

**Long Point Waterfowl  
Technical Report  
Volume 1.**

**Mourning Dove (*Zenaida macroura*) population dynamics and societal assessment  
towards a proposed hunting season in Ontario.**

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## **Executive Summary:**

Mourning doves (*Zenaida macroura*) (hereafter doves) are one of the most abundant birds in North America, and it is suspected that their populations are increasing in Ontario. Due to the abundance of this species, and the economic importance of its harvest in the U.S., the Canadian Wildlife Service, Ontario Federation of Anglers and Hunters and Ontario Waterfowl Advisory Committee have discussed the possibility of opening a season to harvest doves in Ontario.

This assessment consisted of two parts. First, to assess potential impacts of implementing a dove season on Ontario's resident dove population, we compared the population dynamics of doves wintering in Ontario with wintering abundances and trajectories of a hunted (Ohio) and non-hunted jurisdictions (New York, Michigan and Vermont) within the U.S. Second, a telephone administered questionnaire was used to assess the opinions of Ontario residents toward the opening of a dove season within the province. An assessment of basic wildlife and hunting-related opinions of Ontario residents was also conducted.

Based on Christmas Bird Count data, dove populations showed rapid increases in all jurisdictions studied; Ontario's winter dove population increased by nearly 13% per year between 1977 and 2001. We also found no detectable difference in indices of winter population abundances for all survey years examined. Further, we noted similar annual fluctuations in winter indices of dove abundance between all hunting and non-hunting jurisdictions. This suggests that changes in winter populations within the hunted and non-hunted jurisdictions were driven primarily by intrinsic and/or extrinsic factors exclusive of hunting. We also observed that northern jurisdictions had the fastest rates of

annual increase in wintering populations (Ohio's wintering population was seasonally stable after initiation of a dove season), possibly due to northern range expansions. With comparable abundances to the hunted and non-hunting jurisdictions in the U.S. and no evidence suggesting that hunting negatively impacts wintering populations; it is likely that an Ontario dove harvest would be biologically sustainable.

The results from the public opinion survey showed several trends. Ontario residents generally view wildlife favourably. Most people surveyed had either neutral (10%) or favourable (79%) views towards hunting. Similarly, most respondents were either in favour (58%) or neutral (25%) towards a dove harvest in Ontario, under the condition that the population can sustain harvest. With the wintering dove population large enough to sustain harvest this societal condition is easily met.

Both population and societal assessments support the implementation of a season to harvest doves in Ontario. Therefore, we suggest that the Canadian Wildlife Service, Ontario Federation of Anglers and Hunters and the Ontario Waterfowl Advisory Committee proceed with the initiation of a season to harvest doves in Ontario.

**Introduction:**

Mourning doves (*Zenaida macroura*) (hereafter doves) are a migratory game bird in North America, residing in all 48 conterminous states in the U.S. and throughout southern Canada (Dolton and Rau 2005). Doves have a broad geographic breeding range with birds nesting throughout southern Canada, south to Mexico and the Bahamas (Terres 1980). Doves are also among the most abundant game birds in the U.S., with an estimated fall population between 400 and 475 millions birds (Dunks et al. 1982, Tomlinson et al. 1988, Dolton and Rau 2005). Such a large fall population is a result of a high reproductive rate; doves lay two eggs on average and can raise one to two clutches per season in northern breeding areas (Mirarchi and Baskett 1994).

Population surveys such as the Breeding Bird Survey (BBS), the Call-count Survey (CCS), the Audubon Christmas Bird Count (CBC) and Project Feeder Watch (PFW) all indicate that dove populations have increased (and continue to increase) in certain areas of the U.S. and Canada, including southern Ontario (Dalton and Rau 2005, Sauer et al. 2005). Results from the Ontario Breeding Bird Atlas (2007) also suggest a significant northward expansion of the dove's breeding range in Ontario (Figure 1). A study that compared survey results from PFW with those from the CBC between 1976-1997, reported an increasing trend in dove populations in both Southern and Central Ontario (Lepage & Francis 2002). Furthermore, the 2005 Mourning Dove Population Status Report showed an increase in dove populations from 1996-2005 in all states that border Southern Ontario except for Pennsylvania (Dolton & Rau 2005).

Doves are the most popular game bird in the U.S.; they are harvested more than all other migratory game birds combined in the U.S. With an estimated 20 million

harvested during the 2004-2005 season, harvest rate represents nearly 6% of the population (Dolton and Rau 2005). On average, \$1 billion is generated each year from dove hunting in the U.S. each year (U.S. Fish and Wildlife Service 2001).

Increases in dove populations and their northward range expansion has resulted in debate among Ontario wildlife management advisory groups and organizations (e.g. Ontario Waterfowl Advisory Committee [OWAC], the Canadian Wildlife Service [CWS] and the Ontario Federation of Anglers and Hunters [OFAH]), on instituting a dove harvest within the province. However, prior to making decisions pertaining to a dove harvest, all groups agreed that a dove population assessment must be conducted for Ontario to assess population indices and to determine population growth rates over time. All groups also agreed that a societal assessment must be performed to evaluate the attitudes of Ontario residents toward the possibility of a dove harvest. Societal assessments of this nature are becoming increasingly important, as the public expects its opinions to be considered when wildlife management decisions are made (White et al. 2005). Also, wildlife managers feel that people's opinions regarding wildlife are moving from what was once a utilitarian perspective towards a more protectionist perspective (Butler et al. 2003). If this is the case, then Ontario residents might not view the opening of a dove season in a favorable manner.

The assessment of potential impact of dove harvest on Ontario's dove population was conducted using CBC data (1977-2001). To assess Ontarian's views towards a potential dove season, a telephone administered survey was conducted (400 respondents). The results of these two assessments will be used to advise CWS, OWAC and OFAH on

the sustainability and public opinion toward a dove harvest if these groups chose to implement a season.

## **Methods:**

### **CBC data collection**

In this study, we used data on numbers of doves counted during the CBC in Ontario to assess trends in winter abundance and to determine annual and period-specific indices of abundance from 1977 to 2001. We also used CBC data to determine trends and similar abundance indices for Ohio (a state with a dove hunting season since 1995) and for New York, Michigan, and Vermont (states without dove hunting seasons). The CBC is a volunteer-based survey of winter bird abundance that has been coordinated by the National Audubon Society in North America since 1900 (Butcher 1990). This survey is conducted one day each year within one and a half weeks prior to or after 25 December. During that time, volunteers count individuals of all bird species they encounter and can identify (either in the field or at bird feeders) within a distinct, pre-determined 24 km diameter circles located within states and provinces (Butcher 1990). Because of the CBC survey period, some counts within and among jurisdictions can span two different calendar years. Thus, for our analyses, counts conducted in January were grouped with data collected during the preceding year (i.e., year = year – 1). We also only included CBC circles in our analyses that had at least 2 consecutive years of observations and had at least one previous dove observation (Petrie and Francis 2002).

CBC data on doves in Ontario, Michigan, Ohio, New York and Vermont were obtained from the National Audubon Society's website

(<http://www.audubon.org/bird/cbc> [accessed January 15, 2006]). Relevant data

downloaded included, number of party hours in the field (an indication of survey effort), number of doves per survey circle, survey circle location, and survey year. Data from Ohio, New York, Vermont, and Michigan were selected for analyses because they generally have similar climates and are in close proximity to Ontario, particularly southern Ontario (Figure 2). Southern Ontario, the region of the province where most doves are detected during CBC, also has similar broad habitat types (e.g., forests, agricultural lands, grasslands, etc.) to each state included in this study. We designated Ohio as a hunting jurisdiction because it has had a dove hunting since 1995; New York, Vermont, and Michigan currently do not allow harvest of doves and were designated as non-hunting jurisdictions. We compared patterns in winter population trends and variation in annual (or multi-annual) winter population indices between hunting and non-hunting jurisdictions to evaluate potential differences and impacts potentially due to dove harvest.

When analyzing CBC data, it is important to account for between-year and site differences in observer effort. We only analyzed CBC data from the period 1977 to 2001 because information on survey effort was not available after that period. If observer effort is not accounted for in analyses, trends observed may be an artifact of varying amounts of time spent looking for birds in the field or at bird feeders (Link and Sauer 1999, Lepage and Francis 2002). Data on feeder effort (Ontario only) and observer effort was obtained through the summary publications of *Birds of America* published by the Audubon society (LeBaron 2001); Denis Lepage (Bird Studies Canada) supplied feeder effort data for Ontario compiled up to 1997. To account for these sources of variation, we used data on total numbers of surveyors and time they spent observing birds in the field and at bird

feeders to calculate 2 indices of survey effort: party hours ( $PH = \# \text{ surveyors} \times \# \text{ hours in field}$ ) and feeder hours ( $FH = \# \text{ feeders visited} \times \text{hours}$ ). We included total party hours (all jurisdictions) and total feeder hours (Ontario only) as covariates in our analysis. Feeder effort, however, was not accounted for in analyses involving US states. This was primarily due to time constraints and inability to compile the data. However, we had no reason to believe that feeder effort would vary considerably or differently among jurisdictions. To make comparisons between hunted and non-hunted jurisdictions, we re-analyzed the Ontario data without including feeder-effort as a covariate. Doing so allows for a valid comparison of trends among all jurisdictions because each was modeled using the same set of explanatory variables and covariates.

### **Societal assessment**

A telephone administered questionnaire (Appendix 1) was used to determine the opinions of Ontario residents toward wildlife, hunting in general, and the possibility of opening a season to harvest doves in Ontario. Based on the size of the human population in Ontario, 400 respondents were necessary to yield a confidence interval of 95% with a maximum margin of error of  $\pm 5\%$  (ACL Services Ltd. 2005). Telephone number lists were purchased through Sampling Modelling and Research Technologies Inc. Telephone numbers were randomly generated based on area code proportions to total available Ontario phone numbers. People were called at various times during the day between 10:00am and 7:00pm, Eastern time. Only those 16 years of age or older were sampled, as this is the legal age to obtain a hunting license in Ontario.

Initially, the respondent was verbally provided with background information on why this research was being conducted as well as information pertaining to the



questionnaire. Respondents were given the option to terminate the questionnaire at any time. Responses to wildlife and hunting related questions were scored and given value on a Likert scale with possible responses of 1, 2, 3, 4 or 5 representing the attitudes “strongly disagree”, “disagree”, “neutral”, “agree”, and “strongly agree”, respectively. Responses were asked for opinions regarding wildlife through use of the following questions: 1) It is important to me personally to know that wildlife exist in nature; 2) It is important to me personally that I consider the presence of wildlife as a sign of the quality of the natural environment; 3) It is important to me personally that I have knowledge of wildlife issues; and 4) I value wildlife. Responses were also asked for opinions toward hunting through the following questions: 1) It is important to me personally that Canadians have the right to hunt as long as it is done in a safe manner and does not impact wildlife populations; 2) It is important to me personally that hunting is used to manage the populations of certain game animals if they become troublesome; and 3) It is important to me personally that Canadians have the right to hunt as long as they eat what they hunt. Finally, respondents were also asked to respond to the statement: If it is determined that Mourning dove populations in Ontario could sustain a hunting season, I would agree to the opening of a season to hunt this species within the province.

The respondent’s past and present hunting status was determined by asking the respondent during the survey, as well as hunting status of immediate family. Also, respondents were asked whether they resided in a rural or urban setting. Based on definitions by Statistics Canada (2005), rural was defined as residing in an area with a population of 1,000 people or less and urban as being an area with a population of more than 1,000 people. Questionnaires that were not completed in full were discarded.

## **Data analysis**

### **Dove population dynamics**

In trend analyses, we treated Ontario, Michigan, Ohio, Vermont and New York treated as distinct jurisdictions (Figure 2). Only CBC circles which had been surveyed for at least 2 years and which have reported doves previously were included in the analysis (Figure 3). It was assumed that CBC circles not previously reporting doves either contained habitat unsuitable for the species or were north of their wintering range.

Use of generalized linear models with log-transformed count data has been used in the past to derive trend estimates (Thomas and Martin 1996). Link and Sauer (1997), however, suggested this method can introduce bias into trend estimates and that use of Poisson regression can better control for overdispersion caused by variation in the amount of survey effort. However, it has also been determined that both Poisson regression and generalized linear model (using log-transformed count data) approaches yield comparable results with CBC data (Denis Lepage, pers. comm. and unpublished data).

To derive linear trend estimates for each jurisdiction, we used a multiple regression using log-transformed count data (a constant of 0.23 was added to each value to account for zero counts) (Thomas and Martin 1996), where year was treated as a continuous variable and both total party hours (PH) and feeder hours (FH) were treated as covariates in the models. We used a similar, but slightly different, technique to derive annual estimates of doves counted in each jurisdiction during CBC; the same statistical model described above was specified except that year was included as a class variable. Using the following formula, we applied a Box-Cox transformation to both PH and FH

effort measures before including those data into models (Link and Sauer 1998, Lepage and Francis 2002):

$$f(\mathbb{E}) = ((\mathbb{E}^p) - 1)/p$$

where  $f(\mathbb{E})$  = transformed PH or FH,  $\mathbb{E}$  = PH or FH (a constant of 0.5 was added to all values to account for zeros), and  $p = -1.5$ .

We present linear changes in dove numbers over times as percentage change per year and plot annual CBC indices to graphically illustrate year to year (and long-term) population changes. We compared trend estimates between hunting and non-hunting jurisdictions by evaluating their 95% confidence intervals. If considerable overlap was observed then growth rates did not differ detectably between jurisdictions; if there was little or no overlap then we deemed that growth rates differed between jurisdictions.

In addition to evaluating long-term trends between jurisdictions, we also were interested in making comparisons of dove abundance among jurisdictions during different periods. To do this, we used annual indices derived from previous analyses to calculate mean abundances (and SE) for each jurisdiction during two different time frames of interest: 1) the most recent year included in analyses (i.e., 2001) and 2) during the preceding 5 years of the survey period (1997-2001). The comparison of abundance indices from 2001 was made because it provides the most recent indication of potential differences among jurisdictions. Comparisons using data averaged from 1997-2001 was made because that relatively recent period corresponds to the time when Ontario's dove population was undergoing considerable growth and northward range expansion.

Further, prior to the mid-1990s Ontario's dove winter index was well below those of the

other jurisdictions, so including data prior to that period and making comparisons over longer time frames could result in somewhat biased estimation of Ontario's dove index in recent times.

### **Societal assessment**

Contingency tables were used and Chi square analyses were conducted to test differences ( $\alpha=0.05$ ) in responses based on the demographics of present hunting status, as well as type of residence (rural or urban).

### **Results**

#### **Dove population dynamics**

##### **Modeling effort**

When both forms of effort were included as covariates (Figure 4), total party hours had no effect on Ontario CBC counts ( $P = 0.179$ ), but feeder hours had a significant effect on counts ( $P < 0.001$ ). Specifically, there was a positive relationship between the amount of time spent watching feeders and the number of doves counted. However, when analyses were run without correcting for feeder effort (Figure 5), trends and population indices were similar (i.e., considerable overlap in 95% CI) to those generated in the model accounting for both forms of effort (Table 1, Figure 10). Based on these findings, feeder effort had no measurable effect on dove trends and annual abundance indices, so we did not include feeder effort as a covariate in analyses for other jurisdictions. Thus, hereafter we compare trend estimates and annual abundance indices based on models without feeder effort.

## Population Growth Rates and Indices for Ontario

Dove abundance increased significantly between 1977 and 2001 in Ontario ( $Y = 239.98 + 0.13 \text{ Year}$ ;  $R^2 = 0.75$ ,  $F_{1, 86} = 1004.36$ ,  $P < 0.001$ ). These results suggest that Ontario's wintering population of doves has been increasing by 13.0% (95% CI: 12.9% – 13.9%) per year (Figure 5). During 2001, an average of 210.0 (95% CI: 173.2 – 254.5) doves were counted per survey circle. An average of 173.1 (141.4 – 211.9) doves were observed per CBC survey circle during 1995-2001 in Ontario.

## Comparison of growth rates between hunting and non-hunting jurisdictions

As in trend analyses for Ontario, there was significant positive covariation between total party hours (time spent in the field) and dove abundance in analyses for all states ( $P < 0.001$ ) except Ohio ( $P = 0.829$ ). Number of doves wintering in Ohio, the state that allows dove hunting, increased ( $Y = -25.1 + 0.02 \text{ Year}$ ;  $R^2 = 0.61$ ,  $F_{1, 66} = 24.3$ ,  $P < 0.001$ ) by 1.5% (0.9% - 2.1%) per year from 1977-2001 (Figure 5). Doves in Vermont increased by 7.4% (6.2%-8.7%) per year ( $Y = -154.80 + 0.07 \text{ Year}$ ;  $R^2 = 0.72$ ,  $F_{1, 20} = 145.96$ ,  $P < 0.001$ ) between 1977 and 2001 (Figure 5). New York's winter dove population increased by 3.8% (3.2%-4.3%) per year from 1977 – 2001 ( $Y = 0.403 + 0.04 \text{ Year}$ ;  $R^2 = 0.59$ ,  $F_{1, 76} = 184.87$ ,  $P < 0.001$ ) (Figure 5). Winter dove numbers in Michigan have increased by 5.1% (4.3% - 5.8%) per year during 1977-2001 ( $Y = -137.56 + 0.05 \text{ Year}$ ;  $R^2 = 0.75$ ,  $F_{1, 55} = 188.15$ ,  $P < 0.001$ ) (Figure 5). Thus, the winter dove populations in all non-hunting states exhibited long-term population increases.

Comparisons of trends among jurisdictions revealed that rates of increase differed between some jurisdictions (Table 1). Ontario had higher annual growth rates (~13%) than all other jurisdictions. Vermont also had growth rates that were higher than those in

New York, Michigan, and Ohio. Notably, rates of increase for Ohio, the state allowing dove hunting, was lower than all other jurisdictions. Trend estimates for New York and Michigan were similar, which suggested no detectable difference in growth rates between these non-hunting jurisdictions. When the annual rates of change were averaged for the U.S. non-hunting states and compared to those of Ohio and Ontario, there was a noticeable difference between these grouped jurisdictions (Figure 6); Ontario had the highest rate, non-hunting states had the second highest rate, and Ohio had the lowest annual rate of increase.

### **Comparisons of abundance indices between hunting and non-hunting jurisdictions**

Based on inspections of mean abundance indices and 95% CI, there were no detectable differences among jurisdictions in number of doves counted in CBC circles during 2001 (Table 1). Average number of doves counted per circle ranged from 171.1 in Ohio to 244.3 in New York (Table 1). Ontario was third in relative dove abundance compared to the other jurisdictions (Table 1).

Mean dove abundances for the period 1997-2001 also were similar among jurisdictions and thus also did not differ between hunted or non-hunted areas (Table 1). Average number of doves counted per circle during this period ranged from 173.1 in Ontario to 234.9 in New York (Table 1). Ontario was lowest in relative dove abundance compared to the other jurisdictions (Table 1).

### **Societal assessment**

#### **Ontario's attitudes towards wildlife**

Respondents held wildlife in high regard (Table 2). The majority of respondents either agreed or strongly agreed and considered it was important that: 1) they valued

wildlife, 2) it is important that wildlife exists in nature, 3) wildlife is a sign of the quality of the environment, and 4) it is important to them to have knowledge of wildlife-related issues. A minority of respondents either disagreed or strongly disagreed with these statements and few showed no opinion (were neutral) (Table 2).

### **Ontario's attitudes towards hunting**

Survey results showed that people have high values regarding hunting (Table 2). Most respondents felt that Ontario residents had a right to hunt, as long as what was hunted is eaten. The majority of respondents also agreed with the use of hunting to manage nuisance wildlife populations. Few respondents either disagreed or strongly disagreed with the hunting statements, but a large proportion were neutral towards them (Table 2).

### **Ontario's opinion towards a proposed dove harvest**

The majority of respondents would support a dove harvest in Ontario if it was determined that populations could sustain harvest (Table 2). Of people responding to surveys, 58% said they would either agree or strongly agree with a dove harvest if populations could sustain one. Seventeen percent of respondents either disagreed or strongly disagreed with a dove harvest and 25% were neutral towards the possibility of a dove season.

### **Urban versus rural attitudes toward wildlife and hunting**

Of the 400 people surveyed, 84% resided in urban areas, while 16% resided in rural areas; Statistics Canada reported that 85% of Ontarians resided in urban areas in 2001 (Statistics Canada 2005). With 84% of study respondents residing in urban areas, our study adequately represented the urban and rural demographics of Ontario.

There was a significant difference between urban and rural residents with respect to their attitudes towards wildlife and hunting (Table 2). Rural residents were more likely to strongly agree with the importance of having knowledge of wildlife issues, as well as that hunting is acceptable as long as what is harvested is eaten. However, urban residents were more likely to simply agree, rather than strongly agree, to these statements. Differences were also found between responses of rural and urban residents towards the statement that Canadians have the right to hunt. Rural residents were more likely to strongly agree with this statement, whereas urban residents were more likely to disagree or reply neutrally to this statement. No other wildlife or hunting attitude statements showed differences between rural and urban residents (Table 2).

### **Hunter versus non-hunter attitudes toward wildlife and hunting**

In this survey, 23% of 400 respondents currently hunt, whereas 77% claimed to not have hunted recently. Also, 30% of the 400 respondents claimed to have hunted in the past, while 70% had never hunted. Of the 400 respondents, 29% reported having someone other than themselves in their immediate family who currently hunts, while 71% did not have an immediate family member that hunted. The Canadian Wildlife Service (2005) reported 5% of the Canadian population in 1996 consisted of people that hunted. Another study found that 4% of Ontario residents hunted (HHHF 2001). Thus, opinions of hunters maybe over-represented in this study given that 23% of respondents claimed to be current hunters. It is possible that over-sampling of the hunting community did not occur, but this is unlikely since hunter numbers probably have not increased 18-19% since 1996.



Chi square analysis revealed that there was an effect of present hunting status on all attitudes toward wildlife and hunting, with one exception. Hunters and non-hunters were equally likely to strongly agree or agree that hunting is acceptable as long as what is hunted is eaten (Table 2). Hunters were more likely to agree or strongly agree on all wildlife attitude statements than non-hunters. Non-hunters were more likely to disagree or strongly disagree to all wildlife attitude statements than hunters. When comparing hunting attitude statement responses, hunters and non-hunters opinions did not differ as long as game was eaten (Table 2).

Hunters were more likely to strongly agree with the remainder of the hunting attitude statements, including the proposed dove harvest. Non-hunters were more likely to disagree or strongly disagree with hunting attitude statements, however 33% of non-hunting respondents were neutral to a dove harvest and 45% agreed or strongly agreed. Of the hunters that responded, 96% of them agreed or strongly agreed with the proposed harvest (Table 2).

Since hunters may have been over-sampled, it is important to assess at responses of non-hunters, especially with respect to the proposed dove harvest. Respondents that did not hunt or had not hunted in the past equaled 70% of the total people surveyed. The majority of these respondents agreed or strongly agreed that Canadians had the right to hunt and agreed that they would support the proposed dove harvest (Table 2). Of non-hunters surveyed, few were in disagreement or strong disagreement toward the proposed harvest. The proportion of non-hunter respondents in disagreement or strong disagreement with a proposed dove hunt did not differ from the proportion of the entire study sample (hunters and non-hunters) (Table 2).

With respect to the other hunting attitudes, a small proportion of the non-hunting population disagreed or strongly disagreed with: 1) hunting as long as for food, and 2) hunting as a means to manage troublesome wildlife populations. The proportion of non-hunters disagreeing with these statements did not significantly differ from the entire study sample response. Responses towards these two questions by the entire study sample showed higher agreement and strong agreement than those of non-hunters. However, there were higher responses of neutrality among the non-hunter sub-sample compared to the entire study sample (Table 2).

## **Discussion**

### **Dove population dynamics**

Our results showed that the number of doves wintering in Ontario (and several adjacent states in the northeastern United States) has increased significantly over the past 24 years. During this same period of time, doves have expanded their breeding range north within Ontario (Cadman et al. 1987, Cadman et al., unpubl. data). Such trends ultimately may be due to a combination of global warming trends and changing agricultural practices within Ontario. Increasingly moderate winter temperatures likely are enabling doves to expand their range northward. Further, increased corn and cereal grain production and use of no-till farming practices (which increases weed seed and waste grains) likely has substantially increased food availability, thus the carrying capacity for doves within the province.

Comparisons of 2001 and average 1997-2001 winter abundance indices were similar between Ohio (hunted) and all non-hunted jurisdictions (New York, Vermont, Michigan). Before 1997, dove abundance in Ontario was lower than all US states, but

after that time winter abundance indices were similar among all jurisdictions. Thus, Ontario's winter dove population has increased substantially since the 1970s and is now similar to that of hunted and non-hunted northeastern U.S. states. Since the overwinter population of doves in Ontario had the highest annual rate of population increase, Ontario's dove population will likely continue to grow.

One biological concern associated with initiating a fall dove hunt in Ontario is that a disproportionate number of winter resident birds may be harvested relative to fall-migrants. This could result in reduced overwintering populations over time. In order to determine the potential for this to occur, we assessed plots of winter dove abundances in hunted and non-hunted jurisdictions over time. In general, we noted very similar temporal fluctuations in winter population indices from 1977 – 2001 irrespective of whether hunting was or was not permitted. These observations suggest that annual and longer-term fluctuations in dove abundance are more dependent on environmental conditions than on harvest (Miller et al. 2001).

Evaluation of pre- (before 1994), and post-harvest temporal patterns in winter abundance in Ohio provides additional support for harvest not having a substantial additive effect on dove populations. Winter dove abundance increased from the late 1970s to the late 1980s, but was generally stable from the early 1990s until 2001. There was, however, a declining trend in winter abundance from 1994 to 2001, and dove populations in Ohio had the lowest rate of annual increase of all jurisdictions. Thus, harvest may have had a stabilizing effect on the dove population in Ohio. However, Ohio still had a population index that was comparable and relatively high compared to the

jurisdictions where doves were not hunted. This result further indicates that harvest was not having a substantial impact on winter dove numbers in the state.

### **Societal assessment**

Concerns have been raised over the changing trend in societal attitudes towards wildlife and hunting. Manfredo et al. (1999) suggested that public attitudes towards wildlife have recently become more protectionist and less utilitarian. Mankin et al. (1999) reported decreases in consumptive uses of wildlife and considerable increases in non-consumptive use of wildlife in Illinois. This change in public opinion has prompted wildlife managers to change their decision making strategies and many agencies now consider public perceptions and opinions prior to making management decisions (Johnson et al. 1993).

The proportion of people who currently hunt, or have hunted in the past (30%) surveyed in this study may have been higher than the national and provincial average. CWS and the Hunting Heritage Hunting Futures Initiative reported that 5% of Canadians and 4% of Ontarians currently hunt (HHHF 2001, Canadian Wildlife Service 2005). It is possible that our study sampled more hunters than the national and provincial average. However, when opinions of non-hunters were compared to the entire study group (hunters and non-hunters) their attitudes towards wildlife, hunting and a proposed dove harvest did not significantly differ. Therefore, we feel that the overall survey adequately reflect the opinions of Ontario citizens with respect to the proposed dove harvest and on wildlife and hunting-related issues in general.

Overall, Ontario residents responding to this survey have high personal wildlife values. However, this has not resulted in a protectionist view towards wildlife. The

majority of respondents (58%) strongly agreed or agreed that a dove harvest is warranted in Ontario. The only stipulation to their response was that a dove harvest would only be acceptable if populations could support it. Many Ontario residents were indifferent since a large proportion of respondents (25%) were neutral towards a dove harvest. The strong support (and neutral opinion) for dove harvest suggests that Ontario residents are not protectionist in their beliefs and that they either use wildlife consumptively, or are not against the consumptive use of wildlife.

### **Conclusions and suggestions for management**

Given the rapid rate of winter population increase in Ontario, comparable abundance indices to neighboring states, and evidence that hunting does not substantially impact dove populations, we suggest that a fall dove harvest is biologically justifiable for in Ontario. Since most Ontario residents (including the non-hunters in the sample) either agree that a dove season is warranted or are neutral to the possibility, it would appear that the opening of a dove season would be socially acceptable.

With the exception of one year in the mid-1950s, Ontario has never had a dove harvest. As such, there is no specific survey currently in place to monitor dove populations in Ontario, such as the Mourning Dove Call Count Survey (MDCCS), conducted in the U.S. (Daulton and Rau 2005). Therefore, if a dove season is opened in Ontario, we suggest that the MDCCS be expanded to include areas of Ontario where doves would be harvested. This would provide an annual index to population size while enabling wildlife managers to assess the potential effects of harvest.

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## Tables and Figures

Table 1: Summary of rates of population change and population indices for Ontario and the hunting and non-hunting jurisdictions within the United States. Abundances and annual rates of change are given with the upper and lower 95% confidence interval (CI). Abundances are given for the last year of the study period as well as the average of the last 5 years of the study period. Significance was based on a  $P = 0.05$ .

<sup>a</sup>: Ontario analysis correcting for all forms of effort.

<sup>b</sup>: Ontario analysis omitting feeder hour effort.

| <b>Location</b>                  | <b>Rate<br/>(%<br/>change<br/>per<br/>year)</b> | <b>Lower<br/>CI</b> | <b>Upper<br/>CI</b> | <b>N (CBC<br/>circles<br/>surveyed)</b> | <b>P</b> | <b>Mean #<br/>per Circle<br/>in 2001</b> | <b>Lower<br/>CI</b> | <b>Upper<br/>CI</b> | <b>Mean<br/># per<br/>Circle<br/>of last<br/>5 years<br/>(1997-<br/>2001)</b> | <b>Lower<br/>CI</b> | <b>Upper<br/>CI</b> |
|----------------------------------|---|---------------------|---------------------|---|----------|--|---------------------|---------------------|---|---------------------|---------------------|
| Ontario <sup>a</sup>             | 12.92   | 12.07               | 13.78               | 87                                      | < 0.001  | 209.92                                   | 173.23              | 254.39              | 172.28  | 140.78              | 210.83              |
| Ontario <sup>b</sup>             | 13.04   | 12.19               | 13.90               | 87                                      | < 0.001  | 209.98                                   | 173.23              | 254.54              | 173.08  | 141.4               | 211.87              |
| <b>Non-hunting Jurisdictions</b> |   |                     |                     |   |          |  |                     |                     |   |                     |                     |
| New York                         | 3.77  | 3.21                | 4.32                | 77                                      | < 0.001  | 244.38                                   | 206.50              | 289.08              | 234.92  | 197.86              | 278.94              |
| Vermont                          | 7.41  | 6.17                | 8.67                | 21                                      | < 0.001  | 204.11                                   | 146.6               | 284.19              | 192.64  | 136.72              | 271.56              |
| Michigan                         | 5.07  | 4.33                | 5.82                | 56                                      | < 0.001  | 223.97                                   | 181.15              | 276.91              | 198.1   | 161.36              | 243.20              |
| Combined                         | 5.42  | 4.57                | 6.27                | 154                                     | < 0.001  | 224.15                                   | 223.95              | 237.53              | 208.55  | 165.31              | 264.57              |
| <b>Hunting Jurisdictions</b>     |   |                     |                     |   |          |  |                     |                     |   |                     |                     |
| Ohio                             | 1.53  | 0.93                | 2.14                | 67                                      | < 0.001  | 171.14                                   | 141.23              | 207.39              | 212.98  | 175.42              | 258.57              |

Table 2: Percentage breakdown (Strongly agree/Agree and Strongly disagree/Disagree and Neutral) by respondent demographic (Urban, Rural, Hunter and Non-Hunter) and Chi square analysis comparing responses of hunters with non-hunters and urban and rural respondents to wildlife attitude statements and hunting attitude statements. Bolded results show significant differences between demographics ( $p < 0.05$ ).

| Statement                                   | Total Sample | Urban    | Rural    | Hunter  | Non-Hunter | Urban/Rural                   | Hunter/Non-Hunter             |
|---|--------------|----------|----------|---------|------------|-------------------------------|-------------------------------|
| <b>Wildlife Attitudes</b>                   |              |          |          |         |            |                               |                               |
| Important that wildlife in nature.          | 73/11/16     |          |          | 97/0/3  | 65/14/21   |                               | $\chi^2=51.19, df=4, p<0.001$ |
| Wildlife as sign of quality of environment. | 79/7/14      |          |          | 100/0/0 | 68/12/20   |                               | $\chi^2=41.73, df=4, p<0.001$ |
| Knowledge of wildlife issues.               | 59/19/22     | 57/18/25 | 65/20/15 | 64/0/36 | 56/25/19   | $\chi^2=10.95, df=4, p=0.027$ | $\chi^2=37.56, df=4, p<0.001$ |
| Value wildlife.                             | 73/25/2      |          |          | 100/0/0 | 65/33/2    |                               | $\chi^2=47.81, df=4, p<0.001$ |
| <b>Hunting Attitudes</b>                    |              |          |          |         |            |                               |                               |
| Canadians have the right to hunt.           | 79/11/10     | 80/10/10 | 93/4/3   | 98/2/0  | 71/12/17   | $\chi^2=9.86, df=4, p=0.043$  | $\chi^2=159.6, df=4, p<0.001$ |
| Hunting as a means to manage nuisance pops. | 49/16/35     |          |          | 81/1/18 | 42/22/36   |                               | $\chi^2=75.37, df=4, p<0.001$ |
| Hunt as long as for food.                   | 47/9/44      | 43/8/49  | 51/4/45  |         |            | $\chi^2=12.67, df=4, p=0.013$ | $\chi^2=8.67, df=4, p=0.070$  |
| Hunt mourning doves in Ontario.             | 58/17/25     |          |          | 96/4/0  | 45/22/33   |                               | $\chi^2=184.4, df=4, p<0.001$ |

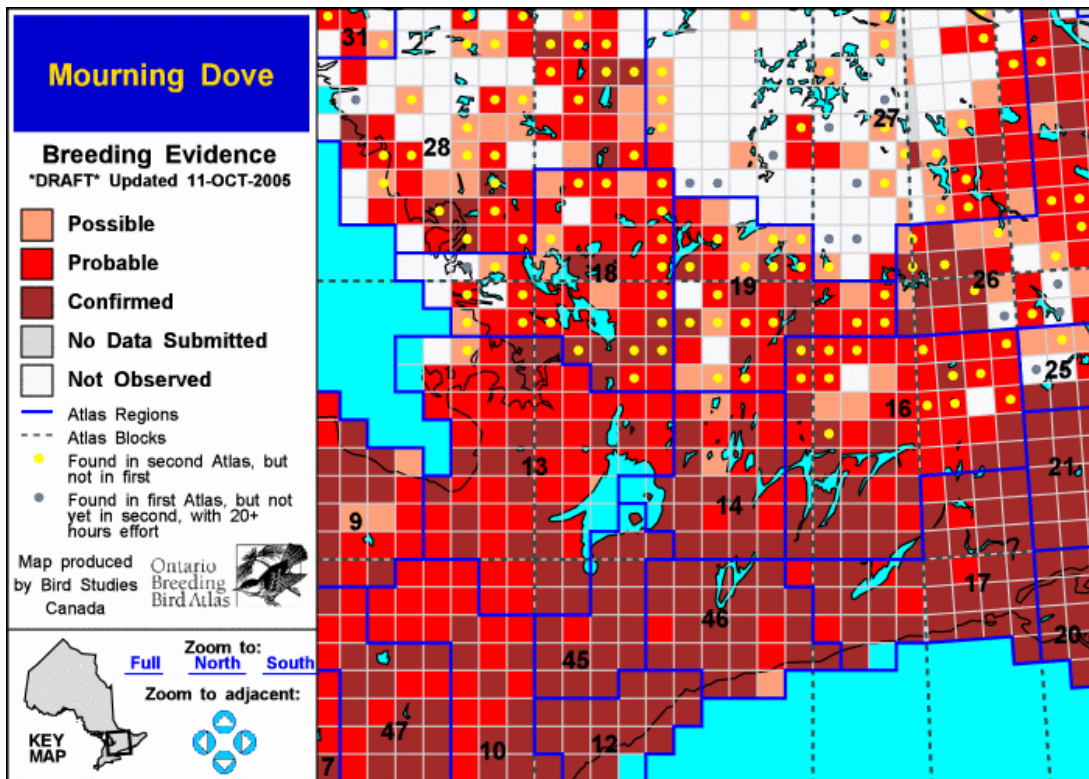


Figure 1. Breeding Evidence from the Ontario Breeding Bird Atlas of Mourning Doves in Ontario. Data suggests that Mourning Doves are expanding their range north (Ontario Breeding Bird Atlas 2005).



Figure 2: Map of the eastern United States and Ontario, showing the relative geographical position of the hunting (Michigan, Ohio) and non-hunting (Ontario, New York, Vermont) jurisdictions studied during Christmas Bird Count analysis (Mapstoprint.com [accessed March 28, 2006]).

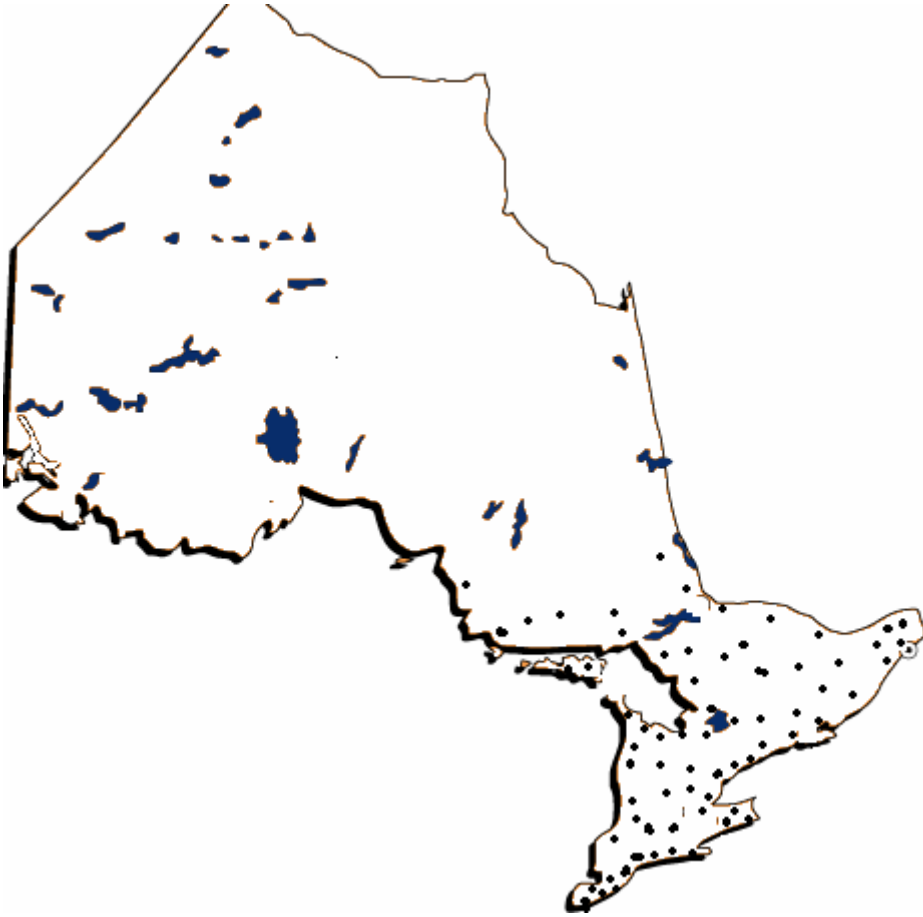


Figure 3. Ontario's distribution of CBC circles used for trend analysis.

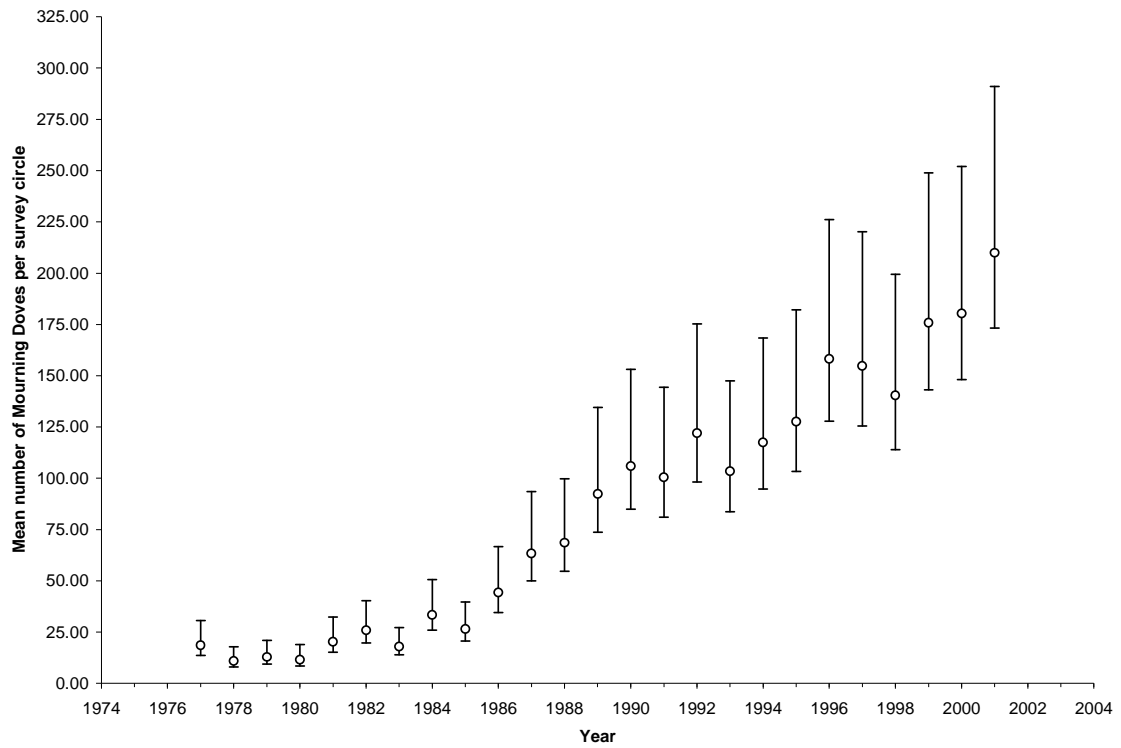
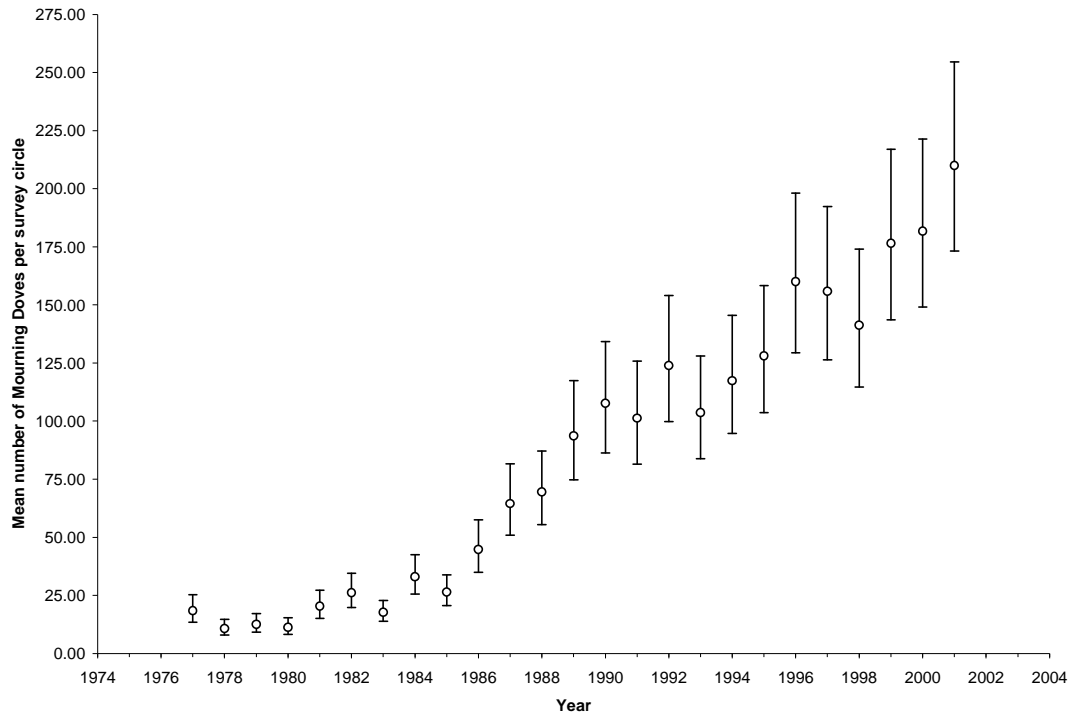
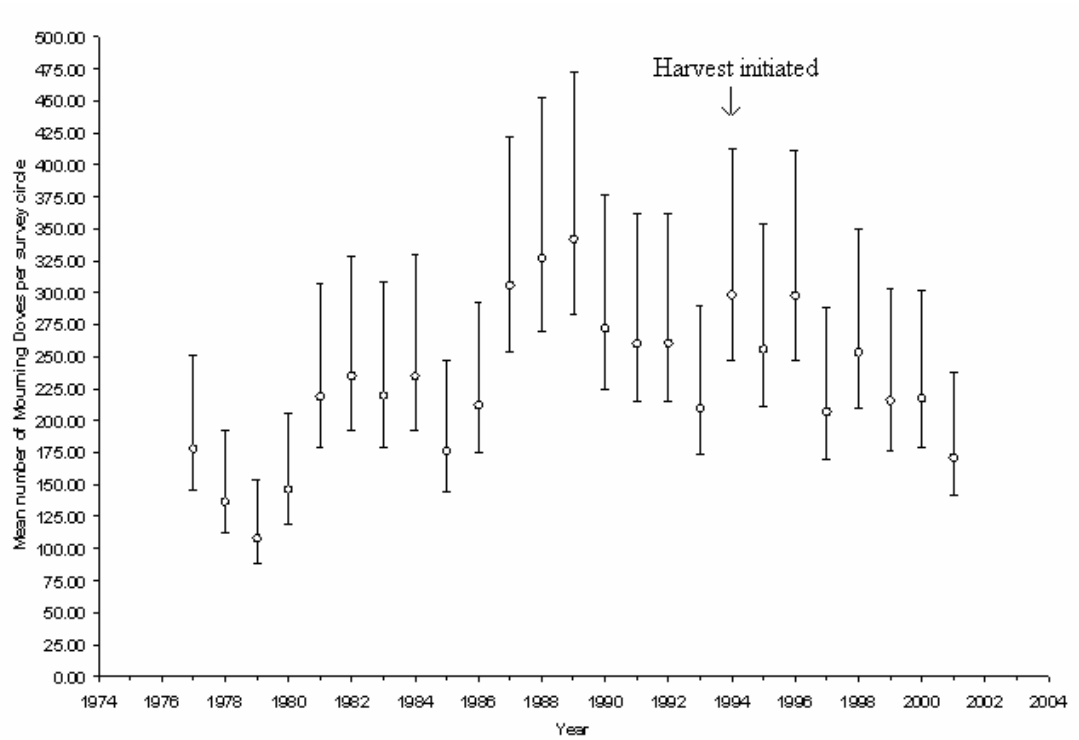


Figure 4: Ontario's wintering mourning dove population trends from 1977-2001 based on back-transformed CBC count data correcting for both forms of effort as covariates.

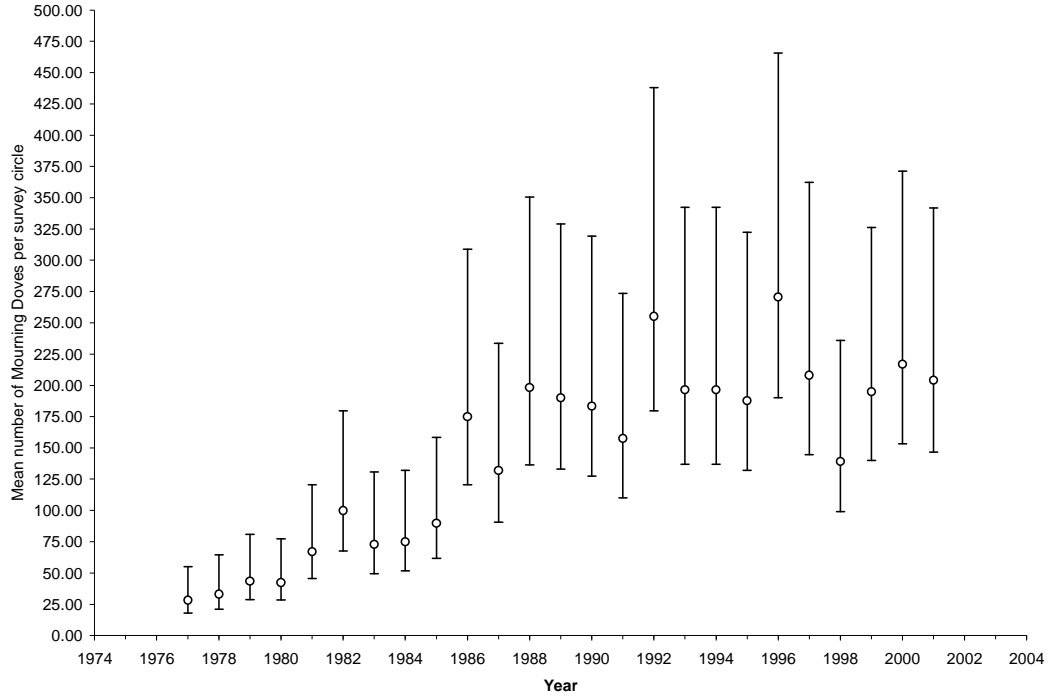
a)



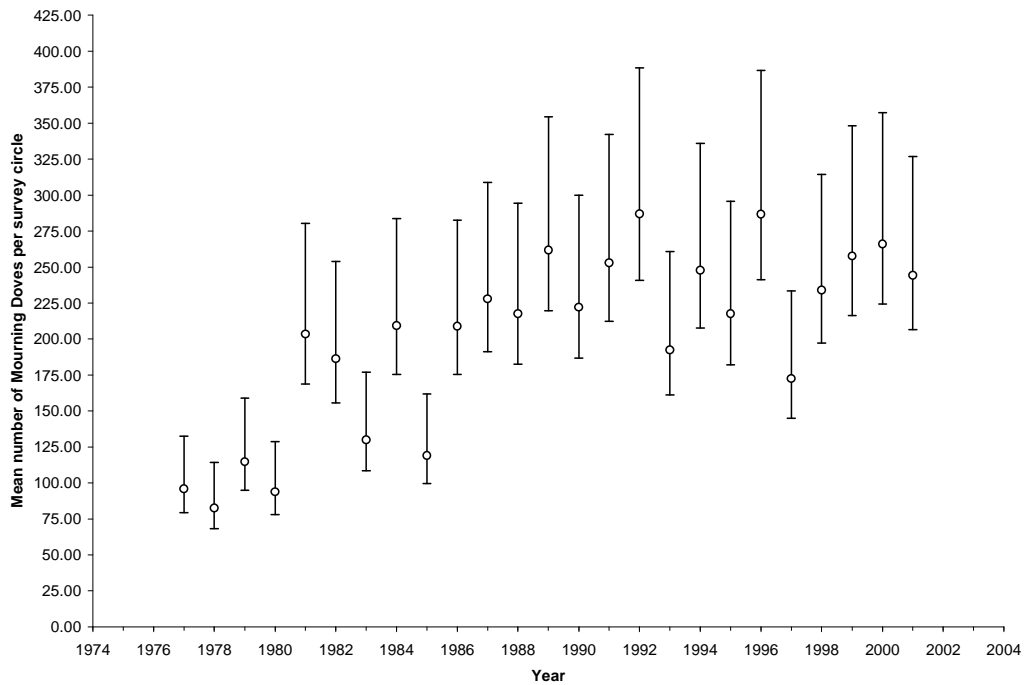
b)



c)



d)





e)

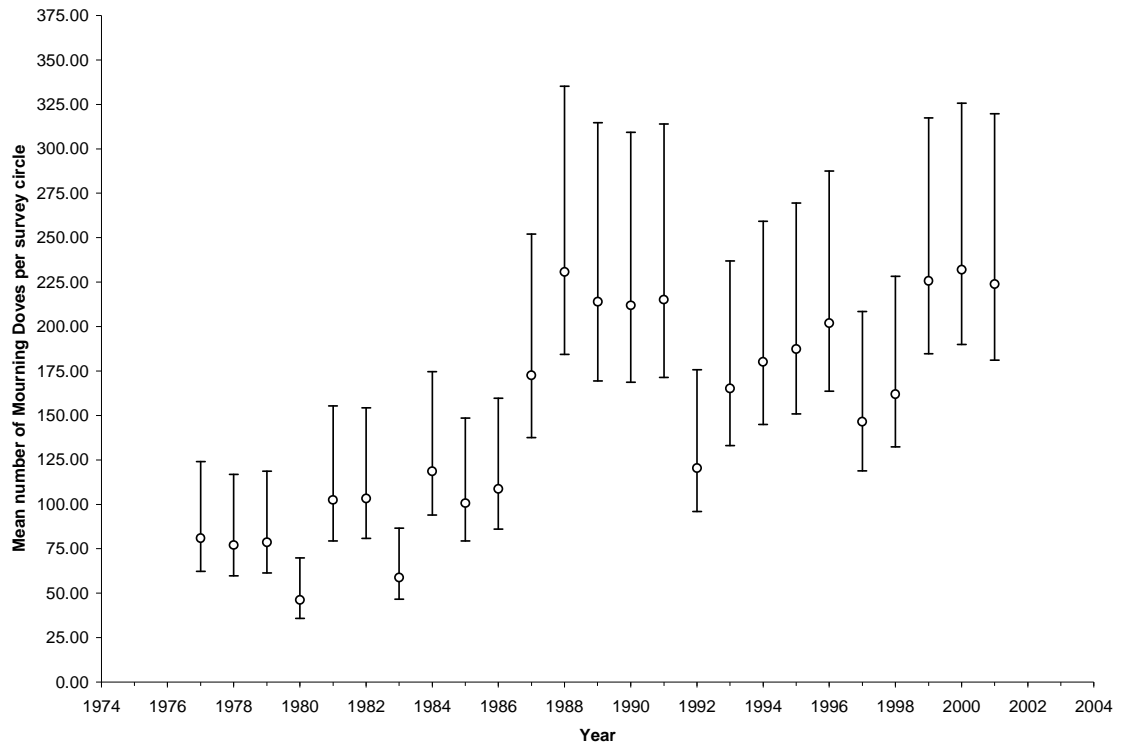


Figure 5: Wintering mourning dove population trends from 1977-2001 based on back-transformed CBC count data corrected for only total party hours effort as a covariate for a) Ontario, b) Ohio (arrow represents initiation of mourning dove harvest in 1994), c) Vermont, d) New York, and e) Michigan.

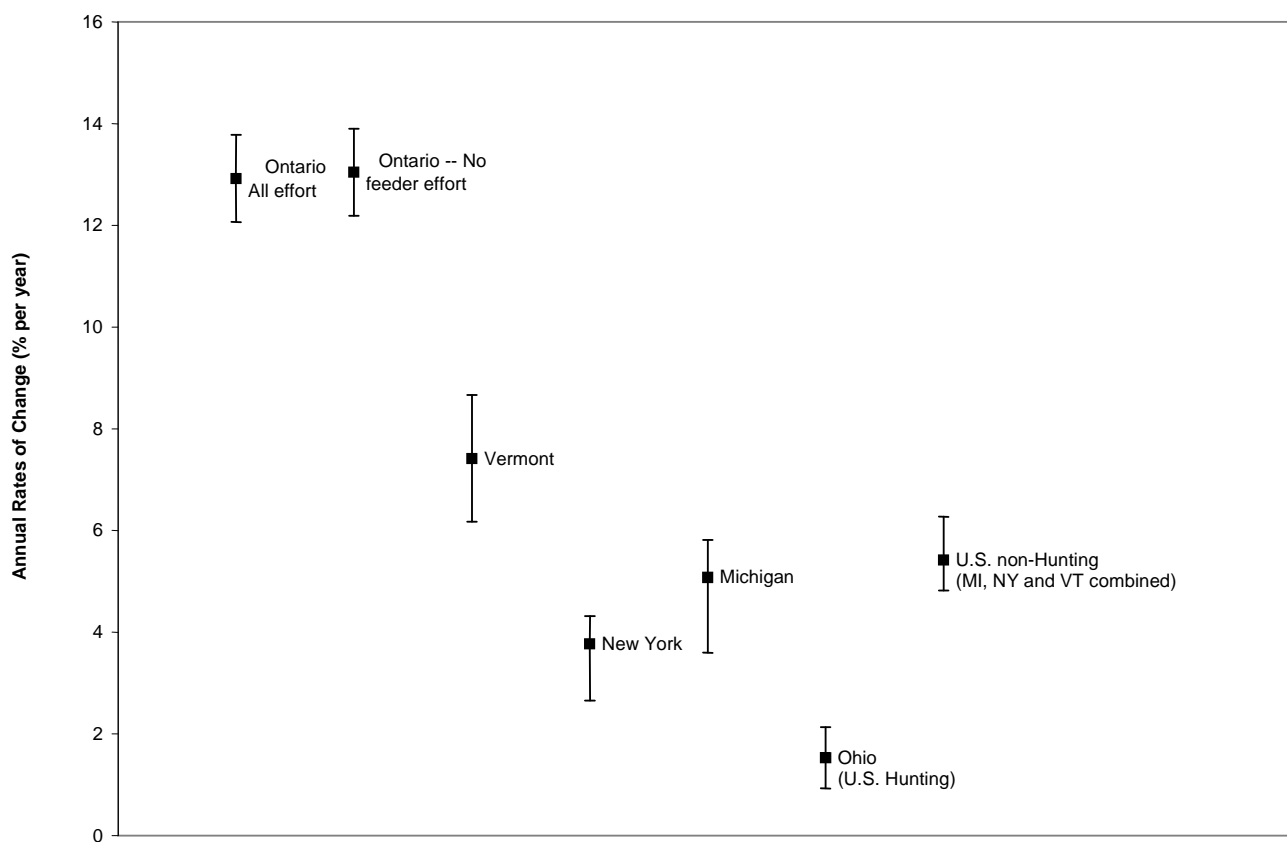


Figure 6: Annual rates of change with their corresponding 95% confidence intervals of all individual jurisdictions and grouped U.S. hunting and non-hunting jurisdictions. Both Ontario rates of change, with feeder and party hours modeled as covariates and feeder effort omitted as a covariat

## Appendix

### Dove Hunting Telephone Questionnaire

1. Hello, my name is ..... and I am a Biology student at the University of Western Ontario. I am conducting some educational related research for Dr. Scott Petrie and was wondering if I may speak with someone in your household who is 16 years of age or older.
2. If same person - May I ask for your participation in a research questionnaire that will take up less than 5 minutes of your time? Yes – continue to Part 3  
No – Thank you for your time.

If new person - Hello, my name is ..... and I am a Biology student at the University of Western Ontario. I am conducting some educational related research for Dr. Scott Petrie and I was wondering if I could ask for your participation in a research questionnaire that will take up less than 5 minutes of your time? Yes – continue to Part 3  
No – Thank you for your time.

3. You may refuse to answer any or all questions I ask or stop answering any questions at any time. All of your answers will be kept confidential. Responding to the questions indicates that you agree to participate in this study.

Mourning doves are among the most widely distributed and abundant birds in North America. Mourning doves are hunted in many states but they are not hunted in Ontario. The main purpose of this study is to get an Ontario-wide opinion on the possibility of a harvest on Mourning doves in Ontario. Mourning doves are present mostly throughout the Southern portion of Ontario and evidence indicates that their populations are increasing. Currently, a population analysis is being conducted to confirm this.

First, I am going to ask you a few questions regarding your attitudes towards wildlife in general.

Please rate your agreement to the following statements on a scale from 1 to 5.

- 1 strongly disagree
- 2 disagree
- 3 neutral
- 4 agree
- 5 strongly agree

I) It is important to me personally to know that wildlife exist in nature. 1 2 3 4 5

II) It is important to me personally that I consider the presence of wildlife as a sign of the quality of the natural environment. 1 2 3 4 5

III) It is important to me personally that I have knowledge of wildlife issues. 1 2 3 4 5

IV) I value wildlife. 1 2 3 4 5

4. Thank you, now I am going to ask you a few questions regarding your attitudes towards hunting.

a) Please answer yes or no to the following:

I) Do you presently hunt? Yes No

If No – Have you hunted in the past?

II) Does anyone in your immediate family hunt? Yes No

b) Please rate your agreement to the following statements on a scale from 1 to 5.

- 1 strongly disagree
- 2 disagree
- 3 neutral
- 4 agree
- 5 strongly agree

I) It is important to me personally that Canadians have the right to hunt as long as it is done in an ethical manner and does not impact wildlife populations. 1 2 3 4 5

II) It is important to me personally that hunting is used to manage the populations of certain game animals if they become troublesome. 1 2 3 4 5

III) It is important to me personally that Canadians have the right to hunt as long as they eat what they hunt. 1 2 3 4 5

5. Thank you, now I will ask you the final question of this study.

a) Please rate your agreement to the following statement on a scale from 1 to 5.

- 1 strongly disagree
- 2 disagree
- 3 neutral
- 4 agree
- 5 strongly agree

I) If it is determined that Mourning dove populations are increasing in Ontario, I would agree to the opening of a season to hunt this species within the province. 1 2 3 4 5

This is the end of the survey. Do you have any questions or concerns about any of the questions I have just asked you?

Thank you for your participation and have a nice morning/day/evening.