

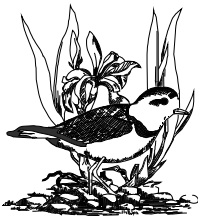
**Migratory and Breeding Bird Research for the Green River Proposed Wind Energy
Site: Summary of Spring and Summer 2011 Field Seasons**



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Executive summary

Many areas in Illinois 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 will help wind energy developers and resource managers to 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 Project Area, we collected point count data to estimate migratory bird densities in mid April – May 2011. We also searched appropriate habitats in the Project Area for the nests of the following focal species: Loggerhead Shrike (state-listed threatened), Upland Sandpiper (state-listed endangered), Northern Harrier (state-listed endangered), Short-eared Owl (state-listed endangered), Field Sparrow, and Bell's Vireo. None of the focal species were detected during the surveys in the Project Area; however, a Field Sparrow was detected during migration in the western portion of the Project Area and during the breeding season in the west central portion of the Project Area. We also found an active Red-tailed Hawk nest. 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. Row crop agricultural fields would tend to have fewer of those species sensitive to the presence of tall structures than those species found in pastures and hayfields.

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Introduction

Many areas in Illinois 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 migratory 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 lighting systems of the structure (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 which decreases the likelihood of songbirds becoming attracted into the site. 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 areas upon construction of a nearby wind turbine (Leddy et al. 1999).

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 Green River Project Area in Whiteside, Lee, and Bureau Counties, located in north-central Illinois, USA (Fig.1). The land use / land cover of the Project Area is predominantly agricultural fields (e.g, corn, soybeans, and wheat), with some grassy pastures and waterways as well as some forest patches, and ponds. The tree species in this area include: maple (*Acer* spp.), oak (*Quercus* spp.), and cottonwood (*Populus deltoides*). The topography is predominantly flat with historic oak savannahs and wetlands now drained for agricultural use. In the center of the Project Area is the Green River State Wildlife Area, which is managed for wetland habitats, as well as grasslands, and savannahs. Along the western boundary of the Project Area are the Foley Sand Prairie Nature Preserve and the Sand Prairie Habitat Area.

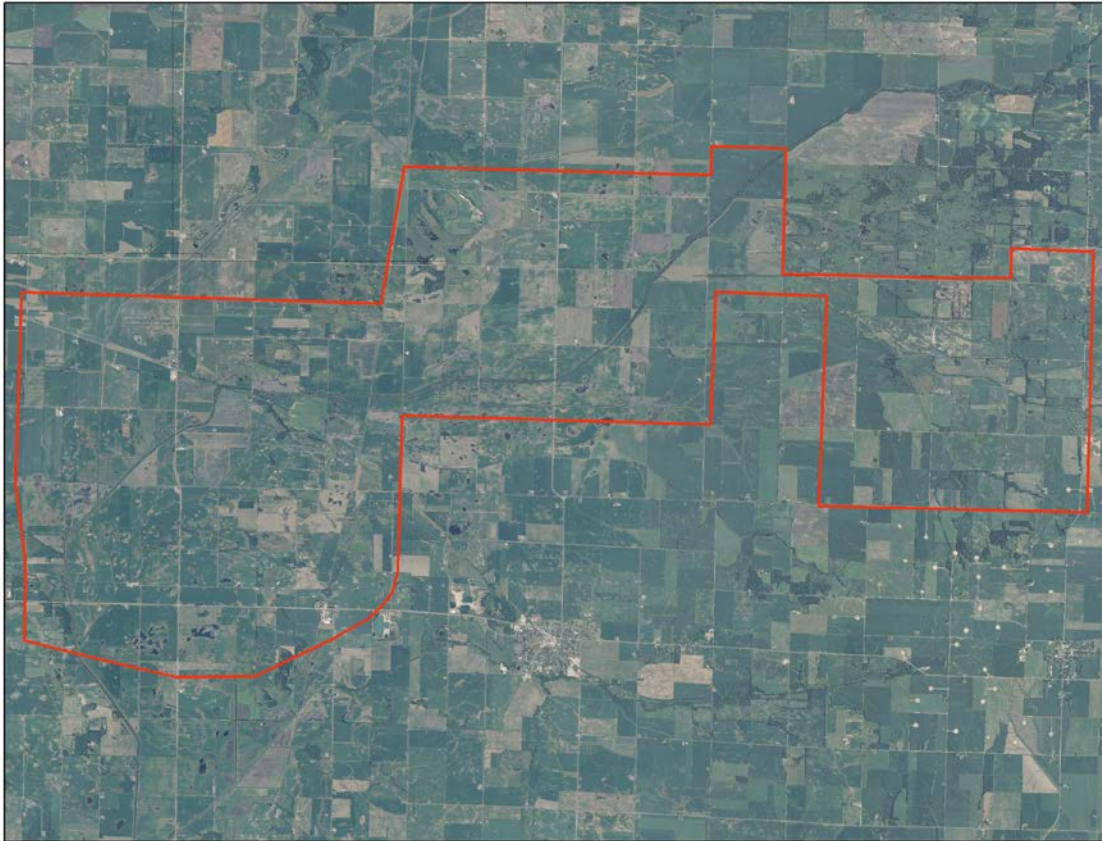


Figure 1. The Green River Project Area in Whiteside, Lee, and Bureau Counties, IL are predominantly agricultural lands with some interspersed grassland and forest woodlot areas.

Migratory 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). Ten point count locations were established within the Project Area (Fig. 2). Surveys were conducted 3 times between mid-April and the end of May 2011 to focus on the quantification of the birds migrating through the Project Area in the spring.

Surveys at point count sites were 7 min. long (after 2 minutes of silence) and conducted between 15 minutes before sunrise and 1030 AM CST. 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.

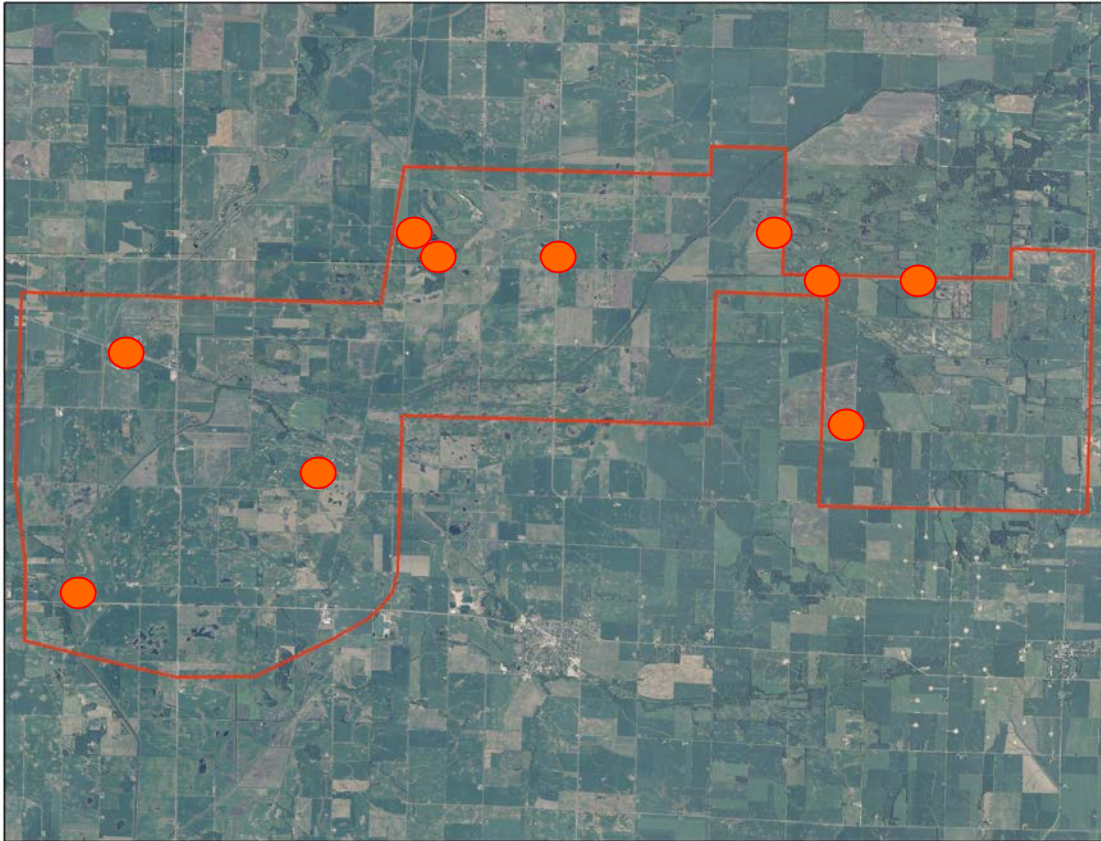


Figure 2. Point count sites were established in the Green River Project Area. Point count sites were surveyed in mid-April and May 2011 for migratory bird use.

Nesting bird surveys

Based on species-specific timing, we conducted nesting surveys between early May and early July 2011. We focused our efforts on determining general breeding bird diversity in the Project Area, raptors, and the following focal species: Northern Harrier, Upland Sandpiper, Loggerhead Shrike, Short-eared Owl, Field Sparrow, and Bell's Vireo. The entire Project Area was visually searched for raptor activity / nests and grassland and shrubland areas were searched for the presence and nesting behavior of rare species. Multiple visits to grassland areas occurred in order to consider and include the nesting phenology of all focal species. In addition, 6 7-minute point counts were conducted throughout the Project Area to quantify the species and density of nesting birds in a higher diversity of habitats (Fig 3).

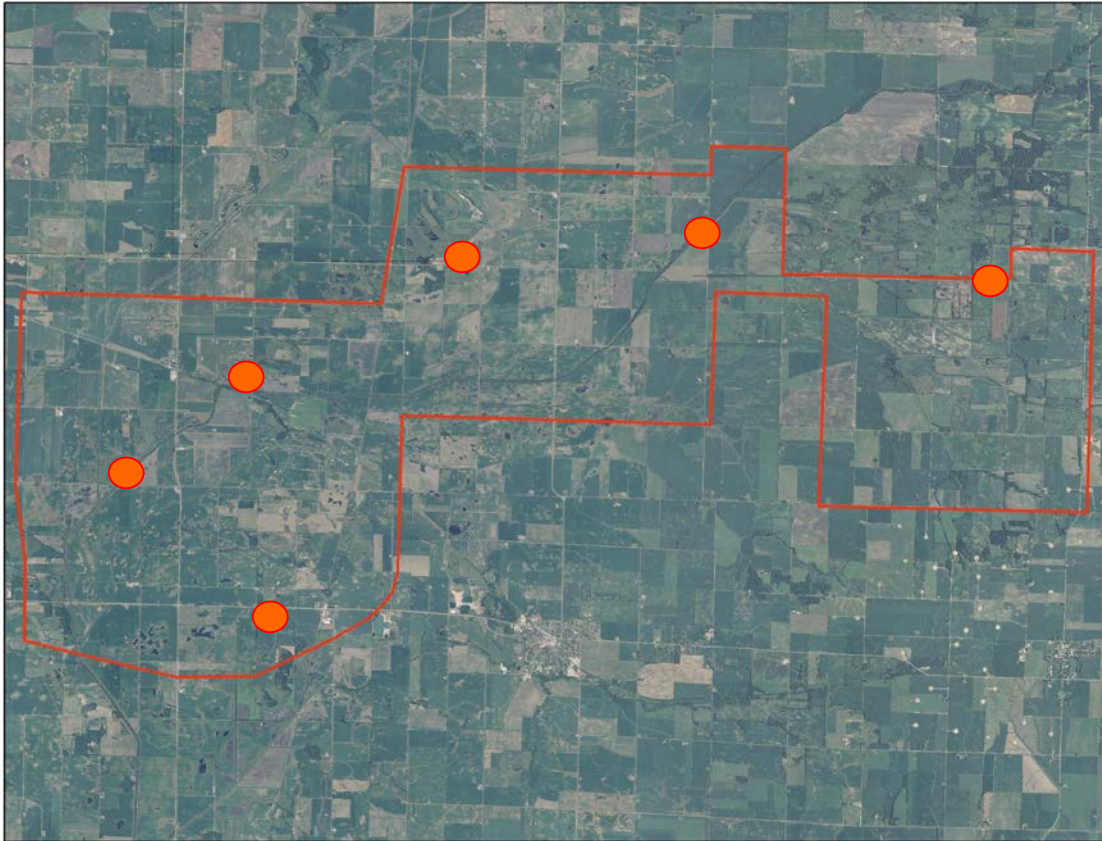


Figure 3. Point count sites were established in the Green River Project Area. Point count sites were surveyed in June and early July for breeding bird use.

Results and Summary

Migratory bird surveys

We visited 10 point counts in the Green River Project Area 3 times between 29 April and 21 May 2011. Surveys of point count stations detected 345 birds of 37 species (Table 1, Appendix A). We detected a mean of 11.5 birds per point count visit (mean of 9 species / survey; Table 1).

The 3 most abundant bird groups per survey were the blackbirds (8.0 birds / survey), followed by invasives (species not native to the area and invasive, commonly found in areas intensely disturbed by humans; 1.6 birds / survey), and waterfowl (1.4 birds / survey) (Table 2). These species groups were consistent with the open / grassland / shrubland habitats found in the Project Area. The majority of the blackbirds and waterfowl 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 state or federally listed species were observed in the Project Area during the spring migration study.

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, forcing their displacement. Those species in the Project Area that could be potentially sensitive to the construction of tall structures include: Red-winged Blackbird, Eastern Meadowlark, Western Meadowlark, Field Sparrow, Song Sparrow, Grasshopper Sparrow, Dickcissel, and Northern Bobwhite. The migration period point count locations where we detected 3 or more of those species are highlighted in Figure 4. The northern portions of the Project Area include a higher proportion of these point counts while the eastern and southern areas, that have more row crops, have a lower proportion. 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. Loss of foraging habitat to turbine avoidance has the potential to be mitigated via mowing delay agreements with owners of leased land. Specifically, a delay in mowing grass until the middle of June provides grassland nesting birds an opportunity to successfully forage during migration birds before the area is mowed resulting in habitat loss.

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 loss. In addition, a delay in mowing of all grassland areas in the Project Area has the potential to offset habitat loss near turbines and loss of individual birds due to direct collision with wind turbines.

Table 1. Avian abundance and richness in the Green River Project Area proposed for the development of wind energy. Data were collected in April - May 2011 (migration) and in June – early July 2011 (breeding) at point count sites.

	Migration	Breeding
No. Species	37	31
Mean No. Individuals / Survey	11.5	15.8
Mean No. Species/Survey	9.0	8.8

Table 2. Mean bird abundance in the Green River Project Area proposed for the development of wind energy. Data were collected in April - May 2011 (migration) and in June –July 2011 (breeding) at point count sites.

Group	Mean Abundance ^a	
	Migration	Breeding
Blackbirds	8.0	4.3
Buntings/Larks	0.1	0.8
Chickadees/Nuthatches	0.0	0.3
Corvids	0.4	0.2
Doves	0.3	0.8
Finches	0.8	2.0
Flycatchers	0.1	0.0
Grosbeaks	0.0	0.2
Hawks	0.1	0.2
Invasives	1.6	1.7
Mimics	0.1	0.2
Quail	0.3	0.0
Shorebirds	0.3	0.3
Sparrows	0.8	2.0
Swallows/Swifts	1.0	0.2
Thrushes	1.2	1.3
Vireos	0.0	0.2
Warblers	0.8	0.5
Waterbird	0.3	0.3
Waterfowl	1.4	0.0
Woodpeckers	0.0	0.2
Wrens	0.1	0.3

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

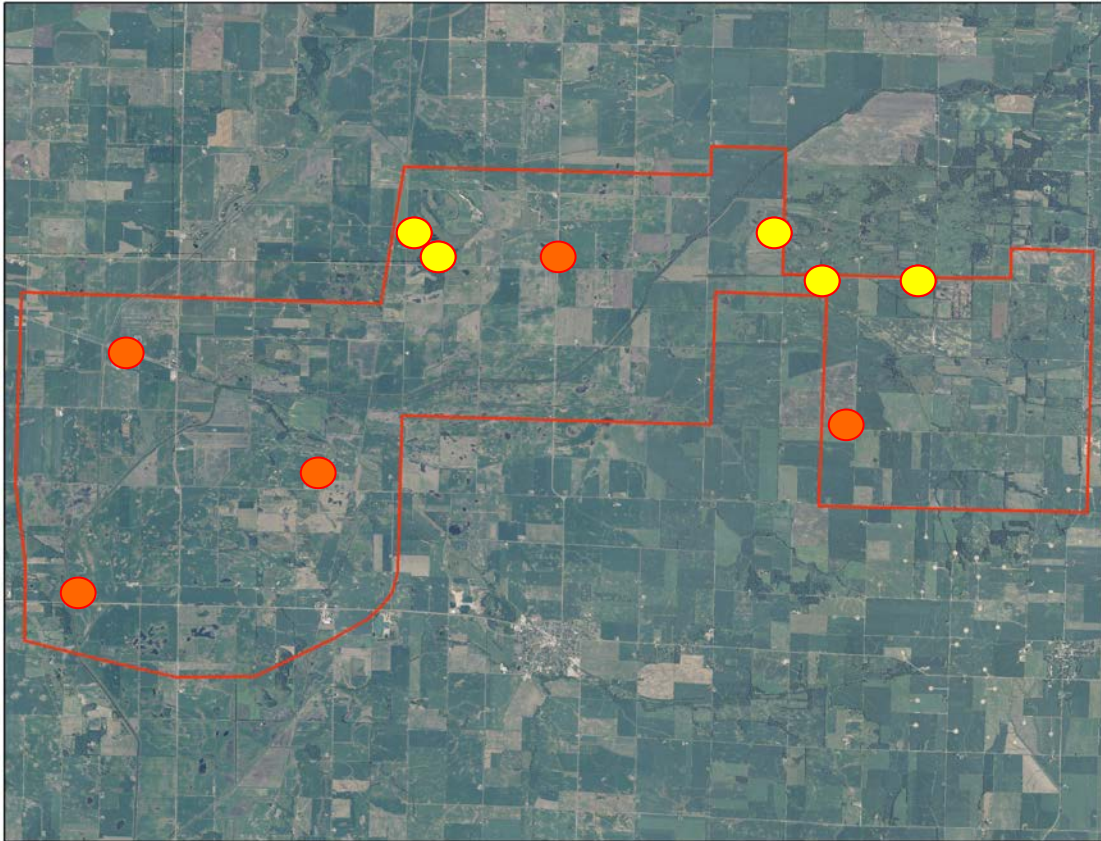


Figure 4. Point count sites were established Whiteside, Lee, and Bureau Counties, IL in the Green River Project Area proposed for wind energy development. Point count sites were surveyed in April and May 2011 for bird use. Those points highlighted with yellow circles included detections of 3 or more open-area species potentially sensitive to the construction of tall structures.

Nesting bird surveys

The following focal species were not detected as breeding in the Project Area during the survey: Northern Harrier, Upland Sandpiper, Loggerhead Shrike, Short-eared Owl, Field Sparrow, and Bell's Vireo. However, during the breeding season we detected a Field Sparrow displaying nesting behaviors within the Project Area (Fig. 5). These specific birds were within 200 meters of a communication tower which suggests that they were tolerant of tall structures within their nesting area. While the Field Sparrow is not currently of any special conservation concern, meetings with the Department of Natural Resources requested that we consider it a focal species. We also found an active Red-tailed Hawk nest in the Project Area (Fig. 5). In addition, we observed an adult Bald

Eagle in the Project Area. It appeared to be flying through the area as no nest was observed. Similar to the migratory bird surveys, 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, forcing their displacement. The breeding period point counts where we detected 3 or more of those species are highlighted in Figure 5. The portions of the Project Area with this diversity of sensitive birds are located near grasslands, pastures, and hayfields while those areas with more row crops, have a lower proportion. If these areas can not be avoided in the turbine array plan then loss of nesting habitat might be mitigated via mowing delays until the middle of June.

The majority of detected birds were habitat generalists and fairly common in the region. Impacts to the less common species can be minimized by avoiding construction in grassland areas and wetland areas. In addition, a delay in mowing of all grassland areas in the Project Area has the potential to offset habitat loss near turbines and loss of individual birds due to direct collision with wind turbines.

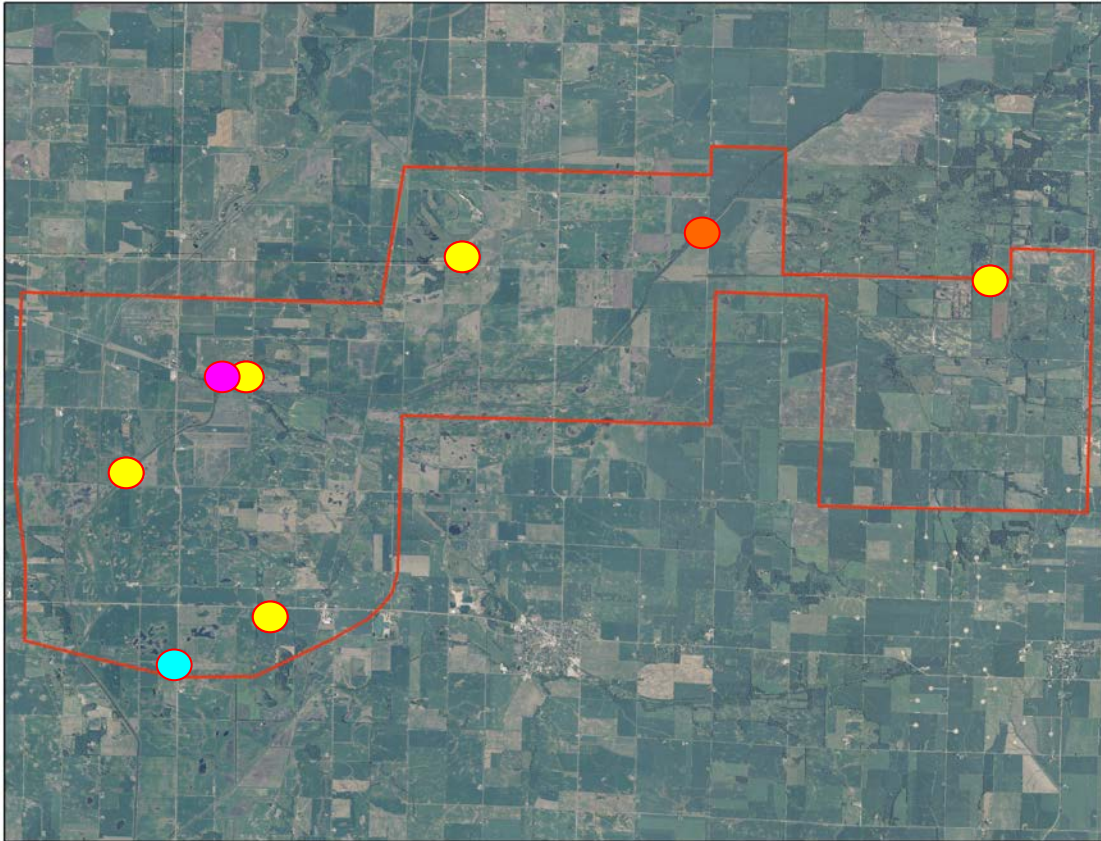


Figure 5. Point count sites were established Whiteside, Lee, and Bureau Counties, IL in the Green River Project Area proposed for wind energy development. Point count sites were surveyed between June 3 and early July 2011 for bird use. Those points highlighted with yellow circles included detections of 3 or more open-area species potentially sensitive to the construction of tall structures. The aqua circle denotes an active Red-tailed Hawk nest. The purple circle denotes Field Sparrow nesting behavior.

Conclusions

The Green River Project Area is predominantly agricultural fields (e.g., corn, soybeans, and wheat), with some grassy pastures and waterways as well as some woodlots, and ponds. Although natural habitats are present to the north and west of the Project Area (Green River State Wildlife Area and Foley Sand Prairie Nature Preserve/Sand Prairie Habitat Area, respectively), the agricultural landscape in the Project Area, reduces the likelihood of the presence of rare species of birds. Surveys conducted during the 2011 migration period and nesting period did not detect any listed species that have been known to use the Project Area. However, a Field Sparrow, which was suggested to be of special consideration by a Department of Natural Resources representative, was

observed displaying nesting behaviors in the west central portion of the Project Area. Our sampling period did include the potential passage and stopover of shorebirds in spring migration; however, we did not detect any large flocks of shorebirds during our sampling. Due to their conservation status we also made special note to record any observations of the following birds during all visits to the Project Area: Black-crowned Night Heron, Common Moorhen, Yellow-headed Blackbird, Whooping Crane, and Least Bittern. No observations were made of any of these species.

Avian collision rates at wind farms tend to be positively correlated with the densities of birds using the wind farm. Therefore, the limited amount of habitat for rare bird species in the Green River Project Area and our survey results demonstrating no detections of listed species suggest that collisions of rare bird species with turbines would be unlikely in this Project Area.

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Appendix A. List of bird species observed during bird surveys conducted in Lee, Whiteside, and Bureau Counties, IL, in sites proposed for wind energy development. This site was surveyed in 2011 for bird use.

Species ^a	AOU code
Canada Goose	CAGO
Mallard	MALL
Wood Duck	WODU
Great Blue Heron	GBHE
Sora	SORA
Greater Yellowlegs	GRYE
Red-tailed Hawk	RTHA
Bald Eagle	BAEA
Turkey Vulture	TUVU
Killdeer	KILL
Mourning Dove	MODO
European Collared Dove	EUCD
Rock Pigeon	ROPI
Northern Bobwhite	NOBO
Ring-necked Pheasant	RNPH
Downy Woodpecker	DOWO
Great-crested Flycatcher	GCFL
Willow Flycatcher	WIFL
Barn Swallow	BARS
Tree Swallow	TRES
American Crow	AMCR
Blue Jay	BLJA
Black-capped Chickadee	BCCH
House Wren	HOWR
Sedge Wren	SEWR
Gray Catbird	GRCA
American Robin	AMRO
European Starling	EUST
Warbling Vireo	WAVI
Common Yellowthroat	COYE
Yellow Warbler	YEWB
Red-winged Blackbird	RWBL
Eastern Meadowlark	EAME
Western Meadowlark	WEME
Baltimore Oriole	BAOR
Common Grackle	COGR
Brown-headed Cowbird	BHCO
Rose-breasted Grosbeak	RBGR
Northern Cardinal	NOCA
Indigo Bunting	INBU
American Goldfinch	AMGO
Dickcissel	DICK
Horned Lark	HOLA
Chipping Sparrow	CHSP
Field Sparrow	FISP
Grasshopper Sparrow	GRSP
Song Sparrow	SOSP
House Sparrow	HOSP

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