Appendix F – Whooping Crane Likelihood of Occurrence Report

Whooping Crane Likelihood of Occurrence Report

Ashley Wind Energy Project
McIntosh County, North Dakota

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1.0 INTRODUCTION

CPV Ashley Renewable Energy Company, LLC (CPV) is currently developing plans for a wind energy facility in McIntosh County, North Dakota (Figure 1). One environmental element that is investigated when developing wind energy facilities in parts of the Great Plains is the likelihood of the federally endangered whooping crane (*Grus americana*) to be present in or migrate through a project area. The whooping crane migrates through portions of North Dakota during spring and fall. Whooping cranes have been killed by collisions with power lines, and the International Whooping Crane Recovery Plan (hereafter, Recovery Plan) lists construction of power lines, fences, and other structures in the migration corridor as a threat to the species (Canadian Wildlife Service [CWS] and United States Fish and Wildlife Service [USFWS] 2007). Thus, prior to the construction of wind turbines an investigation of whooping crane likelihood should be conducted.

CPV contracted Tetra Tech EC, Inc. (Tetra Tech) to conduct a landscape-scale analysis to assess the potential occurrence of whooping cranes within the Ashley Wind Energy Project (WEP). The objective of this likelihood of occurrence analysis is to evaluate the biological and landscape features within the WEP to determine the potential for whooping cranes to occur. Certain landscape features may increase the likelihood of whooping crane occurrence during migration. Thus, Tetra Tech developed a likelihood index to evaluate the WEP based on its location in the migration corridor, the availability of habitat within the WEP compared to the surrounding landscape and the presence of feeding and roosting sites. The likelihood index does not predict how many whooping cranes will occur in the WEP; rather it scores the site based on a suite of variables that are related to whooping crane occurrence. Higher scores denote higher potential likelihood of occurrence. This assessment tool is not intended to replace field surveys. However, given the low probability of detecting a whooping crane during field surveys, thereby minimizing their utility to document presence or absence from a given area, this assessment tool was designed to take advantage of available data.

2.0 LEGAL STATUS OF THE WHOOPING CRANE IN THE UNITED STATES

The whooping crane is protected by both federal and state laws in the United States. It was considered endangered in the United States in 1970 and the endangered listing was 'grandfathered' into the Endangered Species Act (ESA) of 1973, which prohibits "take" (CWS and USFWS 2007). "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. §1532(19)). "Incidental take" occurs when take of an ESA-listed species occurs as an unintended consequence of an otherwise legal activity, as would the case in the unlikely event of a fatality occurring at a wind farm. To Tetra Tech's knowledge, no whooping crane fatality has occurred at a wind energy facility and no utility has been prosecuted for crane collisions with transmission lines, despite at least 46 known fatalities or serious injuries.

If the potential for take exists, the first step is to consult with the USFWS to further assess the potential risk and discuss strategies to minimize the risk. If it is determined that project development may affect whooping cranes, formal consultation may need to be initiated with the USFWS under Section 7 of the ESA if the Project has a federal nexus or under Section 10 of the ESA if there is no federal nexus. Under a Section 7 consultation, the USFWS must have a finding of no jeopardy in order to concur with the ESA. Under a Section 10 consultation, the applicant develops mitigation and conservation plans to offset losses due to the proposed project by way of a habitat conservation plan (HCP), at which point the USFWS will issue an incidental take permit if they are in agreement. The USFWS is working with the American Wind Energy Association and a group of wind developers, including CPV, to develop a bi-regional HCP.

The whooping crane is also considered a level III Species of Conservation Priority by the North Dakota Game and Fish Department (Hagen et al. 2005). Under the North Dakota comprehensive wildlife conservation strategy guide, a level III species of conservation priority is a species of moderate priority but is believed to be peripheral or non-breeding in North Dakota (Hagen et al. 2005). Inclusion as a Species of Conservation Priority carries no regulatory weight; as such, North Dakota does not provide any protections for the whooping crane.

The whooping crane population in North America has experienced sharp declines and disappearance from most of its historic range, with the population reaching its lowest point in the late 1930s and early 1940s (CWS and USFWS 2007). The number of whooping cranes in North America prior to 1870 is estimated to have been between 500 and 1,400 individuals (Allen 1952; Banks 1978), but some biologists suggest that the population may have numbered as many as 10,000 individuals (CWS and USFWS 2007). Activities such as habitat destruction, hunting, and displacement due to anthropogenic activities likely lead to widespread population declines (CWS and USFWS 2007). One self-sustaining wild population of whooping cranes currently exists in the world. Members of this population breed primarily within the boundaries of Wood Buffalo National Park in Canada and migrate through the central United States in route to the wintering grounds at Aransas National Wildlife Refuge along the Gulf Coast of Texas. This flock is referred to as the Aransas-Wood Buffalo National Park Population. Due to intensive management, this population has increased from 15 birds in 1941 to 263 as of the start of spring migration in 2010 (WCCA 2010).

3.0 PROJECT AREA DESCRIPTION AND ENVIRONMENTAL SETTING

3.1 Project Area Description

The WEP is located on privately owned lands in south-central North Dakota, consists of approximately 17,400 acres under easement with CPV, and is located slightly more than 6 miles north of the town of Ashley in McIntosh County (Figure 1). The WEP area is characteristic of the upland portion of this region, with the majority of the land surface currently covered by agriculture, rangelands, and native prairie. The area contains numerous small wetlands that vary from shallow, vegetated depressions to deeper, open water communities. Residences and abandoned farmsteads are scattered throughout the WEP. Patches of trees and shrubs exist throughout the WEP, and are found primarily between agricultural fields, in drainages, and as shelter belts around homesteads and between agricultural fields.

3.2 Environmental Setting

The WEP is located within the Northwestern Glaciated Plain. This ecoregion is a transitional region between the generally more level, moister, more agricultural Northern Glaciated Plains to the east and the generally more irregular, dryer, Northwestern Great Plains to the west and southwest. The western and southwestern boundary roughly coincides with the limits of continental glaciation. Pocking this ecoregion is a moderately high concentration of semi-permanent and seasonal wetlands, locally referred to a Prairie Potholes. Native prairie persists in areas of steep or broken topography, but they have been largely replaced by spring wheat and alfalfa over most of the ecoregion. Land use is predominantly dry-land farming of spring and winter wheat, barley, sunflowers and corn, interspersed with cattle grazing.

4.0 WHOOPING CRANE BIOLOGY

The whooping crane is a long-lived species that may reach 28 years old in the wild (Binkley and Miller 1983). Individuals reach sexual maturity at 3 to 5 years of age and form life-long breeding pairs while on the wintering grounds or during spring migration (Stehn 1997; CWS and USFWS 2007). Whooping cranes have low annual reproductive output. Females typically lay 2 eggs, but only 10 percent of families arrive on the winter grounds with 2 chicks because the smaller chick usually dies within the first two weeks after hatching (CWS and USFWS 2007). The juveniles become independent of the parents on the wintering ground prior to spring migration. Sexually immature individuals (i.e., subadults) return to the breeding grounds where they may remain solitary or congregate in small groups on the periphery of breeding pairs (CWS and USFWS 2007).

4.1 Reasons for the Population Decline

Populations of long-lived species with low annual reproductive output such as the whooping crane are sensitive to changes in adult survival (Stahl and Oli 2006). Hunting, especially during spring migration, from 1870 to 1930 resulted in 274 documented whooping crane fatalities (Allen 1952). In addition, Hahn (1963) tallied 309 mounts and 9 skeletons in museum collections throughout the world. Because many of these specimens do not contain information regarding the date and location of collection, it is unlikely that the majority were collected by museum personnel. It is possible that mortality from shooting exceeded annual production of juveniles during the early 1900s (CWS and USFWS 2007).

Degradation and loss of breeding habitat eliminated the whooping crane from much of its core breeding range in North America (CWS and USFWS 2007). Whooping cranes once bred from the southern edge of Lake Michigan north through southern Minnesota to northeastern North Dakota through Manitoba, Saskatchewan, and Alberta (Allen 1952). Conversion of prairie and pothole ecosystems to agriculture and ranching made much of the breeding habitat unsuitable (CWS and USFWS 2007). Due to their high degree of site fidelity (i.e., the tendency to use the same geographic locations and routes over time), members of the Aransas-Wood Buffalo Population are unlikely to recolonize the historic whooping crane range in North America naturally.

4.2 Threats to Whooping Cranes

Due to its small population size and concentration of all members of the Aransas-Wood Buffalo National Park population at breeding and wintering locations, there are several factors which may threaten the whooping crane (CWS and USFWS 2007). These include human settlement and development, habitat loss, shooting, disturbance, disease, and predation. Threats to the whooping crane that are related to wind power development include collision with power lines, fences, and other structures, and loss and degradation of stopover and wintering habitat (CWS and USFWS 2007; USFWS 2009).

Power lines pose a threat to whooping cranes when they are located in the vicinity of foraging or roosting habitat because individuals often fly at low altitudes (33 to 49 feet above the ground) when moving among sites (CWS and USFWS 2007; Stehn and Wassenich 2008). The majority of documented fatalities during migration are due to collision with power lines. Since 1956, 46 whooping cranes have been killed (91% of collisions) or seriously injured (9% of collisions) as a result of collisions with power lines (Stehn and Wassenich 2008). The majority of confirmed power-line fatalities have occurred within the experimental populations that are maintained by the introduction of captive-reared young; power-line fatalities have also been reported for the Aransas-Wood Buffalo National Park population (at least 7 fatalities and 2 serious injuries since 1956).

Although whooping crane mortality has not been attributed to wind turbines, the Recovery Plan considers wind power development within the whooping crane migration corridor a threat because of the construction of power lines and associated structures (CWS and USFWS 2007). It is unknown how whooping cranes will respond to the presence of wind turbines. The USFWS (2009) holds the opinion that whooping cranes will avoid stopping at areas with operational wind turbines; thus, behavioral avoidance of wind farms by whooping cranes may reduce the probability of collision, but may amount to loss of stopover habitat.

5.0 WHOOPING CRANE MIGRATION

Whooping cranes undertake a 5,000-mile round-trip migration from the breeding area in Canada to the wintering area in Texas every year. Individuals depart the breeding ground in Canada and travel south through Alberta, Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and reach the wintering ground on the Texas coast. The migration route is well defined and 94 percent of all observations occur within a 200-mile wide corridor during spring and fall migration (CWS and USFWS 2007, Figure 2). Whooping cranes may occasionally travel with sandhill cranes during migration, and stopover sites used by sandhill cranes may indicate potential whooping crane stopover areas (CWS and USFWS 2007). The absence of sandhill crane sightings on the ground within a project area does not mean that cranes of either species will never be observed there, but inferences can be drawn about the relative unsuitability of the location.

During migration, whooping cranes can occur where suitable habitat is available. Some sites in the migration corridor are used consistently and have high annual use. Four traditional stopover sites are found in Nebraska (Platte River), Kansas (Cheyenne Bottoms Wildlife Management Area, Quivira National Wildlife Refuge), and Oklahoma (Salt Plains National Wildlife Refuge). These sites are designated as critical habitat under the ESA (CWS and USFWS 2007).

5.1 Fall Migration

Whooping cranes depart the breeding grounds at Wood Buffalo National Park in mid-September. Birds may travel alone, in pairs, in family groups, or in small flocks (Johns 1992). Individuals travel southeast about 300 miles to the major staging area in Saskatchewan, where they may remain for 2 to 4 weeks before resuming migration. During fall migration, birds may stay at traditional stopover sites for 7 to 10 days, but stays as long as 6 weeks have been documented at Quivira National Wildlife Refuge (CWS and USFWS 2007). The majority of whooping cranes reach the wintering grounds by mid-November. In North Dakota most sightings occur from early October to early November and peak migration occurs around October 18 (Austin and Richert 2001).

5.2 Spring Migration

Whooping cranes depart the wintering ground at Aransas National Wildlife Refuge in late March; the last birds depart in May. Breeding pairs are typically first to depart and migration is facilitated by winds from the southeast. There is no known staging area in spring as there is in fall, and migration is completed in 2 to 4 weeks. Traditional stopover sites that are used in fall are also used in spring. However, individuals spend fewer days at stopover sites during spring migration. Whooping cranes travel through North Dakota from early April to late April and peak migration occurs around April 19 (Austin and Richert 2001).

5.3 Migration Flight Behavior

Whooping cranes are diurnal migrants and primarily fly by using static soaring, but low-level flapping flight may be used when conditions dictate. Migration is initiated after the air has warmed and thermal updrafts are present. Individuals spiral upwards on thermals of warm air to heights of 1,000 to 6,000 feet (Kyut 1992), then enter into long, descending glides. This process is repeated throughout the day until suitable habitat is reached. Static soaring is energy efficient as birds seldom flap after they are airborne. Whooping cranes may travel up to 500 miles per day in ideal conditions; during average conditions they may travel 250 miles per day (Stehn and Wassenich 2008). During the end of the diurnal migration flight, individuals will enter long descending glides and use flapping flight at lower altitudes until they reach suitable roosting and feeding habitat. Whooping cranes do not regularly migrate during unfavorable weather conditions such as a strong headwind, rain or other precipitation, or overcast conditions. When visibility is poor, individuals use flapping flight at lower altitudes until they reach suitable roosting or feeding habitat. Poor weather conditions can lengthen stopover duration in a given location (USFWS 2009).

5.4 Stopover Habitat Characteristics

Whooping cranes require roosting habitat when they stop during migration. They often select sites with unobstructed visibility (Austin and Richert 2001). Palustrine wetlands (freshwater wetlands characterized by emergent vegetation) are most often used as roosting sites, but individuals have been found roosting at lacustrine wetlands (wetlands around a lake), and riverine wetlands (wetlands along a river). The size of wetlands used during spring and fall migration ranges from 0.4 hectare (ha) to over 500 ha (1 to 1200 acres), and no seasonal use patterns are evident (Austin and Richert 2001). It is noted that 75 percent of recorded roost wetlands were smaller than 4 ha (10 acres). Cranes have been observed using wetlands as deep as 10 feet; however, they generally restrict their usage of these wetlands to areas where the water depth is less than 2 feet (Austin and Richert 2005).

Whooping cranes forage in wetlands and agricultural fields during migration and may travel between roosting and feeding areas. Palustrine wetlands are used most often when whooping cranes forage in wetlands, but lacustrine and riverine have also been used as feeding sites (Austin and Richert 2001). Among agricultural crops used as feeding sites, use of winter wheat was higher than other crop types in fall and use of row-crop stubble (comprised mostly of corn) was higher in spring than other crop types (Austin and Richert 2001). Whooping cranes have also been observed feeding in sorghum, sunflower, and soybean stubble (Austin and Richert 2001). Feeding sites are often found adjacent to roosting sites. For example, 94.9 percent and 72.9 percent of roosting sites were within 0.62 mile of feeding sites in spring and fall, respectively (Johns et al. 1997; USFWS 2009).

6.0 ASSESSMENT OF WHOOPING CRANES LIKELIHOOD OF OCCURRENCE

The USFWS (2009) holds the opinion that whooping cranes will avoid stopping at areas with operational wind turbines. The primary threats of wind energy development to whooping cranes are loss of habitat and mortality due to collision with transmission lines and associated structures. Because of the high levels of concern regarding whooping cranes, the ability to evaluate the risk to whooping cranes at individual wind project areas is a critical component to understanding the environmental impacts of a proposed wind facility. If avoidance by the whooping crane of a previously utilized area occurs, the area occupied by the wind facility would constitute stopover habitat loss. Here, Tetra Tech presents a method (one that has been used in multiple ESA-related consultations) to evaluate the likelihood of whooping cranes to occur at the WEP located in southeast North Dakota. This evaluation method incorporates the location of the project in the migration corridor, the availability of habitat within the WEP area compared to the surrounding landscape and the presence of feeding and roosting sites (Table 1). Tetra Tech expects whooping cranes to be more likely to occur over the life of a project at projects with high scores. For the purposes of this report, Tetra Tech calculated scores for each parameter and, based on desktop modeling of variable weights, assigned the following likelihood of occurrence rankings: Low (0-3); Moderate (4-8); High (8+). This assessment tool is not intended to replace field surveys. However, given the low probability of detecting a whooping crane during field surveys, thereby minimizing their utility to document presence or absence from a given area, this assessment tool was designed to take advantage of available data.

6.1 Location of a WEP in the Migration Corridor (L)

Biological Justification

The United States Geological Survey (USGS) has compiled a report documenting the locations and habitat of whooping cranes during migration from 1943-1999 (Austin and Richert 2001). These observations indicate that a whooping crane, or group of whooping cranes, was seen at some point between 1943 and 1999. The USFWS has produced an updated map showing the location of whooping crane observations though 2008 (Figure 2). It is important to note that while these are the best data available, they are largely non-standardized and incidental; as such these data are not suitable for assessing habitat preferences or shifts in migration patterns.

The location of a potential wind facility influences the likelihood of whooping crane occurrence due to the well-defined migratory pattern of the cranes. The median location of all crane observations was statistically derived and was used to describe the migration route from the breeding grounds to the wintering grounds (CWS and USFWS 2007). Buffers were then calculated based on the percentage of observations (Figure 2). For example, 75 percent of all observations occurred within the 75-percent buffer. If two sites are compared, whooping cranes are more likely to stop over at a site within the 75-percent buffer than at a site outside the 95-percent buffer.

Scoring

Tetra Tech developed scores for the location of a project based on the percent of observations within each buffer. If a project fell within the 75-percent buffer, it was scored 7.5. If a project fell between the 75-percent and 95-percent buffers, it was scored 2.0 because 20 percent of all observations occur between these buffers. If a project fell outside of the 95-percent buffer, it was scored 0.5 because 5 percent of all observations occur outside the 95-percent buffer.

Assumptions

The likelihood of whooping crane occurrence in the future will not deviate from the patterns observed through 2008.

If a portion of the project fell on the boundary of a buffer or in two buffers, the project was assumed to be within the buffer closer to the middle of the migratory corridor.

6.2 Attractiveness on the Landscape (A)

Biological Justification

Wetlands are used by whooping cranes for feeding and roosting. The amount of wetlands within a given area compared to the surrounding landscape may influence whooping crane use of a site during migration. After whooping cranes have descended from migration flight altitudes, they may travel up to 35 miles in search of suitable roosting habitat (USFWS 2008). Therefore, Tetra Tech used a ranking criteria based on the idea that if a project area contained a higher proportion of suitable wetlands than was found within the 35 miles surrounding the project area then the WEP is more attractive than the surrounding area.

Scoring

Tetra Tech used GAP data for North American (Strong et al. 2005) in conjunction with National Wetlands Inventory (NWI) data (USFWS 2006) and National Land Cover Database data (USGS 2007) to determine the total acreage of wetlands within the WEP and within 35 miles of the WEP. The use of multiple data sources will help avoid the limitations of any one data source (e.g., Stahlecker 1992). Tetra Tech then calculated the proportion of the total acreage of the project that was comprised of wetlands and the proportion of the total acreage of a 35-mile area around the WEP that was wetlands (excluding the WEP). Tetra Tech divided the proportion of the WEP that was suitable wetlands by the proportion of the 35-mile buffer that was suitable wetlands to determine if the project contained more suitable wetlands than the surrounding area. Tetra Tech used the ratio as the score in the likelihood index equation. If the ratio was greater than 1, the project contained a greater proportion of suitable wetlands and is more attractive than the surrounding 35-mile buffer. If the ratio was equal to 1, the project contained a similar proportion of wetlands and is as attractive as the surrounding 35-mile buffer. If the ratio was less than 1, the project contained less wetlands and is less attractive than the surrounding 35-mile buffer.

Assumptions

The distribution of wetlands in the Geographic Information System (GIS) data is an accurate representation of the location of wetlands in the project area.

35 miles is an appropriate scale to examine whooping crane habitat use.

6.3 Presence of Foraging and Roosting Sites (W)

Biological Justification

Whooping cranes often make low altitude flights between roosting and foraging habitat and are thus at risk of collision with power lines and other structures (CWS and USFWS 2007; Stehn and Wassenich 2008; USFWS 2009). Austin and Richert (2001) found that agricultural crops, especially corn, sorghum, and winter wheat were the habitat most often contiguous to roosting areas and that most cranes traveled 0.62 mile from a roosting site to a foraging site. Therefore, wetlands located within 0.62 mile of agricultural crops form a wetland-agricultural matrix that is often used by whooping cranes during migration (Austin and Richert 2001). Tetra Tech determined the proportion of the project area that was comprised of wetland-agricultural matrix. Tetra Tech included water bodies of any type (hereafter wetlands), but restricted the analysis to wetlands greater than 0.25 acre to eliminate inclusion of unusable wetland (e.g., borrow pits). Tetra Tech limited the analysis to crop agriculture because it is most often used for feeding habitat and restricted the analysis to agriculture greater than 1 acre because most observations of cranes occurred in agriculture greater than 1.0 acre (Austin and Richert 2001).

Scoring

To quantify the amount of roosting and foraging habitat in a project area, GIS landcover data (GAP data) was obtained for North Dakota (Strong et al. 2005). Water features and the spatial extent of waters were verified with NWI data (USGS 2007). The GIS analysis was designed to calculate the total area of wetland-agricultural matrix, which may include other habitat types between patches of wetlands and agriculture. Thus, based on the size restrictions and spatial configuration, the total acres of wetland-agricultural matrix could be greater or less than the sum of the acres of wetland and agriculture. Tetra Tech calculated the proportion of the project area that was wetland-agricultural matrix by dividing the total acres of wetland-agricultural matrix by the total acres of the project. Tetra Tech used the proportion as the score in the likelihood index; therefore, scores may range from 0 to 1.

Field Verification

Tetra Tech verified the presence of suitable roosting locations during a site visit in October timed to coincide with the fall migratory period for whooping cranes in North Dakota. Any desktop-identified wetlands that were found to (a) either not exist or (b) exist in a form that might render then unusable by cranes were removed from the analysis. The field visit resulted in the removal of 855 acres of wetland from the analysis; no suitable wetlands were added.

Assumptions

The optimal distance of foraging habitat from roosting habitat is 0.62 mile.

Habitats not classified as suitable wetlands or agriculture are of neutral value and do not influence the availability of suitable wetlands or agriculture on the landscape.

6.4 Likelihood Index Formula (LI)

The likelihood index of whooping cranes occurring at the WEP was calculated by evaluating the landscape features in and around the project. Tetra Tech used the following formula to calculate the likelihood index:

$$LI_i = (L_i \times A_i) + W_i$$

Where:

L_i = location of project in relation to the migration corridor score;

A_i = attractiveness score, or the ratio of suitable wetlands in a project to suitable wetlands in a 35-mile area around a project; and

W_i = wetland-agricultural matrix score.

The equation places the most weight on the location in the migration corridor because of the wide range of scores. Thus, a project within the 75-percent corridor will tend to score higher than a project within the 95-percent corridor unless the attractiveness score for the project within the 75-percent corridor is low (e.g., <0.50) or the attractiveness score for the project within the 95-percent corridor is high (>4.0), when other values are equal. Projects located outside of the 95-percent corridor will tend to score low unless the attractiveness score is high because the location score is less than 1.0.

7.0 ASHLEY WEP ASSESSMENT

The likelihood index score was 2.99 for the entire WEP (Table 2) implying a low likelihood of occurrence. The WEP is located within the 89-percent buffer (Figure 3); therefore, the Location (L) parameter was 2.0. A total of 7 observations of 26 individuals have been reported within the 35-mile buffer around the WEP (Figure 4). The percentage of available and suitable wetlands within the WEP is higher than the surrounding 35-mile buffer area, with a calculated Attractiveness on the Landscape (A) value of 1.39. Twenty-one percent of the WEP consists of suitable wetland-agriculture matrix habitat, making the Presence of Feeding and Roosting Sites (W) value 0.21 (Figure 4).

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TABLES

Table 1. Parameters used in the likelihood index calculation.

Parameter	Score	Justification
Location in the Migration Corridor (L)		
Within the 75-percent buffer	7.5	75% of all whooping crane observations occur within the 75-percent buffer
Between the 75-percent and 95-percent buffers	2.0	20% of all observations occur between 75-percent and 95-percent buffers
Outside the 95-percent buffer	0.5	5% of observations occurred outside the 95-percent buffer
Attractiveness on the Landscape (A)		
Ratio of wetlands per total acreage for the WEP/ wetland per total acreage for 35-mile area not including the WEP	Actual ratio	Indicates if the WEP is similar (=), less (<), or more (>) attractive than the surrounding landscape to migrating cranes searching for roosting habitat
Presence of Foraging and Roosting Habitat (W)		
Proportion of the WEP that is a wetland-agricultural matrix	Actual proportion	Indicates the proportion of the WEP that is favored by cranes for foraging and roosting habitat

Table 2. Likelihood index score for the Ashley WEP.

Location in the Migration Corridor (*L*)	Attractiveness on the Landscape (*A*)	Presence of Foraging and Roosting Habitat (*W*)	Likelihood Index Score (*LI*)
2.0	1.39	0.21	2.99

FIGURES

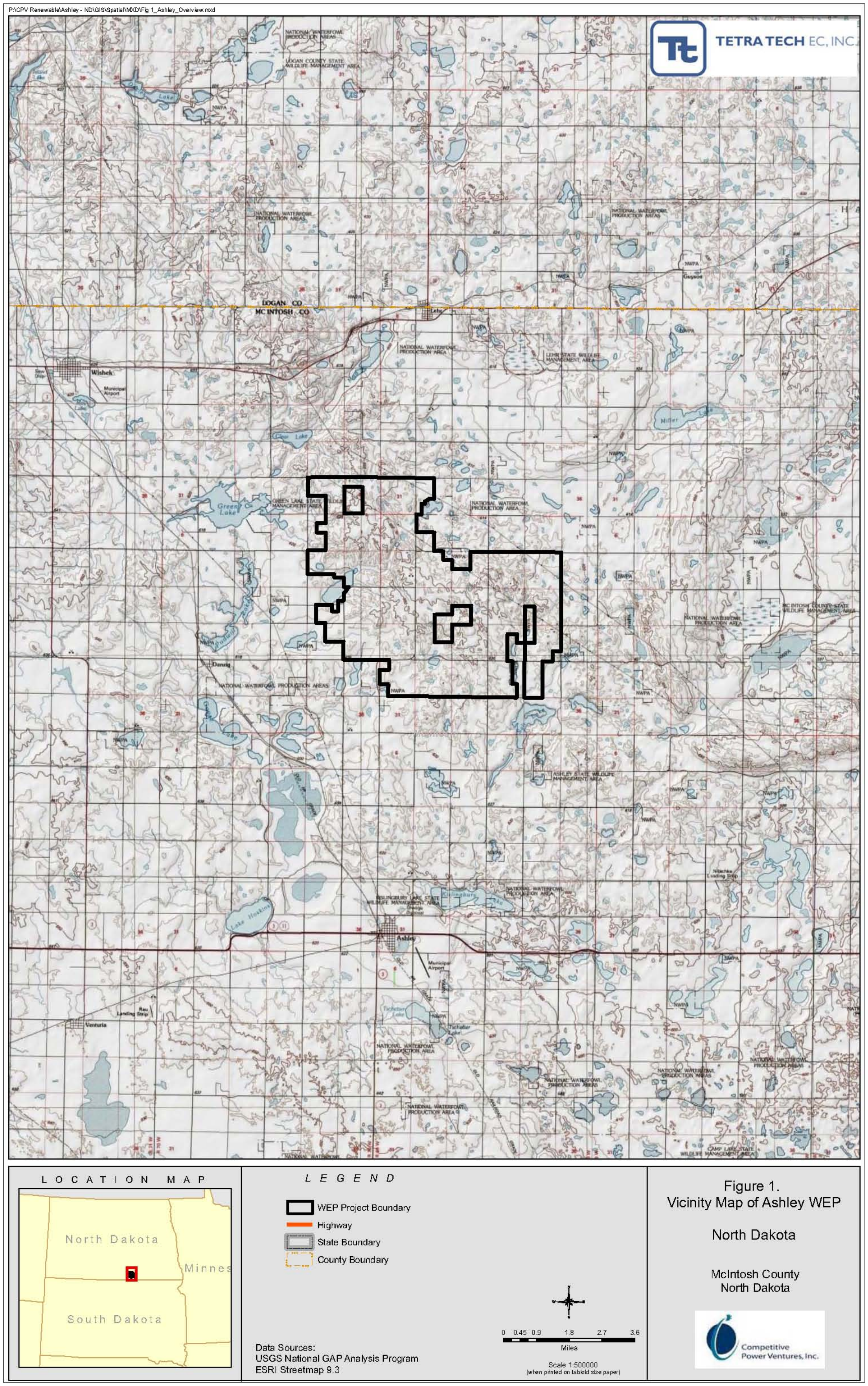
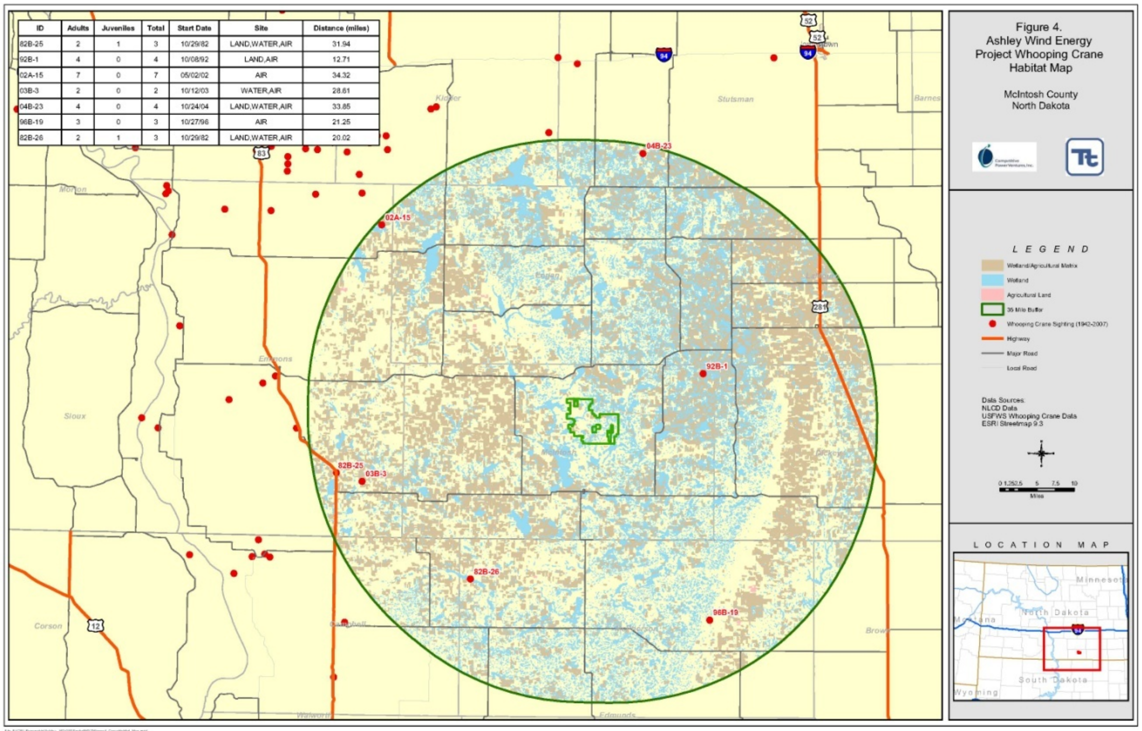


Figure 1.
Vicinity Map of Ashley WEP

North Dakota

McIntosh County
North Dakota



ID	Adults	Juveniles	Total	Start Date	Site	Distance (miles)
82B-25	2	1	3	10/29/82	LAND,WATER,AIR	31.94
92B-1	4	0	4	10/08/92	LAND,AIR	12.71
02A-15	7	0	7	05/02/02	AIR	34.32
03B-3	2	0	2	10/12/03	WATER,AIR	28.61
04B-23	4	0	4	10/24/04	LAND,WATER,AIR	33.85
96B-19	3	0	3	10/27/96	AIR	21.25
82B-26	2	1	3	10/29/82	LAND,WATER,AIR	20.02

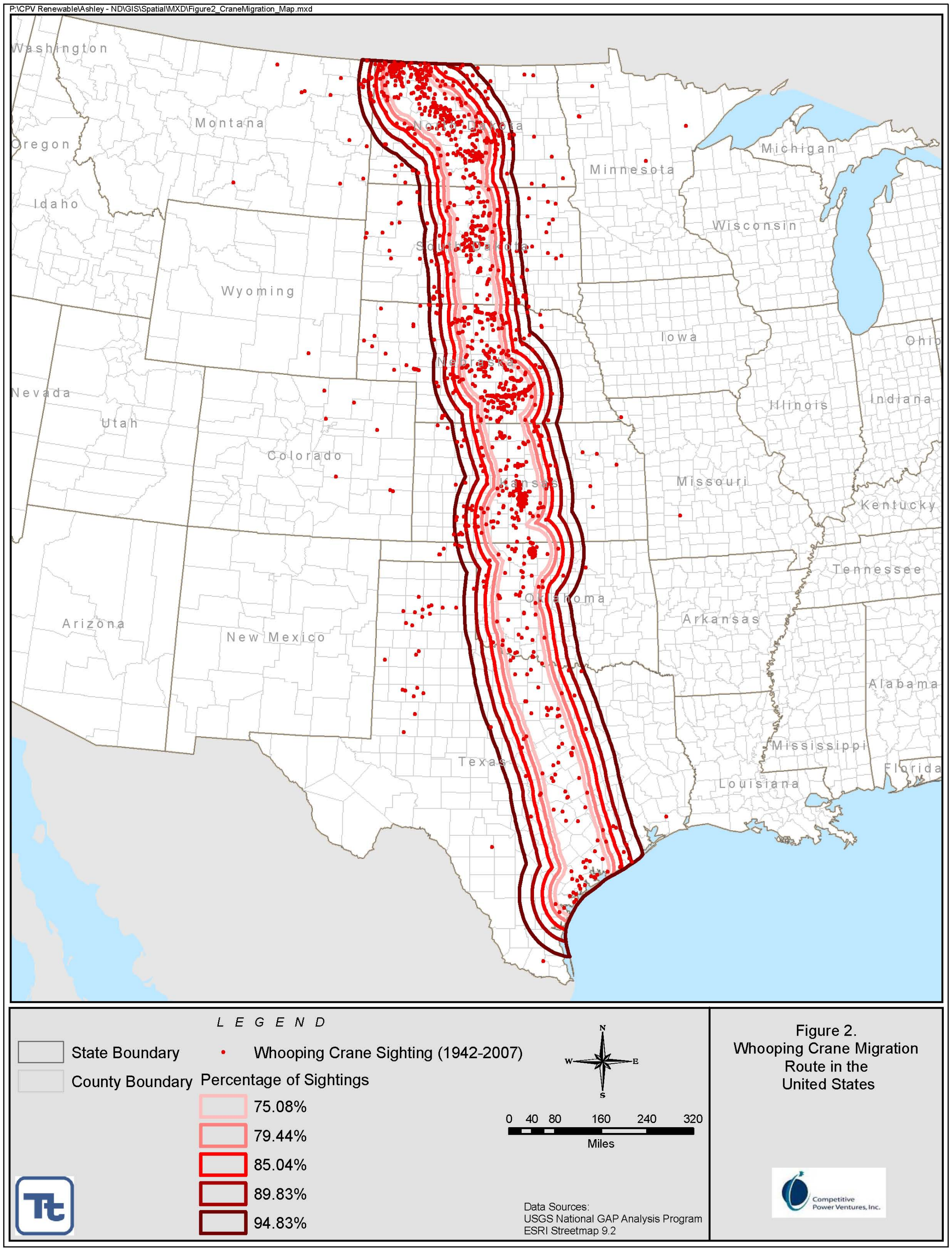


Figure 2.
Whooping Crane Migration Route in the United States

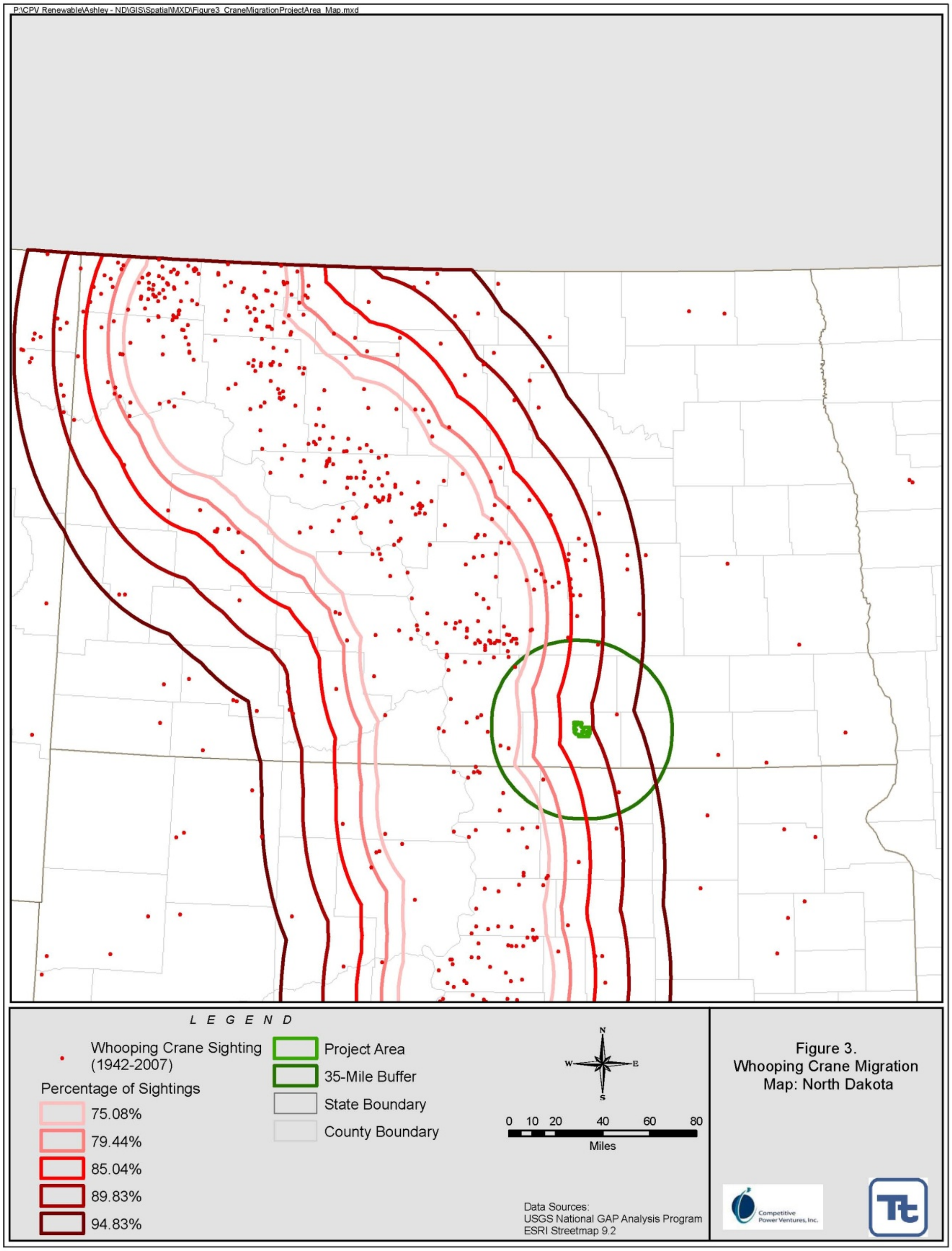


Figure 3.
Whooping Crane Migration Map: North Dakota