

**2006 Rare Bird Survey
at the
Proposed
Clayton Wind Project
in Clayton, New York**

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1.0 Introduction

1.1 Project Context

PPM Atlantic Renewable (PPM) has proposed the construction of a wind project to be located in Clayton, Orleans, and Brownville, New York (Figure 1). The project would include up to approximately 54 2.75-megawatt (MW) wind turbines that could generate up to 150 MW of power annually. Turbines would have a maximum height of approximately 150 meters (m) (492') and would be located predominantly in active agricultural fields being used for hay and crop production, as well as for pasturing.

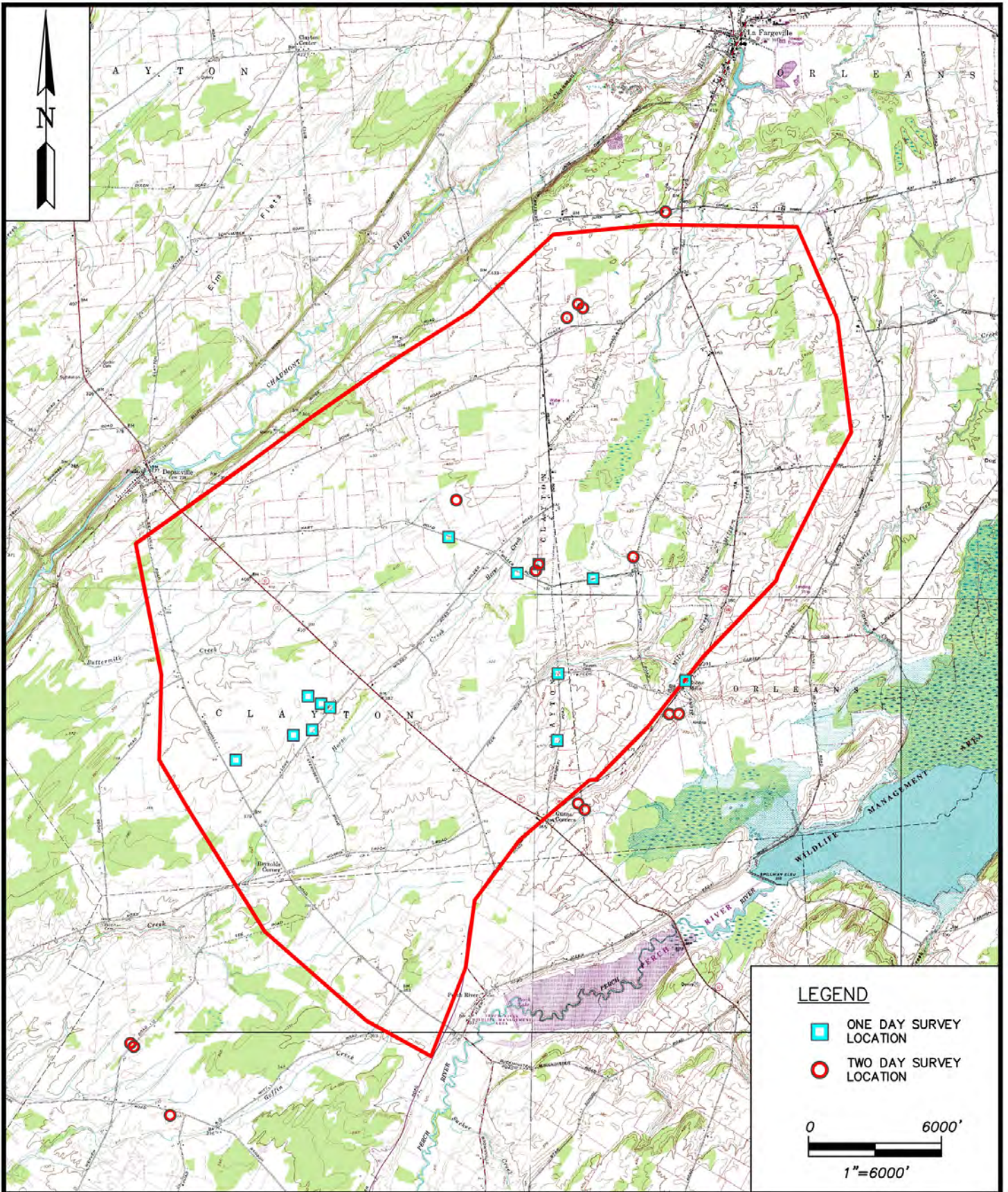
Birds are known to collide with tall lighted structures, such as buildings and communication towers, particularly when weather conditions reduce visibility (Crawford 1981; Avery *et al.* 1976, 1977). Depending on their height and location, wind turbines can also pose a potential threat to migrating birds because they are relatively tall structures, have moving parts, and may be lit. The mortality of migrating and resident birds and bats has been documented at wind farms as a result of collisions with turbines, meteorological measurement towers (met towers), and guy wires (Anderson *et al.* 2004; Erickson *et al.* 2000, 2003; Johnson *et al.* 2003; Thelander and Ruge 2000).

PPM undertook bird and bat migration studies in the spring and fall of 2005 as well as a breeding bird survey during the early summer of 2005. Fifteen rare bird species were observed in the Clayton project area during the original 2005 field surveys. This included five state Endangered species, three state Threatened species, and seven state Species of Special Concern. As a result, additional surveys were conducted during 2006 and are reported here. The surveys for this project were conducted to provide data that will be used to help assess the potential risk to birds from this proposed project.

1.2 Project Area Description

The project area is located within the Eastern Ontario Plain ecozone of New York (Andrle and Carroll 1988). This is a relatively flat region with open grasslands, patches of woodlands, and active agricultural fields, with elevation ranging from approximately 76 m to 152 m (250' to 500'). Forest communities in the area are dominated by American elm (*Ulmus americana*), red maple (*Acer rubrum*), and northern hardwoods on soils of lake sediments that overlie limestone bedrock. The proximity of Lake Ontario helps moderate the local climate, which has resulted in the widespread development of agricultural land uses, predominantly dairying.

The project area is located in a part of New York State that has been identified as important for a number of bird species. The National Audubon Society lists a number of established and proposed Important Bird Areas (IBAs) in the vicinity of the project. Included are the established Fort Drum, Perch River, and Point Peninsula IBAs and one under consideration, the Jefferson County Grasslands IBA (<http://iba.audubon.org/iba/stateIndex.do?state=US-NY>). Additionally, the project area is bounded on its western edge by the Chaumont Barrens, a unique alvar landscape of open grasslands, shrub savannas, and patches of woods, owned by The Nature Conservancy. The United States Fish and Wildlife Service (USFWS) has also prepared a Land Protection Plan for the St. Lawrence Wetland and Grassland Management District in recognition of the use of wetlands and grasslands of parts of Jefferson County for regionally rare bird species (<http://www.fws.gov/r5mnwr/LandProtectionPlan.pdf#search=%22jefferson%20county%20iba%22>).



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105030-F01-BBS_Surv.dwg

SHEET TITLE:

Breeding Bird Survey Location

PROJECT:

Clayton Wind Power Project
Clayton, New York

DATE: August 2006

SCALE: 1"=6000'

PROJ. NO.: 105030

FIGURE:

1

2.0 Methods

Survey effort targeted three species: short-eared owl (*Asio flammeus*); upland sandpiper (*Bartramia longicauda*); and Henslow's sparrow (*Ammodramus henslowii*). The short-eared owl is listed as Endangered in New York and the other two are listed as Threatened. All three species were determined to likely be nesting within the project area during the 2005 breeding bird surveys. The goal of the work will be to determine the overall number of nesting pairs of each of these species and collect site specific habitat use information and other incidental bird observations.

Targeted rare species and breeding bird surveys were conducted across three weeks of field surveys during April, May, and June of 2006. The goal of the project was to document habitat use, including confirmation of nesting, nest territory delineation, nest locations, and population size of targeted species in the project area by the three target species and incidental observations of other state-listed species. Approximately 60 percent of the fields of the project area were surveyed. Morning and early evening surveys were conducted to coincide with activity patterns of targeted species. Field surveys included a combination of breeding bird point counts and roving (walking) surveys, as well as nest searches. In addition, information on all breeding birds encountered during point count surveys was collected.

2.1 Targeted Species Field Surveys

Field surveys for the three target species consisted of systematic surveys to document the occurrence, location, and habitat use of the project area starting in early May and extending through late June. Upon confirmation of their presence, early morning site visits to each location were made to document nesting behavior and, when possible, nest locations. Habitat at each site was characterized. Periodic visits through the nesting season were made to nesting areas to document nesting success, when possible.

Roving surveys were conducted throughout the project area where landowner permission was granted to access the land. Observers walked along roads and fields of the project area specifically targeting areas of good habitat for short-eared owls, Henslow's sparrows, and upland sandpipers. Surveys started at 5:30 am and continued until 11:00 am and resume in the evening from about 5:00 pm to dusk. All observations were recorded, including behavioral notes, and all targeted species locations were recorded by GPS.

2.2 Breeding Bird Field Surveys

To collect species occurrence and use information across the entire project area, regardless of habitat quality, breeding bird surveys were conducted to supplement the targeted species surveys at various points in the project area. Point counts were stratified across the project area to cover transitional woodland-field edges, open grassland, and in active agricultural and hayfields (Figure 1). The point count methodology, modeled after the North American Breeding Bird Survey (BBS), was used to count individuals of each species located at a series of survey points (Sauer *et al.* 1997) and was the same method used during the 2005 breeding bird survey.

Twenty-eight points were sampled, including 18 points in fields and 10 points along field-woodland edges. Survey locations were chosen based on the proposed locations of the wind turbines and transmission lines and by identifying points that would provide representative coverage of the entire area's habitat types. The survey points were located far enough away from each other to ensure that double-counting of individuals did not occur (typically 0.3 miles apart). Survey locations were recorded using GPS for later identification.

For statistical purposes, the points were divided into two groups (1 day and 2 day) with one set of points (2 day) having two surveys per point and another set of points (1 day) being surveyed only once. Each point was unique and did not overlap with any other points. The 1 day surveys had 13 points and the 2 day surveys had 15 points. Each of the 15 points was surveyed twice during the breeding season, with the first survey of all points conducted on May 16 and 17 and the second round of surveys on May 18 and 19, 2006. The 13 points were surveyed once during the period of May 16 to 19, 2006.

The four days of surveys were conducted during suitable weather conditions, including generally clear conditions with, at most, drizzle and light to moderate winds. Surveys were not conducted during periods of moderate to heavy rain or high winds. Surveys were timed to coincide with the hours of peak bird singing activity, approximately 5:30 to 9:30 am. Each point was surveyed for five minutes and birds observed by sight or sound were recorded onto a data sheet for that point. Each bird was identified as to species, distance from survey site (0 – 50 m, 50 – 100 m, >100 m, or flyover), and time interval when it was first observed. This method is similar to the methodology of the BBS and in the future the data could be compared with BBS data. The approximate location of each bird was also plotted on a point count data sheet to ensure that individual birds were not double-counted.

When possible, species identifications of birds flying overhead (flyovers) were documented, as were observations of notable activities (i.e., singing, courtship flights, territorial displays, nest flushes, food exchanges, or foraging). In addition, bird observations made incidental to the survey were noted.

Data Analysis

Observational data from the targeted species surveys were used to determine species' distributions, potential nest sites, nesting behavior, and document habitat use. Data collected from the breeding bird field point counts were used to calculate the frequency, species richness, and relative abundance of breeding avian species over the entire survey area and by habitat type. The majority of the observations were singing males, each presumed to be defending a territory at this time of year. Bird species recorded as flyovers and incidental observations were not included in the numerical analyses but are described below.

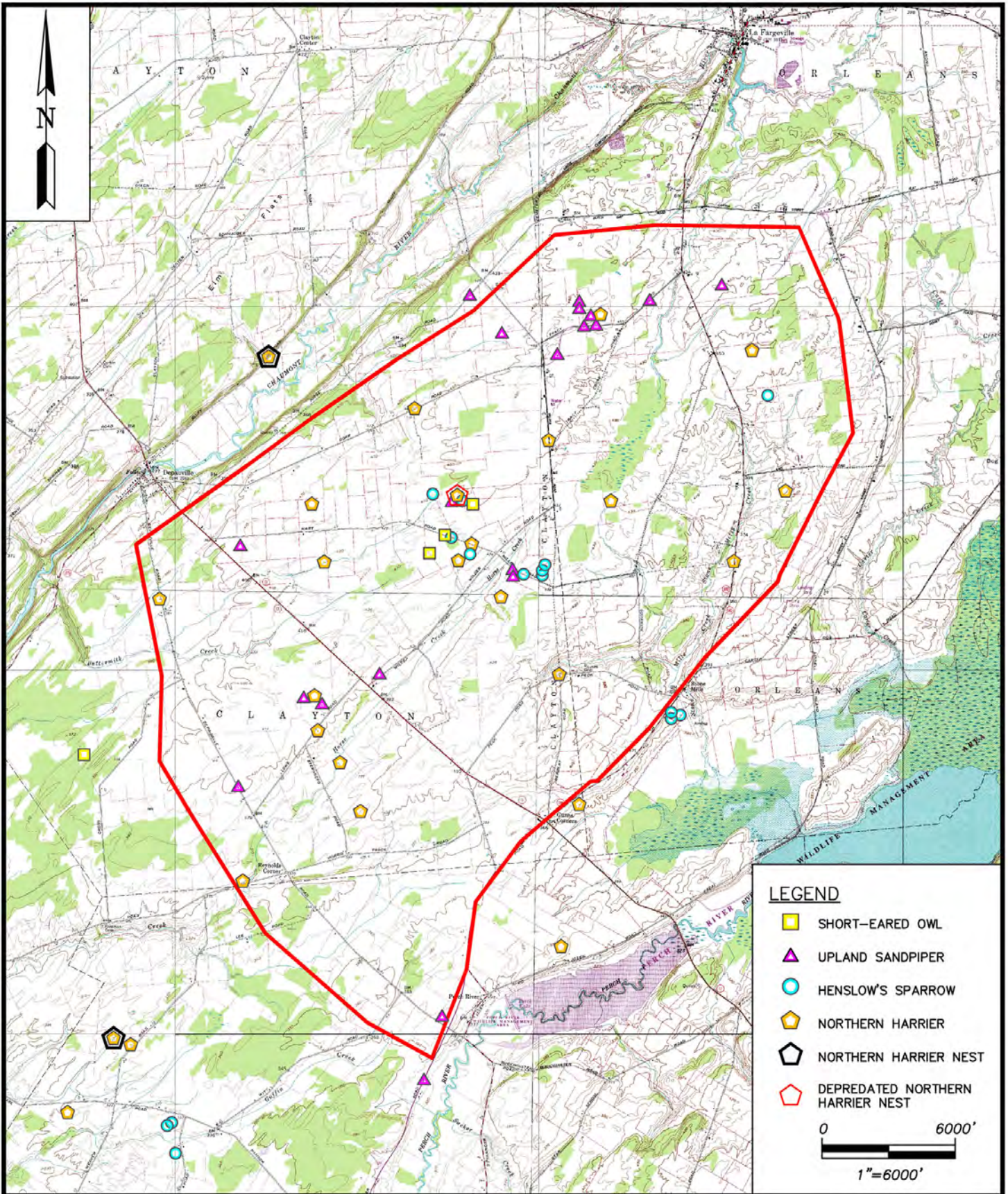
3.0 Results/Discussion

All three targeted species were detected and observed at the Clayton Wind Project in spring 2006. The locations of these species are depicted in Figure 2.

3.1 Targeted Species Field Surveys

3.1.1 Short-eared Owl

Short-eared owls are the most diurnal of all northeastern owl species. Short-eared owl preferred breeding habitats are grasslands, marshes, and tundra throughout North America. However, New York is considered the southern extent of their breeding range. These owls are active during the crepuscular hours of dawn and dusk and during the late afternoon. Their primary food sources are small mammals, but they will occasionally prey on small birds and insects. Short-eared owls tend to breed in areas where meadow voles (*Microtus pennsylvanicus*) are abundant. Nests are placed on the ground, with average clutch sizes between four and nine eggs.



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105030-F02-RareSp.dwg

SHEET TITLE: **Rare Species Survey Results**

PROJECT: **Clayton Wind Power Project
Clayton, New York**

DATE: August 2006
SCALE: 1"=6000'
PROJ. NO.: 105030
FIGURE: **2**

Short-eared owls were observed in only one locality in the project area, which was the same area where a pair of owls was observed in 2005. The observations could constitute a pair that was nesting in the project area, though this was not definitive. The habitat where the observations were made was searched but no nest was found. The observed activity was limited to an undeveloped patch of open grassland and shrub-dominated old field.

One individual was observed on two occasions in this same area. The first sighting occurred at 5:45 pm on April 18, 2006, in which one owl was hunting over the project area along Hart Road (Figure 2). The bird circled over the north and south sides of the road. The owl spent approximately 15 minutes flying low (i.e., < 20 m above the ground), searching and diving after prey. The second sighting occurred on May 16, 2006, where one individual was perched in a small tree overlooking open grasslands about 300 m to the north of Hart Road. No short-eared owls were observed during four other visits in April, May, and June. The owl may have been in the area but were not detected or they may have moved elsewhere.

A short-eared owl was observed in the Chaumont Barrens, west of the project area, on June 5, 2006. The bird flew quickly across the grassland into the nearby woodland. It is unknown if this individual was distinct from the short-eared owl pair along Hart Road.

Short-eared owls were not observed at any of the 28 breeding bird point counts during the four morning visits. However, during the 2005 breeding bird surveys, a pair of owls was detected at the survey point located along Hart Road, where the 2006 observations were made. Based on the history and type of observations during the two years of surveys in the project area, one to two pairs of short-eared owls could be nesting within or in the vicinity of the project area.

The project area's fallow fields, open grasslands, and shrub dominated old-field habitat do provide abundant habitat for this species, as does the surrounding landscape of this part of New York State (Figure 3). Protection and management of this type of habitat could be considered as a potential mitigation strategy for the project.



Figure 3. Short-eared Owl habitat near Hart Rd at Clayton Wind Project in spring 2006.

3.1.2 Henslow's Sparrow

Henslow's sparrow is a species of agricultural grasslands, tallgrass prairies, and pine savannahs of the eastern United States. Populations have declined over the last 40 years due to reforestation of abandoned agricultural lands and development. Jefferson County grasslands have been listed by the Audubon Society as an important bird area for Henslow's sparrow.

Henslow's sparrows were documented during both the targeted species surveys and the breeding bird survey point counts. This species was widely distributed throughout, but localized within, the project area (Figure 2). Abundance of this species during the 1-day survey of 13 points was 0.23 individuals per point and birds were observed at only 2 (15.4%) of the 13 points. The 2-day survey of 15 other points had the same relative abundance as the 1-day survey (average of 0.23 individuals per point surveyed), but Henslow's sparrows were observed at 4 (26.7%) of the 15 points. Based on these results the population size in the project area was determined to be at least 15 to 20 pairs. They were often found in fields where other grassland sparrows, such as grasshopper sparrows (*Ammodramus savannarum*) and savannah sparrows (*Passerculus sandwichensis*), occurred.

Henslow's sparrows are very cryptic in their behavior. The sparrows typically perch atop tall weeds or grass and sing. Generally, the song could be detected only from within 50 m, though this varied with weather conditions. Limited nest searches documented no nests, but this was probably most likely due to their habits and our desire to disturb the birds as little as possible.

Henslow's sparrows were generally found in tall grasslands intermixed with tall weeds (Figure 4) and they were not detected in active agricultural or hayfield habitats. This is typical habitat for the species.



Figure 4. Henslow's sparrow habitat at Clayton Wind Project in spring 2006.

3.1.3 Upland Sandpiper

Unlike other sandpipers, upland sandpipers prefer dry, open grasslands. They prefer to nest in tall, herbaceous vegetation on open grasslands, meadows, and prairies. Similar to other grassland nesting

birds, habitat for upland sandpiper is shrinking as rural development and forest regeneration on agricultural lands increases.

Upland sandpipers were documented during both the targeted and the breeding bird survey efforts. Observations of this species were located throughout the project area, although these were grouped in several areas (Figure 2). During April and May surveys, upland sandpipers were observed in courtship aerial displays over their territories. Displays involved male sandpipers circling up and producing their characteristic 'wolf-whistle' call as they circled over their territories. These courtship flights ranged from 20 m to 200 m above the ground and lasted up to 10 minutes. During June surveys, most of their activity was based on the ground where the pairs were observed foraging for food together. Based on the location and timing of the observations, it is estimated that at least 8 to 10 pairs breeding in the areas surveyed throughout the project area.

Most upland sandpiper observations occurred in open grasslands with little weeds or shrubs (Figure 5). Birds were occasionally observed perching on fence posts and on one occasion on a utility line. Active searches for nest sites for this species were not conducted, but it was obvious that nesting occurs in the project area.



Figure 5. Upland sandpiper habitat at Clayton Wind Project in spring 2006.

3.2 Breeding Bird Survey

When the 1-day and 2-day breeding bird survey point count results were pooled, 900 birds from 54 different species were detected from 28 points. Various state Endangered, state Threatened, and state Species of Special Concern were documented to be nesting in the project area during these surveys.

The 2-day survey points had an overall relative abundance of 16.60 individuals/survey point (15 points) and 39 different species observed. Species richness (number of observed breeding species at individual survey points) ranged from 9 to 20 birds. Field habitats had a relative abundance of 17.44 and species richness of 27. The field-edge habitat had a relative abundance of 15.64 and species richness of 33. The most abundant species across all survey points and habitat types were the red-winged blackbird (*Agelaius*

phoeniceus) (2.67 individuals/survey point), bobolinks (*Dolichonyx oryzivorus*) (2.50), yellow-warbler (*Dendroica petechia*) (2.00), savannah sparrow (1.93), and eastern meadowlark (*Sturnella magna*) (0.90) (Appendix A Table 1).

The 1-day survey points had an overall relative abundance of 13.54 individuals/survey point (13 points) and 32 different species observed. Species richness per point ranged from 4 to 13. Field habitats had a relative abundance of 12.30 and species richness of 23. The field-edge habitat had a relative abundance of 17.67 and species richness of 23. The most abundant species after averaging across all survey points and habitat types were the bobolink, savannah sparrow, yellow warbler, red-winged blackbird, and eastern meadowlark (Appendix A Table 3).

Different groups of species were observed to be local to specific habitat types. Nine species were unique to field habitats and 10 species were unique to field-edge habitat. Appendix A Tables 2 and 4 provide specific information on the composition of the breeding birds during these two point counts. In general, there were similarities in the abundance and species composition between the two levels of survey effort (one-day point counts vs. two-day point counts) and both surveys generally documented the same species' use of the available habitats.

3.3 Additional Species

During the course of these field surveys, two other rare species were observed: northern harrier (*Circus cyaneus*) and grasshopper sparrow. The northern harrier is a State-listed Threatened species while the grasshopper sparrow is a State-listed Special Concern species.

A total of nine individual grasshopper sparrows were documented by the two point count surveys. The species was observed at only 4 of the 28 point count locations (3 of the 2-day points and 1 of the 1-day points). However, this species was somewhat commonly observed throughout the project area during the targeted species field surveys. During those latter surveys, grasshopper sparrows were more abundantly observed than the 3 target species and it is likely that more than 50 pairs nest in the project area.

Northern harriers were also observed during the point count and targeted species field surveys. Eight individuals were observed during the point count surveys. The species was observed at 8 of the 28 point count locations (5 of the 2-day points and 3 of the 1-day points). Similar to the grasshopper sparrow, this species was also commonly observed during the targeted species surveys. It is estimated that approximately 8 to 10 pairs nest within or very near the project area.

Three nest sites were found during the surveys (Figure 2). One nest site was located within the project area, while the other two were located just outside the project area boundary. The two pairs nesting outside the project area were believed to hunt within the boundaries of the project area. One nest had six eggs and the other was being incubated by the female when found, so an egg count was not made. A third nest (project area nest) was found, but the four eggs in it had puncture holes and were determined to be predated. However, this pair was frequently observed flying and hunting over the depredated nest area throughout the survey period. All nests were in typical nesting habitat for this species, namely old field and wetland habitat with tall herbaceous vegetation and sporadic shrubs (Figures 6 and 7).



Figure 6. Northern Harrier nest with six eggs near the project area in spring 2006.



Figure 7. Second Northern harrier nest site located on the border of the project area in spring 2006.

4.0 Summary and Conclusions

The three target species were observed in the project area. While their distribution was generally widespread across the project area, their occurrence tended to be concentrated in localized areas. The project area itself provides an abundance of grassland habitat. However, the composition of those habitats appears to be the most significant factor in determining the distribution of these rare birds in the

project area. Specifically, these species were most common either in agricultural areas recently abandoned or in pasturelands.

Abandonment of agricultural fields stimulates the development of tall grasses, forbs, and scattered shrubs, which is preferred by short-eared owls and several other non-target rare species, such as the northern harrier. These areas of denser, taller grasses are also readily used by Henslow's sparrows and upland sandpipers, although both also use pasturelands. Active agricultural activities, such as row crop production or mowing of hayfields, tends to limit the occurrence of these species, however, despite the fact that other grassland species (i.e., bobolink and savannah sparrow) are very common in those habitats.

As with any rare species, the loss of a few individuals from a population should be considered more significant than for abundant species. The occurrence of these species in proximity to proposed wind turbines does pose a risk to the local populations of these species. However, while individuals of these species could be at risk of colliding with the proposed wind turbines the absolute risk is unknown due to a lack of information on bird and windpower interactions. More and more information on these interactions is becoming available, though the growth and distribution of this information is generally slow.

Important factors affecting risk for these species at this project could include the location of individual turbines, habitat distribution, size of the breeding populations, and species-specific habits. Project design and mitigation considerations should take into account the location of turbines relative to known areas of suitable habitat or potential habitat preservation sites.

Flight and activity habits of these grassland nesting birds are variable. Small species with cryptic habits, such as the Henslow's sparrow, probably have fairly limited risk due to their habits of remaining in tall herbaceous cover. Alternatively, upland sandpipers have occasionally long flights to heights of 100 to 200 m during their courtship period. This activity would probably place this species more at risk than those that consistently fly at lower heights. The occurrence of species with similar habits (such as American woodcock [*Scolopax minor*] or common snipe [*Gallinago gallinago*]) in mortality reports from existing wind developments that harbor populations of these species (such as the Maple Ridge or Top of Iowa projects) should be investigated to more accurately assess the potential for collision-related impact to this species and others with more elaborate courtship flights.

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Appendix A

Breeding Bird Survey Tables

Appendix A Table 1. Total number of observations, relative abundance, and frequency of occurrence of 2 days of breeding bird surveys at Clayton Wind Project in spring 2006.									
Species	Field (8 Points)			Field/woodland edge (7 Points)			All Habitats (15 Points)		
	Total # ^a	Relative Abundance ^b	Frequency ^c	Total # ^a	Relative Abundance ^b	Frequency ^c	Total # ^a	Relative Abundance ^b	Frequency ^c
American crow	6	0.38	37.5%	5	0.36	71.4%	11	0.37	53.3%
American goldfinch	2	0.13	12.5%	10	0.71	71.4%	12	0.40	40.0%
American robin	7	0.44	37.5%	9	0.64	57.1%	16	0.53	46.7%
Baltimore oriole	1	0.06	12.5%	0	0.00	0.0%	1	0.03	6.7%
Black-capped chickadee	2	0.13	12.5%	4	0.29	42.9%	6	0.20	26.7%
Bluejay	1	0.06	12.5%	2	0.14	28.6%	3	0.10	20.0%
Bobolink	53	3.31	87.5%	22	1.57	85.7%	75	2.50	86.7%
Brown-headed cowbird	0	0.00	0.0%	1	0.07	14.3%	1	0.03	6.7%
Canada goose	19	1.19	25.0%	6	0.43	57.1%	25	0.83	40.0%
Chestnut-sided warbler	4	0.25	37.5%	7	0.50	42.9%	11	0.37	40.0%
Chipping sparrow	1	0.06	12.5%	2	0.14	14.3%	3	0.10	13.3%
Common yellowthroat	6	0.38	37.5%	7	0.50	42.9%	13	0.43	40.0%
Downy woodpecker	0	0.00	0.0%	1	0.07	14.3%	1	0.03	6.7%
Eastern kingbird	2	0.13	12.5%	3	0.21	42.9%	5	0.17	26.7%
Eastern meadowlark	19	1.19	87.5%	8	0.57	57.1%	27	0.90	73.3%
Eastern phoebe	0	0.00	0.0%	1	0.07	14.3%	1	0.03	6.7%
Eastern towhee	0	0.00	0.0%	2	0.14	28.6%	2	0.07	13.3%
European starling	0	0.00	0.0%	14	1.00	28.6%	14	0.47	13.3%
Field sparrow	0	0.00	0.0%	1	0.07	14.3%	1	0.03	6.7%
Grasshopper sparrow	5	0.31	37.5%	0	0.00	0.0%	5	0.17	20.0%
Gray catbird	0	0.00	0.0%	5	0.36	42.9%	5	0.17	20.0%
Henslow's sparrow	4	0.25	25.0%	3	0.21	28.6%	7	0.23	26.7%
Hermit thrush	0	0.00	0.0%	6	0.43	42.9%	6	0.20	20.0%
Herring gull	0	0.00	0.0%	2	0.14	14.3%	2	0.07	6.7%
Least flycatcher	1	0.06	12.5%	3	0.21	42.9%	4	0.13	26.7%
Unid. sparrow	1	0.06	12.5%	0	0.00	0.0%	1	0.03	6.7%
Mallard	1	0.06	12.5%	0	0.00	0.0%	1	0.03	6.7%
Mourning dove	2	0.13	25.0%	3	0.21	14.3%	5	0.17	20.0%
Northern cardinal	0	0.00	0.0%	3	0.21	28.6%	3	0.10	13.3%
Northern harrier	2	0.13	12.5%	4	0.29	28.6%	6	0.20	20.0%
Red-winged blackbird	40	2.50	87.5%	40	2.86	85.7%	80	2.67	86.7%
Rose-breasted grosbeak	1	0.06	12.5%	0	0.00	0.0%	1	0.03	6.7%
Ruffed grouse	0	0.00	0.0%	1	0.07	14.3%	1	0.03	6.7%
Savannah sparrow	52	3.25	100.0%	6	0.43	42.9%	58	1.93	73.3%
Song sparrow	14	0.88	75.0%	1	0.07	14.3%	15	0.50	46.7%
Upland sandpiper	4	0.25	25.0%	0	0.00	0.0%	4	0.13	13.3%
Wild turkey	2	0.13	25.0%	3	0.21	14.3%	5	0.17	20.0%
Winter wren	0	0.00	0.0%	1	0.07	14.3%	1	0.03	6.7%
Yellow warbler	27	1.69	100.0%	33	2.36	85.7%	60	2.00	93.3%
Grand total	279			219			498		
Relative abundance		17.44			15.64			16.60	
Species richness			27			33			39

^a Total number of observations ^b Mean number of birds observed. ^c Percentage of survey points where species occurred..

Appendix A Table 2. Total number of species recorded and distance from point count center at Clayton Wind Project during 2 day breeding bird surveys in spring 2006.					
Species	0-50 m	50-100 m	> 100 m	Flyovers^a	Grand Total
American crow		4	7	2	13
American goldfinch	8	4		15	27
American kestrel				1	1
American robin	6	10		2	18
Baltimore oriole ^b		1			1
Barn swallow				14	14
Black-capped chickadee		6			6
Bluejay		3			3
Bobolink	12	60	3	96	171
Brown-headed cowbird ^c	1				1
Canada goose		17	8	7	32
Chestnut-sided warbler	1	10			11
Chipping sparrow	2	1			3
Common grackle				4	4
Common yellowthroat	2	11			13
Downy woodpecker ^c		1			1
Eastern kingbird	2	3			5
Eastern meadowlark	3	23	1	2	29
Eastern phoebe ^c		1			1
Eastern towhee ^c		2			2
European Starling ^c		14		9	23
Field sparrow ^c		1			1
Grasshopper sparrow ^b	3	2			5
Gray catbird ^c	4	1			5
Great Blue heron				3	3
Henslow's sparrow	6	1			7
Hermit thrush ^c		6			6
Herring gull ^c			2	1	3
Killdeer				1	1
Least flycatcher	2	2			4
Unidentified sparrow ^b		1			1
Mallard ^b		1		3	4
Mourning dove	1	4			5
Northern cardinal ^c		3			3
Northern flicker				1	1
Northern harrier		4	2	2	8
Red-tailed hawk				1	1
Red-winged blackbird	25	54	1	18	98
Rock pigeon				1	1

(continued)

Appendix A Table 2. Total number of species recorded and distance from point count center at Clayton Wind Project during 2 day breeding bird surveys in spring 2006. <i>(continued)</i>					
Species	0-50 m	50-100 m	> 100 m	Flyovers^a	Grand Total
Rose-breasted grosbeak ^b		1			1
Ruffed grouse ^c			1		1
Savannah sparrow	16	39	3	8	66
Song sparrow	13	2		2	17
Turkey vulture				1	1
Upland sandpiper ^b			4		4
Wild turkey		1	4		5
Winter wren ^c	1				1
Yellow warbler	16	42	2		60
Grand total	124	336	38	194	692
^a Not included in numerical analysis					
^b Species unique to field habitat					
^c Species unique to field-woodland edge habitat					

Appendix A Table 3. Total number of observations, relative abundance, and frequency of occurrence of one day of breeding bird surveys at Clayton Wind Project in spring 2006.									
Species	Field (10 Points)			Field/woodland edge (3 Points)			All Habitats (13 Points)		
	Total # ^a	Relative Abundance ^b	Frequency ^c	Total # ^a	Relative Abundance ^b	Frequency ^c	Total # ^a	Relative Abundance ^b	Frequency ^c
American crow	0	0.00	0.0%	1	0.33	33.3%	1	0.08	7.7%
American robin	3	0.30	20.0%	5	1.67	100.0%	8	0.62	38.5%
American woodcock	2	0.20	80.0%	1	0.33	33.3%	3	0.23	23.1%
Black-capped chickadee	0	0.00	0.0%	2	0.67	33.3%	2	0.15	7.7%
Bobolink	29	2.90	50.0%	1	0.33	33.3%	30	2.31	69.2%
Brown thrasher	5	0.50	20.0%	1	0.33	33.3%	6	0.46	46.2%
Chestnut-sided warbler	0	0.00	0.0%	1	0.33	33.3%	1	0.08	7.7%
Chipping sparrow	0	0.00	0.0%	3	1.00	33.3%	3	0.23	7.7%
Common yellowthroat	2	0.20	10.0%	2	0.67	66.7%	4	0.31	30.8%
Eastern kingbird	1	0.10	50.0%	1	0.33	33.3%	2	0.15	15.4%
Eastern meadowlark	9	0.90	20.0%	0	0.00	0.0%	9	0.69	38.5%
Eastern towhee	2	0.20	10.0%	2	0.67	66.7%	4	0.31	30.8%
European starling	1	0.10	10.0%	3	1.00	33.3%	4	0.31	15.4%
Field sparrow	0	0.00	0.0%	2	0.67	33.3%	2	0.15	7.7%
Grasshopper sparrow	4	0.40	10.0%	0	0.00	0.0%	4	0.31	7.7%
Gray catbird	1	0.10	20.0%	1	0.33	33.3%	2	0.15	15.4%
Henslow's sparrow	3	0.30	10.0%	0	0.00	0.0%	3	0.23	15.4%
Hermit thrush	0	0.00	0.0%	3	1.00	33.3%	3	0.23	7.7%
Indigo bunting	1	0.10	10.0%	0	0.00	0.0%	1	0.08	7.7%
Unidentified sparrow	3	0.30	20.0%	0	0.00	0.0%	3	0.23	7.7%
Mourning dove	0	0.00	0.0%	2	0.67	66.7%	2	0.15	15.4%
Northern flicker	2	0.20	20.0%	3	1.00	100.0%	5	0.38	38.5%
Northern harrier	2	0.20	70.0%	0	0.00	0.0%	2	0.15	15.4%
Red-winged blackbird	9	0.90	90.0%	7	2.33	66.7%	16	1.23	69.2%
Savannah sparrow	17	1.70	20.0%	3	1.00	33.3%	20	1.54	76.9%
Song sparrow	4	0.40	20.0%	3	1.00	33.3%	7	0.54	23.1%
Tree swallow	4	0.40	30.0%	0	0.00	0.0%	4	0.31	15.4%
Tufted titmouse	0	0.00	0.0%	1	0.33	33.3%	1	0.08	7.7%
Upland sandpiper	4	0.40	20.0%	0	0.00	0.0%	4	0.31	23.1%
White-throated sparrow	0	0.00	0.0%	1	0.33	33.3%	1	0.08	7.7%
Wild turkey	2	0.20	80.0%	0	0.00	0.0%	2	0.15	15.4%
Yellow warbler	13	1.30	0.0%	4	1.33	66.7%	17	1.31	76.9%
Grand total	123			53			176		
Relative abundance		12.30			17.67			13.54	
Species richness			23			23			32

^a Total number of observations. ^b Mean number of birds observed. ^c Percentage of survey points where species occurred.

Appendix A Table 4. Total number of species recorded and distance from point count center at Clayton Wind Project during one day of breeding bird surveys in spring 2006.					
Species	0-50 m	50-100 m	> 100 m	Flyovers^a	Grand Total
American crow ^c		1		2	3
American goldfinch				3	3
American robin		8			8
American woodcock	1	1	1		3
Barn swallow				2	2
Black-capped chickadee ^c			2		2
Bobolink	7	21	2	4	34
Brown thrasher	1	5			6
Canada goose				2	2
Chestnut-sided warbler ^c		1			1
Chipping sparrow ^c	1	2			3
Common yellowthroat		2	2		4
Eastern kingbird		2		1	3
Eastern meadowlark ^b		8	1		9
Eastern towhee	1	2	1		4
European Starling	3	1		5	9
Field sparrow ^c		2			2
Grasshopper sparrow ^b	1	3			4
Gray catbird	1		1		2
Great blue heron				2	2
Henslow's sparrow ^b		3			3
Hermit thrush ^c		1	2		3
Indigo bunting ^b		1			1
Unid. sparrow ^b		2	1		3
Mallard				2	2
Mourning dove ^c		2			2
Northern flicker	1	3	1		5
Northern harrier ^b			2	1	3
Red-winged blackbird	4	11	1	4	20
Savannah sparrow	12	8			20
Song sparrow	6	1			7
Tree swallow ^b			4	4	8
Tufted titmouse ^c		1			1
Upland sandpiper ^b		2	2		4
White-throated sparrow ^c		1			1
Wild turkey ^b		2			2
Yellow warbler ^c	4	10	3		17
Grand total	43	107	26	32	208
^a Not included in numerical analysis					
^b Species unique to field habitat					
^c Species unique to field-woodland edge habitat					