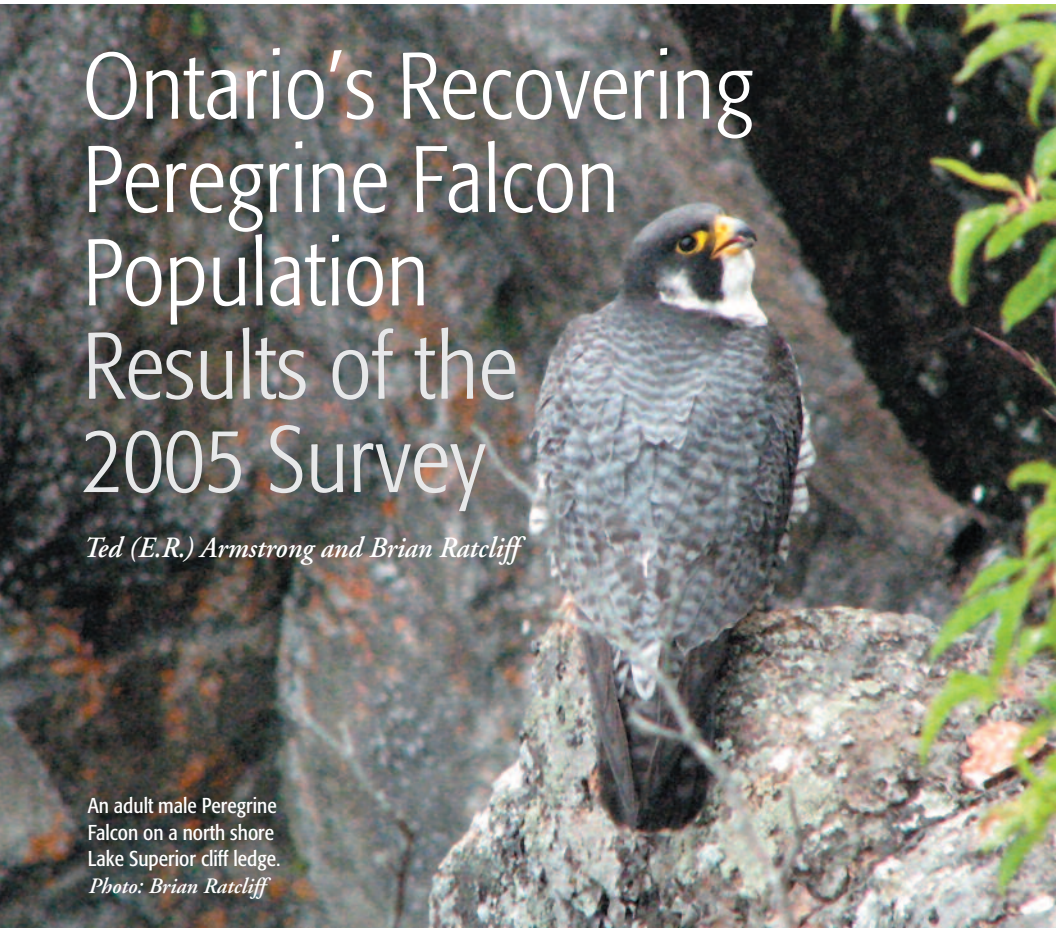
Ontario's Recovering Peregrine Falcon Population Results of the 2005 Survey

Ted (E.R.) Armstrong and Brian Ratcliff



An adult male Peregrine Falcon on a north shore Lake Superior cliff ledge. *Photo: Brian Ratcliff*

Introduction

The Peregrine Falcon (*Falco peregrinus*) disappeared as a breeding species in Ontario in the early 1960s, primarily as a result of DDT contamination. The *anatum* subspecies of the Peregrine Falcon was designated as endangered in Ontario in 1977, and nationally in 1978. Identified priorities of the resulting National Recovery Plan (Erickson *et al.* 1988) were population monitoring, addressing low productivity as a result of pesticides, and preserving the gene pool (Erickson *et al.* 1988). Other recovery efforts included prohibitions on the use of DDT in Canada, and the release of captive-reared young across Canada. A total of 592 young Peregrine Falcons was released into the wild between 1977-2005 (OMNR data). Since recovery efforts were initiated, Peregrine Falcon numbers have dramatically increased both nationally and in Ontario (Holroyd and Banasch 2003, Armstrong 2007).

Population monitoring is addressed as part of the National Recovery Strategy primarily through coordinated national surveys conducted every five years (Cade and Fyfe 1970, Fyfe *et al.* 1976, Murphy 1990, White *et al.* 1990, Holroyd and Banasch 1996, Rowell *et al.* 2003, Banasch and Holroyd 2004). Since 1970, Ontario has participated in these nation-wide surveys to determine site occupancy, productivity, and population trends. Additionally, several local monitoring programs continue annually between these 5-year surveys. We are reporting here on the results of the 2005 survey, prior to initiation of the upcoming 2010 survey.

Survey Methods

The 2005 survey was designed using the same format as the 2000 Ontario Peregrine Falcon survey (Ratcliff and Armstrong 2002) and consistent with the national survey protocol. A combination of volunteers, naturalist organizations, Parks Canada and Ontario Ministry of Natural Resources (OMNR) staff coordinated surveys of historic and currently active nest sites, as well as areas with high potential as nesting habitat. A number of communication measures were undertaken to raise public awareness of the survey and to solicit reports of Peregrine Falcon breeding activity. The 2005 survey also coincided with and benefited from the final year of the most recent Ontario Breeding Bird Atlas (Cadman *et al.* 2007).

Field surveys were timed to regional breeding chronology. Nesting chronology of Peregrine Falcons is generally earlier in southern Ontario than in northern Ontario (Figure 1). In northern Ontario, Peregrine Falcons return to nest sites in late March and begin egg laying in late April. In southern Ontario, many urban nesting birds no longer migrate and maintain territories throughout the year. Egg laying is often initiated in mid-March, about one month earlier than the earliest date noted for historical southern Ontario cliff nests of April 23 (Peck and James 1983). Northern Ontario was defined for this survey as all of the province north of the French and Mattawa River systems; southern Ontario includes that portion of the province south of these rivers.

Cliff Monitoring

All active cliff breeding sites identified in previous surveys were re-surveyed. Efforts were also made to check additional cliff sites with high potential, as well as all known historic nesting sites. Helicopter surveys have proven to be an effective and efficient method for surveying Peregrine Falcon nesting activity along remote cliffs with limited access and abundant, high quality habitat. These areas include Algonquin Park, the Bruce Peninsula, the Ottawa River, the north shore of Lake Huron, Lake Nipigon, and the Lake Superior Basin. Helicopter survey windows were identified

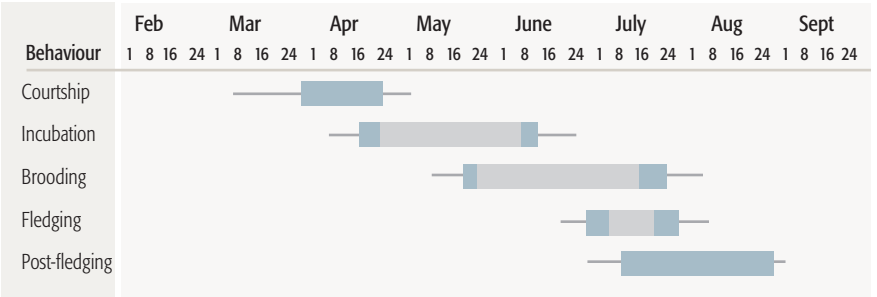


Figure 1a. Approximate nesting chronology for Northern Ontario Peregrine Falcons obtained from the recorded observations in the Peregrine Falcon nesting status reports from 2000 – 2004. This figure pertains to 112 nests and 212 young over the five year duration. The lines indicate the observed range for each behaviour while the solid bars indicate when the majority of each behaviour occured. The grey area signifies the range when approximately 80% of the behaviour occurred. It was assumed that the incubation and brooding periods have a duration of 33 days and 40 days respectively.

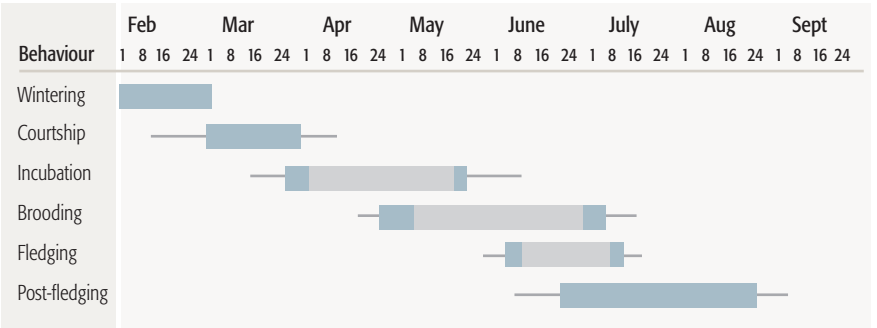


Figure 1b. Approximate nesting chronology for Southern Ontario Peregrine Falcons obtained from the recorded observations in the Peregrine Falcon nesting status reports from 2000 – 2004. This figure pertains to 41 nests and 59 young observed over the five year duration. The lines indicate the observed range for each behaviour while the solid bars indicate when the majority of each behaviour occured. The grey area signifies the range when approximately 80% of the behaviour occurred. It was assumed that the incubation and brooding periods have a duration of 33 days and 40 days respectively. Out of the 13 nesting sites in the 2004 nesting season, it was observed that 62% of the mature falcons overwintered at the nest site while 15% returned in the spring. There was no data for the remaining 23%.

as the best survey dates both to confirm nesting activity and to count the number of young at each nest site for productivity estimates. Surveys were conducted in late May in southern Ontario, and during the second week of June in northern Ontario. Some cliff sites were also monitored from the ground or by water.

Urban Areas Monitoring

Most urban nesting sites are known, and many are monitored annually by local monitoring programs. Data on urban nesting Peregrine Falcons were obtained from existing nest monitoring programs, and additional reports of new nesting sites that were received.

Evidence of Breeding and Productivity

Progressive levels of breeding activity were recorded as follows:

- **Occupied Territory** — a single adult Peregrine Falcon observed in suitable habitat throughout part or all of the breeding season;
- **Territorial Pair** — confirmation of a pair on territory during the breeding season; and
- **Confirmed Nesting Attempt** — the highest level of breeding activity, indicated by an adult sitting on a scrape, the presence of eggs, nestlings or recently fledged young.

Banding of young Peregrine Falcons at nest sites was undertaken in northwestern and southern Ontario where it could be feasibly and efficiently coordinated with monitoring activities. Banding studies provided additional productivity information. The presence of young of banding age (approximately three weeks or older) was used as an estimate of the number of young fledged. While this is likely an overestimate of productivity, this provides annual reference data at a point in the nesting cycle where nestling mortality declines significantly.

Origin of Territorial Birds

At each territory, efforts were undertaken to identify the origin of adult birds by the presence or absence and colour of legs bands as follows:

- unbanded — a wild-reared bird from either Canada or the U.S.;
- black colour band — a Canadian wild-reared bird;

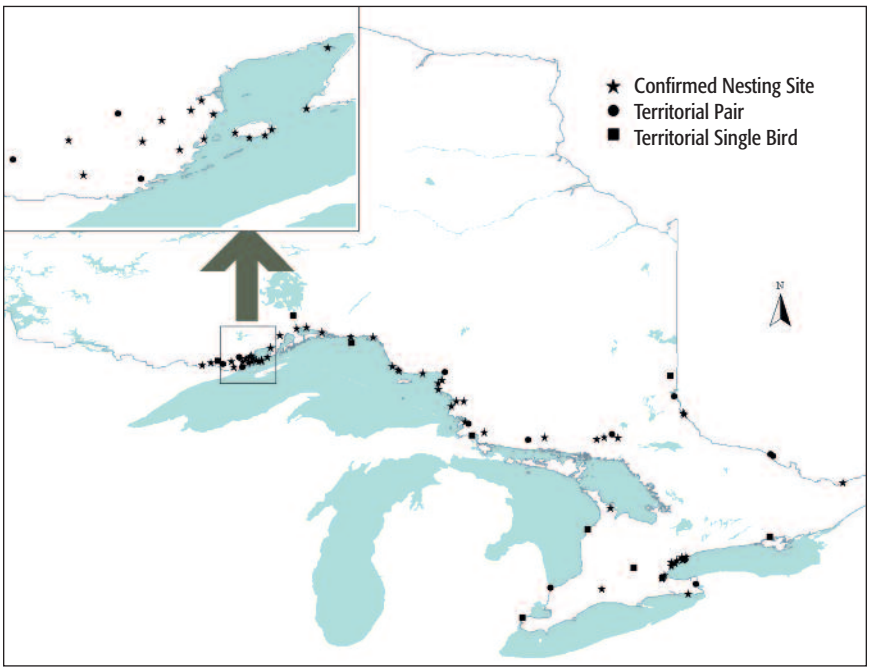


Figure 2. Location of confirmed Peregrine Falcon territories in Ontario, 2005

- red colour band — a Canadian released bird;
- bicoloured band (black over green or black over red), or purple-anodized U.S.F. & W.S. band — a U.S. wild-reared bird;
- gold-anodized U.S.F. & W.S. band — a U.S. released bird; and
- plain silver U.S.F & W.S. band — a Canadian wild-reared bird, or a bird banded at a banding station while on migration.

Results

Confirmed Peregrine Falcon breeding activity was recorded at 78 active sites, comprising 54 confirmed nesting attempts, 13 territorial pairs and 11 single birds occupying territories (Figure 2, Table 1). Four of these territorial pairs nested in Quebec, Michigan or New York, with significant parts of their territory in Ontario. Of the 78 territories, 53 (68%) were located in northern Ontario, while 25 (32%) were from southern Ontario. The highest number of territories (43, or 55%) occurred within the Lake Superior Basin.

Seventeen new territories were located that had not been documented previously — 9 in the north and 8 in the south. Eleven territories that were active in 2000 were not occupied in 2005. The trend in the number of territories recorded in Ontario between 1980-2005 is shown in Figure 3.

Cliffs made up the majority of Peregrine Falcon territories in Ontario — 53 (68%) were associated with cliffs (Figure 4), while 17 (22%) were associated with buildings (Table 2). Smaller numbers of territories were associated with bridges (4), open pit mines (3) and smokestacks (1). Of the confirmed nesting attempts, 39 were on cliffs, 12 on buildings, 2 in open pit mines, and 1 on a bridge.

Forty-six (85%) of the 54 nest attempts were considered successful in fledging at least 1 young (Table 3). Estimated productivity was:

- Average number of chicks fledged/ pair (N= 63) -2.0
- Average number of chicks fledged/ nest attempt (N= 54) -2.3
- Average number of chicks fledged /successful nest (N= 46) -2.7

Figure 3. Trend in the number of Peregrine Falcon territories in Ontario based on 5-year surveys, 1970-2005.
This trend closely fits a 2-factor polynomial curve with high significance (y = 4.3 x 2 – 14.7x + 10.5; y = number of territories; x = number of 5-year periods starting in 1980; R2 = 0.9766).

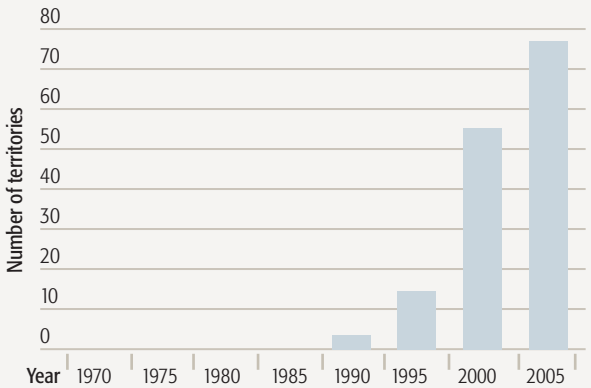


Table 1. Overall summary results of the 2005 Ontario Peregrine Falcon survey.

Breeding Status	Northern Ontario	Southern Ontario	Number
Confirmed nesting attempts	40	14	**54**
Territorial pairs	7	6	**13**
Occupied territories	6	5	**11**
Total	53	25	**78**

Four of the territorial pairs were recorded as territorial pairs in Ontario but were successfully nesting in New York, Michigan and Quebec. All pairs utilize significant portions of Ontario as their hunting and perching territories. These birds are included in the total number of territories, but are not included in numbers of nesting attempts, successful nests or number of young fledged.

Table 2. Peregrine Falcon territory type identified during the 2005 survey.

Territory Type	Northern Ontario	Southern Ontario	Total (%)
Cliff	49	4	**53 (68.0)**
Building	0	17	**17 (21.8)**
Open Pit Mine	3	0	**3 (3.8)**
Bridge	1	3	**4 (5.1)**
Stack	0	1	**1 (1.3)**
Total	**53**	**25**	**78 (100.0)**

Table 3. Estimated productivity of Peregrine Falcons by nest site type, 2005.

Nest Site Type	Confirmed nesting attempts	Successful nests (no. fledged young)	No. Fledged young	No. Fledged young/nesting attempt	No. Fledged young /successful nesting attempt
Cliff	39	34	89	2.28	2.62
Building	12	10	32	2.66	3.20
Mine	2	2	5	2.50	2.50
Bridge	1	0	0	0.00	0.00
Totals	**54**	**46**	**126**	**2.33**	**2.74**

Table 4. Origin of known territorial adult Peregrine Falcons identified during 2005 and 2000 surveys.

Origin	2005 Survey (%)	2000 Survey (%)
United States release program	0 (0.0)	4 (11.5)
Canadian release program	1 (2.3)	5 (14.0)
Unbanded birds (wild origin)	18 (40.9)	12 (34.0)
Canadian wild banded	10 (22.7)	3 (9.0)
United States wild banded	8 (18.2)	4 (11.5)
United States banded unknown origin	4 (9.1)	0 (0.0)
Birds banded but not identified	3 (6.8)	7 (20.0)
Total	**44** (100)	**35** (100)

Figure 4. Lake Nipigon island cliff site, surveyed and inactive in 2005, with nesting activity first recorded in 2006. *Photo: Rob Swainson*

Productivity was highest at southern Ontario urban sites (Figure 5), averaging 3.2 fledged young per successful nest, compared with 2.6 for northern cliff sites.

Forty-four adults were identified on territory by banding status — 1 from a captive release program, 36 were wild-reared, and 7 were banded but of unknown origin (Table 4).

Discussion

Falcon population continues to increase. In 2005, there was an increase of 25 territories (47%) over the last provincial survey. The 78 occupied territories documented during the 2005 survey represented the highest number of territories ever recorded in Ontario. Since the last province-wide survey in 2000, additional territories have been documented annually, with 52 new territories documented between 2001 and 2005 (OMNR data), and seventeen new territories in 2005 alone. Not all territories are occupied annually.

The rate of population increase is remarkable, given that the first confirmed nesting record after the population collapse only occurred in 1986. Ontario Breeding Bird Atlas records suggest a similar rate of population recovery, increasing from only 3 squares with breeding evidence in the first atlas in the early 1980s (none of which were confirmed nesting) to 96 squares in the second atlas in the early 2000s (Armstrong 2007). Projections suggest that Ontario's Peregrine Falcon population will continue to increase, perhaps until the available nesting habitat becomes saturated. There is no reliable estimate of the provincial population prior to the DDT-induced population collapse in the mid-20th century. During historical times, much of the highest quality cliff habitat across the north was inaccessible, and there were few observers and even fewer who recorded their observations (many of those who did document early nest records collected eggs or nestlings for museum or private collections). While historical records are sparse and spotty, there are 48 documented historical nesting sites (confirmed or suspected) from 1848-1963 (OMNR data). The actual size of the historical nesting population would have been much higher.

Ontario's Peregrine Falcon population continues to be partitioned into distinct northern and southern populations. Territories in northern Ontario were distributed mainly on cliff sites, from the Lake Superior Basin to Lake Timiskaming, while in southern Ontario territories were primarily associated with buildings in urban centres. There is little mixing of

Figure 5. An adut Peregrine Falcon near an urban nesting site, Greater Toronto area.
Photo: Mark Heaton / www.peregrinefoundation.ca

birds reared in either rural or urban environments (Holroyd and Banasch 1990), an observation also found from Ontario banding returns. The greatest proportion of territories (55%) occurred in the Lake Superior Basin. As the infilling of territories and the expansion of range continues in both northern cliffs and southern urban sites, Peregrine Falcons are still not re-occupying the majority of the historically documented cliff-nesting sites in south-central and eastern Ontario. If the pattern of distinct urban and cliff populations continues, reoccupancy of this area may rely on gradual infilling from more northern cliff-nesting birds rather than expansion from the geographically closer urban population. There was essentially no increase in cliff-nesting in southern Ontario since the 2000 survey, with only one cliff nest site located on the Bruce Peninsula. However, a portion of the territory occupied by the Niagara Falls pair was in Ontario, while the pair nested on a cliff ledge in the New York side of the gorge.

Surveying northern cliffs is challenging due to the remoteness and the large amount of potential habitat. In the western Lake Superior Basin, where there are many cliffs, most of the highest quality cliff sites are now occupied, and Peregrine Falcons are beginning to use some of the lower quality sites (i.e. lower cliff

heights, shorter linear extents of cliff face). Some lower quality cliffs were not surveyed, and thus some active territories in both northern and southern Ontario may have been missed. Similarly, Peregrine Falcons traditionally have been using buildings of more than 18 stories, but in 2005, a Scarborough nest site was on a 5-story building (M. Heaton pers. comm.). It is probable that more marginal cliff sites and smaller buildings will be used in future years as the population continues to expand.

The trend towards increasing Peregrine Falcon numbers in Ontario parallels that in adjacent jurisdictions. Similar population trends have been observed across southern Canada, except that Ontario's population recovery appears to have started later and been more rapid (Rowell *et al.* 2003). Each year since 1987 there has been a year-to-year increase in the number of Peregrine Falcon territorial pairs recorded in the Midwest U.S., and northwestern Ontario (Tordoff *et al.* 2005). The number of territorial pairs increased from 2000 to 2005 in the adjacent jurisdictions of Michigan, Minnesota, New York and Wisconsin (Tordoff *et al.* 2005, Loucks 2008). The opportunity for recruitment from these adjacent populations into the Ontario population is very high, and Ontario birds are similarly contributing to the U.S. breeding population. Although 2005 data are not available, in 2004, 7 Ontario banded birds were confirmed breeding in the Midwest U.S., including Minnesota (2), Michigan (2), Ohio (2) and Wisconsin (1) (Tordoff *et al.* 2004). Both Minnesota birds were cliff nesters from Ontario cliffs, while the other 5 were urban nesting birds from southern Ontario urban nests.

Naturally-reared birds now make up almost the entire breeding population, another sign of population recovery. Only 2% of the identified banded adults originated from Canadian or U.S. release programs, a significant decrease from the 24% identified during the 2000 survey (Ratcliff and Armstrong 2002). This can be attributed to the ending of major release programs nation-wide and the continued expansion of the wild-reared population. More than twice the number of young were fledged naturally in 2005 as were released during the peak of the release program in Ontario (i.e. 126 vs. 54). Canadian wild-banded adults increased from 9% in 2000 to 23% in 2005, while unbanded birds, reflecting wild-reared birds from Canada and/or the U.S., increased from 34% to 41%.

The productivity of Ontario's Peregrine Falcon population remains high. The number of successful breeding pairs located in 2005 was the highest ever recorded in Ontario, and the record number of chicks that were assumed to have fledged was almost double the productivity of 2000 (126 vs. 68 respectively). The estimated productivity of 2.72 chicks/successful nest is comparable to the 2.62 young/successful nest recorded in 2000 (Ratcliff and Armstrong 2002) and the 2.8 young/successful nest average noted in the Midwest U.S. (Tordoff *et al.* 2004).

The original goal of the Peregrine Falcon recovery program, initiated in the 1970s, was to re-establish the Peregrine

Falcon as a breeding species in Ontario. The current Ontario population exceeds the objectives established for the original Recovery Plan (Erickson *et al*. 1988), although this alone cannot be a sign of full recovery — those recovery objectives were developed at a time when there was no breeding Peregrine Falcon population in Ontario, and the prospects for success were far less clear. Reflecting this improvement, and based largely on the positive population trends evidenced over the past several provincial and national surveys, the status of the Peregrine Falcon was downlisted recently from Endangered to Threatened in Ontario (Ontario Ministry of the Environment 2006), and recommended for a status of Special Concern nationally (COSEWIC 2007). The prospects for continued recovery of the Peregrine Falcon population in Ontario continue to look very promising. The 2010 national Peregrine Falcon survey will provide the next opportunity to check on the status of the recovery this species in Ontario.

A Follow-up Note Regarding the 2010 Peregrine Falcon Survey

Ontario is once again participating in the national Peregrine Falcon survey in the spring and summer of 2010. Ontario birders and ornithologists are encouraged to be on the lookout for observations of Peregrine Falcons during their breeding season, and to report their observations through a local monitoring program, your local Ontario Ministry of Natural Resources district office, or to jenn.chikoski@ontario.ca

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Ted (E.R.) Armstrong, Ontario Ministry of Natural Resources, 435 James St. S., Suite 221a, Thunder Bay ON P7E 6S8

Brian Ratcliff, Ontario Ministry of Natural Resources, 435 James St. S., Suite 221a, Thunder Bay ON P7E 6S8