

Appendix B
Site Characterization Study

Key to Land Cover Types

South Dakota Regulations Category, per SDCL 49-41B-11(2, 11) 49- 41B-22, ARSD 20:10:22:18	Buffalo Ridge II Site Permit Application Land Cover Type Category, described in Section 10	Description
Land used primarily for row and nonrow crops in rotation	Cultivated cropland	Annually tilled land in crop production
Irrigated lands	NA – no irrigation circles, etc noted in Project boundary	Cropland with irrigation systems
Pasturelands	Pasture	Regularly grazed land dominated by non-native grasses
Rangelands	Rangeland	Grazed land dominated by native species
Haylands	Hayland	Regularly mowed grasses or alfalfa for hay production
Undisturbed native grasslands	NA – no undisturbed (non-grazed) prairie in Project boundary	Native grass-dominated prairie that is not being grazed by livestock
Existing and potential extractive nonrenewable resources	Gravel Pits	Mineral aggregate extraction sites
Other major industries	NA – no large scale industries within Project boundary	Large-scale, non-farm related manufacturing facilities
Rural residences and farmsteads, family farms, and ranches	Farmsteads	Rural homes with surrounding buildings and yards.
Residential	Residential (within Toronto and Astoria municipal boundaries)	Non-rural homes.

Public, commercial, and institutional use	Commercial/Industrial	Small non-farm related businesses
Municipal water supply and water sources for organized rural water districts	NA – although there are two water towers in the Project boundary (see Figure 12a), they are not treated as a land cover type. No known wellhead protection areas in the Project boundary	Water towers, wells, wellhead protection areas
N/A	Woodland	Wooded areas such as wind rows, small woodlots, and larger forested areas
N/A	Stock Ponds	Excavated ponds for livestock
Lakes and rivers	Lakes	Large waterbodies without emergent vegetation
N/A	Roads	Roads
N/A	Planted grassland (i.e., Conservation Reserve Program)	Grassed areas enrolled in CRP
N/A	Wetlands	Wetlands per the 1987 COE Manual
N/A	Utilities	Municipal water treatment facilities
Cemeteries	Cemeteries	Cemeteries

Site Characterization Study of the Buffalo Ridge II Wind Resource Area

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October 27, 2008



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EXECUTIVE SUMMARY

The proposed Buffalo Ridge II wind resource area (BRIIWRA), currently about 49,463 acres is located in northeast Brookings County and southern Deuel County in eastern South Dakota along the South Dakota/Minnesota border. Biological resources within the BRIIWRA were evaluated through a search of existing data and site visits on March 18, 2008 and September 11, 2008. The purpose of this report is to characterize biological resources in the proposed project area and determine if additional biological resource surveys are warranted.

The landscape within the project area has a limited number of wetlands but they are fairly evenly distributed throughout the WRA. Topography is flat to rolling, with elevations ranging from 1,719-1,991 feet (ft; 524-607 meters [m]) above sea level. Ownership within the BRIIWRA is almost all private but there are federal Waterfowl Production Areas and several federal easements within the current boundary. About 60% of the BRIIWRA is tilled agriculture. The next most common habitat is pasture, which comprises about 20% of the BRIIWRA. Planted grassland (5%), wetland (4.2%), and hayland (3.5%) were the next most common land use.

The greatest concern with displacement impacts are for wind-energy facilities that are placed in native grasslands and other native habitats, of which few are found within the BRIIWRA. However, pastures were grazed or hayed, so definitive species identification was difficult. The BRIIWRA does include some grassland (native or planted), so it is probable that some grassland-dependent species will be displaced.

Based on National Wetland Inventory polygon data, there are approximately 791 acres (320 ha) of wetlands, not including streams and rivers, found throughout the BRIIWRA. About 1.6% of the total BRIIWRA is wetlands, excluding rivers and streams. The highest percentage (34.4%) of wetlands are seasonally flooded, but temporarily and semipermanently flooded wetlands make up another 31.6% and 29.5% respectively. Deer Creek drains to the south in the southern part of the WRA. Sixmile Creek drains to the south through the western portion of the project area. There are also several unnamed streams/creeks in the BRIIWRA.

No state or federally-listed endangered, threatened, or candidate plant species are known to occur in the BRIIWRA. One federally-listed threatened plant species, the western prairie fringed orchid is listed for the state but probably no longer occurs in South Dakota. There are two wildlife species listed as endangered, threatened, or candidate by the USFWS under the Endangered Species Act known to occur in Brookings County; one of those species, the Topeka shiner, also occurs in Deuel County. The Topeka shiner is found in Deer Creek and Sixmile Creek, portions of which are located in the project area. The Dakota Skipper has been documented in Brookings County; specific surveys for this species were conducted in BRIIWRA in 2008. The whooping crane, an endangered species, has been observed in counties adjacent to Brookings and Deuel Counties and therefore may occur in the project area.

In the reply from the state of South Dakota, several area-sensitive species were noted as being found in the project area or having the potential to occur in the project area. These grassland birds included the sedge wren, clay-colored sparrow, grasshopper sparrow, bobolink, dickcissel, song sparrow, northern harrier, upland sandpiper, field sparrow, Vesper sparrow, Savannah

sparrow, and Henslow's sparrow. If suitable breeding habitat exists within the BRIIWRA, the state recommends species appropriate surveys be conducted in June for these breeding grassland birds, or ideally, mid-May to early July. The state of South Dakota expressed concern regarding another rare butterfly, the Ottoe Skipper. Records show that the Skipper has not been noted in the project area but has been found nearby on contiguous grasslands. The State recommends preconstruction butterfly surveys for these two Skippers; the State also recommends surveys occur during and after construction. Specific surveys for this species were conducted in 2008.

In their project review reply, the State mentioned two species that are designated endangered or threatened by South Dakota but not federally protected by the ESA. The bald eagle is a state threatened species that may migrate through or breed in the project area. Bald eagles may be found during migration and winter periods in areas away from major rivers if sufficient forage is available. Bald eagles nest in areas with mature forest, typically along major waterways, lakes, and reservoirs but nesting eagles are also found in areas away from "major" waterbodies. No eagle nests were observed during the site visits and the State does not have any records of nesting eagles but potential nesting and roosting habitat is present within the project area in the form of scattered mature trees. The northern redbelly dace is a state threatened species that is predicted to occur near the project area. The State, in their project review, states that there is a record of this species just outside the eastern edge of the project boundary. Impacts to this species are not expected given that wind energy facilities are constructed on the higher landscapes. However, similar precautionary steps taken to avoid impacts to the Topeka shiner will also protect this species for impacts.

The following raptor species could occur in or near the project area: bald eagle, northern harrier, sharp-shinned hawk, Cooper's hawk, northern goshawk, broad-winged hawk, Swainson's hawk, ferruginous hawk, red-tailed hawk, rough-legged hawk, American kestrel, and merlin. Other species often grouped with raptors that could be found in the project area include the great-horned owl, eastern screech owl, burrowing owl, and turkey vulture. Six of these species are confirmed or suspected breeders in the project area: northern harrier, Swainson's hawk, red-tailed hawk, eastern screech owl, great-horned owl, and American kestrel. During the site visits, red-tailed hawks and American kestrels were observed in the project area. Specific surveys designed to determine raptor use are ongoing within the project area in 2008.

No raptor nests were observed during the site visits but potential nest structures for above ground nesting species were present in the form of living and dead trees. Grassland areas could provide nesting habitats for ground-nesting raptors, such as the northern harrier. No signs of colonial rodents, such as prairie dogs, were observed during the site visits; these types of areas are known to attract feeding raptors. Plains pocket gopher mounds were observed during the site visits, suggesting the presence of a potential prey item. Overall prey densities are not expected to be significantly different than areas outside of the proposed BRIIWRA. With roost sites and food available, it is likely that raptors will use the area but not to a greater degree than the surrounding areas with similar habitat.

It is likely that birds migrate through the proposed BRIIWRA, including passerines, raptors, and waterfowl. Woodlots, wetlands, and riparian areas scattered throughout the BRIIWRA may provide stopover habitat for migrants or individuals during post-breeding dispersal. Harvested

grain crops, such as the corn that was observed during the March site visit, could serve as a feeding area that could attract migrating and wintering waterfowl. These types of habitats are found throughout the region and therefore their presence in the BRIIWRA should not concentrate bird use as compared to adjacent areas.

There are several species of bats that could be found in the WRA, including the big brown bat, hoary bat, eastern red bat, little brown myotis, northern myotis, and the silver-haired bat. Potential roosting habitat within the BRIIWRA is found in the form of trees and buildings; no caves were observed during the site visits. Bats may forage over the entire BRIIWRA, although the extent of use is not known. Bats may prey on insects that are likely to concentrate over water in wetlands and streams, and these types of areas found in the BRIIWRA are most likely to attract foraging bats.

Table E-1. Site Characterization Summary.

Resource	Project Considerations	Potential Future Studies	Timing of Potential Studies
Vegetation			
Wetlands and Waters of the US	Wetlands and Waters of the US occupy a portion of the project area. Site away from higher wetland concentration areas to minimize wildlife impacts	Conduct a wetland delineation once the facility design has been determined but prior to finalizing the layout. Micro-site facilities when possible to avoid or minimize impacts to wetlands/waters	Mostly complete. Updates during snow free period if needed.
Native Grasslands	Native grassland remnants may be in the project area. Site away from native grassland areas to minimize impacts.	Updated vegetation map of selected regions to help micro-site facility to minimize impacts to native grasslands.	Mostly complete. Updates during snow free period if needed.
Wildlife			
Threatened and Endangered Species	Several state species of interest may occur in the project area.	Habitat mapping of any selected site would be required before further surveys, if any, would be completed.	Butterfly surveys were completed. Habitat mapping has been done. Other work to be performed as necessary during appropriate survey windows.
Nesting Raptors	Tree rows, woodlands, and riparian zones in the area provide nesting habitat for raptors.	Survey suitable habitat for nests.	Spring
Migratory Birds	Migrating birds likely pass over the project area and could utilize the area.	Fixed-point bird use surveys.	Spring, Summer, and Fall
Breeding Birds	The grasslands, woodlands, and wetlands in the project area provide potential nesting for many species.	Breeding bird transect surveys.	Summer
Bats	Habitats suitable for bat roosting and foraging occur.	Acoustic bat surveys.	Summer and Fall

INTRODUCTION

Knowledge of biological resource issues early in the development phase of wind energy facilities helps the industry identify, avoid, and minimize future problems. This report describes biological resources present within a potential wind resource area and evaluates these general characteristics as related to potential or known impacts on the resources from wind energy facilities.

The proposed Buffalo Ridge II wind resource area (BRIIWRA) is located in Brookings and Deuel Counties, South Dakota (Figure 1), near the towns of White and Astoria. The purpose of this report is to characterize biological resources in the proposed project area and determine if additional biological resource surveys are warranted.

STUDY AREA

The BRIIWRA, currently about 49,463 acres (20,017 hectares; ha), is located in northeast Brookings County and southern Deuel County in eastern South Dakota along the South Dakota/Minnesota border (Figure 1).

The proposed WRA is located mainly in the Big Sioux Basin of the Northern Glaciated Plains ecoregion with the northeast corner located in the Prairie Coteau ecoregion (<http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/sodak.htm>; Figure 2). The Northern Glaciated Plains is a unique ecoregion that is a transitional zone between the tall and shortgrass prairie. The Big Sioux Basin is a glacially formed trough that pierces the Prairie Coteau ecoregion. The Basin topography is generally flat to rolling and it has a well-developed drainage system and relatively few wetlands. It was historically dominated by tallgrass prairie, but has been converted to mainly tilled agricultural. The Prairie Coteau is the result of stagnant glacial ice melting beneath a sediment layer. This ecoregion has rolling topography and has many wetlands which have semipermanent and seasonal water regimes. In contrast to the Basin, the Prairie Coteau has no well defined drainage system. Native vegetation was prairie grass and forb species and woodlands around wetlands. The Coteau generally has less tilled agriculture than the Basin.

The BRIIWRA soils are mostly Kranzburg-Brookings silty clay loams, Barnes clay loams, and Buse-Langhei complex. The landscape within the project area has a limited number of wetlands but they are fairly evenly distributed throughout the WRA (Figure 3). Wetlands are more concentrated in the northeast corner, where the WRA is Prairie Coteau. Topography is flat to rolling, with elevations ranging from 1,719-1,991 feet (ft; 524-607 meters [m]) above sea level (Figure 4). Ownership within the BRIIWRA is almost all private but there are federal Waterfowl Production Areas and several federal easements within the current boundary.

METHODS

Biological resources within the BRIIWRA were evaluated through a search of existing data and site visits. The site visits entailed an examination of the BRIIWRA from public roads on March 18, 2008 (southern $\frac{3}{4}$ of WRA) and September 11, 2008 (northern $\frac{1}{4}$), during which biological

features and potential wildlife habitat, including plant communities, topography features, and potential raptor nesting habitat and prey populations, were identified. All wildlife species observed during the site visits were recorded and photographs were taken of the BRIIWRA (Appendix A).

Several sources of available data were used to identify biological resources within the BRIIWRA including published literature, field guides, and public data sets. Information about sensitive species presence and locations was requested from the South Dakota Game, Fish, and Parks (SDGFP) and US Fish and Wildlife Service (USFWS). The initial request was for an area slightly smaller than the area (southern three-quarters) contained in the current project boundary. Letters requesting information for the additional area were sent in October 2008 (Appendix B). Responses regarding the original boundary were received from both agencies and their comments are addressed in this report (Appendix B).

LAND COVER

About 60% of the BRIIWRA is tilled agriculture (Table 1; Figure 5). The next most common habitat is pasture, which comprises about 20% of the BRIIWRA. Planted grassland (5%), wetland (4.2%), and hayland (3.5%) were the next most common land use (Table 1).

Table 1. Land use types present within the BRIIWRA.

Land use	Acres	% Composition
tilled agriculture	29842.84	60.35
pasture	9969.95	20.16
planted grassland	2475.59	5.01
wetland	2113.24	4.27
hayland	1715.85	3.47
farmstead	1376.14	2.78
woodland	854.49	1.73
rangeland	679.55	1.37
residential	172.68	<1%
gravel pit	70.74	<1%
lake	46.61	<1%
stock pond	45.70	<1%
road	29.05	<1%
industrial	27.57	<1%
utility	27.31	<1%
cemetery	0.70	<1%

Sensitive and Special Status Plant Species

No state or federally-listed endangered, threatened, or candidate plant species are known to occur in the BRIIWRA (<http://www.sdgifp.info/Wildlife/Diversity/TES.htm>, ECOS 2008). One federally-listed threatened plant species, the western prairie fringed orchid (*Platanthera*

praeclara), is listed for the state but probably no longer occurs there (http://ecos.fws.gov/tess_public/StateNonOccurrence.do?state=SD).

Western prairie fringed orchid

The western prairie fringed orchid is a perennial orchid of tall grass prairies and wet meadows and is commonly associated with big and little bluestem, switchgrass, and Indiangrass. It is believed to be extirpated from South Dakota, possibly due to conversion of prairie to cropland and habitat fragmentation, competitive exotic plants, and chemical applications associated with agriculture (<http://www.fws.gov/southdakotafieldoffice/ORCHID.HTM>). However, if suitable habitat is found within the project area and construction impacts cannot be avoided, the USFWS recommends that surveys for this species be considered.

Sensitive Habitats

The presence of wind turbines may alter the landscape so that wildlife habitat use patterns are altered, possibly displacing wildlife from the WRA. The greatest concern with displacement impacts are for wind-energy facilities that are placed in native grasslands and other native habitats, of which few are found within the BRIIWRA. During the site visits, very few areas were observed that were obviously native grasslands. However, pastures were grazed or hayed during both site visits, so definitive species identification was difficult. The BRIIWRA includes some grasslands (native or planted), so it is probable that some grassland-dependent species will be displaced (see the Breeding Bird section for more discussion on displacement). A detailed and ground based vegetation mapping exercise of project facility areas was undertaken by HDR Engineering in May, June, and July 2008 as part of the state permitting process for the southern portion of the current project area and through aerial photography interpretation and ground truthing later in 2008 for the northern portion of the project area (Figure 5).

Wetlands and Riparian Areas

Based on National Wetland Inventory (NWI) polygon data (USGS NWI 2007), there are approximately 791 acres (320 ha) of wetlands, not including streams and rivers, found throughout the BRIIWRA (Table 2). About 1.6% of the total BRIIWRA is wetlands, excluding rivers and streams. The highest percentage (34.4%) of wetlands are seasonally flooded, but temporarily and semipermanently flooded wetlands make up another 31.6% and 29.5% respectively (Table 2).

Table 2. Wetland types present within the BRIIWRA (NWI wetland polygons; USGS NWI 2007).

Wetland type/modifier	Acres	% Composition
temporary	250.10	31.62
seasonal	272.33	34.43
semipermanent	233.41	29.51
lake	35.07	4.43

Deer Creek drains to the south in the southern part of the WRA (Figure 5). Sixmile Creek drains to the south through the western portion of the project area. There are also several unnamed streams/creeks in the BRIIWRA.

There are several USFWS easements, some of them wetland easements, in and near the project area. There are also two USFWS Waterfowl Production Areas in the upper northeast corner. Constructing access roads to the turbines and other facilities may require crossing some wetlands, drainages, and easements in the project area and proper permits will be required. Wetland delineations were completed in May-July 2008 by HDR Engineering.

WILDLIFE

Wildlife species associated with tilled agricultural landscapes, pastures, and deciduous forests are expected to be the most common species at the BRIIWRA. A list of species observed during the site visits is provided in Table 3.

Table 3. Wildlife species observed at the BRIIWRA during the March 18, 2008 and September 11, 2008 site visits.

Species	Scientific Name	Date Observed
American kestrel	<i>Falco sparverius</i>	both
barn swallow	<i>Hirundo rustica</i>	September 11, 2008
brown-headed cowbird	<i>Molothrus ater</i>	September 11, 2008
Canada goose	<i>Branta canadensis</i>	March 18, 2008
European starling	<i>Sturnus vulgaris</i>	March 18, 2008
great egret	<i>Ardea alba</i>	September 11, 2008
horned lark	<i>Eremophila alpestris</i>	September 11, 2008
killdeer	<i>Charadrius vociferus</i>	September 11, 2008
northern flicker	<i>Colaptes auratus</i>	September 11, 2008
red-tailed hawk	<i>Buteo jamaicensis</i>	March 18, 2008
red-winged blackbird	<i>Agelaius phoeniceus</i>	March 18, 2008
ring-necked pheasant	<i>Phasianus colchicus</i>	March 18, 2008
rock pigeon	<i>Columba livia</i>	March 18, 2008
sharp-shinned hawk	<i>Accipiter striatus</i>	September 11, 2008
western meadowlark	<i>Sturnella neglecta</i>	both
white-tailed deer	<i>Odocoileus virginianus</i>	March 18, 2008
Virginia opossum	<i>Didelphis virginiana</i>	March 18, 2008
red fox	<i>Vulpes vulpes</i>	September 11, 2008
striped skunk	<i>Mephitis mephitis</i>	September 11, 2008

WEST is currently conducting avian use point counts in the project area which will greatly expand upon the number of species documented in the BRIIWRA.

Federal Listed Species

There are two wildlife species listed as endangered, threatened, or candidate by the USFWS under the Endangered Species Act (ESA 1973) known to occur in Brookings County (ECOS

2008). One of these species, the Topeka shiner (*Notropis topeka*) is also found in Deuel County. The Topeka shiner is found in Deer Creek and Sixmile Creek, portions of which are located in the project area. The Dakota Skipper (*Hesperia dacotae*) has been documented in Brookings County. The whooping crane (*Grus americana*), an endangered species, has been observed in counties adjacent to Brookings and Deuel Counties and therefore may occur in the project area.

Topeka Shiner

The Topeka shiner is an endangered species that is a small minnow native to the streams of the prairie (Shearer 2003). This small fish (up to about 3 inches in length) prefers small, quiet streams with clean gravel or sand substrates and vegetated banks. Declines in Topeka shiner abundance could be related to habitat degradation, sedimentation, impoundments of tributaries, and water quality problems. The Topeka Shiner State Management Plan reports that several studies have documented shiners in 80% of their historic range in South Dakota as well as in new sites. As the shiner is known to occur in at least two of the streams in the project area (Deer Creek and Sixmile Creek) additional precautions should be exercised when working near these waters. As most wind projects are built on the higher ground, direct impacts from the turbines would not be expected. However, roads and powerlines between turbines may cross these drainages. If impacts cannot be avoided to the streams, additional survey efforts and consultations with appropriate agencies will be needed.

Dakota Skipper

The Dakota Skipper butterfly (*Hesperia dacotae*) is a candidate species under the ESA. This small butterfly (1-1.5 inch wingspan) is found in the northeastern counties, including Brookings County, of South Dakota (<http://www.fws.gov/southdakotafieldoffice/ctycand.htm>). The Dakota skipper is found in native, tallgrass, alkaline prairie, particularly in rolling pastures near wetlands. Conservation efforts include protection of remaining tracts of undisturbed native prairie. As the project contains grasslands, and limited native grasslands, there is the possibility for this species to occur in the project area. Specific surveys for this species were conducted during the 2008 flight period and none were found (Selby 2008).

Whooping Crane

The whooping crane is an endangered bird with a peak 2007-08 winter population of 262 birds (Martha Tacha, USFWS, pers. comm.). Whooping cranes typically migrate from their breeding grounds in Wood Buffalo National Park, Canada to their wintering areas in Aransas National Wildlife Refuge, Texas. During the migration, most birds pass through central South Dakota (mainly west of the project area; Austin and Richert 2001). Based on observations from Austin and Richert (2001), the project area would appear to be on the very eastern edge of whooping crane migration. The project area is outside of the 200-mile wide migration corridor identified by the USFWS (Stehn 2007)

The potential exists for whooping cranes to fly through the area during migration, although the possibility is remote given their very low numbers and that the majority of historic use is west of the project area. Whooping cranes generally migrate at 1,000-5,000 ft, altitudes well above turbine height (Tom Stehn, USFWS, <http://www.learner.org/jnorth/spring1998/jnexpert/CraneAnswer.html>), and thus for the most part are unlikely to collide with turbines. However, as whooping cranes ascend and descend during takeoff and landing, or migrate during inclement

weather, they may fly at lower altitudes and may fly within the flight altitudes corresponding to the rotor-swept areas.

South Dakota Species of Concern

In the reply from the State of South Dakota regarding the original project boundary, several area-sensitive species were noted as being found in the project area or having the potential to occur in the project area. These grassland birds included the sedge wren (*Cistothorus platensis*), clay-colored sparrow (*Spizella pallida*), grasshopper sparrow (*Ammodramus savannarum*), bobolink (*Dolichonyx oryzivorus*), dickcissel (*Spiza americana*), song sparrow (*Melospiza melodia*), northern harrier (*Circus cyaneus*), upland sandpiper (*Bartramia longicauda*), field sparrow (*Spizella pusilla*), Vesper sparrow (*Poocetes gramineus*), Savannah sparrow (*Passerculus sandwichensis*), and Henslow's sparrow (*Ammodramus henslowii*). If suitable breeding habitat (native grasslands) exists within the BRII WRA, the state recommends species appropriate surveys be conducted in June for these breeding grassland birds, or ideally, mid-May to early July.

In addition to the Dakota Skipper, discussed above, the state of South Dakota expressed concern regarding another rare butterfly, the Ottoe Skipper (*Hesperia ottoe*). This Skipper requires relatively undisturbed native grasslands with nectar sources; the State suggests that suitable habitat might exist within the project area in the eastern and southeastern portions. Records show that the Skipper has not been noted in the project area but has been found nearby on contiguous grasslands.

In their response letter, the State recommends preconstruction butterfly surveys for these two Skippers; the State also recommends surveys occur during and after construction. Specific surveys for this species were conducted during the 2008 flight period and none were found (Selby 2008).

South Dakota State Listed Species

In their project review reply, the State mentioned two species that are designated endangered or threatened by South Dakota but not federally protected by the ESA (Appendix B).

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is a state threatened species that may migrate through or breed in the project area. In previous discussions and correspondence with the USFWS, they described the bald eagle as migrating primarily along major rivers through South Dakota. Eagles have been known to concentrate during the winter along the Missouri River (Tallman et al. 2002). Wintering bald eagles are often associated with lakes, rivers, and reservoirs where they feed primarily on fish (Johnsgard 1990). Bald eagles may also be found during migration and winter periods in areas away from major rivers if sufficient forage is available. If waterfowl concentrate in the area during winter, they could serve as a food base for eagles.

Bald eagles nest in areas with mature forest, typically along major waterways, lakes, and reservoirs. However, with increasing bald eagle populations, nesting eagles are also being found

in areas away from “major” waterbodies. No eagle nests were observed during the site visits and the State does not have any records of nesting eagles but potential nesting and roosting habitat is present within the project area in the form of scattered mature trees. It is possible for bald eagles to occur in the project area, either during migration or the breeding season.

Northern Redbelly Dace

The northern redbelly dace (*Phoxinus eos*) is a state threatened species that is predicted to occur near the project area (SD GAP Analysis). The State, in their project review, states that there is a record of this species just outside the eastern edge of the project boundary (Appendix B). The 2 inch fish is found in clear, cool, spring-fed streams with areas of aquatic vegetation. Habitat alteration and introduction of exotic fish are two of the primary threats affecting the dace.

Impacts to this species are not expected given that wind energy facilities are constructed on the higher landscapes. However, similar precautionary steps taken to avoid impacts to the Topeka shiner (i.e., avoid impacts, runoff, etc) will also protect this species from impacts.

Raptors

Species Likely To Occur In the Area

The following raptor species could occur in or near the project area: bald eagle, northern harrier, sharp-shinned hawk (*Accipiter striatus*), Cooper’s hawk (*A. cooperii*), northern goshawk (*A. gentilis*), broad-winged hawk (*Buteo playpterus*), Swainson’s hawk (*B. swainsoni*), ferruginous hawk (*Buteo regalis*), red-tailed hawk, rough-legged hawk (*B. lagopus*), American kestrel (*Falco sparverius*), and merlin (*F. columbarius*). Other species often grouped with raptors that could be found in the project area include the great-horned owl (*Bubo virginianus*), eastern screech owl (*Otus asio*), burrowing owl (*Athene cunicularia*), and turkey vulture (*Cathartes aura*). Six of these species are confirmed or suspected breeders in the project area: northern harrier, Swainson’s hawk, red-tailed hawk, eastern screech owl, great-horned owl, and American kestrel (Peterson 1995). During the site visits, red-tailed hawks and American kestrels were observed in the project area (Table 3). Specific surveys designed to determine raptor use are ongoing within the project area in 2008.

Potential Raptor Nesting Habitat

No raptor nests were observed during the site visits but potential nest structures for above ground nesting species were present in the form of living and dead trees. Farmsteads observed during the site visits usually had tree rows or woodlots associated with them. Grassland areas could provide nesting habitats for ground-nesting raptors, such as the northern harrier.

Potential for Prey Densities

No signs of colonial rodents, such as prairie dogs (*Cynomys* spp.) were observed during the site visits; these types of areas are known to attract feeding raptors. However, it is possible that small mammal colonies are present within the BRIIWRA, but were not visible from public roads. Plains pocket gopher (*Geomys bursarius*) mounds were observed during the site visits, suggesting the presence of a potential prey item. Other potential raptor prey sources include rodents, rabbits, and waterfowl.

Overall, it is very difficult to assess potential prey densities during individual site visits from public access roads and prey densities can fluctuate rapidly based on habitat and climatic factors. However, overall prey densities are not expected to be significantly different than areas outside of the proposed BRIIWRA. With roost sites and food available, it is likely that raptors will use the area but not to a greater degree than the surrounding areas with similar habitat.

Does the Topography of the Site Increase the Potential for Raptor Use?

Topography in the BRIIWRA is flat to rolling. There are no big hills, ridges, or other topographical features that might cause bottlenecks or updrafts where raptors might concentrate (Figure 6). At other wind-energy facilities located on prominent ridges with defined edges (e.g., rims of canyons, steep slopes), raptors often fly along the rim edges, using updrafts to maintain altitude while hunting, migrating or soaring (Johnson et al. 2000b; Hoover and Morrison 2005). In Wyoming, raptors most often used areas within 164 ft (50 m) of the rim edge (Johnson et al. 2000b).

Bird Migration

Most species of birds are protected by the Migratory Bird Treaty Act (MBTA 1918). Although many species of passerines migrate at night and may collide with tall man-made structures, no large mortality events on the same scale as those seen at communication towers have been documented at wind-energy facilities in North America (NWCC 2004). Large numbers of passerines have collided with lighted communication towers and buildings when foggy conditions occur during spring or fall migration. Birds appear to become confused by the lights during foggy or low cloud ceiling conditions, flying circles around lighted structures until they become exhausted or collide with the structure (Erickson et al. 2001). Most collisions at communication towers are attributed to the guy wires on these structures, which wind turbines do not have. Additionally, the large mortality events observed at communication towers have occurred at structures greater than 500 ft (152 m) in height (Erickson et al. 2001), likely because most small birds migrate at elevations of 500 to 1,000 ft (152 to 305 m) above the ground (USFWS 1998), which is higher than most of the modern turbines. Migrating passerines are likely more at risk of turbine collision when ascending and descending from stopover habitats.

It is likely that birds migrate through the proposed BRIIWRA, including passerines, raptors, and waterfowl. Woodlots, wetlands, and riparian areas scattered throughout the BRIIWRA may provide stopover habitat for migrants or individuals during post-breeding dispersal. Harvested grain crops, such as the corn that was observed during the site visits, could serve as feeding areas that could attract migrating and wintering waterfowl. These types of habitats are found throughout the region and therefore their presence in the BRIIWRA should not concentrate bird use as compared to adjacent areas.

Breeding Birds

The nearest US Geological Survey (USGS) Breeding Bird Survey (BBS) routes are the Volga route, in South Dakota, and the Tyler route in Minnesota (Figure 7). Each BBS route is 24.5 mi (39.4 km) long, and all birds seen or heard are tallied for a three-minute period every half mile (0.8 km) along the route. In 2007, 1,145 individuals comprising 55 species were observed on the

Volga BBS route (USGS BBS 2008). The most abundant birds observed were the common grackle (*Quiscalus quiscula*), red-winged blackbird, and yellow-headed blackbird (*Xanthocephalus xanthocephalus*). On the Tyler route, which was last surveyed in 2004, 21 species and 242 individuals were observed (USGS BBS 2008). The red-winged blackbird, common grackle, and mourning dove (*Zenaida macroura*) were the most abundant birds.

Recent research has started to focus on the potential displacement of grassland passerines at wind-energy facilities, and some uncertainty currently exists over the effects of wind-energy facilities on the breeding success of these birds. In Minnesota, researchers have found that breeding passerine density on Conservation Reserve Program (CRP) grasslands was reduced in the immediate vicinity of turbines (Leddy et al. 1999), but changes in density at broader scales was not detectable (Johnson et al. 2000a). Erickson et al. (2004) documented a decrease in density of some native grassland passerines, such as grasshopper sparrow (*Ammodramus savannarum*), near turbines in Washington; however, they could not determine if a decrease in post-construction density was the result of behavioral disturbance or a loss of habitat. Piorkowski (2006) conducted a displacement study at a wind-energy facility in Oklahoma where, of the grassland species present on the site, only the western meadowlark (*Sturnella neglecta*) showed significantly lower densities near turbines. Piorkowski (2006) suggested that habitat characteristics were more important to determining passerine breeding densities than the presence of wind turbines. Shaffer and Johnson (2007) documented avoidance by grasshopper sparrows out to 492 ft (150 m) at a wind-energy facility in northern South Dakota. The proposed BRII WRA contains grasslands, some of which could be native grasslands, and some species of sensitive grassland passerines are likely to be present in the BRII WRA. As more research is published, the potential impacts of wind turbines on breeding passerines can be better defined. If the project does not affect the few grasslands in the BRII WRA, displacement impacts should be negligible.

Bats

There are several species of bats that could be found in the WRA, including the big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), eastern red bat (*Lasiurus borealis*), little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*), and the silver-haired bat (*Lasionycteris noctivagans*) (<http://www.batcon.org/SPprofiles>). The USFWS had formerly listed the long-eared bat (*Myotis evotis*), Townsend's big-eared bat (*Corynorhinus townsendii*), long-legged bat (*Myotis volans*), and small-footed myotis (*Myotis leibii*) as candidate species. Based on information from Bat Conservation International (BCI), none of the former candidate species occur in the BRII WRA (BCI 2008).

Potential roosting habitat within the BRII WRA is found in the form of trees and buildings; no caves were observed during the site visits. Bats generally forage over water and open spaces such as agricultural fields, grasslands, streams, and wetlands/ponds. Bats may forage over the entire BRII WRA, although the extent of use is not known. Bats may prey on insects that are likely to concentrate over water in wetlands and streams, and these types of areas found in the BRII WRA are most likely to attract foraging bats.

Bat casualties have been reported from most wind-energy facilities where post-construction fatality data are publicly available. Reported estimates of bat mortality at wind-energy facilities have ranged from 0.01 – 47.5 fatalities per turbine per year (0.9 – 43.2 bats / MW / Year) in the US, with an average of 3.4 per turbine or 4.6 per MW (NWCC 2004). Most of the bat casualties at wind-energy facilities to date are migratory species which conduct long migrations between summer roosts and winter areas. The species most commonly found as fatalities at wind-energy facilities include hoary bats, silver-haired bats and eastern red bats (Johnson 2005). The highest numbers of bat fatalities found at wind-energy facilities to date have occurred in eastern North America on ridge tops dominated by deciduous forest (NWCC 2004). However, Barclay et al. (2007) recently reported relatively high fatality rates from a facility in Canada located in grassland and agricultural habitats. Unlike the eastern US wind-energy facilities with high bat mortality, the Alberta facility is in open grasslands and crop fields, although it is adjacent to foothills along the Rocky Mountains and may lie within a bat migration corridor.

Construction of the proposed BRIIWRA will likely result in the mortality of some bats. The magnitude of these fatalities and the degree to which bat species will be affected is difficult to determine, but they should be within or below the average range of bat mortalities found throughout the US.

CONCLUSIONS

A summary of the potential for wildlife and habitat conflicts in the proposed wind-energy facility development area is presented in Table 4.

No state or federally-listed endangered, threatened, or candidate plant species are known to occur in the BRIIWRA. One federally-listed threatened plant species, the western prairie fringed orchid is listed for the state but probably no longer occurs there. There are two wildlife species listed as endangered, threatened, or candidate by the USFWS under the ESA known to occur in Brookings County; one of these species, the Topeka shiner, is also known to occur in Deuel County. The Topeka shiner is found in Deer Creek and Sixmile Creek, portions of which are located in the project area. The Dakota Skipper has been documented in Brookings County. The whooping crane, an endangered species, has been observed in counties to the west of the WRA.

In their project (original, slightly smaller area) review reply, the State mentioned two species that are designated endangered or threatened by South Dakota but not federally protected by the ESA. The bald eagle is a state threatened species that may migrate through or breed in the project area. The Northern redbelly dace is a small fish documented in streams near the project area. In the reply from the state of South Dakota, several area-sensitive bird species were noted as being found in the project area or having the potential to occur in the project area. If suitable breeding habitat (native grasslands) exists within the BRIIWRA and cannot be avoided during construction, the state recommends species appropriate surveys be conducted in June for these breeding grassland birds, or ideally, mid-May to early July. In addition to the Dakota Skipper, the state of South Dakota expressed concern regarding another rare butterfly, the Ottoe Skipper.

In general, native land cover in most of the BRIIWRA, including native grasslands and wetlands, are not unique in the region, but are of concern (i.e., concern regarding loss of native prairie). As

the land cover is not unique to the region, these characteristics are not likely to attract or concentrate bird or bat species compared to surrounding areas. Project developments in the areas with less woodland and native grasslands would likely have lower impacts (i.e., displacement) to wildlife, particularly grassland and woodland nesting bird species.

Numerous birds and bats, both as measured by species and individuals, will utilize the area. Raptors, especially red-tailed hawk, northern harrier, and American kestrel, are likely to frequent the area. The presence of larger trees in tree rows and woodlots provide nesting habitat for the tree-nesting species and the grasslands provide nesting opportunities for ground-nesting birds such as the northern harrier. These are all species and habitat types common to the region.

Deciduous trees and buildings in the area provide potential roosting habitat and hibernacula for bats. Research to date on the impacts of wind-energy facilities on bats has shown that species that conduct long distance migrations usually make up the vast majority of bat fatalities at wind-energy facilities. Additionally, the timing of bat fatalities at wind-energy facilities indicates that most bats are killed by turbines during the migration season. Few bat fatalities have been recorded at wind-energy facilities during spring or summer, although bat use at wind-energy facilities has been recorded during those seasons. Migrating bats appear to be at much higher risk of collision than resident bat species that may breed near wind-energy facilities.

As the proposed BRIIWRA moves forward, further wildlife and habitat surveys may be warranted on specific site(s), such as grasslands. The results can be used to identify areas of high wildlife use and sensitive habitats to assist with turbine siting and to compare with post-construction data collection. These surveys are likely to include:

- Jurisdictional wetlands and waters of the US are present in the BRIIWRA. A formal delineation was performed in June and July 2008.
- Update of vegetation community mapping in selected areas of the BRIIWRA to assist in micro-siting away from grassland areas if current project layout changes. This mapping was initially done in June and July 2008.
- Surveys for nesting raptors should be conducted as part of ongoing survey efforts (e.g., incidentally during bird use surveys) to determine breeding raptor use of the BRIIWRA.
- Fixed-point bird use surveys are being conducted from spring 2008 through fall 2008 to determine to what extent the site is utilized and/or in the pathway of migrating birds. Fixed-point surveys will allow a more quantitative assessment of the potential for the wind-energy facility to impact birds.
- There is little information on bat migration routes in the Midwest and potential impacts of wind-energy development on bats are of increasing concern. The BRIIWRA has trees and several rural buildings/structures as potential roosts. Although there is no evidence that significant numbers of bats would migrate through the BRIIWRA, acoustic bat surveys could be ongoing from mid-July through October 2008, which coincides with peak bat mortality at studied wind-energy facilities.

- Species-specific surveys for federal or state species of concern likely to be impacted by the BRII WRA should be made once construction plans are finalized and it is known if the layout will impact potential habitat. This would include both plant and animal surveys as appropriate.
- Post-construction bird and bat mortality monitoring to estimate fatality rates and at least one year post-construction surveys for breeding birds, bats, and bird use surveys to compare to pre-construction survey information.

Table 4. A summary of the potential for wildlife and habitat conflicts in the BRIIWRA.
VH = Very High, H = High, M = Medium, and L = Low.

Issue	VH	H	M	L	Notes
Potential for raptor nest sites			✓		Several tree rows and woodlots
Concentrated raptor flight potential				✓	The general lack of stark topography over the majority of the BRIIWRA decreases the potential for concentrated raptor use.
Potential for migratory pathway			✓		The project area has no topography or other prominent features likely to concentrate birds during migration.
Potential for raptor prey species			✓		Suitable habitat for small mammals
Potential for protected species to occur		✓			Protected species may occur in the area (e.g., bald eagles).
Potential for State Issues		✓			Protection of native grasslands and woodlands, likely state species issues.
Uniqueness of habitat at wind-energy facility			✓		Overall, habitat in the BRIIWRA is not unique compared to the surrounding landscape, but is of concern on a broader scale.
Potential for rare plants to occur				✓	No federally listed plants known to occur in county.
Potential for use by bats			✓		The site has scattered trees, buildings, and wetlands.

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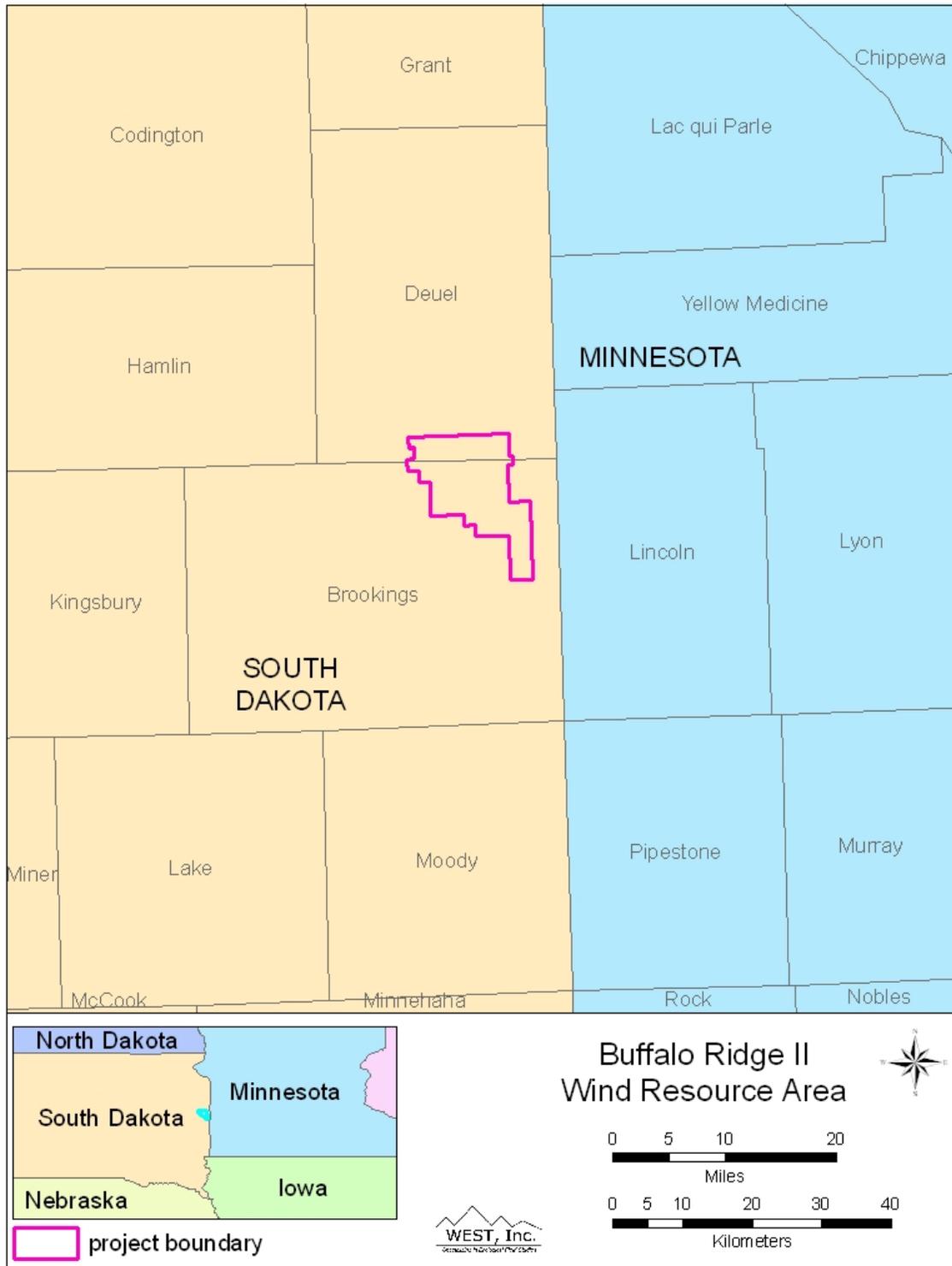


Figure 1. Location of the BRIIWA.

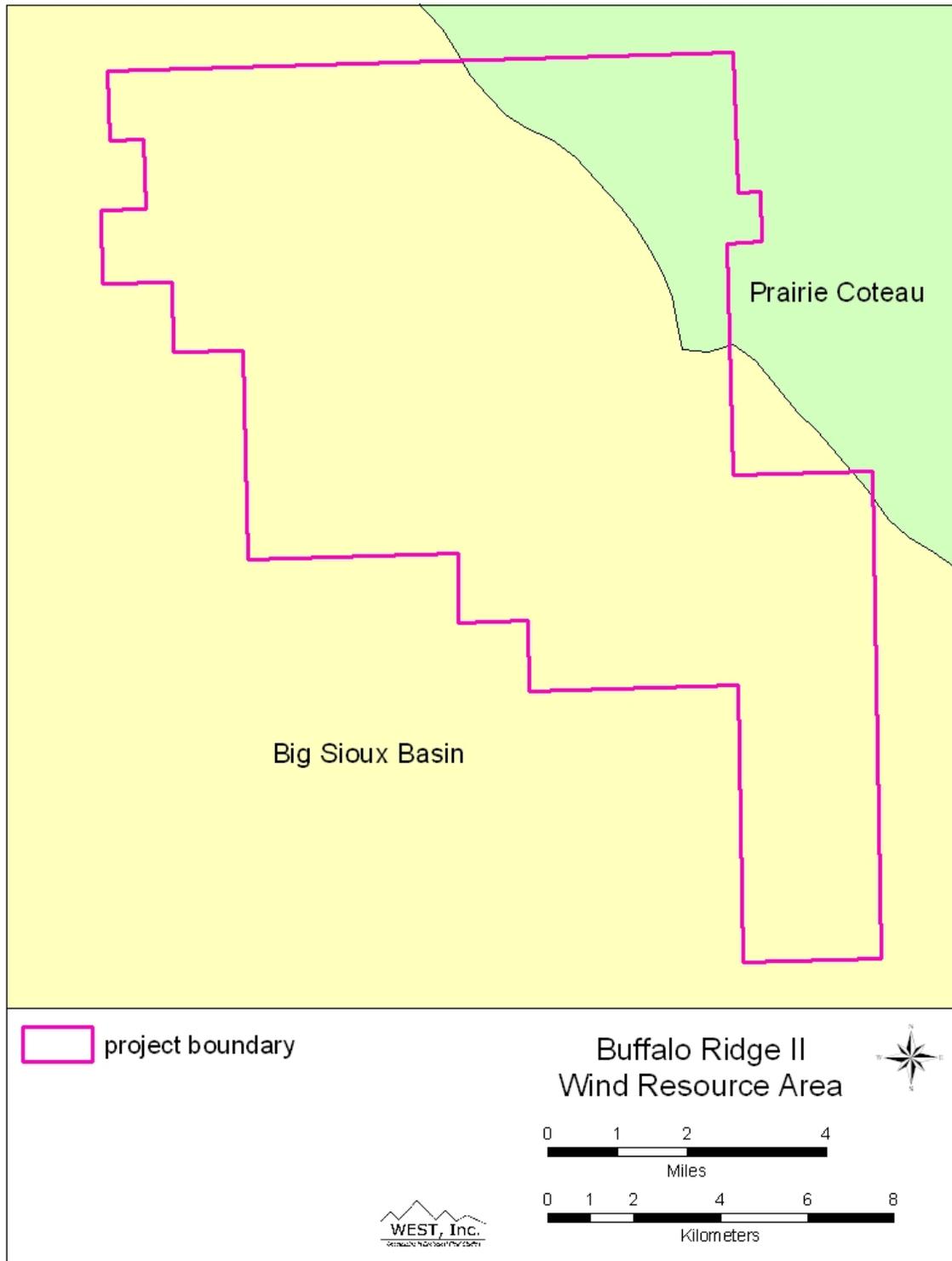


Figure 2. Ecoregion map of the BRIIWA.

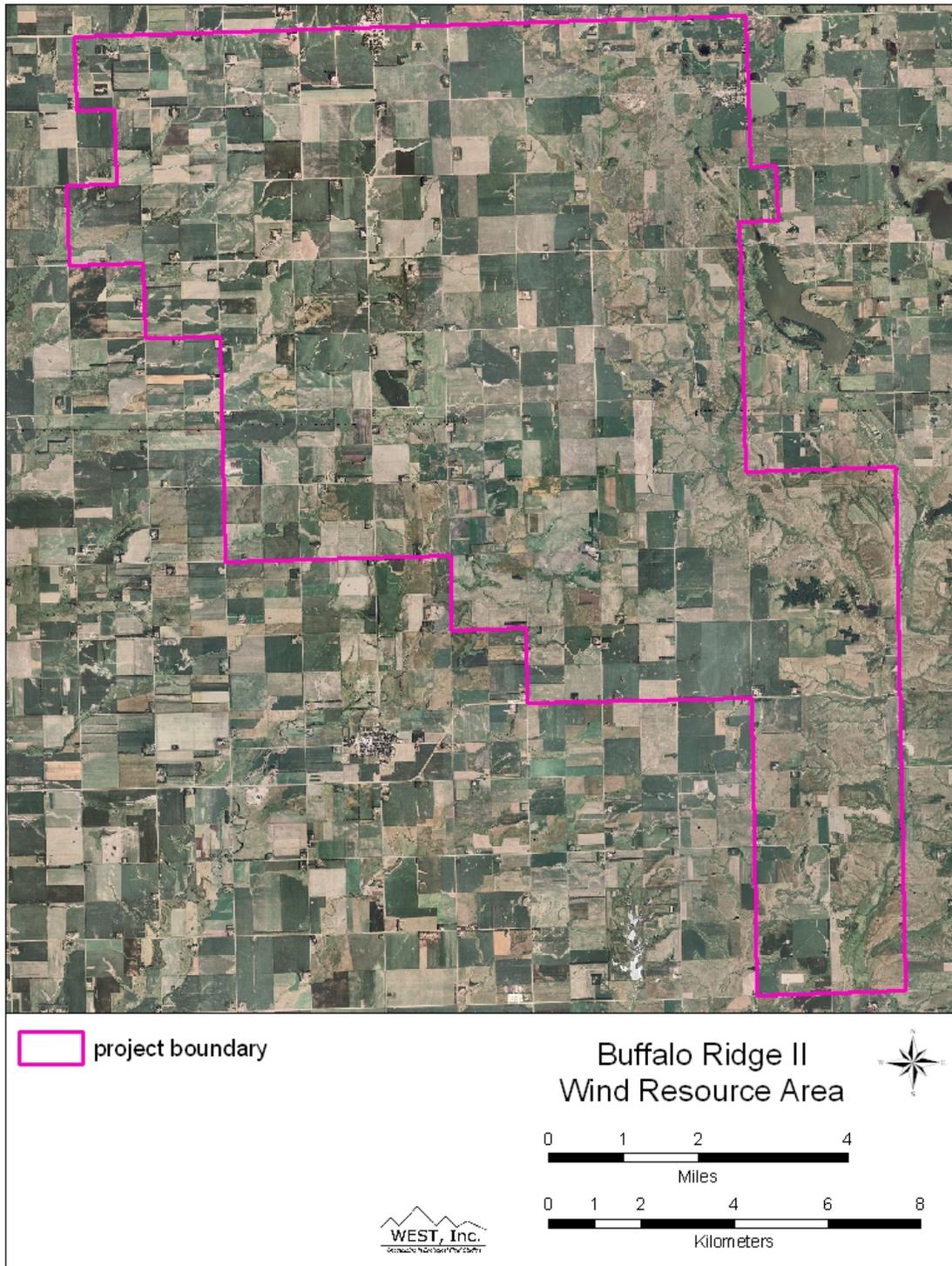


Figure 3. Aerial photo of the BRII WRA (NAIP 2006).

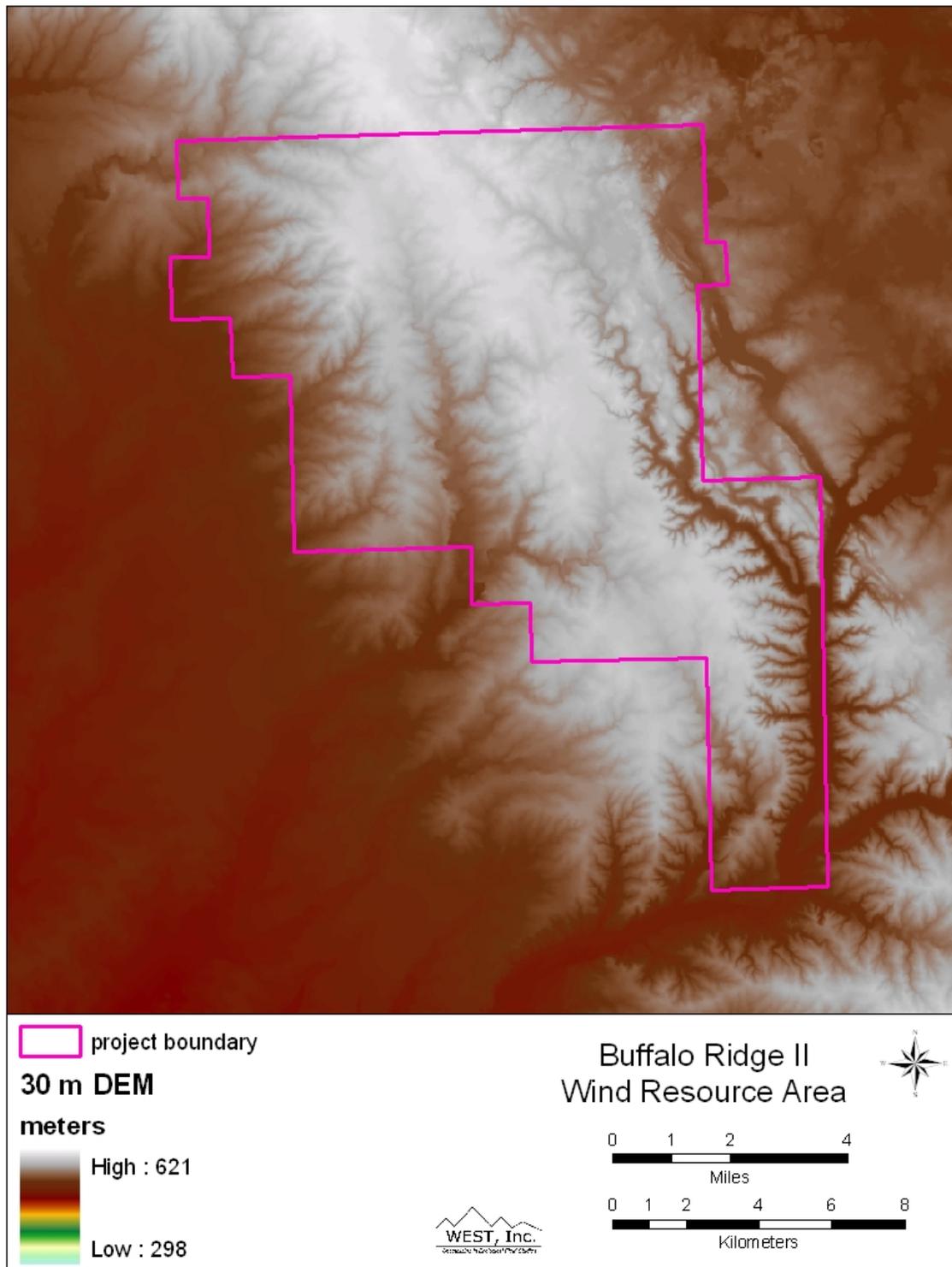


Figure 4. Digital elevation model of the BRIIWA.

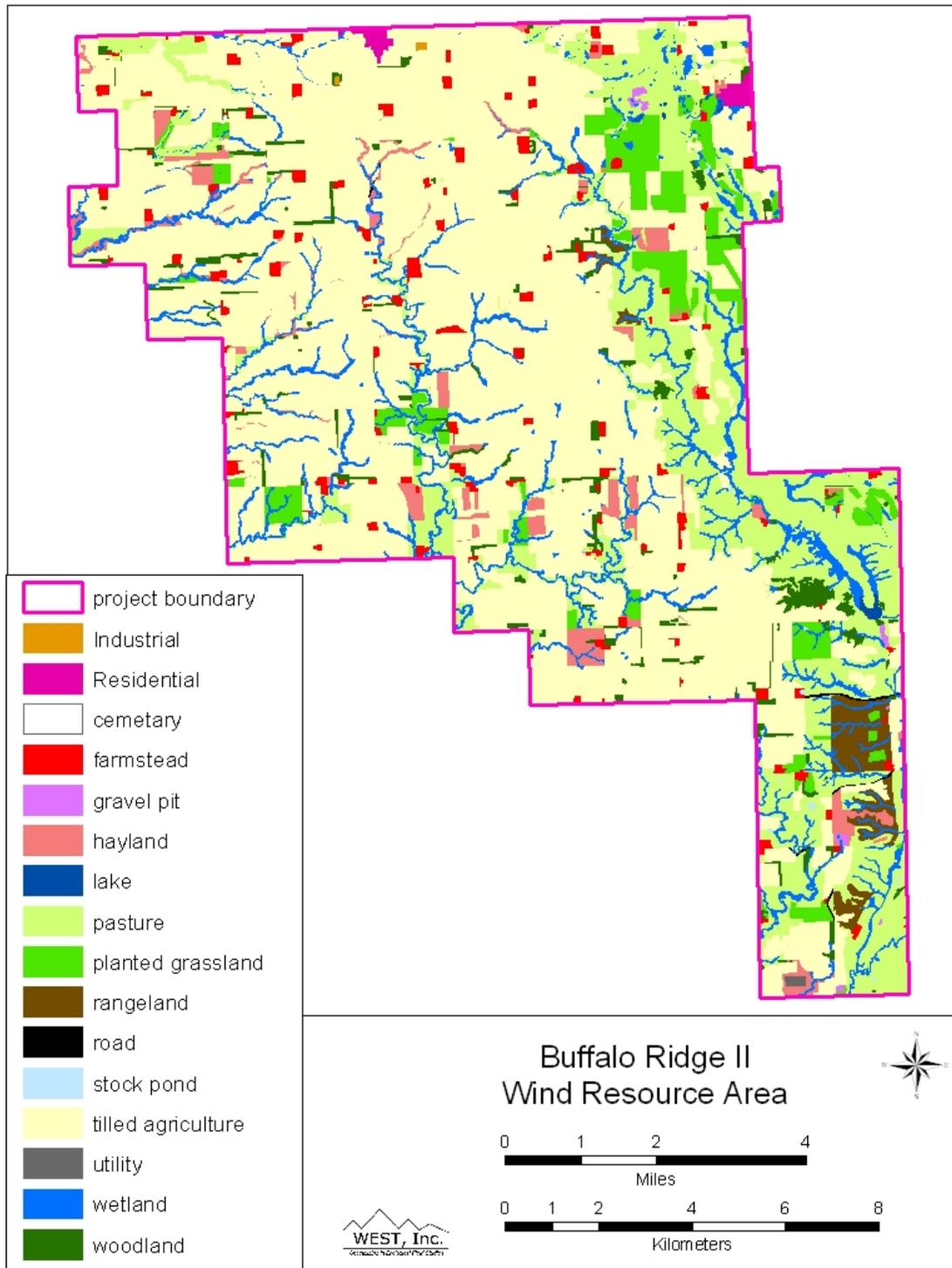


Figure 5. Land cover on the BRIIWA.

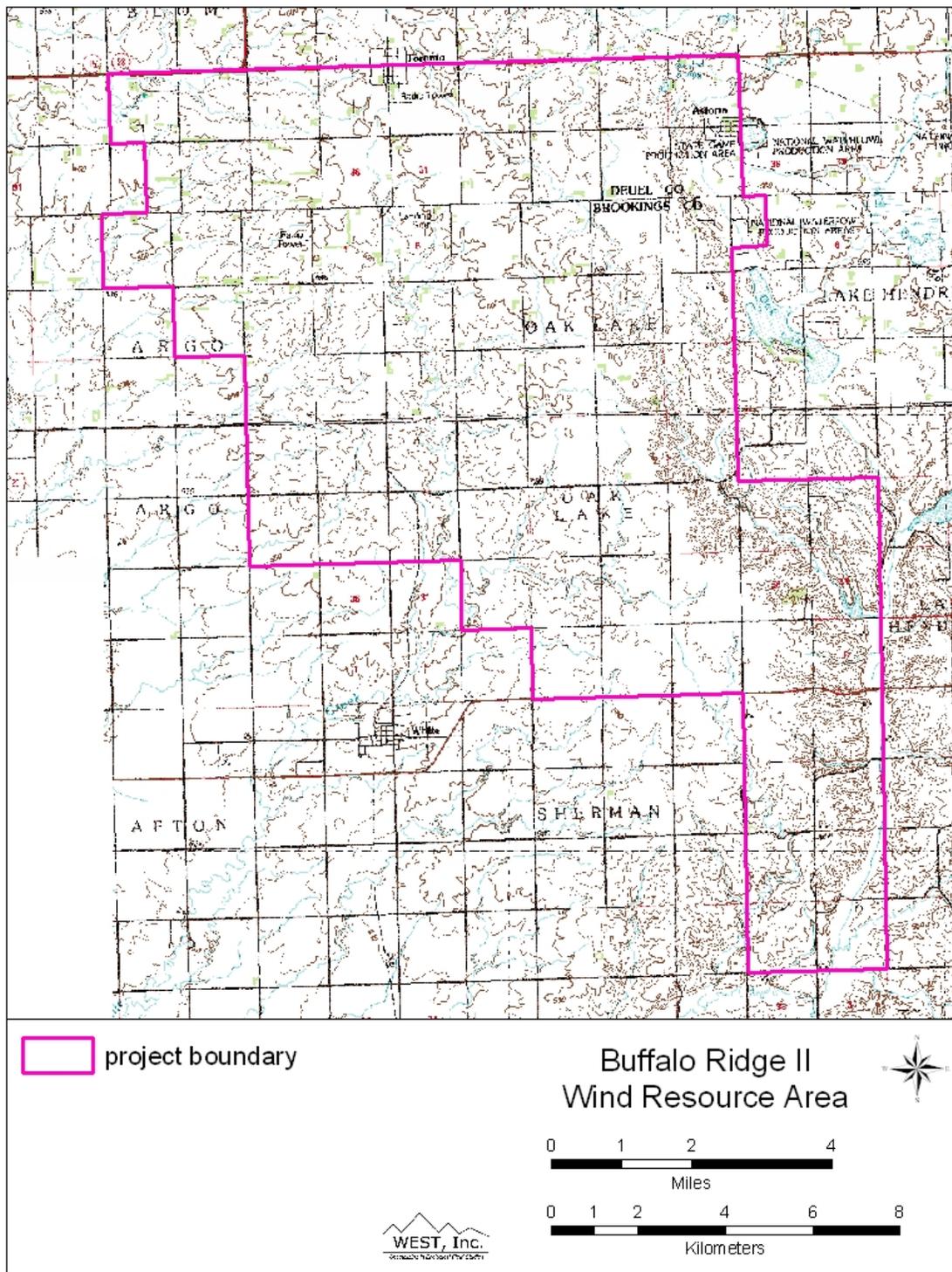


Figure 6. Topographic map of the BRIIWA.

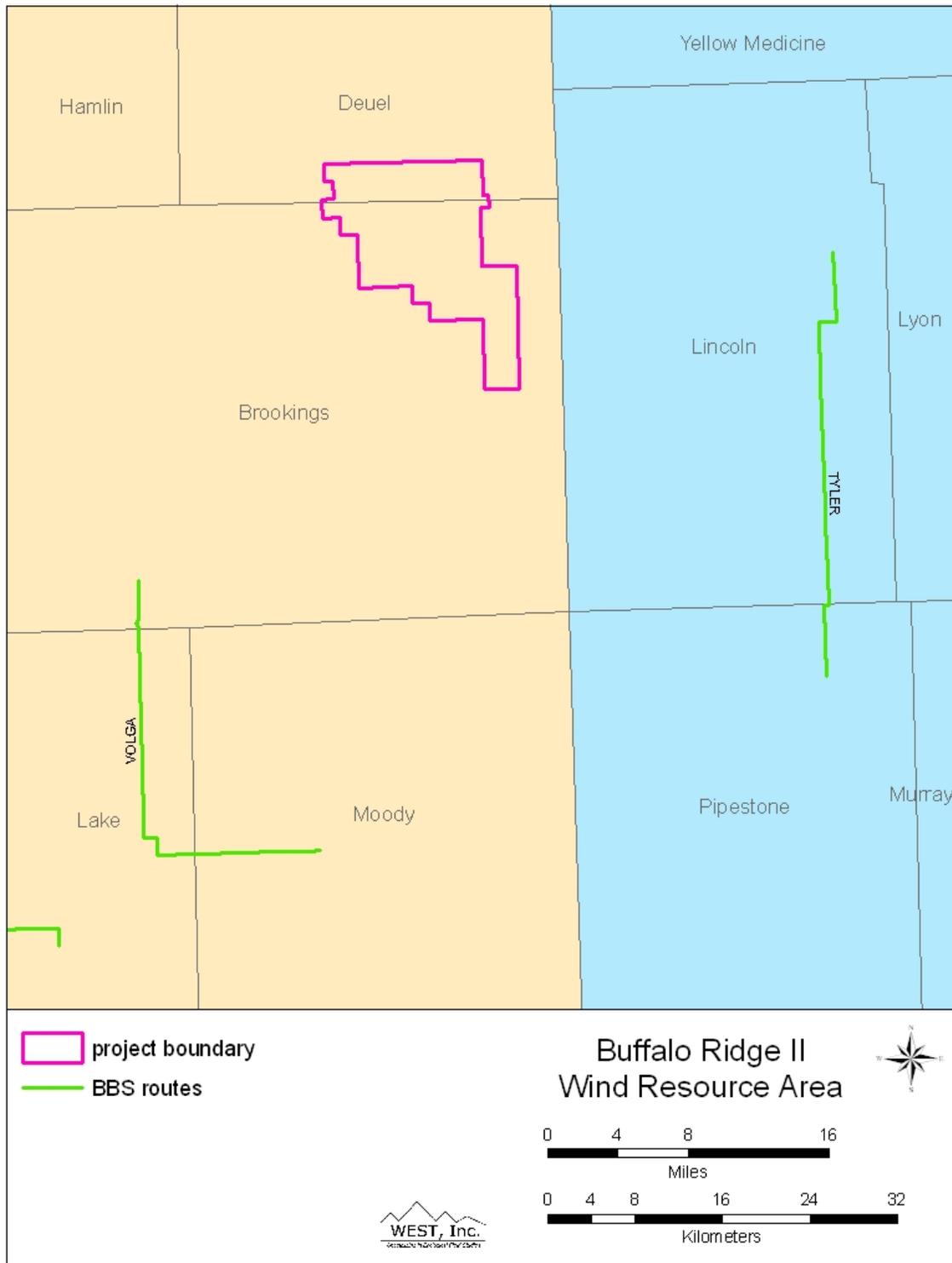


Figure 7. Breeding bird survey routes near the BRIIWA.

Appendix A: Photographs from the BRII WRA
(Actual photo date was March 18, 2008)



Photo 1. Southeastern portion of project area, looking southeast.



Photo 2. Southeastern portion of project area, looking southeast.



Photo 3. Southeastern portion of project area.



Photo 4. Southeastern portion of project area, looking southeast.



Photo 5. Southeastern portion of project area, looking southwest.



Photo 6. Near the eastern boundary, looking west.



Photo 7. Central portion of project area, looking northwest.



Photo 8. Northern part of project area.



Photo 9. Northern part of project area.

Appendix B: Correspondence with the USFWS and the SDGF&P.

Email to Joyce Pickle from Natalie Gates (USFWS SD)

Joyce,

(I have) A few comments below on the avian/bat survey protocol you'd sent for this project. Charlene has not provided any feedback on the Dakota skipper protocol yet.

It appears that the avian survey will provide minimal information over a minimal timeframe. One year pre- and one year post-construction will provide some data, but will not be as useful as multiple years during those timeframes. No mortality searches are proposed to evaluate the survey predictions. Surveys do not appear intensive; sampling is to be done only every other week. A variety of factors may affect wildlife use of the project area over multiple seasons regardless of the proposed project, thus the information obtained over the timeframe proposed may not provide an adequate picture of actual use.

Will these surveys affect turbine locations? It is not clear that the survey information will be used to site turbines away from high-use bird/bat areas, but rather only to predict the level of impact anticipated.

In short, it's good that there will be some data collected, but it appears to be relatively limited in its value/use. More intensive surveys over longer timeframes, with means of evaluating the predicted risks to birds/bats is recommended. And use of the data to site turbines in a manner to minimize wildlife impacts is also recommended.

One item to note: the project area encompasses known occupied Topeka shiner habitat. If access roads are to be built over/near Topeka streams, the potential for adverse affects to this minnow exist. Sixmile Creek, North Deer Creek, and Deer Creek are all in the vicinity of the project and known to harbor this species. If the project may impact these waterways and their tributaries, further consultation with this office is needed.

Additionally, while the Western prairie fringed orchid has not been recently located in South Dakota, it may be possible that the species exists here in as yet undiscovered populations. If suitable habitat exists in the project area, surveys for this species should be considered and results reported to this office.

I did review the Dakota skipper protocol. One question in my mind is how the surveyors will actually spot and identify skippers. It sound like they will simply walk around and look. I would think it'd be very easy to miss these tiny butterflies, and be unable to identify them before they flutter off, but I will leave more specific comments to Charlene and forward those (if any) when I receive them. If you wish, you might contact Charlene Bessken directly at (605) 224-8693 extension 231.

Thank you for the opportunity to comment.

-Natalie

Project:	Buffalo Ridge II	Project No:	79112
Date:	7/31/2008	Subject:	FWS comments on Project
Call	Natalie Gates, Charlene Bessken – USFWS		
Participants:	Joyce Pickle, Sarah Emery – HDR Andy Linehan – Iberdrola Renewables Clayton Derby - WEST		

Discussion, Agreement and/or Action:

The purpose of the conference call was to discuss USFWS comments on the Buffalo Ridge II project (Project). Because there is no expected federal nexus for the project, no Section 7 consultation is anticipated. Iberdrola Renewables (IBR) requested comment from the USFWS on the proposed 210 MW Project via a letter dated April 25, 2008. HDR and WEST also provided USFWS with proposed avian, bat and Dakota/Ottoo skipper pre-construction survey protocol and requested comment. In an email dated June 23, 2008, Ms. Gates provided initial comments on the Project and survey protocols; Ms. Bessken commented on the skipper survey protocols on June 24th (attached). A conference call was scheduled to discuss these USFWS comments and provide a recorded response to the Project to include as part of the application to the South Dakota Public Utilities Commission for an Energy Facility Site Permit.

Avian and Bat Survey Protocols

WEST summarized the pre-construction avian and bat survey protocols. The avian point count surveys began in May 2008 and will continue through fall migration. The bat surveys began in mid-summer 2008 and will continue through fall 2008. Because a majority of the site is in cropped fields, it is not anticipated that the Project area is in a high use corridor. Ms. Gates initially expressed a preference for more than one year of pre-construction avian and bat surveys, and asked if there were any planned post-construction mortality surveys. She also inquired if the results of the survey would be used to help site the proposed wind farm layout. IBR responded that given the agricultural setting of the project area, and the existence of long-term avian and bat surveys previously done in the vicinity on the Buffalo Ridge area, they did not feel that more than one year of pre-construction surveys would be necessary for the Project. In addition, the Service’s “Interim Windpower Guidelines” also state that “an average of three years monitoring data” is recommended only in areas with “high seasonal concentrations of birds.” IBR said that if “hot-spots” or high use areas are identified as part of the pre-construction surveys this information would be used to as criteria for the final layout. USFWS found this acceptable.

IBR indicated that they are proposing one year of post construction mortality surveys; protocol will be developed for these surveys once final design is determined, also using results of the pre-construction surveys to help refine the parameters. IBR and USFWS discussed the number of years

for post-construction mortality surveys. It was agreed that one year was sufficient; however, if problem areas of high mortality are recorded, IBR agreed to discuss the possibility of additional years of surveys with USFWS.

Western Prairie Fringed Orchid

Ms. Gates stated that the orchid could occur in Brookings County. HDR described the project area and indicated that suitable habitat (wet/mesic prairies) does not exist in the vicinity of proposed facilities. USFWS agreed that an orchid survey is not warranted for the Project.

Topeka Shiners

Ms. Gates stated that the project is within the range of the Topeka shiner, and the USFWS would have concerns over any impacts to shiner streams. HDR explained that they have worked with the USFWS on projects within watersheds containing Topeka shiners, and that HDR and IBR would work to avoid direct impacts and manage construction to avoid sedimentation into shiner streams. However, HDR indicated that previous experience has shown that some upper portions of tributaries in shiner habitat can be dry and unsuitable for the shiner; HDR said that in these cases the possibility of trenching should be left available. Ms. Gates said that she would appreciate being sent photos of any proposed stream crossings in order to confirm that Topeka shiner habitat would not be impacted. Ms. Gates indicated that trenching through dried tributaries would likely be but any pools should be avoided. It was determined that if a culvert or bridge crossing of a suitable Topeka shiner stream is proposed, a Habitat Conservation Plan (HCP) would need to be developed and approved (since no Section 7 consultation is anticipated) before permission to affect the stream would be granted. IBR stated that would avoid triggering the HCP process if at all possible. (HDR anticipates that if a stream crossing is necessary for the Project, then a Section 404 permit from the U.S. Army Corps of Engineers would be required and the USFWS would provide Section 7 consultation).

Dakota Skippers

Ms. Gates and Ms. Bessken indicated that there is the potential for prairie remnants within the Project boundary that may provide Dakota skipper habitat. HDR summarized the results of the skipper survey that was conducted by Dr. Jerry Selby on July 8th and 11th, 2008. As the skipper survey protocol lay out, only pasture areas containing native plant populations proposed to be crossed by Project facilities were surveyed for skippers during their flight time. Three such parcels were surveyed by Dr. Selby, and no Dakota or Ottoe skippers were documented. Dr. Selby did observe the target species in other prairie remnants in the general Project vicinity as part of surveys he was doing at the same time for the Minnesota Department of Natural Resources; therefore, the survey did occur during the correct flight period. Ms. Bessken indicated that even though the target species were not found during the survey that does not mean that they are not there. HDR replied that they would work with IBR to map any native prairie communities within the Project vicinity (whether or not the skippers were found) and develop a prairie management plan to avoid and minimize impacts to this habitat to the greatest extent possible. USFWS indicated that this approach was acceptable.



DEPARTMENT OF GAME, FISH AND PARKS

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

June 3, 2008

Joyce E. Pickle
HDR Engineering, Inc.
701 Xenia Avenue South, Suite 600
Minneapolis, MN 55416

RE: Request for environmental review of a 210 megawatt wind power project in Brookings County, South Dakota.

Dear Joyce,

The following information and comments are in response to your letter dated April 25, 2008 and phone call of April 29, 2008 requesting environmental review of the above referenced wind power project. The Proposed Project Area is located near the town of White, South Dakota in portions of Richland, Lake Hendricks, Sherman, Oak Lake, and Argo Townships. The number of turbines and the amount of infrastructure associated with the proposed wind power project has not yet been described. Once these details are determined, we request that this information be provided.

Doug Backlund, our Natural Heritage Database (NHD) manager, has provided location information on rare and protected species known to be within or near the Proposed Project Area. Please note that absence of a species from the NHD does not preclude its presence in the Proposed Project Area. Many areas in South Dakota have not been surveyed for rare or protected species. The species location information along with an invoice was provided to you via electronic mail on May 8, 2008. If you have further questions regarding the NHD search, please contact Doug Backlund at (605) 773-4345. If you have specific questions about the plant records, please contact our botanist, Dave Ode, at (605) 773-4227.

The proposed siting and operation of a wind power project has potential to directly and indirectly impact area wildlife. This may occur by altering important and declining habitats and breeding and movement behavior of wildlife and/or by killing bats and birds through wind turbine and power line strikes. While we applaud efforts to provide

renewable energy sources, we offer the following information on wildlife habitats and associated species that are important in South Dakota and that may be impacted. If impacts are unavoidable, we recommend mitigation to avoid or lessen direct and indirect impacts. We also provide, when appropriate, mitigation suggestions and additional contacts and resources for further information.

Ecoregions (Bryce et al. 1998) - Ecoregions are areas that are similar in the type, quality, and quantity of environmental resources (e.g. geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology). The Proposed Project Area is located within the Big Sioux Basin Ecoregion. This ecoregion is lightly glaciated with rolling topography and a well developed drainage network; there are a limited number of basin wetlands. Average annual precipitation is some of the highest in the state (20-22 inches). Agricultural tillage dominates the ecoregion. Potential natural vegetation is primarily tall-grass species such as big and little bluestem, switchgrass, indiagrass, sideoats grama, and lead plant. Riparian vegetation includes willows, cordgrass and/or hardwoods trees.

Grasslands - The Proposed Project Area is located within the tall-grass prairie zone. Native grasslands within this zone are decreasing at an alarming rate. Less than one percent of native tall-grass prairie habitat in South Dakota remains (Samson et al. 1998). Other grassland types such as rangeland (grazed grasslands with native plant spp.), pasture (grazed grasslands with non-native plant spp.) and Conservation Reserve Program lands (tilled land planted to vegetative cover) serve as grassland wildlife habitat (Hauffer 2005). Fragmentation resulting from woody encroachment, road construction, and conversion of surrounding habitat has resulted in the remaining grassland habitats existing as smaller disjunct patches. Patches often provide less suitable habitat for many native species of grassland wildlife. Some of the last remaining contiguous grasslands tracts may occur in the southeastern portion of the Proposed Project Area.

Grassland Birds - Placement of turbines in the Proposed Project Area may fragment grassland wildlife habitat reducing its suitability to serve as habitat and modify behavior of grassland bird species, a group of species which has shown the most consistent and long term declines of any other group of bird species in North America (Peterjohn and Sauer 1999). Johnson and Igl (2001) gave a regional perspective on the area-sensitivity of several Great Plains bird species. The breeding ranges of four area-sensitive species are found within the Proposed Project Area. The Sedge Wren, Clay-colored Sparrow, Grasshopper Sparrow, and Bobolink. Northern Harrier, Upland Sandpiper, Field, Vesper, Savannah, Henslow's and Song sparrows, and the Dickcissel also are grassland bird species that have shown area-sensitivity (Johnson 2001) and have breeding ranges in the Proposed Project Area. Note that local, species-specific breeding habitat conditions must exist for reproductive activities to occur. Properly timed, species-appropriate surveys for grassland bird species should be conducted pre-construction. Surveys are best conducted in June, although mid-May through early July is acceptable.

Butterflies – The Dakota skipper and the Ottoe skipper are two rare butterfly species located near the Proposed Project Area.

The Dakota skipper is primarily found in western Minnesota, northeastern South Dakota, and scattered prairies across most of North Dakota. More specifically, the range of the Dakota skipper in South Dakota is limited to eleven counties in the north eastern portion of the state, including Brookings County. The Dakota skipper is reduced to scattered populations in fragmented prairies unsuitable for agricultural production, mostly in glacial hills that are too steep or rocky to plow. The Dakota skipper requires native mid- to tall-grass prairie and is currently found on rolling rangeland with abundant wetlands. Larval host plants are grasses, especially little bluestem. Flight of emerging adults occurs from June to mid-July. Adults use various prairie flowers as nectar sources. Current threats to this species include, but are not limited to, improper land management uses, agricultural cultivation, road construction, and invasive plant species.

South Dakota populations are important to the existence of this species. Approximately half of known populations are located on private lands. Dakota skippers, though not found within the Proposed Project Area boundary, are found nearby on the Oak Lake Field Station managed by South Dakota State University. Similar grassland habitat needed by this species may be found in the extreme eastern and southeastern portions of the Proposed Project Area.

This species is a candidate for listing under the Federal Endangered Species Act (ESA). As such, I recommend contacting the U.S. Fish and Wildlife (USFWS) Ecological Services Field Office in Pierre, SD (605-224-6893 or Natalie_Gates@fws.gov) for further information regarding the protection of this species required under ESA.

The Ottoe skipper range is located in the mid-section of North America, extending from Manitoba south to Texas, west to Montana and east to Michigan and Indiana. Distribution in South Dakota is very local and generally uncommon to rare occurring with known occurrences scattered in various counties. The Ottoe skipper requires relatively undisturbed native prairie with nectar sources (coneflowers, grayfeathers, asters, etc). It is uncommon to rare throughout the state. Peak flight for the Ottoe skipper is in mid-July. The reduction and degradation of prairie habitat is the main threat to this species. Our NHD records of this species do not fall within the boundary of the Proposed Project Area but are found nearby on contiguous grasslands. Similar grassland habitat needed by this species may be found in the extreme eastern and southeastern portions of the Proposed Project Area.

The presence of butterfly species that require native prairie are good indicators that high quality native prairie remains. Protection of these remaining tracts of native prairie and associated nectar sources and larval host plants is required for the conservation of these rare butterfly species. There are potential disturbances to these rare butterfly species associated with the construction and maintenance of a wind power project. Road construction and turbine maintenance increases the chances of non-native,

invasive plant species invasion. Road construction is a known threat to the Dakota skipper. Pre-construction surveys for rare butterfly species should be conducted before, during, and after the construction of wind turbines and during the appropriate times (flight periods). Construction in areas that are or potential rare butterfly habitat should be avoided.

Bats - Construction of a wind power plant may affect daily and seasonal bat movements between breeding and foraging areas. There has been limited research conducted on bats in South Dakota. However, thirteen species of bats are currently known to be found in South Dakota, some of which are summer residents, year-round residents, or migratory (Table 1).

Table 1. South Dakota Bats

Common Name	Scientific Name	State Residency
Big Brown Bat ¹	<i>Eptesicus fuscus</i>	Year-round resident
Fringed Myotis ²	<i>Myotis thysanodes</i>	Year-round resident
Little Brown Myotis	<i>Myotis lucifugus</i>	Year-round resident
Long-eared Myotis ²	<i>Myotis evotis</i>	Year-round resident
Long-legged Myotis	<i>Myotis volans</i>	Year-round resident
Northern Myotis ²	<i>Myotis septentrionalis</i>	Year-round resident
Townsend's Big-eared Bat ²	<i>Corynorhinus townsendii</i>	Year-round resident
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	Year-round resident
Hoary Bat ¹	<i>Lasiurus cinereus</i>	Summer resident
Eastern Red Bat ¹	<i>Lasiurus borealis</i>	Summer resident
Silver-haired Bat ^{1,2}	<i>Lasionycteris noctivagans</i>	Summer resident
Evening Bat ²	<i>Nycticeius humeralis</i>	Migratory
Eastern pipistrell ¹	<i>Pipistrellus subflavus</i>	unclassified

¹ = species known to be killed by wind turbines (Higgins et al. 2007)

² = monitored by the Natural Heritage Program

According to Swier (2006), big brown bat, eastern red bat, hoary bat, and little brown myotis are known to be found within Brookings County. In particular the eastern red bat was captured at Oak Lake Field station which is adjacent to the eastern boundary of the Proposed Project Area. Species of bats that migrate are currently the most commonly known species killed at wind power projects in the US (Kunz et al. 2007). The eastern red and hoary bats are two known migratory species that may occur in the Proposed Project Area.

Eastern red bats migrate into South Dakota in mid-April and migrate south by late August or early September (Swier 2006). Gestation is 80-90 days with parturition occurring in mid-June (Higgins et al. 2000). Hoary bats also do not winter in South Dakota. After a 90 day gestation period, pups are born between mid-May and July.

Migration occurs in spring and fall, specifics on migration timing of this species is unknown.

There have been no known surveys for bats within the Proposed Project Area. Because of limited, project-specific data, we recommend pre-construction surveys of the area for potential bat habitat and species and post-construction surveys for documentation and evaluation of strike morality. Surveys for species should be conducted for at least one full year before construction and encompass all seasons. We are aware that acoustic surveys for bats are being conducted from mid-June to mid-October. We encourage timing of these surveys to occur as soon as possible to account for migration and/or beginning additional pre-construction acoustic surveys in April of 2009.

South Dakota Department of Game, Fish and Parks (SDGFP) in cooperation with the South Dakota Bat Working Group (SDBWG), developed the *South Dakota Bat Management Plan* specific to bats and their habitats in South Dakota (<http://www.sdgifp.info/Wildlife/Diversity/batmanagementplan71304.pdf>). Please review this document for pertinent information. Again, because bats reside and migrate through South Dakota, it is important to evaluate the Proposed Project Areas for roosting, feeding, migration and/or stopover habitat and to survey these areas for bats.

Bird and Bat Strikes - Birds and bats are known to be susceptible to direct strikes with wind turbines. Refer to Table 1 in Higgins et al. (2007) for a list of bird species with known wind turbine strike mortality found at a wind power project in the Buffalo Ridge area of Minnesota. Several of these species are migratory and are protected by the Migratory Bird Treaty Act which is administered by the US Fish and Wildlife Service. Please contact Natalie Gates at the South Dakota Ecological Services Field Office in Pierre, SD (605-224-6893 or Natalie_Gates@fws.gov) for more information. All bat species, excluding the little brown Myotis, that have been documented in Brookings County have had documented mortalities at wind turbines (Higgins et al. 2007; Table 2).

Threatened and Endangered Species – Although there are no records of the state listed bald eagle and the state and federally endangered whooping crane, they could occur in the area. Bald eagles may be nesting in the area without our knowledge. Migrant bald eagles and whooping cranes are possible in the spring and fall.

The Topeka shiner is a federally endangered species that occupies a high percentage of known historic locations in South Dakota (Shearer 2003). The Topeka shiner is found near the Proposed Project Area. Landscape alterations that occur during construction projects, etc. can cause land erosion and alter the sediment load and water regime of prairie streams affecting habitat available to fish, e.g., Topeka shiners. Conversion of prairie landscape and wetland drainage act in combination to reduce individual populations of Topeka shiners thereby affecting the Topeka shiner population rangewide (Shearer 2003). Since Topeka shiners are found in streams near the Proposed Project Area, it is likely construction near natural drainages will influence Topeka shiner habitat. South Dakota Game, Fish & Parks, in collaboration with the US

Fish and Wildlife Service developed the Topeka Shiner Management Plan (<http://stage.sdgifp.info/Wildlife/Diversity/Topeka%20Shiner/TopekaShinerManagementPlan-Revised.pdf>). Please refer to this document for information regarding habitat protection and/or mitigation of prairie streams.

The Northern redbelly dace is a state threatened species and is found in the Big Sioux and Minnesota watersheds. A record of this species is found just outside of the eastern border of the Proposed Project Area. This is a small fish (2 inches) that inhabits spring-fed streams, boggy lakes, ponds, beaver ponds, and pools of headwaters and creeks preferring areas that have beds of aquatic vegetation. Waters are often tea colored and over fine detritus or silt. Threats include stream channelization, reduced discharge and changes in water quality.

Landscape considerations - Placement of a wind power project should take into account landscape-level (e.g. surrounding land uses) impacts and the impacts of project associated infrastructure (i.e. transmission lines and roads).

Placement of public lands is often done so in areas with existing and potential wildlife habitat. Management of these lands is done for wildlife and conducted in the public interest. Wildlife using these areas may be affected by the placement of a wind power project in the surrounding area. South Dakota Game, Fish and Parks Department owns tracts of land within three miles of the Proposed Project Area including Astoria, Black Slough Slough and Kvernmoe Slough Game Production Areas, and Lake Hendricks Lakeside Use Area.

In addition Oak Lake Field Station is located adjacent to the eastern border of the Proposed Project Area. The Station is managed by South Dakota State University's Department of Biology and Microbiology as a site to foster appreciation of the Great Plains ecosystem through education, research, and service. The field station is open to the public throughout the year. The station director is Nels H. Troelstrup Jr. He can be contacted at 605-688-5503 or Nels.Troelstrup@sdstate.edu.

The US Fish and Wildlife Service owns and manages several Waterfowl Production Areas within or near the proposed project boundary. These lands are managed out of the Madison Wetland Management District (WMD). Tom Tornow, WMD manager can be contacted at 605-256-2974 or MadisonWetlands@fws.gov. The location of these and other public lands can be found on line at <http://www.sdgifp.info/Wildlife/PublicLands/PubLand.htm>.

Construction and placement of new power lines is often associated with a proposed wind power project. Power line strikes are a known cause of mortality to birds (Erickson et al. 2005). Waterfowl (ducks, geese, swans, and cranes), raptors, and passerines are species most susceptible to power line collisions. The Avian Protection Power line Interaction Committee has developed two documents that may be of use to reduce power line strikes and mortality: 1) *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and 2) *Mitigating Bird Collisions with Power Lines*.

Both of these documents are available from the Edison Institute (<http://www.aplic.org/>, under 'products and services'). existing power lines associated with the proposed project should be buried, marked, or retrofitted to reduce strikes and electrocutions of bird species and poles modified to prevent their use as raptor perch sites.

As roads are built, wildlife habitat is often altered, fragmented and/or lost (Forman et al. 2003). Area-sensitive and/or rare species become less and less resilient to changes in their environment as habitat quantity and quality diminishes (Forman et al. 2003). Similar impacts to area-sensitive species in South Dakota may occur from wind power project- associated roads.

Non-native/invasive plant species - During the construction and maintenance phase of a wind power project existing roads often experience increased traffic and new roads are constructed. This increases the amount of area disturbed and allows for the introduction and establishment of non-native plant species. Non-native plant species are a major threat to threatened and endangered wildlife species. Resulting control of non-native, invasive species through pesticides and herbicides may also impact habitats of rare wildlife species. Improved road access into an area can also increase the amount of human disturbance to wildlife.

Research and Monitoring - Before project construction, we strongly encourage appropriately timed surveys be conducted to determine wildlife use of the project areas. These types of surveys are often time specific, require trained personnel and often take a minimum of one year.

Based upon results of these baseline studies, project construction should be modified, continued, or cancelled. If the project is continued, monitoring should be conducted for a minimum of two years post-construction to determine if and how many bird and bat strikes are caused by this project, if habitats have been significantly altered, and if the surrounding public lands and their uses have been impacted. Any mitigation should be carefully planned, funded, and carried out.

If monitoring involves live trapping or collection of wildlife species, you must first obtain a collection permit from our agency. Also, we request that if you or your associates observe any of the animal or plant species monitored by the NHP, please contact myself or any of our NHP staff. A list of species monitored by the NHP and staff contact information can be found at <http://www.sdgifp.info/Wildlife/Diversity/>.

The US Geological Survey is currently investigating the influence of wind generators on breeding grassland bird density and species composition in the Dakotas. The results of this study may be of interest as you work on the siting and development of this proposed project. Please contact Jill Shaffer with Northern Prairie Wildlife Research Center, Jamestown, ND for more information (701-253-5547 or jshaffer@usgs.gov).

Siting Guidelines - In coordination with the SDBWG, the SDGFP has developed *Siting Guidelines for Wind Power Projects in South Dakota*. This document addresses many

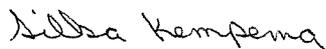
of the concerns involved with siting wind power projects in South Dakota and may be found at on the web (<http://www.sdgfp.info/Wildlife/Diversity/windpower.htm>). These voluntary guidelines are currently being updated using a multi-stakeholder, consensus-based approach.

Summary - As outlined above, our agency has concerns regarding direct and indirect impacts to wildlife and habitats in association with the siting of the proposed project. The native prairie and/or contiguous grassland habitats in a portion of the Proposed Project Areas play a crucial role in the life history of several wildlife species, many of which are experiencing population declines.

Because of the potential impacts placement of the proposed wind power project would have on unique and declining habitats in the region and their associated species, we recommend the placement of turbines in areas currently disturbed (e.g. cultivated areas) and the use of existing infrastructure (roads and transmission lines) as much as possible. We recommend avoiding the placement of turbines in the extreme eastern and south eastern portion of the proposed project area, if field evaluation reveals presence of native prairie and/or contiguous grassland habitat.

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

Regards,



Silka L. F. Kempema
Terrestrial Wildlife Biologist

CC: Doug Backlund, SD Game, Fish and Parks, Pierre, SD
Natalie Gates, US Fish and Wildlife Service, Pierre, SD
Ron Schauer, SD Game, Fish and Parks, Sioux Falls, SD
Jill Shaffer, US Geological Survey, Jamestown, ND

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October 17, 2008

Mr. Doug Backlund
South Dakota Department of Game, Fish and Parks
Foss Building
523 East Capitol
Pierre, SD 57501-3182

RE: Update to Buffalo Ridge II Wind Project in Brookings and Deuel Counties, South Dakota

Dear Mr. Backlund:

HDR Engineering, Inc. (HDR) is currently gathering environmental information for the Buffalo Ridge II Wind Project proposed by Iberdrola Renewables (IBR) in Brookings and Deuel Counties, South Dakota. The purpose of this letter is to inform you that the boundaries of the Buffalo Ridge II Wind Project have been slightly modified from what was described in the April 25, 2008 letter sent to you. The project boundary now includes 18 sections in Deuel County and an additional section in Brookings County (Table 1). The project boundary has been extended in order to accommodate an increase in overall project size. The total megawatts (MW) for the project has increased from 210 MW to 306 MW. The general project description remains the same as described in the April 25, 2008 letter.

Table 1 below identifies the sections included in the extended project boundary that are in addition to the sections listed in the April 25, 2008 letter. Table 2 identifies the existing sections that were included in the April 25, 2008 letter; these sections remain within the project boundary.

IBR has applied to interconnect the wind farm with Xcel Energy's Brookings County Substation near White, South Dakota. Because the project is over 100 MW in size, IBR is required to apply for an Energy Facility Siting Permit through the South Dakota Public Utility Commission (SDPUC). IBR is planning to submit a permit application to the SDPUC in fall 2008 for the 306 MW project. HDR received your May 8, 2008 response containing documented occurrences of state and federal species within the initial project boundary. At this time, HDR requests your review specifically of the project sections identified in Table 1 for potential effects to known federally and state-listed threatened or endangered species and rare natural features. Your comments will be incorporated into the SDPUC review process for the Buffalo Ridge II project.

Table 1 – Sections within Extended Project Boundary

County	Township Name	Township	Range	Sections
Brookings	Lake Hendricks	112 N	47 W	30
Deuel	Scandinavia	113N	48W	26, 27, 28, 29, 30, 31, 32, 33, 34, 35
	Blom	113N	49W	25, 26, 27, 28, 33, 34, 35, 36

Table 2 – Sections within Original Project Area, Brookings County

Township Name	Township	Range	Sections
Richland	111 N	47 W	6, 7, 18, 19, 30
Lake Hendricks	112 N	47 W	31
Sherman	111 N	48 W	1, 2, 3, 4, 12, 13, 24, 25
Oak Lake	112 N	48 W	1-11, 14-23, 25-30, 32-36
Argo	112 N	49 W	1-4, 10-14, 23-26

Enclosed are a map and shapefile detailing the location and revised project boundary of the Buffalo Ridge II Project area to facilitate your review. Please provide us with GIS species data for the sections listed in Table 1. If you require further information or have questions regarding this matter, please call me at (763) 591-5443.

Sincerely,



Joyce E. Pickle
 Environmental Scientist

Enclosures:
 Updated Project Location Map
 Project Location Shapefile

Cc: Timothy Seck, Iberdrola Renewables
 Sarah Emery, Iberdrola Renewables



October 17, 2008

Ms. Silka Kempema
Environmental Review & Management
South Dakota Department of Game, Fish and Parks
Foss Building
523 East Capitol
Pierre, SD 57501-3182

RE: Update to Buffalo Ridge II Wind Project in Brookings and Deuel Counties, South Dakota

Dear Ms. Kempema:

HDR Engineering, Inc. (HDR) is currently gathering environmental information for the Buffalo Ridge II Wind Project proposed by Iberdrola Renewables (IBR) in Brookings and Deuel Counties, South Dakota. The project boundary now includes 18 sections in Deuel County and an additional section in Brookings County (Table 1). The project boundary now includes these sections in Deuel County (Table 1) and Section 30 of Lake Hendricks Township in Brookings County. The project boundary has been extended in order to accommodate an increase in overall project size. The total megawatts (MW) for the project has increased from 210 MW to 306 MW. The general project description remains the same as described in the April 25, 2008 letter.

Table 1 below identifies the sections included in the extended project boundary that are in addition to the sections listed in the April 25, 2008 letter. Table 2 identifies the existing sections that were included in the April 25, 2008 letter; these sections remain within the project boundary.

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Table 1 – Sections within Extended Project Boundary

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Enclosed is a map detailing the location and revised project boundary of the Buffalo Ridge II Project area to facilitate your review. If you require further information or have questions regarding this matter, please call me at (763) 591-5443.

Sincerely,



Joyce E. Pickle
 Environmental Scientist

Enclosures:
 Updated Project Location Map

Cc: Timothy Seck, Iberdrola Renewables
 Sarah Emery, Iberdrola Renewables



October 17, 2008

Ms. Natalie Gates
U.S. Fish and Wildlife Service
Ecological Services
420 South Garfield Avenue, Suite 400
Pierre, SD 57501

RE: Update to Buffalo Ridge II Wind Project in Brookings and Deuel Counties, South Dakota

Dear Ms. Gates:

HDR Engineering, Inc. (HDR) is currently gathering environmental information for the Buffalo Ridge II Wind Project proposed by Iberdrola Renewables (IBR) in Brookings and Deuel Counties, South Dakota. The purpose of this letter is to inform you that the boundaries of the Buffalo Ridge II Wind Project have been slightly modified from what was described in the April 25, 2008 letter sent to you. The project boundary now includes 18 sections in Deuel County and an additional section in Brookings County (Table 1). The project boundary has been extended in order to accommodate an increase in overall project size. The total megawatts (MW) for the project has increased from 210 MW to 306 MW. The general project description remains the same as described in the April 25, 2008 letter.

Table 1 below identifies the sections included in the extended project boundary that are in addition to the sections listed in the April 25, 2008 letter. Table 2 identifies the existing sections that were included in the April 25, 2008 letter; these sections remain within the project boundary.

IBR has applied to interconnect the wind farm with Xcel Energy's Brookings County Substation near White, South Dakota. Because the project is over 100 MW in size, IBR is required to apply for an Energy Facility Siting Permit through the South Dakota Public Utility Commission (SDPUC). IBR is planning to submit a permit application to the SDPUC in fall 2008 for the 306 MW project. HDR received comments from you on the initial project boundary in a July 31, 2008, phone conversation. We welcome any comments the U.S. Fish and Wildlife Service may have at this time or throughout the permit application process on the additional Township sections. In particular, HDR requests your review of the sections identified in Table 1 for potential effects to known federally-listed threatened or endangered species and rare natural features. Your comments will be incorporated into the SDPUC review process for the Buffalo Ridge II project.

Table 1 – Sections within Extended Project Boundary

County	Township Name	Township	Range	Sections
Brookings	Lake Hendricks	112 N	47 W	30
Deuel	Scandinavia	113N	48W	26, 27, 28, 29, 30, 31, 32, 33, 34, 35
	Blom	113N	49W	25, 26, 27, 28, 33, 34, 35, 36

Table 2 – Sections within Original Project Area, Brookings County

Township Name	Township	Range	Sections
Richland	111 N	47 W	6, 7, 18, 19, 30
Lake Hendricks	112 N	47 W	31
Sherman	111 N	48 W	1, 2, 3, 4, 12, 13, 24, 25
Oak Lake	112 N	48 W	1-11, 14-23, 25-30, 32-36
Argo	112 N	49 W	1-4, 10-14, 23-26

Enclosed is a map detailing the location and revised project boundary of the Buffalo Ridge II Project area to facilitate your review. If you require further information or have questions regarding this matter, please call me at (763) 591-5443.

Sincerely,



Joyce E. Pickle
 Environmental Scientist

Enclosures:
 Updated Project Location Map

Cc: Timothy Seck, Iberdrola Renewables
 Sarah Emery, Iberdrola Renewables