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# Whooping Cranes and Wind Farms - Guidance for Assessment of Impacts

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We know that birds, including large birds, are killed by wind turbines. The amount of mortality is presumably highly variable and site specific. It is unknown how whooping cranes will react to large wind turbines. However, an assessment for potential impacts to whooping cranes at any site proposed for a wind farm needs to be conducted.

## Location of whooping Crane Migration Corridor

There exists a data set on whooping crane occurrence in their migration corridor. Eighty-two percent of all known sightings occur within a migration corridor 100 miles wide (Figure 1) that runs through the central portions of ND, SD, NE, KS, OK and TX (Stehn and Wassenich, In Press). The chance for a whooping crane colliding with a turbine or associated power line is much greater within the main 100-mile whooping crane migration corridor, less in the 100 to 200 mile-wide corridor, and negligible outside the 200-mile corridor. Karine Gil de Weir at the Platte River Whooping Crane Habitat Trust in Wood River, Nebraska (308 384-4633) is working on putting this map and an updated data set of all sightings in to a GIS format to facilitate disseminating this information. Updated information on documented whooping crane sightings for any county can be obtained from Dr. Martha Tacha at the USFWS Endangered Species office in Grand Island, Nebraska (308 382-6468, Ext. 19).

It is very important to correctly interpret this sighting data. The data set is based on about 2,000 confirmed sightings collected over the past 47 years that was originally analyzed by Austin and Richert (2001)**.** Please note how limited the data set is. Most whooping cranes complete the migration without ever being reported. As a ballpark figure, we get reports on less than 10% of all stopovers. In addition, there are now roughly 4 times as many whooping cranes as there was when the sightings began being collected in 1975, so today there are more stopovers. Every whooping crane makes approximately 12-15 stopovers during each 4,000 km (2,486 mi) migration (Kuyt 1992). With current whooping crane numbers, I have estimated there are about 2,000 whooping crane stopovers annually <u>if</u> we knew where every whooping crane stopped. Thus, the accumulated 47-year data set represents about 1 year of stopovers. Just having one known whooping crane stopover in a county in the data set roughly means that you can expect at least one whooping crane group to stop in that county in any given year. That is quite different from a consultant concluding from a single data point in the data set

"…that there has only been one documented sighting ever of whooping cranes in a particular county". In addition, locations in counties to the north and south of a proposed wind farm location are a strong indication that the site is within the whooping crane migration corridor, even if there has never been a documented sighting in a particular county.

## Whooping Crane Behavior and Habitat Use in Migration

Whooping cranes spend approximately 3 months annually in migration. Whooping cranes use migration stopover habitat opportunistically. Whooping cranes often do not use traditional roost sites, but stop wherever they happen to be late in the day when they find conditions no longer suitable for migration. Although some areas are used regularly by multiple whooping cranes, the possibly more common situation is to have a few cranes stopping at a small wetland or farm pond for a night at a location that they may never use again in their life time. Migration flights usually take place from about 0930 AM until about 5 PM. At that time, thermal currents are dying out, and the birds quickly tire of flapping flight and will soon look for suitability stopover habitat close to wherever they happen to be. This can make for a very unpredictable pattern of stopover use depending on daily weather conditions. Given this opportunistic use of habitat, the Platte River Cooperative Agreement has promoted the idea of having suitable whooping crane habitat located at 10-mile intervals along the Platte River. If carried out, whooping cranes crossing the Platte River would never have top fly more than 5 miles to find usable habitat. This provides a possible framework for planning for the amount of usable habitat needed throughout the whooping crane migration corridor. At a **minimum**, habitat complexes should be available every 10 miles.

Whooping cranes in migration are most vulnerable to collisions with structures early in the morning or late in the day when light levels are diminished as they fly at very low altitudes between roost and foraging sites. Although whooping crane migration flights are generally at altitudes of between 1,000 and 6,000 feet, whooping cranes will be flying at low altitude when starting or ending a migration flight, especially when thermal currents are minimal. Also, they occasionally interrupt daytime migration flights to drink and/or forage in an agricultural field or wetland for a brief period and thus can be at low altitudes during mid-day. They usually migrate during daylight hours but occasionally will fly during periods of darkness.

Whooping cranes use a variety of habitats during migration (Howe 1987, 1989, Lingle 1987, Lingle et al. 1991, Johns et al. 1997). Nine radio-tagged whooping cranes monitored for one or more seasons and others that associated with them fed primarily in a variety of croplands and wetlands, and roosted in palustrine (marshy) wetlands (Howe 1987, 1989). Seventy-five percent of the roosting wetlands were less than 4 ha in size and within 1 km of a suitable feeding site. More than 40% of the roosting wetlands were smaller than 0.5 ha. Johns et al. (1997) found that on average, wetlands used in Canada were larger than those of Howe (1987, 1989), with spring sites averaging 36 ha and fall sites averaging 508 ha in size. Cropland accounted for 70% of the feeding sites of non-families, but wetlands accounted for 67% of the feeding sites of families.

Clusters of migratory observations suggested relationships with large-scale spatial patterns in land cover (Richert et al. 1999, Richert and Church 2001). Areas characterized by wetland mosaics appear to provide the most suitable stopover habitat (Johns et al. 1997, Richert et al. *In press*). In states and provinces, excluding Nebraska, whooping cranes primarily used shallow, seasonally and semi-permanently flooded palustrine wetlands for roosting, and various cropland and emergent wetlands for feeding (Johns et al. 1997, Austin and Richert 2001).

During migration, whooping cranes often are recorded in riverine habitats, especially in Nebraska. Cranes can roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance (Armbruster 1990).

### Migration Habitat Management and Research

Suitable stopover habitat is necessary for the birds to complete their migration in good condition. There has been considerable alteration and destruction of natural wetlands, rivers, and streams, some of which had served as potential roosting and feeding sites for migrating cranes. There may be additional areas along the migration route that need to be delineated and protected.

The USFWS has funded studies of availability of suitable migration stopover habitat within the AWBP migration pathway in the United States (Stahlecker 1988, 1992, 1997a, 1997b). National Wetland Inventory (NWI) maps, used in conjunction with aerial photo maps and suitability criteria (Armbruster 1990), were poor predictors (33% correct) of suitable roosts in Oklahoma, but good predictors (97% correct) of unsuitability (Stahlecker 1992). NWI map review in Nebraska was a good predictor of both suitability (63% correct) and unsuitability (73% correct). Wetlands suitable for overnight roost sites for migrating whooping cranes were available throughout the migration corridor in the Dakotas and Nebraska (Stahlecker 1997a, 1997b), but may be limited in Oklahoma (Stahlecker 1992). Similar sampling to evaluate roost availability in Kansas and Texas should be conducted.

Richert (1999) used Geographic Information Systems (GIS) and remote sensing technologies to evaluate whooping crane stopover habitat in Nebraska. Confirmed whooping crane sightings, when compared with habitat selection, suggest that whooping cranes select roost habitat by recognizing local and larger-scale land cover composition. Habitat selection was influenced by social group, season, and landscape pattern (Richert 1999).

## Whooping Cranes and Wind Turbines

It is unknown how whooping cranes will react to large wind turbines. In the worst case scenario, there could be direct mortality, especially when whooping cranes occasionally fly at night or fly when visibility is limited by bad weather. Although whooping cranes generally migrate above the height of wind turbines, the cranes stop daily for food and for roosting at night. They often will make low flights of up to 2 miles from a roost site to forage late in the day or first thing in the morning. When the weather is unfavorable for migration, whooping cranes may remain at a stopover site for a few days to a few weeks. Their potential vulnerability to wind turbines is presumably mostly associated with this activity at migration stopover points.

In a less worrisome scenario, whooping cranes may mostly avoid wind turbines and not use stopover habitat located in wind farms areas. However, in this scenario, construction of wind farms would be removing stopover habitat from the species, a form of "take" which would negatively impact the species.

Wind turbine companies must avoid "take" of whooping cranes. Placing a wind farm within the main whooping crane migration corridor increases the risk that a whooping crane may collide with a structure and be killed. If a whooping crane were to be killed by a wind turbine, the USFWS might call for the wind farm to cease operations during the spring and fall migration periods of the whooping cranes. These migration periods are prolonged, lasting 2 months in the fall and about 6 weeks in the spring. One should factor in the scenario of a possible required cessation of operations when selecting a wind farm site. In addition, it may turn out that whooping cranes will tend to avoid wind farm sites. In that scenario, construction of the wind farm may be taking away stopover habitat from the species.

Another key factor associated with wind farms is power line construction. Power lines are known to be the highest known cause of mortality of fledged whooping cranes. There have been 45 documented instances of whooping cranes killed colliding with power lines in North America (Stehn and Wassenich, In Press). Wind farm impacts to whooping cranes must consider both power lines on-site, and also any new transmission lines constructed or anticipated to be proposed to transport the produced electricity to population centers. On-site, USFWS recommends that all power lines at wind farm sites be buried underground. Any new transmission lines anywhere in the 200-mile wide whooping crane migration corridor need to be marked according to USFWS recommendations that are based on "*Avian Power Line Interaction Committee (APLIC) 1994. Mitigating bird collisions with power lines: the state of the art in 1994. Edison Electric Institute. Washington, D.C. 99 pp.*" However, although marking lines will reduce collision mortality for cranes and other large birds between 53-89%, an average of about 60-70 % can be anticipated. Thus, even when lines are marked, some whooping crane mortality will still occur. It is important for whooping cranes that the number of collisions with power lines does not increase. Thus, construction of every mile of new marked line should be matched by marking up to 1 mile of existing line so that the net rate of collisions on all lines will actually decrease. This practice would insure that new line construction will not result in a net increase of whooping crane mortality and could be a basis for a Habitat Conservation Plan for the Wind Power industry for whooping crane issues. Completion of an HCP would protect wind power companies by granting them an incidental take permit for whooping cranes if one were to be struck by a wind turbine or a result of "take" of habitat from the placement of multiple turbines. Without an HCP being done, it is my understanding that companies cannot obtain an incidental take permit unless they go through formal consultation under the Endangered Species Act.

Data has shown that the proximity of power lines to locations where birds are landing and taking off is critical (Lee 1978, Thompson 1978, Faanes 1987). Power lines dividing wetlands used for roosting from grain fields used for feeding caused the most collisions for cranes because these circumstances encouraged crossing the lines at low altitude several times each day (Brown et al. 1987). Cranes frequently flew 10-15 m (33-49 ft) above the ground between fields; as a consequence, 12-m-high (39 ft) transmission lines obstructed their typical flight path. No sandhill crane or waterfowl collisions were observed where distances from power lines to bird use areas exceeded 1.6 km (1 mi) (Brown et al. 1984, 1987). Wind turbines are many times higher than the tallest transmission lines. Thus, I anticipate that any crane use occurring within 5 miles of a wind turbine could result in direct take as the cranes make local flights or start or end migration flights. Wind farms should not be constructed in areas with a wetland mosaic suitable for whooping cranes to use.

An assessment of turbines on whooping cranes needs to include the following factors:

1. Location of the proposed wind farm compared to the 100-mile and 200-mile whooping crane migration corridor.

2. Analysis of documented sightings in the county and surrounding counties where the turbines will be located.

3. Document presence of whooping crane stopover habitat within a 10-mile radius of every turbine. Look for suitable shallow wetlands including marshes, small ponds, dugouts, lake edges, or rivers free from human disturbance such as nearby roads or buildings. Assess whether there is lots of suitable stopover habitat in the general area in that area of a county, or is the proposed wind farm site the only suitable whooping crane stopover habitat for miles around.

4. Use sandhill cranes as a surrogate species to assess impacts of development. This is important because with low whooping crane numbers limiting sample size, sandhills can be used as an indicator of potential presence of whooping cranes. Whooping cranes often select stopover habitat based on the presence of sandhills. If there are any known sandhill crane roosts or foraging sites near a development site, one can expect whooping cranes to stop at those locations also. Document and/or assess sandhill crane use (flyovers and stopovers) of the wind farm and nearby areas.

5. Determine what new power line construction is needed in association with the wind farm. Are power lines between turbines going to be placed underground? One needs to also assess new power lines needed to transport power from the wind farms to urban areas, not just power lines on the site of the wind farm. How much mortality of whooping cranes would be anticipated from all new power lines?

6. Analyze the totality of proposed wind farms in a particular portion of the migration corridor. If it turns out whooping cranes mostly avoid wind farms and nearby habitat,

will there be sufficient habitat remaining without wind farms for the whooping cranes to find stopover habitat?

**Note: Lit. Cited below is incomplete. You can find the citations in the Lit. Cited section in the new whooping crane recovery plan published in May, 2007.**

## Literature Cited


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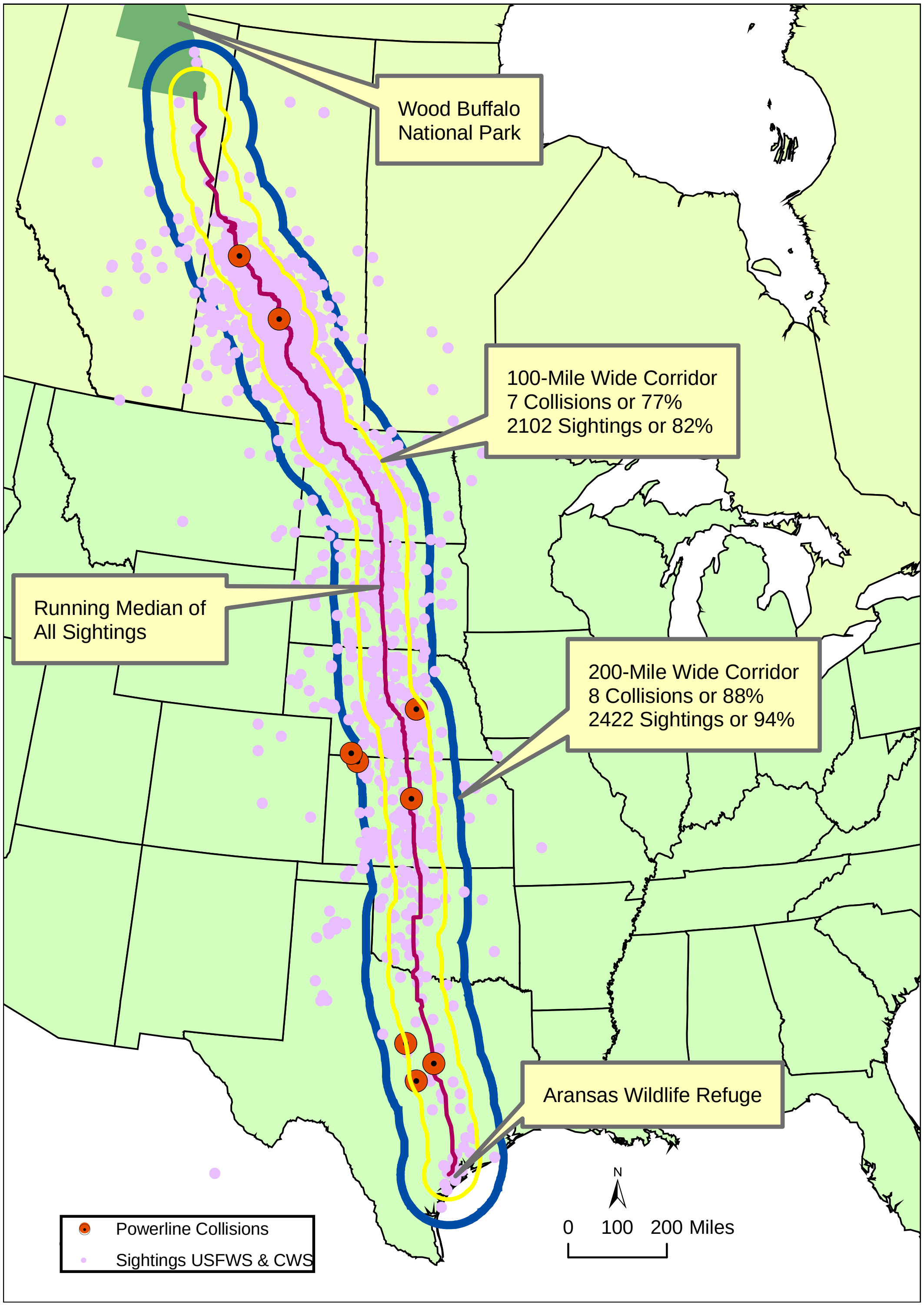


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