable to collisions with structures in the early morning or late evening when light levels are diminished, as they fly at very low altitudes between roost and foraging sites, or when flying at low altitude when starting or ending a migration flight, especially when thermal currents are minimal;
- Whooping cranes use a variety of habitats during migration, but wetland mosaics appear to be most suitable (see discussion above).

In assessing possible impacts from wind farms, Stehn (2007) also identified six factors to be considered:

1) Location of the proposed wind farm in relation to the 100-mile and 200-mile whooping crane migration corridor.
2) Locations of documented sightings in relation to the proposed WTGs.
3) Documentation of whooping crane stopover habitat within a 10-mile radius of every WTG, focusing on suitable shallow wetlands including marshes, small ponds, dugouts, lake edges, or rivers free from human disturbance such as nearby roads or buildings. Assess the amount of suitable stopover habitat in the vicinity to determine potential use outside of the wind farm.
4) Sandhill cranes should be used as a surrogate species to assess impacts. Sandhill cranes can be used as an indicator of potential presence of whooping cranes, since whooping cranes often select stopover habitat based on the presence of sandhill cranes. Document and/or assess sandhill crane use (flyovers and stopovers) of the wind farm and nearby areas.
5) Determine the extent of new power line construction needed for the wind farm and the extent of marking new and existing powerlines.
6) Analyze the number of proposed or existing wind farms in a particular portion of the migration corridor.

Given the Project area location in the 75 to 80 percent of all confirmed sightings band of the AWBP migration corridor, and the available historic use information, there is a possibility that cranes would utilize the Project area during migration. As noted above, the birds are opportunistic, and myriad factors can influence selection of a particular stopover location.

5.2.1.1 Direct Effects

Direct effects to whooping cranes include permanent and temporary loss of habitat and mortality associated with collisions. This section considers both the temporary and permanent impacts to

various land cover types and the risk of mortality from WTG blade strikes and transmission line strikes.

Permanent and Temporary Impacts to Land Cover

If construction were to occur during the migration season, the disturbance would likely result in avoidance of the Project area by whooping cranes and a temporary reduction in available migration habitat. During placement of the WTGs and construction of associated infrastructure, approximately 1,645.0 acres of suitable habitat would be temporarily disturbed (Table 1), the majority occurring on mixed-grass prairie and cropland (99 percent). Table 1 indicates that no wetlands would be temporarily impacted; roads will be routed around wetlands and collector lines will be directionally drilled to avoid wetland impacts. Additionally, there would be no direct disturbance to or permanent loss of wetland areas. Habitats that are temporarily disturbed would be reclaimed and are expected to return to their former condition. The amount of land lost permanently would be significantly less than the land temporarily disturbed; approximately 150.2 acres of mixed-grass prairie, 58.0 acres of cropland, and minimal amounts of other cover types would be lost (Table 2).

Many landowners have placed easements on their properties. All of the easements within the Project area are administered by the USFWS, and include wetland and grassland easements. There are approximately 2,836 acres of wetland easements and 1,629 acres of grassland easements in the Project area (Figure 5). Construction of the WTGs and associated infrastructure would impact these areas both temporarily and permanently. Table 3 shows the disturbance to easements and other areas. The NRCS administers CRP easements but does not disclose locations of CRP land, therefore, these acreages are not included in Table 3.

Direct Mortality

In their 2004 review, the National Wind Coordinating Committee (NWCC) did not find wind facility-related mortalities of any crane species from publicly available data (NWCC 2004). Specifically, collision mortality with WTGs has not been documented for the whooping crane; however, the species is considered vulnerable (Langston and Pullan 2003). If whooping cranes utilize habitat within or near the Project area after the construction of the project, it is presumed that they would be vulnerable to collision mortality due to their large size, low maneuverability, and known vulnerability to other structures on the landscape, such as power lines. A number of factors may affect that vulnerability. Age/experience of individual birds may play a role as may weather conditions, light levels, locations of feeding and roosting areas relative to the WTGs and transmission lines, locations of updraft areas relative to the WTGs and transmission lines, operation of the WTGs when cranes are present, and other possible unidentified factors. It is anticipated that the level of direct collision mortality, if it occurs, is likely to be extremely low. The reason for this is that whooping cranes do not travel in large flocks, but rather individually or in small family groups and they generally fly at altitudes higher than WTGs. Also, if they avoid the wind facility altogether direct mortality would not occur. Monitoring during and after construction would result in immediate reporting in the unlikely event of crane mortality, and curtailment of WTG operations.

Table 1 - Summary of Temporary Disturbance on Vegetation Communities (Acres)									
Vegetation Community	**WTGs**	**Crane Walks**	**Access Roads**	**Underground Collection Lines**	**Overhead Collection Lines**	**Substations**	**O&M Building**	**Laydown* Area**	**Total Disturbance**
Mixed-grass prairie	507.0	258.2	330.2	96.3	55.9	10.0	0.0	0.0	1,257.6
Cropland	117.0	52.1	128.0	19.3	0.3	0.0	20.0	40.0	376.7
Wetlands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Farmstead	0.0	0.1	3.0	0.0	0.0	0.0	0.0	0.0	3.1
Shelterbelt	0.0	0.8	3.8	0.3	0.0	0.0	0.0	0.0	4.9
Deciduous forest	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	2.7
Total	624	311.2	467.7	115.9	56.2	10	20	40	1,645.0

*Actual location of temporary laydown area is unknown at this time; it is assumed to be in cropland.

Table 2 - Summary of Permanent Disturbance on Vegetation Communities (Acres)									
Vegetation Community	**WTGs**	**Crane Walks**	**Access Roads**	**Underground Collection Lines**	**Overhead Collection Lines**	**Substations**	**O&M Building**	**Laydown Area**	**Total Disturbance**
Mixed-grass prairie	3.9	0.0	144.4	0.0	0.1	1.8	0.0	0.0	150.2
Cropland	0.9	0.0	56.9	0.0	0.0	0.0	0.2	0.0	58.0
Wetlands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Farmstead	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	1.5
Shelterbelt	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	1.5
Deciduous forest	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	1.2
Total	4.8	0.0	205.5	0.0	0.1	1.8	0.2	0	212.4

Table 3 - Disturbed Acres- Easement Lands		
Type	**Temporary Disturbance (Acres)**	**Permanent Disturbance (Acres)**
Grassland Easement	73.3	13.2
Wetland Easement	156.4	14.6
Private Land not under easement	1,433.2	229.6
Total	1,662.9	257.4

5.2.1.2 Indirect Effects

The primary indirect effect is the potential for complete avoidance by whooping cranes of the stopover habitat located within the area of the proposed facilities (WTGs, transmission lines, access roads, substations, O&M building). It is currently unknown whether the presence of WTGs would deter cranes from utilizing the area. It has been suggested that, based on anecdotal observations, sandhill cranes appear to avoid wind project areas. Birds observed in the past using habitat that is now occupied by wind farms appear to be using other suitable sites away from the wind farms. It is uncertain whether whooping cranes would react to wind farms similarly to sandhill cranes (USFWS 2008). There are 50 wetlands (76.7 acres) within ½ mile of foraging habitat and within ½ mile of WTGs in the Project area. Based on the anecdotal observations that sandhill cranes appear to avoid wind project areas, whooping cranes may also avoid these 50 wetlands.

Loss of migration habitat is a growing concern regarding the AWBP. As previously discussed, the indirect effects of the SDPW Project could reduce the amount of available stopover habitat in the Project area, and also present the threat of increased energy expenditure required while birds search for suitable stopover habitat, or increase the exposure to hazards as birds are required to fly low for longer distances in search of suitable habitat. The potential exists for this disturbance to affect the physical condition of the birds, placing energy demands and stressors on individuals at a critical point in their life cycle (migration). The increased disturbance could also place the cranes at greater risk of exposure to other hazards encountered during migration such as power lines, hunters, disease, and predation.

5.2.1.3 Cumulative Effects

Wind and other renewable sources are expected to become a larger share of the total electric generation resource in the United States for several reasons, primarily a desire to reduce overall greenhouse gas emissions, help increase energy security, and aid in economic stimulus efforts. Local, state and national energy policies are increasingly incorporating renewable portfolio standards, with wind as a major component, and targeting implementation of such standards by 2020 or sooner. Consequently, installation of wind and other renewable generation has increased dramatically, especially in the last 8-10 years. Between 2002 and 2006, wind generation (in thousands of kilowatt hours [KwH]) rose from approximately 10,400,000 to 26,600,000 (EIA 2008). In 2008, approximately 8,500 megawatts (MW) of new wind energy were installed in the U.S., representing roughly 40% of new power producing capacity, and making wind the second largest new generation source (AWEA 2009).

The federal Production Tax Credit (PTC), which was extended through the American Recovery and Reinvestment Act, has been a major incentive for wind energy development. With the recent economic downturn, difficulties in obtaining credit reportedly have hampered the addition of wind

power capacity by some developers. Very recently, the USEPA declared that greenhouse gases (GhG) are a threat to human health and the environment, which will likely lead to additional regulatory or legislative action to reduce GhG emissions. Growth in wind generation is expected to slow appreciably through 2010, after having grown 50 percent in 2008 (EIA 2009). Nonetheless, the EIA (Energy Information Administration, U.S. Department of Energy) forecast through 2030 indicates steady growth in wind capacity through 2012, after which capacity increases slightly, but essentially levels off, through 2030. In 2030, wind is forecast to be 2.5% of total generation. It should be noted that the EIA forecast was published prior to the recent EPA announcement on GhGs. Also, an increase in the cost of carbon-based generation would make wind power more economical, which could drive wind development. If legislation allowed for the conversion of renewable energy credits to emissions offsets, wind development could be even more prolific (SDPUC 2009).

The federal government has also recognized, for some time, the need for improvement to the nation's transmission infrastructure and the alleviation of transmission constraints. The American Reinvestment and Recovery Act granted the Western Area Power Administration $3.2B in budget authority "… to construct, finance, facilitate, own, plan, operate, maintain or study construction of new and/or upgraded electric power transmission lines and related facilities … for delivering or facilitating the delivery of power generated by renewable energy resources constructed or reasonably expected to be constructed" (Western 2009). The Obama administration has highlighted transmission line infrastructure needs and planning, siting, and interconnection considerations for renewable energy, including development of a so-called 'smart grid'.

South Dakota is one of the top ranked states for potential wind development in the U.S., and has actively promoted development of wind energy. The state offers a wind energy tax credit and a reduced property tax for wind facilities; the wind energy credit was extended in March 2009. Although South Dakota has high wind potential, like many other states, it has not been fully developed because of the limited amount of installed transmission. The distance of the markets from the wind regions of South Dakota further compounds this issue.

Recognizing this, South Dakota and four nearby states have discussed integrated transmission development in support of wind energy that will promote regional electric transmission investment and cost sharing (http://www.governor.nd.gov/media/news-releases/2008/09/080918.html). The states working together are contributing to the Upper Midwest Transmission Development Initiative to identify energy generation resources, transmission projects and infrastructure needed to support those resources in a cost-effective manner. Over the next 10 months, participants will determine a reasonable allocation of costs for necessary infrastructure ultimately leading to the development of a concrete plan or tariff proposal for consideration by the Midwest Independent Transmission System Operator (MISO).

The issue of transmission constraints links to another factor in assessing cumulative effects to whooping cranes, that of collision with electric transmission and distribution lines. Stehn and Wassenich (2008) summarized historical data on crane collisions with lines and mortality thereof (primarily addressing whooping cranes, but also sandhill cranes, discussed crane biology and behavior in relation to collision risk, and provided recommendations for management actions to minimize the risk of collisions). These authors pointed out that large, slow-moving birds such as cranes may be particularly susceptible to utility line collisions, and this may be compounded with juveniles due to their limited flight skills. Lines already constructed have negatively affected the whooping crane, and as discussed in the preceding paragraphs, the need for additional transmission capacity to meet increasing demand would likely constitute a serious cumulative stressor.

There is approximately 488 MW of installed (Table 4) wind power and 536 currently proposed in South Dakota (BEPC 2009). Other areas considered for wind energy development are the Coteau des Prairies in the northeast; Buffalo Ridge, which extends north-south from Marshall County to Brookings

County; Turkey Ridge within Turner and Yankton counties; Fox Ridge near Faith; and several central South Dakota counties and tribal lands. New wind development in the state will probably augment about 10 percent of existing coal and hydropower-based generation in 2009. Much of this development also occurs in the AWBP corridor, and combined the two states' current and foreseen wind development presents a considerable risk to whooping cranes. There is approximately 673 MW of installed wind power in North Dakota, with a nearly equal amount currently proposed. These facilities are logically located in those areas with the best wind resources, which also corresponds to the AWBP migration corridor. In assessing current and proposed wind development in the AWBP migration corridor, the USFWS notes that much of this development has and will occur on private land by private developers, with no federal nexus (USFWS 2009b). This may result in incomplete information due to business confidentiality concerns, and also perhaps lessen planning and design efforts to avoid and minimize wildlife impacts and understate the baseline for avian mortality, although the South Dakota Bat Working Group and the SDGFP have developed Siting Guidelines for Wind Power Projects in South Dakota to encourage planning at early project stages to avoid or reduce impacts for a number of issues (SDBWG and SDGFP 2009).

Given the current economic climate and a host of other variables, it is difficult to accurately predict the actual growth of wind energy in South Dakota and other top wind states – many of which also lie within the whooping crane migration corridor. However, based on the brief preceding summary, the number of WTGs and associated infrastructure is growing, and will likely continue to grow into the near future. Research on how whooping cranes respond to WTGs remains nascent, so it is difficult to predict the cumulative impacts of wind energy project development and disturbance within the whooping crane corridor. It can be assumed that as development and disturbance within the migratory corridor continues to increase, migratory stopover habitat quality and quantity would continue to degrade. Past activities that have affected habitat in the Project area include conversion of native vegetation and CRP lands for farming, and construction of roads, transmission lines, and residences. Development of electrical power generation and transmission within the crane migration corridor has contributed to a baseline condition that presents considerable risk to a small and vulnerable crane population. Continued development of power generation and transmission, whether from renewable or non-renewable sources, will increase the potential for collisions with structures and loss or avoidance of stopover habitat.

Table 4 – Existing South Dakota Wind Facilities								
Name	**Location**	**Power Capacity (MW)**	**Units**	**Turbine Mfr.**	**Developer**	**Owner**	**Power Purchaser**	**Year Online**
Buffalo Ridge	Brookings County	50.4	24	Suzlon	Iberdrola Renewables	Iberdrola Renewables	NIPSCO	2009
Wessington Springs	Jerauld County	51	34	GE Energy	Babcock & Brown	Pattern Energy Group LP	Heartland Consumers Power District	2009
Tatanka Wind Project	McPherson County	88.5	59	Acciona	Acciona Energy	Acciona Energy		2008
Minn-Dakota Wind Farm	Brookings County	54	36	GE Energy	PPM Energy	PPM Energy	Xcel Energy	2007
Highmore Wind Energy Project	Highmore	40.5	27	GE Energy	FPL Energy	FPL Energy	Basin Electric	2003
Rosebud Sioux Wind Energy Project	Rosebud Sioux reservation	0.75	1	NEG Micon	Rosebud Sioux	Rosebud Sioux	Rosebud Sioux	2003
Canova	near Carthage	0.11	1	Micon	City of Howard	City of Howard	City of Howard	2002
Gary Wind Energy Project	Gary	0.09	1	Vestas	Energy Maintenance Services-Distributed Energy Services	Energy Maintenance Services-Distributed Energy Services	Energy Maintenance Services-Distributed Energy Services	2002
Chamberlain Wind Project	Chamberlain	2.6	2	Nordex	Crown Butte Wind Power	Basin Electric	Basin Electric/East River Coop	2001
Howard Wind Energy Project	Howard	0.22	2	Micon	City of Howard	City of Howard	City of Howard	2001
White Wind Farm	White	200	103		Navitas	Babcock & Brown		Not Constructed

The current level of existing wind energy development within the South Dakota portion of the migration corridor of the AWBP of whooping cranes is relatively low, but increasing. Approximately 3,788 WTGs are known within the 1,400 mile long whooping crane corridor in the United States, with another 1,355 proposed for construction in the near to midterm future (Western 2007). This type of energy development is the fastest growing form occurring in the United States today, as an important component of a range of renewable energy resources spurred by Federal government tax incentives. Additionally, the majority of this development is currently occurring without Federal regulation, as most projects to date are developed on private lands by private companies, without interconnections to federally owned transmission lines or another Federal nexus. Many states have developed, and many will develop, renewable portfolio standards, requiring that certain proportions of energy generated or sold in their States be from renewable forms of energy.

Several states within Basin Electric's service territory have adopted Renewable Energy Objectives (REOs) that require renewable generation to meet a certain percentage of retail sales in that state. The states that have adopted REOs include Colorado, Minnesota, Montana, North Dakota and South Dakota. The State of South Dakota has a voluntary 10 percent by 2015 REO.

If the wind industry continues to develop wind farms within the migration corridor of the AWBP of whooping cranes, as expected, these farms, and the overhead transmission lines typically associated with them, will present increased structural hazards to this species. The Great Plains states traversed by the whooping cranes are among the windiest states in the nation (U.S. Department of Energy [DOE] 2008). The least developed areas within these states (often due to topography not conducive to farming practices) often harbor the high value wind resources that appeal to the wind industry. Unfortunately, these undeveloped areas within the AWBP of whooping cranes also likely afford attractive stopover sites, thus the potential for overlap with future wind energy development is high.

The significant increase in WTGs on the landscape anticipated in the future cannot be predicted with accuracy, but can reasonably be expected to result in thousands to tens of thousands of individual WTGs and associated appurtenances. Conceivably, a number of projects, each consisting of numbers of WTGs anywhere from projects similar to the Wessington Springs project to projects with 2,000 or more individual WTGs and appurtenances, could be constructed within the whooping crane migration corridor. A smaller, although significant number of additional wind energy facilities may be built within the action area, as there is considerable undeveloped land in this area with presumably favorable wind resources. In addition, it is estimated that there are 79,598 miles of transmission and distribution lines within the states that include the whooping crane corridor, with 80,570 miles projected by 2010 (Western 2007).

5.2.1.4 Determination

Based on current information and the potential for avoidance of the Project area by the species during migration, it is unlikely, although possible, that the proposal would result in the direct mortality of a whooping crane. There would be a relatively small permanent loss of suitable stopover habitat. Avoidance of the Project area by whooping cranes could result in indirect effects as described above. Construction of a new 11-mile transmission line and 101 WTGs would result from the proposal; all or portions of the new line will be marked as a voluntary conservation measure. Implementation of the proposal would also contribute incrementally to cumulative impacts to the crane within South Dakota and the migration corridor. With the proposed avoidance, minimization, and voluntary conservation measures in place, it is determined that implementation of the proposal **may affect, is likely to adversely affect** the whooping crane.

5.3 Topeka Shiner

This species was listed by USFWS in December 1998. Critical habitat was designated on July 27, 2004. There is no designated critical habitat in South Dakota (Shearer 2003).

The Topeka shiner is a small pool dwelling minnow that is found in prairie streams of the lower Missouri River Basin and upper Mississippi River Basin. The range of this fish covers eastern South Dakota, southwest Minnesota, eastern Nebraska, Iowa, northern Kansas and Missouri. In South Dakota, the Topeka shiner has been found in about 40 streams in the James River, Big Sioux River and Vermillion River watersheds. The Topeka shiner currently retains its historic distribution and is locally abundant in South Dakota; however, population trends are unclear.

According to the SDDOT website, the species was observed in the Firesteel Creek and the West Branch Firesteel Creek, approximately 25 miles downstream of the Crow Lake Alternative, as recently as 2006 (SDDOT 2006). The eastern portion of the site (within Aurora County) supports the headwaters of three small tributaries to West Branch Firesteel Creek (Figure 3).

5.3.1 Effects of the Action

5.3.1.1 Direct Effects

Direct effects to the Topeka shiner would not occur; no stream crossings are proposed to tributaries to West Branch Firesteel Creek. Further, there would be no water withdrawals from this watershed for construction, operation or maintenance activities.

5.3.1.2 Indirect Effects

Indirect impacts, such as sedimentation resulting from WTG and access road construction, would be precluded through the implementation of the BMPs and APMs included in the DEIS. The nearest known population is 25 miles downstream, so Topeka Shiners would not be affected by the SDPW Project.

5.3.1.3 Cumulative Effects

Implementation of the proposal would have no direct or indirect effects on the Topeka Shiner and would not contribute to cumulative effects to this species.

5.3.1.4 Determination

Based on the preceding discussion, it is determined that implementation of the proposal will have **no effect** on the Topeka shiner.

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APPENDIX 1 – FIGURES

Figure 1 - Proposed SDPW Project: General Location and Associated Infrastructure

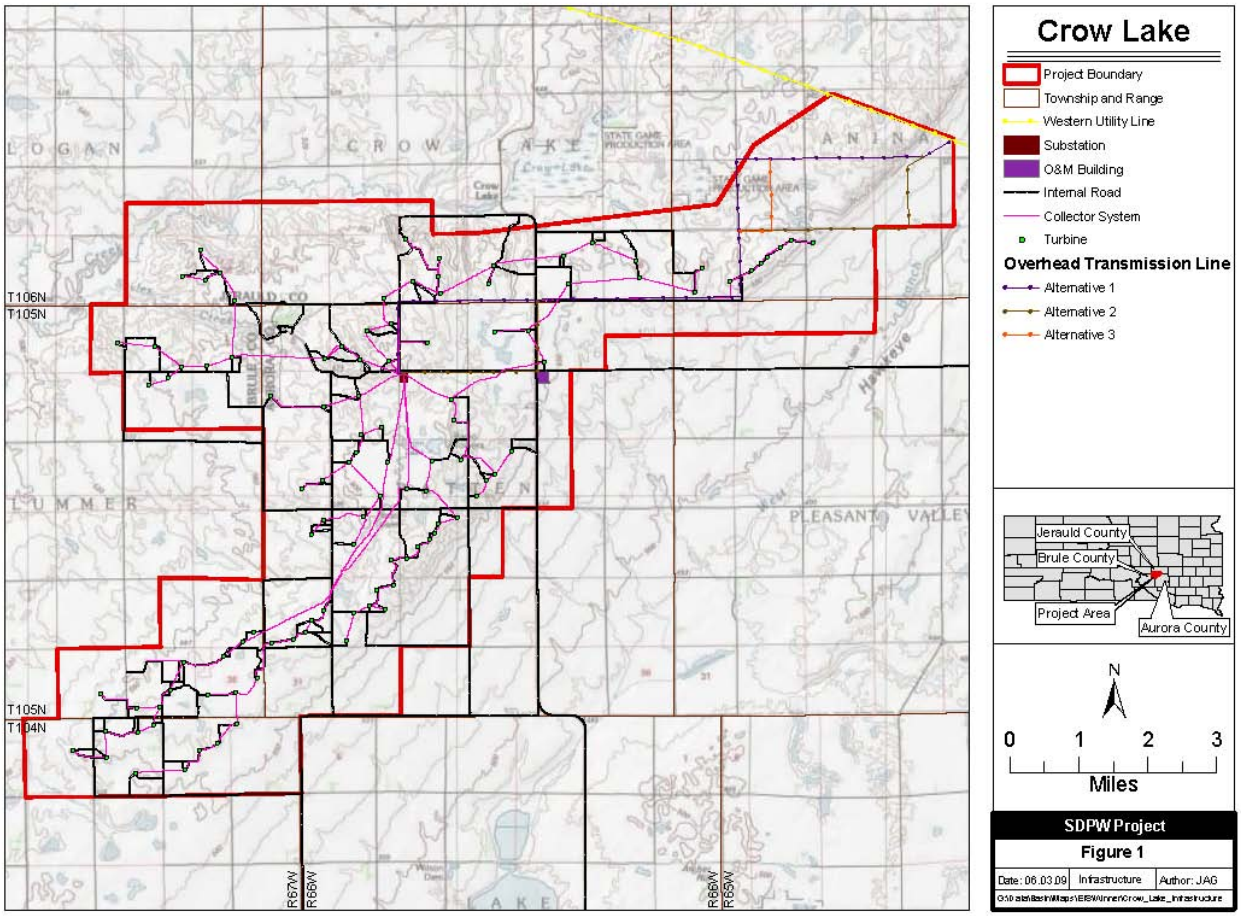


Figure 2 - Proposed SDPW Project: Habitat

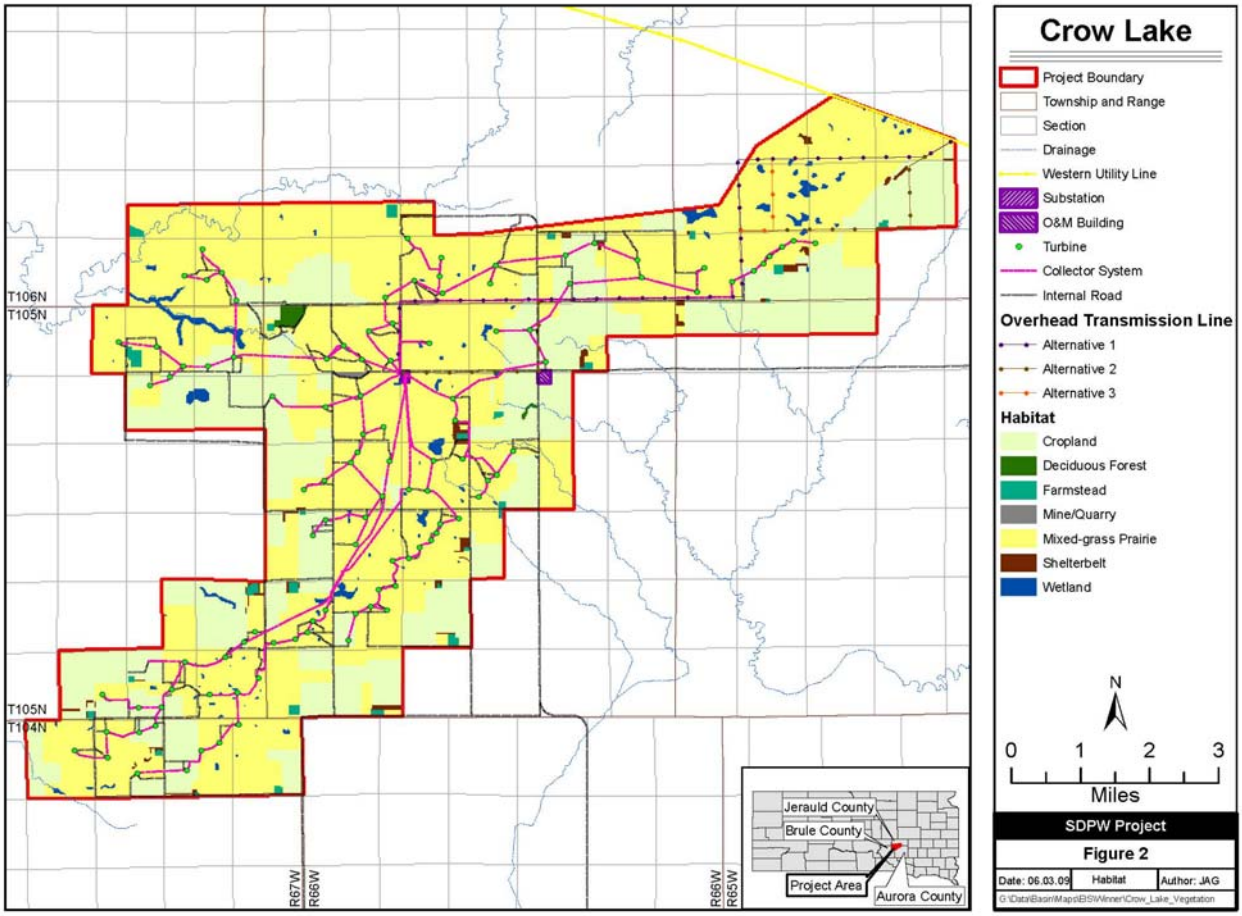


Figure 3 - Proposed SDPW Project: Wetland Density

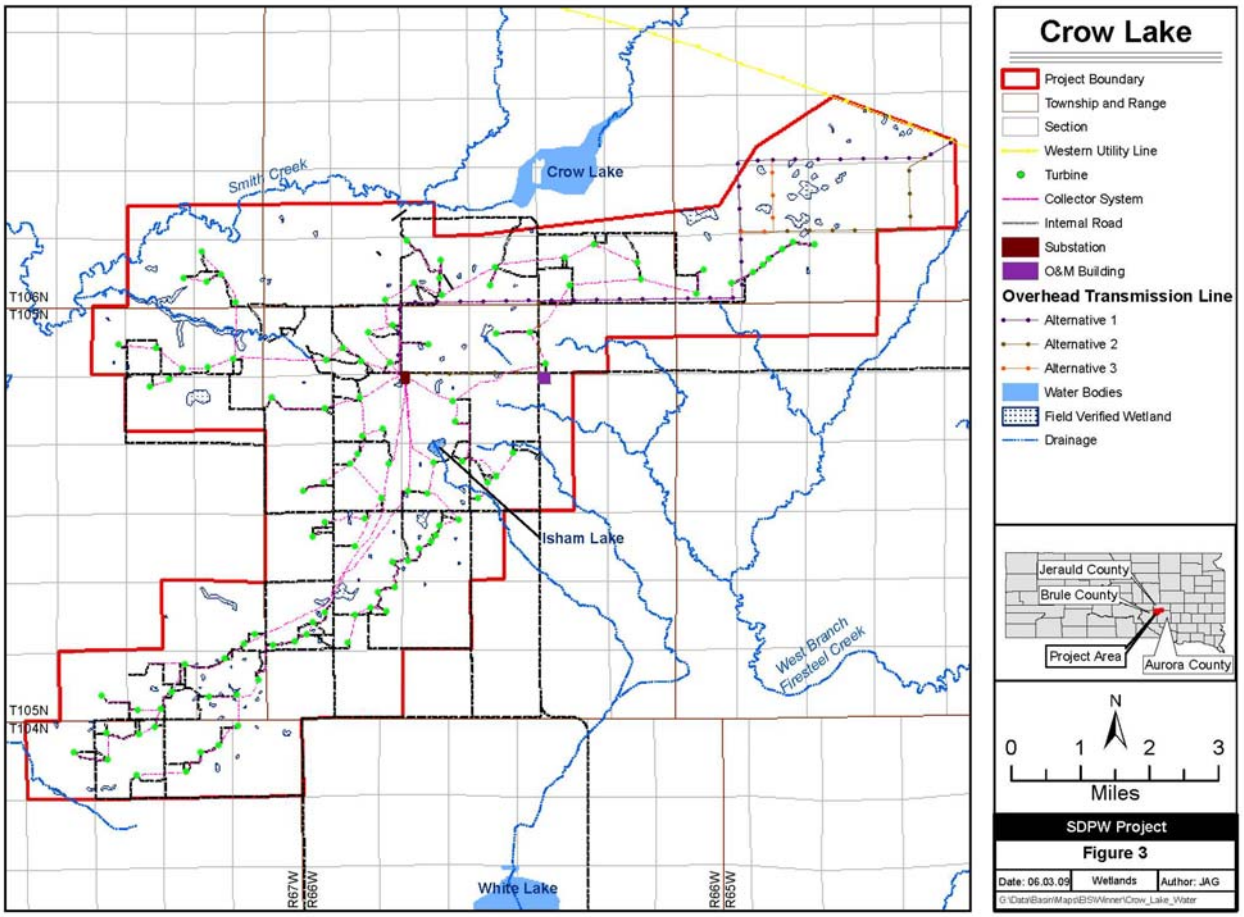


Figure 4 - AWBP Migration Corridor: Whooping Crane Sightings

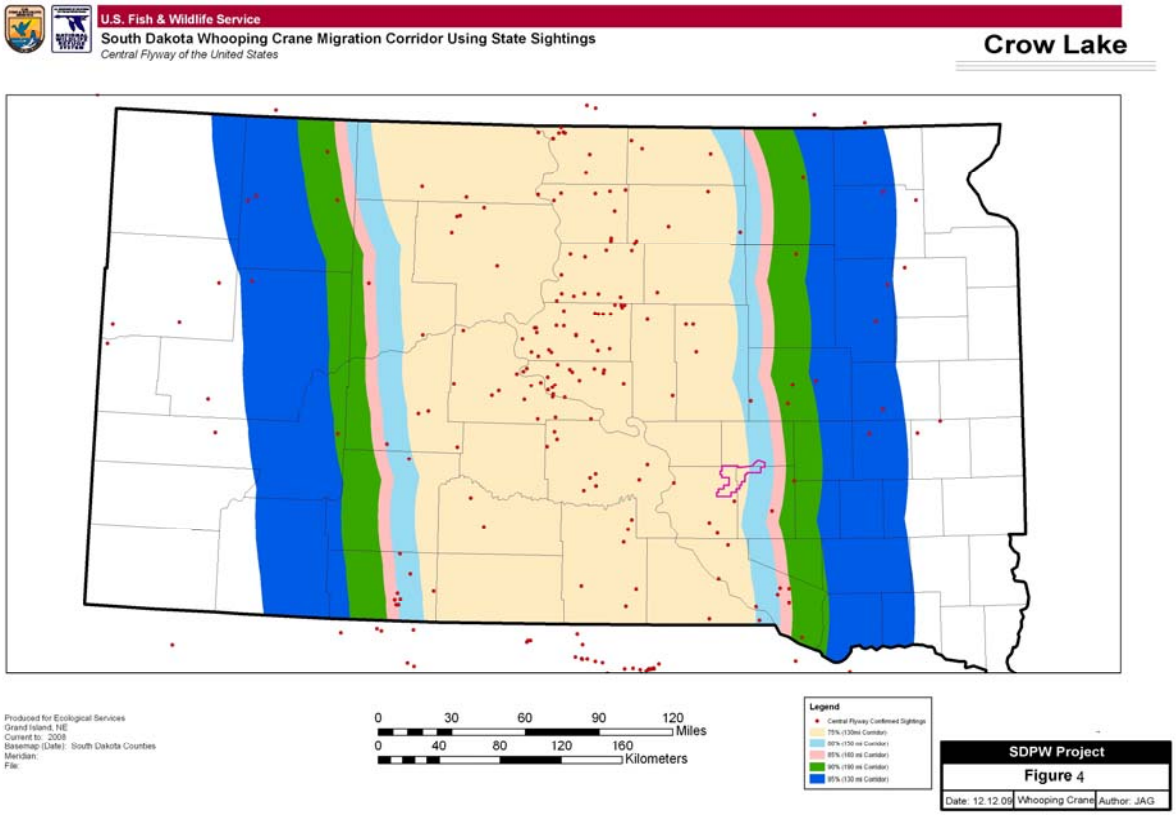
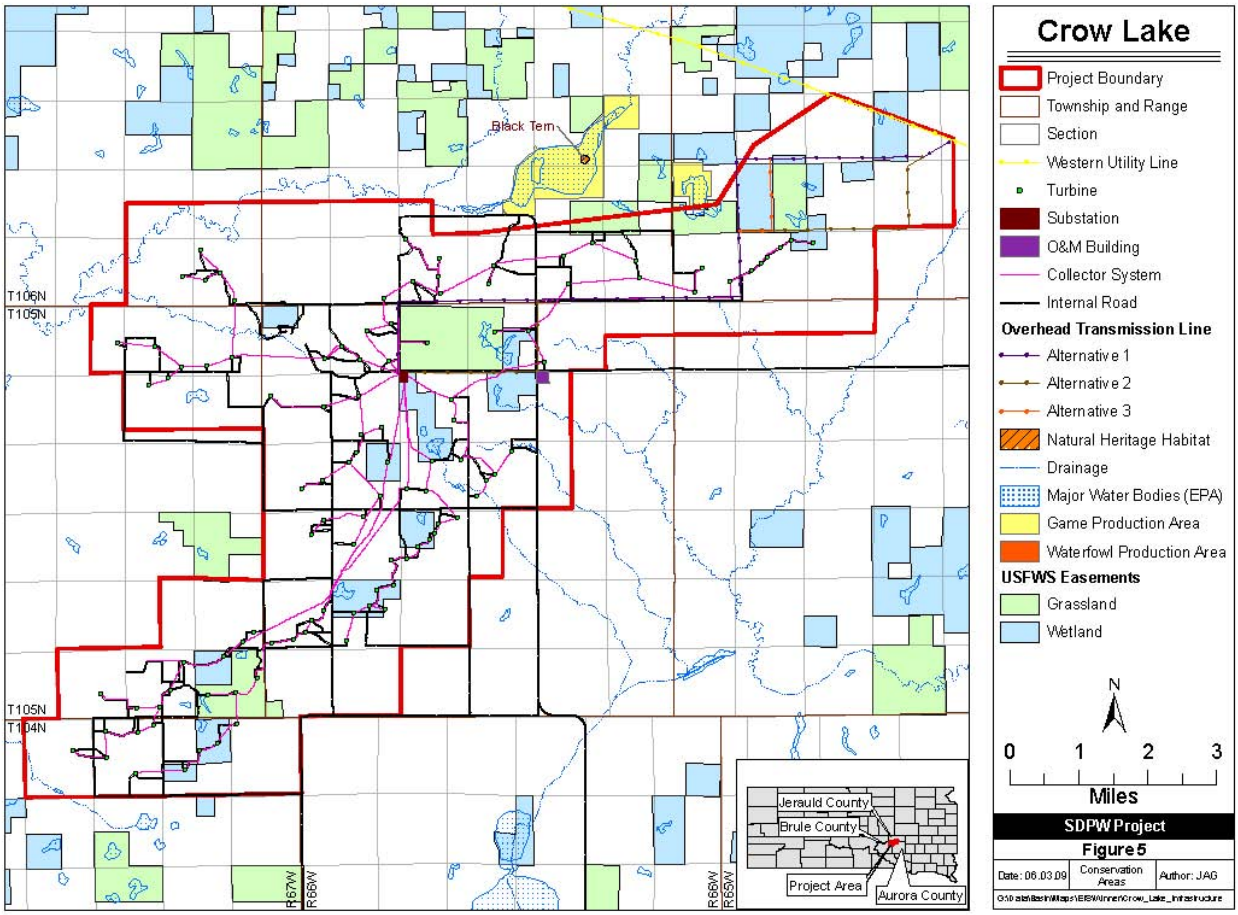


Figure 5 - Proposed SDPW Project: Wetland and Grassland Easements



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
420 South Garfield Avenue, Suite 400
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March 16, 2010

Mr. Mark S. Plank, Director
USDA Rural Utilities Service
Engineering and Environmental Staff
1400 Independence Avenue, S.W.
Washington, DC 20250-0700

Re: Endangered Species Act Section 7 Consultation, Proposed South Dakota Prairie Winds Facility in Aurora, Brule, and Jerauld Counties, South Dakota

Dear Mr. Plank:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service) February 22, 2010, receipt of your February 18, 2010, letter and Biological Assessment (BA) requesting initiation of formal section 7 consultation under the Endangered Species Act. The consultation concerns the possible effects of the proposed South Dakota Prairie Winds Project on the endangered whooping crane (Grus americana). Two other federally listed species were considered in your letter and BA: the piping plover (Charadrius melodus) and the Topeka shiner (Notropis topeka). We concur with your determination that the project may affect but is not likely to adversely affect the piping plover, and Service concurrence is not required regarding your "no effect" determination regarding the Topeka shiner. Thus, these species are not considered further herein. Finally, we concur with your determination that the project may affect and is likely to adversely affect the whooping crane.

All information required of you to initiate consultation was either included with your letter or is otherwise accessible for our consideration and reference. The December 2009 draft Environmental Impact Statement for this project indicates that appropriate offsetting measures for impacts to migratory birds will be developed to compensate for habitat loss and avoidance. We would like to meet as soon as possible to develop those offsetting measures for migratory birds as these measures could also potentially benefit the whooping crane. This information could be incorporated into the Biological Opinion. We suggest meeting at our office some time during the weeks of either April 5-9 or April 12-16, 2010, to initiate these discussions. We will follow up via electronic mail or by telephone in this regard shortly.

Section 7 allows the Service up to 90 calendar days to conclude formal consultation with your agency and an additional 45 calendar days to prepare our Biological Opinion (unless we mutually agree to an extension). Therefore, we expect to provide you with our Biological Opinion no later than July 7, 2010.

As a reminder, the Endangered Species Act requires that, after initiation of formal consultation, the Federal action agency may not make any irreversible or irretrievable commitment of resources that limits future options. This practice ensures that agency actions do not preclude the formulation or implementation of reasonable and prudent alternatives that avoid jeopardizing the continued existence of endangered or threatened species or destroying or modifying their critical habitats.

If you have any questions or concerns about this consultation or the consultation process in general, please feel free to contact Natalie Gates at (605) 224-8693, Extension 234.

Sincerely,

Scott Larson

Acting For

Pete Gober
Field Supervisor
South Dakota Field Office

Operations and Monitoring Plan
PrairieWinds SD1 Project
Crow Lake, South Dakota

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WEST, Inc.

June 9, 2010

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I. Introduction

This operations and monitoring plan addresses post-construction wildlife monitoring needs identified in the February 2010 Final Biological Assessment (BA) prepared for the Project. Four main areas are addressed in this document: 1) Whooping Crane Monitoring 2) Bird and Bat Fatality Monitoring 3) Grassland Breeding Bird Monitoring and 4) Avian Use Monitoring. The grassland breeding bird monitoring and avian use monitoring are being done as a continuation of efforts started during pre-construction surveys. As such, issues related to possible displacement will be investigated. In addition to the four items discussed in this Plan, prairie grouse lek survey and monitoring will be done post-construction as part of a separate, stand-alone plan.

II. Whooping Crane Monitoring

Crane monitoring will be carried out for three years (three spring and three fall migrations) after the turbines have become commercially operational. However, per the BA (RUS 2010), "*At the end of the three year post-construction whooping crane monitoring period, the USFWS and the Agencies will consult to determine whether additional monitoring is needed and any modifications deemed necessary in the monitoring or operational protocols, such as extending the post-construction whooping crane monitoring period*." Surveys will begin the first migration season after the project is operational (likely spring 2011). Procedures outlined in the Whooping Crane Contingency Plan (USFWS 2006) will be followed for all whooping crane sightings.

II.A. Purpose

The whooping crane monitoring has three main components:

1) To document use of the project area and two-mile buffer surrounding the wind farm by whooping cranes during the spring and fall migration periods, such that turbine operation can be curtailed if whooping cranes are seen in the project area. Turbines within two miles of whooping cranes would be curtailed.
2) To document use of the project area and two-mile buffer surrounding the wind farm by sandhill cranes.
3) To document any mortality of whooping cranes or sandhill cranes.

II.B. Methods and Design

II.B.1. Use of Project Area

Whooping crane use monitoring will be conducted during spring and fall migration periods. Spring surveys will be conducted daily from approximately April 1 to May 15 and fall surveys will be conducted daily from September 10 to October 31; however, the Applicants will rely on real time migration tracking data provided by the USFWS if available. These dates encompass approximately 90% of the documented whooping crane observations in South Dakota.

Two trained biologists will drive public roads and other accessible roads (e.g., turbine roads) within the project area and an approximate two-mile buffer around the turbine locations. If there are suitable roosting or foraging areas not adequately observable from public roads, access across private lands will be sought. Observations will generally occur from sunrise to 10:00 a.m. and from 5:00 p.m. to sunset, or as necessary to adequately cover the search area. During early morning and late evening the biologist will focus on areas of potential roosting habitat (e.g., shallow wetlands and ponds). In the late mornings and early afternoons the observer will focus on potential foraging areas (e.g., croplands, haylands). During inclement weather, additional surveys during the middle of the day may also be conducted. Areas will be scanned with binoculars and/or spotting scope. In addition to the trained biologists, operations personnel will be trained in identification of whooping cranes and sandhill cranes; they will report crane sightings to the biologists. Whooping cranes would be monitored until they leave the area.

All crane observations, GPS/mapped locations, and behaviors will be recorded for both whooping and sandhill cranes. Groups of sandhill cranes will be studied closely for the possible inclusion of one or more whooping cranes migrating with the sandhill cranes. Whooping cranes have been documented migrating as individuals, pairs, family groups, small flocks, and as part of larger sandhill crane flocks. All positive observations of whooping cranes will be closely tracked to determine their movements/behaviors and to report the locations for turbine shut down. If whooping cranes are located on the project site, the U.S. Fish and Wildlife Service, South Dakota Field Office (USFWS) will be notified within 24 hours. USFWS Law Enforcement shall be notified immediately [Brad Merrill (cell phone: 605-280-1712; office; 605-224-9045)].

During movement tracking, the biologist will maintain maximum distance from the whooping crane to avoid flushing the bird(s) into potential collision situations. A general rule is to maintain 2000 feet of separation if in open country or to screen the areas between the crane(s) and observer with a hill, trees, etc. if this 2000 foot distance cannot be maintained.

II.B.2. Turbine shutdown

If a whooping crane is observed within 2 miles or less of a turbine(s), the observer will immediately contact the site manager and/or operational personnel for the immediate shutdown of turbines within 2 miles of the bird or birds; the exact procedures and protocol to be followed for notifications and chain of command will be established by Basin Electric Power Cooperative, and all operational personnel will be trained-in/familiarized with the protocol. Any whooping cranes detected will be monitored/observed and behaviors in relation to the wind turbines will be documented. In coordination with the USFWS, turbine operations may resume after whooping cranes are confirmed to have left the wind farm area.

II.B.3. Whooping Crane Fatality Monitoring

Each turbine will be checked once daily for whooping and sandhill crane fatalities. The daily checks will include a complete visual inspection of the structures out to 100 m around each turbine, considered sufficient to locate these large birds. No set spacing of transects or time will be made as the amount of time necessary at each turbine will be dictated by the terrain. In flat

terrain with heavily grazed grass, a check of only a few minutes may be needed. In areas with a ridges, taller grass, etc. additional time will be needed to sufficiently inspect the area.

If a dead or injured crane is found, the bird will be left in place and both the South Dakota Field Office [(605) 224-8693] and USFWS Law Enforcement Staff [Brad Merrill (cell phone: 605-280-1712; office; 605-224-9045)] will be contacted immediately. Procedures outlined in the Whooping Crane Contingency Plan (USFWS 2006) and the BA (RUS 2010) will be followed for all whooping crane injuries or fatalities.

II.C. Reporting

Observation and behavioral reports will be forwarded to the South Dakota Field Office, with copies to RUS and Western, by December 31 each monitoring year. These reports will document time and effort used in evaluating whooping crane and sandhill crane use of the project area. This report will contain general maps of the routes driven, days surveyed, and observations made. The number of whooping/sandhill cranes identified during the monitoring will be clearly identified in the report, and maps of whooping crane/sandhill crane use locations will be included.

II.D. Whooping Crane Identification Training during Construction

In addition to the whooping crane monitoring during the first three years of operations, WEST will also participate in training of construction personnel in regards to identifying whooping cranes. This training will be done if construction occurs during the spring or fall migration period and will include both identification methods as well as how construction personnel should report suspected whooping crane observations. Details on the measures that will be implemented during construction are included in the Biological Assessment (BA) (RUS 2010). Procedures for avoiding harassment of cranes outlined in the Whooping Crane Contingency Plan (USFWS 2006) will also be followed.

III. BIRD AND BAT FATALITY MONITORING

This portion of the operations and monitoring effort will continue for three years after the turbines have become commercially operational and all testing has been completed. Surveys will likely begin in spring 2011.

III.A. PURPOSE

The fatality monitoring has three main objectives:

1) To estimate annual bird and bat fatalities attributable to the facility, such that the fatality rate can be compared to other projects regionally and nationally to determine the Project's relative fatality rate.
2) To determine species composition of bird and bat fatalities.
3) To evaluate spatial and temporal patterns of fatalities.

III.B. METHODS AND DESIGN

This fatality monitoring protocol is similar to protocols used at other wind energy facilities in similar habitats across the country. The methods will include standard, regular carcass searching to locate carcasses at turbines in a systematic fashion, as well as carcass removal trials and searcher efficiency trials to provide a corrected estimate of total fatalities. If it is found that fatality rates are greatly exceeding other regional projects investigated with similar methods (e.g., Buffalo Ridge, MN; Wessington Springs, SD), the survey effort would be re-evaluated to more appropriately investigate potential causes of mortality.

III.B.1. Standardized Carcass Searches

Twice Monthly Searches

Fatality monitoring will begin the season (as defined below) after all turbines are constructed and commercially operational (i.e., after testing). Consistent with sampling approaches at other wind facilities, approximately one-half of the turbines (50 of 101 turbines) will be searched once every 14 days during the spring migration (March 15 – May 15), summer breeding season (May 16 – August 15), and fall migration (August 16 – November 1) and once per month during the winter (November 1-March 15) for three years post-construction. Square search plots will be centered on each turbine and met tower, with the minimum distance searched in any direction equal to 100 m. Transects will be walked 10 m apart within each plot to sample the area under the structure (Figure 1). A technician trained in proper search techniques will walk at a rate of approximately 45-60 meters per minute (e.g., normal walking rates) along each transect searching both sides for casualties. Search area and speed may be adjusted by habitat type after evaluation of the first searcher efficiency trial. When a carcass or feather spot is located, the perpendicular distance from the transect to the carcass will be measured and recorded. All fatalities documented will be attributed to the facility (i.e., no reference area will be searched) unless another cause is positively determined (e.g., gunshot). This search method is an example of a standard practice used in the Midwest and elsewhere. Specifically this method was or is used at the Ainsworth Facility in the Nebraska Sandhills, Wessington Springs (adjacent to the proposed SDPW project), and the PrairieWinds North Dakota Project. It is also very similar to the protocol used at the Buffalo Ridge, Minnesota Project.

Data Recording

The condition of each carcass found will be recorded using the following condition categories:

- Intact – a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger;
- Scavenged – an entire carcass, which shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location (e.g., wings, skeletal remains, legs, pieces of skin, etc.);
- Feather Spot - 10 or more feathers at one location indicating predation or scavenging.

All carcasses found will be labeled with a unique number, bagged and frozen for future reference and possible necropsy. A copy of the data sheet for each carcass will be maintained, bagged and frozen with the carcass at all times. For all casualties found, data recorded will include species, sex and age when possible, date and time collected, GPS location, condition (e.g., intact,

scavenged, feather spot), site-specific habitat descriptions, and any comments that may indicate cause of death. All casualties located will be photographed as found and mapped on a detailed map of the study area showing the location of the wind turbines and any associated structures.

Dead or injured birds/bats found outside the formal search area by carcass search technicians but within 150 m of a wind turbine or other project facility will be processed according to the preceding protocol as closely as possible. Dead or injured birds/bats found within 150 m of a wind turbine or related facility by maintenance personnel and others not conducting the formal searches will also be documented. Any carcass found within the standardized carcass search areas (i.e., within turbine search area), but not during a scheduled search will be recorded, but will be left undisturbed unless it is a state or federal endangered, threatened or otherwise protected species so as not to disrupt the scheduled search efforts (i.e., removing carcasses before scheduled searchers have an opportunity to find them could bias estimated fatality rates).

Collection of migratory birds and state or federal endangered, threatened, or protected species will be coordinated with the USFWS and all required collection permits will be obtained from the Service and state agencies. When non-study personnel discover carcasses or injured animals, a photograph will be taken, and the Project Coordinator or Biologists will be notified to identify the specimen. Personnel involved in searches will receive training prior to working on the project. Dead or injured birds/bats found in non-search areas will be treated as incidental discoveries, and any injured native birds found will be handled according to state and federal permits. Annual reports will be made available to Basin Electric Power Cooperative and appropriate agencies, including the USFWS.

III.B.2. Carcass Removal Trials

For this study, carcass removal is defined to include removal by predation or scavenging, or removal by any other means, such as being plowed into a field. Estimates of carcass removal will be used to adjust counts of carcasses found during systematic searches for removal bias. Carcass removal studies will be conducted once during each season near, but outside, the carcass search plots (e.g., near turbines not included in the searches). While carcass removal trials will be conducted during spring migration (March 15 - May 15); breeding season (May 16-August 15); fall migration (August 16-November 1); and winter (November 1-March 15), the timing within these periods may vary. Carcasses will be planted randomly within the carcass removal trial plots, which will be located outside the carcass search areas to avoid confusing trial carcasses with actual turbine-related fatalities.

Each season approximately 30 bird carcasses of two size classes (twenty small, and ten medium to large) will be distributed within the carcass removal plots, resulting in a total of approximately 120 trial carcasses used in carcass removal studies for the monitoring year. The entire wind farm is located in native grassland or cropland; both vegetation types will be included in the sampling. Small carcasses (e.g., house sparrows, starlings, commercially available game bird chicks) will simulate passerines. Medium to large birds such as raptors and waterfowl will be simulated by commercially available adult game birds, rock doves, and raptor carcasses provided by agencies. When possible, two starting dates will be used in each season, for a total of 8 potential starting dates for the trials. Although a specific start date is used for a trial to make the logistics more manageable, the trial lasts for a maximum total of 30 days. This should provide data that

incorporate within-season variation due to the effects of varying weather, climatic conditions, farming practices, and scavenger densities. If fresh bat carcasses are available, they will also be used in addition to the bird carcasses.

Carcasses will be checked for a period of 30 days to determine removal rates. They will be checked every day for the first 4 days, and then on days 7, 14, 21, and 30. This schedule may vary depending on weather and coordination with the other survey work. At the end of the 30-day period remaining carcasses will be removed. Experimental carcasses will be marked discreetly (type of marker to be determined) for recognition by searchers and other personnel. Experimental carcasses will be left at the location until the end of the carcass removal trial. The personnel conducting the removal trials will be properly trained.

III.B.3. Searcher Efficiency Trials

Searcher efficiency studies will be conducted in the same survey plots used for carcass searches. One trial will be conducted each season (spring, summer, fall, and winter). If there are multiple individuals conducting carcass searches, each individual will participate in the searcher efficiency trials. Searcher efficiency will be estimated by size of carcass and season. Estimates of searcher efficiency will be used to adjust the number of carcasses found (i.e., correcting for detection bias) during the systematic carcass searches.

Searcher efficiency trials will begin when turbines are commercially operational and actual searches begin. Personnel conducting the searches will typically not know when trials are conducted or the location of the detection carcasses. The time spent searching during the trial days versus non-trial days will be recorded. During each season, approximately 20 small bird carcasses and 10 large bird carcasses will be placed in the search plots, for a total of approximately 120 searcher efficiency trial carcasses for the entire year. Two dates will be used each season for a minimum total of 8 trial dates. An attempt will be made to use several small brown birds during the fall season to simulate bat carcasses. Legally obtained bat carcasses will be used if available.

All carcasses will be placed at random locations within areas being searched prior to the carcass search on the same day. If avian scavengers appear attracted by placement of carcasses, the carcasses will be distributed before dawn. Carcasses will be dropped from waist high, which should simulate a variety of carcass postures.

Each carcass used will be discreetly marked (see scavenger removal studies) so that it can be identified as a study carcass after it is found. The number and location of the detection carcasses found during the carcass search will be recorded. The number of carcasses available for detection during each trial will be determined immediately after the trial by the person responsible for distributing the carcasses.

III.C. ANALYSIS

The estimate of the total number of wind facility-related fatalities is based on:

(1) Observed number of carcasses found during standardized searches for which the cause of death is either unknown or is probably facility-related.

(2) Searcher efficiency expressed as the proportion of planted carcasses found by searchers during the entire survey period.
(3) Non-removal rates expressed as the estimated average probability a carcass is expected to remain in the study area and be available for detection by the searchers during the entire survey period.

Details of statistical analysis formulas are described in Erickson et al. 2004 and Kerns et al. 2005.

The estimated per turbine annual fatality rate (*m*) will be calculated by:

$$m = \frac{\bar{c}}{\hat{\pi}},$$

where *c bar* is the mean observed per turbine fatality rate and $\hat{\pi}$ is an estimate of the probability a carcass is available to be found during a search (not removed by scavengers) and is found (searcher efficiency) If the carcass removal times follow an exponential distribution, $\hat{\pi}$ is calculated by

$$\hat{\pi} = \frac{\bar{t} \cdot p}{I} \cdot \left[\frac{\exp \; I/\bar{t} \; -1}{\exp \; I/\bar{t} \; -1 + p} \right],$$

where *I* is the search interval, *p* is the searcher efficiency rate and *t bar* is the mean removal time. Adjustments to the formula will be made to incorporate the results of the weekly searches with the twice monthly searches.

IV. Avian Use Monitoring

IV.A. Fixed Point Bird Use Surveys

IV.A.1. Purpose

1) To estimate the seasonal, spatial, and temporal use of the study area by birds, in particular raptors.
2) To estimate effects of the wind facility on species using pre- and post-construction collected data.

IV.A.2. Methods

The 20 fixed survey plots utilized in 2009 during the pre-construction surveys will be surveyed during the post-construction survey efforts. The points were selected to survey representative habitats and topography of the study area, while also providing relatively even coverage with minimal overlap of points. Each survey plot is an approximate one-half mile (800-m) radius circle centered on a point. All species of birds observed during fixed point surveys will be recorded, and all large birds observed perched within or flying over the plot will be recorded and mapped. Small birds (e.g., sparrows) within 328 ft (100 m) of the point will be recorded, but will

not be mapped. Observations of birds beyond the half-mile (800-m) radius will also be recorded, but will not be included in the statistical analyses.

Surveys will be conducted weekly from mid-March to mid-May and mid-September to early November. All surveys will be conducted during daylight hours.

IV.B. Breeding Bird Surveys

This portion of the operations and monitoring effort will continue for three years after the turbines have become operational and reclamation efforts have been completed. These efforts will likely begin in spring 2012 to allow time in 2011 for reclamation activities to be completed.

IV.B.1. Purpose

1) Document breeding bird use of the PrairieWinds SD1 Crow Lake wind facility.
2) Investigate disturbance and/or displacement of breeding birds within the facility.
3) Obtain information on disturbance and/or displacement of breeding birds from individual turbines or turbine strings.

IV.B.2. Methods

Surveyors will slowly walk along the same 30 pre-determined line transects (assuming an adequate number intersect actual turbine locations) and record all birds that are observed or heard within 50 meters of either side of the transect line. Surveyors will record observations for 50 meter segments along each transect. The "block" for which birds are recorded by will be 50 meters long (as the surveyor moves along the transect) by 100 meters wide (50 meters either side of the transect). Each transect will be 800 meters long and will include 16 blocks. General habitat categories will be developed and each 50-meter block will be categorized by habitat type.

Raptors and other large birds (e.g., waterfowl, waterbirds) also will be recorded during the survey beyond the 50 meter survey area.

Each of the 30 transects will be surveyed three times during the breeding season (typically May, June and July). Surveys will be conducted from sunrise to 10:00 a.m. All species observed by sight or sound will be recorded during each survey so that a species list by survey period and for the entire project area can be developed.

The study design, based on a before/after-control/impact (BACI design) will facilitate development of species density estimates as well as location/habitat use information that can be analyzed between pre- and post-construction periods, control and impact areas, survey dates, location, etc., using gradient analyses.

V. LITERATURE CITED

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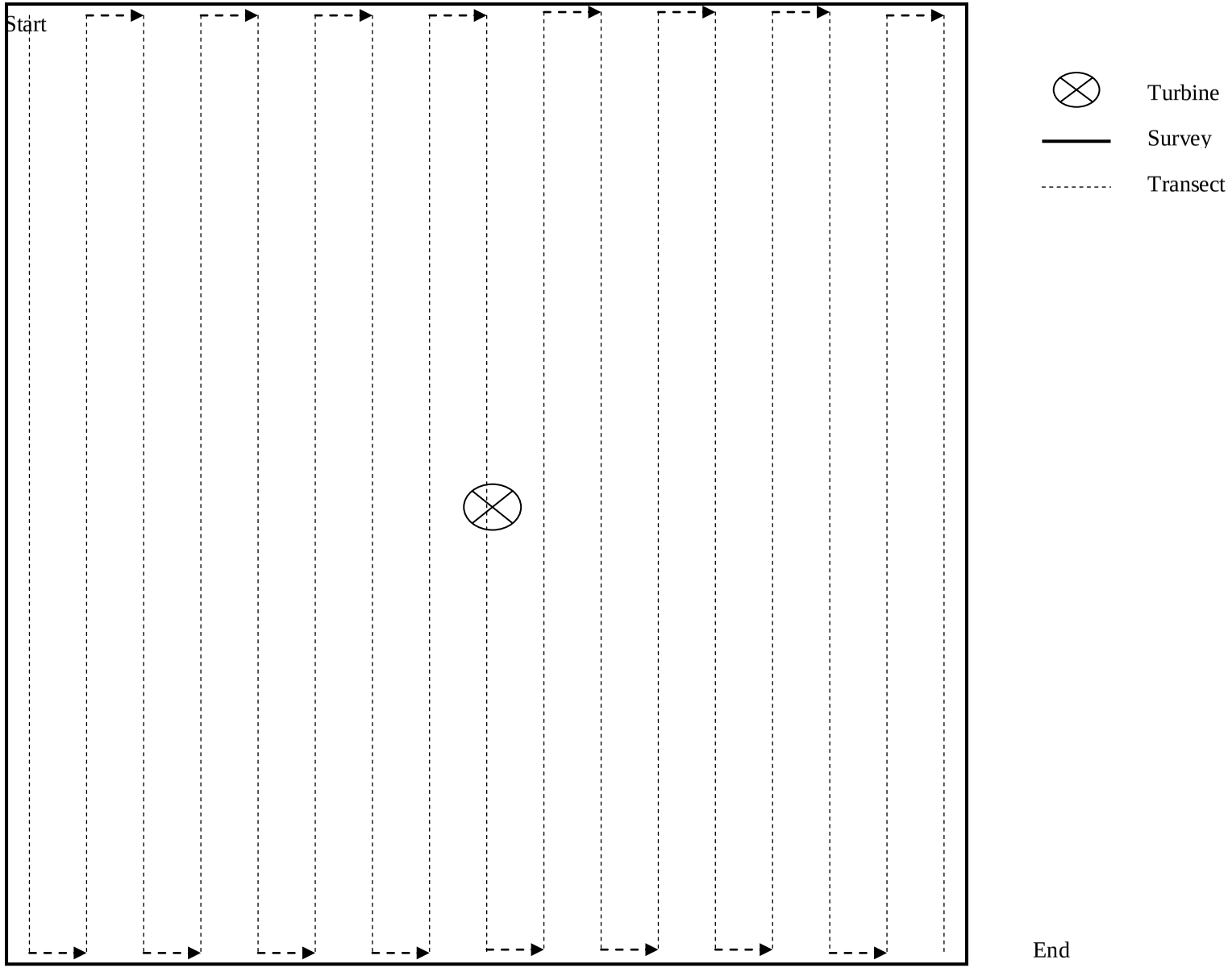

Figure 1. Schematic of survey pattern (not to scale). Transects will be placed 10 m apart.