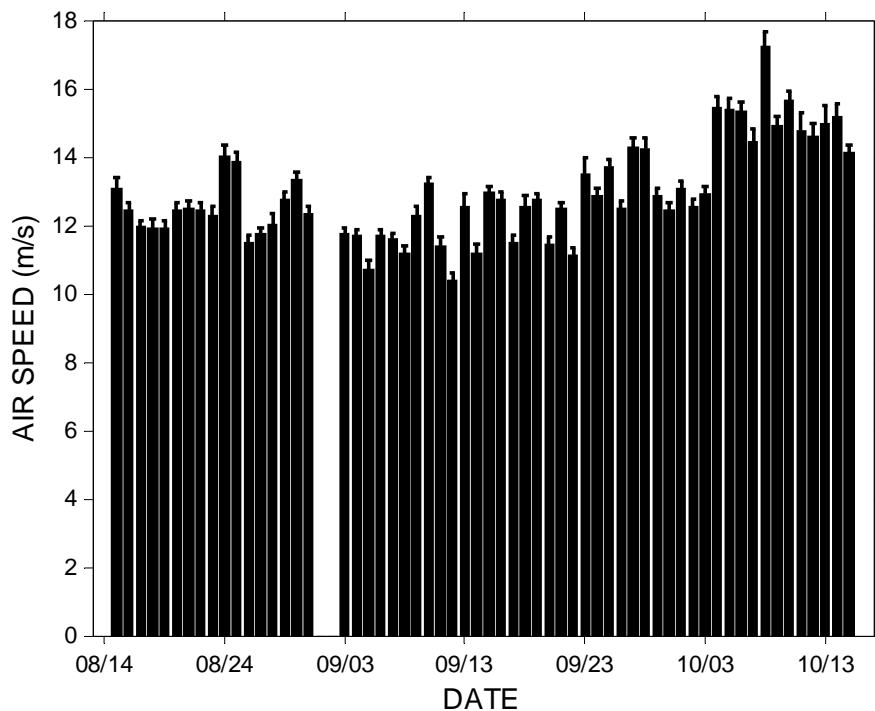


### Target Speed

Air speed of targets was calculated by adjusting for wind speed and direction (see Methods above). Of 12190 targets, approximately 1% (120 targets) were moving very slow (< 6 m/s) and one target was moving at high speed (> 35m/s). After excluding very slow and very fast targets, overall mean target air speed was  $12.95 \pm 0.03$  m/s (mean  $\pm$  SE) ( $n = 12069$  targets). Nightly mean target air speed varied from approximately 10 to 17 m/s (Figure 12). Because the percentage of targets moving slow was so small, no further adjustment to the data set was warranted.

**Figure 12.** Mean + 1 SE nightly target air speed.



### 3.2 Raptor Migration Surveys

The objective of the raptor migration surveys is to estimate the spatial and temporal use of the sites by migrant raptors, other diurnal migrants (e.g., waterfowl, corvids), and other large birds. Point counts using variable circular plots (Reynolds *et al.* 1980, Bibby *et al.* 1992) were conducted within the project area according to methods used by the Hawk Migration Association of North America (HMANA) with observers continuously scanning the sky and surrounding areas for raptors in the survey area. Three permanent stations were designated for diurnal surveys (Figure 3). All large birds and flocks detected during the point counts were recorded, but the emphasis of the surveys was locating and counting raptors within approximately 800-m (0.5 mi) of each point. The timing of surveys was determined in consultation with the NYSDEC

and based on available information from migrant raptor watch stations in northern and western New York (e.g., Derby Hill, see below).

### *3.2.1 Methods*

Three survey points were established within the proposed project area to provide good visibility while providing widespread east-west coverage of the project area, while also attempting to minimize the double-counting of individual birds (Figure 3). Survey stations were established to maximize visibility over long distances in an effort to locate and identify migrating raptors and other large birds. To the extent possible while maintaining the integrity of the east-west point layout, the points were selected to provide good coverage of the vegetation and topographic features of the area, good visibility in 360° around the point, and so that each point was surveying unique area. Each survey plot was a variable circular plot centered on the observation point. All birds observed were recorded, although the survey effort was concentrated within an approximate 800-m radius circle centered on the observation point. Observations of birds beyond the 800-m radius were recorded, but not included in the analysis of data within the plot.

Each fixed point was surveyed once each survey day during daylight hours (0900 – 1700) to cover the peak period for observing migrant raptors. Survey periods at each point were 60 minutes long. All raptors and other large birds/flocks observed during the survey were assigned a unique observation number and plotted on a map of the survey plot. Data recorded for each survey included date; start and end time of the observation period; and weather information such as temperature, barometric pressure, wind speed, wind direction, and cloud cover. Species or best possible identification, number of individuals, sex and age class (if possible), distance from plot center when first observed, closest distance, altitude above ground, activity (behavior), and habitat(s) were recorded for each raptor observed. Approximate flight direction or movement paths were mapped for all raptors and large birds seen. The behavior of each raptor/large bird observed and the habitat in which or over which the bird occurred was recorded. Behavior categories included perched, circling/soaring, flapping, hunting, gliding, and other (noted in comments). Habitats included agriculture, old field, deciduous woods/forest, developed (e.g., farms), and other (noted in comments). The initial behavior and habitat (when first observed) were uniquely identified on the data sheet and subsequent behaviors and habitats (if any) also recorded. Approximate flight height at first observation and the approximate lowest and highest flight heights were recorded to the nearest meter or 5-meter interval. Any comments or unusual observations were noted in the comments section.

Sampling intensity was designed to document raptor migration through the project area. In New York, spring hawk watch locations are concentrated along the Great Lakes shorelines and are more inland in eastern portions of the state during fall migration. According to spring count data from the Derby Hill Bird Observatory, located in Mexico, New York, approximately 50 miles south of Cape Vincent along Lake Ontario, peak numbers of sharp-shinned hawks migrate through the area during April, with large pulses of broad-winged hawks during the last two weeks of the month. Fall migration counts from Franklin Mountain in Oneonta, New York (150 miles southeast of Cape Vincent) report peak periods for migrant broad-winged and sharp-shinned hawks during September and October, respectively. Concern for migrant golden eagles potentially using the St. Lawrence Windpower project area was expressed during talks with the NYSDEC. Golden eagles are later migrants with peaks reported from the end of March through April during spring migration and the end of October through November during fall migration.

Spring raptor surveys at the St. Lawrence Windpower project area began later in the 2006 season (April 14, 2006) and likely did not capture early raptor migrants, such as golden eagles. In fall, surveys were conducted from September 23 – November 11.

### *3.2.2 Results*

During the spring season, each point was surveyed 4 times, for a total of 12 surveys. A total of 1147 individual birds were recorded; 54 raptors of 10 species were observed (Table 1). During the fall season, each fixed point was surveyed 10 times during the survey window, for a total of 30 surveys. A total of 7108 individual large birds were recorded during the surveys; 288 individual raptors of 10 species were observed (Table 1). Canada goose and unidentified gull species were the most commonly seen bird during both spring and fall surveys. During spring migration, turkey vulture was the mostly commonly recorded raptor species (n = 51, freq = 83.3%), followed by red-tailed hawk (n = 8, freq = 50.0). In the fall, northern harrier was the most commonly recorded raptor species (n = 87, freq = 90.0%); red-tailed hawk and turkey vulture were also commonly seen species during surveys. Other raptor species seen included: broad-winged hawk, rough-legged hawk, sharp-shinned hawk, Cooper's hawk, osprey, American kestrel, peregrine falcon, merlin, bald eagle, and turkey vulture.

Exposure indices were calculated as the mean use estimates (number of birds/60-minute survey) multiplied by the proportion of birds observed flying and the proportion of birds flying within the zone of risk (defined as the approximate rotor-swept area). During both migratory seasons, gull species had the highest exposure index due to high numbers of individuals occurring in the project area (Table 2).

Avian and raptor use varied among survey stations (Figure 13). Avian use was higher at Station 3 during both seasons. High numbers of waterfowl and gulls foraging in nearby fields or flying close to the shoreline accounted for higher avian use at this station. Mean avian use was lower at Station 1 and 2. Raptor use was similar between seasons and did not differ across survey points.

**Table 1.** Raptors and other large bird species observed while conducting diurnal migrant surveys at the St. Lawrence Windpower project area.

Species/Group	Spring 2006				Fall 2006			
	# ind	# groups	mean use <sup>2</sup>	% freq <sup>3</sup>	# ind	# groups	mean use	% freq
<b>Waterbirds</b>								
Great blue heron	4	4	0.33	25.0	1	1	0.03	3.3
Herring gull	19	3	1.58	16.7	0	0	0	0
Ring-billed gull	317	9	26.42	50.0	634	33	21.1	33.3
Unidentified gull	879	15	73.25	66.7	6421	38	214.03	50.0
<b>Waterfowl</b>								
Canada goose	197	6	16.4	50.0	927	51	30.9	60.0
Double-crested cormorant	2	1	0.17	8.3	0	0	0	0
Unidentified duck	40	2	3.33	16.7	0	0	0	0
Mallard	0	0	0	0	1	1	0.03	3.3
<b>Raptors</b>								
<i>Accipiters</i>								
Sharp-shinned hawk <sup>SC</sup>	5	3	0.42	25.0	3	3	0.1	10.0
Cooper's hawk <sup>SC</sup>	0	0	0	0	4	4	0.13	13.3
Unidentified accipiter	5	5	0.42	33.3	0	0	0	0
<i>Buteos</i>								
Broad-winged hawk	7	7	0.58	33.3	6	3	0.2	6.7
Red-tailed hawk	8	7	0.67	50.0	43	37	1.43	63.3
Rough-legged hawk	2	2	0.17	16.7	12	8	0.4	23.3
Unidentified buteo	4	3	0.33	25.0	0	0	0	0
<i>Falcons</i>								
American kestrel	1	1	0.08	8.3	11	9	0.37	26.7
Merlin	0	0	0	0	2	2	0.07	6.7
<i>Eagles</i>								
Bald eagle <sup>FT</sup>	0	0	0	0	1	1	0.03	3.3
<i>Other Raptors</i>								
Northern harrier <sup>ST</sup>	6	6	0.5	41.7	87	65	2.9	90.0
Osprey <sup>SC</sup>	2	2	0.17	16.7	0	0	0	0
Turkey vulture	51	31	4.25	83.3	119	53	3.97	40.0
<b>Other Birds</b>								
American crow	31	11	2.58	50.0	193	86	6.43	80.0
Common raven	0	0	0	0	3	3	0.1	10.0
Common snipe	0	0	0	0	9	4	0.3	13.3
Ring-necked pheasant	0	0	0	0	1	1	0.03	3.3
Wild turkey	0	0	0	0	42	2	1.4	6.7
<b>Total</b>	<b>1147</b>	<b>118</b>			<b>7108</b>	<b>406</b>		

FT = Federal threatened ST = State threatened SC = State listed species of special concern

<sup>2</sup> Mean use = number observed within 800 m of survey point per 60-min survey

<sup>3</sup> Frequency of occurrence = percent of surveys in which species was observed

**Table 2.** Flight height characteristics and exposure indices by species observed during spring and fall 2006 diurnal migrant surveys at the St. Lawrence Windpower project area.

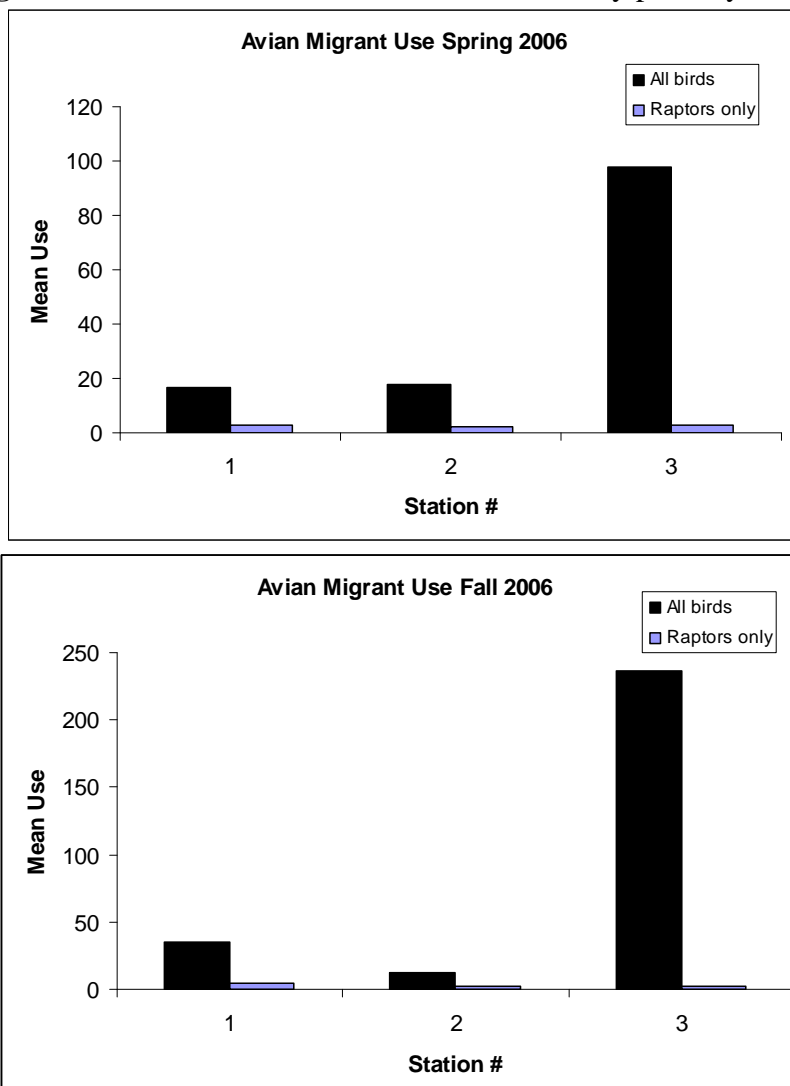
Species	# individuals flying		% birds flying		Relation to rotor-swept area <sup>4</sup>						Exposure Index <sup>5</sup>	
	S	F	S	F	% below		% within		% above		S	F
<b>Waterbirds</b>												
Great blue heron	4	1	100.0	100.0	100.0	100.0	0	0	0	0	0	0
Herring gull	19	0	100.0	0	100.0	0	0	0	0	0	0	0
Ring-billed gull	167	466	52.7	73.5	70.1	27.9	29.9	72.1	0	0	<b>4.17</b>	<b>11.2</b>
Unidentified gull	244	4971	27.8	77.4	76.6	45.2	23.4	54.7	0	0.01	<b>4.75</b>	<b>90.7</b>
<b>Waterfowl</b>												
Canada goose	197	902	100.0	97.3	100.0	0	0	75.8	0	24.2	0	<b>22.8</b>
Double-crested cormorant	2	0	100.0	0	100.0	0	0	0	0	0	0	0
Unidentified duck	40	0	100.0	0	100.0	0	0	0	0	0	0	0
Mallard	0	1	0	100.0	0	0	0	0	0	100.0	0	0
<b>Raptors</b>												
<i>Accipiters</i>												
Sharp-shinned hawk <sup>SC</sup>	5	2	100.0	66.7	0	50.0	80.0	50.0	20.0	0	0.33	0.03
Cooper's hawk <sup>SC</sup>	0	4	0	100.0	0	0	0	100.0	0	0	0	0.13
Unidentified accipiter	5	0	100.0	0	0	0	60.0	0	40.0	0	0.25	0
<i>Buteos</i>												
Broad-winged hawk	7	6	100.0	100.0	14.3	0	28.6	50.0	57.1	50.0	0.17	0.1
Red-tailed hawk	7	41	87.5	95.3	14.3	24.3	42.9	73.2	42.9	2.4	0.25	0.97
Rough-legged hawk	2	12	100.0	100.0	50.0	58.3	50.0	33.3	0	8.3	0.08	0.13
Unidentified buteo	4	0	100.0	0	0	0	100.0	0	0	0	0.33	0
<i>Northern Harriers</i>												
Northern harrier <sup>T</sup>	6	84	100.0	96.6	100.0	100.0	0	0	0	0	0	0
<i>Osprey</i>												
Osprey <sup>SC</sup>	2	0	100.0	0	0	0	100.0	0	0	0	0.17	0

<sup>4</sup> Defined as the area between approximately 25 and 125 m above ground level

<sup>5</sup> Exposure index = (mean use) \* (% individuals flying) \* (% flying within rotor-swept area)

Species	# individuals flying		% birds flying		Relation to rotor-swept area <sup>4</sup>						Exposure Index <sup>5</sup>	
					% below		% within		% above			
	S	F	S	F	S	F	S	F	S	F	S	F
<i>Falcons</i>												
American kestrel	1	11	100.0	100.0	100.0	90.9	0	9.1	0	0	0	0.03
Merlin	0	2	0	100.0	0	100.0	0	0	0	0	0	0
<i>Eagles</i>												
Bald Eagle <sup>T</sup>	0	1	0	100.0	0	0	0	0	0	100.0	0	0
<i>Vultures</i>												
Turkey vulture	49	119	96.1	100.0	4.1	5.0	61.2	92.5	34.7	2.5	<b>2.5</b>	<b>3.67</b>
<b>Other Birds</b>												
American crow	31	183	100.0	94.8	58.1	44.8	41.9	54.6	0	5.5	<b>1.08</b>	<b>3.33</b>
Common raven	0	3	0	100.0	0	66.7	0	33.3	0	0	0	0.03
Common snipe	0	9	0	100.0	0	100.0	0	0	0	0	0	0
Ring-necked pheasant	0	0	0	0	0	0	0	0	0	0	0	0
Wild turkey	0	0	0	0	0	0	0	0	0	0	0	0

**Figure 13.** Diurnal avian estimates for each survey point by season.



### 3.3 Breeding Bird Survey

The objective of the breeding bird surveys was to estimate the spatial and temporal use of the proposed development area by breeding resident birds. The emphasis of the surveys was locating and counting breeding resident birds within the area proposed for development. The surveys were conducted based on the regional timing recommended for USGS BBS in central New York (USGS 2001).

#### 3.3.1 Methods

Twenty survey points were established within the project area. The survey points were selected to cover as much of the proposed development area and habitat types as possible. Each survey station was marked on a map and GPS coordinates were recorded for each point (Figure 14). The habitat at each survey point was described to examine the applicability of the site to represent other areas within the proposed development area.