

Baseline Bird Behaviour Monitoring Report Flesherton Wind Farm Project

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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Baseline Bird Behaviour Monitoring Report Flesherton Wind Farm Project

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Appendix I: Data Forms

Appendix II: Birds Known From the Study Area and Vicinity

1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained by Flesherton Wind Farms Inc. in April 2006 to conduct a review of natural environment resource issues that might influence the location, potential impacts, and mitigation of a proposed wind power generating facility in Grey County, Ontario. The analysis of biological factors affecting the proposed site is just one issue being considered. Other factors under consideration include wind dynamics, land ownership, and social impacts.

This report summarizes the findings of the bird field studies and background review relating to birds conducted for this project since 2006. Extensive work on bats, birds, vegetation and other wildlife was conducted by NRSI concurrently, and results of these field investigations are summarized in the following report::

- Baseline Bat Behaviour Monitoring Report (December 2008)

The specific extent of land leases, as well as the locations for proposed turbines, access roads, and other ancillary facilities were either unknown at the time of conducting field work, or changed over the course of the study. Access to private land was available in 2007 and 2008, but not in 2006. When possible, field surveys were completed by walking throughout the study area, though at other times only road-side surveys were permissible. Inclusion of the lands in the biological study does not imply that all lands are being considered for wind turbines.

2.0 Study Area

The Flesherton Wind Energy Project is located in Grey County, Ontario, just northeast of the Town of Flesherton. Originally the Flesherton Wind Energy Project was comprised of two separate land parcels. After several changes to the project area, it was reduced to a smaller land parcel of approximately 64ha on April 15, 2008. The current study area is located northeast of the 35th Sideroad and 8th Concession intersection (see Figure 1 for both the old and new study area boundaries).

Over the course of the study, lands in both the current and old project areas were studied. In addition, some secondary sources of information, particularly the Ontario Breeding Bird Atlas, extend beyond the study area, so background sources for lands outside the study area were included in the overview of biological features, and pertinent information has been included where warranted.

Figure 1. Study Area

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3.0 Project Level of Concern

Environment Canada and the Canadian Wildlife Service (2007b) provide information and recommendations in their *Guidance Document for Environmental Assessment* on how to select and evaluate site suitability for wind power facilities, based on reducing risk to birds. Site sensitivity is ranked as low, medium, high, or very high. It is based on determining factors such as the presence of rare bird species and significant bird habitat.

Rare species and significant bird habitat are discussed later on in this report (see Sections 6.3 and 6.2 respectively). Based on the review, there is no significant bird habitat within the study area. There are, however, 4 rare bird species reported from the study area and vicinity. Only one of these (red-shouldered hawk, *Buteo lineatus*) was recorded from within the study area by NRSI. Three other species, whose habitat range covers the study area (Environment Canada 2008), were not documented from the OBBA square covering the study area, but were recorded in the second OBBA as occurring in adjacent squares (OBBA 2008). These 3 other species are cerulean warbler (*Dendroica cerulean*), Henslow's sparrow (*Ammodramus henslowii*), and red-headed woodpecker (*Melanerpes erythrocephalus*). Habitat for cerulean warbler, Henslow's sparrow, red-headed woodpecker, and red-shouldered hawk is found within the study area. Table 1 lists the rare species that may be found in the study area, as well as their status and their breeding potential, based on the OBBA (2008) and observations made by NRSI.

Despite the absence of other determining factors, but based on the observation of a red-shouldered hawk in the study area, and the potential of 4 other rare birds being found there, the Flesherton wind energy site is considered to have very high sensitivity.

The size of the facility is based on the number of turbines. Given that only 5 turbines are proposed, the size is considered small.

Table 1. Significant Species That may be Found in the Study Area

Common Name	SRANK	COSEWIC	OMNR	Breeding Evidence
Cerulean Warbler	S3B,SZN	SC	SC	PO
Henslow's Sparrow	S1B,SZN	END	END-R	PR
Red-headed Woodpecker	S3B,SZN	SC	SC	PO
Red-shouldered Hawk	S4B,SZN	SC	SC	PO

Legend:

Provincial Rank (SRANK)	COSEWIC	OMNR
S1 Critically imperiled	END Endangered	END-R Endangered-Regulated
S2 Imperiled	THR Threatened	END Endangered
S3 Vulnerable	SC Special Concern	THR Threatened
S4 Apparently secure	NAR Not at Risk	VUL Vulnerable
S5 Secure		SC Special Concern
SZN Non-breeding migrants/vagrants		NAR Not at Risk
B Breeding		
<i>Breeding Evidence:</i> PO Possible breeder PR Probable breeder		

Level of concern for the wind farm facility is determined from the matrix in Table 2, which is based on Environment Canada and the Canadian Wildlife Service (2007b). Because the site sensitivity is very high and the facility size is small, the level of concern is listed as Category 4. Category 4 carries a relatively high level of potential risk to birds and requires the highest level of effort for the environmental assessment. However, NRSI has observed no evidence that suggests that the Flesherton Wind Energy project would significantly impact the rare species or their potential habitat. In the 3 years of monitoring for the Flesherton Wind Energy Project, only a single rare bird was observed (red-shouldered hawk)¹. It is anticipated that the Flesherton Wind Energy Project will not have a significant affect on rare species.

¹ A great egret (*Casmerodius albus*), which is considered imperiled in Ontario as a breeding species (S3B) (NHIC 2008), was noted flying over an old breeding bird station (BMB-010) on June 27, 2006. This station is located 4km south of the current study area boundary. The egret was not exhibiting any breeding evidence, and was likely flying to the shores of Georgian Bay. It is therefore not considered significant for the study.

Table 2. Level of Concern Matrix

Facility Size	Site Sensitivity			
	Very High	High	Medium	Low
Very Large	Category 4	Category 4	Category 3	Category 2
Large	Category 4	Category 3	Category 2	Category 2
Medium	Category 4	Category 3	Category 2	Category 1
Small	Category 4	Category 2	Category 1	Category 1

4.0 Study Methodology

4.1 Daytime Bird Behaviour Monitoring

Station Selection

Five daytime bird behaviour monitoring stations have been set up over the years, based on the varying study area boundary. Daytime bird behaviour stations are denoted as hawk (HWK) stations, as raptors are the focus of this survey. HWK stations 1 and 2 were monitored in 2006; stations 1, 2, and 3 were monitored in 2007; and stations 4 and 5 were monitored in 2008. Only HWK stations 4 and 5 are located within the current study area boundary, so only results from these two stations were used for analysis. The location of HWK stations 4 and 5 can be seen on Figure 2. The 2 daytime bird behaviour stations were established towards the eastern and western ends of the study area to determine how birds, especially raptors and other soaring birds use the area. The stations were set up in open areas that provided good vantage points of the surrounding countryside. This was done in correlation with Environment Canada and the Canadian Wildlife Service's recommended protocol (2007a).

Monitoring Period

Daytime bird behaviour monitoring was conducted on June 24 and July 3, 2008. The times these stations were monitored are listed in Table 3. All birds seen were recorded. Each station was monitored for species, numbers, behaviour, flight height and flight direction. A copy of the field monitoring form is appended to this report (see Appendix I).

Table 3. Daytime Bird Behaviour Monitoring Times

<i>Station</i>	<i>Date</i>	<i>Time and Duration</i>
HWK-004	June 24, 2008	0900-1445hrs (5 h 45 m)
HWK-004	July 3, 2008	1040-1415hrs (3 h 35 m)
HWK-005	June 24, 2008	0900-1500hrs (6 h)
HWK-005	July 3, 2008	1030-1430hrs (4 h)

Figure 2. Bird Monitoring Stations

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The daytime bird behaviour data was analyzed in part by calculating the utilization rate. Kingsley and Whittam (2001) recommend calculating the utilization rate by plot and height zone. There was no limit on the distance at which birds observed during daytime bird behaviour monitoring could be recorded. In order to calculate utilization rate per hectare, the area was derived using the maximum observed distance.

4.2 Breeding Bird Monitoring

Station Selection

Forty-seven breeding bird monitoring stations have been set up over the years, based on the varying study area boundary. Breeding bird monitoring stations are denoted as BMB. BMB stations 1 through 12 were monitored in 2006; stations 13 through 35 were monitored in 2007; and stations 36 through 47 were monitored in 2008. Only those stations that are within the current study area boundary were used for analysis; these are BMB stations 20, 21, and 36 through 47. The location of these breeding bird stations can be seen on Figure 2. The station locations were set up based on the criteria set out in the *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (Environment Canada and Canadian Wildlife Service 2007a). As the study area is small, 14 breeding bird stations were set up within the study area to represent the different types of habitat, and also give a fairly even representation of the study area as a whole.

Monitoring Period

Breeding bird monitoring took place on the dates listed in Table 4. These dates are within the peak period for assessing breeding birds in this portion of Ontario. During the surveys, the activities of bird species observed was documented using the standard breeding bird monitoring methodology described below, and the highest breeding evidence observed during the field visit was recorded.

Table 4. Breeding Bird Monitoring Dates

<i>Station</i>	<i>Date</i>
BMB-020; BMB-021	June 8, 2007; June 26, 2007
BMB-036 through BMB-047	June 20, 2008; July 3, 2008

Point counts were performed based on Environment Canada and Canadian Wildlife Service guidelines (2007a) and the Ontario Breeding Bird Atlas (2001). Bird species, breeding evidence, number of individuals, and approximate distance observed were recorded. Stations were monitored during early morning hours, from half an hour before sunrise to 1000hrs. Each station was monitored for 10 minutes. The data was then analyzed to determine the relative abundance of species within the study area. Although all birds were recorded, only those observed within 100m were used in the analysis. A copy of the field monitoring form is appended to this report (see Appendix I).

5.0 Results

5.1 Daytime Bird Behaviour

Because of the time of year that the daytime bird behaviour surveys were done, all birds recorded are potential local breeders. Weather during the surveys was good, with temperatures approximately 15°C on both occasions. Cloud cover was 60% on June 24, 2008 and almost at 100% on July 3, 2008. There was no precipitation and wind was recorded as a 3 (gentle breeze) on the Beaufort Wind Scale, coming from the north or northwest on both monitoring dates.

In total, 468 individual birds, consisting of 34 different species (in addition to an unidentified gull species) were recorded at the 2 daytime bird behaviour stations in 2008. Five of these species were raptors, including 51 turkey vultures (*Cathartes aura*), 7 red-tailed hawks (*Buteo jamaicensis*), 4 American kestrels (*Falco sparverius*), 1 red-shouldered hawk, and 1 northern goshawk (*Accipiter gentilis*). This is illustrated graphically in Figure 3, giving percentages.

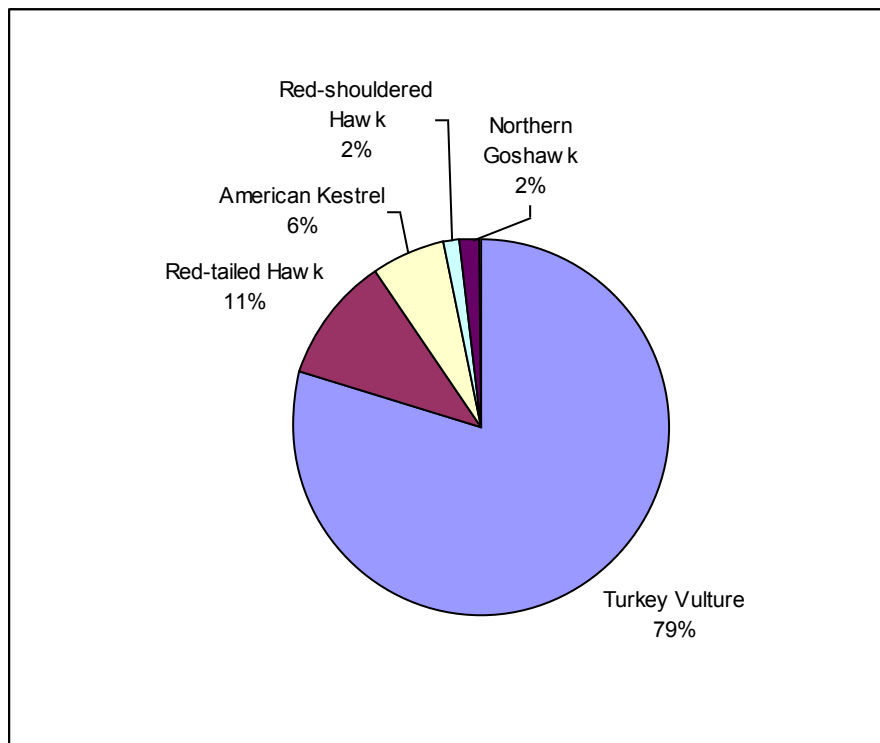


Figure 3. Raptors Recorded From Daytime Bird Behaviour Monitoring

The most common species by station are shown in Figures 4 and 5. The most common species was red-winged blackbird at HWK station 4, and European starling at HWK station 5. Both were followed by turkey vultures in abundance. Bird species by group were much more similar between stations. The vast majority of birds recorded were landbirds, followed by raptors, and then waterbirds. No waterfowl, shorebirds, or owls were recorded from the daytime bird behaviour stations. Bird groups are shown graphically on Figure 6.

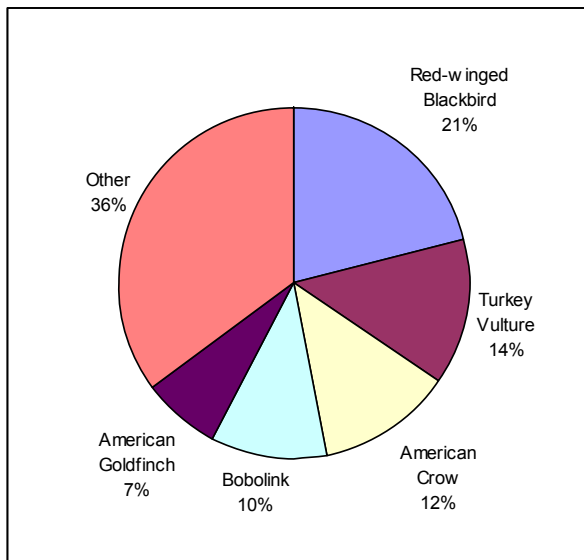


Figure 4. Most Common Species Recorded From Station HWK-004

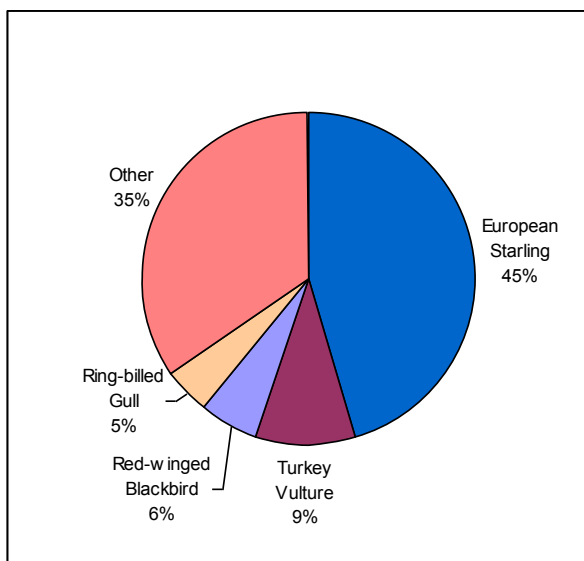


Figure 5. Most Common Species Recorded From Station HWK-005

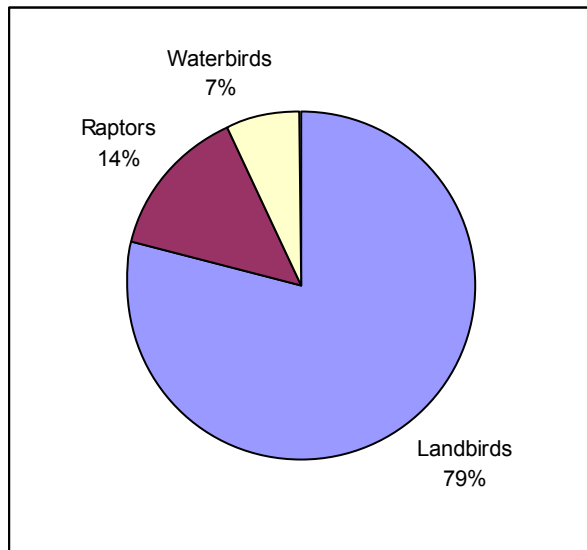


Figure 6. Bird Groups Recorded From Daytime Bird Behaviour Monitoring Studies

The height at which birds were flying was estimated based on the relationship to a wind turbine. Height Zone A is within the turbine’s blade sphere (40-120m), Height Zone B is close to the blades (20-39m and 121-140m), Height Zone C is well below the blade sphere (less than 20m), and Height Zone D is well above the blade sphere (more than 140m). Figure 7 shows the percentage of birds that were flying within each height zone for both daytime bird behaviour monitoring stations combined, as individually the stations were extremely similar. The vast majority (3/4) of birds were recorded from well below the blade sphere. Many of these birds were perched, foraging, or simply flying at low altitudes. Twenty-one percent of the birds were recorded from within the blade sphere or close to it (Height Zones A and B). Few birds were recorded from well above turbine height. All of the birds in the latter category were raptors and gulls. Of the 42 birds that were recorded from Height Zone A (flying within the blade sphere), 32 (76%) were raptors. The other species included American goldfinch (*Carduelis tristis*), red-winged blackbird (*Agelaius phoeniceus*), and gulls.

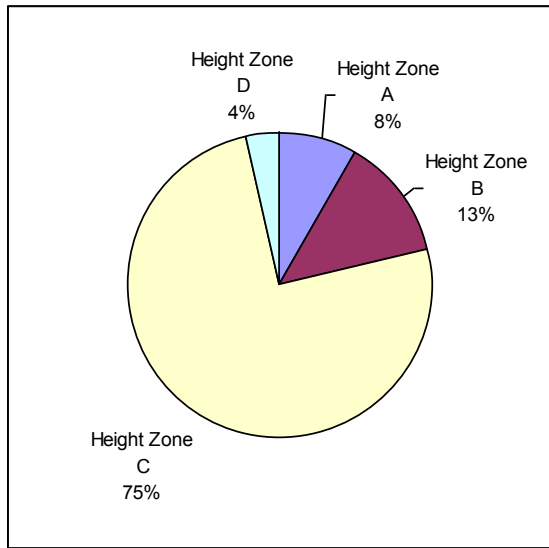


Figure 7. Percentage of Birds Flying in Each Height Zone

The utilization rate (birds/ha/min) was calculated for time of day and height zone. Figures 8 and 9 show the results. The graphs show large differences by plot. At HWK station 4, the majority of birds were seen in the early afternoon rather than the late morning, which is the opposite case at HWK station 5. In fact, many more birds were seen at HWK station 5 from 1100hrs to noon than at any other time or station (utilization rate of 0.0106 birds/ha/min compared to the next highest utilization rate of 0.0047 birds/ha/min at HWK station 4 from noon until 1300hrs). In total, almost twice as many birds were seen at HWK station 5 than at HWK station 4, due to several large flocks of European starling (*Sturnus vulgaris*) being recorded there on July 3, 2008. The graphs also show the relative abundance of birds in each height zone (many more birds noted from Height Zone C, well below the blade sphere, than from any other height zone). At both stations there are more birds flying in Height Zone D (well above the blade sphere) from 1300 to 1400hrs than earlier in the day, which is characteristic as the air is warmer then and thermals more pronounced, which raptors use to soar.

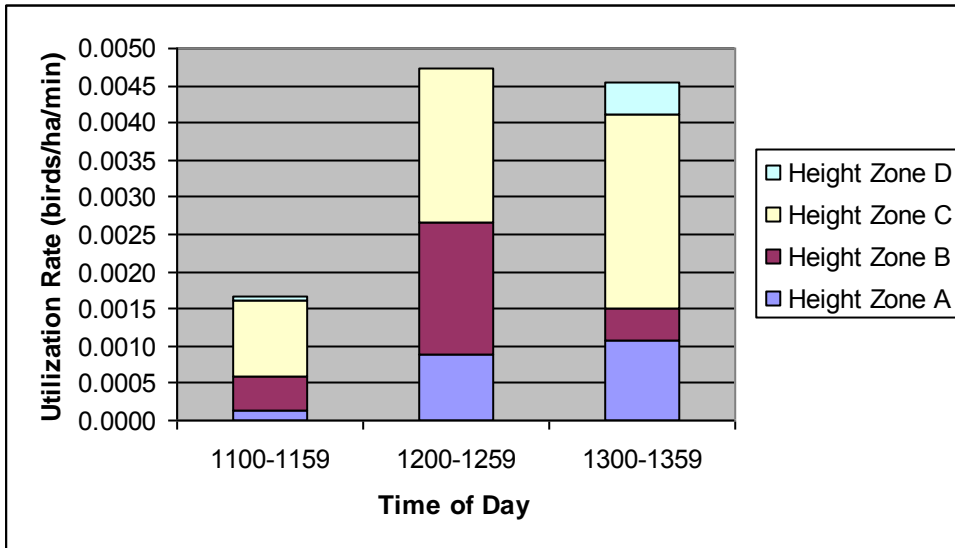


Figure 8. Utilization Rate by Time of Day and Height Zone for Station HWK-004

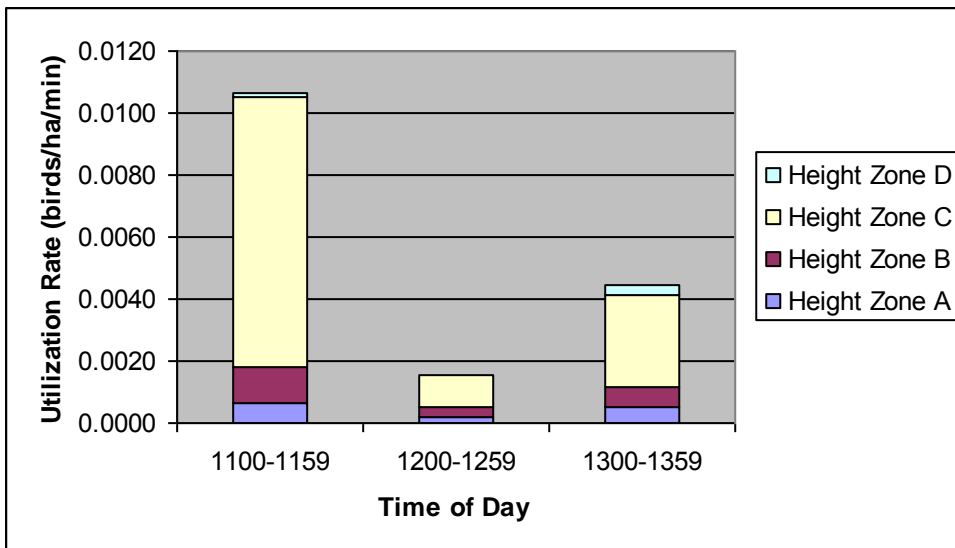


Figure 9. Utilization Rate by Time of Day and Height Zone for Station HWK-005

A complete list of all the birds recorded from the study area can be seen in Appendix II.

5.2 Breeding Bird Surveys

Birds observed more than 100m away from the monitoring station have been included in the incidental observations in Appendix II, but are excluded from the analysis below.

Appendix II also lists the birds reported from the first and second Ontario Breeding Bird Atlases (OBBA) from the square that covers the study area (17NK40). In total, 102 species were recorded from the second OBBA, which ran from 2001 to 2005.

Seventeen of these species were confirmed breeders, 29 were probable, 55 possible, and one was observed showing no signs of breeding evidence.

During NRSI's breeding bird surveys, 452 individuals, representing 42 bird species, were observed. The 5 most common species made up almost 50% of the birds noted. The most common species was red-winged blackbird, followed by song sparrow (*Melospiza melodia*), Canada goose (*Branta canadensis*), and bobolink (*Dolichonyx oryzivorus*) (see Figure 10). Most birds were observed as individuals or in small groups. However, groups of more than 10 individuals were observed on several occasions. Two flocks of Canada geese, with 24 and 22 individuals were observed, along with a flock of 30 European starlings, 12 red-winged blackbirds and 2 flocks of song sparrows with 12 and 15 birds each. The stations and dates that these flocks were seen on are listed in Table 5.

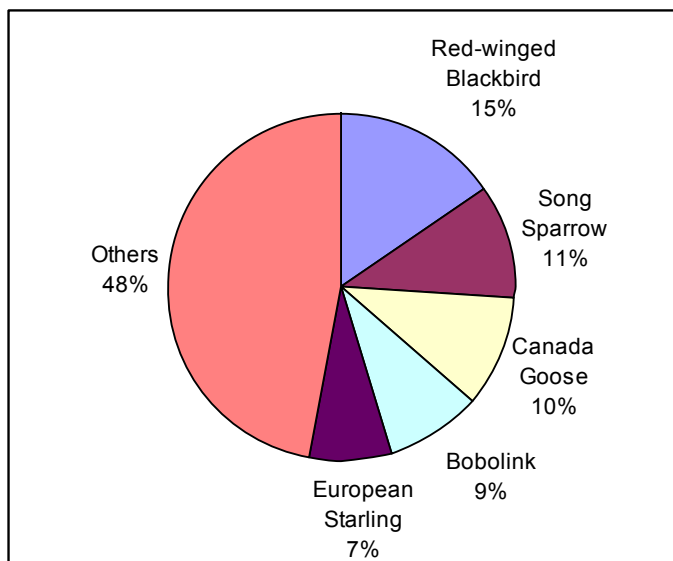


Figure 10. Most Common Species Recorded During Breeding Bird Monitoring

Table 5. List of Bird Flocks Recorded During Breeding Bird Monitoring

Species	# of birds	BMB Station #	Date
Canada Goose	24	44	June 20, 2008
Canada Goose	22	46	June 20, 2008
European Starling	30	46	July 3, 2008
Red-winged Blackbird	12	38	July 3, 2008
Song Sparrow	15	21	June 8, 2007
Song Sparrow	12	38	July 3, 2008

The vast majority of birds recorded were landbirds. Waterbirds, waterfowl, and raptors made up only 14% of the birds seen. Bird groups are shown graphically on Figure 11. No shorebirds or owls were noted.

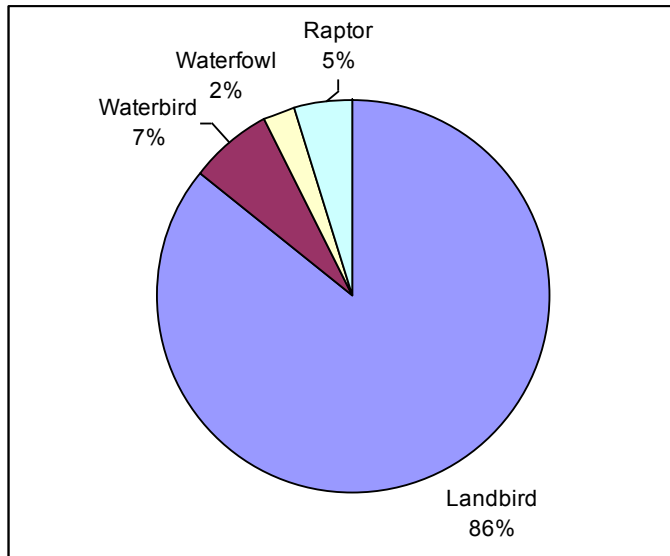


Figure 11. Bird Groups Recorded From Breeding Bird Monitoring

Breeding evidence for all birds seen was recorded as confirmed, probable, possible, or observed (showing no signs of breeding evidence). This is illustrated in Figure 12. Most birds, 79%, showed some sign of breeding evidence. A complete list of the highest breeding evidence observed during the breeding bird surveys can be found in Appendix II.

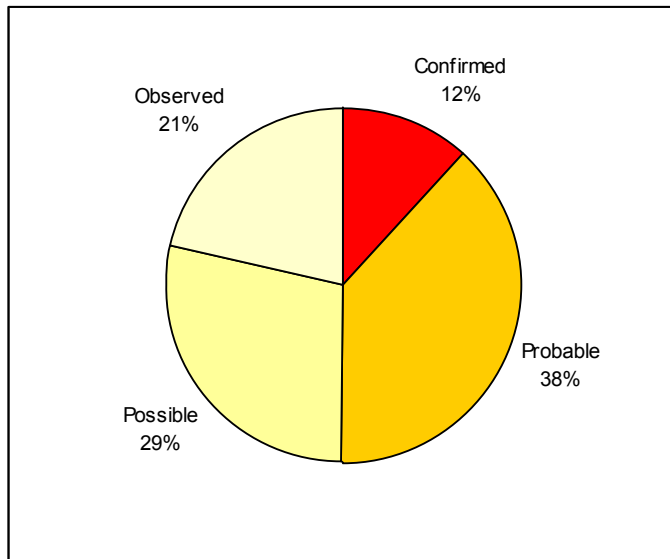


Figure 12. Breeding Evidence Recorded During Breeding Bird Monitoring

The habitat type found at each breeding bird monitoring station is listed in Table 6. The number of bird species and individuals found at each station are listed. The utilization rate was also calculated for each station. The highest utilization rate of 1.15 birds/ha/min was found at BMB station 46 (also see Figure 13). The lowest utilization rate was found at BMB station 37 (0.06 birds/ha/min).

Table 6. Breeding Bird Counts per Station

BMB Station #	Habitat Type	Total # of Birds	Total Number of Species	Utilization Rate (birds/ha/min)
020	Forest	23	11	0.37
021	Agricultural field	44	13	0.70
036	Pasture	24	15	0.38
037	Forest	4	4	0.06
038	Pond in poplar stand	51	9	0.81
039	Agricultural field	41	12	0.65
040	Agricultural field	25	11	0.40
041	Wetland in forest	21	15	0.33
042	Forest	19	9	0.30
043	Agricultural field	26	14	0.41
044	Pasture	53	14	0.84
045	Forest	19	13	0.30
046	Road / Agricultural field / pond	72	13	1.15
047	Road / Agricultural field	30	10	0.48

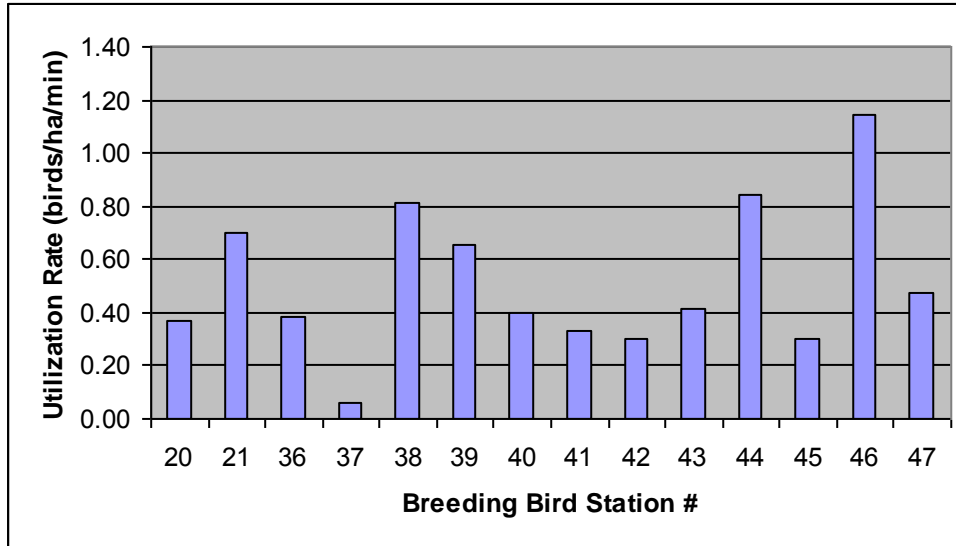


Figure 13. Utilization Rate by Station

The stations were divided by habitat type (agriculture, forest, wetland) and the utilization rate by habitat type was calculated. The highest utilization rate was seen at stations within the agricultural fields (which included pasture and roadside stations), with a rate of 0.63 birds/ha/min. The forested stations (which included BMB station 38 within the small poplar stand) had a utilization rate of 0.37 birds/ha/min. The single wetland station had a rate of 0.33 birds/ha/min.

6.0 Bird Groups

6.1.1 Landbirds

Landbirds are songbirds (passerines and close relatives), whose life cycle is largely terrestrial. Landbirds often include raptors and grouse (Heagy and McCracken 2004), but diurnal raptors (hawks, eagles, falcons) and owls are dealt with separately in this report (see Sections 6.1.5 and 6.1.6), based on the *Background Review for Environmental Assessments* (Kingsley and Whittam 2005). Landbirds include the greatest number of species compared to any other bird group; half the birds that regularly occur in Ontario are classified as landbirds (Heagy and McCracken 2004).

Table 7 lists all landbirds known from the study area and vicinity, as recorded by NRSI and documented in the second OBBA. Landbirds were consistently the most common bird group noted during the study.

Table 7. Landbirds Known From the Study Area and Vicinity

Common Name	Breeding Bird	Bird Behaviour	Incidental Observations
Alder Flycatcher	*		
American Crow	✓*	✓	✓
American Goldfinch	✓*	✓	✓
American Redstart	*		✓
American Robin	✓*	✓	✓
Baltimore Oriole	✓*	✓	✓
Bank Swallow	*		
Barn Swallow	✓*	✓	
Belted Kingfisher	*		
Black-and-white Warbler	*		
Black-billed Cuckoo		✓	
Blackburnian Warbler	*		
Black-capped Chickadee	✓*	✓	✓
Black-throated Blue Warbler	*		
Black-throated Green Warbler	*		
Blue Jay	✓*	✓	
Blue-headed Vireo	*		
Bobolink	✓*	✓	✓
Brown Thrasher	✓*		
Brown-headed Cowbird	✓*	✓	
Cedar Waxwing	✓*	✓	
Chestnut-sided Warbler	✓*		
Chipping Sparrow	✓*		✓

Common Name	Breeding Bird	Bird Behaviour	Incidental Observations
Cliff Swallow	✓		
Common Grackle	✓*	✓	
Common Raven	*	✓	
Common Yellowthroat	*		
Downy Woodpecker	✓*		
Eastern Bluebird	*		
Eastern Kingbird	✓*		
Eastern Meadowlark	✓*	✓	✓
Eastern Phoebe	*		
Eastern Towhee	*	✓	
Eastern Wood-pewee	✓*		✓
European Starling	✓*	✓	
Field Sparrow	✓*		✓
Grasshopper Sparrow	*		
Gray Catbird	✓*		✓
Great Crested Flycatcher	*	✓	
Hairy Woodpecker	✓*		✓
Horned Lark	*		
House Sparrow	*		
House Wren	✓*	✓	✓
Indigo Bunting	*		✓
Least Flycatcher	✓*		
Magnolia Warbler	✓*		
Mourning Dove	*	✓	
Mourning Warbler	✓		✓
Nashville Warbler	*		
Northern Cardinal	*		
Northern Flicker	*	✓	✓
Northern Rough-winged Swallow	*		
Northern Waterthrush	*		
Ovenbird	✓*		✓
Pileated Woodpecker	*		✓
Purple Finch	*		
Red-bellied Woodpecker	*		
Red-breasted Nuthatch	*		
Red-eyed Vireo	✓*	✓	✓
Red-winged Blackbird	✓*	✓	✓
Rock Pigeon	*		
Rose-breasted Grosbeak	✓*		✓
Ruby-throated Hummingbird	*		
Ruffed Grouse	✓*		✓
Savannah Sparrow	✓*	✓	✓
Scarlet Tanager	*		
Song Sparrow	✓*	✓	✓
Swamp Sparrow	*		
Tree Swallow	✓*	✓	

Common Name	Breeding Bird	Bird Behaviour	Incidental Observations
Veery	*		
Vesper Sparrow	*		
Warbling Vireo	✓*	✓	
White-breasted Nuthatch	*		
White-throated Sparrow	*		
Wild Turkey	*		
Winter Wren	*		
Wood Thrush	*		
Yellow Warbler	*		✓
Yellow-bellied Sapsucker	✓*		
Yellow-rumped Warbler	*		
Yellow-throated Vireo	*		

* Reported from the second OBBA; birds from the first OBBA are not included.
Sources: OBBA 2008 and NRSI field work

Daytime Bird Behaviour

A total of 324 individual landbirds, consisting of 24 species were observed during the daytime bird behaviour monitoring period. European starling was observed to be the most abundant species, accounting for almost 43% of all landbird observations. Red-winged blackbird was the next most common species, representing 15% of all landbird observations.

93.5% of all landbird observations were observed in Height Zone C (0-19m), which is well below the blade sphere. Only 3 individual landbirds (2 American goldfinches and 1 red-winged blackbird) were noted to be flying in Height Zone A (40-119m), which is within the risk zone of the blade sphere.

Breeding Birds

A total of 381 individual landbirds, consisting of 42 species were observed during the monitoring period. Red-winged blackbird was the most abundant species, accounting for 18.4% of all landbird observations. Song sparrow was the next most common species, representing 12.6% of all landbird observations made during breeding bird monitoring.

6.1.2 Waterfowl

Ducks, geese and swans are collectively known as waterfowl. All the waterfowl known from the study area and vicinity are listed in Table 8. Only Canada goose and mallard (*Anas platyrhynchos*) were recorded by NRSI biologists. Two flocks of Canada geese were recorded on June 20, 2008 during the breeding bird monitoring. Mallards were recorded incidentally during area surveys.

Table 8. Waterfowl Known From the Study Area and Vicinity

Common Name	Breeding Bird	Bird Behaviour	Incidental Observations
Canada Goose	✓*		
Common Merganser	*		
Hooded Merganser	*		
Mallard	*		✓
Wood Duck	*		
Blue-winged Teal	*		
Black-billed/Yellow-billed Cuckoo	*		

* Reported from the second OBBA; birds from the first OBBA are not included.

Sources: OBBA 2008 and NRSI field work

6.1.3 Waterbirds

Waterbirds are those species that are typical of water habitats such as lakes, rivers and wetlands, but do not include waterfowl or shorebirds. Some are colonial, meaning they nest in colonies, while other waterbirds nest singly. Table 9 lists which species are colonial, of those known from the study area and vicinity. Colonial waterbirds are frequently quite numerous. Since each colony may represent a significant portion of a species' population, they are vulnerable to events that take place at or near their nesting areas. Also, flights to and from colonies often follow traditional routes at low altitudes. Non-colonial waterbirds are generally less abundant and appear to be in decline in North America as a result of diminishing wetland habitat. For many species, the protection of important terrestrial habitats and adjacent feeding areas is essential for their survival (Milko et al. 2003).

Table 9. Waterbirds Known From the Study Area and Vicinity

Common Name	Breeding Bird	Bird Behaviour	Incidental Observations
American Bittern (c)	*		
Black Tern (c)			
Common Loon	*		✓
Common Moorhen			
Double-crested Cormorant (c)	*		
Great Blue Heron (c)	✓*	✓	✓
Green Heron (c)	✓*		
Herring Gull (c)	*		
Least Bittern			
Pied-billed Grebe	*		
Ring-billed Gull (c)	✓	✓	✓
Virginia Rail	*		

* Reported from the second OBBA; birds from the first OBBA are not included.

(c) colonial nester

Sources: OBBA 2008 and NRSI field work

Daytime Bird Behaviour

A total of 17 individual waterbirds, consisting of great-blue heron (*Ardea herodias*), ring-billed gull (*Larus delawarensis*), and gull species were observed from daytime bird behaviour monitoring. Gulls were the most abundant, making up 94% of all waterbird sightings.

Most of the waterbirds (47%) recorded were flying in Height Zone B (20-39m and 121-140m), which is close to the blade sphere. 18% were flying within Height Zone A (40-119m), which is within the risk zone of the blade sphere. The remaining 35% were flying at heights well removed from the theoretical blade sphere.

Breeding Birds

A total of 20 individual landbirds, consisting of 3 species were observed during the monitoring period. Again, ring-billed gulls were the most common, making up 90% of all waterbirds recorded. Great blue heron and green heron (*Butorides virescens*) were also seen.

Common loon (*Gavia immer*) was recorded flying outside of a breeding bird plot in 2007.

6.1.4 Shorebirds

NRSI did not record any shorebirds within the study area. Three shorebirds are known from the vicinity of the study area, as they were documented in the second OBBA (2008) (see Table 10). On June 13, 2006 and June 11, 2007, NRSI biologists did observe an upland sandpiper (*Bartramia longicauda*) at HWK station 1, which is located approximately 1.7km east of the current study area boundary. Upland sandpiper was only recorded in the first OBBA (2008).

Table 10. Shorebirds Known From the Study Area and Vicinity

Common Name	Breeding Bird	Bird Behaviour	Incidental Observations
Killdeer	*		
Spotted Sandpiper	*		
Wilson's Snipe	*		

* Reported from the second OBBA; birds from the first OBBA are not included.
Sources: OBBA 2008 and NRSI field work

6.1.5 Raptors

Eagles, hawks, osprey, accipiters, and falcons are all birds of prey, collectively known as raptors. Turkey vultures, although not raptors, are also included in this bird group, as they have soaring flight characteristics similar to raptors (Kingsley and Whittam 2005). Though owls are raptors, they are discussed separately in the next section (Section 6.1.6). Table 11 lists all the raptor species known from the Flesherton study area and vicinity.

Table 11. Raptors Known From the Study Area and Vicinity

Common Name	Breeding Bird	Bird Behaviour	Incidental Observations
Northern Goshawk	✓	✓	
Osprey	*		
Red-shouldered Hawk		✓	
Turkey Vulture	✓*	✓	✓
American Kestrel	✓*	✓	
Red-tailed Hawk	✓*	✓	✓
Northern Harrier	*		

* Reported from the second OBBA; birds from the first OBBA are not included.
Sources: OBBA 2008 and NRSI field work

Daytime Bird Behaviour

A total of 64 raptors were seen during daytime bird behaviour monitoring surveys. This includes all raptors seen outside the 100m standard plot radius, as raptors can generally be seen and identified at much greater distances. The most common species was turkey vulture, making up 80% of all raptor sightings. Red-tailed hawks were next, with 11%.

Most of the raptors (45%) recorded were flying in Height Zone A (40-119m), which is within the blade sphere. 28% were flying within Height Zone B (20-39m and 121-140m), which is close to the blade sphere. 22% were recorded flying far above the blade sphere (Height Zone D – higher than 140m), and only 5% were recorded flying near the ground (Height Zone C – below 19m).

Breeding Birds

Only one raptor species was recorded during breeding bird surveys. In total, 4 turkey vultures were recorded from 2 breeding bird stations (BMB station 43 and 47).

6.1.6 Owls

No owls were recorded from within the study area by NRSI biologists. The only owl species known from the area is eastern screech-owl (*Otus asio*), documented in the second breeding bird atlas as a possible breeder (OBBA 2008). Great-horned owl (*Bubo virginianus*) was recorded from the first OBBA, but not since.

7.0 Significant Bird Areas and Species

7.1 Significant Bird Areas

There are no Important Bird Areas in the vicinity of the study area (IBA Canada 2004).

Eugenia Lake, a large inland lake created by a hydroelectric dam, is located 250m to the east of the study area boundary. This lake and associated marshes provides habitat for waterfowl, waterbirds, and shorebirds. Few of these types of birds were observed in the study area, however, and no major flyways over the study area were documented.

7.2 Significant Species

The significant species known from the study area and vicinity area listed in Table 12. Three of the species (least bittern, *Ixobrychus exilis*; black tern, *Chlidonias niger*, red-headed woodpecker) are documented only in the first breeding bird atlas, but were not recorded in the second one, despite significant efforts. It is therefore highly unlikely that these species will be found in the area. Least bittern and black tern are not found in any of the adjoining OBBA squares either. Red-headed woodpecker, however, was documented as a possible breeder in the second OBBA from the square to the east of the square covering the study area (OBBA 2008). Cerulean warbler and Henslow's sparrow have ranges that cover the study area according to the Species at Risk website (Environment Canada 2008). These species were not recorded by NRSI or the OBBA, though they are both documented from adjoining OBBA squares in the second breeding bird atlas (OBBA 2008). Cerulean warbler was documented as a possible breeder, Henslow's sparrow as a probable breeder (OBBA 2008).

Table 12. Significant Species Known From the Study Area and Vicinity

Common Name	SRANK	COSEWIC	OMNR	Known From
Black Tern	S3B,SZN	NAR	SC	OBBA 1
Cerulean Warbler	S3B,SZN	SC	SC	SAR
Henslow's Sparrow	S1B,SZN	END	END-R	SAR
Least Bittern	S3B,SZN	THR	THR	OBBA 1
Red-headed Woodpecker	S3B,SZN	SC	SC	OBBA 1
Red-shouldered Hawk	S4B,SZN	SC	SC	NRSI

Legend:

OBBA 1 – first Ontario Breeding Bird Atlas (1981-1985)

SAR – Species at Risk website, Environment Canada 2008
(http://www.sis.ec.gc.ca/ec_species/ec_species_e.phtml)

<i>Provincial Rank (SRANK)</i>	<i>COSEWIC</i>	<i>OMNR</i>
S1 Critically imperiled	END Endangered	END-R Endangered-Regulated
S2 Imperiled	THR Threatened	END Endangered
S3 Vulnerable	SC Special Concern	THR Threatened
S4 Apparently secure	NAR Not at Risk	VUL Vulnerable
S5 Secure		SC Special Concern
SZN Non-breeding migrants/vagrants		NAR Not at Risk
B Breeding		

Red-shouldered hawk is not known from the OBBA, but was seen by NRSI biologists on June 24, 2008 at HWK Station 5, gliding over HWK station 5 in Height Zone D, well above the blade sphere. Red-shouldered hawks inhabit lowland hardwood forests, riparian areas, deciduous swamps and upland deciduous-coniferous forests. Although they prefer extensive woodlands with open subcanopies, they may be found in suburban areas (Dykstra et al. 2008). Suitable habitat for this species is available within the study area.

Habitat preferences are discussed for the 3 other species that are known from adjoining breeding bird atlas squares:

Cerulean Warbler – These warblers prefer large tracts of deciduous forests (both upland and lowland) with open understories, though they also use second-growth forests. Generally cerulean warblers are considered an area sensitive species, but in Ontario they have been documented as breeding in forests as small as 10ha (Hanel 2000).

Habitat for cerulean warbler is found in the forests, predominately to the north of the study area.

Henslow's sparrow – Habitat consists of tall dense grasses with a well developed litter layer, standing dead vegetation, and very little to no woody species. As the native habitats of Henslow's sparrow have diminished, they have also made use of cultivated hayfields (Herkert et al. 2002). Habitat for Henslow's sparrow is available in the form of such hayfields within the study area.

Red-headed woodpecker – This species is found in a large variety of wooded and open habitats. It is found in pasture areas dispersed large deciduous trees or groves of trees, as well as in isolated woodlots (Smith et al. 2000). Habitat for red-headed woodpecker is found within the study area.

7.3 Aerial Flight Displays

Bobolink perform aerial flight displays that may put them at risk of collision with turbine blades. Although other species do this as well, they were not noted by NRSI in the study area. Bobolink males perform song flights which reach 2-40m in height (Martin and Gavin 1995). Generally bobolinks remain below the height of the turbine blades. Their flight-song displays are given frequently during the breeding season, especially early on, with song flights lasting up to one minute in length (Martin and Gavin 1995). Bobolinks were one of the most common species recorded from both the breeding bird surveys and the daytime bird behaviour surveys, being the fourth and third most common species, respectively. Bobolink was recorded by NRSI as a confirmed breeder. It was seen performing its flight display on several occasions.

No studies have been undertaken to determine the impact of turbines on these flight displays.

7.4 Partners in Flight Priority Species

Ontario Partners in Flight (2006) have used a variety of behavioural characteristics and population tendencies of bird species in Ontario to establish conservation objectives for the species most at risk of declining populations. Twenty-one of the 42 birds identified as being priority land bird species within the region have been observed and documented within the Flesherton study area. Table 13 lists the Partners in Flight priority species known from the study area. The table also lists whether NRSI noted the bird during field studies, and from which OBBA the species is known.

Table 13. Partners in Flight Priority Species Known From the Study Area and Vicinity

Species	Habitat Guild	Overall Objective	NRSI	OBBA
American Kestrel	Grassland & Agriculture	Halt Decline	✓	1,2
Baltimore Oriole	Other	Reverse Decline	✓	1,2
Bank Swallow	Other & Aerial Insectivore Suite	Reverse Decline		1,2
Belted Kingfisher	Other	Reverse Decline		1,2
Black-billed Cuckoo	Shrub/Successional and Forest	Reverse Decline	✓	1
Bobolink	Grassland & Agriculture	Halt Decline	✓	1,2
Brown Thrasher	Shrub/Successional	Reverse Decline		1,2
Eastern Kingbird	Grassland & Agriculture	Halt Decline		1,2
Eastern Meadowlark	Grassland & Agriculture	Halt Decline	✓	1,2
Eastern Towhee	Shrub/Successional	Reverse Decline	✓	1,2
Eastern Wood-pewee	Forest	Reverse Decline	✓	1,2
Field Sparrow	Shrub/Successional	Reverse Decline	✓	1,2
Grasshopper Sparrow	Grassland & Agriculture	Halt Decline		2
Northern Flicker	Forest	Reverse Decline	✓	1,2
Northern Harrier	Grassland & Agriculture	Maintain Current		1,2
Red-headed Woodpecker	Forest	Reverse Decline		1
Red-shouldered Hawk	Forest	Maintain Current	✓	
Rose-breasted Grosbeak	Forest	Maintain Current	✓	1,2
Savannah Sparrow	Grassland & Agriculture	Halt Decline	✓	1,2
Vesper Sparrow	Grassland & Agriculture	Halt Decline		1,2
Wood Thrush	Forest	Maintain Current		1,2

8.0 Summary

During the monitoring study, NRSI biologists conducted daytime bird behaviour and breeding bird surveys to characterize different aspects of bird behaviour and movement within the study area. This report provides a summary of the baseline bird monitoring that was conducted for the Flesherton Wind Energy Project.

Daytime Bird Behaviour Monitoring

Bird behaviour monitoring took place on June 24 and July 3, 2008 at 2 monitoring stations. A total of 468 individuals consisting of 34 species were observed. The majority of these observations were individuals or small flocks. Landbirds accounted for almost 80% of all observations. The majority of bird observations were noted to be in the 0-39m height category, which is below the blade sphere (Height Zone C).

Most of the birds noted in the study area were residents on breeding territory. They were observed foraging or flying between habitat patches. No significant bird movement patterns were observed.

Relatively low numbers of raptors were observed during the monitoring period. A total of 64 individuals, consisting of 5 species were observed. The majority of raptors observed during the bird behaviour monitoring period were recorded within 40-119m, which is within the risk zone of the blade sphere (Height Zone A). No large concentrations of raptors were observed within the Flesherton study area and it is therefore not anticipated that the proposed Flesherton Wind Energy Project will have a significant impact on raptors and their populations.

Breeding Bird Monitoring

Breeding bird surveys were conducted in June and early July of 2007 and 2008. Over the course of the breeding bird surveys, a total of 452 individual birds, representing 42 species were observed by NRSI. The most abundant species observed was red-winged blackbird, representing 15% of all individuals observed. Landbirds represented 86% of all individuals observed. These observations are expected, given the habitat found within the study area.

Significant Species

A total of 6 provincially and nationally rare species are known from the study area and vicinity. Only one of these, red-shouldered hawk, was observed by NRSI. Suitable habitat is found within the study area for cerulean warbler, Henslow's sparrow, red-headed woodpecker, and red-shouldered hawk, though none of these are known from the OBBA (2008). It is anticipated that the Flesherton Wind Energy Project will not have a significant affect on rare species.

9.0 Conclusions and Recommendations

Background review and results from the bird monitoring program in the study area indicated the Flesherton Wind Energy Project to have a very high site sensitivity, based on the following:

The presence of a bird species listed as “at risk” by the SARA, COSEWIC or provincial/territorial threat ranking, or the presence of the residence(s) of individuals of that species if listed under the SARA, or of its critical habitat. To be of concern, either the bird or its residence or critical habitat must be considered to be potentially affected by this project (Environment Canada 2007b).

Although one rare species was observed in the study area, and a further 3 may be found there, NRSI has observed no evidence that suggests that the Flesherton Wind Energy Project would significantly impact these species or their potential habitat. In the 3 years of monitoring for the Flesherton Wind Energy project, only one rare bird was observed.

The completed monitoring provides a detail characterization of avian resources in the vicinity of the Flesherton project area. This data also provides a baseline characterization against which post-construction monitoring can adequately be compared.

10.0 References

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**Appendix I
Data Forms**

Appendix II
Birds Known From the Study Area and Vicinity
