

EXHIBIT 8

Site Characterization Study

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Tier II Site Characterization Study Of The New Frontier Wind Resource Area

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EXECUTIVE SUMMARY

The New Frontier Wind Resource Area (NFWRA), currently about 11,082 acres (48.8 square kilometers, 17.3 square miles) and the associated transmission line corridor which is approximately 16,859 acres (68.1 square kilometers, 26.3 square miles), are located in north-central North Dakota and more specifically southwest McHenry County. This area and one mile buffer are analyzed as part of a Tier II Site Characterization Study (Figure 1).

Ownership within the NFWRA is private. The buffer around the NFWRA contains two small parcels of North Dakota State School Land while the transmission line corridor contains one small area of US Fish and Wildlife Service Waterfowl Production Area. There may also be other lands of conservation program enrollments (i.e., Conservation Reserve Program, federal grassland or wetland easements) within and around the NFWRA. The NFWRA and its' buffer contain approximately the same proportion of cropland (40.5%), grassland (36.8%) and wetlands (10.7%), while the transmission corridor contains more cropland (61.3%) and less grassland (26.6%) and wetland (4.8%) habitats. A review of National Wetland Inventory data shows the proportion of wetlands to be similar to the land cover data but in lesser amounts. Constructing access roads to the turbines will need to consider the location of wetlands and drainages.

Wildlife species associated with a mixed agricultural landscape (crop production and livestock grazing) are expected to be the most common in and around the NFWRA. In 2010, the closest Breeding Bird Survey Route (Denbigh) documented 89 species and 2,278 individuals. Canada geese, red-winged blackbirds, western meadowlarks, and brown-headed cowbirds were the most abundant. Thirty three bird species, two of which were raptors, were observed during the May 6, 2011 site visit.

The following raptor species could occur in or near the NFWRA during some portion of the year: northern harrier, sharp-shinned hawk, Cooper's hawk, broad-winged hawk, northern goshawk, red-tailed hawk, Swainson's hawk, ferruginous hawk, rough-legged hawk, golden eagle, bald eagle, osprey, merlin, American kestrel, and peregrine falcon. Other species often grouped with raptors that could be found in the NFWRA at some point during the year include the snowy owl, short-eared owl, great-horned owl, eastern screech owl, burrowing owl, and turkey vulture. Red-tailed hawks and northern harriers were observed during the site visit.

Several raptor nests were observed during the site visit and other 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. No signs of colonial rodents were observed during the site visit. Other potential raptor prey sources include other rodents, rabbits, and other birds. Overall prey densities are not expected to be different than areas outside of the proposed NFWRA. There are no large hills, ridges, or other topographical features that might cause bottlenecks or updrafts where raptors might concentrate.

Six bat species (big brown bat, hoary bat, eastern red bat, little brown myotis, northern myotis, and silver-haired bat) could be found in and around the NFWRA. None of these species are listed by the federal government under the Endangered Species Act or of conservation need by the state. However, all six of these species have been document as mortalities at other wind energy facilities. Trees and buildings in the area may provide potential roosting habitat for bats while open areas over agricultural fields, grasslands, streams, and wetlands could provide areas for foraging. Operation of the proposed project 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 would likely be within the range documented at other sites in the Midwest, which has been generally low.

The state does not designate endangered, threatened, or candidate species but instead has a list of 100 species which have some level of conservation need. Nineteen bird, two amphibian, and two reptile state Level I (highest conservation need) species have the potential to occur in or around the NFWRA. The US Fish and Wildlife Service lists four bird, one fish, one insect and one mammal species as endangered, threatened, or candidate as occurring in the three counties (McHenry, McLean, and Ward) of the overall NFWRA. Four of these species (endangered whooping crane, threatened piping plover, candidate species Sprague's pipit and Dakota skipper) could utilize the NFWRA, its one mile buffer and transmission line corridor. Two other species, the endangered interior least tern and endangered gray wolf, may possibly occur in or around the NFWRA, but this is unlikely. The state Level II conservation need species and species of concern by US Fish and Wildlife Service – sharp-tailed grouse, likely occurs and breeds in and around the NFWRA. There are no federally listed or state conservation need plant species listed for the NFWRA or surrounding area. North Dakota's Natural Heritage Program database does not have any records of plant or animal species of concern or ecological communities of concern in or within one mile of the NFWRA. The North Dakota Game and Fish Department has expressed concern regarding placement of wind facilities and other developments in native grasslands.

A review of The Nature Conservancy and Audubon Society data indicates that the proposed project, buffer, and transmission line corridor are outside of any conservation or priority areas. Grasslands, wetlands, and woodlands scattered throughout the NFWRA may provide stopover habitat for migrant or individual birds during post-breeding dispersal. Harvested grain crops, such as the small grains, sunflowers, and corn, could serve as feeding areas for migrating waterfowl and other birds. These types of habitats are found throughout the region and therefore their presence in the New Frontier Wind Resource Area, one mile buffer, and transmission corridor should not concentrate bird use as compared to adjacent areas.

The greatest concern with displacement impacts are for wind-energy facilities that are placed in native grasslands and other native habitats. The NFWRA includes grassland habitat, some of which is likely native and ample wetland habitat. Minimizing placement of facilities within and near these areas would minimize any potential displacement impacts to grassland and wetland breeding birds.

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INTRODUCTION

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

The proposed New Frontier Wind Resource Area (NFWRA) is located in McHenry County, North Dakota (Figure 1), southeast the City of Minot. The purpose of this report is to characterize biological resources in the NFWRA (the proposed project area), a 1.6 kilometer (km; 1 mile [mi]) buffer (Buffer) surrounding the project boundary, and an approximate 21 km by 3.2km (13 mi by 2 mi) transmission corridor (Corridor) east and north of the NFWRA. Also, this report will help determine if additional biological resource surveys may be warranted.

STUDY AREA

The NFWRA, currently about 11,082 acres (ac; 48.8 square kilometers [km²]; 17.3 square miles [mi²]) and the Corridor which is approximately 16,859 ac (68.1 km², 26.3 mi²), are located in north-central North Dakota and more specifically southwest McHenry County (Figure 1). The approximate 14,629 ac (59.1 km², 22.8 mi²) Buffer is located in the same general area but parts of it lie within southeast Ward and north-central McLean Counties (Figure 1).

All three parts of the project lie within both the Level IV Drift Prairie and Missouri Coteau Ecoregions (USEPA 2010; Figure 2). Both of these ecoregions were influenced by glacial activity which created the “prairie pothole” landscape. The Drift Prairie is flatter with more seasonal and temporary wetlands while the Missouri Coteau is undulating with more permanent type wetlands. Historically, vegetation within both ecoregions was a transition zone of tall-grass to short-grass prairie. Today, most of these ecoregions have been converted to agricultural use with crop production the primary use in the Drift Prairie while livestock grazing is more predominant in the Missouri Coteau. Today, trees and shrubs can be found around farmsteads, within planted shelter belts, and along drainages in the transition zone between ecoregions. Wetland drainage has occurred throughout the ecoregions, especially for the smaller temporary and seasonal wetlands in the Drift Prairie.

The landscape within the NFWRA and Buffer is gently rolling while that of the Corridor is more level. Elevations over the three areas range from 473 - 665 meters (m; 1,552 – 2,182 feet [ft]) above sea level and increase as you move north to south (Figure 3). Soils are typical of historical grassland ecosystems (Mollisols soil order) and derived mainly from glacial till.

Ownership within the NFWRA is private. The Buffer contains two small parcels of North Dakota State School Land while the Corridor contains one small area of US Fish and Wildlife Service (USFWS) Waterfowl Production Area (Figure 4). There may also be other conservation program enrollments (e.g., Conservation Reserve Program, USFWS grassland or wetland easements) within and around the NFWRA.

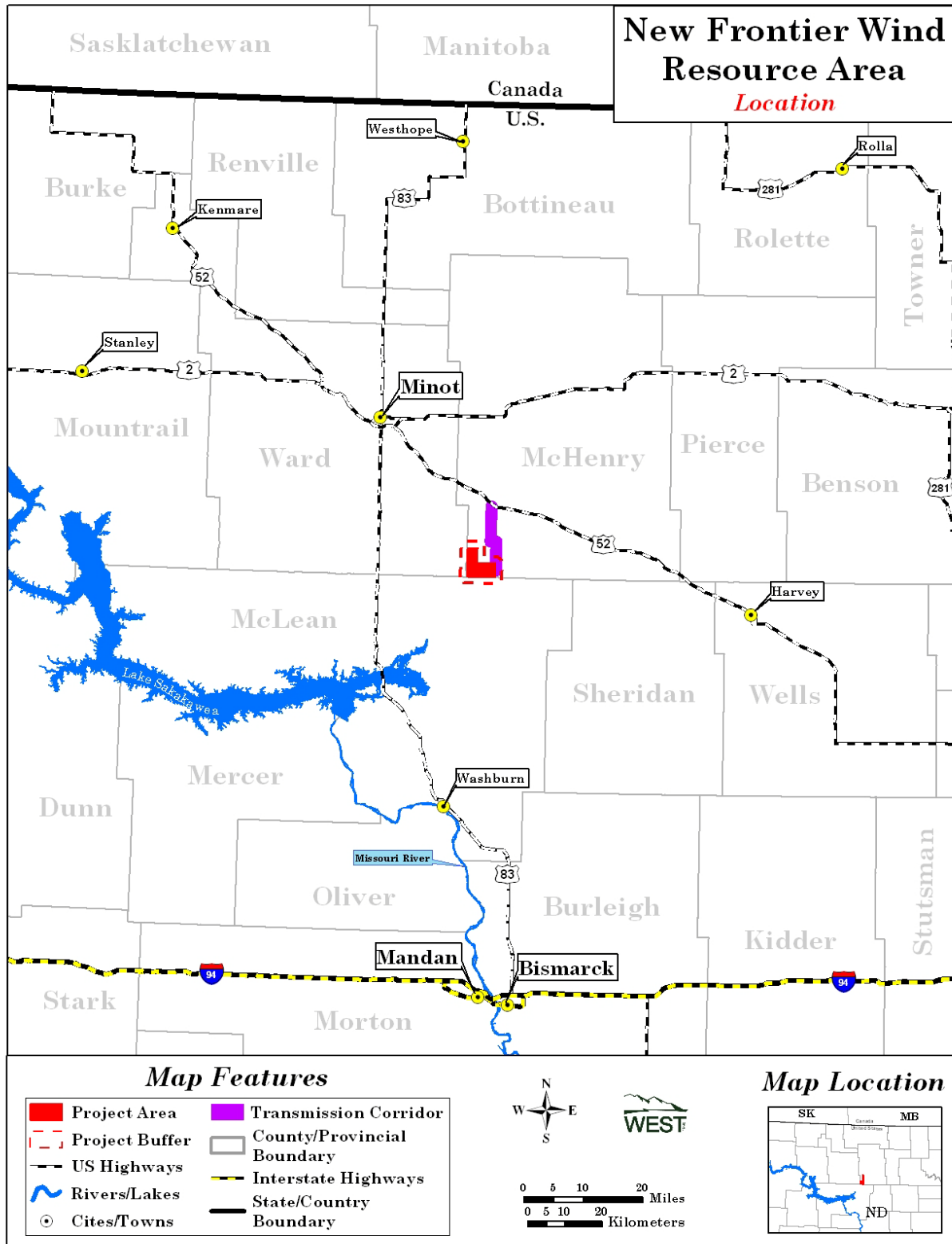


Figure 1. Location of the New Frontier Wind Resource Area.

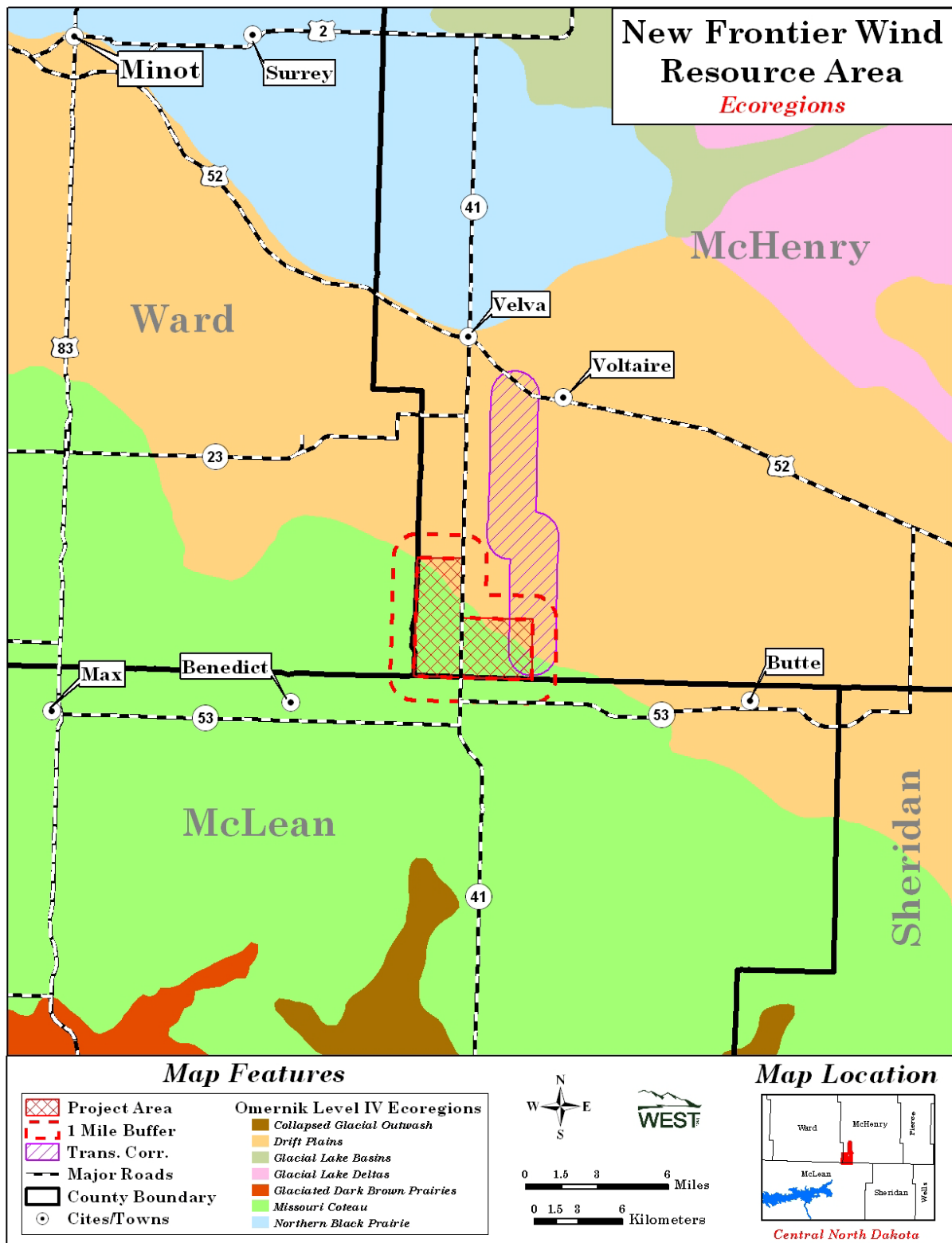


Figure 2. Ecoregions of the New Frontier Wind Resource Area.

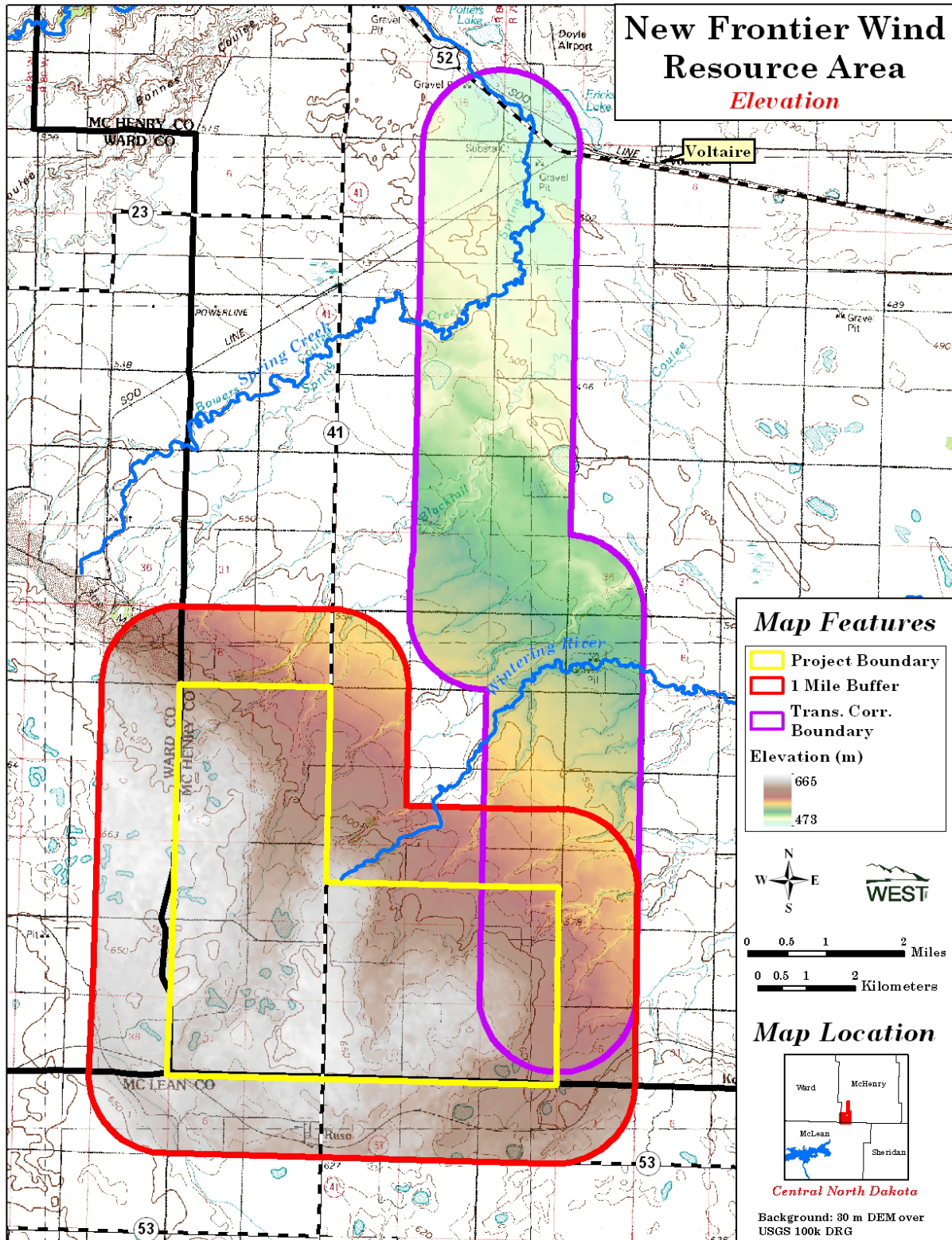


Figure 3. Elevation of the New Frontier Wind Resource Area.

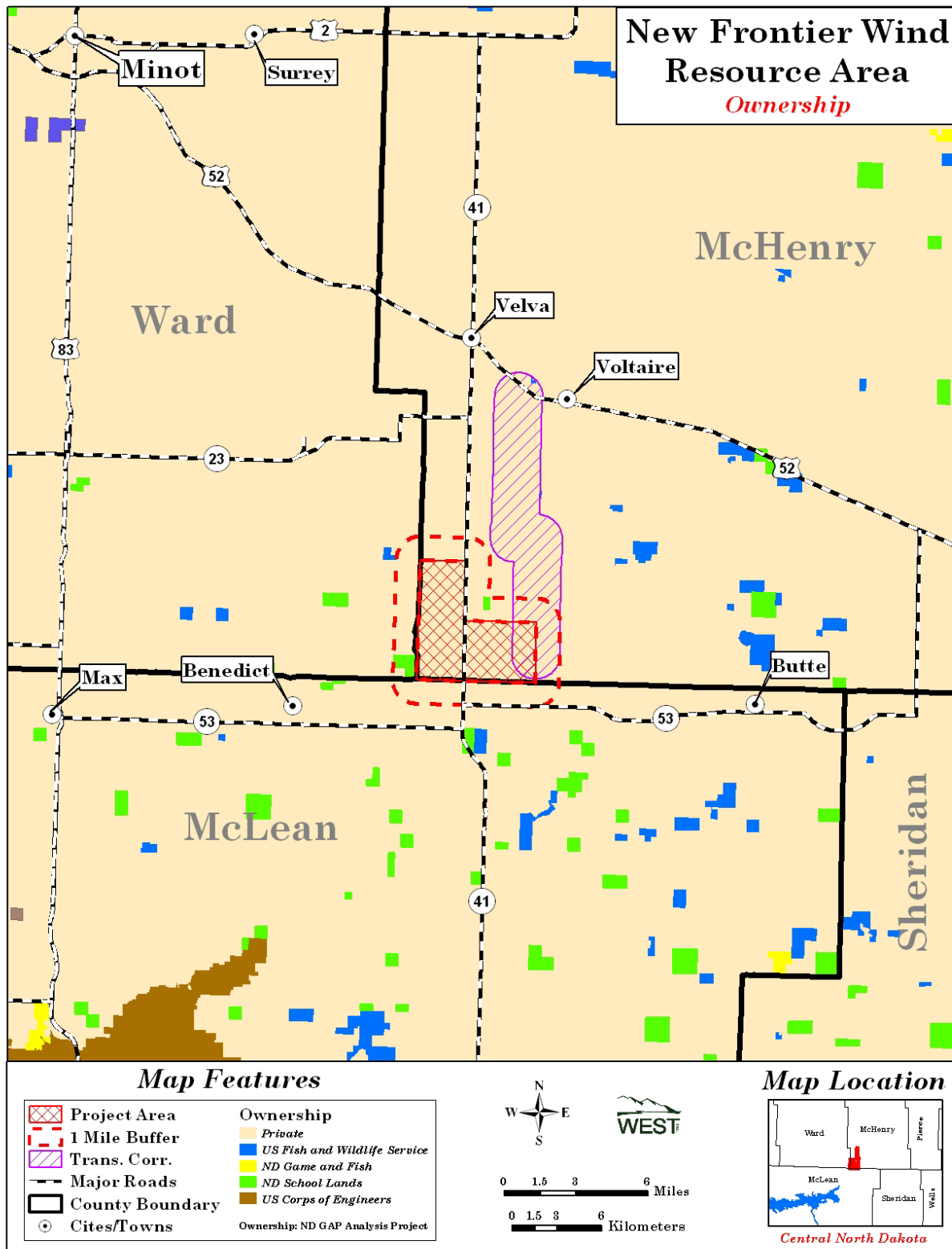


Figure 4. Ownership of the New Frontier Wind Resource Area.

METHODS

Biological resources within the NFWRA, Buffer, and Corridor were evaluated through a search of existing data and a site visit. The site visit entailed an examination of the three areas from public roads on May 6, 2011, 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 visit were recorded and photographs (Appendix A) were taken of the areas.

Several sources of available data were used to identify biological resources within and surrounding the NFWRA including published literature, field guides, and public data sets. Information about sensitive species presence and locations was requested from North Dakota Game and Fish Department (NDGFD) and USFWS by Western EcoSystems Technology, Inc. (WEST) and responses are found in Appendix B. Federal and state responses regarding other potential wind-energy facilities in the region were reviewed and the general information provided from these informal consultations is used as appropriate in this document.

Land Use/Land Cover

The NFWRA and Buffer have similar percent composition of land cover types with cropland and grassland comprising about 77% of the total areas (Table 1). Habitat types are scattered throughout the NFWRA but grasslands are found mostly along the west and south sides while cropland dominates the north and east sides of the Buffer (Figure 5). Wetlands make up slightly more (12%) of the NFWRA than they do the buffer (9.4%; Table 1). Approximately 61% of the Corridor is cropland and 27% is grassland habitat (Table 1). About 5% of the Corridor is wetland with the other four land cover types making up the remaining area (Table 1). Small grain and oil seed crops are common crops of the area.

Table 1. Land cover types present within the NFWRA, Buffer, and Corridor.

Land Cover	Project Acres	Percent Total	Buffer Acres	Percent Total	Corridor Acres	Percent Total
Cropland	4,672.6	42.2	5,687.7	38.9	10,326.5	61.3
Grassland ^a	3,933.9	35.5	5,577.9	38.1	4,488.2	26.6
Wetland	1,330.6	12.0	1,380.5	9.4	807.1	4.8
Shrubland	679.2	6.1	1,330.1	9.1	623.9	3.7
Deciduous Woodland	366.7	3.3	541.4	3.7	371.6	2.2
Sparse/Barren	94.9	0.9	87.0	0.6	120.6	0.7
Developed	5.5	<0.1	25.0	0.2	121.0	0.7
Total	11,083.4	100	14,629.6	100	16,858.9	100

Data: North Dakota Gap Analysis, USGS 2004

^a both planted grassland and non-planted native prairie

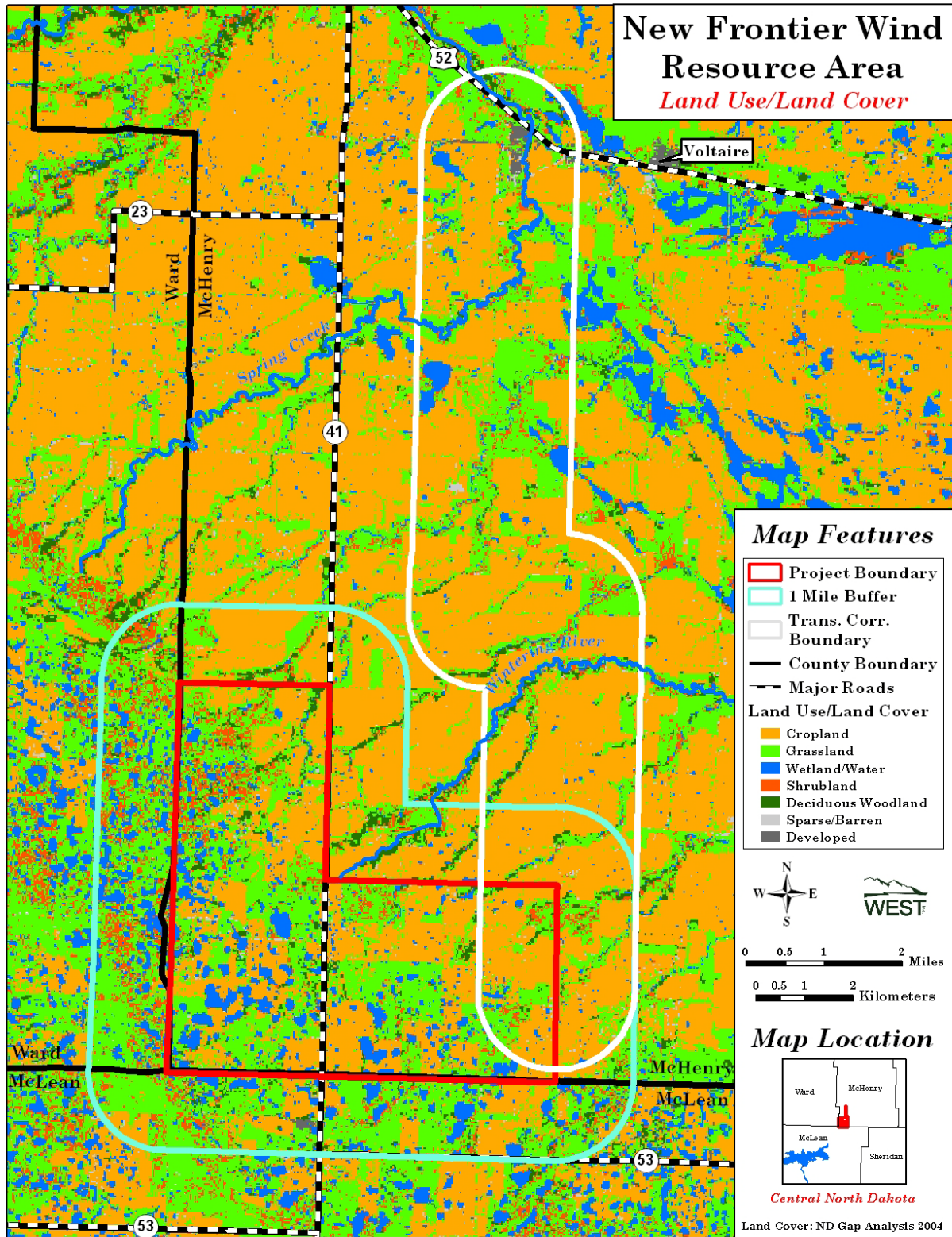


Figure 5. Land Use/Land Cover of the New Frontier Wind Resource Area.

SENSITIVE PLANTS AND HABITATS

Sensitive and Special Status Plant Species

A review of the USFWS website revealed that there are no federally threatened, endangered, or candidate plant species listed for McHenry, Ward or McLean Counties (ECOS 2011). The USFWS has not completed a project review at this time; it is possible that issues regarding sensitive plant species and habitats may arise once this information is received.

There are many species of rare plants without official state or federal status that are tracked by the state's Natural Heritage Program. Although a search of North Dakota's Natural Heritage Program database has not been completed at this time, some data can be accessed through Nature Serve's online database (NatureServe 2009). Thirty-five vascular plant species are listed for McHenry County. Most are globally ranked secure or apparently secure (NatureServe 2009).

Sensitive Areas and Habitats

There are Nature Conservancy conservation areas in both McHenry and McLean Counties but they lie approximately 40 km (25 mi) to the south and northeast of the NFWRA (The Nature Conservancy 2008). There are no Audubon Society Important Bird Areas designated in North Dakota (National Audubon Society 2011).

The presence of wind turbines may alter the landscape so that wildlife use patterns change, possibly displacing wildlife from the NFWRA. The greatest concern with displacement impacts are for wind-energy facilities that are placed in native grasslands and other native habitats. The NFWRA, Buffer, and Corridor all contain grasslands, some of which is likely native. It is probable that some grassland-dependent species will be displaced from construction and/or operation of the wind facility (see the Breeding Bird section for more discussion on displacement). Both the state and USFWS have expressed concerns regarding wind facility development within intact native landscapes. In past informal discussions, most concern has been expressed regarding landscapes where 75% or more is comprised of native grasslands, wetlands, and other native features. The NFWRA has less than 60% landcover that might be native and less than 50% native grassland and wetlands components.

Wetlands and Riparian Areas

Based on National Wetland Inventory (NWI) polygon data (USFWS NWI 2010a), there are approximately 890 acres of wetlands, not including streams and rivers, found within the NFWRA, 908 acres in the Buffer, and 550 acres in the Corridor (Table 2). All of these acreages are less than those determined by the North Dakota Gap Analysis (USGS 2004; Table 1). However, total NWI wetland acreages follow the same trend as GAP wetland data (similar between the NFWRA and Buffer and less in the Corridor; Table 1 & Table 2). The majority of wetland basins are found southwest of a diagonal line through the NFWRA and Buffer while the northern half of the Corridor contains larger wetlands (Figure 6).

Table 2. NWI wetland types present within the NFWRA, Buffer, and Corridor.

NWI Wetland Type	Project Acres	Percent Total	Buffer Acres	Percent Total	Corridor Acres	Percent Total
Freshwater Emergent	689.8	77.5	760.1	83.7	397.0	72.2
Freshwater Pond	138.7	15.6	120.3	13.3	17.1	3.1
Lake	61.8	6.9	27.5	3.0	135.9	24.7
Total	890.3	100	907.9	100	550.0	100

There are no named creeks or rivers within the NFWRA. The Wintering River originates within the Buffer and flows to the northeast through the Corridor. Spring Creek enters on the west side of the Corridor and flows north out the top (Figure 6). Constructing access roads to the turbines and other facilities and constructing transmission lines may require crossing some wetlands, drainages, and possible easements in the NFWRA and Corridor.

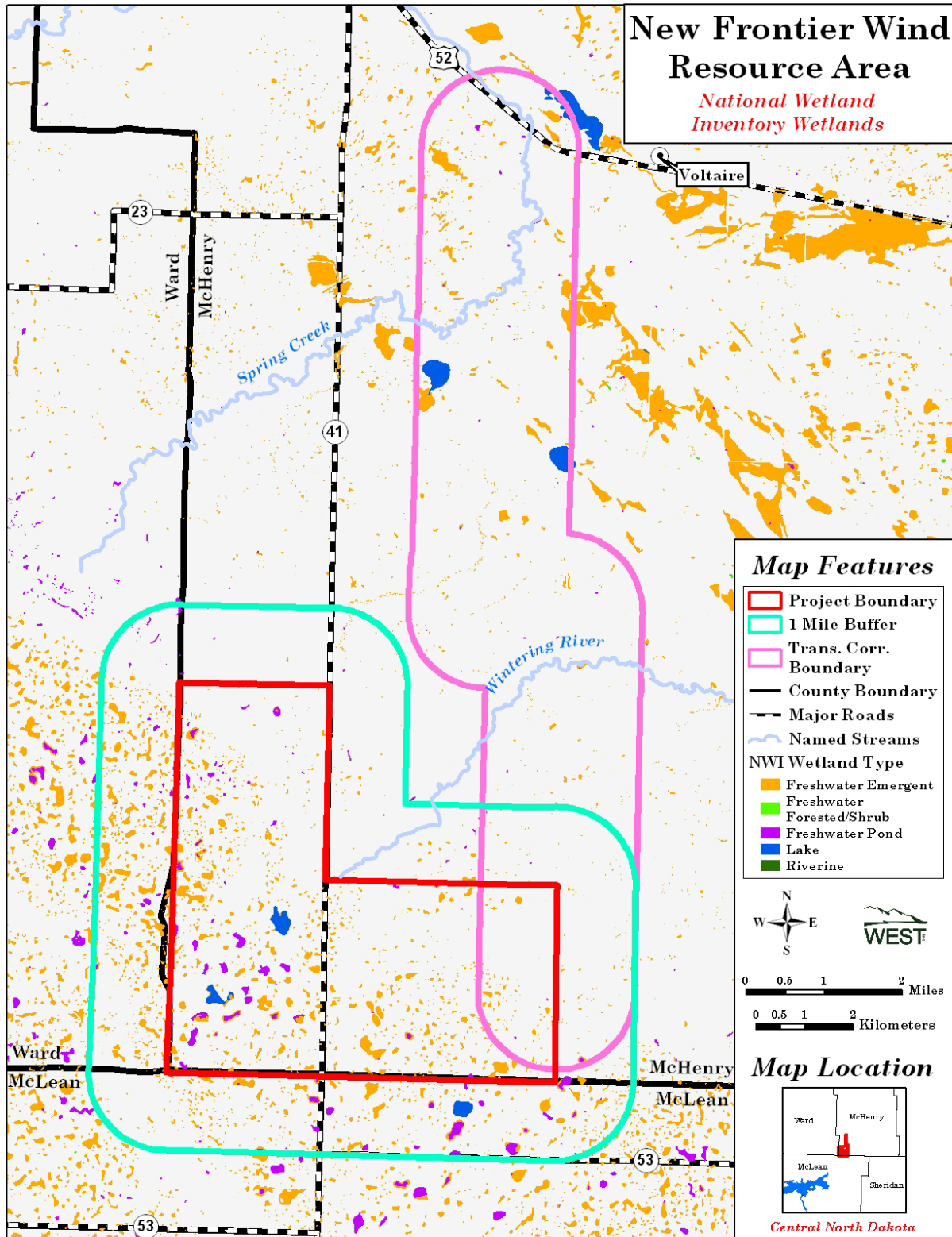


Figure 6. NWI wetlands of the New Frontier Wind Resource Area.

WILDLIFE

Wildlife species associated with grasslands, wetlands, and tilled agricultural landscapes are expected to be the most common species in the three areas. A list of species observed during the site visit is provided in Table 3.

Table 3. Wildlife observed in the NFWRA, Buffer, and Corridor during the site visit on May 6, 2011.

Species	Scientific Name
Birds	
red-winged blackbird	<i>Agelaius phoeniceus</i>
Canada goose	<i>Branta canadensis</i>
mallard	<i>Anas platyrhynchos</i>
blue-winged teal	<i>Anas discors</i>
lesser scaup	<i>Aythya affinis</i>
red-tailed hawk	<i>Buteo jamaicensis</i>
northern harrier	<i>Circus cyaneus</i>
northern pintail	<i>Anas acuta</i>
common grackle	<i>Quiscalus quiscula</i>
Say's phoebe	<i>Sayornis saya</i>
vesper sparrow	<i>Pooecetes gramineus</i>
black-capped chickadee	<i>Poecile atricapillus</i>
Wilson's snipe	<i>Gallinago delicata</i>
northern shoveler	<i>Anas clypeata</i>
redhead	<i>Aythya americana</i>
brown-headed cowbird	<i>Molothrus ater</i>
American coot	<i>Fulica americana</i>
ring-necked pheasant	<i>Phasianus colchicus</i>
chipping sparrow	<i>Spizella passerina</i>
double-crested cormorant	<i>Phalacrocorax auritus</i>
blue jay	<i>Cyanocitta cristata</i>
lesser yellowlegs	<i>Tringa flavipes</i>
gadwall	<i>Anas strepera</i>
ring-billed gull	<i>Larus delawarensis</i>
killdeer	<i>Charadrius vociferus</i>
bufflehead	<i>Bucephala albeola</i>
canvasback	<i>Aythya valisineria</i>
mourning dove	<i>Zenaida macroura</i>
American crow	<i>Corvus brachyrhynchos</i>
Franklin's gull	<i>Larus pipixcan</i>
western meadowlark	<i>Stumella neglecta</i>
upland sandpiper	<i>Bartramia longicauda</i>
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>

Federal Listed Wildlife Species

According to the USFWS, there are four endangered, one threatened, and two candidate species listed under the Endangered Species Act (ESA 1973) that could occur within McHenry, McLean or Ward Counties (Table 4; ECOS 2011).

Table 4. Federal threatened, endangered, and candidate wildlife species with the potential to occur in the NFWRA, Buffer, or Corridor.

Group/Species	Status	Scientific Name
BIRDS		
whooping crane	FE	<i>Grus americana</i>
interior least tern	FE	<i>Sterna antillarum</i>
pipin plover	FT	<i>Charadrius melodus</i>
Sprague's pipit	FC	<i>Anthus sparagueii</i>
FISH		
pallid sturgeon	FE	<i>Scaphirhynchus albus</i>
INSECT		
Dakota skipper	FC	<i>Hesperia dacotae</i>
MAMMAL		
gray wolf	FE	<i>Canis upus</i>

FE=Federal Endangered, FT = Federal Threatened, FC=Federal Candidate

The endangered pallid sturgeon (*Scaphirhynchus albus*) is confined to the Missouri and Yellowstone River systems in North Dakota. It is not found in or near the project. Another endangered species which is highly associated with these two river system is the endangered interior least tern (*Sterna antillarum*). It is possible this species could be found in the project area during migration or on foraging trips but unlikely. Another species which may occur in the project area as a transient, but is unlikely to use the project area consistently, is the endangered gray wolf (*Canis lupus*). Wolf sightings would most likely be those of dispersing animals from packs in Minnesota or Manitoba Canada.

This project lies within the defined migration corridor for the endangered whooping crane (*Grus americana*). Both foraging (cropland and grasslands) and roosting (wetlands) habitat is present within the project area thus making it possible for whooping cranes to utilize the NFWRA, Buffer, and transmission Corridor.

In North Dakota, the threatened piping plover (*Charadrius melodus*) utilizes sand and gravelly shorelines of rivers and lakes, void of vegetation. Their preferred habitat in areas away from the Missouri River system is alkali wetlands. Critical habitat has been designated for piping plovers approximately 24 km (15 mi) to the southwest and approximately 19 km (10 mi) to the east of the project area (USFWS 2002a). Although no obvious alkali wetlands were visible on recent (2010) aerial imagery, under different water regimes, suitable habitat may become available within the project area.

The federal candidate Sprague's pipit (*Anthus sparagueii*) is a grassland dependent species which prefers medium height native prairie with no shrubs or trees in relative large blocks (MNHP and MFWP 2011). Grassland habitat, some of which is likely native prairie, is present within the project area, especially the NFWRA and Buffer. If native prairie grasslands cannot be

avoided for this project, surveys may be needed to determine the presences and population size of Sprague’s pipits within potentially impacted areas.

Dakota skippers, also a federal candidate species, are found mainly in two types of habitats: a flat, mesic bluestem prairie and a drier, upland prairie along ridges and hill sides (USFWS 2002b). There is grassland habitat within the NFWRA, Buffer, and Corridor which may be suitable to Dakota skippers. If grasslands can’t be avoided for this project, Dakota skipper surveys may be needed to determine presences and population size within potentially impacted areas.

North Dakota State Species

The State of North Dakota does not have a state list of endangered and threatened species. However, they have documented 100 animal species of conservation priority. This group was then categorized by conservation need into three levels with Level I species having the greatest conservation need (Hagen et al. 2005). Level I species with the potential to occur within the NFWRA, Buffer or Corridor are listed in Table 5. Species descriptions are taken from Hagen et al. (2005).

Table 5. North Dakota Level I wildlife species with the potential to occur in or near the NFWRA.

Group/Species	Scientific Name
BIRDS	
horned grebe	<i>Podiceps auritus</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>
American bittern	<i>Botaurus tentiginosus</i>
Swainson’s hawk	<i>Buteo swainsoni</i>
ferruginous hawk	<i>Buteo regalis</i>
yellow rail	<i>Columicops noveboracensis</i>
willet	<i>Catoptrophorus semipalmatus</i>
upland sandpiper	<i>Bartramia longicauda</i>
marbled godwit	<i>Limosa fedoa</i>
Wilson’s phalarope	<i>Phalaropus tricolor</i>
Franklin’s gull	<i>Larus pipixcan</i>
black tern	<i>Chlidonias niger</i>
black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
Sprague’s pipit	<i>Anthus spragueii</i>
grasshopper sparrow	<i>Ammondramus savannarum</i>
Baird’s sparrow	<i>Ammondramus bairdii</i>
Nelson’s sharp-tailed sparrow	<i>Ammondramus nelsonii</i>
lark bunting	<i>Calamospiza melanocorys</i>
chestnut-collared longspur	<i>Calcarius omatus</i>
AMPHIBIANS AND REPTILES	
Canadian toad	<i>Bufo hemiophrys</i>
plains spadefoot	<i>Spea bombifrons</i>
smooth green snake	<i>Liochlorophis vernalis</i>
western hognose snake	<i>Heterodon nasicus</i>

Wetland Related Species

Horned grebes (*Podiceps auritus*) prefer wetlands with emergent vegetation and areas of open water. American white pelicans (*Pelecanus erythrorhynchos*) will use island and peninsulas in larger lakes for nesting but will frequent various wetlands types to feed and loaf. Another wetland related bird is the American bittern (*Botaurus lentiginosus*). It prefers wetlands with tall emergent vegetation and will also utilize tall, thick grasslands for nesting. The yellow rail's (*Coturnicops noveboracensis*) main habitat is shallow wetlands or wet meadows of various sizes with emergent vegetation. Marbled godwits (*Limosa fedoa*) nest in short-grass (or grazed) prairies and will forage in various wetland types. Another species with similar habitat requirements is the willet (*Cataptrophorus semipalmatus*). However, it may utilize a wider variety of upland habitat types for nesting. Shallow, open wetlands with mudflats are utilized by Wilson's phalaropes (*Phalaropus tricolor*). Both the Franklin's gull (*Larus pipixican*) and black tern (*Chlidonias niger*) use wetlands with ample open water and stands of emergent vegetation. The Nelson's sharp-tailed sparrow (*Ammodramus nelsonii*) is included in this paragraph due to its preference for the shallow, wet meadow areas of wetlands.

Grassland Related Species

Although classified as a shorebird, the upland sandpiper (*Bartramia longicauda*) uses a wide variety of upland habitats throughout its life cycle; preferred habitat is mixed-type grassland. The grasshopper sparrow (*Ammodramus savannarum*) also utilizes various upland habitats with preferred habitat being grasslands with visual obstructions and ample vegetation litter. Baird's sparrows (*Ammodramus bairdii*) prefer larger tracts of native prairie without shrubs and forbs. Lark buntings (*Calamospiza melanocorys*) preferred habitat is low to medium height grasslands with shrubs. Native, open mixed and short grass prairies are preferred by chestnut-collared longspurs (*Calcarius ornatus*). Sprague's pipit, also a federal candidate species is described above.

Other Bird Species

The two hawk species, Swainson's (*Buteo swainsoni*) and ferruginous (*Buteo regalis*) both prefer open grassland habitat with Swainson's hawks using taller trees and shrubs for nesting while ferruginous hawks will nest on or near the ground. The black-billed cuckoo (*Coccyzus erythrophthalmus*) is mostly associated with edges of woodlands and to a lesser extent tree and/or shrub patches in grassland.

Reptiles and Amphibians

The plains spadefoot (*Spea binbufrons*) is found in dry, open grassland with loose, sandy soils. It uses small, temporary wetlands for breeding. Another species which prefers open grassland with dry sandy soil is the western hognose snake (*Heterodon nasicus*). Another grassland dwelling species is the smooth green snake (*Liochlorophis vernalis*). It prefers short grass and can use a variety of grassland habitats. The Canadian toad (*Bufo hemiophrys*) utilizes the edges of more permanent water bodies.

State Species of Concern Summary

Due to the diverse habitats, both wetland and upland, present in and around the project, all of the above mentioned state Level I species could occur within the NFWRA. It does not appear however, that the project or its buffer and transmission corridor contain specific habitats which would concentrate any one of these species. The overall project area has been significantly disturbed by tilled agriculture, and likely wetland drainage. These actions likely diminish the

potential for some of the species in these tilled areas and in the overall landscape; however, the avoidance of grassland, particularly native grassland and wetlands may further reduce impacts to these species.

Raptors

Species Likely to Occur in the Area

The following raptor species could occur in or near the project area (Sibley 2000): northern harrier (*Circus cyaneus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperii*), northern goshawk (*A. gentilis*), broad-winged hawk (*Buteo playpterus*), red-tailed hawk (*B. jamaicensis*), Swainson's hawk, ferruginous hawk, rough-legged hawk (*B. lagopus*), golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), merlin (*Falco columbarius*), American kestrel (*F. sparverius*), and peregrine falcon (*F. peregrinus*). Red-tailed hawks and northern harriers were observed during the site visit.

Other species often grouped with raptors that could be found in the project area include the snowy owl (*Nyctea scandiaca*), short-eared owl (*A. flammeus*), great-horned owl (*Bubo virginianus*), eastern screech owl (*Otus asio*), burrowing owl (*Athene cunicularia*), and turkey vulture (*Cathartes aura*; [Sibley 2000]).

Twelve of these species could potentially breed in or near the NFWRA: northern harrier, sharp-shinned hawk, Cooper's hawk, Swainson's hawk, red-tailed hawk, ferruginous hawk, American kestrel, burrowing owl, eastern screech owl, great-horned owl, short-eared owl, and turkey vulture (Sibley 2000). The area is outside of high potential bald and golden eagle nest area, but with expansion of bald eagle populations they are being found in areas not previously thought to be potential habitat (e.g., away from major waterbodies).

Potential Raptor Nesting Habitat

Several raptor nests were observed during the site visit and other potential nest structures for above ground nesting species were present in the form of living and dead trees. Farmsteads observed during the site visit usually had tree rows or woodlots associated with them. Most creeks and drainages also had some trees along them. There were also planted tree rows scattered throughout the areas. Grasslands could provide nesting habitats for ground-nesting raptors, such as the northern harrier or burrowing owl. A thorough nest search should be conducted to document raptor nest locations.

Potential for Prey Densities

No signs of colonial rodents were observed during the site visit; these types of areas are known to attract feeding raptors. However, it is possible that small mammal colonies such as ground squirrels are present in and around the NFWRA, but were not visible from public roads. Other potential raptor prey sources include other rodents, rabbits, and other birds.

Overall, it is very difficult to assess potential prey densities during site visits and prey densities can fluctuate rapidly based on habitat and climatic factors. Overall prey densities are not expected to be significantly different than areas outside of the proposed NFWRA. 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 NFWRA, Buffer, and Corridor is flat to gently rolling with elevation increasing as you move from north to southeast (Figure 3). Although there is a topographical change along the boundary of the Drift Plains and Missouri Coteau ecoregions (Figure 2), it is unclear if this feature would create bottlenecks where raptors might concentrate (Figure 3). 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).

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 passerines along with the various other bird groups migrate through the NFWRA, Buffer, and Corridor in a broad front fashion given the lack of stark ridgelines, waterbodies, or other features that would appear to funnel migration. Woodlots, wetlands, and riparian areas scattered throughout the area may provide stopover habitat for migrants or individuals during post-breeding dispersal. Harvested grain crops, such as corn, sunflower, small grains, and oil seed could serve as feeding areas that could attract migrating and wintering waterfowl and other birds. These types of habitats are found throughout the region and therefore their presence in and around the NFWRA should not concentrate bird use as compared to adjacent areas.

Breeding Birds

The nearest US Geological Survey (USGS) Breeding Bird Survey (BBS) route is Denbigh. It lies approximately 14.5 km (9 mi) northeast of the Corridor and 27 km (17 mi) northeast of the NFWRA (Figure 7). Each BBS route is 39.4 km (24.5 mi) long, and all birds seen or heard are tallied for a three-minute period every 0.8 km (0.5 mi) along the route. In 2010, there were 89 species with 2,278 individuals recorded on the Denbigh route (USGS BBS 2011). Canada goose (*Branta canadensis*), red-winged blackbird (*Agelaius phoeniceus*), western meadowlark (*Sturnella neglecta*), and brown-headed cowbird (*Molothrus ater*) were the most abundant birds. Sixteen individual federal candidate Sprauge's pipits were also recorded along this route in 2010 (USGS 2011). Fifteen of the 19 state Level I bird species of greatest conservation need with the potential to occur in or around the NFWRA were also recorded along the Denbigh route in 2010 (USGS 2011).

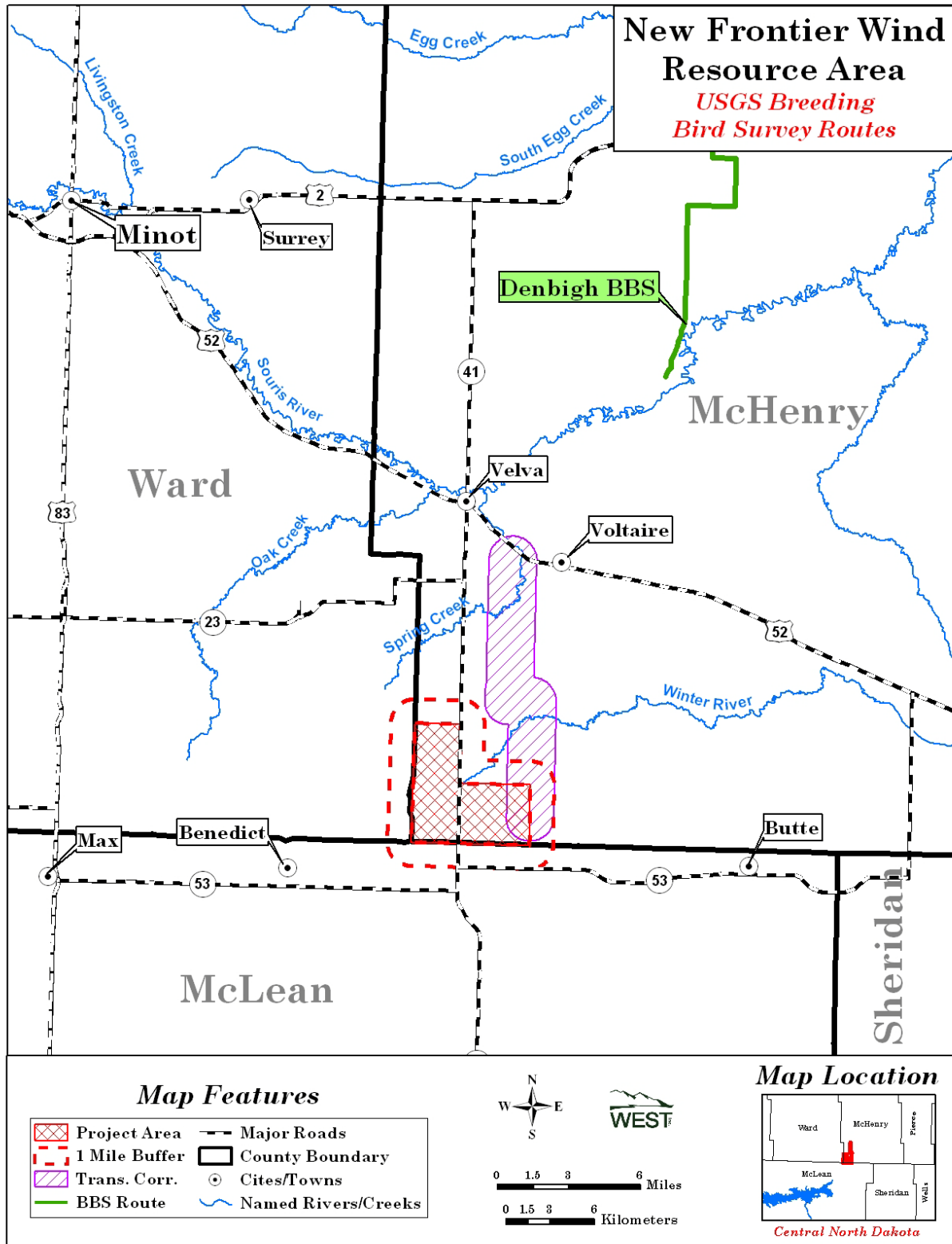


Figure 7. USGS Breeding Bird Survey routes near the New Frontier Wind Resource Area.

Recent research has started to focus on the potential displacement of grassland passerines at wind-energy facilities, and some uncertainty currently exists over the overall 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, 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 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 150 m (492 ft) at a wind-energy facility in northern South Dakota. While research concerning displacement impacts to songbirds, waterfowl, and waterbirds is limited, the projects that have been completed have only shown small scale impacts (50-200 m), while impacts to birds at larger scales has not been demonstrated. Additional research is ongoing at several projects across the country. The NFWRA, Buffer, and Corridor contain anywhere between 27% and 38% grassland habitat according to North Dakota Gap Analysis data (USGS 2004; Table 1). Some species of sensitive grassland passerines are likely to be present in all three areas. Breeding bird surveys may be required prior to construction to determine the presence and density of grassland nesting species.

Federal and state agencies have raised concerns regarding the potential impact of wind facilities on prairie grouse species. Sharp-tailed grouse (*Tympanuchus phasianellus*) are common throughout most of North Dakota. However, they are listed as a state Level II species of conservation need (Hagen et al. 2005). Based on the location of and presence of grasslands, the NFWRA, Buffer and Corridor will likely be utilized by sharp-tailed grouse. Sharp-tailed grouse surveys would determine if leks are present in and around the project area.

Bats

There are several species of bats that could be found in or around the NFWRA, 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 silver-haired bat (*Lasionycteris noctivagans*) (BCI website). None of these species are listed by the federal government under ESA (1973) or of greatest conservation need by the state.

Assessing the potential impacts of wind energy development on bats at the NFWRA, Buffer, and Corridor is complicated by our current lack of understanding of why bats are being impacted at wind turbines (Kunz et al. 2007, Baerwald et al. 2008), combined with the inherent difficulties of monitoring elusive, night-flying animals (O'Shea et al. 2003). To date, monitoring studies of wind projects suggest that:

- a) migratory tree-roosting species (eastern red, hoary, and silver-haired bats) comprise almost 75% of reported bats killed,
- b) the majority of fatalities occur during the post-breeding or fall migration season (roughly August and September), and

- c) the highest reported fatalities occur at wind facilities located along forested ridge tops in the eastern United States (Gruver 2002, Johnson et al. 2003, Kunz et al. 2007, Arnett et al. 2008), although recent studies in agricultural regions of Iowa and Alberta, Canada, report relatively high fatalities as well (Jain 2005, Baerwald 2006).

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.

Migratory tree bats comprise most of the bats killed at wind-energy facilities in North America with the majority of collisions occurring in the fall (Gruver 2002, Johnson et al. 2003). The reason for disproportionate mortalities during fall are unknown. However, it may be that tree bats fly at lower altitudes during spring migration than during fall migration. For example, hoary bats fly one to five m (3.3 to 16.4 ft) from the ground while migrating through New Mexico in the spring, but not in the fall (Cryan and Veilleux 2007).

At least eleven bat species have been recovered during carcass searches at wind-energy facilities throughout the US (Table 6; Johnson 2005, Kunz et al. 2007, NRC 2007, Arnett et al. 2008). All six of the species that are likely residents and migrants in and around the NFWRA have been found as casualties at other facilities.

Table 6. Species composition of bat fatalities from wind-energy facilities in the US (adapted from NRC 2007 p. 65).

Common Name	Scientific Name	Total	
		# individuals	%
hoary bat	<i>Lasiurus cinereus</i>	1,023	41.0
eastern red bat	<i>Lasiurus borealis</i>	580	23.0
eastern pipistrelle	<i>Pipistrellus subflavus</i>	261	11.0
silver-haired bat	<i>Lasionycteris noctivagans</i>	209	8.4
little brown myotis	<i>Myotis lucifugus</i>	145	5.8
Mexican free-tailed bat	<i>Tadarida brasiliensis</i>	143	5.7
big brown bat	<i>Eptesicus fuscus</i>	59	2.4
northern myotis	<i>Myotis septentrionalis</i>	8	0.4
western red bat	<i>Lasiurus blossevilli</i>	4	0.2
Seminole bat	<i>Lasiurus seminolus</i>	1	0.1
unknown		53	2.1
Total		2,486	100.0

Potential roosting habitat in the NFWRA, Buffer, and Corridor is found in the form of trees and buildings (Figure 8); no caves were observed during the site visit. Bats generally forage over water and open spaces such as agricultural fields, grasslands, streams, and wetlands/ponds. Bats may forage over the entire project area, although the extent of use is not known. Since some insects concentrate over open water, foraging bats may be attracted to these areas.

Operation of the proposed NFWRA 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.

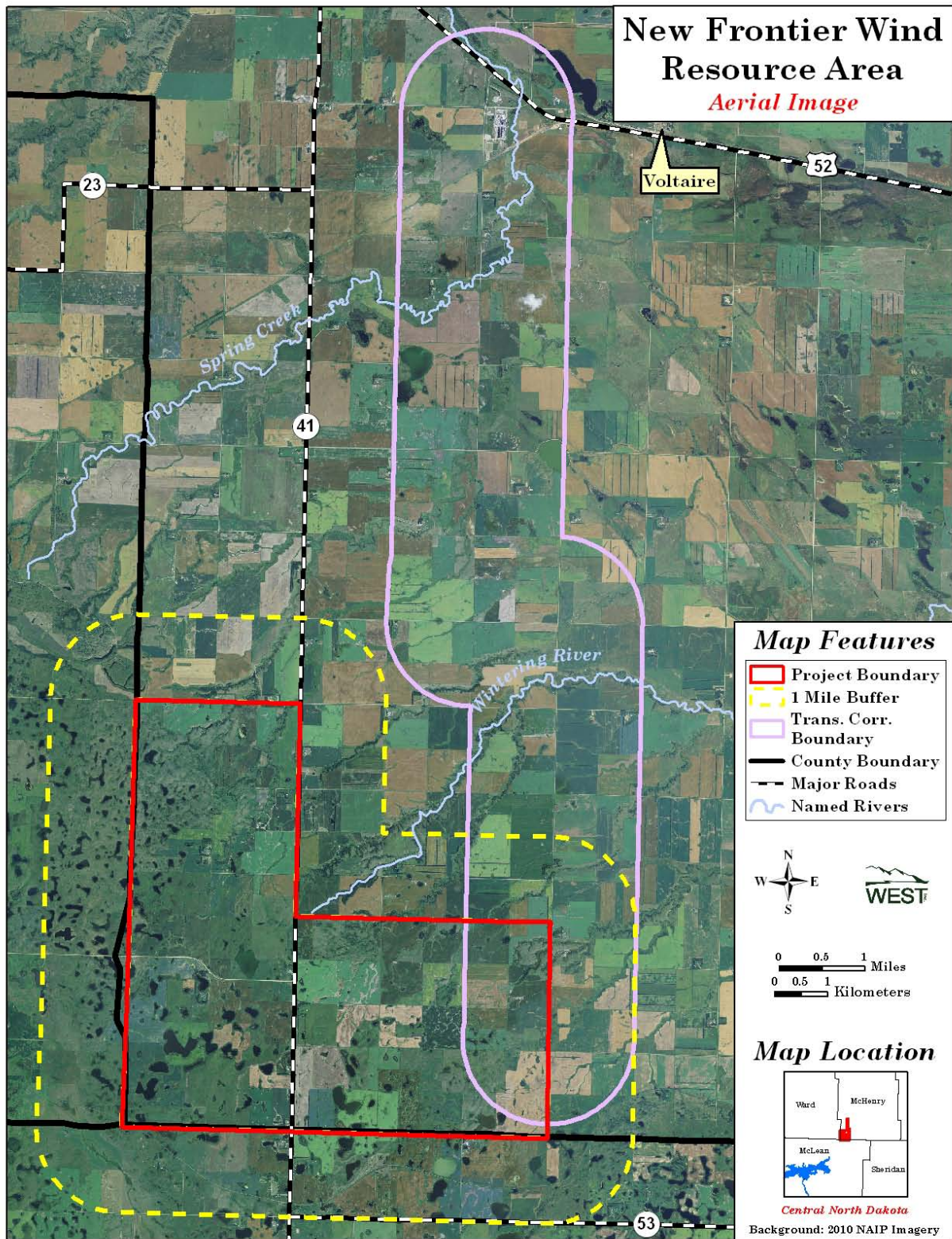


Figure 8. Aerial photo of the New Frontier Wind Resource Area.

CONCLUSIONS

A summary of the potential for wildlife and habitat conflicts in the proposed wind-energy facility development area is presented in Table 7. Table 8 summarizes potential future studies and their timing.

This report describes biological resources present within the NFWRA and evaluates these general characteristics as related to potential or known impacts on the resources from wind energy facilities.

The USFWS Wind Turbine Guidelines Advisory Committee Recommendations suggests six questions to answer while conducting a Tier 2 (Site Characterization) study (2010b). These questions and their answers follow.

1.) Are there known species of concern present on the proposed site, or is habitat (including designated critical habitat) present for these species?

The USFWS lists four species (whooping crane, piping plover, Dakota skipper, and Sprague's pipit) under ESA which have the potential to occur in or around the NFWRA. Piping plover critical habitat has been designated 24 km (15 mi) southwest and 19 km (10 mi) east of the proposed project. There are 19 bird, two amphibian, and two reptiles species which the state lists as Level I species of conservation need that may use the project area. Sharp-tailed grouse, a growing species of concern by both federal and state agencies, will likely be found in and around the NFWRA with lekking probable. All six bat species that may occur within the NFWRA, Buffer, or Corridor have been recorded as fatalities at other wind power facilities.

To fully address this issue, Tier 3 surveys would be required. As a first step in addressing the question would be to conduct habitat mapping. It is recommended that the habitat mapping occur in two stages. Step one would be to conduct an updated of the older GAP data by digitizing vegetation community types from recent aerial photographs. Step two would be to conduct more detailed habitat mapping of community types and species composition in areas where turbines could be placed in community types of concern (e.g., native grasslands). For example, if there are turbines for placement in native grasslands, a ground survey effort in those areas would confirm the presence or absence of grass and forb species needed for Dakota skippers. The second step of the mapping should also confirm the presence or absence of potential piping plover habitat (e.g., saline wetlands) or other features that are required for species of concern presence if they cannot be avoided by turbine placement.

Species specific surveys that would be required include sharp-tailed grouse lek surveys (completed in 2011) and breeding bird surveys to determine presence of Sprague's pipit.

2.) Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information? Examples of designated areas include, but are not limited to : "areas of scientific importance;" "areas of significant value;" federally designated critical habitat; high-priority conservation areas for NGOs; or other local, state, regional, federal, tribal, or international categorizations.

The NFWRA does not appear to contain any designated sensitive or other areas which would preclude development.

3.) Are there plant communities of concern present or likely to be present at the site(s)?

There are no federal or state listed plants listed as occurring in McHenry, McLean, or Ward Counties. The Natural Heritage Database review indicates there are no records of species of concern or sensitive ecological communities in or within one mile of the project (Appendix B). However, both grassland and wetland habitats are present within and around the NFWRA. Both of these broad habitat categories are of concern on a state (Appendix B), regional and/or national scale. The habitat mapping discussed above in 1) will also help address this issue.

4.) Are there known critical areas of congregation of species of concern, including, but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?

The NFWRA has the potential to contain sharp-tailed grouse leks and wetlands are likely used as stopover habitat by migrating waterfowl; however, the project area does not appear to contain any habitats or features which would concentrate plants or animals markedly different than the surrounding region.

Sharp-tailed grouse lek surveys will identify lek locations such that they can be avoided during construction and/or followed post-construction to determine impacts. Lek surveys should be conducted within the project boundary and out a minimum of 0.5 mile.

Raptor nest surveys should be conducted to identify nest locations that can be avoided during project planning and construction. Nest surveys should include the project boundary and a minimum of one mile around the project. If potential eagle nests are found or if eagle nests are known to occur within 10 miles of the project boundary, the survey effort should be extended out 10 miles from the project boundary.

5.) Using best available scientific information, has the relevant federal, state, tribal, and/or local agency independently demonstrated the potential presence of a population of a species of habitat fragmentation concern? If not, the developer need not assess impacts of the proposed project on habitat fragmentation.

No information was found indicating that a government agency has independently demonstrated the potential presence of a population of species of habitat fragmentation concern is located in the NFWRA. Based on the review of potential species in this report, it is possible that some species requiring large blocks of habitat occur in the NFWRA (e.g., Baird's sparrow).

6.) What species of birds and bats, especially those known to be at risk by wind energy facilities are likely to use the proposed site based on an assessment of site attributes?

Any bird or bat using a wind energy facility would be at risk of mortality. There is also risk of displacement from construction and operation of a wind energy facility. Please review the answer to question 1 for species of concern which may utilize the NFWRA and surrounding area. Certain bird groups such as raptors and waterfowl may be at greater risk of collisions due to their relatively higher flight heights; however, behavioral characteristic of different species can greatly affect their risk of collision.

To more fully address this question, acoustic bat surveys would be needed. It is unclear if bat mortality, in general, is a significant concern in North Dakota as there are not publically data sets currently available. Based on information from grassland/agricultural landscapes, bat mortalities are general low but can be elevated.

To address the issue in regards to birds, the breeding bird surveys would identify the presence of grassland nesting species (e.g. Sprague's pipit). Avian point counts would be used to investigate use of the area by raptors and other large birds. The USFWS has indicated that there is a known bald eagle nest north of project area approximately 10-12 miles. Avian point counts could document if these birds utilize the project area for foraging.

Table 7. A summary of the potential for wildlife and habitat conflicts in and around the NFWRA. VH = Very High, H = High, M = Medium, and L = Low.

Issue	VH	H	M	L	Notes
Potential for raptor nest site			✓		Tree rows, woodlots, grasslands and some riparian habitat are present in around the NFWRA.
Concentrated raptor flight potential				✓	A general lack of stark topography over the majority of the NFWRA, Buffer, and Corridor 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		✓			Seven federally listed species occur or have the potential to occur in McHenry, McLean, and Ward Counties.
Potential for State issues			✓		Protection of native grasslands and woodlands, likely state species of conservation need issues.
Uniqueness of habitat at wind-energy facility			✓		Overall, habitat in the NFWRA is not unique compared to the surrounding landscape.
Potential for rare plants to occur				✓	No federal or state listed plants are listed as occurring in McHenry, McLean, and Ward Counties. However, there are possible native prairie and wetland habitats which may harbor rarer plants.
Potential for use by bats			✓		The site has scattered trees, buildings, wetlands, and some riparian habit which bats could utilize.

Table 8. Possible future studies and their timing.

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	Snow free periods
Native Grasslands	Native grassland may be in the project area. Site away from grassland areas to minimize impacts.	Plant sampling of any grasslands which are considered for impact to determine native plant status. Micro-site facility to minimize impacts to native grasslands.	After initial layout is determined
Wildlife			
Threatened, Endangered, and Conservation Need Species	Several federal and 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.	Surveys to be performed as necessary during appropriate survey windows.
Nesting Raptors	Woodlands and grasslands in the area provide nesting habitat for raptors.	Survey suitable habitat for nests.	Early 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	Woodlands, grasslands, 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.	Acoustic bat surveys.	Spring, Summer, Fall

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Appendix A: Photographs from the New Frontier Wind Resource Area, 1 mile buffer, and transmission line corridor.



Photo 1. Rolling native grassland with wetlands.



Photo 2. Wheat stubble with woodlands (planted trees around farmstead) in background.



Photo 3. Woody draws with planted tree rows in background.



Photo 4. Planted grassland.



Photo 5. Potential raptor nest structures in cropland.



Photo 6. Typical emergent type wetland.



Photo 7. Larger, more permanent type wetland.



Photo 8. Un-harvested sunflower field with tree rows and woody draws in background.

Appendix B: Agency Correspondence.



Jack Dalrymple, Governor
Mark A. Zimmerman, Director
1600 East Century Avenue, Suite 3
Bismarck, ND 58503-0649
Phone 701-328-5357
Fax 701-328-5363
E-mail parkrec@nd.gov
www.parkrec.nd.gov

March 18, 2011

Clayton Derby
West Inc.
4007 State Street, Suite 109
Bismarck, ND 58503

Re: Proposed New Frontier Wind Energy Project - McHenry County

Dear Mr. Miller:

The North Dakota Parks and Recreation Department has reviewed the above referenced project proposal for developing the New Frontier wind energy project in McHenry County.

Our agency scope of authority and expertise covers recreation and biological resources (in particular rare species and ecological communities). The project as defined does not affect state park lands that we manage or Land and Water Conservation Fund recreation projects that we coordinate.

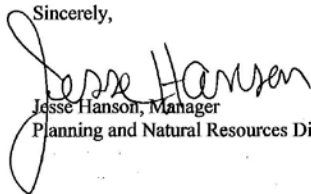
The North Dakota Natural Heritage biological conservation database has been reviewed to determine if any current or historic plant or animal species of concern or other significant ecological communities are known to occur within an approximate one-mile radius of the project area. Based on this review, there are no known occurrences within or adjacent to the project area. Because this information is not based on a comprehensive inventory, there may be species of concern or otherwise significant ecological communities in the area that are not represented in the database. The lack of data for any project area cannot be construed to mean that no significant features are present. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources.

Given the project's potential for not only habitat disturbance and disruption but the threat to nesting, feeding and migratory bird and bats in the area we suggest that all efforts be made to avoid impacts to wildlife species and their habitats. In an effort to avoid or minimize impacts to wildlife and their habitats we encourage proper evaluation of all potential wind energy sites. To identify and assess adverse impacts to wildlife we suggest pre and post construction avian and bat monitoring studies be conducted.

Regarding any reclamation efforts, we recommend that any impacted areas be revegetated with species native to the project area.

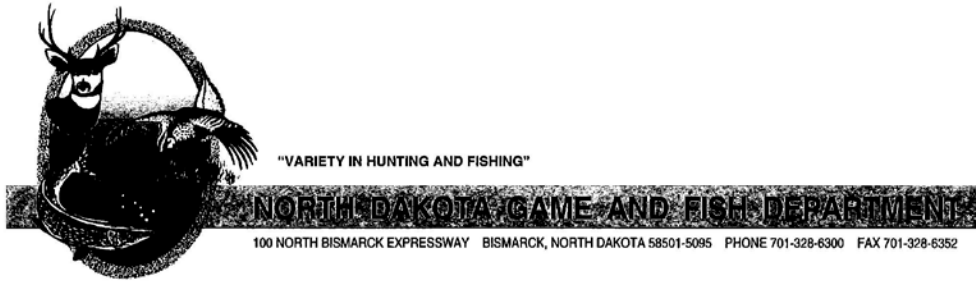
Thank you for the opportunity to comment on this project. Please contact Kathy Duttenehner (701-328-5370 or kgduttenehner@nd.gov) of our staff if additional information is needed.

Sincerely,


Jesse Hanson, Manager
Planning and Natural Resources Division

R.USNDNHI*2011-059 KD3/16/2011DL3.25.2011

.....
Play in our backyard!



March 28, 2011

Clayton Derby
Senior Manager
WEST, Inc.
4007 State Street, Suite 109
Bismarck, ND 58503

Dear Mr. Derby:

RE: Proposed New Frontier Wind Energy Project – McHenry County, North Dakota

The North Dakota Game and Fish Department has reviewed this project for wildlife concerns.

Our primary concern with wind power development is the disturbance of native prairie associated with construction of turbines, access roads, and other associated facilities. We ask that work within native prairie be avoided to the extent possible. This could include micro-siting turbines onto adjacent previously disturbed land, locating access roads on existing section line trails rather than across undisturbed native prairie, etc.

The National Wetland Inventory indicates numerous wetlands within the proposed project area. We recommend that any unavoidable wetland impacts be replaced in kind, above-ground appurtenances not be placed in wetland areas, and no alterations be made to existing drainage patterns.

We also recommend that routine monitoring for avian and bat mortality be included as part of the facility maintenance plan for the life of the project. We would appreciate being kept informed as this project progresses, and if possible, we would like the GPS coordinates for each turbine after the site has been established.

Sincerely,

A handwritten signature in black ink, appearing to read "Paul Schadewald".

Paul Schadewald
Chief
Conservation & Communication Division

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