

Exhibit J
Fall 2011 Avian Survey Report
And
Spring 2012 Avian Survey Report



**Fall 2011 Avian Migration Report
Greenwich Wind Project**

Survey results for Fall 2011 Passerine
Migration Surveys and Diurnal
Bird/Raptor Migration Surveys

February 2012

Executive Summary

WindLab Developments USA, Ltd. (WindLab) has proposed to develop a wind project in Huron County, Ohio (Project; Figure 1) that would include construction of turbine towers and pads, transmission lines, and access roads. The Project is still in the preliminary stages of design; however, turbines could be placed within an area comprising approximately 36.5 square kilometers square (14 square miles) of privately owned land.

WindLab contracted Stantec Consulting Services Inc. (Stantec) to perform studies to investigate bird use of the Project area, including 2011 fall passerine migration surveys and diurnal bird/raptor migration surveys. The primary goal of these avian surveys was to document the level and timing of species activity, diversity, and abundance of the avian community within the Project area.

A total of 104, 10-minute surveys for passerine migration were conducted within the Project area. A total of 1,157 observations of passerine migrants were recorded during the fall season. The most commonly observed species were Ring-billed Gull (*Larus delawarensis*; 8.8%), American Robin (*Turdus migratorius*; 8.7%), Blue Jay (*Cyanocitta cristata*; 7.5%), American Crow (*Corvus brachyrhynchos*; 7.3%), and Red-winged Blackbird (*Agelaius phoeniceus*; 6.9%). No federally-listed threatened or endangered species were observed during passerine migration surveys within the Project area. However, state-listed species, including one Ohio state-threatened species and two special concern species were detected incidentally between passerine migration surveys.

Diurnal bird/raptor surveys occurred on 24 days between September 7 and October 25, 2011, totaling 168 hours. Seven raptor species were observed during these surveys. Turkey Vulture (*Cathartes aura*) was the most commonly observed bird species while Red-tailed Hawk (*Buteo jamaicensis*) and American Kestrel (*Falco sparverius*) were the most commonly observed raptor species. No federally-listed threatened or endangered species were observed during diurnal bird/raptor migration surveys within the Project area. However, two state-listed species, Ohio-state endangered Northern Harrier (*Circus cyaneus*) and Ohio-state threatened Bald Eagle (*Haliaeetus leucocephalus*) and Ohio-state species of concern, Sharp-shinned Hawk (*Accipiter striatus*) were observed in the Project area.

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PN175630014¹

¹ This report was prepared by Stantec Consulting Services Inc. for WindLab Developments USA, Ltd. The material in it reflects Stantec's judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any suffered by any third party as a result of decisions made or actions based on this report.

1.0 Introduction

WindLab Developments USA, Ltd. (WindLab) is evaluating the potential development of a wind project to be located in Greenwich Township, Huron County, Ohio (Figure 1). Turbine locations as well as a project layout of infrastructure and transmission alignments have not been identified at this time. As part of the Ohio Power Siting Board (OPSB) permitting process to receive a Certificate of Environmental Compatibility and Public Need, WindLab is required to consult with the Ohio Department of Natural Resources (ODNR) and the U.S. Fish and Wildlife Service (USFWS).

WindLab retained Stantec Consulting Services Inc. (Stantec) to complete passerine migration and diurnal bird/raptor migration surveys within the Project area during fall 2011. The goal of the surveys was to document the level and timing of species activity, diversity, and abundance within the Project area. Surveys followed methodologies outlined by the ODNR Cooperative Agreement document “On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio.”²

1.1 PROJECT SETTING

The Project is located in the Till Plains Physiographic Region. Elevations in this area range between 177 and 367 meters (m) above sea level. The average rainfall for the area is 77 centimeters (cm) annually. The geologic strata of the Till Plains consist of two similar bedrock formations from the Devonian period. The Lower and Upper Devonian-age rock are generally fragmented sedimentary rocks that are mainly limestone and dolomite with some shale and sandstone (Ohio Division of Geological Survey 1998).

Most of Ohio, including Huron County, is part of the Beech-Maple Forest Region (Braun 1950). The Beech-Maple Forest Region is dominated by beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*); however, extensive tracts of elm-ash-maple (*Ulmus* spp., *Fraxinus* spp., *Acer* spp.) type forests occur in depressions and areas between glacial moraine flats, reaching into the area of the Great Black Swamp in Northwestern Ohio. The bogs and prairies that are scattered throughout the area increase the vegetation diversity of the Beech-Maple Region (Braun 1961).

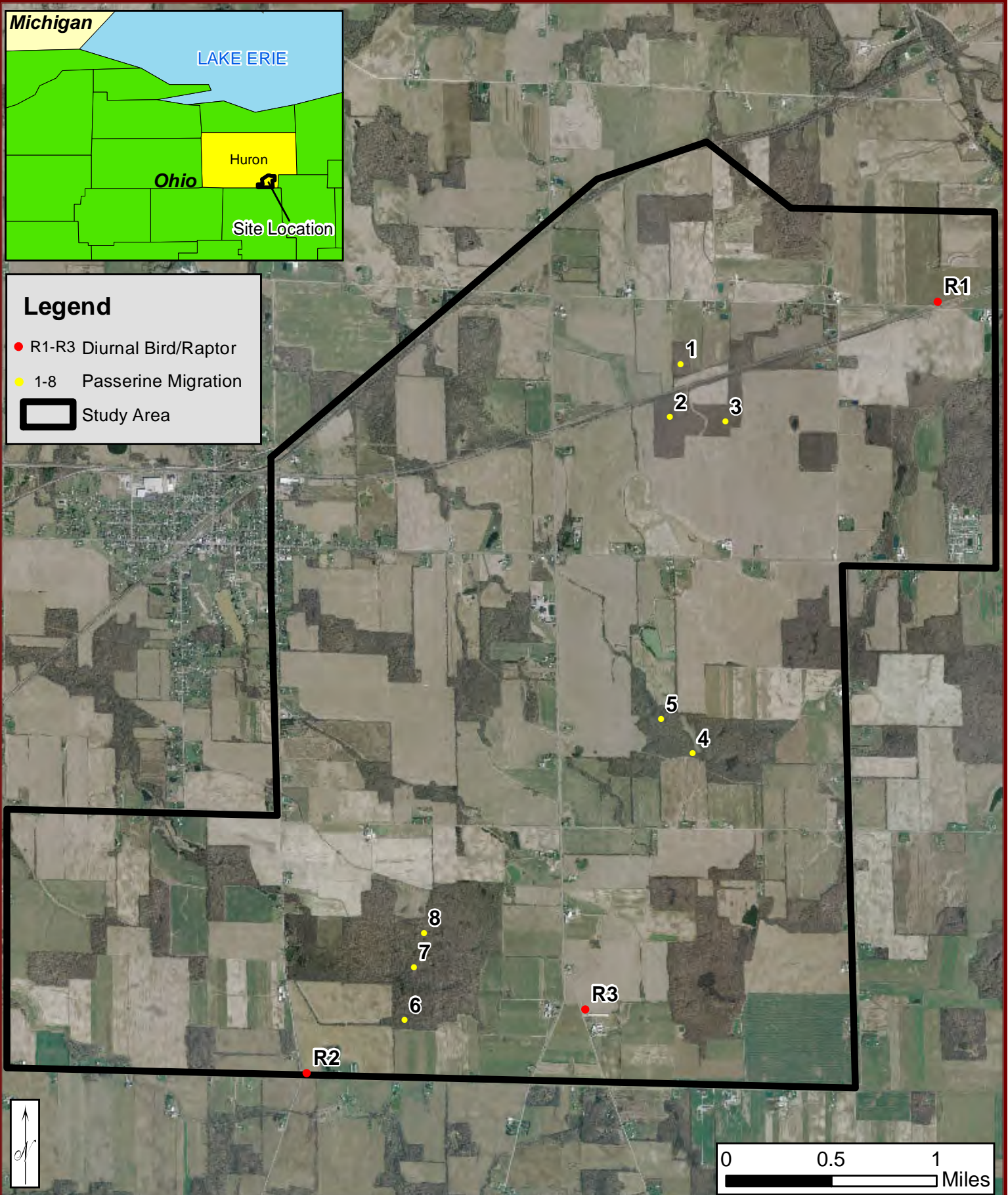
According to the US Geologic Survey soil survey for Huron County, the area has primarily hydric, slow draining soils (Ernst and Martin 1994). Additionally, these soils are considered prime farmland when drained. Small (<4 hectares [ha]) to large (121 ha) woodlots occur throughout the study area in low lying areas. These woodlots are generally the slowest draining areas where water collects during spring rains.

² Available at: <http://ohiodnr.com/LinkClick.aspx?fileticket=IoJTSEwL2uE%3D&tabid=21467>



Legend

- R1-R3 Diurnal Bird/Raptor
- 1-8 Passerine Migration
- ▭ Study Area



Geographic Information Systems

Source: Windlab, 2011

Base Map: Ohio Statewide Imagery Program (OSIP), 2006

Project Number: 175630014

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Figure 1
Site Location and Survey Points

Greenwich Wind Project
Huron County, Ohio



Stantec

The majority of the landscape in the study area is cultivated land (2,294 ha; 62.8%). Deciduous forest comprise the next highest land use with 698 ha (19.1%). Many of the forested areas are large (>20 ha) woodlots. Fragmented woodlots that have been difficult to clear due to seasonal drainage issues also occur throughout the study. Table 1 shows the breakdown in land uses and area within the Project boundaries.

Table 1. Land use area and percent total for Project area³

Land Use	Area (ha)	Percent of Project Area
Agriculture	2,298	62.8
Deciduous Forest	698	19.1
Evergreen Forest	3	0.1
Mixed Forest	0.6	<0.1
Wetlands	15	0.4
Open Water	5	0.1
Scrub/Shrub	9	0.2
Hay-Pasture	409	11.2
Developed	58	1.6
Developed – Open Space	163	4.5
Total	3,659	

1.2 REGULATORY SETTING

In Ohio, ODNR possesses the responsibility to administer various regulations in regards to game and nongame plants and animals (Ohio Revised Code, Title 15: Chapter 1531). In Ohio, animals and plants listed as endangered or threatened receive protection under RC § 1518.01–99; 1531.25, 1531.99.

Wind energy, in Ohio, is regulated by the Ohio Power Siting Board (OPSB) for any proposed wind facility greater than generating greater than 5 megawatts of power, cumulatively. As part of the OPSB application process, developers must perform an assessment of the potential ecological impact of the proposed facility in order to receive their certificate of need from OPSB (ORC, Title 49: Chapter 4906). As one of seven voting members of the OPSB, the ODNR provides input and recommendations to the OPSB regarding potential impacts of proposed wind facilities in regards to wildlife resources within the state.

³ Information from 2011 Critical Issues Analysis for Greenwich Wind Project

2.0 Passerine Migration Surveys

2.1 INTRODUCTION

Based upon the Project boundary, a list of survey recommendations was prepared by the ODNR for the Greenwich Wind Project and presented in a letter dated May 21, 2011 (Appendix A). This letter states that eight passerine migration survey points were to be established within the Project area. Point locations were coordinated with Jennifer Norris of the ODNR prior to surveys.

2.2 METHODS

The goal of passerine migration surveys was to document the level and timing of species activity, diversity, and abundance of passerines (songbirds) in the Project area during the fall 2011 migratory season. The intent was to estimate migratory passerine use of combined forest, shrub, and wooded wetland habitats in the Project area (ODNR 2009). Surveys were completed during fall 2011, per the ODNR guidelines (ODNR 2009)⁴.

As recommended in the May 21, 2011 correspondence from ODNR, eight survey points were established (see Figure 1) and visited once a week during fall 2011 between August 18 and November 11. Observers were skilled in the ability to identify species by sight and song/call. Binoculars were used to aid in the survey. Table 2 summarizes the general habitat of the eight survey points.

Table 2. Point number and plot habitat type for passerine migration surveys.

Survey Point	Plot Habitat Type	Type Abbreviation
1, 2, 3	Forest, bordered by agricultural fields	Forest/Ag
4	Forest interior, adjacent to forested wetland	Forest/Wet
5	Forest, bordered by fallow fields	Forest/Fallow
6, 7, 8	Forest Interior	Forest Interior

2.2.1 Data Collection

Surveys were timed to occur between approximately dawn to 10:00 AM on days with seasonably favorable weather and when rain or wind would not inhibit the detection of birds. Each point was surveyed for 10 minutes. Each bird observed (by sight or song) was recorded, regardless of distance. Surveys were performed from the approximate center of circular plots (Reynolds et al. 1980), and bird occurrences were recorded within a 200-m radius from the observer as per ODNR guidelines (ODNR 2009).

⁴ Spring passerine migration surveys are planned for spring 2012 in order to satisfy ODNR survey requirements.

Species, number of individuals, and other behavioral notes were recorded during surveys. Sex and age class were recorded for each observation if they could be determined. Estimated distance of the bird(s) from the observer and compass bearing from the observer to the bird were noted. Observations of birds made before and after the point-count timeframes were recorded separately as incidental observations.

Other information recorded on data sheets included date, start time and stop time of the survey, and weather conditions (i.e. temperature, wind speed, and percent cloud cover). Temperature and wind speed were recorded using a hand-held anemometer/thermometer once for each 10-minute survey point. Percent cloud cover was visually estimated by the observer.

2.2.2 Data Summary and Analysis

The habitats present at point-count locations were grouped into four general community types based on dominant vegetation cover: Forest/Ag, Forest/Fallow, Forest/Wet, and Interior. Habitats with similar characteristics were grouped wherever possible for simplicity of data analysis.

The species and number of individuals documented during surveys were used to calculate species richness, relative abundance, frequency of occurrence, and community diversity, for all species for all habitats combined, and for each habitat classification. These indexes are described in more detail below.

- Species richness (SR) is the total number of species that were detected.
- Relative abundance (RA) is a way to quantify the number of individuals of a species in relation to other species observed. RA takes into account the total number of individuals detected, the number of times each point-count location was surveyed, and the number of survey points.
- Frequency (Fr) of occurrence, expressed as a percentage, measures the percentage of points where a particular species is detected.
- Shannon Diversity Index (SDI) is a measure of species diversity in a community or habitat. SDI can provide more information about community composition than species richness alone because it takes into account relative abundance and the evenness of the distribution of species. It indicates not only the number of species, but also how abundance is distributed among all the species in the community or habitat.

2.3 RESULTS

2.3.1 Weather

Thirteen surveys were conducted at each point-count location, one site visit each week from August 18 to November 11. Surveys were conducted when wind or rain conditions did not adversely affect bird detection. Over the course of the surveys, wind speeds were calm. Sky conditions generally ranged from clear to cloudy skies. Temperatures ranged from an average daily low of 2.1°C (November 11) to an average daily high of 24.2°C on September 2. Weather conditions for survey days are summarized in Table 3.

Table 3. Summary of weather parameters during fall 2011 migration surveys at the Greenwich Wind Project.

Site Visit	Date (s)	Average Wind Speed (m/s)	Average Temperature (C)	Average Percent Cloud Cover
1	8/18/2011	0.00	19.3	0
2	8/23/2011	0.00	17.9	1
3	9/2/2011	0.01	24.2	5
4	9/7/2011	0.00	15.0	100
	9/8/2011	0.00	17.5	100
5	9/12/2011	0.01	16.5	0
	9/13/2011	0.03	19.0	10
6	9/20/2011	0.00	17.0	100
	9/21/2011	0.30	18.1	74
7	9/29/2011	0.10	13.9	100
	9/30/2011	0.32	11.6	100
8	10/2/2011	0.10	8.1	100
	10/3/2011	0.00	8.6	100
	10/4/2011	0.00	12.0	100
9	10/11/2011	0.06	16.4	38
	10/12/2011	0.00	15.4	100
	10/13/2011	0.00	15.1	100
10	10/21/2011	0.27	7.6	98
	10/22/2011	0.03	4.8	0
11	10/23/2011	0.01	5.5	3
	10/25/2011	0.23	6.5	0
12	11/1/2011	0.00	3.5	0
	11/2/2011	0.16	10.4	3
13	11/11/2011	0.40	2.1	82

2.3.2 Habitat

The Forest/Ag habitat type had the most individuals observed ($n=510$) as well as the greatest species richness ($SR=33$; Table 4). The Forest/Wet habitat type had the greatest diversity ($SDI=2.98$). The Forest/Fallow habitat type had the highest relative abundance ($RA=14.38$). A total of 49 species were observed during the migration surveys. A total of 1,157 individuals were recorded (Table 4; Appendix B – Table 1).

American Robin had the greatest relative abundance and frequency in the Forest/Wet ($RA=1.77$; $F=100\%$) and Interior ($RA=1.03$; $F=100\%$) habitat types. Red-Winged Blackbird had the greatest relative abundance and frequency in the Forest/Ag habitat type ($RA=1.54$; $F=100\%$) while Ring-Billed Gull had the highest relative abundance in the Forest/Fallow habitat type ($RA=3.85$; $F=100\%$). Appendix B – Table 2 shows the relative abundance and frequency of each species observed by habitat type.

Table 4. Summary of Project area migration bird point-count results by habitat type.

Habitat Type	Number of Points	Total Birds Observed	Relative Abundance	Species Richness	Shannon Diversity Index
Forest/Ag	3	510	13.08	33	2.94
Forest/Fallow	1	187	14.38	25	2.73
Forest/Wet	1	158	12.15	30	2.98
Interior	3	302	7.74	28	2.94
All Points	8	1,157	11.13	49	3.14

2.3.3 Point-Counts

Point location 3 had the highest number of individuals observed ($n=224$) and the highest relative abundance of all the points ($RA=17.23$). Ring-billed Gull had the highest relative abundance of any species ($RA=0.98$) across all points as well as the highest and second highest point specific relative abundance (Point 5; $RA=3.85$ – Point 3; $RA=3.38$). Eleven species were detected at all 8 point-count locations ($F=100\%$); American Crow, American Goldfinch (*Spinus tristis*), American Robin, Black-capped Chickadee (*Poecile atricapillus*), Blue Jay, Downy Woodpecker (*Picoides pubescens*), Eastern wood-peewee (*Contopus virens*), Northern Cardinal (*Cardinalis cardinalis*), Northern Flicker (*Colaptes auratus*), Red-bellied Woodpecker (*Melanerpes carolinus*) and White-breasted Nuthatch (*Sitta carolinensis*). Appendix B – Table 3 shows the relative abundance and frequency of each species observed by point-count location.

2.3.4 Incidental Observation

Incidental observations are defined as occurring outside a designated survey period yet within the project boundary. There were 41 individuals documented of 14 species identified. Eleven species seen incidentally were not detected during point-counts. Appendix B – Table 4 shows all incidental observations made outside of a 10-minute point-count survey within the Project area.

2.3.5 Rare, Threatened and Endangered Species

There were no state or federally listed endangered or threatened species observed during the 2011 fall migration point count surveys. However, one species, Dark-eyed Junco (*Junco hyemalis*; state threatened) was observed incidentally between point-counts. Six individuals were observed on the north side of point 3 (Appendix B – Table 4).

Two species of concern were documented during surveys; one Northern Bobwhite (*Colinus virginianus*) was heard on August 18 at point 4, and one Sharp-shinned hawk was heard vocalizing on October 4, also at point 4. Surveys also documented three species of special interest; Brown Creeper (*Certhia americana*) (n=2), Golden-crowned Kinglet (*Regulus satrapa*) (n=9), and Winter Wren (*Troglodytes hiemalis*) (n=5). Two additional species of special interest were documented as incidental observations; Blackburnian Warbler (*Setophaga fusca*) (n=2) and Mourning Warbler (*Geothlypis philadelphia*) (n=3). See Appendix B – Table 4 for additional details on incidental observations.

2.4 DISCUSSION

The goal of the passerine migration survey was to document the level and timing of species activity, diversity, and abundance within the Project area. Point-count surveys are a common method used to estimate abundance and density of birds during the breeding season (Reidy et al 2011; Bibby et al 2000; Ralph et al 1995); however, few studies have been published demonstrating their use and effectiveness during migratory periods. Inherent challenges during migratory periods, especially during fall, include certain species of birds vocalize less frequently and are less conspicuous to observers. Consequently these birds are often under-represented not only during breeding bird surveys but also during migratory surveys (Fletcher et al 2000; Farnsworth et al. 2002, Reidy et al. 2011). Additionally, there are several factors that can influence detection probability during point-counts including time of day and season, weather, breeding status, distance to detected individuals, habitat type, and number of observers; these biases can influence the reported density of birds (Reidy et al. 2011).

However, the fall 2011 passerine migration surveys targeted optimal weather conditions that would allow for maximum detection of birds, and surveys were conducted during the peak migration period of September. Further, the 2011 surveys used standard methods that are comparable to other point-count surveys conducted in the region; therefore, the results of the surveys provide a suitable reflection of the baseline fall migration bird community in the Project area. It should be noted that comparisons among point-count surveys at different sites are difficult to make due to highly variable habitat types and conditions among sites as well as variations in point-count survey methodologies.

The species detected during the surveys are all generally common and regionally abundant, and are representative of the habitats in which they were observed. There were no state- or federally-listed endangered species observed in the Project area. One state-listed threatened species was observed incidentally.

3.0 Diurnal Bird/Raptor Migration Surveys

3.1 INTRODUCTION

Based upon the Project boundary, a list of survey recommendations was prepared by the ODNR for the Greenwich Wind Project and presented in a letter dated May 21, 2011 (Appendix A). This letter states that one diurnal bird/raptor migration survey point was to be established within the Project area. Due to the size and breadth of the Project area, three (3) sites were selected to conduct surveys (Figure 1). Each Survey point was surveyed for 2 hours and 20 minutes daily. Order of survey start and finish was changed daily to minimize temporal and/or spatial differences during surveys.

3.2 METHODS

3.2.1 Data Collection

Surveys were conducted in fall from September 7 to October 25, 2011 when weather conditions permitted (i.e., light winds, no heavy precipitation). Surveys occurred three days per week from 09:00 to 16:00 hrs. The observer scanned the sky continuously from the observation point using binoculars, spotting scope, and/or naked eye. Travel between sites was minimal and was no more than 15 minutes total for the survey day. Observations were recorded as incidentals during travel between sites.

All raptors and other large diurnal birds, such as herons, crows, and waterfowl, were recorded, with the time of observation, number of birds observed, species or highest level of classification, age and sex, if possible. Flight behavior in relation to the Project area was recorded for each bird, or group of birds as well as flight direction. A height classification created by ODNR (see ODNR Form WD03 in ODNR 2009) was assigned to each bird or group of birds: 1 = 0-40 m above ground; 2 = 40-180 m; 3 = greater than 180 m.

Other information recorded during diurnal bird/raptor surveys included date, start and end times, and weather variables. Air temperature (degrees Celsius) and wind speed (m/s) were measured whenever a recordable bird was observed. Cloud cover (percentage of sky) was visually estimated. Other birds were noted such as state- or federally-listed species⁵.

3.2.2 Data Summary and Analysis

Bird diversity recorded for the diurnal bird/raptor migration surveys was summarized for the fall 2011 migratory time period. Flight height of bird observations in relation to proposed turbine height was summarized in two ways. The total number of raptors and the number of each species of raptor flying at three altitude levels: 0-40 m, 40-180 m, and greater than 180 m, was

⁵ Wild Resources — Endangered & Threatened Species. Available online at: <http://www.dnr.state.oh.us/Home/ExperienceWildlifeSubHomePage/Endangeredthreatenedspeciesplaceholder/resourcesmgtpiansspecieslist/tabid/5664/Default.aspx>

summarized. Finally, numbers of birds traveling in each direction was calculated and graphically represented.

3.3 RESULTS

Eight species of raptor were recorded during diurnal bird/raptor surveys (Table 5). Seven non-raptor species were observed during surveys.

Table 5. A summary of the Fall 2011 diurnal bird/raptor survey effort and results at the Greenwich Wind Project.

Survey Effort	Range of survey dates		9/7 – 10/25	
	No. survey days		24	
	No. survey hours		168	
Results				
Species Observed (common name)		Scientific Name		Status in Ohio
American Kestrel		<i>Falco sparverius</i>		NA
Bald Eagle		<i>Haliaeetus leucocephalus</i>		Threatened
Cooper's Hawk		<i>Accipiter cooperii</i>		NA
Merlin		<i>Falco columbarius</i>		NA
Northern Harrier		<i>Circus cyaneus</i>		Endangered
Red-tailed Hawk		<i>Buteo jamaicensis</i>		NA
Sharp-shinned Hawk		<i>Accipiter striatus</i>		Species of Concern
Turkey Vulture		<i>Cathartes aura</i>		NA
American Crow		<i>Corvus brachyrhynchos</i>		NA
Canada Goose		<i>Branta canadensis</i>		NA
Common Loon		<i>Gavia immer</i>		NA
Double-crested Cormorant		<i>Phalacrocorax auritus</i>		NA
Great Blue Heron		<i>Ardea herodias</i>		NA
ring-billed gull		<i>Larus delawarensis</i>		NA
Wild Turkey		<i>Meleagris gallopavo</i>		NA
		Raptor	Vulture	Non-raptor
Total no. observations		87	3,088	3,526
Seasonal passage rate (observations/hour)		0.52	18.38	20.99
Seasonal average observed per day		3.63	128.67	146.92
Total no. observations of within Project area (percent of total observations)		72 (82%)	1,920 (62%)	3,426 (97%)
Total no. of observations seen in the Project area by height category (percent of total observations)				
Observations at 0 - 40 m		40 (46%)	641 (21%)	2,339 (66%)
Observations at 40 - 180 m		19 (22%)	874 (28%)	885 (25%)
Observations at > 180 m		13 (15%)	405 (13%)	202 (6%)

3.3.1 Weather

The highest daily average temperature recorded during surveys was 26.3°C on September 13; the lowest average daily temperature was 7.5°C on October 20. Average daily wind speed varied from a daily average high of 8.6 m/s on October 20, to a low daily average of 0.5 m/s on September 9, September 20 and October 12. Cloud cover varied widely across days from 0 to 100 percent cloud cover. The seasonal average cloud cover was 66 percent. Weather observations in the Project area are summarized in Table 6.

Table 6. Weather summary during Fall 2011 raptor surveys at Greenwich Wind Project

Date	Average Temp. (°C)	Average Wind Speed (m/sec)	Average Cloud Cover (%)
9/7/2011	17.0	1.5	100%
9/8/2011	25.5	2.7	94%
9/9/2011	22.4	0.5	74%
9/12/2011	25.0	2.3	7%
9/13/2011	26.3	6.2	0%
9/14/2011	23.1	1.2	73%
9/20/2011	25.5	0.5	87%
9/21/2011	20.0	2.5	99%
9/22/2011	25.9	2.2	60%
9/29/2011	18.3	2.0	94%
9/30/2011	13.0	2.0	99%
10/1/2011	9.4	2.7	100%
10/2/2011	14.1	3.4	62%
10/3/2011	11.1	2.1	100%
10/4/2011	17.5	1.6	26%
10/11/2011	23.1	3.3	65%
10/12/2011	17.6	0.5	100%
10/13/2011	19.4	2.4	86%
10/20/2011	7.5	8.6	100%
10/21/2011	9.0	2.9	99%
10/22/2011	11.1	1.6	18%
10/23/2011	17.8	2.2	47%
10/24/2011	13.5	2.4	77%
10/25/2011	16.4	4.1	19%
Season Average	18.1	2.5	66%

3.3.2 Raptors

Over the course of the survey period, a total of 87 observations of raptors were made. The seasonal passage rate was 0.62 raptor observations per hour (raptors/hour). Figure 2 and Appendix B – Table 5 show the daily totals of raptor species observed during the survey period. Daily passage rates ranged from 0 raptors/hr (September 13, 20, 22 and 30) to 1.86 raptors/hour (October 22) (Appendix B – Table 5). The day with the highest passage rate, October 22, was characterized by moderate west southwest winds. The day with the second highest passage rate, October 2, was characterized by moderate winds from the north northwest.

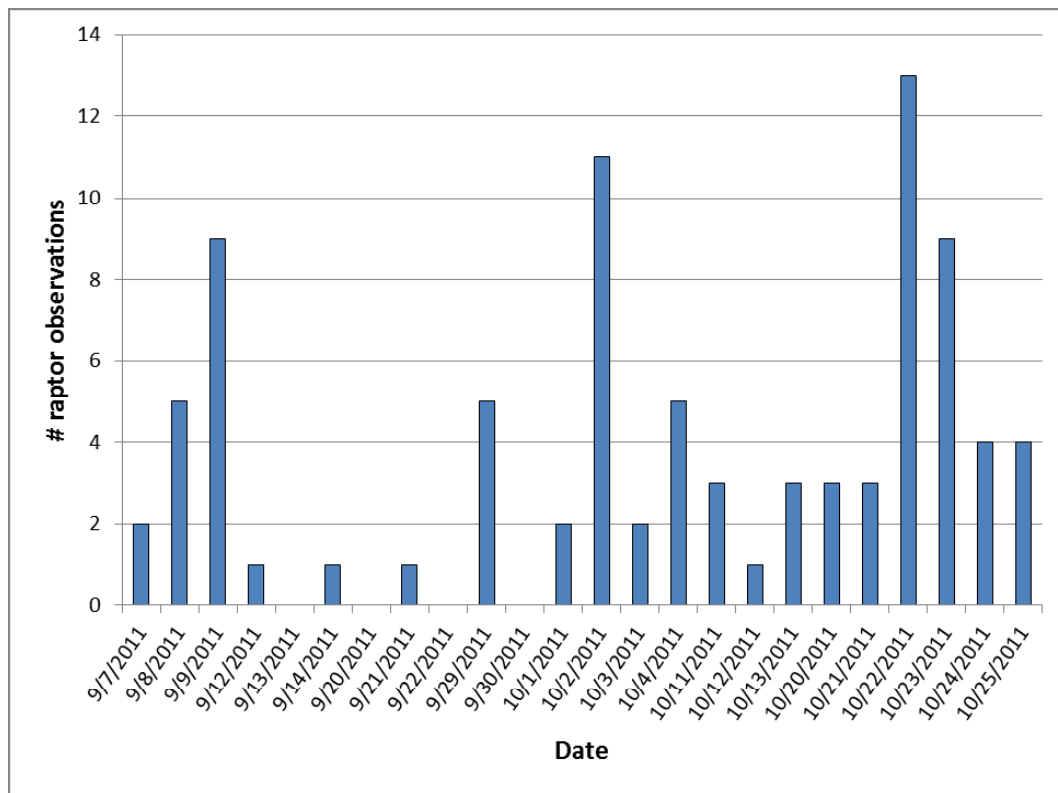


Figure 2. Survey day totals of raptor observations during fall 2011 surveys at the Greenwich Wind Project.

Seven species of raptors totaling 87 individuals were recorded during the diurnal bird/raptor migration surveys in fall 2011 (see Appendix B – Tables 5 and 6). Red-tailed Hawk was the most commonly observed species (n=51, 59%). American Kestrel was the second most commonly observed raptor species, accounting for 15 percent of observations (Figure 3). A mean of 3.6 raptors were recorded per day (Appendix B – Table 5).

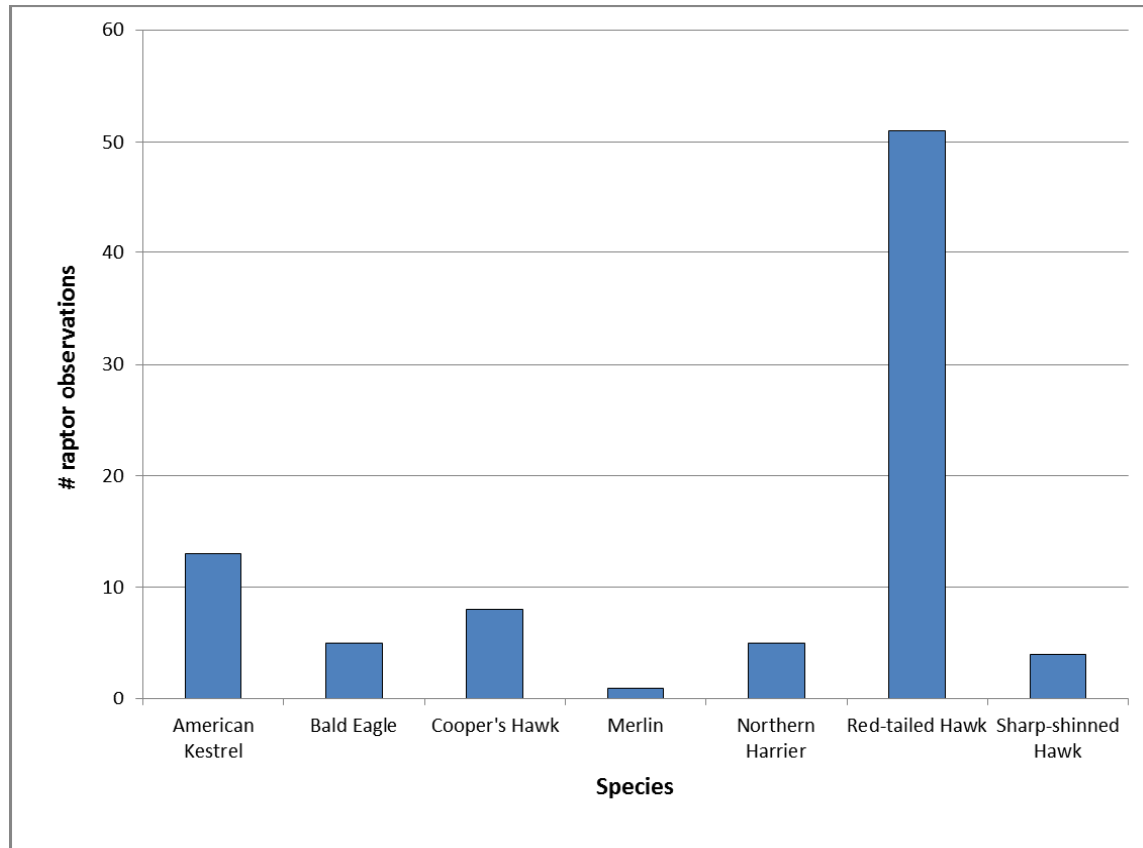


Figure 3. Number of observations of raptor species observed during fall 2011 surveys at the Greenwich Wind Project.

Throughout the survey season, the majority of raptor observations peaked between 15:00 and 16:00 hours (23% of total observations). A second peak in activity occurred between 11:00 and 12:00 (Figure 4, Appendix B – Table 6).

Flight height was visually estimated in four categories: 0-40 m, 40-180 m, and greater than 180 m. Four raptor species were observed flying in the rotor-swept area (40-180 m). These species included Bald Eagle ($n=4$), Cooper's Hawk (*Accipiter cooperii*, $n=2$), Red-tailed Hawk ($n=13$), and Sharp-shinned Hawk ($n=1$) (Figure 5; Appendix B – Table 7).

Flight direction of raptors observed was noted during field observations. Raptors observed in the study area were generally moving in a southerly or south westerly direction (Figure 6).

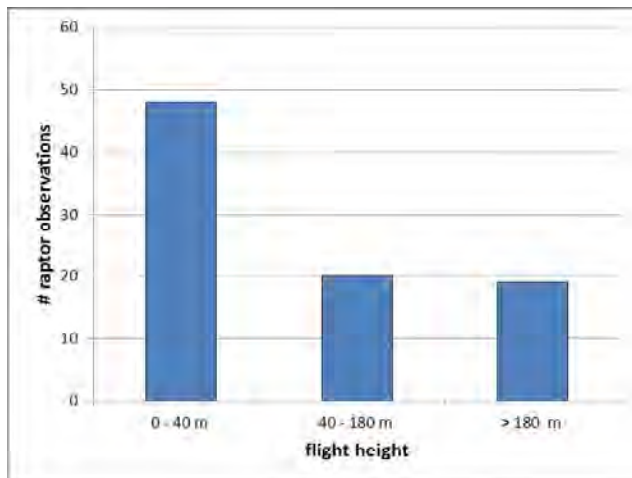


Figure 5. Number of observations of raptors per flight height category during fall 2011 surveys at the Greenwich Wind Project.

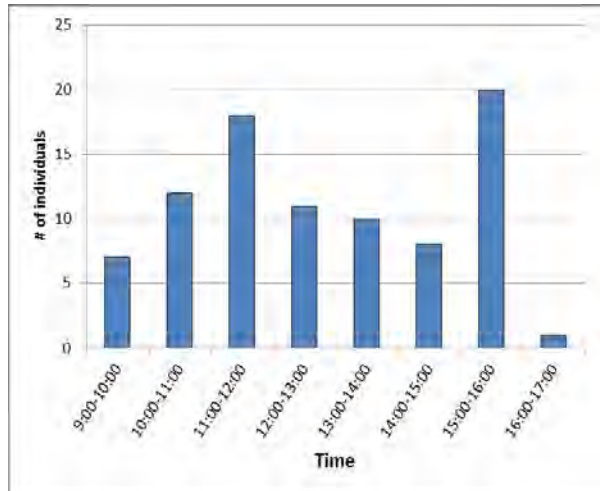


Figure 4. Number of observations of raptors per survey hour during fall 2011 surveys at the Greenwich Wind Project.

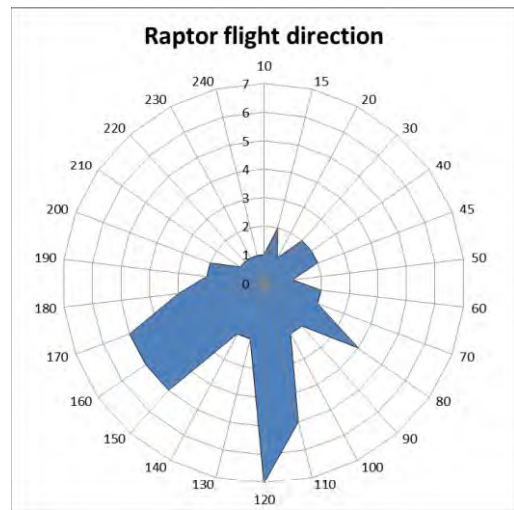


Figure 6. Raptor flight direction during fall 2011 surveys at the Greenwich Wind Project.

3.3.3 Vultures

Turkey Vulture observations were separated from raptor observations for purposes of analysis due to the disproportionate number of birds observed. A total of 3,088 individual Turkey Vultures were observed during the survey period. The peak number of vultures were observed on October 2 (n=353), with a secondary peak on October 1 (n=278) (Figure 7, Appendix B – Table 8).

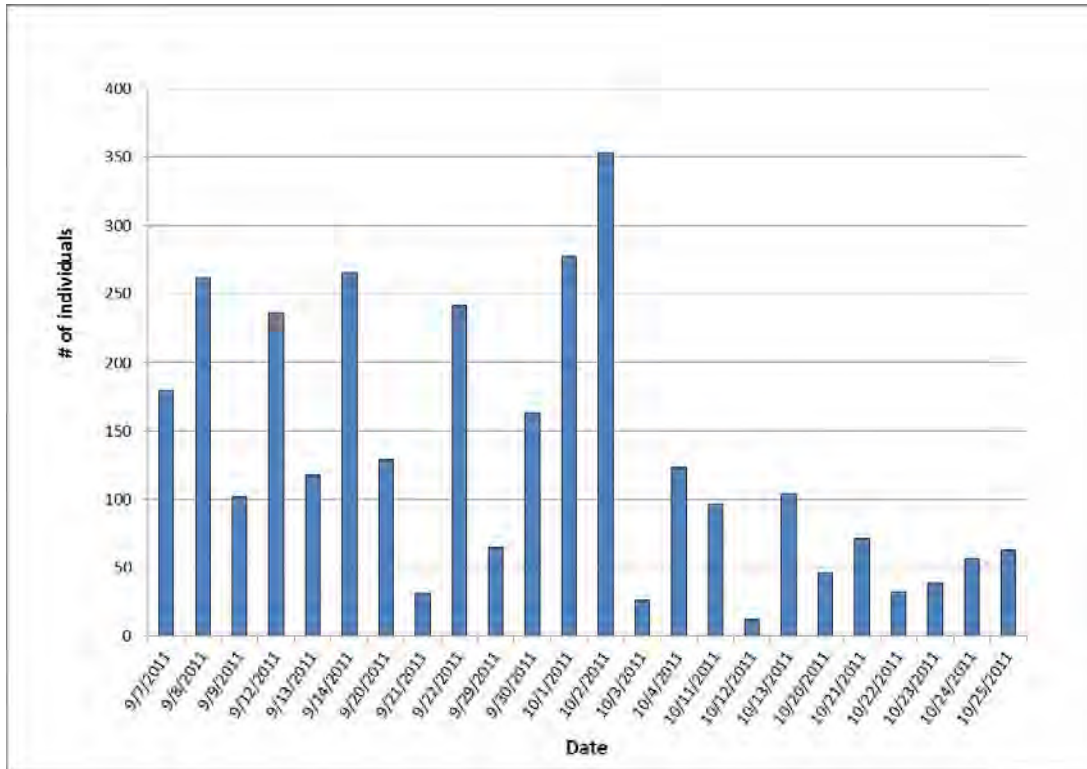


Figure 7. Survey day totals of vulture observations during fall 2011 surveys at the Greenwich Wind Project.

Throughout the survey season, the majority of vulture observations peaked between 11:00 and 12:00. A second peak in activity occurred between 14:00 and 15:00 hours (Figure 8, Appendix B – Table 6).

Flight height of vultures observed was noted during field observations. Fifty-two percent of Turkey Vultures (n=1601) were observed flying in the rotor-swept area (40-180 m) (Figure 9, Appendix B – Table 8).

Flight direction of raptors observed was noted during field observations. Vulture flight heights varied more than those of raptors at the Project site. In general most vultures were moving in southern direction (Figure 10).

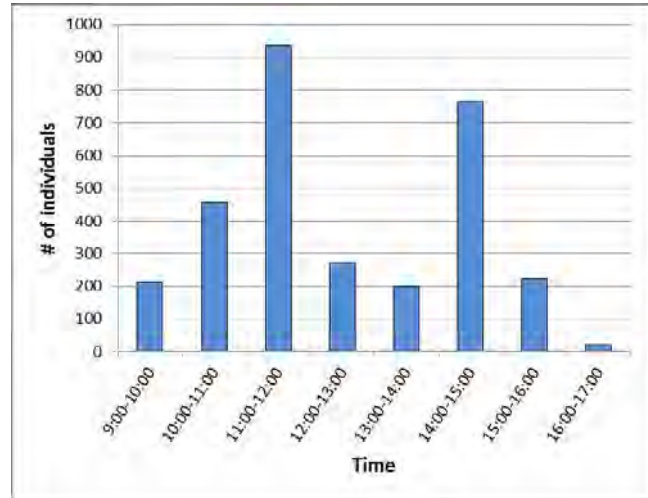


Figure 8. Number of observations of vultures per survey hour during fall 2011 surveys at the Greenwich Wind Project.

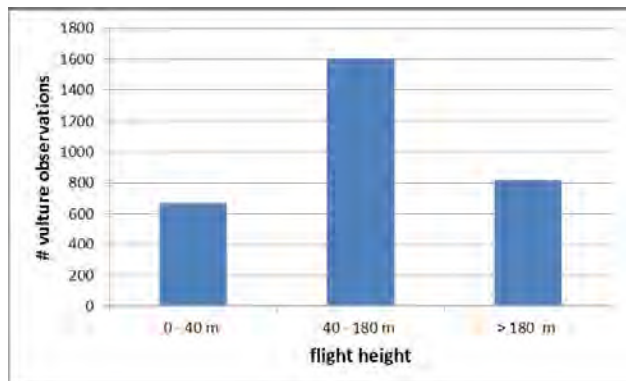


Figure 9. Number of observations of Turkey Vultures per flight height category during fall 2011 surveys at the Greenwich Wind Project.

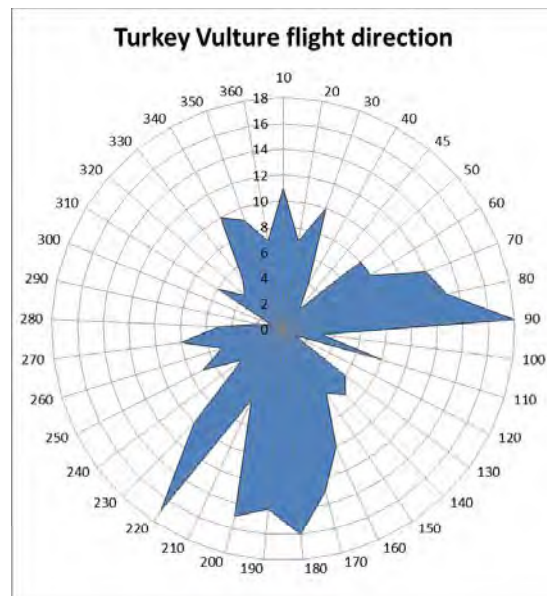


Figure 10. Turkey Vulture flight direction during fall 2011 surveys at the Greenwich Wind Project.

3.3.4 Other Diurnal Birds

A total of 3,526 individual non-raptor bird species were observed during the survey period. The peak number of birds were observed on October 23 (n=976), with a secondary peak on October 21 (n=429) (Figure 11, Appendix B – Table 9).

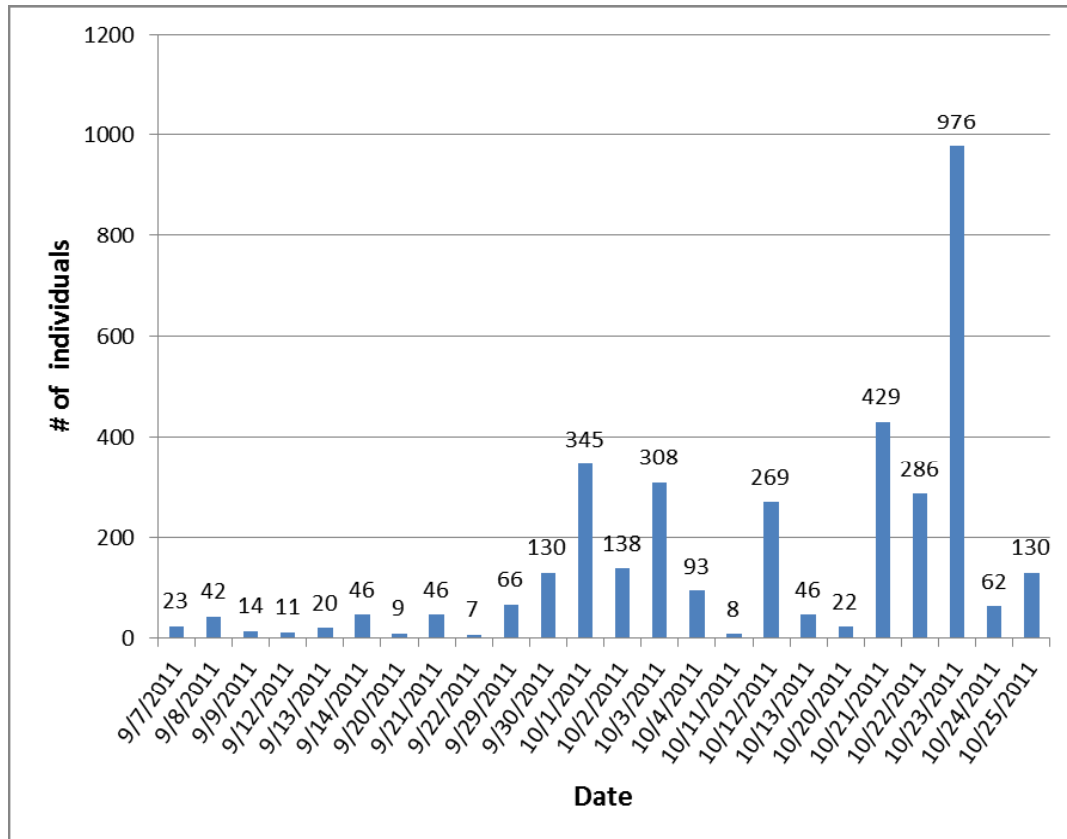


Figure 11. Survey day totals of non-raptor observations during fall 2011 surveys at the Greenwich Wind Project.

Non-raptors included seven species. The most common species recorded included Ring-billed Gull 33 percent, American Crow 32 percent, and Canada goose (*Branta canadensis*) 28.67 percent (Figure 12, Appendix B – Table 9). Bird use of the Project area was calculated to be 2.55 birds per survey hour.

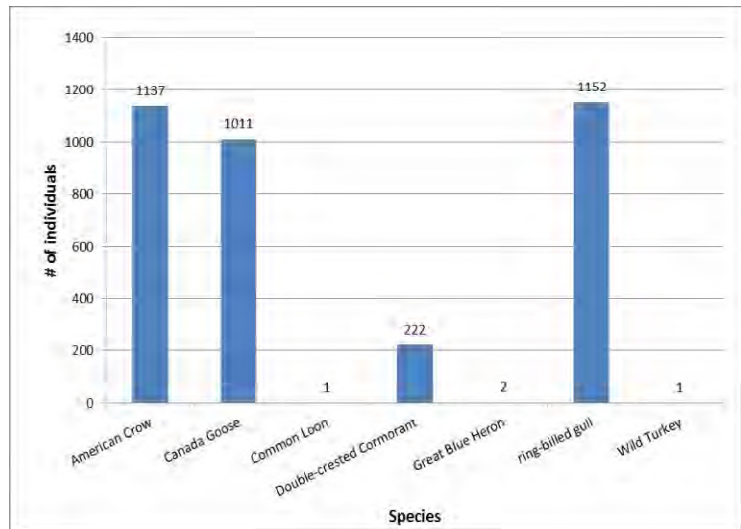


Figure 12. Number of observations of non-raptor species observed during fall 2011 surveys at the Greenwich Wind Project.

Throughout the survey season, the majority of non-raptor observations peaked between 9:00 and 10:00. A second peak in activity occurred between 15:00 and 16:00 hours (Figure 13, Appendix B – Table 6).

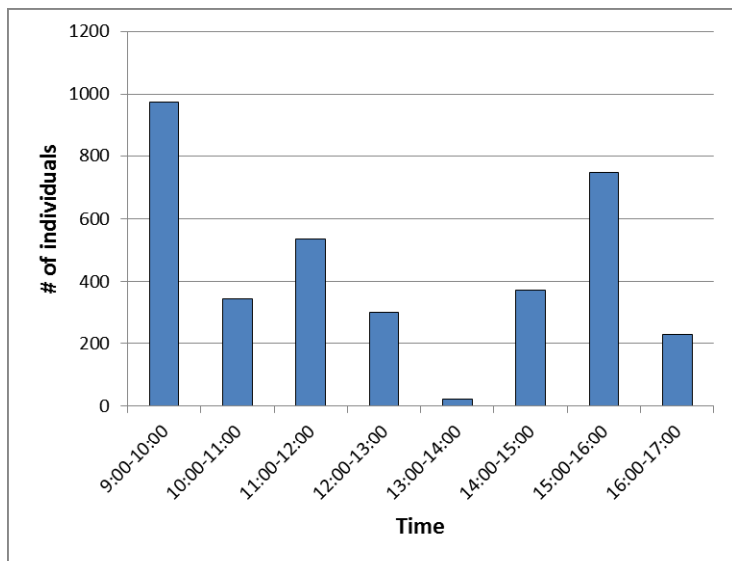


Figure 13 . Number of observations of non-raptors per survey hour during fall 2011 surveys at the Greenwich Wind Project.

The majority of non-raptor observations occurred between 0 – 40 m flight height (n=2439; 69%). Twenty-five percent of non-raptors (n=885) were observed flying in the rotor-swept area (40-180 m) (Figure 14, Appendix B – Table 7).

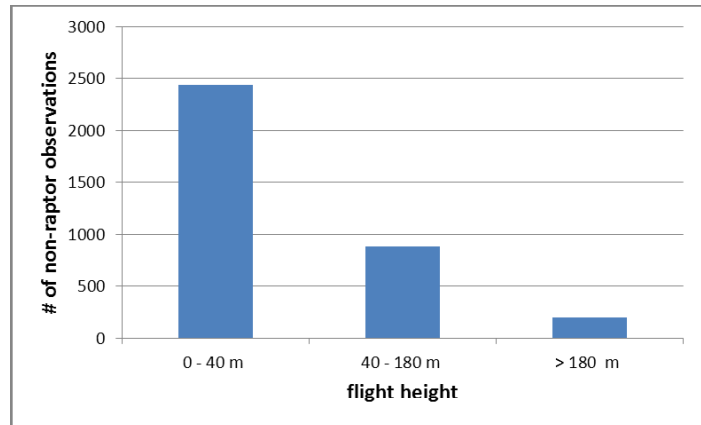


Figure 14. Number of observations of non-raptors per flight height category during fall 2011 surveys.

Non-raptor species flight direction was predominantly to the south with most observations moving at either 180 or 190 degrees (Figure 15).

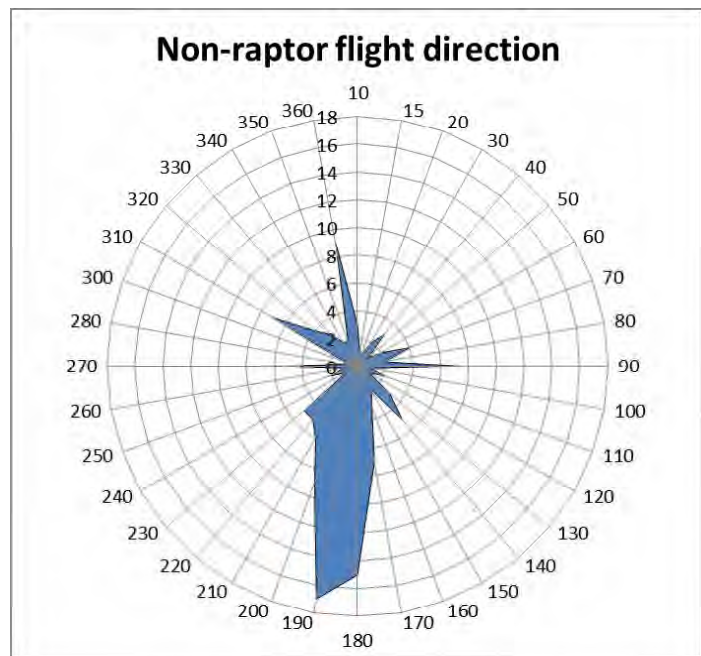


Figure 15. Non-raptor flight direction during fall 2011 surveys at the Greenwich Wind Project.

3.3.5 Rare, Threatened and Endangered Species

One state-listed endangered species was observed during the fall 2011 surveys: Northern Harrier (n=5). All Northern Harrier observations within the Project area occurred below 40 m. The first Northern Harrier observation occurred on October 2; this observation was of a juvenile flying southwest. Two Northern Harriers were observed on October 23; one adult male at point 3 flying west and one juvenile at point 1 flying west. The fourth Northern Harrier observation occurred on October 24; this observation was an adult male, observed likely hunting and returned from its south flight on a 10 degree bearing. The fifth observation was another adult male at point 3 on October 24 flying west.

A total of 5 Bald Eagle observations, a state-listed threatened species, were observed during the survey period. Single sightings occurred on September 8, October 20 and October 22. Two Bald Eagles were observed on October 23 at point 1. Observations of Bald Eagles for which age could be determined were: 3 adults, 1 SA-III and 1 juvenile. One Bald Eagle observation occurred outside of the Project area. Observations of four Bald Eagles within the Project area noted three flew at heights between 40 and 180 m, with the fourth flying below 40 m. Four of the seven observations of Bald Eagles were suspected to be actively migrating. No other state-listed threatened species were observed.

One species of special concern was observed during the fall 2011 surveys: Sharp-shinned hawk (n=4).

No federally-listed endangered or threatened species were observed during the fall 2011 surveys

3.4 DISCUSSION

The goal of the diurnal bird/raptor migration surveys was to document the level and timing of species activity, diversity, and abundance within the Project area. Survey protocols developed by ODNR are similar to those established by HawkWatch International⁶ and the Hawk Migration Association of North America⁷ (HMANA). Hawk migration is different from passerine migration in that birds are generally more conspicuous and actively foraging or migrating above or alongside woodlots and other land features. Diurnal bird/raptor surveys focus on raptors but other larger diurnal birds were recorded as well. One drawback of this survey method is that not all of the Project area can be seen from the survey location; therefore, birds occurring outside of the observer's field of view are not recorded.

Of the 87 total raptor observations made within the study area, 72 (82%) observations occurred within the Project area. For the 3,088 Turkey Vulture observations made within the Project area, 1,920 (62%) observations occurred within the Project area. It should be noted that the

⁶ HawkWatch International available online at: <http://hawkwatch.org/index.php>

⁷ HMANA available online at: <http://hmana.org/index.php>

locations where raptors were observed in the study area are subject to observer bias. Birds in closer proximity to the observation location would be more likely to be seen than birds occurring at greater distances from the observer. Also, birds that traveled outside of the observer's view shed would have gone undetected.

During raptor migration, flight pathways and flight heights along ridges, side slopes, and across valleys may vary seasonally, daily, or hourly. Raptors may shift and use different ridgelines and cross different valleys from year to year or season to season. Weather and wind are major factors that influence migration paths and flight heights; in particular, wind, air temperature, and cloud cover influence the development of updrafts and thermals used by raptors making long-distance flights. The flight paths of raptors observed at the Project varied between survey dates and were likely influenced by wind direction and weather. The four survey days which experienced the highest raptor counts during the survey period (September 9, October 2, October 22, and October 23) were characterized by moderate temperatures and light winds (0.5 to 2.2 m/s). Vulture counts peaked on October 2 with large counts also occurring on October 1 and September 14. Non-raptor counts peaked at similar times during the survey period to the raptors (October 21 and October 23). Seasonal timing and weather both likely influenced the daily activity rates at the Project. Within days, most raptor activity occurred between 15:00 and 16:00 hours. Vulture activity peaked between 11:00 and 12:00 and non-raptor activity from 09:00 to 10:00.

The southern direction observed during fall surveys may indicate that some raptors were migrating to warmer climates. Many of the raptors observed in fall were Turkey Vultures, which tend to have varied flight directions. Vultures tend to have a wandering flight and may have detected food in the other directions and, therefore, traveled to feed. In comparison, both raptor only and non-raptor flight directions showed strong southern movement.

During the fall survey period, fewer raptors were observed in the rotor-swept zone than below it, though some individuals were observed flying above the rotor zone. For Turkey Vultures, the majority of observations were within the rotor zone, while non-raptor observations were primarily below the rotor zone.

During raptor migration, flight pathways and flight heights along ridges, side slopes, and across valleys may vary seasonally, daily, or hourly. Raptors may shift and use different ridgelines and cross different valleys from year to year or season to season. Weather and wind are major factors that influence migration paths as well as flight heights. Wind strongly affects the propensity of raptors to congregate along 'leading lines' or topographic features (Richardson 1972). Wind, air temperature, and cloud cover influence the development of updrafts and thermals used by raptors while making long-distance flights. Studies have documented high raptor collision avoidance behaviors at modern wind facilities (Whitfield and Madders 2006, Chamberlain et al. 2006). As most raptors are diurnal, raptors may be able to visually, as well as acoustically detect turbines during periods of fair weather.

There were no federally-listed species observed during the diurnal raptor survey, but two state-listed species of raptors were observed. During surveys in fall 2011, five Bald Eagles (state

threatened), and five Northern Harriers (state endangered) observations were recorded. These observations were not uncommon or unexpected from the Project area (Peterjohn et al. 1987; Peterjohn 2001; and Wheeler 2003). In general, these individuals were observed for a short time within the survey area while hunting or gliding by during migration.

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Appendix A

Agency Coordination



Ohio Department of Natural Resources

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DAVID MUSTINE, DIRECTOR

Ohio Division of Wildlife

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Phone: (614) 265-6300

May 21, 2011

To all interested parties,

Based upon the project boundary map received on May 20, 2011 the Ohio Department of Natural Resources Division of Wildlife (DOW) has prepared these survey recommendations for Windlab's proposed Greenwich project located in Huron County.

Currently the project falls within regions of the state that DOW has identified as needing moderate monitoring efforts. The below survey recommendations are based on a GIS analysis of the site and may be reevaluated after a site visit. Additionally, if the developer decides to amend the current boundaries, the DOW will revise our survey recommendations.

The table below was created based upon a review of the project maps provided and summarizes the types and level of effort recommended by the DOW. Results from these studies will help the Department of Natural Resources assess the potential impact these turbines may pose, and influence our recommendations to the Ohio Power Siting Board. Monitoring should follow those criteria listed within the "On-shore Bird and Bat Pre-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio."

For additional ODNR comments, including information on the potential presence of threatened and endangered species within or adjacent to your project area, please contact Brian Mitch at (614) 265-6378 or brian.mitch@dnr.state.oh.us.

Project	
Survey type	
Breeding bird	Breeding bird surveys should be conducted at all sites. The number of survey points may be based on the amount of available habitat, or twice the maximum number of turbines proposed for the site. If turbines are placed in agricultural land it, this requirement may be waived by DOW after a review of the proposed turbine locations is provided.
Raptor nest searches	Nest searches should occur on, and within a 1-mile buffer of the proposed facility.



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Raptor nest monitoring	The DOW has no records of state or federally listed species of raptor nesting on or within 2-miles of the project area. Any discovered during the raptor nest searches should be monitored.
Bat acoustic monitoring	To be conducted at all meteorological towers.
Passerine migration (# of survey points)	8
Diurnal bird/raptor migration (# of survey point)	1
Sandhill crane migration (same points as raptor migration)	NS
Owl playback survey points	2
Barn owl surveys	NS
Bat mist-netting (# of survey points)	15
Nocturnal marsh bird survey points	2
Waterfowl survey points	NS
Shorebird migration points	NS
Radar monitoring locations	NS

NS = Not required based on the lack of suitable habitat.

If you have any questions, please feel free to contact me.

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Ohio Department of Natural Resources

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cc: Mr. Stuart Siegfried, Ohio Power Siting Board
Ms. Megan Seymour, United States Fish and Wildlife Service
Mr. Brian Mitch, Ohio Department of Natural Resources

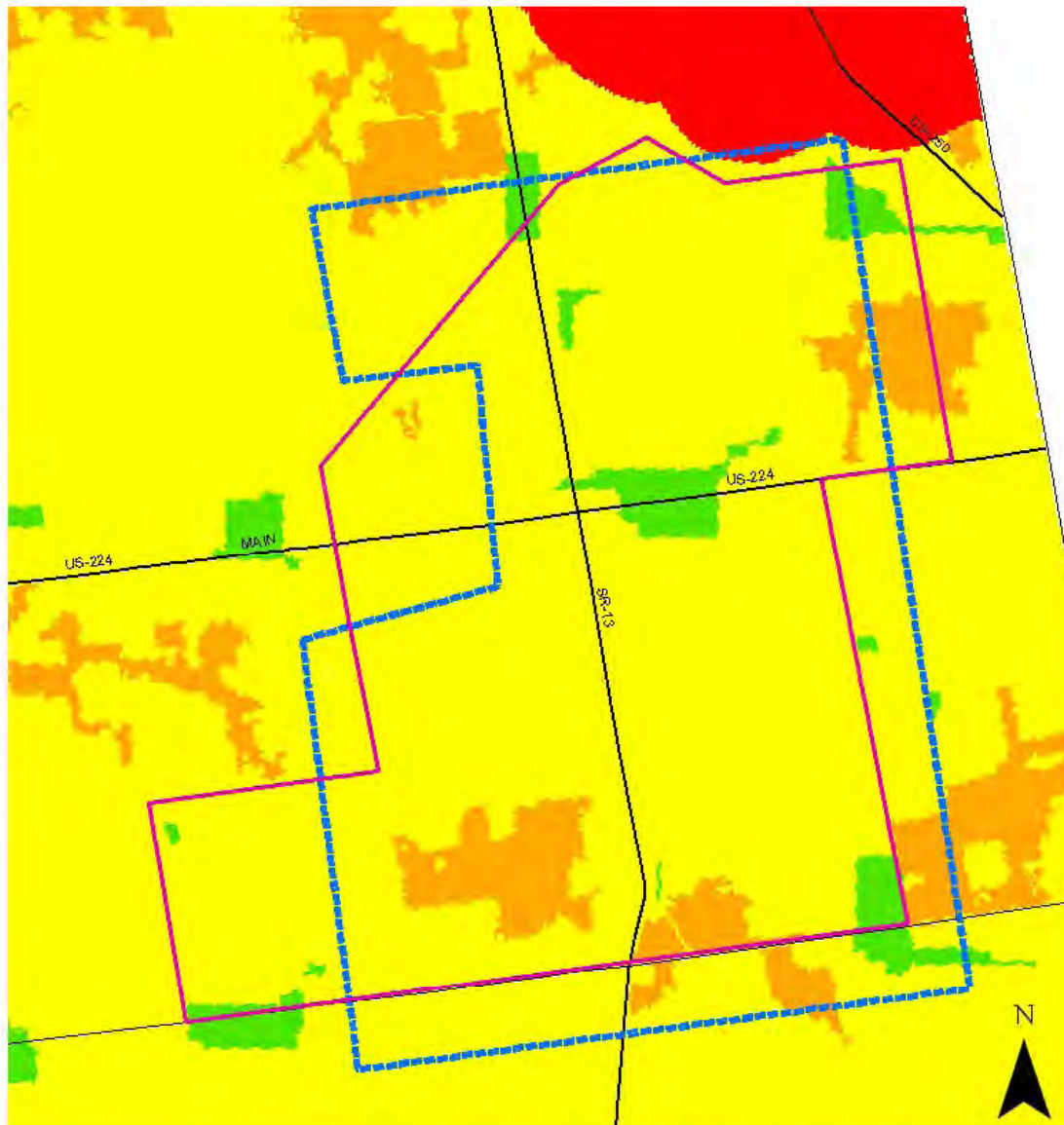








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Figure 1. Survey effort map with the revised (May 2011) boundary for Windlab's proposed Greenwich project.



-  Windlab Greenwich Revised May 2011 Project
-  Windlab Greenwich January 2011 Project
-  Minimum
-  Moderate
-  Moderate (where applicable)
-  Extensive

0 0.3 0.6 1.2 Miles



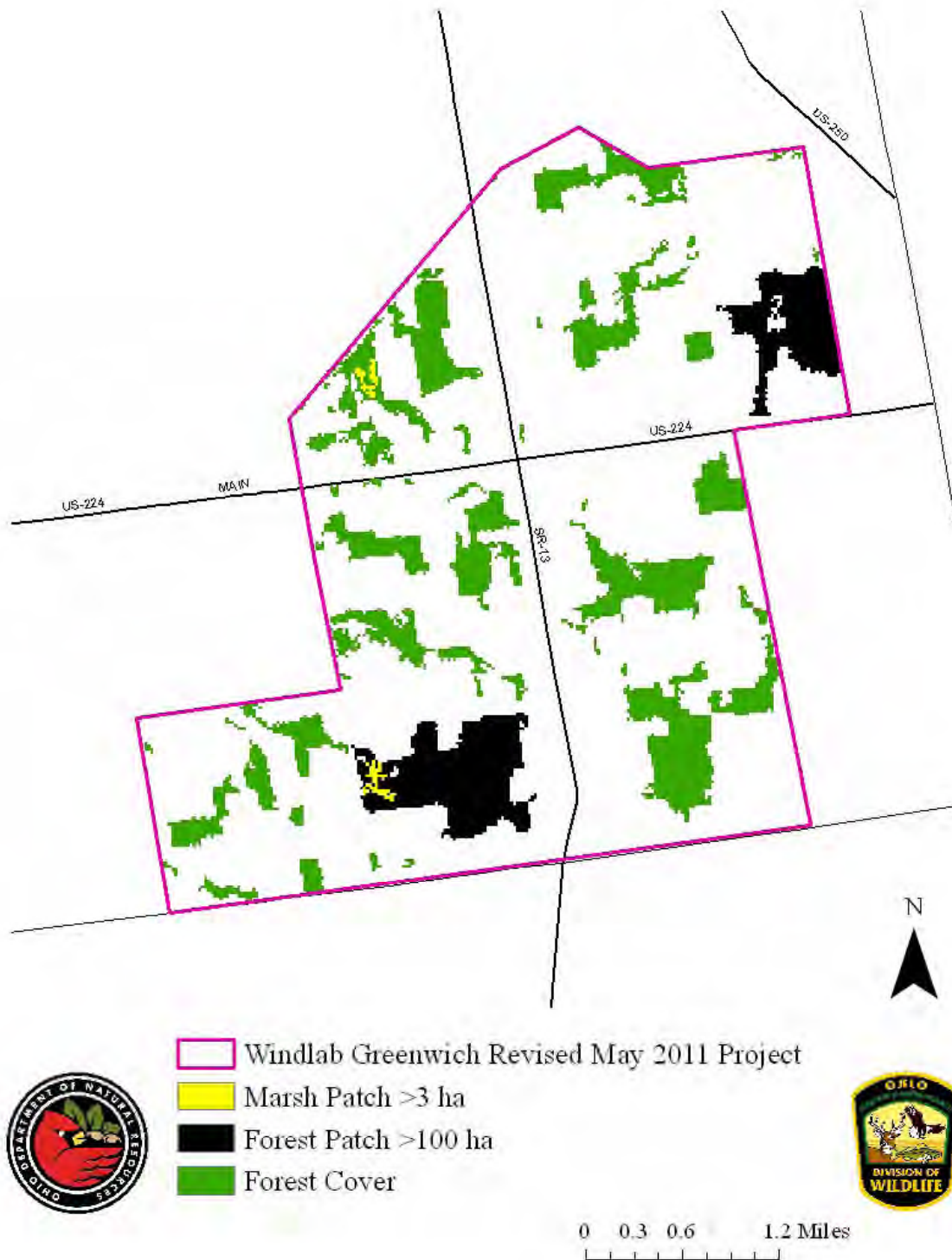


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Figure 2. Forest and marsh cover within the revised (May 2011) boundary of Windlab's proposed Greenwich project.



Appendix B

Fall 2011 Passerine Migration and
Diurnal Bird/Raptor Survey Data Tables

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Table 1. Species composition list and distance from observer at eight point count locations during thirteen survey periods - Greenwich Wind Project; Fall 2011

Common Name	Scientific Name	0-50 m	> 50 m	Flyovers	Grand Total
Acadian Flycatcher	<i>Empidonax vireescens</i>	6			6
American Crow	<i>Corvus brachyrhynchos</i>	7	23	54	84
American Goldfinch	<i>Spinus tristis</i>	29	1	11	41
American Robin	<i>Turdus migratorius</i>	92	8	1	101
American Tree Sparrow	<i>Spizella arborea</i>	1			1
Baltimore Oriole	<i>Icterus galbula</i>	1			1
Barn Swallow	<i>Hirundo rustica</i>			6	6
Barred Owl	<i>Strix varia</i>	1			1
Black-capped Chickadee	<i>Poecile atricapillus</i>	63	6		69
Blue Jay	<i>Cyanocitta cristata</i>	53	34		87
Brown Creeper	<i>Certhia americana</i>	2			2
Brown-headed Cowbird	<i>Molothrus ater</i>	1			1
Canada Goose	<i>Branta canadensis</i>			9	9
Carolina Wren	<i>Thryothorus ludovicianus</i>	1			1
Common Grackle	<i>Quiscalus quiscula</i>			32	32
Downy Woodpecker	<i>Picoides pubescens</i>	62	7		69
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	1			1
Eastern Wood-pewee	<i>Contopus virens</i>	37	17		54
European Starling	<i>Sturnus vulgaris</i>	1			1
Field Sparrow	<i>Spizella pusilla</i>		2		2
Golden-crowned Kinglet	<i>Regulus satrapa</i>	9			9
Gray Catbird	<i>Dumetella carolinensis</i>	8	1		9
Hairy Woodpecker	<i>Picoides villosus</i>	7			7
House Wren	<i>Troglodytes aedon</i>	1			1
Killdeer	<i>Charadrius vociferus</i>		2	1	3
Mourning Dove	<i>Zenaida macroura</i>	1		15	16
Northern Bobwhite	<i>Colinus virginianus</i>		1		1
Northern Cardinal	<i>Cardinalis cardinalis</i>	69	3		72
Northern Flicker	<i>Colaptes auratus</i>	21	10	2	33
Ovenbird	<i>Seiurus aurocapilla</i>	1			1
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	42	8	1	51
Red-eyed Vireo	<i>Vireo olivaceus</i>	8	2		10
Red-tailed Hawk	<i>Buteo jamaicensis</i>	1	2		3
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	1	1	78	80
Ring-Billed Gull	<i>Larus delawarensis</i>			102	102
Scarlet Tanager	<i>Piranga olivacea</i>	2			2
Sharp-shinned Hawk	<i>Accipiter striatus</i>	1			1
Song Sparrow	<i>Melospiza melodia</i>	1	2		3

Table 1. Species composition list and distance from observer at eight point count locations during thirteen survey periods - Greenwich Wind Project; Fall 2011

Swainson's Thrush	<i>Catharus ustulatus</i>	6			6
Tufted Titmouse	<i>Baeolophus bicolor</i>	32	3		35
Turkey Vulture	<i>Cathartes aura</i>	3			3
White-breasted Nuthatch	<i>Sitta carolinensis</i>	61	8		69
White-throated Sparrow	<i>Zonotrichia albicollis</i>	10	1		11
Wild Turkey	<i>Meleagris gallopavo</i>	4	6		10
Winter Wren	<i>Troglodytes hiemalis</i>	5			5
Wood Thrush	<i>Hylocichla mustelina</i>	27	3		30
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2	4		6
Yellow-rumped Warbler	<i>Setophaga coronata</i>	8			8
Yellow-throated Vireo	<i>Vireo flavifrons</i>	1			1
Grand Total		690	155	312	1,157

Table 2. Total number of observations, relative abundance, and frequency of species at point count locations during thirteen survey periods at Greenwich Wind Project - Fall 2011

Species	Forest/Ag (3 points)			Forest/Fallow (1 point)			Forest/Wet (1 point)			Interior (3 points)		
	Total ^a	Relative abundance ^b	Frequency ^c	Total ^a	Relative abundance ^b	Frequency ^c	Total ^a	Relative abundance ^b	Frequency ^c	Total ^a	Relative abundance ^b	Frequency ^c
Acadian Flycatcher				2	0.15	100%			100%	4	0.10	67%
American Crow	45	1.15	100%	4	0.31	100%	2	0.15	100%	33	0.85	100%
American Goldfinch	12	0.31	100%	3	0.23	100%	13	1.00	100%	13	0.33	100%
American Robin	33	0.85	100%	5	0.38	100%	23	1.77	100%	40	1.03	100%
American Tree Sparrow	1	0.03	33%									
Baltimore Oriole	1	0.03	33%									
Barn Swallow	6	0.15	33%									
Barred Owl				1	0.08	100%						
Black-capped Chickadee	30	0.77	100%	11	0.85	100%	9	0.69	100%	19	0.49	100%
Blue Jay	44	1.13	100%	10	0.77	100%	10	0.77	100%	23	0.59	100%
Brown Creeper	2	0.05	33%									
Brown-headed Cowbird	1	0.03	33%									
Canada Goose				3	0.23	100%				6	0.15	67%
Carolina Wren							1	0.08	100%			
Common Grackle	32	0.82	33%									
Downy Woodpecker	28	0.72	100%	10	0.77	100%	11	0.85	100%	20	0.51	100%
Eastern Towhee							1	0.08	100%			
Eastern Wood-pewee	23	0.59	100%	6	0.46	100%	9	0.69	100%	16	0.41	100%
European Starling	1	0.03	33%									
Field Sparrow							2	0.15	100%			
Golden-crowned Kinglet	8	0.21	33%							1	0.03	33%
Gray Catbird	3	0.08	67%	2	0.15	100%	2	0.15	100%	2	0.05	33%
Hairy Woodpecker							2	0.15	100%	5	0.13	67%
House Wren							1	0.08	100%			
Killdeer	1	0.03	33%				2	0.15	100%			
Mourning Dove	5	0.13	33%							11	0.28	33%
Northern Bobwhite							1	0.08	100%			
Northern Cardinal	37	0.95	100%	8	0.62	100%	7	0.54	100%	20	0.51	100%
Northern Flicker	10	0.26	100%	10	0.77	100%	3	0.23	100%	10	0.26	100%
Ovenbird				1	0.08	100%						
Red-bellied Woodpecker	24	0.62	100%	9	0.69	100%	3	0.23	100%	15	0.38	100%
Red-eyed Vireo	5	0.13	67%	1	0.08	100%	1	0.08	100%	3	0.08	67%
Red-tailed Hawk	1	0.03	33%	2	0.15	100%						
Red-winged Blackbird	60	1.54	100%	5	0.38	100%	11	0.85	100%	4	0.10	33%
Ring-Billed Gull	44	1.13	33%	50	3.85	100%	8	0.62	100%			

Table 2. Total number of observations, relative abundance, and frequency of species at point count locations during thirteen survey periods at Greenwich Wind Project - Fall 2011

Species	Forest/Ag (3 points)			Forest/Fallow (1 point)			Forest/Wet (1 point)			Interior (3 points)		
	Total ^a	Relative abundance ^b	Frequency ^c	Total ^a	Relative abundance ^b	Frequency ^c	Total ^a	Relative abundance ^b	Frequency ^c	Total ^a	Relative abundance ^b	Frequency ^c
Scarlet Tanager										2	0.05	33%
Sharp-shinned Hawk							1	0.08	100%			
Song Sparrow	1	0.03	33%				2	0.15	100%			
Swainson's Thrush	1	0.03	33%				1	0.08	100%	4	0.10	67%
Tufted Titmouse	5	0.13	67%	13			8	0.62	100%	9	0.23	100%
Turkey Vulture	3	0.08	33%									
White-breasted Nuthatch	23	0.59	100%	14	1.08	100%	14	1.08	100%	18	0.46	100%
White-throated Sparrow	10	0.26	67%							1	0.03	33%
Wild Turkey										10	0.26	67%
Winter Wren				2	0.15	100%	3	0.23	100%			
Wood Thrush	9	0.23	67%	7	0.54	100%	4	0.31	100%	10	0.26	100%
Yellow-billed Cuckoo	1	0.03	33%	2	0.15	100%	2	0.15	100%	1	0.03	33%
Yellow-rumped Warbler				6	0.46	100%	1	0.08	100%	1	0.03	33%
Yellow-throated Vireo										1	0.03	33%
Grand Total	510			187			158			302		
Relative abundance		13.08			14.38			12.15			7.74	
Species richness		33			25			30			28	
Shannon Diversity Index		2.94			2.73			2.98			2.94	

a Total number of individuals detected (includes all individuals observed).

b Mean number of birds observed.

c Percentage of survey points at which the species was observed.

Table 3. Number of individuals by species and relative abundance at eight point count locations during thirteen survey periods - Greenwich Wind Project, Fall 2011

Species	Point 1			Point 2			Point 3			Point 4			Point 5			Point 6			Point 7			Point 8			ALL		
	Number of Individuals	Relative Abundance		Number of Individuals	Relative Abundance		Number of Individuals	Relative Abundance		Number of Individuals	Relative Abundance		Number of Individuals	Relative Abundance		Number of Individuals	Relative Abundance		Number of Individuals	Relative Abundance		Number of Individuals	Relative Abundance		Number of Individuals	Relative Abundance	Frequency
Acadian Flycatcher																											37.50%
American Crow	7	0.54		12	0.92		26	2.00		2	0.15		4	0.31		4	0.31		20	1.54		9	0.69		6	0.06	37.50%
American Goldfinch	5	0.38		3	0.23		4	0.31		13	1.00		3	0.23		4	0.31		5	0.38		4	0.31		84	0.81	100.00%
American Robin	10	0.77		8	0.62		15	1.15		23	1.77		5	0.38		23	1.77		8	0.62		9	0.69		41	0.39	100.00%
American Tree Sparrow	1	0.08																							101	0.97	100.00%
Baltimore Oriole				1	0.08																				1	0.01	12.50%
Barn Swallow	6	0.46																							1	0.01	12.50%
Barred Owl													1	0.08											6	0.06	12.50%
Black-capped Chickadee	3	0.23		14	1.08		13	1.00		9	0.69		11	0.85		14	1.08		2	0.15		3	0.23		69	0.66	100.00%
Blue Jay	16	1.23		15	1.15		13	1.00		10	0.77		10	0.77		5	0.38		12	0.92		6	0.46		87	0.84	100.00%
Brown Creeper				2	0.15																				2	0.02	12.50%
Brown-headed Cowbird	1	0.08																							1	0.01	12.50%
Canada Goose													3	0.23		3	0.23		3	0.23					9	0.09	37.50%
Carolina Wren										1	0.08														1	0.01	12.50%
Common Grackle							32	2.46																	32	0.31	12.50%
Downy Woodpecker	7	0.54		9	0.69		12	0.92		11	0.85		10	0.77		8	0.62		8	0.62		4	0.31		69	0.66	100.00%
Eastern Towhee										1	0.08														1	0.01	12.50%
Eastern Wood-pewee	5	0.38		11	0.85		7	0.54		9	0.69		6	0.46		7	0.54		4	0.31		5	0.38		54	0.52	100.00%
European Starling	1	0.08																							1	0.01	12.50%
Field Sparrow										2	0.15														2	0.02	12.50%
Golden-crowned Kinglet				8	0.62																	1	0.08		9	0.09	25.00%
Gray Catbird	2	0.15					1	0.08		2	0.15		2	0.15		2	0.15								9	0.09	62.50%
Hairy Woodpecker										2	0.15								3	0.23		2	0.15		7	0.07	37.50%
House Wren										1	0.08														1	0.01	12.50%
Killdeer							1	0.08		2	0.15														3	0.03	25.00%
Mourning Dove	5	0.38														11	0.85								16	0.15	25.00%
Northern Bobwhite										1	0.08														1	0.01	12.50%
Northern Cardinal	20	1.54		9	0.69		8	0.62		7	0.54		8	0.62		9	0.69		4	0.31		7	0.54		72	0.69	100.00%
Northern Flicker	6	0.46		1	0.08		3	0.23		3	0.23		10	0.77		2	0.15		2	0.15		6	0.46		33	0.32	100.00%
Ovenbird													1	0.08											1	0.01	12.50%
Red-bellied Woodpecker	6	0.46		11	0.85		7	0.54		3	0.23		9	0.69		3	0.23		2	0.15		10	0.77		51	0.49	100.00%
Red-eyed Vireo				2	0.15		3	0.23		1	0.08		1	0.08					1	0.08		2	0.15		10	0.10	75.00%
Red-tailed Hawk				1	0.08								2	0.15											3	0.03	25.00%
Red-winged Blackbird	4	0.31		35	2.69		21	1.62		11	0.85		5	0.38		4	0.31								80	0.77	75.00%
Ring-Billed Gull							44	3.38		8	0.62		50	3.85											102	0.98	37.50%
Scarlet Tanager																			2	0.15					2	0.02	12.50%
Sharp-shinned Hawk										1	0.08														1	0.01	12.50%
Song Sparrow	1	0.08								2	0.15														3	0.03	25.00%

Table 3. Number of individuals by species and relative abundance at eight point count locations during thirteen survey periods - Greenwich Wind Project; Fall 2011

Species	Point 1		Point 2		Point 3		Point 4		Point 5		Point 6		Point 7		Point 8		ALL	
	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Frequency
Swainson's Thrush			1	0.08			1	0.08			3	0.23	1	0.08			6	50.00%
Tufted Titmouse			4	0.31	1	0.08	8	0.62		13	1.00	2	0.15	4	0.31	3	35	87.50%
Turkey Vulture	3	0.23															3	12.50%
White-breasted Nuthatch	12	0.92	6	0.46	5	0.38	14	1.08		14	0.46	6	0.46	7	0.54	5	69	100.00%
White-throated Sparrow	8	0.62			2	0.15					1	0.08				11	11	37.50%
Wild Turkey																10	10	25.00%
Winter Wren							3	0.23		2						5	5	25.00%
Wood Thrush			3	0.23	6	0.46	4	0.31		7	0.54	2	0.15	4	0.31	4	30	87.50%
Yellow-billed Cuckoo			1	0.08			2	0.15		2			1	0.08			6	50.00%
Yellow-rumped Warbler							1	0.08		6	0.46	1	0.08				8	37.50%
Yellow-throated Vireo															1	0.08	1	12.50%
Grand Total	129	9.92	157	12.08	224	17.23	158	12.15	187	14.38	117	9.00	103	7.92	82	6.31	1157	11.13
																		100.00%

Table 4. Summary of Incidental bird observations made during fall 2011 at the Greenwich Wind Project.

Date	Time	Common Name	Scientific Name	Number
9/8/2011	8:12	Bay-breasted Warbler*	<i>Setophaga castanea</i>	1
9/20/2011	8:15	Black-and-white Warbler*	<i>Mniotilta varia</i>	1
9/20/2011	8:10	Blackburnian Warbler*	<i>Setophaga fusca</i>	2
9/21/2011	7:30	Common Yellowthroat*	<i>Geothlypis trichas</i>	1
9/21/2011	7:24	Gray Catbird	<i>Dumetella carolinensis</i>	1
9/21/2011	8:05	Red-tailed Hawk	<i>Buteo jamaicensis</i>	1
9/30/2011	8:34	Mourning Warbler*	<i>Geothlypis philadelphia</i>	1
10/4/2011	8:29	Yellow-rumped Warbler	<i>Setophaga coronata</i>	1
10/4/2011	8:21	White-Crowned Sparrow*	<i>Zonotrichia leucophrys</i>	1
10/4/2011	8:21	White-throated Sparrow*	<i>Zonotrichia albicollis</i>	12
10/11/2011	8:30	White-throated Sparrow*	<i>Zonotrichia albicollis</i>	1
10/12/2011	8:39	Mourning Warbler*	<i>Geothlypis philadelphia</i>	1
10/13/2011	8:11	Mourning Warbler*	<i>Geothlypis philadelphia</i>	1
10/13/2011	8:15	Nashville Warbler*	<i>Oreothlypis ruficapilla</i>	1
10/25/2011	8:50	Chipping Sparrow*	<i>Spizella passerina</i>	1
10/25/2011	8:45	Dark-eyed Junco*	<i>Junco hyemalis</i>	6
10/25/2011	8:47	Swamp Sparrow*	<i>Melospiza georgiana</i>	1
10/25/2011	8:47	White-Crowned Sparrow*	<i>Zonotrichia leucophrys</i>	2
10/25/2011	8:47	White-throated Sparrow*	<i>Zonotrichia albicollis</i>	5

* Species not detected during point count surveys.

Table 5. Number of raptors observed by survey date during Fall 2011 surveys at the Greenwich Wind Project.

	American Kestrel	Bald Eagle	Cooper's Hawk	Merlin	Northern Harrier	Red-tailed Hawk	Sharp-shinned Hawk	Grand Total	Passage rate
9/7/2011	1					1		2	0.29
9/8/2011		1	2			2		5	0.71
9/9/2011	2			1		6		9	1.29
9/12/2011						1		1	0.14
9/13/2011								0	0.00
9/14/2011						1		1	0.14
9/20/2011								0	0.00
9/21/2011	1							1	0.14
9/22/2011								0	0.00
9/29/2011	2					2	1	5	0.71
9/30/2011								0	0.00
10/1/2011	1						1	2	0.29
10/2/2011	1				1	8	1	11	1.57
10/3/2011	1		1					2	0.29
10/4/2011						5		5	0.71
10/11/2011						3		3	0.43
10/12/2011			1					1	0.14
10/13/2011			2			1		3	0.43
10/20/2011		1				2		3	0.43
10/21/2011						3		3	0.43
10/22/2011	2	1				9	1	13	1.86
10/23/2011	1	2	1		2	3		9	1.29
10/24/2011					1	3		4	0.57
10/25/2011	1		1		1	1		4	0.57
Grand Total	13	5	8	1	5	51	4	87	0.52
% of Total	15%	6%	9%	1%	6%	59%	5%		

Table 6. Hourly species totals during fall 2011 survey period at the Greenwich Wind Project.

Species	Hour								Grand Total
	9:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	
American Kestrel	2		5			3	3		13
Bald Eagle		1			2	1		1	5
Cooper's Hawk		3			2	1	2		8
Merlin	1								1
Northern Harrier		2	1			1	1		5
Red-tailed Hawk	4	4	12	11	6	2	12		51
Sharp-shinned Hawk		2					2		4
Raptor Total	7 (8%)	12 (14%)	18 (21%)	11 (13%)	10 (11%)	8 (9%)	20 (23%)	1 (1%)	87
Turkey Vulture	213	457	937	271	200	766	223	21	3,088
Vulture Total	213 (7%)	457 (15%)	937 (30%)	271 (9%)	200 (6%)	766 (25%)	223 (7%)	21 (1%)	3,088
American Crow	110	181	71	259	6	80	201	229	1,137
Canada Goose	547	56	322	16	15	31	24		1,011
Common Loon			1						1
Double-crested Cormorant	166	55				1			222
Great Blue Heron				1		1			2
ring-billed gull	152	51	140	25	2	260	522		1,152
Wild Turkey				1					1
Non-raptor Total	975 (28%)	343 (10%)	534 (15%)	302 (9%)	23 (1%)	373 (11%)	747 (21%)	229 (6%)	3,526

Table 7. Species observed during diurnal bird/ raptor migration surveys and estimated altitude intervals observed during fall 2011 survey at the Greenwich Wind Project.

	0 - 40 m	40 - 180 m	> 180 m	Grand Total
American Kestrel	13	0	0	13
Bald Eagle	1	4	0	5
Cooper's Hawk	5	2	1	8
Merlin	1	0	0	1
Northern Harrier	5	0	0	5
Red-tailed Hawk	20	13	18	51
Sharp-shinned Hawk	3	1	0	4
Raptor Total	48	20	19	87
Raptor % of total	55%	23%	22%	
Turkey Vulture	670	1601	817	3088
Vulture Total	670	1601	817	3088
Vulture % of total	23%	52%	26%	
American Crow	803	334		1137
Canada Goose	883	128		1011
Common Loon	1			1
Double-crested Cormorant		167	55	222
Great Blue Heron	2			2
ring-billed gull	749	256	147	1152
Wild Turkey	1			1
Non-raptor Total	2439	885	202	3526
Non-raptor % of total	69%	25%	6%	

Table 8. Summary of Turkey Vulture observations during fall 2011 surveys at the Greenwich Wind Project.

Date	Flight height categories			Turkey Vulture Total
	0 - 40 m	40 - 180 m	> 180 m	
9/7/2011	144	36		180
9/8/2011	21	47	193	261
9/9/2011	11	55	36	102
9/12/2011	23	94	119	236
9/13/2011	62	56		118
9/14/2011	9	205	51	265
9/20/2011	8	59	62	129
9/21/2011	14	17		31
9/22/2011	23	70	148	241
9/29/2011	26	38		64
9/30/2011	5	99	59	163
10/1/2011	10	268		278
10/2/2011	101	252		353
10/3/2011	26			26
10/4/2011	33	90		123
10/11/2011	13	30	54	97
10/12/2011	9	3		12
10/13/2011	5	42	57	104
10/20/2011	9	20	17	46
10/21/2011	22	49		71
10/22/2011	18	14		32
10/23/2011	22	16		38
10/24/2011	26	9	21	56
10/25/2011	30	32		62
Grand Total	670	1601	817	3,088
% of total	22%	52%	26%	

Table 9. Number of other diurnal birds observed by survey date during Fall 2011 surveys at the Greenwich Wind Project.

	American Crow	Canada Goose	Common Loon	Double-crested Cormorant	Great Blue Heron	Ring-billed Gull	Wild Turkey	Grand Total	Passage Rate
9/7/2011	8	13				2		23	3.29
9/8/2011	10	31	1					42	6.00
9/9/2011	12					2		14	2.00
9/12/2011	6	5						11	1.57
9/13/2011	11	9						20	2.86
9/14/2011	22	23					1	46	6.57
9/20/2011	9							9	1.29
9/21/2011	46							46	6.57
9/22/2011	6	1						7	1.00
9/29/2011	66							66	9.43
9/30/2011	82	48						130	18.57
10/1/2011	6	339						345	49.29
10/2/2011	103	30				5		138	19.71
10/3/2011	89	209				10		308	44.00
10/4/2011	77	16						93	13.29
10/11/2011	7			1				8	1.14
10/12/2011	9	260						269	38.43
10/13/2011	44	2						46	6.57
10/20/2011	9	9				4		22	3.14
10/21/2011	79	16		221		113		429	61.29
10/22/2011	152					134		286	40.86
10/23/2011	173					803		976	139.43
10/24/2011	54				1	7		62	8.86
10/25/2011	57				1	72		130	18.57
Grand Total	1137	1011	1	222	2	1152	1	3526	20.99
% or total	32%	29%	<1%	6%	<1%	33%	<1%		

Avian Survey Report Greenwich Wind Project

Survey methods, results, and discussion for nesting owl surveys, raptor nest searches and monitoring, diurnal bird/raptor migration surveys, and spring passerine migration surveys during 2012



February 26, 2013

Executive Summary

WindLab Developments USA, Ltd. (WindLab) has proposed to develop a wind project in Huron County, Ohio (Project; Figure 1) that would include construction of turbine towers and pads, transmission lines, and access roads. The Project is still in the preliminary stages of design; however, turbines could be placed within an area comprising approximately 36.5 square kilometers of privately owned land.

WindLab contracted Stantec Consulting Services Inc. (Stantec) to perform studies to investigate bird use of the Project area, including owl surveys, raptor nest searches and monitoring, bald eagle nest/activity monitoring, diurnal bird/raptor migration surveys, and passerine migration surveys. The primary goal of these avian surveys was to document the level and timing of species activity, diversity, and abundance within the Project area.

Owl surveys were conducted according to protocol and occurred on January 30, 2012 for great-horned owl; February 28, 2012 for barred owl; and March 14, 2012 for eastern screech owl. There were few responses to the playback calls of target species during surveys. The only response, not obtained during target month, was the great horned owl. However, no nests were observed or located during survey efforts or while walking to the survey location. No other species of owl were heard or observed during the survey period.

Raptor nest surveys were conducted on March 13, 14, and 15, 2012 within the Project area and a 1-mile buffer of the Project area. No state or federally listed raptor nests were located inside the Project area. One bald eagle nest was located just outside the northeastern Project boundary. This nest was monitored for several months to establish foraging patterns. Observation indicated that the adults primarily used large reservoirs to the northeast of the project area and rarely entered the Project area. No bald eagles were observed in the Project area during summer surveys.

Diurnal bird/raptor surveys occurred on 17 days between March 21 and April 26, 2012, totaling 136 hours. Seven raptor species were observed during these surveys. Turkey vulture (*Cathartes aura*) was the most commonly observed bird species while red-tailed hawk (*Buteo jamaicensis*) and American kestrel (*Falco sparverius*) were the most commonly observed raptor species. No federally-listed threatened or endangered species were observed during diurnal bird/raptor migration surveys within the Project area. However, one state-listed species, Ohio-state endangered northern harrier (*Circus cyaneus*) and one Ohio-state species of concern, sharp-shinned hawk (*Accipiter striatus*) were observed in the Project area.

A total of 45, 10-minute surveys for passerine migration were conducted within the Project area. A total of 675 observations of passerine migrants were recorded during the fall season. The most commonly observed species were American goldfinch (*Spinus tristis*; 8.4%), northern cardinal (*Cardinalis cardinalis*; 7.6%), brown-headed cowbird (*Molothrus ater*; 6.2%), tufted

**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

titmouse (*Baeolophus bicolor*; 5.2%), wood thrush (*Hylocichla mustelina*; 4.4%), and black-capped chickadee (*Poecile atricapillus*; 4.3%). No federally-listed threatened or endangered species were observed during passerine migration surveys within the Project area. However, state-listed species, including one Ohio state species of concern and one species of interest were detected. Three additional species of interest were observed incidentally between passerine migration surveys.

AVIAN SURVEY REPORT GREENWICH WIND PROJECT

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**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

Introduction

February 26, 2013

1.0 Introduction

WindLab Developments USA, Ltd. (WindLab) is evaluating the potential development of a wind project to be located in Greenwich Township, Huron County, Ohio (Figure 1). Turbine locations as well as a project layout of infrastructure and transmission alignments have not been identified at this time. As part of the Ohio Power Siting Board (OPSB) permitting process to receive a Certificate of Environmental Compatibility and Public Need, WindLab is required to consult with the Ohio Department of Natural Resources (ODNR) and the U.S. Fish and Wildlife Service (USFWS).

WindLab retained Stantec Consulting Services Inc. (Stantec) to complete passerine migration and diurnal bird/raptor migration surveys within the Project area during spring 2012. The goal of the surveys was to document the level and timing of species activity, diversity, and abundance within the Project area. Surveys followed methods outlined by the ODNR Cooperative Agreement document “On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio.”¹

1.1 PROJECT SETTING

The Project is located in the Till Plains Physiographic Region. Elevations in this area range between 177 and 367 meters (m) above sea level. The average rainfall for the area is 77 centimeters (cm) annually. The geologic strata of the Till Plains consist of two similar bedrock formations from the Devonian period. The Lower and Upper Devonian-age rock are generally fragmented sedimentary rocks that are mainly limestone and dolomite with some shale and sandstone (Ohio Division of Geological Survey 1998).

Most of Ohio, including Huron County, is part of the Beech-Maple Forest Region (Braun 1950). The Beech-Maple Forest Region is dominated by beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*); however, extensive tracts of elm-ash-maple (*Ulmus* spp., *Fraxinus* spp., *Acer* spp.) type forests occur in depressions and areas between glacial moraine flats, reaching into the area of the Great Black Swamp in Northwestern Ohio. The bogs and prairies that are scattered throughout the area increase the vegetation diversity of the Beech-Maple Region (Braun 1961).

According to the US Geologic Survey soil survey for Huron County, the area has primarily hydric, slow draining soils (Ernst and Martin 1994). Additionally, these soils are considered prime farmland when drained. Small (<4 hectares [ha]) to large (121 ha) woodlots occur throughout the study area in low lying areas. These woodlots are generally the slowest draining areas where water collects during spring rains.

¹ Available at: <http://ohiodnr.com/LinkClick.aspx?fileticket=loJTSEwL2uE%3D&tabid=21467>



Legend

 Project Area

0 0.5 1 Miles



Geographic Information Systems

Source: Windlab, 2011

Base Map: BING Imagery

Project Number: 175630014

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Figure 1 Project Location

Greenwich Wind Project
Huron County, Ohio

AVIAN SURVEY REPORT GREENWICH WIND PROJECT

Introduction

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The majority of the landscape in the study area is cultivated land (2,294 ha; 62.8%). Deciduous forest comprise the next highest land use with 698 ha (19.1%). Many of the forested areas are large (>20 ha) woodlots. Fragmented woodlots that have been difficult to clear due to seasonal drainage issues also occur throughout the study. Table 1 shows the breakdown in land uses and area within the Project boundaries.

Table 1. Land use area and percent total for Project area²

Land Use	Area (ha)	Percent of Project Area
Agriculture	2,298	62.8
Deciduous Forest	698	19.1
Evergreen Forest	3	0.1
Mixed Forest	0.6	<0.1
Wetlands	15	0.4
Open Water	5	0.1
Scrub/Shrub	9	0.2
Hay-Pasture	409	11.2
Developed	58	1.6
Developed – Open Space	163	4.5
Total	3,659	

1.2 REGULATORY SETTING

In Ohio, ODNR possesses the responsibility to administer various regulations in regards to game and nongame plants and animals (Ohio Revised Code, Title 15: Chapter 1531). In Ohio, animals and plants listed as endangered or threatened receive protection under RC § 1518.01–99; 1531.25, 1531.99.

Wind energy, in Ohio, is regulated by the Ohio Power Siting Board (OPSB) for any proposed wind facility generating greater than 5 megawatts of power, cumulatively. As part of the OPSB application process, developers must perform an assessment of the potential ecological impact of the proposed facility in order to receive their certificate of need from OPSB (ORC, Title 49: Chapter 4906). As one of seven voting members of the OPSB, the ODNR provides input and recommendations to the OPSB regarding potential impacts of proposed wind facilities in regards to wildlife resources within the state.

² Information from 2011 Critical Issues Analysis for Greenwich Wind Project

**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

Owl Playback Surveys
February 26, 2013

2.0 Owl Playback Surveys

2.1 INTRODUCTION

Based upon the Project boundary, a list of survey recommendations was prepared by the ODNR for the Greenwich Wind Project and presented in a letter dated March 21, 2011³ (Appendix A). This letter states that two survey points were to be established within the Project area for conducting owl playback surveys. Point locations were coordinated with Jennifer Norris of the ODNR prior to surveys. See Appendix A for the 2012 Study Plan to Conduct Avian Baseline Surveys.

2.2 METHODS

Survey methods follow guidelines provided by ODNR⁴. The ODNR guidelines state that owl playback surveys are conducted once for each potentially occurring species for a total of three surveys; one survey in January for great horned owls (*Bubo virginianus*), one in February for barred owls (*Strix varia*), and one in March for the Eastern screech owls (*Otus asio*).

The guidelines require one (1) survey point for each 100 ha of contiguous forest, therefore, based on ODNR assessment of the Project area two survey locations were required. There are two large woodlots that occur within the Project area. The South woodlot lies between Rome Greenwich Road and St. Route 13 and between E Plymouth East Road and Base Line Road. The North woodlot lies partially outside of the Project area. It is located east of Nineveh Road between Alpha road and US Route 224E. Survey locations are depicted on Figure 2.

Surveys were conducted according to protocol and occurred on January 30, 2012 for great-horned owl; February 28, 2012 for barred owl; and March 14, 2012 for eastern screech owl. Surveys were recorded as north and south survey locations. Survey date and start times were recorded. Weather conditions were also recorded for each location. Weather conditions included estimated cloud cover, temperature measured with a digital thermometer, and wind speed average using a digital thermometer (Table 2).

Table 2. Survey information for owl playback surveys

Date and Target Species	Survey Start Time	Weather Conditions
January 30, 2012 Great Horned Owl	North: 6:15 pm South: 7:30 pm	North: 90% cloudy/3.8°C/1 m/s South: 100% cloudy/6.1°C/1.7-2.7 m/s
February 28, 2012 Barred Owl	North: 6:30 pm South: 7:45 pm	North: Clear/3.8°C/calm South: 100% cloudy/6.1°C/1 m/s
March 14, 2012 Eastern Screech Owl	North: 8:00 pm South: 8:50 pm	North: Clear/16.1°C/1 m/s South: Clear/13.8°C/1 m/s

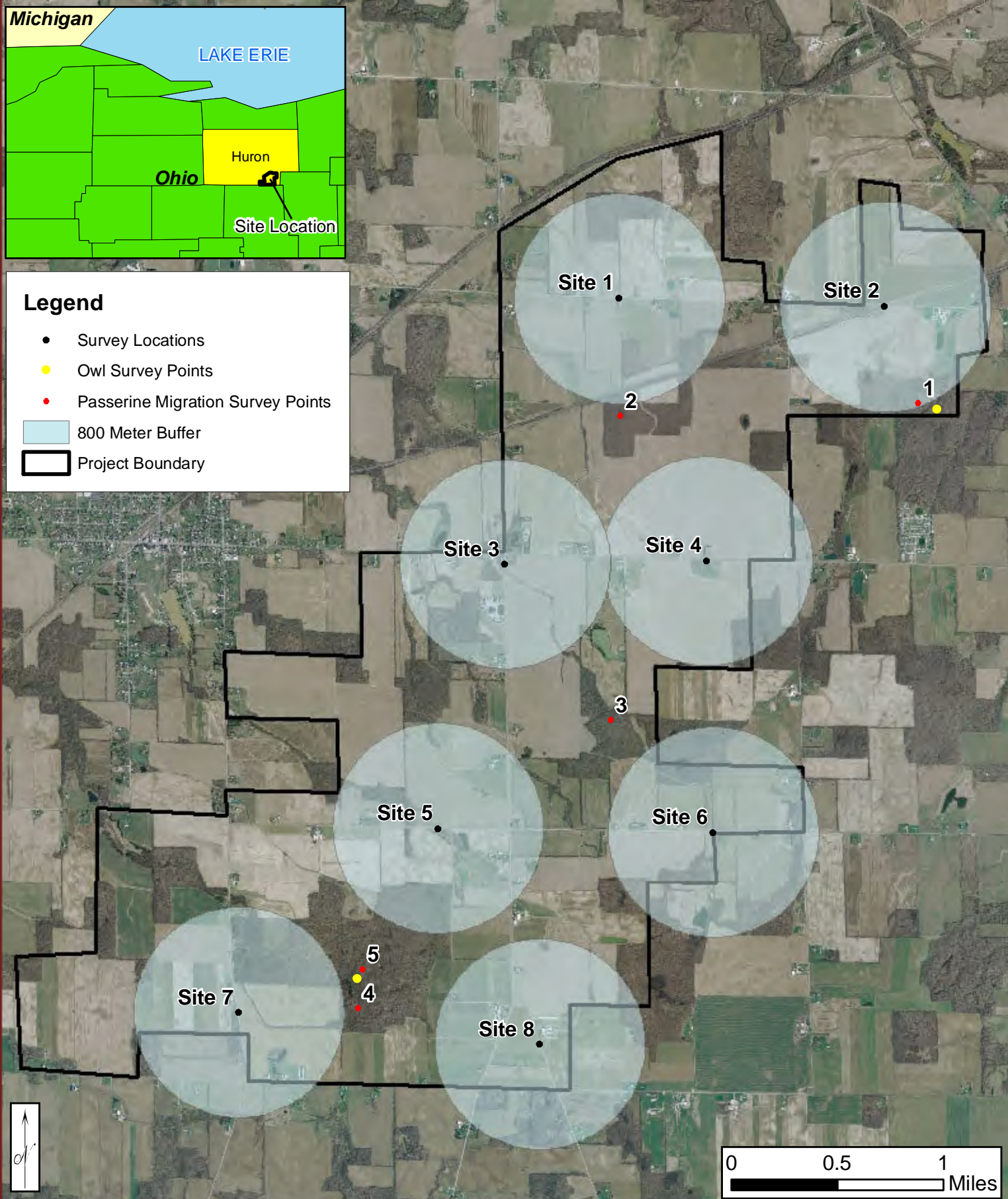
³ The May 21, 2011 recommendations were consistent with the March 26, 2012 revised correspondence.

⁴ On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio.



Legend

- Survey Locations
- Owl Survey Points
- Passerine Migration Survey Points
- 800 Meter Buffer
- Project Boundary



Geographic Information Systems

Source: Windlab, 2011

Base Map: Ohio Statewide Imagery Program (OSIP), 2006

Project Number: 175630014

Figure 2
Project boundary and survey locations (owl survey points,
diurnal bird/raptor points, passerine migration points)

Greenwich Wind Project
Huron County, Ohio



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**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

Owl Playback Surveys
February 26, 2013

2.4 RESULTS

2.4.1 Great Horned Owl

January surveys targeted nesting great horned owls. While biologists walked to the North survey location a great horned owl was heard from within the woodlot. This species was heard calling from this woodlot during all three survey events (January 30, February 28, and March 14). A single great horned owl was heard responding to the playing of a barred owl call during the March 14, 2012 survey period; however, this was not the survey month for the great horned owl. No nests were observed during survey efforts in either the North or South woodlots.

2.4.2 Barred Owl

February surveys targeted nesting barred owls. No barred owls were heard or observed during surveys of the North or South woodlots during survey periods or while walking to and from survey locations. No nests were observed during survey efforts. No potential nest cavities were observed during survey efforts.

2.4.3 Eastern Screech Owl

March surveys targeted nesting eastern screech owls. No eastern screech owls were heard or observed during surveys of the North or South woodlots during survey periods or while walking to and from survey locations.

2.5 DISCUSSION

Results of the owl playback survey indicate that there is likely a great horned owl nest somewhere in the vicinity of the North woodlot survey location. However, no nests were observed or located during survey efforts or while walking to the survey location. This species is very common throughout Ohio and in agricultural landscapes (Peterjohn 2001).

The presence of great horned owls in the vicinity of the Project area is likely the reason why no barred owls were heard or observed at either survey location. Peterjohn (2001) states that barred owls are unable to compete with great horned owls for both nesting sites and territory.

The probable absence of the eastern screech owl is likely due to limited nest cavity locations. While the North woodlot had a variety of aged trees with a generally open subcanopy few cavities were observed. The South woodlot was younger and denser. Few trees larger than 25 centimeters (cm) were observed and no cavities were observed during owl playback surveys or previous year 2011 surveys (Stantec 2012).

**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

Raptor Nest Searches and Monitoring
February 26, 2013

3.0 Raptor Nest Searches and Monitoring

3.1 INTRODUCTION

Based upon the Project boundary, a list of survey recommendations was prepared by the ODNR for the Greenwich Wind Project and presented in a letter dated March 21, 2011⁵ (Appendix A). This letter states that nest searches should occur on, and within a 1-mile buffer of the Project area. Records of state or federally listed species of raptors were not known from or within a 2-mile buffer of the Project area. Any nests of state or federally listed species are required to be monitored twice weekly for four hours daily in an attempt to establish patterns. Nest searches and monitoring were coordinated with Jennifer Norris of the ODNR prior to surveys. See Appendix A for the 2012 Study Plan to Conduct Avian Baseline Surveys.

3.2 METHODS

3.2.1 Raptor Nest Searches

The ODNR guidelines state that one early season survey should be conducted between February 1 and March 31 within 1-mile of the proposed Project for raptor nests (Figure 2). At the time of survey, the locations of facility components (i.e. turbines, access roads, interconnections) were not yet determined; therefore, a search of the entire project area was conducted.

The ODNR guidelines provide minimal detail on the recommended protocols for this survey; however, ODNR staff indicated this survey would likely require a minor survey effort. Therefore, the current survey included a windshield survey using binoculars, spotting scopes, and other resources in order to view into woodlots within the Project area. The raptor nest searches were conducted within those leaseholder properties (within the Project area) where access was granted and was conducted from publicly accessible roads within the 1-mile vicinity of the Project area. Additionally, biologists looked for raptor nests during bat mist netting, fall 2011 passerine migration surveys, and fall 2011 diurnal bird/raptor migration surveys.

3.2.2 Nest Monitoring

According to ODNR guidelines, monitoring of nests should be conducted to assess daily patterns of movement. During incubation and rearing, monitoring of the adults should occur at least four hours twice per week until consistent activity patterns are recorded.

3.3 RESULTS

⁵ The May 21, 2011 recommendations were consistent with the March 26, 2012 revised correspondence.

**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

Raptor Nest Searches and Monitoring
February 26, 2013

Raptor nest surveys were conducted on March 13, 14, and 15, 2012 within the Project area and within a 1-mile buffer of the Project area (Figure 2). No nests within the Project area were observed prior to these dates during other survey efforts.

However, on March 13, 2012, a bald eagle (*Haliaeetus leucocephalus*) nest was located outside of the Project area but within one mile of the northeastern project boundary. Upon identification of the nest, WindLab and Stantec notified both USFWS and ODNR of its presence. Nest and activity monitoring methods were developed and approved in coordination with ODNR and USFWS. See Appendix A for the 2012 Study Plan to Conduct Avian Baseline Surveys. No other raptor nests were observed within the Project area or the 1-mile buffer.

3.4 DISCUSSION

No raptor nests of state or federally listed species were found during nest searches in the Project area. One nest was located outside the Project area and was inhabited by a pair of bald eagles. The bald eagle was removed from the Endangered Species Act on June 28, 2007. It is currently considered a federal Species of Concern. Similarly, the bald eagle was removed from the State of Ohio's list of threatened species and no longer receives a designation from the state (ODNR 2012). A more detailed discussion regarding eagles is presented in Section 4.0. There are no known protected nesting raptors within the Project area (see ODNR May 30, 2012 correspondence).

4.0 Bald Eagle Nest and Activity Monitoring

4.1 INTRODUCTION

On March 13, 2012 a bald eagle (*Haliaeetus leucocephalus*) nest was located outside of the Project area, but within one mile of the northeastern project boundary. The nest is approximately 1.5 m tall by 1.5 m wide and is located in an eastern cottonwood (*Populus deltoides*) approximately 15 m in height. The nest tree is on the northern edge of a small lake approximately 3.5 ha in size. Local residents indicated that the nest was originally established in 2011. Upon identification of the nest, WindLab and Stantec notified both USFWS and ODNR of its presence. Both the ODNR and USFWS requested that nest monitoring be conducted to get a better understanding of the activity patterns of both the adults and fledglings and how they interact inside the project boundaries.

4.2 METHODS

4.2.1 Nest Monitoring

As recommended by ODNR's March 26, 2012 letter of effort, the eagle's nest was monitored twice weekly for four hours each day in effort to establish patterns of use within the Project area. Surveys were conducted visually or with the aid of binoculars from the opposite side of the small lake from the nest tree. When adults would leave the nest the surveyor would attempt to follow their flight path via roadway.

4.2.2 Point Count Activity Monitoring

In an effort to estimate the Project risk to eagles, surveys were conducted to document spatial and temporal use of the Project area. Eight survey locations were established throughout the Project area. These eight points were additionally used for the spring diurnal bird/raptor surveys so that eagle observations could be captured during those survey periods. These points were monitored twice monthly from May to September 2012 to assess usage of the Project area during summer months. Surveys were conducted between 10:00 a.m. and 6:00 p.m. Surveys were conducted for an hour at each location daily.

4.3 RESULTS

4.3.1 Nest Monitoring

Nest monitoring began on April 6, 2012 and was conducted for a total of 18 days from April 6 to June 5. A minimum of 72 hours were spent directly monitoring the bald eagle nest. However, additional uncounted hours were spent attempting to follow adults as well as periodic "checks" of the nest during other project survey efforts. Surveys occurred on the following dates:

**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

Bald Eagle Nest and Activity Monitoring
February 26, 2013

- April 4, 6, 8, 12, 15, 19, 23, 27;
- May 1, 2, 6, 7, 18, 19, 24, 29; and
- June 1, 5.

One eagle (presumed female based on relative time spent on nest) spent the majority of time near the nest. This eagle rarely left the nest and was presumed to be incubating eggs until the last hatched or brooding young. It was not until April 12, 2012 that this bird was observed leaving the vicinity of the nest. During this time, the second adult (presumed male) was rarely observed at the nest location. When this eagle returned it was often observed bringing fish to the nest.

When the eagles left the nest site, either individually or together, they were most often observed flying north and east from the nest. Eagles were followed upon leaving the nest site a minimum of eight times and were generally lost before their foraging location was found due to local road patterns and flight speeds.

Bald eagles were directly observed twice during nest monitoring foraging at nearby New London Reservoir (April 19, and May 6, 2012). This reservoir is approximately 89 ha in size. The eagles were observed foraging by multiple people (Burkholder and Ottie, pers. comm.) on May 6 at 8:50 am and 5:30 pm to 6:45 pm).

The breeding pair of eagles successfully hatched two chicks. The chicks were first directly observed on April 12. On April 27, the eaglets' down feathers appeared to be gone and one of the juveniles was standing in the nest with wings raised. By May 2, the juveniles appeared to be nearly half the size of an adult and were observed exercising their wings often. On May 29, the juveniles were seen perching on the rim of the nest. The two juveniles were not observed fledging the nest. Local residents indicated that they had seen both in other trees near the nest.

On April 8 and 27, a bald eagle sub-adult (i.e. after hatch year bird) was observed at the nest site. On the first occasion, the sub-adult flew into the vicinity of the lake, circled three times and perched throughout the rest of the monitoring event. On the second occasion, a sub-adult was seen circling over the nest site with both adult eagles. The three eagles circled together from 90 – 120 m in height for 45 minutes before the sub-adult and one adult departed to the east-northeast. It is likely, but not certain, that this bird was the same bird observed previously.

There were two observations of the nesting eagles entering the Project area. The first observation was on May 2 when the nesting pair entered the northeast corner of the Project area. Both eagles left the nest site at approximately the same time and flew directly south making a few low-level circles (approximately 10 – 15 m above ground) before settling on the railroad tracks just east of the intersection with Alpha Road. After feeding for a time on an opossum (*Didelphis virginiana*) carcass, the eagles returned directly north to the nest site. The

**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

Bald Eagle Nest and Activity Monitoring
February 26, 2013

first eagle was observed from 10:15 am until 10:51am. The second eagle was observed from 10:18am until 10:32am.

The second observation was of an eagle returning from the direction of the Project area on May 18. This eagle was not directly observed in the Project area; however, the flight direction suggested that it had spent time in the Project area. It was first observed flying over the open field just north of the intersection of Alpha Road and Ninevah Road. This was straight-line, powered flight at approximately 20 m.

4.3.2 Point Count Activity Monitoring

Spring Raptor Migration Surveys began on March 21, 2012. There were a total of eight survey points. Point counts were completed as part of the spring 2012 Diurnal Bird/Raptor Migration Surveys (see Section 5.0). Outside of these survey dates point count monitoring was conducted on

- May 30, 31;
- June 18, 27;
- July 20, 30; and
- August 23, 30.

A total of two bald eagles were observed within the Project area during surveys from March 21 to August 30, 2012. No adult bald eagles were observed, only sub-adults. Figure 3 shows the locations of bald eagles observed during 2011 survey events (from Stantec 2011) and 2012 efforts.

On April 5, a sub-adult bald eagle was observed at survey point #8 at 11:44 am. The eagle approached the survey point from the north and was flying at approximately 10 m, flapping continuously and flying in a straight line to the south. After 30 seconds, the eagle took two circles and climbed up to a height of approximately 50 m. The eagle continued south at this height and began circling and gaining altitude. The bird was observed between 40 to 180 m for approximately three minutes as it gained altitude and rode a thermal to the west. Eventually the eagle found its wind direction and departed in a straight line to the west. The entire length of the observation was approximately eight minutes.

On April 10, a sub-adult bald eagle was observed from survey point #4 at 12:49 pm. This bird, overall, was traveling in a northwesterly direction at approximately 40 m. Prevailing winds were out of the northwest and it took the eagle approximately two minutes to traverse the viewshed.

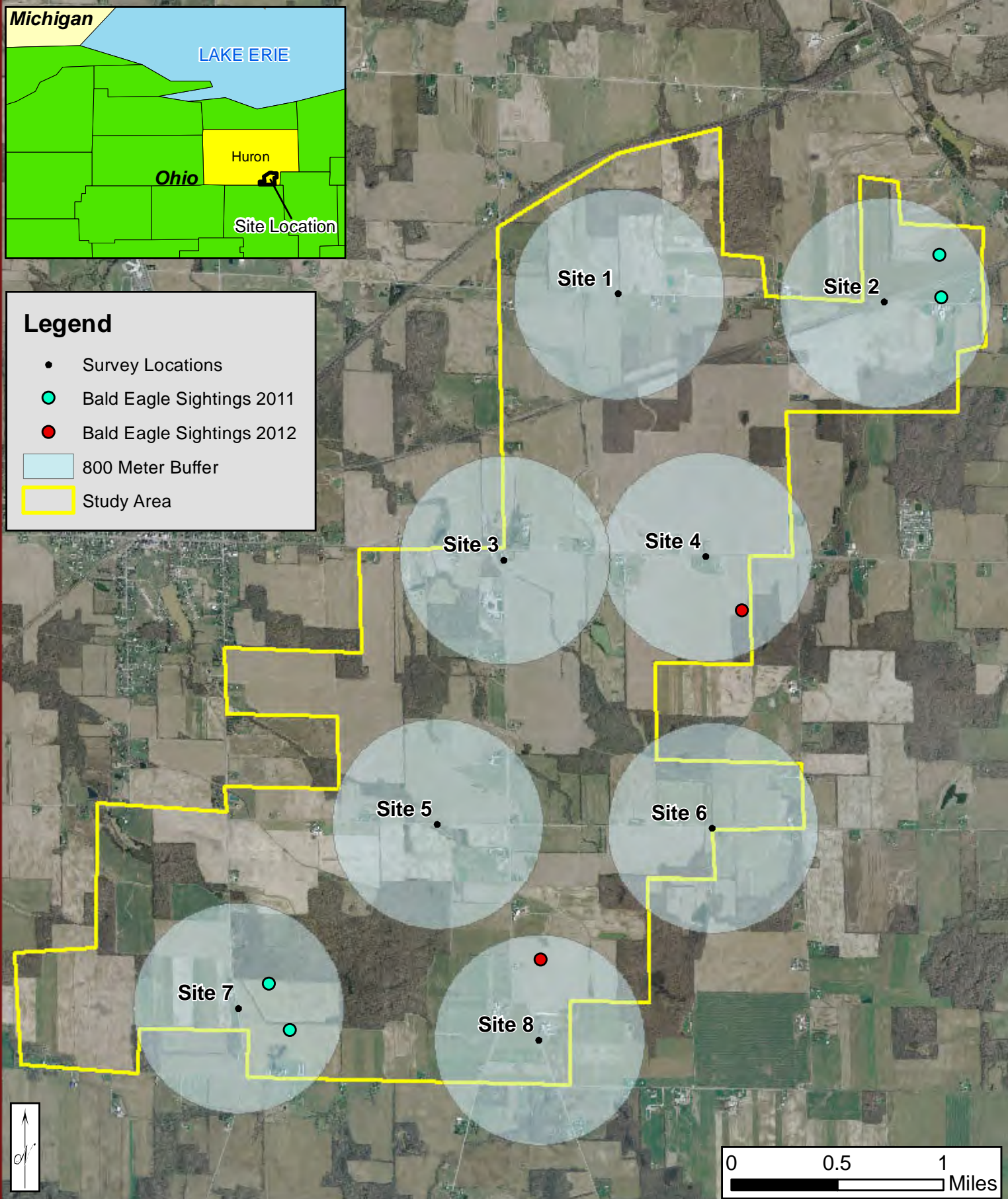


Legend

- Survey Locations
- Bald Eagle Sightings 2011
- Bald Eagle Sightings 2012

800 Meter Buffer

Study Area



Geographic Information Systems

Source: Windlab, 2011

Base Map: Ohio Statewide Imagery Program (OSIP), 2006

Project Number: 175630014



Stantec

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Figure 3
Bald eagle sightings from within
the project area (2011 and 2012)

Greenwich Wind Project
Huron County, Ohio

**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

Bald Eagle Nest and Activity Monitoring
February 26, 2013

4.4 DISCUSSION

Based on observations and reports of bald eagles foraging at New London Reservoir and the observations of large fish prey delivery observed at the nest, it appears that the majority of the breeding pair's diet comes from larger aquatic habitats. This is consistent with Buehler's (2000) assertion that ideal nesting sites often occur within two km of ample water/fish resources. There are no large water features within the Project area. Small yard ponds and drainage ditches limit the amount of food availability for raising young. This is the most obvious reason for the observations of these nesting eagles foraging on fish from New London Reservoir. It is expected that these eagles foraged along larger portions of rivers and other large water sources outside of the Project area. Peterjohn (2000) cites various studies that found bald eagles nesting in northern Ohio were generally year-round residents. These eagles would leave territories during the harshest part of winter in search of open water and more numerous prey resources.

In Ohio, spring migration occurs between late February and mid-April, with peak migration occurring between February 20 and March 20, and a second peak during May (Peterjohn 2000). The bald eagles observations during the spring 2012 Diurnal Bird/Raptor Migration Survey fell within the known migration dates, and very near to the peak. Bald Eagles observed during this spring survey were sub-adults or juveniles and were likely migrants based on migration times and their pre-breeding maturity status (i.e. not having achieved adult plumage).

**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

Diurnal Bird/Raptor Migration Survey
February 26, 2013

5.0 Diurnal Bird/Raptor Migration Survey

5.1 INTRODUCTION

Based upon the Project boundary, a list of survey recommendations was prepared by the ODNR for the Greenwich Wind Project and presented in a letter dated March 26, 2012 (Appendix A). This letter states that one diurnal bird/raptor migration survey point was to be established within the Project area. However, raptor nest searches (see Section 3.0) resulted in identification of a bald eagle nest less than one mile northeast of the project area. Consultation with USFWS and ODNR on March 6, 2012 resulted in the recommendation that eight survey locations be monitored three days per week for an hour at each site to address eagle issues with the project area (Figure 2). Survey protocols were developed and coordinated with Jennifer Norris of the ODNR and Megan Seymour of the USFWS prior to surveys. See Appendix A for the 2012 Study Plan to Conduct Avian Baseline Surveys.

5.2 METHODS

5.2.1 Data Collection

Surveys were conducted during spring from March 21 to April 26, 2012 when weather conditions permitted (i.e., light winds, no heavy precipitation). Surveys occurred three days per week for an hour at each site starting at 09:00 hours (hrs) from eight points. The observer scanned the sky continuously from the observation point using binoculars, spotting scope, and/or naked eye. Observations were recorded as incidentals during travel between sites.

All raptors and other large diurnal birds, such as herons, crows, and waterfowl, were recorded, with the time of observation, number of birds observed, species or highest level of classification, age and sex, if possible. Flight behavior in relation to the Project area was recorded for each bird, or group of birds as well as flight direction. A height classification created by ODNR (see ODNR Form WD03 in ODNR 2009) was assigned to each bird or group of birds: 1 = 0-40 m above ground; 2 = 40-180 m; 3 = greater than 180 m.

Other information recorded during diurnal bird/raptor surveys included date, start and end times, and weather variables. Air temperature (Celsius) and wind speed (m/s) were measured whenever a recordable bird was observed. Cloud cover (percentage of sky) was visually estimated. Other birds were noted such as state- or federally-listed species⁶.

⁶ Wild Resources – Endangered & Threatened Species. Available online at: <http://www.dnr.state.oh.us/Home/ExperienceWildlifeSubHomePage/Endangeredthreatenedspeciesplaceholder/resourcesmgtplansspecieslist/tabid/5664/Default.aspx>

AVIAN SURVEY REPORT GREENWICH WIND PROJECT

Diurnal Bird/Raptor Migration Survey
February 26, 2013

5.2.2 Data Summary and Analysis

Bird diversity recorded for the diurnal bird/raptor migration surveys was summarized for the spring 2012 migratory time period. Flight height of bird observations in relation to proposed turbine height was summarized in two ways. The total number of raptors and the number of each species of raptor flying at three altitude levels: 0-40 m, 40-180 m, and greater than 180 m, was summarized. Additionally, numbers of birds traveling in each direction was calculated and graphically represented.

5.3 RESULTS

Surveys were conducted during 17 days between March 21 and April 26, 2013. A total of 136 hours of survey time was recorded from eight survey locations located throughout the project area. Eight species of raptor were recorded during diurnal bird/raptor surveys. Seven non-raptor species were observed during surveys. Three state listed species were observed during surveys including the northern harrier, sharp-shinned hawk, and green-winged teal (*Anas crecca*). Table 3 provides a summary of survey results.

Table 3 Summary of Spring 2012 diurnal bird/raptor survey effort and results

Survey Effort	Range of survey dates		3/21 - 4/26
	No. survey days		17
	No. survey hours		136
Species Observed (common name)	Scientific Name	Status in Ohio	
American Kestrel	<i>Falco sparverius</i>		
Bald Eagle*	<i>Haliaeetus leucocephalus</i>		
Cooper's Hawk	<i>Accipiter cooperii</i>		
Northern Harrier	<i>Circus cyaneus</i>	Endangered	
Red-shouldered Hawk	<i>Buteo lineatus</i>		
Red-tailed Hawk	<i>Buteo jamaicensis</i>		
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Species of Concern	
Turkey Vulture	<i>Cathartes aura</i>		
American Crow	<i>Corvus brachyrhynchos</i>		
Canada Goose	<i>Branta canadensis</i>		
Common Loon	<i>Gavia immer</i>		
Double-crested Cormorant	<i>Phalacrocorax auritus</i>		
Great Blue Heron	<i>Ardea herodias</i>		
Ring-billed Gull	<i>Larus delawarensis</i>		
Green-winged Teal	<i>Anas crecca</i>	Species of Interest	
Lesser Scaup	<i>Aythya affinis</i>		
Mallard	<i>Anas platyrhynchos</i>		

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Table 3 Summary of Spring 2012 diurnal bird/raptor survey effort and results

	Raptor	Vulture	Non-raptor
Total no. observations	135	1013	288
Seasonal passage rate (observations/hour)	0.99	7.45	2.12
Seasonal average observed per day	7.94	59.59	16.94
Total no. observations of within Project area (percent of total observations)	130 (96%)	975 (96%)	288 (100%)
Total no. of observations seen in the Project area by height category (percent of total observations)			
Observations at 0 - 40 m	45 (34%)	215 (21%)	229 (80%)
Observations at 40 - 180 m	77 (57%)	709 (70%)	46 (16%)
Observations at > 180 m	7 (5%)	51 (5%)	13 (5%)

*bald eagle was taken off the state threatened list and no longer receives a designation as of August 2012

The highest daily average temperature recorded during surveys was 27.0°C on March 21; the lowest average daily temperature was 5.5°C on April 10. Average daily wind speed varied from 9.6 m/s on March 28 to 0.7 m/s on March 22. Cloud cover varied widely across days from 0 to 100 percent cloud cover. The seasonal average cloud cover was 46 percent. Weather observations in the Project area are summarized in Table 4.

Table 4. Weather summary during Spring 2012 diurnal bird/raptor surveys

Date	Average Temp. (°C)	Average Wind Speed (m/sec)	Average Cloud Cover (%)
3/21/2012	27.0	2.1	0%
3/22/2012	24.2	0.7	1%
3/23/2012	21.2	1.9	69%
3/27/2012	7.4	2.5	7%
3/28/2012	19.0	9.6	10%
3/29/2012	10.8	2.2	100%
4/3/2012	14.4	1.6	72%
4/4/2012	14.2	4.3	5%
4/5/2012	13.6	3.2	51%
4/9/2012	14.3	4.8	51%
4/10/2012	5.5	3.7	100%
4/11/2012	7.8	4.0	96%
4/16/2012	22.3	7.8	64%
4/17/2012	14.5	2.0	57%
4/18/2012	14.9	2.1	12%
4/24/2012	12.4	3.4	15%
4/25/2012	18.0	2.6	43%
4/26/2012	13.0	3.1	100%
Season Average	15.0	3.5	46%

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5.3.1 Raptors

Over the course of the survey period, a total of 135 observations of raptors were made. The seasonal passage rate was 0.99 raptor observations per hour (raptors/hour). Figure 2 and Appendix B – Table 1 show the daily totals of raptor species observed during the survey period. Daily passage rates ranged from 0.13 raptors/hr (April 11) to 2.00 raptors/hour (April 4) (Appendix B – Table 1). The day with the highest passage rate, April 4, was characterized by moderate northeast winds. The day with the second highest passage rate, April 9, was characterized by moderate winds from the west.

Seven species of raptors totaling 135 individuals were recorded during the diurnal bird/raptor migration surveys in spring 2012 (see Appendix B – Tables 5 and 6). Red-tailed hawk was the most commonly observed species (n=96, 71%). American kestrel was the second most commonly observed raptor species, accounting for 10 percent of observations (Figure 3). A mean of 7.9 raptors were recorded per day (Appendix B – Table 5).

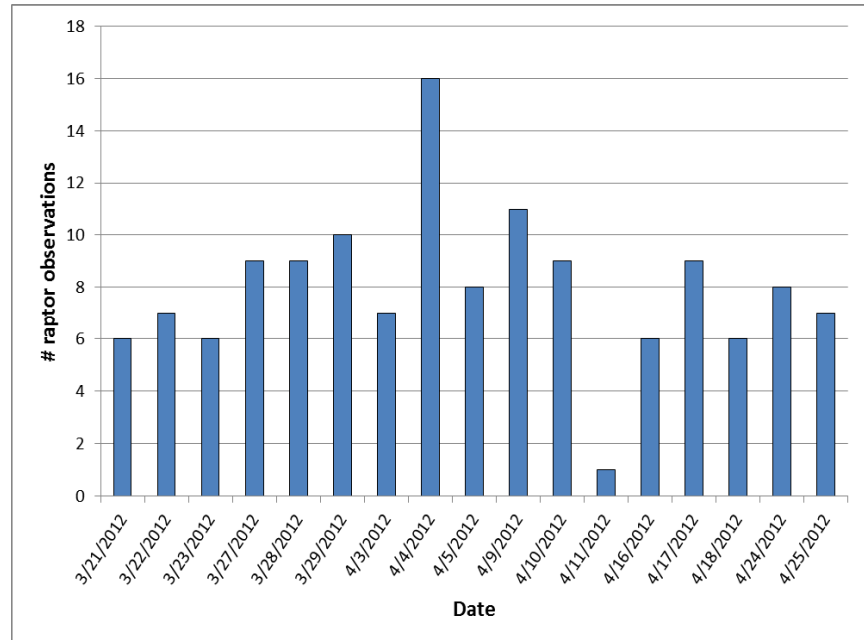


Figure 5. Survey day totals of raptor observations during spring 2012 surveys

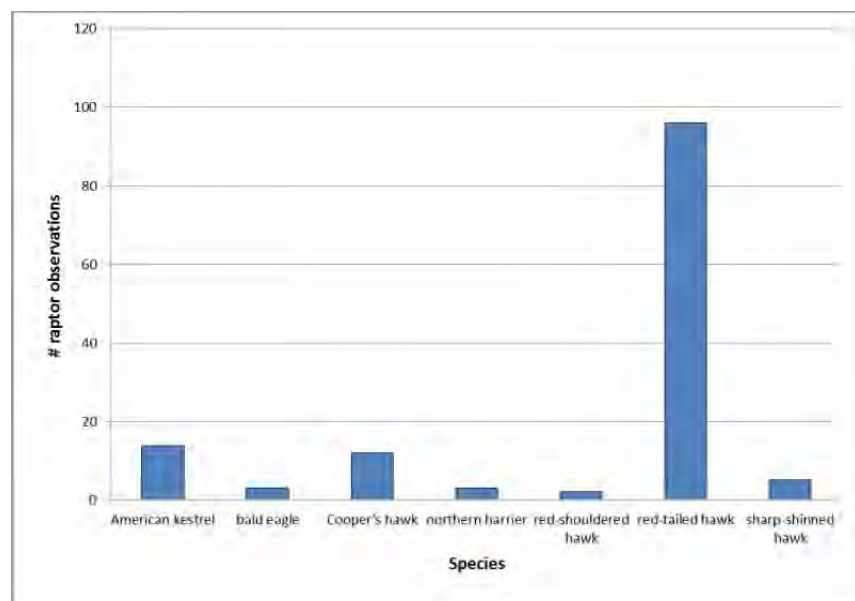


Figure 4. Number of observations of raptor species observed during spring 2012 surveys

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Throughout the survey season, the majority of raptor observations peaked between 12:00 and 13:00 hours (23% of total observations). A second peak in activity occurred between 15:00 and 16:00 (Figure 4, Appendix B – Table 6).

Flight height was visually estimated in four categories: 0-40 m, 40-180 m, and greater than 180 m. Four raptor species were observed flying in the rotor-swept area (40-180 m). These species included bald eagle (n=2), Cooper's hawk (*Accipiter cooperii*; n=4), red-tailed hawk (n=13), and sharp-shinned hawk (n=75) (Figure 5; Appendix B – Table 7).

Flight direction of raptors observed was noted during field observations. Raptors observed in the study area were generally moving in a westerly or south westerly direction (Figure 6)

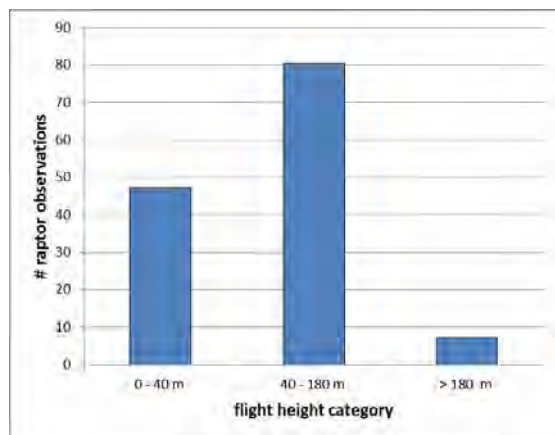


Figure 8. Number of observations of raptors per flight height category during spring 2012

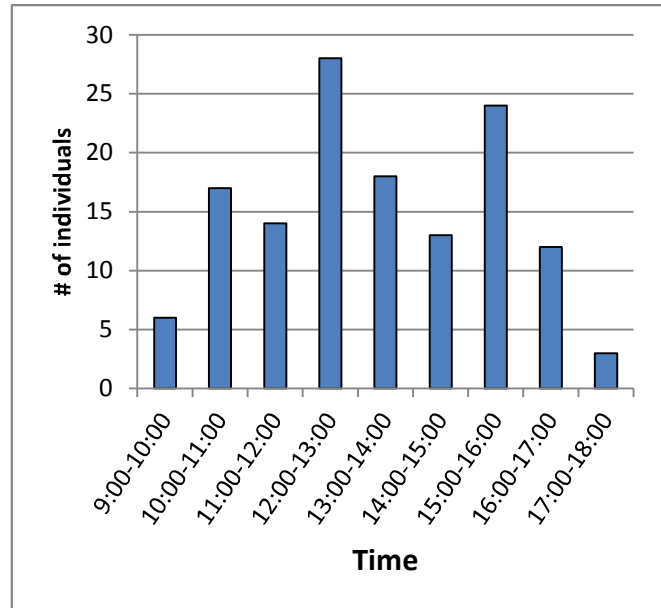


Figure 7. Number of observations of raptors per survey hour during spring 2012

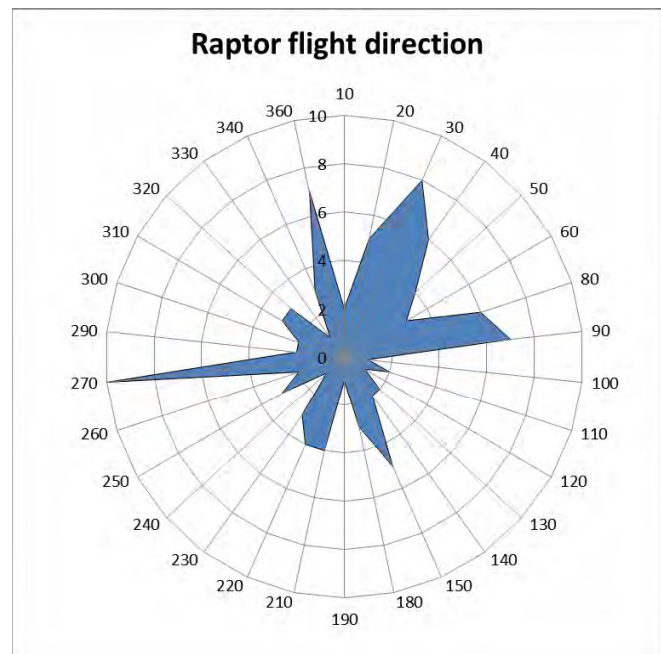


Figure 6. Raptor flight direction during spring 2012 surveys

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5.3.2 Vultures

Turkey vulture observations were separated from raptor observations for purposes of analysis due to the disproportionate number of birds observed. A total of 1,013 individual turkey vultures were observed during the survey period. The peak number of vultures were observed on October 2 (n=353), with a secondary peak on March 21 (n=84) (Figure 7, Appendix B – Table 8).

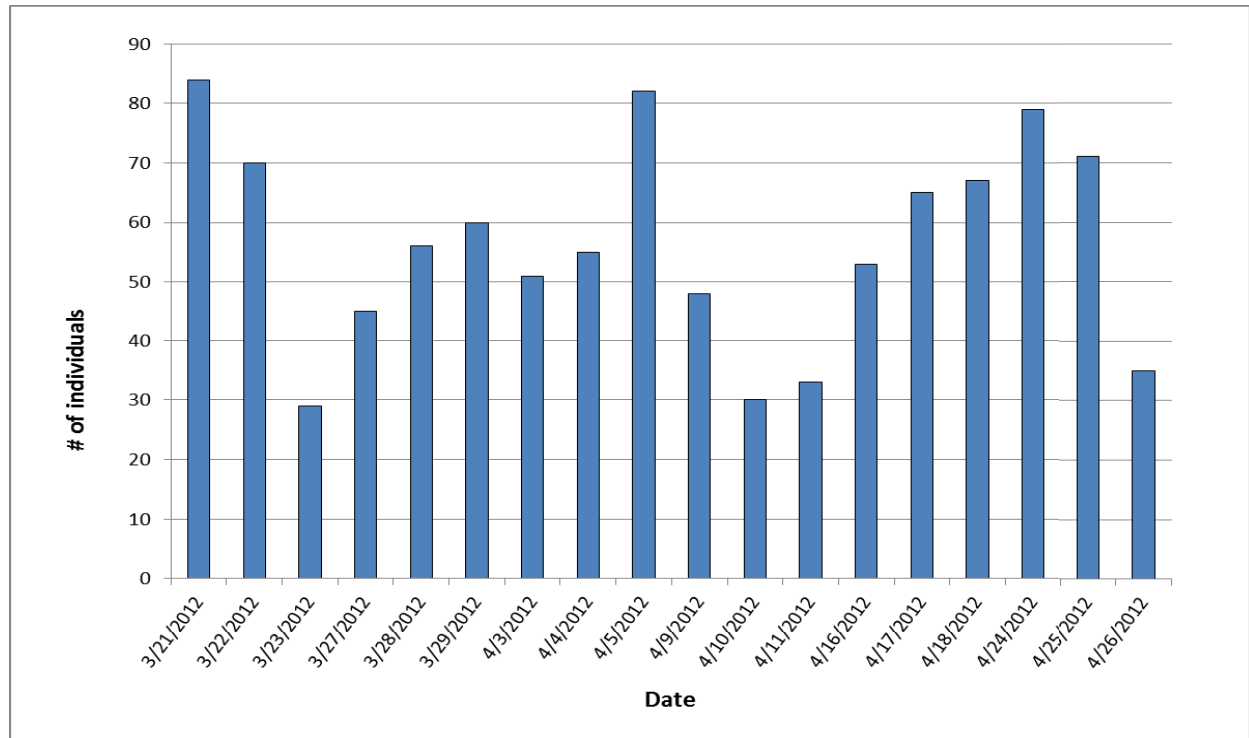


Figure 9. Survey day totals of vulture observations during spring 2012

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Throughout the survey season, vulture observations peaked between 15:00 and 16:00. A second peak in activity occurred between 10:00 and 11:00 hours (Figure 8, Appendix B – Table 6).

Flight height of vultures observed was noted during field observations. Seventy-two percent of turkey vultures (n=728) were observed flying in the rotor-swept area (40-180 m) (Figure 9, Appendix B – Table 8).

Flight direction of raptors observed was noted during field observations. Vulture flight direction varied more than those of raptors at the Project site. In general most vultures were moving in north-westerly direction (Figure 10).

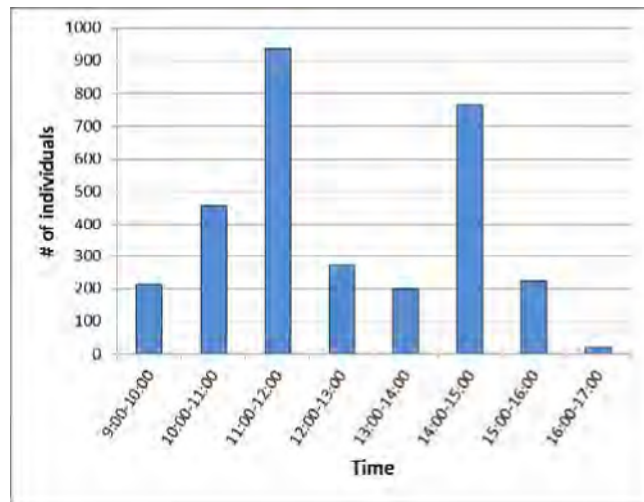


Figure 10. Number of observations of vultures per survey hour during fall 2011 surveys at the Greenwich Wind Project.

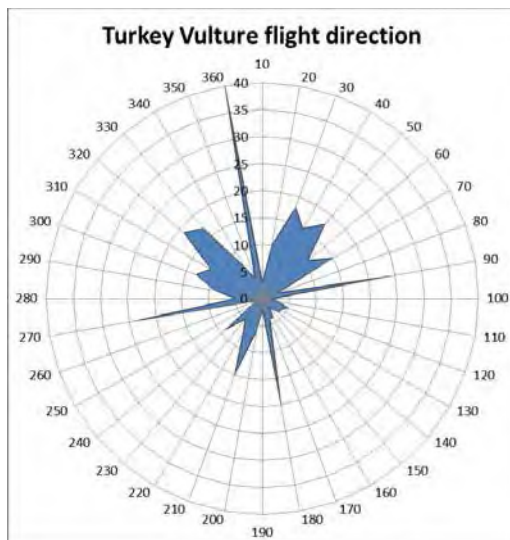


Figure 12. Turkey vulture flight direction during spring 2012

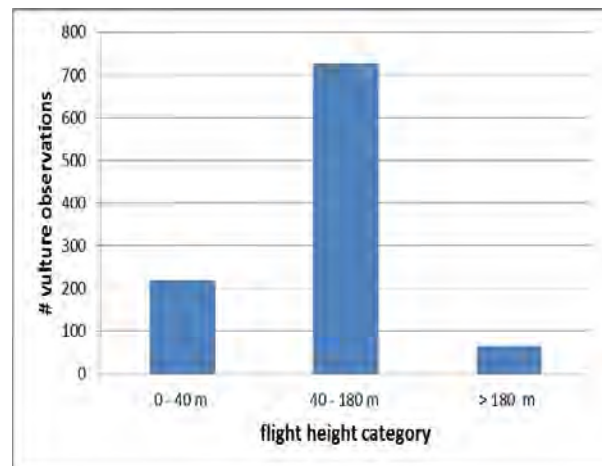


Figure 11. Number of observations of turkey vultures per flight height category during spring 2012.

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5.3.3 Other Diurnal Birds

A total of 288 individual non-raptor bird species were observed during the survey period. The peak number of birds were observed on April 10 (n=44), with a secondary peak on April 9 (n=28) (Figure 11, Appendix B – Table 9).

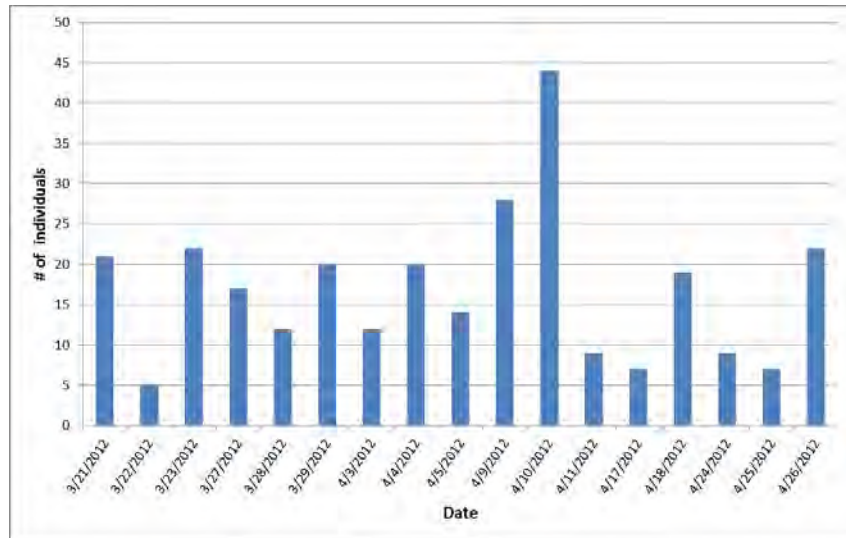


Figure 13. Survey day totals of non-raptor observations during spring 2012.

Non-raptors included nine species. The most common species recorded included American crow 59 percent, Canada goose (*Branta canadensis*) 22 percent (Figure 12, Appendix B – Table 9). Bird use of the Project area was calculated to be 2.12 birds per survey hour.

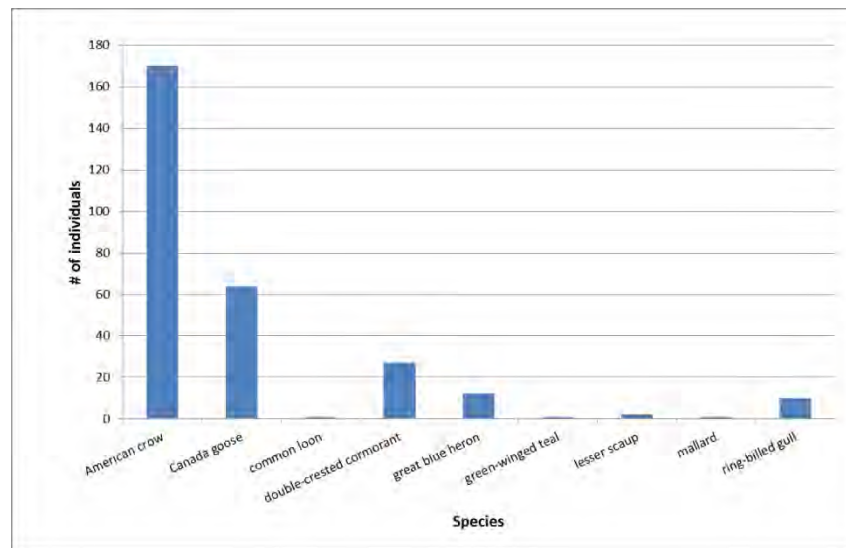


Figure 14. Number of observations of non-raptor species observed during spring 2012.

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Throughout the survey season, the majority of non-raptor observations peaked between 9:00 and 10:00. A second peak in activity occurred between 10:00 and 11:00 hours (Figure 13, Appendix B – Table 6).

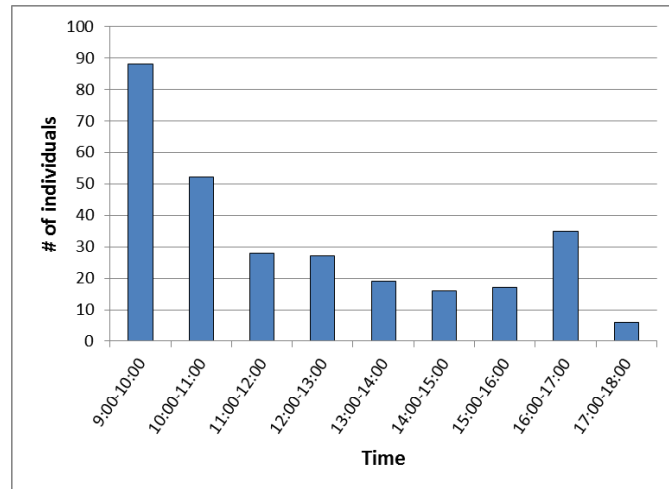


Figure 15. Number of observations of non-raptor species per survey hour during spring

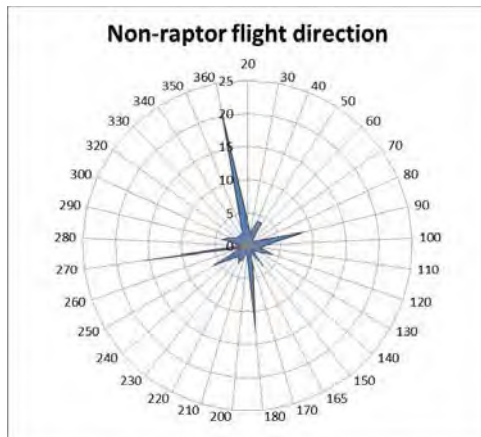


Figure 16. Non-raptor flight direction during spring 2012 surveys.

Non-raptor species flight direction was predominantly to the north with most observations moving at 180 degrees (Figure 15).

The majority of non-raptor observations occurred between 0 – 40 m flight height (n=229; 80%). Sixteen percent of non-raptors (n=46) were observed flying in the rotor-swept area (40-180 m) (Figure 14, Appendix B – Table 7).

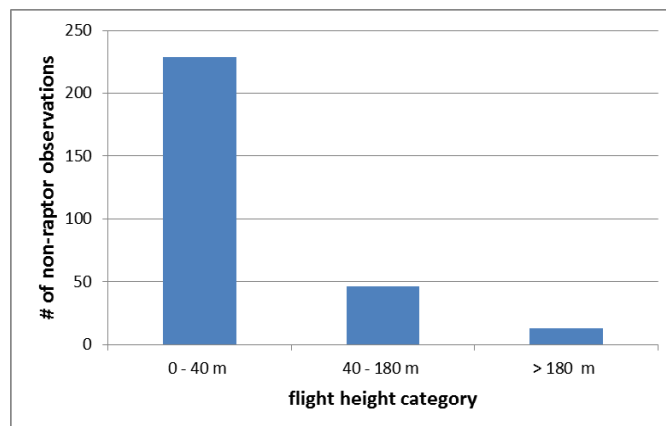


Figure 17. Number of observations of non-raptors per flight height category during spring 2012

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5.3.4 Rare, Threatened, and Endangered Species

One state-listed endangered species was observed during the spring 2012 surveys: northern harrier (n=3). Two northern harrier observations within the Project area occurred below 40 m, the third occurred at greater than 180m. The first northern harrier observation occurred on March 22; this observation was of an adult male flying east from Point #1. The second was a juvenile observed on April 10 at Point #2 flying southwest. The third observation, on April 18, was another juvenile at Point 1 flying southeast.

One species of special concern was observed during the spring 2012 surveys: sharp-shinned hawk (n=5). One species of Interest was observed during the spring 2012 surveys: green-winged teal (n=1).

No federally-listed endangered or threatened species were observed during the spring 2012 surveys.

5.4 DISCUSSION

The goal of the diurnal bird/raptor migration surveys was to document the level and timing of species activity, diversity, and abundance within the Project area. Survey protocols developed by ODNR are similar to those established by HawkWatch International⁷ and the Hawk Migration Association of North America⁸ (HMANA). Hawk migration is different from passerine migration in that birds are generally more conspicuous and actively foraging or migrating above or alongside woodlots and other land features. Diurnal bird/raptor surveys focused on raptors but other larger diurnal birds were recorded as well. One drawback of this survey method is that not all of the Project area can be seen at any given time from the survey locations (n=8); therefore, birds occurring outside of the observer's field of view are not recorded.

Of the 135 total raptor observations made within the study area, 130 (96%) observations occurred within the Project area. For the 1,013 turkey vulture observations made within the Project area, 975 (96%) observations occurred within the Project area. It should be noted that the locations where raptors were observed in the study area are subject to observer bias. Birds in closer proximity to the observation location were more likely to be seen than birds occurring at greater distances from the observer. Also, birds that traveled outside of the observer's view shed would have gone undetected.

During raptor migration, flight pathways and flight heights along ridges, side slopes, and across valleys may vary seasonally, daily, or hourly. Raptors may shift and use different ridgelines and cross different valleys from year to year or season to season. Weather and wind are major factors that influence migration paths and flight heights; in particular, wind, air temperature, and cloud cover influence the development of updrafts and thermals used by raptors making long-distance flights. The flight paths of raptors observed at the Project varied between survey dates

⁷ HawkWatch International available online at: <http://hawkwatch.org/index.php>

⁸ HMANA available online at: <http://hmana.org/index.php>

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and were likely influenced by wind direction and weather. The three survey days which experienced the highest raptor counts during the survey period (March 29, April 4, and April 9) were characterized by moderate temperatures and light winds (0.6 to 12.5 m/s) rather than topographical features as the landscape is generally even across the project area. Vulture counts peaked on March 21 with large counts also occurring on April 5 and April 24. Non-raptor counts peaked at similar times during the survey period to the raptors (April 9 and April 10). Seasonal timing and weather both likely influenced the daily activity rates at the Project. For most days, raptor activity peaked between 12:00 and 13:00 hours. Vulture activity peaked between 15:00 and 16:00 and non-raptor activity from 09:00 to 10:00.

The northern direction observed during spring surveys may indicate that some raptors were migrating to their summer breeding grounds. Many of the raptors observed in spring were turkey vultures, which tend to have varied flight directions. Due to the addition of five points to the previous year's three points (to cover bald eagle survey requirements), many of the vulture observations are likely individuals previously observed at other surveys points in a given day. Vultures tend to have a wandering flight pattern and may have detected food in the other directions and, therefore, traveled to feed. In comparison, both raptor only and non-raptor flight directions showed average northern movement.

Wind strongly affects the propensity of raptors to congregate along 'leading lines' or topographic features (Richardson 1972). Wind, air temperature, and cloud cover influence the development of updrafts and thermals used by raptors while making long-distance flights. Studies have documented high raptor collision avoidance behaviors at modern wind facilities (Whitfield and Madders 2006, Chamberlain et al. 2006). As most raptors are diurnal, raptors may be able to visually, as well as acoustically detect turbines during periods of fair weather.

During the spring survey period, more raptors were observed in the rotor-swept zone than below it, though some individuals were observed flying above the rotor-swept zone. For turkey vultures, the majority of observations were also within the rotor-swept zone, while non-raptor observations were primarily below the rotor zone.

There were no federally-listed species observed during the diurnal raptor survey, but one state-listed species was observed. During surveys in spring 2012, three northern harriers (state endangered) observations were recorded. These observations were not uncommon or unexpected from the Project area (Peterjohn et al. 1987; Peterjohn 2001; Wheeler 2003). In general, these individuals were observed for a short time within the survey area while hunting or gliding by during migration.

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6.0 Passerine Migration Survey

6.1 INTRODUCTION

Based upon the Project boundary revisions, a list of survey recommendations was prepared by the ODNR for the Greenwich Wind Project and presented in a letter dated March 26, 2012 (Appendix A). This letter replaced the May 21, 2011 coordination and states that four passerine migration survey points were to be established within the Project area. Survey protocols were developed and coordinated with Jennifer Norris of the ODNR prior to surveys. See Appendix A for the 2012 Study Plan to Conduct Avian Baseline Surveys.

6.2 METHODS

The goal of passerine migration surveys was to document the level and timing of species activity, diversity, and abundance of passerines (songbirds) in the Project area during the spring 2012 migratory season. The intent was to estimate migratory passerine use of combined forest, shrub, and wooded wetland habitats in the Project area (ODNR 2009). Surveys were completed during spring 2012, per the ODNR guidelines (ODNR 2009).

As recommended in the March 26, 2012 correspondence from ODNR, four survey points were established. Due to the size of the southwestern woodlot an additional site was added to total five point count locations (see Figure 2). These five point count locations were visited once a week during spring 2012 between April 27 and May 25. Observers were skilled in the ability to identify species by sight and song/call. Binoculars were used to aid in the survey. Table 5 summarizes the general habitat of the eight survey points.

Table 5. Point number and plot habitat type for passerine migration surveys.

Survey Point	Plot Habitat Type	Type Abbreviation
1,2	Forest, bordered by agricultural fields	Forest/Ag
3	Forest, bordered by fallow fields	Forest/Fallow
4,5	Forest interior	Forest Interior

6.2.1 Data Collection

Surveys were timed to occur between approximately dawn to 10:00 AM on days with seasonably favorable weather and when rain or wind would not inhibit the detection of birds. Each point was surveyed for 10 minutes. Each bird observed (by sight or song) was recorded, regardless of distance. Surveys were performed from the approximate center of circular plots (Reynolds et al. 1980), and bird occurrences were recorded within a 200-m radius from the observer as per ODNR guidelines (ODNR 2009).

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Species, number of individuals, and other behavioral notes were recorded during surveys. Sex and age class were recorded for each observation if they could be determined. Estimated distance of the bird(s) from the observer and compass bearing from the observer to the bird were noted. Observations of birds made before and after the point-count timeframes were recorded separately as incidental observations.

Other information recorded on data sheets included date, start time and stop time of the survey, and weather conditions (i.e. temperature, wind speed, and percent cloud cover). Temperature and wind speed were recorded using a hand-held anemometer/thermometer once for each 10-minute survey point. Percent cloud cover was visually estimated by the observer.

6.2.2 Data Summary and Analysis

The habitats present at point-count locations were grouped into three general community types based on dominant vegetation cover: Forest/Ag, Forest/Fallow, and Interior. Habitats with similar characteristics were grouped wherever possible for simplicity of data analysis.

The species and number of individuals documented during surveys were used to calculate species richness, relative abundance, frequency of occurrence, and community diversity, for all species for all habitats combined, and for each habitat classification. These indexes are described in more detail below.

- **Species richness (SR)** is the total number of species that were detected.
- **Relative abundance (RA)** is a way to quantify the number of individuals of a species in relation to other species observed. RA takes into account the total number of individuals detected, the number of times each point-count location was surveyed, and the number of survey points.
- **Frequency (Fr)** of occurrence, expressed as a percentage, measures the percentage of points where a particular species is detected.
- **Shannon Diversity Index (SDI)** is a measure of species diversity in a community or habitat. SDI can provide more information about community composition than species richness alone because it takes into account relative abundance and the evenness of the distribution of species. It indicates not only the number of species, but also how abundance is distributed among all the species in the community or habitat.

6.3 RESULTS

6.3.1 Weather

Nine surveys were conducted at each point-count location, one site visit each week from April 4 to May 31. Surveys were conducted when wind or rain conditions did not adversely affect bird

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detection. Over the course of the surveys, wind speeds were calm. Sky conditions generally ranged from clear to cloudy skies. Temperatures ranged from an average daily low of 1.8°C (April 6) to an average daily high of 22.8°C on May 25. Weather conditions for survey days are summarized in Table 6.

Table 6. Summary of weather conditions during spring 2012 surveys.

Site Visit	Survey Date(s)	Average Wind Speed (m/s)	Average Temperature (°C)	Average percent cloud cover
1	4/4/2012	0.44	9.4	3%
	4/6/2012	0.45	1.8	0%
2	4/10/2012	1.55	5.4	0%
	4/11/2012	0.37	4.0	100%
3	4/17/2012	0.00	8.4	23%
	4/18/2012	0.00	6.6	0%
4	4/25/2012	0.00	7.7	18%
	4/27/2012	0.58	4.1	54%
5	5/2/2012	0.02	18.9	70%
6	5/7/2012	0.02	16.0	100%
7	5/19/2012	0.02	18.5	0%
8	5/25/2012	0.14	22.8	37%
9	5/30/2012	0.03	17.2	0%
	5/31/2012	0.26	15.1	80%

6.3.2 Habitat

The Interior habitat type had the most individuals observed (n=269; Table 7). The Forest/Ag habitat showed the greatest species richness (SR=46) as well as the highest diversity (SDI=3.41; Table 7). The Forest/Fallow habitat type had the highest relative abundance (RA=16.33). A total of 61 species were observed during the migration surveys. A total of 675 individuals were recorded (Table 7; Appendix B – Table 1).

American goldfinch had the greatest relative abundance and frequency across all habitat types; Forest/Ag (RA=1.17; F=100%), Forest/Fallow (RA=6.00; F=100%) and Interior (RA=1.33; F=100%). Northern cardinal tied American goldfinch for relative abundance in the Forest/Fallow habitat type and had the second greatest relative abundance in the interior habitat type (RA=1.22; F=100%). Appendix B – Table 2 shows the relative abundance and frequency of each species observed by habitat type.

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Table 7. Summary of Project area migration bird point count results by habitat type.

Habitat Type	Number of Points	Total Birds Observed	Relative Abundance	Species Richness	Shannon Diversity Index
Forest/Ag	2	259	14.39	46	3.41
Forest/Fallow	1	147	16.33	37	3.33
Forest Interior	2	269	14.94	44	3.35
All points	5	675	15.00	61	3.54

6.3.3 Point Count

Point location #4 had the highest number of individuals observed (n=159) and the highest relative abundance of all the points (RA=17.67). American goldfinch had the highest relative abundance of any species (RA=1.27) across all points as well as the highest point specific relative abundance (Point 5; RA=1.56). Fourteen species were detected at all five point-count locations (F=100%); acadian flycatcher (*Empidonax virens*), American goldfinch (*Spinus tristis*), black-capped chickadee (*Poecile atricapillus*), blue jay (*Cyanocitta cristata*), brown-headed cowbird (*Molothrus ater*), downy woodpecker (*Picoides pubescens*), eastern wood-peewee (*Contopus virens*), northern cardinal (*Cardinalis cardinalis*), red-bellied woodpecker (*Melanerpes carolinus*), red-eyed vireo (*Vireo olivaceus*), red-winged blackbird (*Agelaius phoeniceus*), tufted titmouse (*Baeolophus bicolor*), white-breasted nuthatch (*Sitta carolinensis*) and wood thrush (*Hylocichla mustelina*). Appendix B – Table 3 shows the relative abundance and frequency of each species observed by point-count location.

6.3.4 Incidental Observation

Incidental observations are defined as occurring outside a designated survey period yet within the project boundary. There were 24 individuals documented of 16 species identified. Nine species seen incidentally were not detected during point-counts. Appendix B – Table 4 shows all incidental observations made outside of a 10-minute point-count survey within the Project area.

6.3.5 Rare, Threatened, and Endangered Species

There were no state or federally listed endangered or threatened species observed during the 2012 spring migration point count surveys.

One state species of concern was documented during surveys; one yellow-bellied sapsucker (*Sphyrapicus varius*) was heard and seen on May 7 at Point #5. Surveys also documented one state species of special interest, a single purple finch (*Carpodacus purpureus*) singing at Point #5. Three additional state species of special interest were documented as incidental observations; hermit thrush (*Catharus guttatus*) (n=2), Blackburnian warbler (*Setophaga fusca*)

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(n=2) and least flycatcher (*Empidonax minimus*). See Appendix B – Table 4 for additional details on incidental observations.

6.4 DISCUSSION

The goal of the passerine migration survey was to document the level and timing of species activity, diversity, and abundance within the Project area. Point-count surveys are a common method used to estimate abundance and density of birds during the breeding season (Reidy et al 2011; Bibby et al 2000; Ralph et al 1995); however, few studies have been published demonstrating their use and effectiveness during migratory periods. Several factors can influence detection probability during point-counts including time of day and season, weather, breeding status, distance to detected individuals, habitat type, and number of observers; these biases can influence the reported density of birds (Reidy et al. 2011).

However, the spring 2012 passerine migration surveys targeted optimal weather conditions that would allow for maximum detection of birds, and surveys were conducted during the peak migration period of April to May. Further, the 2012 surveys used standard methods that are comparable to other point-count surveys conducted in the region; therefore, the results of the surveys provide a suitable reflection of the baseline spring migration bird community in the Project area. It should be noted that comparisons among point-count surveys at different sites are difficult to make due to highly variable habitat types and conditions among sites as well as variations in point-count survey methodologies.

The species detected during the surveys are representative of the habitats in which they were observed. There were no state- or federally-listed endangered species observed in the Project area.

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**AVIAN SURVEY REPORT
GREENWICH WIND PROJECT**

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February 26, 2013

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Appendix A
Agency Correspondence and Study Plan to
Conduct Avian Baseline Surveys



Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

DAVID MUSTINE, DIRECTOR

Ohio Division of Wildlife

David B. Lane, Chief
2045 Morse Rd., Bldg. G
Columbus, OH 43229-6693
Phone: (614) 265-6300

May 21, 2011

To all interested parties,

Based upon the project boundary map received on May 20, 2011 the Ohio Department of Natural Resources Division of Wildlife (DOW) has prepared these survey recommendations for Windlab's proposed Greenwich project located in Huron County.

Currently the project falls within regions of the state that DOW has identified as needing moderate monitoring efforts. The below survey recommendations are based on a GIS analysis of the site and may be reevaluated after a site visit. Additionally, if the developer decides to amend the current boundaries, the DOW will revise our survey recommendations.

The table below was created based upon a review of the project maps provided and summarizes the types and level of effort recommended by the DOW. Results from these studies will help the Department of Natural Resources assess the potential impact these turbines may pose, and influence our recommendations to the Ohio Power Siting Board. Monitoring should follow those criteria listed within the "On-shore Bird and Bat Pre-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio."

For additional ODNR comments, including information on the potential presence of threatened and endangered species within or adjacent to your project area, please contact Brian Mitch at (614) 265-6378 or brian.mitch@dnr.state.oh.us.

Project	
Survey type	
Breeding bird	Breeding bird surveys should be conducted at all sites. The number of survey points may be based on the amount of available habitat, or twice the maximum number of turbines proposed for the site. If turbines are placed in agricultural land it, this requirement may be waived by DOW after a review of the proposed turbine locations is provided.
Raptor nest searches	Nest searches should occur on, and within a 1-mile buffer of the proposed facility.



Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

DAVID MUSTINE, DIRECTOR

Raptor nest monitoring	The DOW has no records of state or federally listed species of raptor nesting on or within 2-miles of the project area. Any discovered during the raptor nest searches should be monitored.
Bat acoustic monitoring	To be conducted at all meteorological towers.
Passerine migration (# of survey points)	8
Diurnal bird/raptor migration (# of survey point)	1
Sandhill crane migration (same points as raptor migration)	NS
Owl playback survey points	2
Barn owl surveys	NS
Bat mist-netting (# of survey points)	15
Nocturnal marsh bird survey points	2
Waterfowl survey points	NS
Shorebird migration points	NS
Radar monitoring locations	NS

NS = Not required based on the lack of suitable habitat.

If you have any questions, please feel free to contact me.

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Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

DAVID MUSTINE, DIRECTOR

cc: Mr. Stuart Siegfried, Ohio Power Siting Board
Ms. Megan Seymour, United States Fish and Wildlife Service
Mr. Brian Mitch, Ohio Department of Natural Resources

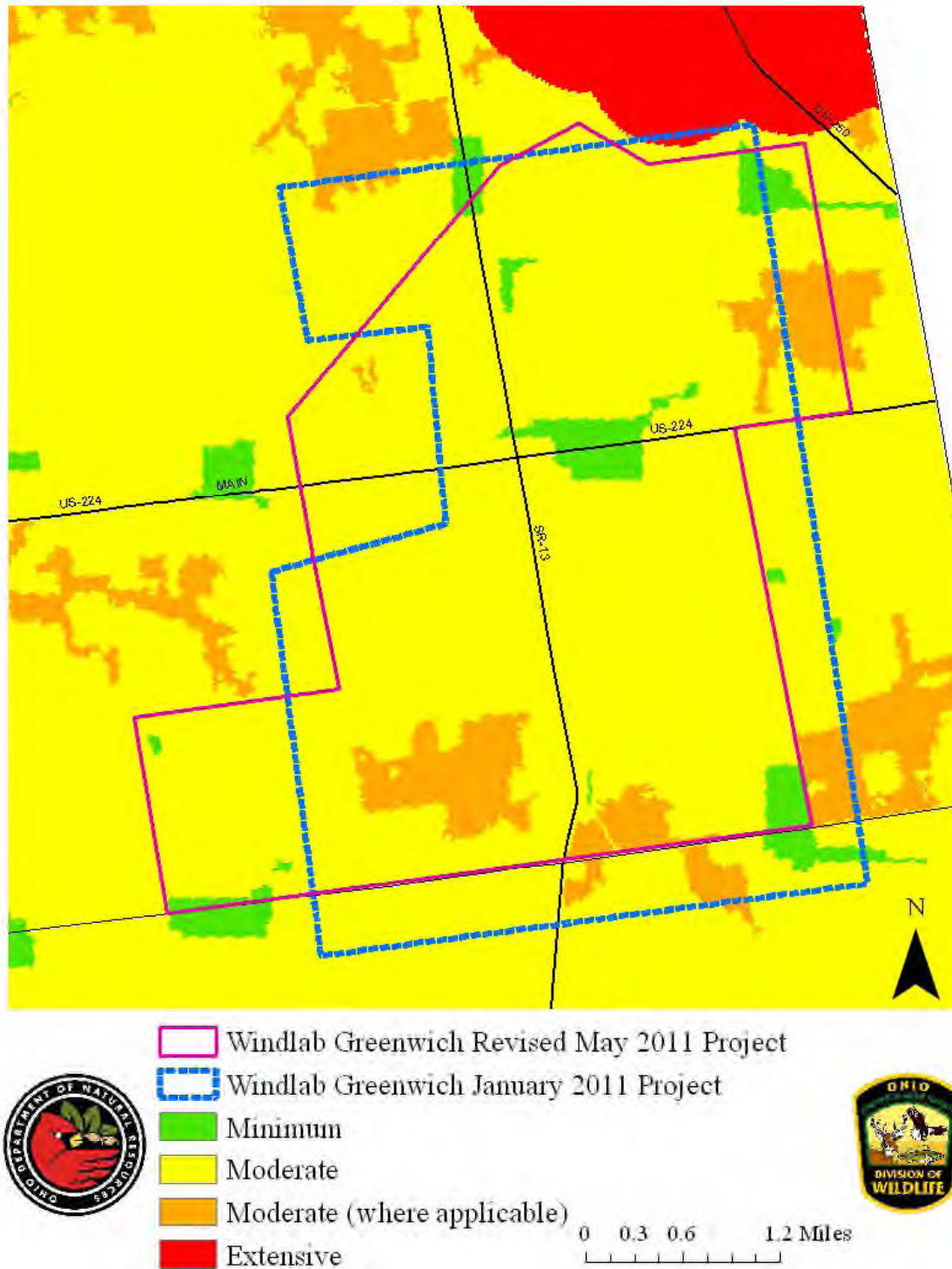


Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

DAVID MUSTINE, DIRECTOR

Figure 1. Survey effort map with the revised (May 2011) boundary for Windlab's proposed Greenwich project.



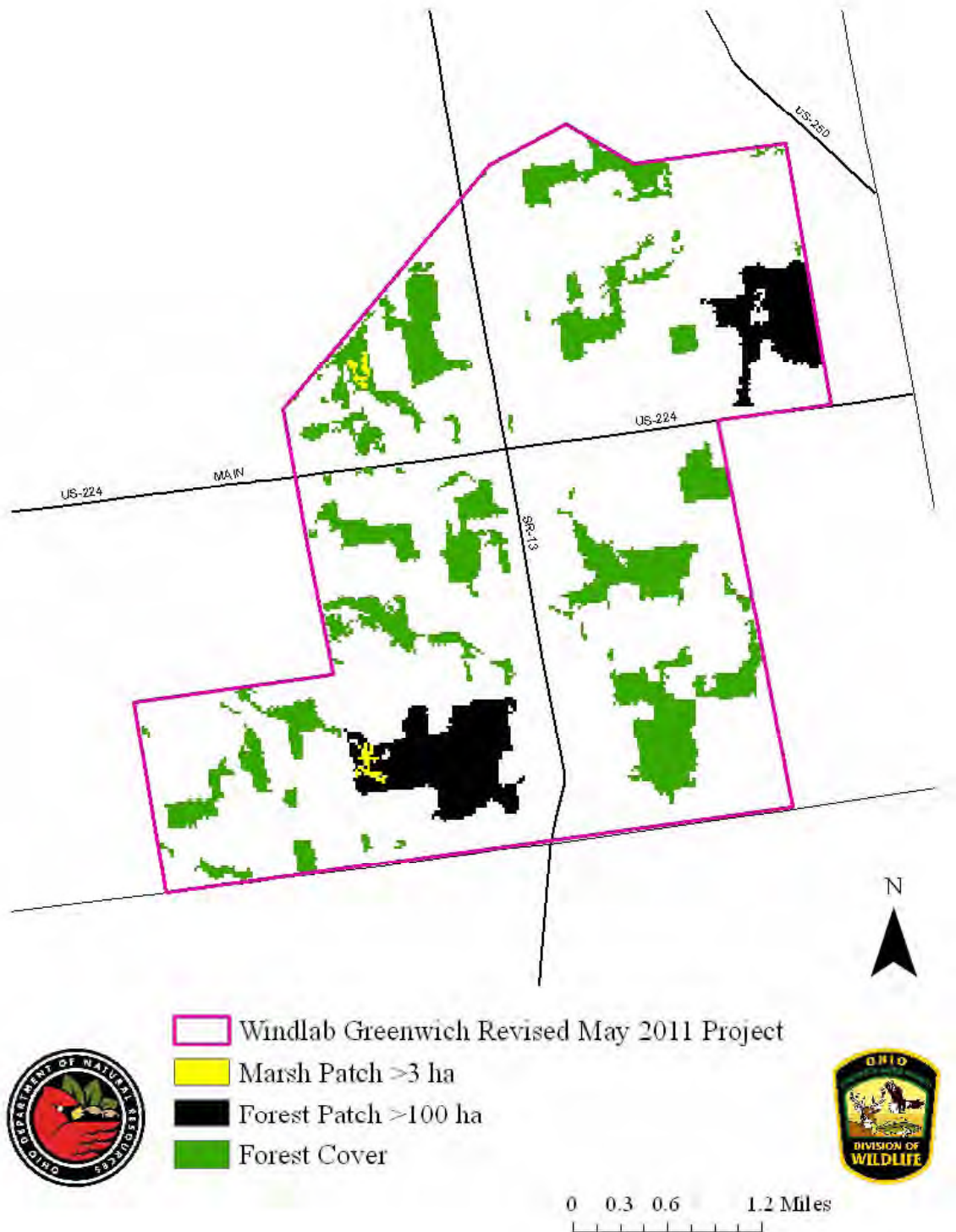


Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

DAVID MUSTINE, DIRECTOR

Figure 2. Forest and marsh cover within the revised (May 2011) boundary of Windlab's proposed Greenwich project.



Ohio Division of Wildlife

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Phone: (614) 265-6300

March 26, 2012

To all interested parties,

Based upon the revised project boundary map received on March 16, 2012, the Ohio Department of Natural Resources Division of Wildlife (DOW) has prepared these revised survey recommendations for Windlab's proposed Greenwich project located in Huron County.

Currently the project falls within regions of the state that DOW has identified as needing moderate monitoring efforts. The below survey recommendations are based on a GIS analysis of the site and may be reevaluated after a site visit. Additionally, if the developer decides to amend the current boundaries, the DOW will revise our survey recommendations.

The table below summarizes the types and level of effort recommended by the DOW. Results from these studies will help the Department of Natural Resources assess the potential impact these turbines may pose, and influence our recommendations to the Ohio Power Siting Board. Monitoring should follow those criteria listed within the "On-shore Bird and Bat Pre-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio."

For additional ODNR comments, including information on the potential presence of threatened and endangered species within or adjacent to your project area, please contact Brian Mitch at (614) 265-6378 or brian.mitch@dnr.state.oh.us

Project	
Survey type	
Breeding bird	Breeding bird surveys should be conducted at all sites. The number of survey points may be based on the amount of available habitat, or twice the maximum number of turbines proposed for the site. If turbines are placed in agricultural land it, this requirement may be waived by DOW after a review of the proposed turbine locations is provided.
Raptor nest searches	Nest searches should occur on, and within a 1-mile buffer of the proposed facility.

Raptor nest monitoring	There is 1 bald eagle nest located on or within the 2 miles of the proposed project. This pair should be monitored to assess their daily movement patterns. Should any additional nests of a protected species of raptor be located during nest searches, monitoring should commence as outlined within the on-shore protocols.
Bat acoustic monitoring	To be conducted at all meteorological towers.
Passerine migration (# of survey points)	4
Diurnal bird/raptor migration (# of survey point)	1
Sandhill crane migration (same points as raptor migration)	NS
Owl playback survey points	2
Barn owl surveys	NS
Bat mist-netting (# of survey points)	9
Nocturnal marsh bird survey points	Waived
Waterfowl survey points	NS
Shorebird migration points	NS
Radar monitoring locations	NS

NS = Not required based on the lack of suitable habitat.

If you have any questions, please feel free to contact me.

Jennifer Norris, Wind Energy Wildlife Biologist
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cc: Mr. Stuart Siegfried, Ohio Power Siting Board
Ms. Megan Seymour, United States Fish and Wildlife Service
Mr. Brian Mitch, Ohio Department of Natural Resources

Figure 1. Survey effort map with the revised boundary for Windlab's proposed Greenwich project.

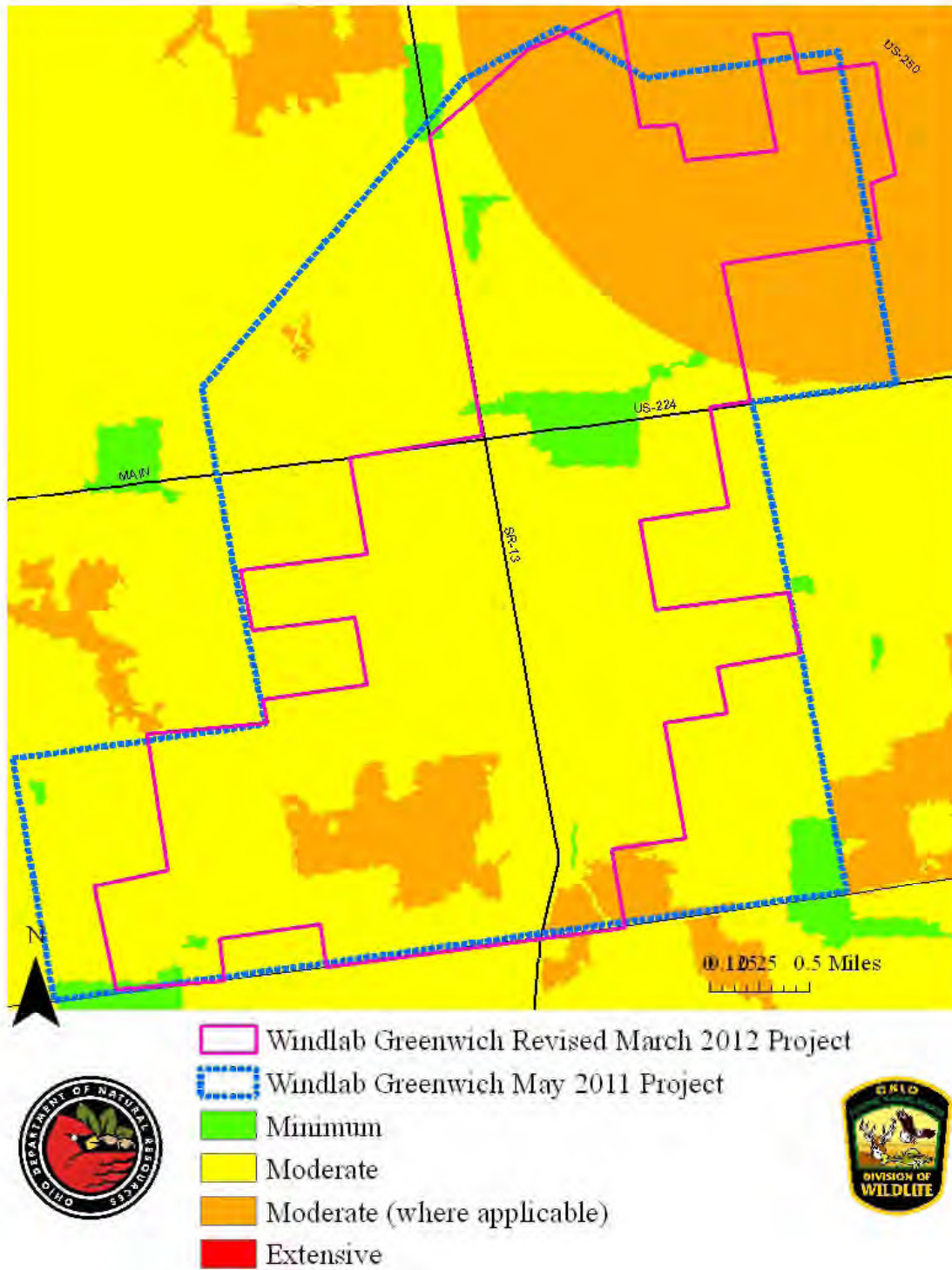
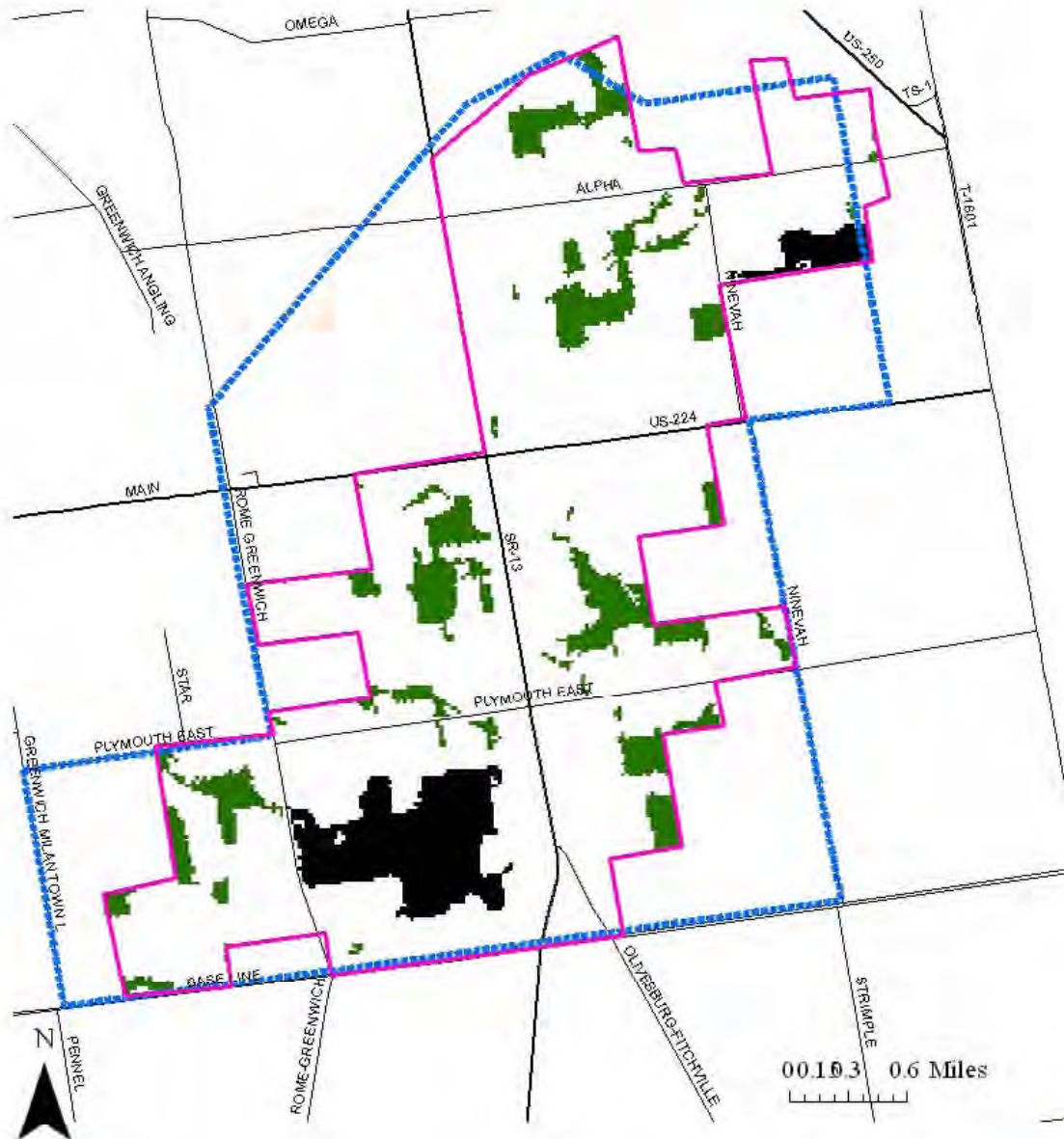


Figure 2. Forest and marsh cover within the revised boundary of Windlab's proposed Greenwich project.



- Windlab Greenwich Revised March 2012 Project
- Windlab Greenwich May 2011 Project
- Forest Patch >100 ha
- Forest Cover



Study Plan to Conduct Avian Baseline Surveys

Spring 2012 Owl, Passerine Migration, and Diurnal Bird/Raptor Surveys
Greenwich Wind Project – Huron County, Ohio

January 30, 2012

Submitted to:

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Stantec Project No. 175630014



Stantec

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Appendix A – ODNR Level of Effort Guidance Letter

Appendix B – Figures

1 INTRODUCTION

WindLab Developments USA, Ltd. (WindLab) is evaluating the potential development of a wind project to be located in Greenwich Township, Huron County, Ohio. Turbine locations as well as a project layout of infrastructure and transmission alignments have not been identified at this time.

Stantec Consulting Services Inc. (Stantec) was contracted by WindLab to conduct baseline wildlife surveys. Several surveys have been completed;

- Indiana bat surveys during June 2011,
 - Fall 2011 passerine migration surveys between August 14 and November 15, 2011,
 - Fall 2011 diurnal bird/raptor surveys between September 1 and October 31, 2011,
 - Winter 2012 owl surveys during January, February, and March 2012, and
 - Winter 2012 raptor nest searches.
- Acoustic monitoring at the one meteorological tower within the project area was deployed on March 15, 2012 and will collect data until November 15, 2012.

We are working to continue data collection and analysis for our client by continuing our avian baseline surveys this spring. The objectives of our surveys are:

1. Describe the species composition and frequency of occurrence for migratory passerines within the project area;
2. Describe the rate and temporal variation of use by state or federally listed species that may be observed in the project area;
3. Describe passage rates for diurnal birds/raptors in the project area, including number of species, flight direction, and flight altitude; and
4. Describe the overall level and seasonal variation of use of the study area by passerines and diurnal birds/raptors.

This study has been developed as part of the ongoing preconstruction planning process for the project. We ask that you provide your written concurrence and/or comments back regarding this study plan.

2 OVERVIEW OF PROJECT AREA

The project is located within Greenwich Township in rural eastern Huron County, Ohio. Elevations in this area range between 582 and 1,205 feet above sea level with an average rainfall for the area is 30.2 inches annually. The study area lies in the Till Plains physiographic region and is part of the Beech-Maple Forest Region. The Beech-Maple Forest Region is dominated by beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*); however, extensive tracts of elm-ash-maple (*Ulmus* spp.-*Fraxinus* spp.-*Acer* spp.) type forests occur in depressions and areas between glacial moraine flats.

The project area has primarily hydric, slow draining soils. Additionally, these soils are considered prime farmland when drained. Small (<10 acres) to large (299 acres) woodlots occur throughout the study area in low lying areas. These woodlots are generally the slowest draining areas where water collects during spring rains.

3 AVIAN SURVEY STUDY PLAN

The Ohio Dept. of Natural Resources (ODNR) provided WindLab a revised letter dated March 26, 2012 defining the level of effort recommended for the project (Appendix A). The recommendations are based on a project boundary provided to ODNR from WindLab. Based upon this letter, a total of two (2) owl survey locations, four (4) passerine migration survey locations and one (1) diurnal bird/raptor survey location were

recommended. The following sections provide a basic background of survey methodologies based on guidelines provided by ODNR¹.

3.1 Owl Playback Survey

The ODNR guidelines state that owl playback surveys are to be conducted once monthly for each of the potentially occurring species for a total of three surveys. One survey in January will occur for the Great-horned owl, one in February for the Barred Owl, and one in March for the Eastern Screech Owl. These owls are territorial and defend their mate and territory by calling during the nighttime hours. If another owl (of the same species) is present then males may enter into a very loud and extensive scolding of each other to show dominance. Rarely does a physical altercation occur to determine which owl is the dominant.

The guidelines require one (1) survey point for each 100 hectares of contiguous forest. The Greenwich project has been recommended to conduct two (2) surveys. There are two large woodlots that occur within the project area. The first woodlot lays between Rome Greenwich Road and St. Route 13 to the west and east and between E Plymouth East Road and Base Line Road to the north and south. The second woodlot is partially outside of the project area. It is located east of Nineveh Road between Alpha road and US Route 224E. Survey locations are depicted on Figure 1 (Appendix B)

3.2 Raptor Nest Searches

The ODNR guidelines state that one early season survey should be conducted between February 1 and March 31 within one-mile of the proposed site for raptor nests. Because the project layout for turbines is not yet set, we assume that we will search the entire project area. This survey will include a windshield survey using binoculars, spotting scopes, and other resources in order to view into woodlots within the project area. It should be noted that although the ODNR guidelines provide minimal detail on the recommended protocol for this survey, this survey has been described by ODNR staff during conversations as requiring only a minor survey effort. Thus, the raptor nest search will be cursory in nature and will be limited by access to leaseholder property (within the project area) and publicly accessible roads within the 1 mile vicinity of the project area.

Nest searching will also include observing raptor movements in the project area. When encountered, raptors will be observed in an attempt to locate a nest or determine if they are likely migrating through the project area. Observers will record the location and description of any nest structures on data sheets and photographs will be taken. Some species that may be encountered are not likely to nest in the project area (e.g. Northern Rough-legged Hawk). Other species such as Red-tailed Hawks, Northern Harriers, and Red-shouldered Hawks (to name a few) may be present but not nesting in the project area.

Correspondence from the ODNR indicated that they do not have records of protected species of raptor nesting on or within two-miles of the project area, but that if any are discovered during the survey ODNR recommends that they be monitored twice a week for four hours per day to establish daily patterns.

3.3 Passerine Migration Survey Methodology

The objective of the passerine migration surveys are to estimate the overall rate of use of the combined forest, shrub, and wooded wetland habitat is the project area by migrating birds. Passerine migration consists of counts of birds observed within circular plots around fixed observation point's following standard methods established by the ODNR.

Per ODNR recommendations (Appendix A), a minimum of four (4) point-count locations were placed in the proposed project area. Stations were stratified throughout the project area and placed on leased lands with forested, shrub, and/or wooded wetland habitats. Due to the size of the southeast woodlot ODOT requested

¹ On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio.

that an additional site be added, if possible, to the southwest woodlot. WindLab and Stantec propose to add an additional location to total five (5) for the project. Station locations within these habitats were located at least 250 meters apart (Appendix B – Figure 1).

Surveys will be conducted once weekly from April 15 to May 31, 2011 for the spring migratory season. All surveys will begin at approximately dawn and not extend past 10:00 a.m. EST. Observers will record every bird seen and/or heard during a 10-minute period at each point. Birds flying overhead that do not land or originate within 200 meters of the center of the point will be listed as “fly over.” The direction (bearing) and estimated distance of the bird from the observer will also be recorded. Birds seen between stops or before and after the 10-minute period will not be included in counts but will be noted as incidental observations. The habitat type where birds are observed will also be recorded. Bird density and abundance will be summarized for each point location.

3.4 Diurnal Bird/Raptor Survey Methodology

Diurnal raptor surveys will be conducted from March 15 to May 1, 2011 during the fall migration season. To comply with survey requirements, surveys will be conducted during seasonally favorable weather for migration. The ODNR recommended surveys be conducted from a centrally located point that provides a good view of the Project area. However, raptor nest searches resulted in location of a Bald Eagle nest less than one mile northeast of the project area. Consultation with USFWS and ODNR on March 6th resulted in the recommendation that eight (8) survey locations be monitored three days per week for an hour at each site to address eagle issues with the project area. While this exceeds the general recommended ODNR guidelines it is necessary to collect the necessary data for USFWS to assess eagle activity in the project area. Eight sites have been selected to conduct surveys (Appendix B – Figure 2). Each Survey point will be surveyed for 1 hour daily for three days per week totaling eight hours per day and 24 hours per week. Order of survey start and finish will be changed daily to capture any temporal and/or spatial differences during surveys. Surveys will be conducted three days per week between 9:00 a.m. and 6:00 p.m. during this survey period.

Observers will scan the sky and surrounding landscape for raptors and other birds flying through the Project area. Observations will be recorded onto ODNR data sheets. Information regarding height and direction of the observation will be recorded as well as whether the bird flying was within a rotor area. Weather observations, including wind speed, wind direction, temperature, percent cloud cover, and precipitation, will also be recorded hourly. Birds that fly too rapidly or are too far to accurately identify will be recorded as “unidentified” to genus.

3.5 Bald Eagle Nest Monitoring

A Bald Eagle nest was located northeast of the project area (Appendix B – Figure 2). Several survey efforts will be needed to meet both ODNR and USFWS needs for assessing eagle use within the project area. As recommended by ODNRs March 26, 2012 letter of effort, the eagle will need to be monitored twice a week for four hours daily to establish patterns of use within the project area. Once patterns are established those will be coordinated with ODNR and USFWS. If patterns are sufficient for ODNR to assess then monitoring will cease.

Secondly, in order to determine the project risk to the eagles surveys are required to determine spatial and temporal use of the project area. The eight (8) survey locations established for the spring diurnal bird/raptor surveys will be monitored twice monthly from May to September 2012. Surveys will occur between 10:00 a.m. and 6:00 p.m. Detection of eagles is lowest during the first and last 2 – 3 hours of the day. Surveys will be conducted for a minimum of 30 minutes at each location. Results will be coordinated with USFWS.

APPENDIX A – ODNR LEVEL OF EFFORT GUIDANCE LETTER



Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

JAMES ZEHRINGER, DIRECTOR

Ohio Division of Wildlife

Scott Zody, Chief
2045 Morse Rd., Bldg. G
Columbus, OH 43229-6693
Phone: (614) 265-6300

March 26, 2012

To all interested parties,

Based upon the revised project boundary map received on March 16, 2012, the Ohio Department of Natural Resources Division of Wildlife (DOW) has prepared these revised survey recommendations for Windlab's proposed Greenwich project located in Huron County.

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For additional ODNR comments, including information on the potential presence of threatened and endangered species within or adjacent to your project area, please contact Brian Mitch at (614) 265-6378 or brian.mitch@dnr.state.oh.us

Project	
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Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

JAMES ZEHRINGER, DIRECTOR

Raptor nest monitoring	There is 1 bald eagle nest located on or within the 2 miles of the proposed project. This pair should be monitored to assess their daily movement patterns. Should any additional nests of a protected species of raptor be located during nest searches, monitoring should commence as outlined within the on-shore protocols.
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Radar monitoring locations	NS

NS = Not required based on the lack of suitable habitat.

If you have any questions, please feel free to contact me.

Jennifer Norris, Wind Energy Wildlife Biologist
Olentangy Wildlife Research Station
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8589 Horseshoe Road
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Cell: 419-602-3141



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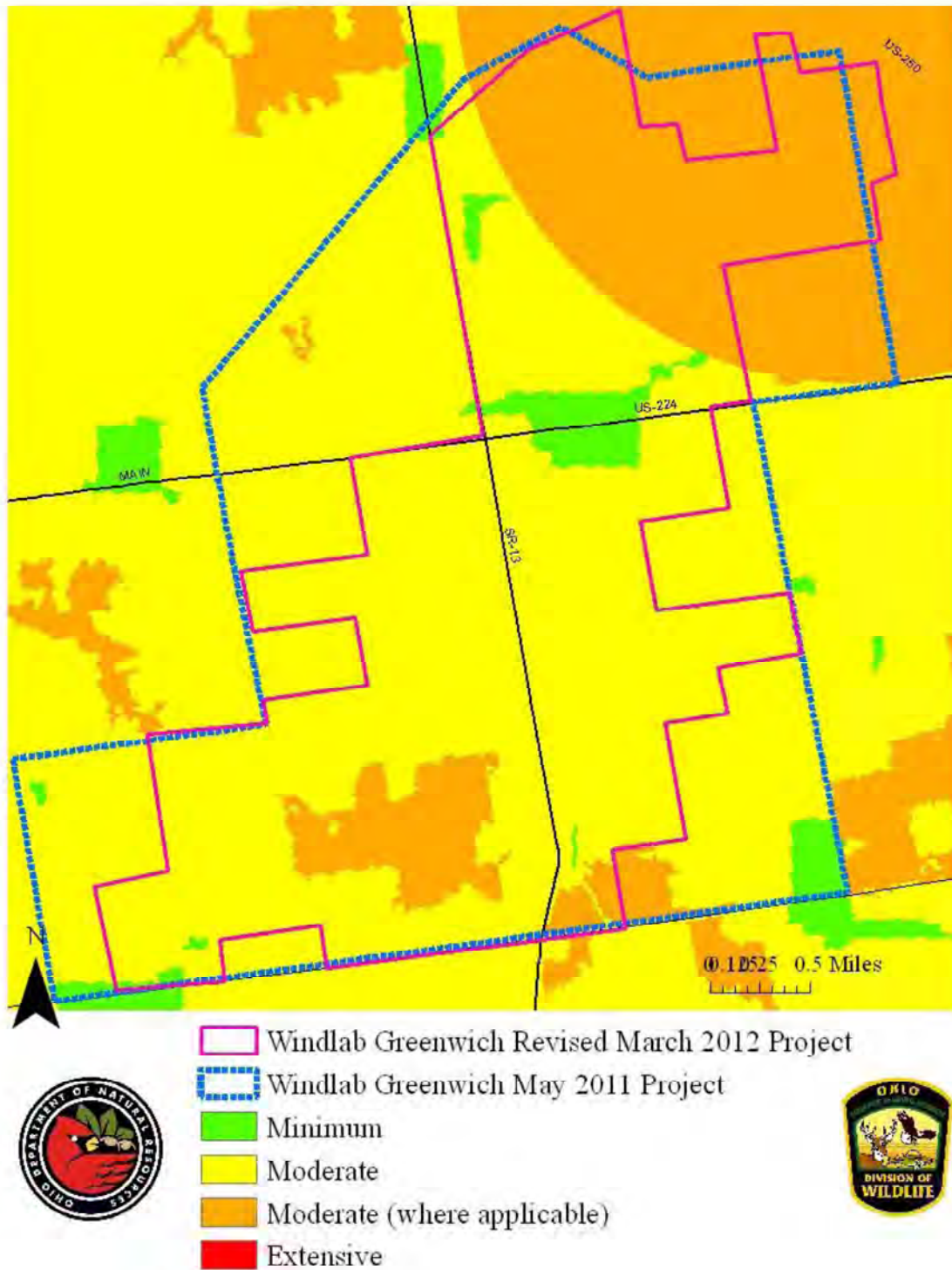


Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

JAMES ZEHRINGER, DIRECTOR

Figure 1. Survey effort map with the revised boundary for Windlab's proposed Greenwich project.



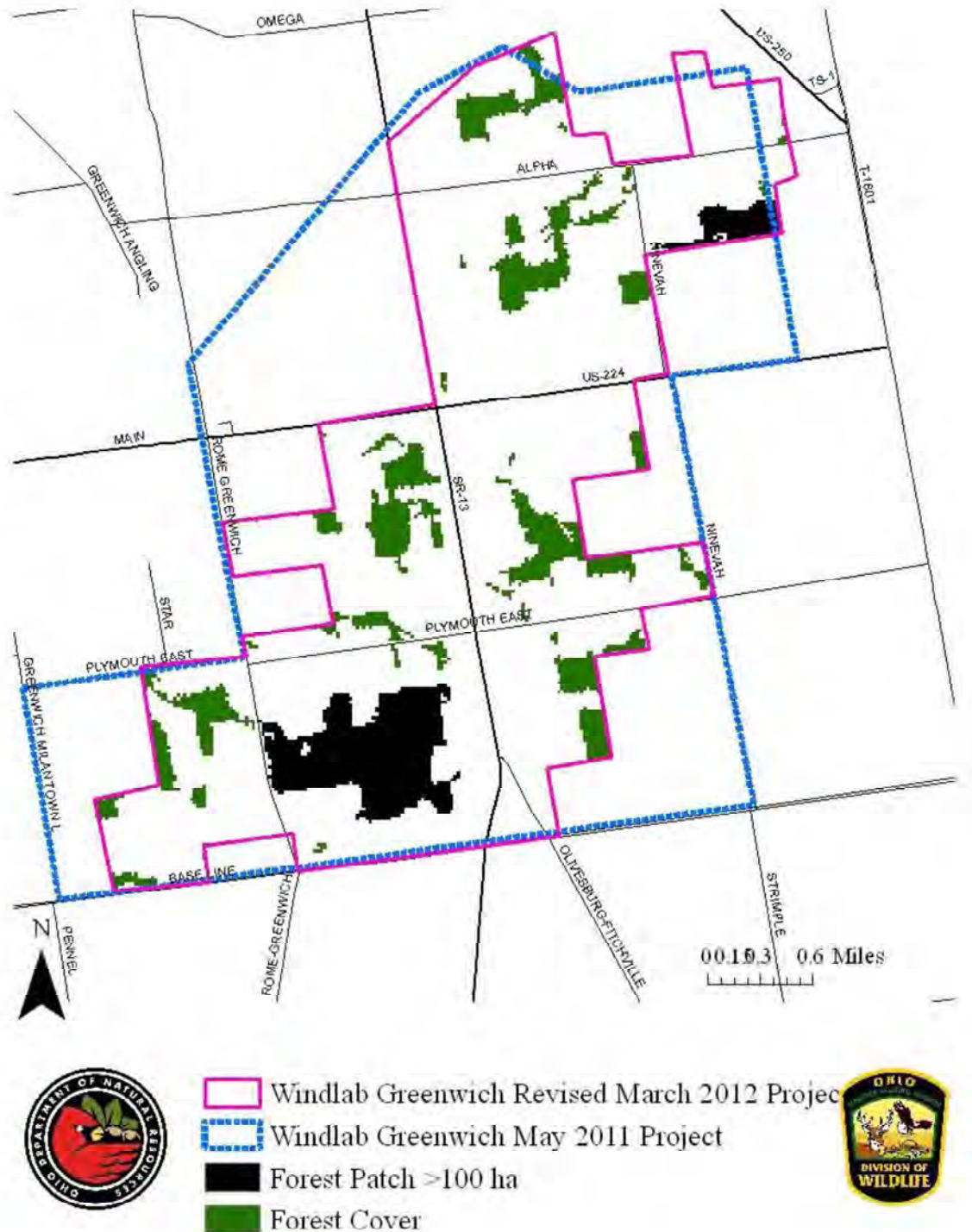


Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

JAMES ZEHRINGER, DIRECTOR

Figure 2. Forest and marsh cover within the revised boundary of Windlab's proposed Greenwich project.

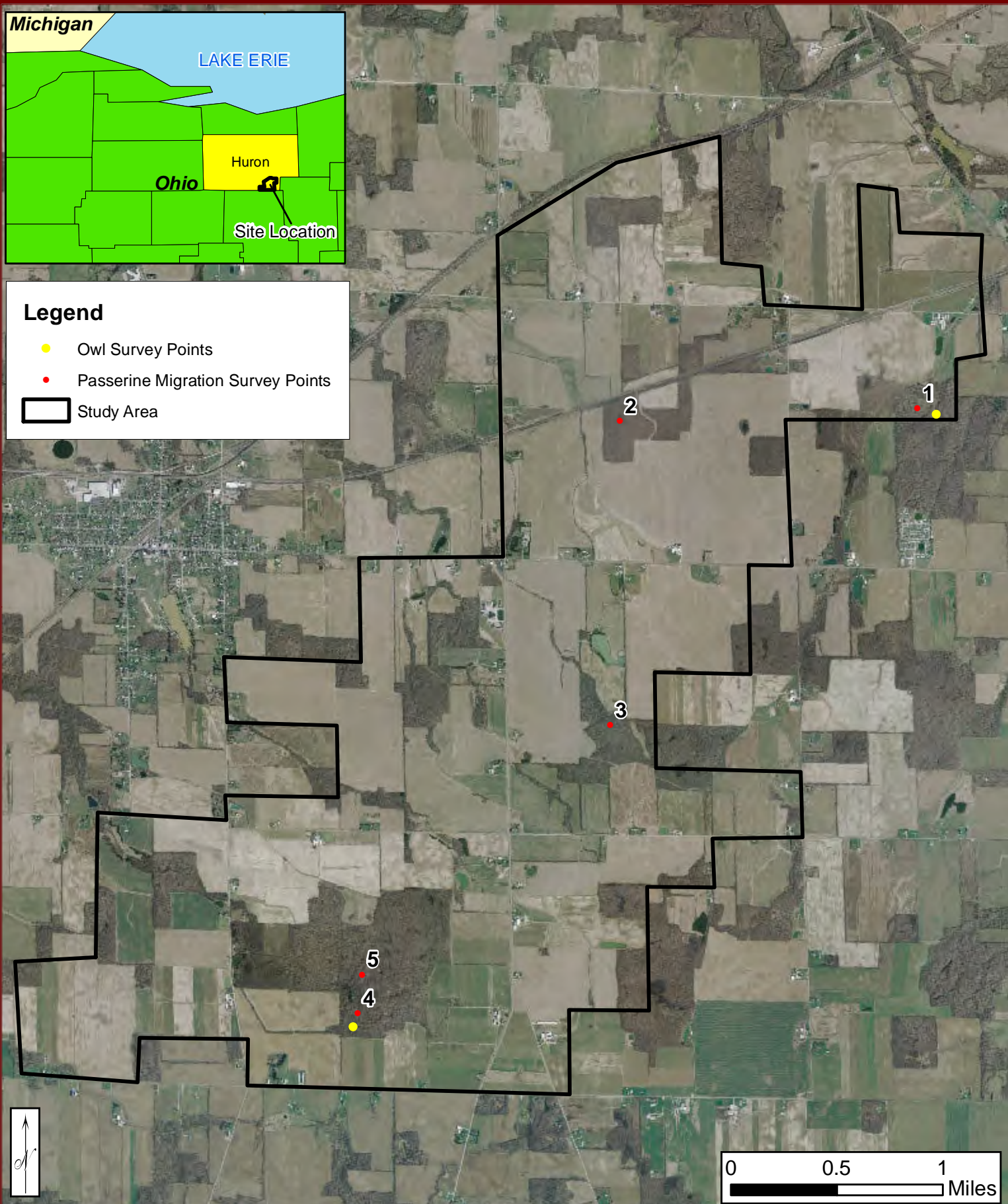


APPENDIX B – FIGURES



Legend

- Owl Survey Points
- Passerine Migration Survey Points
- ▭ Study Area



Geographic Information Systems

Source: Windlab, 2011

Base Map: Ohio Statewide Imagery Program (OSIP), 2006

Project Number: 175630014



Stantec





11687 Lebanon Road, Cincinnati, OH 45241 Phone 513.842.8200 www.stantec.com

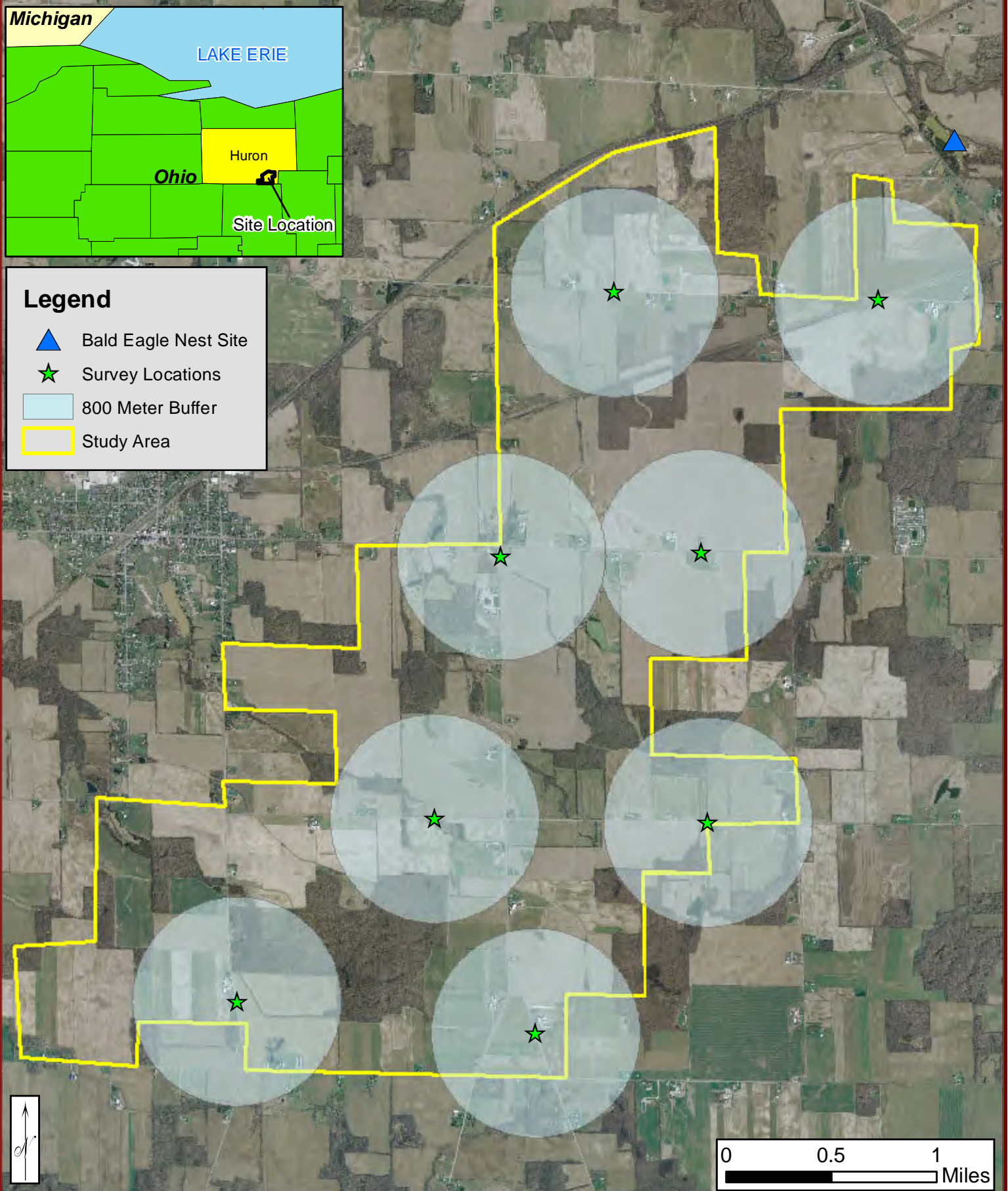
Figure 1
Passerine Migration Survey Points
and Owl Survey Points

*Greenwich Wind Project
Huron County, Ohio*



Legend

-  Bald Eagle Nest Site
-  Survey Locations
-  800 Meter Buffer
-  Study Area



Geographic Information Systems

Source: Windlab, 2011

Base Map: Ohio Statewide Imagery Program (OSIP), 2006

Project Number: 175630014



Stantec

11687 Lebanon Road, Cincinnati, OH 45241 Phone 513.842.8200 www.stantec.com

Figure 2
Diurnal Bird/Raptor Survey Points
(including Bald Eagle)

Greenwich Wind Project
Huron County, Ohio

Appendix B
Spring 2012 Diurnal Bird/Raptor and
Passerine Migration Survey Data Tables

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Table 1. Number of raptors observed by survey date during spring 2012 surveys

	American Kestrel	Bald Eagle	Cooper's Hawk	Northern Harrier	Red-shouldered Hawk	Red-tailed Hawk	Sharp-shinned Hawk	Grand Total	Passage Rate
3/21/2012	0	0	1	0	0	5	0	6	0.75
3/22/2012	0	0	0	1	0	6	0	7	0.88
3/23/2012	0	0	0	0	0	6	0	6	0.75
3/27/2012	1	0	1	0	0	7	0	9	1.13
3/28/2012	1	0	3	0	0	5	0	9	1.13
3/29/2012	2	1	2	0	0	5	0	10	1.25
4/3/2012	2	0	1	0	0	4	0	7	0.88
4/4/2012	0	0	4	0	0	12	0	16	2.00
4/5/2012	1	1	0	0	0	4	2	8	1.00
4/9/2012	1	0	0	0	0	9	1	11	1.38
4/10/2012	0	1	0	1	0	7	0	9	1.13
4/11/2012	1	0	0	0	0	0	0	1	0.13
4/16/2012	1	0	0	0	0	5	0	6	0.75
4/17/2012	2	0	0	0	0	7	0	9	1.13
4/18/2012	1	0	0	1	0	4	0	6	0.75
4/24/2012	0	0	0	0	2	5	1	8	1.00
4/25/2012	1	0	0	0	0	5	1	7	0.88
Grand Total	14	3	12	3	2	96	5	135	0.99
Percent of Total	10%	2%	9%	2%	1%	71%	4%		

Table 2. Hourly species totals during spring 2012 surveys

Species	Hour										Grand Total
	9:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00		
American Kestrel	1	4	0	4	1	0	1	2	1	14	
Bald Eagle	0	0	1	2	0	0	0	0	0	3	
Cooper's Hawk	1	3	2	2	1	1	0	1	1	12	
Northern Harrier	2	0	0	0	1	0	0	0	0	3	
Red-tailed Hawk	2	10	9	19	14	12	20	9	1	96	
Sharp-shinned Hawk	0	0	1	1	1	0	2	0	0	5	
Red-shouldered Hawk	0	0	1	0	0	0	1	0	0	2	
Raptor Total	6 (4%)	17 (13%)	14 (10%)	28 (21%)	18 (13%)	13 (10%)	24 (18%)	12 (9%)	3 (2%)	135	
Turkey Vulture	70	152	113	107	103	127	168	141	32	1013	
Vulture Total	70 (7%)	152 (15%)	113 (11%)	107 (11%)	103 (10%)	127 (13%)	168 (17%)	141 (14%)	32 (3%)	1013	
American Crow	37	30	23	23	12	14	12	14	5	170	
Canada Goose	16	18	0	4	3	0	4	19	0	64	
Common Loon	0	0	0	0	1	0	0	0	0	1	
Double-crested Cormorant	27	0	0	0	0	0	0	0	0	27	
Great-blue Heron	2	4	1	0	1	1	1	1	1	12	
Green-winged Teal	1	0	0	0	0	0	0	0	0	1	
Lesser Scaup	0	0	0	0	2	0	0	0	0	2	
Mallard	0	0	0	0	0	0	0	1	0	1	
Ring-billed Gull	5	0	4	0	0	1	0	0	0	10	
Non-raptor Total	88 (31%)	52 (18%)	28 (10%)	27 (9%)	19 (7%)	16 (6%)	17 (6%)	35 (12%)	6 (2%)	288	

Table 3. Species observed and estimated altitude during diurnal bird/raptor migration surveys during spring 2012

	0 - 40 m	40 - 180 m	> 180 m	Grand Total
American Kestrel	14			14
Bald Eagle	1.3	1.3	0.3	3
Cooper's Hawk	8	4		12
Northern Harrier	2		1	3
Red-shouldered Hawk	2			2
Red-tailed Hawk	15	75	6	96
Sharp-shinned Hawk	5			5
Raptor Total	47.3	80.3	7.3	135
Raptor percent of total	35%	59%	5%	
Turkey Vulture	220	728	65	1013
Vulture Total	220	728	65	1013
Vulture percent of total	22%	72%	6%	
American Crow	166	4		170
Canada Goose	49	4	11	64
Common Loon			1	1
Double-crested Cormorant		27		27
Great-blue Heron	5	6	1	12
Green-winged Teal	1			1
Lesser Scaup	2			2
Mallard	1			1
Ring-billed Gull	5	5		10
Non-raptor Total	229	46	13	288
Non-raptor percent of total	80%	16%	5%	

Table 4. Summary of Turkey Vulture observations during spring 2012

Date	Flight Height Categories			Turkey Vulture Total
	0 - 40 m	40 - 180 m	> 180 m	
3/21/2012	14	50	20	84
3/22/2012		47	23	70
3/23/2012	11	18		29
3/27/2012	14	28	3	45
3/28/2012	32	24		56
3/29/2012	11	49		60
4/3/2012	11	40		51
4/4/2012	14	41		55
4/5/2012	35	32	15	82
4/9/2012	19	29		48
4/10/2012	10	20		30
4/11/2012	1	32		33
4/16/2012	10	43		53
4/17/2012	3	61	1	65
4/18/2012	5	59	3	67
4/24/2012	20	59		79
4/25/2012	7	64		71
4/26/2012	3	32		35
Grand Total	220	728	65	1013
Percent of total	22%	72%	6%	

Table 5. Number of other diurnal birds observed by survey date during spring 2012

	American Crow	Canada Goose	Common Loon	Double-crested Cormorant	Great-blue Heron	Green-winged Teal	Lesser Scaup	Mallard	Ring-billed Gull	Grand Total	Passage Rate
3/21/2012	18	3	0	0	0	0	0	0	0	21	2.63
3/22/2012	4	0	0	0	1	0	0	0	0	5	0.63
3/23/2012	14	0	0	0	3	0	0	0	5	22	2.75
3/27/2012	14	2	0	0	1	0	0	0	0	17	2.13
3/28/2012	11	1	0	0	0	0	0	0	0	12	1.50
3/29/2012	14	3	1	0	2	0	0	0	0	20	2.50
4/3/2012	3	9	0	0	0	0	0	0	0	12	1.50
4/4/2012	9	11	0	0	0	0	0	0	0	20	2.50
4/5/2012	14	0	0	0	0	0	0	0	0	14	1.75
4/9/2012	11	15	0	0	2	0	0	0	0	28	3.50
4/10/2012	14	2	0	27	1	0	0	0	0	44	5.50
4/11/2012	6	2	0	0	0	0	0	0	1	9	1.13
4/17/2012	6	0	0	0	1	0	0	0	0	7	0.88
4/18/2012	16	3	0	0	0	0	0	0	0	19	2.38
4/24/2012	4	0	0	0	0	1	0	0	4	9	1.13
4/25/2012	5	2	0	0	0	0	0	0	0	7	0.88
4/26/2012	7	11	0	0	1	0	2	1	0	22	2.75
Grand Total	170	64	1	27	12	1	2	1	10	288	2.12
Percent of total	59%	22%	0.35%	9%	4%	0.35%	1%	0.35%	3%		

Table 6. Species composition list and distance from observer at five point count locations during nine survey periods – spring 2012

Common Name	Scientific Name	0-50 m	> 50 m	Flyovers	Grand Total
Acadian Flycatcher	<i>Empidonax virescens</i>	14			14
American Crow	<i>Corvus brachyrhynchos</i>	1	8	5	14
American Goldfinch	<i>Spinus tristis</i>	42		15	57
American Redstart	<i>Setophaga ruticilla</i>	2			2
American Robin	<i>Turdus migratorius</i>	22	3		25
Baltimore Oriole	<i>Icterus galbula</i>	2			2
Barred Owl	<i>Strix varia</i>		1		1
Black-capped Chickadee	<i>Poecile atricapillus</i>	25	4		29
Black-throated Green Warbler	<i>Setophaga virens</i>	3			3
Blue Jay	<i>Cyanocitta cristata</i>	19	3		22
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	4			4
Broad-winged Hawk	<i>Buteo platypterus</i>			1	1
Brown Thrasher	<i>Toxostoma rufum</i>	1			1
Brown-headed Cowbird	<i>Molothrus ater</i>	39	3		42
Carolina Wren	<i>Thryothorus ludovicianus</i>	2			2
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	1			1
Chipping Sparrow	<i>Spizella passerina</i>	2	1		3
Common Grackle	<i>Quiscalus quiscula</i>			13	13
Common Yellowthroat	<i>Geothlypis trichas</i>	3	1		4
Cooper's Hawk	<i>Accipiter cooperii</i>	2			2
Downy Woodpecker	<i>Picoides pubescens</i>	23	4		27
Eastern Kingbird	<i>Tyrannus tyrannus</i>	1			1
Eastern Phoebe	<i>Sayornis phoebe</i>	1			1
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	10	6		16
Eastern Wood-pewee	<i>Contopus virens</i>	14	2		16
Field Sparrow	<i>Spizella pusilla</i>	6	1		7
Gray Catbird	<i>Dumetella carolinensis</i>	13			13
Great crested Flycatcher	<i>Myiarchus crinitus</i>	9			9
Hairy Woodpecker	<i>Picoides villosus</i>	4			4
House Wren	<i>Troglodytes aedon</i>	15	1		16
Indigo Bunting	<i>Passerina cyanea</i>	6	1		7
Killdeer	<i>Charadrius vociferus</i>		2		2
Mourning Dove	<i>Zenaida macroura</i>	2			2
Myrtle Warbler	<i>Setophaga c. coronata</i>	4			4
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	3			3
Northern Cardinal	<i>Cardinalis cardinalis</i>	46	5		51
Northern Flicker	<i>Colaptes auratus</i>	6	1		7
Orchard Oriole	<i>Icterus spurius</i>	2			2
Ovenbird	<i>Seiurus aurocapilla</i>	13	3		16
Philadelphia Vireo	<i>Vireo philadelphicus</i>	2			2

Table 6. Species composition list and distance from observer at five point count locations during nine survey periods – spring 2012

Common Name	Scientific Name	0-50 m	> 50 m	Flyovers	Grand Total
Pileated Woodpecker	<i>Dryocopus pileatus</i>	2	1		3
Purple Finch	<i>Carpodacus purpureus</i>	1			1
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	18	7		25
Red-eyed Vireo	<i>Vireo olivaceus</i>	24	1		25
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	10		14	24
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	11			11
Rusty Blackbird	<i>Euphagus carolinus</i>			2	2
Scarlet Tanager	<i>Piranga olivacea</i>	4			4
Song Sparrow	<i>Melospiza melodia</i>	19	1		20
Tufted Titmouse	<i>Baeolophus bicolor</i>	32	3		35
Turkey Vulture	<i>Cathartes aura</i>			1	1
Veery	<i>Catharus fuscescens</i>	2	2		4
White-breasted Nuthatch	<i>Sitta carolinensis</i>	23			23
White-throated Sparrow	<i>Zonotrichia albicollis</i>	3			3
Wild Turkey	<i>Meleagris gallopavo</i>		1		1
Wood Duck	<i>Aix sponsa</i>	1			1
Wood Thrush	<i>Hylocichla mustelina</i>	21	9		30
Yellow Warbler	<i>Setophaga petechia</i>	8			8
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	1			1
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	1			1
Yellow-throated Vireo	<i>Vireo flavifrons</i>	4			4
Grand Total		549	75	51	675

Table 7. Number of individuals by species and relative abundance at five point count locations during nine survey periods - spring 2012

Species	Point 1		Point 2		Point 3		Point 4		Point 5		ALL	
	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance	Number of individuals	Relative Abundance
Acadian Flycatcher	2	0.22	2	0.22	3	0.33	1	0.11	6	0.67	14	0.31
American Crow	3	0.33			3	0.33	6	0.67	2	0.22	14	0.31
American Goldfinch	10	1.11	11	1.22	12	1.33	10	1.11	14	1.56	57	1.27
American Redstart							2	0.22			2	0.04
American Robin	9	1.00	7	0.78	6	0.67	3	0.33			25	0.56
Baltimore Oriole			1	0.11	1	0.11					2	0.04
Barred Owl									1	0.11	1	0.02
Black-capped Chickadee	3	0.33	1	0.11	8	0.89	13	1.44	4	0.44	29	0.64
Black-throated Green Warbler					1	0.11	2	0.22			3	0.07
Blue Jay	3	0.33	12	1.33	2	0.22	4	0.44	1	0.11	22	0.49
Blue-gray Gnatcatcher	2	0.22	1	0.11	1	0.11					4	0.09
Broad-winged Hawk									1	0.11	1	0.02
Brown Thrasher					1	0.11					1	0.02
Brown-headed Cowbird	7	0.78	7	0.78	11	1.22	9	1.00	8	0.89	42	0.93
Carolina Wren							2	0.22	2	0.22	2	0.04
Chestnut-sided Warbler	1	0.11									1	0.02
Chipping Sparrow	1	0.11			1	0.11	1	0.11			3	0.07
Common Grackle	7	0.78			6	0.67					13	0.29
Common Yellowthroat	1	0.11	1	0.11	2	0.22					4	0.09
Cooper's Hawk			2	0.22							2	0.04
Downy Woodpecker	2	0.22	8	0.89	6	0.67	6	0.67	5	0.56	27	0.60
Eastern Kingbird	1	0.11									1	0.02
Eastern Phoebe					1	0.11					1	0.02
Eastern Towhee	3	0.33			3	0.33	5	0.56	5	0.56	16	0.36
Eastern Wood-pewee	3	0.33	3	0.33	5	0.56	2	0.22	3	0.33	16	0.36
Field Sparrow	3	0.33			3	0.33			1	0.11	7	0.16
Gray Catbird	7	0.78			1	0.11	5	0.56			13	0.29
Great crested Flycatcher			1	0.11	5	0.56	3	0.33			9	0.20
Hairy Woodpecker							2	0.22	2	0.22	4	0.09
House Wren	1	0.11			4	0.44	11	1.22			16	0.36
Indigo Bunting	3	0.33	1	0.11			3	0.33			7	0.16
Killdeer	2	0.22									2	0.04
Mourning Dove	1	0.11							1	0.11	2	0.04
Myrtle Warbler	2	0.22	1	0.11	1	0.11					4	0.09
Nashville Warbler	1	0.11	1	0.11			1	0.11			3	0.07
Northern Cardinal	10	1.11	7	0.78	12	1.33	14	1.56	8	0.89	51	1.13
Northern Flicker			4	0.44	2	0.22			1	0.11	7	0.16
Orchard Oriole			2	0.22							2	0.04

Table 7. Number of individuals by species and relative abundance at five point count locations during nine survey periods - spring 2012

Species	Point 1			Point 2			Point 3			Point 4			Point 5			ALL		
	Number of individuals	Relative Abundance		Number of individuals	Relative Abundance		Number of individuals	Relative Abundance		Number of individuals	Relative Abundance		Number of individuals	Relative Abundance		Number of individuals	Relative Abundance	Frequency
Overbird				1	0.11		2	0.22		4	0.44		9	1.00		16	0.36	80.00%
Philadelphia Vireo				2	0.22											2	0.04	20.00%
Pileated Woodpecker	1	0.11		1	0.11								1	0.11		3	0.07	60.00%
Purple Finch													1	0.11		1	0.02	20.00%
Red-bellied Woodpecker	2	0.22		6	0.67		4	0.44		7	0.78		6	0.67		25	0.56	100.00%
Red-eyed Vireo	4	0.44		4	0.44		4	0.44		4	0.44		9	1.00		25	0.56	100.00%
Red-winged Blackbird	2	0.22		2	0.22		11	1.22		8	0.89		1	0.11		24	0.53	100.00%
Rose-breasted Grosbeak				2	0.22		4	0.44		5	0.56					11	0.24	60.00%
Rusty Blackbird													2	0.22		2	0.04	20.00%
Scarlet Tanager	3	0.33		1	0.11											4	0.09	40.00%
Song Sparrow	11	1.22					5	0.56		3	0.33		1	0.11		20	0.44	80.00%
Tufted Titmouse	6	0.67		12	1.33		2	0.22		8	0.89		7	0.78		35	0.78	100.00%
Turkey Vulture										1	0.11					1	0.02	20.00%
Veery				2	0.22		2	0.22								4	0.09	40.00%
White-breasted Nuthatch	6	0.67		8	0.89		4	0.44		4	0.44		1	0.11		23	0.51	100.00%
White-throated Sparrow										3	0.33					3	0.07	20.00%
Wild Turkey													1	0.11		1	0.02	20.00%
Wood Duck				1	0.11											1	0.02	20.00%
Wood Thrush	6	0.67		10	1.11		4	0.44		7	0.78		3	0.33		30	0.67	100.00%
Yellow Warbler	4	0.44					3	0.33		1	0.11					8	0.18	60.00%
Yellow-bellied Sapsucker													1	0.11		1	0.02	20.00%
Yellow-billed Cuckoo	1	0.11														1	0.02	20.00%
Yellow-throated Vireo							1	0.11		1	0.11		2	0.22		4	0.09	60.00%
Grand Total	134	14.89		125	13.89		147	16.33		159	17.67		110	12.22		675	15.00	100.00%

Table 8. Summary of incidental bird observations made during spring 2012

Date	Time	Common Name	Scientific Name	Number of Individuals	Status in Ohio
4/27/2012	8:21	Ruby-crowned Kinglet*	<i>Regulus calendula</i>	1	
4/27/2012	8:21	Ovenbird	<i>Seiurus aurocapilla</i>	1	
4/27/2012	8:23	Yellow Warbler	<i>Setophaga petechia</i>	1	
4/27/2012	8:25	Hermit Thrush*	<i>Catharus guttatus</i>	2	Species of Interest
4/27/2012	8:55	Black-throated Green Warbler	<i>Setophaga virens</i>	1	
5/2/2012	7:08	Blue-winged Warbler*	<i>Vermivora cyanoptera</i>	1	
5/2/2012	7:09	Black-throated Green Warbler	<i>Setophaga virens</i>	3	
5/2/2012	7:29	Black and White Warbler*	<i>Mniotilta varia</i>	1	
5/2/2012	7:59	Warbling Vireo*	<i>Vireo gilvus</i>	1	
5/2/2012	8:00	Red-eyed Vireo	<i>Vireo olivaceus</i>	1	
5/2/2012	8:19	Baltimore Oriole	<i>Icterus galbula</i>	1	
5/2/2012	9:15	Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	1	
5/2/2012	9:15	Baltimore Oriole	<i>Icterus galbula</i>	1	
5/2/2012	9:34	Black-throated Green Warbler	<i>Setophaga virens</i>	2	
5/2/2012	9:37	Tennessee Warbler*	<i>Oreothlypis peregrina</i>	1	
5/7/2012	7:57	Great Horned Owl*	<i>Bubo virginianus</i>	1	
5/19/2012	7:30	Veery	<i>Catharus fuscescens</i>	1	
5/19/2012	8:35	Blackburnian Warbler*	<i>Setophaga fusca</i>	2	Species of Interest
5/25/2012	7:20	Least Flycatcher*	<i>Empidonax minimus</i>	1	Species of Interest

*Species not detected during point count surveys

Table 9. Total number of observations, relative abundance, and frequency of species at point count locations during nine survey periods at Greenwich Wind Project - Spring 2012

Species	Forest/Ag (2 points)			Forest/Fallow (1 point)			Forest Interior (2 points)		
	Total _a	Relative Abundance _b	Frequency _c	Total _a	Relative Abundance _b	Frequency _c	Total _a	Relative Abundance _b	Frequency _c
Acadian Flycatcher	4	0.22	100%	3	1.50	100%	7	0.39	100%
American Crow	3	0.17	50%	3	1.50	100%	8	0.44	100%
American Goldfinch	21	1.17	100%	12	6.00	100%	24	1.33	100%
American Redstart							2	0.11	50%
American Robin	16	0.89	100%	6	3.00	100%	3	0.17	50%
Baltimore Oriole	1	0.06	50%	1	0.50	100%			
Barred Owl							1	0.06	50%
Black-capped Chickadee	4	0.22	100%	8	4.00	100%	17	0.94	100%
Black-throated Green Warbler				1	0.50	100%	2	0.11	50%
Blue Jay	15	0.83	100%	2	1.00	100%	5	0.28	100%
Blue-gray Gnatcatcher	3	0.17	100%	1	0.50	100%			
Broad-winged Hawk							1	0.06	50%
Brown Thrasher				1	0.50	100%			
Brown-headed Cowbird	14	0.78	100%	11	5.50	100%	17	0.94	100%
Carolina Wren							2	0.11	50%
Chestnut-sided Warbler	1	0.06	50%						
Chipping Sparrow	1	0.06	50%	1	0.50	100%	1	0.06	50%
Common Grackle	7	0.39	50%	6	3.00	100%			
Common Yellowthroat	2	0.11	100%	2	1.00	100%			
Cooper's Hawk	2	0.11	50%						
Downy Woodpecker	10	0.56	100%	6	3.00	100%	11	0.61	100%
Eastern Kingbird	1	0.06	50%						
Eastern Phoebe				1	0.50	100%			
Eastern Towhee	3	0.17	50%	3	1.50	100%	10	0.56	100%

Table 9. Total number of observations, relative abundance, and frequency of species at point count locations during nine survey periods at Greenwich Wind Project - Spring 2012

Species	Forest/Ag (2 points)			Forest/Fallow (1 point)			Forest Interior (2 points)		
	Total _a	Relative Abundance _b	Frequency _c	Total _a	Relative Abundance _b	Frequency _c	Total _a	Relative Abundance _b	Frequency _c
Eastern Wood Pewee	6	0.33	100%	5	2.50	100%	5	0.28	100%
Field Sparrow	3	0.17	50%	3	1.50	100%	1	0.06	50%
Gray Catbird	7	0.39	50%	1	0.50	100%	5	0.28	50%
Great crested Flycatcher	1	0.06	50%	5	2.50	100%	3	0.17	50%
Hairy Woodpecker							4	0.22	100%
House Wren	1	0.06	50%	4	2.00	100%	11	0.61	50%
Indigo Bunting	4	0.22	100%				3	0.17	50%
Killdeer	2	0.11	50%						
Mourning Dove	1	0.06	50%				1	0.06	50%
Myrtle Warbler	3	0.17	100%	1	0.50	100%			
Nashville Warbler	2	0.11	100%				1	0.06	50%
Northern Cardinal	17	0.94	100%	12	6.00	100%	22	1.22	100%
Northern Flicker	4	0.22	50%	2	1.00	100%	1	0.06	50%
Orchard Oriole	2	0.11	50%						
Ovenbird	1	0.06	50%	2	1.00	100%	13	0.72	100%
Philadelphia Vireo	2	0.11	50%						
Pileated Woodpecker	2	0.11	100%				1	0.06	50%
Purple Finch							1	0.06	50%
Red-bellied Woodpecker	8	0.44	100%	4	2.00	100%	13	0.72	100%
Red-eyed Vireo	8	0.44	100%	4	2.00	100%	13	0.72	100%
Red-winged Blackbird	4	0.22	100%	11	5.50	100%	9	0.50	100%
Rose-breasted Grosbeak	2	0.11	50%	4	2.00	100%	5	0.28	50%
Rusty Blackbird							2	0.11	50%
Scarlet Tanager	4	0.22	100%						
Song Sparrow	11	0.61	50%	5	2.50	100%	4	0.22	100%

Table 9. Total number of observations, relative abundance, and frequency of species at point count locations during nine survey periods at Greenwich Wind Project - Spring 2012

Species	Forest/Ag (2 points)			Forest/Fallow (1 point)			Forest Interior (2 points)		
	Total _a	Relative Abundance _b	Frequency _c	Total _a	Relative Abundance _b	Frequency _c	Total _a	Relative Abundance _b	Frequency _c
Tufted Titmouse	18	1.00	100%	2	1.00	100%	15	0.83	100%
Turkey Vulture							1	0.06	50%
Veery	2	0.11	50%	2	1.00	100%			
White-breasted Nuthatch	14	0.78	100%	4	2.00	100%	5	0.28	100%
White-throated Sparrow							3	0.17	50%
Wild Turkey							1	0.06	50%
Wood Duck	1	0.06	50%						
Wood thrush	16	0.89	100%	4	2.00	100%	10	0.56	100%
Yellow warbler	4	0.22	50%	3	1.50	100%	1	0.06	50%
Yellow-bellied Sapsucker							1	0.06	50%
Yellow-billed Cuckoo	1	0.06	50%						
Yellow-throated Vireo				1	0.50	100%	3	0.17	100%
Grand Total	259			147			269		
Relative abundance		14.39			16.33			14.94	
Species richness		46			37			44	
Shannon Diversity Index		3.41			3.33			3.35	

a Total number of individuals detected (includes all individuals observed).

b Mean number of birds observed.

c Percentage of survey points at which the species was observed.

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Summary: Application of 6022 Greenwich Windpark, LLC - Exhibit J electronically filed by
Teresa Orahod on behalf of Sally Bloomfield