

Breeding Bird Research for the Crosswinds Wind Energy Site: Summary of Fall Migration 2011 Field Season



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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 migrant songbird use of the Project Area, we collected point count data to estimate bird densities in September - November 2011. We also searched the Saginaw Bay shoreline of the Project Area via aircraft to quantify the waterfowl and waterbird use. Several of the grassland / open land species observed in the Project Area are thought to be sensitive to the presence of tall structures in their breeding habitats, potentially forcing their displacement. The majority of the Project Area is planted in row crops and agricultural fields that would tend to have fewer of those species sensitive to the presence of tall structures than those species found in grasslands, pastures, hayfields, and herbaceous wetlands.

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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 or using areas near any tall structure, including a wind turbine (Strickland 2004). These species can be displaced from traditionally used 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 County, 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 Project Area is approximately 0-20 miles from the Lake Huron lakeshore (i.e., Saginaw Bay), which is considered to be a concentration area for migratory birds.

Migrating bird surveys

In an effort to quantify the migrant 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). Sixteen point count locations were established within the Project Area (Fig. 1). Surveys were conducted weekly in the fall of 2011 to focus on quantifying the birds migrating through the Project Area.



Figure 1. The Crosswinds 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 fall of 2011 for migrant bird use.

Surveys at point count sites were 7 min. long (after 2 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 shoreline bird surveys

We conducted aerial nesting surveys between 4 October and 11 November 2011. The entire Saginaw Bay shoreline of the Project Area was visually searched for birds using aircraft. Transects were flown each spaced 1 km apart and running northeast and

southwest over the shoreline of 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.

Results and Summary

Breeding bird surveys

We visited 16 point counts in the Crosswinds Project Area weekly during the fall of 2011. Surveys of point count stations detected 3412 birds of 54 species (Table 1, Appendix A). We detected a mean of 33.1 birds per point count visit (mean of 4.2 species / survey; Table 1).

The 3 most abundant bird groups per survey were the blackbirds (12.3 birds / survey), followed by equally abundant waterfowl and invasive (species not native to the area and invasive, commonly found in areas intensely disturbed by humans) species (5.2 birds / survey), and then larks; 1.7 birds / survey, Table 2). These species groups were consistent with the open / grassland / agricultural habitats found in the Project Area, as well as the proximity to the Saginaw Bay. 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. Three of the species detected in the Project Area are state listed species: American Bittern (Special Concern), Peregrine Falcon (Endangered), Grasshopper Sparrow (Special Concern).

Several of the grassland / open land species observed in the Project Area are thought to 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, Savannah Sparrow, Lincoln's Sparrow, Grasshopper Sparrow, and Song Sparrow. Figure 2 details which point count sites had 3 or more species believed to be sensitive to tall structures. 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.

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 would minimize their loss.

Table 1. Avian abundance and richness in the Crosswinds Project Area proposed for the development of wind energy. Data were collected in the fall of 2011 (migrating) at point count sites.

	Migration
No. Species	54
Mean No. Individuals / Survey	33.1
Mean No. Species/Survey	4.2

Table 2. Mean bird abundance in the Crosswinds Project Area proposed for the development of wind energy. Data were collected in the fall of 2011 (migrating) at point count sites.

Group	Mean Abundance ^a
Blackbirds	12.3
Finches/Buntings	0.9
Corvids	0.2
Doves	0.6
Flycatchers	0.0
Gull	0.7
Raptors	0.0
Invasives	5.2
Larks	2.3
Other Passerine	0.5
Shorebirds	0.4
Sparrows	1.5
Swallows/Swifts	0.6
Thrushes	0.6
Warblers	0.3
Waterbird	0.0
Waterfowl	5.2
Woodpeckers	0.1
Waxwing	0.1

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



Figure 2. The Crosswinds 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 fall of 2011 for migrant bird use. Yellow points signify locations where we observed 3 or more species sensitive to the presence of tall structures.

Aerial shoreline bird surveys

We detected 3,988 birds of 19 species during the aerial shoreline surveys (Fig. 3).

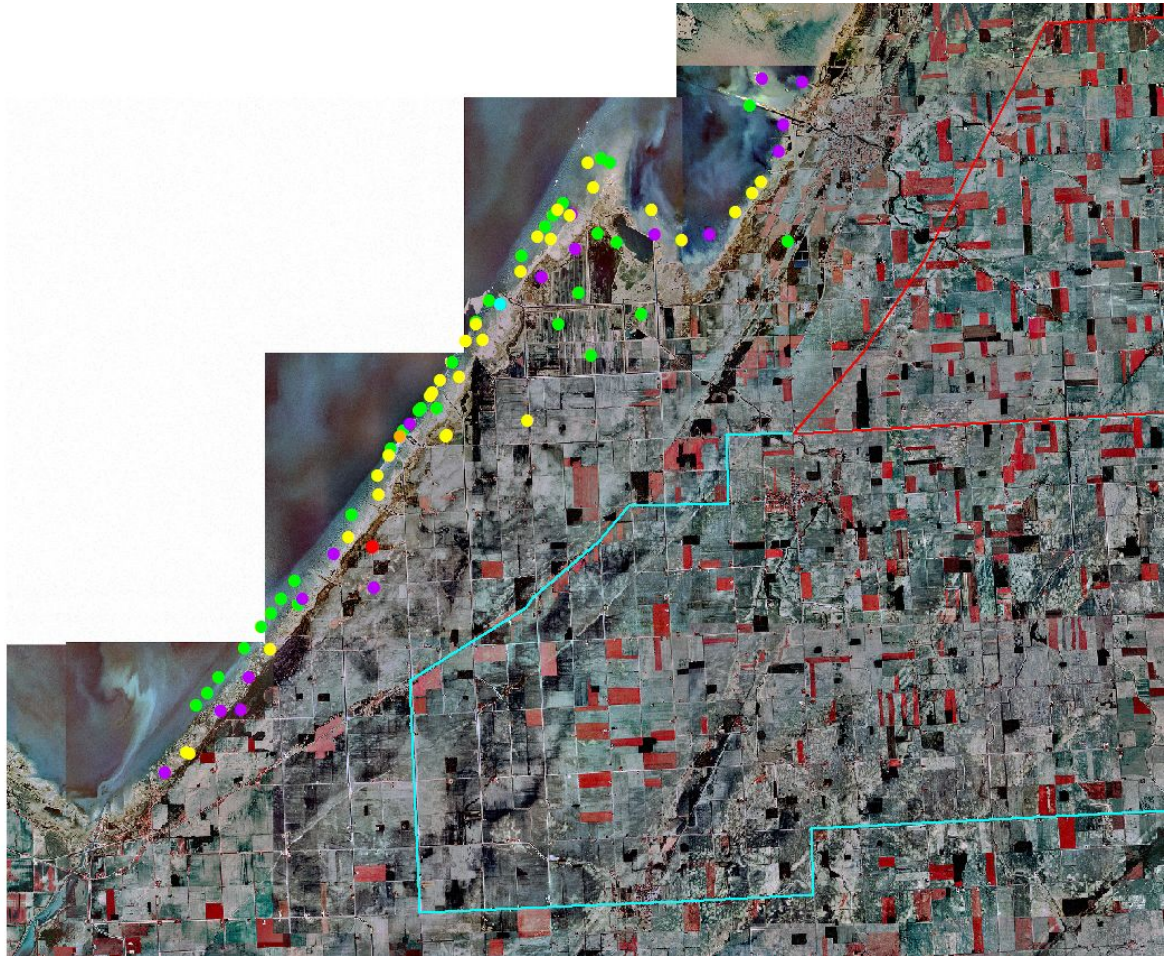


Figure 3. Fall 2011 observations of birds during aerial shoreline surveys in the Crosswinds Project Area proposed for wind energy development. Green designates waterfowl, yellow represents gulls, purple sites are shorebirds/waterbirds, and red, brown, and blue are American Crows, songbirds, and Bald Eagles, respectively.

Conclusions

The Crosswinds 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 2011 migration period detected several listed species in the Project

Area; specifically, American Bittern (state special concern), Peregrine Falcon (state endangered), Bald Eagle (state special concern), and Grasshopper Sparrow (state special concern).

Point counts in the migration season detected several species of grassland specialist birds. 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).

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Appendix A. List of bird species observed during bird surveys conducted in the Crosswinds Project Area. This site was surveyed in 2011 for bird use.

Species ^a	AOU code
American Bittern	AMBI
Bonaparte's Gull	BOGU
Ring-billed Gull	RBGU
Great Blue Heron	GBHE
Great Egret	GREG
Snowy Egret	SNEG
Sandhill Crane	SACR
Double-crested Cormorant	DCCO
Canada Goose	CAGO
Mallard	MALL
American Black Duck	AMBD
Northern Pintail	NOPI
Bufflehead	BUFF
Blue-winged Teal	BWTE
Golden-eye	GOLD
Mute Swan	MUSW
Tundra Swan	TUSW
Turkey Vulture	TUVU
American Kestrel	AM KE
Peregrine Falcon	PEFA
Bald Eagle	BAEA
Killdeer	KILL
Mourning Dove	MODO
Rock Pigeon	ROPI
Red-bellied Woodpecker	RBWO
Downy Woodpecker	DOWO
Yellow-shafted Flicker	YSFL
Barn Swallow	BARS
Cliff Swallow	CLSW
Tree Swallow	TRES
American Crow	AMCR
Blue Jay	BLJA
American Robin	AMRO
Gray Catbird	GRCA
European Starling	EUST
Tufted Titmouse	TUTI
Black-capped Chickadee	BCCH
Common Yellowthroat	COYE
Yellow Warbler	YWAR
Black-and-white Warbler	BAWW
Yellow-rumped Warbler	YRWA
Eastern Phoebe	EAPH
Red-winged Blackbird	RWBL

Appendix A continued.

Species ^a	AOU code
Brewer's Blackbird	BRBL
Common Grackle	COGR
Brown-headed Cowbird	BHCO
Northern Cardinal	NOCA
American Goldfinch	AMGO
House Finch	HOFI
Cedar Waxwing	CEDW
American Pipit	AMPI
Horned Lark	HOLA
Dark-eyed Junco	DEJU
Snow Bunting	SNBU
Golden-crowned Kinglet	GCKI
Chipping Sparrow	CHSP
Grasshopper Sparrow	GRSP
Savannah Sparrow	SAVS
Song Sparrow	SOSP
House Sparrow	HOSP
Lincoln's Sparrow	LISP
White-crowned Sparrow	WCSP
White-throated Sparrow	WTSP

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