

# **The Pembina Valley 2005 and 2006 Spring Raptor Migration**

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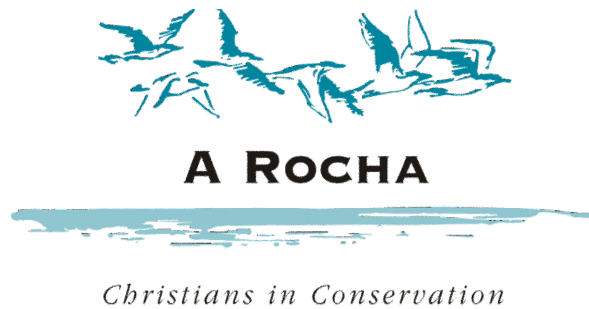


**A ROCHA**

*Christians in Conservation*

**A Rocha  
Pembina Valley Field Study Centre  
Biodiversity Report Series No. 1**

**Al Schritt, Dorothy Schritt,  
Luc Blanchette, J. Paul Goossen  
and Valorie Goossen**



### **About A Rocha**

A Rocha is an international conservation organization working to show God's love for all creation. We work out our commitment to environmental action through community-based conservation projects. Underlying all we do is our biblical faith in God, who made the world, loves it and entrusts it to the care of human society.

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**March 2007**

## Executive Summary

Migrating raptors were monitored in Manitoba's Pembina Valley in 2005 and 2006. In total, observers spent 490 h during 68 days monitoring the spring raptor migration near Windygates, about 125 km southwest of Winnipeg. Fifteen raptor species, totaling 8433 and 9147 individuals were counted in 2005 and 2006, respectively. The mean migration date in 2005 was 2 April and 1 April in 2006. Raptor numbers peaked daily between 1300-1500 h. Most (78%) raptors were counted on days with southerly winds. The three most common raptors seen were Red-tailed Hawks (*Buteo jamaicensis*), Bald Eagles (*Haliaeetus leucocephalus*) and Sharp-shinned Hawks (*Accipiter striatus*). In both years, Red-tailed Hawk numbers exceeded 6500, Bald Eagles topped 900 and Sharp-shinned Hawks surpassed 500 individuals. The Manitoba one-day count record of 168 Bald Eagles set near St. Adolphe in 2001 was surpassed twice in 2006 when 174 and 245 Bald Eagles were seen on 26 March and 1 April, respectively. Provincial high spring seasonal counts were made for Turkey Vultures, Bald Eagles, Sharp-shinned Hawks and Golden Eagles in 2006. The Windygates spring counts (2005 and 2006) surpassed all spring raptor counts in western North America. The Windygates site is well within the range of the top North American site for Red-tailed Hawks. Long-term monitoring at the Windygates site will give conservation organizations a better understanding of the Pembina Valley's importance to raptors and will contribute to assessing provincial raptor migration status and trends.

## **Acknowledgements**

We are indebted to Jack Nichol for his hospitality and permission to use his property for monitoring raptors. We thank the Rural Municipalities of Stanley and Pembina for their support and understanding of the valley as a valuable asset for the promotion and protection of wildlife. Thanks also to the Town of Morden, the Pembina Valley Conservation District, the Pembina Valley Development Corporation and the Oak Hammock Marsh Interpretive Centre for their part in planning one or both Raptor Awareness Days. The report benefited from earlier reviews by Glen Carlson, Ken De Smet, Geoff Holroyd, Robert Jones, Rudolf Koes and Robert Nero, all of whom we thank. We also thank birding friends of the Manitoba Naturalists Society for their moral support and knowledgeable presence in the valley. We thank Christian Artuso and Lou Males for allowing us the use of their photographs for the report. Funding support for this project was provided through donations made to A Rocha Canada by Allmar Industries, the Bill and Margaret Fast Family Foundation, M. Goossen, P. and V. Goossen, R. Goossen and I. and I. Pauls.

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## **1.0 INTRODUCTION**

Manitoba's Pembina Valley is recognized as a prime area for observing migrating raptors in spring. A favourite location of birdwatchers to observe and count spring raptors is located about 7 km northeast of Windygates (49° 00' N, 98° 22' W) near the U.S.-Canada border. Observers typically visit the site in early spring on days with favorable weather conditions. Individuals or groups record numbers of raptors for their own enjoyment and often share their findings with others interested in the raptor migration. The discovery of the Pembina Valley raptor migration was made by the senior author who, after noticing migrating raptors in the valley in 1985, made return visits and confirmed the presence of this migration corridor. Since then, hundreds of Manitobans have had the pleasure of watching this special migration. The only other regular spring raptor migration count site in Manitoba is near St. Adolphe (49° 68' N, 97 °08' W), about 10 km south of Winnipeg. Raptors following the Red River are opportunistically counted annually at the St. Adolphe Bridge by interested birdwatchers. In 2006, a standardized daily count was organized to better assess the number of migrating raptors passing by St. Adolphe.

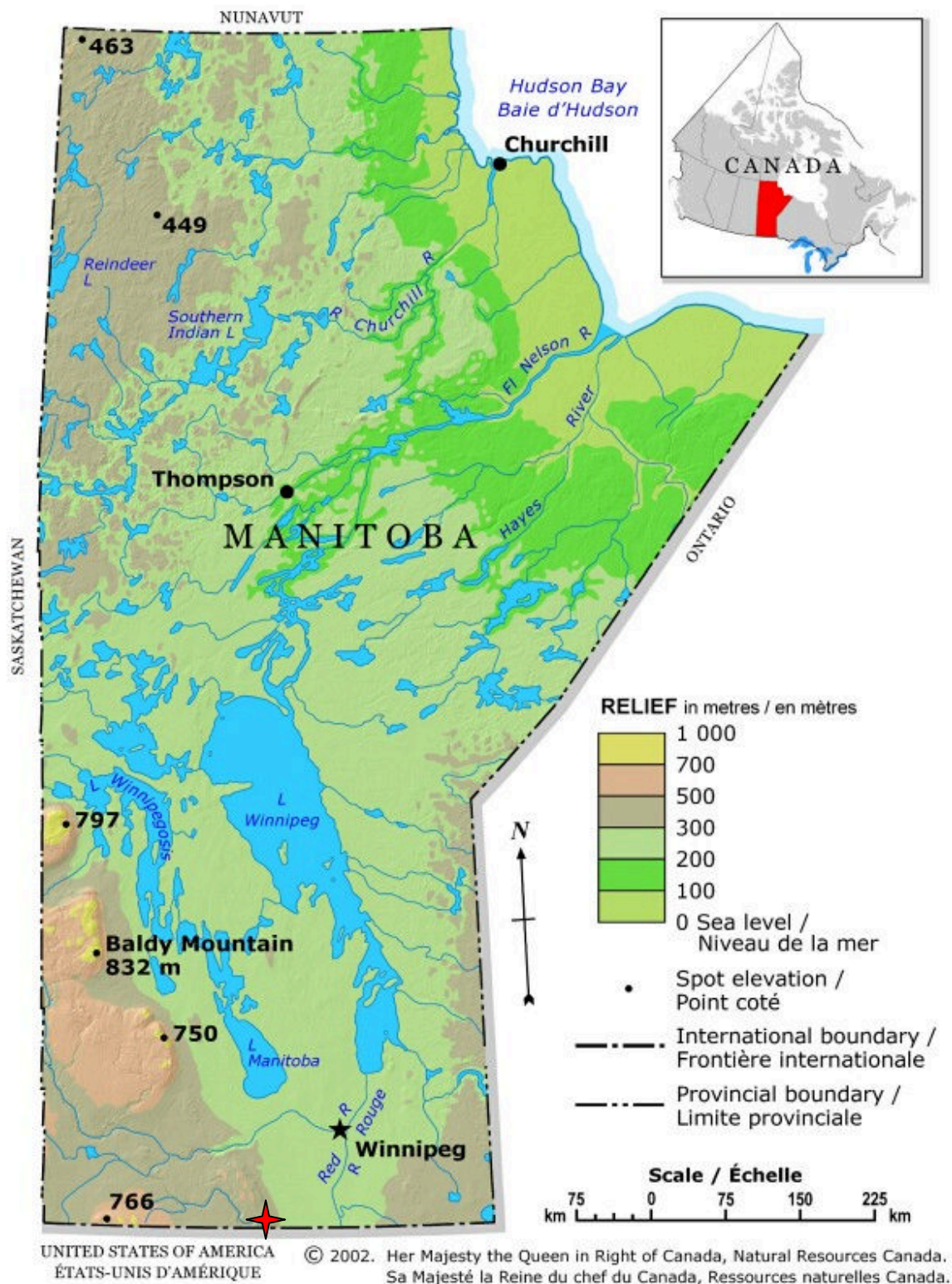
Raptor migration monitoring in Canada is carried out primarily by interested citizens and nongovernment organizations which play an important role in documenting the status and trends of raptors in Canada. In 2005, A Rocha, an international conservation organization, initiated Manitoba's first standardized spring raptor migration count and the first raptor monitoring site in Region 11 of the North American Bird Conservation Initiative (Rich et al. 2004).



In this report, we document the results of the 2005 and 2006 spring raptor migration counts made near Windygates, Manitoba and make recommendations for future monitoring efforts. This project is helping expand Manitoba's raptor monitoring efforts, increase Manitoba's growing knowledge of raptors, provide conservation education to the public and share information with resource agencies.

## **2.0 STUDY AREA**

The Pembina Valley lies within the Aspen Parkland region of southern Manitoba. The Pembina River, which meanders through the valley, originates in the Turtle Mountains and flows southeastward for 550 km before emptying into the Red River near Pembina, North Dakota. The 2005 and 2006 raptor monitoring site (49° 01' N, 98° 16' W), referred to as the Windygates site in this report, is the same sites used by birdwatchers over the past 20 years. The site is located 125 km southwest of Winnipeg, Manitoba (Figure 1) and 7 km northeast of Windygates, in the vicinity where the Pembina River and Provincial Road No. 201 intersect. This section of the valley is located in both the municipalities of Stanley and Pembina, about 10 km west of the Manitoba escarpment. At the count site, the valley is characterized by relatively steep walls and ridges which are much closer together here than elsewhere in the Canadian portion of the Pembina Valley. These topographic features cause raptors to funnel through this narrow section of the valley and gives raptor counters good viewing opportunities. Agricultural and natural habitats are characteristic of this part of the valley and include pastures, riparian and upland deciduous woods and shrubs.



**Figure 1.** Location of the Windyates raptor migration count site (★) in the Pembina Valley, Manitoba. Map source: National Resources Canada [www.atlas.nrcan.gc.ca](http://www.atlas.nrcan.gc.ca).

### 3.0 METHODS

Raptor migration monitoring was carried out from 13 March – 4 May 2005 and 11 March – 18 April 2006. In 2005, counts were made daily except for 14–17 March, 12, 14–22, 24–30 April and 1–3 May when no counts were made. In 2006, counts were made on each day of the entire count period. Two official observers (Al and Dorothy Schritt) carried out the daily counts in both years and were assisted by volunteers and visitors. The official observers tried to arrive daily before raptors began flying and stayed up to 0.5 h after what was assumed to be the last migrating raptor for that day. Counts started as early as 0815 h (0845h in 2006) and ended as late as 1945 h. Local sky conditions, precipitation and temperatures were recorded at the start of the count day and at or about 1200 h and 1600 h (See Appendix 1). In 2005, the official observers were the first to arrive and the last to leave, except for two days. In 2006, both observers were present on each count day. Other observers and visitors were on site for only part of the days and usually left long before the last bird was recorded. A daily guest book was kept to record the names of observers and visitors who visited the count site.

Scientific names of bird species in this report (except field data sheet in Appendix 1) are listed in American Ornithologists' Union taxonomic order ([www.aou.org/checklist/index.php3](http://www.aou.org/checklist/index.php3)) and can be found in Appendix 2. Turkey Vultures were previously listed under Falconiformes (American Ornithologists' Union 1983) but are now listed under Ciconiiformes ([www.aou.org/checklist/index.php3](http://www.aou.org/checklist/index.php3)). In this report, however, the term raptor includes Turkey Vultures. On count days, official observers checked the wind direction before entering the valley, observed the flight path of migrating

raptors and then set up for data collection at the appropriate location in the valley. When winds were southerly, observers monitored from the north slope of the valley. Northerly breezes moved the birds to the southern part of the valley and observers moved accordingly to the south slope. Observers usually faced the same direction and called out new arrivals by referring to the bird's position on a clock dial. Landmarks, poles or trees served as reference points when pinpointing raptor locations. Observers used binoculars and spotting scopes to aid with raptor identification and counting. Bird sightings were recorded on a standardized form (Appendix 1). Mechanical counters were used to keep track of Red-tailed Hawks, Bald Eagles and occasionally Sharp-shinned Hawks. At the end of each day, raptor numbers were tallied by species and posted on the Internet. Immature and adult eagles were recorded separately as were dark and light morphs of buteos. Mean migration dates were calculated following the method Priestly and Priestly (2005) used to determine mean owl capture dates. The total number of raptors counted each year was divided by two and then the daily counts were added chronologically until their total value exceed 50% of the total raptor count in the given year. The date which coincided with this value was designated as the mean migration date. Weather data were obtained online from Environment Canada ([www.climate.weatheroffice.ec.gc.ca](http://www.climate.weatheroffice.ec.gc.ca)) and the North Dakota Agricultural Weather Network (NDAWN) ([www.ndawn.ndsu.nodak.edu/](http://www.ndawn.ndsu.nodak.edu/)) for the Pilot Mound, Morden and Langdon weather stations located about 54, 21 and 27 km from the count site, respectively. Wind data were also obtained from the NDAWN website for the Langdon area.

## **4.0 RESULTS**

### **4.1 Weather**

Temperatures in March 2005 were 0.9 to 1.1 degrees colder than normal for Morden, Pilot Mound and Langdon (Appendix 3) while April 2005 temperatures were 2.8 to 3.9 degrees warmer than normal. In 2006, March temperatures were about normal but April temperatures were approximately four degrees warmer at all stations. At the Windygates site March temperatures in 2005, during count hours, averaged approximately 1 °C and April temperatures about 11 °C. At the Windygates site March temperatures in 2006, during count hours, averaged approximately -3 °C and April temperatures about 10 °C. Precipitation in March 2005 for Morden and Pilot Mound was approximately 10 mm below normal. In April, Morden precipitation was 11 mm below average (35.5 mm), Pilot Mound was approximately 19 mm below normal (35.9 mm) and Langdon was 4 mm above normal (25.4 mm). In 2006, March precipitation (all snow) at Morden was more than double the normal (25.0 mm), reaching 55.1 mm. April 2006 precipitation was 15 mm below the norm at Morden, 35.9 mm below normal at Pilot Mound and about 7 mm above normal at Langdon. There was more snow in the valley in 2006 than the senior author can remember since the start of monitoring at this site in 1985. Snow cover in the valley lasted into April and was finally gone by 5 April.

### **4.2 Monitoring effort**

In 2005, observers counted raptors (Figures 2 and 3) intermittently from 13 March – 4 May. Counts were made on 29 (54.7%) of 53 days in this period (Table 1) and totaled 222.7 h. The number of observers on any given day ranged from 2-20 knowledgeable



**Figure 2.** Red-tailed Hawk No.1000 migrating through the Pembina Valley near Windygates, Manitoba (2005). Photo by Christian Artuso.



**Figure 3.** Adult Bald Eagle migrating through the Pembina Valley near Windygates, Manitoba (2005). Photo by Lou Males.

**Table 1.** Observer numbers and effort (h) for the 2005 and 2006 spring raptor migration near Windygates, Manitoba.

Month	March																						
Day	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
No. of observers <sup>1</sup> (2005)			2					1	4	8	3	3	2	4	15	5	10	18	8	8	7		
No. of observers <sup>1</sup> (2006)	2	2	2	1	2	2	1	8	6	3	6	2	4	3	4	5	5	13	8	1	4		
Observation hours (2005)			4.50					1.50	8.25	8.00	7.50	5.50	6.25	7.75	8.25	8.00	8.25	9.25	9.25	9.50	9.00		
Observation hours (2006)	5.25	7.00	4.00	5.00	5.50	6.25	6.50	6.25	7.00	5.50	5.75	6.00	6.25	7.00	6.25	8.25	4.75	9.50	6.00	1.00	8.25		
Month	April																						
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
No. of observers <sup>1</sup> (2005)	8	18	15	4	3	2	11	5	10	5	1		2										2
No. of observers <sup>1</sup> (2006)	5	3	4	5	7	2	2	6	2	2	2	2	2	6	3	1	1	1					
Observation hours (2005)	8.50	10.25	9.50	9.75	9.75	9.25	9.25	10.00	8.90	9.50	3.00		5.25										5.00
Observation hours (2006)	10.00	9.75	9.00	10.00	10.00	8.50	8.00	8.25	7.00	8.00	6.50	6.25	8.75	8.00	7.00	6.00	5.00	4.25					
Month	May																						
Day	1	2	3	4																			
No. of observers <sup>1</sup> (2005)				2																			
No. of observers <sup>1</sup> (2006)																							
Observation hours (2005)				4.00																			
Observation hours (2006)																							

<sup>1</sup> Individual with sufficient experience to help with identification of raptors in flight.

birdwatchers. A minimum of two observers were present on count days except for two days (18 March and 11 April) when only one observer was present. In 2006, observers spent 267.5 h monitoring the spring raptor migration over a continuous period of 39 days, beginning on 11 March and ending on 18 April. The overall monitoring efforts averaged 7.7 h/day (SD = 2.3) and 6.9 h/day (SD = 1.9) in 2005 and 2006, respectively (Table 1). In 2005, the number of observers per day averaged 6.4 (SD = 5.0). On average in 2006 there were 3.6 observers/day (SD = 2.5). Excluding 2 and 3 April 2005, there was an average of 11 recorded visitors/observers per day at the count site. On 2 April there were 118 people and on 3 April there were 85. The number of people on these two days reflected the publicity of the migration through the Raptor Awareness Day, initiated by A Rocha and held in Morden on 2 April 2005. Most people who came to the count site were from Manitoba and others were from Saskatchewan, Alberta, and British Columbia. In 2006, the recorded visitors/observers per day averaged nine. Fifty-three people came out to the count site on 1 April (Raptor Awareness Day). People who came to the count site in 2006 were from Manitoba and one from Alberta.

### **4.3 Overview**

Fifteen species of migrant raptors were identified and 17,580 individuals counted during the two spring counts. In 2005, the count totaled 8433 and 9147 in 2006 (Table 2). Counts for 12 of the 15 species seen increased in numbers from 2005 to 2006. One contributing factor was probably the earlier start date in 2006. In 2006, observers made record high counts for the Windygates sites for the following five raptors: Turkey Vulture (70), Bald Eagle (923), Sharp-shinned Hawk (649), Rough-legged Hawk (37) and Golden Eagle (81).



**Table 2.** Total number of raptors by species and change in annual numbers for the 2005 and 2006 spring counts near Windygates, Manitoba.

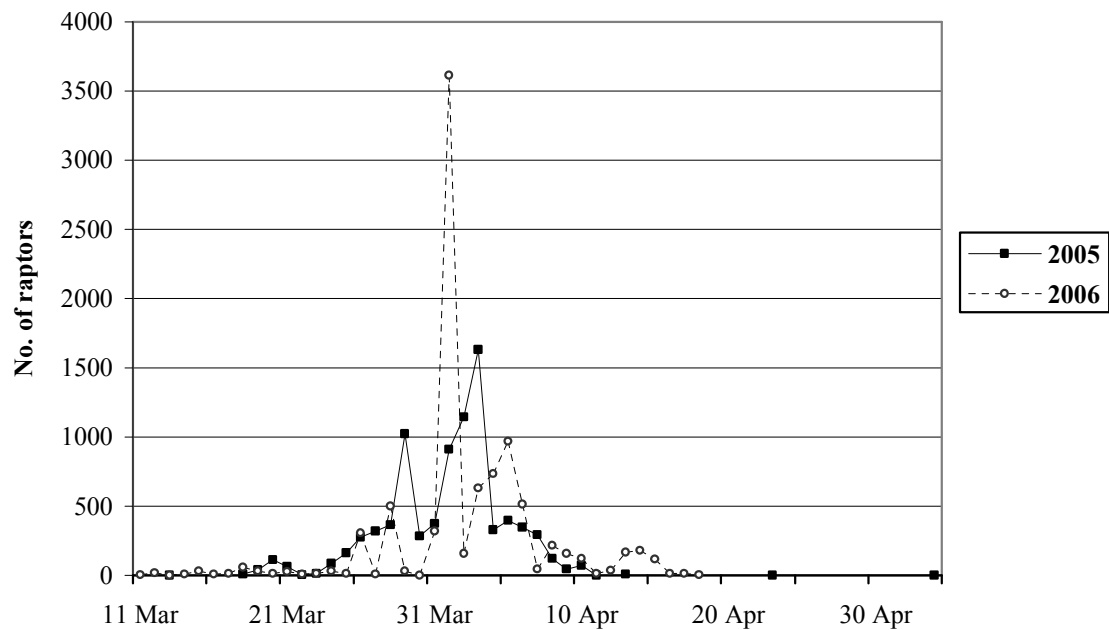
Species	Total count (2005) <sup>1</sup>	Total count (2006) <sup>2</sup>	Change from previous year (↑↓)	Mean	SD <sup>3</sup>
Turkey Vulture	69	70	↑	69.5	0.7
Osprey	0	2	↑	1	1.4
Bald Eagle	902	923	↑	912.5	14.8
Northern Harrier	154	109	↓	131.5	31.8
Sharp-shinned Hawk	539	649	↑	594	77.8
Cooper's Hawk	43	75	↑	59	22.6
Northern Goshawk	56	27	↓	41.5	20.5
Swainson's Hawk	2	14	↑	8	8.5
Red-tailed Hawk	6546	7107	↑	6826.5	396.7
Ferruginous Hawk	1	0	↓	0.5	0.7
Rough-legged Hawk	37	37	↔	37	0
Golden Eagle	62	81	↑	71.5	13.4
American Kestrel	8	13	↑	10.5	3.5
Merlin	13	38	↑	25.5	17.7
Peregrine Falcon	1	2	↑	1.5	0.7
Total	8433	9147	↑	8790	504.9

Migration count start date was 13 March in 2005.

<sup>2</sup> Migration count start date was 11 March in 2006.

<sup>3</sup> SD = Standard deviation.

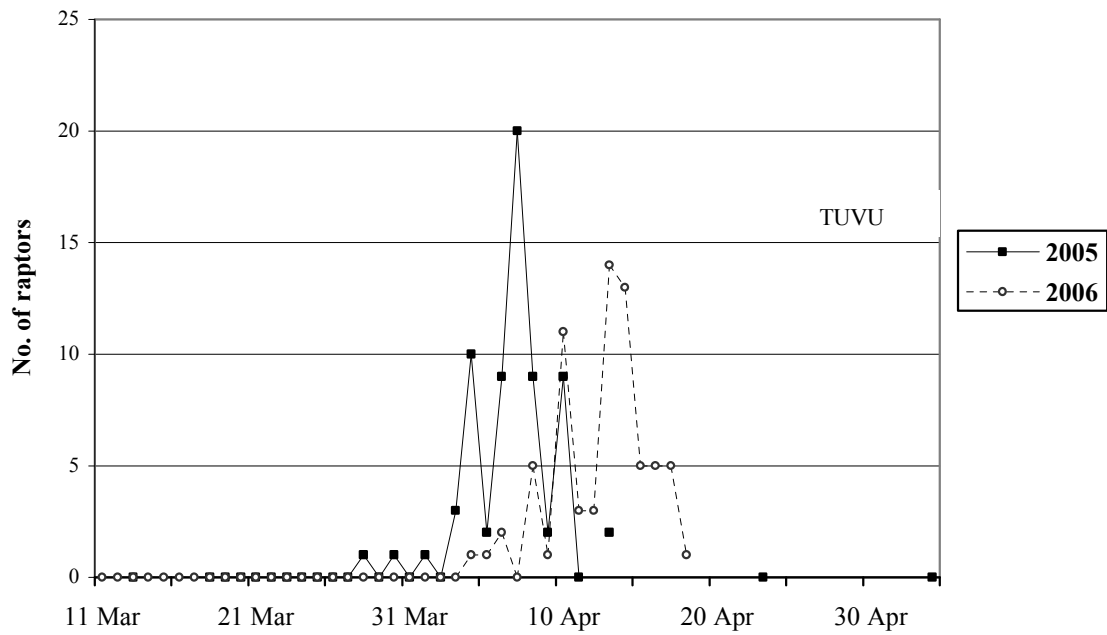
We believe the counts for Turkey Vulture, Bald Eagle, Sharp-shinned Hawk and Golden Eagle are greater than any previous provincial spring count made elsewhere in Manitoba. The composition of raptors for both years' counts was ospreys (<1%), falcons (<1%) vultures (1%), harriers (1%), accipiters (8%), eagles (11%) and buteos (78%). The most abundant raptor in both years was the Red-tailed Hawk. Raptor numbers peaked on 3 April 2005 and on 1 April 2006 (Figure 4). The mean migration date for each year was 2 April 2005 and 1 April 2006 (Table 3). Ninety percent of raptors were counted within a 14 day



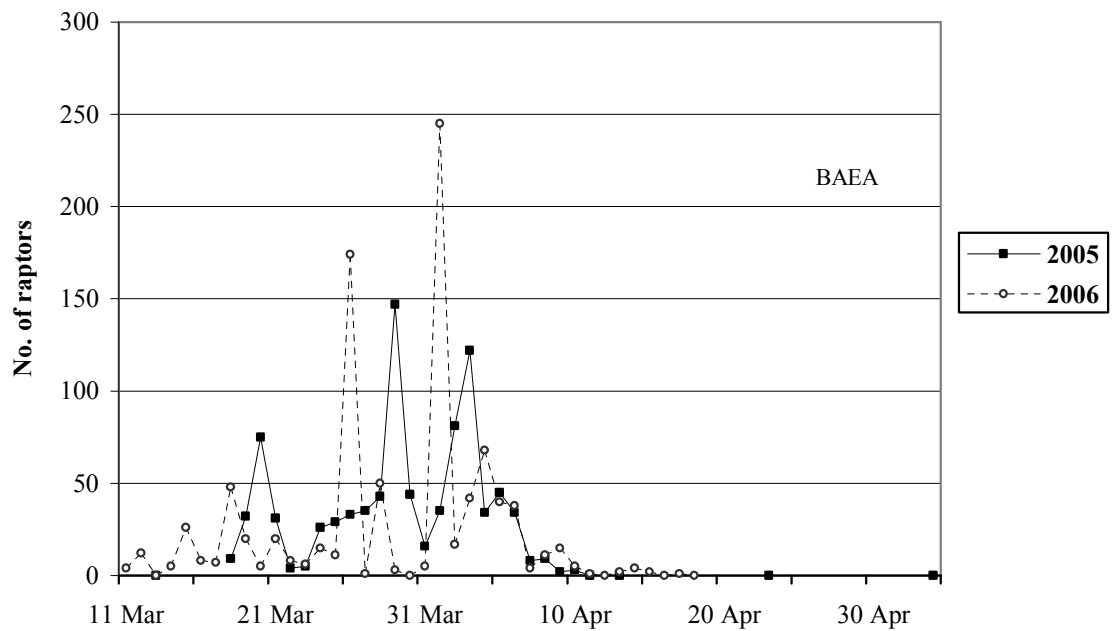
**Figure 4.** Total number of raptors observed near Windygates, Manitoba in spring 2005 and 2006.

**Table 3.** Mean migration dates and migration count intervals for the 2005 and 2006 spring raptor migration near Windygates, Manitoba.

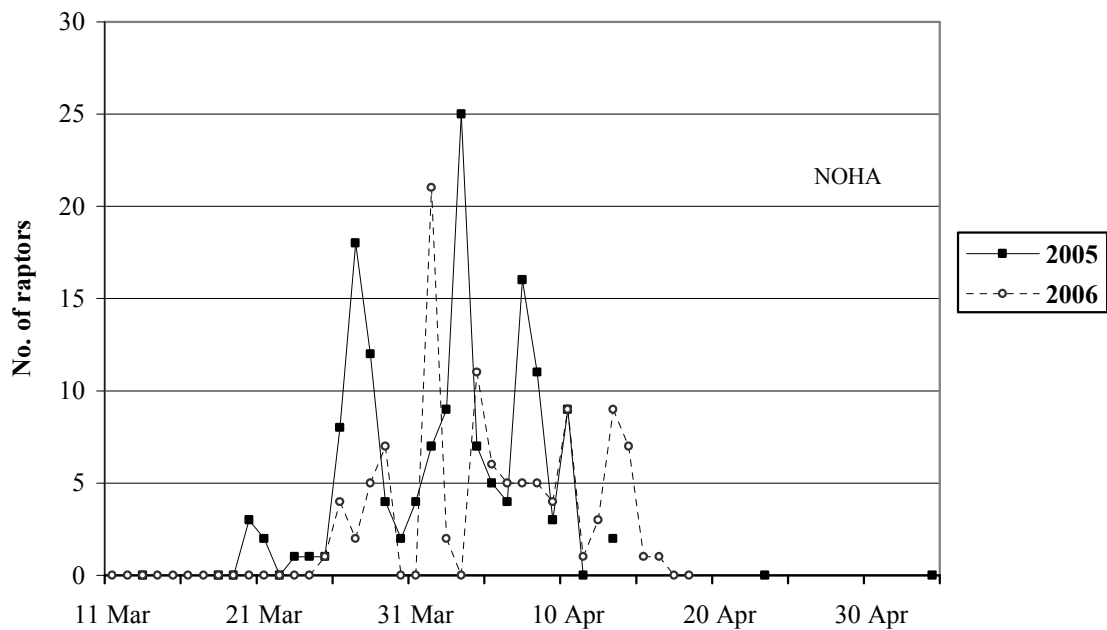
Parameter	2005	2006
Mean migration date	2 April	1 April
Migration count interval (66%)	28 March–4 April	1–6 April
Migration count interval (90%)	25 March–7 April	26 March–13 April
Migration count interval (95%)	21 March–8 April	22 March–14 April



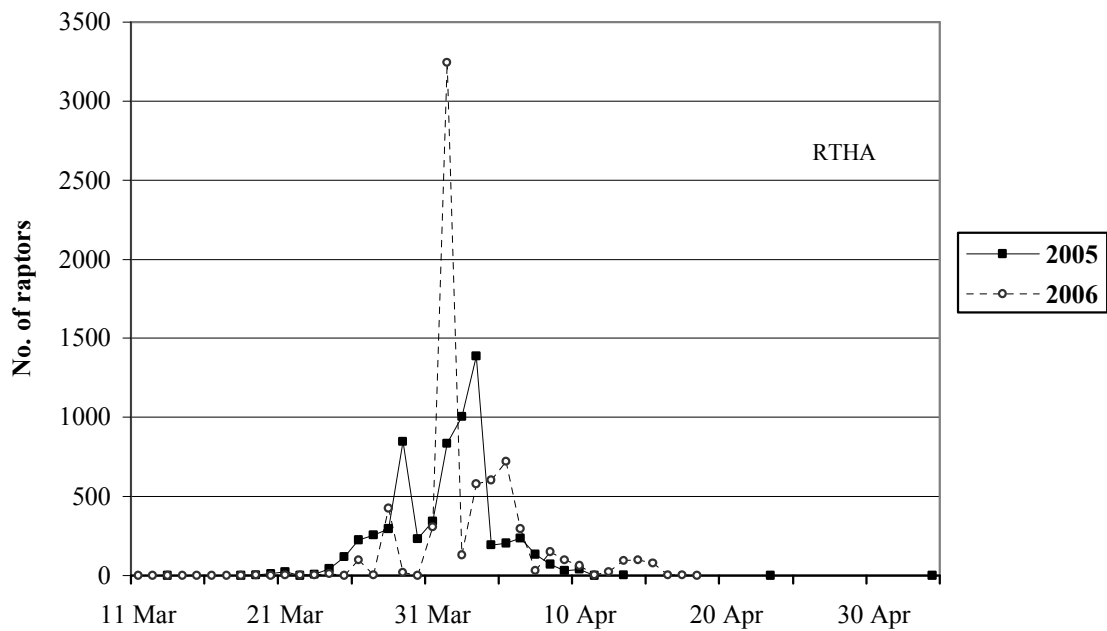
**Figure 5.** Number of Turkey Vultures observed near Windygates, Manitoba in spring 2005 and 2006.



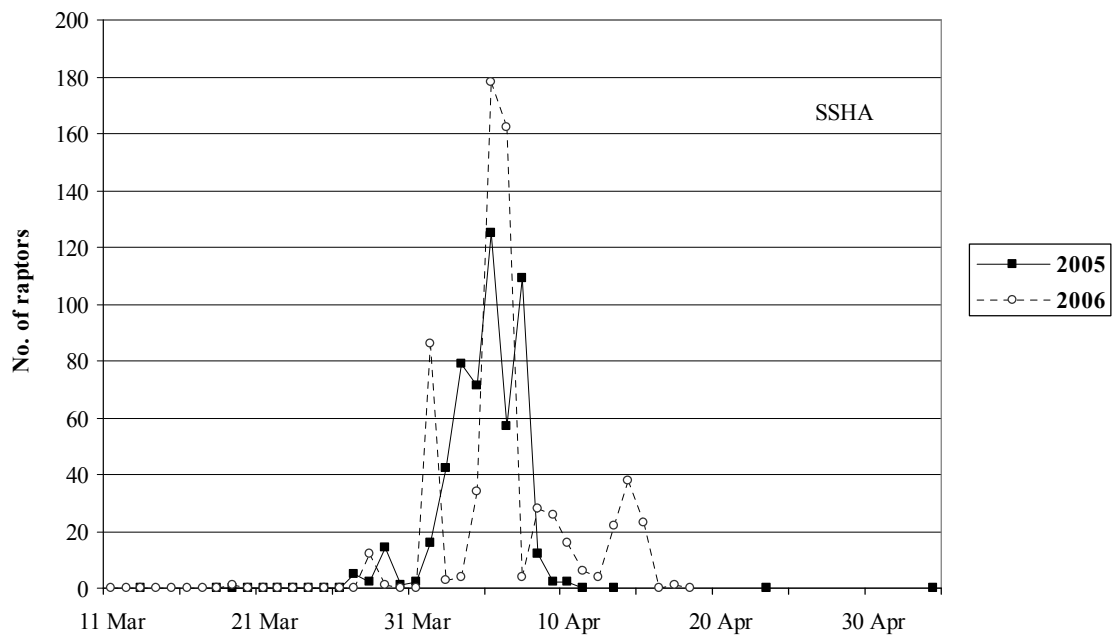
**Figure 6.** Number of Bald Eagles observed near Windygates, Manitoba in spring 2005 and 2006.



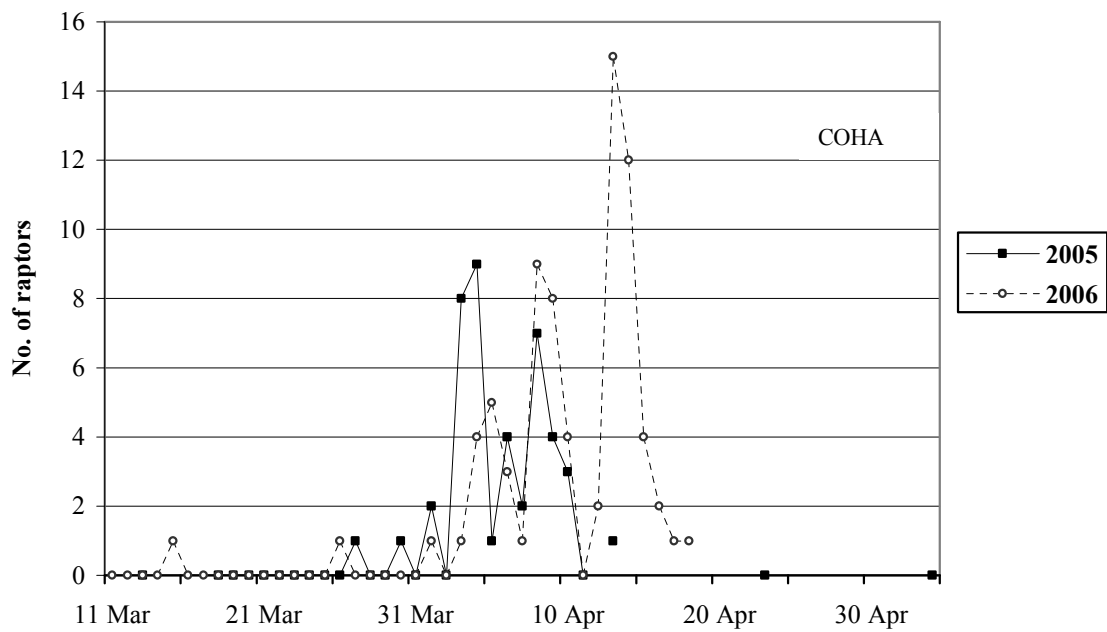
**Figure 7.** Number of Northern Harriers observed near Windygates, Manitoba in spring 2005 and 2006.



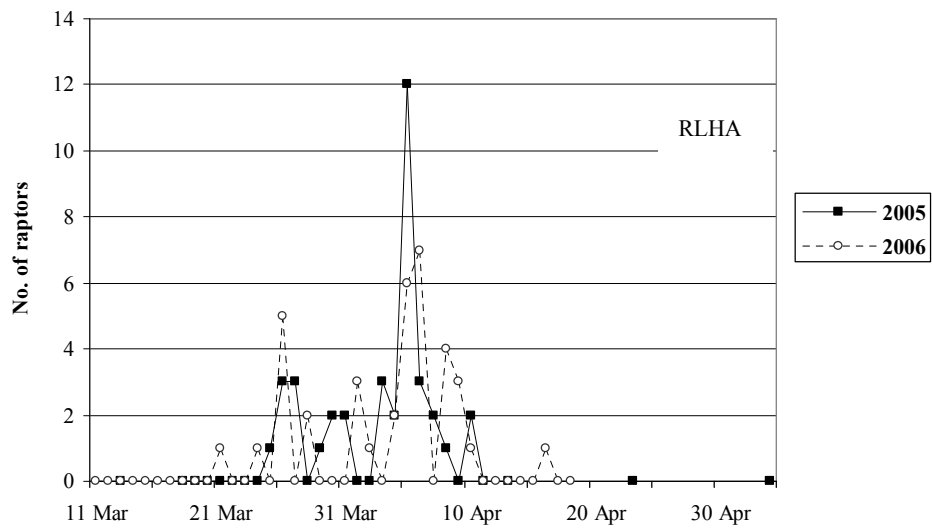
**Figure 8.** Number of Red-tailed Hawks observed near Windygates, Manitoba in spring 2005 and 2006.



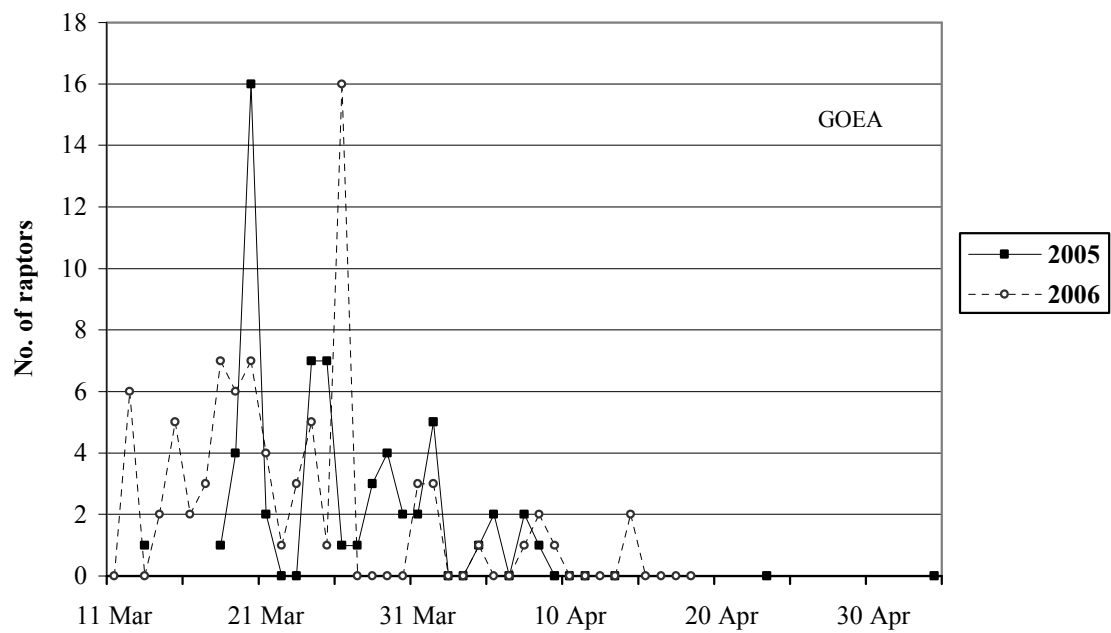
**Figure 9.** Number of Sharp-shinned Hawks observed near Windygates, Manitoba in spring 2005 and 2006.



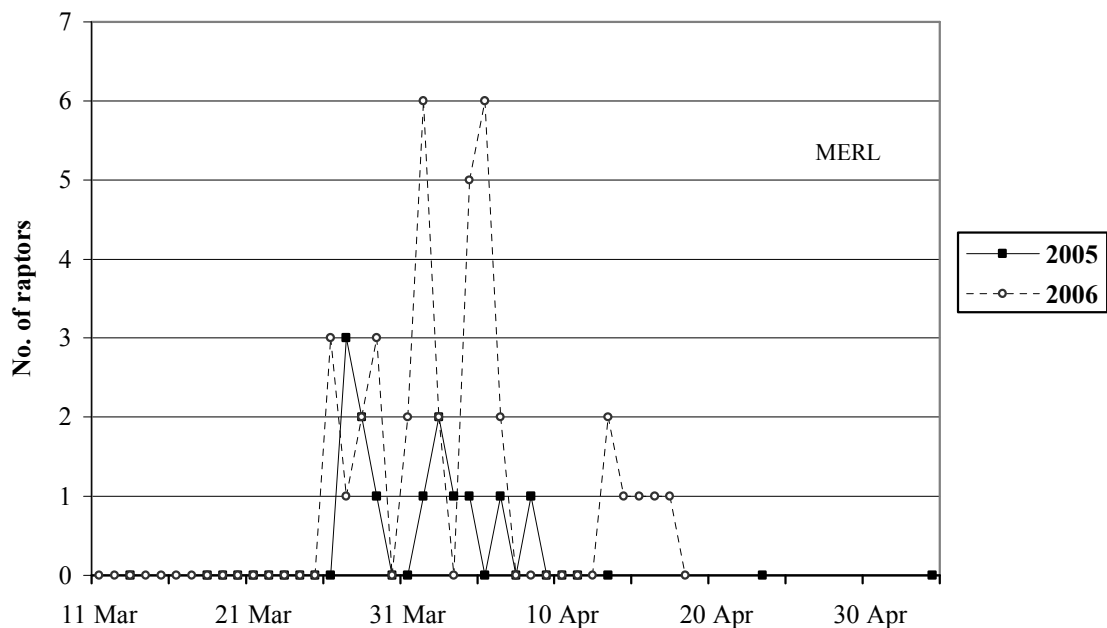
**Figure 10.** Number of Cooper's Hawks observed near Windygates, Manitoba in spring 2005 and 2006.



**Figure 11.** Number of Rough-legged Hawks observed near Windygates, Manitoba in spring 2005 and 2006.



**Figure 12.** Number of Golden Eagles observed near Windygates, Manitoba in spring 2005 and 2006.



**Figure 13.** Number of Merlins observed near Windygates, Manitoba in spring 2005 and 2006.

period in 2005 from 25 March to 7 April and a 19 day period in 2006 from 26 March to 13 April. Individual species' numbers varied daily and seasonally (Figures 5-13). On average, daily raptor numbers peaked between 1400 – 1500 h in 2005 and 1300 – 1400 h in 2006 (Table 4; Figure 14). Raptor numbers were highest on days with southerly winds (Figure 15).

#### 4.4 Spring 2005

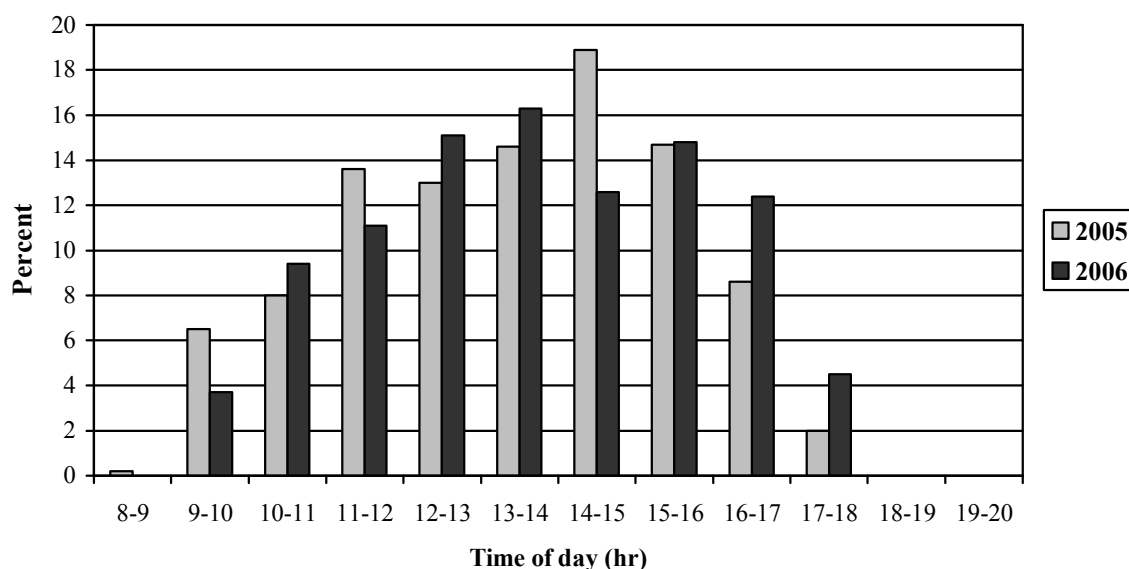
In 2005, the three most common species (Table 2) were Red-tailed Hawks (6546), Bald Eagles (902) and Sharp-shinned Hawks (539). The next six most common species were Northern Harriers (154), Turkey Vultures (69), Golden Eagles (62), Northern Goshawks (56), Cooper's Hawks (43) and Rough-legged Hawks (37). Three falcon species,

consisting of 22 individuals, were observed: 13 Merlins, eight American Kestrels and one Peregrine Falcon. One Ferruginous Hawk and two Swainson's Hawks completed the list. Of the 6546 Red-tailed Hawks seen, 241 (3.7%) were dark morphs. Five (13.5%) of the 37 Rough-legged Hawks were also dark morphs. Immature Bald Eagles numbered at least 327

**Table 4.** Relationship between number of raptors and time of day near Windygates, Manitoba (2005 and 2006).

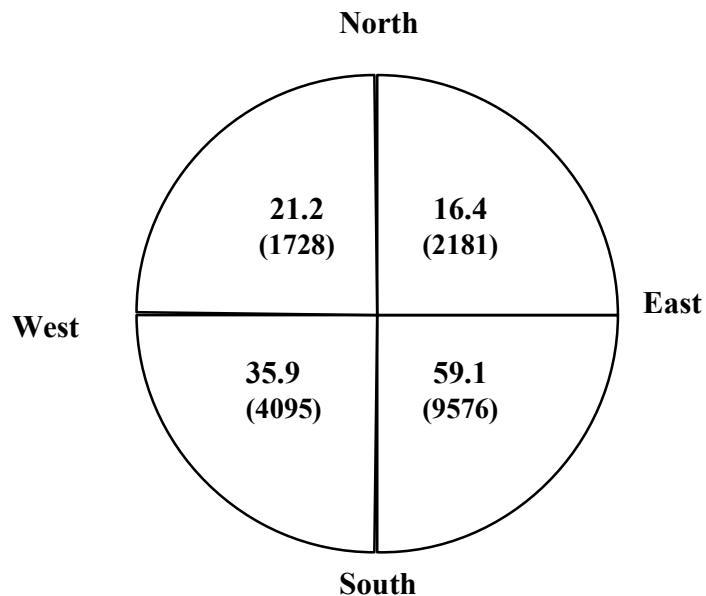
Hour (CST) <sup>1</sup>	0800- 0900	0900- 1000	1000- 1100	1100- 1200	1200- 1300	1300- 1400	1400- 1500	1500- 1600	1600- 1700	1700- 1800	1800- 1900	1900- 2000
<b>2005</b>												
No. of raptors	15	534	661	1125	1074	1206	1566	1212	714	165	0	0
No. of hrs	2	19	26	28	27	27	24	22	20	11	0	0
Percent	0.2	6.5	8.0	13.6	13.0	14.6	18.9	14.7	8.6	2.0	0	0
<b>2006</b>												
No. of raptors	0	339	852	1009	1364	1480	1145	1338	1119	409	2	0
No. of hrs	0	17	22	38	38	36	36	28	17	9	1	0
Percent	0.0	3.7	9.4	11.1	15.1	16.3	12.6	14.8	12.4	4.5	0.0	0.0

<sup>1</sup> Central Standard Time.



**Figure 14.** Percent of raptors observed in relation to time of day near Windygates, Manitoba spring 2005 and 2006.





**Figure 15.** Mean number of raptors seen per hour in relation to wind direction near Windygates, Manitoba (2005 and 2006). Numbers in brackets equal total number of raptors seen per quadrant.

(36.3%) of the 902 Bald Eagles and 21 (33.9%) of the 62 Golden Eagles were identified as immatures. By 1 April, all migratory raptor species recorded during the count had been observed except for the Peregrine Falcon which was seen on 9 April.

#### 4.5 Spring 2006

In 2006, the three most common species were the Red-tailed Hawk (7107), Bald Eagle (923) and Sharp-shinned Hawk (649). Next in order were: Northern Harrier (109), Golden Eagle (81), Cooper's Hawk (75), Turkey Vulture (70), Rough-legged Hawk (37), Merlin (38), Northern Goshawk (27), Swainson's Hawk (14), American Kestrel (13), Peregrine

Falcon (2) and Osprey (2). Two hundred and forty-three (3.4%) Red-tailed Hawks and four (10.8%) Rough-legged Hawks were identified as dark morphs. Of the 923 Bald Eagles seen, 295 (32.0%) were immatures as were 16 (19.8 %) of the 81 Golden Eagles seen. By 5 April, all raptor species recorded during the count had been observed, except for Ospreys which were seen singly on 11 and 14 April.

## **5.0 DISCUSSION**

There is only one certainty about the raptor migration along the Pembina Valley and that is there are no certainties. Every year is different. Good weather conditions in early spring mean snow melts quickly and as a result the birds can catch thermals outside of the valley confines and so are not as reliant on thermals over the valley. Raptors are then less concentrated over the valley and lower count numbers may not mean that fewer birds are migrating but rather that their migration distribution is broader. Wind directions dictate where raptors fly. Southerly breezes “push” the birds over the north slope of the valley. The majority (78%) of raptors arrived with southerly tail winds. Historically, there is only one known case of the Red-tailed Hawk count surpassing 1000 individuals at the Windygates site when a north wind was blowing (A. and D. Schritt, unpubl. data). On count days when the wind is relatively calm and air temperatures are warm, the raptors respond by spreading out over the width of the valley and finding thermals which enable them to soar to estimated altitudes of 500–1000 m. At such heights, species identification is a challenge for observers.

Turkey Vultures numbers differed by one over the two-year count and averaged about 70 individuals. Koonz and Taylor (2003) considered this vulture to be an uncommon migrant

in the Pembina River Valley and seeing greater than 10 on a spring day in Manitoba was thought to be unusual. On four separate days during the two count years, observers counted more than 10 vultures.

Bald Eagle numbers in 2006 were the highest on record for the Windygates site and for the province during spring counts. On 29 March 2005, observers recorded 147 Bald Eagles, surpassing the previous daily record for the Windygates site of 143 Bald Eagles seen on 3 April 1997 (Sherrington 1998; Koonz 2003). On 26 March 2006, a new local and provincial one-day spring record was set for Bald Eagles – 174 individuals. The old provincial record of 168 was set in 2001 near St. Adolphe (Koonz 2003). But records are meant to be broken and one week later, on 1 April 2006, 245 Bald Eagles were counted.

Northern Harriers were more numerous in 2005 than in any previous year, however, greater monitoring effort likely accounted for the higher count. In 1989 and 1990, 71 and 87 were recorded, respectively, (A. and D. Schritt, unpubl. data) but in most other years their numbers were much lower.

Of the three accipiter species which migrate through the valley, the Sharp-shinned Hawk was the most abundant. In both years numbers exceeded 500 birds and in 2006 observers counted more than double the number of the previous high count of 277 birds seen on 14 April 2001 (Holland and Taylor 2003). Sharp-shinned Hawks also outnumbered Cooper's Hawks by 10 to one during the two year count. Even though monitoring efforts were greater in 2005 and 2006, Cooper's Hawk numbers failed to exceed past high counts. In 1989 and 1990, 102 and 84 Cooper's Hawks were seen, respectively (A. and D. Schritt

unpubl. data). Northern Goshawk numbers were variable but in 2005 outnumbered (56) St. Adolphe's high count of 47 made on 31 March 1993 (Sliworsky and Taylor 2003).

Swainson's and Ferruginous hawks were rare migrants during both count periods. Both species breed in southwestern Manitoba, west of the Windygates count site (De Smet 2003, Gardner 2003). Arctic-breeding Rough-legged Hawks migrated through the Pembina Valley in small but equal numbers in both years.

Daily Red-tailed Hawk numbers exceeded 3000 in four separate years: 1989, 1997, 2001 and 2006. The highest count made for the Windygates site was on 3 April 1997 when 3671 individuals were counted (Sherrington 1998; Berger and Taylor 2003).

The Windygates site appears to be the best site in Manitoba to view high numbers of migrant Golden Eagles. We believe that more Golden Eagles may migrate through the valley as this species is an early migrant (see Sherrington 2006). Earlier starts to the Windygates count would probably increase the number seen.

The Merlin was the most common of the three falcon species that migrated through the valley in spring. Thirteen or fewer American Kestrels were seen during the two counts and Peregrine Falcons were very rare in migration at the Windygates site with one or two seen each spring.

Birders have counted raptors in the Pembina Valley for over 20 years, usually when the weather and winds were favorable for a good count. Even though the 2005 and 2006

migration monitoring effort was greater than in any previous year since 1985, total numbers of species and individuals were not necessarily higher than when observers paid only 10 or more visits to the valley in a given year. For example, 14 visits to the same location in the spring of 1990 resulted in a Red-tailed Hawk count of 6634 (A. and D. Schritt, unpubl. data). In 2005, 6546 Red-tailed Hawks were seen in 29 days. In 1997, Red-tailed Hawks numbered 6710 individuals during only 10 days of observations (Sherrington 1998) and yet exceeded the more intensive and longer counts of 2005 and 2006. One explanation may be that previous opportunistic visits were made during peak Red-tailed Hawk migration days, thereby counting peak migrating hawks.

The Northern Great Plains in Canada and the United States are characterized by vast expanses and little relief to favour concentrations of migrating raptors (Street 2006, Sherrington 2006). The Pembina Valley, however, provides favourable geographical and climatological conditions which are attractive to migrating raptors. In fact, the Windygates site ranks as the highest spring raptor count site in western North America. The 2005 and 2006 Windygates total spring raptor counts each exceeded spring counts of at Pacific Flyway (McDermott 2005), Western Mountain Continental Flyway (Sandia Mountains, New Mexico 1985-2005; Mount Lorette, Alberta 1992-2005) (Sherrington 2006) and Eastern Continental Flyway (2001-2005) sites except for Fort Smallwood, Maryland (Kellogg 2006). In the Central Continental Flyway, however, average counts from seven of 11 sites (Street 2005, 2006), exceeded Windygates' total raptor counts. A single count from the Straits of Mackinaw in Michigan (Street 2005) also exceeded Windygates' total counts.

The Windygates site also ranks among the top spring North American sites for migrating Red-tailed Hawks. The Eastern and Western Mountain continental flyways all average fewer than 1000 Red-tailed Hawks each spring (Kellogg 2006; Sherrington 2006). In the Central Continental Flyway, the Windygates site is well in the range of the top site at West Skyline in Duluth, Minnesota (Table 5).

## **6.0 RECOMMENDATIONS**

We recommend that the Pembina Valley spring raptor migration continue to be monitored annually in a standardized manner. Long-term monitoring is essential to assessing trends and abundance of migrating raptors in Manitoba. These data also provide a baseline to monitor potential environmental and anthropomorphic impacts. Extending the migration count earlier into March and later into April would facilitate recording early Golden and Bald eagle arrivals and late arriving Swainson's Hawks, respectively. We recommend that the Windygates raptor data be shared with the larger raptor community to benefit raptor conservation on an international level.

**Table 5.** Red-tailed Hawk total counts in the Central Continental Flyway of North America, spring 2001-2005<sup>1</sup>.

Count Site	Province/State	Year					Mean	N <sup>2</sup>
		2001	2002	2003	2004	2005		
Windygates	Manitoba	-	-	-		6550	6550	1
West Skyline, Duluth	Minnesota	5414	7309	5733	7398	2651	5701	5
Chequamegon, Ashland	Wisconsin	678	405	1351	1373	-	951.8	4
Whitefish	Michigan	1251	1699	1537	1871	2523	1776.2	5
Port Huron	Michigan	319	563	418	481	397	435.6	5
Straits of Mackinaw, Mackinaw City	Michigan	-	-	-	5388	-	5388	1
Ripley	New York	376	613	1483	1324	1521	1063.4	5
Hamburg	New York	981	1223	1779	1167	1368	1303.6	5
Braddock Bay, Greece	New York	2845	3249	4717	4281	2004	3419.2	5
Derby Hill, Oswego County	New York	4786	5805	6760	4701	4022	5214.8	5
Eagle Crossing, St. Stanislas de Kostka, Valleyfield	Quebec	966	895	1353	937	1459	1122	5
Niagara Peninsula, Grimsby	Ontario	2358	2033	2258	2513	2693	2371	5
Bélvédère Raoul Roy, Bic National Park, Saint- Fabien	Quebec	-	1942	3040	4879	3634	3373.8	4

<sup>1</sup> Information from Street (2005, 2006) except Windygates data (this report).

<sup>2</sup> Sample size.

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## **APPENDICES**

**Appendix 1.** Example of data sheet used for the Pembina Valley raptor monitoring project.

**Pembina Valley Raptor Migration 2005**

Date \_\_\_\_\_ Location \_\_\_\_\_

Temperature & Wind: 8 am \_\_\_\_\_ noon \_\_\_\_\_ 4pm \_\_\_\_\_

Sky & Precipitation: 8 am \_\_\_\_\_ noon \_\_\_\_\_ 4 pm \_\_\_\_\_

Observers: \_\_\_\_\_

Start time \_\_\_\_\_ Finish time \_\_\_\_\_ Total Hours \_\_\_\_\_

Species / Time	8	9	10	11	12	1	2	3	4	5	6	7	Total
Turkey Vulture													
Bald Eagle (adult)													
(imm.)													
Golden Eagle (adult)													
(imm.)													
Northern Harrier													
Northern Goshawk													
Cooper's Hawk													
Sharp-Shinned Hawk													
Red-Tailed Hawk (lt)													
(dk.)													
Rough-Legged Hawk (lt.)													
(dk.)													
Ferruginous Hawk													
Swainson's Hawk													
Broad-Winged Hawk													
Peregrine Falcon													
Prairie Falcon													
Merlin													
American Kestrel													
Osprey													
Red-Shouldered Hawk													
Owls													
Canada Goose													
Snow Goose													
Ross's Goose													
White-Fronted Goose													
American White Pelican													
Double Crested Cormorant													
Tundra Swan													
Sandhill Crane													
Great Blue Heron													
Mallard													
Pintail													
Common Merganser													
Hooded Merganser													
Wood Duck													
Northern Shoveler													

**Appendix 2.** Scientific names of migratory raptors counted near Windygates, Manitoba  
(spring 2005 and 2006).

Turkey Vulture .....	<i>Cathartes aura</i>
Osprey .....	<i>Pandion haliaetus</i>
Bald Eagle .....	<i>Haliaeetus leucocephalus</i>
Northern Harrier .....	<i>Circus cyaneus</i>
Sharp-shinned Hawk .....	<i>Accipiter striatus</i>
Cooper's Hawk .....	<i>Accipiter cooperii</i>
Northern Goshawk .....	<i>Accipiter gentilis</i>
Swainson's Hawk .....	<i>Buteo swainsoni</i>
Red-tailed Hawk .....	<i>Buteo jamaicensis</i>
Ferruginous Hawk .....	<i>Buteo regalis</i>
Rough-legged Hawk .....	<i>Buteo lagopus</i>
Golden Eagle .....	<i>Aquila chrysaetos</i>
American Kestrel .....	<i>Falco sparverius</i>
Merlin .....	<i>Falco columbarius</i>
Peregrine Falcon .....	<i>Falco peregrinus</i>

**Appendix 3.** March and April temperature and precipitation data for select weather stations near Windygates, Manitoba  
(2005 and 2006).

**Table 1.** Temperature and precipitation data for March and April 2005 at three locations near Windygates, Manitoba.

	Normal	2005			Normal	2005	Normal	2005			Normal	2005
Location	March Temp. (°C)	Mean March Temp. (°C)	Mean Min. March Temp. (°C)	Mean Max. March Temp. (°C)	March Precip. (mm)	Total March Precip (mm)	April Temp. (°C)	Mean April Temp. (°C)	Mean Min. April Temp. (°C)	Mean Max. April Temp. (°C)	April Precip. (mm)	Total April Precip. (mm)
Morden, Manitoba <sup>1</sup>	-4.9	-5.8	-10.7	-0.8	25.0	14.7	4.7	8.0	2.3	13.6	35.5	24.8
Pilot Mound, Manitoba <sup>1</sup>	-6.5	-7.6	-13.2	- 2.0	22.7	12.2	3.5	6.3	0.3	12.4	35.9	16.8
Langdon, North Dakota <sup>2,3</sup>	-6.1	-7.2	-12.2	-1.7	15.5	M <sup>4</sup>	3.3	7.2	1.1	12.8	25.4	29.7

<sup>1</sup> Source: ([www.climate.weatheroffice.ec.gc.ca](http://www.climate.weatheroffice.ec.gc.ca)).

<sup>2</sup> Source: ([www.ndawn.ndsu.nodak.edu/](http://www.ndawn.ndsu.nodak.edu/)).

<sup>3</sup> Langdon Experimental Farm.

<sup>4</sup> M= missing data.

**Table 2.** Temperature and precipitation data for March and April 2006 at three locations near Windygates, Manitoba.

	Normal	2006			Normal	2006	Normal	2006			Normal	2006
Location	March Temp. (°C)	Mean March Temp. (°C)	Mean Min March Temp. (°C)	Mean Max March Temp. (°C)	March Precip. (mm)	Total March Precip. (mm)	April Temp. (°C)	Mean April Temp. (°C)	Mean Min April Temp. (°C)	Mean Max April Temp. (°C)	April Precip. (mm)	Total April Precip. (mm)
Morden, Manitoba <sup>1</sup>	-4.9	-4.7	-8.0	-1.4	25.0	55.1	4.7	9.0	3.0	14.9	35.5	20.1
Pilot Mound, Manitoba <sup>1</sup>	-6.5	-6.4	-10.4	-2.4	22.7	0.0	3.5	7.2	1.3	13.2	35.9	0.0
Langdon , North Dakota <sup>2,3</sup>	-6.1	-6.1	-10.0	-2.2	15.5	M <sup>4</sup>	3.3	7.8	1.7	13.3	25.4	32.3

<sup>1</sup> Source: ([www.climate.weatheroffice.ec.gc.ca](http://www.climate.weatheroffice.ec.gc.ca)).

<sup>2</sup> Source: ([www.ndawn.ndsu.nodak.edu/](http://www.ndawn.ndsu.nodak.edu/)).

<sup>3</sup> Langdon Experimental Farm.

<sup>4</sup> M= missing data.

**Appendix 4.** Summary of data for the 2005 and 2006 raptor counts near Windygates, Manitoba.

**Table 1.** Species and numbers of raptors seen during 13-31 March 2005 near Windygates, Manitoba.

Species	March 2005																					
	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Totals
Turkey Vulture																		1		1		2
Bald Eagle								9	32	75	31	4	5	26	29	33	35	43	147	44	16	529
Northern Harrier										3	2		1	1	1	8	18	12	4	2	4	56
Sharp-shinned Hawk																	5	2	14	1	2	24
Cooper's Hawk																	1			1		2
Northern Goshawk			1						2	5	4		1	9	3	2	1	4	5	1	5	43
Swainson's Hawk																			1			1
Red-tailed Hawk									4	11	25	1	7	42	120	226	255	296	846	232	341	2406
Ferruginous Hawk																						0
Rough-legged Hawk															1	3	3		1	2	2	12
Golden Eagle			1					1	4	16	2			7	7	1	1	3	4	2	2	51
American Kestrel										1								1				2
Merlin																	3	2	1			6
Peregrine Falcon																						0
Total raptors			2					10	42	111	64	5	14	85	161	273	322	364	1023	286	372	3134

**Table 2.** Species and numbers of raptors seen during 1 April–4 May 2005 near Windyates, Manitoba.

Species	April 2005													May 2005	Totals
	1	2	3	4	5	6	7	8	9	10	11	13	23	4	
Turkey Vulture	1		3	10	2	9	20	9	2	9		2			67
Bald Eagle	35	81	122	34	45	34	8	9	2	3					373
Northern Harrier	7	9	25	7	5	4	16	11	3	9		2			98
Sharp-shinned Hawk	16	42	79	71	125	57	109	12	2	2					515
Cooper's Hawk	2		8	9	1	4	2	7	4	3		1			41
Northern Goshawk	6	2	2							3					13
Swainson's Hawk									1						1
Red-tailed Hawk	837	1007	1386	192	203	237	134	70	31	39		4			4140
Ferruginous Hawk	1														1
Rough-legged Hawk			3	2	12	3	2	1		2					25
Golden Eagle	5			1	2		2	1							11
American Kestrel		1	2	1			1		1						6
Merlin	1	2	1	1		1		1							7
Peregrine Falcon									1						1
<b>Total raptors</b>	911	1144	1631	328	395	349	294	121	47	70	0	9	0	0	5299



**Table 3.** Species and numbers of raptors seen during 11–31 March 2006 near Windygates, Manitoba.

Species	March 2006																					
	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Totals
Turkey Vulture																						0
Osprey																						0
Bald Eagle	4	12		5	26	8	7	48	20	5	20	8	6	15	11	174	1	50	3		5	428
Northern Harrier															1	4	2	5	7			19
Sharp-shinned Hawk									1									12	1			14
Cooper's Hawk					1											1						2
Northern Goshawk							2	4	1					1		5					1	14
Swainson's Hawk																						0
Red-tailed Hawk					1			1	5	1	4	2	3	10		97	4	427	18		308	881
Rough-legged Hawk											1			1		5		2				9
Golden Eagle		6		2	5	2	3	7	6	7	4	1	3	5	1	16					3	71
American Kestrel															1	2						3
Merlin																3	1	2	3		2	11
Peregrine Falcon																						0
Total raptors	4	18	0	7	33	10	12	60	33	13	29	11	12	32	14	307	8	498	32	0	319	1452

**Table 4.** Species and numbers of raptors seen during 1 –18 April 2006 near Windygates, Manitoba.

Species	April 2006																		Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Turkey Vulture				1	1	2		5	1	11	3	3	14	13	5	5	5	1	70
Osprey											1			1					2
Bald Eagle	245	17	42	68	40	38	4	11	15	5	1		2	4	2		1		495
Northern Harrier	21	2		11	6	5	5	5	4	9	1	3	9	7	1	1			90
Sharp-shinned Hawk	86	3	4	34	178	162	4	28	26	16	6	4	22	38	23		1		635
Cooper's Hawk	1		1	4	5	3	1	9	8	4		2	15	12	4	2	1	1	73
Northern Goshawk	2	1		1	1			1		6				1					13
Swainson's Hawk										2			6	2	4				14
Red-tailed Hawk	3244	131	581	604	723	295	30	150	98	65	2	23	95	97	78	5	4	1	6226
Rough-legged Hawk	3	1		2	6	7		4	3	1						1			28
Golden Eagle	3			1			1	2	1					2					10
American Kestrel		1	1	1	1	1								2	1		1	1	10
Merlin	6	2		5	6	2							2	1	1	1	1		27
Peregrine Falcon					1					1									2
<b>Total raptors</b>	3611	158	629	732	968	515	45	215	156	120	14	35	165	180	119	15	14	4	<b>7695</b>