

**Small Bird Research and Nesting Bird Research for the Cross Winds Wind Energy
Site: Summary of Spring and Summer 2012 Field Seasons**



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Executive summary

Many areas in Michigan possess winds adequate for the efficient generation of wind energy. These areas have also been documented to provide habitat for wildlife, including migratory songbirds and raptors. Avian collisions with wind turbines have been documented in the Midwest, but the frequency of those collisions is site and situation specific. Informed siting of wind turbines can minimize impacts to birds. In addition to collision risks, some grassland or open-land nesting bird species are not adapted to nesting near any tall structures, including a wind turbine, and can be displaced. Due to the potential for avian collisions with wind turbines or turbine related avian displacement from nesting areas, we conducted avian surveys to better understand the densities of birds in the Project Area, as well as the species composition. These data have the potential to help wind energy developers and resource managers make appropriate decisions regarding the potential impacts to birds and the methods by which they might reduce those impacts.

In an effort to quantify the songbird use of the Study Area, we collected point count data to estimate migratory (April and May) and breeding (June) bird densities in 2012. We also searched the Project Area on 17 April 2012 for raptor nests and the presence of threatened and endangered species. We found five active Red-tailed Hawk nests and 2 Bald Eagle nests. Several of the grassland / open land species observed in the Project Area may be sensitive to the presence of tall structures in their breeding habitats, potentially forcing their displacement. Much of the Project Area is planted in row crops and agricultural fields. Focusing turbine construction in these areas may minimize the impact to the species sensitive to the presence of tall structures in grasslands, pastures, hayfields, and herbaceous wetlands. Bird densities were higher at point counts located within 3 km of the lakeshore. The Project Area currently focuses on developing areas more distant from the lakeshore than 3 km.

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Introduction

Many areas in Michigan possess the quality of winds necessary for the efficient generation of wind energy. These areas have also been documented to provide habitat for wildlife, including songbirds and raptors. Avian collisions with wind turbines in North America have been documented but the frequency of those collisions is site and situation specific. Songbird collisions with turbines, as well as with other tall structures, are related to the presence of lighting systems on the structure and the characteristics of the lighting systems (Gehring et al. 2009). Songbirds can become attracted to non-blinking lights, especially during nocturnal migration; thereby, increasing their risk of collision with any structure illuminated with these types of lights. Most turbines are lit with Federal Aviation Administration recommended blinking lights or left unlit; which decreases the likelihood of songbirds becoming attracted into the site (Kerlinger et al. 2011). Birds that use the airspace within the rotor swept area of a turbine are at risk of a collision and therefore the frequency of avian collisions at turbine sites can be directly correlated to the density and behavior of birds in the local area.

In addition to collision risks, some grassland or open-land nesting bird species are not adapted to nesting near any tall structure, including a wind turbine (Strickland 2004). These species can be displaced from traditionally used open areas upon construction of a nearby wind turbine (Leddy et al. 1999, Strickland 2004, Guarnaccia and Kerlinger 2007).

Due to the potential for avian collisions with wind turbines or turbine related avian displacement we conducted avian surveys to better understand the densities of birds in the area as well as the species composition and habitat use. These data will help wind energy developers and resource managers to make appropriate decisions regarding the potential impacts to birds and the methods in which they might reduce those impacts.

Study Site and Methods

Study site and description

Research was conducted in the Project Area within Tuscola and Huron Counties, located in east-central Michigan, USA (Fig. 1). The land use / land cover of the Project Area consists mainly of agricultural fields (e.g, corn, soybeans, and sugar beets), with some pastures, forested areas, fencerows, and some small wetlands. The natural vegetation in this area is generally described as mesic forests, and wet forests. The forest overstory typically includes components of maple (*Acer* spp.), oak (*Quercus* spp.), ash (*Fraxinus* spp.) and beech (*Fagus grandifolia*). Historically, the eastern inland portion of the Project Area was vegetated with beech-sugar maple forest mixed with black ash swamps. The western portion was predominantly mixed hardwood swamp and areas of mixed conifers with hemlock-white pine. The majority of these areas are now drained for agricultural use (Comer et al. 1995). The western edge of the Project Area is approximately 3.5 km (2.0 miles) from the Lake Huron lakeshore (i.e., Saginaw Bay), which is considered by some to be a concentration area for migratory birds. Our Study Area includes the shoreline areas thereby providing a thorough survey effort.

Methods

Migratory bird and breeding bird surveys

In an effort to quantify the songbird use of the Project Area, we collected data using methods similar to those used in studies estimating breeding bird densities (Reynolds 1995, Johnson et al. 2000). Fifteen point count locations were established within the Project Area (Fig. 1). Surveys were conducted four-five times during the spring 2012 migration season (April and May) and two times in the breeding season of 2012 (June).

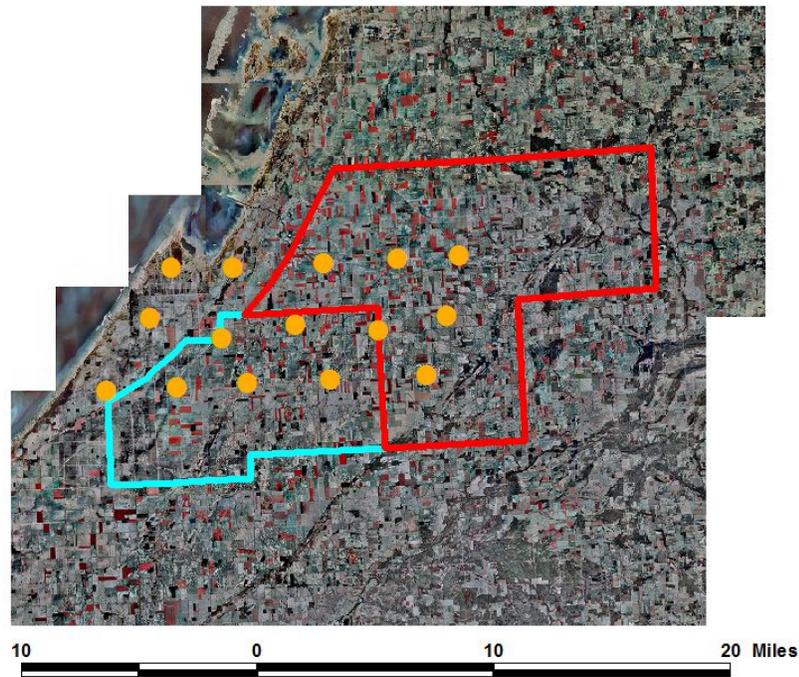


Figure 1. The Cross Winds Project Area in east-central Michigan and is predominantly agricultural lands with some interspersed forested areas. Point count sites were established and surveyed in the spring (migration) and summer (breeding) of 2012. Blue lines designate phase 1 and red is phase 2 of the project.

Surveys at point count sites were seven min. long (after two minutes of silence) and conducted between 15 minutes before sunrise and 1030 AM EST. Technicians recorded the following data: date, survey start time, temperature, wind speed, wind direction, cloud cover. Each individual bird observed during a survey was recorded by species, as well as the azimuth to the bird, gender (if known), distance from the observer, estimated flight height (if applicable), and other comments.

Aerial large bird surveys

We conducted aerial nesting surveys on 17 April 2012. The entire Project Area was visually searched for raptor activity / nests using aircraft. Transects were flown each spaced 1 km apart and running north and south over the Project Area and in a 2-km buffer around the Project Area. We flew between 77 - 92 m above ground level, at approximately 145-160 km / hr. Surveys were conducted when winds were less than 32 km / hr, and when skies were clear and without fog. Follow up ground visits were made to those nests where birds were not seen from the air for verification of species and use status of the nest structure.

Results and Summary

Migratory bird surveys

We visited 15 point counts in the Cross Winds Project Area four-five times during the spring of 2012 (April- May). Surveys of point count stations detected 1907 birds of 77 species (Table 1, Appendix A). We detected a mean of 26.9 birds per point count visit (mean of 1 species / survey; Table 1).

The three most abundant bird groups per survey were the blackbirds (5.8 birds / survey), followed by waterbirds (3.2 birds / survey), and then swallows tied with invasives (species not native to the area and invasive, commonly found in areas intensely disturbed by humans; 2.6 birds / survey, Table 2). These species groups are often associated with open / grassland / agricultural areas located near wetlands and large bodies of water that are found in the Project Area. The waterbirds were typically gulls and herons. The majority of the blackbirds and invasives detected in the Project Area were generalists or those species that select more open habitats as compared to more forest dwelling species within their respective taxonomic group. No federally listed species were observed in the Project Area during the songbird surveys. However, the following Michigan state listed species were detected: Bald Eagle (Special Concern), Black-crowned Night Heron (Special Concern), Caspian Tern (Threatened), and Northern Harrier (Special Concern) (Appendix A).

Several of the grassland / open land species observed in the Project Area may be sensitive to the presence of tall structures in their breeding habitats, potentially forcing

their displacement. Those species in the Project Area that could be potentially sensitive to the construction of tall structures include: Red-winged Blackbird, Bobolink, Savannah Sparrow, Vesper Sparrow, Horned Lark, Indigo Bunting, and Song Sparrow. Those point counts where more than 3 of these sensitive species were detected are marked in Figure 2. Row crop agricultural fields would tend to have fewer of these sensitive species than pastures, and hayfields. Construction of wind turbines in the areas that support species sensitive to tall structures may result in these species avoiding areas previously utilized and relocating to new areas.

The Great Lakes shorelines are thought to be areas with high concentrations of migratory birds. Figure 3 delineates the relationship between the numbers of migratory birds detected during point counts and the distance to the lakeshore of each point count. These data suggest that there were more birds within 3 km (10,000 ft) of the shoreline. Point counts greater than 3 km from the shoreline had numbers of birds similar to one another and less than the areas closer to the shoreline. The Project Area is delineated as being greater than 3 km from the shoreline, which will likely minimize an increased avian collision rate that could be present in areas closer to the shoreline.

Overall, most of the species of birds detected in the Project Area were habitat generalists and fairly common in the region. Of those species that are less common in the region avoidance of grassland areas and shoreline areas would minimize their loss.

Table 1. Avian abundance and richness in the Cross Winds Project Area proposed for the development of wind energy. Data were collected in the spring (migration) and summer (breeding) of 2012 at point count sites.

	Migratory	Breeding
No. Species	77	53
Mean No. Individuals / Survey	26.9	30.5

Table 2. Mean bird abundance in the Cross Winds Project Area proposed for the development of wind energy. Data were collected in spring (migratory) and summer (breeding) 2012 at point count sites.

Group	Mean Abundance ^a	
	Migratory	Breeding
Blackbirds	5.8	4.7
Finches/Buntings	0.8	0.9
Corvids	1.0	0.6
Doves	1.1	1.4
Flycatchers	0.2	0.3
Raptors	0.2	0.1
Invasives	2.6	5.1
Larks	1.2	1.0
Other Passerine	0.5	0.7
Pheasant/quail/turkey	0.3	1.7
Shorebirds	0.5	0.6
Sparrows	2.4	1.7
Swallows/Swifts	2.3	3.9
Thrushes	1.5	1.0
Waterbird	3.2	6.6
Waterfowl	1.9	0.0
Warblers	0.7	0.5
Woodpeckers	0.3	0.1

^a Mean Abundance = mean number of individuals observed per survey

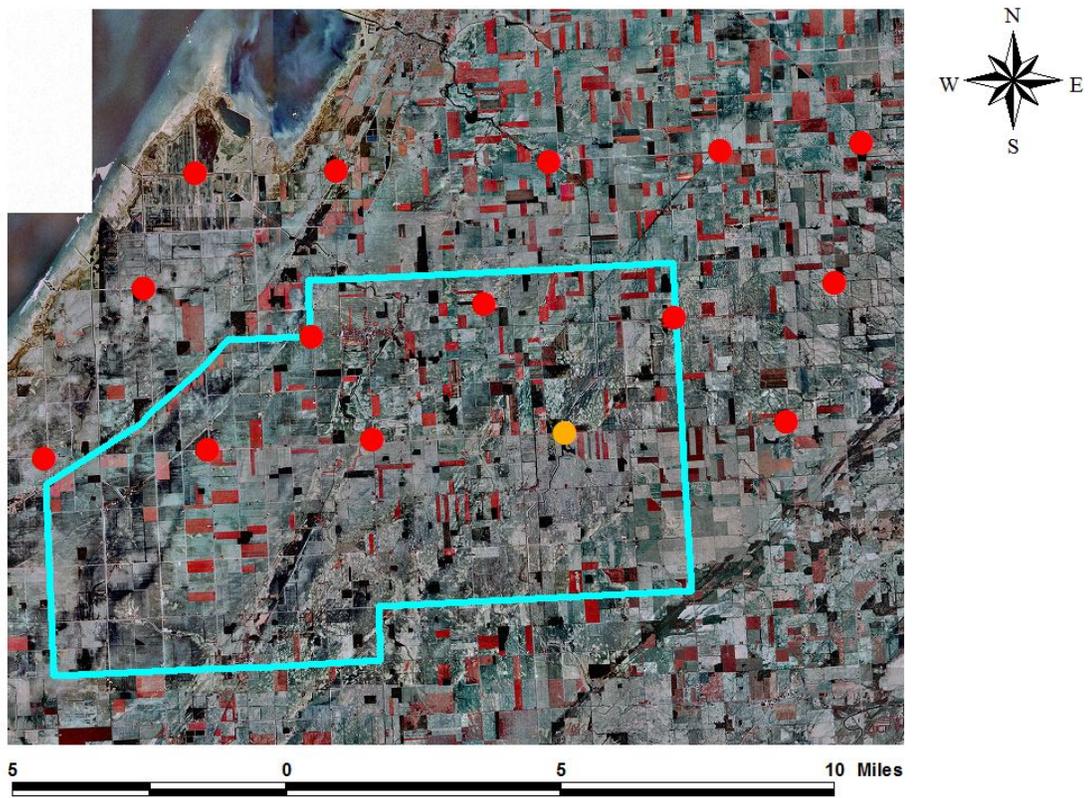


Figure 2. The Cross Winds Project Area in east-central Michigan and is predominantly agricultural lands with some interspersed forested areas. Point count sites were established and surveyed in the spring and summer of 2012 for migratory and breeding bird use, respectively. Red dots designate the point counts where 3 or more species of birds that are potentially sensitive to tall structures, such as wind turbines, in their habitat. The orange dot designates the point count where no sensitive species were detected.

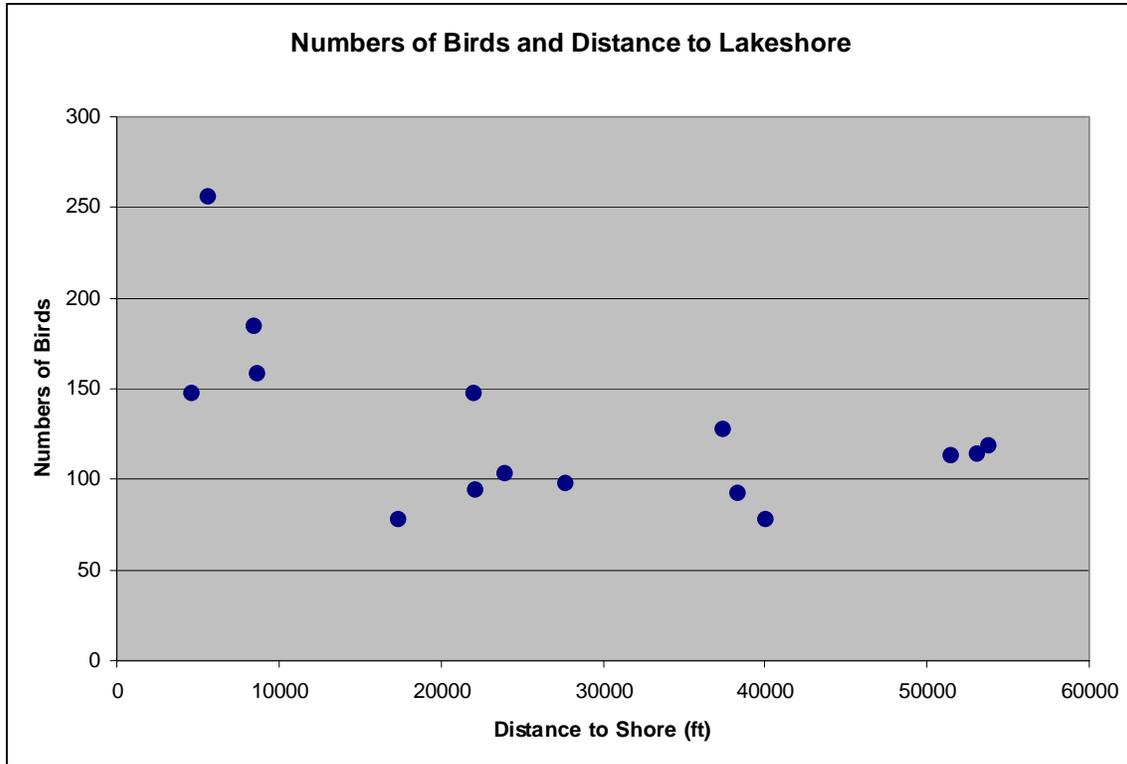


Figure 3. The Cross Winds Project Area in east-central Michigan and is predominantly agricultural lands with some interspersed forested areas. Point count sites were established and surveyed in the spring of 2012 for migratory bird use. More birds were detected at point counts sites approximately closer than 3 km (10,000 ft) to the lakeshore.

Breeding bird surveys

We visited 15 point counts in the Cross Winds Project Area two times during the summer of 2012 (June). Surveys of point count stations detected 914 birds of 53 species (Table 1, Appendix A). We detected a mean of 30.5 birds per point count visit (mean of 2 species / survey; Table 1).

The three most abundant bird groups per survey were the waterbirds (6.6 birds / survey), followed by invasives (species not native to the area and invasive, commonly found in areas intensely disturbed by humans; 5.1 birds / survey), and then blackbirds (4.7 birds / survey, Table 2). These species groups are often associated with open / grassland / agricultural areas located near wetlands and large bodies of water that are found in the Project Area. The waterbirds were typically gulls and herons. The majority of the blackbirds and invasives detected in the Project Area were generalists or those

species that select more open habitats as compared to more forest dwelling species within their respective taxonomic group. No federally listed species were observed in the Project Area during the songbird surveys. However, The following Michigan state listed species were detected: Bald Eagle (Special Concern), Black-crowned Night Heron (Special Concern), and Northern Harrier (Special Concern) (Appendix A).

Several of the grassland / open land species observed in the Project Area may be sensitive to the presence of tall structures in their breeding habitats, potentially forcing their displacement. Those species in the Project Area that could be potentially sensitive to the construction of tall structures include: Red-winged Blackbird, Bobolink, Savannah Sparrow, Vesper Sparrow, Horned Lark, Indigo Bunting, and Song Sparrow. Those point counts where more than 3 of these sensitive species were detected are marked in Figure 2. Row crop agricultural fields would tend to have fewer of these sensitive species than pastures, and hayfields. Construction of wind turbines in the areas that support species sensitive to tall structures may result in these species avoiding areas previously utilized and relocating to new areas.

The Great Lakes shorelines are thought to be areas with high concentrations of migratory birds, however it is unknown if that trend is present for breeding birds. Figure 4 delineates the relationship between the numbers of breeding birds detected during point counts and the distance to the lakeshore of each point count. These data suggest that while there were more birds within 3 km (10,000 ft) of the shoreline, the relationship was less than during the migration season. Again, the distance from the lakeshore to the Project Area will likely minimize an increased avian collision rate that could be present in areas close to the shoreline.

Overall, most of the species of birds detected in the Project Area were habitat generalists and fairly common in the region. Of those species that are less common in the region avoidance of grassland areas and shoreline areas would minimize their loss.

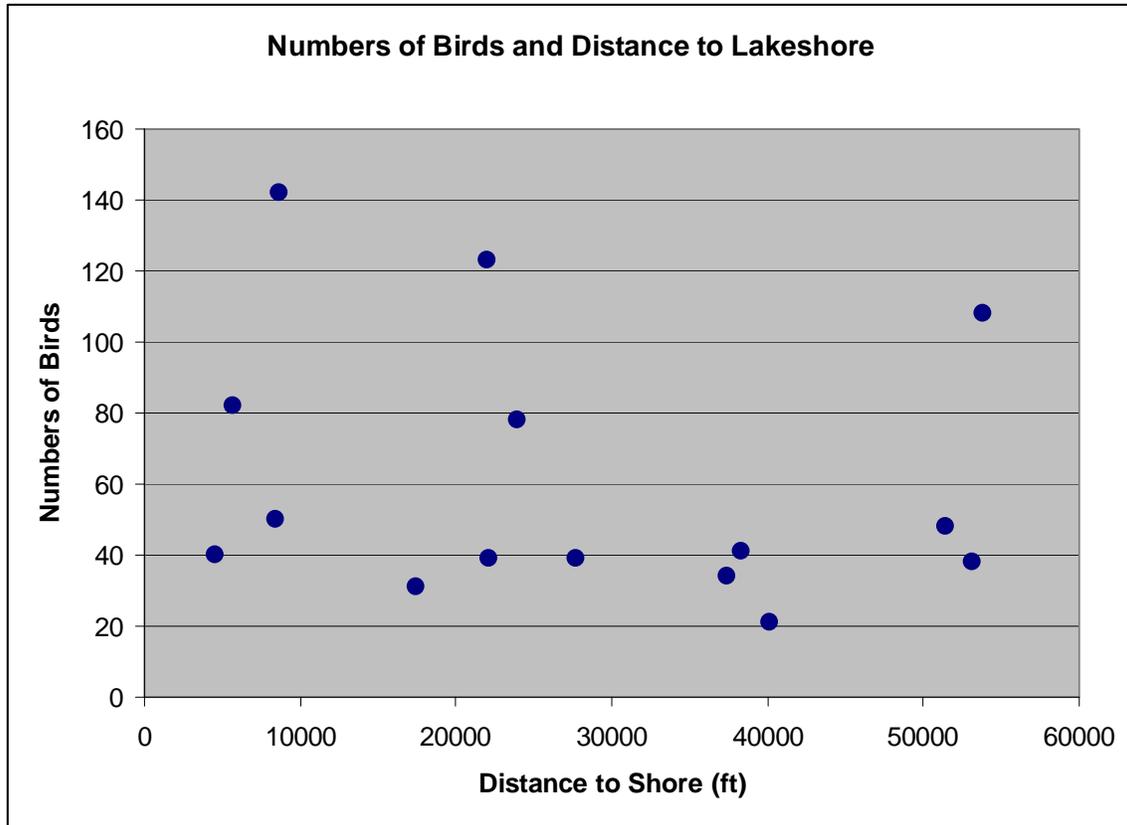


Figure 4. The Cross Winds Project Area in east-central Michigan and is predominantly agricultural lands with some interspersed forested areas. Point count sites were established and surveyed in the summer of 2012 for breeding bird use. More birds were detected at point counts sites approximately closer than 3 km (10,000 ft) to the lakeshore, but the relationship was not as strong as during the migration season.

Aerial nesting bird surveys

In 2012 we detected five active Red-tailed Hawk nests and two Bald Eagle nests in the Project Area and its buffer area (Fig. 5). Raptors often reuse nests for many years; therefore, Red-tailed Hawk and Bald Eagle nests from both 2011 and 2012 should be buffered from development. The radius of buffers around Bald Eagle nests should be

discussed with the United States Fish and Wildlife Service.

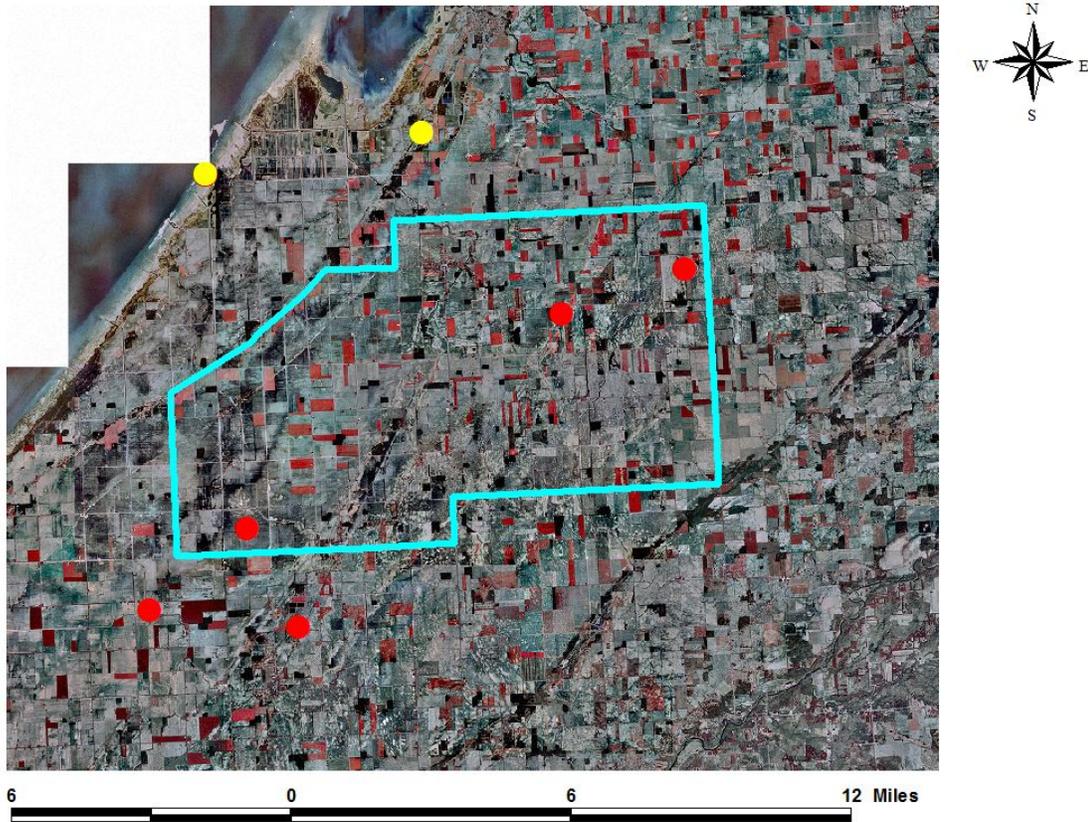


Figure 5. Nests of Red-tailed Hawks (red) and Bald Eagles (yellow) were detected in the Cross Winds Project Area proposed for wind energy development and its 2-km buffer. Blue lines designate the Project Area.

Conclusions

The Cross Winds Project Area is predominantly agricultural fields (e.g., corn, soybeans, and sugar beets), with some grassy pastures and waterways as well as woodlots, fencerows, and ponds. The Saginaw Bay shoreline and the Fish Point Wildlife Area contain unique natural habitats; however, the agricultural landscape in the Project Area generally reduces the likelihood of the presence of rare species of birds. Surveys conducted during the 2012 nesting period did not detect any Federally threatened or endangered avian species in the Project Area; however, the following Michigan state listed species were detected: Bald Eagle (Special Concern), Black-crowned Night Heron (Special Concern), Caspian Tern (Threatened), and Northern Harrier (Special Concern) (Appendix A).

Point counts in the breeding season detected several species that are potentially sensitive to the construction of tall structures in their breeding habitat. When the specific turbine array is designed for the Project Area, grassland areas should be buffered by at least 180 m (Guarnaccia and Kerlinger 2007). Figure 5 identifies nesting raptors. Ideally, non-eagle nests should be buffered by at least 0.5 miles, based on the recommendation for nesting non-eagle raptors (http://www.fws.gov/windenergy/docs/Raptor_Nest_Searches.pdf). Due to the presence of Bald Eagle nests near the Project Area, I suggest that Consumers Energy continue working with the United States Fish and Wildlife Service in consideration of these records and the appropriate buffer distance. Nest surveys from 2011 should also be buffered in the turbine array plan.

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Appendix A. List of bird species observed during bird surveys conducted in the Cross Winds Project Area. This site was surveyed in 2012 for bird use.

Species ^a	AOU code	Status
Mallard	MALL	
Black Duck	BLDU	
Bufflehead	BUFF	
Wood Duck	WODU	
Canada Goose	CANG	
Double-crested Cormorant	DCCO	
Black-crowned Night Heron	BCNH	Michigan Spp. of Sp. Concern
Great Blue Heron	GBHE	
Great Egret	GREG	
Sandhill Crane	SACR	
Killdeer	KILL	
Spotted Sandpiper	SPSA	
Herring Gull	HERG	
Ring-billed Gull	RBGU	
Caspian Tern	CATE	Michigan Threatened Spp.
Red-tailed Hawk	RTHA	
Bald Eagle	BAEA	Michigan Spp. of Sp. Concern
Northern Harrier	NOHA	Michigan Spp. of Sp. Concern
Turkey Vulture	TUVU	
Great-horned Owl	GHOW	
Northern Bobwhite	NOBO	
Ring-necked Pheasant	RNEP	
Wild Turkey	WITU	
Mourning Dove	MODO	
Rock Pigeon	ROPI	
Northern Flicker	NOFL	
Red-bellied Woodpecker	RBWO	
Hairy Woodpecker	HAWO	
Yellow-bellied Sapsucker	YBSA	
White-breasted Nuthatch	WBNU	
Belted Kingfisher	BEKI	
Whip-poor-will	WPWI	
Barn Swallow	BARS	
Tree Swallow	TRES	
Chimney Swift	CHSW	
American Crow	AMCR	
Blue Jay	BLJA	
American Robin	AMRO	
Eastern Bluebird	EABL	
Hermit Thrush	HETH	
Gray Catbird	GRCA	
Brown Thrasher	BRTH	
Northern Mockingbird	NOMO	

European Starling	EUST
Black-capped Chickadee	BCCH
Tufted Titmouse	TUTI
House Wren	HOWR
Horned Lark	HOLA
Warbling Vireo	WAVI
Common Yellowthroat	COYE
Yellow Warbler	YWAR
Myrtle Warbler	MYWA
Nashville Warbler	NAWA
Northern Waterthrush	NOWA
Orange-crowned Warbler	OCWA
Pine Warbler	PIWA
Parula Warbler	PAWA
Wilson's Warbler	WIWA
Eastern Kingbird	EAKI
Eastern Phoebe	EAPH
Eastern Wood-peewee	EAWP
Great-crested Flycatcher	GCFL
Least Flycatcher	LEFL
Bobolink	BOBO
Red-winged Blackbird	RWBL
Common Grackle	COGR
Baltimore Oriole	BAOR
Brown-headed Cowbird	BHCO
Red-breasted Grosbeak	RBGR
Northern Cardinal	NOCA
Indigo Bunting	INBU
American Goldfinch	AMGO
House Finch	HOFI
Cedar Waxwing	CEDW
Chipping Sparrow	CHSP
Clay-colored Sparrow	CCSP
Field Sparrow	FISP
Fox Sparrow	FOSP
Savannah Sparrow	SAVS
Song Sparrow	SOSP
Swamp Sparrow	SWSP
Vesper Sparrow	VESP
House Sparrow	HOSP
White-crowned Sparrow	WCSP

^a names of birds follow the AOU Check-list of North American Birds