# Atlantic Flyway
# Resident Population Canada Goose
# Management Plan

Prepared by the
Canada Goose Committee
Atlantic Flyway Migratory Game Bird Technical Section

Adopted by the
Atlantic Flyway Council

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**ATLANTIC FLYWAY**
**RESIDENT POPULATION CANADA GOOSE**
**MANAGEMENT PLAN**

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## EXECUTIVE SUMMARY

Local-nesting or "resident" Canada geese were introduced into the Atlantic Flyway (AF) during the early 1900s and now comprise the largest population of geese in the flyway, with an estimated 1.1 million birds in spring 2011. This plan describes the status and values (positive and negative) of Atlantic Flyway Resident Population (AFRP) Canada geese and summarizes the consensus of wildlife agencies in the AF with respect to management of these birds. As such, this document provides direction and objectives for cooperative efforts. Direct actions resulting from implementation of the plan must still go through normal regulatory procedures, where additional environmental assessment and public input can occur.

The overall management goal of this plan is to:

**Manage AFRP Canada geese to achieve a socially acceptable balance between the positive values and negative conflicts associated with these birds.**

Specific management objectives to achieve this goal are as follows:

1. Reduce AFRP Canada geese to 700,000 birds (spring estimate) by 2020, distributed in accordance with levels prescribed by individual states and provinces.
2. Permit a wide variety of effective and efficient options for relief of damage and conflicts associated with AFRP Canada geese.
3. Provide maximum opportunities for use and appreciation of AFRP Canada geese, consistent with population objectives.
4. Ensure compatibility of AFRP goose management with management of migrant goose populations in the AF.
5. Annually monitor populations, harvest, and damage/conflict levels to evaluate effectiveness of management actions.

For each objective, specific strategies are identified which represent activities or policies to be undertaken or supported by state and federal wildlife agencies. Strategies include: (1) increasing sport harvest of AFRP Canada geese (without adversely affecting migrant geese), (2) allowing capture and euthanasia of geese in problem areas, (3) reducing recruitment on public and private lands, (4) allowing a wide variety of damage control techniques by private and public property owners, (5) monitoring population size, distribution, harvest, and damage complaints, (6) conducting research, and (7) effectively communicating with the public about the need for balance rather than eradication of AFRP geese. In addition to member agencies of the Atlantic Flyway Council, the U.S. Department of Agriculture's Wildlife Services program has a primary role in AFRP goose management, and they were full partners in development and anticipated implementation of this plan. Their assistance here and in providing programs to alleviate goose damage in the AF are acknowledged and appreciated.

# ATLANTIC FLYWAY
# RESIDENT POPULATION CANADA GOOSE
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## INTRODUCTION

For purposes of this plan, Atlantic Flyway Resident Population (AFRP) Canada geese are geese that hatch or nest in any Atlantic Flyway (AF) state, or in Canada at or below 48° N latitude and east of 80° W longitude, excluding Newfoundland (Figure 1). As their name implies, resident geese spend most of the year near their breeding areas, although many in northern latitudes do migrate. Population dynamics vary across the breeding range and local flocks exhibit a high degree of site fidelity, so management of sub-populations at the state or provincial level is possible. However, because federal laws and regulations protect all Canada geese, including non-migratory resident geese, coordinated management within the flyway is necessary.

Atlantic Flyway Resident Population geese are distinctly different from Canada geese that nested in the flyway historically. The original stock in pre-colonial times was primarily *Branta canadensis canadensis* (Delacour 1954), but they were extirpated long ago. The present-day population was introduced and established during the early 20th century, and is comprised of various subspecies or races of Canada geese, including *B. c. maxima*, *B. c. moffitti, B. c. interior*, *B. c. canadensis*, and possibly other subspecies, reflecting their diverse origins (Dill and Lee 1970, Pottie and Heusmann 1979, Benson et al. 1982). The first resident geese were birds released by private individuals in the early 1900s. When use of live decoys for hunting was prohibited in 1935, captive flocks of domesticated or semi-domesticated geese were numerous (estimated at more than 15,000 birds), and many were liberated in parks or allowed to wander at large (Dill and Lee 1970). From the 1950s through the 1980s, wildlife agencies in many AF states were actively involved in relocation and stocking programs to establish resident goose populations, primarily in rural areas. Nuisance flocks in urban/suburban conflict areas were a primary source of birds for these programs, which were highly successful and were mostly discontinued by 1990.

Populations of resident Canada geese have increased dramatically in recent years across North America (Ankney 1996, Nelson and Outing 1998). The dramatic growth and importance of the AFRP was not fully recognized until recently. The first management plan for these birds was developed in 1989, when it became apparent that they were contributing significantly to sport harvests, and human/goose conflicts were becoming more common, especially in urban/suburban areas. In the 1980s, biologists also became concerned that increasing numbers of AFRP geese might be masking a decline in the number of migratory Atlantic Population (AP) Canada geese as measured by the Midwinter Waterfowl Survey. Banding studies have confirmed that **resident geese are not AP geese that simply stopped migrating north to breed**; they are distinct populations with very different population growth rates, management needs and opportunities.

Resident Canada geese are now the most numerous waterfowl population in the AF, and concerns about their overabundance are widespread. Resident Canada geese have negatively

affected property and agricultural resources throughout the eastern U.S. High densities of goose feces reduce the aesthetic value and recreational use of parks, beaches, golf courses, athletic fields, and residential lawns and are often perceived as health hazards (Conover and Chasko 1985, U.S. Fish and Wildlife Service [USFWS] 2005). The increasing number of resident geese, while migrant populations have undergone dramatic changes in abundance, has complicated traditional Canada goose management and created new challenges where human/goose conflicts have occurred

This plan provides objectives and strategies to guide management of AFRP Canada geese over the next 5-10 years or as needed. State, provincial and federal agencies responsible for management of AFRP Canada geese have cooperatively developed this plan and agreed to support the basic goals and objectives as guidelines for management of this resource. It does not prescribe specific regulations or dictate management policies or programs. The plan allows for adjustments and flexibility as more is learned about the size and distribution of AFRP Canada geese, their biology and harvest, the nature and extent of damage and conflicts, and the interactions they have with management of other goose populations in the flyway. The plan will likely need to be updated again before another decade passes.

## DISTRIBUTION AND STATUS

### Breeding Distribution

As noted earlier, AFRP Canada geese are geese that were hatched or nest in any AF state or in Canada at or below 48° N latitude and east of 80° W longitude, excluding Newfoundland (Figure 1). Over the past 70 years, the AFRP has expanded from just a few early releases to where the breeding range now includes every state and province in the flyway, except Newfoundland (Hindman and Ferrigno 1990). Their range continues to expand at both ends of the flyway and within most states and provinces. The AFRP may someday merge with migrant geese nesting in the boreal forest zone of Quebec above 48° N latitude. Throughout this range, breeding habitats of AFRP Canada geese vary widely from agricultural landscapes to forested wetlands to urban and suburban environments.

Highest densities (>0.9 pair/$km^2$ in spring) of AFRP geese occur in northern New Jersey, Long Island (New York), southeastern Pennsylvania, central Maryland, and portions of northern Virginia. This may reflect the longer history of AFRP geese nesting in those areas. Moderate densities (0.5 – 0.9 pair/$km^2$) occur in eastern Massachusetts, Rhode Island, and most of upstate New York and Connecticut as well as northern Pennsylvania, central Virginia, and southeastern Pennsylvania. Low densities (<0.5 pair/$km^2$) occur in mountainous areas of northern New England, northern New York (Heusmann and Sauer 2000), and in the southern Maritime provinces.

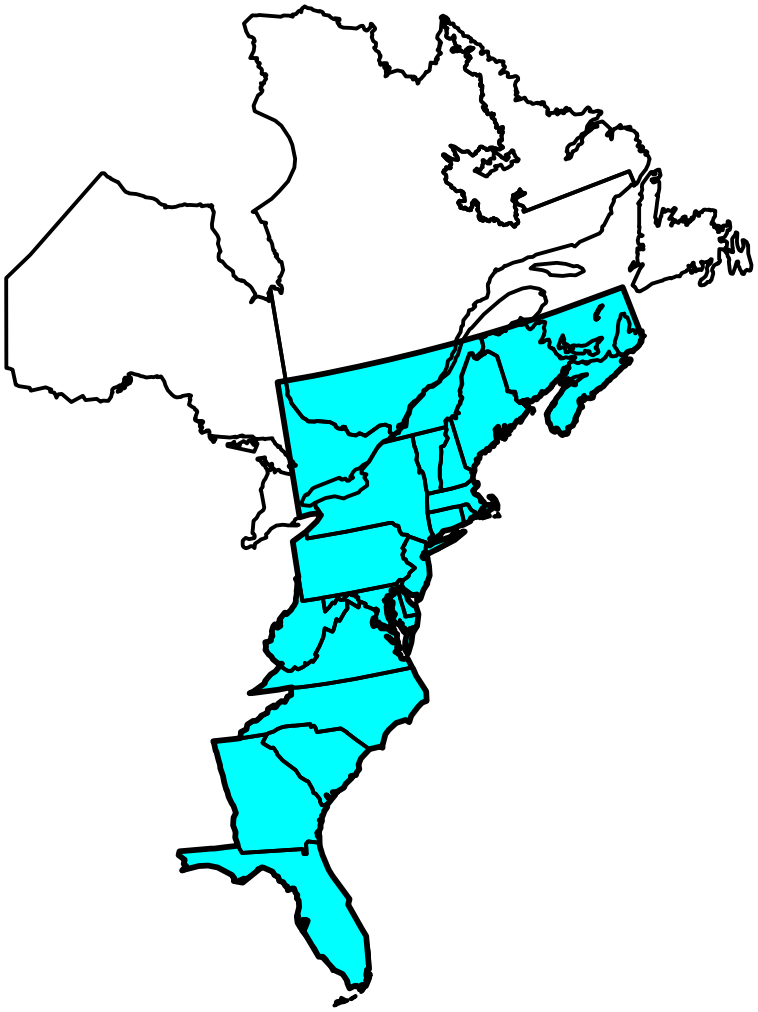

Figure 1. Breeding range of Atlantic Flyway Resident Population Canada geese.

**Migration and Winter Distribution**

Most AFRP Canada geese are non-migratory or undergo short local movements between breeding and wintering areas. Nearly 99% of resident geese neck-banded in the mid-Atlantic region (New York-New Jersey-Pennsylvania) during the early 1990s remained in that region throughout the year (Hestbeck 1995). Geese nesting inland in northern states and provinces tend to exhibit more regular "migration" behavior than those nesting in coastal regions or at mid or southern latitudes. Some local flocks, especially in northern and interior parts of the AF, travel several hundred kilometers between breeding and wintering areas, but most travel much shorter distances (<35 km) or remain year-round in local areas (Johnson and Castelli 1998). These movements are small compared to the 2,000+ km that AP and North Atlantic Population (NAP) Canada geese make during migration. Most AFRP geese are reluctant to leave their breeding areas, and move to other areas only when severe winter weather makes it necessary to find open water and feeding areas. Resident geese that migrate typically move to wintering areas in late November or December and return to nest in March.

The winter distribution of AFRP geese is similar to their breeding distribution, with

wintering flocks found from southern Canada to northern Florida. In northern states and southern Canada, concentrations occur inland in agricultural areas near large unfrozen lakes, rivers, and reservoirs, such as the Finger Lakes and Hudson River Valley regions of New York. In southern New England and states to the south where ice and snow cover are less common, wintering resident geese are more widely distributed throughout the Atlantic Coastal Plain.

Resident geese use a variety of habitats in winter, including rural agricultural fields, parks, golf courses and other open lawns in densely populated urban and suburban areas. They often remain in urban areas during winter because those areas are typically not hunted, contain good roosting sites in the form of rivers, ponds or lakes that remain ice-free well into winter, and have readily available foods, such as lawn grasses, supplemental feeding by local citizens, or waste grain on crop fields nearby.

Many AFRP geese undergo a molt migration but this phenomenon appears to be less developed with AFRP geese than with Mississippi Flyway Giant Population geese (Nichols et al. 2004, Sheaffer et al. 2007). In New Jersey, Nichols et al. (2004) estimated that 25-30% of AFRP geese left the state in a molt migration whereas Zicus (1981) and Lawrence et al. (1998) each reported that approximately 60% of the spring population of Canada geese departed on a molt migration from study areas in Wisconsin and Illinois, respectively. Birds banded during the summer in AF states are regularly shot in subsequent years in Ontario and Quebec (USGS Bird Banding Lab, unpubl. data). This pattern is particularly strong for known 1-year old (i.e. banded as goslings), subadult birds. These recoveries are birds presumed to be non-breeding (sub-adult) birds returning from or at molt migration sites. Northward flights of high-flying geese are often seen during late May or early June in some AF states (B. Swift, New York State Dept. of Env. Conserv., pers. commun.) and Ontario (Abraham et al. 1999). Atlantic Flyway Resident Population Canada geese have also been recaptured during summer banding operations in southern James Bay (Abraham et al. 1999), in the boreal forest of interior Quebec (P. Brousseau and P. Lamothe, CWS, unpubl. report), and in Labrador (Pollard et al. 2007). Sheaffer et al. (2007) reported that twelve of the 27 satellite radio-tagged, female AFRP geese (44%) whose nests were destroyed made a northward migration to molt in northern Quebec, Canada: seven to the eastern coast of Hudson Bay, three to lowland areas east of James Bay, and two to interior locations south of Ungava Bay. With >1 million AFRP geese estimated in the AF, the potential exists for substantial numbers of non-breeding adults to molt migrate to northern breeding areas. Sheaffer et al. (2007) also found that AFRP geese in more coastal areas of the AF were less inclined to molt migrate than birds further inland within the flyway.

**Population Trends**

Numbers of AFRP Canada geese in the AF have increased dramatically since their establishment nearly a century ago. Breeding waterfowl surveys conducted in the northeastern U.S. (from New Hampshire to Virginia), aerial surveys in eastern Canada and Maine, and estimates provided by biologists in other AF states and provinces indicate a total spring population of approximately 1.4 million AFRP geese in the flyway in 2010, including more than 1 million in the U.S. (Table 1). Pairs annually account for about one-half to two-thirds of the total population, with the remainder in groups of non-breeding or subadult birds (H Heusmann, Mass. Div. Fish. and Wildl., unpubl. data, Klimstra 2010). Annual productivity, estimated from harvest age ratios corrected for differential vulnerability, averaged 0.5 young-of-the-year birds per adult from 2004-2008. Thus, assuming similar production in 2010 and negligible adult

mortality in spring and summer, the total estimated U.S. population was approximately 1.5 million birds in late August, just before the hunting seasons opened.

The estimated number of AFRP Canada geese in the northeastern U.S. has increased more than 3-fold between 1990 and 2010 (Figure 2). The estimated annual growth rate over this period was approximately 15% per year, similar to what is predicted by population models that assume moderate recruitment (2.4 young per nesting female) and 80% adult survival, as are typical of resident geese (S. Sheaffer, Livingston Ripley Waterfowl Conservancy, unpubl. data). However, spring population estimates based upon the AF Breeding Waterfowl Plot Survey have leveled off since 1997 after special hunting seasons were established throughout the AF (Figure 2, Table 2). Since 2008 the survey estimates suggest that AFRP geese in the northeast U.S. have begun to decline due to expanded hunting seasons and additional population control work that is allowed or encouraged by most state wildlife agencies (Table 2). That work includes roundups, special Canada goose permits, and widespread egg and nest destruction that have been authorized by resident Canada goose depredation and control orders (Code of Federal Regulations [50 CFR Part 21.26, 21.41, 21.49 – 21.52]).

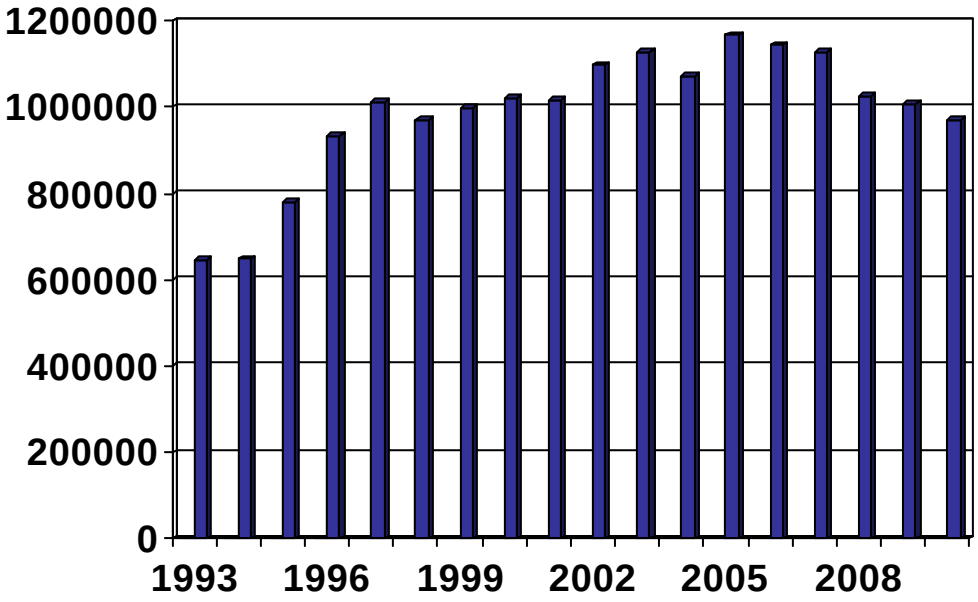


Figure 2. Estimated number of resident Canada geese from the Atlantic Flyway Breeding Waterfowl Plot Survey (Virginia to Vermont) 1993-2010). Estimates for 2002-2010 based upon calculating total indicated pairs [TIB = (2 x pairs) + singles + groups].

Population growth in other AF states and provinces is not as well documented, but similar growth rates were indicated by Breeding Bird Survey (BBS) data, which provide a larger geographic and longer-term perspective (Figure 3). Breeding Bird Survey indices for every physiographic region of the eastern U.S. and Canada increased dramatically between 1993 and 2010 (J. Sauer, U.S. Geological Survey [USGS], unpubl. data). The estimated annual growth for the entire region, as measured by the BBS has been about 14% per year with no indication that the breeding population has stabilized (Figure 3). Midwinter counts of Canada geese are not as reliable as breeding population surveys, and must be interpreted with caution because resident and migrant goose stocks cannot be distinguished on these surveys. Traditional winter surveys

in southern AF states (South Carolina, Georgia, Florida), where very few migrant geese winter, do not cover areas typically used by AFRP geese and do not accurately reflect population trends. Local area winter counts, such as Christmas Bird Counts, are available for many areas and may be useful where AFRP birds comprise most of the Canada geese counted.

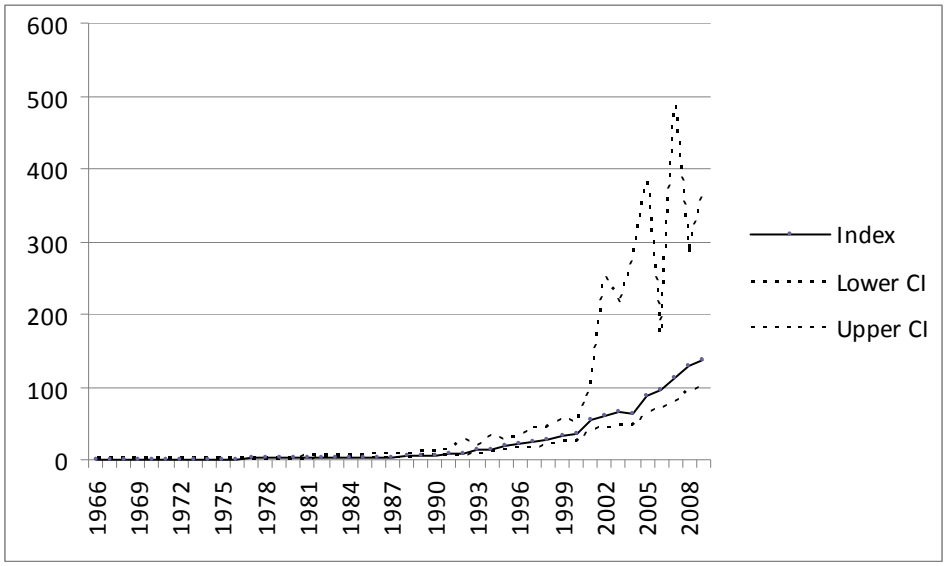


Figure 3. Population trend of Canada geese (mean number of geese observed per route) observed in the Atlantic Flyway states and provinces from the Breeding Bird Survey 1966-2009 (J. Sauer, USGS, unpubl. data).

## POSITIVE VALUES AND USE

### Aesthetic Values

For much of the 20th century, Canada geese were a symbol of northern wilderness, and migrating flocks were harbingers of the changing seasons. Resident geese provide distinctly different aesthetic benefits, and are valued by many people for the recreational opportunities the birds provide. Due to their wide distribution, year-round presence, and usual tolerance of people, resident geese have become very popular for wildlife observation, especially for young, elderly, and amateur bird watchers and naturalists. In many situations, resident geese may be an ideal subject for nature study or environmental education, and often appear in local media, because they are easily observed and often occur in close proximity to people. This may be especially true in areas that are not frequented by significant numbers of migrant geese, adding wildlife diversity to those areas.

Despite the growing number of conflicts associated with resident Canada geese, most people enjoy seeing or hearing some birds, and would not want the population eliminated. In a 1993 survey of people from 10 metropolitan areas across the U.S. (including 4 in the AF where resident geese occurred), approximately 26% of respondents said they wanted more geese, 54% wanted no change in numbers, and 19% wanted fewer geese in their neighborhood (Conover

1997). Apparently, problems were not so widespread that most residents viewed them as pests, although support for population reduction went beyond the 5% of respondents who had experienced a problem with Canada geese in the previous year. In a public attitude survey about geese in a Long Island (New York) community, 78% of respondents said they enjoyed the presence of resident Canada geese, even though half of those were concerned about problems the birds may cause. Only 11% said they did not enjoy geese and regarded them entirely as nuisances (Loker 1996). Long-term management of all geese in the AF could be seriously impacted if AFRP geese become so abundant that Canada geese, in general, become devalued and perceived primarily as pests.

**Sport Hunting and Harvest**

Sport hunting has played an important role in recreation and population control for AFRP Canada geese since the 1980s. Before the mid-1980s, Canada goose harvest management did not differentiate between resident and migrant populations in the AF. During the late 1980s, the Canada goose harvest management paradigm shifted from a general approach to a strategy where additional harvest pressure was directed at AFRP geese, while reducing harvest of migrant stocks. Shortly thereafter, during the early 1990s, this strategy received greater emphasis due to the declines in various migrant (i.e., AP and Southern James Bay Population [SJBP]) populations (Heusmann 1999).

Three general approaches have been taken with special Canada goose hunting seasons based on the temporal and/or spatial distribution of migrant populations. These approaches include September or "early" seasons, winter or "late" seasons, and establishment of "regular" seasons within specific AFRP harvest zones (Figure 4). Criteria were developed cooperatively within and between the flyways and the USFWS to allow special hunting seasons in the U.S. to increase harvest of resident geese at times and places where impacts to migrant goose populations would be minimal. In the U.S., these special seasons were initially permitted on an experimental basis, with a requirement that impacts on migrant populations be assessed and reported. Experimental seasons that met the criteria were permitted to become operational or were amended to remain within established criteria. Early and late seasons have also been established in Canada, but without formal criteria.

September or "early" seasons are predicated on timing the hunting seasons prior to the fall arrival of migrant Canada goose populations. Early seasons began in North Carolina in 1989 and quickly expanded throughout the AF. By 2010, 18 AF states/provinces held September seasons (Table 3). Generally, season ending frameworks, geographic areas open to hunting, and bag limits have become more liberal as managers have gained experience with September seasons. Several AF states have incorporated special regulations including unplugged guns, extended shooting hours, and electronic calls during September seasons (Table 4).

Harvest rates of AFRP geese vary by hunting season. September seasons have proven efficient for exerting harvest pressure on AFRP geese. From 2000-2009, adult harvest rates of AFRP geese during September seasons have averaged 5.96% ± 0.25%. Mean juvenile harvest rates were 7.34% ± 0.33. Regular seasons in the Atlantic Flyway have varying frameworks, and depending upon where located, have typically run from 30 to 90 days in length. Mean adult harvest rates during regular seasons (October-Jan) since 2000 were 5.89% ± 0.27. Juvenile harvest rates were 6.85% ± 0.54. Harvest rates of AFRP geese during late seasons (February and

March) are significantly lower than in early or regular seasons. Mean adult harvest rates since 2000 were 1.01% ± 0.15. Juvenile harvest rates averaged 0.84% ± 0.14.

In the Mississippi Flyway (MF), Sheaffer et al. (2005) found that September seasons did not increase direct recovery rates for SJBP or Eastern Prairie Population geese; however, harvest rates for Mississippi Valley Population geese did increase with September seasons, although observed harvest levels did not represent a significant mortality source. Nichols and Zimpfer (2006) reviewed band recoveries during 1996-2004 AF September seasons and found that these seasons had minimal impact on migrant Canada goose populations. The highest harvest rate observed during any one year for each migrant Canada goose population was 0.0022 (young) for AP, 0.00750 (adults) for SJBP and 0.00295 (adults) for NAP. During years when AF regular hunting season packages were moderate, the mean percent of total annual recoveries (direct and indirect) occurring during September was 1.0%, 1.6%, and 0.7% for AP, SJBP, and NAP geese, respectively.

Special "late" seasons are predicated on allowing special hunting seasons in geographic areas that have lower proportions of migrant Canada geese during late winter when migrant population geese have passed through to wintering termini (Heusmann et al. 1998). In some areas, AFRP geese are forced by winter weather to coastal areas where they are more vulnerable to harvest during late seasons. The first late seasons were held during 1986 in Connecticut and Ontario. Suspension of the regular Canada goose hunting season in 1995 due to the poor population status of AP geese prompted many AF states to offer late seasons to reduce damage associated with AFRP geese and to maintain recreation and harvest opportunity. During the late 1990s, when AP seasons were closed, nine states/provinces held late seasons (Table 3). The utility of late seasons declined in some AF states with the initiation of regular seasons in AFRP zones in 2002. By 2010, only five states/provinces held late seasons (Table 3).

During the mid-late 1900s, migrant populations of Canada geese began wintering further north than they historically did (Trost and Malecki 1985, Hindman et al. 2004). Concurrently, AFRP geese were stocked and/or became established in southern AF states. Since migrant populations became nearly absent in southern states, their status did not need to be considered when establishing "regular" (i.e., traditional fall and winter) Canada goose hunting seasons. Georgia held regular seasons for AFRP Canada geese beginning in 1992, followed by South Carolina in 1994 and Florida in 1997 (Table 3).

Although early and late special seasons have been useful in harvesting AFRP geese, "regular seasons" (e.g., seasons within the traditional October–January frameworks) remain popular with waterfowl hunters as well as an efficient period for maximizing AFRP harvest. Similar to other flyways, Canada goose management in the AF is based upon the geographic range of the various populations within the flyway. In 2002, the USFWS granted AF states the ability to establish AFRP harvest zones where more liberal regular seasons were allowed (Figure 4). The intent of these AFRP zones was to maximize harvest of AFRP geese with minimal impact upon migrant populations (AP, NAP, and SJBP). The 2002 criteria required that AFRP zones may not contain more than 10% of AP recoveries and no more than 30% of SJBP recoveries within the state. The 30% criterion applied to areas outside of SJBP zones. These AFRP harvest zones were originally established in portions of New York, North Carolina, Pennsylvania, Maryland and Virginia. In 2008, the criteria were modified to allow portions of some NAP "low harvest" zones to be converted to AFRP zones (Figure 5). At the same time,

and in congruence with the 2003 SJBP Management Plan (Abraham et al. 2008), the requirement of no more than 30% SJBP recoveries was removed. Instead a collective requirement of <1% adult direct recovery rate (DRR) for any migrant goose population in AFRP zones was deemed adequate to provide necessary protection to migrant goose populations.

An evaluation of the impacts of harvest on migrant stocks within regular season AFRP harvest zones is done periodically (e.g., about every three years). Evaluation criteria were established in 2002 and modified in 2005 and again in 2008. Evaluations of AFRP harvest zones were based upon band recovery data to ensure that these zones did not exceed the <1% adult DRR criteria. In addition, AFRP harvest zones could not account for more than 10% of either AP or NAP band recoveries within a state. Areas within states contributing disproportionately to the cumulative adult DRR would be eliminated to stay below the 1% threshold. In the event a season was closed for any migrant population, AFRP hunting zones would remain open as long as they do not result in exceeding the cumulative 1% adult DRR threshold.

In 2005 and again in 2008, the impacts to migrant populations from these AFRP hunt zones were examined and where necessary, the boundaries for the hunt zones were adjusted accordingly. Adult DRR from all migrant goose populations have been below the 1% threshold specified in the evaluation criteria during all years that AFRP hunt zones have been in place. These AFRP hunt zones have proven effective for increasing hunting opportunity and harvests of AFRP geese with minimal impacts to migrant goose populations.

Biologists have explored and used several techniques to differentiate resident geese from migrant birds. The morphological differences among populations of Canada geese have been used to differentiate populations (Moser and Rolley 1990, Merendino et al. 1994). Moser (1999) found that various models correctly classified 80-88% of AFRP geese from AP and NAP geese; however, this analysis contained relatively few AP and NAP samples. Caccamise et al. (2000) found that stable isotopes in primary feathers could be used to distinguish between AP and AFRP Canada geese. Although further analyses are underway (D. Caccamise, Rutgers Univ., pers. commun.), this technique has not been tested across a broad geographic scale in the AF. Scribner et al. (2003) used genetic markers to discriminate among various migrant stocks of Canada geese. Using these methods, Sheaffer et al. (2007) determined that AFRP geese could be discriminated from AP and NAP geese but analyses were done with small AFRP sample sizes from a relatively limited geographic area.

Atlantic Flyway Resident Population Canada geese now comprise a large portion of the total Canada goose harvest in the AF. The mean annual September Canada goose season harvest in the U.S. portion of the AF from 1999-2009, as estimated by the USFWS harvest survey, was 223,600 geese (Table 5). From 1999-2002, during the height of the use of late seasons, an average of 51,400 geese were harvested each year in the U.S. portion of the AF during late seasons (Table 5). From 2003-08, late season harvest declined 39% to an annual mean of 31,400 birds. Since 2002, harvest within AFRP regular season zones supplanted late season harvest in several AF states, but estimates for those areas were not readily available.

**Harvest Distribution**

Klimstra and Padding (2011) used population estimates and band recovery data to

calculate the distribution and derivation of the AF Canada goose harvest during the 2004-2008 harvest seasons. During that period, over 70% of adult Canada geese harvested in the New England and Mid-Atlantic regions were AFRP geese, while 58% and 27% of the harvest was AFRP geese in the Chesapeake Region and Canada, respectively. The regional distribution of the harvest of adult AFRP geese during the 2004-2008 seasons was: Canada 7%, New England 9%, Mid-Atlantic Region 45%, Chesapeake Region 17% and the Southern Region 22% (Table 6) (Klimstra and Padding 2011). Liberalization of hunting regulations in regular AFRP, AP and NAP harvest zones has increased AFRP goose harvests in all regions of the flyway.

In the U.S., only half of the AFRP birds harvested were shot during regular seasons (Table 6) (Klimstra and Padding 2011). Most of the rest were taken during special September seasons, but in four of the six states with special late seasons (Connecticut, Massachusetts, New Jersey, and Virginia), more than 10% of the state's AFRP harvest occurred during the late seasons (Table 6). Ontario, with the largest number of AFRP birds in eastern Canada (Table 2), had the highest harvest in that region; likewise, states with large numbers of AFRP birds during spring (Pennsylvania, New York, Georgia, and Virginia; Table 2) were the highest harvest states (Table 6). Atlantic Flyway Resident Population geese were shot in several states in the Mississippi, Central, and even Pacific Flyways, but these comprised <1% of the total harvest (Table 6).

Nearly all of each state's special September season AFRP harvest consisted of birds that were banded in that state (Figure 6; Klimstra and Padding 2011). This is consistent with previous findings (e.g., Heusmann 1999). During the regular seasons, however, the harvest distribution of birds banded in each state or province followed a north-south gradient; moving from north to south, the proportion of AFRP birds harvested in the same province or state in which they were banded increased from about 50% to >95% (Figure 6). This could be the result of some AFRP birds joining migrant geese on their way south. Alternatively, perhaps AFRP geese in more northern latitudes tend to move more frequently or extensively than they do further south, in response to colder temperatures, or snow or ice cover that force them to search for open water and feeding opportunities (Klimstra and Padding 2011). Although Heusmann (1999) found that resident geese moved more during late seasons compared to other seasons, Klimstra and Padding (2011) did not find the same north-south trend for the special late seasons, possibly because sample sizes (both number of states and band recoveries) were small (Figure 6).

**Harvest Derivation**

During the 2004-2008 September seasons, AFRP geese comprised about 98% of the average estimated annual harvest of adult Canada geese in the AF (Table 7; Klimstra and Padding 2011). Of the rest, only 1% were from migrant populations and nearly 1% were Mississippi Flyway (MF) giant Canada geese. September harvest was >95% AFRP birds in all but a few states; Vermont, New Jersey and Maryland derived about 14%, 5% and 5%, respectively, of their early season harvests from migrant AP geese, and West Virginia's harvest consisted of 6% MF giant Canada geese (Table 7).

In the U.S. portion of the AF, the majority (62%) of the estimated annual regular season harvest of adult Canada geese during 2004-2008 was also AFRP birds (Table 8; Klimstra and Padding 2011). Most states derived well over half of their harvests from AFRP birds, but Rhode

Island, Delaware, and Maryland hunters shot mostly migrant geese, and the harvest in Maine, Vermont, and New York was about evenly split between AFRP and migrant birds (Table 8). Atlantic Flyway Resident Population geese (52%), AP Hudson Bay (26%), NAP (13%), and AP Ungava Bay (8%) birds were all important in New York's harvest.

In the AF portion of Canada, the annual harvest of adult Canada geese during 2004-2008 regular seasons was comprised of about 79% migrant birds and 21% AFRP geese (Table 8; Klimstra and Padding 2011). Nova Scotia was the only province to derive all of its harvest from AFRP geese (Table 8). Ontario's harvest was mostly AFRP (52%), whereas Quebec hunters harvested a much lower proportion of AFRP geese (16%). New Brunswick's harvest was about 67% NAP and 30% AFRP birds.

Of the six AF states that had special late seasons, all but two derived all of their harvest from AFRP geese (Table 9). Approximately 44% of the harvest in Massachusetts consisted of NAP geese, with the remainder derived from the AFRP. In Virginia 95% of the late season harvest was AFRP, while 3% was AP Hudson Bay birds and 2% SJBP geese (Klimstra and Padding 2011).

In the AF states it is evident that both the special September and late seasons are effective in targeting AFRP geese (combined they accounted for half of the AFRP harvest in the U.S.) with minimal harvest of migrant populations. However, despite expansion of those seasons and longer regular seasons in AFRP zones, AF managers are still faced with overabundant resident goose populations (Appendix). The desire to minimize impacts on migrant birds reduces options for further increasing hunting pressure on the AFRP, either by expanding areas or time periods during which Canada geese may be hunted. Furthermore, managers often cannot target AFRP geese in urban and suburban areas because of local firearm ordinances, which is problematic given that geese in those areas typically have high survival rates (Balkcom 2010). This in turn can make reducing population size difficult given that reducing adult survival is one of the most effective methods of controlling overabundant geese (Ankney 1996). Thus, it is unlikely that hunter harvest alone will be able to reduce AFRP numbers to attain the AF population objective (Klimstra and Padding 2011).

## DAMAGE AND CONFLICTS

Resident Canada geese are often involved in damage to property, agriculture, or natural resources, and conflicts with public health and safety (Conover and Chasko 1985, USFWS 2005). Problems are most numerous in urban and suburban areas where large numbers of geese occur in parks, golf courses, corporate properties, private residences, swimming facilities, marinas, and water supply reservoirs. Damage is costly to repair or prevent, may compromise public health, and results in loss of aesthetic values and diminished public tolerance of geese.

Goose damage information in the U.S. is uniformly collected by the USDA WS program. Between 1994 and 2010, WS offices in the AF received more than 32,000 requests for technical assistance with Canada goose damage (Table 10). Some of these requests pertained to migratory geese, so it is difficult to determine the exact number attributed to AFRP geese. However, most requests were received during April-September, when migrant geese are absent from the U.S., and 84% involved property damage or human health and safety (Table 11), which typically

involve resident geese. Additionally, many calls received during autumn and winter often pertained to damage that occurred during spring and summer. The number of complaints received does not fully reflect the extent of problems associated with AFRP geese; many conflicts are not reported, and others may continue for years before or after they were reported. Comparable data on goose damage and conflicts in Canada is not available.

**Property Damage**

Property damage accounted for 59% of complaints (12,679 calls) received by WS in AF states during 1999-2010 (Table 11). Most of those involved excessive accumulations of goose feces on landscaping and walkways at parks, private residences, businesses, schools, golf courses, and athletic fields. Property damage complaints regarding feces involved damaged lawns, cleanup costs, loss of property use for intended purpose, and diminished quality of life for complainants.

Property damage can also occur when geese graze excessively on lawns or turf areas, which reduces aesthetics, can be expensive to repair, and contributes to soil erosion. Damage to golf courses occurs most often in late summer, when cool season grasses become dormant due to warmer temperatures and during spring in newly seeded or planted areas. Occasionally, geese destroy flower gardens by grazing and trampling. A negative aesthetic appearance of commercial property caused by excessive grazing or accumulation of feces may discourage business clients and guests, resulting in economic loss to those businesses.

**Human Health and Safety**

Resident geese can directly affect human health and safety. Potential impacts include disease transmission to humans, collisions with aircraft, aggressive behavior towards people, and traffic hazards. In addition to any direct consequences, considerable costs are incurred by the public to prevent such impacts from occurring. Although the threat of serious harm may seem low to those not involved with the incident, management to prevent or reduce human health and safety risks associated with resident geese is warranted (USFWS 2005).

Between 1994 and 1998, WS offices in the AF received 1,194 calls (239/year) regarding Canada geese impacts on human health and safety. Between 1999 and 2010, this number increased to 5,291 (440/year; Table 11), or nearly a two-fold increase in the mean annual number of calls received related to human health and safety.

The potential for human illness from exposure to goose feces is a common concern, especially on public use areas and where children or elderly people are present. It is also a concern wherever people of any age may ingest water infected with pathogens from goose feces, such as drinking water supplies and bathing beaches. Field studies by Bigus (1996), Converse et al. (2001), and Clark (2003) provided quantitative data on prevalence in goose feces of various human pathogens, including *Giardia*, *Cryptosporidium, Campylobacter, Salmonella*, *Shigella*, *Proteus*, *Pseudomonas*, *Yersinia*, *Enterobacter*, and *Chlamydia psittaci*. Most of these pathogens cause intestinal disorders or respiratory problems in humans that are not easily diagnosed as to the causal agent or source of infection. Although the risk of infection is low, it is probable that some cases have gone unreported.

Two recent cases of humans contracting Giardiasis have been linked to their exposure to goose feces in New Jersey (L. Jargowsky, Monmouth County Board of Health, pers. commun.). *Giardia* cysts and *Cryptosporidium parvum* oocysts are not killed by water chlorination procedures, and are viable in the environment for up to one year. The U.S. Centers for Disease Control and Prevention consider *Giardia* and Cryptosporidiosis to be emerging, highly infectious disease threats, and these two parasites are among the most prevalent of disease-causing agents in goose feces (Graczyk et al. 1998). Canada geese can transport viable oocysts of *Cryptosporidium parvum*, resulting in possible contamination of surface waters the birds frequent (Graczyk et al. 1997). The birds may also act as vectors or reservoirs of other pathogens, including antimicrobial resistant bacteria (Cole et al. 2005).

Canada goose droppings typically contain fecal coliform bacteria (*Escherichia coli*) as a normal part of the gut flora of these birds (Alderisio and DeLuca 1999, Kullas et al. 2002). *Escherichia coli* from waterfowl, including Canada geese, have been linked to high fecal coliform counts at beaches, drinking water supplies and small ponds (Hussong et al. 1979, Jamieson 1998, Samadpour 1998, Jones 2007). Most public health agencies interpret high coliform counts as evidence of fecal contamination, with possible presence of more serious human pathogens, and respond by prohibiting swimming, drinking or other direct contact uses of the water (Damare et al. 1979, Standridge et al. 1979). Consequently, the presence of large numbers of geese in a small body of water with little or no flushing can preclude those uses even if specific pathogens are not found (Simmons et al. 1998).

Recent concerns about the possibility of highly pathogenic avian influenza (HPAI, resulting from the H5N1 virus) and swine flu (resulting from the H7N1 virus) becoming global pandemics have heightened public awareness and health officials' interest in the role that birds may play in transmission of diseases to humans. Resident Canada geese have been sampled extensively within the AF for the presence of avian influenza, in accordance with an interagency plan for early detection of HPAI in wild migratory birds (Interagency Asian H5N1 Early Detection Working Group 2006). Between 2006 and 2010, AF states sampled more than 10,000 AFRP Canada geese for avian influenza; however, only one of these birds tested positive for a low pathogenic strain of avian influenza that could have animal health implications. Of the 4,348 AF Canada geese tested during the migratory period, 0.1% tested positive for similar low pathogenic strains of avian influenza. To date, highly pathogenic strains of avian influenza, those of greatest public and animal health concern, have not been detected in any migratory birds in North America. Although the incidence of avian influenza appears to be very low among resident geese, these birds could act as a route for disease transmission to humans in the event that HPAI reaches this continent.

The presence of Canada geese on and around airports creates a significant threat to aviation and human safety throughout the AF. Due to their large body size, flocking characteristics, and abundance and behavior near airports, Canada geese are considered a very hazardous species. Waterfowl (ducks and geese) were involved in 12% of all bird-aircraft strikes to U.S. civil aviation between 1991 and 1997 and 31% of bird-aircraft strikes where civil aircraft were damaged. Waterfowl-aircraft strikes accounted for 59% of reported monetary losses resulting from wildlife strikes to civil aircraft in the U.S. (Cleary et al. 1998).

A recent high profile case of a Canada goose strike resulted in an emergency landing of US Airways Flight 1549 on the Hudson River in January 2009. Although this may have

involved migratory rather than AFRP geese (Marra et al. 2009), Flight 1549 was only one of 89 goose-aircraft strikes reported in the New York City metropolitan area since 1999 (Federal Aviation Administration, National Wildlife Strike Database 2009, Swift et al. 2009). Nearly half (40) of those strikes occurred between April and September, when very few geese from nesting populations in Canada occur in this region (Hestbeck and Bateman 2000). More tragic goose strikes resulting in loss of human life have occurred in the past. One example was the September 1995 crash of a military plane that struck Canada geese at Elmendorf Air Force Base in Alaska. The strike resulted in 24 human fatalities and total destruction of the aircraft, which was valued at $190 million.

Resident Canada geese pose localized but serious public safety problems during the nesting season when they aggressively defend a nest, nest site, or goslings. Aggressive geese will attack children, the elderly, clients, employees, students, and others, and have caused human injuries, usually resulting from falls. These encounters have also resulted in lawsuits, inaccessible areas, and declining public tolerance of geese. Geese nesting or raising young near roadways create traffic hazards when they cross the roadway without regard for oncoming traffic potentially resulting in accidents and human injuries.

**Agricultural Resources**

As AFRP Canada goose numbers have increased over the past 20 in years in the flyway, so have the number of agriculture-related conflicts. Over the past 12 years (1999-2010), USDA WS has received 2,934 complaints concerning Canada goose damage to agriculture (Table 11).

The dietary preferences and habitat selection of Canada geese can lead to impacts to agricultural producers. Grazing behavior can reduce forage quantity and quality of pastures, establishment and yields of grain and cover crops, deprive livestock of food, and increase costs of agricultural production. Goose droppings in and around agricultural areas and ponds can negatively affect water quality and possibly be a factor in disease transmission affecting livestock and/or poultry.

Resident Canada geese graze a variety of crops, including alfalfa, barley, beans, corn, soybeans, wheat, rye, oats, spinach, and peanuts. Heavy grazing by Canada geese can reduce crop yields and if high enough during critical plant growth periods can result in crop failure. Even a single intense grazing event by Canada geese in fall, winter or spring can reduce the yield of winter wheat by 16-30% (Allen et al. 1985, Flegler et al. 1987), and reduce growth of rye plants by >40% (Conover 1988). There have been reports of increased rye or wheat seed yields with grazing by geese during winter (Allen et al. 1985, Clark and Jarvis 1978); however, recent advances in wheat-growing practices can result in higher yields but the crops are unable to sustain even light grazing pressure (USFWS 2005). Costs associated with crop damage from Canada geese include losses from decreased yields as well as expenses incurred from replanting of damaged crops, purchase of replacement forage for livestock, and implementation of damage abatement practices.

Resident Canada geese are also a concern to some livestock producers. Goose droppings in and around water supply ponds for livestock can negatively affect water quality and are a potential source of pathogenic bacteria. Although no direct links have been made, there has been concern that Canada geese may contribute to *Salmonella* loads on cattle farms (M. Lowney,

USDA WS, pers. commun.). *Salmonella* causes shedding of the intestinal lining and severe diarrhea in cattle, and if undetected and untreated, can be fatal. The same concerns exist for bovine coccidiosis in calves; however, the coccidia, which infect cattle, is a different species than that which infects Canada geese (Doster 1998). Costs involved with agricultural livestock health associated with Canada geese include veterinarian expenses, altering animal husbandry and implementing damage abatement practices.

Wild and domestic waterfowl are acknowledged natural reservoirs for a variety of avian influenza viruses that can affect animal health as well as human health. As noted earlier, AFRP geese were sampled extensively for the presence of highly pathogenic H5N1 avian influenza, but only one of these birds tested positive for any strain of avian influenza that could have animal health implications. Avian influenza often circulates among birds without clinical signs and is usually not an important mortality factor in wild waterfowl. However, the potential for avian influenza to produce devastating disease in domestic poultry makes its occurrence in waterfowl an important issue (USDA APHIS Veterinary Services 1993, Davidson and Nettles 1997). An outbreak of avian influenza in 1983-84 resulted in the slaughter of 1.7 million domestic turkeys and chickens at a loss of $63 million in Virginia (Trice 1999). Contract poultry producers are warned to maintain secure and sanitary facilities and to keep poultry away from wild or migratory birds or water contaminated by wild or migratory birds (USDA Veterinary Services 1993).

**Natural Resources**

Flocks of Canada geese can impair water quality in ponds, lakes, and in wetlands that have limited flushing. Congregations of resident geese on pond shores can remove vegetation by feeding and trampling, resulting in bank erosion and soil sediments being carried by rainwater into lakes, ponds, reservoirs, and wetlands. Severe herbivory by resident geese on wild rice (*Zizania aquatica*) has also been found in tidal freshwater marshes in Maryland (Haramis and Kearns 2004) and New Jersey (T. Nichols, New Jersey Div. Fish and Wildl., unpubl. data). Goose feces can also be a significant source of phosphorus and nitrogen in surface waters, which can stimulate algae blooms and cause ecosystem changes (loss of aquatic macrophytes) and diminished aesthetics (Manny et al. 1994). Oxygen levels are depleted when the algae dies, resulting in stress or death of aquatic organisms. Coliform bacteria can increase acidity of the water and lower dissolved oxygen, with harmful effects on aquatic life (Cagle 1998). Geese grazing on newly planted wetland vegetation (or grass seedings on dikes and upland fields near wetlands) have interfered with habitat restoration efforts in some areas. A total of 511 instances of Canada goose damage to natural resources were reported to USDA WS in AF states during 1999-2010 (Table 11).

**Goose Damage Management**

Goose damage management has evolved considerably over the past 40 years. During the 1970s and through the mid-1980s, complaints about resident goose damage in the AF were concentrated in the northeast (primarily New Jersey, Connecticut, Massachusetts, and New York). Sport hunting and various hazing techniques were traditionally suggested as remedies, but were not often practical in urban-suburban areas. During that same period, the USFWS and states also captured and relocated tens of thousands of geese from problem locations in some AF states (e.g., New York) to help establish resident populations in other states (e.g., Maine,

Maryland, West Virginia, North and South Carolina, Georgia, Florida, Alabama and Arkansas). These operations were costly and had mixed results for reducing conflicts, largely because other measures to prevent population growth and immigration were not employed. Relocated geese sometimes returned to their capture areas, while others created problems near release sites.

Relocation of geese is generally not permitted now because it does little to suppress population size, and there are few areas where additional geese are desired. With resident goose populations established and conflicts occurring in virtually every state and province, there are no unoccupied areas in the AF where releases are desired. Relocating adult geese is often ineffective because they have a strong tendency to return to areas where they previously nested or may create conflicts in release areas. However, relocating geese, especially goslings, to public hunting areas can result in some harvest of birds in the release area (Smith et al. 1999, Holevinski et al. 2006, Swift et al 2009).

In recent years, there has been much interest and research into alternative damage management techniques. Harassment with dogs (Castelli and Sleggs 2000), use of non-toxic repellents, reproductive control by egg addling (Preusser et al. 2008), and capture and euthanasia have all seen increasing use in recent years (Smith et al. 1999, Holevinski et al. 2007). Federal regulations adopted in 2006 greatly improved the ability of property owners to control damage by resident geese with a minimum of federal and state oversight via a set of depredation and control orders.

## INTERACTIONS WITH MIGRANT GOOSE POPULATIONS

Resident geese mix with migrant geese on wintering, staging and breeding grounds. Resident geese have long shared wintering areas with migrant Canada geese in many areas of the AF. The realization that mixing of AFRP and migrant goose stocks were confounding winter surveys led to the transition from the Midwinter Waterfowl Survey to breeding ground surveys to monitor the status and distribution of the three migrant populations (AP, NAP, and SJBP) that winter in the AF. Unfortunately, the presence of molt migrants from the AFRP and the MF Giant Canada Goose Population may confound some of these breeding populations. For example, recent surveys and banding efforts on the breeding grounds of the NAP indicate that substantial numbers of molting AFRP geese from the northeastern U.S. may occur in portions of Labrador and Newfoundland, which was previously thought to be free of AFRP geese (B. Pollard, CWS, pers. commun.). Apart from potentially confounding migrant population estimates, increasing numbers of molt-migrant resident geese may also compete with migrant stocks for preferred food resources on breeding and brood-rearing areas (Abraham et al. 1999).

The impact that AFRP geese might have on the overall carrying capacity of goose wintering grounds is poorly understood. Contemporary goals for AP geese are based on wintering numbers observed during the 1970-80's when AFRP geese were relatively uncommon and agricultural landscapes more abundant. Winter carrying capacity issues are further exacerbated by overabundant snow geese in core Canada goose wintering areas. These changes in wintering goose abundance and density also have implications for social carrying capacity related to the amount of goose damage that the agricultural community is willing to tolerate.

Based upon when and where different populations of Canada geese occur and mix during fall and winter, harvest regulations are crafted for the population with the lowest ability to

withstand hunting pressure (i.e. the respective migrant population). In AF wintering areas with significant migrant stocks, harvest management of AFRP geese is constrained by concerns about the status of migrant stocks. In many instances, conservative hunting regulations used to protect migrant stocks have prevented managers from achieving adequate sport harvests of AFRP geese needed to induce population decline. The development of operational banding programs for AP and SJBP geese on the breeding grounds during the 1990s has helped to delineate areas of significant migrant goose density and/or areas where migrant geese are vulnerable to harvest. This has made it possible for managers to develop harvest zones and regulations within traditional hunting season frameworks that can specifically target AFRP resident geese.

To the casual observer, or to anyone experiencing conflicts with geese, all Canada geese are the same. Communicating the different values and management needs between migrant and resident goose populations to the agricultural community, the general public, and to the hunting community, remains a major challenge. Despite the overabundance of AFRP geese, wildlife managers have the responsibility to maintain populations of various migrant population geese for sport hunters in the U.S. and Canada, subsistence Inuit and Cree hunters in the Canadian Arctic, as well as for wildlife viewers in both countries. Perhaps more important is to maintain the historic biodiversity of these migrant Canada goose populations on the North American continent. To effectively reduce AFRP goose numbers while maintaining migrant populations, affected constituencies need to understand the subtleties inherent in the management of different goose populations.

## MANAGEMENT GOAL

The management goal of wildlife management agencies in the AF, with respect to AFRP Canada geese, is to:

> **Manage AFRP Canada geese in the AF to achieve a socially acceptable balance between the positive values and negative conflicts associated with these birds.**

Although we believe that most people would support this general goal, it may be difficult to achieve. Our success will be challenged by the high survival and productivity of AFRP geese, and by the fact that most geese reside on private or municipal properties beyond wildlife agencies' direct control. As mentioned earlier, the propensity of AFRP to occur in areas of high human density where hunting is often not possible, and the mixing of AFRP and migrant stocks where hunting is possible, requires waterfowl managers to do more than harvest management to reach this plan's objectives. Some strategies, such as culling of flightless geese in problem areas and reduced regulation of control activities will likely be controversial, which could prevent or delay some actions (Conover 1997).

Despite these challenges, objectives and strategies in this plan identify what must be accomplished to achieve the management goal. A combination of techniques that help control, reduce, or redistribute AFRP geese must be encouraged on public and private properties. Activities that promote population growth (e.g., nesting platforms) should be replaced with activities that minimize recruitment and alleviate goose problems in nearby areas. After years of work to establish AFRP geese in AF states, this may be hard for many conservationists, public and private, to accept, so effective communication is needed to gain public understanding, support, and involvement in management efforts. Cooperative efforts by wildlife agencies, bird

conservation groups, and many new stakeholders (e.g., local governments, park managers, etc.) will be necessary to be successful.

## MANAGEMENT OBJECTIVES AND STRATEGIES

### A. Population Management

Objective**:** **Reduce the AFRP Canada geese to 700,000 birds (spring estimate) by 2020, distributed in accordance with levels prescribed by individual states and provinces (Table 1).**

Strategies:

1. Reduce the annual growth rate of AFRP geese to approximately 0.95, through increased sport hunting, increased capture and removal of geese from areas experiencing damage or conflicts, and more aggressive reproductive control programs.
2. Develop population models to predict and evaluate results of management alternatives.
3. Support basic research, as needed, on population ecology of AFRP geese.

Discussion: The AFRP increased ~15% per year during the 1990s, and most state and provincial wildlife agencies consider their current populations to have exceeded the "social carrying capacity" (i.e., public tolerance) with regard to damage and conflicts associated with the birds. The long-term population objective is a spring population of approximately 700,000 AFRP geese in the AF (North Carolina excluded), distributed in accordance with objectives of individual states and provinces (Table 1 and Appendix). Fortunately, it appears that population growth in at least the northeastern U.S. may have slowed since 2008, and the total number of AFRP geese in that region may be declining. However, reaching the overall population objective from the recent (2010) population size of 1.4 million birds will require a flyway-wide reduction in the annual population growth rate to ~0.95 (i.e., reduction of the current population size by 5% per year). Balkcom (2010) suggested that hunting had limited potential to reduce population size in unhuntable areas. Where hunting opportunity is unlimited, areas with goose hunting could see dramatic reductions in the goose population while unhuntable areas would still sustain high population densities of geese. While this scenario could result in achieving the overall population objective, it would likely also result in an unbalanced population density where both the hunting public would be dissatisfied with a lack of geese in huntable areas while areas of higher human density (unhuntable areas) would still suffer from problems caused by overabundant AFRP geese. Since many portions of the AF contain a mosaic of huntable and unhuntable areas, managers should strive to use a balance of hunting and other strategies (i.e., egg addling, culling, etc.) to achieve this population reduction. Such a strategy would result in a more uniform distribution of geese that would also provide a better balance between the positive and negative values associated with AFRP geese. Lower and more evenly distributed populations would reduce severity of problems in many areas and help prevent new problems from occurring.

Population objectives for individual states and provinces were derived independently based on their respective management needs and capabilities. In most cases, the objectives were

an approximation of population levels at an earlier time when damage and conflicts were less frequent and less severe. In other cases, objectives were estimated from what was judged to be a more desirable or acceptable density of birds. Unlike traditional population objectives for waterfowl, the population objectives in this plan represent a socially acceptable size, not a minimum number where being above the goal is desirable. Population objectives presented here may be revised periodically in response to changes in goose populations, damage levels, public input, or other factors.

To effectively reduce AFRP geese, a decrease in adult and immature survival rates, combined with reproductive control, is necessary. The principal means to reduce survival is to increase mortality from hunter harvest and site-specific culling programs, primarily in urban areas. Reproductive control (e.g., egg-oiling to prevent hatching) alone can not reduce the population in an acceptable time; even treatment of 95% of all goose nests each year would result in only a 25% reduction over 10 years (Allan et al. 1995). In contrast, reducing annual survival of AFRP geese by just 10% (e.g., from 80% to 70%) would reduce a predicted growth rate of +15%/year to a stable population, assuming moderate recruitment (R. Malecki and S. Sheaffer, Livingston Ripley Waterfowl Conservancy, pers. commun.).

Adult resident Canada geese are long-lived and subject to negligible mortality other than hunting. Current adult harvest rates (≤15 %) through sport hunting are far below what is needed to maintain a stable population (~30%). Since hunting is and the most practical and cost-effective way to reduce survival on a large scale, continued efforts are needed to design hunting regulations that will increase hunter harvest rates, especially in areas where problem geese are most likely to be taken. A 50% increase in annual sport harvests to a harvest rate >20% seems realistic and desirable. However, additional harvest may be difficult to achieve since many AFRP geese are not exposed to harvest on a local scale (Balkcom 2010) and some regulatory approaches may require allowing additional harvest of migrant geese where possible.

Where hunting is not practical, or cannot achieve desired harvest rates, other removal options, including capture and euthanasia of geese from problem areas, will be necessary to accomplish population objectives. Capturing adult geese during the summer flightless period in problem areas, and processing the birds so they can be used by local food bank programs, has been shown to be a cost-efficient way to directly reduce local goose populations (Keefe 1996). This practice may be especially useful in suburban and urban areas where hunting is not allowed, because geese can be efficiently captured and specific geese causing problems can be removed. Standard guidelines for capturing, handling, processing and distributing geese to the public through food banks would be useful, based on the experience gained through existing programs. During 2004-2008, more than 36,300 geese were captured by WS and either euthanized or slaughtered to provide meat for local food banks in AF States (Table 12). Public demand for and acceptance of these programs has increased in recent years and will likely increase in the future. Annual harvests of ≥10,000 geese per year from problem areas throughout the AF are conceivable in the next few years.

Reproductive control by wildlife agencies is not practical on a large scale, but can be carried out in high density nesting areas, such as wildlife management areas (WMAs), parklands, and islands in lakes and reservoirs. Property owners experiencing damage or providing attractive nesting habitat should be more actively encouraged to conduct or allow nest

destruction or egg treatment programs, and releases of captive-reared geese by private game breeders should be prohibited throughout the AF.

Table 1. Population estimates ("BPOP", in 1,000s of geese), population objectives, and preseason banding goals for Atlantic Flyway Resident Population Canada geese in states and provinces of the Atlantic Flyway.[1] [2]

| State/Province | Land ($km^2$) | Current BPOP | BPOP per $km^2$ | BPOP objective | Objective per $km^2$ | Objective per $mi^2$ | Banding goals |
|---|---|---|---|---|---|---|---|
| Connecticut | 12,593 | 27 | 2.1 | 15 | 1.2 | 3.1 | 405 |
| Delaware | 5,135 | 21 | 4.1 | 2 | 0.2 | 0.5 | 315 |
| Florida | 140,158 | 5 | 0.0 | 5 | 0.0 | 0.1 | na |
| Georgia | 150,259 | 186 | 1.2 | 30 | 0.2 | 0.5 | 2,000 |
| Maine | 80,215 | 24 | 0.3 | 5 | 0.2 | 0.5 | 360 |
| Maryland | 25,618 | 61 | 2.4 | 30 | 1.2 | 3.0 | 915 |
| Massachusetts | 20,267 | 37 | 1.8 | 20 | 1.0 | 2.6 | 555 |
| New Jersey | 19,477 | 87 | 4.5 | 41 | 2.1 | 5.5 | 1,305 |
| N Hampshire | 23,378 | 27 | 1.1 | 20 | 0.7 | 1.8 | 405 |
| New York | 124,730 | 243 | 1.9 | 85 | 0.7 | 1.8 | 2,000 |
| N Carolina | 126,406 | 97 | 0.8 | na | na | na | 1,445 |
| Pennsylvania | 116,461 | 264 | 2.3 | 150 | 0.9 | 2.2 | 2,000 |
| Rhode Island | 2,717 | 3 | 1.1 | 3 | 1.1 | 2.9 | 100 |
| S Carolina | 78,176 | 69 | 0.9 | 68 | 0.3 | 0.7 | 1,035 |
| Vermont | 24,002 | 18 | 0.7 | 20 | 0.8 | 0.5 | 270 |
| Virginia | 103,021 | 153 | 1.5 | 150 | 1.5 | 4.5 | 2,000 |
| West Virginia | 62,433 | 27 | 0.4 | 24 | 0.4 | 1.0 | 405 |
| **Total - U.S.** | **1,111,838** | **1,084** | **1.0** | **668** | **0.6** | **1.4** | **12,929** |
| N Brunswick | 73,380 | 6 | 0.1 | 6 | 0.1 | 0.2 | 100 |
| Nova Scotia | 55,448 | 2 | 0.0 | 2 | 0.0 | 0.1 | na |
| SE Ontario | 84,201 | 23 | 0.3 | 20 | 0.2 | 0.6 | 348 |
| PEI | 5,652 | 2 | 0.3 | 2 | 0.4 | 0.9 | na |
| S Quebec | 56,231 | 5 | 0.1 | 0 | 0.0 | 0.0 | 100 |
| **Total - Can** | **274,912** | **37** | **0.1** | **30** | **0.1** | **0.3** | **548** |
| **TOTAL - All** | **1,386,750** | **1,121** | **1.1** | **698** | **0.5** | **1.2** | **13,477** |

[1] Mean annual estimate for 2007-2009 or best estimate of wildlife agency staff.

[2] Banding quotas calculated as 1.5% of current BPOP, with no less than 100 and no more than 2,000 for any state or province except FL, NS, and PEI, where no banding is recommended at this time.

Changes in annual productivity of AFRP geese can be assessed from harvest age ratios for geese shot during September seasons. Age ratios of geese shot in the AF states during September seasons in 2004-2008 averaged about 0.6 immatures/adult. Using the harvest age ratio and band recovery data to account for differential vulnerability to harvest yields a

preseason age ratio (i.e., recruitment index) of about 0.5 immatures/adult. Reduction of recruitment by 50%, to 0.25, would complement efforts to lower survival. Reducing survival through harvest can help reduce productivity by increasing the proportion of sub-adults (non-breeders) in the population. Productivity of flocks that are not subject to harvest can be assessed through special surveys during spring or early summer, if desired.

Population management would be enhanced by development of science-based population models for AFRP geese. Models could be used to predict effects of different population management options and would help explain and evaluate efforts (and alternative strategies) to achieve population objectives. Much of the data needed may already be available from past flyway research (Hestbeck 1998), and other field research in various AF states (e.g., New Jersey, Connecticut, Pennsylvania, New York). Likewise, new field studies or data analysis may be warranted as information needs arise. Of particular interest would be studies documenting effects of roundup and culling operations and translocation programs that move geese from sanctuary areas to areas of high hunting pressure (Swift et al. 2009).

## B. Monitoring and Evaluation

Objective: **Annually monitor population size, harvest, and damage/conflict levels of AFRP Canada geese to evaluate effectiveness of management actions.**

Strategies:

1. Monitor breeding population size and distribution through various surveys.
2. Monitor annual sport harvest and harvest rates through hunter surveys and an operational leg-banding program.
3. Monitor numbers of complaints or other indicators of public demand for relief from conflicts associated with AFRP geese.

Population monitoring programs are needed to evaluate progress towards the management objectives. Population size and distribution will be assessed primarily by annual breeding waterfowl surveys in 11 northeastern states (New Hampshire to Virginia). These surveys provide estimates of total Canada geese (and indicated breeding pairs) with a 95% confidence interval of ±20% at the survey area level. Population objectives for many states were based on data from these surveys, but annual estimates may vary widely, especially for smaller states, and should be used with caution (e.g., 3-year averages may be more reliable). In addition, USFWS conducts aerial surveys across the breeding range in southern Canada that provide annual estimates of total AFRP geese in AF provinces and Maine. Breeding Bird Survey data can also be used to assess population trends in most areas of the AF. Mark-recapture estimates from band recovery or neckband observation data have also been used to estimate populations in some states (Georgia, Massachusetts). Special surveys could be conducted in local areas to obtain more reliable estimates of resident goose numbers than regional surveys described above.

Harvest assessment is also important for evaluating management success. Existing migratory bird harvest surveys in the U.S. and Canada provide adequate estimates of total goose harvest during all hunting seasons offered. However, to obtain information on survival, direct recovery rates, harvest rates, harvest distribution, and the impacts of hunting and other population controls on AFRP Canada geese, the coordinated preseason banding program should continue. State and provinces with a resident goose population >5,000 birds should continue to

band at least 1.5% of their spring population of adult (AHY) birds with 67% of the banded sample comprising adult (AHY) and 33% of the banded sample comprising juvenile (L or HY) birds (Table 1). Those jurisdictions not currently participating in the preseason banding program are encouraged to do so. The geographic distribution of the banded sample should reasonably reflect the relative distribution of geese within the jurisdiction. In addition, the banded sample should reasonably reflect the distribution of AFRP geese within different landscape types (e.g., rural, suburban, etc) of the jurisdiction (Table 1).

Continued documentation and assessment of damage or complaint levels is desirable. U.S. Department of Agriculture's WS program has systematically documented the number of requests for assistance for many years, which provides a useful measure of program demand and effectiveness. However, the volume of complaints they receive could be affected by changes in federal regulations, such as a depredation order, or if states assume greater management authority for AFRP geese via a special purpose permit. Public attitude surveys in areas where goose management programs have been implemented would help determine and document success of those efforts.

## C. Compatibility with Other Goose Populations

Objective: **Ensure compatibility of AFRP Canada goose management with management of migrant goose populations in the AF, and vice versa. Maximize AFRP harvest without hindering attainment of migrant goose population objectives.**

Strategies:

1. Maintain and further refine, to the extent practical, hunting regulations (seasons, bag limits, and zones) for special and regular hunting seasons to maximize the hunter harvest of AFRP geese.
2. Develop or refine techniques to differentiate, or estimate proportions of, resident and migrant Canada geese in harvest or banding samples.
3. Assess potential impacts of molt migration by AFRP geese on monitoring programs and habitats for migrant Canada geese.

Resident Canada geese are the most abundant Canada goose population in the AF and can sustain higher harvest rates than migrant populations. As such, it has been necessary to restrict hunter harvest in most areas when and where migrant geese are known to occur. Clearly, suspension of regular goose seasons in the mid 1990s accelerated the growth of the AFRP, and population growth appears to have slowed since September goose seasons were expanded and regular goose seasons were re-established in the AF. At this time, further refinements to regular or late goose seasons offer the greatest potential for increasing harvests of AFRP geese. Such refinements must not jeopardize any migrant stocks, but they should be considered whenever the latter are judged to be secure.

Since the implementation of the 1999 AFRP Canada Goose Management Plan, the AF has taken steps to refine goose harvest zones to maximize harvest opportunity for AFRP geese. In 2002, the AF developed and was granted the creation of AFRP regular season harvest zones in certain areas of the flyway (Figure 4). These zones were to collectively account for no more than a 1% DRR for any migrant goose population (AP, SJBP, NAP) in the flyway with an open regular season. Subsequently, in 3-year intervals, changes have been made to these harvest

zones as new information has become available. The most recent assessment of these zones indicated a total DRR of 0.35% on migrant geese. These zones have proven to be effective in not only avoiding harvest of migrants, but in directing harvest pressure toward AFRP geese, and providing hunting opportunity during more 'traditional' times (e.g., November-January).

Another potential avenue towards increasing hunter opportunity and AFRP goose harvest is to examine whether a tiered approach of high and low harvest areas can be delineated within existing AP goose harvest areas. A similar approach was taken with NAP harvest zones in 2003. The resulting NAP-Low and NAP-High harvest zones allowed for differing regulations in areas known to winter differing proportions of migrant and resident stocks. This finer scale harvest management approach for areas that would not qualify for inclusion into an AFRP zone would allow for greater harvest opportunity and potentially higher harvests of AFRP geese in select areas of the AF.

Periodic assessment of the harvest derivation of geese in the flyway would benefit management and allow for further refinement and evaluation of harvest management zones and frameworks. The utility of harvest derivation estimates depends upon adequate banded samples of each migrant population and representative banding of AFRP geese. In addition to providing the data necessary to estimate harvest derivation, band recoveries from preseason banding of migrant and AFRP Canada geese also provides current information on population distribution and harvest rates at both the regional and flyway scale. Thus, continued operational banding programs are a high priority for Canada goose management in the AF.

Genetic analysis of mitochondrial (mt) DNA (Shorey et al. 2007, Scribner and Filcek 2008) and stable isotope analysis (Caccamise et al. 2000) have proven to be reliable methods for determining the origin of harvested geese. However, their overall utility and cost-effectiveness for large-scale management has yet to be demonstrated.

The overall incidence of molt migration within the AF should be fully evaluated. Morphological data should be taken periodically on breeding ground banding drives to monitor for the potential presence of molt migrant AFRP geese inbreeding areas for migrant population geese. This is particularly appropriate in Labrador and Newfoundland as the utility of an operational banding program is evaluated. Although recent research has indicated that it is highly unlikely that managers can induce molt migration of failed nesters, an unknown proportion of subadult AFRP geese and failed breeders do undertake a northward molt migration. Most of these birds presumably move into Canada, although an unknown proportion molt in the lower 48 states. A cursory analysis of band recovery data since 1980 found that more than 1,100 recoveries of summer banded AFRP geese occurred at least 3 degrees north of the origin of banding. Over 700 of these occurred in either Quebec, Ontario, or the Atlantic Provinces. The rest of the recoveries were from states in either the AF or MF north or west of the original state of banding. This only represents 2.6% of all recoveries over this time frame. The low percentage of band recoveries in areas north of the original banding state may be misleading, as the time that molt migrants spend outside of their natal area is slight compared to the time spent vulnerable to harvest in natal areas. Thus, vulnerability to harvest on the southward journey back to natal areas is much lower than when birds get back to their natal areas. It would be of value to determine if such movements are affecting management of migrant Canada goose populations in the AF. Resident geese molting in AP, NAP, or SJBP breeding areas may be confounding population surveys and operational banding programs in

those areas. Molt migrants may also be competing with migrant geese for food resources during the critical brood-rearing period.

## D. Relief of Damage and Conflicts

Objective**:** **Promote use of a wide variety of effective and efficient options for population reduction and relief of damage and conflicts associated with AFRP Canada geese.**

Strategies:

1. Allow and encourage property owners and municipalities to use a full range of effective and legal techniques to reduce damages and conflicts, including population reduction.
2. Modify the federal depredation and control orders to allow additional times, methods and purposes for take of resident Canada geese between March 11 and September 15, as long as migrant populations are not affected.
3. Encourage state and federal agencies to implement goose population control programs on WMAs and USFWS National Wildlife Refuges (NWRs) in the AF.
4. Aggressively promote greater use and acceptance of lethal and non-lethal population control programs.
5. Support research documenting the nature and extent of goose damage and effectiveness of alternative damage management techniques.

Substantial relief from damage and conflicts caused by AFRP Canada geese will require population reduction as well as a variety of damage abatement techniques. Current population levels are far above desired levels and more aggressive programs and policies to address this overabundance are needed. This plan advocates greater effort and additional measures aimed at reducing overall numbers of AFRP geese in the AF. At the same time, the plan seeks to promote and streamline public use of lethal and non-lethal measures to alleviate conflicts on a site-specific scale.

The most readily available tool for reducing the AFRP on a large scale is sport harvest. Waterfowl hunters in the AF annually take several hundred thousand AFRP geese during special seasons targeting those birds (Table 5) combined with harvests during regular Canada goose hunting seasons. In fact, breeding population estimates for AFRP geese have stabilized or declined since 2005 (Figure 1), after most AF states and provinces established September seasons, and regular seasons were gradually re-opened following closure in 1995 to reduce harvest of AP geese.

In addition to sport harvest, other methods of population control or reduction should be encouraged, especially in urban-suburban areas where hunting alone is not likely to accomplish the desired results. The most immediate and effective way to reduce resident goose numbers in such areas is through culling programs, typically involving capture and removal (killing or relocation) of flightless geese during the summer molting period (Swift et al. 2009). These programs are often controversial, resulting in some local officials or communities being reluctant to implement them; sometimes culls are not implemented at all. However, use of this practice has increased in recent years, with more than 62,000 geese captured and removed from problem areas by WS in the AF during 2004-2010 (Table 12). Critics of "round-ups" often advocate other population control methods, such as egg-addling, but geese are long-lived and reductions

in numbers on a large scale (e.g., county-wide) from this technique alone have not been demonstrated. Egg-treatment programs combined with sport harvest or culling can be very effective at reducing and maintaining lower goose populations (Swift 2000).

Many site-specific complaints concerning resident geese can be resolved by using abatement techniques such as scare devices (shell crackers, dogs, and Mylar® tape), aversive agents and/or fencing. Habitat manipulation, reducing public feeding, and permanent fences can be effective, long-term solutions for solving site-specific human/goose conflict situations. The wide variety of techniques available should be used in comprehensive, integrated programs to alleviate conflicts associated with resident Canada geese. Increasing problems, especially in urban and suburban areas, warrants continued evaluation of on practical and effective lethal and non-lethal alternatives.

There are relatively few restrictions on use of non-lethal controls. However, those methods are not always practical, effective, and affordable, and most of them simply move problem birds to other locations. Population controls that involve direct handling or taking of geese or eggs, including egg treatments, nest destruction, shooting outside of the hunting season, capture and euthanasia, or relocation, have normally required "depredation" permits from USFWS. However, federal regulations adopted in 2006 (50 CFR Sections 21.49-21.52) established several new depredation and control orders for airports, nest and egg destruction, agriculture and public health, which greatly reduced the federal permit requirements for take of resident geese in certain situations. Another new regulation authorized states to implement broader population control, or "managed take" programs to help reduce and stabilize for resident goose populations when other authorized measures were not successful or not feasible (50 CFR Sections 21.61). This regulation allows certain special measures during resident goose hunting seasons, and allows take of geese during August using methods allowed during September hunting seasons. However, no AF state has implemented the managed take alternative during August. Most managers have been reluctant to implement managed take because of conflicts with other recreational users of public waters and opposition by waterfowl hunters, and likelihood of little added mortality that would already occur within existing September hunting seasons.

Most AF states have implemented one or more of the other depredation or control orders, with more than 19,500 geese and 3,300 nests (2007-2008) taken by authorized agencies or individuals in accordance with these new regulations (Tables 12-16). However, given the status of AFRP geese, and the continuing demand for relief of goose damage and conflicts, the current level of federal oversight is still an impediment to successful management on a flyway scale. Some limitations and inconsistencies among the current orders should be addressed to more fully deal with resident goose problems in the AF, including allowing the take of birds to alleviate general nuisance or property damage. We also note that no AF state has implemented a full managed take program, in part because of constraints on the times and methods of take allowed. Managed take should be allowed any time between May 1 and August 31, and should include capture and removal programs in additional to methods allowed during hunting seasons.

In keeping with the above, it is important for state and federal wildlife agencies to lead the AFRP goose management efforts by example. Many publicly owned wildlife management areas, refuges, parks, and other properties support large numbers of nesting, molting or wintering

resident geese. In some cases, these properties are located close to other public or private properties that are experiencing serious goose damage problems. In such cases, we urge state and federal entities to implement goose control programs as long as migratory Canada goose populations are not affected. This may be opposed by some segments of the public, including some hunters, but should be pursued wherever geese on lands managed for wildlife may be contributing to local or regional resident goose problems.

An important consideration related to public and agency acceptance of lethal control methods is whether the birds, or parts thereof, are put to good use. Canada goose meat is an excellent source of protein that is enjoyed by most waterfowl hunters, and some culling programs have generated substantial amounts of meat for food pantries and other charitable organizations. One impediment to donating goose meat to charitable organizations is the limited availability of meat processors who are willing to handle wild geese without conflicting with their normal poultry processing operations. Another constraint is the potential for resident Canada geese, like any wild game, to have harmful contaminants in their meat from exposure to chemicals in the environment. However, most analyses of goose meat have found low levels of contaminants that have human health implications, even when other tissues (e.g., skin, fat, or vital organs) from the same bird have elevated concentrations. Unfortunately, a few meat samples have had elevated lead or pesticide levels, requiring a risk assessment or a health advisory for consumers. Efforts to promote greater use of geese removed from problem areas will help minimize public objection to such programs and provide benefits to needy people. Standardized guidelines for processing, testing and/or consumption of urban goose meat would help avoid duplication and allow for greater use of what should be a valuable commodity.

## E. **Public Use and Enjoyment**

Objective**:** **Provide maximum opportunities for use and appreciation of AFRP Canada geese consistent with population objectives.**

Strategies**:**

1. Develop more flexible goose hunting regulations that allow states and provinces to maximize sport harvest of AFRP geese during special and regular seasons, as long as migrant populations are not adversely affected.
2. Maintain public appreciation, understanding and tolerance of AFRP geese for viewing, nature study, and other aesthetic values, despite the need for population reduction.

Sport harvest is an essential tool for management of resident goose populations, and the recreation and consumptive use benefits that the birds provide are important to more than 100,000 people who hunt geese in the AF. The AFRP provides annual harvests well in excess of 300,000 birds, reflecting high hunter participation and success. Resident geese provide harvest opportunities in many areas that currently do not or historically did not have significant numbers of migratory geese. Even if the AFRP was reduced to the goal of 700,000 birds, annual harvests of 175,000 - 350,000 could be sustained on a long-term basis with annual recruitment rates of 0.25-0.50.

More refined harvest management aimed at reducing AFRP goose numbers will require more flexible hunting regulations during regular goose hunting seasons, as long as migratory populations of Canada geese are not adversely affected. Most AF states have expanded their

September seasons and, thus, hunter numbers are not likely to increase. Therefore, refinement of regular seasons to allow additional harvest opportunity for those hunters is needed. Maximum allowable season lengths (107 days) and framework dates (September 1 - March 10) should be considered wherever AFRP geese comprise most of the harvest or where large numbers of migrant geese would not likely be taken. Additional splits, special hunting zones, and differential bag limits within the season are other options available to manage harvests. Such approaches could be accomplished by a judicious liberalization of the criteria for special late seasons, or by delineating special resident goose harvest areas where regular seasons are as liberal as possible. The latter approach has already been implemented in a few AF states, but additional areas could be included. A strategy similar to that incorporated for NAP geese with a "tiered" approach utilizing high and low harvest areas should be considered. Consideration should be given also to allowing non-traditional hunting methods, including electronic calls or extended shooting hours.

Despite the need to reduce resident goose populations in most areas of the AF, managers must be careful not to foster excessive negative public attitudes toward geese. Most people enjoy small numbers of geese, and the birds provide opportunities for bird watching and incidental observation that add to quality of life and help maintain public support for wildlife habitat conservation. Negative attitudes can also lead to lower tolerance for geese and unrealistic demand for population reduction and relief from conflicts caused by small numbers of birds. Communications about geese should always note both the positive and negative aspects, and emphasize the need for balance rather than eradication. Likewise, managers need to be sensitive to the aesthetic benefits that geese can provide, while also providing options to relieve conflicts when they occur.

There is little current information on the public's attitude toward AFRP geese, the nature and severity of problems, and the acceptability of various control methods. Surveys to document public attitudes on these issues would enable managers to more effectively design effective population management programs and communicate the need for these programs to the public,

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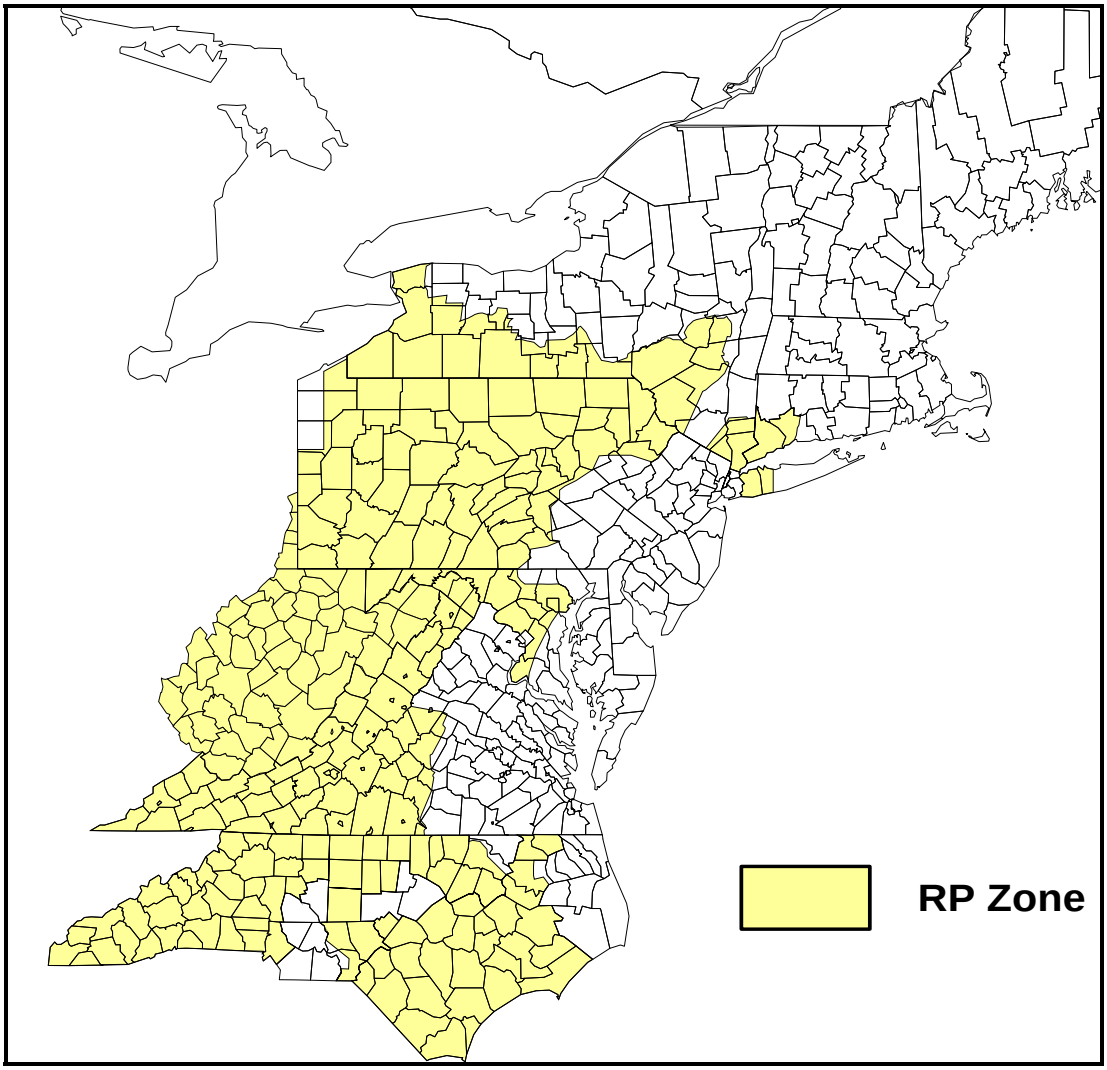


Figure 4: Atlantic Flyway Resident Population Canada goose (RP) regular hunting season zones in the Atlantic Flyway, 2011.

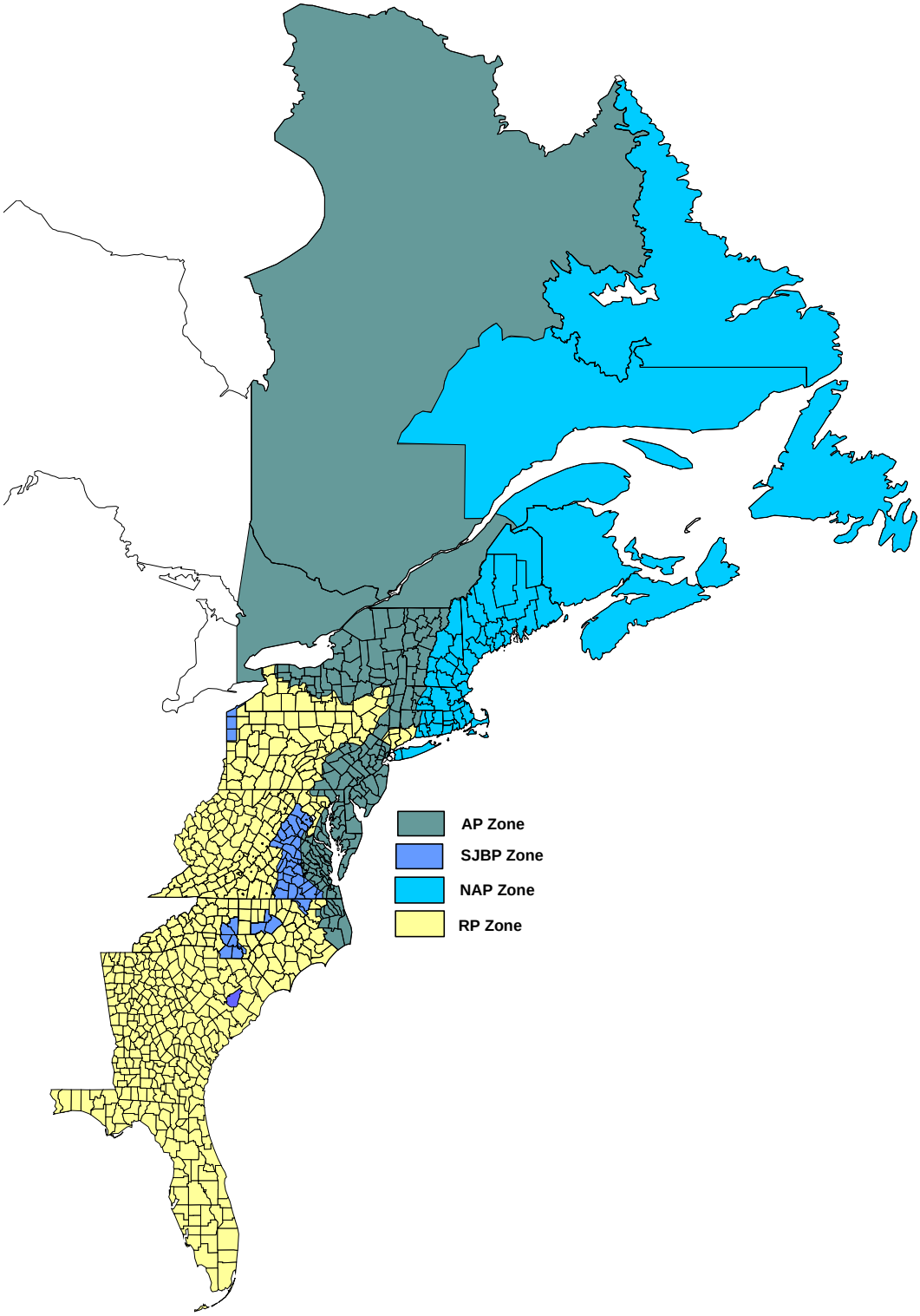


Figure 5. Canada goose hunting zones in the Atlantic Flyway, 2011.

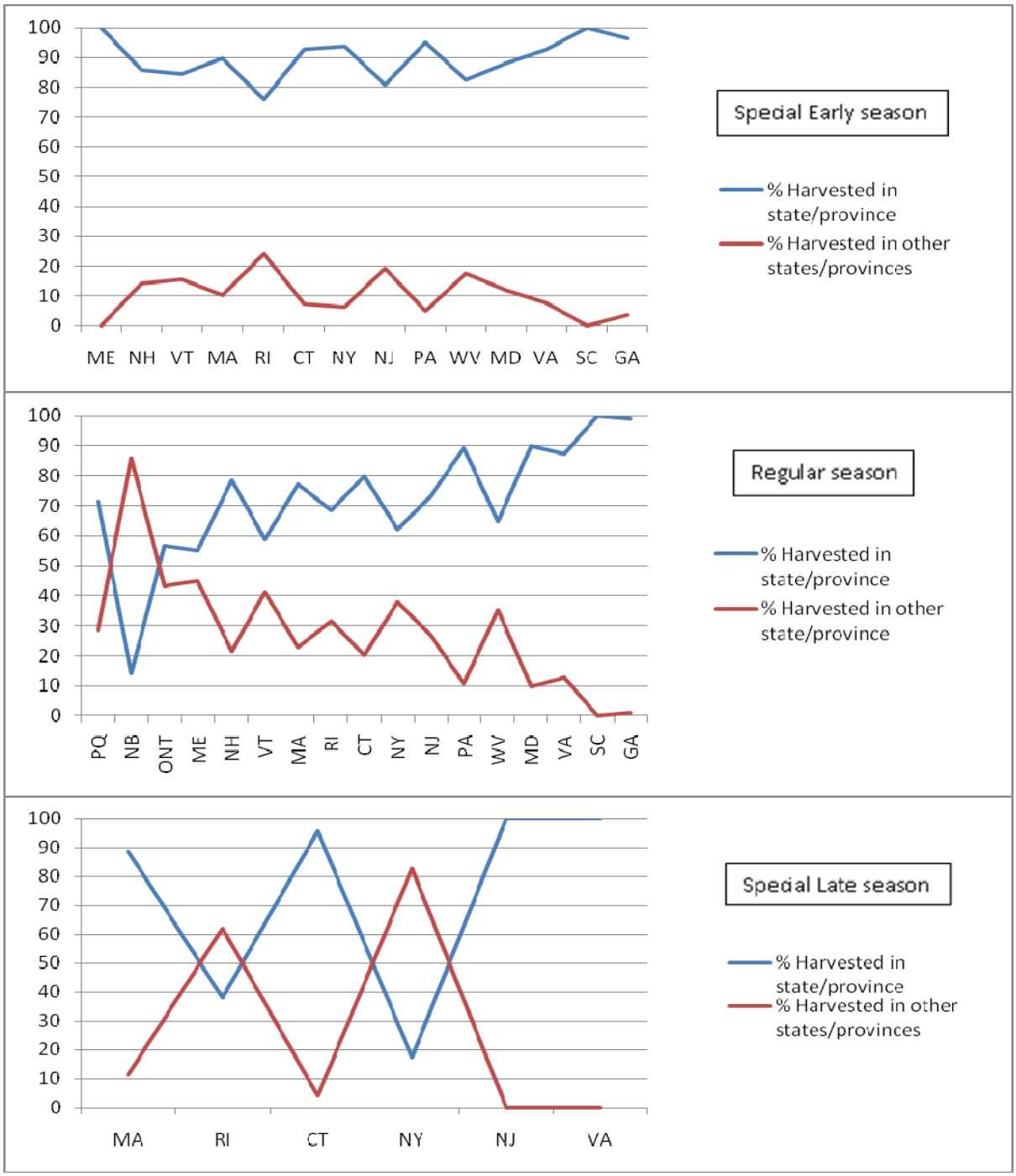


Figure 6. Percent of adult Atlantic Flyway Resident Population Canada geese harvested in the state or province in which they were banded versus the percent harvested in other states or provinces during special September, regular, and special late seasons from 2004 - 2008. States and provinces are listed in north to south order; some states and provinces omitted due to lack of or insufficient data (Klimstra and Padding 2011).

Table 2. Estimated number of adult Atlantic Flyway Resident Population Canada geese in each state and province of the Atlantic Flyway, 2004-2010.

| | Estimated Breeding Population | | | | | | |
|---|---|---|---|---|---|---|---|
| State/Province | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| Connecticut | 25,341 | 34,903 | 24,863 | 29,234 | 24,230 | 26,347 | 31,272 |
| Delaware | 7,762 | 9,026 | NS | 29,311 | 17,918 | 14,977 | 6,807 |
| Florida | 1,000 | 1,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 |
| Georgia | 86,000 | 103,000 | 158,194 | 256,068 | 299,831 | | |
| Maine | 15,383 | 20,510 | 6,546 | 20,468 | 8,311 | 6,781 | 16,933 |
| Maryland | 78,630 | 86,500 | 73,862 | 85,164 | 51,438 | 45,247 | 48,880 |
| Massachusetts | 46,519 | 38,048 | 42,266 | 48,283 | 31,558 | 30,472 | 29,422 |
| New Hampshire | 15,919 | 38,768 | 59,490 | 37,712 | 27,678 | 15,366 | 13,828 |
| New Jersey | 97,661 | 98,506 | 104,360 | 86,429 | 81,052 | 92,913 | 76,190 |
| New York | 159,449 | 209,223 | 250,063 | 274,856 | 238,290 | 216,761 | 257,391 |
| North Carolina | 121,000 | 125,000 | 111,000 | 111,000 | 111,000 | 111,000 | 111,000 |
| Pennsylvania | 338,230 | 311,171 | 245,689 | 255,924 | 246,499 | 289,879 | 231,780 |
| Rhode Island | 3,857 | 4,306 | 2,525 | 3,050 | 3,242 | 3,627 | 6,471 |
| South Carolina | 36,656 | 79,650 | 81,300 | 66,300 | 53,481 | | |
| Vermont | 10,685 | 8,654 | 13,666 | 16,565 | 19,236 | 19,019 | 18,332 |
| Virginia | 105,013 | 167,299 | 163,655 | 160,966 | 167,492 | 130,119 | 165,271 |
| West Virginia | 27,500 | 27,000 | 27,000 | 27,000 | 27,000 | 27,000 | 27,000 |
| | | | | | | | |
| New Brunswick | 11,524 | 12,259 | 6,988 | 6,958 | 8,958 | 1,990 | 9,456 |
| Nova Scotia | 8,628 | 3,693 | 1,823 | 4,395 | 1,760 | 5,282 | 2,641 |
| Ontario | 202,845 | 213,191 | 269,464 | 264,900 | 244,225 | 186,078 | 318,162 |
| Prince Edward Island | 1,859 | 4,276 | 1,115 | 11,710 | 2,383 | 3,667 | 4,767 |
| Quebec[1] | 8,460 | 11,053 | 9,925 | 24,418 | 24,742 | 12,415 | 16,839 |
| AF Total | 1,409,921 | 1,607,036 | 1,658,794 | 1,825,711 | 1,695,324 | 1,243,940 | 1,397,442 |

[1]Quebec estimate is total indicated pairs x 2 and does not include grouped birds.

Table 3. Special early, regular, and late resident Canada goose hunting seasons in the Atlantic Flyway, 1986-2010.

| | ME | NH | VT | MA | RI | CT | NY | NJ | PA | DE | MD | VA | WV | NC | SC | GA | FL | ON | PQ | NB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1986 | | | | | | L | | | | | | | R | | | | | | | |
| 1987 | | | | L | | L | | | | | | | R | | | | | | | |
| 1988 | | | | L | | L | | | | | | | R | | | | | | | |
| 1989 | | | | L | | L | | | | | | | R | E | | L | | | | |
| 1990 | | | | E, L | | L | E | | | | | | R | E | | L | | | | |
| 1991 | | | | E, L | | L | E | | | | | | R | E | L | L | | E | | |
| 1992 | | | | E, L | | L | E | | E | | | | R | E | L | R | | E | | |
| 1993 | | | | E, L | | L | E, L | E | E, L | | E | E | R | E | L | R | | E | | |
| 1994 | | | | E, L | | L | E | E, L | E, L | | E | E | E, R | E | R | R | | E | | |
| 1995 | | | | E, L | E | L | E, L | E, L | E, L | E | E | E | E, R | E | R | R | | E, L | | |
| 1996 | E | E | | E, L | E, L | E, L | E, L | E, L | E, L | E | E, L | E, L | E, R | E | E, R | R | | E, L | E | |
| 1997 | E | E | | E, L | E, L | E, L | E, L | E, L | E, L | E | E, L | E, L | E, R | E | E, R | R | R | E | E | |
| 1998 | E | E | E | E, L | E, L | E, L | E, L | E, L | E, L | E | E, L | E, L | E, R | E | E, R | R | R | E, L | E | |
| 1999 | E | E | E | E, L | E, L | E, L | E, L | E, L | E, L | E | E, L | E, L | E, R | E | E, R | R | R | E, L | E | |
| 2000 | E | E | E | E, L | E, L | E, L | E, L | E, L | E, L | E | E, L | E, L | E, R | E | E, R | R | R | E, L | E | |
| 2001 | E | E | E | E, L | E, L | E, L | E, L | E, L | E, L | E | E, L | E, L | E, R | E | E, R | R | R | E, L | E | |
| 2002 | E | E | E | E, L | E, L | E, L | E, L | E, L | E, L | E | E, L | E, L | E, R | E | E, R | R | R | E, L | E | |
| 2003 | E | E | E | E, L | E, L | E, L | E, R | E, L | E, R | E | E, R | E, R | E, R | E | E, R | R | R | E, L | E | |
| 2004 | E | E | E | E, L | E, L | E, L | E, R | E, L | E, R | E | E, R | E, R | E, R | E | E, R | R | R | E, L | E | |
| 2005 | E | E | E | E, L | E, L | E, L | E, R | E, L | E, R | E | E, R | E, R | E, R | E, R | E, R | R | R | E, L | E | |
| 2006 | E | E | E | E, L | E, L | E, L | E, R | E, L | E, R | E | E, R | E, R | E, R | E, R | E, R | R | R | E, L | E | |
| 2007 | E | E | E | E, L | E, L | E, L | E, R | E, L | E, R | E | E, R | E, R | E, R | E, R | E, R | R | R | E, L | E | E |
| 2008 | E | E | E | E, L | E, L | E, L | E, R | E, L | E, R | E | E, R | E, R | E, R | E, R | E, R | R | R | E, L | E | E |
| 2009 | E | E | E | E,L | E,L | E,L | E,R | E,L | E,R | E | E,R | E,R | E,R | E,R | E,R | R | R | E, L | E | E |
| 2010 | E | E | E | E,L | E,L | E,L | E,R | E,L | E,R | E | E,R | E,R | E,R | E,R | E,R | R | R | E, L | E | E |

E - Early (September) season in all or part of state or province.
R - Regular (November - March) season in all or part of state or province.
L – Late (February) season in part of state or province.

Table 4. Resident Canada goose September season ending dates, bag limits and management actions in Atlantic Flyway states, 2011.

| | | | Control and Depredation Orders | | | | | Special Hunting Methods | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Framework Ending Dates | Bag Limit Size | Nest and Egg | Agriculture | Airport | Public Health | | E-call | Unplugged Gun | Expand Shooting Hours | | August Managed Take |
| States | Sept. 25 | | | | | | | | | | | |
| Maine | Sept. 25 | 6,8 | yes | u | u | u | | no | no | no | | no |
| New Hampshire | Sept. 25 | 5 | yes | u | u | u | | no | no | no | | no |
| Vermont | Sept. 25 | 2,5 | yes | u | u | u | | no | no | no | | no |
| Connecticut | Sept. 30 | 15 | yes | yes | yes | yes | | no | yes | yes | | no |
| Rhode Island | Sept. 30 | 15 | yes | yes | yes | u | | no | no | no | | no |
| New York | | | | | | | | | | | | |
| Long Island Zone | Sept. 30 | 8 | yes | yes | yes | u | | u | u | u | | no |
| Remainder NY | Sept. 25 | 5,8 | yes | yes | yes | u | | u | u | u | | no |
| Massachusetts | Sept. 25 | | yes | u | u | u | | u | u | u | | no |
| New Jersey | Sept. 30 | 15 | yes | yes | u | u | | yes | yes | yes | | no |
| Pennsylvania | Sept. 25 | 1,3,8 | yes | yes | yes | no | | no | no | yes | | no |
| West Virginia | Sept. 25 | 5 | yes | yes | yes | yes | | no | no | no | | no |
| Delaware | Sept. 30 | 15 | yes | yes | u | no | | no | u | yes | | no |
| Maryland | | | | | | | | | | | | |
| Western Zone | Sept. 25 | 8 | yes | yes | yes | no | | no | yes | yes | | no |
| Eastern Zone | Sept. 15 | 8 | yes | yes | yes | no | | no | yes | yes | | no |
| Virginia | | | | | | | | | | | | |
| Western Zone | Sept. 25 | 10 | yes | u | u | no | | no | u | yes | | no |
| Eastern Zone | Sept. 15 | 10 | yes | u | u | no | | no | u | yes | | no |
| North Carolina | Sept. 30 | 15 | yes | yes | no | no | | yes | yes | yes | | no |
| South Carolina | Sept. 30 | 15 | yes | no | no | no | | no | no | no | | no |
| Georgia | Sept. 30 | 5 | yes | yes | yes | yes | | no | no | no | | no |
| Florida | Sept. 30 | 5 | yes | yes | u | u | | u | u | u | | no |

yes = action taken by state
no = action not taken
u = undecided

Table 5. Estimated harvest of Canada geese in Atlantic Flyway states during September, regular and special late seasons, 1999-2009 (USFWS harvest survey).

| Season | Year | ME | VT | NH | MA | CT | RI | NY | PA | WV | NJ | DE | MD | VA | NC | SC | GA | FL | AFTOT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| September | 1999 | 1,300 | 2,200 | 1,300 | 4,700 | 6,100 | 1,200 | 59,300 | 94,900 | 3,900 | 10,500 | 4,700 | 18,300 | 11,400 | 20,100 | 0 | NS[a] | NS[a] | 239,900 |
| | 2000 | 5,200 | 2,900 | 1,700 | 2,800 | 4,400 | 500 | 63,100 | 67,500 | 1,600 | 18,200 | 2,600 | 14,200 | 10,800 | 20,500 | 0 | NS[a] | NS[a] | 216,000 |
| | 2001 | 2,100 | 3,100 | 1,400 | 2,300 | 4,800 | 1,300 | 49,300 | 111,900 | 2,000 | 10,000 | 4,300 | 27,100 | 14,100 | 30,300 | 5,800 | NS[a] | NS[a] | 269,800 |
| | 2002 | 3,000 | 3,700 | 1,500 | 2,800 | 4,000 | 1,000 | 48,200 | 92,500 | 2,000 | 11,800 | 6,200 | 14,800 | 13,600 | 20,100 | 4,800 | 6,600 | 0 | 236,600 |
| | 2003* | 3,300 | 1,500 | 1,400 | 3,800 | 4,200 | 800 | 32,100 | 69,400 | 1,100 | 7,600 | 2,900 | 11,600 | 14,800 | 19,300 | 1,000 | 6,400 | NS[a] | 181,200 |
| | 2004* | 2,500 | 3,900 | 500 | 4,100 | 5,300 | 700 | 35,800 | 65,900 | 2,300 | 9,800 | 3,300 | 18,600 | 17,000 | 11,100 | 3,100 | 6,600 | 0 | 190,500 |
| | 2005* | 2,400 | 4,700 | 1,700 | 4,300 | 6,600 | 200 | 42,500 | 71,200 | 2,000 | 4,000 | 2,000 | 10,400 | 10,100 | 26,400 | 6,900 | 12,200 | 0 | 207,600 |
| | 2006* | 2,100 | 3,400 | 2,400 | 3,800 | 5,900 | 400 | 52,300 | 67,600 | 1,100 | 7,500 | 1,100 | 12,700 | 11,100 | 23,600 | 6,800 | 2,700 | 0 | 204,300 |
| | 2007* | 3,400 | 2,900 | 2,400 | 2,600 | 3,700 | 200 | 56,900 | 93,700 | 2,800 | 2,800 | 2,100 | 10,500 | 13,600 | 22,200 | 13,600 | 5,100 | 0 | 238,500 |
| | 2008* | 5,500 | 6,200 | 3,400 | 4,600 | 6,400 | 1,400 | 78,000 | 70,400 | 1,400 | 6,500 | 2,200 | 6,500 | 17,500 | 10,500 | 10,000 | 8,100 | 0 | 238,400 |
| | 2009* | 1,600 | 6,400 | 4,500 | 4,200 | 2,700 | 900 | 63,000 | 54,700 | 900 | 12,700 | 1,500 | 6,500 | 16,800 | 16,500 | 23,800 | 21,100 | 0 | 236,900 |
| | | | | | | | | | | | | | | | | | | | |
| Regular | 1999 | 2,100 | 1,100 | 3,200 | 5,500 | 10,100 | 1,200 | 19,900 | 38,500 | 1,600 | 2,900 | 300 | 9,500 | 9,000 | 9,000 | 10,000 | 12,500 | 1,000 | 137,900 |
| | 2000 | 5,300 | 800 | 3,500 | 5,300 | 10,000 | 500 | 25,600 | 27,500 | 2,100 | 3,900 | 200 | 15,700 | 16,100 | 9,000 | 11,100 | 12,200 | 0 | 150,300 |
| | 2001 | 3,100 | 1,300 | 2,400 | 6,500 | 13,100 | 1,300 | 41,500 | 75,100 | 2,900 | 10,000 | 6,600 | 112,800 | 22,400 | 15,700 | 10,200 | 26,100 | 1,200 | 352,900 |
| | 2002 | 7,600 | 2,700 | 4,800 | 8,700 | 16,000 | 1,000 | 60,500 | 102,000 | 3,100 | 16,200 | 14,900 | 100,500 | 38,200 | 18,200 | 22,800 | 14,500 | 0 | 433,100 |
| | 2003* | 6,300 | 2,200 | 3,800 | 5,200 | 14,000 | 800 | 64,700 | 93,700 | 3,100 | 16,300 | 8,800 | 119,800 | 30,800 | 22,600 | 13,800 | 18,900 | 3,800 | 431,200 |
| | 2004* | 4,500 | 3,200 | 2,700 | 7,100 | 14,300 | 700 | 73,500 | 80,300 | 5,100 | 12,800 | 10,700 | 123,400 | 23,900 | 17,000 | 13,900 | 14,600 | 300 | 410,800 |
| | 2005* | 5,400 | 4,600 | 3,600 | 4,400 | 13,700 | 200 | 77,500 | 78,400 | 1,900 | 19,200 | 17,000 | 159,600 | 42,100 | 46,800 | 20,700 | 22,900 | 0 | 520,600 |
| | 2006* | 7,700 | 4,400 | 4,300 | 6,200 | 7,400 | 400 | 61,500 | 76,200 | 1,400 | 19,400 | 11,700 | 140,000 | 21,000 | 19,700 | 20,300 | 12,200 | 2,800 | 420800 |
| | 2007* | 5,700 | 3,400 | 4,100 | 6,100 | 13,400 | 200 | 81,200 | 180,800 | 3,800 | 27,900 | 19,900 | 151,500 | 37,800 | 32,200 | 11,200 | 17,300 | 0 | 602,600 |
| | 2008* | 8,300 | 6,100 | 3,600 | 7,300 | 16,500 | 1,400 | 85,200 | 161,200 | 3,300 | 22,800 | 26,400 | 207,200 | 38,000 | 35,900 | 13,800 | 24,000 | 0 | 662,000 |
| | 2009* | 3,100 | 5,200 | 7,000 | 9,400 | 6,300 | 900 | 108,900 | 107,300 | 6,100 | 32,500 | 23,400 | 156,500 | 46,900 | 35,500 | 9,700 | 52,200 | 2,500 | 612,300 |
| | | | | | | | | | | | | | | | | | | | |
| Late | 1999 | NS[a] | NS[a] | NS[a] | 1,700 | 4,100 | 400 | 1,200 | 18,200 | NS[a] | 5,200 | NS[a] | NS[a] | 14,300 | NS[a] | NS[a] | NS[a] | NS[a] | 45,100 |
| | 2000 | NS[a] | NS[a] | NS[a] | 3,200 | 5,700 | 700 | 900 | 16,200 | NS[a] | 3,500 | NS[a] | NS[a] | 20,400 | NS[a] | NS[a] | NS[a] | NS[a] | 50,600 |
| | 2001 | NS[a] | NS[a] | NS[a] | 3,000 | 200 | 400 | 700 | 32,700 | NS[a] | 2,600 | NS[a] | 12,500 | 17,400 | NS[a] | NS[a] | NS[a] | NS[a] | 69,500 |
| | 2002 | NS[a] | NS[a] | NS[a] | 1,300 | 1,400 | 200 | 0 | 19,500 | NS[a] | 1,900 | NS[a] | --- | 16,000 | NS[a] | NS[a] | NS[a] | NS[a] | 40,300 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Late cont. | 2003* | NS[a] | NS[a] | NS[a] | 3,900 | 500 | 800 | 0 | 25,200 | NS[a] | 2,000 | NS[a] | NS[a] | 17,000 | NS[a] | NS[a] | NS[a] | NS[a] | 49,400 |
| | 2004* | NS[a] | NS[a] | NS[a] | 4,000 | 800 | 200 | 0 | 21,400 | NS[a] | 2,000 | NS[a] | NS[a] | 14,100 | NS[a] | NS[a] | NS[a] | NS[a] | 42,500 |
| | 2005* | NS[a] | NS[a] | NS[a] | 3,900 | 600 | 100 | 0 | 31,300 | NS[a] | 1,000 | NS[a] | NS[a] | 9,200 | NS[a] | NS[a] | NS[a] | NS[a] | 46,100 |
| | 2006* | NS[a] | NS[a] | NS[a] | 3,100 | 700 | 400 | 0 | 16,800 | NS[a] | 600 | NS[a] | NS[a] | 15,700 | NS[a] | NS[a] | NS[a] | NS[a] | 37,300 |
| | 2007* | NS[a] | NS[a] | NS[a] | 2,300 | 1,400 | 100 | --- | 1,500 | NS[a] | 3,900 | NS[a] | NS[a] | 11,800 | NS[a] | NS[a] | NS[a] | NS[a] | 19,600 |
| | 2008* | NS[a] | NS[a] | NS[a] | 1,200 | --- | 200 | 200 | --- | NS[a] | 1,100 | NS[a] | NS[a] | 16,800 | NS[a] | NS[a] | NS[a] | NS[a] | 19,500 |
| | 2009* | NS[a] | NS[a] | NS[a] | 2,800 | | 200 | 0 | | NS[a] | 2,100 | NS[a] | NS[a] | 0 | NS[a] | NS[a] | NS[a] | NS[a] | 5,200 |

* = Preliminary
NS = No season

Table 6. Average distribution of the estimated harvest (Ĥ) of adult Atlantic Flyway Resident Population Canada geese during the 2004-2008 hunting seasons, based on weighted band recoveries (Klimstra and Padding 2011) .

| | Early season[1] | | | Regular season | | | Late season[2] | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| State/Province | Ĥ | % | | Ĥ | % | | Ĥ | % | | Ĥ | % |
| New Brunswick | 0 | 0 | | 385 | <1 | | 0 | 0 | | 385 | <1 |
| Newfoundland | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Nova Scotia | 0 | 0 | | 154 | <1 | | 0 | 0 | | 154 | <1 |
| Ontario | 0 | 0 | | 12,249 | 6 | | 0 | 0 | | 12,249 | 6 |
| Prince Edward Island[3] | 0 | 0 | | 267 | <1 | | 0 | 0 | | 267 | <1 |
| Quebec | 0 | 0 | | 2,230 | 1 | | 0 | 0 | | 2,230 | 1 |
| Eastern Canada[4] | 0 | 0 | | 15,285 | 7 | | 0 | 0 | | 15,285 | 7 |
| | | | | | | | | | | | |
| Maine | 784 | <1 | | 514 | <1 | | 0 | 0 | | 1,298 | 1 |
| New Hampshire | 2,213 | 1 | | 2,837 | 1 | | 0 | 0 | | 5,051 | 2 |
| Vermont | 1,630 | 1 | | 662 | <1 | | 0 | 0 | | 2,292 | 1 |
| Massachusetts | 1,740 | 1 | | 2,574 | 1 | | 969 | <1 | | 5,283 | 3 |
| Rhode Island | 228 | <1 | | 331 | <1 | | 4 | <1 | | 564 | <1 |
| Connecticut | 1,218 | 1 | | 1,537 | 1 | | 623 | <1 | | 3,378 | 2 |
| New England | 7,814 | 4 | | 8,454 | 4 | | 1,597 | 1 | | 17,865 | 9 |
| | | | | | | | | | | | |
| New York | 15,054 | 7 | | 10,927 | 5 | | 199 | <1 | | 26,180 | 12 |
| New Jersey | 3,301 | 2 | | 5,523 | 3 | | 1,309 | 1 | | 10,133 | 5 |
| Pennsylvania | 30,165 | 14 | | 27,541 | 13 | | 0 | 0 | | 57,706 | 27 |
| Mid-Atlantic region | 48,520 | 23 | | 43,991 | 21 | | 1,507 | 1 | | 94,018 | 45 |
| | | | | | | | | | | | |
| Delaware[3] | 1,252 | 1 | | 1,654 | 1 | | 0 | 0 | | 2,906 | 1 |
| Maryland | 4,232 | 2 | | 9,787 | 5 | | 0 | 0 | | 14,019 | 7 |
| Virginia | 6,753 | 3 | | 6,311 | 3 | | 5,870 | 3 | | 18,933 | 9 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chesapeake Bay region[5] | 12,237 | 6 | | 17,752 | 8 | | 5,870 | 3 | | 35,859 | 17 |
| | | | | | | | | | | | |
| West Virginia | 585 | <1 | | 1,208 | 1 | | 0 | 0 | | 1,794 | 1 |
| North Carolina[3] | 5,085 | 2 | | 9,348 | 4 | | 0 | 0 | | 14,433 | 7 |
| South Carolina | 7,240 | 3 | | 2,372 | 1 | | 0 | 0 | | 9,611 | 5 |
| Georgia | 5,686 | 3 | | 13,758 | 7 | | 0 | 0 | | 19,445 | 9 |
| Florida | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Southern Atlantic Flyway[6] | 18,596 | 9 | | 26,686 | 13 | | 0 | 0 | | 45,283 | 22 |
| | | | | | | | | | | | |
| U.S. Atlantic Flyway | 87,168 | 41 | | 96,883 | 46 | | 8,974 | 4 | | 193,025 | 92 |
| | | | | | | | | | | | |
| Other flyways | 524 | <1 | | 1,250 | 1 | | 0 | 0 | | 1,774 | 1 |
| | | | | | | | | | | | |
| Total | 87,692 | 42 | | 98,134 | 47 | | 8,974 | 4 | | 210,084 | 100 |

[1] September seasons designated as "special early Canada goose seasons" in the U.S.

[2] Late January and February seasons designated as "special late Canada goose seasons" in the U.S.

[3] No banded sample. Estimates extrapolated from state/province-specific population estimates and regional estimates of harvest rate, proportion of harvest occurring within state/province of banding, and proportion of in-state/province harvest occurring in early and regular seasons

[4] Includes estimate for Prince Edward Island (PEI) extrapolated from PEI population estimates and eastern Canada estimates of harvest rate and proportion of harvest occurring within province of banding

[5] Includes estimate for Delaware (DE) extrapolated from DE population estimates and Chesapeake Bay region estimates of harvest rate, proportion of harvest occurring within state of banding, and proportion of in-state harvest occurring in early and regular seasons

[6] Includes estimate for North Carolina (NC) extrapolated from NC population estimates and southern Atlantic Flyway region estimates of harvest rate, proportion of harvest occurring within state of banding, and proportion of in-state harvest occurring in early and regular seasons

Table 7. Estimated average annual state- and population-specific harvests of adult Canada geese in the Atlantic Flyway during special September seasons in the U.S. from 2004-2008, and the percent of each state's adult Canada goose harvest that was Atlantic Flyway Resident Population (AFRP), Atlantic Population [Hudson Bay group; AP (HB)], Atlantic Population [Ungava Bay group; AP (UB)], North Atlantic Population (NAP), Southern James Bay Population (SJBP), and Mississippi Flyway Giant (MF Giant) Canada geese (Klimstra and Padding 2011).

| | Estimated harvest | | | | | | | | Percent of state harvest | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | AFRP | AP (HB) | AP (UB) | NAP | SJBP | MF Giant | Total | State | AFRP | AP (HB) | AP (UB) | NAP | SJBP | MF Giant |
| CT | 1,218 | 0 | 0 | 0 | 0 | 0 | 1,218 | CT | 100 | 0 | 0 | 0 | 0 | 0 |
| DE | 1,252 | 0 | 0 | 0 | 0 | 0 | 1,252 | DE | 100 | 0 | 0 | 0 | 0 | 0 |
| FL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | FL | 0 | 0 | 0 | 0 | 0 | 0 |
| GA | 5,686 | 0 | 0 | 0 | 0 | 29 | 5,715 | GA | >99 | 0 | 0 | 0 | 0 | <1 |
| ME | 784 | 0 | 0 | 0 | 0 | 0 | 784 | ME | 100 | 0 | 0 | 0 | 0 | 0 |
| MD | 4,232 | 206 | 0 | 0 | 0 | 0 | 4,438 | MD | 95 | 5 | 0 | 0 | 0 | 0 |
| MA | 1,740 | 0 | 0 | 0 | 0 | 0 | 1,740 | MA | 100 | 0 | 0 | 0 | 0 | 0 |
| NH | 2,213 | 0 | 0 | 0 | 0 | 0 | 2,213 | NH | 100 | 0 | 0 | 0 | 0 | 0 |
| NJ | 3,301 | 0 | 184 | 0 | 0 | 0 | 3,485 | NJ | 95 | 0 | 5 | 0 | 0 | 0 |
| NY | 15,054 | 0 | 0 | 0 | 0 | 16 | 15,070 | NY | >99 | 0 | 0 | 0 | 0 | <1 |
| NC | 5,085 | 0 | 0 | 0 | 0 | 0 | 5,085 | NC | 100 | 0 | 0 | 0 | 0 | 0 |
| PA | 30,165 | 0 | 0 | 0 | 193 | 545 | 30,902 | PA | 97 | 0 | 0 | 0 | 1 | 2 |
| RI | 228 | 0 | 0 | 0 | 0 | 0 | 228 | RI | 100 | 0 | 0 | 0 | 0 | 0 |
| SC | 7,240 | 0 | 0 | 0 | 0 | 0 | 7,240 | SC | 100 | 0 | 0 | 0 | 0 | 0 |
| VT | 1,630 | 263 | 0 | 0 | 0 | 0 | 1,893 | VT | 86 | 14 | 0 | 0 | 0 | 0 |
| VA | 6,753 | 0 | 0 | 0 | 0 | 14 | 6,767 | VA | >99 | 0 | 0 | 0 | 0 | <1 |
| WV | 585 | 0 | 0 | 0 | 0 | 40 | 625 | WV | 94 | 0 | 0 | 0 | 0 | 6 |
| Total | 87,168 | 469 | 184 | 0 | 193 | 644 | 88,657 | Total | 98 | <1 | <1 | 0 | <1 | 1 |

Table 8. Estimated average annual state-, province-, and population-specific harvests of adult Canada geese in the Atlantic Flyway during regular seasons from 2004-2008, and the percent of each state's and province's adult Canada goose harvest that was Atlantic Flyway Resident Population (AFRP), Atlantic Population [Hudson Bay group; AP (HB)], Atlantic Population [Ungava Bay group; AP (UB)], North Atlantic Population (NAP), Southern James Bay Population (SJBP), and Mississippi Flyway Giant (MF Giant) Canada geese (Klimstra and Padding 2011).

| | Estimated harvest | | | | | | | | Percent of state/province total | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State/Province | AFRP | AP (HB) | AP (UB) | NAP | SJBP | MF Giant | Total | State/Province | AFRP | AP (HB) | AP (UB) | NAP | SJBP | MF Giant |
| Connecticut | 1,537 | 0 | 125 | 495 | 0 | 0 | 2,157 | Connecticut | 71 | 0 | 6 | 23 | 0 | 0 |
| Delaware | 1,654 | 1,646 | 1,648 | 0 | 0 | 0 | 4,949 | Delaware | 33 | 33 | 33 | 0 | 0 | 0 |
| Florida | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Florida | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | 13,758 | 0 | 0 | 0 | 0 | 46 | 13,805 | Georgia | >99 | 0 | 0 | 0 | 0 | <1 |
| Maine | 514 | 0 | 0 | 457 | 0 | 5 | 976 | Maine | 53 | 0 | 0 | 47 | 0 | <1 |
| Maryland | 9,787 | 23,316 | 7,635 | 0 | 92 | 0 | 40,830 | Maryland | 24 | 57 | 19 | 0 | <1 | 0 |
| Massachusetts | 2,574 | 0 | 87 | 473 | 0 | 0 | 3,133 | Massachusetts | 82 | 0 | 3 | 15 | 0 | 0 |
| New Hampshire | 2,837 | 0 | 252 | 200 | 0 | 0 | 3,289 | New Hampshire | 86 | 0 | 8 | 6 | 0 | 0 |
| New Jersey | 5,523 | 139 | 1,286 | 423 | 0 | 0 | 7,371 | New Jersey | 75 | 2 | 17 | 6 | 0 | 0 |
| New York | 10,927 | 5,516 | 1,628 | 2,700 | 80 | 26 | 20,876 | New York | 52 | 26 | 8 | 13 | <1 | <1 |
| North Carolina | 9,348 | 0 | 0 | 0 | 48 | 45 | 9,440 | North Carolina | 99 | 0 | 0 | 0 | <1 | <1 |
| Pennsylvania | 27,541 | 2,254 | 2,718 | 144 | 400 | 426 | 33,482 | Pennsylvania | 82 | 7 | 8 | <1 | 1 | 1 |
| Rhode Island | 331 | 0 | 0 | 2,194 | 0 | 0 | 2,525 | Rhode Island | 13 | 0 | 0 | 87 | 0 | 0 |
| South Carolina | 2,372 | 413 | 56 | 0 | 0 | 13 | 2,853 | South Carolina | 83 | 14 | 2 | 0 | 0 | <1 |
| Vermont | 662 | 206 | 361 | 0 | 0 | 0 | 1,230 | Vermont | 54 | 17 | 29 | 0 | 0 | 0 |
| Virginia | 6,311 | 1,854 | 92 | 0 | 110 | 195 | 8,561 | Virginia | 74 | 22 | 1 | 0 | 1 | 2 |
| West Virginia | 1,208 | 0 | 0 | 0 | 40 | 131 | 1,378 | West Virginia | 88 | 0 | 0 | 0 | 3 | 9 |
| U.S. total | 96,884 | 35,345 | 15,888 | 7,085 | 769 | 886 | 156,856 | U.S. total | 62 | 23 | 10 | 5 | <1 | <1 |
| | | | | | | | | | | | | | | |
| New Brunswick | 385 | 0 | 0 | 866 | 0 | 37 | 1,288 | New Brunswick | 30 | 0 | 0 | 67 | 0 | 3 |
| Newfoundland | 0 | 0 | 0 | 1,116 | 0 | 0 | 1,116 | Newfoundland | 0 | 0 | 0 | 100 | 0 | 0 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nova Scotia | 154 | 0 | 0 | 0 | 0 | 0 | 154 | | Nova Scotia | 100 | 0 | 0 | 0 | 0 | 0 |
| Ontario | 12,249 | 8,378 | 212 | 288 | 2,662 | 0 | 23,789 | | Ontario | 52 | 35 | 1 | 1 | 11 | 0 |
| Prince Edward Island | 267 | 0 | 0 | 5,744 | 0 | 0 | 6,011 | | Prince Edward Island | 4 | 0 | 0 | 96 | 0 | 0 |
| Quebec | 2,230 | 5,937 | 5,648 | 200 | 20 | 0 | 14,035 | | Quebec | 16 | 42 | 40 | 1 | <1 | 0 |
| Canada total | 15,286 | 14,315 | 5,860 | 8,213 | 2,682 | 37 | 46,393 | | Canada total | 33 | 31 | 12 | 18 | 6 | <1 |

Table 9. Estimated average annual state- and population-specific harvests of adult Canada geese in the Atlantic Flyway during special late seasons in the U.S. from 2005-2009, and the percent of each state's adult Canada goose harvest that was Atlantic Flyway Resident Population (AFRP), Atlantic Population [Hudson Bay group; AP (HB)], Atlantic Population [Ungava Bay group; AP (UB)], North Atlantic Population (NAP), Southern James Bay Population (SJBP), and Mississippi Flyway Giant (MF Giant) Canada geese (Klimstra and Padding 2011).

| | Estimated harvest | | | | | | | | Percent of state total | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | AFRP | AP (HB) | AP (UB) | NAP | SJBP | Total | State | AFRP | AP (HB) | AP (UB) | NAP | SJBP |
| Connecticut | 623 | 0 | 0 | 0 | 0 | 623 | Connecticut | 100 | 0 | 0 | 0 | 0 |
| Massachusetts | 969 | 0 | 0 | 777 | 0 | 1,746 | Massachusetts | 56 | 0 | 0 | 44 | 0 |
| New Jersey | 1,309 | 0 | 0 | 0 | 0 | 1,309 | New Jersey | 100 | 0 | 0 | 0 | 0 |
| New York | 199 | 0 | 0 | 0 | 0 | 199 | New York | 100 | 0 | 0 | 0 | 0 |
| Rhode Island | 4 | 0 | 0 | 0 | 0 | 4 | Rhode Island | 100 | 0 | 0 | 0 | 0 |
| Virginia | 5,870 | 206 | 0 | 0 | 109 | 6,185 | Virginia | 95 | 3 | 0 | 0 | 2 |
| Total | 8,974 | 206 | 0 | 777 | 109 | 10,066 | Total | 89 | 2 | 0 | 8 | 1 |

Table 10. Number of Canada goose damage technical assistance requests received by the USDA Wildlife Services, 1994-2010.

| State | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New Jersey | 190 | 342 | 348 | 400 | 392 | 532 | 387 | 375 | 466 | 460 | 316 | 921 | 487 | 375 | 422 | 489 | 431 | 7,333 |
| New York | 173 | 184 | 201 | 198 | 217 | 203 | 232 | 191 | 283 | 235 | 270 | 243 | 204 | 238 | 256 | 299 | 483 | 4,110 |
| Virginia | 102 | 60 | 142 | 198 | 194 | 259 | 209 | 213 | 236 | 189 | 201 | 166 | 195 | 187 | 137 | 209 | 343 | 3,240 |
| North Carolina | 285 | 211 | 299 | 244 | 205 | 81 | 184 | 282 | 242 | 236 | 272 | 309 | 142 | 73 | 59 | 113 | 233 | 3,470 |
| Maryland | 142 | 195 | 232 | 264 | 272 | 290 | 248 | 248 | 216 | 160 | 131 | 139 | 163 | 227 | 237 | 251 | 235 | 3,650 |
| Pennsylvania | 77 | 210 | 277 | 333 | 187 | 87 | 74 | 85 | 116 | 138 | 179 | 172 | 173 | 175 | 211 | 233 | 428 | 3,155 |
| Georgia | 50 | 37 | 62 | 87 | 70 | 107 | 95 | 101 | 71 | 87 | 114 | 50 | 88 | 58 | 84 | 100 | 86 | 1,347 |
| New Hampshire | 27 | 30 | 47 | 49 | 45 | 61 | 63 | 81 | 68 | 67 | 89 | 85 | 100 | 85 | 66 | 58 | 116 | 1,137 |
| Massachusetts | 88 | 114 | 111 | 96 | 119 | 73 | 100 | 81 | 85 | 82 | 48 | 42 | 38 | 14 | 32 | 40 | 139 | 1,302 |
| Connecticut | 50 | 47 | 60 | 52 | 94 | 104 | 112 | 66 | 65 | 72 | 67 | 53 | 16 | 11 | 28 | 17 | 100 | 1,014 |
| West Virginia | 41 | 35 | 31 | 40 | 34 | 37 | 10 | 52 | 48 | 34 | 59 | 17 | 26 | 47 | 38 | 29 | 77 | 655 |
| South Carolina | 10 | 6 | 7 | 7 | 11 | 14 | 9 | 16 | 15 | 1 | 41 | 85 | 36 | 78 | 52 | 42 | 49 | 479 |
| Vermont | 0 | 4 | 18 | 21 | 15 | 20 | 32 | 38 | 31 | 29 | 39 | 37 | 28 | 24 | 31 | 33 | 33 | 433 |
| Delaware | 2 | 2 | 9 | 13 | 28 | 20 | 26 | 28 | 40 | 23 | 41 | 34 | 16 | 23 | 17 | 30 | 33 | 385 |
| Maine | 5 | 18 | 11 | 10 | 21 | 32 | 32 | 29 | 15 | 29 | 46 | 34 | 18 | 17 | 13 | 33 | 46 | 409 |
| Rhode Island | 8 | 5 | 8 | 15 | 16 | 20 | 11 | 13 | 11 | 15 | 20 | 10 | 10 | 14 | 12 | 10 | 70 | 268 |
| Florida | 1 | 10 | 10 | 5 | 7 | 0 | 4 | 9 | 5 | 9 | 5 | 5 | 12 | 10 | 10 | 7 | 9 | 118 |
| DC | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 3 | 2 | 3 | 1 | 0 | 1 | 1 | 1 | 2 | 0 | 18 |
| Total | 1,251 | 1,512 | 1,873 | 2,032 | 1,929 | 1,940 | 1,828 | 1,911 | 2,015 | 1,869 | 1,939 | 2,402 | 1,753 | 1,493 | 1,532 | 1,995 | 2,911 | 32,523 |

Table 11. Annual mean number of requests for assistance by resource type received by USDA Wildlife Services, 1999-2010.

| State | Property | Human Health and Safety | Agriculture | Natural Resources |
|---|---|---|---|---|
| New Jersey | 213 | 160 | 59 | 21 |
| New York | 151 | 43 | 28 | 2 |
| Virginia | 130 | 32 | 31 | 3 |
| North Carolina | 125 | 30 | 29 | 3 |
| Maryland | 54 | 47 | 33 | 4 |
| Pennsylvania | 102 | 36 | 18 | 1 |
| Georgia | 63 | 14 | 7 | <1 |
| New Hampshire | 37 | 23 | 3 | 0 |
| Massachusetts | 33 | 7 | 12 | 2 |
| Connecticut | 37 | 7 | 4 | 1 |
| West Virginia | 27 | 5 | 4 | <1 |
| South Carolina | 28 | 5 | 3 | <1 |
| Vermont | 16 | 6 | 3 | 1 |
| Delaware | 15 | 11 | 4 | 1 |
| Maine | 14 | 7 | 4 | 3 |
| Rhode Island | 8 | 2 | 2 | 1 |
| Florida | 2 | 4 | 1 | 0 |
| District of Columbia | 1 | 1 | 0 | <1 |
| Total Mean # of Requests | 1,056 | 440 | 245 | 43 |
| Total # of Requests | 12,679 | 5,291 | 2,934 | 511 |

Table 12. Number of roundups and Canada geese captured by U.S. Department of Agriculture (USDA) Wildlife Services in Atlantic Flyway states to alleviate goose dama

| | 2004 | | 2005 | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | No. roundups | No. birds captured | No. roundups | No. birds captured | No. roundups | No. birds captured | No. roundups | No. birds captured | No. roundups | No. birds captured | No. roundups | No. birds captured | No. roundups | No bir capt |
| Maine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 45 | 0 | 0 | 2 | 1 |
| New Hampshire | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 68 | 0 | 0 | 2 | 36 | 5 | 22 |
| Vermont | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 33 | 0 | 0 |
| Massachusetts | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rhode Island | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| Connecticut | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New York | 1 | 518 | 3 | 533 | 2 | 306 | 1 | 167 | 4 | 640 | 50 | 2,519 | 51 | 3,1 |
| Pennsylvania | 0 | 0 | 20 | 952 | 30 | 1,336 | 25 | 1,407 | 21 | 838 | 23 | 1,272 | 23 | 99 |
| New Jersey | 0 | 0 | 11 | 781 | 8 | 504 | 16 | 1,104 | 21 | 1,893 | 22 | 1,461 | 60 | 2,9 |
| Delaware | 1 | 116 | 3 | 103 | 2 | 263 | 1 | 66 | 0 | 0 | 1 | 104 | 2 | 15 |
| Maryland | 1 | 40 | 3 | 389 | 5 | 1,170 | 9 | 369 | 9 | 553 | 6 | 229 | 8 | 68 |
| West Virginia | 6 | 300 | 3 | 187 | 2 | 98 | 7 | 514 | 1 | 22 | 8 | 219 | 12 | 50 |
| Virginia | 14 | 1,984 | 16 | 1,802 | 24 | 1,817 | 19 | 1,705 | 20 | 1,493 | 33 | 2,141 | 49 | 3,2 |
| North Carolina | 7 | 426 | 5 | 322 | 6 | 960 | 7 | 347 | 10 | 546 | 12 | 912 | 22 | 1,3 |
| South Carolina | 4 | 59 | 15 | 894 | 20 | 1,002 | 21 | 976 | 20 | 726 | 21 | 965 | 20 | 99 |
| Georgia | 36 | 1,706 | 24 | 1,019 | 30 | 1,443 | 19 | 936 | 19 | 735 | 20 | 789 | 19 | 57 |
| Florida | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 104 | 1 | 37 | 0 | 0 | 1 | 7 |
| Total | 70 | 5,149 | 103 | 6,982 | 129 | 8,899 | 130 | 7,763 | 127 | 7,528 | 199 | 10,680 | 275 | 15, |

Table 13. Reported take of resident Canada goose nests in Atlantic Flyway states under the Resident Canada Goose Nest and Egg Depredation Order, 2007-2010.

| State | 2007 | | 2008 | | 2009 | | 2010[1] | |
|---|---|---|---|---|---|---|---|---|
| | Registrants | Nests | Registrants | Nests | Registrants | Nests | Registrants | Nests |
| CT | 17 | 51 | 15 | 96 | 39 | 168 | 28 | 109 |
| DC | 2 | 87 | 1 | 136 | 2 | 175 | 2 | 21 |
| DE | 6 | 50 | 8 | 24 | 17 | 54 | 16 | 44 |
| FL | 6 | 0 | 0 | 0 | 6 | 1 | 5 | 45 |
| GA | 23 | 28 | 19 | 186 | 51 | 75 | 54 | 153 |
| MA[2] | 29 | 133 | 41 | 224 | 36 | 322[3] | 42 | 357[3] |
| MD | 64 | 532 | 68 | 541 | 70 | 437 | 26 | 293 |
| ME | 5 | 14 | 7 | 37 | 3 | 30 | 3 | 34 |
| NC | 127 | 695 | 120 | 930 | 146 | 675 | 152 | 426 |
| NH | 3 | 0 | 0 | 0 | 1 | 0 | 5 | 2 |
| NJ | 190 | 500 | 137 | 772 | 209 | 670 | 219 | 972 |
| NY | 124 | 730 | 121 | 1,046 | 154 | 779 | 156 | 746 |
| PA | 145 | 1,058 | 158 | 978 | 146 | 721 | 143 | 877 |
| RI | 4 | 21 | 3 | 44 | 5 | 63 | 4 | 47 |
| SC | 3 | 0 | 2 | 0 | 8 | 149 | 21 | 318 |
| VA | 89 | 389 | 57 | 353 | 105 | 444 | 116 | 410 |
| VT | 4 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| WV | 4 | 32 | 4 | 41 | 8 | 20 | 10 | 34 |
| Total | 845 | 4,320 | 762 | 5,408 | 1,007 | 4,783 | 1,002 | 4,888 |

[1]Preliminary results.
[2]All nest and egg control activities were conducted under a Special Canada Goose Permit issued to the state by the USFWS.
[3] Totals for Massachusetts also includes an additional 70 nests in 2009 and 127 in 2010 treated by USDA Wildlife Services.

Table 14. Reported take of Canada geese under U.S. Fish and Wildlife Service Depredation Permits in Atlantic Flyway states, 2000-2009.

| State | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 9-Year Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CT | 226 | 196 | 147 | 312 | 317 | 262 | 407 | 373 | 328 | 611 | 3,179 |
| DE | 50 | 60 | 82 | 73 | 119 | 126 | 326 | 311 | 35 | 274 | 1,456 |
| FL | 15 | 3 | 7 | 20 | 5 | 7 | 2 | 20 | 72 | 12 | 163 |
| GA | 0 | 0 | 3 | 41 | 47 | 0 | 177 | 391 | 133 | 130 | 922 |
| MA | 96 | 80 | 119 | 330 | 189 | 125 | 188 | 354 | 178 | 622 | 2,281 |
| MD | 1,493 | 120 | 1,114 | 1,307 | 1,326 | 1,014 | 1,961 | 808 | 897 | 1,385 | 11,425 |
| ME | 0 | 0 | 17 | 23 | 58 | 18 | 22 | 28 | 33 | 47 | 246 |
| NC | 158 | 482 | 336 | 819 | 982 | 614 | 1,303 | 695 | 677 | 841 | 6,907 |
| NH | 0 | 9 | 18 | 42 | 23 | 124 | 39 | 29 | 20 | 281 | 585 |
| NJ | 749 | 974 | 2,567 | 5,566 | 5,129 | 3,722 | 4,003 | 2,557 | 2,573 | 6,758 | 34,598 |
| NY | 484 | 1,439 | 762 | 1,053 | 1,525 | 1,414 | 2,479 | 1,404 | 1,573 | 5,323 | 17,456 |
| PA | 164 | 166 | 392 | 1,484 | 1,532 | 1,210 | 1,632 | 1,358 | 1,288 | 2,135 | 11,361 |
| RI | 0 | 3 | 2 | 135 | 204 | 182 | 153 | 237 | 250 | 462 | 1,628 |
| SC | 2 | 0 | 11 | 101 | 29 | 0 | 31 | 39 | 45 | 980 | 1,238 |
| VA | 2,162 | 1,579 | 1,801 | 1,661 | 3,469 | 297 | 2,456 | 257 | 1,853 | 4,192 | 19,727 |
| VT | 0 | 37 | 22 | 13 | 12 | 31 | 35 | 43 | 13 | 60 | 266 |
| WV | 10 | 18 | 125 | 579 | 345 | 371 | 267 | 533 | 97 | 654 | 2,999 |
| Total | 5,609 | 5,166 | 7,525 | 13,559 | 15,311 | 9,517 | 15,481 | 9,437 | 10,065 | 24,767 | 116,437 |

Table 15. Reported take of Canada goose nests from U.S. Fish and Wildlife Service Depredation Permits in Atlantic Flyway states, 2000-2008.

| State | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008[1] | 9-Year Total |
|---|---|---|---|---|---|---|---|---|---|---|
| CT | 41 | 39 | 61 | 231 | 192 | 171 | 122 | 15 | 5 | 877 |
| DE | 0 | 0 | 14 | 70 | 35 | 34 | 17 | 0 | 0 | 170 |
| FL | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 6 |
| GA | 0 | 0 | 0 | 112 | 67 | 0 | 98 | 0 | 0 | 277 |
| MA | 0 | 0 | 25 | 165 | 236 | 286 | 171 | 22 | 1 | 906 |
| MD | 0 | 0 | 20 | 434 | 340 | 455 | 139 | 93 | 127 | 1,608 |
| ME | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 486 | 487 |
| NC | 0 | 40 | 0 | 30 | 30 | 50 | 56 | 6 | 0 | 212 |
| NH | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| NJ | 0 | 7 | 173 | 1,860 | 1,526 | 1,415 | 1,367 | 328 | 0 | 6,676 |
| NY | 225 | 0 | 156 | 1,624 | 1,123 | 2,274 | 1,228 | 35 | 1,158 | 7,823 |
| PA | 13 | 181 | 114 | 1,202 | 1,710 | 1,564 | 1,007 | 473 | 544 | 6,808 |
| RI | 0 | 0 | 68 | 5 | 4 | 14 | 6 | 12 | 0 | 109 |
| SC | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| VA | 15 | 19 | 262 | 597 | 1,001 | 462 | 421 | 0 | 54 | 2,831 |
| VT | 0 | 0 | 1 | 71 | 15 | 16 | 15 | 0 | 0 | 118 |
| WV | 0 | 0 | 9 | 83 | 27 | 33 | 29 | 2 | 1 | 184 |
| Total | 294 | 286 | 903 | 6,484 | 6,306 | 6,774 | 4,684 | 986 | 2,376 | 29,093 |

[1]Represents the last year that nests were authorized under USFWS Depredation Permits. All nests after 2008 are authorized under the Resident Canada Goose Nest and Egg Depredation Order or Special Canada Goose Permits issued directly to state agencies.

Table 16. Reported take of Canada geese and nest in Atlantic Flyway states under the Resident Canada Goose Agriculture Depredation Order, 2007-2010.

| State | 2007 | | | 2008 | | | 2009 | | | 2010 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Permits | Geese | Nests | Permits | Geese | Nests | Permits | Geese | Nests | Permits | Geese | Nests |
| CT[1] | 13 | 124 | 0 | 12 | 51 | 48 | 13 | 60 | 39[1] | na | 102 | 34[1] |
| DC[3] | | | | | | | | | | | | |
| DE | 5 | 40 | 0 | 5 | 7 | 0 | 6 | 54 | 3 | 7 | 63 | 0 |
| FL | | | | | | | | | | 1 | 10 | 0 |
| GA[2] | na | 58 | 0 | na | 616 | 0 | | | | | | |
| MA[3] | | | | | | | | | | | | |
| MD | 15 | 130 | 0 | 35 | 296 | 16 | 31 | 329 | 7 | 31 | 298 | 5 |
| ME[3] | | | | | | | | | | | | |
| NC[3] | | | | | | | | | | | | |
| NH | na | 56 | 0 | na | 24 | 0 | na | 61 | 0 | na | 210 | 0 |
| NJ | | | | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| NY | 12 | 106 | na | 48 | 258 | na | 72 | 453 | na | 86 | 518 | na |
| PA | 8 | 12 | 0 | 3 | 14 | 0 | na | 10 | 0 | na | 16 | 0 |
| RI[3] | | | | | | | | | | | | |
| SC[3] | | | | | | | | | | na | 182[2] | 0 |
| VA | | | | | | | 38 | 324 | 12 | 33 | 166 | 4 |
| VT[3] | | | | | | | | | | | | |
| WV | na | 13 | 0 | na | 3 | 0 | na | 11 | 0 | na | 0 | 0 |
| Total | 53 | 539 | 0 | 105 | 1,269 | 64 | 161 | 1,302 | 61 | 158 | 1,383 | 44 |

[1] Eggs not nests
[2] Special Canada goose permit
[3] No USFWS Agriculture Depredation Order implemented
na = not available

## APPENDIX

## Resident Canada Goose Status and Management in Atlantic Flyway States and Provinces

### UNITED STATES

### Connecticut

The Canada goose was not described as a summer resident of Connecticut in the early 1900s. The origin of the current resident population can be traced to several separate events. During the period 1920-1940, in an effort to maintain and increase the low wood duck population, the State Board of Fisheries and Game and the White Memorial Foundation in Litchfield began a winter feeding program. A small flock of Canada geese took advantage of this winter feeding program and remained through the year, eventually nesting and successfully rearing young. The population grew to approximately 80 Canada geese. Early in the 1940s the feeding program was discontinued. These geese began to disperse and nest throughout northwest Connecticut. In 1960, the Connecticut Department of Environmental Protection (DEP) established a small breeding population of Canada geese at Charter Marsh WMA in northeast Connecticut. In addition, during the 1960s, goslings and adults were transplanted to Connecticut from Brigantine NWR in New Jersey. During this time period several other transplants of Canada geese were made throughout the state, primarily by sporting clubs.

The resident Canada goose population is monitored annually through the AF Breeding Waterfowl Plot Survey (AFBWPS). From 2000 to 2008 the breeding population declined from an estimated 12,139 breeding pairs to 9,851 pairs. Mark-resight population estimates conducted in 2002 estimated the overall resident population at 41,872 ± 7,543.

Nuisance problems occur throughout the state and are significantly correlated with human population density. The most common complaints are excessive fecal droppings, decreased water quality, aggressive behavior, traffic concerns, and turf damage to golf courses, playing fields, and municipal parks. Agricultural damage is reported in the spring when seedlings are emerging and in the fall when winter cover crops are planted. Safety problems occur at several airports due to the potential for bird/plane strikes. Several incidents at Bradley International Airport involving commercial jet airliners and Canada geese have occurred in the past 2 years. The DEP does not track nuisance calls, however, in 2010 APHIS WS responded to 100 requests for technical assistance and removed 85 resident geese throughout the State.

The DEP utilizes regulated hunting as the primary means to control the growth of the resident goose population. Recent federal changes to resident goose season frameworks have resulted in extremely liberal regulations aimed at reducing goose numbers. These seasons have been effective in reducing or eliminating nuisance problems in some areas of the state, primarily in the northern counties where hunter access to feeding areas is still good. Many areas of the State, however, are not conducive to hunting, and thus, in urbanized areas where goose hunting is not practical or allowable, goose populations continue to increase. The State passed legislation in October 2003 to allow certain entities (municipalities, homeowner associations, and non-profit land owning groups) to conduct capture and euthanasia operations in areas where persistent goose problems occur. The DEP has also initiated an agricultural depredation program

to assist affected agricultural operations with resident goose population management outside of regulated hunting seasons.

The desired population objective is 15,000 adults as measured by the AFBWPS. This was the population size of 1991 and under current conditions is considered achievable. An assessment conducted in 2004 of human attitudes towards resident goose population levels indicated that the cultural carrying capacity of resident geese in Connecticut is 13% of current population levels. Thus, affected municipalities, farmers, water companies, and golf course superintendents would be satisfied with an overall reduction in the resident goose population of 87%. Given the current climate in Connecticut towards wildlife population management, this level of reduction is impractical and unachievable. The desirable distribution of geese in the State is to achieve the population objective through reduction of geese inhabiting urban areas while maintaining current levels in rural areas of the State.

**Delaware**

Resident Canada geese have been present in Delaware in significant numbers for more than 40 years. Resident geese in the early 1970s were mostly confined to northern Delaware in New Castle County, north of the cities of Newark and Wilmington. These birds were probably the progeny of captive birds released on large estates by landowners. As late as 1985, the total resident population in Delaware was estimated at approximately 600 birds. At that time, all but about 100 birds were still located on estates, golf courses and industrial sites in northern New Castle County. Control efforts in the early 1980s consisted of capture and transport to other states which relieved problems in Delaware at that time. Since the late 1980s, resident geese have increased in numbers and spread across the state, partially due to intrastate movement of captured nuisance birds (e.g., other states would no longer take them). In-state trap and transport activities were terminated by the Delaware Division of Fish and Wildlife (Division) in 1997. In retrospect this activity should have been terminated sooner. Between 1985 and 1995, Delaware's resident Canada goose population increased 7-fold to about 4,700 birds. Although these geese provided increased aesthetic values they also frequently caused unacceptable damage and nuisance problems.

Current resident Canada goose problems are primarily due to birds being in non-traditionally hunted areas. These include golf courses, water treatment facilities, residential areas, state parks, industrial complexes, hospitals, shopping malls and other areas where feces, feathers, noise, water pollution and aggression conflict with human activities. Approximately 30 to 40 complaints are received each year. At this point agricultural damage is a smaller problem than the above listed items.

Delaware initiated a September resident Canada goose season in 1995, which has traditionally begun on 1 September and ended on 15 September. Besides providing additional hunting opportunities for Delaware hunters, the September season has been considered the primary management tool to control resident geese, as this September harvest has averaged 2,300 geese in recent years. In 2008, this season was expanded 10 days from 1-25 September in an effort to further reduce resident goose numbers.

In areas where hunting is not practical, other resident goose control measures being implemented in Delaware include molt roundups, egg oiling/addling, lawn treatment with taste

aversion chemicals, fencing, Mylar® tape, hazing with trained dogs, and depredation permits and orders. Molt roundups have been conducted by private contractors and both USDA WS and the Division. Governmental agency efforts have been conducted almost exclusively in conjunction with avian influenza surveillance. Captured birds are then euthanized and donated to local food banks. Annually these roundups remove about 400 geese from areas not conducive to hunting. Egg oiling and addling activities have expanded with federal passage of the 2006 Regulations for Managing Resident Canada Goose Populations. Currently approximately 40-50 nests are destroyed or treated each year with this egg/nest depredation order, most from state parks and private developments. The agricultural depredation order has received little interest from farmers with approximately 7 permits issued and 60 birds taken annually. Of the other depredation order/permits available, Delaware only utilizes the airport control order and Special Canada Goose Permits (site specific and mostly within Delaware state parks). The depredation orders not currently utilized include the public health, expanded hunting methods and managed take orders.

Due to the small size of the State (1,956 $mi^2$), resident goose numbers can be monitored by aerially counting flocks as well as through the AF Waterfowl Breeding Plot Survey. The current resident Canada goose population in Delaware, as estimated by a summer aerial survey, is estimated to be approximately 10,800 birds including approximately 2,550 breeding pairs. This population has dramatically shifted from the northern part of the state (New Castle County) to the central and southern regions (Kent and Sussex Counties). In 1998, 65% of Delaware's resident geese were located in New Castle County. Today only 21% are located in New Castle County with 74% now being located south of Dover or within the southern half of Delaware. Leg-banding activities of resident geese, used to estimate harvest and survival rates, have been discontinued as captured birds are usually euthanized and donated to local food banks.

The Division endorses a statewide resident Canada goose population goal of 2,150 birds including not more than 500 breeding pairs. This is consistent with populations in the late 1980s-early 1990s when problems with these birds were minimal in Delaware and at a level that can be managed by recreational hunting. Additionally, the Division endorses a population cap of 20 geese per site as compatible with human activities except in cases were health or human safety is concerned. In those cases, all birds should be removed. These population goals should provide ample opportunity for the public to observe and enjoy Canada geese without placing an unacceptable financial burden on landowners.

**Florida**

Approximately 1,600 Canada geese were released in Florida in the late 1960s and early 1970s in an effort to establish a resident flock. Florida historically did not support a breeding population of resident Canada geese. The attempts to establish breeding geese in Florida had only limited success, likely due to poor nest success and gosling survival. No reliable empirical estimates of statewide abundance exist. Anecdotal information and casual observations suggest that the current population ranges between 3,000 and 7,000, concentrated in urban and suburban areas (B. Constantin and D. Eggeman, Florida Freshwater and Fish Commission, pers. commun.).

Nuisance problems are relatively minor. Florida's population goal is to maintain the current population size.

## Georgia

Historically, migratory Canada geese passed through Georgia on their way to an important wintering area, St. Marks National Wildlife Refuge in Florida. Over time, the number of Southern James Bay Population Canada geese that passed through Georgia declined, and today there are virtually no migratory geese that winter in Georgia.

In 1975, the Georgia Department of Natural Resources began a program to re-establish Canada geese in the State. During the restocking period of 1975 through 1987, over 8,000 resident Canada geese were relocated from several northeastern states and were released on reservoirs and farm ponds across the State. Canada geese quickly adapted to the available habitats in Georgia, and the resident goose population began to grow and expand into new areas.

Currently, Georgia's goose population is estimated at about 250,000. Current population estimates are based on a "Lincoln-Index" using direct recoveries of birds that are banded during the summer molting period.

Geese often use habitats where they cannot be hunted, such as golf courses, beaches, lawns, housing developments around major impoundments, and man-made ponds in subdivisions and apartment complexes. Goose-human interactions occur often in these settings. Goose complaints usually fall into one of four categories: (1) crop damage, (2) property damage, (3) being in areas where they are unwanted, and (4) potential health and safety issues.

The Canada goose hunting season in Georgia provides recreational opportunity for sport hunters and acts as a management tool to slow the growth rate of the resident population. Since the first resident goose season in January 1990, Georgia has gradually increased goose hunting opportunity. Georgia currently has a September season and a regular 60-day season that coincides with the duck season. Both seasons have a daily bag limit of 5 geese. Using a calculated direct band recovery rate of 9%, and an estimated reporting rate of 90%, Georgia hunters harvest about 11% of the population each year.

The management objective for resident Canada geese in Georgia is to reduce the population to a level that will allow adequate recreational opportunity, reduce nuisance problems, and retain the aesthetic value of the birds to the public.

## Maine

Maine now has an established population of resident Canada geese. Management objectives are strongly influenced by goose hunting opportunity and goose/human interactions (i.e., nuisance objectives). Thus, Maine manages resident Canada goose populations based on two zones. They are the Northern and Southern Zones and mirror the waterfowl hunting zone split used in regulating the migratory bird hunting season. This split is used to address two areas that differ in the human population. The majority of Maine's human population resides in the Southern Zone. Management objectives differ between the two zones and are addressed separately. In 2007, Maine updated its Waterfowl Management System to reflect objectives for resident Canada geese specific to the Northern and Southern management zones. Objective #1, Northern Zone "Resident Canada Goose Population Objective: Maintain Maine's resident goose

population in the Northern Zone at the 2006 level until 2021." Objective #2, Southern Zone "Resident Canada Goose Nuisance Objective: Develop and implement specific strategies that reduce Canada goose nuisance complaints in the Southern Zone to at least 50% below 2005 levels by 2011."

Maine's resident goose population is currently estimated at 7,300 pairs, distributed over the entire length and breadth of Maine. Geese are monitored by brood counts on index areas, during the Midwinter Waterfowl Survey, and during the USFWS May Breeding Waterfowl Population Survey, Stratum 62. Statewide Maine's recent three-year average of nuisance complaints related to Canada geese is 20 (2007 = 27, 2008 = 10, 2009 = 24). In July of 2008, combining USDA WS and Maine Department of Inland Fish and Wildlife efforts, 80 geese were trapped and relocated to state lands. Resident goose harvest continues to contribute to population and nuisance objectives. Increases to daily bag and possession limits have provided increased hunting opportunity as well as helped in controlling the resident goose population. Maine's current bag limit for the Northern Zone is 6 birds/day with 12 in possession. The Southern Zone is 8 birds/day with 16 in possession.

An age-structured model is being developed that will account for differences in survival and breeding propensity dependent on age. Information for input into the model is obtained from resident Canada goose banding efforts during the July molting period. Annual banding efforts are used as a management tool to help ensure that estimates produced by the population model are reliable.

**Maryland**

Resident Canada geese in Maryland originated from the release of decoy flocks during the 1930s and government and private stocking programs. Many flocks in Maryland were started with giant Canada geese (*Branta canadensis maxima*) brought from the Midwest. Famed decoy maker Madison Mitchell told of how geese were purchased from sources in the Midwest and used as decoy flocks to attract wild geese to the gun. These birds were released each spring and other birds were purchased next fall.

The earliest recording of Canada goose stocking in Maryland dates back to 1935, when a group of 41 geese was moved to Backwater National Wildlife Refuge (NWR) in Dorchester County. In the 1930s, migrant geese were not common on the Eastern Shore, but were observed stopping to feed on pastures before moving further south to Carolina wintering areas. The most successful flock of resident geese in Maryland was started at Patuxent Wildlife Research Center near Laurel. This flock began in 1945 and 1946 when 17 wintering geese were trapped at Blackwater NWR, pinioned and released at the Center. They nested for the first time in the summer of 1946. More wild birds were added in 1951. Flocks on the Patuxent River near Croom, Maryland were started in the late 1940s. Edgar Merkel began to release Canada geese obtained from Eastern Shore ponds. The flock established near Davidsonville, Maryland can be credited to Lou Wayson. In 1953, he placed several pinioned pairs of adult Canada geese purchased on the Eastern Shore on a pond located on his farm. Other geese, principally crippled migrant geese given to him by hunters, were added at irregular intervals. Offspring from these releases remained in the area to breed, establishing new flocks that spread to farm ponds and tidal marshes in nearby counties.

Other flocks were started by the Maryland Department of Natural Resources (DNR) when >2,000 nuisance Canada geese were captured on western shore golf courses and were relocated to Dorchester, Caroline, and Somerset Counties. In 1991, the DNR stopped relocating nuisance geese.

Today, breeding pairs are found in every county of the State. Most resident Canada geese are found west of Chesapeake Bay, mainly in the Piedmont region. However, concentrations also occur in the vicinity of District of Columbia, the upper Chesapeake Bay near Aberdeen Proving Grounds in Harford County, and in the marshes of the lower Eastern Shore, especially near Blackwater NWR in Dorchester County.

Since 1989, estimates of breeding resident geese have been obtained from the AF Breeding Waterfowl Plot Survey conducted annually each April. Estimates of resident geese in Maryland have increased from 25,000 in 1989 to more than 90,000 in 1998. Recent estimates suggest the population size has declined to ≤ 60,000 birds (2008-2010).

Problems caused by nuisance geese are frequent and increasing. Problems include over-grazed lawns, turf farms, and golf courses; accumulation of droppings and feathers on walkways, beaches, play areas, and golf courses; nutrient loading of water areas; public health concerns at beaches; aggressive behavior by urban nesting birds; and safety hazards near roads and airports. Complaints of geese damaging agriculture crops (sprouting corn and soybeans) have become more severe, especially on the Eastern Shore. In addition, severe overgrazing of wetlands dominated by wild rice has been documented in the upper Patuxent River.

In 1991, the DNR established a population objective of 30,000 resident geese. At this level the DNR believes that nuisance and depredation problems caused by geese could be managed by sport hunting and socially acceptable control methods. The agency has used special resident goose hunting seasons as the primary means of trying to slow the growth of this goose population. However, resident geese typically inhabit urban and suburban areas where they are safe from hunter harvest. In 2002, a 60-day regular AFRP goose season was established in the western portion of the State aimed at increasing AFRP goose harvest. In 2008, the regular hunting season was expanded to 80 days and the closing framework was expanded to early March. In addition, hunters were permitted to use unplugged shotguns and expanded hunting hours during September seasons.

Since 1993, capture and euthanasia has been conducted in the State by USDA WS and private contractors to solve severe nuisance goose problems on private property. In addition, Blackwater NWR used an integrated control effort that included culling to reduce the number of resident geese using the refuge in spring and summer. Resident geese were causing severed damage to estuarine wetlands and agricultural crops grown for migratory waterfowl. In 2006, the DNR implemented federal depredation and control orders for control of resident geese. These include depredation orders for: nests and eggs; at agricultural facilities with required State permit issued by USDA WS; and at airports and military air fields. The public health and safety control order was not utilized. In 2011, the DNR plans to seek a USFWS special Canada goose permit to reduce the number of resident geese on State-owned lands.

**Massachusetts**

Resident Canada goose populations in Massachusetts are the descendants of birds once kept as live decoys. In 1930, state records indicate that 8,500 geese were registered as live decoys. In 1935, the use of live decoys was prohibited and an unknown number of these birds were released, joining flocks of geese previously established via escapes or earlier releases. Most of these flocks were located in the eastern third of Massachusetts.

Complaints about geese in the 1960s led to a transplant program which involved moving goslings from eastern areas to central and western Massachusetts. This program continued until the mid 1970s. At that time, Massachusetts' resident goose population was estimated at 6,000 – 8,000 birds.

Special resident goose hunting seasons were initiated in Massachusetts in 1988 with a post migration season in the coastal waterfowl hunting zone. In 1990, a short, September season was held in the western waterfowl hunting zone opening the day after Labor Day. Both seasons allowed a 5-bird daily bag. In 1992, the late season was expanded into the central waterfowl hunting zone and in 1995 the September season was expanded statewide when the regular 70-day season for migrant geese was closed. It remained in place after regular goose hunting seasons resumed and in 2008 the daily bag limit was increased to 7.

Population estimates based on mark-resight techniques using neck-collared birds resulted in an August population estimate of 25,000 geese in 1991 which increased to 38,000 by 1997. Increases in population size appeared related to restrictions on Canada goose hunting during the regular waterfowl season. In 2005, after the resumption of regular season goose hunting, which combined with the resident seasons resulted in the maximum 107 days of hunting allowable under the Migratory Bird Treaty Act, geese were once again neck collared and the population was estimated at 39,500 on mainland Massachusetts with perhaps 500 more on Nantucket and Martha's Vineyard islands. Current monitoring is based on breeding pair estimates derived from the AF Breeding Waterfowl Plot Survey at a state level, with broad confidence limits.

Goose populations in western Massachusetts appear to have stabilized, with broad distribution of geese with few major buildups of flocks in urban areas. The 2005 population estimate was 8,300 geese in the western two-thirds of Massachusetts. This is a desired goal. In central Massachusetts, nuisance problems are minor and localized. Only eastern Massachusetts continues to experience major problems with geese at a number of sites. The 2005 population estimate for the eastern third of Massachusetts was 31,200 with over 8,000 in the Greater Boston area.

Hunting is restricted in urbanized eastern areas, but more sites are being opened to goose hunters. The combined special seasons harvest up to 25% of the State's resident population. The reinstatement of a traditional Canada goose season in 1998 via implementation of the North Atlantic Population Canada Goose Management Plan has increased the harvest of resident geese.

Massachusetts' population goal for resident geese is to reduce the size of large flocks in urban-suburban settings and create greater dispersal of geese throughout existing habitat, reducing complaints about geese. Resident geese will be the focus of Massachusetts' Canada goose harvest. A socially acceptable resident goose population size is likely a summer population of less than 20,000 birds.

**New Jersey**

The establishment of resident Canada geese in New Jersey is not well documented. However, resident geese are believed to have originated from the release and/or escape of captive birds from private waterfowl breeders and hunters as well as through purposeful introductions within the State and from adjacent states. Stone (1937) found no evidence that Canada geese were breeding in New Jersey prior to the 1930s. Fables (1955) reported Canada geese were observed in the State during summer suggesting that birds were breeding by that time. Large scale purposeful introductions were initiated at Great Swamp and Brigantine (now Forsythe) NWRs during the 1950s. During the 1960s and early 1970s resident geese were trapped and transported from Connecticut, New York, and Brigantine NWR to several state wildlife management areas in New Jersey. As resident geese expanded within the State, they utilized a variety of habitats. These birds provided aesthetic and recreational values, but they are also associated with many damage and nuisance problems. As the number of resident geese increased in the late 1970s and 1980s, federal wildlife agencies, with State assistance, captured molting resident geese and transferred them to several southern states. After 1984, there was a prohibition on trap and transfer operations due to an avian influenza outbreak.

The population is monitored through the AF Breeding Waterfowl Plot Survey (AFBWPS). Population estimates derived during this survey indicate that within New Jersey, resident geese doubled from the outset of the survey in the early 1990s to the late 1990s where it has remained relatively stable with an annual mean of 92,000 geese. Resident geese are most dense in suburban habitats within the Piedmont and Highlands physiographic zones. During the mid-1990s Walsh et al. (1999) conducted a comprehensive census of breeding birds in the State. Statewide, presence or absence was documented during the spring in 852 survey blocks. Canada geese were well distributed throughout the state being encountered in 686 of the 852 total blocks. Resident geese were found in more than 85% of the survey blocks in all regions of the State except in the core of the Pine Barrens and in the Outer Coastal Plain.

The New Jersey resident Canada goose population objective is 41,000 birds as measured in the AFBWPS. This is the same statewide population objective as published in the 1999 AFRP Canada Goose Management Plan. This population objective is based on a mean population from the early 1990s when damage and nuisance complaints were at more tolerable levels. In deriving this population objective, consideration was given to maintaining the significant aesthetic and recreational benefits these birds provide, while reducing damage problems as well as concerns about human health and safety.

**New Hampshire**

The New Hampshire resident Canada goose population continues a slow increase in number and distribution. Breeding birds are now found statewide with the largest numbers in southern counties. The Canada goose is the third most abundant breeding waterfowl species in New Hampshire. The breeding population is monitored as part of the AF Breeding Waterfowl Plot Survey and the spring population is estimated to be about 8,600 pairs.

Since 1993, brood size data has been collected annually in late June during Canada goose banding efforts. Over this time period, annual brood sizes have ranged from 4.4 to 5.3 goslings with the average being 4.8 goslings/brood.

In winter, New Hampshire's resident Canada geese move primarily to southern New England. In mild winters with little snow, up to 3,500 geese will remain in the state at inland locations. If snow comes early and is deep, virtually all geese leave inland locations. Wintering geese in coastal marshes are birds from eastern Canada.

Canada goose nuisance complaints and requests for assistance are reported to USDA WS. Annually, the number of complaints and requests for assistance has more than doubled since 1998. Human health and safety issues and property damage issues comprise the majority of the complaints and requests for technical assistance.

In 1996, New Hampshire initiated a special September goose hunting season in part of the State to help increase the harvest of resident birds. The season has been held annually and today it's a statewide season from the day after Labor Day to September 25. A five-bird daily bag limit is allowed and results in an annual September harvest of about 2,700 geese.

The Canada goose population objective for New Hampshire continues to be 2/square mile or about 20,000 birds.

**New York**

New York's resident goose population was among the first established in the Atlantic Flyway. In the early 1900s, Canada goose flocks were held in captivity on private estates on Long Island and in the Lower Hudson Valley, with stock from wild-trapped birds, and possibly from western game breeders. These early flocks probably included *B. c. canadensis*, *B. c. interior* and *B. c. maxima*. It is not known when some of these birds became feral and self-sustaining, but by 1930, flocks had become established in local parks, cemeteries and golf courses. In upstate New York, resident Canada goose flocks are nearly all related to stock obtained from a Wisconsin game bird breeder in 1910. These birds and their progeny were held in captivity until 1919, when some were allowed to fly free around a State game farm at Sherburne. In 1934 some of the birds were moved to other game farms where free-flying flocks were also established. Liberation of private decoy flocks in 1935 (when their use for hunting was banned), with geese from various sources, may have contributed to these local flocks, resulting in a mixture of subspecies throughout the population. During the 1950s and 1960s, game farm stocks were used to establish goose flocks at various upstate wildlife management areas.

Pioneering and translocations of geese from these areas eventually resulted in geese nesting statewide in a wide variety of habitats from industrial properties to remote beaver ponds.

In 1981, it was estimated that there were about 19,000 resident Canada geese in New York (12,000 in the Lower Hudson Valley and Long Island, and 7,000 upstate). During 1997-1999, spring population estimates averaged 137,000 birds (not counting young-of-the-year), with about 39,000 breeding pairs statewide, indicating a 7-fold increase in less than 20 years. Ten years later (2007-2009), the breeding population had reached approximately 240,000 birds

statewide, including about 90,000 breeding pairs. Population estimates seem to have leveled off or declined slightly in recent years, perhaps because of higher hunter harvests and other management efforts. Previously, densities were highest in the Lower Hudson Valley and Long Island, but now densities in many upstate regions are comparable or higher than the former areas. An exception is in the Adirondack region, where the population remains relatively low, with an average estimated population of <5,000 geese (<0.2 geese/km$^2$).

Across New York State, resident Canada geese provide tremendous aesthetic benefits and recreational opportunities. In addition to viewing, resident geese provide a substantial sport hunting activity and harvest in New York. During the 2004-2008 hunting seasons in New York, approximately 10,000 people who hunted geese harvested more than 50,000 birds per year (on average) during the September resident goose season. Resident geese also comprised a large proportion, if not most, of the regular season harvest of Canada geese, which averaged more than 70,000 birds during the same 5-year period. If each hunter spends an average of $200 per year on this activity, goose hunting generates close to $2 million in economic activity in the state.

Although most people enjoy seeing some geese, conflicts and damage occur when the birds become over abundant, creating demand for management relief. Human/goose conflicts have been common in the Lower Hudson Valley and Long Island since the 1960s, resulting in wildlife agency programs to capture and relocate geese to more rural areas and other states. Between 1960 and 1990, an estimated 25,000 geese were taken from nuisance locations in the Lower Hudson Valley, for release in Maine, West Virginia, North Carolina and South Carolina. Complaints about resident geese became widespread in upstate New York during the 1990s, and conflicts with geese seem to have intensified in all areas of the state in recent years.

We believe that the frequency and severity of complaints about geese throughout New York State is directly related to overall growth of the resident population, and their adaptability to a wide variety of habitats, including human-populated urban and suburban areas. Goose population growth seemed to accelerate after suspension of the regular hunting season in 1995, but has leveled off with restoration of regular seasons combined with growing use and acceptance of egg-addling and goose roundups. Based on these observations, New York Department of Environmental Conservation biologists believe that a more acceptable number of resident geese in New York is at or below 85,000 birds, assuming a fairly uniform distribution of geese (e.g., 0.8 geese/km$^2$), except in the Adirondacks, where a much lower density (e.g., 0.2 geese/km$^2$) is more appropriate due to habitat limitations. A lower and more evenly distributed population would reduce severity of problems in many areas and help prevent new problems from occurring.

**North Carolina**

In that portion of North Carolina approximately west of I-95 the resident goose population likely originated as birds moved from adjacent states, particularly South Carolina, Georgia, and Virginia. Only one flock at Cowan's Ford in Mecklenburg County is known to be the result of stocking by the North Carolina Wildlife Resources Commission (WRC). Private individuals, who maintained flocks for use as live-decoys or practiced aviculture, released additional birds. In the lower coastal plain, east of I-95, resident goose populations were established from birds stocked by the WRC during the 1980s. Several thousand nuisance geese

were transported to North Carolina from Ontario, Pennsylvania, New York, New Jersey, Connecticut, and Delaware, and released.

No standardized, annual survey is conducted to estimate the statewide, spring-breeding population of resident Canada geese in North Carolina. In 1999, local WRC biologists estimated the statewide population to total approximately 97,000 resident Canada geese. Liberalizations of bag limits and season lengths have been implemented to attempt to lower resident Canada goose populations in North Carolina. However, the statewide population of resident Canada geese is thought to have increased since 1999.

In that portion of the state east of I-95, the landscape is predominantly rural, and nuisance, resident goose problems involve more conflicts with agriculture relative to the remainder of the state. Most agricultural damage seems to occur in the spring immediately after planting and germination, particularly to seedlings of corn, soybeans, and peanuts. Significant problems also occur in urbanized areas of eastern North Carolina. These have been the result of droppings on waterfront lawns and golf courses and damage to turf grass.

In the more urban portions of the state west of I-95, damage from resident geese is more serious and widespread, particularly in the I-85 corridor between Durham and Charlotte, and west to Winston-Salem. Most damage is reported by managers of parks, golf courses, corporate parks, and municipal water supplies and by homeowners. Typical problems involve droppings on lawns, damage to turf, degradation of water quality, and noise.

Nuisance complaints and requests for technical and direct assistance with damage associated with resident Canada geese in North Carolina are reported by USDA WS. Between 2003 and 2007, WS responded to 945 requests for assistance to manage damage from resident Canada geese from all 100 counties. Sixty-six percent (628) of those were complaints involving property damage. The USFWS reported 6,807 eggs and 122 goose nests were destroyed during this same time period.

The population objective for resident Canada geese in North Carolina should maintain their aesthetic and recreational value while reducing nuisance and damage problems associated with human health and safety, property, and agriculture. Due to the lack of a current statewide population estimate, a definitive population objective for *x* number of geese cannot be determined at this time. Further, the lack of a standardized survey limits the ability of state managers to effectively determine the impacts of harvest on the overall population.

**Pennsylvania**

Pennsylvania's resident goose population is believed to have originated from the introduction of *Branta canadensis maxi*ma by the Pennsylvania Game Commission (PGC) and various sportsmen's organizations. In 1936, 30 pinioned birds were obtained that started the nucleus of the Pymatuning flock in Crawford County. Over the ensuing years more birds were obtained from game breeders and through natural reproduction that enabled introduction efforts to occur throughout the state. During the 1970s the first nuisance complaints were received from landowners in southeastern Pennsylvania. Subsequent trap and transfer programs relocated over 40,000 problem geese to new areas both within and outside the state. In 1995, the PGC

terminated the trap and transfer program.

Most nuisance complaints are associated with suburban areas where geese congregate on public or private ponds and forage on lawns and mowed areas associated with parks, beaches, golf courses and residences. The major problems are associated with goose droppings both aesthetically and from direct damage to lawns or golf greens. Agricultural losses occur primarily in the late winter and spring. The major crops damaged are corn, soybeans, winter wheat and improved pastures. In recent years, damage complaints have increased in number and severity, particularly in the southeastern and southwestern (especially near Pittsburgh) portions of the State.

The PGC has implemented various components of depredation and control orders approved by the USFWS in 2006 for control of resident Canada geese. These include depredation orders for nests and eggs; at agricultural facilities with required state permit; and at airports and military air fields. In addition, expanded hunting hours during September seasons are also authorized.

Breeding resident Canada geese occur in every county. The breeding population is monitored annually through the AF Breeding Waterfowl Plot Survey (AFBWPS). The highest densities of breeding geese are in the Southeast (1.78 pairs/$km^2$) and the Northwest (1.38 pairs/$km^2$) parts of the state. The statewide total spring population declined (not statistically significant) from a peak of 338,230 geese in 2004 to an estimated 289,879 in 2009. Trends in numbers of resident geese have been stable in most strata since 2004.

Since 2003, Pennsylvania has annually leg-banded about 3,000 Canada geese or about 1% of the total statewide population. These band recovery data are used to help evaluate special hunting seasons and estimated recovery rates of resident Canada geese. Annual leg-band recovery rates have increased since the mid-1990s from less than 15% to approximately 20%, while annual adult harvest rates have increased from around 17% to around 23%. The PGC has used special resident hunting seasons as the primary tool to control population growth. When hunting opportunity was restricted during regular seasons from 1995 to 2001, the September season comprised 50% to 70% of the total annual Canada goose harvest. This has declined in recent years to between 30% and 40%, as regular fall and winter hunting seasons regulations have been expanded in response to improved status of migrant populations. The total annual Canada goose harvest (still comprised largely of resident Canada geese) in Pennsylvania has doubled from 1995 to present and has averaged nearly 200,000 per year since 2001.

The statewide population objective for Pennsylvania should be about 150,000 geese. This statewide objective has been further partitioned into specific population objectives for each physiographic stratum as measured by the AFBWPS. These are; Stratum 10 42,000; Stratum 13 22,000; Stratum 22 15,000; Stratum 241 39,000; Stratum 242 24,000; and Stratum 243 8,000. These population levels were the statewide estimates during the mid- 1990s before regular Canada goose hunting seasons were suspended and population levels began to increase dramatically. This level should support the current demand for recreational opportunities while reducing nuisance and damage complaints. However, the distribution of geese is important in regards to cultural carrying capacity. Although the current cultural carrying capacity for geese in Pennsylvania is unknown, the distribution objective of geese in the state is to reduce populations in urban areas, while maintaining current levels in rural areas of the state where hunting has been

effective in controlling populations.

**Rhode Island**

Dr. Harold Hanson identified Rhode Island's resident Canada goose population as the giant subspecies (*B. c. maxima*) in the mid 1970s. First reported nesting of Canada geese was in 1958 in Briggs Marsh, Little Compton. Population build-up was reported on during the 1970s (Allin 1980), and estimated at 500 birds.

During the initial study, Canada geese had an 89% hatching success and 90% brood survival rate. Since then, the resident population has grown to an estimated 4,500 geese distributed statewide. A greater proportion of the population is located in Providence, Kent, and Washington Counties, with molt flocks of 500± birds.

Monitoring of the population has occurred sporadically with leg and neckbands in the AF cooperative study. A brief study is planned for 1999 and 2000 to recheck nesting and brood survival success and compare with our earlier study. Much of the resident population remains in RI year round; however, a small segment has been reported wintering in central New Jersey. Recent years have found the state's wintering population has grown to over 12,000 birds, causing complaints from farmers, golf courses, commercial properties, and state airports. Nuisance complaints generated by resident birds come from golf courses, public drinking water supplies, waterfront property owners, state airports, state parks, private pond associations, cemeteries, and town recreation departments. The basic complaints are of goose droppings and feathers, pollution, and aggressive behavior.

Rhode Island has conducted special resident seasons in September (1995-2010) and late experimental seasons (1997-2010). Goose hunters find the September season framework dates do not correspond with local farming corn harvest, resulting in declining requests for required season permits. Harvest during this season is averaging 473 birds and the late experimental season average harvest is 579 geese.

A desired goose population of 3,000 birds would be a satisfactory level for a state objective for resident Canada geese.

**South Carolina**

As a result of declining migratory Canada geese, South Carolina Department of Natural Resources (SCDNR) began attempts to establish a resident Canada goose flock in 1979. The goal of this restoration effort was to reestablish a population of Canada geese in South Carolina that could support sport hunting. Resident, temperate nesting birds were captured during the flightless stage from other states and withing South Carolina and then transported and released to suitable sites in the State. This effort was successful and a resident population has become established.

By the mid 1980's the SCDNR began receiving complaints from landowners concerning nuisance flocks of Canada geese, especially in residential communities and on golf courses

where manicured grasslands combined with accessible water provided excellent habitat for resident Canada geese.

Nuisance goose complaints in South Carolina are typical of resident Canada goose complaints around the nation. The birds occupy the typical suburban areas including public parks, neighborhood ponds, and golf courses. Several large reservoirs in the State are bordered with residential communities and provide excellent goose habitat. The geese cause problems to humans by depositing droppings and feathers on lawns and walkways, nesting on pontoon boats and docks, and exhibiting aggression to protect nests during breeding season.. Resident Canada geese have also caused damage to agricultural crops and gardens. They have been implicated as causing human health hazards due to high fecal coliform counts in public swimming areas forcing the closure of these areas. They also cause safety concerns at the numerous private, commercial, and military airports in South Carolina.

In 1988, SCDNR staff relocated 493 birds; by 1994 the total had risen to just over 4,000 birds. These relocation efforts provided only temporary relief for complainants as many geese returned to their original areas as soon as molt was completed. Due to the relative ineffectiveness and reduced manpower, SCDNR gradually decreased relocation efforts in the late 1990's and began referring nuisance goose control requests to USDA Wildlife Services.

South Carolina has no specific population goal for resident Canada geese within the State. The original management objective for resident Canada geese was to establish a population that could support sport hunting. That objective has been attained. The current management strategy is to maximize sport hunting opportunity as an aid to control population growth and to utilize the various control methods available to mitigate goose complaints.

South Carolina's breeding population of Canada geese is estimated at 34,000 breeding pairs. This estimate was derived by using an annual average goose harvest of 22,700 (derived from USFWS Harvest Information Program estimates from 2001-2005), then using a 20% harvest rate to reach a total estimated average annual population of 113,500 geese. Given that 60% of a population is considered to be breeders, then 68,000 geese is the estimated breeding population equaling 34,000 breeding pairs.

In addition to regular and late seasons, SCDNR offers the full 30 days in September with liberal bag limits, but not extended shooting hours or unplugged guns. The SCDNR has implemented Control Order for airports, agricultural facilities, and public health Control Order. In addition, the agency utilizes the Depredation Order for Nest and Eggs, and the Special Canada Goose Permit.

**Vermont**

Prior to the 1960s, Canada geese were not known to nest in Vermont. In 1956, 44 birds, wild trapped on the Bombay Hook NWR in Delaware, were released on the Dead Creek WMA in Addison, Vermont. The first nest was observed in 1960. A survey conducted by the Vermont Department of Fish and Wildlife (VDFW) during the late 1970s showed that resident Canada geese were nesting in the Champlain Valley in Addison, Chittenden, and Grand Isle Counties, and in Bennington and Windham Counties in southern Vermont. A breeding bird survey

conducted by the Vermont Institute of Natural Sciences (VINS) during 1976-1981 (*Atlas of Breeding Birds of Vermont)* showed similar findings. The source of the southern Vermont birds is unknown, but they are suspected to have originated from Massachusetts or New York. The total population of resident geese was estimated at that time to have numbered <500.

Canada goose populations have grown significantly over the past 20 years. The VINS *Atlas of Breeding Birds of Vermont* survey was conducted again in 2004-08. Canada geese were confirmed breeding in 56% of the priority blocks compared to 1% during the 1976-1981 survey, and are now distributed throughout the entire state. The AF Flyway Breeding Waterfowl Plot Survey data for Vermont fluctuates widely between years due to the small sample size. However, the spring population estimate for Vermont has increased steadily during the past three years (2008-10) to an average of 19,000 birds.

From the late 1960's until 2004, most resident Canada goose banding was done in the vicinity of the Dead Creek WMA in Addison County. In 2005, the VDFW expanded banding operations statewide in an effort to meet flyway objectives for Atlantic Flyway Resident Population Canada geese. The number of geese banded annually has ranged from 319 (2005) to 793 (2008).

Vermont held its first September Canada goose season in 1998. This season now runs from the day after Labor Day until September 25. An average of 4.720 Canada geese has been harvested annually in this season during the most recent 5-year period 2005-09. Resident Canada geese have also become increasing important during the regular season in Vermont. In addition to birds banded in Vermont, AFRP geese from 7 AF states and 1 Canadian province have been harvested during the regular seasons in recent years.

Nuisance goose complaints are directed to USDA WS. During the past 5-year period (2006-2010) an average of 30 damage or nuisance complaints have been received. Most of the complaints have involved lake shore property, state and municipal parks, golf courses and agriculture fields. While the bulk of these complaints are handled by USDA WS, assistance is provided by personnel of the VDFW in responding to these complaints.

Given the current population levels and distribution, it is felt that a reasonable spring population objective for resident Canada geese in Vermont would be around 20,000 birds.

**Virginia**

As in other areas of the AF, Virginia's resident goose population is derived from a number of sources, including the release or escape of captive birds from private waterfowl breeders and hunters, and introduction or immigration of birds from other areas. Small numbers of local breeding geese have probably been present in the State since the 1930s or 1940s.

As the number of resident geese increased in the 1970s and 1980s, so did the number of contacts and interactions with humans. The geese adapted well to living around people, taking advantage of the well-manicured lawns and quiet ponds in urban environments. The geese provide aesthetic and recreational values to many citizens of the State but they also cause many nuisance and damage problems, and have raised concerns for human health and safety. A population growth rate of >10% during the 1990s has led to increasing concern about

interactions with people and with other wildlife populations, and is creating new management challenges.

Management activities have evolved over time from simply monitoring the birds as they became established, and promoting their growth in some instances, to attempting to control their growth rate as their numbers have continued to increase. In the 1970s and 1980s many private landowners erected nesting platforms and created habitats to promote resident goose production. When complaints about "nuisance" geese occurred, initial management actions were to capture problem birds and move them to areas where there were no geese. Such actions, though well intentioned, probably accelerated the spread of geese across the State. These translocations ceased by the early 1990s and more emphasis was put on population control measures.

A special September goose hunting seasons was initiated in 1993 to help increase the harvest of resident birds. However, the closure of the regular Canada goose hunting season in 1995 made it difficult to keep resident goose number in check. Harassment and exclusion techniques such as noisemakers, scarecrows, fencing, and chemical taste deterrents have been used in attempts to move geese off problem areas. In addition, a special late hunting season was initiated in 1997 to control resident goose numbers in the western part of the state where fewer migrants winter. Each of these management techniques has been useful, but additional strategies are needed to effectively manage the resident goose population.

The resident Canada goose population in Virginia peaked in 1997 with an estimated 332,806 geese. The population remained relatively high (> 200,000 geese) through the late 1990s and early 2000s. Since 1999, the population has decreased by 5% annually. Special seasons (September and late seasons) as well as liberalization in the regular goose season have to this population reduction. The 2009 population estimate was 142,233 geese statewide as measured by 3-year average of the AF Breeding Waterfowl Plot Survey.

The resident goose management goal for Virginia is to manage resident Canada goose populations that provide significant aesthetic and recreational benefits while reducing economic damages cause by resident Canada geese, alleviating nuisance issues, and minimizing threats to human health and safety. A population objective of 125,000 resident Canada geese should be maintained to accomplish these goals. Virginia acknowledges that even at this level, the populations may need to be further reduced in both agricultural and urban areas to address concerns expressed by these constituents.

**West Virginia**

West Virginia's resident Canada goose population originated primarily from birds transplanted from northeastern states. Most of the transplanted geese came from New York, but Connecticut, New Jersey, Maryland, and Delaware also supplied birds. A total of 5,442 Canada geese were relocated to West Virginia between 1976 and 1983. Relocating "nuisance" geese within the state continued sporadically on a very limited basis until the mid-1990s.

Canada geese are established in suitable habitat statewide. The Ohio Valley and the Eastern Panhandle have the most uniform distribution and highest concentrations of geese. Central and northern West Virginia also has a relatively uniform distribution and a moderate goose density. Canada goose distribution in southern West Virginia is spotty with good numbers

of birds in areas of suitable habitat.

West Virginia does not conduct a standardized survey to monitor the Canada goose population. Calculations based on USFWS harvest estimates and survival rates from banding/neck collar studies, subjective estimates from each district game biologist, and the mid-winter inventory are used to derive a subjective estimate. The current population estimate is 25,000-27,000 birds.

Canada goose management in West Virginia has changed dramatically over time. Management efforts in the 1970s and 1980s were aimed at establishing and expanding a resident population. Beginning in the mid-1990s management efforts shifted to controlling the population and addressing the growing number of "nuisance" and damage complaints. A special early hunting season (September) was initiated in 1994 and is still utilized. Regular hunting seasons (October-January) are as liberal as the frameworks allow, currently 80 days with a 5 bird/day bag limit.

Most Canada goose complaints in West Virginia come from urban/suburban areas and are of the nuisance variety (e.g., droppings, feathers, aggressive behavior) or property damage (lawns, golf courses) variety. Agricultural damage and public health and safety complaints are not common.

Although the statewide population has been reduced and stabilized at a level near the objective, there will always be nuisance goose complaints in urban/suburban and other areas where hunting is not feasible. The USFWS Nest and Egg and Agricultural Depredation Orders provide valuable tools for addressing nuisance geese problems. USDA WS is a valued partner where more comprehensive control programs including removal of birds are needed.

The Canada goose population objective for West Virginia is 1 bird/$mi^2$ or 24,119 birds. The current Canada goose population is slightly above the objective.

**CANADA**

**New Brunswick** - TBA

**Nova Scotia**

The New Scotia resident Canada goose population has continued to increase in number and distribution over the past twenty years. Breeding birds are now distributed across the Province, with highest numbers in agricultural areas of the Annapolis Valley, around the Bras D'or Lakes in Cape Breton, in central NS and along the Northumberland coastal plain. Breeding populations in the Province are currently monitored using Environment Canada's Eastern Waterfowl Survey and parallel aerial surveys (supported by the Eastern Habitat Joint Venture) of agricultural lands in the Province. Estimates of the total breeding population fluctuates annually (likely an artefact of the survey coverage and timing) but is generally consistent with USFWS MBPHS survey estimates.

Targeted Canada goose banding efforts have been ongoing in the province since 2008, with the extent of the banding effort increasing as new sites are identified and put into operation.

In some years, Nova Scotia can winter relatively large numbers of Canada geese (up to 25,000) however given a lack of contemporary banding information the natal source of these geese (NAP versus resident) is unknown. Primary winter concentration areas include the coastal marshes of the southern part of the Province (Musquodoboit Harbour to Yarmouth).

Canada goose nuisance complaints and requests for assistance are reported to Environment Canada. Although the number of complaints remains relatively low, damage to individual property owners can be significant and requests for permits to manage this population continue to increase. Property damage issues comprise the majority of the complaints and requests for technical assistance.

Following consultation with interested parties and the Provincial government, Environment Canada initiated a Province-wide September goose hunting season in 2010. The season runs from the day after Labour Day for either 6 or 11 consecutive days, depending on the specific hunt zone of the Province. An eight-bird daily bag limit is allowed during this September season; results from harvest surveys are not yet available to allow estimation of the contribution of the special early season to overall goose harvest.

The Canada goose population objective for Nova Scotia is 1,000 pairs (2,000 birds) which translates into an density of approximately 0.1 birds/square mile total land area.

**Ontario**

Prior to European colonization, nesting by temperate-breeding Canada geese in Ontario was probably limited to prairie areas in the extreme southwest since much of the rest of the province was completely forested. While clearing land for farming improved its quality for geese, early settlers harvested them for food leading to a dramatic decline in their numbers by the late 1800s. A formal re-introduction program began in 1968 and since then the density and breeding range has increased dramatically. Canada geese now nest throughout the province south of 46$^{o}$N and localized breeding populations have also become established in agricultural and urban areas north of 46$^{o}$N. Based on data from the Southern Ontario Waterfowl and Wetlands Plot Survey (SOWPS), the Ontario Temperate-breeding Population (OTBP) grew exponentially from the early 1970's to 2006. Since 2006, population estimates have fluctuated widely with a 5-year average (2006-2010) of 83,000 breeding pairs or a total spring population of 345,000 individuals. At this level, the OTBP contributes approximately 260,000 Canada geese to the AFRP.

Complaints about Canada geese have been common in the Greater Toronto Area since the mid-1970s, but are now more widespread. In agricultural settings, the majority of complaints are related to the depredation of emerging green crops in the spring, although depredation on specialty vegetable and fruit crops has also been reported. In urban and residential settings, accumulations of goose droppings and damage to manicured turf grass are the most commonly reported conflicts and aggressive geese are also reported wherever geese nest or raise their young. Since 2005, over 700 permits have been issued annually to Ontario residents in an effort to manage nuisance Canada geese. The majority of permits allotted to the agricultural community prescribe the scaring or shooting of nuisance geese, while permits issued in urban centers generally focus on controlling reproduction and relocation. To date, no large-scale culls have been permitted in Ontario.

Harvest is the principal tool for influencing adult survival and population size. Recognizing that the population was increasing rapidly and that the number of human-goose conflicts was on the rise, changes to the hunting regulations to increase harvest of OTBP were implemented beginning in 1985. Early and late Canada goose-only seasons were added to increase harvest of temperate-breeding geese and minimize any impact on northern populations. Since 1999, harvest during special goose seasons has represented about 40% of the total harvest of OTBP in the province, with 33% of the total harvest occurring during the early season in September. The number of Canada geese harvested in Ontario has increased steadily in the past three decades. Harvest has surpassed 145,000 Canada geese every year since 2001 and continues to climb with over 190,000 harvested in 2008 and 2009. The majority of harvest in Ontario occurs in areas associated with abundant temperate-breeding Canada geese. Although there is currently no reliable method to separate harvested geese from temperate and sub-arctic populations, harvest derivations from banding data suggest that 2/3 of Canada geese harvested in Ontario were from the OTBP, while the other 1/3 were birds from other populations including temperate-breeding populations from the United States (molt migrants).

The interim population goal for temperate-breeding Canada geese in Ontario is to stabilize the population at a maximum of 80,000 breeding pairs, based on a 3-year average population estimate. If the 3-year average population size exceeds 80,000 pairs, consideration will be given to declaring Canada geese overabundant which would trigger special conservation harvest measures. The aim is to maintain the population between 40,000 and 80,000 pairs and hunting regulations will be adjusted in order to achieve this objective. The Canada goose population in southern Ontario will continue to be assessed using the indicated breeding pair estimates (3-year average) from the Southern Ontario Waterfowl and Wetlands Plot Survey.

**Prince Edward Island** – TBA

**Quebec**

Before 1970, Canada geese were rarely observed during summertime between 45° N and 48°50′ N, with the exception of Anticosti Island (North Atlantic Population of Canada Geese). After 1980, small flocks of 30-50 non-reproductive Canada geese were regularly seen between June and October along the St. Lawrence, the Ottawa and the Saguenay Rivers. In the St. John Lake area (48° N), molting birds were captured in 1996 and 1997 and none had a brood-patch. According to Moser and Rolley (1990), 80% of those birds were resident Canada geese.

By the mid-1980s, some nests were found south of 46° N, mainly in the St. Lawrence valley and since then, the nesting population has been expanding. The nesting population of resident Canada geese was estimated at 1,000 pairs according to the 1998 waterfowl breeding ground survey carried out in agricultural areas of the St. Lawrence lowlands. A total of 4,994 Canada geese were observed during this survey. Most resident Canada geese migrate south of the province after mid-November and come back by early April.

Early and late hunting seasons for the resident Canada geese were introduced in the agricultural fields of some hunting districts in 1996. Since then, we have increased hunting opportunities for resident Canada Geese while trying to avoid harvest of Atlantic Population

Canada Geese migrating from areas north of 48° N.

The Canadian Wildlife Service will continue to advise people on methods or means to minimize damages and nuisances by resident Canada geese. When control is required, emphasis will be put on addling eggs, but other methods could be used, including deliverance of permits to kill birds when human security is an issue.

The Québec population of resident Canada geese is small but increasing. Since 2009, the number of complaints has increased at a level where resident Canada geese began to be negatively pursued by some individuals or organisations. Considering all these factors, the population objective of the resident Canada goose in Québec has been fixed to 2,000-3,000 breeding pairs, which is lower than the actual (2008) estimate of about 5,000 breeding pairs.