Population Size and Habitat Use of Ring-necked Pheasants Five and Three Years After Rehabilitation in Lambton and Elgin Counties, Ontario, Canada.

Report to Ontario Ministry of Natural Resources, Aylmer District

by

Ted Barney, Shannon Badzinski and Scott Petrie
Long Point Waterfowl & Wetlands Research Fund
Bird Studies Canada

Abstract

Dramatic decreases in Ring-necked Pheasant (*Phasianus colchicus*) populations have occurred across much of their North American range, including southwestern Ontario, since the 1970's. In 2002, the Ontario Ministry of Natural Resources initiated a pilot pheasant rehabilitation project in Lambton and Elgin Counties to asses the feasibility of establishing trap-and-transfer programs to re-establish pheasant populations in southwestern Ontario. This study was conducted to estimate pheasant numbers five and three breeding seasons after initial release in those Counties. Between January 11th and February 2nd, 2007, stratified line transects were run to estimate pheasant densities, total pheasant populations, and winter habitat use within the Elgin and Lambton study areas. Track count surveys were used to determine if such surveys could be used in future to index pheasant populations in southern Ontario.

No pheasants were observed on transects, or through landowner surveys, and no tracks were found in Lambton County. Pheasants were found in Elgin County and the best population estimate was 30 individuals inhabiting a 3 km radius around the initial release site. Pheasants observed in Elgin were found exclusively in grassland and shrubland habitats. Weather conditions limited track surveys in Elgin and no tracks were observed.

The rehabilitation of pheasants in Lambton appeared unsuccessful, but the small population in Elgin is somewhat encouraging. Winter cover is lacking on the landscape in both study areas and likely is the habitat type that is most limiting to pheasant populations in southwestern Ontario. If the goal is to establish a population large enough to support a trap-and-transfer program, then increasing the current population in Elgin County with more translocated wild pheasants is required. Provision of additional winter, nesting and brood rearing cover and management of existing cover should also be undertaken. Managers should focus future efforts in

areas with adequate pheasant cover and should maximize initial numbers of released pheasants. Monitoring pheasant population dynamics and reproductive success throughout the rehabilitation process would be useful. Changes to current pheasant hunting regulations (e.g. from 3 bird any sex limit to males only) should also be considered in areas where future pheasant transfers may occur.

1.0 Introduction

Ring-necked Pheasants (*Phasianus colchicus*), hereafter pheasants, are a naturalized game bird in North America that were originally introduced near the end of the 1800's from Asia (Fergus 2001). Established populations of pheasants occur throughout many mid-latitude agricultural areas from southern Canada to Utah, California to the New England states, and south to Virginia (Giudice and Ratti 2001). These populations do best in hay and cash crop agricultural regions, especially in areas with grassy field edges/hedge rows, wetlands, and numerous interspersed patches of idle land with tall grass, forbs and some brush and trees (Giudice and Ratti 2001). Pheasants are a highly sought after upland game species and may be the most well-studied Galliformes in the world (Giudice and Ratti 2001).

During the early 1900's, pheasant populations were sustained throughout much of their range, but since the 1970's, their numbers have declined substantially in most areas. Declines in wild pheasant populations in some regions, including southern Ontario, have been attributed to changes in agricultural practices, loss of habitat (both nesting and winter), and changes in density and composition of predator communities (Clark and Bogenschutz 1994, Perkins et al. 1997, Mitchell et al. 2001). Changes from small multicrop farms to large monoculture farms have resulted in loss of edge habitat, loss of wetland habitat, increased use of pesticides, advancement in hay-mowing dates, and increased numbers of grazing animals on grassland habitats, all of which have significantly decreased pheasant habitat and food availability (Giudice and Ratti 2001).

Predators of pheasants have adapted well to the agricultural change and many populations are now at record levels (Harris et al. 2000). Increased predator densities could largely limit pheasant numbers in areas where birds are sparse and isolated into small populations (Harris et al.

2000). For instance, population growth could be limited by increases in nest predation and/or decreased female and juvenile survival rates (Riley and Schulz 2001, Frey et al 2003).

There are no reliable estimates of how many naturalized pheasants currently remain in southern Ontario. Previous reports suggest numbers of pheasants are very low and individuals are distributed in localized populations throughout southwestern Ontario (Harris et al. 2000). Earlier attempts to augment these populations by releasing pen-reared birds were unsuccessful. These failed attempts were attributed to pen-reared birds being more susceptible to predators and having lower recruitment rates than wild pheasants (Kabat el al. 1955, Leif 1994).

In 1997, a group of Ontario outdoor writers proposed that the provincial government of Ontario should consider a pheasant rehabilitation program. It was suggested that naturalized pheasants should be translocated to southern Ontario from populations established elsewhere. This proposal was considered by the provincial government and the Ontario Ministry of Natural Resources and in 1997 the decision was made to conduct a risk assessment for the rehabilitation of pheasants. A comprehensive “Risk Assessment For The Rehabilitation of Ring-Necked Pheasants Populations in South Western Ontario” was conducted by LGL Limited Environment Research Associates for the Ontario Ministry of Natural Resources. The report concluded that the probability of a successful rehabilitation of pheasant populations in south western Ontario would be moderate and that chances for local rehabilitation, in pockets of suitable rehabilitated habitat with supporting management efforts would be high. During the winters of 2002-2004, a total of 210 pheasants were captured in Saskatchewan, transported to Ontario and released at two sites in Lambton and Elgin Counties. A total of 120 pheasants (36 male and 84 female), were released in Lambton County during 2002 and 2003. In 2004, 90 pheasants (27 male and 63 female), were released in Elgin County. Population monitoring was conducted for one year post-release at each site and included estimating survival, distribution, and presence of the birds in Lambton County.

The current size of the pheasant populations in Elgin and Lambton Counties and their habitat use has not been determined. Thus, this project was conducted to estimate population size and habitat use of pheasants at, and near, the original release sites five and three years, respectively, after the releases.

Project Objectives

1. Estimate winter population size and density of pheasants five and three breeding seasons after release in Lambton and Elgin Counties, respectively
2. Identify winter habitats used by pheasants in Lambton and Elgin Counties.
3. Determine if track counts can be used as an index for future population monitoring in southern Ontario
4. Make recommendations for future rehabilitation and management of pheasants in southern Ontario.

2.0 Methods

2.1 Study Area

The rural landscapes of Lambton and Elgin Counties are predominately agricultural farmlands (Figure 1, Table 1). No-till crop production has been widely practiced within these landscapes since the 1980's and roadside habitat destruction (e.g. mowing) has been minimized (Harris et al. 2000). These two counties have large areas of rolling uplands and riparian corridors, making them somewhat similar to the pheasants' native Saskatchewan landscape (P. Hunter, Ontario Ministry of Natural Resources, pers. comm.). The Lambton and Elgin study areas are approximately 110 km^2 and 30 km^2, respectively.

2.2 Line Transect Methodology

Pheasant population densities were estimated from line transect sampling (Burnham et al. 1980). This method has been used to estimate population densities of several upland game birds and non-game birds (Burnham et al. 1980, Guthery 1988, Delisle and Savidge 1997, Best et al. 1998, Wang Nan et al. 2004, Hart et al. 2006). Hart et al. (2006) used this method to estimate pheasant populations and juvenile production in California.

Line transect stratification

Line transect locations were pre-determined following a stratified design based on habitat type. Stratification focused survey effort within two potential broad pheasant habitat types; (1) uplands (e.g. grasslands, shrublands, riparian areas, and woodlots), and (2) lowlands (e.g. cattail marshes and flooded swamps) within the landscape. Habitat types were identified from 1:10,000 ortho photos and were placed into one of the following four cover type categories: (1) cropland (harvested corn, soybean and winter wheat, standing corn and soybeans, hay lands, and pasture lands); (2) upland (see above); (3) lowland (see above); and (4) developed land (residential areas, farm yards, roadways, railways, and ditches). Each individual habitat polygon (i.e., area on map that contains either upland or lowland) on the study area was numbered. Polygons initially were selected randomly with a random numbers generator. This random polygon selection limited bias and allowed for sampling of both edge and interior habitats.

Transect placement

Transects of a minimum 200m length were placed at least 500 m apart, and positioned systematically North/South or East/West to maximize area coverage of each selected polygon. Selected polygons were ground truthed by local volunteers to determine if they were located within appropriate upland or lowland habitats (i.e. grasslands, shrublands, or cattail marshes).

Polygons selected that were woodlots, flooded swamps, or harvested agricultural lands were either removed and a new polygon in an appropriate area (i.e. grasslands, shrublands, or cattail marshes) was selected, or eliminated from the study because these habitat types are not typical pheasant habitat. If a habitat polygon was selected adjacent to cropland, transects were placed perpendicular to the crop if possible so as to minimize the probability of overestimating the number of birds, given that pheasants tend to concentrate along cropland edges. To the extent possible, total transect distance per selected polygon was allocated at 1 kilometre/15 hectares (Guthery 1988). We opportunistically placed transects in standing corn and along upland habitat that occurred within croplands (approximately 5 man-hours in Elgin and 2-man hours in Lambton). Pheasants observed on opportunistic transects were not included in final estimations of population size and density, but were included in the minimum population estimate for both study areas (see below).

Survey methodology

Surveys were done between January 11th and February 2nd, 2007, and were conducted from one hour after sunrise to one hour before sunset. Pheasants are more visible during this period, as they are off of the roost and feeding or traveling between roosting and feeding sites (Johnsgard 1999). Transects were run once during the survey period and transects close to each other were sampled on the same day, which minimized double counting pheasants.

Volunteer dog handlers, data recorders, and Long Point Waterfowl and Wetlands Research Fund (LPWWRF) staff were divided into groups of approximately four. Dog handlers were required to work their dogs through habitat perpendicular to the transect line. The data recorder recorded all flushes, distances and angles determined by the observer. The observer was required to walk straight down the transect line, noting all flushed pheasants and corresponding angles and distance measurements, as well as noting all pheasant tracks and individual trails. The fourth individual in the group used a compass and/or GPS to ensure the observer walked straight down the transect line. All volunteer participants received instruction on their specific duty from a LPWWRF employee who always acted as the observer.

Transect data collection

Groups of surveyors made and recorded the following measurements that were later used to estimate total densities of pheasants. The horizontal flushing angle (θ_i) from the transect line was estimated from hand held compasses. Radial flushing distance (r_i) from the transect line was measured to the nearest metre with a measuring tape. Right angle distance (x_i) was calculated later by $r_i \sin \theta_i$. All measurements were taken in reference to the spot from which a pheasant flushed (Figure 2). If multiple birds were flushed (i.e. in a flock) the centre of the group was used as a measuring point. Flock size was recorded and used for later analysis. Specific habitat types crossed while conducting transects (i.e. grasslands, shrublands, and riparian areas within the upland cover type) were recorded. An estimate of total distance surveyed in each habitat type was made, based on the total length of the transect line and the amount of each habitat type encountered during transect. This estimate was used to calculate mean pheasant density in each habitat type. If weather conditions limited visibility (i.e. heavy snow fall or blowing snow), produced high winds (> 30km/h), or limited data collection in any way, surveys were not conducted.

Opportunistic sightings

Opportunistic pheasant sightings made along road ditches, in open fields, or non-surveyed areas were recorded. Travel between transects was used primarily to increase opportunistic sightings. Some of these observations (i.e. ones of pheasants that were clearly not counted previously on transects) were later added to the minimum estimate of pheasants.

Track surveys

Track surveys were conducted to determine the feasibility of using this technique as a population index. Track surveys were run simultaneously with line transects. While walking transects, all members of the group looked for pheasant tracks. Winter distributions of pheasants were determined through track surveys. Numbers of trails were recorded as present/absent while conducting line transects. If a bird was flushed it was present irregardless of tracks being recorded. However, if no birds were flushed, presence/absence was determined based on tracks observed. An attempt to record separate individual pheasant trails was made.

Landowner surveys

A questionnaire was distributed to local landowners prior to the survey period (late December, 2006), (Figure 3), because of interest from many individuals in the pheasant program. Not all individual landowners were able to participate in transect surveys, but most could watch for pheasants on the landscape during the survey period. Local landowners were asked to record all pheasant sightings and location within a given time period (8-28 January in Elgin and 29 January-18 February in Lambton) and report these sightings to a local volunteer. Sightings and locations were evaluated and individual pheasants that were observed in areas not surveyed or that were observed before and after surveys, were included in the minimum population estimate.

2.3 Data Analysis

Data from transects were summarized into total distance walked in each habitat type and total transect length and were entered into program Distance (Thomas et al. 2006). Angle and radial distance measurements of flushed pheasants were also entered. We used program Distance to calculate densities of pheasants for the two main pheasant habitat types within study areas, and across habitat types within the two study areas. Densities calculated by program Distance were used to extrapolate total populations of pheasants within study areas and across habitat types. Extrapolation was conducted under the assumption that pheasant densities calculated from transect data were representative of those throughout the study area for each habitat type. Densities of pheasants within different habitat types were used to infer winter habitat use of pheasants. A minimum total population for each study area also was obtained by combining the total number of pheasants flushed over all transects with individuals observed opportunistically, or recorded by local landowners.

3.0 Results

3.1 Pheasant Density

Elgin County

At the Elgin study site, 33.7 km of transect were surveyed over 54 transects. Surveys comprised approximately 138 person-hours and 66 dog-hours in the field. The minimum population of pheasants in the Elgin study area was 15, 14 of which were found within 3 km of the original release site. The 15 pheasants were comprised of 8 males, 5 females and 1 individual of unidentified sex. The precision of all density estimates (see below) is very low, as 0 is included in all confidence limits.

Because 14 of 15 pheasants observed were located within 3 km radius of the original release site, pheasant densities were calculated for two areas (within and beyond a 3km radius of the release site) stratified by distance from the original release site. The density of pheasants within the 3 km radius was 0.29 ± 0.89 (SE) pheasants/ha and extrapolated out to 30 ± 9 (SE) pheasants (Table 2). The density of pheasants in the area outside of this 3 km radius was unable to be calculated due to limitations in the program Distance, as a result of only one pheasant sighting. However, based on the intensity of survey effort and number of pheasants recorded (1 bird), the number of pheasants occurring outside the 3km core area would have been very low.

Lambton County

Within the Lambton County study area, a total of 65 transects were conducted over 28.8 km. Survey time totalled approximately 258 person-hours and 92 dog-hours. No pheasants were observed in Lambton County on transect, opportunistically, or by local landowners.

3.2 Pheasant Habitat Use

No habitat use data are available for Lambton, as no pheasants were observed there. Pheasants observed in Elgin were concentrated in grassland / shrubland habitats (0.29 ± 0.89 (SE) pheasants/ha) (Table 3). Pheasants occurred in grasslands 73 % of the time and 26 % of their use was within shrublands (woody cover 100-200 cm tall with dense grass understory).

3.3 Pheasant Track Surveys

Weather conditions limited our ability to conduct track surveys in the Elgin study area. Two of 10 days spent on the Elgin county study area had sufficient snow cover to conduct track surveys but no tracks were observed (Table 2). Despite daily snowfall, no pheasant tracks were observed in the Lambton study area.

4.0 Discussion

4.1 Pheasant population size and density

Population size, as calculated by extrapolating pheasant densities to the Elgin Study area, represent two possible scenarios. First, the most likely scenario, in which 0.29 ± 0.89 (SE) pheasants/ha observed in the 3 km radius around the initial release site extrapolates to 30 ± 9 (SE) pheasants. Second, the worst case scenario, in which the population is 15 (i.e. total number of birds flushed, opportunistically sighted and recorded on land owner sighting surveys).

Pheasant density estimates within the 3 km area around the release site (most likely population scenario) in Elgin County are comparable to other areas. Krauss et al. (1987) noted a density of 0.31 pheasants/ha in Pennsylvania, in areas of high pheasant populations. However, the Elgin County density of 0.29 ± 0.89 (SE) pheasants/ha is imprecise because all pheasant observations used for analysis occurred on one transect.

The lack of pheasant observations outside of the 3km radius suggests that pheasants have not expanded their range much beyond the initial release area. Unfortunately, no information is available on the survival rates of female pheasants in Elgin County. However, female survival rates are quite possibly low, given low population estimates in Elgin County. Studies of translocated wild pheasants in Missouri found that female survival was approximately 30% in the first winter post-release (Wilson et al. 1992). If this survival rate was applied to the Elgin County release of 63 females, only 25 may have survived the first winter. With a low initial breeding population in Elgin, there may have not been enough individuals initially released to ensure high enough rates of recruitment to overcome mortality factors (e.g. predation) for population range expansion.

The fact that no pheasants were observed in Lambton County indicates that adult survival and/or recruitment was low. For instance, mortality of released pheasants could have been so high in Lambton (88% of radio marked birds died within 7 months of release, Pud Hunter, pers. comm.) that a breeding population was not established (no breeding population occurred in Lambton prior to release), and subsequent release of birds in the second year was not enough to establish a breeding population. Lack of adequate winter, nesting and brood cover, minimal winter food supply, and high predator densities, may all have contributed to pheasants not being able to establish a population in this area. It is possible that pheasants rehabilitated into Lambton County may have emigrated to other areas with more suitable habitat.

4.2 Winter pheasant habitat use

The main habitat type in Elgin and Lambton Counties is agriculture. Agriculture covers approximately 75% of the landscape in Elgin and 83% in Lambton, of which, most is planted to row crops (Table 1). Forest is the second most common habitat type in the study areas, comprising 22% in Elgin and 16% in Lambton. Grasslands make up 6% of the habitat cover in Elgin and 4% in Lambton.

Numerous studies have shown the importance of winter cover to pheasant survival (Gatti et al. 1989, Leptich 1992, Robertson et al. 1993, Perkins et al. 1997, Gabbert et al. 1999, Homan et al. 2000, Giudice and Ratti 2001). Dense grasslands, cattail marshes and shrublands with dense grass understory provide cover from snow and decreases energetic costs of thermoregulation (Gatti et al. 1989, Leptich 1992, Robertson et al. 1993, Perkins et al. 1997, Gabbert et al. 1999, Homan et al. 2000, Giudice and Ratti 2001). Fields planted to warm season grasses (such as Big Bluestem; *Andropogon gerardii*) are preferred by wintering pheasants, as they withstand compression from snowfall (Delisle and Savidge 1997, Perkins et al. 1997). All pheasants observed in this study were found in grassland and/or shrubland habitats within Elgin County. Finding all pheasants within this habitat type suggests strong selection for this habitat by pheasants. Grasslands and shrublands in the Elgin County study site comprise 6 % of total land cover for the area. Limitations of this cover type have been suggested to reduce pheasant survival in winter (Homan et al. 2000). With 6 % grasslands and shrublands coverage in Elgin County, this winter habitat type may be limiting to pheasants.

Cattail marsh, when available is an important winter habitat, and one that has positive effects on winter survival rates (Gatti et al. 1989, Perkins et al. 1997, Gabbert et al. 1999). Cattail marshes provide much better cover than grasslands because they can withstand large amounts of snowfall without collapse (Homan et al. 2000). No pheasants were found in wetlands, specifically cattail marsh. This may be due to limited amounts of this habitat on the study area rather than avoidance by pheasants. Of the 360 ha of evaluated wetlands in Elgin County (98 ha in Lambton County) most was flooded swamp and very little (0 ha in Elgin and 7.5 ha in Lambton) dense cattail marsh was present. Homan et al. (2000) commented that large areas of dense cattail surrounded by substantial buffers of stout vegetation (e.g. warm season grass and forbs), was ideal winter pheasant cover. Very few, if any wetland areas we observed at the Elgin or Lambton study area matched these conditions. Winter cover appears to be severely lacking at both study areas, but especially in Lambton. The lack of winter cover could be one major factor limiting survival and thus population growth of pheasants released in Elgin and Lambton Counties.

Winter food availability also may be a limiting factor, particularly in Lambton County. The vast majority of the study area was planted into soybeans (55% of croplands) and winter wheat (23% of croplands), but a smaller percentage was corn (18% of croplands). Further, these crops once harvested provide little winter food as most seeds have either been eaten (winter wheat is harvested in August) or are predisposed to quick decomposition (Shearer et al. 1969). During winter, pheasants often prefer food plots (e.g. both harvested and unharvested corn fields) because of increased energetic demands at that time (Gabbert et al. 1999). Reliable and readily available food sources are of limited use to pheasants if they are not situated close to dense winter cover. Proper juxtaposition of potential food and winter cover is needed to increase availability and accessibility of food to pheasants during winter (Lyon 1967). Limited food availability could adversely effect pheasant survival, especially in winter when environmental conditions result in high thermoregulatory costs.

In general, grassland cover is lacking in both study areas. Grasslands comprise approximately 6% of the total land cover area in Elgin and approximately 4% of the Lambton study area. Also, the remaining areas of grassland cover in Elgin and Lambton County are generally small and isolated from each other. Pheasants nesting in patchy grasslands may be at higher risk of nest predation, as limited grassland cover allows predators to focus their search effort and be more successful (Clark and Bogenshutz 1999). Limited grassland cover during nesting and brood rearing can limit nest success, recruitment and population expansion because of predation pressure (Clark and Bogenshutz 1999). Populations of pheasants in Elgin and Lambton counties have most likely been limited by insufficient grassland cover during nesting and brood rearing.

4.3 Track surveys as an index method

The use of pheasant tracks as a population index method was unsuccessful in Elgin and Lambton Counties. Little to no snow-fall occurred during the survey period in Elgin County, negating effectiveness of track surveys. Unfortunately, on days with adequate snowfall in the Elgin study site, no pheasants were encountered and no tracks were observed. Favourable conditions for track surveys were encountered in Lambton County during the sampling period. Fresh snowfall occurred almost every night, which provided ideal conditions for track surveys. Despite ideal conditions, no pheasant tracks were observed in Lambton County, further supporting our conclusion that there are few if any pheasants remaining in that study area. More research is needed in Elgin County to asses the feasibility and accuracy of track surveys as indices for pheasant populations.

4.4 Conclusions and suggestions for future management

The lack of pheasant sightings or tracks observed in the Lambton County study area after substantial survey effort suggests that the pheasant rehabilitation program was unsuccessful in that area. If there are pheasants in the area, they must be at very low densities. However, there appears to be a relatively small population of pheasants (an estimated 15 - 30 individuals) in Elgin County three breeding seasons after initial release. This population may increase over time if it does not become limited by habitat or food availability, or by predation pressure. The Elgin County population may now be established, but currently is not large, or widespread, enough to justify initiation of a trap-and-transfer program there to rehabilitate pheasants in other areas in southern Ontario.

If no additional rehabilitation activities ensue in Elgin County, the population may increase at a slow rate, with individuals emigrating into appropriate adjacent habitats/areas, and larger, self-sustaining population(s) may eventually become established. Conversely, the Elgin County pheasant population may not increase, without individuals emigrating and a self-sustaining population will not establish. Based on previous pheasant translocations, it could take up to 20 years for successful population establishment to occur (Bump 1963). Translocation of substantial numbers of naturalized pheasants (specifically females) to Elgin County could be used to augment the current population and greatly decrease the time needed for population growth and range expansion. However, we strongly suggest that sizeable tracts of grassland habitat (i.e., nesting, brood-rearing, and winter cover) must be established strategically on the landscape (i.e., adjacent to appropriate seasonal food sources) prior to investing additional time, money, and effort into pheasant translocations.

If future rehabilitations are to occur, pre-release surveys of chosen areas should ensure that appropriate winter cover is present. The juxtaposition of habitat types in relation to food resources is also important and should be considered for future release sites if further translocations occur. Thus, we suggest that managers should focus on providing adequate areas of winter habitat, as well as nesting and brood rearing areas, given that these habitats likely limit pheasant density in southwestern Ontario.

More research is needed to asses the effectiveness of winter track surveys to establish an index of pheasant populations. Managers should focus this effort in Elgin County as it is the only area still holding detectible numbers of pheasants. However, winter track surveys may prove difficult, given that southwestern Ontario winters do not always provide appropriate conditions for this type of survey. Managers should also focus more effort on spring crowing surveys because this is the standard method of pheasant population assessment (Luukkonen et al. 1997, Rice 2003).

Trap-and-transfer and rehabilitation programs of wild pheasants have been promoted in other areas (Krauss et al. 1987, Hill and Robertson 1988, Wilson et al. 1992). Griffith et al. (1989) noted that multiple translocations of wild pheasants could be necessary to establish populations over a wide area. Wilson et al. (1992) found that about 60% of the wild hens relocated during the winter died before the first spring. Based on this, we suggest that future translocation efforts involve the release of more individuals over multiple years to maximize the likelihood of success

Many studies have shown the importance of understanding population dynamics for effective management of pheasants (Krauss et al. 1987, Gatti et al. 1989, Wilson et al. 1992, Perkins et al. 1997, Clark and Bogenschutz 1999, Smith et al. 1999, Homan et al. 2000). If additional pheasant translocations are to occur, it is crucial that consistent monitoring of adult survival, habitat use, post-release dispersal, mortality factors, nest success and recruitment are undertaken. Graduate student projects should be developed in conjunction with future rehabilitation efforts to monitor population dynamics, thereby ensuring that potential limiting factors are identified.

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7.0 Tables and Figures

Table 1. 2005 planted row and cover crop area (ha) for Elgin and Lambton Counties, Ontario.

	Elgin	Lambton
Total area corn	34,561	34,682
Total area soybeans	49,454	105,627
Total area winter wheat	14,569	43,546
Total area hay	9,794	9,430

Table 2. Pheasant densities and extrapolated pheasant populations (± SE) from line transects conducted January and February 2007, in Elgin and Lambton Counties, Ontario.

	Elgin	Lambton
Man-hours	138	258
Dog-hours	66	92
Total number of transects	54	65
Total km of transects	33.65	28.82
Density of pheasants outside 3km radius*	NA*	0
Density of pheasants within 3km radius	0.29 ± 0.89	0
Extrapolated pheasant population outside 3km radius	NA	NA
Extrapolated pheasant population within 3km radius	30 ± 9	NA

*Sample size too small (N=1) to calculate density

Table 3. Habitat use of pheasants determined from line transects surveys conducted January 2007, in Elgin County, Ontario.

Total transect number	54
Total transects distance (km)	33.65
Area of upland surveyed (ha)	639.64
Area of lowland surveyed (ha)	0
Density of pheasants outside 3 km radius in uplands	NA*
Density of pheasants within 3 km radius in uplands	0.29 ± 0.89
Density of pheasants lowlands	0
Density of pheasants croplands	0
Density of pheasants developed lands	0
Extrapolated pheasant population within 3 km radius in uplands	30 ± 9
Extrapolated pheasant population lowlands	0
Extrapolated pheasant population croplands	0
Extrapolated pheasant population developed lands	0

* Sample size too small (N=1) to calculate density

Figure 1. Map showing release sites of wild-strain pheasants in Elgin and Lambton Counties in southern Ontario, Canada.

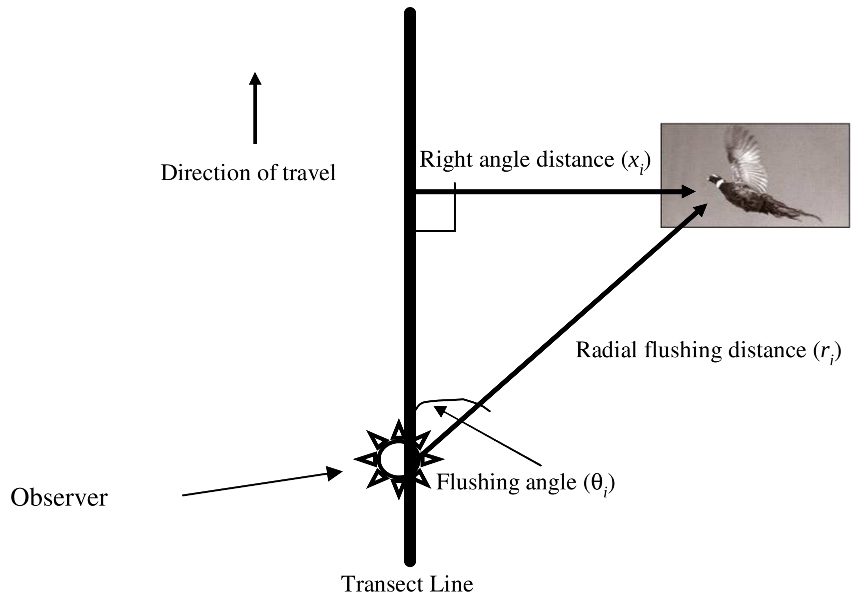


Figure 2. Schematic of line transect method showing reference and measurement points.

Winter Ring-necked Pheasant Volunteer Survey

SURVEY PERIOD: 8-28 JANUARY 2007

A ring-necked pheasant population survey is being conducted locally over the next 2-3 weeks. Your assistance in helping with the survey would be appreciated. If you see ring-necked pheasants from **8-28 JANUARY** could you please record below the date, time, and the number of birds of each sex observed at each specific location, plus also circle the habitat type that best describes where birds were observed. On the back of this sheet, are photographs of male and female ring-necked pheasants, plus a map of the local area on which you can indicate the sighting location (see example on map). If you observe more birds than space provided on the survey, please attach additional sightings to a separate sheet. Your ring-neck pheasant sightings will help estimate their current population. We appreciate your involvement in this survey. Please call Bill Prieksaitis at 519-785-0176 between the hours of 8am and 8pm if you have any questions and to coordinate survey pick-up/delivery.

1)Total # of males _____ # of females _____ Location: Lot___ Conc____ Twp____ 911 #_____
Habitat (circle one): Cornfield, Soybean field, Grassland, Shrubland, Forest, Wetland/Marsh, Unknown
Observer's name: Date seen: Time:
Phone number: Sighting location: **PLACE #1 ON MAP** (see back)

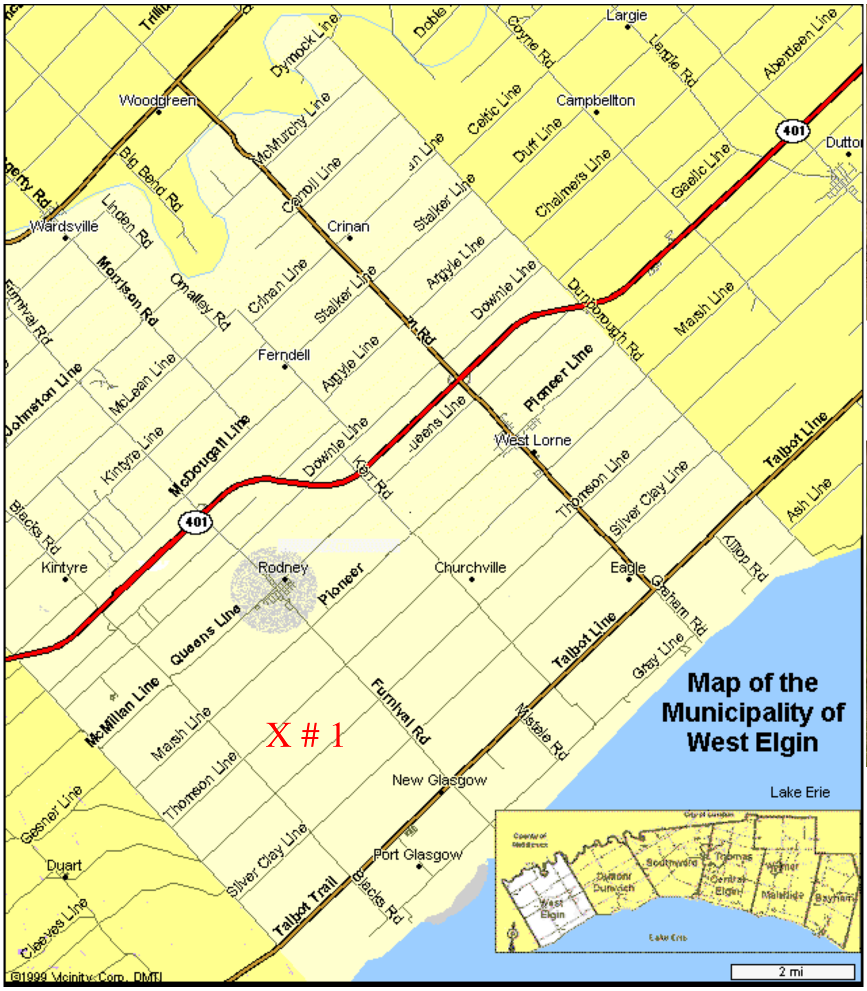
2) Total # of males _____ # of females _____ Location: Lot___ Conc____ Twp____ 911 #_____
Habitat (circle one): Cornfield, Soybean field, Grassland, Shrubland, Forest, Wetland/Marsh, Unknown
Observer's name: Date seen: Time:
Phone number: Sighting location: **PLACE #2 ON MAP**

3) Total # of males _____ # of females _____ Location: Lot___ Conc____ Twp____ 911 #_____
Habitat (circle one): Cornfield, Soybean field, Grassland, Shrubland, Forest, Wetland/Marsh, Unknown
Observer's name: Date seen: Time:
Phone number: Sighting location: **PLACE #3 ON MAP**

4) Total # of males _____ # of females _____ Location: Lot___ Conc____ Twp____ 911 #_____
Habitat (circle one): Cornfield, Soybean field, Grassland, Shrubland, Forest, Wetland/Marsh, Unknown
Observer's name: Date seen: Time:
Phone number: Sighting location: **PLACE #4 ON MAP**

5) Total # of males _____ # of females _____ Location: Lot___ Conc____ Twp____ 911 #_____
Habitat (circle one): Cornfield, Soybean field, Grassland, Shrubland, Forest, Wetland/Marsh, Unknown
Observer's name: Date seen: Time:
Phone number: Sighting location: **PLACE #5 ON MAP**

6) Total # of males _____ # of females _____ Location: Lot___ Conc____ Twp____ 911 #_____
Habitat (circle one): Cornfield, Soybean field, Grassland, Shrubland, Forest, Wetland/Marsh, Unknown
Observer's name: Date seen: Time:
Phone number: Sighting location: **PLACE #6 ON MAP**



Male (cock) Ring-necked Pheasant
-very bright and colorful

Female (hen) Ring-necked Pheasant
-drab and brown

Figure 3. Example of the local landowner pheasant sighting survey distributed to residents of Elgin and Lambton Counties, Ontario during late December 2006.