

WHOOPING CRANE DESKTOP STOPOVER RISK ASSESSMENT

GRANDE PRAIRIE WIND FARM HOLT COUNTY, NEBRASKA

April 2014

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TABLE OF CONTENTS

| | |
|---|----------|
| 1.0 INTRODUCTION | 1 |
| 1.1. Whooping Crane Migration Ecology..... | 1 |
| 1.2. Potential Impacts from Wind Development..... | 2 |
| 2.0 METHODS | 3 |
| 3.0 RESULTS | 4 |
| 3.1. Analysis of Risk Associated with Proposed Project..... | 4 |
| 4.0 DISCUSSION | 6 |
| 5.0 LITERATURE CITED | 9 |

LIST OF TABLES

| | |
|-----------------|---|
| Table 1. | Potential Scenarios and Possible Responses Developers may Undertake to Reduce the Possibility of Whooping Crane Mortality as a Result of Collision with Wind Turbines and Wind Power Infrastructure |
|-----------------|---|

LIST OF FIGURES

| | |
|------------------|--|
| Figure 1. | Project Location and Topography |
| Figure 2. | Nebraska Whooping Crane Migration Corridor and Confirmed Records |
| Figure 3. | Migration Use Area of Whooping Crane |
| Figure 4. | Index of the Sensitivity of Wildlife Habitats in Nebraska to Wind Energy Development |
| Figure 5. | Field Delineated Wetlands within Project Area |
| Figure 6. | National Wetlands Inventory within 5 Miles of Project Area |
| Figure 7. | NRCS Soils Survey within Project Boundary |
| Figure 8. | NRCS Soils Survey within 5 Miles of Project Boundary |
| Figure 9. | Conservation Areas |

1.0 INTRODUCTION

Grande Prairie Wind, LLC is considering the development of the Grande Prairie Wind Farm (project) in Holt County, Nebraska. The proposed project is located approximately 7 miles (11 km) east of the town of O'Neill, Nebraska (Figure 1). The project will likely be developed in two phases, with a build-out capacity of approximately 400 megawatts (MW). The project area will cover approximately 25,000+ acres (10,117+ ha). The project is proposed to interconnect to Western Area Power Administration's (Western) grid system. This interconnect brings a federal nexus to the project.

The whooping crane (*Grus americana*) was listed as endangered by the U.S. Fish and Wildlife Service (USFWS) on June 2, 1970 (35 FR 8495). A USFWS Whooping Crane Recovery Plan was developed and signed on January 23, 1980 (USFWS 1980). Revisions to the recovery plan were approved in 1986 and 1994. The third revision was approved on May 29, 2007 (72 FR 29544) (USFWS 2007). Critical habitat has been designated for the whooping crane. Final ruling for critical habitat for the whooping crane was published on August 17, 1978 (43 FR 36588-36590).

The whooping crane is also currently listed as endangered by the State of Nebraska. State listed species are protected under the Nebraska Nongame and Endangered Species Conservation Act and regulatory authority under State law lies with the Nebraska Game and Parks Commission (NGPC).

The proposed project is located within the migration corridor of the only self-sustaining wild population of the whooping crane (Figures 2 and 3), the Aransas-Wood Buffalo Population (AWBP), which has the potential to occur in Holt County (USFWS 2010). Programmatic National Environmental Policy Act (NEPA), Endangered Species Act (ESA) Section 7, and Nebraska Nongame and Endangered Species Act (NESCA) Section 37-807(3) consultation will therefore be necessary if the project goes forward to ensure that project activities and operation will not jeopardize the continued existence of the whooping crane species or adversely modify designated critical habitat.

This Desktop Stopover Risk Assessment was developed according to USFWS and NGPC recommendations to provide an initial assessment of potential impacts to whooping cranes from the project and to serve as a basis for initiating a risk assessment regarding whooping cranes with USFWS and NGPC (NGPC and USFWS 2011; The Nebraska Wind and Wildlife Working Group 2011).

1.1. Whooping Crane Migration Ecology

Cranes of the AWBP pass through Nebraska twice annually as they migrate between wintering grounds at the Aransas National Wildlife Refuge (NWR) near Austwell, Texas and their breeding grounds in Wood Buffalo National Park located in Alberta and the Northwest Territories of northern Canada (USFWS 2009). The AWBP was estimated at approximately 257 individuals as of December 2012, with more individuals outside of the survey boundary (Harrell and Bidwell 2013). Spring migration generally begins between March 25 and April 15, with the last cranes usually leaving Aransas NWR by May 1, and is completed over two to four weeks. The fall migration normally begins mid-September; most cranes arrive in Aransas NWR between late October and mid-November (USFWS 2009).

Whooping cranes are most frequently observed migrating in small groups of one to three individuals (73% of all sightings) (Armbruster 1990); however groups of approximately 30

individuals have been observed twice since 2005 (M. Carlisle, USFWS NEFO, personal communication). Whooping cranes are diurnal (daytime) migrants, primarily migrating between 0930 and 1700 hours (USFWS 2009). Migrating cranes make stopovers at night, during periods of inclement weather, and for short periods of resting or foraging (Armbruster 1990). Migration flights are generally at altitudes between 1,000 and 6,000 feet (305 – 1,829 m) above the ground, but whooping cranes fly at lower altitudes when starting or ending a migration flight, especially when thermal currents are minimal, or when making brief mid-day stopovers to forage (USFWS 2009).

Stopover habitat for whooping cranes consists primarily of palustrine wetlands (i.e. water depth <6.6 feet [2m]) and riverine systems, with riverine systems being used much more commonly in Nebraska than in other states along the AWBP migration corridor. In Nebraska, 56% of state records occurred in palustrine wetlands and 39.6% occurred in riverine systems, together accounting for 95.6% of all records in the state (Austin and Richert 2001).

Riverine roost sites in Nebraska have primarily been recorded along the Platte, Niobrara, and North and Middle Loup Rivers (Austin and Richert 2001). Whooping cranes have most commonly been observed in wetlands having seasonal and semi-permanent water regimes. Average depth of water at wetland roosting and foraging sites has been 7.1 ± 4.2 inches (18.0 ± 10.7 cm).

Cranes have been observed in wetlands of highly-varied size, and on rivers of varying widths (Austin and Richert 2001). Seventy-five percent of recorded wetland roost sites were less than 10 acres (4 ha) in size, with 40% being less than 1.24 acres (0.5 ha; USFWS 2009). Areas characterized by wetland mosaics appear to provide the most suitable stopover habitat (USFWS 2009).

Whooping cranes are opportunistic feeders and will forage in a variety of agricultural crops adjacent to wetland or riverine roosting sites. Armbruster (1990) reported that foraging and roosting sites were generally within 0.6 mile (1 km) of one another, while Austin and Richert (2001) detected no patterns in distance between roost and the closest feeding sites. Visibility at upland and wetland foraging sites has been consistently observed to be unobstructed to 0.25 mile (0.4 km; Armbruster 1990, Austin and Richert 2001).

1.2. Potential Impacts from Wind Development

Although it is currently unknown how whooping cranes will respond to wind energy development in the AWBP migration corridor, USFWS and NGPC anticipate that potential effects could include both direct and indirect impacts (USFWS 2009, The Nebraska Wind and Wildlife Working Group 2011).

Direct impacts may result from collisions with wind turbines or powerlines associated with wind energy facilities. Powerline collisions have historically been a significant source of mortality for wild whooping cranes. Collision mortality with wind turbines has not been documented for whooping cranes (USFWS 2009). The sandhill crane (*Grus Canadensis*), a behaviorally similar species, has had two documented wind turbine collision-related deaths (Stehn 2011). However, whooping cranes are not expected to be at risk of collisions with either powerlines or wind turbines during migration flights. However, cranes may be at risk when starting or ending migration flights, as they may fly for several miles at low altitudes due to a lack of thermal updrafts. Crane biologists expect that whooping cranes will normally see wind turbines and stay clear, but darkness or inclement weather conditions may limit cranes' range of sight and cranes in close proximity to turbines may not be able to maneuver quickly enough to avoid turning

blades (USFWS 2009). It may be possible to minimize direct impacts to whooping cranes through the implementation of several measures, including:

- Burying all collection lines
- Constructing and/or modifying all above-ground transmission lines to *Avian Power Line Interaction Committee* (APLIC) avian-safe standards (APLIC 2006)
- Fitting lines with bird-flight diverters
- Implementation of a contingency plan to detect and react (i.e. monitoring, turbine curtailment, turbine shut-off) to the presence of whooping cranes in the project vicinity (see Table 1).

Indirect impacts to whooping cranes from wind energy development through the loss of safe roosting habitat are also of concern. The USFWS has estimated that whooping cranes may avoid areas within 0.5 mile (0.8 km) of wind turbines (USFWS 2009). Additionally, avoidance behavior has been observed in the similar sandhill crane, though sandhill cranes have also been observed foraging at the base of turbines (Stehn 2011). USFWS is therefore concerned about the cumulative impact that development of a large number of wind energy facilities within the whooping crane migration corridor may have on the availability of suitable stopover habitat for the birds (USFWS 2009). Loss of suitable stopover habitat (i.e. areas characterized by wetland mosaic [USFWS 2009]) could be energetically expensive for cranes and may expose individuals to additional dangers, possibly resulting in increased mortality (USFWS 2009). Indirect impacts could be reduced through project siting and micro-siting of turbines.

2.0 METHODS

This Desktop Stopover Risk Assessment included a review of available data regarding the potential for whooping crane interactions with the proposed Grande Prairie Wind Farm Project. Topics of the review included:

1. Whooping crane migration ecology and stopover habitat requirements.
2. Potential impacts from wind development and pertinent wind development guidance.
3. Federal and state conservation areas located near the project area.
4. Characteristics and conservation issues of Nebraska's wetlands.
5. Confirmed whooping crane record locations.
6. Wetland resources in the project area and vicinity.

Information and data for this Desktop Stopover Risk Assessment were obtained from several online resources and project specific reports. The USFWS Mountain-Prairie Region (Region 6) and NGPC websites provided wind development and wind-wildlife interaction guidance documents and contact information for the agencies. Several maps were also obtained from agency websites, including maps depicting whooping crane sightings, the whooping crane migration corridor, and areas in Nebraska considered by the agencies to be sensitive to development. Information on whooping crane ecology and habitat requirements was gathered from USFWS-recommended scientific papers. All documents referenced for this assessment are listed in Section 5.0 - Literature Cited.

Spatial data on confirmed whooping crane records, National Wetlands Inventory (NWI) wetlands, and Soil Survey Geographic (SSURGO) hydric soil map units within the project area

and surrounding vicinity were also obtained online. Whooping crane records were obtained from the NGPC; NWI and SSURGO data were obtained from the Nebraska GIS Clearinghouse. Project specific wetland data were obtained from a wetland delineation survey conducted at the project in June 2012 (Olsson and Associates 2012).

3.0 RESULTS

3.1. Analysis of Risk Associated with Proposed Project

The project is located within the known AWBP migration corridor; specifically, within the band encompassing 95% of all confirmed whooping crane sightings used in an analysis conducted by the Service in 2008 (Figure 2). The project is also within the primary occurrence area as established by the NGPC (Figure 3).

The NGPC has identified areas in Nebraska which may be sensitive to wind energy development (Figure 4). Based on this coarse scale, the proposed Grande Prairie project is located in an area rated as low to moderate sensitivity (Figure 4). However, it should be noted that even in low sensitivity areas there may be specific locations where siting a wind farm may negatively impact significant biological resources.

Stopover sites for whooping cranes can be highly sensitive. Portions of the Central Platte River between Lexington and Shelton have been designated as critical habitat for whooping cranes (43 FR 36588-36590). This critical habitat is located more than 100 miles (161 km) from the project area and would not be impacted by the project (Figure 3). The Niobrara River is located approximately 6 miles (10 km) north of the project and the Elkhorn River is located approximately 7 miles (11 km) southwest of the project. Both rivers have the potential to provide roosting sites for whooping cranes. Although the Niobrara River is rated as highly sensitive where it runs through the primary migration corridor (in Keya Paha, Brown, and Rock counties), the river is rated as moderately sensitive habitat by the NGPC where it runs north of the project area (Figure 4). The Elkhorn River is also in an area of moderate sensitivity (Figure 4).

The closest confirmed whooping crane records to the project area are located in the vicinity of the Niobrara and Elkhorn rivers (Figure 2). Although there are no confirmed records within the project area, USFWS (2009) notes that a lack of sightings does not represent lack of use by whooping cranes; very few stopovers are actually documented each year but approximately 1,419 stopovers are estimated to occur.

The western and central sections of the project area overlap with border areas of the Sandhills regional wetland complex (LaGrange 2005). Wetlands used by sandhills are mostly freshwater and include saturated wet meadows, shallow marshes, and open-water lakes. The majority (80%) of these wetlands are estimated to be less than 10 acres (4 ha) in size. The Sandhills wetland complex has experienced a high amount of wetland loss, and historical wetlands may no longer be present throughout much of the complex (LaGrange 2005). The remainder of the project area is located outside of any regional wetland complex designation.

A project specific wetland delineation conducted within the project area in June 2012 found a total of 465 wetlands comprising 1,718 acres (695 ha), covering approximately 3% of the project area (Olsson and Associates 2012). The majority of these wetlands are located adjacent to riparian corridors and tributaries of various streams within the project area (Figure 5). Those that are not, are isolated, shallow depressions in cropland or pasture, or agricultural impoundments located in pastures that are connected to swales (Figure 5).

Project representatives met with biologists from Western, USFWS, and NGPC for a site visit on August 16, 2012. The group visited wetlands and potential biologically significant areas within the project area that had been identified through the wetland delineation and habitat evaluation of the project area. Three potential wetland complexes were pre-chosen by USFWS and NGPC to be visited based on the potential for future use as whooping crane stopover sites (Figure 5). The site visit enabled the group to further evaluate the three areas:

1. Site 1 - Suspected playa wetland complex located northwest of the intersection of 501 Avenue and 878 Road in Section 21, Township 30 North, Range 10 West (Figure 5). NWI mapping identified several Palustrine Emergent Temporarily Flooded and Palustrine Emergent Seasonally Flooded wetlands scattered throughout this location (Figure 6). The site specific wetland delineation identified no wetland in this location (Figure 5; Olsson and Associates 2012). Soils in the area are mapped as Fillmore silt loam, occasionally ponded, which occurs predominantly in playas. The fields at this location are cultivated. The landowner was present to field questions regarding hydrology of the area; he stated that the area was not artificially drained. The landowner explained that the wet signatures shown on a 2010 aerial photograph of the area were the result of a heavy rain event of several inches, and aside from the 2010 rain event, the fields had been dry for the past 10 or more years. While additional heavy rain events will likely occur over the next 40-years, it is not possible at this time to predict whether these events will occur frequently enough or for long enough duration to sustain wetland in this area, thereby providing stopover habitat. At present, this area is of poor quality and likely low potential for stopover use by whooping cranes based on the lack of wetland hydrology and the lack of other wetland in the vicinity (Figure 5).
2. Site 2 - Broad riverine riparian corridor with an associated multi-functional wetland complex near the headwaters of North Branch Verdigre Creek located in the southeast corner of the project area, in parts of Sections 20, 21, 22, 28, and 29, Township 30 North, Range 9 West (Figure 5). NWI maps indicate wetlands scattered throughout the vicinity of this area (Figure 6). The site specific wetland delineation found subirrigated sedge meadows are the dominant wetland type in this area. Soils in the area are mapped as mostly Loup fine sandy loam. This area is considered to be potentially suitable whooping crane stopover habitat based on the following characteristics:
 1. Reliable hydrology during the spring and fall whooping crane migration periods, including riverine and large intact riparian wetlands of multiple hydrologic regimes, including emergent wetlands that were either temporarily or semi-permanently flooded and impoundments with aquatic beds that were intermittently exposed,
 2. Open landscape,
 3. Adjacent forage opportunities, including cropland and mesic prairie, and
 4. Low level of human activity and disturbance.

Northeast of this area, North Branch Verdigre Creek transitions into a deeper valley with a greater amount of trees and becomes less suitable for whooping cranes, which prefer open landscapes.

3. Site 3 - Suspected playa wetland complex located northwest of the intersection of 503 Avenue and 883 Road, in Section 2, Township 30 North, Range 10 West (Figure 5). Playa wetlands were suspected in this area based on NWI mapping showing Palustrine Emergent Temporarily Flooded and Palustrine Emergency Seasonally Flooded wetlands scattered throughout this location (Figure 6). The site specific wetland delineation identified no wetland in this location (Figure 5; Olsson and Associates 2012). Soils in the

area are mapped as Fillmore silt loam, occasionally ponded, which occur predominantly in playas. The fields at this location are cultivated. This area is of poor quality and likely of low potential for stopover use by whooping cranes based on the lack of wetland hydrology and the lack of other wetland in the vicinity (Figure 5).

Although the possibility of occasional whooping crane use of the wetland complex near the headwaters of the North Branch Verdigre Creek in the southeast corner of the project area (Site 2) cannot be dismissed, the other wetlands within the project area and further northeast along North Branch Verdigre Creek are of marginal suitability as stopover habitat. Therefore, regular or consistent stopovers by migrating whooping cranes in the project area and vicinity are considered to be very unlikely based on the limited amount and isolated nature of potential stopover habitat.

The location of hydric soils provide an indication of where wetland may currently be found, where wetlands may have historically existed, or where water may pond during wet years, potentially providing habitat for cranes. Hydric soils in the project area and vicinity are limited and confined primarily to areas associated with small streams and creeks (Figures 7 and 8). The exceptions to this are the areas discussed above associated with the two areas of potential playa wetlands (Sites 1 and 3) visited by the Western, USFWS and NGPC. No wetland was found at either site during the site specific wetland delineation (Olsson and Associates 2012) and both sites are poor quality and likely of low potential for stopover use by whooping cranes. Based on the site specific wetland delineation and hydric soil mapping, the best available data do not suggest that significant portions of the project site are inundated during wet years. In addition, the lack of hydric soils in the project area suggests that historically very few wetlands were present in the project area.

Three state conservation areas are located within 5 miles (8 km) of the project area (Figure 9). These areas are small in size and include: Redbird Wildlife Management Area, Greenvale Wildlife Management Area, and O. John Emerson Wildlife Management Area. The O. John Emerson Wildlife Management Area is the closest, found within 1 mile (1.6 km) of the project boundary. The nearest federal conservation area to the project area is the Missouri National Recreational River designation which extends approximately 10 miles (16 km) along the Niobrara River from its juncture with the Missouri (Figure 9). Recreational use is permitted on Wildlife Management Areas in Nebraska and on the Missouri National Recreational River. None of the Wildlife Management Areas located within 5 miles (8 km) of the project area are associated with major wetland systems (LaGrange 2005).

4.0 DISCUSSION

The location of the proposed project within the AWBP migration corridor suggests that whooping cranes have the potential to occur within the project area; however, several factors likely limit the chances of whooping cranes occurring in the project area or the habitat suitability of the project area for whooping cranes:

1. Distance from the center of the migration corridor (Figures 2 and 3) - The project's location near the outer border of the migration corridor suggests that whooping crane sightings may be less frequent in the project area than in areas closer to the center of the migration corridor.
2. Distance from areas rated as highly sensitive to wind energy development or as designated whooping crane critical habitat (Figure 4) - No highly sensitive whooping crane habitat areas were found during site specific studies conducted at the site.

3. Lack of significant stopover habitat - Land use in project area is moderately agricultural with few wetlands present (approximately 3% of the project area). The majority of the wetlands present are located adjacent to riparian corridors and tributaries of various small streams, and those that are not, are isolated, shallow depressions in cropland or pasture, or agricultural impoundments located in pastures that are connected to swales (Figure 5). Although wetlands are found in the project area, the majority are not considered to be stopover habitat. Based on the site specific wetland delineation (Figure 5) and hydric soil mapping (Figure 7), the best available data do not suggest that significant portions of the project site are inundated during wet years.

A field review of three potential stopover sites conducted by USFWS, NGPC, Western and Grande Prairie found only one of the sites, a wetland complex located near the headwaters of the North Branch Verdigre Creek in the southeast corner of the project area (Site 2; Figure 5), to be potential whooping crane stopover habitat.

Based on the site specific wetland delineation, the lack of hydric soils in the project area, and the limited amount and isolated nature of potential stopover habitat in the project area, regular or consistent stopovers by migrating whooping cranes in the project area and vicinity are very unlikely. While the incidence of heavy precipitation events is predicted to increase in this region during the next 40 years due to the effects of climate change, the location of the project site toward the outside of the migration corridor and relatively limited presence of hydric soils support the conclusion that substantial indirect impacts to whooping cranes via project impacts to habitat are unlikely.

The limited amount of potential stopover habitat in the project area and surrounding areas suggests that installation of turbines would not greatly increase the risk to whooping cranes. Nevertheless, the possibility does exist for the cranes to occur at the site. Therefore, a contingency plan will be necessary to minimize the potential for take of whooping cranes at the project. Contingency plans outline prudent and common-sense measures that will be implemented if there is a whooping crane observed in the vicinity of the wind farm during the operational life cycle of the facility. Grande Prairie will provide a draft version of a contingency plan to NGPC and USFWS for review one year prior to construction. The contingency plan may include, but not be limited to, the potential scenarios and possible responses shown below.

Table 1. Potential Scenarios and Possible Responses Grande Prairie may Undertake to Reduce the Possibility of Whooping Crane Mortality as a Result of Collision with Wind Turbines and Wind Power Infrastructure

| Scenario | Response |
|--|--|
| Whooping Crane Migration Period | No pre-construction whooping crane surveys were recommended by USFWS or NGPC. |
| Whooping cranes roosting and foraging within 10 miles (16 km) of project turbines | Grande Prairie's personnel would monitor whooping cranes from safe distance, alert agencies, and prepare for additional steps if circumstances on the ground warrant additional action |
| Whooping cranes foraging, roosting, flying within 1 mile (1.6 km) of wind turbines | Grande Prairie's operation center modifies blade rotation until birds leave the project area |
| Whooping crane foraging, roosting, flying within 1 mile (1.6 km) of wind turbines; dense fog in project area | Grande Prairie's operation center shuts down turbines until birds leave the project area |
| Five years following implementation of project's whooping crane contingency plan | Update plan in coordination with the agencies |

Mitigation may be required by USFWS and NGPC if the project will impact those wetlands within the project area considered to be suitable whooping crane habitat (i.e. potentially suitable wetlands occurring within 0.5 mile [0.8 km] of turbines). This may include, but not be limited to, protection of alternative, similar wetland habitat more than 5 miles (8 km) from the project area, on a 1:1 or greater ratio (USFWS 2009).

Micro-siting of turbines more than 0.5 mile from suitable wetlands during the development phase of the project could potentially avoid impacting any wetlands determined to be suitable stopover habitat. Construction of any new above-ground transmission lines may also require mitigation. This would likely include (USFWS 2009):

1. Installation of bird-flight diverters over the entire distance of the new lines, and
2. Installation of bird-flight diverters on an equal distance of existing powerlines elsewhere within the migration corridor

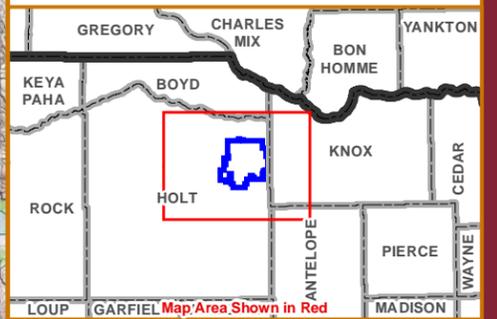
It should be noted that research cannot take the place of mitigation (USFWS 2009). Other USFWS recommendations (2009) include spacing turbines widely apart and siting in arrays parallel to the migration corridor.

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Figure 1.
Project Location and Topography

Grand Prairie Wind Farm



Location

Holt County, Nebraska

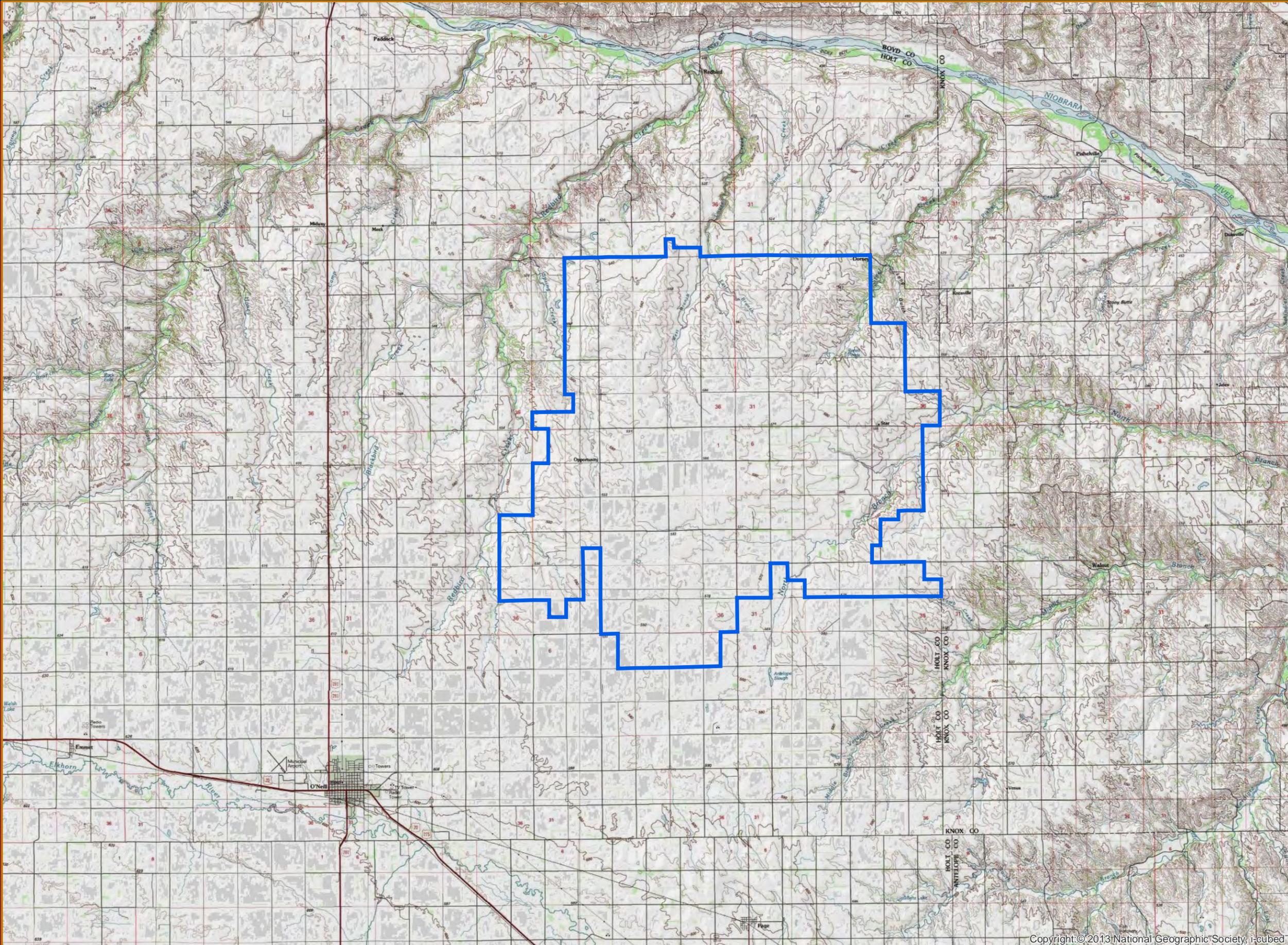


Project Information

Project Number: 193701626
Last Modified: October 29, 2013

Legend

Project Area



Data Sources: USGS



| | Initials | Date |
|-----------------|----------|------------|
| Prepared by | ACS | 10/29/2013 |
| Peer Review by | CP | 10/29/2013 |
| Final Review by | | |

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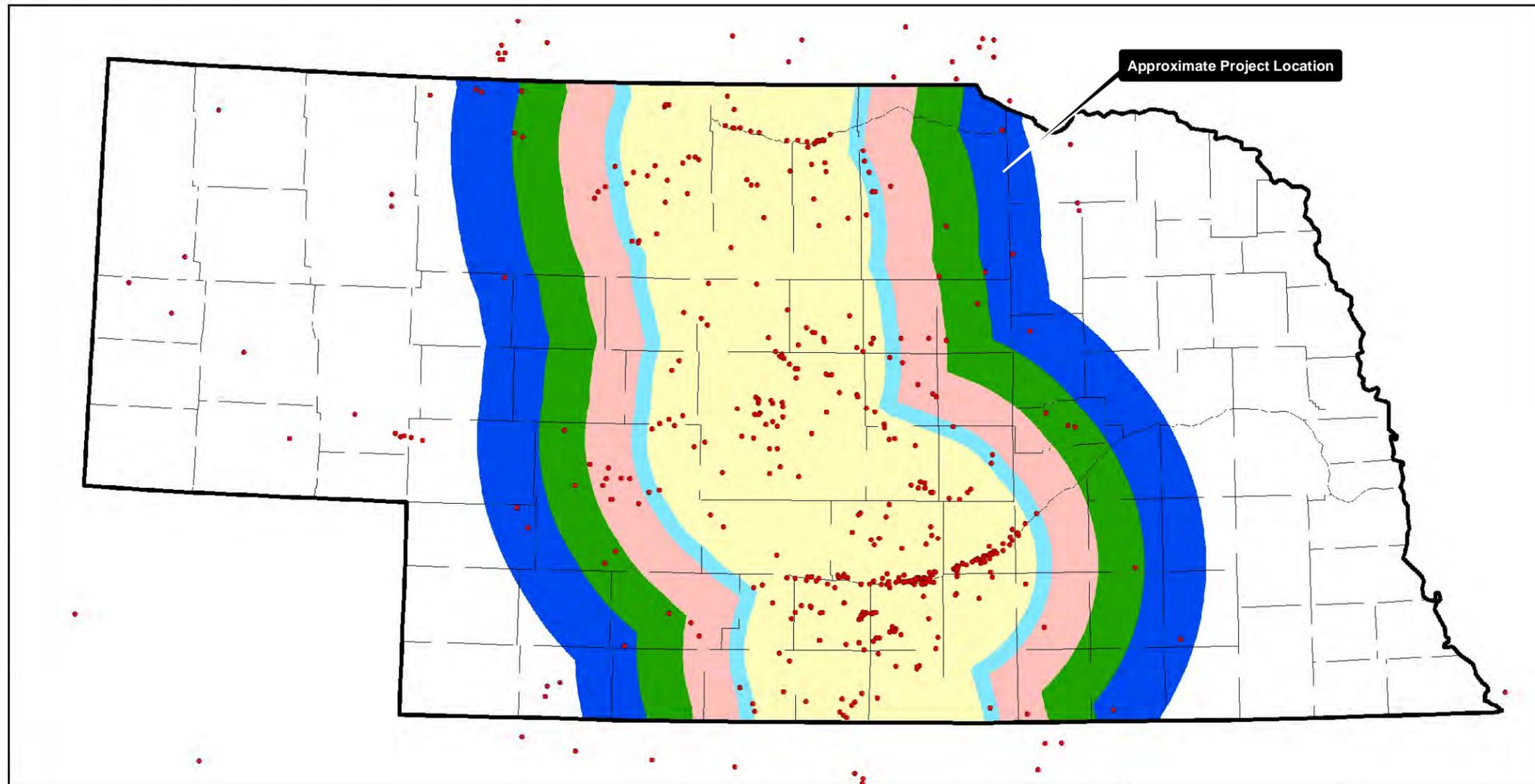
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U.S. Fish & Wildlife Service

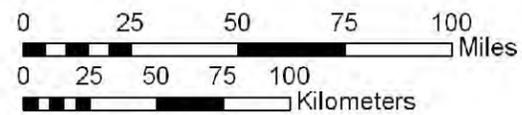
Nebraska Whooping Crane Migration Corridor

Central Flyway of the United States



Legend

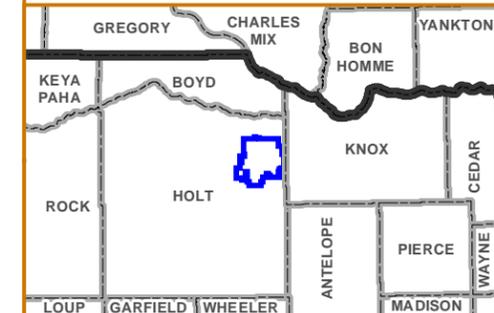
- Central Flyway Confirmed Sightings
- 75% (70 mi Corridor)
- 80% (80 mi Corridor)
- 85% (110 mi Corridor)
- 90% (140 mi Corridor)
- 95% (180 mi Corridor)



Produced for Ecological Services
Grand Island, NE
Current to: 2007
Basemap (Date): Nebraska Counties
Meridian:
File:

Figure 2.
Nebraska Whooping Crane
Migration Corridor and
Confirmed Records

Grand Prairie Wind Farm



Location

Holt County, Nebraska



Project Information

Project Number: 193701626
Last Modified: November 05, 2013

Data Sources: USGS, FWS, ESRI

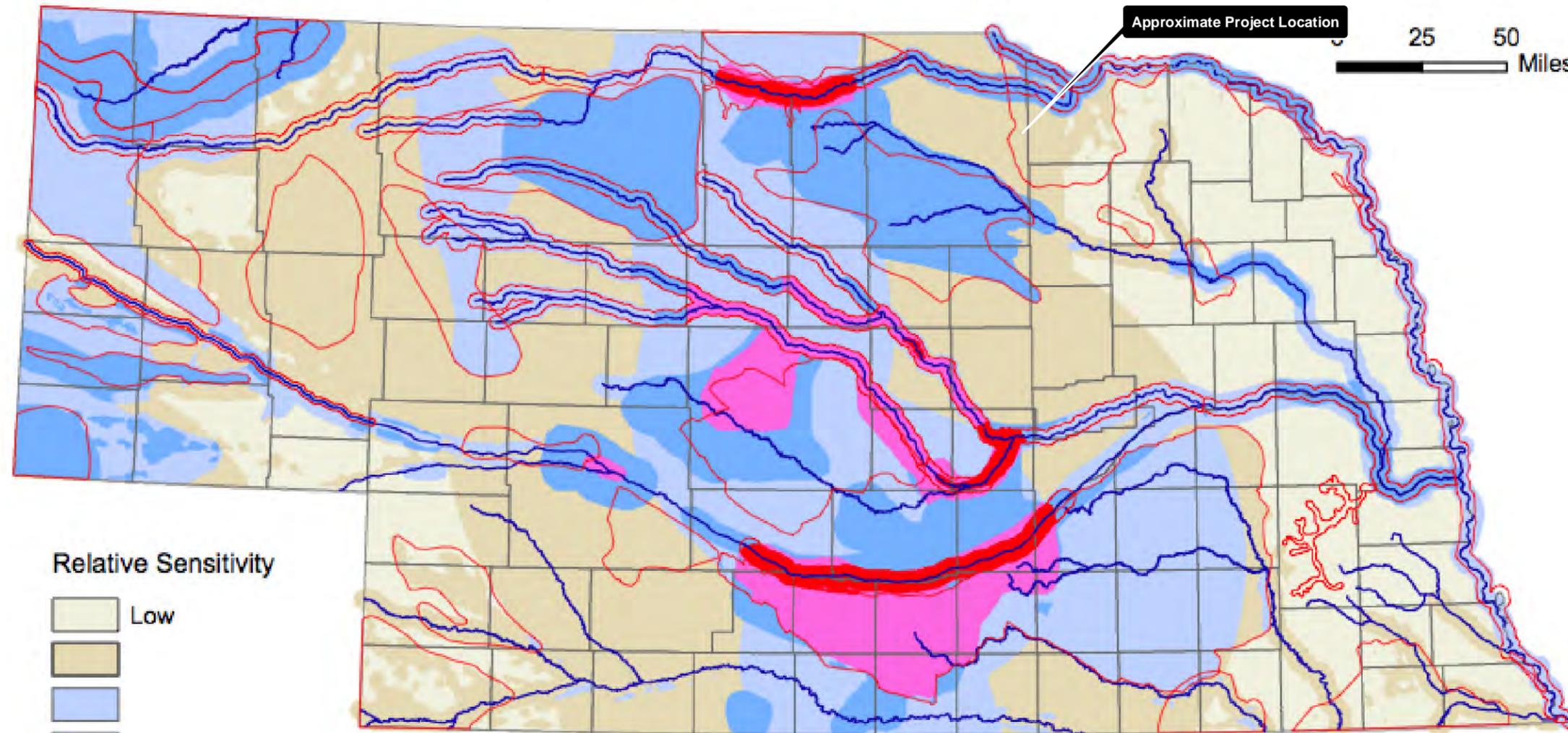


| | Initials | Date |
|-----------------|----------|-----------|
| Prepared by | ACS | 11/5/2013 |
| Peer Review by | CP | 11/5/2013 |
| Final Review by | | |

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Wind Energy and Nebraska's Wildlife: An index of the sensitivity of wildlife habitats to wind energy development, based on selected at-risk species



Relative Sensitivity

- Low
-
-
-
-
- High

Biologically Unique Landscapes



This map was designed to aid in planning for wind energy development by identifying areas that are considered relatively more sensitive or less sensitive to such development, with respect to species of concern. This map is not designed to evaluate wind farm siting at specific locations. Even in "low sensitivity" areas shown, there will be specific locations where siting of wind power infrastructure can negatively impact significant biological resources (e.g. remnant tallgrass prairie, listed plant species, etc.). Contact the Nebraska Game and Parks Commission and the U.S. Fish and Wildlife Service for potential site-specific impacts and potential conservation measures to avoid "take" under the state Nongame and Endangered Species Conservation Act and the federal Endangered Species Act.

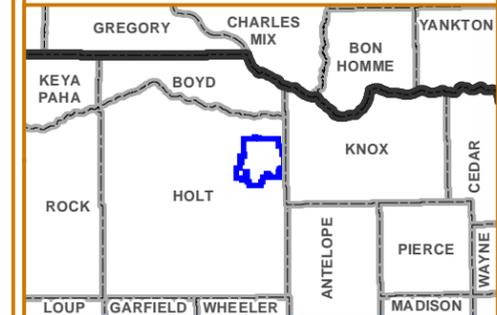
See attached document for a description of the information used to develop this map.

Map version date: October 1, 2011



Figure 4.
Index of the Sensitivity of
Wildlife Habitats in Nebraska
to Wind Energy Development

Grand Prairie Wind Farm



Location

Holt County, Nebraska



Project Information

Project Number: 193701626
Last Modified: November 05, 2013

Data Sources: USGS, FWS, ESRI

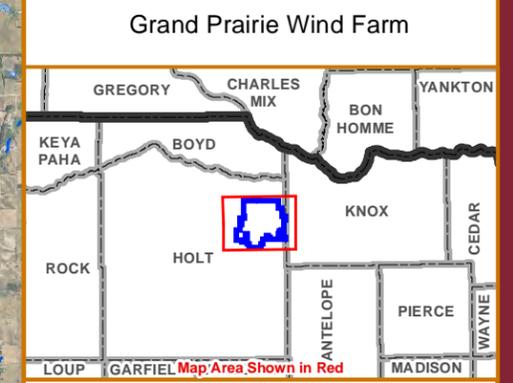
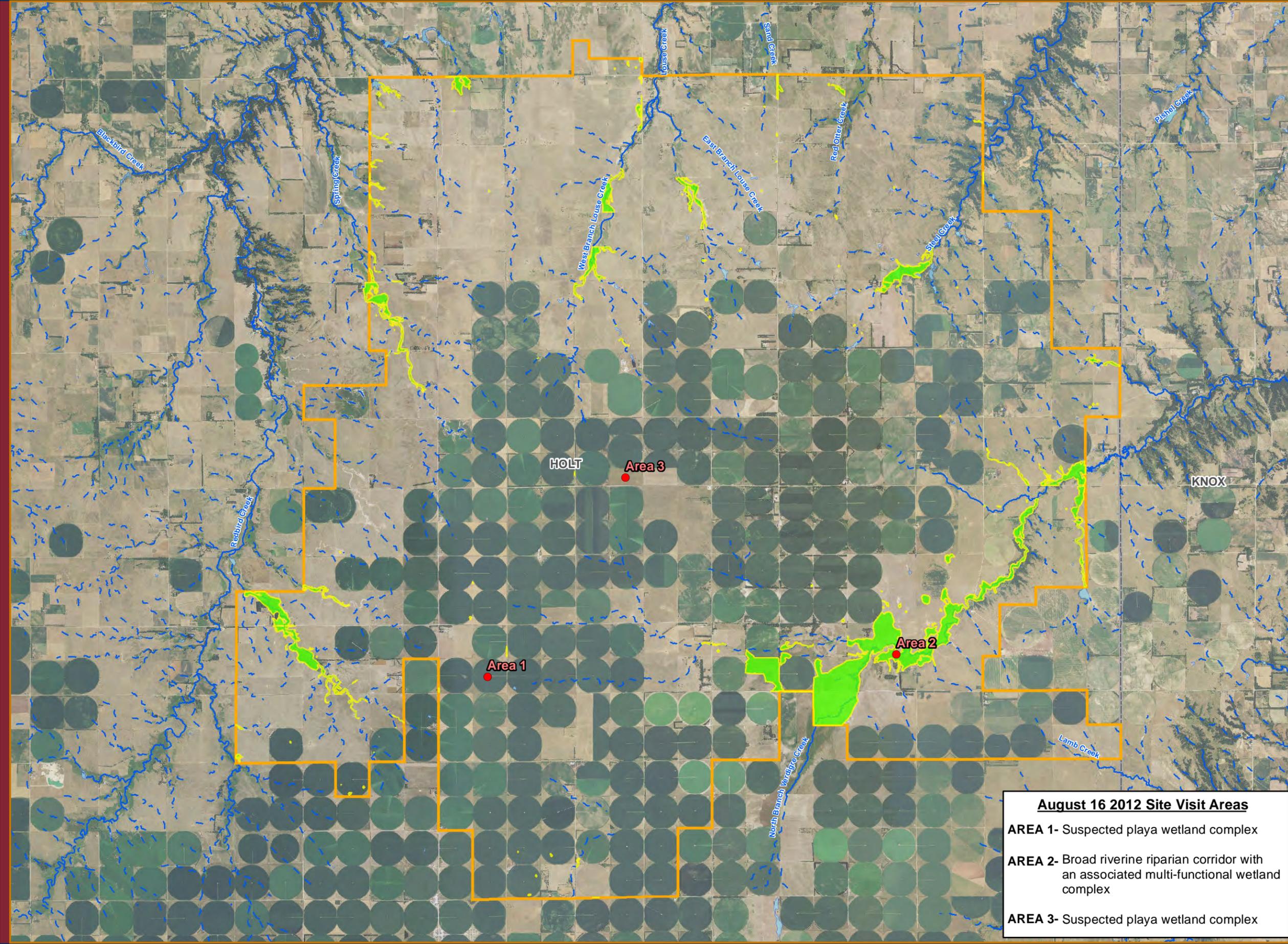


| | Initials | Date |
|-----------------|----------|-----------|
| Prepared by | ACS | 11/5/2013 |
| Peer Review by | CP | 11/5/2013 |
| Final Review by | | |

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Figure 5.
Field Delineated Wetlands
Within Project Area



Location
 Holt County, Nebraska

Project Information
 Project Number: 193701626
 Last Modified: November 05, 2013

- Legend
- Project Area
 - August 16 2012 Site Visit Areas
 - Field Delineated Wetlands
 - National Hydrographic Dataset
 - Perennial Stream/River
 - - Intermittent Stream
 - Waterbody

August 16 2012 Site Visit Areas

AREA 1- Suspected playa wetland complex

AREA 2- Broad riverine riparian corridor with an associated multi-functional wetland complex

AREA 3- Suspected playa wetland complex

Data Sources: USGS, Stantec, NEDNR, ESRI
 Wetland Delineation Data: Olsson and Associates (June 2012)
 Imagery: 2012 NAIP

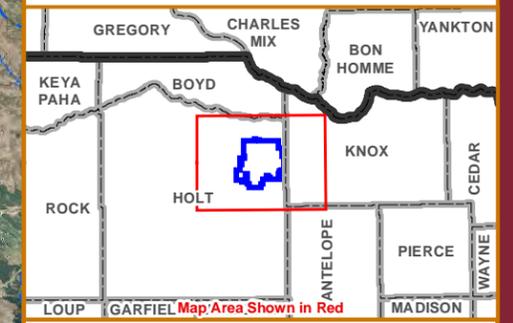
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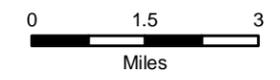
Figure 6.
NWI Wetlands Within 5 Miles
of Project Area

Grand Prairie Wind Farm



Location

Holt County, Nebraska



Project Information

Project Number: 193701626
 Last Modified: November 05, 2013

Legend

- Project Area
- NWI within 5 miles of project area
- 5 Mile Project Buffer
- National Hydrographic Dataset
- Perennial Stream/River
- Intermittent Stream
- Waterbody

Data Sources: USGS, NEDNR, ESRI
 Imagery: 2012 NAIP



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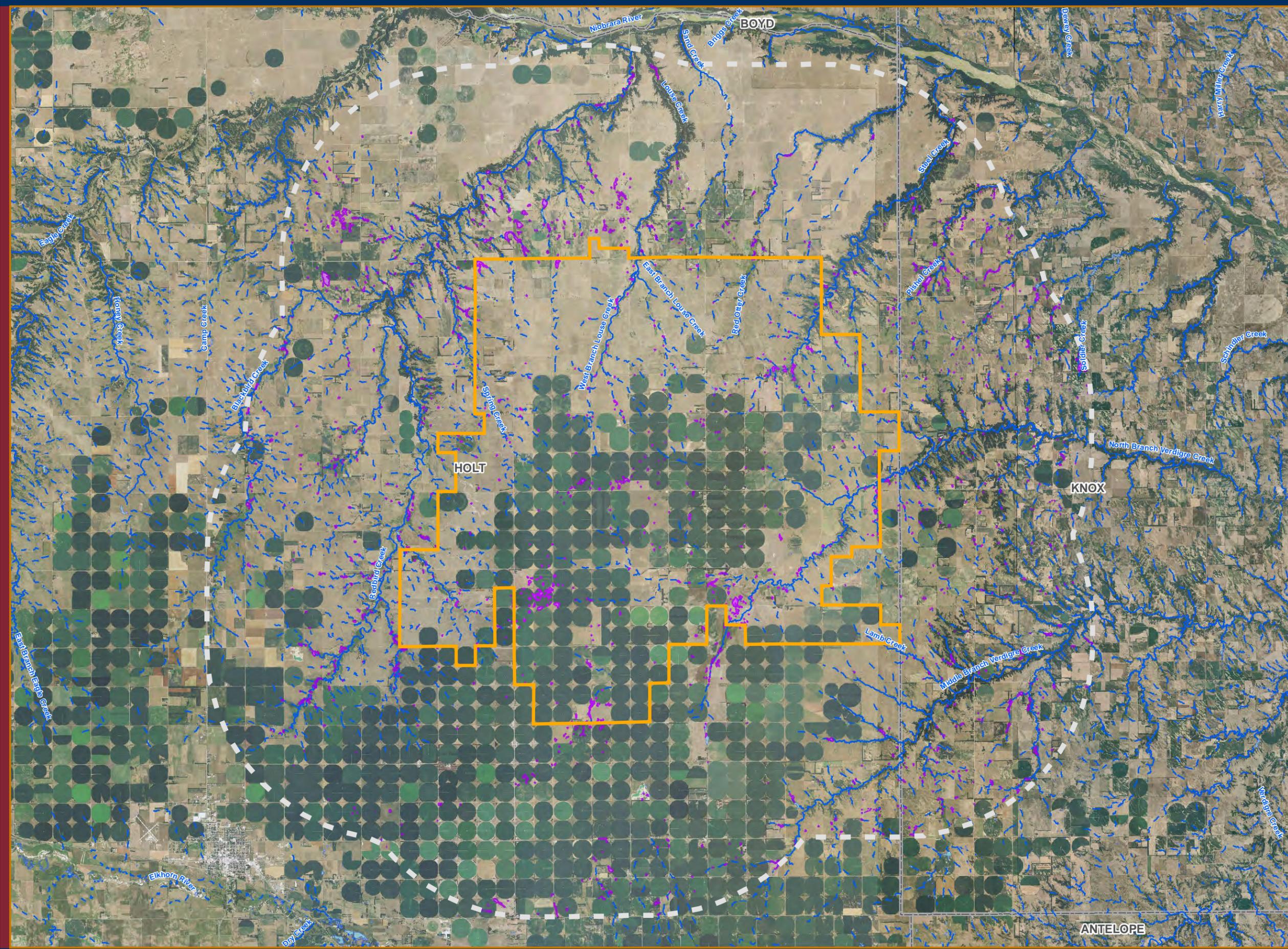
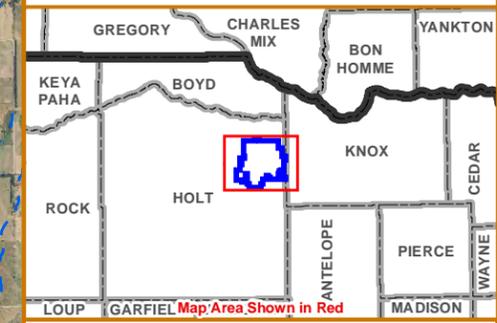


Figure 7.
NRCS Soils Survey
Within Project Boundary

Grand Prairie Wind Farm



Location

Holt County, Nebraska



Project Information

Project Number: 193701626
 Last Modified: November 05, 2013

Legend

- Project Area
- NRCS Soils**
- Hydric Soils
- National Hydrographic Dataset**
- Perennial Stream/River
- Intermittent Stream
- Waterbody

Data Sources: USGS, NRCS, NEDNR, ESRI
 Imagery: 2012 NAIP



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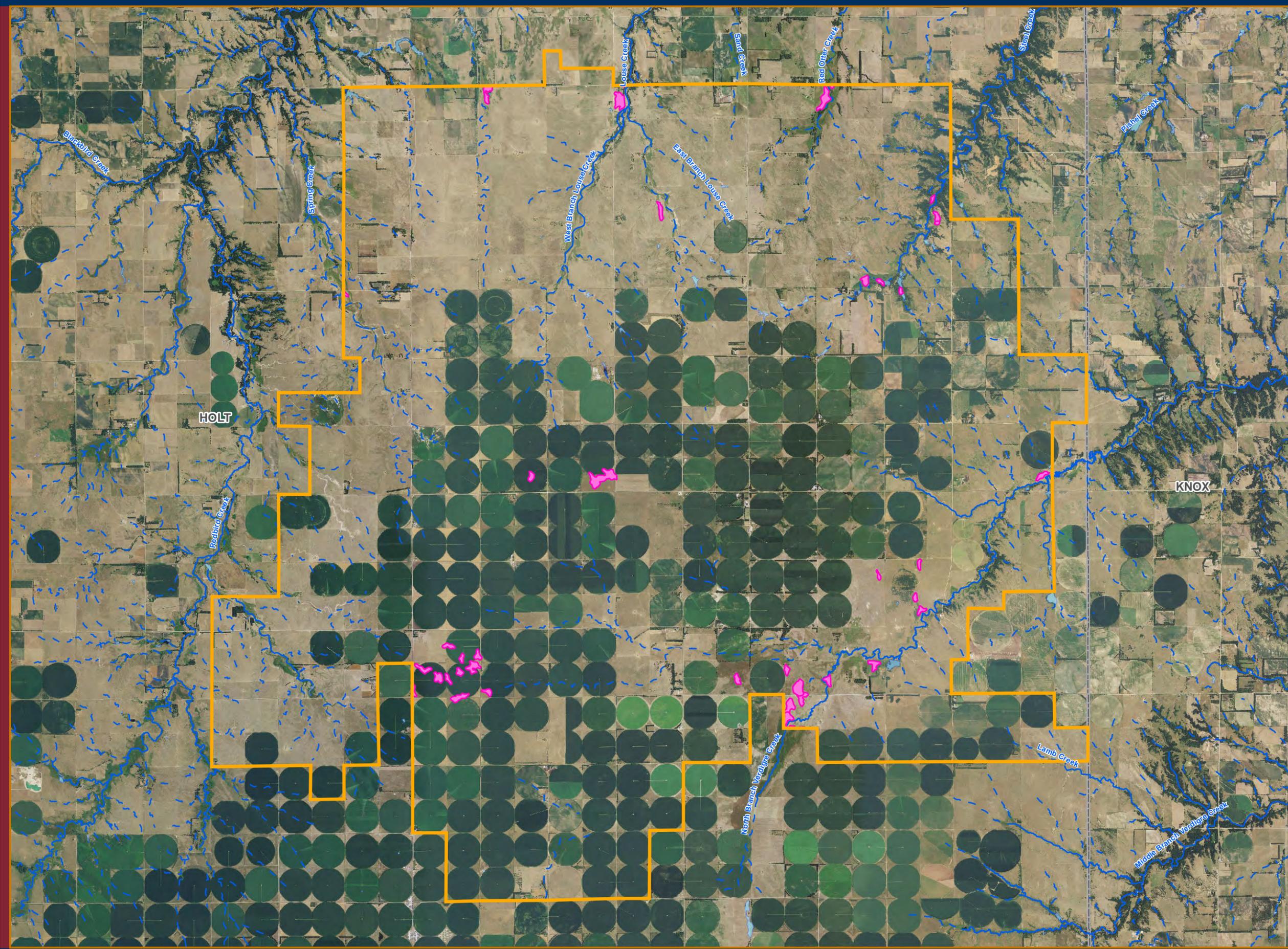
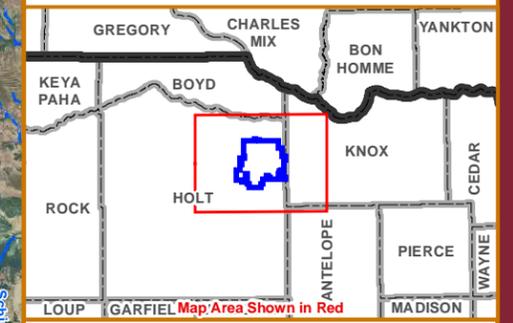


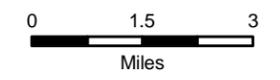
Figure 8.
NRCS Soils Survey Within 5 Miles
of Project Boundary

Grand Prairie Wind Farm



Location

Holt County, Nebraska



Project Information

Project Number: 193701626
 Last Modified: November 05, 2013

Legend

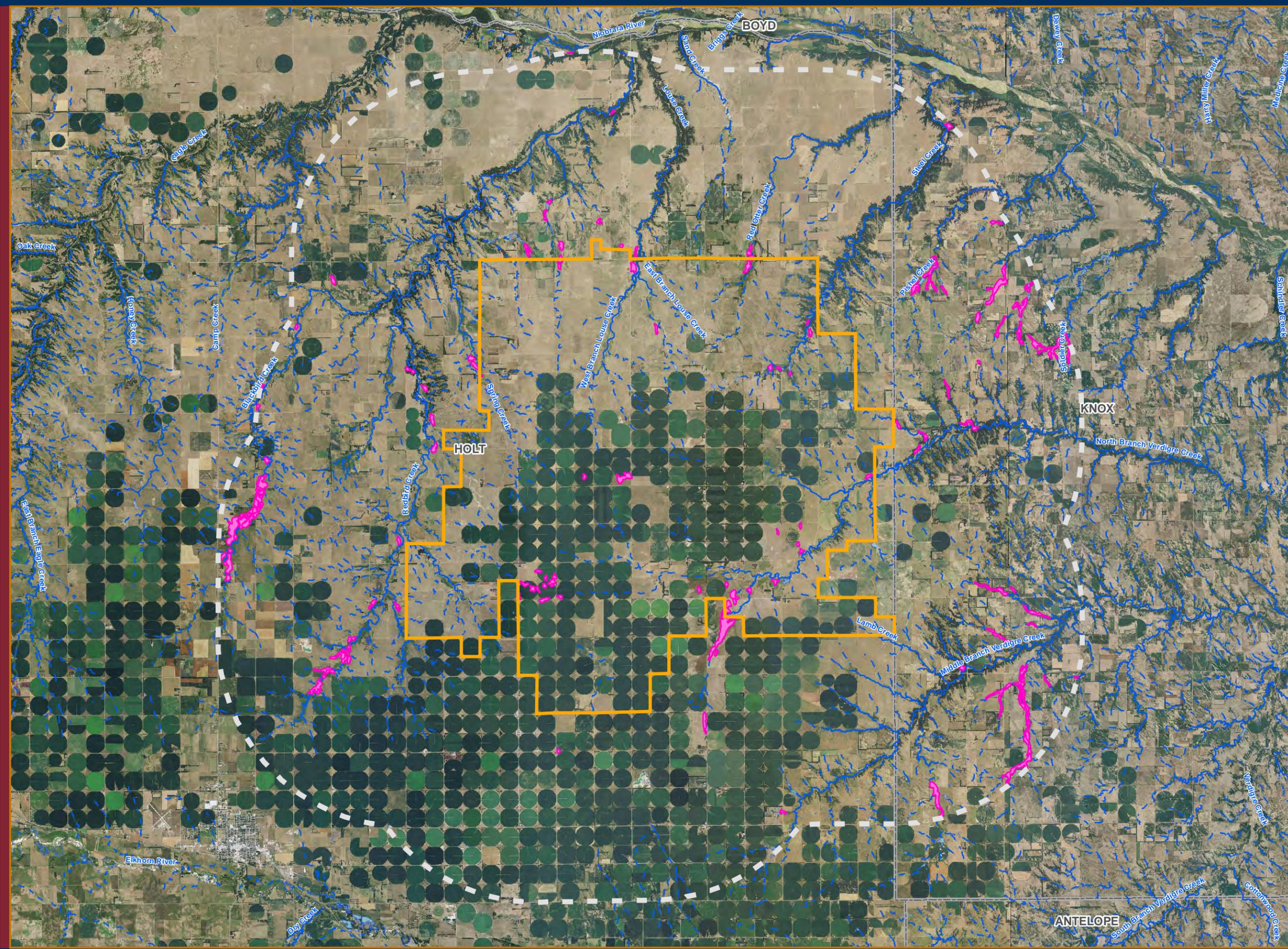
- Project Area
- NRCS Soils
- Hyric Soils
- National Hydrographic Dataset
- Perennial Stream/River
- Intermittent Stream
- Waterbody

Data Sources: USGS, NRCS, NEDNR, ESRI
 Imagery: 2012 NAIP



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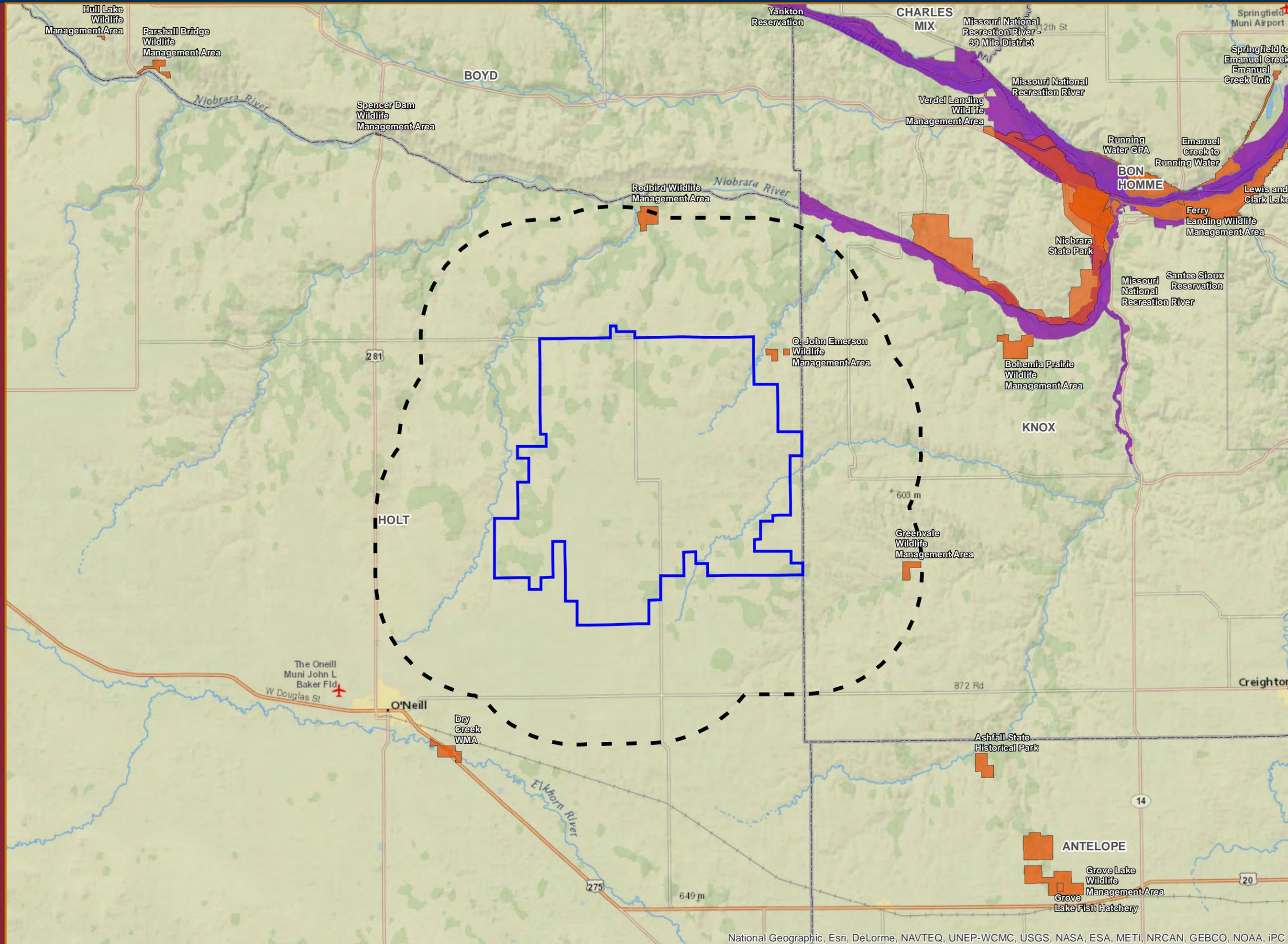
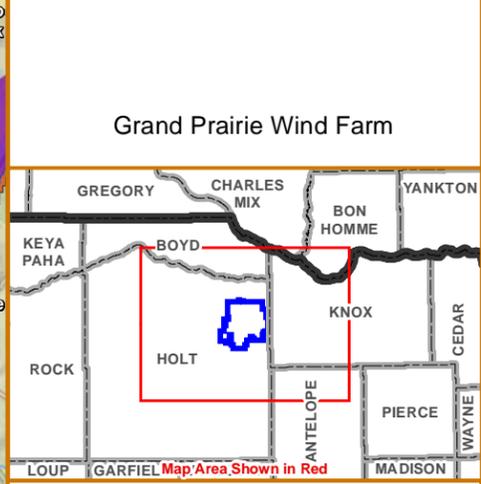


Figure 9. Conservation Areas



Location
 Holt County, Nebraska

0 2 4
 Miles

Project Information
 Project Number: 193701626
 Last Modified: November 05, 2013

Legend

- Project Area
- 5 Mile Buffer Area
- Conservation Areas**
- Federal Land
- State Land

Data Sources: USGS, NRCS, PADUS, NEDNR, ESRI

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