

# Haldimand County Winter Raptor Inventory



Produced For  
Ontario Barn Owl Recovery Team

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Debbie S. Badzinski



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## HALDIMAND COUNTY WINTER RAPTOR INVENTORY

### INTRODUCTION

Haldimand County is located in the extreme southwestern portion of Ontario and as a result supports a unique assemblage of species. A number of breeding bird species reach the northern extent of their range in this part of the province; and similarly there are also a number of species that reach the northern limit of their wintering range. There are 10 species of diurnal raptors that winter either regularly, or occasionally within southwestern Ontario (Coopers Hawk, Sharp-shinned Hawk, Northern Harrier, Northern Goshawk, Rough-legged Hawk, Red-tailed Hawk, Red-shouldered Hawk, Bald Eagle, American Kestrel, Short-eared Owl). Of these, Northern Harrier, American Kestrel, Rough-legged Hawk, Red-tailed Hawk and Short-eared Owl are open country species that are closely associated with grasslands, whereas the remaining species are found in woodlands.

Grasslands are recognized by many as the most imperiled ecosystem worldwide, and the unique avian assemblages associated with grasslands are also in danger. Grassland bird populations have shown steeper, more consistent, and more geographically widespread declines than any other guild of North American bird species. Although there are very few “natural” grasslands (e.g., tall grass prairie, savannahs, short grass prairie) remaining in southern Ontario, “rough” grasslands (e.g., hayfields, pastures) and various types of agricultural fields potentially may support diverse assemblages of grassland breeding and wintering birds. Because wintering raptors spend 7-8 months in southern Ontario, loss and degradation of overwintering habitat could have a serious impact on these species.



The Barn Owl is considered an indicator species for healthy, productive grassland habitat (ref). However, because the Barn Owl is extremely rare in Ontario, and it is a very difficult species to census, standardized surveys for this species are not feasible. By linking efforts to recover the Barn Owl in Ontario with standardized surveys for other grassland bird species, the Ontario Barn Owl Recovery Team hopes to develop a better picture of the current extent and diversity, and sustainability of grassland habitat in southwestern Ontario. In turn, this will allow more knowledgeable targeting and strategic planning for protecting and conserving existing grassland tracts and restoring others. Potential indicator species include Northern Harrier and Short-eared Owl, both of which



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are declining across their North American ranges and both of which overwinter in large numbers (and occasionally breed) in southern Ontario, which makes them excellent candidates for indicator species surveys.

There has been little research into the effects of different agricultural and grassland habitats on the distribution and ecology of wintering raptors in North America and no research on this topic in Ontario. For this reason, the Ontario Barn Owl Recovery Project in partnership with Bird Studies Canada, the Ontario Ministry of Natural Resources, and Norfolk Field Naturalists conducted a winter raptor inventory in Haldimand County. This study area was selected because data collected during Christmas Bird Counts suggest this area supports high concentrations of wintering grassland dependent raptors. The main objective of the survey was to quantify the abundance and diversity of raptors and to describe the types of agricultural and/or grassland habitats that the various species are using.

## METHODS

The 76,377 ha study area located on the north shore of Lake Erie (42.88°N, 79.92°W) in southern Ontario was bordered by the Grand River to the north, Lake Erie to the south, Port Dover to the west, and Evans Point to the east. The study area was subdivided into seven areas that ranged in size from 3,868 to 17,169 ha in area, and contained approximately 100 kilometres of roads (Figure 1).

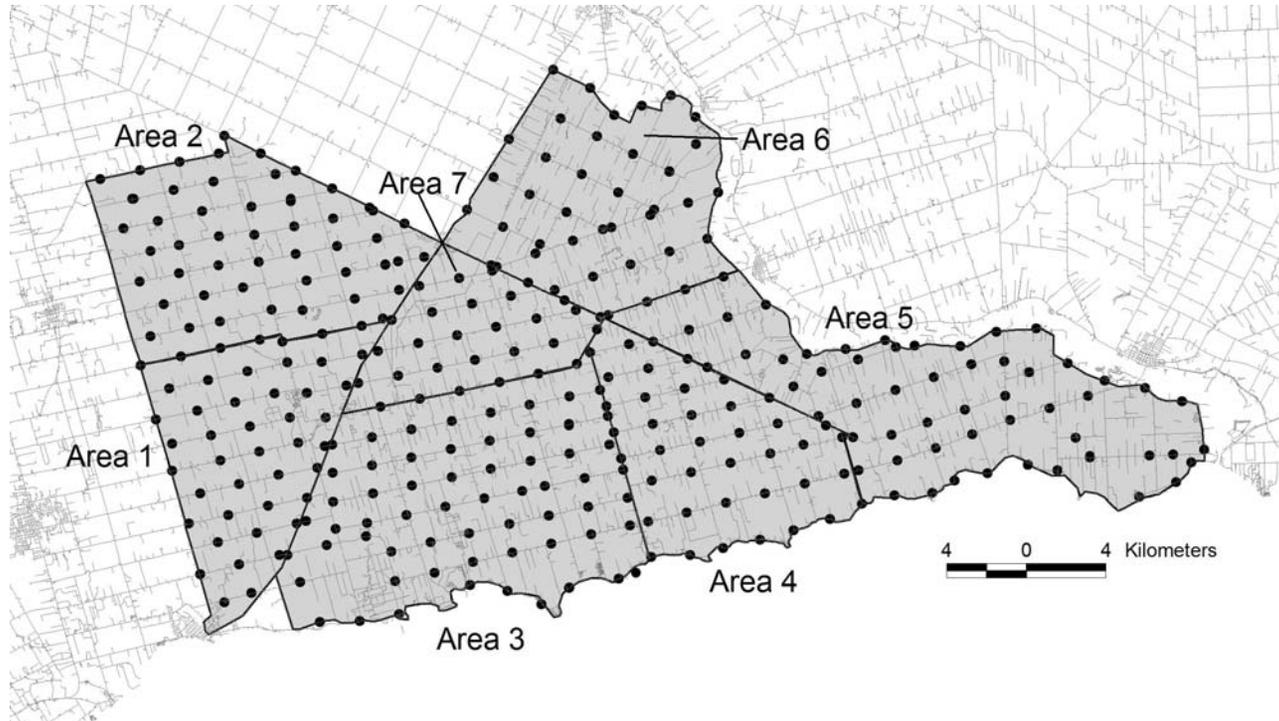
A roadside survey methodology was employed because it is a convenient and efficient method for sampling widely dispersed and highly mobile raptor populations (Bohall and Collopy 1984). All east-west roads in each area were surveyed at a constant speed (50km/hr) and the observer stopped every 2 km for a 3-minute point count. All species seen/heard at the point count were recorded, georeferenced with a GPS unit, and the behaviour of the raptor was noted (i.e, flying, perching, feeding). In addition, all raptor species seen between stops (causal observations) were recorded and georeferenced. Each area was surveyed on four times from 2 January to 7 February 2003. Surveys were conducted in the morning between 8 and 9 am and took approximately 4-6 hours to complete.

To increase to probability of detecting Short-eared Owls, supplemental surveys were conducted at dusk to locate owl roosts. These surveys were less standardized, and did not involve stopping at pre-determined stops. If roosts were located, they were georeferenced, and the number of each owl species was recorded.



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**Figure 1 – Study area boundaries for the Haldimand Winter Raptor Inventory. Dots indicate locations of standardized 3-minute point counts. Each area was surveyed four times between January and February 2003.**



## RESULTS

**Weather conditions.** Weather conditions, particularly snow depth and wind speed have a large impact on the distribution and detectability of raptors in winter (J. Miles, pers. comm.). Mean starting temperature on surveys was  $-7.4^{\circ}\text{C}$  and the range was  $-20^{\circ}\text{C}$  to  $+1^{\circ}\text{C}$ ; mean end temperature was  $-4.6^{\circ}\text{C}$  with a range of  $3^{\circ}\text{C}$  to  $-12^{\circ}\text{C}$ . Wind speed was 2-3 (Beaufort scale) for most surveys but varied from 1 to 5. There was little snow cover during most of the surveys (usually  $<4$  inches, range 0-10 inches) and surveys were typically conducted on days with little or no precipitation.

**Survey timing.** Each area was surveyed four times between 2 January and 12 February 2003. It was sometimes necessary to survey an area on two consecutive days if weather conditions were unfavourable or it was too late in the day to continue the survey. Most surveys started between 7-9 am, but some were surveyed in the afternoon, which may have influenced the number of raptors recorded. Four supplemental owl surveys were conducted at dusk between 3 January and 2 February. A total of 391 kilometres of roads were surveyed for owls.

**Diversity and abundance of raptors.** Nine raptor species were recorded on the winter raptor inventory, however, sample sizes for four of these species (Bald Eagle ( $N=6$ ), Coopers Hawk ( $N=5$ ), Northern Shrike ( $N=12$ ), Sharp-shinned Hawk ( $N=6$ )) were too small for any meaningful analyses. Therefore, this report focuses on the following five raptor species: American Kestrel, Northern Harrier, Rough-legged Hawk, Red-tailed Hawk and Short-eared Owl; Northern Shrike was also included for interest. Red-tailed Hawks were by far, the most common species recorded during the survey; there were 678 Red-tailed Hawk observations (198 during standardized survey, 480 casual observations). American Kestrel was the second most common species with 16 observations from standardized surveys and an additional 79 casual observations. Northern Harrier was the least common of the five species (Table 1). There was large variation in the number of raptors recorded per survey run, which was at least partly due to variable weather conditions (Table 2).

To correct for differences in size among the seven areas, the figures presented below show the mean number of birds recorded per 100 hectares (Figures 2, 3). There was no consistent pattern among the distribution of the various raptor species. Red-tailed Hawks reached their highest densities in area 7 and were least abundant in area 2 (Figure 2). Northern Harriers were most abundant in area 4 and American Kestrels in area 6. Rough-legged Hawks showed similar densities throughout the study area (Figure 3).



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**Table 1 –Total numbers of each of the five raptor species recorded during the Haldimand Winter Raptor Inventory. The study area was divided into seven areas, and data were collected from standardized point counts and casual observations. Numbers are not adjusted for the size of the area surveyed.**

Species	Area 1		Area 2		Area 3		Area 4		Area 5		Area 6		Area 7	
	standard	casual												
<b>Red-tailed Hawk</b>	29	47	15	23	53	97	16	34	33	65	22	188	20	26
<b>American Kestrel</b>	3	12	6	7	4	19	1	10	2	7	7	13	2	10
<b>Northern Harrier</b>	4	3	1	0	6	3	2	13	2	3	1	0	0	1
<b>Rough-legged Hawk</b>	3	4	1	2	4	10	0	6	0	7	2	4	0	3

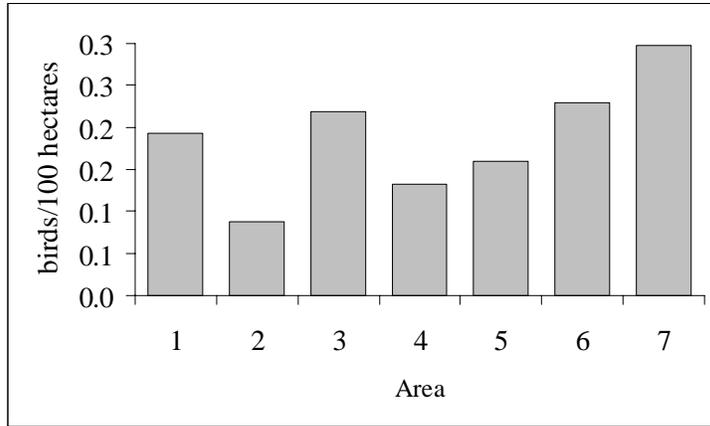
**Table 2 – Mean number of birds ( $\pm$  standard error) recorded during the Haldimand winter raptor survey. The study area was divided into seven areas, and data were collected from standardized point counts and casual observations during four separate survey runs. Numbers are not adjusted for the size of the area surveyed.**

Species	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7
<b>Red-tailed Hawk</b>	19.0 $\pm$ 3.6	9.5 $\pm$ 1.4	37.5 $\pm$ 2.9	12.5 $\pm$ 1.3	24.5 $\pm$ 7.2	22.3 $\pm$ 11.1	11.5 $\pm$ 1.7
<b>American Kestrel</b>	3.75 $\pm$ 1.65	4.0 $\pm$ 0.91	5.75 $\pm$ 1.5	2.75 $\pm$ 1.0	2.25 $\pm$ 0.48	5.0 $\pm$ 2.3	1.5 $\pm$ 0.65
<b>Northern Harrier</b>	1.75 $\pm$ 0.63	0.25 $\pm$ 0.25	2.25 $\pm$ 0.25	3.75 $\pm$ 1.5	1.0 $\pm$ 0.41	0.25 $\pm$ 0.25	0.25 $\pm$ 0.25
<b>Rough-legged Hawk</b>	1.75 $\pm$ 0.85	0.75 $\pm$ 0.48	2.75 $\pm$ 0.75	1.5 $\pm$ 0.5	1.75 $\pm$ 1.44	1.5 $\pm$ 0.87	0.75 $\pm$ 0.5

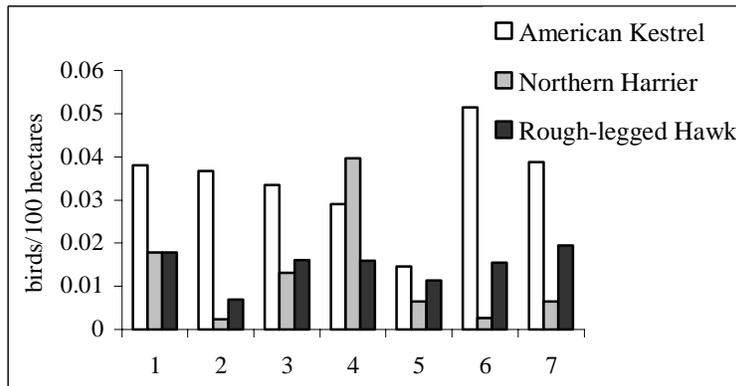


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**Figure 2 – Density of Red-tailed Hawks (mean birds/100 hectares) recorded at each area on the Haldimand County winter raptor inventory.**



**Figure 3 – Density of American Kestrels, Northern Harriers, and Rough-legged Hawks (mean birds/100 hectares) recorded on the 2003 Haldimand County winter raptor inventory.**



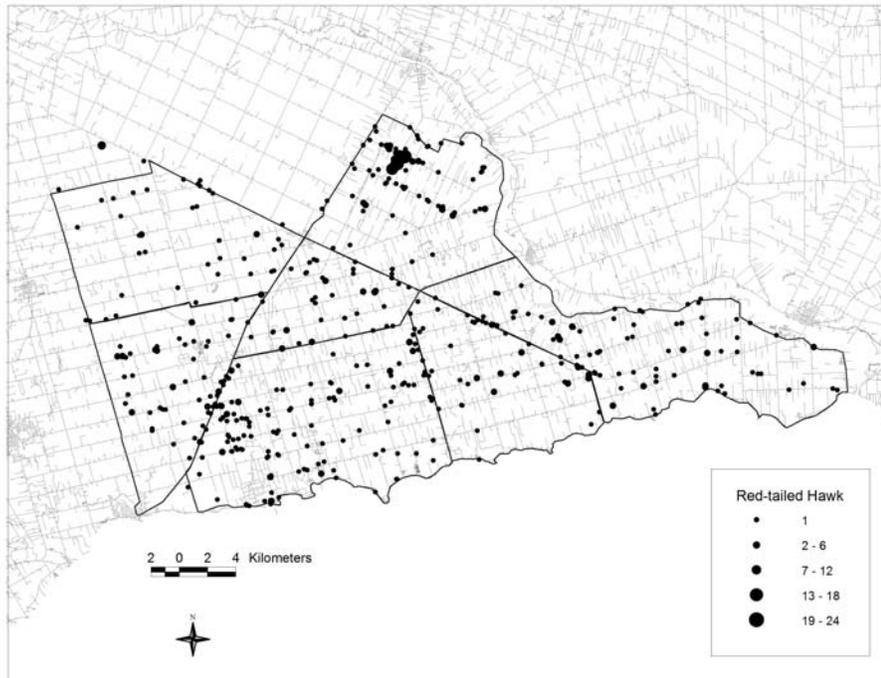
**Distribution of raptors.** The total number of raptors recorded during the standardized surveys and the casual observations are displayed in Figures 4-7. Red-tailed Hawks were found throughout the study area, with an area of concentration in the northern section of area 6 (Figure 4). American Kestrels were also found throughout the study area but seemed to be least common in the eastern portion, with few observations in area 5 (Figure 5). Rough-legged Hawks were uncommon throughout the study area, and were very rare in the western part of the study area (Figure 6). There were two areas of concentration for Rough-legged Hawks: area 4, and the boundary between areas 1 and 3. Northern Shrikes were also uncommon throughout the study area, with only 11 total observations. Northern Harrier was very rare in areas 2, 6, 7, but there were several areas of concentration in areas 3, 4 and 5 (Figure 6). Short-eared Owls were found only in areas 4, 5, and 7 and were most abundant in area 4 (Figure 7).

**Forest cover.** The percent forest cover and the number of individual woodlots for each area surveyed was calculated from Ontario Base Maps in ArcView. Forest cover was lowest in area 3 (9%) and was highest in area 5 (23%) (Table 3).

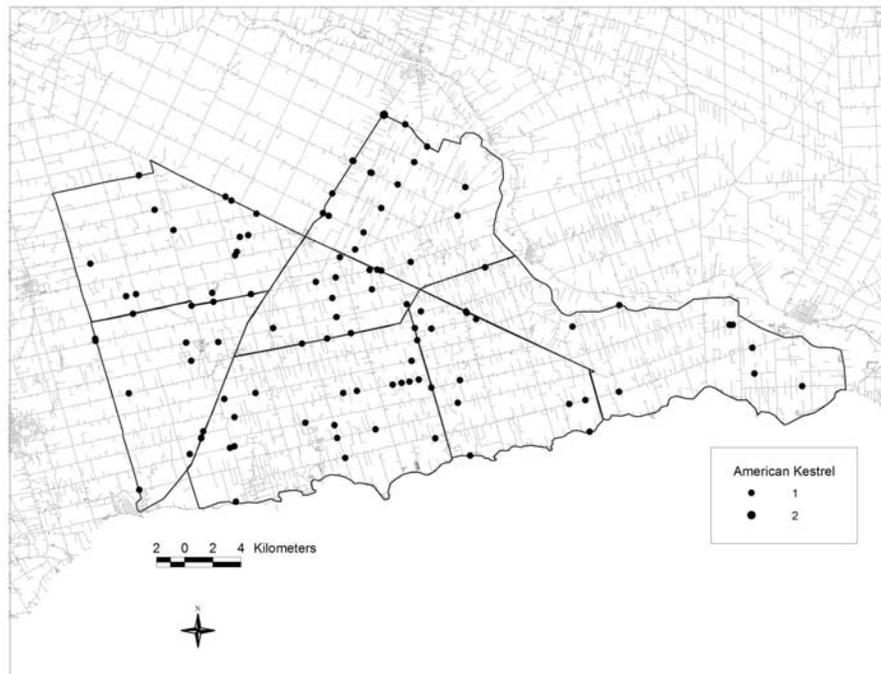
**Table 3 – Percent forest cover and number of individual woodlots in the areas surveyed during the 2003 Haldimand Winter Raptor Inventory.**

Area	Number of woodlots	Percent forest cover
1	244	11
2	196	10
3	537	9
4	358	15
5	635	23
6	432	18
7	182	12



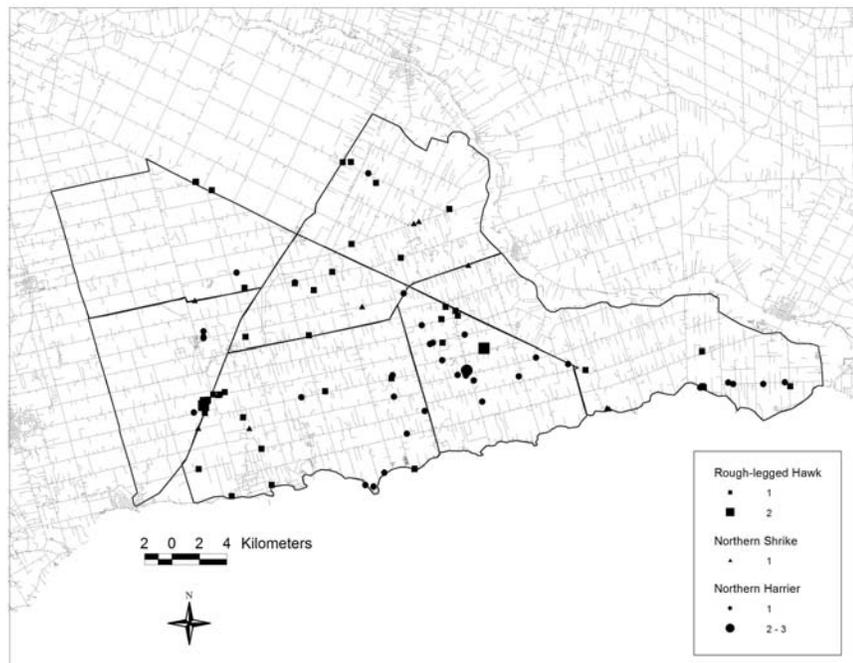


**Figure 4 – Distribution of Red-tailed Hawks on the 2003 Haldimand Winter Raptor Inventory. Data were collected during standardized surveys and casual observations; each area was surveyed four times.**

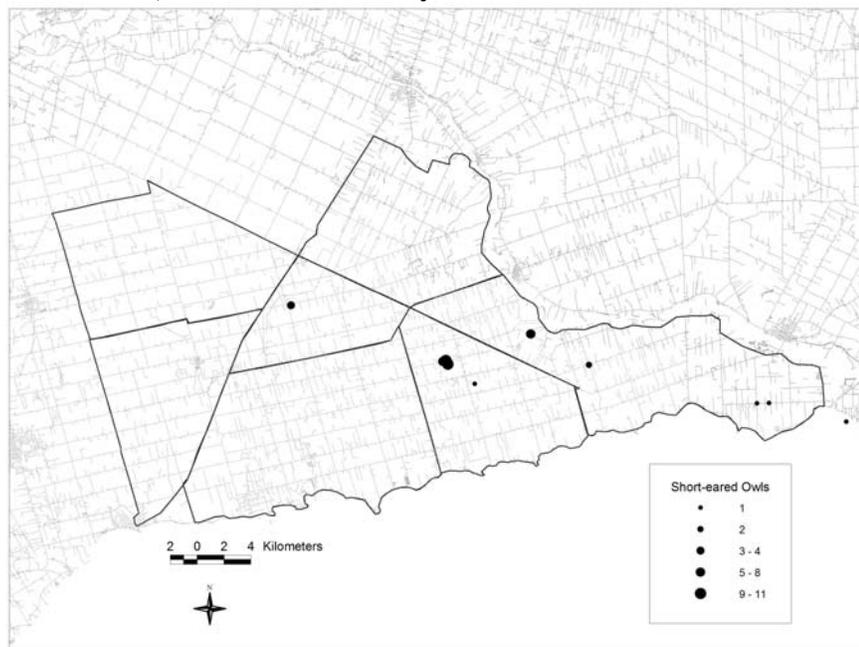


**Figure 5 – Distribution of American Kestrels on the 2003 Haldimand Winter Raptor Inventory. Data were collected during standardized surveys and casual observations; each area was surveyed four times.**





**Figure 6 – Distribution of Rough-legged Hawk, Northern Shrike and Northern Harrier on the 2003 Haldimand Winter Raptor Inventory. Data were collected during standardized surveys and casual observations; each area was surveyed four times.**



**Figure 7 – Distribution of Short-eared Owls on the 2003 Haldimand Winter Raptor Inventory. Data were collected during four supplemental surveys at dusk.**



## DISCUSSION

American Kestrels, Northern Harriers, Rough-legged Hawks and Short-eared Owls rely on grasslands for hunting small mammals during winter months. Wintering populations of these species fluctuate in response to changes vole population cycles. Anecdotal evidence suggests that vole populations experienced a population crash in 2002-2003, which would at least partly account for lower than average numbers of raptors recorded on the survey (J. Miles, pers. comm.). Winter raptor numbers show annual and season fluctuations and are highly influenced by weather conditions. Therefore, to obtain good estimates of winter raptor population size, and to understand habitat use, it is important to monitor winter raptors over several years.

To better understand the differences in distribution and abundance of winter raptors in the study area it is necessary to examine the habitat characteristics of the area, specifically the type of grassland or agricultural field. A similar study of winter raptors in Kansas found that Red-tailed Hawks, Northern Harriers and American Kestrels showed a preference for idleland habitat (Williams et al. 2000). The study also found higher densities of raptors in cropland (vs. rangeland) and speculated that this is the result of increased prey abundance, increased visibility of prey in harvested fields and a greater amount of preferred hunting habitat (Williams et al. 2000). Although the type of crops planted in Kansas are similar to those of Haldimand county (soybeans, corn, winter wheat), there are important differences in landscape attributes between the two areas. The Conservation Reserve Program (CRP) in the USA helps to ensure that windbreaks, riparian forest buffers, grassland filter strips and grassland waterways are maintained in the landscape. The preservation of these features in the landscape results in higher abundances of grassland bird species in CRP lands than in row crops. Because there is no comparable program to the CRP in Ontario, the landscape may be less appropriate for winter grassland dependent species such as Northern Harriers and American Kestrels. Conversion of grasslands to monotypic farming, overgrazing of pastures, loss of fence rows and increased use of pesticides have all been identified as threats to local Northern Harrier populations (MacWhirter and Bildstein 1996).

The Red-tailed Hawk was, by far the most abundant raptor recorded on the survey, but this species is not an appropriate indicator of grassland habitat. Red-tailed Hawks are ubiquitous habitat generalists that are most common in landscapes with high levels of forest fragmentation. Red-tailed Hawks in this study were highly concentrated in area 6 because the birds feed on waste from a poultry processing plant (J. Miles pers. comm.). American Kestrels, Northern Harriers, and possibly Short-eared Owls, may be appropriate grassland indicator species for this area. Sample sizes were sufficient for analyses of habitat selection once appropriate GIS layers are obtained. However, to investigate habitat selection of Short-eared Owls, it would be necessary to identify follow the birds after they leave roosting sites in order to identify hunting grounds. Short-eared Owls in Haldimand County may roost in grasslands, but are more commonly found roosting in evergreen trees in close proximity to houses (sometimes right in front yards).



## RECOMMENDATIONS AND FUTURE DIRECTIONS

The data collected during the 2003 Haldimand Winter Raptor Inventory could provide important information on winter grassland habitat selection of Northern Harriers and American Kestrels. In order to investigate habitat selection, GIS layers identifying the type of grasslands or agricultural fields within the study area are needed. Once these layers are obtained, the locations of winter raptors can be overlain to determine the type of habitat that the birds were using. By comparing the percentage of raptor locations in the various habitat types with the percentage availability of these habitats, we will be able to determine if birds are selecting certain habitat types. Habitat data can be obtained by ground truthing the area and then digitizing the information.

A different suite of bird species use grassland habitats in winter than in spring and summer. For this reason, it is important to also identify the diversity and abundance of bird species using the study area in the breeding season. The same point count locations from the winter inventory should be sampled in June to get a better picture of the year round use of the area by grassland birds. The combination of winter and summer data and the GIS layers would provide a valuable tool to identify “hot-spots” for breeding grassland birds where conservation actions can be focussed (Jones et al. 2001).

## ACKNOWLEDGEMENTS

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