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Population Status of Migratory Game Birds in Canada

November 2014

Canadian Wildlife Service
Waterfowl Committee

CWS Migratory Birds Regulatory Report Number 44

Canada

For more information on migratory birds, please visit Environment Canada's Migratory Birds website: www.ec.gc.ca/nature/default.asp?lang=En&n=FDF836EF-1.

Cover Art:

The Canadian Wildlife Habitat Conservation Stamp, entitled *Sun Kissed Cinnamon,* features the Cinnamon Teal. It is a creation of the Canadian wildlife artist Lori Boast of Winnipeg, Manitoba.

Through a special partnership with Environment Canada, Wildlife Habitat Canada receives the revenues from the sale of the Canadian Wildlife Habitat Conservation Stamp, purchased primarily by waterfowl hunters to validate their Migratory Game Bird Hunting Permits. The conservation stamp is also sold to stamp and print collectors and those interested in contributing to habitat conservation. In 2013–2014, Wildlife Habitat Canada provided 37 grants totaling more than $1.5 million. This in turn helped leverage an additional $11.3 million in partner funding for conservation projects, resulting in the conservation, restoration and enhancement of more than 96 000 acres of wildlife habitat across Canada (www.whc.org).

For more information on Wildlife Habitat Canada or the conservation stamp and print program, please call Wildlife Habitat Canada at 613-722-2090 (in the Ottawa Region) or toll-free at 1-800-669-7919, or consult at: www.whc.org.

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Comments:

Comments regarding this report, the regulation-setting process or other concerns relating to national migratory game birds should be sent to Environment Canada's Canadian Wildlife Service, National Office:

Director of Population Conservation and Management
Environment Canada
Canadian Wildlife Service
351 Saint-Joseph boul., Gatineau, QC, K1A 0H3
Email: mbregs.reports-rapports.omregs@ec.gc.ca.

Region-specific comments should be sent to Canadian Wildlife Service Regional Directors:

Atlantic Region: 17 Waterfowl Lane, P.O. Box 6227, Sackville NB E4L 1G6
Quebec Region: 801–1550 D'Estimauville Avenue, Québec QC G1J 0C3
Ontario Region: 4905 Dufferin Street, Toronto ON M3H 5T4
Prairie and Northern Region: Twin Atria No. 2, 4999 98 Avenue, Edmonton AB T6B 2X3
Pacific and Yukon Region: 5421 Robertson Road, R.R. #1, Delta BC V4K 3N2

The Canadian Wildlife Service is considering the establishment of a hunting season for Mourning Dove in Manitoba and Quebec for the 2016–2017 hunting season. For more information, please see Appendices A and B. Comments may be submitted as described above.

Appendix C presents an update on the consultations held with respect to modernizing the *Migratory Birds Regulations* to improve the management of hunting in Canada.

This report may be downloaded from the following website:
www.ec.gc.ca/rcom-mbhr/default.asp?lang=En&n=0ea37fb2-1

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The American Black Duck breeds primarily in northeastern America. The Black Duck has traditionally been one of the most abundant duck species encountered in this landscape; however, the species declined in abundance over the middle of the last century. Causes for this decline are thought to be the effects of changes in breeding and wintering habitat quality, overharvesting, and interactions (competition, hybridization) with Mallards. It appears now that the population has remained relatively stable since the 1990s. The harvest of Black Duck has declined over time. However, the Black Duck remains a sought-after waterfowl species by hunters in Canada and the United-States.

American Coot *(Fulica americana)*
The American Coot breeds from British Columbia to Ontario, with high densities in the Prairie Provinces. At the beginning of the century, wetland loss and overhunting led to a significant population decline, but the population has since recovered and is showing an increase. In Canada, the harvest of American Coot has diminished over the years, contrary to the United States, where it has remained constant.

American Wigeon *(Anas americana)*
The American Wigeon's breeding range is centred in western Canada. American Wigeon numbers have been increasing steadily throughout most of the species' range, particularly in the Canadian Prairies and the Western Boreal Forest, this after major declines in the 1980s that resulted from prolonged periods of drought. Elsewhere, where the species is less abundant, its population has remained relatively stable, or shown slight declines. The Canadian harvest of this species has remained fairly stable since the 1980s.

American Woodcock *(Scolopax minor)*
There are two distinct American Woodcock populations: the Central Population, which includes individuals breeding in Manitoba and Ontario, and the Eastern Population, which encompasses breeding birds in Quebec and the Maritimes. Numbers for both populations suggest a moderate decrease in population size relative to that of the early 1970s. A possible reason for the decline is the loss of suitable (early succession) wintering and breeding habitat. The American Woodcock is a popular migratory game bird in Canada, and even more so in the United States. However, its harvest has declined in Canada during the last decade, and to an even greater extent in the United States.

Band-tailed Pigeon *(Patagioenas fasciata)*
In Canada, the Band-tailed Pigeon is found in the forested habitats of coastal British Columbia. The species has shown a large decrease in its population size since the 1970s, due in part to overhunting. Harvest has been severely limited in Canada for the past 20 years in agreement with the management plan for the species. The Band-tailed Pigeon was listed in 2011 as a species of "Special Concern" under the *Species at Risk Act*.

Barrow's Goldeneye *(Bucephala islandica)*
Two geographically isolated populations of Barrow's Goldeneye are found in Canada: a small Eastern Population and a much larger Western Population. The Eastern Population was listed in 2003 as a species of "Special Concern" in Schedule 1 of the federal *Species at Risk Act*. As a result, the daily bag limit was restricted to one bird per day, in agreement with the species management plan. Due to its localized distribution and the low number of hunters sampled in that region, Canadian harvest estimates for this species are not well documented.

Blue-winged Teal *(Anas discors)*
The Blue-winged Teal breeds throughout much of Canada with its core breeding range located in the Prairie Pothole Region. While, its population has been significantly increasing since the early 1990s, the southern Ontario and Quebec populations have remained relatively stable following dramatic declines in past decades. Agricultural development and habitat destruction in eastern Canada are considered possible reasons for the species' decline and, consequently, restrictive regulations have been

implemented in Quebec. Generally, fewer Blue-winged Teals are harvested in Canada compared to Green-winged Teals.

Brant *(Branta bernicla)*
Brant are Arctic-nesting geese. There are four distinct populations of Brant recognized in North America. These are: Atlantic, Eastern High Arctic, Black and Western High Arctic populations. Recent estimates of the Atlantic population suggest a population size of approximately 200 000 birds. The number of Eastern High Arctic Brant is estimated through counts on wintering grounds; the 2013 results suggested a population of approximately 35 000 birds. Black and Western Arctic population numbers are assessed during winter surveys, when it is difficult to distinguish the two types of Brant, and therefore to estime the population size of each population.

Bufflehead *(Bucephala albeola)*
The Bufflehead is the smallest of the North American diving ducks and uses tree cavities to nest. The species occurs from coast to coast, but is more abundant in western regions of Canada. Overall, the continental population is increasing. Since 2000, the Canadian harvest has remained relatively stable, but has been much lower compared to historic levels observed in the 1970s.

Cackling Goose *(Branta hutchinsii)*
In 2004, the American Ornithologists' Union identified two species of geese from the one species previously referred to as the Canada Goose: the Canada Goose and the Cackling Goose. In Canada, the Mid-continent Population of Cackling Geese includes all Cackling Geese nesting in the Arctic ecozone north of the tree line; these mostly migrate through the prairies and winter mainly in areas of the Central and Mississippi Flyways. Although concrete population estimates are difficult to obtain for this species due to the remoteness of its breeding range, the Cackling Geese Population appears to be stable or increasing. Harvest levels for this species are high and have been stable since the beginning of the century.

Canada Goose *(Branta canadensis)*
Canada Geese are grouped into different management populations based on their breeding and wintering ranges. The subarctic-breeding populations have remained relatively stable since the early 2000s, whereas the temperate-breeding populations have grown so quickly that they have caused conflicts with humans, crop damage, and even hazards in some areas (e.g., airport). To mitigate these issues, their harvest has been liberalized in recent years and as a result, harvest has in fact increased.

Canvasback *(Aythya valisineria)*
The Canvasback is the largest diving duck species in North America. Its core breeding area is in the Prairie Provinces, but it is one of the least abundant species in Canada. Despite fluctuations due to annual changes in water levels, the population has increased since declining in the 1980s. In, Canada, the Canvasback is mostly hunted in the Prairies provinces.

Common Eider *(Somateria mollissima)*
The Common Eider inhabits Arctic and Subarctic coastal marine habitats and has a circumpolar distribution that includes Russia, Alaska, Canada and Greenland. The species spends its entire life cycle in marine environments; it nests in large colonies, mostly on marine islands, and forms large aggregations in inshore coastal regions during the non-breeding season. There are four subspecies of Common Eiders. Information on population size and trends for the Common eider, as for most sea ducks, is unavailable or unreliable because of the remoteness of the breeding and wintering areas, as well as the lack of regular population surveys. In Canada, Common Eiders are harvested for Aboriginal subsistence purposes (adults, eggs). They are also harvested recreationally, and their down is collected commercially. In some regions, data suggest that the harvest needs to be carefully monitored to ensure it remains sustainable.

Common Gallinule *(Gallinula galeata)*
The Common Gallinule is a secretive marsh bird that is primarily found in southern Ontario and southwestern Quebec, with some birds also found in eastern New Brunswick and western Nova Scotia. Population estimates are not available for all of Canada but data from Ontario show a significant decline.

Consequently, in 2012, the CWS-Ontario Region, in partnership with the Ontario Ministry of Natural Resources and Forestry, initiated a pilot banding project of gallinule in Ontario. The species has been listed as a priority species in Ontario, with the objective of reversing its decline. There are no annual harvest estimates for Common Gallinules available in Canada, but the harvest is likely small.

Common Goldeneye *(Bucephala clangula)*
In North America, the Common Goldeneye breeds in tree cavities across the boreal forest regions of Canada and Alaska. The population in western Canada has been steadily increasing since the 1970s and the 1980s, while the population in eastern Canada has remained stable. The harvest of Common Goldeneyes has been decreasing since the 1980s and takes place mainly in eastern Canada.

Common Merganser *(Mergus merganser)*
The Common Merganser is the largest of the three North American merganser species. It breeds across Canada, wherever trees are large enough to support suitable nesting cavities. The population size and trends for mergansers are not reliably known, as many aerial surveys do not distinguish between the three species, whose breeding ranges overlap extensively. An important part of the species' breeding range (boreal forest) is not covered by surveys. However, the three merganser species can be reliably identified during helicopter-based plot surveys in eastern Canada. In Eastern Canada, Common Merganser numbers appear to have been stable since 2000.

Gadwall *(Anas strepera)*
The Gadwall is a common duck species found in Canada, with its core breeding area located in the Prairies. The species has shown a dramatic population increase throughout most of its range and has doubled since the 1990s, following a period of prolonged drought in the 1980s. The large majority of the Gadwall harvest has taken place in the Prairie Provinces and has remained stable over the last several decades, but it remains smaller than the harvest in the United States.

Greater Scaup *(Aythya marila)* **and Lesser Scaup** *(Aythya affinis)*
Two scaup species occur in North America, the Greater Scaup and the Lesser Scaup. These two closely related species are nearly identical in overall appearance, which can cause difficulties distinguishing them. The breeding population status of scaup (Greater and Lesser Scaup, combined) in North America became a conservation concern due to apparent declines from the historically high levels observed in the 1970s. Their populations have not yet fully recovered, and research to understand the cause of the decline is ongoing.

The Greater Scaup is the larger of the two species and is the only diving duck with a circumpolar breeding distribution. In North America, the Greater Scaup is widely distributed across Arctic and Subarctic regions.

The Lesser Scaup is the smaller of the two scaup species and is the most abundant and widespread diving duck in North America. The core breeding area for the Lesser Scaup is the western boreal and Prairie/Parkland Regions, but it also nests at lower densities in eastern Canada.

The Lesser Scaup is the most abundant of the two scaup species and is also the species that is predominantly harvested.

Greater Snow Goose *(Chen caerulescens atlantica)*
Greater Snow Geese breed in the Canadian Eastern High Arctic, with the largest nesting colony on Bylot Island, Nunavut. During migration, the entire population stages in the marshes and agricultural lands of southern Quebec, but a small part of the population recently began to migrate through eastern Ontario and northern New Brunswick. The Greater Snow Goose population has undergone a dramatic increase from a few thousand individuals in the 1930s to one million birds in 1999. Greater Snow Geese have been designated as "overabundant" and have been subject to special conservation measures to control their numbers. In fact, harvest regulations were liberalized and a spring conservation season was established in Quebec in 1999, and subsequently extended in 2012 to southeastern Ontario. Since the implementation of special conservation measures, the growth of the Greater Snow Goose population appears to have been halted, and the population has remained relatively stable, fluctuating between approximately 700 000 and 1 million birds annually.

Greater White-fronted Goose *(Anser albifrons)*
The Greater White-fronted Goose has one of the largest ranges of any species of goose in the world. In North America, it breeds across a broad region of the Arctic, from Alaska to the west coast of Hudson Bay. White-fronted Geese that breed in Canada belong to the Mid-continent population. The population has increased substantially since the late 1980s. Recent estimates suggest a population size of about 2.4 million adults. Most mid-continent White-fronted Geese migrate through Alberta and Saskatchewan in the fall, where most of its Canadian harvest occurs.

Green-winged Teal *(Anas crecca)*
The Green-winged Teal is a widely distributed and relatively abundant species in Canada. Unlike many other dabbling ducks, the species' core breeding range is not located in the Prairie Potholes, but in the boreal forest. In western Canada, Green-winged Teal numbers have increased steadily since the early 1990s, whereas in eastern Canada, numbers have remained relatively stable over the same time period. It is the most hunted among duck species in Canada, after the Mallard and the Black Duck, with a harvest level that has remained relatively stable since early 2000s. Nevertheless, the harvest is only a fraction of the harvest taking place in the United States.

Harlequin Duck *(Histrionicus histrionicus)*
Until the 1990s, little was known of the ecology of Harlequin Ducks in North America. However, research efforts have since improved our understanding of this species, at least in some areas. For management purposes, there are two distinct populations of Harlequin Ducks in North America—the Western Population along the Pacific coast, and the much larger Eastern Population, along the Atlantic coast. Although the Western Population is smaller, its population appears to have remained relatively stable over the years and harvest of the species is thought to be uncommon. The Eastern Population declined in the 1980s, likely because of overharvesting. In 2003, it was listed as a species of "Special Concern" under the Canadian *Species at Risk Act*. The population has shown improvement since its harvest was prohibited in eastern Canada in 1990.

Hooded Merganser *(Lophodytes cucullatus)*
The Hooded Merganser is the smallest of the three merganser species and is the only one that occurs solely in North America. The species breeds mostly in eastern Canada, where it occurs in the highest densities in the Great Lakes Region in southern Ontario, and in Quebec. The species is also found in southeast Saskatchewan, southern Manitoba, New Brunswick and Prince Edward Island. It is thought to be one of the least abundant species of sea duck in Canada, but its population status and numbers are difficult to determine accurately, due to the species' secretive nature, its association with forested wetlands, and the fact that it nests in tree cavities. Furthermore, it is difficult to differentiate between the three species during fixed-wing aerial surveys, and an important part of its breeding range (in the boreal forest) is not covered by surveys.

King Eider *(Somateria spectabilis)*
The King Eider has a circumpolar distribution. Among the sea ducks, this species is one of the most northerly nesting. There are two King Eider populations: the Western Arctic and the Eastern Arctic Populations. Based on limited data, both populations appear to be locally stable or declining. Subsistence

Aboriginal harvest in Canada, Alaska and Russia represents the majority of the take for this species. Information on population trends and harvest is limited.

Lesser Snow Goose *(Chen caerulescens caerulescens)*
Lesser Snow Geese nest in colonies ranging from a few hundred to several hundred thousand birds in coastal and inland areas of the Arctic. There are three populations of Lesser Snow Geese: the Mid-continent Population, the Western Arctic Population and the Wrangel Island population. The Mid-continent Lesser Snow Geese Population has increased dramatically since the 1970s from numbers averaging at 2 million to more than 12 million in recent years. The Mid-continent Lesser Snow Goose population has been designated as "overabundant", and has been subject since 1999 to special measures to control its size. Recent estimates suggest that the size of the mid-continent population could be as high as 13 million birds. In 2014, the western Arctic Population was also designated as overabundant.

Long-tailed Duck *(Clangula hyemalis)*
Despite indications of long-term declines, the Long-tailed Duck remains the most abundant Arctic sea duck in North America. The population appears to have stabilized since the early 1990s. The Long-tailed Duck has a circumpolar distribution and, in North America, pairs breed at low densities in remote Arctic and Subarctic areas. During most of the year, birds are found primarily in coastal marine waters, often far offshore. The Long-tailed Duck is not commonly harvested by recreational hunters in Canada, due to the strong taste of its flesh. However, it is believed to be an important species in the Aboriginal subsistence harvest.

Mallard *(Anas platyrhynchos)*
The Mallard is the most abundant and most widely distributed dabbling duck species in Canada, and is most abundant in the Prairie Provinces. Mallards have been spreading eastward for decades and are now well established in New Brunswick, though they remain rare in Prince Edward Island and Newfoundland and Labrador. The species' population size has remained relatively stable or increased since the drought periods of the 1980s. The Mallard is the most extensively hunted duck species across the country.

Mourning Dove *(Zenaida macroura)*
The Mourning Dove is one of the most familiar and most heavily harvested migratory game birds (mostly in the United States). It is also one of the most abundant and most widespread bird species in North America. This species is a common breeder in urban and rural areas across southern Canada, reaching its highest breeding densities within the Lower Great Lakes/St. Lawrence Plain Region of Ontario and Quebec in the east, and within the Prairie Pothole Region of Manitoba, Saskatchewan and Alberta in the west. The Mourning Dove is monitored in Canada through the Breeding Bird Survey (BBS). Results from this survey indicate that the population has increased markedly since 1970, but has leveled off during the most recent decade. A hunting season was opened in 2013 in Ontario.

Murre
There are two murre species: the **Common Murre** *(Uria aalge)* and the **Thick-billed Murre** *(Uria lomvia).* In Canada, both species are most abundant on the Atlantic coast, with small numbers of Common Murres breeding in B.C. and small numbers of Thick-bill Murres breeding in the western Arctic. Numbers for both species have been drastically reduced over the last century because of human disturbance, overhunting, oil pollution and probably commercial fisheries development. Murres are hunted by residents of Newfoundland and Labrador and by native people. Newfoundland residents were granted hunting rights soon after they entered Confederation, in 1949. The harvest was excessive until 1994, when it was regulated; however, enforcement remains difficult.

Northern Pintail *(Anas acuta)*
The Northern Pintail is one of the most abundant waterfowl species in Canada. The species is found across the country, with its core breeding range located in the Prairie Pothole Region of western Canada. Annual nest success and productivity estimates vary with precipitation conditions in the Prairies: periods of extended drought have led to dramatic population declines, most notably in the Canadian Prairies. Since 1990, the population has been slowly increasing, but has yet to recover completely.

Northern Shoveler *(Anas clypeata)*
In Canada, the core breeding range of Northern Shovelers is in the Prairie Pothole and Parkland Regions of Saskatchewan, Alberta and Manitoba. The continental population has seen a significant increase since the 1990s, following a period of drought in the prairies in the 1980s. Despite a steady population increase, the Canadian harvest of this species has remained relatively stable.

Rails
Four species of rails are found in Canada: the **Virginia Rail** (*Rallus limicola*), the **Yellow Rail** (*Coturnicops noveboracensis*), the **King Rail** (*Rallus elegans*) and the **Sora** (*Porzana carolina*). Rails are secretive marsh birds that breed and stage in many wetlands in Canada. Most often, they remain hidden in dense emergent vegetation, which makes surveying and hunting challenging. The Virginia Rail and Sora populations appear to be increasing and the harvest for these species is allowed, although it is thought to be very low. Conversely, Yellow and King Rail populations are believed to be declining, at least locally. The Yellow Rail was listed in 2003 as a species of "Special Concern" under the Species at Risk Act, and the King Rail was listed the same year as "Endangered". Neither species, the Yellow Rail or the King Rail, can be legally hunted in Canada.

Red-breasted Merganser *(Mergus serrator)*
The Red-breasted Merganser has a wide range in North America and is known to breed at high latitudes (up to 75°N). It is thought to be one of the least abundant species of sea ducks in Canada, but its population status and numbers are difficult to determine accurately due to the species' secretive nature, the remoteness of parts of its breeding range, and its habit of nesting in tree cavities.

Redhead *(Aythya americana)*
The Redhead breeds exclusively in North America, primarily in the Prairie Pothole Region of Canada and the United States. The continental population is increasing and has largely recovered since its decline following periods of drought in the 1980s. The vast majority of Redheads are harvested in the United States.

Ring-necked Duck *(Aythya collaris)*
The Ring-necked Duck is a common diving duck that breeds throughout the boreal forest in Canada. Its range extends from southern Yukon to Newfoundland. Its population has been steadily increasing in the Prairie Provinces since the 1990s, whereas it has remained stable in eastern Canada. The harvest of Ring-necked Ducks in Canada has remained relatively stable in the last 20 years, the Ring-necked Duck being a sought-after waterfowl species by hunters. A much larger harvest occurs in the United States.

Ross's Goose *(Chen rossii)*
The vast majority of Ross' Geese breed in the Queen Maud Gulf Region in the central Canadian Arctic, but increasing numbers are being found along the western coast of the Hudson Bay. Considered a rare species in the early part of the last century, Ross' Goose has shown increasing numbers since the mid-1990s. The population is estimated to be between 1.5 and 2.5 million birds. Ross' Geese have been designated as overabundant and are subject to special measures to control their numbers.

Ruddy Duck *(Oxyura jamaicensis)*
The Ruddy Duck is not an abundant species in Canada. Approximately 86% of the breeding population breeds in the Prairie Pothole Region of Canada. Ruddy Duck numbers are stable or increasing throughout most of its North American breeding range. The species is not an important game bird species in Canada.

Sandhill Crane *(Grus canadensis)*
Two Sandhill Crane populations breed in Canada: the Mid-continent Population, and the Eastern Population. The Mid-continent Population, which is the more abundant of the two, is stable, while the Eastern Population shows a long-term increasing trend. The Canadian harvest of this species is only allowed in Manitoba, Saskatchewan, and the Yukon. The harvest has been variable, but has increased slightly over the years.

Scoters
The three species of scoters that breed in Canada are the **Black Scoter** *(Melanitta americana),* the **Surf Scoter** *(M. perspicillata)* and the **White-winged Scoter** *(M. Fusca).* Less is known about scoters than any other group of sea ducks, but among the three species, the White-winged Scoter is the best known. Research efforts in recent years have led to a better understanding of the breeding, moulting and wintering ecology of this group of species. There are currently no surveys that provide good population or trends estimates for scoters. Despite this, in western Canada, scoter numbers for all three species appear to have declined compared to historic levels, although they have remained stable over the last twenty years. Additional information is needed to better assess the status of scoter populations in Canada.

Trumpeter Swan *(Cygnus buccinator)*
There are three populations of Trumpeter Swans in North America: the Pacific Coast Population, the Rocky Mountain Population, and the Interior Population. The three populations have reached or exceeded their population objectives and are increasing. Hunting Trumpeter Swans is illegal in Canada and the United States.

Tundra Swan *(Cygnus columbianus)*
The Tundra Swan is the most abundant and widespread of the two swan species native to the continent (the Mute Swan being an introduced species). Tundra Swans are managed as two distinct populations—the Eastern Population and the Western Population, primarily based on affiliations with each of their traditional major wintering areas occurring along the Atlantic and Pacific coasts. Mid-winter surveys are used as the primary means of tracking annual abundance and trends of each Tundra Swan Population. Numbers for the Eastern Population appear to have increased slightly over the last decade. No data were available to estimate a trend for the Western Population. Tundra Swan hunting is strictly regulated in the United States, but closed in Canada.

Wilson's Snipe *(Gallinago delicata)*
The Wilson's Snipe is one of the most abundant and widespread shorebirds in North America. However, due to its elusive nature, it is difficult to monitor. Nevertheless, its overall numbers appear to be stable since the late 1960s andearly 1970s. The species is hunted at low levels in Canada and the harvest level has been stable over the last decade. Wilson's Snipe is hunted much more heavily in the United States than in Canada.

Wood Duck *(Aix sponsa)*
The Wood Duck is a secretive cavity nesting species that is commonly found in swamps, marshes and riparian habitats in Canada. In Canada, it primarily breeds in eastern provinces with most Wood Ducks breeding in Ontario, Quebec and New Brunswick. In western Canada, the breeding population is small and found in scattered locations extending from southern British Columbia to the extreme southwest of Alberta. Once threatened with extinction, populations of Wood Duck are now stable or increasing in Canada. The Wood Duck is a sought-after waterfowl species by hunters in Canada.

Background

Environment Canada is responsible for the conservation of migratory birds in Canada and the management of sustainable hunting of these birds. The hunting regulations for migratory game birds are reviewed and amended biennially by Environment Canada, with input from provinces and territories, as well as various other stakeholders. The population status of migratory game birds is assessed on an annual basis to ensure that the regulations are appropriate, and amendments can be made between review periods if necessary for conservation reasons. As part of the regulatory process to amend the hunting regulations, the Canadian Wildlife Service (CWS) produces a series of regulatory reports.

The first report, *Population Status of Migratory Game Birds in Canada* (commonly called the November report), contains population and other biological information on migratory game birds, and thus provides the scientific basis for management. Although hunting regulations are reviewed every two years, Environment Canada evaluates the status of migratory game birds on an annual basis. Thus the November report is published every year.

The second report, *Proposals to Amend the Canadian Migratory Birds Regulations* (the December report), outlines the proposed changes to the hunting regulations, as well as proposals to amend the overabundant species regulations and other proposed amendments to the *Migratory Birds Regulations*. Proposals for hunting regulations are developed in accordance with the Objectives and Guidelines for the Establishment of National Regulations for Migratory Bird Hunting (www.ec.gc.ca/rcom-mbhr/default.asp?lang=En&n=6DE5A330-1). The December report is published every second year when hunting regulations are reviewed.

The third report, *Migratory Birds Regulations in Canada*, summarizes the hunting regulations that were approved for the next two hunting seasons. The July report is published every second year when hunting regulations are reviewed.

The three reports are distributed to organizations and individuals with an interest in migratory bird conservation, to provide an opportunity for input on the development of hunting regulations in Canada. These are also available on the Environment Canada website (www.ec.gc.ca/rcom-mbhr/default.asp?lang=En&n=0EA37FB2-1).

Monitoring Migratory Game Birds in Canada

Environment Canada's CWS supports a variety of surveys to monitor migratory birds in their breeding, wintering, staging, and moulting areas. The monitoring programs include surveys of breeding waterfowl to estimate population size and productivity, banding programs to estimate survival rates and movements, and harvest surveys to estimate the size of the harvest and assess the impacts of hunting regulations on populations. The data obtained from these monitoring programs are used in this report to assess the status of migratory birds in Canada, thus providing the scientific basis for managing waterfowl and setting sustainable hunting regulations. This information ensures that hunting does not jeopardize the sustainability of harvested waterfowl populations.

Population Surveys

- **Dabbling and Diving Ducks**

Breeding duck populations are monitored at a continental level by the Waterfowl Breeding Population and Habitat Survey (WBPHS). This is the most extensive waterfowl survey in Canada and covers parts of most provinces in western Canada, the Northwest Territories and eastern Canada. British Columbia and Yukon are not covered by the WBPHS, but have their own breeding waterfowl surveys (see below). While these surveys are designed primarily to monitor dabbling and diving ducks, they also provide information on other bird species.

❖ ***Large-scale Waterfowl Surveys***

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY

The WBPHS is coordinated by the United States Fish and Wildlife Service (USFWS) and Environment Canada's CWS, and is conducted annually. The survey has two components: one covering much of central and western Canada and the northwestern United States (hereafter "WBPHS in western Canada and the northwestern U.S.") and the other covering much of eastern Canada and the northeastern United States (hereafter "WBPHS in eastern Canada"; northeastern U.S. survey area results are not presented in this report) [Figure 1].

1. WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

The WBPHS in the western Canada and the northwestern U.S. consists of extensive aerial transects to estimate the number of breeding waterfowl and to assess habitat conditions for waterfowl (number of ponds). The survey is conducted annually between May and June and covers the Canadian Prairies and Parkland, Western Boreal Canada (northwestern Ontario, northern part of the Prairie provinces, northeast corner of British Columbia, western Northwest Territories, and Old Crow Flats in Yukon), the north-central U.S. (U.S. Prairies), and parts of Alaska (Figure 1). The survey, which uses fixed-wing aircraft, has been conducted since 1955. Breeding population estimates derived from this survey have been corrected for visibility bias (proportion of waterfowl that are not detected from the air) since 1961, with correction factors provided by the CWS. Those correction factors are obtained from ground counts made by the CWS on a subset of transects in the Canadian Prairies and by the USFWS on a subset of transects in the northern U.S. Estimates of total breeding population sizes derived from this survey provide the most important information used to set regulations for duck hunting in both Canada and the U.S. and provide a long-term data series for effective conservation planning.

2. WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

The WBPHS in eastern Canada and the northeastern U.S. has been conducted annually since 1990. The survey has two components: a helicopter plot survey and a fixed-wing transect survey. The CWS carries out the helicopter plot survey in the Boreal Shield Regions (from northeastern Ontario to Newfoundland and Labrador) and in the Atlantic Highlands Region (Gaspé Peninsula in Quebec, as well as New Brunswick and Nova Scotia; Figure 2). The USFWS conducts the airplane transect survey (fixed-wing aircraft) in parts of eastern Canada and the northeastern U.S. (Figures 1 and 2). Though originally designed to survey American Black Ducks and Mallards in eastern Canada, as part of the Black Duck Joint Venture, the Survey also provides quantitative information on other duck species (such as goldeneyes), which can be used to evaluate the status of breeding populations. Historically, the data from the two components of this survey (CWS helicopter plot survey and USFWS fixed-wing transect survey) were analyzed separately, despite some overlap in geographic coverage. The two components were integrated into one survey in 2004. Population estimates obtained from the WBPHS in eastern Canada are used to establish hunting regulations in Canada and the U.S. and provide a long-term time data series essential to effective conservation planning. These data are also used to inform the Black Duck International Harvest Strategy.

❖ ***Smaller-scale Waterfowl Surveys (British Columbia, Yukon, Ontario, Quebec, Maritime provinces)***

Other smaller-scale breeding waterfowl surveys are conducted in other parts of Canada to evaluate waterfowl populations found outside of the geographic extent of the WBPHS. In addition, local waterfowl surveys are required in some areas to monitor population segments that are at higher risk due to anthropogenic factors (e.g., in urban areas).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

Breeding waterfowl populations in the central interior of British Columbia (*Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C.*) have been monitored annually since 2006, cooperatively by the CWS, Ducks Unlimited Canada and the USFWS, through a helicopter survey. The survey takes place over eight eco-sections, covering a total of 11 million hectares. The survey is accomplished by helicopter using a technique similar to that of the continental WBPHS, except that all waterfowl sightings are geo-referenced and associated with a unique habitat type (i.e., stream, wetland, river, lake, agricultural field) to subsequently allow for the determination of habitat-species relationships and the development of landscape habitat-use models.

- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

Waterfowl populations are monitored in wetlands located along the road system in southern Yukon. This survey has been done cooperatively by the CWS and the Yukon territorial government since 1991. The survey consists in counts conducted 5 times between early May and mid-June in a sample of wetlands. The 2012 survey sample included approximately 285 wetlands along the southern Yukon road system.

- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

In southern Ontario, a plot survey was initiated in 1971 to monitor the status and trends of breeding waterfowl populations and their habitat. Surveys are primarily ground-based, but some remote locations are surveyed by helicopter. The survey consists in 351 plots, each 0.64 km^2 in area. Data from this survey have been important in monitoring the population of temperate breeding Canada Geese in southern Ontario.

- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

The St. Lawrence Lowlands have been surveyed since 2004 by helicopter to estimate the abundance, distribution and trends of breeding waterfowl in the St. Lawrence Valley in Quebec. The survey consists of 144 plots (2 km by 2 km) that are systematically distributed throughout a 29 000 km^2 study area.

- MARITIME PROVINCES WATERFOWL SURVEYS -

From 1983 to 2010, breeding population surveys (waterfowl pair and brood counts) were conducted cooperatively on the ground on selected basins in the province (PEI Waterfowl Breeding Ground Plot Survey) by the CWS and the Prince Edward Island provincial government.

In 2008, an aerial survey program, that is supported in part by the Eastern Habitat Joint Venture, was initiated to assess waterfowl breeding in agricultural landscapes in New Brunswick and Nova Scotia. This five-year survey program was expanded in 2009 to include agricultural land on Prince Edward Island in addition to the areas in Nova Scotia and New Brunswick that were surveyed from 2008 to 2012. Data analysis for all three provincial surveys is ongoing, but there is no immediate plan to continue these surveys.

- **Sea Ducks**

Most sea ducks breed in remote northern areas and spend the remainder of the year in marine and near-shore environments, making this group of birds difficult to survey. Information on sea duck populations comes mainly from localized studies (conducted in key locations or in a small portion of the species' range). Most breeding waterfowl surveys in Canada are designed to monitor dabbling and diving ducks, which generally breed farther south. Sea ducks tend to breed later than other groups of species, so even where surveys cover part of their breeding range, sea ducks are not well captured.

The following are surveys designed specifically to monitor sea duck populations.

- EASTERN POPULATION BARROW'S GOLDENEYE WINTER SURVEY

Established in 1999, this helicopter survey is carried out by Environment Canada's CWS every three years to monitor the population trend of this species of special concern. It is conducted when there is significant ice cover—between late January and mid-February—and covers all coastal habitats suitable for the eastern population of Barrow's Goldeneye (*Bucephala islandica*), including the St. Lawrence Estuary and the eastern portion of the Gulf of St. Lawrence (Quebec and the Dalhousie area in New Brunswick). The survey presents several significant challenges, particularly in distinguishing Barrow's Goldeneyes in mixed flocks that also include Common Goldeneyes (*Bucephala clangula*) and Red-breasted Mergansers (*Mergus serrator*), as the three species appear very similar when seen from the air.

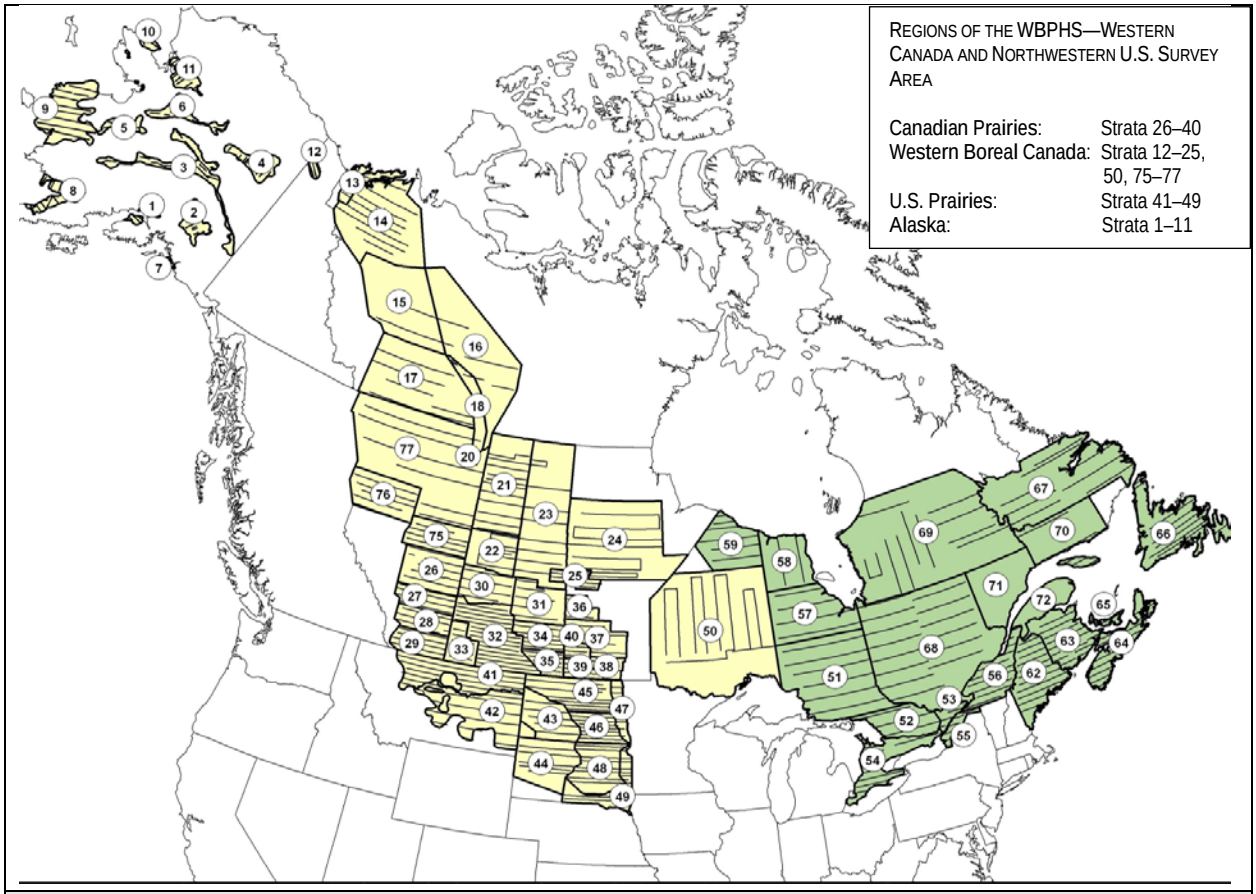


Figure 1. Waterfowl Breeding Population and Habitat Survey in the Survey area of Western Canada and the Northwestern United States (yellow), and in the Survey Area of Eastern Canada and the Northeastern United States (green) [Fixed-wing Survey Transects (black lines) and Strata (numbers) (Source: USFWS)].

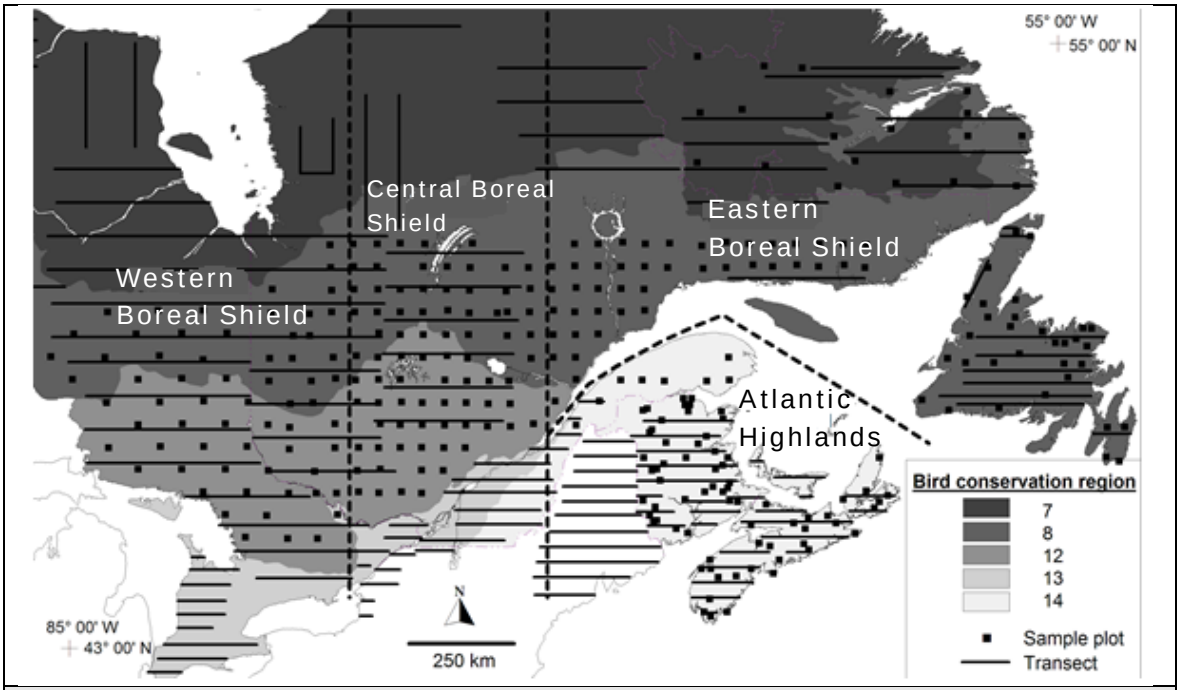


Figure 2. Regions of the Waterfowl Breeding Population and Habitat Survey in the Eastern Canada Survey Area [Fixed-wing Survey Transects (black lines) and Helicopter Plot Survey (Black dots)].

- COMMON EIDER WINTER SURVEY

Initiated in 2003, the Common Eider Winter Survey is conducted every three years by Environment Canada's CWS using fixed-wing aircraft, when the ice cover is at its maximum (usually during the first two weeks of February). This survey is set up like a census, with the objective of covering all suitable habitats for the *borealis* subspecies of the Common Eider (*Somateria mollissima*), although some portions of the habitat of the American subspecies (*S. m. dresseri*) are also included in the survey. The study area, which is covered in a single overflight, comprises the entire Gulf of St. Lawrence (North Shore, Anticosti Island, Magdalen Islands and the Gaspé Peninsula), Newfoundland and Labrador, and Saint-Pierre and Miquelon (France). A ratio estimator is used to relate visual estimates of all eider flocks with counts of a certain number of flocks from photographs.

- LONG-TERM NESTING STUDIES OF SEADUCKS

CWS biologists and other scientists, with assistance from volunteers, collect information about laying date, hatch date, clutch size, and nest success of King Eiders (*Somateria spectabilis*) at Karrak Lake, Nunavut (1995 to current), Long-tailed Ducks (*Clangula hyemalis*) at Karrak Lake, Nunavut (1998 to current), and White-winged Scoters (*Melanitta fusca*) at Redberry Lake and Thickwood Hills, Saskatchewan (2000 to present). In addition to estimating breeding parametres, as part of the survey nesting hens and local ducklings are marked and recaptured, thus providing information on local population dynamics, annual survival, recruitment age and other vital parametres.

- **Geese**

Goose population estimates and trends are derived mainly from specific annual or occasional surveys carried out during the breeding season or, in some cases, during the migration or in wintering areas. Table 1 shows the main goose surveys in Canada.

Table 1. Goose Population Surveys in Canada.					
Species	Survey	Year Initiated and Frequency	Time of year	Geographic Coverage in Canada	Survey Method
Arctic Geese	Long-term Nesting Studies of Arctic Geese	Collection of information about laying date, hatch date, clutch size, and nest density of nesting geese at several locations across Canada: 1) The Ontario Ministry of Natural Resources has monitored Canada Geese and Lesser Snow Geese on Akimiski Island, Nunavut, in James Bay since 1993 and at Burntpoint Creek; Polar Bear Provincial Park, Ontario, for the years 2001–2003 and 2007–current; 2) Université Laval and Environment Canada's CWS have monitored Greater Snow Geese at Bylot Island, Nunavut, since 1989; 3) Academic researchers have monitored Lesser Snow Geese at La Pérouse Bay and the Cape Churchill Region in Manitoba since 1968; and 4) Environment Canada's Science and Technology Branch has monitored Lesser Snow Geese and Ross's Geese at Karrak Lake, Nunavut, in the Queen Maud Gulf Migratory Bird Sanctuary since 1991.			
Greater Snow Goose	Spring Greater Snow Goose Survey	Annually since 1965 Conducted by the CWS	Spring migration	Quebec, Ontario: spring staging areas in the St. Lawrence Valley in southern Quebec (from Champlain lake (south) to lac St- Jean (north), and from eastern Ontario to Chaleur Bay (east))	-Fixed-wing survey: five aircraft are used simultaneously for complete coverage during a one-day survey -All flocks are photographed for subsequent photo analysis
Greater Snow Goose	Colony Photo Surveys	Periodically (every five years) since 1983	Late summer	Nunavut (Bylot Island)	- Fly-overs are conducted in the southwest plain of the island and the geese are photographed. Adults and goslings are counted in the photographs to obtain an estimate of population size. -Conducted by the CWS with support from Université Laval
Lesser Snow Goose	Mid-winter Waterfowl Survey	Annually since 1935 Conducted by the USFWS	Winter	- Central and Mississippi flyway area	-Fixed-wing transect survey
Lesser Snow Goose (Wrangel Island Population)	Fraser-Skagit Mid-winter Lesser Snow Goose Count	Annually since 1987	Mid-winter	B.C.: Fraser River delta U.S.: Skagit River delta of Washington State.	-Aerial photo count
Lesser Snow Goose and Ross's Goose	Colony Photo Surveys	Periodically (at intervals of 3 to 18 years) since 1973. Conducted by Environment	Spring	Northwest Territories, Nunavut, Manitoba, Ontario: major Ross's Goose and Lesser Snow Goose colonies in the Canadian Arctic (Baffin Island,	-Fixed-wing transect survey: a sample of photographs is taken along

Table 1. Goose Population Surveys in Canada.					
Species	Survey	Year Initiated and Frequency	Time of year	Geographic Coverage in Canada	Survey Method
		Canada (CWS, S&T) and the USFWS		Southampton Island, Akimiski Island, Cape Henrietta Maria, La Pérouse Bay, Queen Maud Gulf Region, Banks Island)	transect lines over colonies. Photo analysis is performed subsequently.
Mid-continent Population White-fronted Geese	Fall Inventory of Mid-continent White-fronted Geese	Annually since 1992	Fall migration	Saskatchewan and Alberta	-Fixed-wing transect -Cooperative survey (USFWS and the CWS)
Cackling Goose	Mid-winter Waterfowl survey	Annually since 1970	Winter	Conducted in Central and Mississippi Flyway wintering areas	-Fixed-wing transect survey
North Atlantic Population Canada Goose	WBPHS-eastern Canada (Quebec's north shore and NL part of the survey)	Annually since 1990	Breeding	WBPHS-eastern Canada (stratum 2)	-Helicopter plot survey
Atlantic Population Canada Goose	A Breeding Pair Survey of Canada Geese in Northern Quebec	Annually since 1993	Breeding	Coastal and interior areas of Ungava and Hudson Bays of northern Quebec	-Cooperative survey; CWS and USFWS -Fixed-wing transect survey
Southern James Bay Population Canada Goose	Spring Population Survey for Southern James Bay Population Canada Geese	Annually since 1990	Breeding	Akimiski Island and southwestern James Bay (coast and inland)	-Fixed-wing transect -Cooperative survey by Ontario Ministry of Natural Resources and CWS
Mississippi Valley Population Canada Goose	Mississippi Valley Canada Goose Breeding Pairs Survey	Annually since 1989	Breeding	Hudson Bay lowlands in Ontario	-Fixed-wing transect -Cooperative survey by Ontario Ministry of Natural Resources and CWS
Eastern Prairie Population Canada Goose	Eastern Prairie Breeding Population Survey	Annually since 1972	Breeding	Northern Manitoba	-Fixed-wing transect cooperative survey; USFWS and Manitoba Conservation
Temperate-breeding Canada Goose - Maritimes	-WBPHS-eastern Canada -Eastern Habitat Joint	Annually since 1990	Breeding	New-Brunswick, Nova Scotia	-Helicopter plot survey

Table 1. Goose Population Surveys in Canada.					
Species	Survey	Year Initiated and Frequency	Time of year	Geographic Coverage in Canada	Survey Method
	Venture (agricultural plots)				
Temperate-breeding Canada Goose - Quebec	St. Lawrence Lowlands Breeding Waterfowl Survey, Quebec	Annualy since 2004	Breeding	St. Lawrence lowlands	-Helicopter plot survey
Temperate-breeding Canada Goose - Ontario	Southern Ontario Waterfowl Plot Survey	Since 1971. Every 2–5 years from 1971 to 2005; Annually, in a rotational survey since 2005.	Breeding	Southern Ontario	-Ground plot survey -Conducted by CWS
Temperate-breeding Canada Goose - Prairies	WBPHS-western survey area	Annually since 1955	Breeding	Southern Prairie Provinces	-Fixed-wing transect survey -conducted by the CWS and the USFWS
Temperate-breeding Canada Goose - Southern British Columbia	Waterfowl Breeding Population Survey of the Central Interior Plateau of BC	Annually since 2006	Breeding	Southern British Columbia	-Helicopter transect survey -Cooperative Survey conducted by the CWS, Ducks Unlimited and the USFWS
Atlantic, Black and Western High Arctic Brant	USFWS mid-winter survey; CWS Ground Counts (Black and WHA Brant)	Annualy since 1992	Wintering	-Wintering areas in the U.S. -Fraser Valley, B.C.	-Fixed-wing transect survey -Ground counts

Surveys for Other Species

Additional information on waterfowl populations is provided by mid-winter waterfowl surveys that are conducted on the wintering grounds in the four flyways in the U.S.. The mid-winter surveys provide population indices for most species of ducks and geese. It has been conducted annually since 1935. The mid-winter survey is not based on a statistical sampling plan and some wintering habitats are not covered, so results are best used for the evaluation of relative abundance and distribution in wintering habitats.

Band-tailed Pigeons, Wilson's Snipes, Rails and **Mourning Doves** are surveyed through the North American Breeding Bird Survey (BBS) [www.ec.gc.ca/reom-mbs/default.asp?lang=En&n=416B57CA-1]. The BBS is an international avian survey conducted annually since 1966 in the United States and Canada. It is designed to monitor trends in relative abundance of North American breeding birds at the continental, national and regional level. The BBS focuses on landbirds and is the main source of information on long-term population change for these species in North America.

Tundra Swans are counted in their wintering areas by the USFWS mid-winter survey conducted in the United States.

First conducted in 1968, repeated in 1975, and then conducted every five years since then, the North American **Trumpeter Swan** Survey estimates the population size and productivity of Trumpeter Swans from counts on the species' breeding grounds in Canada (Yukon, Northwest Territories, British Colombia, Alberta and Ontario) and the United States. The survey is coordinated by the United States' Fish and Wildlife Service and Environment Canada's CWS, with the help of many other partners. In Yukon, the Northwest Territories, British Columbia and Alberta, biologists count adults and young from the air during the late summer. In Ontario, volunteers with the Ontario Trumpeter Swan Restoration Group conduct a ground-based survey. Across Canada, anyone who sees a banded Trumpeter Swan can report it to Environment Canada's Bird Banding Office and to the Trumpeter Swan Society.

Waterfowl—especially **Trumpeter and Tundra Swans**—that concentrate in early spring at several small accessible migration sites in the Southern Lakes' region of Yukon is surveyed by the Yukon Spring Migration Survey. The program, initiated in 1986, consists in daily counts of swan from the ground at the most heavily used location (Marsh Lake, Yukon), and less often at other sites. Two aerial surveys cover more remote sites and provide photo documentation of ice conditions.

There is no formal survey to monitor **murre** populations, although murres in some specific colonies are counted. Special surveys are conducted occasionally to estimate murre harvest.

The status of the **American Woodcock** in North America is monitored through the singing-ground survey in Canada and the United States, which consists in a spring count of male courtship displays at dusk.

The Mid-continent Population of **Sandhill Cranes** is monitored through a spring aerial transect survey. The Eastern Population has been monitored since 1979 by a fall survey in its staging areas, and estimates for the southern portion of the range are devised from the WBPHS in eastern Canada (helicopter plot survey only), which is conducted annually in Quebec.

The **American Coot** is monitored in Canada through the WBPHS, and the BBS estimates the population at a continental level.

- NATIONAL HARVEST SURVEY

Initiated in the late 1960s, the National Harvest Survey documents the annual harvest of waterfowl and other migratory game birds, as well as trends in hunter activity across Canada. Coordinated by Environment Canada's CWS, the survey uses data from hunters to determine the geographic distribution of the hunt and to estimate the number of birds of each species that are harvested each year. Participants (hunters) are randomly selected, and responses are voluntary. The survey has two components: the Harvest Questionnaire Survey, which is used to estimate the total number of birds taken by hunters, and the Species Composition Survey, which helps determine the proportion of each species in the total harvest. Harvest estimates are generated by integrating the results of these two surveys (see www.ec.gc.ca/reom-mbs/default.asp?lang=en&n=CFB6F561) and the data are used in harvest management decisions. Supplemental surveys are undertaken to estimate the numbers of geese harvested during the Snow Goose Spring Conservation Hunt, a special conservation measure put in place to control overabundant snow geese.

From 1952 through to 2001, estimates of waterfowl harvest in the U.S. were derived from the USFWS's Waterfowl Questionnaire Survey. A new survey, however—the Harvest Information Program—was fully implemented in 1999. In addition to waterfowl data, it gathers information on species and groups of migratory game birds such as woodcocks, doves and snipes. This survey also includes a species composition survey (Waterfowl Parts Survey), and the results of both surveys are combined to calculate harvest estimates. It should be noted that harvest estimates obtained from the two surveys (before 1999 and after 1999) cannot be directly compared.

In this report, harvest data are presented in detail for each province of Canada. More information on the distribution of the harvest in the U.S. may be found on the USFWS Migratory Bird Program website: www.fws.gov/migratorybirds/NewReportsPublications/HIP/hip.htm.

Waterfowl Banding

Band recovery data provide consistent information to assess survival and harvest rates, temporal and geographic distribution of the harvest and, in some cases, population size.

- DUCK BANDING PROGRAMS

The Canadian Duck Banding Program began in the 1900s. As part of this program, ducks are caught on their breeding grounds at the end of the breeding season, when they swim into baited traps. CWS staff carefully extract ducks from the traps, band each duck on one leg, collect information about age, sex, and species, and then quickly release the birds. This program targets adult and juvenile ducks of multiple species. During the hunting season, when hunters shoot a banded duck, they can report it to Environment Canada's Bird Banding Office. The band number and associated information, such as the date and location, can be reported via the internet (www.reportband.gov), via a toll-free telephone number (1-800-327-2263), or by post. Biologists and researchers use the information from banded ducks to assess survival rate, harvest rate and distribution. The data also feed into harvest management decisions.

- GOOSE BANDING PROGRAMS

Arctic goose banding programs have been conducted in Canada since the 1950s. Geese are banded in the Northwest Territories, Nunavut, Manitoba, Ontario and Quebec. Snow Geese, Ross's Geese, Cackling Geese, Greater White-fronted Geese and Brant are banded on their northern breeding grounds. Canada Geese are banded on their subarctic and temperate breeding grounds. The birds are banded after they have been carefully herded into an enclosure during the post-breeding season, when the adults are moulting their flight feathers and before the young can fly. CWS staff apply individually numbered metal bands that can be used to track individual birds to the legs of the captured birds. If a person encounters a banded bird, they are encouraged to report it to Environment Canada's Bird Banding Office, via telephone at 1-800-327-BAND (2263), or online at www.reportband.gov. Researchers use the information from banded geese to assess survival rates, harvest rates, migration movements, and distribution. The data also feed into harvest management decisions.

Marking programs—which typically use leg-bands, neck collars or transmitters (radio or satellite)—are also part of the waterfowl monitoring program.

Trends Analysis

Trends in the numbers of May ponds and duck breeding populations in western Canada estimated from the WBPHS are calculated using the estimating equations technique (Link and Sauer 1994). A minimum of five strata (containing the aerial survey transects) was deemed necessary to perform a trend analysis. In 2013, a trend analysis was not performed for certain species because of lack of data in some survey strata.

References

Link, W.A., and Sauer, J.R. 1994. Estimating equations estimates of trends. Bird Populations 2: 23–32.

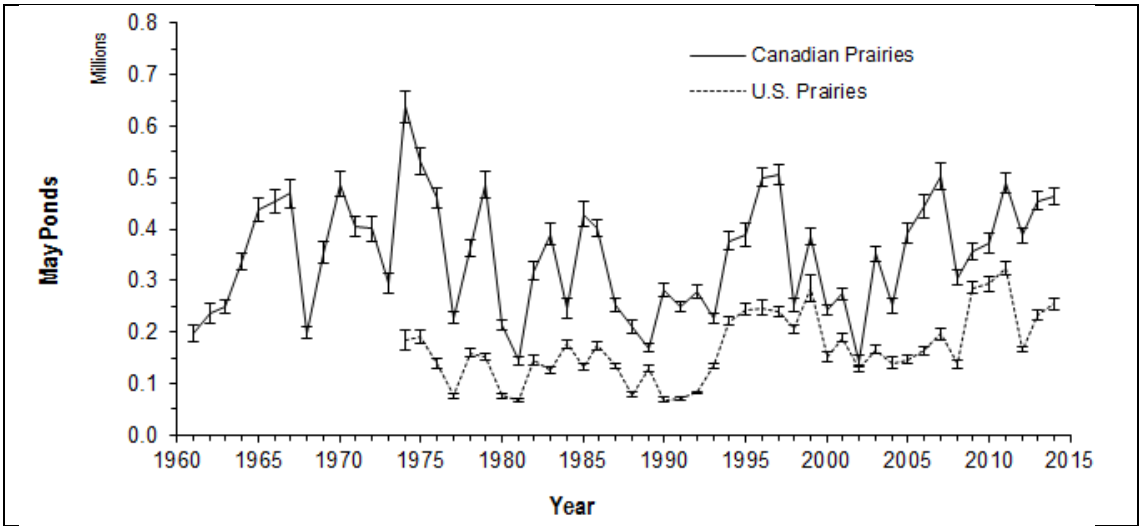
U.S. Department of the Interior and Environment Canada. 1987. Standard Operating Procedures for Aerial Waterfowl Breeding Ground Population and Habitat Surveys in North America. Unpublished report of the U.S. Fish and Wildlife Service and Canadian Wildlife Service.

2014 Breeding Habitat Conditions

After a long winter, spring was delayed for most areas in Canada. Overall, habitat conditions in the western area of the WBPHS were either similar to those of the previous year, or showed a slight improvement. A total of 49.2 million ducks was estimated in the survey area in 2014. This is a record high: 8% greather than the 2013 estiimate and 43% greater than the 1993–2013 long-term average (USFWS 2014).

- PRAIRIE POTHOLE REGION

In the Prairie Pothole Region (in the Canadian and U.S. prairies), weather has a strong influence on waterfowl breeding habitat conditions and, consequently, on the abundance of waterfowl populations. Droughts create difficult breeding conditions for ducks. Since 1961, spring habitat conditions have been assessed based on an estimate of the number of ponds in May (Figure 1). In 2014, the total pond estimate (Prairie Canada and U.S. combined) was of 7.2 million ponds. This was similar to the 2013 estimate, and 40% above the long-term average of 5.1 million ponds (USFWS 2014). The 2014 estimate in the Canadian Prairies was of 4.6 million ponds, similar to that of 2013 (4.6 million; Figure 1). An analysis of trends showed significant increases in the number of ponds in the Canadian Prairie Pothole Region during the last 10 years (2004–2013; Figure 1).



	Trends		
	1961–2013	**2004–2013**	**2009–2013**
Canadian Prairies	0.3	3.1*	5.4
U.S. Prairies	1.7*	6.8*	–9.3

Figure 1. Estimated Number of May Ponds (± 1 SE) and Trends in the Canadian and U.S. Prairies (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

- WESTERN BOREAL FOREST

Breeding conditions varied within the Western Boreal Forest, with generally below-average precipitations, but overall good habitat conditions. Temperatures were cooler than average, and ice cover persisted later than usual in some boreal areas. After a late spring snowfall, the region experienced below-average rainfall and above-average temperatures leading to fair wetland conditions. Precipitation was only 60–85% of the normal for northern areas of Peace Region. Conditions were generally dry. Wetlands suffered stress from poor rainfall and high temperatures as they experienced receding water levels.

The spring was exceptionally late in northern Alberta and the Northwest Territories, but good habitat conditions prevailed where ice melt had occurred on small lakes and wetlands available for birds. In the Northwest Territories, precipitation levels were among the lowest in the last 50 years, contributing to multiple forest fires and affecting wetland conditions.

The Boreal Region benefitted from above- to well-above-average annual precipitation in Yukon, northern Saskatchewan and Manitoba. Eastern parts of the Boreal Region experienced below average temperatures that led to late snow and ice melt. Spring runoff was good in the southwest, producing very good wetland conditions in spite of low precipitation levels.

- CENTRAL BRITISH COLUMBIA

The May 2014 habitat conditions were poor in the prime waterfowl areas of Southern British Columbia and average in the northern part of the province. Winter precipitation levels were below or near average in the B.C. interior during the 2013–2014 winter. April 2014 saw below-normal temperatures and above-normal precipitation in the last 2 weeks, which led to increased snow packs (B.C. Water Supply and Snow Survey, http://bcrfc.env.gov.bc.ca/bulletins/watersupply/archive.htm). The transition from accumulating to melting snow packs was delayed in April 2014, with more higher-elevation wetlands frozen in early May compared to previous years. In the southern part of the B.C. interior, where the most productive waterfowl habitat in the province can be found, wetland water levels were marginally lower compared to the previous year, as well as below the long-term average, while northern interior wetlands had near-average water levels.

- CANADIAN ARCTIC AND SUBARCTIC REGIONS

The habitat conditions in May and June 2014 in this region were generally good. Persistence of snow cover varied considerably between regions in the Canadian Arctic: late in the north-central Arctic, early in the south-central Arctic, and variable in the eastern Arctic. More specifically, the ice cover was less extensive than in 2013 and ice breakup took place up 14 days earlier than on average in the eastern part of the Arctic. The breakup of the ice cover was also the earliest ever recorded in the Queen Maud Gulf Region. Light snow pack and early snowmelt were reported on Ellesmere and Southampton Islands. Ellesmere Island experienced cold and very dry weather during the spring.

- EASTERN CANADA (ONTARIO, QUEBEC AND MARITIMES)

Spring appeared to be delayed in Maritime Canada in 2014. Ice conditions in Nova Scotia were similar to those typically observed: the survey crew encountered extensive ice cover in Cape Breton Highlands National Park, but plots were generally ice-free elsewhere in the province. Survey plots in New Brunswick were all ice-free. However, the crew did observe extensive ice cover on some larger wetland complexes (e.g., Grand Lake Meadows). The spring freshet was greater in 2014 than in recent years, and the timing coincided with what should have been a peak in the American Black Duck nesting effort. This may have resulted in the loss of some nests in the Saint John River watershed. Spring was slightly delayed in Newfoundland and Labrador. Surveys were flown in during the “usual” time intervals. However, one plot normally flown during the first survey leg was postponed until the start of the second leg due because wetlands in that plot were completely covered by ice. Ice conditions on the second leg of the survey were not significantly different from what is normally observed.

Sea ice lingered along the east coast of insular Newfoundland and the Labrador coast throughout May and early June, bringing cool temperatures. Snowmelt was delayed and most areas above 350-m elevations were still covered by snow and ice on May 20th. Melting of the large accumulation of snow over the 2013–2014 winter resulted in high water levels that flooded most stream and river banks throughout the province.

Spring conditions in Quebec were good in 2014, with mild temperatures throughout most of the period. Snowfall was slightly above average during the winter, which led to good water levels in wetlands in the

spring, and thus generally good habitat conditions for breeding waterfowl in the province. The timing of the survey was well coordinated with the breeding season.

In Ontario, snow was present and temperatures were low throughout March and continued into early April. As a result, the survey took place later than in recent years. Rainfall levels were comparable to the yearly average, but high snow pack and lake ice conditions contributed to flooding in some areas. Temperatures were generally cool, especially at the beginning of the survey, but began increasing in early May. Water levels were generally high in wetlands, lakes, etc., due to snow melt, resulting in generally good habitat conditions for breeding waterfowl in the province.

Reference

U.S. Fish and Wildlife Service. 2014. *Waterfowl population status, 2014*. U.S. Department of the Interior, Washington, D.C., USA.

Trends in the Sale of Migratory Game Bird Hunting Permits in Canada

Information on the sale of Migratory Game Bird Hunting Permits is available since 1966 (Figure 1). Annual sales peaked in 1978 (524 946 permits sold) and subsequently declined almost every year until 2005, when sales were down to 165 678 permits, the lowest number ever recorded. For several years, the number of permits sold annually remained at around 170 000. Sales have however increased slightly in recent years, with a total of 189 844 permits sold in 2013.

For more information on Migratory Game Bird Hunting Permit sales in Canada, please visit: www.ec.gc.ca/reom-mbs/default.asp?lang=en&n=C9046964.

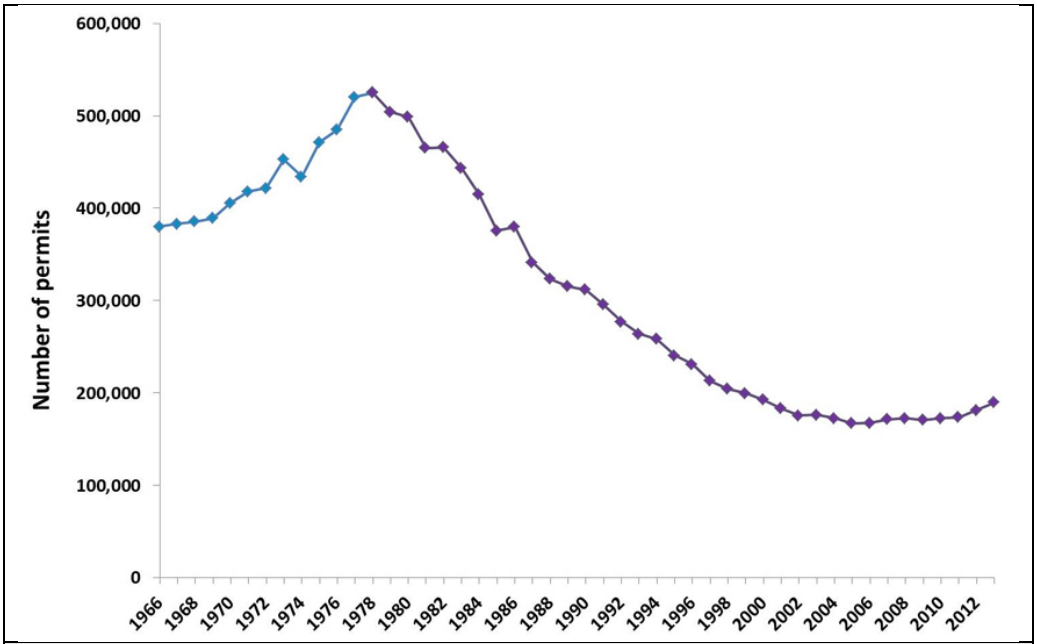


Figure 1. Numbers of Migratory Game Bird Hunting Permit Stubs Returned to Environment Canada (Permits that were sold, but for which the stubs were not returned to Environment Canada, are excluded from the totals).

Various reasons have been put forth to explain the decline in the number of hunters in Canada, including limited access to hunting areas, increasing hunting-related expenses, gun control measures, increasing urbanization, and general societal changes.

Environment Canada is supportive of migratory bird hunting and fully recognizes the value of hunters and anglers to conservation. Environment Canada has implemented a number of measures to recognize this contribution of hunters and Canadians more generally, including the establishment of Waterfowler Heritage Days, a country-wide event aimed at promoting the mentoring of young hunters in a safe environment.

Population Status of Inland Ducks—Dabbling Ducks

American Black Duck (*Anas rubripes*)

The American Black Duck breeds primarily in northeastern North America. The Black Duck has always been one of the most abundant duck species. However, the species' abundance declined over the middle of the last century. Causes of this decline are thought to include the effects of changes in breeding and wintering habitat quality, overharvesting, and interactions (competition, hybridization) with Mallards. Black Duck numbers appear to have stabilized since the last 20–30 years.

Abundance and Trends

The core breeding range of the Black Duck is located in eastern Canada. The Black Duck breeding population is monitored annually through the Waterfowl Breeding Population and Habitat Survey in eastern Canada (Figure 1, Monitoring section). Black Duck numbers are also monitored through other smaller-scale breeding waterfowl surveys, as described below.

- *Waterfowl Breeding Population and Habitat Survey in Eastern Canada*

Black Duck breeding population estimates in the four regions of the survey area are presented in Table 1 and Figure 1. The Black Duck population trend is relatively stable in most survey strata, except for the Western Boreal Shield, where the population is declining. The population remains below the North American Waterfowl Management Plan population goal of 830 000 Black Ducks (NAWMP 2012).

Table 1. Black Duck Breeding Population Estimates (in Thousands) Based on the WBPHS in Eastern Canada, with 90% Credible Intervals (The estimates are based on the combined results of helicopter and fixed-wing aircraft surveys. However, in 2013, only data from the helicopter plot survey were used).

WBPHS—Eastern Canada	Breeding Population Estimates (in Thousands)		
	2013	2014	10-yr Average (2004–2013)
Entire Survey Area	626 (562–697)	619 (552–699)	623
Atlantic Highlands	137 (101–170)	116 (97–141)	125
Eastern Boreal Shield	150 (122–185)	168 (139–202)	162
Central Boreal Shield	146 (119–176)	144 (112–187	139
Western Boreal Shield	189 (155–232)	186 (152–231)	192

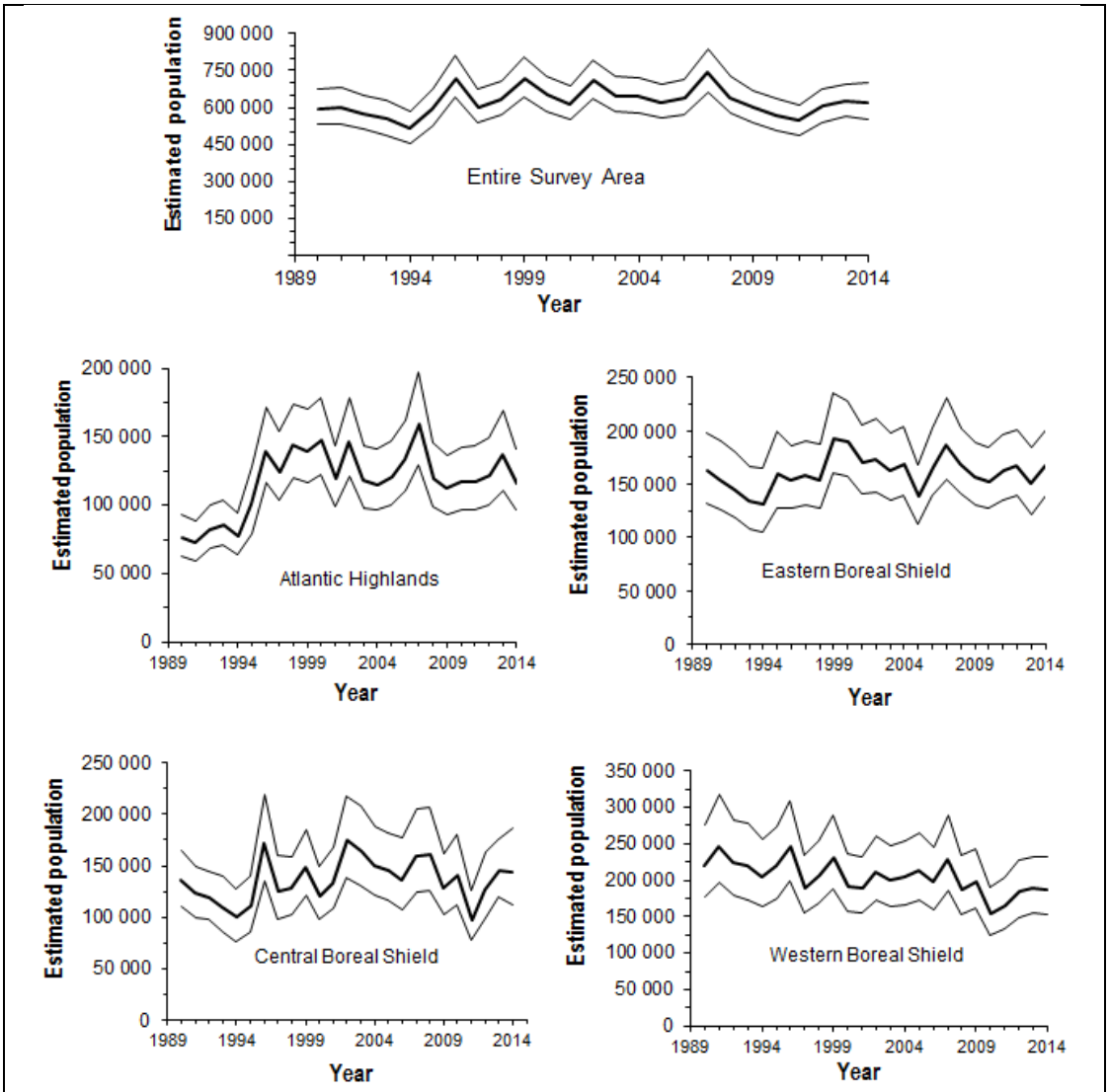


Figure 1. Black Duck Breeding Population Estimates Based on the WBPHS in Eastern Canada, with 90% Credible Intervals (The figures represent the combined results of helicopter and fixed-wing aircraft surveys. However, in 2013, only the helicopter plot survey data were used to produce the population estimates).

- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

The Black Duck population in southern Ontario declined substantially in the early 1970s, and numbers have fluctuated since then. The 2013 estimate of just over 3000 pairs was the lowest estimate ever recorded since the survey started in 1971 (Figure 2). However, in 2014, the estimate returned to a level close to the long-term average.

2013	2014	10-yr Trend (2005–2014)	Long-term Trend (1971–2014)
3641 (1552)	15 595 (10 822)	–3.77%	–0.9%

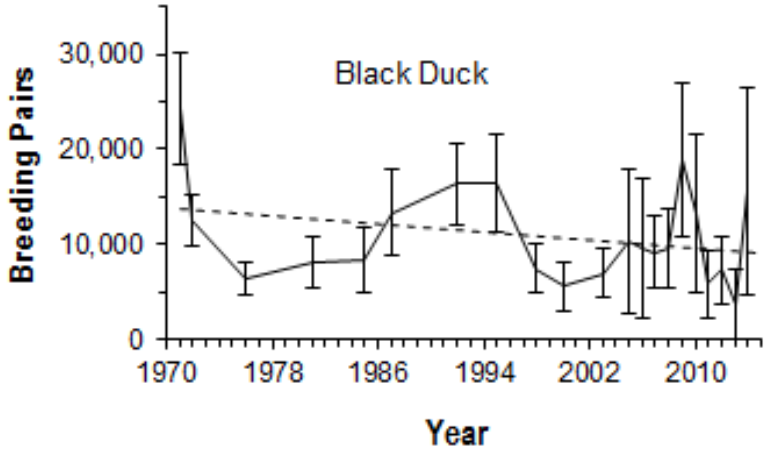
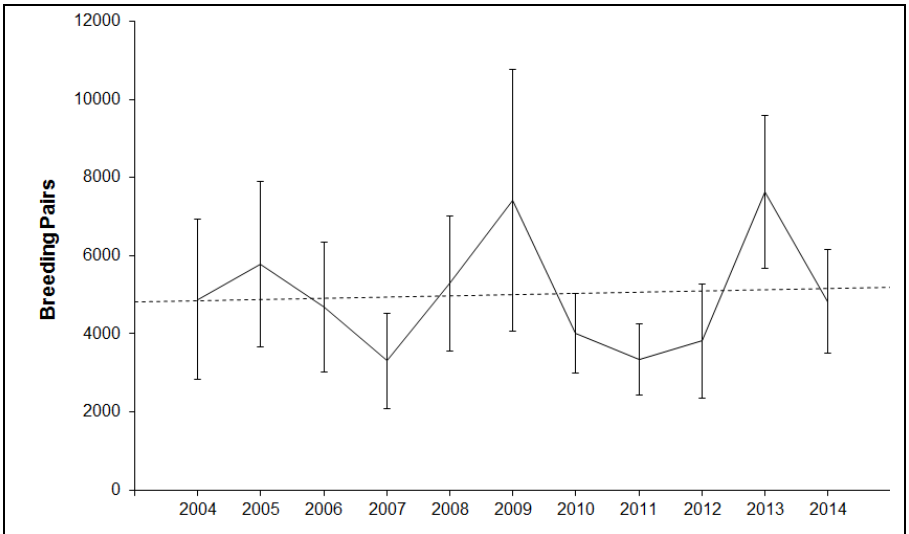


Figure 2. Indicated Breeding Pair Estimates (± 1SE) and Trends of Black Duck in Southern Ontario, 1971–2014 (Trends are expressed as an annual percentage change. Tests for statistical significance for these trends have not yet been performed).

- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

In the St. Lawrence lowlands, despite fluctuating population numbers, the Black Duck is the second most abundant species after the Mallard. Although historically the Black Duck was the dominant dabbling duck species, the St. Lawrence lowlands are still an important breeding area for Black Duck. The St. Lawrence Lowlands Waterfowl Survey was initiated in 2004 and shows that the Black Duck has been replaced by the Mallard as the most abundant breeding dabbling duck species in this area.

The highest densities of breeding Black Ducks in southern Quebec occur along the shores of the St. Lawrence River, with an average of approximately 5000 breeding pairs estimated annually for the period of 2010–2014. and where the trend over the past five years has been increasing, and the long-term trend since 2004 has been stable (Figure 3).



Breeding Pairs		Trends	
2010–2014	**2014**	**2004–2014**	**2010–2014**
4 725	4 828	0.1%	12.1%

Figure 3. Indicated Breeding Pair Estimates (± 1 SE) and Trends of Black Duck in the St. Lawrence Lowlands, Quebec, 2004–2014 (Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not yet been performed).

Harvest

Declines in Black Duck numbers on wintering grounds in the U.S. prompted the U.S. government to initiate in 1983 a program to reduce the harvest of the species. Canada joined the initiative in 1984 by imposing restrictions on harvest within its boundaries. Between 1984 and 1988, the harvest in the U.S. decreased gradually, but it remained stable in Canada. In 1989 and 1990, Canada implemented more restrictive hunting regulations to protect local Black Duck breeding populations. The annual Canadian Black Duck harvest declined by approximately 3% between 1990 and 2010—compared to an average decrease of 1% in the U.S. (Table 2). The introduction of more restrictive harvest regulations, combined with a decline in the number of waterfowl hunters, are thought to be responsible for the decreased Black Duck harvest. Furthermore, Black Duck population declines in the western portion of the species' breeding range likely contributed to reducing the number of birds available to hunters.

Historically, the harvest of Black Ducks in the U.S. and in Canada was roughly equivalent (Table 2). The number of Black Ducks harvested in Canada in 2013 was comparable to last year's estimate (Table 2).

Table 2. Harvest Estimates of Black Ducks in Canada and the United States.

	Canada												U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	19 543	11 684	29 594	14 008	75 534	61 702	511						212 576	388 999	601 575
1975	35 354	14 620	59 467	21 876	90 593	85 070	262	118					307 360	357 197	664 557
1976	23 770	21 891	48 624	23 342	120 622	96 761	180	586	143	64			335 983	426 137	762 120
1977	38 835	18 044	46 186	20 568	129 618	82 886	727	547		48			337 459	274 049	611 508
1978	49 008	19 660	47 874	34 598	130 379	89 818	379			66			371 782	336 800	708 582
1979	44 658	12 732	33 687	24 339	112 926	87 557	242	363	256	266			317 026	299 300	616 326
1980	32 316	21 568	67 341	28 094	120 602	91 503	2 171	268					363 863	397 051	760 914
1981	38 047	16 133	58 692	26 460	105 733	76 298	337	213		41			321 954	290 405	612 359
1982	26 961	25 771	47 447	32 130	117 514	86 650	161	426					337 060	235 100	572 160
1983	32 956	25 049	57 725	31 007	101 637	60 454	259						309 087	198 217	507 304
1984	26 119	23 256	51 880	33 283	106 868	64 272	327		518				306 523	201 700	508 223
1985	28 556	18 535	44 397	32 261	110 998	64 692	427	135					300 001	189 980	489 981
1986	27 278	18 650	46 612	27 896	114 493	60 461	367	260	151				296 168	178 542	474 710
1987	20 184	18 114	39 138	27 218	129 612	61 176							295 442	172 212	467 654
1988	20 137	20 364	44 311	30 193	127 134	58 840		151	92				301 222	154 112	455 334
1989	29 299	11 548	47 322	25 582	99 675	47 518	144						261 088	193 726	454 814
1990	22 663	11 369	38 012	26 743	105 277	38 357	106	621	286	103			243 537	143 322	386 859
1991	15 073	14 499	39 295	20 122	85 220	48 670	1 189	312	1 329	229			225 938	167 520	393 458
1992	13 487	8 043	41 079	23 090	82 134	38 228	138	239	73				206 511	135 706	342 217
1993	13 133	10 741	36 298	19 591	87 869	34 556	1 125						203 313	146 666	349 979
1994	16 507	10 221	32 670	23 389	67 440	24 774	254	169				35	175 459	130 466	305 925
1995	15 461	13 355	40 546	29 332	54 776	33 470		204		17			187 161	168 800	355 961
1996	19 447	9 469	39 759	20 418	49 219	25 289							163 601	118 500	282 101
1997	18 816	12 982	32 666	17 966	56 103	26 309	265	147	215				165 469	151 779	317 248
1998	22 410	6 789	33 852	22 802	49 065	23 091	165		81	124			158 379	175 936	334 315
1999[2]	19 058	10 782	44 658	22 445	51 385	26 579	36						174 943	153 600	328 543
2000	21 605	6 980	43 922	18 083	43 476	19 995	204	653					154 918	179 500	334 418
2001	16 800	9 465	26 729	12 879	38 717	19 185	293						124 068	125 195	249 263
2002	18 021	6 214	28 310	14 449	36 346	19 130		76	89				122 635	176 538	299 173
2003	10 174	7 228	26 010	15 219	35 077	15 176		334					109 218	129 213	238 431
2004	12 888	4 827	16 969	9 775	30 588	16 710							91 757	111 955	203 712
2005	9 333	4 560	16 717	9 031	34 472	15 276	191						89 580	129 886	219 466
2006	16 529	5 168	20 630	11 159	33 900	16 644							104 030	129 196	233 226
2007	20 485	7 054	24 180	10 391	27 596	13 462	140	503					103 811	137 397	241 208
2008	22 067	5 829	22 764	12 285	29 154	11 094	160	184					103 537	120 150	223 687
2009	13 583	5 049	18 788	9 719	29 150	14 173	155						90 617	111 880	202 497
2010	8 908	7 660	12 913	12 131	31 408	14 096	90			52			87 258	119 617	206 875
2011	8 919	5 866	22 236	9 237	31 678	13 926							91 862	88 351	180 213
2012	20 213	8 795	24 622	13 261	24 594	11 878							103 363	94 559	197 922
2013	18 034	7 296	26 773	10 661	22 433	14 436	152						99 785	100 188	199 973

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway.

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and A. Smith 2014 (CWS Canadian data), and R.V. Raftovich *et al.* 2014 (USFWS US data).

Management and Conservation Concerns

Mid-winter surveys (MVS) conducted by the USFWS in the Atlantic and Mississippi Flyway States (which do not cover all of the Black Duck's wintering range) suggest that Black Duck numbers declined by half from the 1950s to the 1980s (Figure 4). Since then, population numbers have remained relatively stable, but only about half as many Black Ducks are counted in wintering areas in the U.S. now compared to the early 1950s. There has been a concurrent shift in the winter distribution with an increased number of Black Ducks wintering in Canada in recent years. Since the mid-winter survey is not conducted in Canada, the extent of the decline is likely less than shown by the MVS. Three factors have been hypothesized to explain the dramatic decline in the Black Duck population: habitat loss caused by urban and agricultural development—on both breeding and wintering grounds; competition with mallards—whose population size and distribution are expanding in eastern Canada; and harvest, which has been addressed through restrictive regulations (Conroy et al. 2002).

A large-scale aerial survey (the WBPHS in eastern Canada) was initiated in 1990 by the Black Duck Joint Venture to monitor Black Duck numbers on their breeding grounds (Atlantic provinces, boreal forest in Quebec and northeastern Ontario) and improve the tracking and estimation of the Black Duck population (Figure 1, Monitoring section). Data from this survey show that the population has remained relatively

stable for several decades, but population numbers remain below the NAWMP goal of 830 000 ducks (NAMWP 2012).

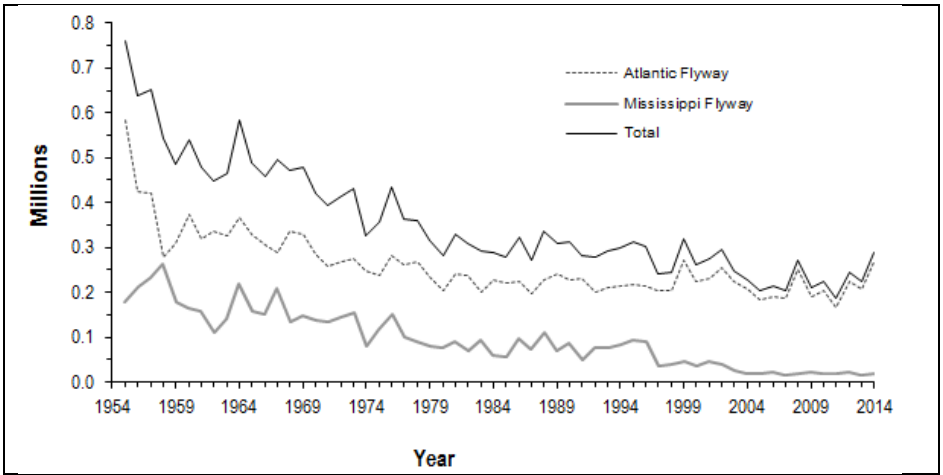


Figure 4. Population Index of Black Ducks in the Atlantic and Mississippi Flyways in Mid-winter (Survey results in the Atlantic Flyway for 2001 and in the Mississippi Flyway for 1993 and 1998 were incomplete in some states) Source: Klimstra and Padding 2014.

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Mallard (*Anas platyrhynchos*)

The Mallard is the most abundant and widely distributed dabbling duck species in Canada, as well as the most extensively hunted duck species in the country. Mallards are most abundant in the Prairie Provinces and Ontario. The population has been expanding eastward for decades and is now well established in New Brunswick and Nova Scotia, while Mallards remain rare in Prince Edward Island and Newfoundland and Labrador. In most regions of Canada, Mallard numbers remain relatively stable from year to year, or show increasing trends.

Abundance and Trends

The Mallard is monitored on its core breeding range through the Waterfowl Breeding Population and Habitat Survey in western and eastern Canada (Figure 1, Monitoring section). The species is also monitored by other smaller-scale breeding waterfowl surveys across the country, as described below.

- Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern United States

The Mallard breeding population in the area covered by this survey had recovered from the decline observed in the 1980s, but dropped again in 2001, and below the NAWMP goal of 8.2 million birds (NAWMP 2012, Figure 1), where it remained until 2006. Between 2007 and 2009, the Mallard breeding population index in the survey area oscillated around the NAWMP goal, and since then has been above the NAWMP goal (10.9 million birds in 2014). There are significant positive 5-year and 10-year trends in the entire survey area (Table 1).

The estimated abundance of Mallards in the Canadian Prairies in 2014 (4.6 million birds) was above the 2013 estimate of 4.2 million birds (Table 1), and above the NAWMP goal of 4.4 million birds for the first time since the mid-1970s (Figure 1). In western boreal Canada, the Mallard breeding population was 18% higher this year compared to the previous year, with an estimated 2.9 million birds (Table 1). There are significant increasing 5-year and 10-year trends in both regions.

Table 1. Mallard Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-yr Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	10 372 (361)	10 900 (348)	8458	0.5	5.3*	6.5*
Canadian Prairies	4165 (162)	4599 (166)	3280	–0.2	4.7*	13.5*
Western Boreal Canada	2458 (260)	2892 (246)	1983	–0.2	7.8*	8.5*
US Prairies (North Central)	3421 (186)	2917 (171)	2573	2.4*	6.6*	–0.2
Alaska	329 (38)	492 (57)	537	2.6*	–4.3*	–5.5*

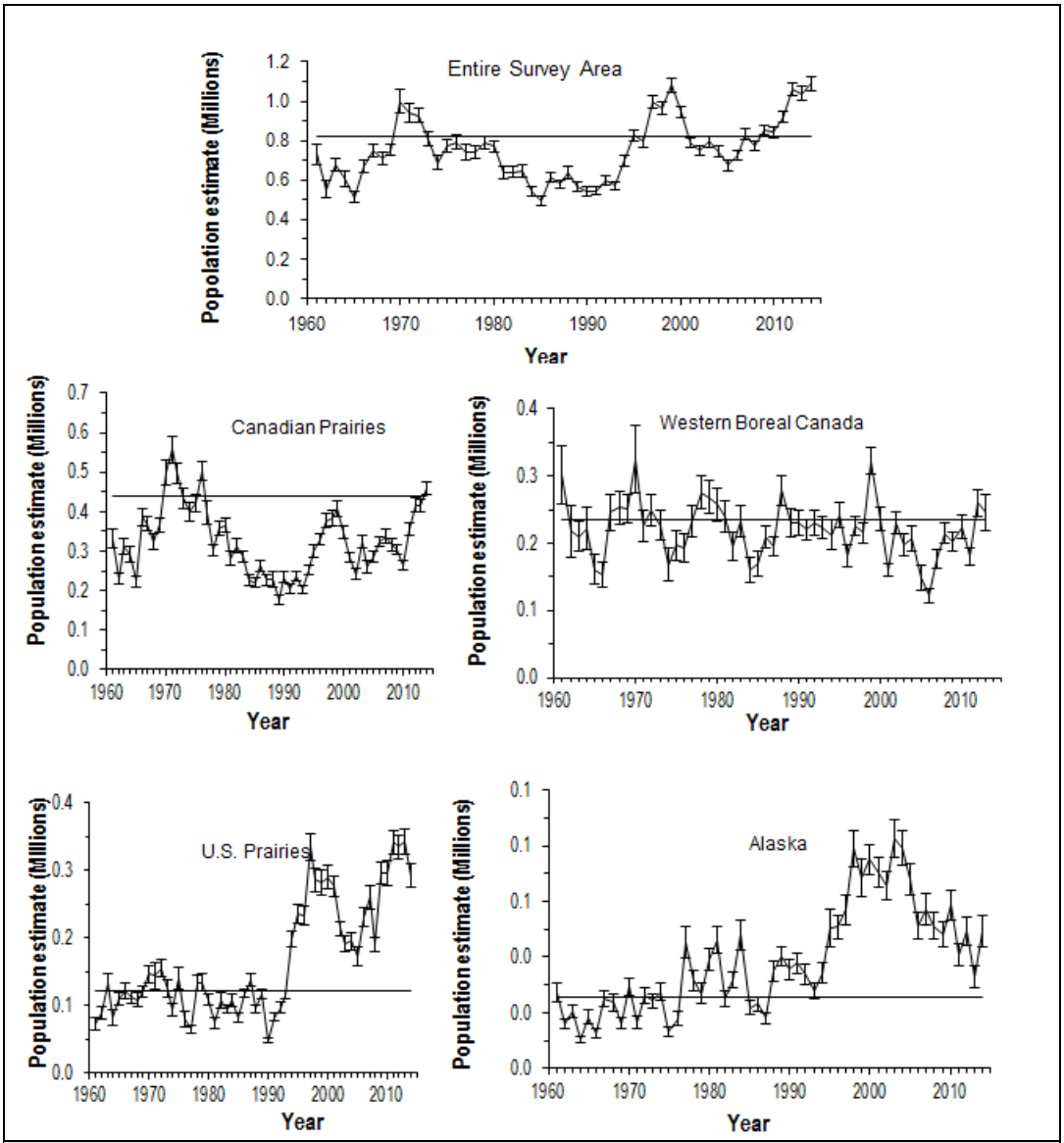

Figure 1. Mallard Breeding Population Estimates (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States (The horizontal line represents the NAWMP goal in each region of the survey).

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

The estimated abundance of Mallards in the entire survey area decreased by 11% in 2014 compared to 2013 (Table 2). However, Mallard numbers continue to exhibit increasing trends in the Atlantic Highlands and Western Boreal Shield regions, and show stable trends in the Eastern and Central Boreal Shield regions covered by the WBPHS (Figure 2).

Table 2. Breeding Population Estimates (in Thousands) of Mallards Based on the WBPHS in Eastern Canada, with 90% Credible Intervals (Results combined data from the helicopter and fixed-winged aircraft surveys; only the CWS helicopter plot survey data were used in 2013).

WBPHS - Eastern Canada	2013	2014	10-yr Average (2004–2013)
Entire Survey Area	501 (328–804)	445 (298–679)	436
Atlantic Highlands	15 (9–27)	13 (8–24)	13
Eastern Boreal Shield	1.0 (0.5–2)	1.6 (0.8–3)	2.1
Central Boreal Shield	15 (10–25)	10 (6–16)	15
Western Boreal Shield	469 (299–769)	420 (275–650)	404

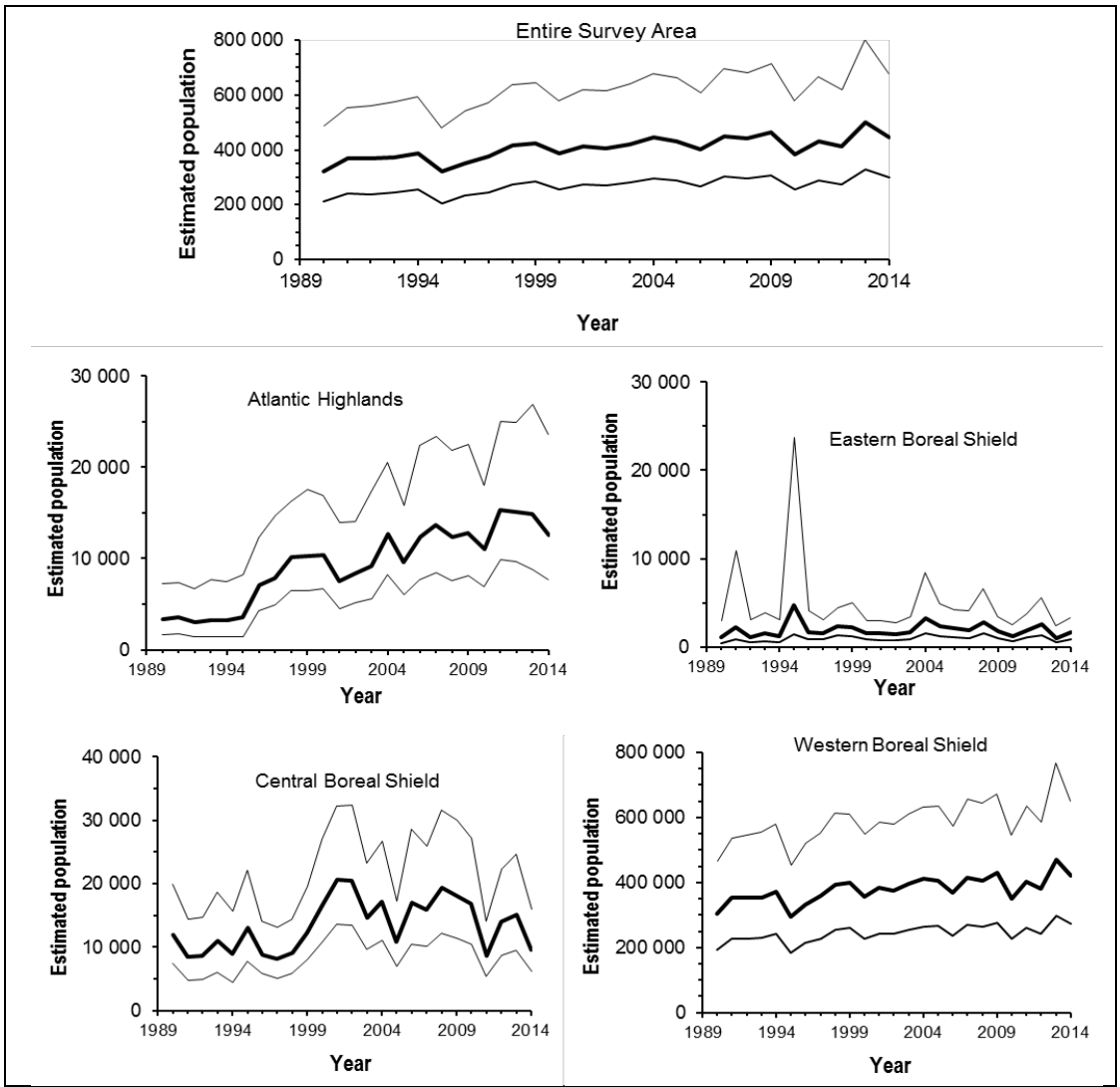

Figure 2. Breeding Population Estimates of Mallards Based on the WBPHS in Eastern Canada, with 90% Credible Intervals (The figures represent the combined results of helicopter and fixed-winged aircraft surveys; only the CWS helicopter plot survey data were used in 2013).

- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

The Mallard is by far the most abundant species in the St. Lawrence Lowlands (2–5 times more abundant than the Black Duck), with the 2014 estimate reaching 17 024 indicated breeding pairs (9% above the 5-year average). The species has experienced a slowly increasing long-term trend of 2.6% per year since 2004 (Figure 3).

Breeding Pairs			Trends	
2013	**2014**	**2010–2014**	**2004–2014**	**2010–2014**
18 803 (1 788)	17 024 (1 370)	15 616 (1 573)	2.6%	5.2%

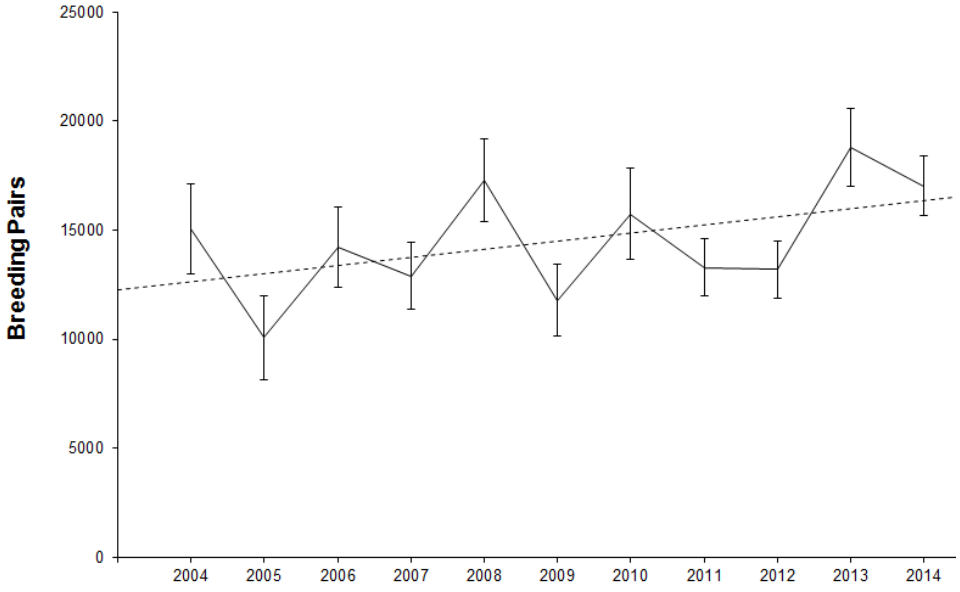

Figure 3. Indicated Breeding Pair Estimates (± 1 SE) and Trends for the Mallard in the St. Lawrence Lowlands, Quebec, 2014–2014 (Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not yet been performed).

- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

Breeding numbers for Mallards, the most abundant duck species in southern Ontario, have increased slightly since 1981–1982. In 2014, there were approximately 118 000 breeding pairs in southern Ontario, the lowest estimate for this species since the 1990s (Figure 4).

2013	2014	10-yr Trend (2005–2014)	Long-term Trend (1971–2014)
146 217 (21 797)	118 911 (18 168)	–0.4%	0.9%

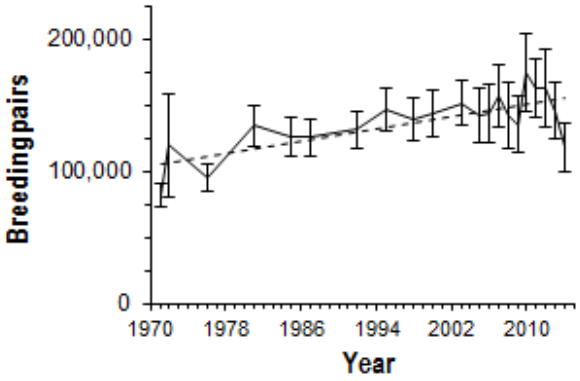

Figure 4. Indicated Breeding Pair Estimates (± 1 SE) and Trends of Mallards in Southern Ontario, 1971–2014 (Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not yet been performed).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

The Mallard is the most abundant species in central British Columbia. The species has shown a stable trend since 2008 (Figure 5).

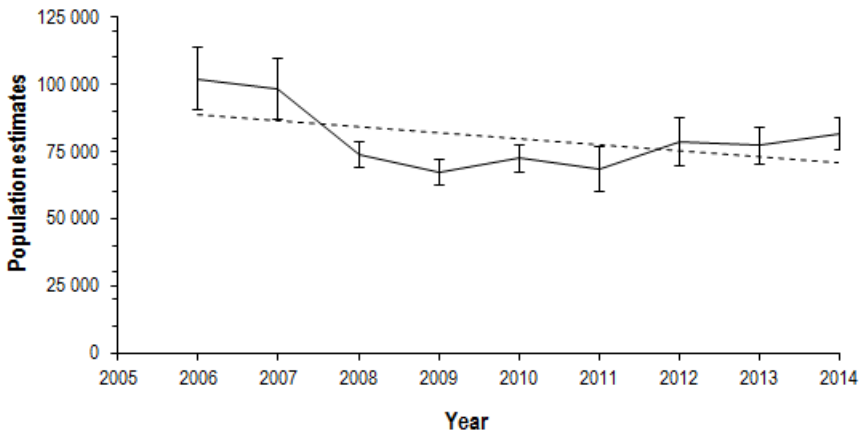

Figure 5. Total Spring Breeding Population Estimates (± 1 SE) for the Mallard, British Columbia Central Plateau, 2006–2014.

- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

In southern Yukon, the Mallard population index decreased slightly in 2014. Despite considerable variation, the population trend has been relatively stable since the mid-1990s (Figure 6).

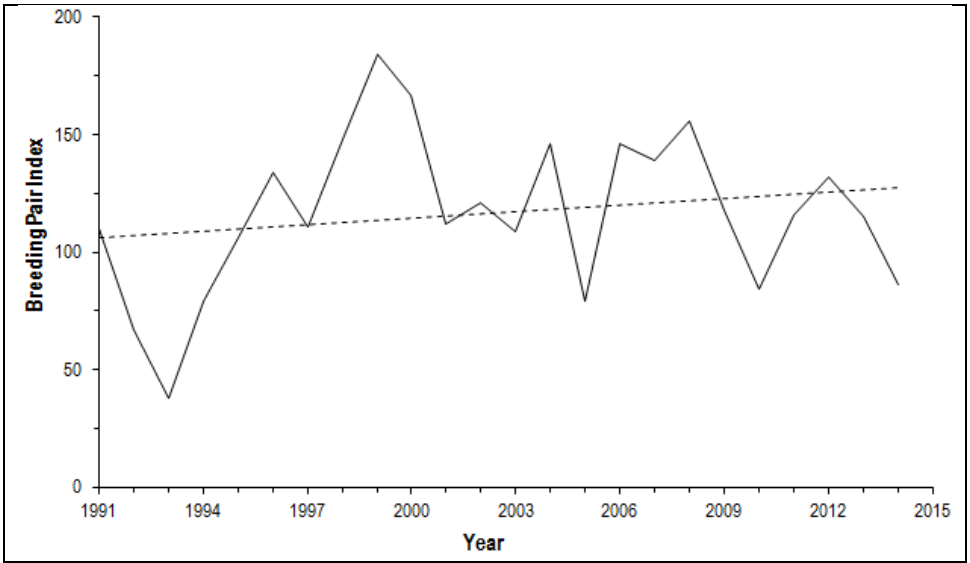

Figure 6. Breeding Pair Index for Mallards in Southern Yukon, 1991–2014.

Harvest

The Canadian Mallard harvest has declined over time concomitantly with the number of waterfowl hunters, reaching an all-time low in 2010 (Table 3). The U.S. harvest has also declined over time, but only slightly. Nevertheless, the Mallard remains the most harvested duck species in Canada and accounts for more than 40% of the total duck harvest.

Table 3. Harvest Estimates of Mallards in Canada and the United States.

	Canada													U.S[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	154	130	406	761	50 036	191 532	105 723	366 291	488 448	62 595			1266 076	4 604 760	5 870 836
1975	774	405	972	583	57 791	296 173	159 142	567 985	521 935	122 725	1 698	797	1730 980	5 021 187	6 752 167
1976	770	256	753	748	71 851	322 047	204 598	606 239	609 576	114 198	3 229	898	1935 163	5 089 879	7 025 042
1977	836	196	1 155	992	81 835	268 878	165 257	391 986	510 396	131 066	3 073	584	1556 254	4 436 025	5 992 279
1978	850	259	2 659	452	61 507	322 006	239 298	395 276	382 319	115 038	2 098	1 290	1523 052	5 024 806	6 547 858
1979	555	465	3 077	725	70 597	266 018	245 016	419 509	485 014	117 176	1 182	1 673	1611 007	4 772 481	6 383 488
1980		948	3 056	1 436	82 027	290 941	210 152	355 042	480 188	104 768	2 551	2 473	1533 582	4 650 996	6 184 578
1981	2 945	1 461	2 536	2 491	91 946	279 541	175 213	231 119	392 273	114 672	1 703	1 033	1296 933	4 342 590	5 639 523
1982	438	410	1 406	1 792	93 288	335 813	148 862	241 734	296 124	92 492	1 552		1213 911	3 907 640	5 121 551
1983	1 067	937	4 044	2 557	87 349	297 944	160 521	284 403	364 000	121 758	2 417	603	1327 600	4 419 401	5 747 001
1984	1 097	738	2 120	1 668	67 432	284 128	117 207	183 300	306 234	89 453	4 501	1 366	1059 244	3 924 516	4 983 760
1985	794	1 149	3 310	3 258	97 037	293 333	87 172	158 302	180 117	81 943	4 153	914	911 482	3 321 432	4 232 914
1986	2 933	755	3 135	2 526	84 303	265 491	112 363	151 384	182 748	72 263	811	433	879 145	3 370 312	4 249 457
1987	1 020	728	3 692	3 141	116 452	315 101	136 678	154 961	211 929	75 591	1 120	192	1020 605	3 204 515	4 225 120
1988		902	2 304	1 620	83 748	233 556	64 324	75 853	139 565	63 700	2 543	412	668 527	1 989 367	2 657 894
1989	1 280	925	4 339	2 246	79 419	263 152	70 132	75 645	188 516	57 269	438	773	744 134	2 333 286	3 077 420
1990	1 162	1 028	3 557	3 183	86 524	261 267	60 851	79 494	175 921	60 395	866	290	734 538	2 287 525	3 022 063
1991	949	1 106	3 712	4 582	84 483	229 026	60 932	70 050	122 105	51 458	94	641	629 138	2 354 562	2 983 700
1992	863	199	6 407	5 243	87 824	196 647	65 991	68 765	94 795	52 172	605	298	579 809	2 538 227	3 118 036
1993	1 025	1 178	5 029	3 755	100 032	202 647	42 969	50 351	83 094	45 181	1 178	560	536 999	2 736 658	3 273 657
1994	795	864	3 305	2 894	107 222	197 833	57 923	88 848	113 068	50 412	2 042	205	625 411	3 108 589	3 734 000
1995	532	751	4 822	5 131	83 307	176 680	74 206	104 296	111 048	40 782	1 509	278	603 342	4 405 867	5 009 209
1996	351	1 024	4 286	4 044	82 201	176 869	91 265	121 608	115 668	42 447	1 326		641 089	4 851 606	5 492 695
1997	1 461	417	8 047	5 371	77 594	178 169	107 379	133 017	151 167	55 513	437	126	718 698	5 378 576	6 097 274
1998	1 628	1 011	5 440	7 512	76 320	164 431	104 469	129 461	119 826	52 663	881	276	663 918	5 589 746	6 253 664
1999[2]	1 188	667	6 305	4 866	69 568	131 901	82 637	182 714	105 126	48 002		220	633 194	5 499 044	6 132 238
2000	1 511	1 915	5 481	5 999	81 655	162 352	78 201	195 276	107 203	49 272	510	72	689 447	5 677 925	6 367 372
2001	600	1 192	5 720	7 046	79 895	166 628	92 114	107 411	94 698	35 574	642	229	591 749	5 383 678	5 975 427
2002	299	2 175	6 498	6 001	66 532	147 844	77 991	118 856	80 706	37 370	1 701	609	546 582	4 915 597	5 462 179
2003	694	803	4 711	6 509	58 871	138 096	66 402	126 396	73 086	35 383	409	109	511 469	5 019 204	5 530 673
2004	1 985	1 100	5 245	5 227	65 284	132 186	75 968	129 627	78 269	28 515	275	36	523 717	4 527 295	5 051 012
2005	754	1 681	4 544	4 732	72 231	115 284	87 315	144 393	78 798	33 586	688		544 006	4 436 639	4 980 645
2006	753	1 122	5 460	6 389	72 245	124 751	111 026	174 174	88 533	28 928	215		613 626	4 668 411	5 282 037
2007	1 837	1 289	5 711	7 030	65 187	119 403	68 121	163 912	82 133	30 167	897	265	545 952	4 858 382	5 404 334
2008	48	1 725	4 748	5 662	69 899	119 971	60 690	150 906	97 567	35 924		488	547 628	4 554 968	5 102 596
2009	80	651	4 079	3 377	65 216	106 537	61 460	135 546	62 778	32 736		67	472 527	4 114 119	4 586 646
2010	1 319	2 197	4 057	4 683	57 138	105 904	48 076	127 207	67 681	28 057			446 319	4 166 253	4 612 572
2011	670	3 434	5 296	5 501	62 037	105 529	59 170	143 258	91 670	32 990	334		509 889	4 409 096	4 918 985
2012	767	1 475	3 060	5 682	55 862	79 180	67 173	188 383	89 249	36 160	415	928	528 334	3 935 272	4 463 606
2013		758	7 500	9 689	47 579	107 319	42 549	193 591	106 935	29 986	923		546 829	3 637 597	4 184 426

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich *et al.* 2014 (USFWS, US data)

Management and Conservation Concerns

Mallards are among the most—and perhaps are the most—sought-after waterfowl species by hunters. They are widely distributed and adaptable, breeding in habitats as diverse as the boreal forest and large cities. Mallards are the most studied waterfowl species and more effort has been directed toward their management than for any other North American duck species. There is increasing hybridization between the Mallard and the Black Duck, in part due to the eastward expansion of the Mallard's range, and this hybridization is believed to be one of the main contributing factors to the Black Duck population decline. Consequently, Mallards are a key factor in the management of the Black Duck population.

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Northern Pintail (*Anas acuta*)

The Northern Pintail is one of the most abundant waterfowl species in Canada. The species is found across the country and has its core breeding range in the Prairie Pothole Region of western Canada. Annual nest success and productivity vary with water conditions in the Prairies. As such, periods of extended drought have caused dramatic population declines, most notably in the Canadian Prairies.

Abundance and Trends

The Northern Pintail breeding population is monitored annually in western Canada through the Waterfowl Breeding Population and Habitat Survey (Figure 1, Monitoring section). Northern Pintail numbers are also monitored by smaller-scale surveys conducted outside of the WBPHS survey area, as described below.

- Waterfowl Breeding Population and Habitat Survey in Western Canada and Northwestern United States

After a sharp decline in the 1980s and early 1990s, the breeding population of Northern Pintail in the WBPHS survey area showed signs of recovery starting in the late 1990s, increasing to 3.6 million birds by 1997 (Figure 1). Pintail numbers subsequently declined again, reaching a historic low of 1.8 million birds in 2002, before rebounding to 4.4 million birds in 2011. In 2014, the population estimate was of 3.2 million birds (Table 1), still well below the NAWMP goal of 5.6 million birds.

The 2014 breeding population estimate in the Canadian Prairies (1.25 million birds) was very similar to that for 2013 (Table 1). Habitat conditions were particularly good in 2014—similar to those observed in 2013, with a very high number of ponds. The Canadian Prairie population estimate, however, remains below the NAWMP goal of 3.3 million birds (NAWMP 2012). In the Western Boreal Region, Northern Pintail numbers increased by 28% compared to 2013 (Table 1), but are still below the NAWMP goal of 407 000 birds.

Table 1. Northern Pintail Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-year average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	3335 (188)	3220 (180)	3205	–1.2*	2.3	–4.5
Canadian Prairies	1229 (82)	1250 (102)	1083	–2.3*	1.9	11.8*
Western Boreal Canada	265 (39)	338 (63)	235	–1.7*	2.8	4.2
US Prairies (North Central)	868 (82)	947 (106)	884	–0.5	13.6*	–13.9
Alaska	974 (143)	686 (82)	1002	0.5	–2.2*	–7.0*

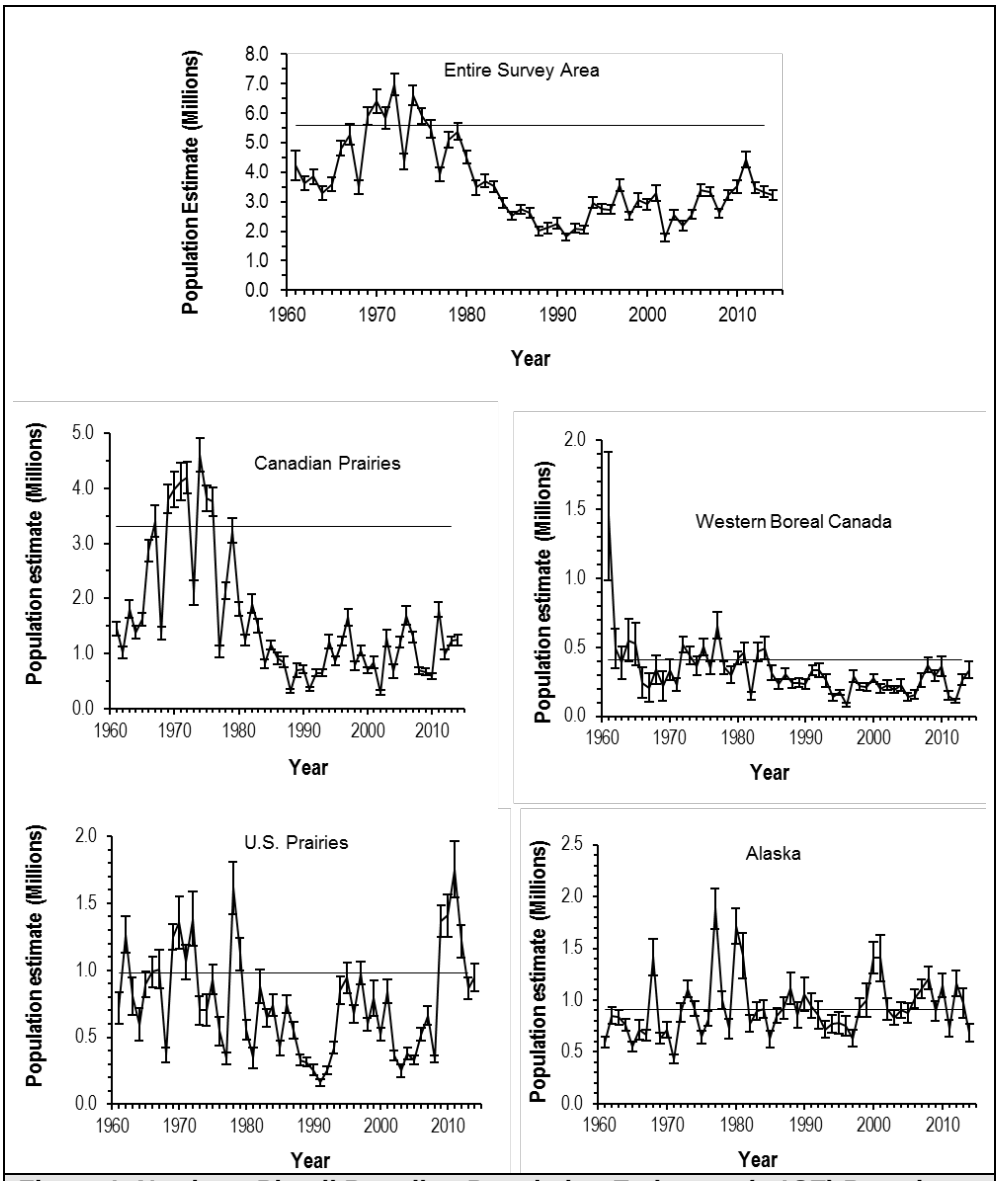

Figure 1. Northern Pintail Breeding Population Estimates (± 1SE) Based on the WBPHS in Western Canada and the Northwestern United States (Data shown are population estimates. The horizontal line represents the NAWMP population goal).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

Despite important inter-annual variation, the Northern Pintail has shown a stable trend since the beginning of the survey in 2006 (Figure 2).

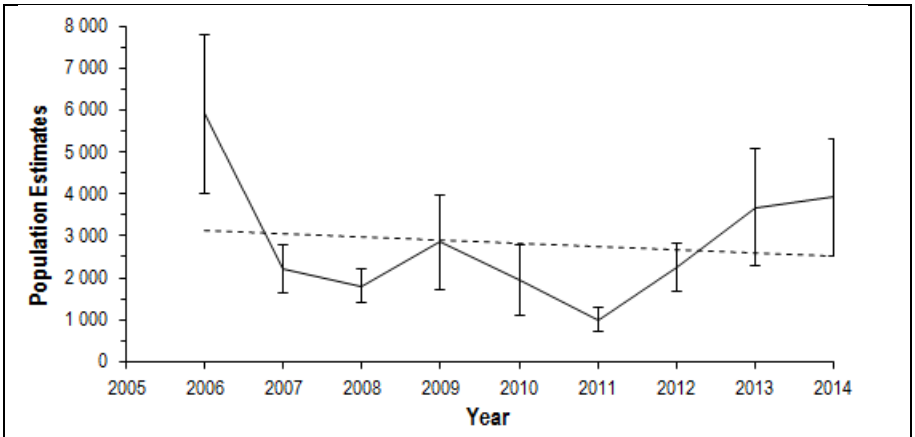

Figure 2. Population Estimates (± 1 SE) of Northern Pintails in British Columbia Central Plateau, 2006–2014.

- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

Northern Pintail numbers have shown a stable long-term trend in the southern Yukon since the beginning of the survey in 1991 (Figure 3).

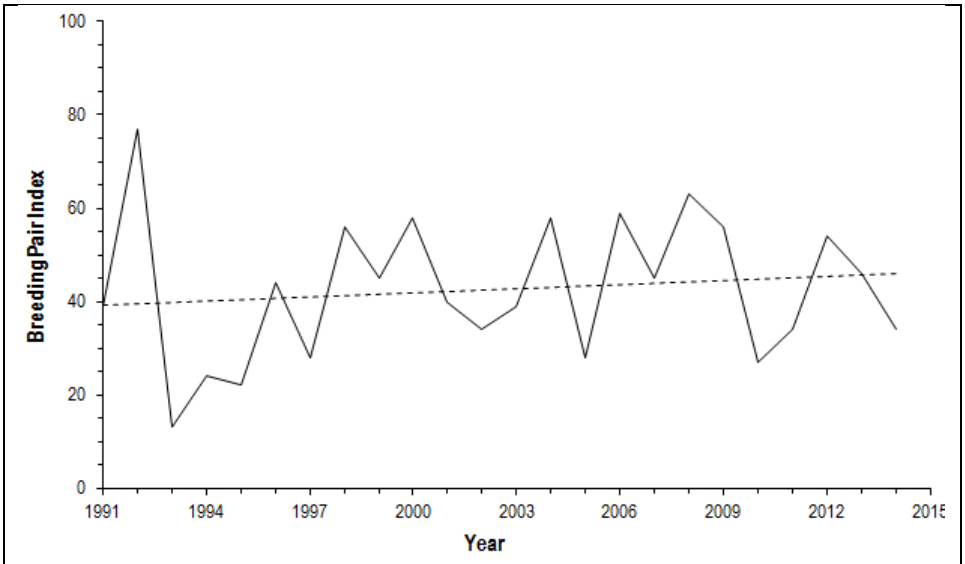

Figure 3. Breeding Pair Index for the Northern Pintail in Southern Yukon, 1991–2014.

Harvest

In Canada, the pintail harvest has decreased by approximately 70–80% since the 1980s. This decline is consistent with the decrease in abundance observed for the population, as well as in hunter numbers (Table 2).

Table 2. Harvest Estimates of Northern Pintails in Canada and the United States.

	Canada													U.S.[1] Continental	
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	939	820	659	790	14 043	8 296	7 545	39 226	69 214	14 281			155 813	1 248 305	1 404 118
1975	1 092	431	612	787	21 999	9 644	20 611	55 909	81 637	23 758	72	417	216 969	1 566 686	1 783 655
1976	1 507	651	2 663	352	27 578	17 112	17 545	34 693	59 532	38 626	385	277	200 921	1 322 166	1 523 087
1977	2 438	1 653	1 717	607	39 581	14 333	11 243	20 469	69 905	29 464	137	313	191 860	985 055	1 176 915
1978	824	829	1 892	1 039	21 298	13 077	21 072	14 051	38 039	22 830	698	216	135 865	1 337 507	1 473 372
1979	1 693	579	1 056	382	14 958	9 326	19 745	30 588	48 505	17 735	691	287	145 545	1 320 392	1 465 937
1980	905	510	757	1 384	16 722	13 248	12 872	16 868	44 003	21 392		108	128 769	1 080 571	1 209 340
1981	1 536	747	951	1 144	17 437	11 977	16 099	2 430	39 745	18 658	91	148	110 963	790 803	901 766
1982		1 531	1 009	1 479	20 791	10 946	13 290	12 598	29 130	14 021			104 795	791 353	896 148
1983	2 805	523	694	303	15 867	10 767	11 195	17 056	27 154	13 385	1 864	175	101 788	809 817	911 605
1984	1 698	1 047	717	908	9 253	10 132	13 131	12 343	34 016	19 661	168	337	103 411	666 255	769 666
1985	1 459	748	1 460	1 817	16 486	15 345	9 668	8 117	24 051	11 244		810	91 205	523 330	614 535
1986	634	565	846	1 841	13 163	9 057	6 988	9 077	8 632	8 885		296	59 984	456 235	516 219
1987	807	2 218	632	1 017	11 864	6 020	5 478	8 386	19 668	10 945		158	67 193	537 942	605 135
1988	1 998	1 449	486	715	12 160	8 019	13 779	5 320	14 667	10 831			69 424	199 100	268 524
1989	1 421	660	344	1 406	15 460	11 511	7 560	4 326	11 766	8 549	45		63 048	262 712	325 760
1990	4 114	450	653	1 707	19 568	8 231	5 279	10 087	13 483	7 750	281	41	71 644	236 271	307 915
1991	351	542	901	844	9 357	4 742	4 407	4 023	5 689	4 179	112	73	35 220	209 701	244 921
1992		910	79	464	6 221	4 861	5 236	2 126	6 914	6 393	136	77	33 417	216 158	249 575
1993	1 090	1 336	852	706	11 401	5 156	5 172	3 253	4 025	4 701	61		37 753	248 406	286 159
1994	934	765	1 163	1 136	11 307	4 649	4 866	7 302	7 518	4 738		64	44 442	310 549	354 991
1995	1 727	454	965	1 240	7 831	4 552	8 974	6 521	7 573	4 476			44 313	522 602	566 915
1996	1 246	478	897	1 234	5 043	4 011	10 323	14 477	9 621	5 367			52 697	520 170	572 867
1997	785	139	116	493	7 423	5 560	13 248	13 656	13 883	5 422	37		60 762	695 410	756 172
1998	1 026		653	757	7 735	6 361	14 347	11 099	11 119	6 462	19	276	59 854	572 168	632 022
1999 [2]	390	1 137	755	1 790	8 956	6 457	9 830	10 610	10 304	5 464		0	55 693	539 520	595 213
2000	470	509	499	581	6 480	5 397	8 766	16 168	13 603	5 825	50		58 348	511 249	569 597
2001	137		400	610	4 910	3 708	9 215	7 050	8 730	4 806	18	59	39 643	434 952	474 595
2002	1 153	77	542	702	5 526	9 908	13 878	13 053	7 640	4 549			57 028	323 409	380 437
2003	571	598	227	1 270	6 794	10 420	8 998	8 687	8 204	1 947	234		47 950	341 113	389 063
2004	30	316	129	701	6 393	5 207	12 623	23 801	8 379	2 361			59 940	306 032	365 972
2005	256	313	308	536	4 677	3 178	6 653	13 450	10 769	3 675			43 815	406 262	450 077
2006	176	939	90	382	5 067	4 861	8 579	11 853	12 527	2 004	39		46 517	430 341	476 858
2007	228	584	660	634	5 533	5 059	13 329	18 054	10 085	2 410	224		56 800	521 998	578 798
2008	427	252	393	427	4 887	5 745	7 911	15 076	12 833	2 989			50 940	536 519	587 459
2009		190	104	504	4 039	4 684	4 582	17 226	6 138	2 837		2	40 306	498 762	539 068
2010	321	943	824	609	6 266	6 480	4 862	13 530	6 728	2 228			42 791	694 530	737 321
2011	302		578	263	3 287	1 670	6 188	20 217	14 053	2 755			49 313	809 973	859 286
2012		435	62		2 216	2 364	2 519	15 474	14 307	4 464			41 841	683 446	725 287
2013	612	671	696	721	7 060	4 850	3 796	19 243	15 786	2 357			55 792	538 467	594 259

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward. Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich et al. 2014 (USFWS, US data)

Management and Conservation Concerns

Although the species is not considered to be threatened, numbers for the Northern Pintail have remained below the NAWMP continental goal for several decades and have not fully recovered despite several years of favourable water conditions on the Prairies. This suggests that the habitat carrying capacity was significantly reduced on a continental scale (NAMWP 2012). Furthermore, the expansion of agriculture and changes in farming practices likely contribute to the disappeareance of potential breeding habitats.

References

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North American Waterfowl Management Plan (NAWMP), Plan Committee. 2012. North American Waterfowl Management Plan 2012: People Conserving Waterfowl and Wetlands. Canadian Wildlife Service, U.S. Fish and Wildlife Service, Secretaria de Medio Ambiente y Recursos Naturales. 48 pp.

Raftovich, R.V., S. Chandler, and K.A. Wilkins. 2014. Migratory bird hunting activity and harvest during the 2012–13 and 2013–14 hunting seasons. U.S. Fish and Wildlife Service, Laurel, Maryland, USA.

Green-winged Teal (*Anas crecca*)

In Canada, the Green-winged Teal has a vast breeding range that extends from Alaska to Newfoundland and Labrador. In the north, its breeding range extends to the tree line. Unlike many other dabbling ducks, the species has its core breeding range not in the Prairie Potholes, but in the boreal forest. The Green-winged Teal is the most harvested duck species after the Mallard and the Black Duck.

Abundance and Trends

In western Canada, Green-winged Teal numbers have increased steadily since the early 1990s, whereas in eastern Canada, they have remained relatively stable over the same time period.

The Green-winged Teal population is monitored on its core breeding range through the Waterfowl Breeding Population and Habitat Survey in western and eastern Canada (Figure 1 in the Monitoring section). The species is also monitored by other smaller-scale breeding waterfowl surveys across the country, as described below.

- Waterfowl Breeding Populations and Habitat Survey in Western Canada and the Northwestern United States

The population shows a significant long-term increase in the entire survey area (Table 1) and exceeds the NAWMP population objective of 1.9 million birds (NAWMP 2012). The 2014 estimates for the boreal forest of western Canada and the Canadian Prairies are similar to the 2013 estimates, and show significant increasing trends over the 10-year period (Table 1 and Figure 1).

Table 1. Green-winged Teal Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and Northwestern United states (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS - Western Canada and the Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-year Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	3053 (174)	3440 (247)	2942	1.6*	3.8	0.2
Canadian Prairies	831 (73)	910 (78)	751	1.1	8.0*	10.7*
Western Boreal Canada	1602 (136)	1835 (224)	1354	1.3*	8.0*	4.3
US Prairies (North Central)	184 (62)	221 (46)	169	2.5*	8.3	-6.9
Alaska	436 (49)	474 (52)	704	4.2*	-4.7*	-15.7*

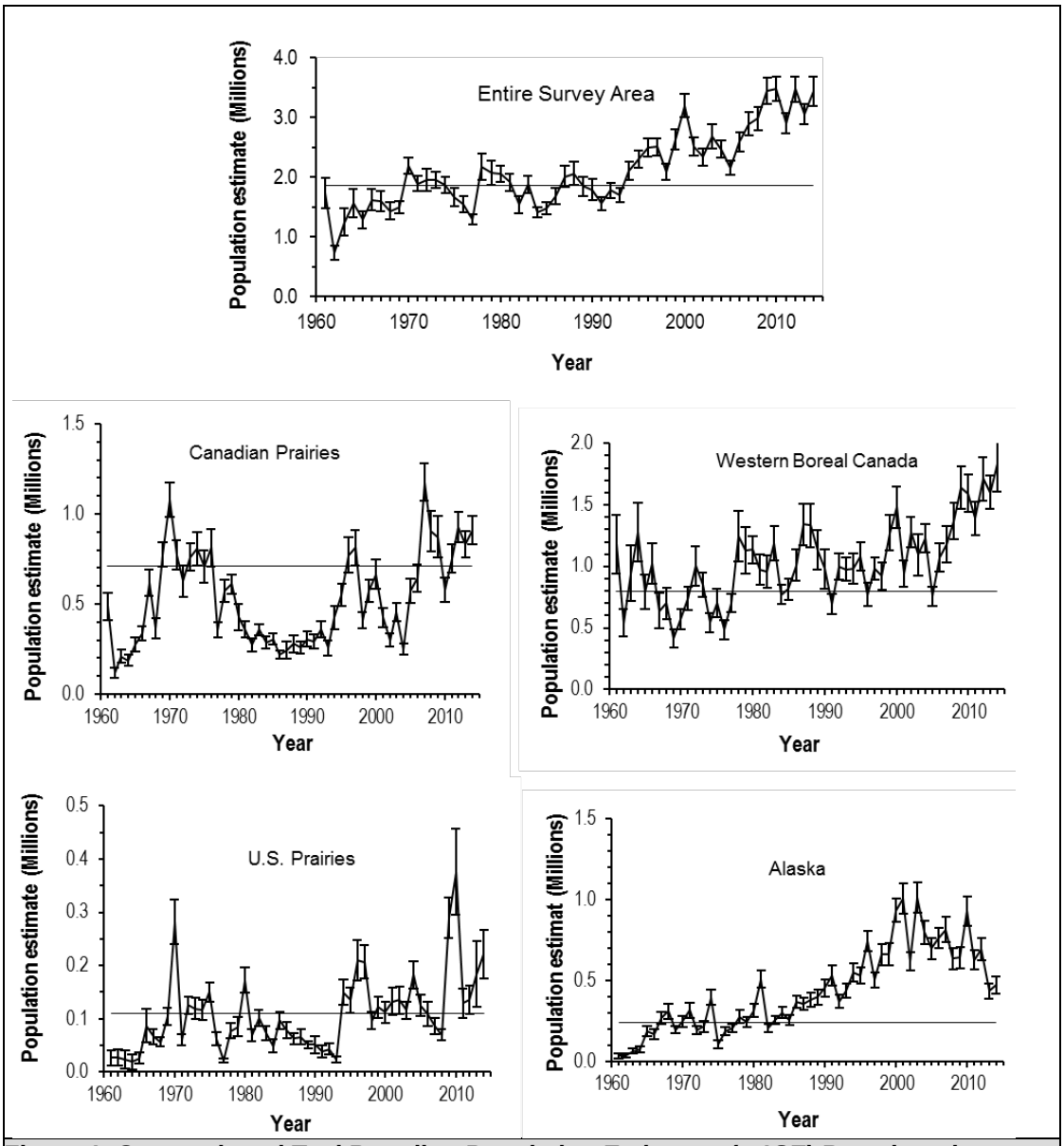

Figure 1. Green-winged Teal Breeding Population Estimates (± 1SE) Based on the WBPHS in Western Canada and the Northwestern United States (The horizontal line represents the NAWMP population goal).

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

The estimated abundance of Green-winged Teals in the entire survey area decreased by 19% in 2014 compared to the 2013 estimate (Table 2). Overall, this species continues to exhibit stable trends in the eastern survey area of the WBPHS (Figure 2).

Table 2. Green-winged Teal Breeding Population Estimates (in Thousands) Based on the WBPHS in Eastern Canada, with 90% Credible Intervals (Results combined data from the helicopter and fixed-winged aircraft surveys; the 2013 estimates were based on the CWS helicopter plot survey only).

WBPHS - Eastern Canada	2013	2014	10-year Average (2005–2014)
Entire Survey Area	292 (231–380)	236 (187–305)	278
Atlantic Highlands	48 (32–76)	37 (26–55)	43
Eastern Boreal Shield	92 (62–144)	96 (67–148)	92
Central Boreal Shield	47 (31–72)	32 (19–50)	47
Western Boreal Shield	97 (66–149)	66 (43 – 101)	90

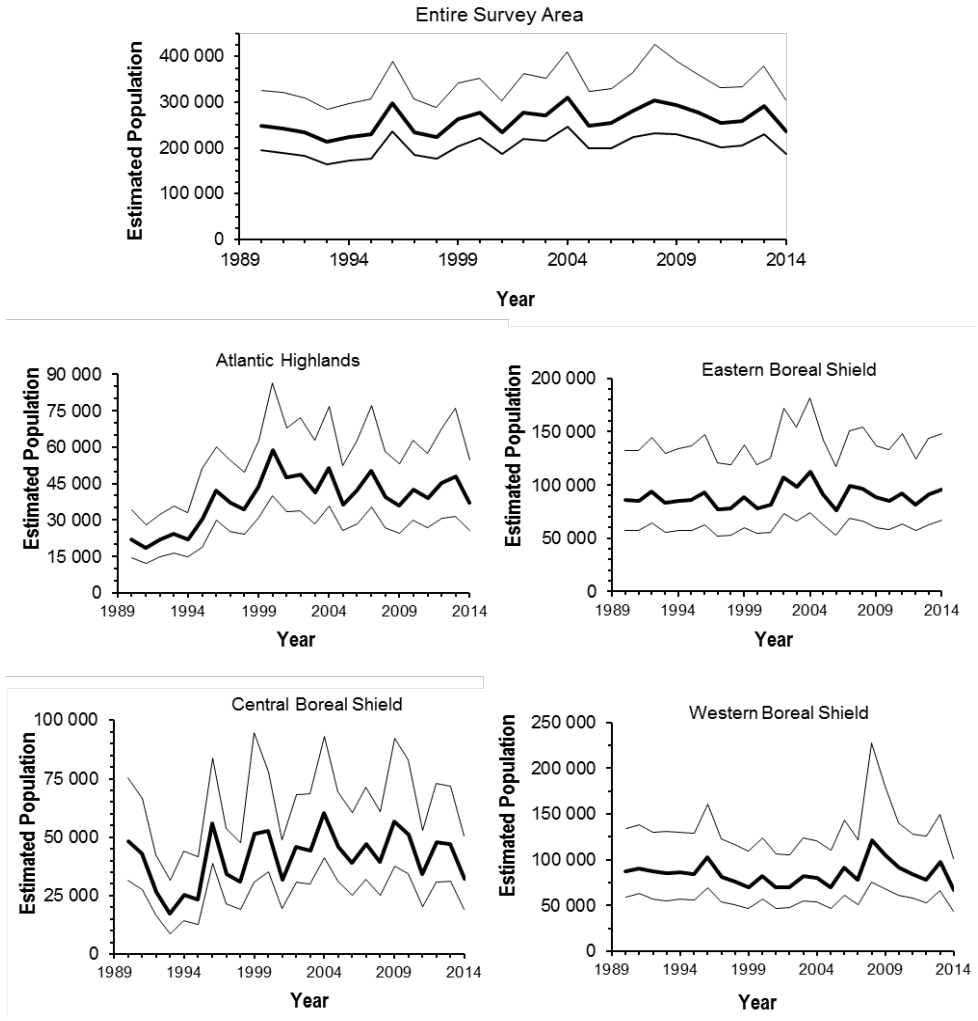

Figure 2. Green-winged Teal Breeding Population Estimates Based on the WBPHS in Eastern Canada, with 90% Credible Intervals (The figures represent the results of helicopter and fixed-winged aircraft surveys; only the CWS helicopter plot survey data were used in 2013).

- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

The Green-winged Teal shows an increasing long-term trend in the St. Lawrence Lowlands in spite of annual variation (Figure 3).

Breeding Pairs (± 1 SE)			Trends	
2013	**2014**	**2010–2014**	**2004–2014**	**2010–2014**
2 947 (685)	3 811 (1 086)	3 890 (1 122)	3.2%	–5.5%

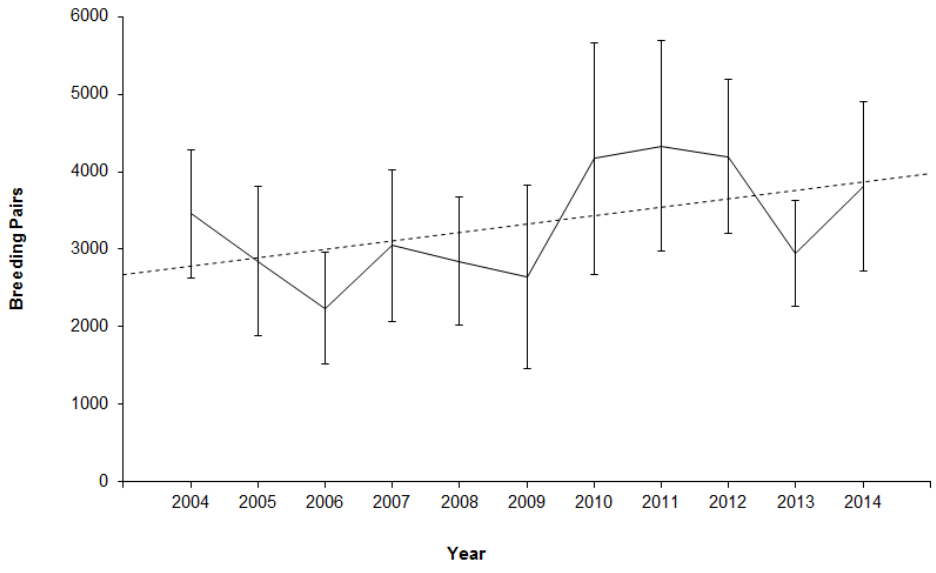

Figure 3. Indicated Breeding Pairs Estimates (± 1SE) and Trends for the Green-winged Teal in the St. Lawrence Lowlands, Québec, 2004–2014
(Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not yet been performed).

- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

Breeding pair estimates for the Green-winged Teal often show significant year-to-year variability, mainly because of the species' generally low abundance within the survey area (Figure 4). However, the Green-winged Teal shows an overall slightly increasing trend in southern Ontario.

2013	2014	10-year Trend (2005–2014)	Long-term Trend (1971–2014)
2461 (1434)	9991 (4886)	–7.56%	0.6%

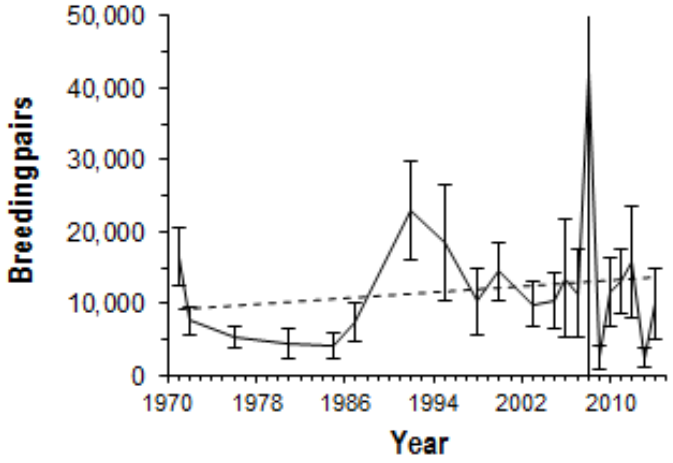

Figure 4. Indicated Breeding Pair Estimates (± 1SE) and Trends for the Green-winged Teal in Southern Ontario, 1971–2014
(Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not been performed yet).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

Green-winged Teal numbers have been decreasing slightly since the beginning of the survey in 2006 (Figure 5).

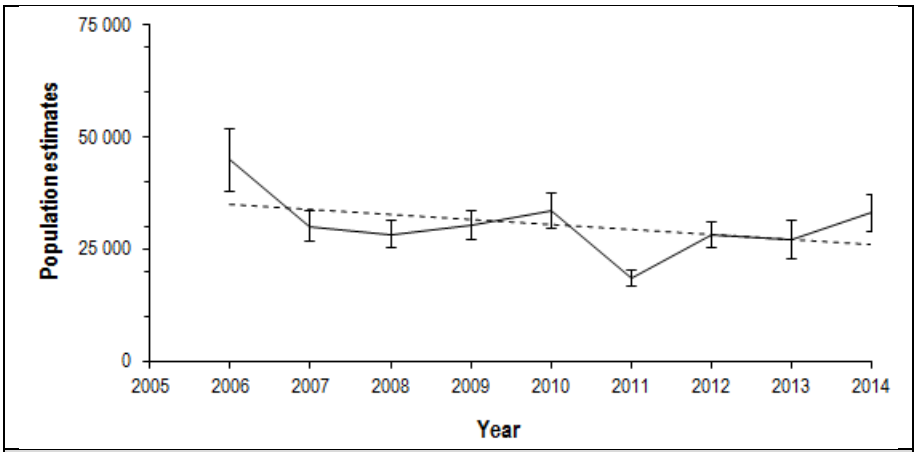

Figure 5. Population Estimates (± 1 SE) of Green-winged Teals in British Columbia Central Plateau, 2006–2014.

- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

The Green-winged Teal breeding pair index has shown significant year-to-year variations, but population estimates suggest a relatively stable long-term trend since 1991, when the survey was initiated (Figure 6).

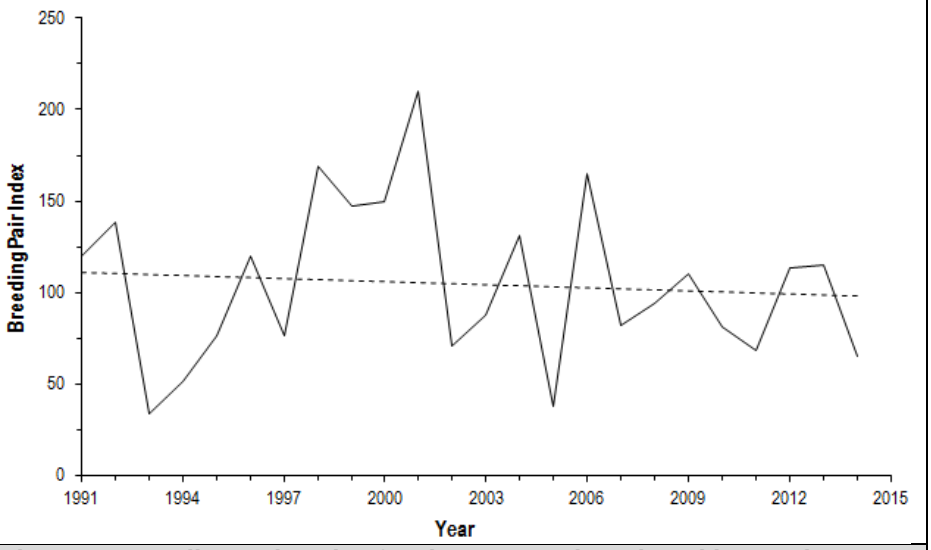

Figure 6. Breeding Pair Index for the Green-winged Teal in Southern Yukon, 1991–2014.

Harvest

In Canada, the Green-winged Teal harvest has been declining steadily, likely because of the decreasing number of hunters since 1970 (Table 3). The U.S. harvest has shown less variation.

Management and Conservation Concerns

Little attention has been given to the management of this species because the Green-winged Teal is a widely distributed and relatively abundant species in Canada.

Table 3. Harvest Estimates of Green-winged Teals in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	24 378	8 287	15 743	10 860	48 341	37 467	7 035	7 680	15 596	15 942			191 329	1 234 312	1 425 641
1975	23 578	7 395	10 541	9 209	39 802	40 630	10 061	11 210	30 229	18 700	149	323	201 827	1 948 376	2 150 203
1976	13 293	7 690	12 596	10 885	67 860	46 868	14 011	11 075	27 753	23 137	949	36	236 153	1 945 056	2 181 209
1977	22 375	6 566	13 933	10 207	81 930	50 099	15 655	9 086	26 850	34 938	61	221	271 921	1 864 393	2 136 314
1978	26 472	6 264	12 083	14 365	60 456	39 522	14 085	6 363	19 866	25 935	526	265	226 202	1 996 615	2 222 817
1979	16 621	5 232	8 731	7 355	35 609	31 260	10 647	8 259	17 756	19 118	569	113	161 270	1 696 651	1 857 921
1980	12 382	7 027	14 408	6 180	45 549	43 429	13 420	3 859	12 983	15 599	123	194	175 153	1 473 799	1 648 952
1981	18 366	6 044	10 702	9 331	47 132	43 684	14 730	5 565	7 732	12 722	119		176 127	1 280 322	1 456 449
1982	14 770	8 129	9 926	7 990	66 339	38 129	7 231	3 652	32 557	15 078			203 801	1 274 764	1 478 565
1983	10 945	5 509	8 571	12 857	42 581	37 548	11 230	5 080	13 000	15 203	160	257	162 941	1 282 982	1 445 923
1984	13 061	5 990	9 404	7 888	40 286	31 378	5 259	3 712	8 785	19 824	59	18	145 664	1 270 111	1 415 775
1985	21 046	7 125	13 518	13 311	60 816	42 239	7 231	3 878	11 167	16 105		163	196 599	1 034 277	1 230 876
1986	12 378	6 133	13 162	9 757	54 939	39 889	8 495	6 761	6 858	12 675	577	386	172 010	1 039 741	1 211 751
1987	8 140	5 607	8 014	7 030	40 585	31 332	9 649	5 014	9 704	9 189		203	134 467	1 246 353	1 380 820
1988	6 434	7 471	8 997	7 438	51 785	36 160	9 324	3 827	2 759	11 091			145 286	647 573	792 859
1989	11 071	6 108	23 255	12 560	68 469	40 838	7 941	3 484	8 732	13 138	44		195 640	921 575	1 117 215
1990	10 656	3 977	19 363	12 306	89 578	39 871	9 634	1 474	4 964	8 076	113		200 012	816 863	1 016 875
1991	7 329	6 137	7 871	5 945	39 825	31 697	3 529	2 218	3 996	4 415	102		113 064	665 837	778 901
1992	5 067	3 787	9 623	6 630	29 630	27 013	5 099	1 560	5 031	5 492	62	111	99 105	730 921	830 026
1993	7 184	6 011	12 065	8 257	41 950	37 717	3 505	3 071	5 229	7 283	34		132 306	795 934	928 240
1994	15 246	3 447	14 362	7 006	41 550	27 962	6 188	2 418	4 090	4 479		89	126 837	948 081	1 074 918
1995	9 860	7 234	15 203	14 164	49 699	34 639	3 626	3 314	3 308	4 407		83	145 537	1 512 103	1 657 640
1996	7 795	2 756	11 185	5 061	22 846	20 454	7 049	6 176	5 333	4 680		199	93 534	1 382 920	1 476 454
1997	9 303	4 958	7 661	7 270	30 007	27 343	11 496	4 442	5 129	3 670	99		111 378	1 855 297	1 966 675
1998	7 101	2 534	13 028	5 468	32 809	34 985	8 595	9 410	4 114	6 529	120		124 693	2 344 966	2 469 659
1999 [2]	6 892	5 537	17 056	10 319	54 580	41 976	10 606	536	3 614	3 574		67	154 757	2 031 028	2 185 785
2000	7 133	1 419	6 515	10 871	49 103	24 263	8 014	2 581	2 840	3 681	38		116 458	1 651 197	1 767 655
2001	4 718	3 579	7 033	5 755	28 592	21 031	6 840	5 603	3 439	2 745		91	89 426	1 401 573	1 490 999
2002	3 877	3 851	6 339	6 775	27 993	32 954	12 775	9 489	4 467	3 234			111 754	1 345 341	1 457 095
2003	3 968	4 571	7 250	5 992	24 291	28 678	6 084	3 007	3 121	3 781	176		90 919	1 489 713	1 580 632
2004	3 536	2 275	6 562	4 281	21 651	15 015	8 373	2 060	5 503	2 189	275		71 720	1 373 554	1 445 274
2005	2 557	2 266	4 824	5 163	22 238	14 333	8 820	3 114	5 268	2 859	344		71 786	1 500 479	1 572 265
2006	3 460	3 644	4 399	6 095	22 863	15 245	5 884	4 012	3 074	1 152			69 828	1 658 728	1 728 556
2007	4 748	1 146	9 914	8 295	33 295	14 682	7 223	6 671	3 735	1 936		265	91 910	1 951 195	2 043 105
2008	3 993	1 217	6 691	4 541	34 817	16 608	5 205	6 683	5 884	2 286		244	88 169	1 997 466	2 085 635
2009	2 734	1 412	3 789	2 111	28 018	18 258	3 573	1 147	4 162	2 158			67 362	1 694 074	1 761 436
2010	3 695	1 783	6 825	5 381	23 309	18 058	3 846	6 030	4 432	2 472			75 831	2 012 046	2 087 877
2011	4 120	1 719	2 473	4 136	16 276	8 834	5 835	3 534	5 326	1 570	334		54 157	1 949 432	2 003 589
2012	584	3 398	4 779	3 523	21 546	13 815	6 453	4 362	4 311	1 120			63 891	2 029 587	2 093 478
2013	4 772	471	3 405	5 244	26 768	16 466	13 529	6 969	3 734	1 626			82 984	1 711 307	1 794 291

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway.
[2]The USFWS implemented an improved national harvest survey in 1999.
The results for years prior to 1999 are not directly comparable to those from 1999 onward.
Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich *et al.* 2014 (USFWS).

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Blue-winged Teal (*Anas discors*)

The Blue-winged Teal breeds throughout much of Canada, but its core breeding range is located in the Prairie Potholes. This species is one of the first duck species to migrate south in the fall and one of the last to migrate north in the spring.

Abundance and Trends

The Blue-winged Teal population is monitored on the species' core breeding range through the Waterfowl Breeding Population and Habitat Survey in western Canada (Figure 1, Monitoring section). The species is also monitored by other smaller-scale breeding waterfowl surveys across the country, as described below.

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

The continental population is well above the NAWMP goal of 4.7 million birds, as is the Canadian Prairie population is also above the NAWMP goal for this region (NAMWP 2012; Figure 1). However, the Western Boreal population has been below the NAWMP goal since the 1990s. Blue-winged Teal numbers shows significant 10-year and short-term increasing trends in the Canadian Prairies, as well as significant 10-year increasing trends in the U.S. Prairies and the entire survey area (Table 1).

Table 1. Blue-winged Teal Breeding Population and Trend Estimates Based on the WBPHS Western Canada and Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS – western Canada and the northwestern United States	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-yr Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	9242 (425)	7732 (363)	6740	1.2*	7.9*	4.3
Canadian Prairies	3855 (281)	4418 (281)	2975	1.0	5.2*	20.5*
Western Boreal Canada	426 (78)	423 (84)	356	–0.7	–2.7	18.5
U.S. Prairies (North Central)	3451 (244)	3701 (356)	3407	2.1*	10.6*	–6.7
Alaska	0	0	2	3.2	NA	NA

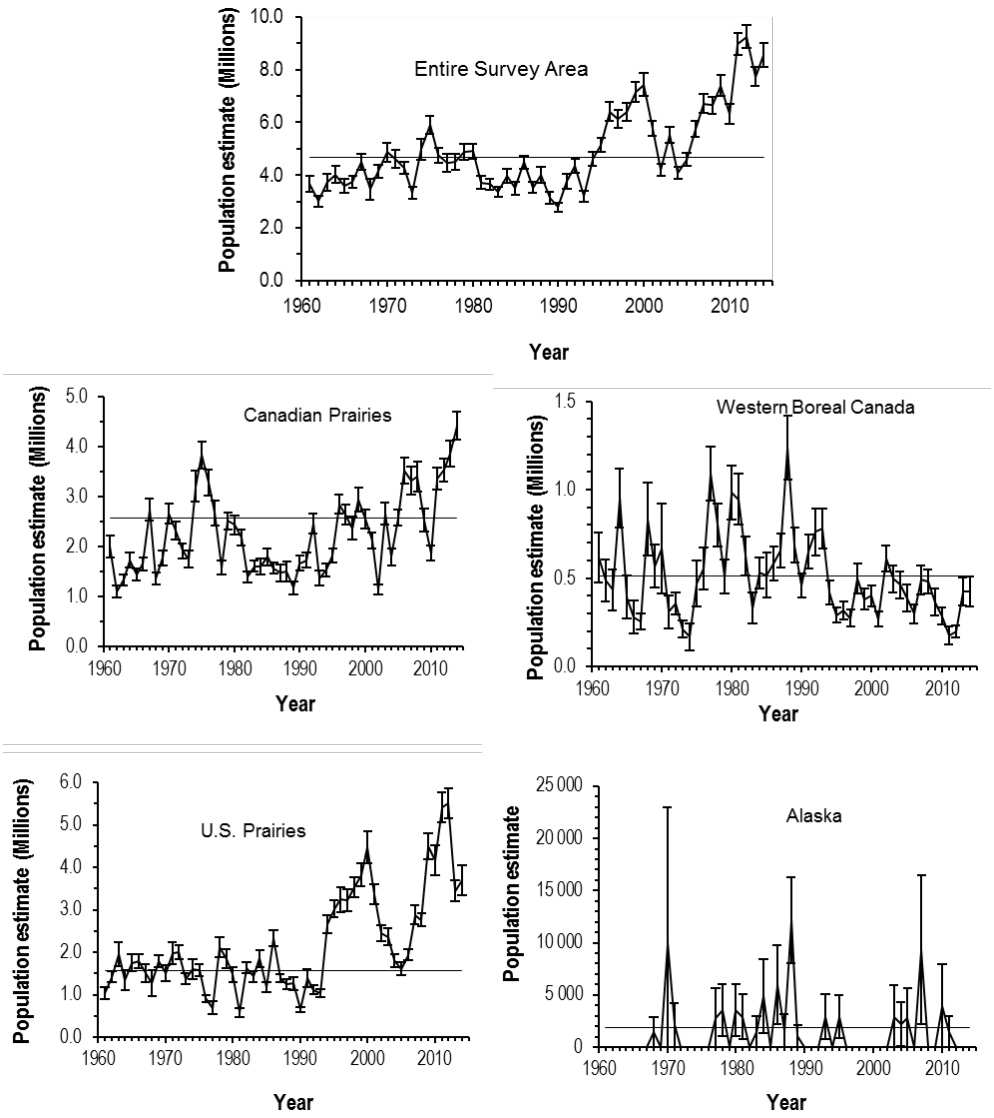

Figure 1. Blue-winged Teal Breeding Population (± 1SE) and Trend Estimates Based on the WBPHS Western Canada and Northwestern United States (The horizontal line represents the NAWMP goal in each region of the survey).

- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

The breeding population of Blue-winged Teal in Southern Ontario has exhibited a long-term declining trend since the early 1970s (6.5% annually; Figure 2). The specific causes of the decline are unknown (S. Meyer, CWS-Ontario Region, pers. comm.).

2013	2014	Recent Trend (2005–2014)	Long-term Trend (1971–2014)
2051 (1476)	812 (893)	–33.2%	–6.5%

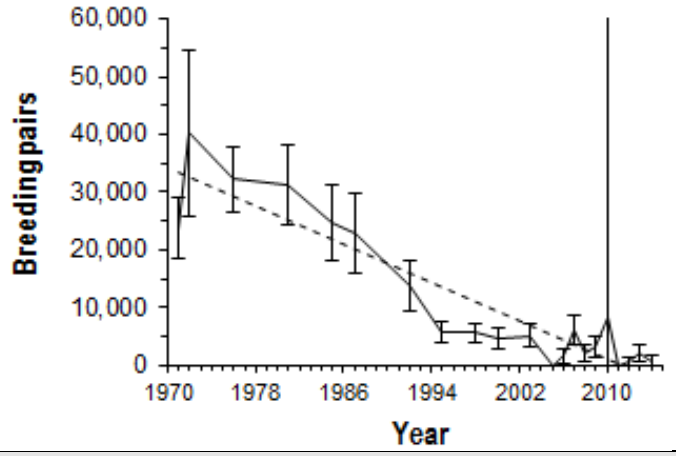

Figure 2. Indicated Breeding Pair Estimates (± 1SE) and Trends for the Blue-winged Teal in Southern Ontario, 1971–2014 (Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not yet been performed).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

The Blue-winged Teal is a common species in central British Columbia. The species displays a stable trend (Figure 3).

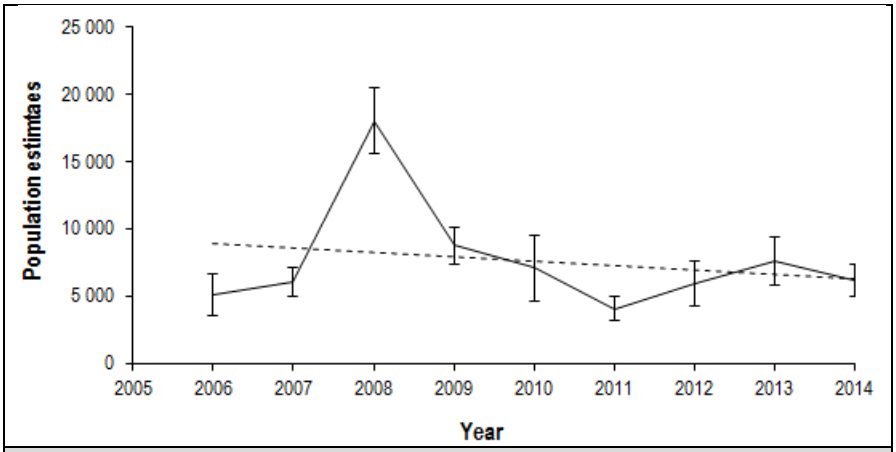

Figure 3. Population Estimates (± 1 SE) of Blue-winged Teals in Spring in British Columbia Central Plateau, 2006–2014.

- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

In southern Yukon, the Blue-winged Teal population increased slightly in 2014. The population index has varied considerably since 1991, but overall it appears to be slightly decreasing (Figure 4).

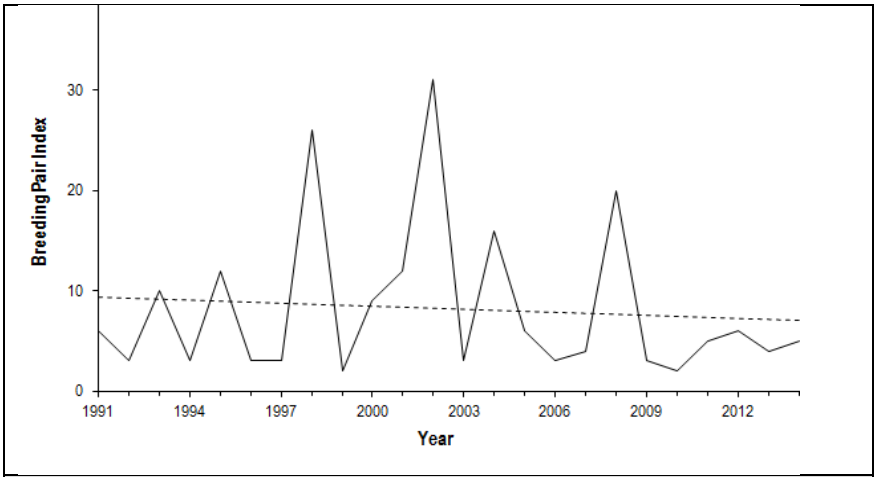

Figure 4. Breeding Pair Index for the Blue-winged Teal in Southern Yukon, 1991–2014.

Harvest

The Blue-winged Teal does not account for a significant portion of the hunter harvest in Canada. It is one of the earliest migrants in spring and most adult males have left Canada before the opening of the hunting season in the fall. Consequently, the majority of the Blue-winged Teal harvest in Canada is of hatch-year birds. Most Blue-winged Teals actually overwinter in areas south of the United States, which also limits the harvest in the U.S. Table 2 shows harvest estimates for the Blue-winged Teal in Canada and the United States.

In Quebec, because of the constant decline observed in the species' population (Brousseau and Lepage 2013), the CWS restricts its harvest.

Management and Conservation Concerns

The population status of the Blue-winged Teal is greatly influenced by wetland conditions on the prairie breeding grounds. In eastern Canada, the intensification of agriculture and the increased destruction of favourable habitat in the recent decades are thought to be the main factors responsible for the decline of the Blue-winged Teal in Quebec and Ontario (Ross 2010; Brousseau and Lepage 2013).

Table 2. Harvest Estimates of Blue-winged Teals in Canada and the United States.

	Canada													U.S.[1, 2]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	T/NU	YT	Total	Total	Total
1974	400	722	1 232	3 307	36 248	27 932	7 076	25 636	25 679	1 093			129 325	763 099	892 424
1975	1 542	1 205	1 320	6 666	33 367	52 772	10 365	22 036	21 655	738	37	156	151 859	1 115 870	1 267 729
1976	848	1 275	1 907	6 098	54 127	48 667	17 858	21 001	31 190	3 457			186 428	830 371	1 016 799
1977	1 394	780	2 045	3 901	42 181	35 650	9 673	14 232	25 947	8 190	318	12	144 323	735 887	880 210
1978	1 505	1 155	1 200	5 472	35 914	47 618	9 556	13 473	20 912	1 754		36	138 595	967 443	1 106 038
1979	293	786	1 567	5 883	13 885	31 895	15 198	17 485	19 750	2 367			109 109	974 717	1 083 826
1980		382	1 571	4 016	10 499	26 081	11 628	9 561	26 535	1 112	45		91 430	625 092	716 522
1981	556	542	1 188	2 638	8 615	25 760	11 502	4 637	12 226	3 634			71 298	618 975	690 273
1982		685	1 351	3 925	14 472	33 083	12 280	2 256	10 909	180			79 141	930 900	1 010 041
1983	660	2 064	1 673	7 152	16 465	46 447	13 052	9 615	16 635	840		39	114 642	1 174 660	1 289 302
1984	462	1 619	1 299	5 126	10 426	28 142	6 013	4 786	11 991	2 296			72 160	1 147 549	1 219 709
1985	846	807	1 052	4 095	9 230	22 639	3 973	4 065	10 033	1 608			58 348	680 576	738 924
1986	313	563	1 494	4 774	9 439	31 869	9 551	7 090	8 130	601	106		73 930	741 711	815 641
1987	129	527	994	2 675	7 921	20 421	5 193	2 387	5 178	1 549			46 974	544 248	591 222
1988		892	410	2 212	5 934	18 668	10 065	2 261	1 709	1 121			43 272	125 544	168 816
1989	681	565	438	1 851	5 990	17 064	4 038	3 066	7 776	959	16		42 444	170 341	212 785
1990	351	1 186	219	3 925	4 220	18 942	1 592	1 802	3 693	1 642			37 572	171 938	209 510
1991		1 861	481	1 317	4 325	12 368	800	4 420	2 509	966			29 047	159 136	188 183
1992		250	314	1 464	3 181	10 278	3 739	994	1 742	497			22 459	339 694	362 153
1993	1 077	778	290	2 930	5 715	11 564	2 574	997	2 824	441			29 190	327 699	356 889
1994	1 122	539	735	5 078	6 017	11 460	2 912	3 179	2 562	333			33 937	548 931	582 868
1995	1 462	2 043	2 041	6 629	7 553	12 771	7 344	8 957	2 553	57			51 410	962 303	1 013 713
1996	297	673	1 022	4 565	4 704	16 045	11 094	8 839	6 416	284			53 939	1 080 325	1 134 264
1997	144	1 326	165	3 085	5 053	14 816	6 999	12 214	8 463	239			52 504	1 091 494	1 143 998
1998			546	2 379	2 827	8 821	7 642	13 811	3 820	317	19		40 182	1 123 180	1 163 362
1999 [3]		446	463	1 813	5 312	17 594	6 097	4 270	4 954	84			41 033	1 154 577	1 195 610
2000	309	258	147	2 496	2 606	9 333	5 280	4 614	3 723	351			29 117	1 202 640	1 231 757
2001	235	543	344	2 699	3 957	13 486	9 283	8 767	2 347	491	48		42 200	1 119 339	1 161 539
2002	117	234	299	1 463	2 049	5 199	9 209	5 201	4 533	660			28 964	760 065	789 029
2003	114	76	624	2 260	1 843	6 199	6 933	10 689	6 909	28			35 675	966 318	1 001 993
2004	78	256	235	962	1 627	3 820	5 947	9 779	7 328	92			30 124	738 948	769 072
2005	100	749	1 111	2 201	3 532	7 469	4 694	11 464	8 951	267			40 538	703 533	744 071
2006		195	114	614	933	5 413	5 824	11 872	12 237	51			37 253	940 965	978 218
2007		106	202	1 287	1 695	4 731	5 312	12 263	10 676	253			36 525	1 121 151	1 157 676
2008		108	224	1 165	1 235	5 004	13 309	15 132	7 894	221			44 292	843 920	888 212
2009		531	207	1 172	2 849	5 552	5 965	2 624	2 931	104			21 935	1 190 638	1 212 573
2010		1 377	521	3 852	3 517	5 180	5 802	12 249	6 048				38 546	1 072 665	1 111 211
2011		248	511	2 363	1 991	5 603	11 266	22 787	4 652				49 421	1 251 149	1 300 570
2012		103	529	1 375	4 395	8 439	10 472	15 466	5 641	80			46 500	1 427 447	1 473 948
2013		384	187	561	1 248	3 882	20 242	38 943	12 572	328			78 347	1 465 318	1 543 665

[1]Including harvest of Cinnamon Teal. 2AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway.

[3]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward. Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich et col. 2014 (USFWS, US data)

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American Wigeon (*Anas americana*)

The American Wigeon's breeding range is centred in western Canada. It breeds in Alaska, northern Yukon and the Northwest Territories, as well as farther south in the Canadian Prairies.

Abundance and Trends

The American Wigeon is monitored on its core breeding range through the Waterfowl Breeding and Habitat Survey in western Canada (Figure 1, Monitoring section), as well as through smaller-scale surveys in Yukon and Bristish Columbia, as described below.

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

Breeding densities for the American Widgeon tend to be high in the prairie and parkland habitats of the southern Prairie Provinces in wet years, when pond density is high. In dry years, birds tend to travel farther north to breed.

Population estimates and trends are shown in Table 1 and Figure 1. The 2014 continental population estimate was above the NAWMP population objective (3.0 million birds; NAWMP 2012) for the first time in more than 15 years. In the Canadian Prairies, the American Wigeon population has been well below the NAWMP population goal of 1.2 million birds for decades (Figure 1). In the Western Boreal Region, the population has been above the NAWMP goal (1 262 000 birds) since 2013, this after a decade-long period when it remained below the population objective.

Table 1. American Wigeon Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS—Western Canada and the Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-year Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	2644 (169)	3117 (190)	2341	–0.2	1.6	7.7
Canadian Prairies	576 (47)	511 (49)	451	–2.0*	3.6*	11.2*
Western Boreal Canada	1372 (152)	1685 (1160)	917	–0.6	5.8*	23.0*
U.S. Prairies (North Central)	160 (33)	235 (41)	199	1.3	3.1	–10.8
Alaska	535 (48)	686 (81)	775	3.7*	–4.4*	–6.8*

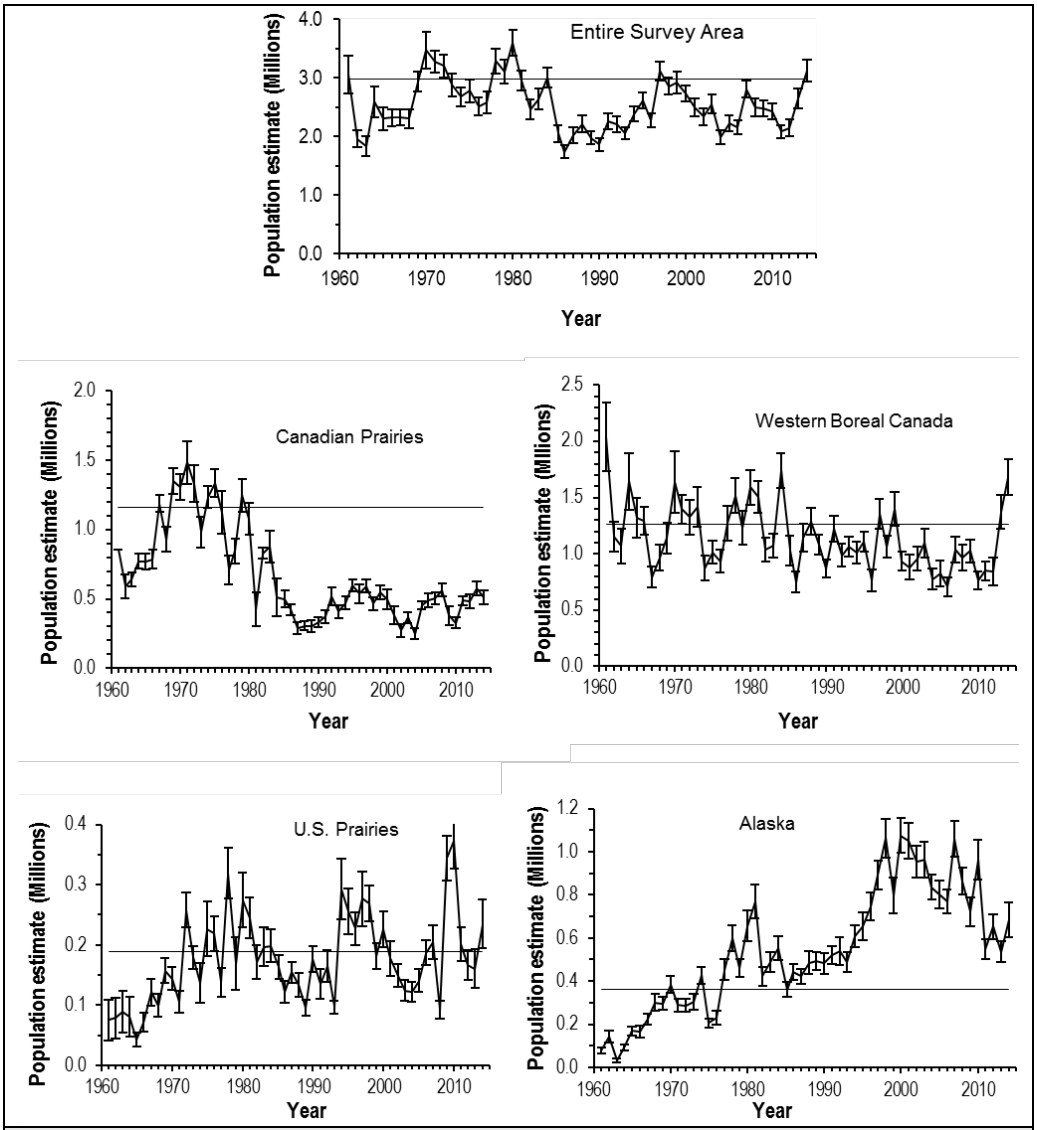

Figure 1. American Wigeon Breeding Population Estimates (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States (The horizontal line represents the NAWMP population goal in each region of the survey).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

The American Wigeon is one of the most abundant species in central British Columbia. The species has exhibited a declining trend since 2006 (Figure 2).

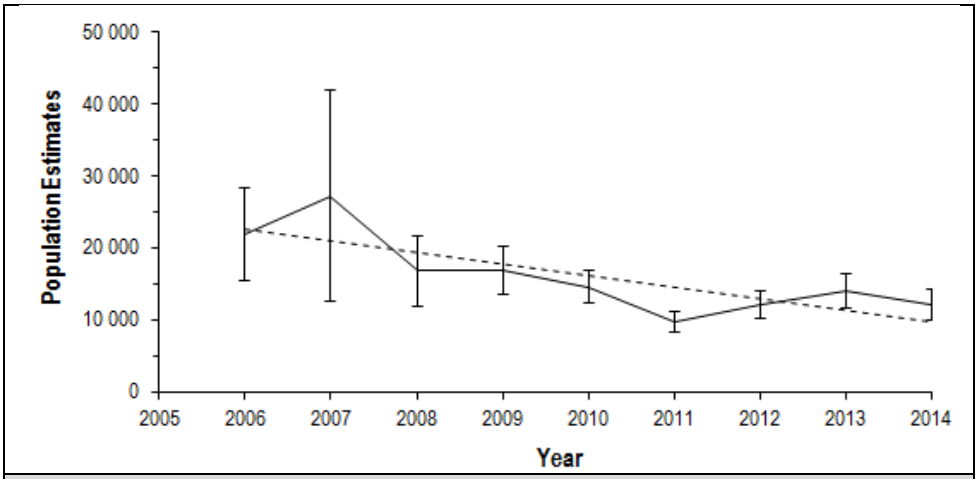

Figure 2. Population Estimates (± 1 SE) of American Wigeons in Spring in British Columbia Central Plateau, 2006–2014.

- *COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY*

In southern Yukon, the American Wigeon population index decreased in 2014 relative to previous years. Despite year-to-year variations, the population has been declining since the end of 1990s (Figure 3).

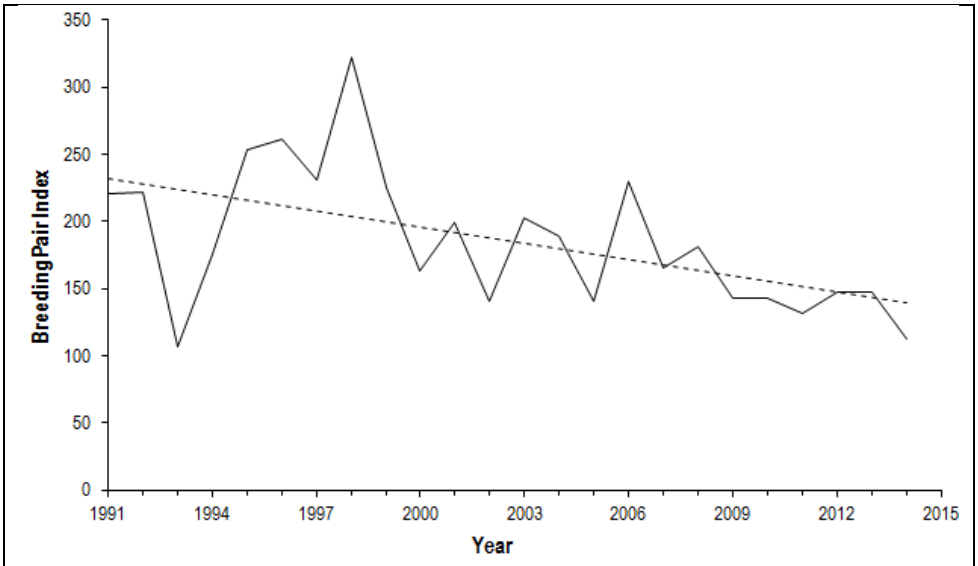

Figure 3. Breeding Pair Index and Trend for the American Wigeon in Southern Yukon, 1991–2014.

Harvest

Approximately 30 000 American Wigeons are shot by hunters every year in Canada, with the greatest harvest taking place in B.C. Most of the American Wigeon harvest is in the U.S. The 2013 harvest of American Wigeon in Canada (27 335 birds) is the lowest estimate since the beginning of the harvest survey in 1974 (Table 2).

Table 2. Harvest Estimates of American Wigeons in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974		308	459	799	8 457	12 516	9 436	24 598	38 187	33 893			128 653	741 147	869 800
1975		166	585	1 683	6 053	17 944	13 798	28 585	49 977	38 830	543	513	158 677	934 094	1 092 771
1976	560	155	334	1 685	11 268	23 333	11 332	27 886	38 400	29 854	1 334	812	146 953	1 028 743	1 175 696
1977	1 027	180	377	1 476	9 735	13 441	10 776	25 699	55 882	34 596	321	232	153 742	923 947	1 077 689
1978	534	299	207	1 436	6 864	22 063	13 011	26 105	34 341	28 477	1 497	254	135 088	1 053 552	1 188 640
1979	123	197	334	1 646	9 143	25 768	9 726	19 335	25 305	27 512	615	514	120 218	980 327	1 100 545
1980		308	303	1 692	7 189	16 303	9 269	13 034	23 477	22 538	227	86	94 426	891 106	985 532
1981	217	357	215	1 007	6 392	13 283	7 962	11 957	18 432	17 712	761		78 295	690 402	768 697
1982	379	468	595	2 134	5 719	10 528	4 482	11 713	22 357	23 299			81 674	716 828	798 502
1983	961	233	340	2 589	8 527	17 351	7 250	9 322	19 949	24 883	2 160	379	93 944	696 762	790 706
1984	545	216	492	1 566	4 284	15 008	6 495	9 037	16 543	23 088	816	565	78 655	632 582	711 237
1985	197		515	1 275	5 684	16 191	5 222	7 672	13 778	21 192		292	72 018	482 820	554 838
1986	270	455	384	2 655	6 906	14 059	9 509	11 918	13 236	15 858	480	221	75 951	546 436	622 387
1987		630	481	2 213	5 439	10 588	7 524	7 329	11 706	14 583			60 493	498 641	559 134
1988		272	137	1 155	2 932	8 810	4 349	3 964	7 966	16 481		444	46 510	272 453	318 963
1989	1 065	513	471	2 211	5 504	12 717	5 787	5 468	10 133	14 352			58 221	361 334	419 555
1990	95	219	331	1 440	5 408	15 724	1 992	4 095	5 569	12 045	451	82	47 451	384 791	432 242
1991	627	888	434	1 160	2 736	12 245	2 494	1 213	3 780	11 897	323	364	38 161	371 402	409 563
1992		789	438	2 439	6 373	12 870	3 784	3 203	5 653	9 808	164	126	45 647	367 883	413 530
1993	657	269	259	1 784	7 336	9 155	3 728	4 201	7 259	10 480	251	78	45 457	356 206	401 663
1994	1 247	180	522	1 403	4 649	8 410	4 872	3 707	6 585	12 018		15	43 608	468 751	512 359
1995	247	77	690	3 211	3 720	8 301	1 426	5 332	5 433	8 500		782	37 719	775 000	812 719
1996		195	744	1 853	3 217	7 529	7 699	6 674	10 240	12 388	331	199	51 069	774 592	825 661
1997	90	419	281	3 517	3 567	9 017	9 343	6 416	6 666	9 803	202	28	49 349	835 048	884 397
1998	141	98	1 298	1 361	3 197	7 499	2 314	7 790	4 899	14 626	56	276	43 555	803 680	847 235
1999[2]	31	335	518	1 095	2 785	5 565	5 027	4 969	5 265	9 254			34 844	822 024	856 868
2000		621	351	2 025	2 863	6 919	5 770	6 355	6 880	9 991		65	41 840	774 927	816 767
2001		2 855	624	1 839	3 559	6 563	5 782	5 364	7 644	8 383	85		42 698	739 026	781 724
2002			489	1 019	2 018	7 465	5 167	7 103	6 791	9 257	1 188	261	40 758	665 204	705 962
2003			771	1 698	2 873	5 049	6 068	2 808	6 669	7 203	644		33 783	594 736	628 519
2004	714	135	176	1 349	1 365	4 328	4 708	5 608	9 739	6 817	275		35 214	749 953	785 167
2005			794	1 260	1 641	8 559	7 080	10 954	7 961	8 915	688		47 852	701 424	749 276
2006		51	674	997	2 601	11 479	3 120	9 433	7 927	6 746	97		43 125	854 218	897 343
2007	244		403	1 287	1 270	5 213	3 521	5 227	7 468	6 497		1 325	32 455	818 847	851 302
2008		75	677	1 013	1 997	5 772	1 631	4 001	6 362	8 097			29 625	873 113	902 738
2009		212	167	924	748	5 503	2 311	3 873	7 686	6 153		22	27 599	711 765	739 364
2010	375	281	659	929	1 743	6 580	3 372	5 372	3 869	8 813			31 993	713 749	745 742
2011	575	744	1 526	1 093	1 263	5 863	1 550	8 992	5 777	9 797	167		37 347	758 249	795 596
2012		577	109	1 378	1 138	5 086	1 755	5 954	5 210	9 844	331		31 382	775 990	807 372
2013			1 110	705	2 231	8 642	3 098	2 527	2 710	5 851	461		27 335	638 214	665 549

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2]The USFWS implemented an improved national harvest survey in 1999.

The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich *et al.* 2014 (USFWS, US data)

Management and Conservation Concerns

The continental population of American Wigeon declined in the 1980s due to a prolonged drought in the Prairies. In the 1990s, however, habitat conditions in western North America improved and the species' breeding range exhibited a continued eastward expansion. These two factors have allowed the continental population of the American Wigeon to recover partially, numbers in 2014 were above the population objective for only the second time since the 1980s.

Wetland water levels in the Prairies are a determining factor in the success of breeding populations in western and central portions of the continent. In the Canadian Prairies, the expansion of agriculture has significantly reduced the habitat for many waterfowl species. In the United States, the loss and degradation of habitat on staging and wintering areas represents a serious problem for the American Wigeon (Mowbray 1999).

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Gadwall (*Anas strepera*)

The Gadwall is a common duck species found in Canada, with its core breeding area located in the Prairies. The species has shown a dramatic population increase throughout most of its range and has doubled since the 1990s, following a period of prolonged drought in the 1980s.

Abundance and Trends

The Gadwall's core breeding area is located in the Prairie Provinces. The breeding population has been increasing in size since the early 1990s (Figure 1) and the breeding distribution has been expanding to eastern Canada and the northwestern U.S. (Leschack et al. 1997).

The Gadwall is monitored in its core breeding area mainly through the Waterfowl Breeding Population and Habitat Survey in western Canada (WBPHS; Figure 1, Monitoring section), as described below.

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHERN WESTERN UNITED STATES

Gadwall show significant increasing long-term, 10-year, and short-term trends in the Canadian Prairies, as well as at the continental level (Table 1). The population has doubled in size since the 1990s (Figure 2). In the U.S. Prairies, long-term and 10-year trends also suggest an increasing population. Gadwall populations are above the NAWMP goals in most parts of the survey area (NAWMP 2012; Figure 1), and the population size in the entire survey area is more than twice the objective of 1.5 million birds.

Table 1. Gadwall Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS- Western Canada and Northwestern U.S.	Breeding Population Indices (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-year Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	3351 (205)	3811 (206)	2990	2.3*	4.2*	5.1*
Canadian Prairies	1772 (127)	2256 (141)	1524	1.6*	3.7*	13.2*
Western Boreal Canada	47 (9)	79 (13)	99	2.1	-7.6	-0.7
U.S. Prairies (North Central)	1531 (160)	1476 (150)	1366	3.5*	6.9*	-2.4
Alaska	1.3 (0.9)	0	2	3.6	-53.2	NA

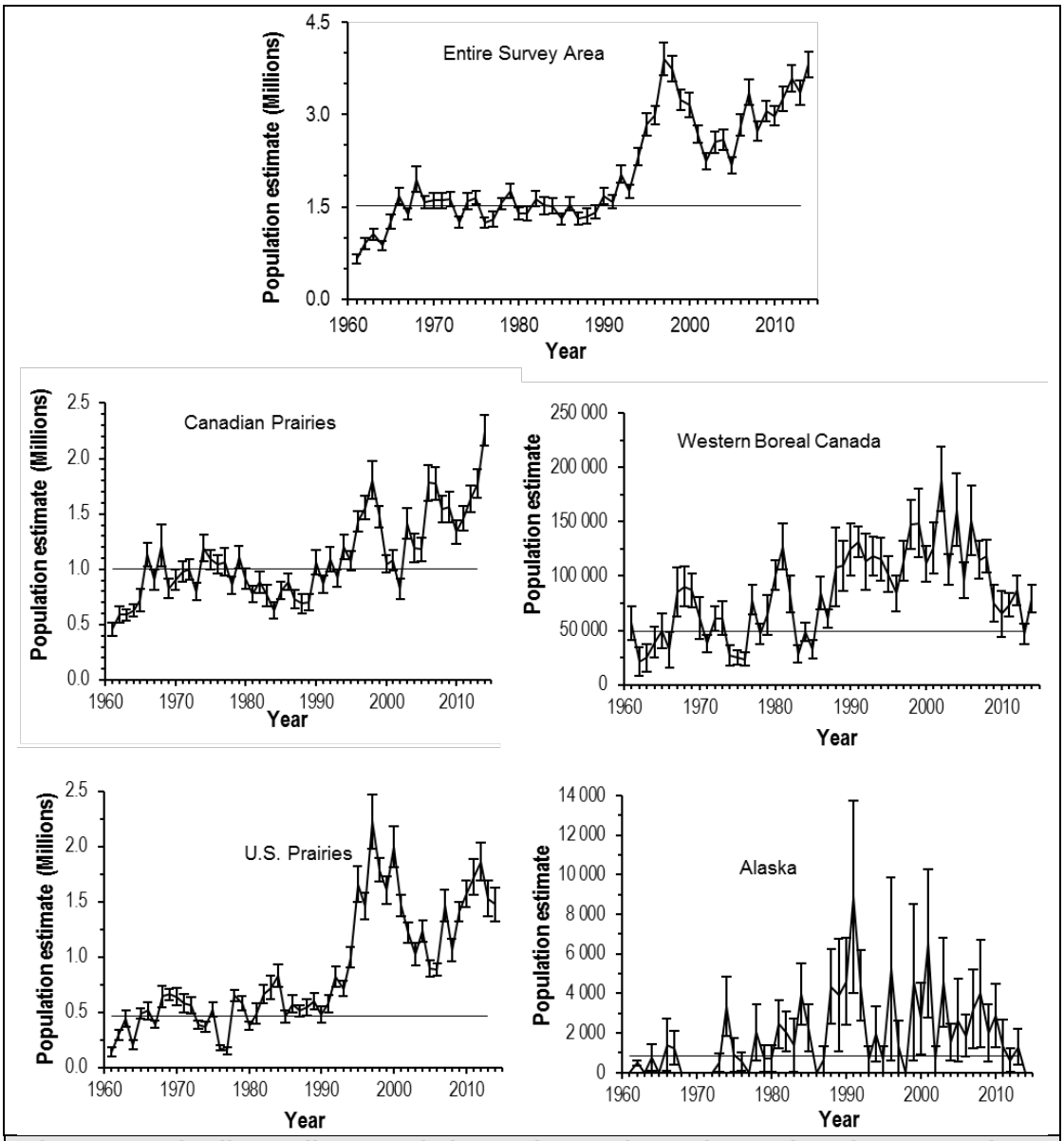

Figure 1. Gadwall Breeding Population Estimates (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States (The horizontal line represents the NAWMP goal in each region of the survey).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C

The Gadwall is a relatively common species in central British Columbia. Overall, the species has exhibited a relatively stable trend since 2006 (Figure 2).

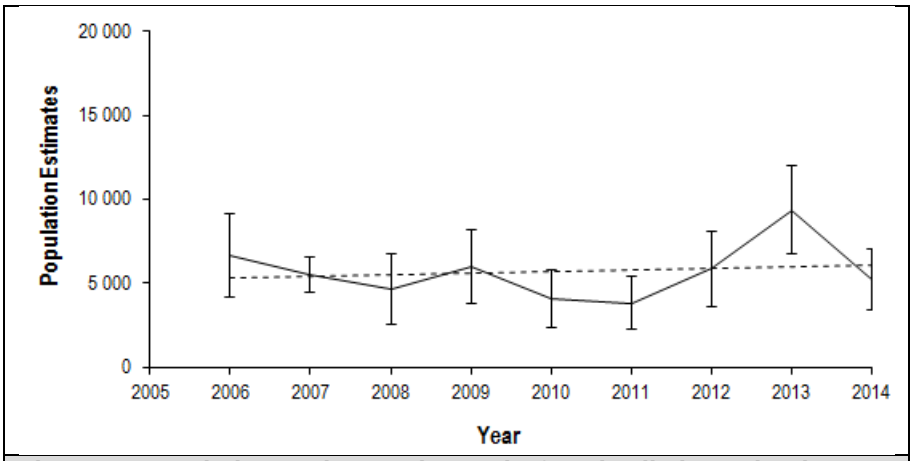

Figure 2. Population Estimates (± 1 SE) of Gadwalls in Spring in British Columbia Central Plateau, 2006–2014.

- *COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY*

Since 2001, the population in southern Yukon has remained above the very low numbers observed in the 1990s, but has shown substantial yearly variations (Figure 3).

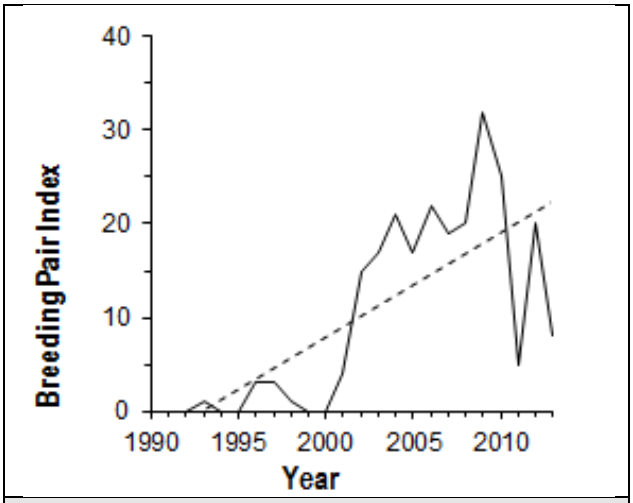

Figure 3. Breeding Pair Trend for Gadwalls in Southern Yukon, 1991–2014.

Harvest

In Canada, most of the Gadwall harvest takes place in the Prairie Provinces. At the continental scale, it is one of the most harvested species of dabbling ducks. However, most of the harvest takes place in the United States (Table 2). Indeed, during the past 10 years, an average of 40 000 Gadwalls have been harvested in Canada, compared to an average of more than 1.5 million birds per year in the United States.

Table 2. Harvest Estimates of Gadwalls in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974		211	88	65	2 912	4 330	11 113	43 412	58 769	1 991			122 891	651 864	774 755
1975	160				3 757	10 666	16 437	59 048	59 594	4 058			153 720	784 830	938 550
1976					6 418	6 672	10 312	41 374	62 412	1 307			128 495	858 794	987 289
1977			85		6 465	5 592	13 922	26 511	40 545	2 531			95 651	737 700	833 351
1978	120		53		7 283	11 316	12 528	37 873	35 451	1 646			106 270	976 788	1 083 058
1979					9 475	6 611	16 379	38 248	31 897	1 031		17	103 658	889 182	992 840
1980				59	10 827	7 028	10 801	22 132	42 540	653			94 040	770 205	864 245
1981		65	46		5 560	6 456	12 414	8 011	17 232	728			50 512	650 793	701 305
1982					7 760	10 766	10 438	26 825	35 506	6 118			97 413	889 397	986 810
1983			122	218	8 319	5 083	10 990	21 689	26 932	3 742			77 095	907 720	984 815
1984	124	93			5 145	2 744	8 533	14 391	22 731	1 732			55 493	781 930	837 423
1985		105	347		8 884	4 946	7 267	12 611	17 945	2 229			54 334	486 413	540 747
1986			28		5 223	3 415	7 462	16 492	17 712	1 146			51 478	560 617	612 095
1987				68	4 832	1 726	5 833	5 491	18 168	1 131			37 249	474 688	511 937
1988		139	122		4 834	2 610	2 791	2 607	7 487	2 534			23 124	214 210	237 334
1989		153			3 628	2 845	6 589	7 701	14 890	1 545			37 351	365 059	402 410
1990	95	213	144	91	3 599	2 368	4 567	10 683	12 653	2 040			36 453	382 342	418 795
1991	140	206		54	6 274	3 540	4 247	5 683	10 522	1 879			32 545	428 194	460 739
1992				237	6 289	3 192	6 725	8 860	6 830	2 740			34 873	375 624	410 497
1993			167	210	5 134	3 156	6 545	8 047	9 150	739			33 148	406 883	440 031
1994			125	150	4 559	2 416	4 084	7 638	15 568	1 802			36 342	655 501	691 843
1995		340		41	4 918	3 734	6 752	7 421	10 755	912			34 873	1 210 200	1 245 073
1996		235	46	179	3 283	4 135	9 111	15 954	16 026	1 134			50 103	1 428 393	1 478 496
1997		551		111	4 110	2 885	4 144	16 247	20 663	1 193			49 904	1 518 971	1 568 875
1998		100	36	272	3 573	3 295	11 294	16 467	13 302	2 228			50 567	1 787 170	1 837 737
1999 [2]				254	3 108	3 490	9 589	9 241	14 013	1 549			41 244	1 821 696	1 862 940
2000		1 337	396		2 642	3 294	7 865	8 134	13 702	1 562			38 932	2 076 737	2 115 669
2001				224	2 285	2 730	10 164	7 451	9 027	1 448	19		33 348	1 493 667	1 527 015
2002		614	106	184	1 279	3 497	9 459	9 844	7 825	858			33 666	1 232 106	1 265 772
2003	42		31	190	2 502	2 301	8 109	14 822	11 390	1 619			41 006	1 466 578	1 507 584
2004			116	206	1 357	2 405	8 289	18 203	11 357	578			42 511	1 363 976	1 406 487
2005		72	126	244	2 498	3 067	3 228	15 782	14 399	573			39 989	1 363 953	1 403 942
2006		103	17	291	2 611	3 767	5 329	11 053	10 838	929			34 938	1 544 792	1 579 730
2007		414	305	220	1 467	1 205	6 745	13 839	14 522	1 273			39 990	1 475 301	1 515 291
2008		330	25	306	1 974	2 213	5 905	16 212	16 366	738			44 069	1 464 272	1 508 341
2009		106	315	112	1 495	2 921	2 649	17 720	9 539	1 082			35 939	1 401 775	1 437 714
2010		403	170		1 263	4 366	3 879	16 075	12 576	620			39 352	1 735 285	1 774 637
2011		705		218	940	3 934	7 225	29 404	8 532	596			51 554	2 312 705	2 364 259
2012		215	280	71	1 501	5 866	4 514	15 565	8 972	181			37 165	2 020 731	2 057 896
2013			171	312	1 748	4 191	3 665	15 565	10 706	237			36 595	1 674 772	1 711 367

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich *et al.* 2014 (USFWS, US data)

Management and Conservation Concerns

Gadwall numbers have increased considerably since the 1990s; reaching double the population size recently. No other dabbling duck species has shown a larger population increase than Gadwall, especially in the Prairie Pothole Region (Leschack et al. 1997). Several factors have contributed to this increase. First, Gadwalls nest later than most dabbling duck species, thereby decreasing nest-site competition and predation. Second, Gadwalls prefer to nest in island habitats, which isolates them from predators (Leschack et al. 1997). Finally, increases in breeding numbers are linked to better wetland conditions in the Prairie Pothole Region, and to enhancement of habitat management actions (Baldassarre 2013).

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Northern Shoveler (*Anas clypeata*)

In Canada, the core breeding range of the Northern Shoveler is in the Prairie Pothole and Parkland Regions of Saskatchewan, Alberta and Manitoba (DuBowy 1996). The continental population is increasing.

Abundance and Trends

The Northern Shoveler is monitored in its core breeding range through the Waterfowl Breeding Population and Habitat Survey (WBPHS; Figure 1, Monitoring section), but also through smaller-scale surveys in Yukon and British Columbia, as described below.

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

The continental population of the Northern Shoveler is increasing and well above the NAWMP goal of 2.0 million ducks (NAWMP 2012; Figure 1).

Northern Shovelers show significant positive long-term, 10-year, and 5-year trends in the Canadian Prairies. In the Western Boreal Region of Canada, there is a significant increasing short-term trend (Table 1).

Table 1. Northern Shoveler Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS – Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-yr Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	4751 (202)	5279 (265)	3985	2.1*	3.9*	5.5
Canadian Prairies	2708 (152)	2880 (166)	2087	1.8*	4.6*	17.1*
Western Boreal Canada	392 (64)	400 (54)	296	0.9	2.6	14.7*
U.S. Prairies (North Central)	1434 (113)	1631 (192)	1 094	2.3*	12.8*	–3.1
Alaska	218 (29)	368 (56)	508	6.7*	–7.2*	–12.5*

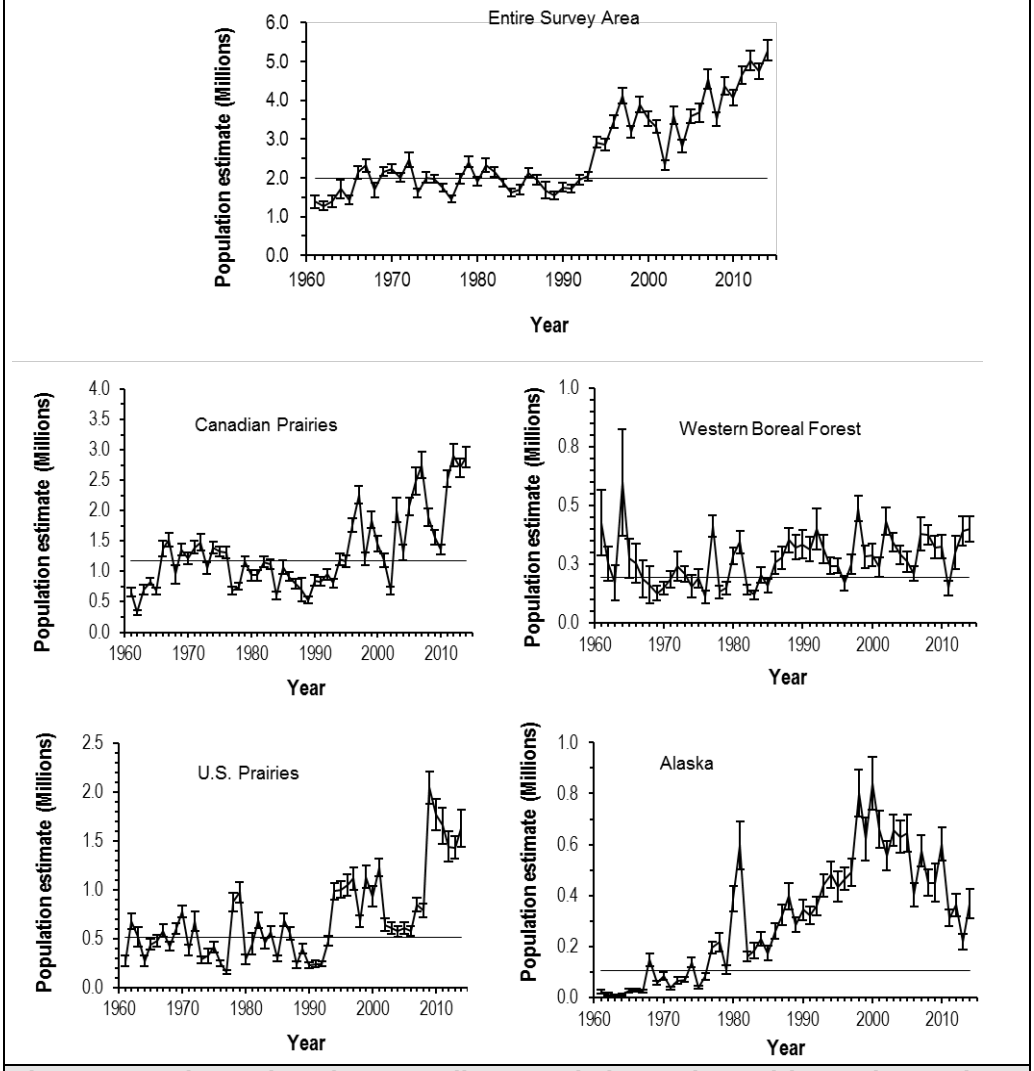

Figure 1. Northern Shovelers Breeding Population estimated (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States (The horizontal line represents the NAWMP goal in each region of the survey).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

The Northern Shoveler is one of the most common species in central British Columbia. Overall, the species' population has exhibited an increasing trend since 2006 (Figure 2).

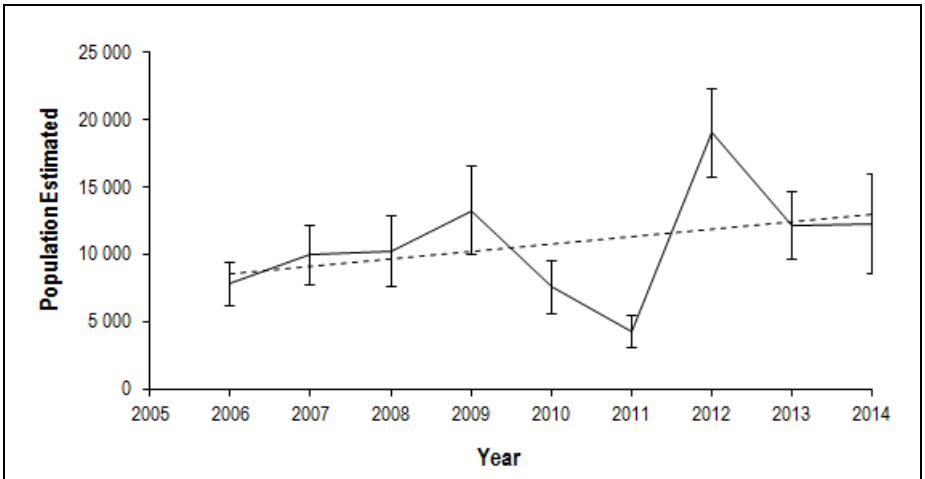

Figure 2. Total Indicated Birds (± 1 SE) of Northern Shovelers in Spring in British Columbia Central Plateau, 2006–2014

- *COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY*

In southern Yukon, the Northern Shoveler population index was significantly lower in 2014 compared to 2013. Despite considerable annual variation, 2014 numbers for this species compare to those observed on average since 1991 (Figure 3).

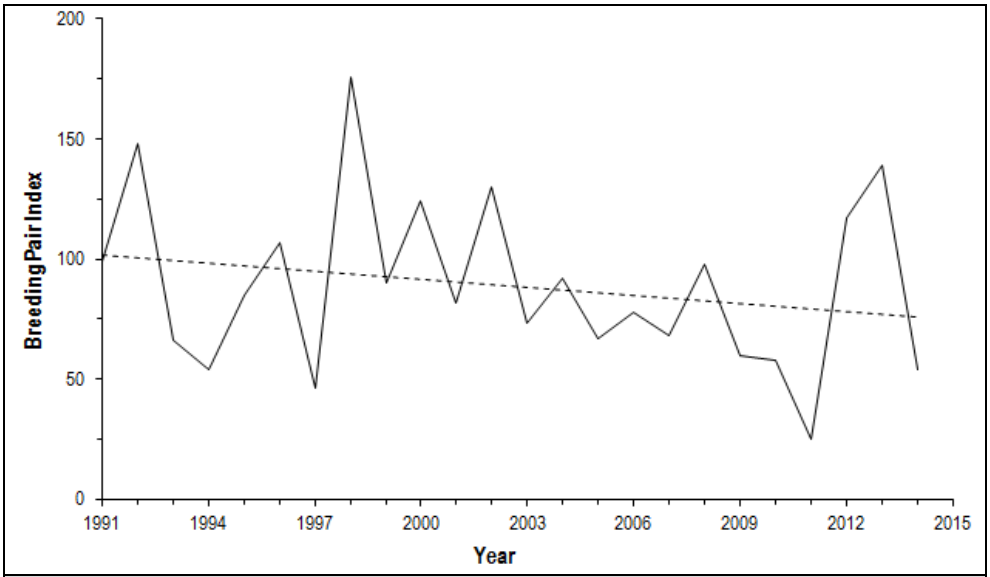

Figure 3. Breeding Pair Index Trends for the Northern Shoveler in Southern Yukon, 1991–2014.

Harvest

The Canadian Northern Shoveler harvest takes place primarily in Saskatchewan, but the bulk of the harvest takes place in the United States (Table 2). Despite a steady population increase, the Canadian harvest of the Northern Shoveler has been relatively stable.

Management and Conservation Concerns

The Northern Shoveler population appears to be in good health. The primary concerns, as for other duck species, are habitat loss and degradation.

Table 2. Harvest Estimates of Northern Shovelers in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974			31	36	3 669	1 744	4 231	27 108	31 785	1 531			70 135	432 462	502 597
1975		42	25		3 449	1 930	3 606	23 549	33 969	3 494	151	19	70 234	546 651	616 885
1976			31	78	2 687	1 435	8 615	28 235	19 431	4 184	151	120	64 967	482 336	547 303
1977				67	6 319	4 221	6 036	4 837	18 720	4 864	30	218	45 312	385 269	430 581
1978			26	92	2 766	1 104	8 620	11 006	18 923	2 307	134		44 978	535 465	580 443
1979				43	2 489	1 949	9 699	15 623	17 418	1 432	318		48 971	445 667	494 638
1980				123	5 073	1 211	6 415	8 929	25 092	2 445	602		49 890	308 228	358 118
1981			230	57	6 047	3 205	8 075	1 655	12 021	2 318	102		33 710	302 717	336 427
1982			39		3 305	1 207	6 179	11 478	12 263	2 986			37 457	386 704	424 161
1983				231	3 338	2 387	7 496	12 160	18 634	2 243		90	46 579	426 436	473 015
1984			84	213	4 331	1 578	3 137	7 213	13 797	2 659	62	165	33 239	347 891	381 130
1985				49	3 369	2 302	2 356	5 897	10 232	2 228		426	26 859	274 293	301 152
1986			28	250	2 439	1 837	8 586	5 442	17 148	1 838	371		37 939	296 108	334 047
1987		132	523	135	1 960	1 160	3 171	5 733	7 305	1 722		247	22 088	309 306	331 394
1988		70		242	2 687	2 323	5 691	2 448	2 569	1 823			17 853	110 329	128 182
1989		51	372	305	2 666	1 430	4 383	947	7 273	1 389			18 816	169 354	188 170
1990			97	104	1 869	1 525	3 767	2 055	4 016	1 044	113	41	14 631	169 510	184 141
1991				54	2 607	978	2 431	1 521	4 624	1 303		22	13 540	156 247	169 787
1992			16	408	3 072	1 009	2 819	3 886	2 455	1 548		64	15 277	173 102	188 379
1993				49	2 415	1 116	1 224	440	3 980	795		60	10 079	167 994	178 073
1994		99		168	2 252	1 628	2 755	4 300	5 729	1 203		29	18 163	345 569	363 732
1995			21	119	1 645	1 665	4 107	4 517	1 688	1 064			14 826	463 965	478 791
1996				195	1 576	974	6 583	6 922	7 457	1 545			25 252	560 074	585 326
1997				213	1 103	956	4 215	8 604	11 003	1 744		28	27 866	685 794	713 660
1998			36	52	1 516	2 905	4 111	8 181	4 869	1 069	76		22 815	702 781	725 596
1999[2]	122			268	1 316	1 254	4 786	7 841	9 056	884			25 527	532 736	558 263
2000	220			175	1 599	750	2 310	3 482	5 192	1 136			14 864	448 200	463 064
2001			92	130	690	927	6 011	7 434	4 457	534	30		20 305	540 111	560 416
2002		78	157		605	2 477	4 471	4 078	5 137	1 150			18 153	368 936	387 089
2003			21	135	1 016	2 034	3 186	12 570	5 421	544			24 927	466 375	491 302
2004				43	746	731	4 327	3 403	6 464	1 143			16 857	479 409	496 266
2005	41		319	163	829	1 097	4 055	13 427	9 894	968			30 793	541 956	572 749
2006			76	89	837	845	2 281	10 863	9 230	303			24 524	644 051	668 575
2007			19		427	924	3 357	9 777	12 218	597	224		27 543	814 785	842 328
2008				69	797	262	3 578	5 958	6 982	827		244	18 717	588 295	607 012
2009			136	150	589	817	4 180	6 045	3 128	444			15 489	643 500	658 989
2010			136	64	1 344	1 287	2 452	14 265	7 275	629			27 452	934 640	962 092
2011					630	1 277	5 291	22 040	7 661	561			37 460	917 485	954 945
2012					387	1 351	1 791	12 332	4 005	342			20 208	952 842	973 050
2013				72	399	1 071	6 162	15 458	7 051	1 467			31 680	821 860	853 540

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway. Pac. : Pacific, including Alaska

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich *et al.* 2014 (USFWS).

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Wood Duck (*Aix sponsa*)

The Wood Duck is a distinctive cavity-nesting species that is commonly found in swamps, marshes and riparian habitats in Canada. In Canada, it breeds primarily in the eastern provinces, with most of its breeding population found in Ontario, Quebec and New Brunswick. In the west, the breeding population is small and can be found in scattered locations from southern British Columbia to the extreme southwest portion of Alberta. Once threatened with extinction, the Canadian Wood Duck population is now stable or increasing.

Abundance and Trends

Estimating the breeding population of Wood Duck is difficult because of the species' elusive behaviour and its use of densely vegetated habitats. This results in a low detectability of birds from traditional fixed wing surveys. Helicopter surveys and ground-based surveys provide better estimates, but broad range data are less available. Targeted waterfowl surveys are conducted in southern Ontario, Quebec, and the Maritimes and provide information on local breeding populations. Although population trends are also available from the Breeding Bird Survey (BBS), the location of BBS routes along roadsides results in a low frequency of observations that limits data extrapolation.

According to the NAMWP, the average population index in eastern and western North America was approximately 4.4 million and 200 000 birds, respectively, between 2002 and 2011 (combining information from multiple surveys; NAWMP 2012). Both populations are stable or increasing in North America. The Wood Duck is mainly found in the United States.

- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

In the St. Lawrence lowlands, the Wood Duck is a common species and its population shows an increasing 10-year trend (Figure 1).

Breeding Pairs (± 1 SE)			Trend	
2013	**2014**	**2010–2014**	**2004–2014**	**2010–2014**
2 084 (460)	4 320 (758)	2 900 (743)	9.0%	–1.2%

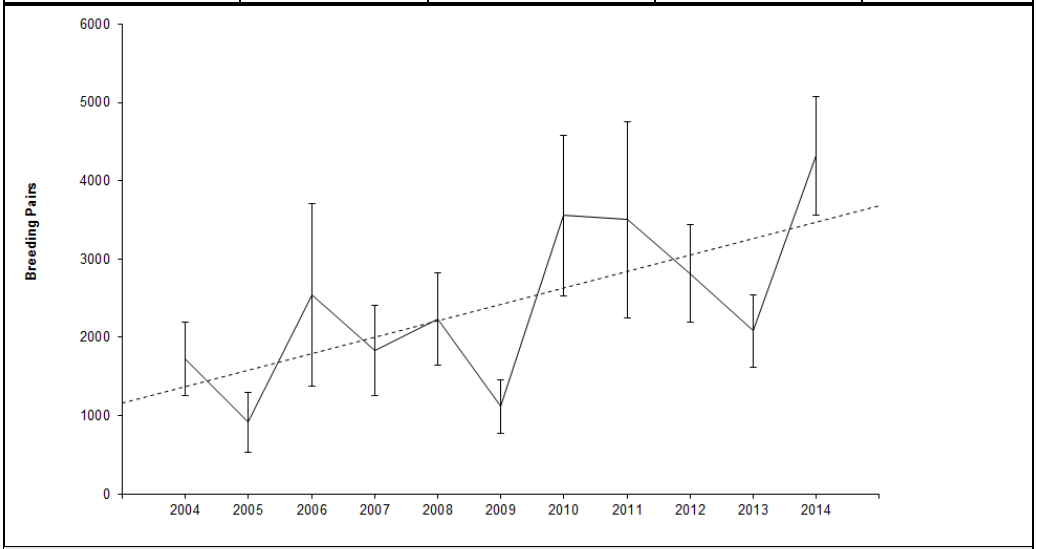

Figure 1. Indicated Breeding Pairs Estimates (± 1 SE) and Trends of Wood Ducks in the St. Lawrence lowlands, Québec, 2004–2014 (Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not been performed yet).

- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

The Wood Duck is the second most abundant duck species in southern Ontario after the Mallard. In Ontario, the breeding population has increased since the early 1970s and now represents the largest proportion of the breeding population in eastern Canada (Figure 2).

2013	2014	10-year Trend (2005–2014)	Long-termTrend (1971–2014)
59 584 (12 571)	49 038 (10 661)	8.7%	3.5%

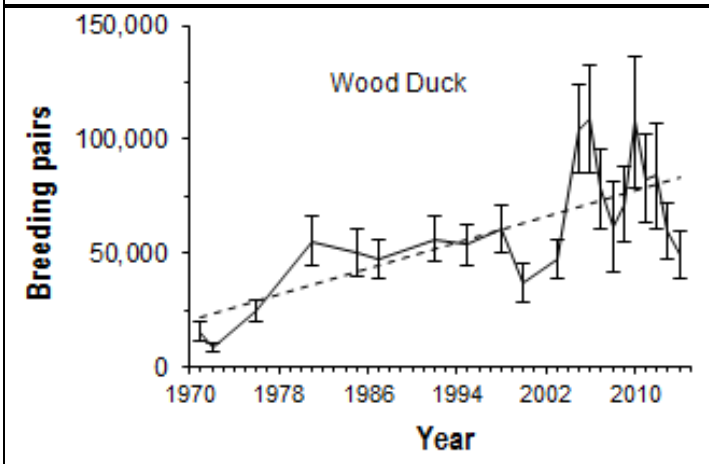

Figure 2. Indicated Breeding Pairs (± 1 SE) and Trends of Wood Duck in Southern Ontario, 1971–2014 (Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not been performed yet).

Harvest

Wood Ducks are sought after by hunters and an average of 65 000 birds of this species have been taken annually in Canada over the past 10 years (Table 1). In the United States, the species accounts for more than 10% of the annual waterfowl harvest.

Management and Conservation Concerns

By the late 1800s to the early 1900s, extinction of the Wood Duck appeared imminent. The destruction of hardwood forests and overharvesting from hunting were the two major factors that contributed to the species' decline. A complete ban on the Wood Duck hunt was imposed between 1918 and 1941. The Wood Duck population recovered and thus the hunt was reopened in 1941. The Wood Duck population is currently increasing or stable throughout much of the species' range.

Table 1. Harvest Estimates of Wood Ducks in Canada and the United States.

	Canada											U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	T/NU/YK	Total	Total	Total
1974			300	1 052	18 608	62 755				1 589		84 304	940 535	1 024 839
1975			296	1 994	16 155	85 586	384			1 686		106 101	1 203 135	1 309 236
1976	93		216	1 509	17 096	92 245	1 386			757		113 302	1 083 651	1 196 953
1977		45	589	1 794	21 843	101 157	780			2 011		128 219	1 026 946	1 155 165
1978		43	724	2 364	18 028	121 304	146			406		143 015	1 275 243	1 418 258
1979	####		877	1 392	18 530	89 125	952	107		706		113 863	1 251 269	1 365 132
1980	280		658	2 935	17 816	94 117	2 054			1 318		119 178	1 395 132	1 514 310
1981		83	524	2 429	24 481	91 912	1 764		274	1 662		123 129	1 364 309	1 487 438
1982		63	715	2 347	20 657	92 014	354			1 229		117 379	1 175 692	1 293 071
1983			435	3 181	24 800	111 558	2 171	96		1 955		144 196	1 377 079	1 521 275
1984	550		348	3 574	23 279	115 160	597			533		144 041	1 426 696	1 570 737
1985			395	2 080	23 553	113 046	604		215	817		140 710	833 400	974 110
1986			361	2 245	15 534	102 722	616			983		122 461	926 286	1 048 747
1987			873	3 543	23 192	115 867	1 018			259		144 752	1 024 443	1 169 195
1988			555	3 622	25 644	98 817	304			1 149		130 091	554 656	684 747
1989		51	788	3 005	24 955	99 571	1 118			1 188		130 676	684 719	815 395
1990			557	3 363	23 702	110 016	883			262		138 783	748 963	887 746
1991		459	350	3 063	20 991	100 552	821		332	763		127 331	834 280	961 611
1992			1 863	2 305	22 775	79 754	948	687		274	15	108 621	677 126	785 747
1993	138	76	979	3 857	27 643	87 302	655			310		120 960	865 817	986 777
1994			1 144	4 886	28 032	97 013	1 064	584		390		133 113	947 751	1 080 864
1995	85	218	467	3 942	19 098	84 708	183			195		108 896	1 161 021	1 269 917
1996	79		1 703	4 983	18 519	78 885	1 828		124	468		106 589	1 143 505	1 250 094
1997		249	745	3 475	21 070	75 262	858	120		710		102 489	1 352 695	1 455 184
1998	838		770	4 099	17 302	74 675	1 902			958		100 544	1 504 803	1 605 347
1999 [2]	101	340	1 096	2 853	20 680	56 696	719	1 019	128	174		83 806	1 554 350	1 638 156
2000		129	815	3 032	15 160	58 335	111			153		77 735	1 364 808	1 442 543
2001	172	181	1 924	2 389	16 342	55 823	132			429		77 392	1 204 524	1 281 916
2002		78	780	2 662	14 124	54 970	991			114		73 719	1 165 957	1 239 676
2003	84		1 284	2 649	11 993	41 255	594	67		40		57 966	1 191 158	1 249 124
2004	428	54	1 027	2 002	11 538	47 969	965			182		64 165	1 105 505	1 169 670
2005		64	1 348	4 214	13 407	48 736	1 010			159		68 938	1 119 920	1 188 858
2006	121	130	1 285	3 399	10 550	42 226	1 320			113		59 144	1 076 201	1 135 345
2007	47	143	1 262	2 601	16 771	37 253	3 636			546		62 259	1 087 840	1 150 099
2008	133		578	2 169	14 620	46 824	1 803					66 127	1 143 819	1 209 946
2009			1 386	4 258	18 327	36 881	269	333				61 454	1 098 345	1 159 799
2010	94		1 103	3 684	12 511	43 159	515					61 066	1 478 889	1 539 955
2011			342	2 357	14 373	52 526	5 032			80		74 710	1 433 957	1 508 667
2012			599	2 673	15 775	53 244	3 824			166		76 281	1 433 957	1 510 238
2013			320	3 140	13 842	51 884	1 734			25		70 945	1 160 863	1 231 808

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich et al. 2014 (USFWS, US data)

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Population Status of Inland Ducks—Diving Ducks

Greater Scaup (*Aythya marila*) and Lesser Scaup (*Aythya affinis*)

Two species of scaup are found in North America: the Greater Scaup and the Lesser Scaup. These two closely related species are nearly identical in their overall appearance, which can cause difficulties in distinguishing between them. The status of the North American breeding population of scaup (Greater and Lesser Scaup, combined) has become a conservation concern, due to apparent declines from historic high levels observed in the late 1970s (Austin et al. 2000).

The Greater Scaup is the larger of the two species and is the only diving duck (Tribe Aythyini) with a circumpolar breeding distribution. In North America, the Greater Scaup is widely distributed across Arctic and Subarctic regions from Alaska to Labrador, where it nests mainly in coastal tundra habitats (Kessel et al. 2002). The species has a discontinuous breeding distribution, with the vast majority of birds nesting in western Alaska. Large numbers of birds also nest within the Bristol Bay—Yukon-Kuskokwim Delta and Seward Pennisula—Kotzebue Sound Regions. Limited breeding has been reported along western Hudson Bay, south from Rankin Inlet, Nunavut, to the northern Ontario coastline and as far east as Cape Henrietta Maria. The species also nests in low densities in northern Quebec along northeastern James Bay and eastern Hudson Bay, and east into western Labrador, with scattered breeding in Newfoundland, as well as further south in the Gulf of St. Lawrence on Anticosti and the Magdelen Islands, Quebec.

The Lesser Scaup is the smaller of the two scaup species and is the most abundant and widespread diving duck in North America. The core breeding area for the Lesser Scaup is the Western Boreal and Prairie and Parkland Regions from central Alaska through Manitoba, but the species also nests at lower densities in the east throughout the northern and boreal forests of Ontario (including Hudson Bay Lowlands), Quebec, and Labrador (Austin et al. 1998).

Abundance and Trends

The Greater and Lesser Scaup are monitored within their core breeding ranges mainly through the Waterfowl Breeding Population and Habitat Survey (WBPHS; Figure 1, Monitoring section). For the purposes of population monitoring, Greater Scaup and Lesser Scaup numbers are combined and reported as “Scaup”, because of the difficulty in distinguishing between species during aerial surveys from fixed-winged aircraft. Because the Lesser Scaup is more abundant than the Greater Scaup, the former makes up a larger proportion of the continental scaup population (Austin et al. 1998).

- Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern United States

The continental population of scaup experienced a decline between the mid-1980s and the mid-2000s. In the most recent 10 years, the population showed an increasing trend. However, the population remains below the NAWMP goal of 6.3 million (NAMWP 2012; Table 1 and Figure 1). The number of scaup in the Canadian Western Boreal Region accounts for nearly two-thirds of the continental total. As with the continental population, the western boreal breeding population shows significant declining long-term, but increasing 10-year trends. The population remains well below the NAWMP population goal of 4.3 million birds for this region (Table 1). The Canadian Prairie breeding population shows significant 5- and 10-year increasing trends (Table 1) and the population in 2014 was larger than the NAWMP goal of 1.05 million birds for the first time since the 1980s.

Table 1. Scaup (Lesser and Greater) Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-year Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	4165 (251)	4611 (253)	3977	–0.8*	4.4*	1.3
Canadian Prairies	664 (70)	1261 (167)	598	–0.7	7.8*	24.4*
Western Boreal Canada	2720 (229)	2383 (164)	2295	–1.3*	6.9*	–1.8
U.S. Prairies(North Central)	296 (55)	444 (76)	238	2.6	11.8*	9.9*
Alaska	486 (49)	522 (59)	846	0.0	–6.7*	–13.6*

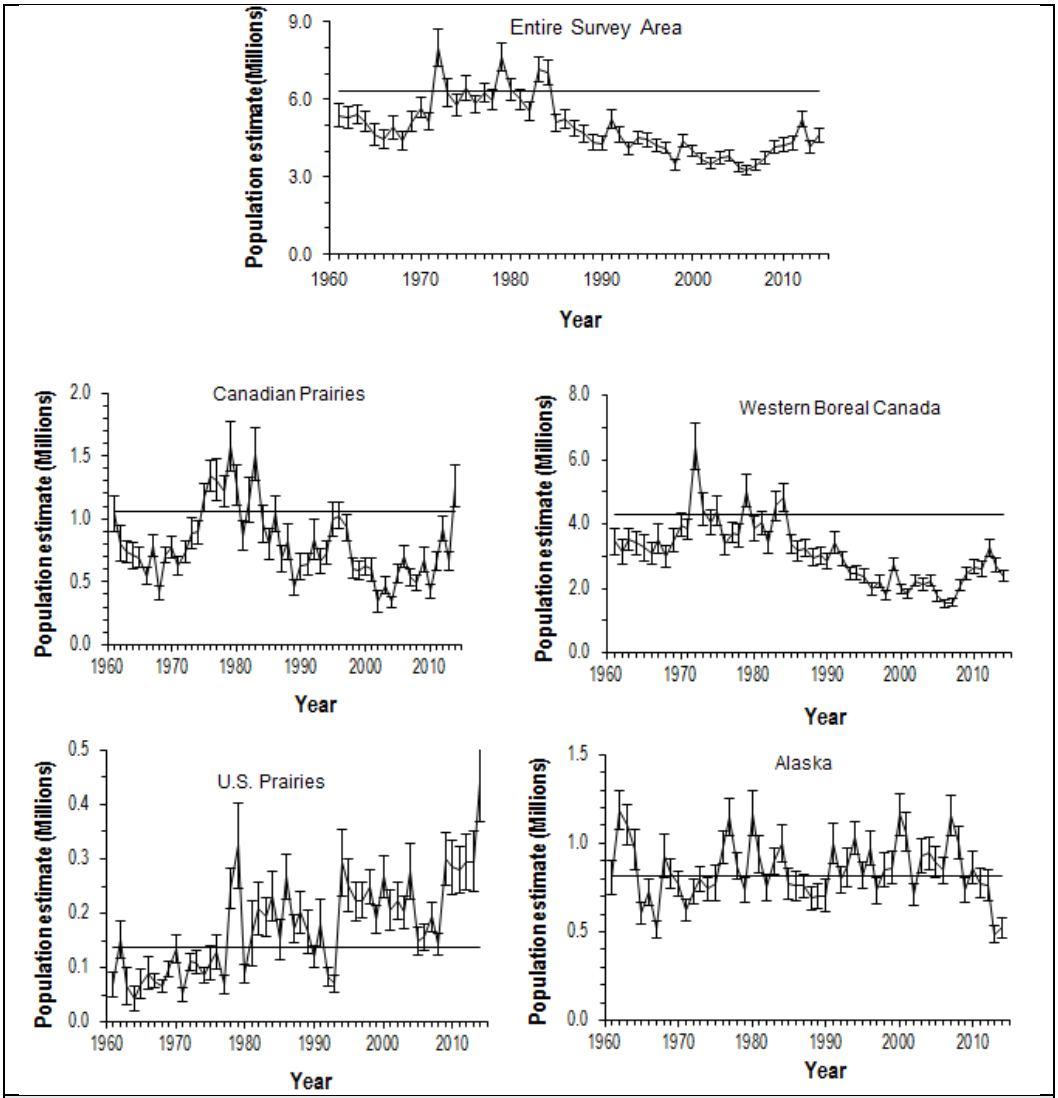

Figure 1. Scaup (Lesser and Greater) Breeding Populations (± 1 SE) Based on the WBPHS in Western Canada and Northwestern United States (The horizontal line represents the NAWMP population goal).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

Scaup in the central Plateau B.C. have shown a stable trend since 2006 (Figure 2).

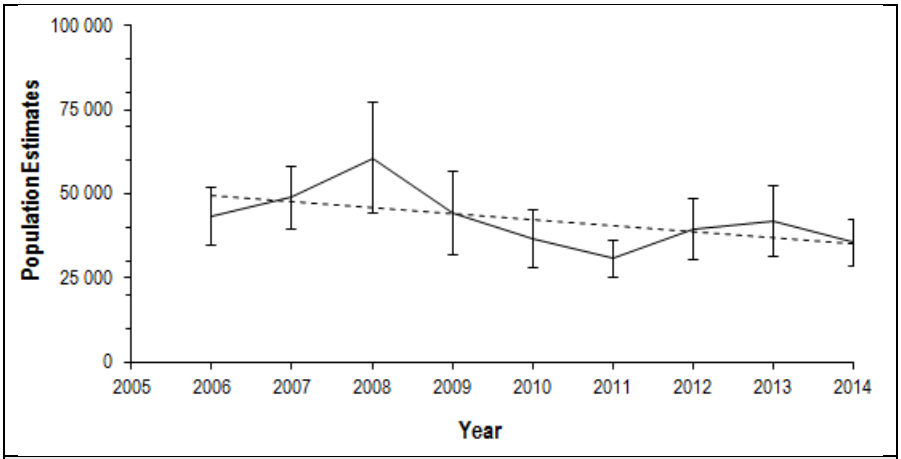

Figure 2. Population Estimates (± 1 SE) of Scaup (Lesser and Greater, combined) in British Columbia Central Plateau, 2006–2014.

- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

In the southern Yukon, the scaup breeding population index has been showing a declining trend since the beginning of the survey in 1991 (Figure 3).

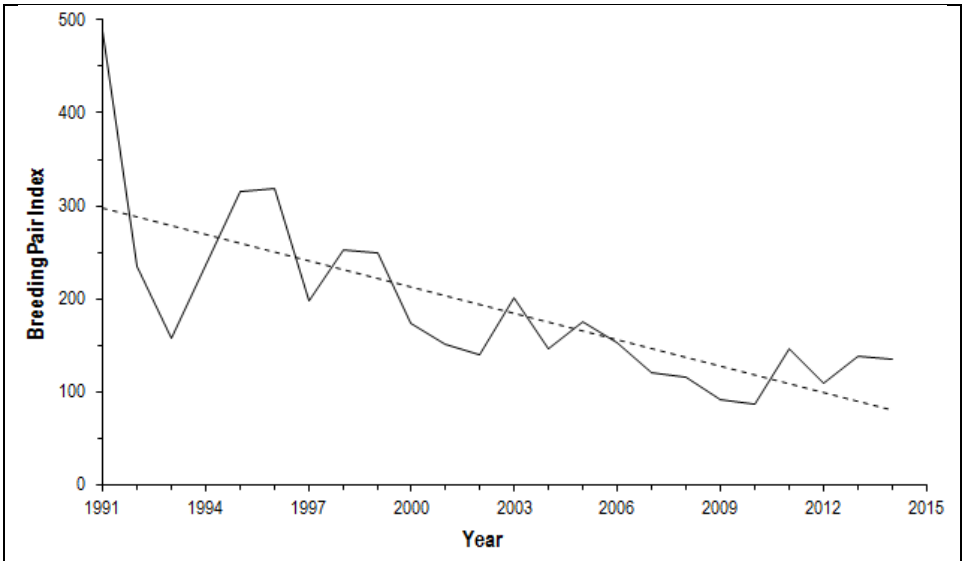

Figure 3. Breeding Pair Index of Scaup (Lesser and Greater) in Southern Yukon, 1991–2014.

Harvest

The harvest of Lesser Scaup and Greater Scaup in Canada has declined considerably over the long term (Tables 2 and 3). In the U.S., the harvest of scaup has varied considerably (Tables 2 and 3). In 2012, the Lesser Scaup harvest, at 634 280 birds, was the highest reported since 1979, coinciding with a liberalization of the harvest regulations. However, the harvest under these liberal regulations was not expected to be as large as it was. USFWS biologists speculate that the large increase in scaup harvest

was due to greater hunter effort and greater availability of scaup. They suspect that many hunters decided to expend more effort on scaup hunting following the increase in the bag limit. Furthermore, they believe that the 2012–2013 season was one when the scaup winter distribution was more coastal, making them more accessible to hunters (K. Wilkins, USFWS, pers. comm.). In 2013 the harvest regulations were again back to a moderate package, with 246 285 Lesser Scaup harvested.

Table 2. Harvest Estimates of Lesser Scaup in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	3 601	37	688	731	22 326	43 359	16 244	10 698	9 432	1 612			108 728	449 130	557 858
1975	6 323	166	1 450	943	28 681	43 739	21 748	10 861	18 870	2 661	369	661	136 472	356 790	493 262
1976	656	89	1 139	238	34 714	50 152	27 108	16 747	14 470	2 243	169	386	148 111	531 104	679 215
1977	1 033	61	3 552	146	31 895	46 505	11 010	7 250	8 363	3 474	799	237	114 325	684 536	798 861
1978	1 666	43	1 857		23 451	26 854	14 537	10 400	13 551	3 114	215	341	96 029	314 815	410 844
1979	241		751	51	26 706	35 097	15 433	7 646	10 827	1 799	571		99 122	251 479	350 601
1980	2 844	73	662	746	28 850	55 807	27 541	4 910	13 112	1 906	599		137 050	235 976	373 026
1981	1 607		704	735	31 991	58 463	18 807	3 225	8 980	1 224	507	148	126 391	547 907	674 298
1982	126		387	309	20 981	37 287	27 394	6 655	13 226	1 721			108 086	356 873	464 959
1983	471	104	550	575	19 171	42 320	22 289	9 122	6 551	103		78	101 334	268 846	370 180
1984	1 695	31	352	912	17 696	53 451	18 336	10 861	5 435	975	98	74	109 916	661 695	771 611
1985	874		365	951	25 866	61 409	15 356	2 498	6 604	1 240	831		115 994	486 452	602 446
1986	1 839		430	1 646	23 080	47 546	14 674	5 382	5 974	1 191	170		101 932	248 061	349 993
1987	339	290	615	541	11 981	34 512	10 400	7 129	5 458	1 140		12	72 417	185 241	257 658
1988		87	943	544	22 429	32 983	6 885	5 019	3 341	496	424		73 151	148 620	221 771
1989	2 063	52	1 237	1 119	26 710	42 316	7 296	1 347	3 073	608	179		86 000	126 833	212 833
1990	1 757	35	1 051	1 696	24 047	25 772	6 592	2 557	3 888	778	191		68 364	102 227	170 591
1991	272		481	455	18 402	31 204	9 226	3 864	2 464	428	37		66 833	150 188	217 021
1992	1 004		171	116	15 249	24 587	8 227	778	2 320	650	33		53 135	187 098	240 233
1993	2 231		401	690	20 912	35 173	6 228	2 196	1 628	452	35	40	69 986	106 264	176 250
1994	510	99	445	244	11 479	27 137	12 344	2 742	3 247	378		52	58 677	176 974	235 651
1995			334	730	8 705	27 465	14 185	2 263	2 926	242			56 850	285 420	342 270
1996	178		331	156	7 460	17 344	9 258	2 415	2 800	1 162	331		41 435	459 787	501 222
1997	232		512	782	6 529	19 843	5 185	4 262	4 863	1 302	431		43 941	510 170	554 111
1998	1 455		223	1 300	11 513	16 069	5 400	6 287	2 695	311			45 253	560 179	605 432
1999 [2]	470		131	110	8 339	19 599	10 233	2 143	939	181			42 145	210 149	252 294
2000	26			49	5 071	9 781	11 987	1 284	1 768	178	74	130	30 348	349 943	380 291
2001	414		60	138	5 082	13 530	8 117	1 777	861	119	128	8	30 234	364 135	394 369
2002	1 436	548	412	843	5 576	14 259	6 007	1 524	1 791	383		174	32 953	390 447	423 400
2003	682	183	433	265	8 602	11 995	2 376	3 980	2 311	175	117		31 119	298 596	329 715
2004	814		27	186	3 619	9 859	7 362	921	1 593	291			24 672	292 883	317 555
2005	381	304	189	266	3 459	10 088	4 683	2 520	1 777	120			23 787	257 564	281 351
2006	250		172	436	7 219	16 425	4 459	865	2 058	46	97		32 027	232 959	264 986
2007	146	47	341	209	1 953	10 813	10 291	907	5 852		224		30 783	224 053	254 836
2008	215	33	90	118	3 374	14 647	12 087		7 259	281			38 109	179 561	217 670
2009		48	247	343	2 710	7 063	8 238	826	7 700	202		22	27 399	222 067	249 466
2010	970		364	747	2 830	11 364	10 250	4 192	3 986	505			35 208	287 907	323 115
2011		209		186	2 987	7 722	5 553	2 029	2 162	218			21 066	227 426	248 492
2012		890	227	191	2 991	9 672	7 775	1 414	5 804	150	775		29 889	634 280	664 169
2013	575	837	205	1 404	2 060	11 648	8 964	1 973	4 339	134			32 139	246 285	278 424

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2] The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich et al. 2014 (USFWS, US data)

Table 3. Harvest Estimates of Greater Scaup in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	1788	314	1620	488	20243	18172	572	532		1039			44768	77064	121832
1975	1321		2401	283	25353	36056	1136	176	1215	2986	69		70996	65390	136386
1976	3095		3522	478	28190	37526	1140	291		1297			75539	97062	172601
1977	2436	217	1895	244	21126	44900				617		64	71499	114931	186430
1978	1611		502	141	17811	20465	1782			320		77	42709	101662	144371
1979	637		959	97	20315	26367	677			1391			50443	49750	100193
1980	3052	147	738	384	18922	29535	720			739			54237	48739	102976
1981	344		170	818	22891	23762	1139			548			49672	86283	135955
1982	1476	63	411	584	15678	15797				230			34239	90892	125131
1983	427		1289	574	13443	38628				924			55285	67843	123128
1984	2565	31	1098	1125	18999	22538	419	561	133	907			48376	67232	115608
1985	2423	428	759	272	17880	28128	1022			134		63	51109	60013	111122
1986	5095	404	2213	1456	11638	30320	970	214	151	1112			53573	55163	108736
1987	1103		672	1323	6941	13103	746	131		318			24337	39712	64049
1988	920		3221	585	13622	13859				212			32419	26202	58621
1989	5264	51	2547	1498	9380	14701			182	242			33865	25082	58947
1990	3684	79	1609	420	9284	11959	383		195	81			27694	26606	54300
1991			1657	267	6314	9815	626	474	387	153			19693	18877	38570
1992	1360		805	898	4830	9913	298			87			18191	19365	37556
1993	5959	176	1161	362	8589	8651	163				21		25082	27152	52234
1994	706		1501	307	6550	8329	306			26			17725	29259	46984
1995	508	82	920	542	5080	12861	268			97			20358	53018	73376
1996	596	65	772	914	5839	7653	286		297				16422	49734	66156
1997	677	83	919	1119	3627	6002	157			379			12963	62883	75846
1998	1703	169	256	1878	4055	4274	165		162				12662	45712	58374
1999[2]	1377		332	55	4171	4671	929					3	11538	35336	46874
2000	1075		1157	659	2961	3190	120						9162	42453	51615
2001	1210		234	1492	1537	4276	747			18			9514	32702	42216
2002	1125	77	437	1517	2725	4816	690				151		11538	72258	83796
2003	576	366	524	337	2100	5481			173				9557	49192	58749
2004	964	39	90	503	3040	7029	285		161	26			12137	71127	83264
2005	447		193	536	1562	2840	235						5813	57212	63025
2006	705	287	191	430	4002	3010					19		8644	47780	56424
2007	619	101	91	165	815	6764	88			29			8672	70833	79505
2008		41	414	243	1445	5876	343		140	35			8537	49465	58002
2009			223	155	912	3244	540					22	5096	55139	60235
2010	442			2624	939	2835	46						6886	69814	76700
2011					1915	3617							5532	59424	64956
2012	224			197	1758	4022			186				6387	97900	104287
2013	1251	234	105	692	2081	4993	156						9512	82225	91737

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich et al. 2014 (USFWS, US data)

Management and Conservation Concerns

Difficulties in differentiating between Greater Scaup and Lesser Scaup during fixed-wing surveys is a challenge for managers who require more detailed information on the status of populations in order to develop hunting regulations and conservation policies. Currently, numbers for both species observed during aerial—and most ground-based—surveys preclude the identification of differing population trajectories and species-specific population estimates. Because Lesser Scaup are a dominant component of the combined population, changes in population status of the less abundant Greater Scaup, in particular, may be undetectable.

Scaup populations in the Canadian Prairies declined similarly to other duck populations during the drought years in the 1980s, but were slow to recover when habitat conditions improved. Scaup breeding in the Boreal Forest also declined during the 1980s, and still has not returned to levels observed in the 1970s. Reasons for this failure to return to 1970s numbers are unknown, but research is ongoing.

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Ring-necked Duck (*Aythya collaris*)

The Ring-necked Duck is a common diving duck that breeds throughout the boreal forest in Canada. Its range extends from southern Yukon to Newfoundland, with some breeding recorded in Labrador. Within the boreal forest, it commonly nests in dense emergent vegetation in shallow wetlands (marshes, bogs and fens).

Abundance and Trends

The Ring-necked Duck is monitored on its core breeding range through the Waterfowl Breeding Population and Habitat Survey (WBPHS) in western and eastern Canada (Figure 1, Monitoring section). The species is also monitored by other small-scale regional breeding waterfowl surveys across the country, as described below.

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

In the survey area as a whole, the Ring-necked Duck population shows both increasing long- and short-term trends (Table 1). In the Western Boreal Forest and Prairie Regions, the population exhibits increasing long- and short-term trends as well (Table 1 and Figure 1).

Table 1. Ring-neck Duck Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percent change. *Trend significant at $p<0.05$).

WBPHS - Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-yr Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	1323 (119)	1574 (113)	1095	2.5*	3.6	9.4*
Canadian Prairies	200 (32)	261 (35)	107	2.7*	13.3*	29.0*
Western Boreal Canada	1027 (114)	1150 (105)	896	2.3*	2.1	7.3*
US Prairies (North Central)	69 (15)	119 (22)	42	8.7	24.2*	12.3
Alaska	27 (6)	45 10)	48	42.9*	–9.3*	–1.2

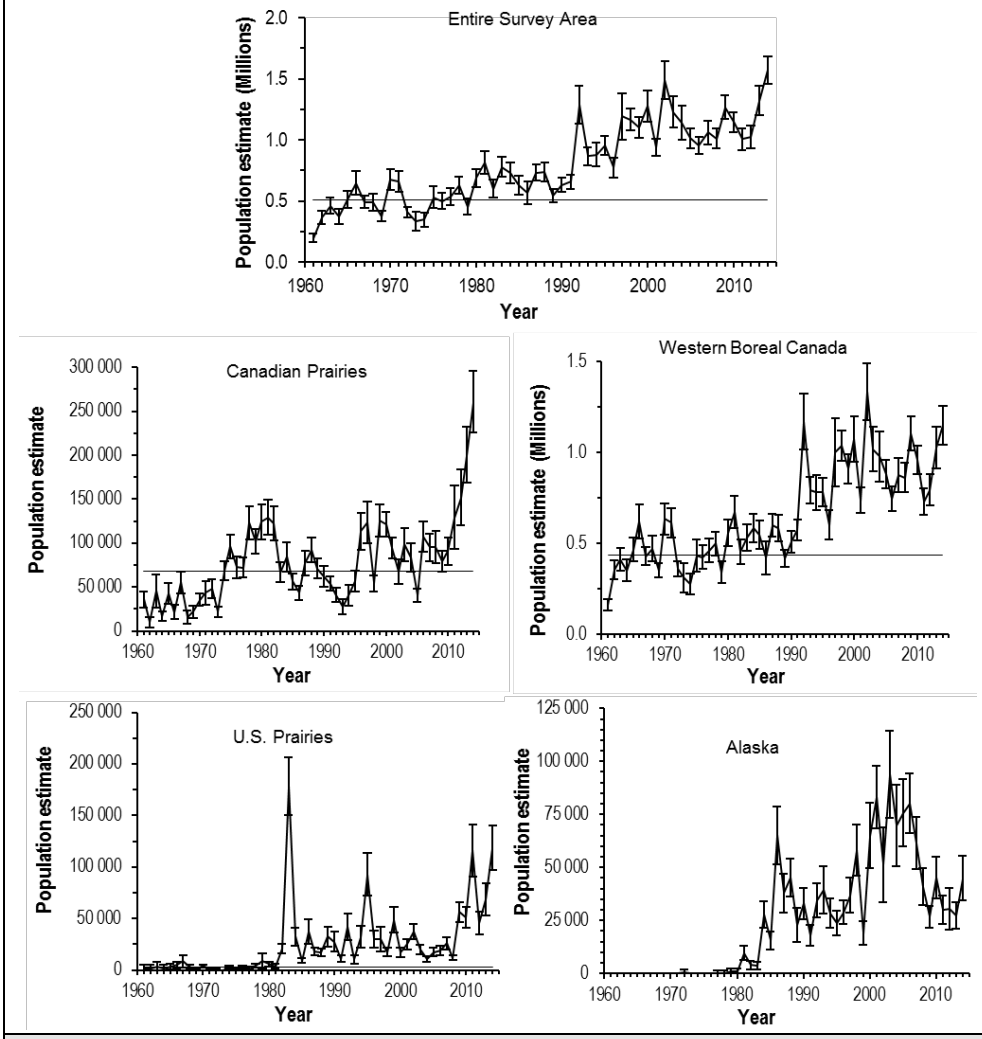

Figure 1. Ring-necked Duck Breeding Population Estimates (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States (The horizontal line represents the NAWMP population goal, when available).

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTER CANADA

In eastern Canada, Ring-necked Ducks show a relatively stable trend in most regions of the survey area (Figure 2 and Table 2).

Table 2. Ring-necked Duck Breeding Population Estimates (in Thousands) Based on the WBPHS in Eastern Canada, with 90% Credible Intervals
(Results combined data from the helicopter and fixed-winged aircraft surveys. Only the CWS helicopter plot survey data were used in 2013).

WBPHS - Eastern Canada	2013	2014	10-yr Average (2004–2013)
Entire Survey Area	635 (501–841)	494 (396–622)	558
Atlantic Highlands	75 (52–106)	54 (38–78)	77
Eastern Boreal Shield	123 (88 –175)	108 (78–150)	130
Central Boreal Shield	119 (85–167)	105 (73 –152)	104
Western Boreal Shield	312 (207–482)	220 (154–319)	238

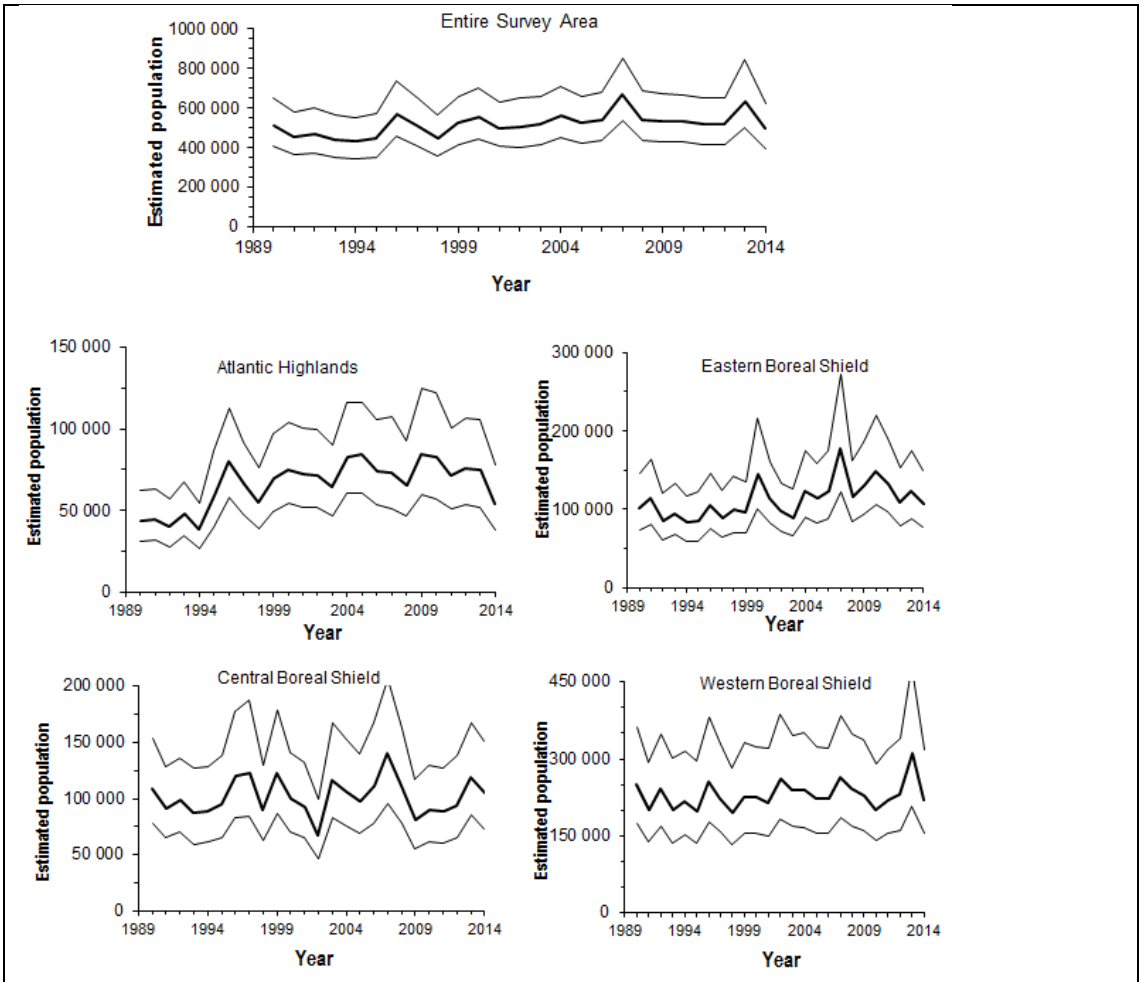

Figure 2. Ring-necked Ducks Breeding Population Estimates Based on the WBPHS in Eastern Canada, with 90% Credible Intervals (Figures represent the combined results of helicopter and fixed-winged aircraft surveys. Only the CWS helicopter plot survey data were used in 2013).

- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

Breeding population estimates in the St. Lawrence Lowlands for the Ring-necked Duck show an increasing trend (Figure 3). The 2014 estimate is the highest since the survey began in 2004.

Breeding Pairs			Trends	
2013	2014	2010–2014	2004–2014	**2010–2014**
1372 (756)	1779 (662)	1309 (577)	9.4%	31.3%

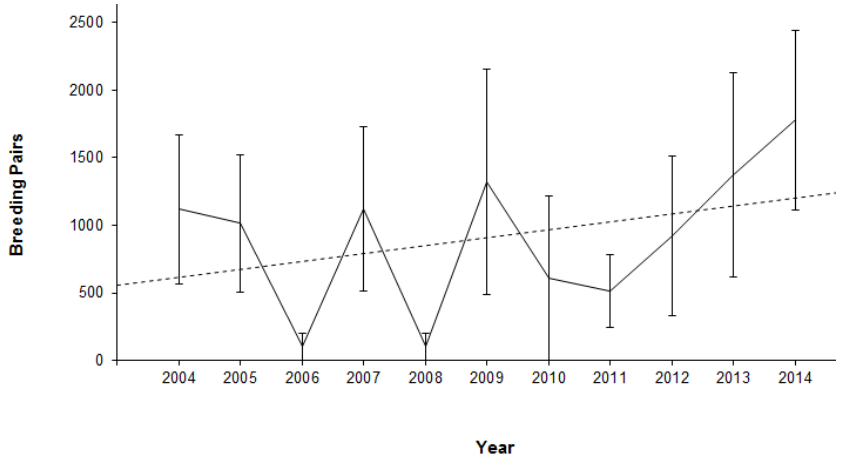

Figure 3. Indicated Breeding Pairs Estimates (± 1 SE) and Trends for the Ring-necked Duck in the St. Lawrence Lowlands, Quebec, 2004–2014
(Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not been performed yet).

- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

Breeding population estimates for Ring-necked Duck in Southern Ontario show increasing 10-year and long-term trends, with 5% and 4% annual increases, respectively (Figure 4).

2013	2014	10-yr Trend (2005–2014)	Long-term Trend (1971–2014)
25 151 (10 383)	29 479 (10 984)	5.2%	4.3%

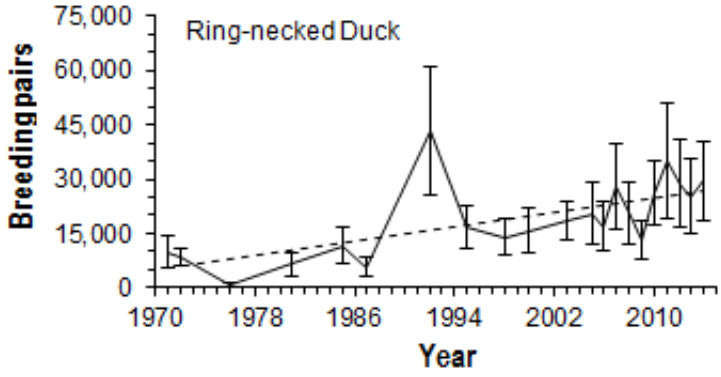

Figure 4. Abundance and Trends in Indicated Breeding Pair Estimates (± 1 SE) for the Ring-necked Duck in Southern Ontario, 1971–2014 (Trends are expressed as an annual percentage change. Tests for statistical significance of these trends have not yet been performed).

- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

The Ring-necked Duck is a common species in central British Columbia. Overall, the species has been showing a decreasing trend since 2006 (Figure 5).

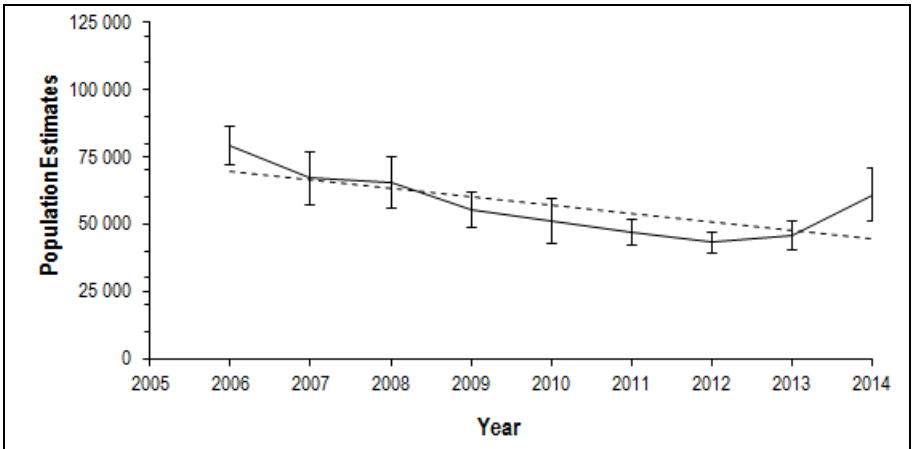

Figure 5. Population Estimates (± 1 SE) of Ring-necked Ducks in the British Columbia Central Plateau, 2006–2014.

- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

The Ring-necked Duck breeding pair index has shown considerable year-to-year variation in southern Yukon, but a stable long-term trend is observed since the beginning of the survey in 1991 (Figure 6).

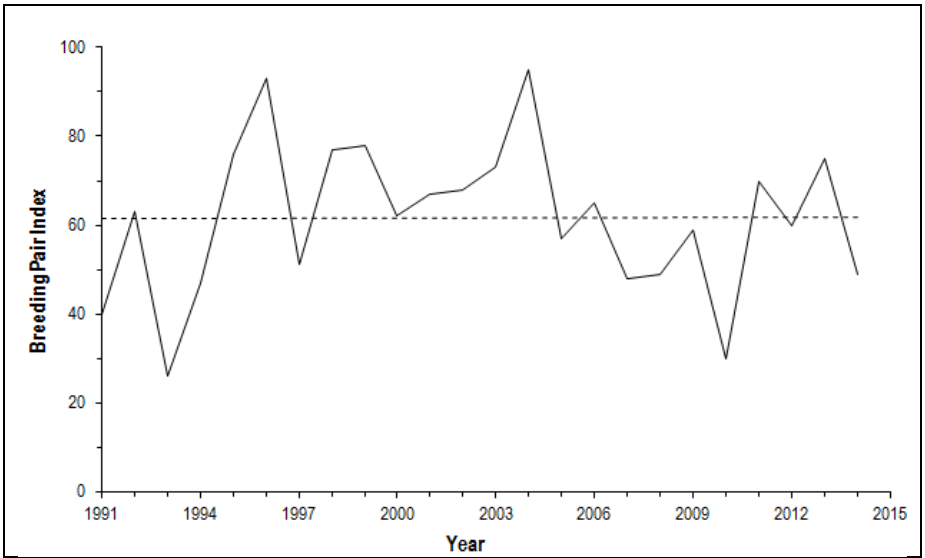

Figure 6. Breeding Pair Index for the Ring-necked Duck in Southern Yukon, 1991–2014.

Harvest

Ring-necked Ducks are a sought-after species by hunters, with an average of 41 000 birds taken annually in Canada in the past 10 years (Table 3). Historically, the Ring-necked Duck is one of the top-five hunted ducks in Canada.

Management and Conservation Concerns

Currently, there are no management or conservation concerns for Ring-necked Ducks in Canada. Ring-necked Ducks, however, breed throughout the boreal forest in Canada. Therefore, any change to this habitat has the potential to negatively affect the species.

Table 3. Harvest Estimates of Ring-necked Ducks in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	5 289	175	1 794	3 630	18 926	57 796	9 212	785	2 443	2 499			102 549	446 750	549 299
1975	8 096	730	2 425	3 828	15 743	74 404	20 309	1 565	2 180	1 242	67	19	130 608	570 903	701 511
1976	6 977	679	4 057	4 190	16 670	52 331	9 334	284	551	406			95 479	511 032	606 511
1977	12 657	481	3 658	3 917	19 301	68 224	5 863	248	1 764	989	152		117 254	437 684	554 938
1978	9 348	385	2 664	3 147	25 392	72 385	6 919	1 211	730	1 491	215		123 887	519 513	643 400
1979	12 376	180	3 523	3 427	18 202	71 920	11 937	1 257	449	2 202		17	125 490	511 041	636 531
1980	6 771	322	3 157	5 375	21 019	77 585	12 183	749	521	411	45		128 138	501 813	629 951
1981	6 835	200	2 279	4 583	20 971	74 415	7 396		330	1 026	26		118 061	371 187	489 248
1982	6 022	425	3 489	1 675	21 273	74 139	12 083	1 223		1 633			121 962	340 839	462 801
1983	6 226	898	2 543	4 999	19 409	71 402	11 625	490	851	1 874			120 317	475 465	595 782
1984	9 688	872	2 249	5 574	27 825	82 295	17 450	761	279	619	27		147 639	492 205	639 844
1985	9 206	483	4 166	4 643	22 913	81 726	20 172		666	1 107	831		145 913	404 393	550 306
1986	15 259	426	3 783	6 761	28 524	67 012	11 196		1 445	1 314	598		136 318	421 227	557 545
1987	6 519	656	1 789	4 274	23 157	52 559	9 638	191	716	1 289	210		100 998	379 363	480 361
1988	5 727	1 460	2 840	5 797	29 580	49 866	1 772		401	1 221			98 664	207 036	305 700
1989	3 782	818	2 657	6 787	24 800	45 462	1 645		176	478	181		86 786	235 765	322 551
1990	9 048	1 330	2 769	8 449	19 464	62 365	4 912	424	1 143	228			110 132	252 627	362 759
1991	6 314	1 578	2 226	3 815	24 623	52 301	6 821	514	1 012	712	37		99 953	267 336	367 289
1992	4 195	516	1 467	3 451	15 617	54 615	8 788	454	139	285	55	55	89 637	311 534	401 171
1993	5 131	1 035	3 188	3 056	18 731	54 916	6 531	1 271	694	276	7	233	95 069	343 261	438 330
1994	5 724	778	2 372	4 997	13 357	31 236	7 066	1 958	2 040	616		32	70 176	353 729	423 905
1995	5 576	2 276	1 766	2 543	12 449	36 641	5 299	779	250	326	216		68 121	520 942	589 063
1996	3 449	2 251	2 418	3 656	10 172	29 878	4 278	362	912	362			57 738	385 128	442 866
1997	4 049	249	3 651	3 894	11 763	27 078	4 278	1 181	555	348	165		57 211	598 576	655 787
1998	3 787		3 842	7 335	13 801	32 203	5 709	320	470	584	467		68 518	694 396	762 914
1999 [2]	4 467	186	1 064	3 168	11 075	26 871	3 570	1 403		476			52 280	553 099	605 379
2000	8 793	64	1 197	3 086	9 347	22 931	4 589	644	801	353	222	194	52 221	496 153	548 374
2001	7 432		1 498	2 462	8 752	19 556	5 027	1 247	429	257	19		46 679	438 534	485 213
2002	5 222	418	1 784	4 337	6 574	20 725	5 512	737	1 093	59			46 461	445 152	491 613
2003	3 605	357	1 238	2 881	5 999	17 250	1 395		1 016	57			33 798	441 800	475 598
2004	5 925	440	1 457	3 394	6 282	17 540	8 536	1 078	1 479	151			46 282	433 793	480 075
2005	8 169	1 747	1 029	3 282	6 630	17 779	4 555	1 056	2 882	267	344		47 740	474 030	521 770
2006	4 442	521	1 512	2 329	7 640	24 939	7 202	813	2 249	125			51 772	656 574	708 346
2007	2 559	350	632	3 128	3 730	19 281	7 694	883	620	209			39 086	503 833	542 919
2008	4 637	1 117	851	2 425	3 587	16 426	3 490	1 816	1 564	262			36 175	500 685	536 860
2009	7 194	1 040	832	1 782	3 725	14 942	3 772		2 177	198			35 662	409 651	445 313
2010	4 065		680	1 774	4 638	13 184	8 795	2 009	410	740			36 295	491 083	527 378
2011	5 129	209	1 305	3 041	5 153	18 088	4 864	2 282		323			40 394	544 952	585 346
2012	9 078	2 037	632	2 360	8 114	16 630	6 043	1 552	1 982	700	110		49 238	651 444	700 682
2013	2 644	843	295	2 174	5 944	11 780	6 675			98			30 453	497 998	528 451

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF : Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich *et al.* 2014 (USFWS).

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Redhead (*Aythya americana*)

The Redhead breeds exclusively in North America and primarily in the Prairie Pothole Region of Canada and the United States. The continental population is increasing and well above the NAWMP goal.

Abundance and Trends

The Redhead is monitored mainly in its core breeding range through the Waterfowl Breeding Population and Habitat Survey (WBPHS) in western Canada (Figure 1, Monitoring section).

- Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern United States

Redhead numbers show a significant increasing trend over the 10-year and longer term in both the Canadian Prairie and the entire survey area (Table 1). However, the breeding population in the Boreal Forest Region shows a decreasing 10-year trend (Table 1). The continental population in the survey area as a whole is well above the NAMWP goal of 638 850 birds (NAWMP 2012), as well as the population in the Canadian Prairie Region (Figure 1).

Table 1. Redhead Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percent change. *Trend significant at $p<0.05$).

WBPHS—Western and Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-yr Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	1202 (91)	1279 (102)	1 012	1.3*	6.7*	2.5
Canadian Prairies	712 (68)	900 (90)	590	1.4*	6.5*	12.5*
Western Boreal Canada	28 (7)	61 (13)	61	–0.2	–8.2*	0.8
US Prairies (North Central)	462 (59)	318 (47)	358	1.7*	16.3*	–11.6
Alaska	0	0	1,6	–3.7	–60.5*	NA

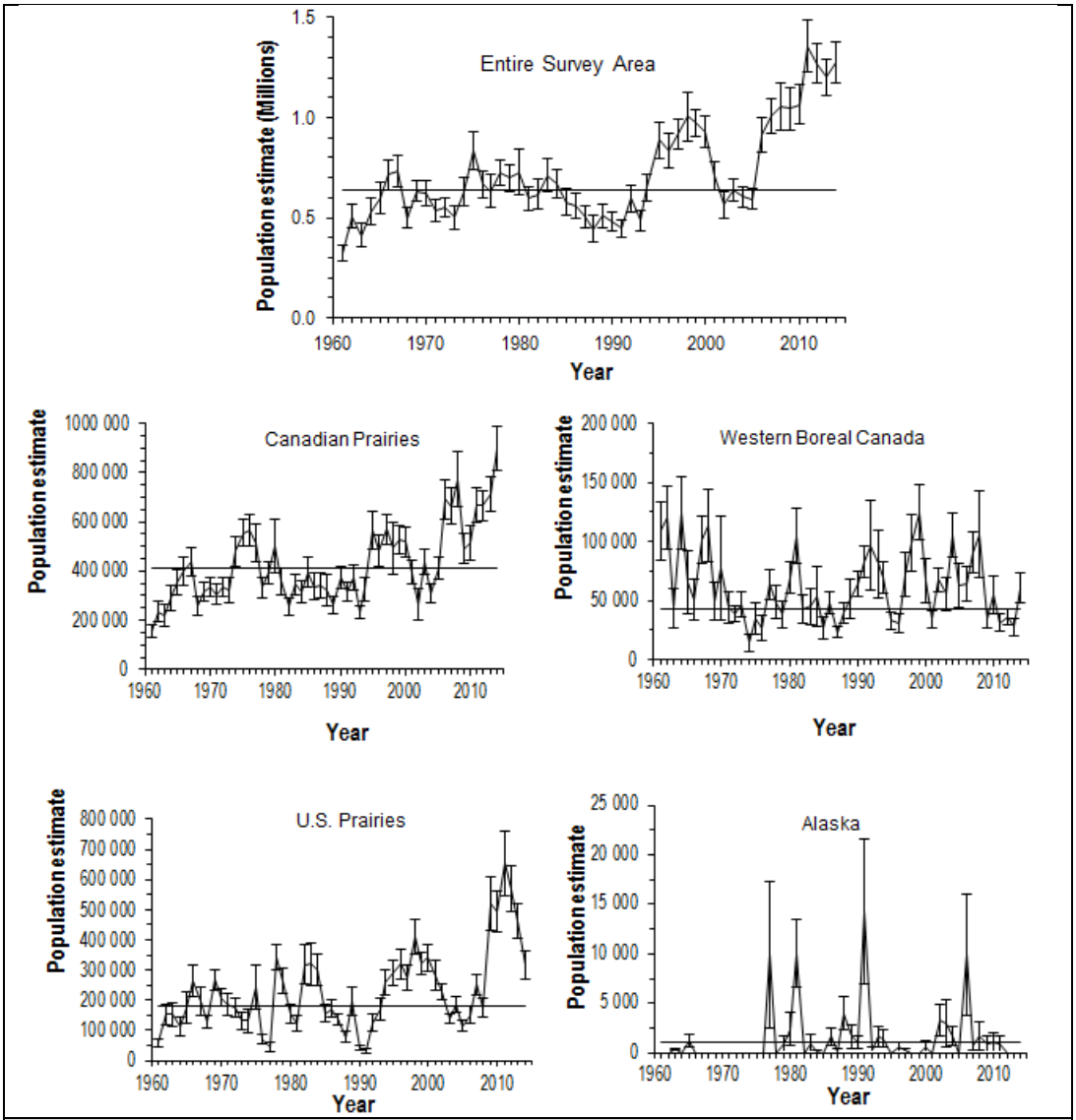

Figure 1. Redhead Breeding Populations Estimates (± 1 SE) Based on the WBPHS in Western Canada and Northwestern United States (Data shown are population estimates The horizontal line represents the NAWMP population goal).

Harvest

In 2005, the number of birds taken (approximately 36 000 birds) reached a level that had not been observed since 1986. The average harvest in Canada over the past 10 years has been of approximately 19 000 birds. The vast majority of Redheads are harvested in the United States (Table 2).

Management and Conservation Concerns

The number of breeding pairs is influenced by the abundance of wetlands in the Prairies. In addition, predation pressure increases during periods of drought and when water levels drop (Woodin and Michot 2002). The conversion of wetlands to farmland in the Prairies remains a concern for the conservation of this species (Brousseau and Lepage 2013).

Table 2. Harvest Estimates of Redheads in Canada and the United States.

	Canada												U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974					6 893	13 149	7 996	9 641	12 478	736			50,893	65,867	116,760
1975				117	4 182	21 105	8 986	9 729	8 404	668	84		53,275	107,915	161,190
1976					6 237	27 251	12 107	9 375	6 569	347			61,886	113,234	175,120
1977					3 691	16 580	1 270	4 617	14 038	758			40,954	105,236	146,190
1978					3 770	16 808	8 436	4 716	7 355	700			41,785	167,869	209,654
1979			14		2 956	26 792	11 883	13 050	11 416	355			66,466	195,432	261,898
1980				29	2 650	31 702	5 670	4 513	7 932	118			52,614	147,568	200,182
1981			45	32	1 110	11 509	8 123	2 599	4 583	418			28,419	115,567	143,986
1982					2 326	11 473	8 333	2 201	1 675	33			26,041	148,242	174,283
1983					2 226	26 853	11 598	7 362	8 815	381			57,235	176,585	233,820
1984	108		13		506	7 345	3 238	2 426	3 556	171			17,363	142,919	160,282
1985					2 535	13 010	3 693	3 127	4 990	206			27,561	97,489	125,050
1986			92		1 642	21 935	8 009	5 728	4 949	92			42,447	101,026	143,473
1987			24	45	1 638	10 107	4 590	2 991	3 781	212			23,388	83,066	106,454
1988			74		1 114	4 541	1 556	780	663				8,728	27,366	36,094
1989					964	2 496	1 053	803	1 140	113			6,569	31,095	37,664
1990					631	5 657	4 879	1 008	4 027	205			16,407	35,324	51,731
1991					356	6 255	1 388	3 958	1 299	140	24		13,420	46,754	60,174
1992					1 104	6 232	2 036	712	641	90			10,815	34,438	45,253
1993					724	5 925	2 864	300	1 897	120	109		11,939	60,548	72,487
1994					925	8 742	4 683	2 578	3 674	179			20,781	102,875	123,656
1995					689	6 591	2 968	3 690	2 039	16			15,993	146,149	162,142
1996					406	8 717	3 431	1 703	3 284	199			17,740	219,086	236,826
1997					673	9 128	7 573	1 199	3 014	94			21,681	226,725	248,406
1998				64	722	4 735	5 026	1 932	1 291	166			13,936	242,294	256,230
1999 [2]					58	5 641	7 434	2 205	996				16,334	182,306	198,640
2000						3 078	15 518	2 496	1 872				22,964	157,792	180,756
2001					63	3 109	7 580	828	1 451		30		13,061	164,945	178,006
2002					121	1 571	3 396	1 414	1 589	71			8,162	70,362	78,524
2003	130					1 838	11 294	301	1 920	38			15,521	97,434	112,955
2004					186	3 695	2 022		2 827				8,730	97,841	106,571
2005	147			253	2 494	8 499	15 354	5 690	3 605	130			36,172	168,907	205,079
2006					476	6 044	8 626	3 966	661				19,773	177,157	196,930
2007					85	3 728	5 163	4 816	4 856				18,648	174,030	192,678
2008					84	3 581	6 020	2 360	3 521				15,566	119,682	135,248
2009					295	3 459	12 547	760	905				17,966	169,815	187,781
2010					211	9 456	15 453	4 588	724				30,432	244,072	274,504
2011					193	4 608	6 151	4 563	4 300	126			19,941	321,418	341,359
2012					383	4 766	4 063	3 974	2 196				15,382	285,764	301,146
2013					72	3 668	9 409	5 884	4 106	75			23,214	310,201	333,415

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich *et al.* 2014 (USFWS).

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Canvasback (*Aythya valisineria*)

The Canvasback is the largest diving duck species in North America. It is also one of the least abundant species in Canada.

Abundance and Trends

The core breeding area of the Canvasback is in the Prairie and Parklands region of the Prairie Provinces, but the species is also found in the U.S. Prairies, in Alaska, the Yukon and in areas of the western edge of the Northwest Territories. The Canvasback is monitored in its core breeding area mainly through the Waterfowl Breeding Population and Habitat Survey in western Canada (WBPHP; Figure 1, Monitoring section).

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

In most of the survey regions, Canvasback numbers have been closely monitored and have remained for the past two decades mostly above the NAMWP population objective, this following a period of decline in the early 1980s. Overall, the continental population of Canvasbacks shows significant increasing long-term trends in the Canadian Prairies as well as in entire survey area (Table 1). However, the breeding population of the Boreal Forest Region appears to be decreasing (non-significant 10-year declining trend). Overall, Canvasbacks are above or at the NAWMP goals in all regions of the survey area except in Alaska and the Western Boreal Region (Figure 1).

Table 1. Canvasback Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwest United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS – Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-yr Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	787 (58)	685 (51)	667	0.6*	2.1	4.3*
Canadian Prairies	498 (42)	456 (38)	384	0.6	5.5*	12.8*
Western Boreal Canada	125 (29)	85 (20)	133	0.2	–5.0	0.2
U.S. Prairies (North Central)	132 (23)	124 (25)	90	2.3*	16.4	–7.6
Alaska	32 (13)	21 (11)	60	0.0	–14.5*	–10.0

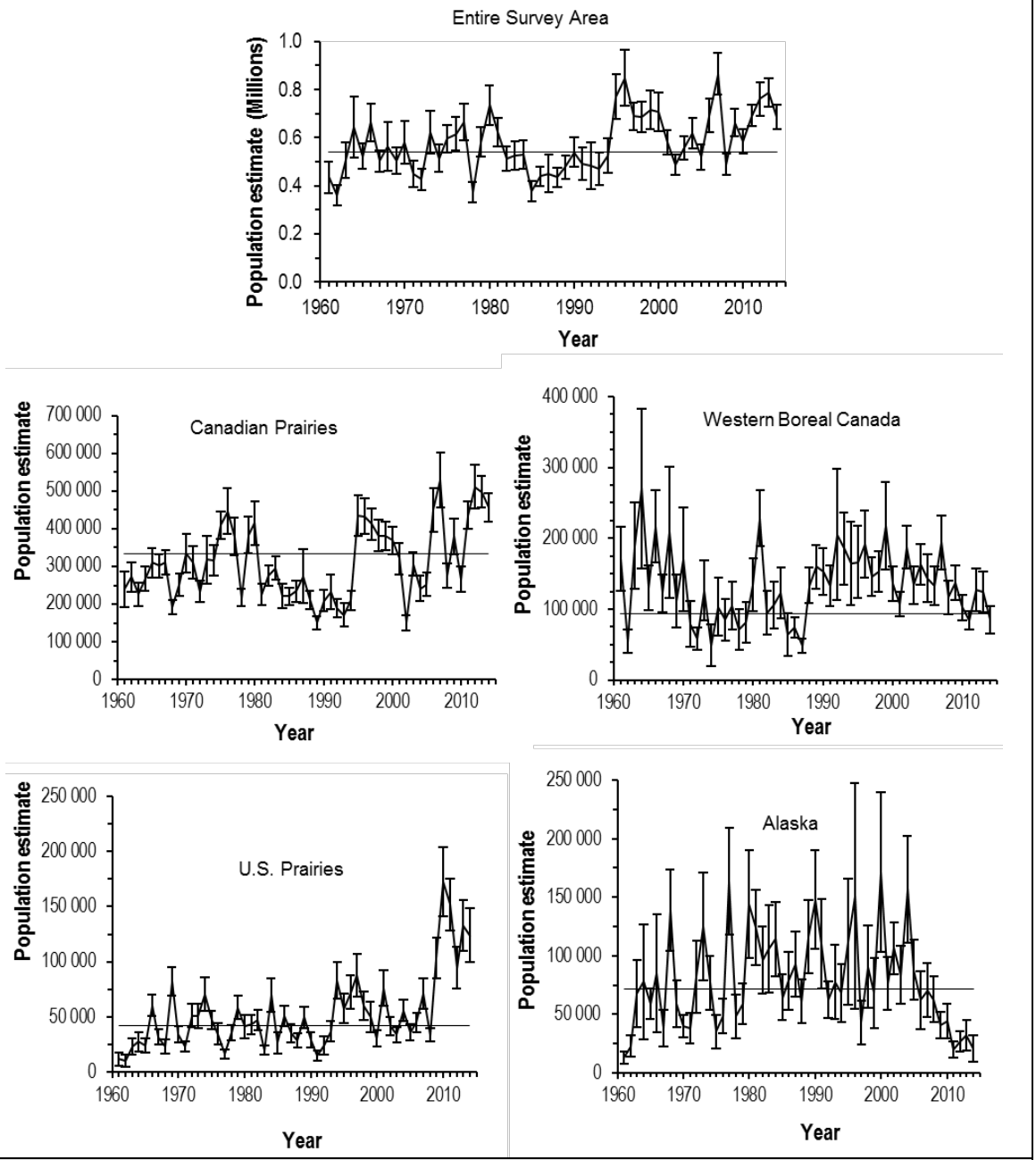

Figure 1. Canvasback Breeding Population Estimates (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States (The horizontal line represents the NAWMP goal in each region of the survey).

- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

Despite considerable annual variation, the population trend of Canvasback has been relatively stable since the survey was initiated in 1991 (Figure 2).

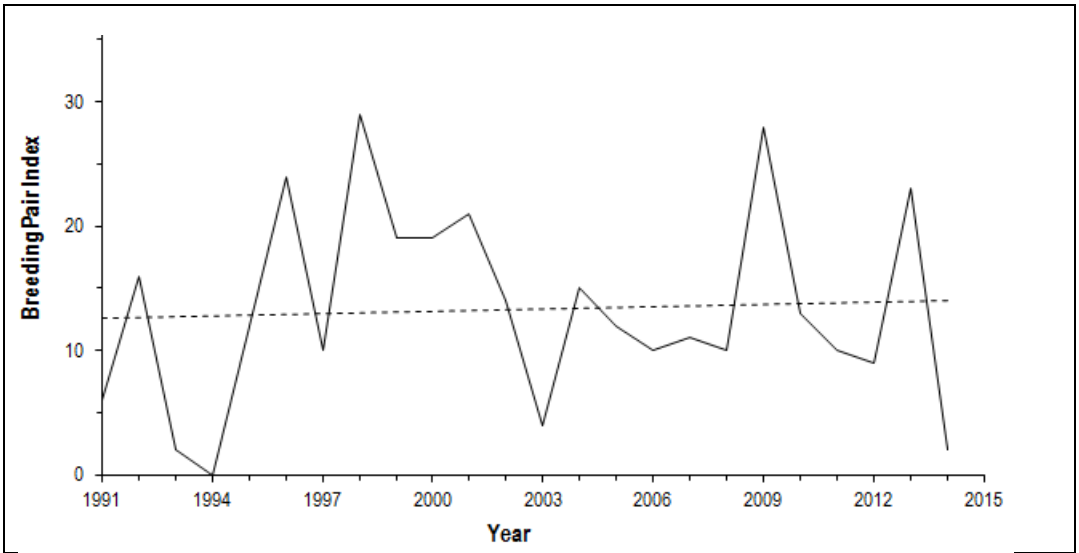

Figure 2. Breeding Pair Trend for the Canvasback in Southern Yukon, 1991–2014.

Harvest

In Canada, Canvasbacks are mostly harvested in the Prairie Provinces. There are harvest restrictions on Canvasback in British Columbia and Manitoba. The majority of the continental harvest takes place in the U.S. (Table 2).

Management and Conservation Concerns

Canvasback breeding populations have increased since the 1980s and have remained above or near the NAWMP goal (NAWMP 2012) since then. These increased population levels have coincided with the return of favourable conditions (pond numbers) in the Prairies. Indeed, much of the variation in this species' abundance is due to changes in water levels, which impact the number of wetland breeding habitats.

Coastal development and reduced water quality in wintering areas are factors that can reduce the size of the continental population. In addition, Canvasback nests are often parasitized by Redheads, who use them to lay their eggs. Parasitized nests are often deserted, thereby affecting Canvasback nesting success and productivity (Bellrose 1980; Mowbray 2002; Brousseau and Lepage 2013).

Table 2. Harvest Estimates for Canvasbacks in Canada and the United States.

	Canada												U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total
1974					1 461	7 530	3 904	5 647	3 344	773			22 659	74 949	97 608
1975					2 116	18 757	8 205	9 065	4 262	1 051		17	43 473	93 761	137 234
1976				20	2 117	17 817	5 321	7 454	3 773	1 360			37 862	127 001	164 863
1977					1 036	6 162	2 770	4 019	2 076	198		44	16 305	75 117	91 422
1978					3 293	11 996	4 596	4 544	2 424	233			27 086	64 092	91 178
1979					3 769	14 208	7 922	7 585	2 239				35 723	91 847	127 570
1980					3 301	10 966	4 746	1 420	5 431	1 269			27 133	66 329	93 462
1981					625	8 327	3 883	1 066	5 193	534			19 628	58 030	77 658
1982					1 440	6 223	7 669	3 236	344				18 912	45 050	63 962
1983					400	10 970	6 696	2 638	4 040	240			24 984	81 108	106 092
1984					214	8 279	1 819	4 716	3 620	210		37	18 895	71 263	90 158
1985					1 435	8 673	3 349	3 617	1 427	201			18 702	79 926	98 628
1986	216		461		1 082	14 385	3 145	5 242	3 951	956	53		29 491	23 983	53 474
1987					503	6 158	2 945	638	709	463			11 416	19 397	30 813
1988					504	2 153	2 744	1 491	385	230			7 507	826	8 333
1989						3 636	1 255	219	869	45	45		6 069	10 882	16 951
1990						5 902	1 392	508	697		23		8 522	7 903	16 425
1991					198	4 206	473	2 473	1 855	98			9 303	7 723	17 026
1992					134	3 194	788	282	194	35			4 627	11 581	16 208
1993					88	1 602	2 505	1 862	570	25			6 652	13 222	19 874
1994						1 331	3 695	1 141	1 843	164			8 174	69 386	77 560
1995						5 444	4 016	1 303	1 542	119			12 424	108 231	120 655
1996					74	4 219	2 965	3 914	1 385				12 557	109 217	121 774
1997						7 585	5 802	1 708	1 387	55			16 537	120 636	137 173
1998						5 266	2 012	392	663	83	233		8 649	93 048	101 697
1999[2]						2 133	5 065		787	51			8 036	88 171	96 207
2000					111	3 085	4 022	588	1 095	0	12		8 913	103 655	112 568
2001						896	4 223	411	464	136			6 130	36 225	42 355
2002						951	3 195	756	253	95			5 250	2 709	7 959
2003						971	5 962	1 325	954	55			9 267	35 384	44 651
2004					57	1 837	2 026	428	145				4 493	44 398	48 891
2005						971	7 563	3 716	825	82			13 157	64 068	77 225
2006						3 173	4 131	2 633	320	15	19		10 291	91 886	102 177
2007						1 812	2 344	4 905	3 334	26			12 421	125 207	137 628
2008						1 018	3 667	2 310	2 265	35			9 295	18 173	27 468
2009						958	7 897	456	797				10 108	70 393	80 501
2010					121	1 972	2 095	518	1 120	59			5 885	145 686	151 571
2011					90	3 913	2 051	6 150	794				12 998	140 862	153 860
2012						504	2 041	1 693	1 346				5 584	117 249	122 833
2013						1 979	5 318	761	6 051				14 109	159 712	173 821

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich *et al.* 2014 (USFWS, US data)

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Ruddy Duck (*Oxyura jamaicensis*)

The Ruddy Duck is not an abundant species in Canada; it is mainly found in the Prairie Pothole Region. The Ruddy Duck winters in saline coastal habitats and large inland water bodies in the U.S. and Mexico. Ruddy Duck numbers are stable or increasing throughout most of the species' breeding range (Brua 2002). This species is not an important game species in Canada.

Abondance and Trends

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

The Ruddy Duck population appears healthy in all regions of the survey area and the continental population is above the NAWMP goal of 350 000 birds (NAWMP 2012). The Ruddy Duck continental breeding population has been showing a significant increasing long-term trend. In the Canadian Prairies, the breeding population has been showing a significant increasing trend in the past five years (Table 1 and Figure 1).

Table 1. Ruddy Duck Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10–yr Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	899 (130)	823 (99)	636	1.9*	3.9	12.2
Canadian Prairies	617 (112)	546 (91)	357	1.4	4.3	31.7*
Western Boreal Canada	62 (25)	46 (15)	72	2	–3.7	–14.2
US Prairies (North Central)	218 (61)	232 (35)	207	3.5*	1.5	3.1
Alaska	1.0 (1.0)	0	0.2	NA	NA	NA

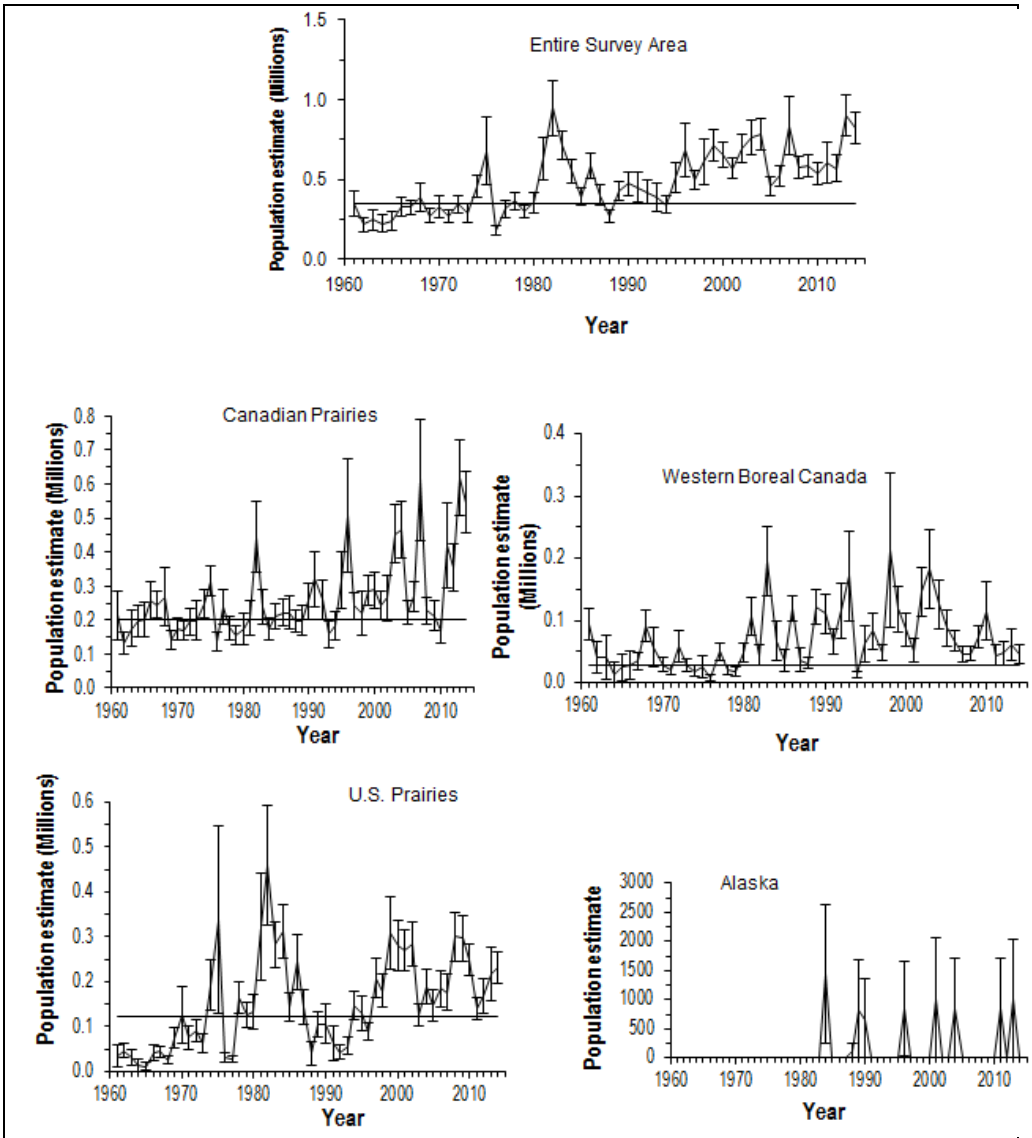

Figure 1. Ruddy Duck Breeding Population Estimates (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States (The horizontal line represents the NAWMP goal in each region of the survey).

Harvest

Ruddy Duck is one of the least harvested species in North America. In Canada, the average yearly harvest in the last 20 years has been of 2000 birds approximately, with most of the harvest taking place in Ontario (Table 2).

Table 2. Harvest Estimates of Ruddy Ducks in Canada.

	Canada												
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total
1974			99		175	2 555	1 067	699	613				5 208
1975			128		783	3 489	256	520	157	103	84		5 520
1976		199	466	176	1 205	3 623	920	444		70	41		7 144
1977						2 181	701		371		30		3 283
1978						930				276		68	1 274
1979		86			825	2 732	2 045	679	1 099				7 466
1980						1 459	363	525	346				2 693
1981					109	1 930	415		424	307			3 185
1982						1 969	714		190				2 873
1983			110			3 391	840	96	251	41			4 729
1984	1 978			58	214	5 421	667	520	296	268	14		9 436
1985					485	1 760	1 274	775	505				4 799
1986					687	6 814	403	85	869				8 858
1987			89			185	95		222	639			1 230
1988						339	361						700
1989				55	383	483							921
1990						567			75	67			709
1991			33	54		3 507			404				3 998
1992					149	186			201				536
1993						836	386		56	19			1 297
1994			132		131	3 731		379		17			4 390
1995					175	2 583	166						2 924
1996			102		361	2 884	182		199	112			3 840
1997			61		61	3 785			190				4 097
1998				64	105	1 767			140				2 076
1999 [2]					79	1 019	343	739					2 180
2000						621	204		182	41			1 048
2001						1 075	676		195				1 946
2002					67	371					303		741
2003						1 852		326	249				2 427
2004					70	1 704	156		161				2 091
2005				66		908			260	25			1 259
2006					151	1 473	162		604				2 390
2007					254	1 080	769	289					2 392
2008						606		1 513					2 119
2009						149							149
2010						957			178				1 135
2011				206		843							1 049
2012						1 170	358		197				1 725
2013						746							746

Data source: M. H. Gendron and A. Smith 2014 (CWS)

Management and Conservation Concerns

As with many North American waterfowl species, the loss or degradation of habitat, especially in the Prairie Potholes in the case of this particular species, is of concern. Also, as a diving duck, Ruddy Ducks are prone to accumulate contaminants such as polychlorinated biphenyls, selenium, and heavy metals (including lead).

References

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Population Status of Sea Ducks

There is concern about the population status of most of the sea duck species (tribe *Mergini*) that breed in North America. There are 15 species on the continent. Sea ducks breed at low densities in remote parts of the continent over broad geographic areas, and moulting and wintering birds often gather on large lakes and coastal waters. Thus, surveying sea ducks is expensive. Most species of sea ducks are poorly monitored by traditional waterfowl surveys, and information on population size and trend for most species is unreliable. Furthermore, they have not been banded in large numbers. The WBPHS, which is used as a basis for setting population goals for many North American waterfowl, is completed during the spring, but is not well designed to survey sea ducks populations. Issues include the fact that the core breeding range of about half of the sea duck species is not covered by the WBPHS, and that the survey is not optimally timed to capture peak counts of breeding sea ducks, which generally nest later than dabbling ducks. Additionally, some groups of sea ducks have not been differentiated into species in the past during the the WBPHS (e.g., scoters, goldeneyes, mergansers). Consequently, few reliable population estimates or trends exist for any of the species. Much of our knowledge is based on a very few, localized studies. Sea ducks are long-lived birds that have low reproductive rates compared with other ducks. Therefore, sea duck populations are sensitive to adult mortality and harvest pressure, and there is limited potential for quick population recovery. Harvest levels are poorly understood, partly due to the fact that the Harvest Questionnaire Survey is inaccurate to estimate the sea duck sport harvest.

Recent analyses indicate that annual production is not sufficient to offset the annual mortality currently experienced by some sea duck populations and that this is causing declines in their numbers. Even though harvest rates are low for sea ducks, it is believed that reductions in harvest levels may be needed to help stabilize those populations. Determining what the annual harvest should be is a priority to achieve sustainability (Continental Technical Team, Sea Duck Joint Venture).

The Sea Duck Joint Venture (SDJV) was formed in 1999 under the auspices of the North American Waterfowl Management Plan to address concerns about the status of sea ducks. The SDJV is a conservation partnership that provides funding and coordination to support research and monitoring of North American sea ducks. Partners include federal, state and provincial wildlife agencies, private conservation groups, and academics. Its purpose is to improve knowledge about sea duck life histories and limiting factors to improve management and address concerns about population declines. A SDJV Strategic Plan was developed for 2014–2018. This plan identifies information needs for sea ducks and describes general strategies to address those needs.

Eiders

Common and King Eiders inhabit Arctic and subarctic coastal marine habitats and have a circumpolar distribution. Their breeding ranges in Canada are extensive and cover most coastlines from the Beaufort Sea east into the Coronation and Queen Maud gulfs, and north into the High Arctic islands, as well as areas throughout the eastern Canadian Arctic, including Ungava, Hudson and James bays, and from the coast of Labrador, down to the St. Lawrence Estuary in Quebec, and south into Nova Scotia. Eiders that breed in Canada, and that winter as far north as open water persists, form large aggregations in coastal areas. In the Pacific, they winter as far north as the polynyas (areas of open water surrounded by sea ice) adjacent to the Chukotka Peninsula in Russia, while in the northwest Atlantic they winter in Hudson Bay, southwest Greenland, and from the Labrador coast south to New York. Throughout their range, there are four subspecies of Common Eiders and two populations of King Eiders. These populations are thought to be demographically distinctive, as they experience different climatic conditions and locally specific threats.

Eiders have long been exploited for food and eiderdown, and more recently they have become the focus of outfitted hunts along the eastern seaboard of the United States. Market hunting almost extirpated them from eastern North America by the end of the 19th century. The *Migratory Birds Convention* designated special protection to eiders and largely eliminated commercial hunting in North America. More recently, commercial exploitation of eiders in Greenland has led to concern for the sustainability of eiders wintering there (Hansen 2002; Gilliland et al. 2009). Unlike other species of migratory birds in North America, Common Eiders in some areas of eastern Canada support large commercial and subsistence harvests of eiderdown, where it provides a cash crop in areas with low employment, or is used locally for insulation in Inuit parkas, supporting local economies.

Industrial activity in Canada's north is likely to increase in the next decades. There is renewed interest in offshore oil and gas development in the Beaufort Sea, as well as in some areas in the eastern Arctic. Marine shipping is likely to increase in the Arctic, especially in the Hudson Strait. Both the Beaufort Sea and the Hudson Strait have important marine resting and feeding areas used by thousands of eiders during certain times of the year. Increased human activity in these areas could negatively affect eiders through disturbance and pollution from accidental spills or chronic discharge.

The remoteness of much of their breeding and wintering ranges, the existence of several distinctive populations, and the fact that eiders do not use recognized North American flyways all have been factors that have led to inconsistent or contributed to the absence of management and monitoring programs across Canada. Canada has a core responsibility for the management of eiders, but better collaboration is needed with Canadian northern wildlife management boards, as well as Russia, Greenland, France (Saint-Pierre and Miquelon), and the U.S.

Common Eider (*Somateria mollissima*)

Common Eiders inhabit Arctic and subarctic coastal marine habitats and have a circumpolar distribution that includes Russia, Alaska, Canada and Greenland. The species spends its entire life cycle in marine environments; it nests in large colonies mostly on marine islands and forms large aggregations in inshore coastal regions during the non-breeding season. Throughout its range, there are four subspecies of Common Eiders.

Abundance and Trends

- PACIFIC COMMON EIDER

More than half of the Pacific Common Eiders (*Somateria mollissima nigra*) that breed in Canada nest in the central Canadian Arctic (Dolphin and Union Strait, Coronation Gulf, and Queen Maud Gulf). Their staging and moulting areas are not well known. Pacific Common Eiders may overwinter in the Arctic Ocean, but most are believed to winter in Alaska in the Bering Sea south to, and including, the Aleutian Region.

Pacific Common Eiders are inadequately monitored throughout their range. The population estimates and trends for Canada are currently based on a count obtained about every 10 years during the spring migration at Point Barrow, Alaska (Suydam et al. 2000, 2008). These counts indicated a 53% decline over a 20-year period from 156 000 birds in 1976 to approximately 73 000 birds in 1996. Counts in 2003 and 2004 suggested the population had increased to over 100 000 eiders.

Beginning in 1995, aerial and ground surveys were conducted over three years to document the size and location of nesting colonies, to provide a breeding population estimate for the region, and to establish a baseline for monitoring Pacific Common Eider populations in the future. At that time, the breeding population for the central Arctic was estimated at about 37 000 eiders, and the primary nesting areas were identified as the southeastern Dolphin and Union Straits, outer Bathurst Inlet, Melville Sound, Elu Inlet, and central Queen Maud Gulf (L. Dickson, pers. comm.). In 2014, aerial surveys were conducted in the Queen Maud Gulf area in late June to establish long-term monitoring. The objective of this survey is to provide more complete coverage of the breeding range and to provide current information on population trends.

Aerial surveys in the Bathurst Inlet area were conducted in late June 1995, and again in 2006–2008, to establish a baseline for monitoring Pacific Common Eider breeding population trends (Raven and Dickson 2008). At a subset of 24 colonies in the same area, nest success and annual survival of adult females were monitored over a 7-year period starting in 2001 (Hoover and Dickson 2007).

Satellite telemetry of eiders from a nesting colony near Bathurst Inlet, Nunavut, indicated that most of these eiders winter off the southeast coast of Chukotka Peninsula, Russia, and off the coast of St. Lawrence Island, Alaska (Dickson 2012). About one third of the males also moult off Russia in the summer.

- NORTHERN COMMON EIDER

The northern subspecies of the Common Eider (*S. m. borealis*) breeds on small islands throughout the coastal areas of the eastern Canadian Arctic and Greenland, and winters along the coasts of Newfoundland and Labrador, Quebec, and southwest Greenland.

There are no recent data on breeding areas: the very large distribution of this subspecies in the Canadian Arctic makes it very difficult to survey on a regular basis. Historical data exist for a few areas only, these are: Ungava Bay, coastal Labrador, East Bay South Hampton Island and Hells Gate (High Arctic), and Digges Sound. Surveys in Greenland indicate that dramatic population declines have occurred since the 1970s.

A winter monitoring program was implemented in 2003 to monitor the component of this subspecies' population that overwinters in Canada. The entire wintering range of Northern Common Eiders in eastern Canada (and Saint-Pierre and Miquelon, France) has been surveyed every third winter since the survey was implemented in 2003. Population estimates in 2003–2009 suggest that the Canadian overwintering component has been stable over this period, but the 2012 estimate was significantly greater than previous estimates (Table 1). This survey will be repeated in February 2015, which will confirm this wintering component of borealis has increased.

Table 1. Wintering Population (Canadian component) for the Northern Common Eider, 2003–2012 (Common Eider Winter Survey).

	Abundance
2003	204 000 (15 500)
2006	179 500 (10 800)
2009	203 300 (19 400)
2012	317 600 (25 100)

- HUDSON BAY COMMON EIDER

The Hudson Bay subspecies of the Common Eider (*S. m. sedentaria*) breeds within Hudson Bay and winters in open water leads near the Belcher Islands and off the western coast of Quebec. The Hudson Bay Common Eider is one of the only waterfowl species in the world that spends the entire year in Arctic waters.

Breeding data for this subspecies exist only for the Belcher Islands and the area of La Perouse Bay, Manitoba. The Belcher Islands, first surveyed in the 1980s, were resurveyed in 1997. The results showed that the breeding population had declined by 70% since the late 1980s, apparently due to winter weather events (e.g., freezing of polynyas—areas of open water surrounded by sea ice) that led to high levels of mortality in 1992 (Robertson and Gilchrist 1998). The CWS initiated research into the winter ecology of Hudson Bay Common Eiders in 1998. The three winters that followed were mild, with vast expanses of open sea available to foraging flocks. There have been no significant winter kill events since this work began.

- AMERICAN COMMON EIDER

The American Common Eider (*S. m. dresseri*) population estimate is of approximately 240 000 birds, based on 2010 regional surveys (C. Lepage, CWS-Quebec Region, pers. comm.). Reliable data for breeding areas exist only for segments of the population that breed in the St. Lawrence Estuary and the North Shore of the Gulf of St. Lawrence. The population in the estuary seemed stable and appeared to be increasing in the Gulf of St. Lawrence (Rail and Cotter 2007), but appear to be declining at about 3% per year in the past few years (J.-F. Giroux, Université du Québec à Montréal, pers. comm.). In contrast, the number of eiders breeding in northern Newfoundland and southern Labrador appears to be increasing (S. Gilliland, unpubl. data). There is little information on the status of the population segments breeding in the southern portion of the species' range. Preliminary analysis suggests that eiders breeding in New Brunswick may be experiencing a long-term decline of about 3% per year (K. Conner, NB Department of Natural Resources, unpubl. data), and anecdotal information for Nova Scotia and Maine suggests declines in the number and size of breeding colonies in these areas as well.

Harvest

- PACIFIC COMMON EIDER

Harvest information for the Pacific Common Eider is limited, but suggests that a substantial harvest of eiders in eastern Russia is taking place. A rough estimate of the subsistence harvest in 2001 in Chukotka,

Rusia, was of 115 000 eiders (from four different species) [E. E. Syroechkovski Jr., Russian Institute of Ecology and Evolution, pers. comm.]. However, it is not known what percentage of this take is of Pacific Common Eiders from Canadian breeding grounds.

The subsistence harvest of Pacific Common Eiders in Canada and Alaska is estimated at 2500 birds per year (Fabijan et al. 1997).

- NORTHERN COMMON EIDER

This subspecies is unique in that it is intensively harvested commercially in west Greenland. In Canada, it is subject to both subsistence and recreational harvest. Recent demographic modelling suggested that harvest levels were unsustainable (Gilliland et al. 2009). The bulk of the harvest occurs in Greenland and insular Newfoundland, but harvest levels in Greenland were determined to be excessive, leading to a harvest allocation issue with Canada. More restrictive harvest regulations were put in place in Newfoundland in 1997, and in Greenland between 2002–2004 (Merkel 2010), resulting in a decrease in the overall harvest. However, harvest levels remain high. Pressures to liberalize harvest in Greenland and Newfoundland continue, and population impacts of recent avian cholera outbreaks in the Canadian Arctic continue to be a major population threat.

Harvest information is estimated through the National Harvest Survey in Canada, but the estimates are thought to be imprecise for most sea duck species. The survey has shown that eider harvest has generally declined over the last 30 years. However, the harvest in Newfoundland and Labrador has been increasing since 2005, and unusually high levels were recorded in 2007 and 2008. Such high levels had not been observed since the mid-1980s and may be unsustainable (Gilliland et al. 2009). The 2010–2013 average harvest estimate for the *boreali* subspecies was of about 9000 birds. Most of the hunting takes place in Newfoundland, Labrador, and Quebec. This subspecies is not harvested in the U.S., as it overwinters in Canada and Greenland.

- HUDSON BAY COMMON EIDER

Hudson Bay Common Eiders are harvested (recreational harvest) throughout their range during the breeding season and more particularly in the Belcher Islands during winter, when they are concentrated in open waters. The annual harvest of eiders by Belcher Island residents was estimated at 6000 birds in 1986 (Reed 1986). Egg and down collection takes place throughout the range during the breeding season, but its extent is unknown (SDJV 2003).

- AMERICAN COMMON EIDER

The American Common Eider is among the most commonly harvested waterfowl in several coastal regions of eastern Canada and the U.S. The most recent harvest estimate was of approximately 17 000 birds (2010–2013 average), which exceeds the estimated sustainable harvest for this subspecies. Historically, the majority of the American Common Eider harvest has taken place in Canada. However, while the Canadian harvest has declined, the subspecies has become the focus of outfitted hunts along the eastern seaboard of the U.S. Currently, approximately 65% of the total harvest takes place in the U.S.

American Common Eiders are harvested not only as part of the recreational harvest, but also for Aboriginal subsistence use, and are locally important for some Aboriginal communities in Quebec and Atlantic Canada. Few estimates of subsistence harvest are available. Eiderdown harvest also represents an important economic activity in the St. Lawrence Estuary.

Management and Conservation Concerns

- PACIFIC COMMON EIDER

Pacific Common Eiders are particularly vulnerable to oil spills because they congregate in large, dense, flocks during winter, moulting, and migration. Discovery of offshore oil and gas reserves in two key spring staging areas, combined with increasing resource development in Canadian Arctic breeding areas, will likely result in increased human activity and may have potential adverse effects on this species' population.

- NORTHERN COMMON EIDER

Emerging threats for Northern Eiders include disease, disturbance of breeding colonies by polar bears, increased shipping though Hudson Strait, mortality from oil spills, and high harvest in Newfoundland. For example, many hundreds of Common Eider ducks died of avian cholera at nesting colonies in northern Hudson Bay and west Hudson Strait in July and August of 2004 and 2005. In the summer of 2006, cholera was again detected at eider colonies along the northern coasts of Quebec in Nunavik and at East Bay, Southampton Island, Nunavut. Similarly, Inuit from Nunavut and Nunavik have recently reported catastrophic losses at many breeding colonies as a result of polar bear activity. Although polar bear activity has been observed intermittently, it has never been observed at the current levels, and cholera had never been observed in Arctic breeding eiders.

- HUDSON BAY COMMON EIDER

The Hudson Bay Common Eider is one of the only waterfowl species in the world that spends the entire year in Arctic waters. Mass die-offs can occur in winter when large portions of the population are concentrated in open-water leads that sometimes freeze over (Robertson and Gilchrist 1998). The frequency and magnitude of these die-offs and their impact on the Hudson Bay Common Eider population are unknown.

This species is harvested by aboriginal subsistence hunters (adults, egg and down collection) throughout the year. Little information on harvest levels is available (SDJV 2003).

- AMERICAN COMMON EIDER

Diseases may play an important role in the dynamics of this population. Intermittent outbreaks of avian cholera have been reported throughout the species' range, with the most recent event occurring in 2002, when an estimated 6000 adult females died at breeding colonies in the St. Lawrence Estuary (Joint Working Group on the Management of the Common Eider 2004). The impacts of these emerging and re-emerging diseases on American Common Eiders are poorly understood. However, research programs at the Université du Québec à Montréal are focusing on the impact of avian cholera on population dynamics of eiders breeding in the St. Lawrence Estuary. Furthermore, the U.S. Geological Survey's National Wildlife Health Center has been collaborating with the Southeastern Cooperative Wildlife Disease Study (University of Georgia, U.S.) and the USFWS to characterize other diseases that could affect eiders, such as the orthomyxovirus.

In addition to diseases, changes in predator communities have also been implicated as potential stresses on American Eiders breeding in the southern portion of their breeding range. The population recovery of river otters, Great Black-backed Gulls and Bald Eagles has been identified as a potential source of mortality and disturbance at American Eider breeding colonies in Nova Scotia, New Brunswick and Maine (S. Gilliland, CWS-Atlantic Region, pers.com.).

In response to concerns for this population, resource agencies in Canada and the U.S. are currently undertaking an assessment of the status of this population and are planning to implement a regular range-wide monitoring program for American Eiders (Gilliland et al. 2011, Bordage et al. 2007).

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King Eider (*Somateria spectabilis*)

The King Eider has a circumpolar distribution. Among sea ducks, this species is one of the most northerly nesting species. The continental population is apparently declining (Powell and Suydam 2012).

Abundance and Trends

There are two King Eider management populations, which are based on the species' wintering areas: the Western Arctic population and the Eastern Arctic population.

No annual surveys covering the King Eider are carried out in North America (Cotter and Lepage 2013). The continental population is estimated at 600 000 individuals (NAWMP 2012).

- WESTERN POPULATION

The population estimates and trends for the Western Arctic King Eider are currently based on a count obtained approximately every 10 years during spring migration at Point Barrow, Alaska (Suydam et al. 2000, 2008). These counts indicate a 56% decline in numbers over a 20-year period, from 800 000 birds in 1976 to approximately 350 000 birds in 1996. However, counts conducted in 2003 and 2004 suggest that the population may have stabilized, or possibly increased, since the mid-1990s (304 000 and 592 000 birds in 2003 and 2004, respectively). Aerial transect surveys on western Victoria Island suggest that the King Eider population breeding in this area declined by 54% between the early 1990s and 2004–2005 (Raven and Dickson 2006). The greatest decline occurred around Holman, the only community in the survey area.

- EASTERN POPULATION

A review of available data on wintering grounds in Greenland has shown a substantial decrease in the number of wintering and moulting King Eiders. These findings suggest that the Eastern Arctic Population is declining. It is not known whether this apparent decline represents a shift in distribution due to human disturbance (Suydam 2000). In the Rasmussen Lowlands of Nunavut, however, a significant decline in the numbers of King Eiders was observed between 1974–1975 and 1994–1995 (Gratto-Trevor et al. 1998). These findings supported the concerns expressed by hunters in the area that King Eider populations were declining (Johnston et al. 2000). In February 2010, the CWS conducted exploratory surveys in parts of the Hudson Strait and in Frobisher Bay. These surveys confirmed the occurrence of large numbers of wintering King and Common Eiders at the northern tip of Labrador and the southern tip of Baffin Island (S. Gilliland and C. Lepage, CWS unpub. data), with small numbers of birds occurring on the eastern side of Ungava Bay and Frobisher Bay. The east coast of Baffin Island has not been explored, but anecdotal observations by helicopter pilots suggest that groups of eiders may winter there as well (J. Innis, pers. comm.).

Harvest

The King Eider is hunted for subsistence in Canada, Alaska and Russia. Concerns have been raised that local harvests of the species in communities such as Holman (Canada), are having an impact on the population, although harvest data for the three countries is not providing the accuracy needed to model the impacts on adult survival. Fabijan et al. (1997) estimated that the harvest in Alaska and Canada was 2% to 5% of the population from the mid-1970s to the mid-1990s. The eider harvest in Canada occurs mainly in June, with most (99 %) of the harvest activities occurring at Holman (96% of the birds harvested are King Eiders). In Canada, sport harvesting of King Eiders has always been very low (Cotter and Lepage, 2013).

In the eastern Arctic, available data on eider harvesting is limited. However, the harvest of eiders (King and Common Eiders combined) in southwest Greenland is estimated at over 100 000 birds per year. The largest eider harvest in Canada takes place in Newfoundland, where about 10% of the harvest may consist of King Eiders (Gilliland and Robertson 2009).

Management and Conservation Concerns

Subsistence harvesting by Aboriginal people and losses associated with starvation are two major sources of mortality for King Eiders (Cotter and Lepage 2013). Losses from mass starvations occur particularly during the spring migration. In 1964, 100 000 King Eiders (western population) perished due to the lack of open water between the ice, which resulted in lack of access to food sources (Barry 1968).

The breeding success of the King Eider varies greatly. A delay in the spring ice melt, as well as bad weather conditions during migration or during the breeding season can greatly affect this species' productivity (Powell and Suydam 2012). The impact on King Eider populations of changes in the extent of the sea ice and the composition and availability of prey resulting from climate changes in the Arctic remains unknown (Powell and Suydam 2012).

Industrial activity in Canada's north is likely to increase over the coming decades. There is renewed interest in offshore oil and gas development in the Beaufort Sea and in some areas in the eastern Arctic. Marine shipping is also likely to increase in the Arctic, especially in the Hudson Strait. Both the Beaufort Sea and the Hudson Strait harbour important marine resting and feeding areas that are used by thousands of eiders at certain times of the year. Increased human activity in these areas could negatively affect eiders through disturbance and pollution from accidental spills or chronic discharges, especially because this species spends most of its life in marine habitats.

The remoteness of most of the species' breeding and wintering areas, the existence of several distinct populations, and the fact that eiders do not use recognized North American flyways, are all factors explaining the lack of consistent management and monitoring programs in Canada. Obviously, Canada has a core responsibility for managing eiders, and a better collaboration is needed from Canadian northern wildlife management boards, Russia, Greenland, France and the United States.

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Harlequin Duck (*Histrionicus histrionicus*)

Until the 1990s, little was known of the ecology of Harlequin Ducks in North America. However, research efforts have improved our understanding of this species in some areas. For management purposes, there are two distinct populations of Harlequin Ducks in North America—the Western Population along the Pacific Coast, and the Eastern Population along the Atlantic Coast. The Eastern Population breeds in Québec, Newfoundland and Labrador, New Brunswick, and Nunavut. The Western Population breeds in Alaska, Yukon, British Columbia, Alberta, Montana, Wyoming, Idaho, and Washington.

The Eastern Population experienced a decline in the 1980s, probably because of overharvesting. It has been listed as being of special concern under the Canadian *Species at Risk Act*. However, the species has shown increases in its numbers since the 1990s. The Western Population has low numbers but appears stable.

Abundance and Trends

- EASTERN POPULATION

This population contains two distinct subpopulations based on the use of two distinct wintering locations. Harlequin Ducks that breed in northern Quebec and Labrador and winter in Greenland are considered a distinct population from those that breed in southern Labrador, Newfoundland, New Brunswick and the Gaspé Peninsula of Quebec and winter mostly in eastern North America (Maritimes and Maine) [Robert et al. 2008; Thomas et al. 2008]. Genetic studies support the existence of two subpopulations with minimal gene flow taking place between them (Scribner et al. 2000). The extent of overlap between the breeding and wintering areas of these subpopulations is unknown.

The Eastern Population declined to historic low numbers in the 1980s and early 1990s, probably because of overharvesting (Goudie 1991). Since then the population has shown a slight upward trend. The Eastern Population was estimated to be roughly 6800 individuals in the mid-2000s (Robert 2013). The province of Quebec is the most important breeding area in eastern North America for the species, as approximately ~80% of pairs breed in northern Quebec (Robert 2013).

The size of the harlequin sub-population overwintering in Greenland is unknown, but an estimate of 6200 moulting harlequins was made along the western coast of Greenland during surveys in 1999 (Boertmann and Mosbech 2002).

The sub-population of Harlequin Ducks wintering in the Maritimes and Maine is estimated at about 3000 birds, with slightly more than half of these (~1600 birds) wintering in Maine at a single location (Mittelhauser 2008; Robertson and Goudie 1999; Environment Canada 2007). Winter surveys conducted in 2010 identified approximately 300 birds in the Bay of Fundy, 600 on the southern and eastern coasts of Nova Scotia, and 450 in Newfoundland.

Robertson et al. (2008) published a summary of the status of the Eastern Population of the Harlequin Duck entitled *Management Plan for the Harlequin Duck (Histrionicus histrionicus), Eastern Population, in Atlantic Canada and Quebec.* This document is available at www.publications.gc.ca/collections/collection_2007/ec/En3-4-21-2007E.pdf

- WESTERN POPULATION

There are no comprehensive estimates of Harlequin Duck numbers or trends for western North America. The Western Population is much larger than the Eastern Population; rough estimates range from 150 000 to 250 000 birds (Robertson and Goudie 1999). The bulk of the Western Population (>100 000 birds) apparently winters in the Aleutian Islands (in the Northern Pacific Ocean).

Harvest

The Western Population of Harlequin Ducks is hunted, but under restrictive regulations. However, estimates of harvest are poor because sea duck hunters are under-sampled in harvest surveys. Probably fewer than 1000 Harlequin Ducks are harvested along the west coast by sport hunters annually, and subsistence harvest in Alaska may account for 2500 birds. Better information on harvest is needed (Robertson and Goudie 1999).

Hunting for Harlequin Ducks in eastern North America has been prohibited since 1990 and the number of birds has subsequently increased.

Management and Conservation Concerns

In the late 1980s, the Eastern Population of the Harlequin Duck was estimated at less than 1000 individuals (Goudie 1991). Overhunting, disturbance from recreation (boats) and development (aquaculture and fisheries, hydro-developments), and habitat loss are believed to have played a role in the decline of the population (Robertson and Goudie 1999). The Eastern Population was assessed as endangered in 1990 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As a consequence, in 1990 the hunting of this species was banned throughout the Atlantic Flyway. Later, new information indicating that the number of harlequins breeding in eastern Canada was significantly larger than suspected led to the population being reassessed as a species with a population of "Special Concern" in 2001 (Environment Canada 2007). The Eastern Population has been increasing and this increase may be attributable to the fact that the hunting of the species has been prohibited everywhere in eastern North American since 1990 (Atlantic Provinces, Ontario, Quebec, and in the eastern United States, where most birds winter; Thomas and Robert 2001). In addition, campaigns to make the public aware of the species' precarious status in eastern Canada have probably also contributed to the increase in population numbers. Although hunting of Harlequin Ducks has been prohibited in eastern Canada since 1990, these remain extremely vulnerable to hunters because of their tameness, their tendency to feed close to shore, and the resemblance of the female and immature individuals to ducks of other species that may be hunted legally.

Hunting closures have not been implemented in western Canada, where hunting of the species is thought to be rare. However, data from Audubon Christmas Bird Counts and the B.C. Coastal Waterbird Survey suggest that the Western Population might be declining at a rate of 2–3% per year (CWS and Bird Studies Canada, unpubl. data). A review of the status of the Western Population and of the current monitoring programs is underway. In the early 2000s, the daily bag limit for western Harlequin Ducks in British Columbia was reduced from 8 to 2 in recognition of the continental importance of British Columbia for breeding and wintering birds.

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Scoters

The three species of scoters that breed in Canada are the Black Scoter (*Melanitta americana*), the Surf Scoter (*M. perspicillata*) and the White-winged Scoter (*M. fusca*). Less is known about scoters than about any other group of sea ducks, but among the three species, the White-winged Scoter is the best known. Research efforts in recent years have led to a better understanding of the breeding, moulting and wintering ecology of this group. Bordage and Savard (1995), Brown and Fredrickson (1997), and Savard et al. (1998) provide useful reviews of the information available on scoters. Several projects supported by the SDJV have also addressed research on important information gaps about scoters (www.seaduckjv.org/ssna.html). There are currently no surveys that provide good population or trend estimates for scoters, but some are under development through the SDJV. There are no NAMWP population objectives available for these three species.

The three species are not differentiated during fixed-wing aircraft surveys such as the WBPHS, as it is difficult to identify them at a species level. The WBPHS in western Canada predominantly covers the White-winged and Surf Scoter breeding areas, and for this reason, results from the WBPHS are presented in the Surf Scoter account.

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Black Scoter (*Melanitta americana*)

There are two Black Scoter populations in Canada: the Atlantic population and the Pacific Population. Until recently, the eastern breeding ground was thought to encompass the Ontario Hudson Bay Lowlands, northern and central Quebec, and western Labrador. However, recent telemetry studies show that pairs also breed from the Hudson Bay coast of Manitoba west-northwest almost up to the Great Slave Lake in the Northwest Territories (SDJV 2014). The Pacific Population breeds primarily in Alaska, but possibly also in northern Yukon and the northwestern Northwest Territories (Bordage and Savard 1995).

Abundance and Trends

The continental Black Scoter population totals approximately 500 000 birds (300 000 birds in the Atlantic Population and 200 000 birds in the Pacific Population; 2002–2011 average, NAWMP 2012).

The Black Scoter population is monitored nationally through the Waterfowl Breeding Population and Habitat Survey of western Canada (WBPHS; Figure 1, Monitoring Section), which combines the three scoter species that breed in Canada. The three species are not differentiated during these surveys, as it is difficult to distinguish among them from fixed-wing aircraft. This survey predominantly covers the White-winged and Surf Scoter breeding areas.

- ATLANTIC POPULATION

• St. Lawrence Estuary and Gulf, and Chaleur Bay

The Chaleur Bay area (Quebec and New Brunswick) and the St. Lawrence Estuary and Gulf are major spring staging areas for scoters. Helicopter surveys indicated a spring staging population of about 90 000 Black Scoters (i.e., 52 000 in the Chaleur Bay and 36 300 in the St. Lawrence Estuary, Quebec) in 2005 (McAloney et al. 2005). In 1998, over 220 000 scoters (the three species combined) were staging in the St. Lawrence Estuary and Gulf (Rail and Savard 2003).

As part of the Atlantic and Great Lakes Sea Duck Migration Study, a number of Black Scoters were marked with satellite transmitters in the Chaleur Bay in 2009 and 2010 (seaduckjv.org/atlantic_migration_study.html). This study aims to provide information on seasonal connectivity, timing and direction of movements, and site fidelity to wintering, breeding and moult sites (SDJV 2014).

• James Bay

Developmental photographic aerial surveys of moulting (primarily male) Black Scoters have been ongoing since 2006 in the James Bay area. During the 2006, 2009 and 2012 surveys, a total of 88 460, 106 600 and 125 369 Black Scoters, respectively, were observed in the core survey area in western James Bay (Badzinski et al. 2012).

During late July and early August 2013, a new reconnaissance survey, based on the extent of satellite telemetry data and employing visual estimates, documented about 45 000 Black, Surf and White-winged Scoters moulting in eastern James Bay in an area around Charlton Island and along the Quebec coastline. Approximately 40 000 Surf, White-winged and Black Scoters were also observed in an area around the Belcher Islands and along the eastern Hudson Bay coastline up to and including Guillaume-Delisle Lake in Quebec. Also, about 110 000 scoters (predominately Black Scoter) were observed in western Hudson Bay scattered along the coastline as far north as Churchill, Manitoba, with the majority (90 000) occurring between the Ontario/Manitoba border and Nelson River inlet (S. Badzinski, CWS-Ontario Region, pers. comm.).

Harvest

In Canada, the harvest includes only a few thousand birds in eastern Canada (Table 1). Most of the harvest is in the United States where in 2013, 23 000 Black Scoters were harvested.

Management and Conservation Concerns

A number of aspects of the breeding ecology of Black Scoters remain poorly known (Bordage and Savard 2011). Reproductive success can vary significantly between years, making adult survival crucial to population dynamics. Thus, this species' population is particularly sensitive to mortality from hunting.

The fact that this species congregates during moulting and in winter makes it highly vulnerable to oil spills and other toxic substances. The Black Scoter also faces threats from aquaculture, as well as potentially from the expected development of offshore wind energy. The development of new hydroelectric projects and the construction of transmission lines in northern Quebec could modify the landscape and affect the breeding of the species (Lepage and Savard 2013).

Table 1. Harvest Estimates of Black Scoters in Canada and the United States.

	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	T/NU	YT	Total	Total	Total
1974	2 239		1 300	17	5 555	3 646							12 757	24 318	37 075
1975	126		2 788		11 105	11 628					23		25 670	19 033	44 703
1976	2 711		5 231	245	17 217	6 853							32 257	11 502	43 759
1977	5 210	94	3 547	40	25 536	3 671				90	198		38 386	19 943	58 329
1978	365		2 106		6 351	1 999				92			10 913	8 142	19 055
1979	1 830		3 078	43	11 455	1 973					85	107	18 571	12 964	31 535
1980	1 195		1 104		12 065	912							15 276	7 830	23 106
1981	3 406		5 231	165	11 438	2 883				55			23 178	12 243	35 421
1982	6 158		2 769		6 574	967							16 468	5 523	21 991
1983	880		2 308	49	5 390	2 303				37			10 967	4 334	15 301
1984	2 024		1 536		7 756	2 074	330			57			13 777	11 649	25 426
1985	884	209	1 094		7 005	3 502							12 694	15 875	28 569
1986	579		3 127		2 314	2 795						34	8 849	7 212	16 061
1987	572		1 359	678	7 195	843	414						11 061	10 128	21 189
1988	147		1 124	441	3 430	714							5 856	5 698	11 554
1989	463		650		5 006	705							6 824	6 815	13 639
1990	377		1 114	202	3 856	1 455							7 004	12 183	19 187
1991	783		2 330	94	3 253	907							7 367	6 600	13 967
1992	969		1 769		1 477	669						24	4 908	4 915	9 823
1993	570		1 166		4 882	656	618						7 892	3 724	11 616
1994	298		3 216	54	2 297	549	971			29		165	7 579	6 952	14 531
1995	1 543		1 978	149	679	563							4 912	3 100	8 012
1996	568		1 000	32	1 598	378							3 576	5 677	9 253
1997			1 324	43	2 202	205							3 774	5 668	9 442
1998	1 212	14	985	51	2 752	186							5 200	3 888	9 088
1999 [2]	524		1 002		1 620	464							3 610	9 600	13 210
2000	29		1 354	677	497	260							2 817	6 300	9 117
2001	928		2 646		947	682							5 203	6 600	11 803
2002	838	158	1 462	72	610	243							3 383	11 600	14 983
2003	536		821	74	655	221							2 307	20 400	22 707
2004			1 737	36	790	96							2 659	13 800	16 459
2005	754		1 580		239								2 573	20 530	23 103
2006	250		740		1 215	288							2 493	9 643	12 136
2007			277		393	227							897	9 122	10 019
2008			823		1 723	126							2 672	6 249	8 921
2009			728	81	81	126							1 016	9 613	10 629
2010	228		2 421	182	1 797								4 628	15 513	20 141
2011			575		1 814								2 389	14 631	17 020
2012	58		197	314	2 543	202							3 314	12 042	15 356
2013			152		1 098	188							1 438	23 658	25 096

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and S. M. Olson 2014 (USFWS, US data)

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Surf Scoter (*Melanitta perspicillata*)

Two populations of Surf Scoters are recognized in North America: one population winters in the Pacific, whereas the other winters in the Atlantic. The Eastern Population breeds in the eastern Northwest Territories (south Keewatin), in the Hudson Bay lowlands (in Manitoba and Ontario), and throughout central Quebec and Labrador (SDJV 2014). The Western Population breeds primarily in Alaska, but also in northern Yukon and the northwestern Northwest Territories, and to a lesser degree in northern B.C., Alberta, and Saskatchewan.

Abundance and Trends

Scoters are monitored through the Waterfowl Breeding Population and Habitat Survey (WBPHS, Figure 1 - Monitoring section) in the western part of their range, but the three species are not differentiated during this survey, as it is difficult to distinguish among them from fixed-wing aircraft. In eastern Canada, the WBPHS only partially covers the southern edge of the Surf Scoter's range. An additional issue is that the survey is not optimally timed to monitor Surf Scoters, which generally breed later than other duck species, leading to annual population estimates that fluctuate widely depending on timing of migration and on how many birds remain in survey areas at the time of the survey (Lepage and Savard 2013). Therefore, targeted monitoring and research activities are conducted periodically.

The population abundance is roughly estimated at 700 000 birds for all North America, the majority of which breed in the western part of the continent (NAWMP 2012, SDJV 2004).

- Waterfowl Breeding Population and Habitat Survey in Eastern Canada

The Waterfowl Breeding Population and Habitat Survey (WBPHS) in western Canada covers a substantial portion of the Surf Scoter range.

Based on the known extent of breeding distributions, scoters detected in the Canadian Prairies should be White-winged Scoters only, while scoters in Western Boreal Canada should include both White-winged and Surf Scoters.

Although the species is found at very low densities in the Canadian Prairies, results of the WBPHS suggest that scoter numbers (3 species combined) have declined over the long term (Table 1 and Figure 1). The same is true in Western Boreal Canada and in the survey area as a whole. However, these data should be interpreted with caution, as the surveys are not well designed for estimating numbers for this bird group (Savard et al. 1998). Alisauskas et al. (2004) showed that the observed declines are not consistent across the region, as scoters increased over the previous decade in northern Manitoba and Saskatchewan but continued to decline in northern Alberta and the Northwest Territories.

Table 1. Scoter (three species combined) Breeding Population Estimates and Trends Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change.*Trend significant at $p<0.05$).

WBPHS - Western Canada and the northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2011	2012	10-yr Average (2002–2011)	1961–2012	2003–2012	2008–2012
Entire Survey Area	1379 (167)	1062 (141)	1058	–0.9*	2.1	3.9
Canadian Prairies	1.1 (0.7)	1.2 (0.5)	2	–10.5*	7.9	NA
Western Boreal Canada	1151 (164)	853 (138)	772	–1.1*	4.6	7.8
U.S. Prairies (North Central)	0	0	NA	NA	NA	NA
Alaska	227 (26)	208 (27)	284	–0.5	–5.1*	–8.0*

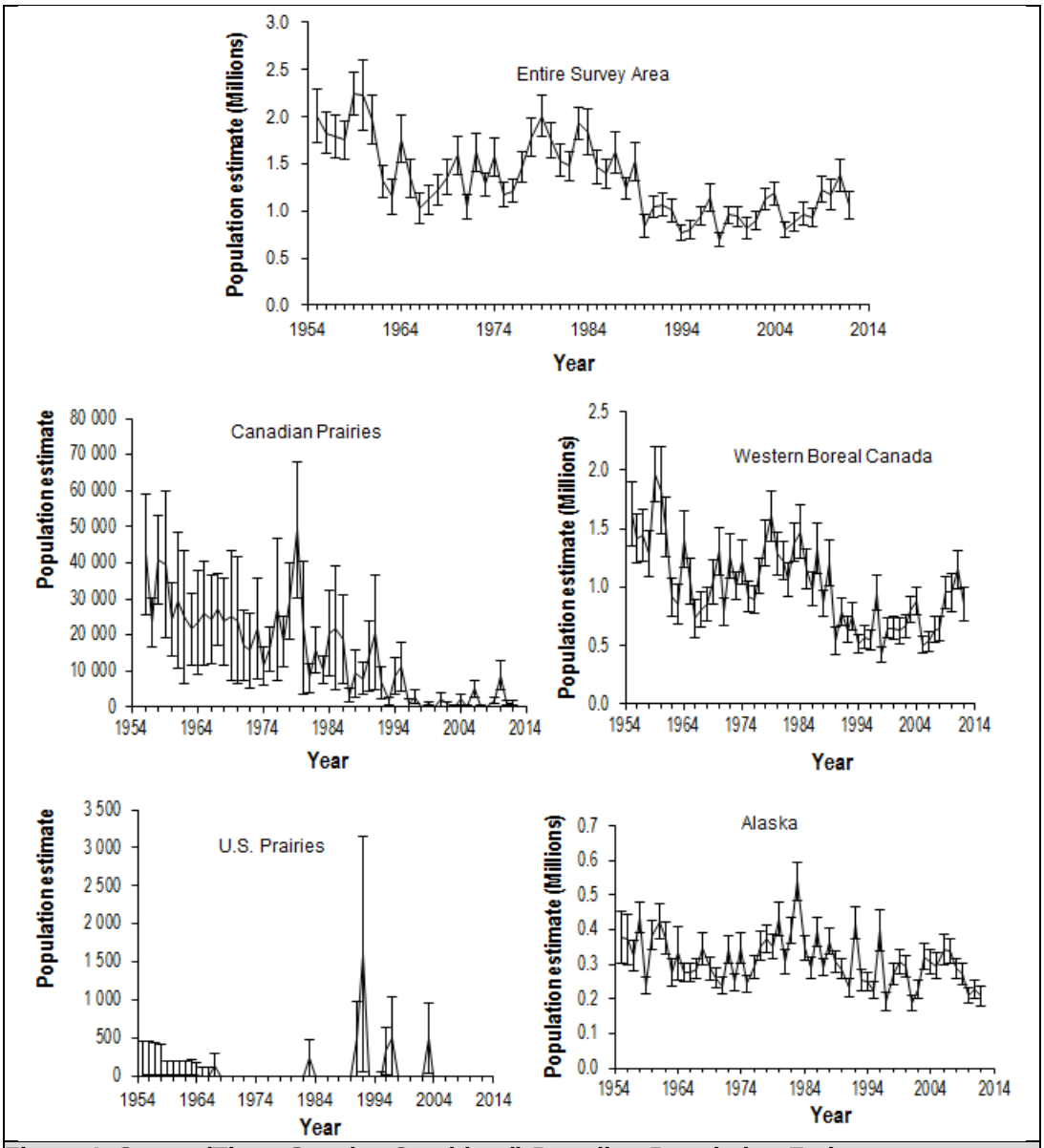

Figure 1. Scoter (Three Species Combined) Breeding Population Estimates (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States.

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

In eastern Canada, Surf Scoters are counted during the WBPHS, but the survey does not provide a reliable population index. The species' core breeding area is farther north and not well covered by the survey. Population estimates from the entire survey area fluctuate widely on an annual basis, but over the long-term, Surf Scoters continue to do well in Eastern Canada (Table 2 and Figure 2).

Table 2. Surf Scoter Population Estimates (in Thousands) Based on the WBPHS in Eastern Canada with 90% Confidence Intervals (results from CWS helicopter plot survey only).

WBPHS - Eastern Canada	2013	2014	Average (2004–2013)
Entire survey area	86 (42–130)	91 (42–140)	125

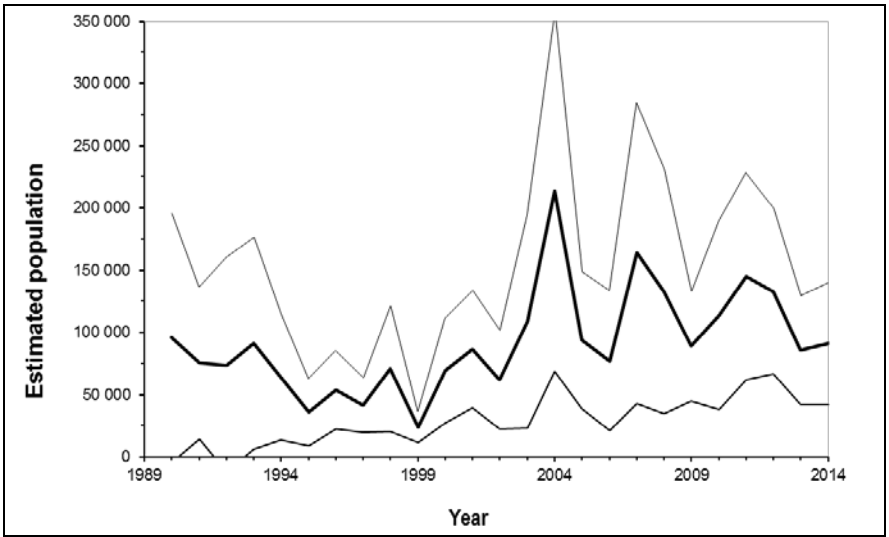

Figure 2. Surf Scoter Breeding Population Estimates Based on the WBPHS in the Entire Survey Area of Eastern Canada (Results from the helicopter plot survey data only, with 90% confidence intervals).

• Other Monitoring

The Chaleur Bay area (Quebec and New Brunswick) and the St. Lawrence Estuary and Gulf are major spring staging areas for scoters (SDJV 2004). In 1998, over 220 000 scoters (all three species combined) were estimated to be staging in the St. Lawrence Estuary and Gulf (Rail and Savard 2003). Surf Scoters were estimated to account for 70% of all scoters in that region.

Between 50 000 and 62 000 moulting scoters (mostly male Surf Scoters) were sighted along the Labrador coast in 1998 and 1999 (S. Gilliland, CWS-Atlantic Region, pers. comm.). Approximately 20 000 Surf Scoters moult in the St. Lawrence Estuary and Gulf, and more than 30 000 Surf Scoters are estimated to moult along the northern portion of the James Bay coast and along the eastern Hudson Bay coast, including in the Belcher Islands (Lepage and Savard 2013; Badzinski et al. 2013).

Surveys in September and October 2006 indicated that the St. Lawrence Estuary was an important staging area for Surf Scoters in the fall, as as many as 80 000 birds were counted there (J.-P. Savard, EC-Quebec Region, pers. comm.).

Recently, efforts were made by the CWS to mark scoters with satellite transmitters, as part of the larger Atlantic and Great Lakes Sea Duck Migration Study (SDJV 2014). In October 2012, 26 female Surf Scoters were marked in the St. Lawrence Estuary, and in October 2013, 53 more satellite transmitters were deployed in the same area. These marked birds should provide valuable information on seasonal connectivity, timing and direction of movements, and site fidelity to wintering, breeding and moult sites (SDJV 2014).

Harvest

The estimated Canadian harvest has been less than 5000 Surf Scoters annually over the past decade (Table 3).

Table 3. Harvest Estimates of Surf Scoters in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	1 074	34	2 714	243	9 757	2 645				322			16 789	27 386	44 175
1975		52	1 422	391	15 601	10 372	360	497		51			28 746	34 570	63 316
1976	4 357	714	7 220	1 168	20 035	8 684	566			77	69	41	42 931	18 167	61 098
1977	1 654	655	7 501	754	17 584	7 911							36 059	31 235	67 294
1978	671	54	1 279	640	8 842	3 118				207	45		14 856	17 054	31 910
1979	1 452		3 061	203	12 279	7 909							24 904	12 804	37 708
1980	1 569		4 190	655	10 321	5 162	89			103	634		22 723	11 931	34 654
1981	1 246		6 390	191	12 827	1 532	495			293	94		23 068	25 120	48 188
1982	9 936		2 776	355	14 879	1 285	260			171			29 662	8 020	37 682
1983	4 748		1 079		4 118	871	351		189	74	148		11 578	8 067	19 645
1984	4 145		2 957	152	7 942	3 063	284			307	112		18 962	27 372	46 334
1985	1 377		3 678	148	6 399	593	283			66	830		13 374	21 076	34 450
1986	2 338	82	2 456	186	2 060	1 994				29	124	34	9 303	20 583	29 886
1987	570		3 031	194	6 888	2 048		130		264			13 125	20 419	33 544
1988	987		2 397	282	7 331	634							11 631	8 714	20 345
1989	2 626		4 803		5 070	2 896				39			15 434	17 772	33 206
1990	3 410		7 552	432	5 184	1 152	714						18 444	15 964	34 408
1991	948		1 318	476	1 821	2 097	586	514					7 760	11 867	19 627
1992	655		1 399		3 479	577							6 110	11 922	18 032
1993	1 289	94	4 916	260	3 890	915	1 124			25	35	5	12 553	10 064	22 617
1994	3 601		7 683	69	6 890	669						35	18 947	17 074	36 021
1995	2 878		4 686	592	3 448	971				34			12 609	10 514	23 123
1996	313		1 354	87	2 970	758							5 482	14 810	20 292
1997	325		2 694	290	3 029	442							6 780	12 314	19 094
1998	982	1 215	6 704	326	2 400	310					76		12 013	17 188	29 201
1999[2]	2 215		4 642	120	2 836	43	285						10 144	12 196	22 340
2000	308		726	601	1 096	61							3 140	11 596	14 736
2001	520		806	108	1 549								2 983	13 095	16 083
2002	1 951	158	922	72	2 314	70				42			5 529	18 309	23 838
2003	706		1 588	15	636	349							3 294	40 208	43 502
2004	216		1 821		1 940	458							4 435	34 643	39 078
2005	1 637		731	108	176	117							2 769	26 920	29 689
2006	272		1 131	104	1 158								2 665	32 031	34 696
2007	86	212	741	131	1 068	202							2 440	37 003	39 443
2008	496		1 336	58	2 118	624							4 632	40 382	45 014
2009			275		156	270							701	33 922	34 623
2010	1 697		1 284	700	904								4 585	22 675	27 260
2011	1 792		1 102		1 113	126							4 133	35 676	39 809
2012			954	992	874	444				120	110		3 494	35 708	39 202
2013	368		370		669	106							1 513	16 852	18 365

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and S. M. Olson 2014 (USFWS, US data)

Management and Conservation Concerns

Large concentrations of Surf Scoters (inter-mixed with White-winged Scoters) are found in coastal British Columbia, in habitats that also support shellfish aquaculture—an industry that has the potential to expand dramatically. This type of activity could limit access of scoters to certain natural habitats and alter the composition of adjacent habitats. The fact that this species feeds on farmed mussels and clams is also problematic for the industry (Savard et al. 1998).

The Surf Scoter is particularly vulnerable to toxic spills (e.g., spills in the St. Lawrence Estuary and Gulf) because individuals tend to concentrate in large groups in saltwater. The moulting period, during which the species is less mobile, is especially critical. The Surf Scoter has a low reproductive rate and generally low reproductive success, which means that populations are highly sensitive to adult mortality (Savard et al. 1998, Lepage and Savard 2013). Hydroelectric development is also a potential threat to the species in its breeding habitat (Lepage and Savard 2013).

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White-winged Scoter (*Melanitta fusca*)

Of the three scoter species that breed in Canada, the White-winged Scoter is the best known (Brown and Fredrickson 1997). It breeds primarily in Alaska and central and northwestern Canada, in the Boreal forest from Yukon to Manitoba, and at lower densities in the Canadian Prairies. The species winters on the Atlantic and Pacific coasts.

Abundance and Trends

- WESTERN CANADA

The Waterfowl Breeding Population and Habitat Survey (WBPHS) covers a large part of the breeding area of White-winged Scoters in western Canada. However, since the three scoter species are counted together during this survey, it is not possible to obtain an accurate estimate of the White-winged Scoter population.

Based on the known extent of breeding distributions, scoter populations in the Canadian Prairies include only White-winged Scoters, while populations in Western Boreal Canada include White-winged and Surf Scoters. All three species are present in Alaska. However, these data should be interpreted with caution, as the surveys are not well designed for estimating scoter numbers (Savard et al. 1998).

Although the species is found at very low densities in the Canadian Prairies, scoter numbers have declined over the long term based on the results of the Waterfowl Breeding Population and Habitat Survey (Table 1 and Figure 1 in the Surf Scoter account).

- EASTERN CANADA

White-winged Scoters marked on moulting grounds in the St. Lawrence Estuary have shown quite dispersed breeding locations the subsequent years: Northwest Territories (Great Bear and Great Slave Lakes), northern Saskatchewan and Manitoba, northwestern Ontario and Northern Quebec (inland northeast James Bay) (SDJV 2014).

The Northumberland Strait, Chaleur Bay, the St. Lawrence Estuary and Gulf, the Great Lakes and James Bay are all important spring staging areas for White-winged Scoters wintering on the Atlantic coast (SDJV 2014).

An estimated 5000 individuals moult in the Estuary and Gulf (Lepage and Savard 2013), while thousands of birds have been observed in northeast James Bay and southeast Hudson Bay, particularly the Cape Jones area, Long Island Sound, Lake Guillaume-Delisle and the Belcher Islands (Badzinski et al. 2013).

Harvest

In Canada, the annual harvest for this speices is estimated at a few thousand individuals (Table 2).

Table 2. Harvest Estimates of White-winged Scoters in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974		113	1 105	46	9 676	4 611	291		251	174			16 267	33 517	49 784
1975			1 742	233	4 934	4 277	141		357	143		54	11 881	35 186	47 067
1976	95	204	2 792	193	8 245	4 122	396		648	61		164	16 920	20 172	37 092
1977			2 253		10 277	4 393	183		118	57		247	17 528	16 329	33 857
1978	1 105	153	417	283	5 042	3 310		381	334	265			11 290	15 839	27 129
1979	565		989	117	8 018	5 845		364	172				16 070	10 444	26 514
1980	3 483		3 497	92	10 829	3 142				102			21 145	17 010	38 155
1981	728		1 231	114	7 831	2 510				689	116		13 219	14 842	28 061
1982	767		1 459	151	7 798	2 000			1 484	1 259			14 918	15 341	30 259
1983	710		1 418	199	7 842	2 470		516		162			13 317	12 116	25 433
1984	1 645	30	2 253		11 052	3 636					408		19 024	34 053	53 077
1985	1 028		791	97	7 792	2 892	283		252	66	1 661		14 862	21 835	36 697
1986	215		401	46	2 359	1 443		213		297			4 974	10 718	15 692
1987			1 090	90	6 950	3 618			106	78			11 932	24 305	36 237
1988	2 190		1 963	60	7 072	1 403				51			12 739	18 720	31 459
1989	202		1 515	128	8 078	1 858							11 781	8 410	20 191
1990	899		2 200	139	5 297	801	789						10 125	15 474	25 599
1991			465	90	2 505	1 096							4 156	19 827	23 983
1992	283		1 638		5 213	441							7 575	11 804	19 379
1993	544	379	1 238	123	4 415	2 041	162				35		8 937	8 920	17 857
1994	344		2 132		5 932	1 343							9 751	6 683	16 434
1995			1 846		1 795	672							4 313	8 548	12 861
1996	89		1 034		2 464	1 175							4 762	13 954	18 716
1997	58		1 191		2 306	470							4 025	7 867	11 892
1998	598		758	198	3 363	291							5 208	6 119	11 327
1999 [2]	41		412		1 337	260						3	2 053	3 500	5 553
2000	47		313		527	104					24		1 015	6 200	7 215
2001	72		227	199	1 021	379	159	157		26			2 240	23 200	25 440
2002		158	680	52	1 179	282							2 351	9 100	11 451
2003	409		636	43	789	97			173				2 147	11 100	13 247
2004			156		1 238	137							1 531	11 100	12 631
2005			151	34	908	78							1 171	6 547	7 718
2006			407	42	1 202	404							2 055	12 287	14 342
2007			130	85	281	334							830	8 009	8 839
2008			480	31	949		64						1 524	7 632	9 156
2009			506		1 048	126			226	19			1 925	8 742	10 667
2010	1 652		1 436		988	318							4 394	6 797	11 191
2011			1 075	56	1 381								2 512	11 034	13 546
2012			350	50	803	168							1 371	4 562	5 933
2013			279	110	1,015	193							1 597	7 109	8 706

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and S. M. Olson 2014 (USFWS, US data)

Management and Conservation Concerns

Spills of hydrocarbons and other toxic substances on White-winged Scoter moulting or wintering grounds may harm the species. The White-winged Scoter is among the seabirds most vulnerable to oil spills because the species is often present in high densities along oil transportation routes. The White-winged Scoter may accumulate a number of contaminants in its flesh, making it potentially vulnerable to poisoning (Brown and Fredrickson 1997).

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Barrow's Goldeneye (*Bucephala islandica*)

Two geographically isolated populations of Barrow's Goldeneye are found in in North America: a small Eastern Population and a much larger Western Population. The Eastern Population was listed as "Special Concern" in Schedule 1 of the *Species at Risk Act* in 2003 (Environment Canada 2013).

Abundance and Trends

- EASTERN POPULATION

Population trends for this species are unknown. The Eastern Population of Barrows Goldeneye is estimated to be at about 8000 individuals.

The main breeding area of the Eastern Population of Barrow's Goldeneye consists mainly of the small fishless lakes of the high plateaus north of the St. Lawrence River from Charlevoix east to Blanc-Sablon, Quebec (Robert et al. 2000; Robert et al. 2008; Robert 2013). Relatively high numbers of pairs and lone males counted in aerial and ground surveys indicate that this area is probably the core breeding area for the Eastern Population of Barrow's Goldeneye (Robert et al. 2000).

In eastern North America, the principal moulting sites for adult male Barrow's Goldeneyes are located in the coastal waters of Hudson, Ungava and Frobisher Bays, and in a few coastal inlets of northern Labrador (Benoit et al. 2001; Robert et al. 2002). Some individuals use small inland lakes for moulting. Two moulting areas—Tasiujaq and Tuttutuuq River, Ungava Bay—were identified while tracking males with satellite telemetry in July 2000. At least 200 goldeneyes (mostly Barrow's) were at the first location, while at least 3000 goldeneyes (mostly Common) were in the latter area (M. Robert, CWS-Quebec Region, pers. comm.). Barrow's Goldeneyes spend up to four months in moulting locations, which highlights the importance of these areas in the species'annual cycle (Robert et al. 2002).

Since 2005, a triennial winter survey has been conducted in Quebec and New Brunswick. The 2011 results indicated that the eastern North American wintering population of Barrow's Goldeneyes was composed of 4100 individuals (F. Bolduc, unpubl. data), compared to 6800 individuals in the 2009 survey. More than 80% winter along the St. Lawrence Estuary and Gulf (Robert and Savard 2006; Robert 2013). About 500 individuals winter in the Maritimes provinces and 100 individuals winter in Maine (Robert and Savard 2006; Environment Canada 2013).

- RESEARCH HIGHLIGHTS IN EASTERN CANADA

During the 2009 breeding season, five female Barrow's Goldeneyes were implanted with satellite transmitters to locate their moulting sites. Two females returned to moult in 2010 at the same location as in 2009 (one on a lake 100 km south of Ungava Bay and one in an inlet of Ungava Bay), and one female that moulted on a small lake near James Bay in 2009 apparently moulted in the St. Lawrence River in 2010 (Savard and Robert 2013). Movements of implanted females can be viewed at www.seaturtle.org/tracking/?project_id=415.

- WESTERN POPULATION

The Waterfowl Breeding Population Survey of the British Columbia Central Interior Plateau has tracked the Western Population of Barrow's Goldeneye since 2006. CWS analyses estimated the presence of 23 363 individuals in the Central Interior Plateau Region in 2014, comparable to the 2013 index (Figure 1). Some data are available for this population from the breeding waterfowl surveys of the southern Yukon (Figure 2), where there has been no discernible trend in the population over the past 5, 10, 15 or 21 years.

The Western Population size is estimated at 250 000 individuals (NAWMP 2012).

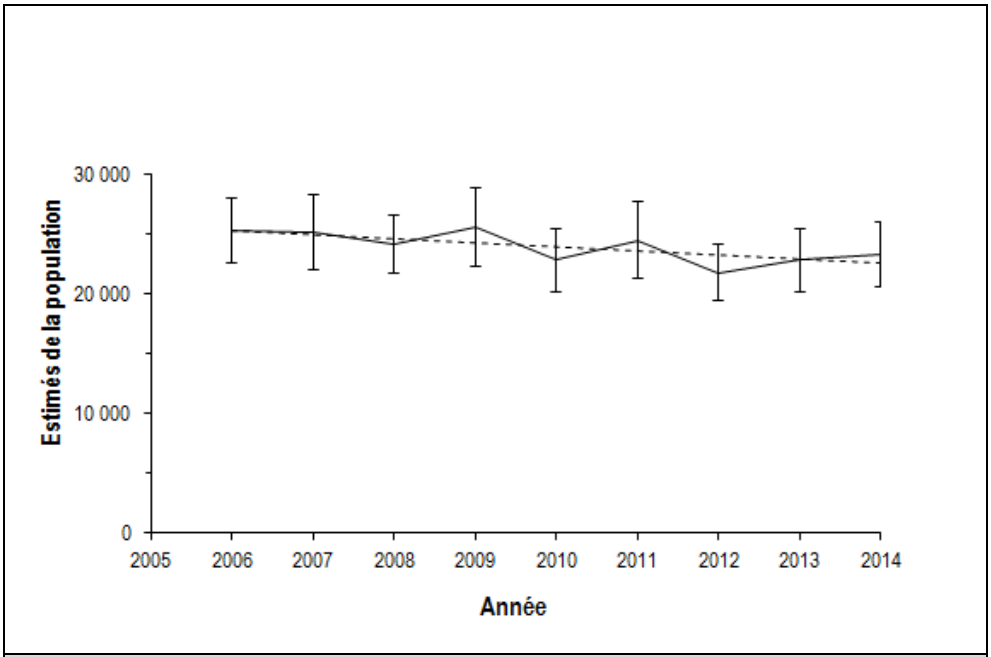

Figure 1. Population Estimates (± 1 SE) of Barrow's Goldeneyes in British Columbia Central Plateau, 2006–2014.

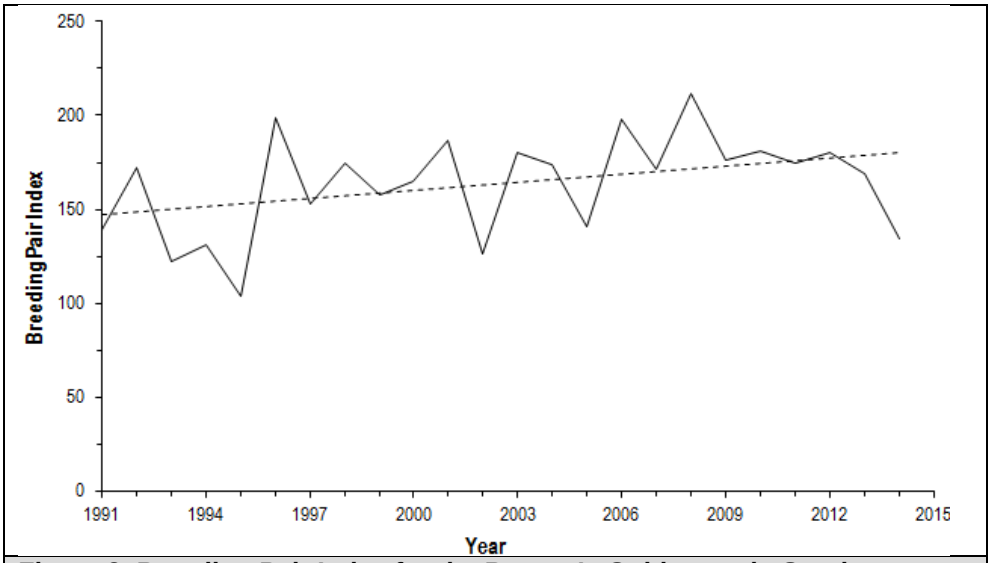

Figure 2. Breeding Pair Index for the Barrow's Goldeneye in Southern Yukon, 1990–2014.

- RESEARCH HIGHLIGHTS IN WESTERN CANADA

Between 2006 and the present, satellite transmitters were implanted in over 300 Pacific Barrow's Goldeneyes to investigate migration routes, seasonal habitat affiliations, and degree of site fidelity within and across years. Migration data from cohorts of birds captured during breeding, moulting, and wintering periods were used to describe population structure and to delineate appropriate units for management. Adult males marked on breeding ponds in the Cariboo Plateau of British Columbia moulted over a large but annually consistent area from central Alberta to northern Northwest Territories. Notably, about 30% of these males moulted on a small lake in Alberta (Cardinal Lake) each year, and this discovery led to

surveys that identified 5000–6000 moulting males on the lake. Cariboo Plateau adult males and females marked during remigial moult on Cardinal Lake consistently wintered along the Pacific Coast, from southern Washington State to just north of Vancouver Island, which constitutes the southern portion of the species primary wintering range. Hatch year birds did not travel to the coast in association with their mothers or siblings but they ultimately overwintered in the same general region as their parents. Birds marked at five coastal wintering sites (from Vancouver BC to south-central Alaska) had different migration and distribution patterns and appear to constitute largely discrete population segments throughout the annual cycle. Finally, adult birds showed high levels of site fidelity to breeding, moulting, and wintering sites. This finding has important management and conservation implications, especially if discrete segments are harvested at excessive levels (S. Boyd, EC-Pacific and Yukon Region, pers. comm.).

Harvest

The Canadian harvest is not well estimated mainly because of the very regional distribution of the species and the small number of hunters sampled in areas where the species is found.

Harvest was a concern in the past for the Eastern Population. However, special regulations were implemented throughout eastern Canada after the population was designated as a species of "special concern" under the federal Species at Risk Act. Hunters were restricted to a maximum daily bag (since 2007) and possession limits (since 2012) of one bird. The current daily bag limit of one bird per day allows for the accidental harvest of this species. Annual recreational harvest of Barrow's Goldeneye in the five eastern provinces (Atlantic Canada and Quebec) is typically less than 1000 individuals per year (Gendron and Smith 2014).

- WESTERN POPULATION

Hunting pressure on the Western Population is generally low. The Pacific Flyway sport harvest is estimated at less than 5000 birds, which are mostly taken in Alaska, British Columbia, and Washington State. Estimates of subsistence harvest are also low, with fewer than 3000 birds harvested in Alaska (Sea Duck Joint Venture Management Board 2008).

Management and Conservation Concerns

In 2000, the Eastern Population of Barrow's Goldeneye was assessed as one of "Special Concern" by the Committee on the Status of Endangered Wildlife in Canada and subsequently listed as a species of "special concern" under the *Species at Risk Act*. Because of the potential threat to the species, hunting has been restricted in eastern Canada. Because Barrow's Goldeneye is an arboreal species, forestry operations and the introduction of fish to fishless lakes on its breeding grounds are possible threats (Robert et al. 2008). Currently, the greatest threats from forest harvest are in British Columbia. There is also the threat of oil spills on its wintering grounds (Robert 2013).

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Common Goldeneye (*Bucephala clangula*)

In North America, the Common Goldeneye breeds across the forested regions of Canada and Alaska. The continental population is stable.

In North America, Common Goldeneyes breed across the boreal forest from Newfoundland to Alaska. They also breed throughout montane forests, the Aspen Parkland Region, and the Acadian and Great Lakes forests, wherever trees are large enough to provide suitable nesting cavities. They winter on fresh water, as far north as water stays open, and along both the Pacific and Atlantic coasts (Eadie et al 1995).

Abundance and Trends

In Canada, goldeneyes are monitored through the Waterfowl Breeding Population and Habitat Survey in western and eastern Canada. However, aerial surveys do not distinguish Common Goldeneyes from Barrow's Goldeneyes, and can only track the combined population of the two species (although most are Common Goldeneye; Baldassarre 2014). This is particularly problematic in western Canada, where the two species overlap extensively.

The North American Breeding Bird Survey (BBS) can yield some species-specific information on population trend (but not population size), though much of the species' breeding range lies outside the area covered by the BBS.

The North American population has been estimated approximately at 1.2 million birds (NAWMP 2012).

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHERN WESTERN UNITED STATES

The estimated abundance of goldeneyes in 2014 in the entire survey area was below the 2013 estimate. Goldeneyes show significant increasing long-term trends in the Canadian Prairies and at the continental level (Table 1 and Figure 1).

Table 1. Goldeneye (both species) Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS- Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands)			Trends in Numbers of Breeding Birds		
	2013	2014	10-yr Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	789	536	714	1.3*	0.4	–5.6
Canadian Prairies	129	86	110	3.0*	0.4	–3.8
Western Boreal Canada	625	422	553	1.4	2.0	–5.5
U.S. Prairies(North Central)	NA	10	0.4	–1.2	NA	NA
Alaska	35	19	50	–0.8	–9.6*	–16.5

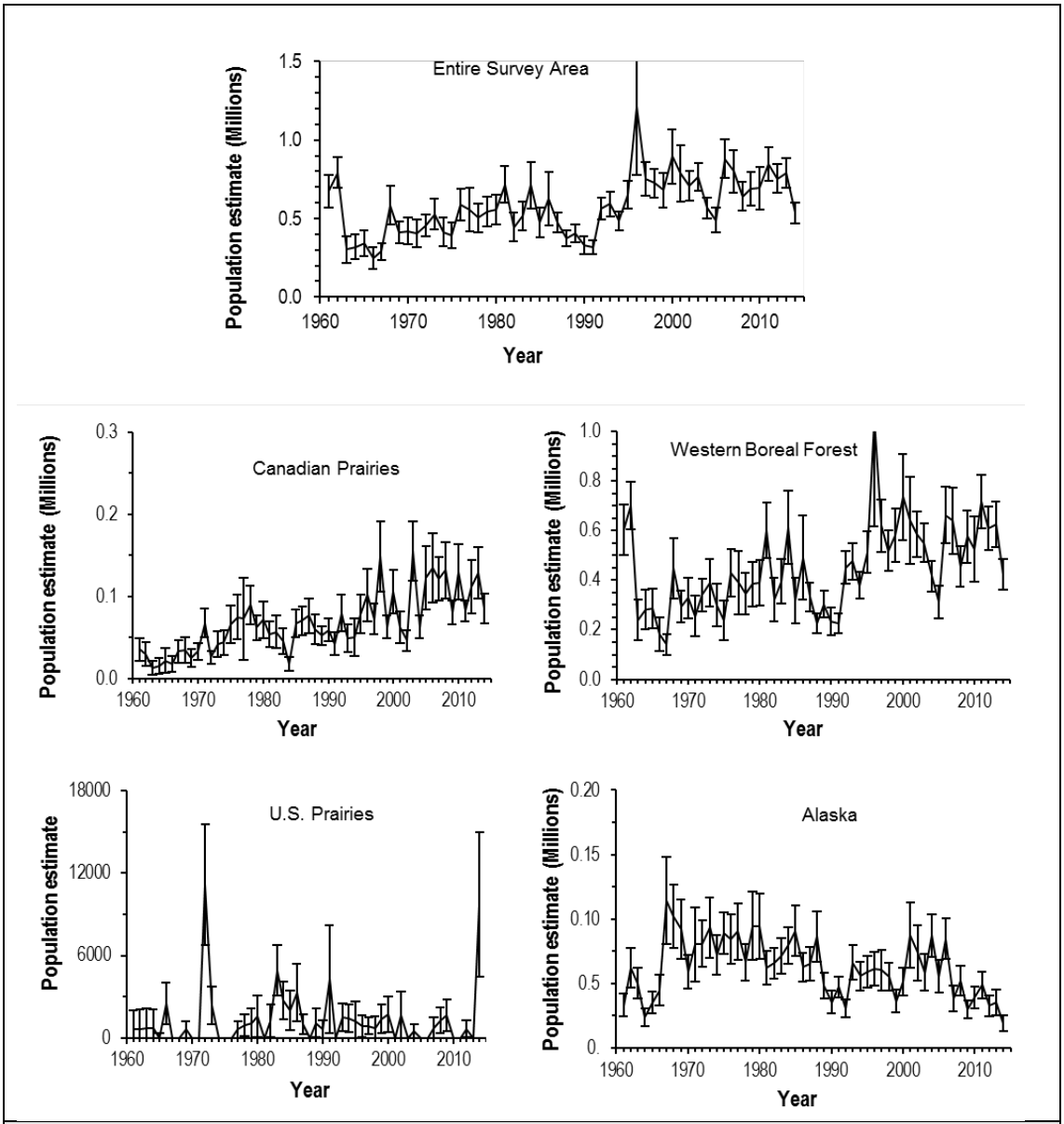

Figure 1. Goldeneye (both species) Breeding Population Estimates (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States.

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

Results from the WBPHS in eastern Canada (helicopter plot survey only) indicate that Common Goldeneye population trend is relatively stable in most survey strata (Table 2 and Figure 2).

Table 2. Common Goldeneye Breeding Population Estimates (in Thousands) Based on the WBPHS in the Eastern Canada (The estimates are based on helicopter plot survey only).			
WBPHS – Eastern Canada	**2013**	**2014**	**10-yr Average (2004–2013)**
Entire Survey Area	349	243	298
Atlantic Highlands	12	8.4	7.6
Eastern Boreal Shield	101	81	119
Central Boreal Shield	68	55	65
Western Boreal Shield	167	98	106

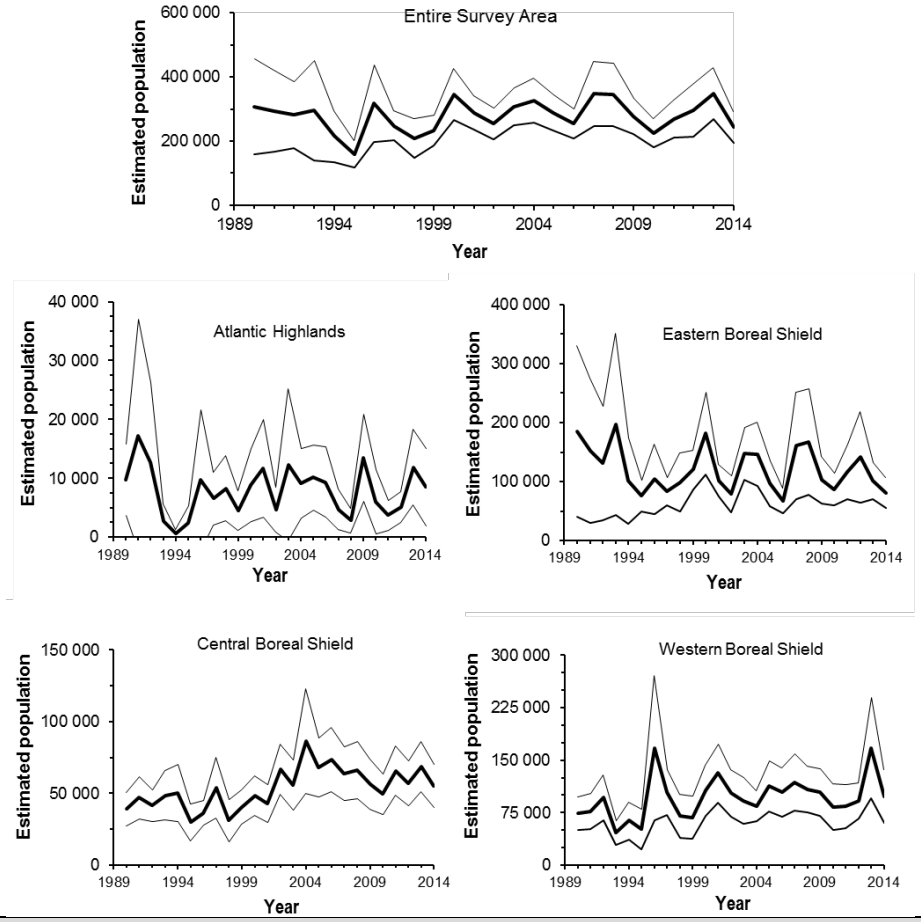

Figure 2. Common Goldeneye Breeding Population Estimates Based on the WBPHS in Eastern Canada, with 90% Credible Intervals (The figures represent the results of helicopter plot survey only).

Harvest

Common Goldeneyes are hunted across Canada, with the largest number traditionally taken in eastern Canada (Table 3). The total number of Common Goldeneyes taken in Canada has been decreasing since the 1980s.

Management and Conservation Concerns

Common Goldeneyes are obligate cavity nesters, and often dominate interactions with competitor species for food and nest sites (Eadie et al. 1995). The most important factor limiting Common Goldeneye populations is likely the availability of suitable cavities for nesting. In regions that were or are being logged, forestry practices may have reduced the availability of suitable cavities, although the species will readily make use of nest boxes.

The species prefers fishless lakes, and in some areas the Common Goldeneye may have benefited from acidification (*i.e.,* acid rain) through the decline of fish competitors and subsequent increases in invertebrate prey populations. The potential impacts of lake recovery on the species are unknown (Sea Duck Joint Venture Management Board 2008).

Table 3. Harvest Estimates of Common Goldeneyes in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	12 358	91	8 053	7 916	47 901	37 281	1 448	830	3 009	2 274			121 161	72 528	193 689
1975	7 833	311	8 326	5 816	27 443	39 303	5 531	451	4 142	4 251	37	140	103 584	76 904	180 488
1976	11 895	623	1 942	6 098	23 276	39 938	5 060	1 251	1 724	1 721	176	52	93 756	88 966	182 722
1977	12 710	45	4 950	5 205	23 761	52 494			459	84			99 708	70 978	170 686
1978	18 559	501	7 849	5 251	32 341	41 654	2 563	554	2 351	1 124	340	85	113 172	94 075	207 247
1979	16 838	90	3 510	4 294	22 891	34 962	2 244	732	1 920	6 721		290	94 492	94 152	188 644
1980	15 163	414	5 375	4 388	26 492	46 443	2 318	327	1 699	947	74	108	103 748	80 779	184 527
1981	21 936	125	2 374	3 047	29 147	44 408	2 914	403	3 764	1 367			109 485	62 530	172 015
1982	16 593	488	2 058	2 301	19 514	40 209	3 095	344	1 354	756		531	87 243	64 963	152 206
1983	18 028	249	5 916	3 612	18 171	34 484	2 876	522	2 780	586		191	87 415	59 854	147 269
1984	9 263	186	3 386	3 740	18 000	37 126	7 463	1 859	4 193	1 078			86 294	100 186	186 480
1985	11 719	290	2 846	2 274	21 863	39 945	3 058		919	1 166			84 080	73 602	157 682
1986	17 238	584	4 381	4 770	15 833	31 865	982	450	255	1 112	57		77 527	64 954	142 481
1987	7 396		3 303	2 060	20 283	28 203	1 860		1 787	1 725	1 174	45	67 836	44 008	111 844
1988	15 085	582	4 161	5 757	17 176	36 789	148	458		1 031		68	81 255	31 419	112 674
1989	10 874		7 999	3 464	9 701	33 718	588	437	91	700	181		67 753	38 413	106 166
1990	14 882		4 312	3 609	17 400	33 176	1 976	336	510	385	106		76 692	36 440	113 132
1991	6 408	206	1 777	1 772	9 679	25 340	1 139		1 189	231			47 741	39 397	87 138
1992	5 077	213	2 425	2 394	12 336	21 968	591		1 027	264			46 295	34 916	81 211
1993	4 184	506	3 926	2 718	15 719	38 604	2 831		1 140	247		127	70 002	45 926	115 928
1994	7 315	666	3 290	914	8 027	18 564	494	213	1 692	287			41 462	54 117	95 579
1995	3 534		3 030	4 187	7 591	19 430			2 809	154			40 735	94 204	134 939
1996	4 496	731	1 366	6 489	9 848	17 596	1 660	354	1 198	351			44 089	100 184	144 273
1997	3 959		1 800	2 014	4 409	13 896	866		1 664	222	296	15	29 141	77 963	107 104
1998	4 758		1 736	2 795	4 726	8 530	1 550	295	979	258		276	25 903	88 428	114 331
1999 [2]	4 578	494	1 309	6 082	5 126	11 602	1 718	2 358	681	131		7	34 086	50 649	84 735
2000	5 753		2 092	2 981	4 713	10 548	4 884			39	12		31 022	56 718	87 740
2001	2 620		1 066	2 095	5 549	11 052	365		739	67			23 553	48 619	72 172
2002	1 989	162	1 239	1 714	2 841	8 140	873		1 278	250		87	18 573	88 935	107 508
2003	3 234		2 215	3 297	3 561	10 517	193		1 818	187			25 022	95 347	120 369
2004	3 995	334	2 044	2 186	5 493	6 130	1 127		1 865	47			23 221	76 357	99 578
2005	1 714	158	1 549	1 412	4 897	4 811	3 154		1 943	59			19 697	71 447	91 144
2006	2 481	233	899	3 079	2 489	6 738	3 321	129	1 993	152			21 514	76 422	97 936
2007	3 016	362	2 989	1 114	1 210	7 862	1 626	264	1 384	75			19 902	78 409	98 311
2008	1 495	138	4 309	2 747	2 874	7 446	643		1 871	444			21 967	77 063	99 030
2009	1 417	179	1 077	2 975	3 077	9 499	1 839		368	593			21 024	84 341	105 365
2010	825		426	832	2 252	8 797	1 673		538	177			15 520	77 715	93 235
2011	410		389	1 790	6 480	11 851	1 138	243	2 067	67			24 435	91 731	116 166
2012	5 807	314	1 025	845	2 891	4 636	98		1 052	260			16 928	76 803	93 731
2013	4 107	434	1 386	1 696	1 701	4 545	1 065	1 590	1 778	232			18 534	81 975	100 509

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich *et al.* 2014 (USFWS).

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Long-tailed Duck (*Clangula hyemalis*)

Despite indications of a long-term decline, the Long-tailed Duck population appears to have stabilized since the early 1990s (SDJV 2003).

The Long-tailed Duck has a circumpolar distribution, and in North America pairs breed at low densities in Arctic and subarctic wetlands in a vast, remote area ranging from the west coast of Alaska across most of northern Canada, as far north as Ellesmere Island and as far south as the Hudson Bay Lowlands, to the east coast of Labrador (SDJV 2003). For the majority of the year, Long-tailed Ducks primarily inhabit coastal marine waters, often far offshore (Robertson and Savard 2002). This species winters along the Pacific coast from Alaska, sometimes far out in open water in the Bearing Sea, to southern California in the west and mostly along the Atlantic coast between Labrador and North Carolina, but also in open water in Hudson Bay and in the Great Lakes, in eastern North America (SDJV 2003).

Abundance and Trends

Because Long-tailed Ducks breed at low densities over a vast range, there have been no comprehensive surveys of their abundance. And because they, like other sea ducks, inhabit offshore areas more than other waterfowl during the winter, Long-tailed Ducks are also poorly monitored by mid-winter waterfowl surveys (inland survey). The continental population size is estimated at 1 million birds (NAWMP 2012).

The Breeding Population and Habitat Survey in western Canada, conducted by the CWS and the USFWS, shows that breeding populations of Long-tailed Ducks have declined approximately 3% annually since the survey began in 1957 (Table 1 and Figure 1). However, that survey covers only a small portion of Alaska and northwestern Canada, which represents a very small portion of their overall breeding range. Causes for populations declines are unknown (SDJV 2003).

Table 1. Long-tailed Duck Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$; no data were available for 2013 and 2014).

WBPHS – Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands)			Trends in Numbers of Breeding Birds		
	2011	2012	10-yr Average (2002–2011)	1961–2012	2003–2012	2008–2012
Entire Survey Area	228	207	168	–2.7*	2.0	12.8
Canadian Prairies	0	0	0	0.7	NA	NA
Western Boreal Canada	155	134	81	–3.5*	4.3	29.8*
U.S. Prairies (North Central)	0	0	0	NA	NA	NA
Alaska	73	73	81	–1.6*	–0.9	–3.6

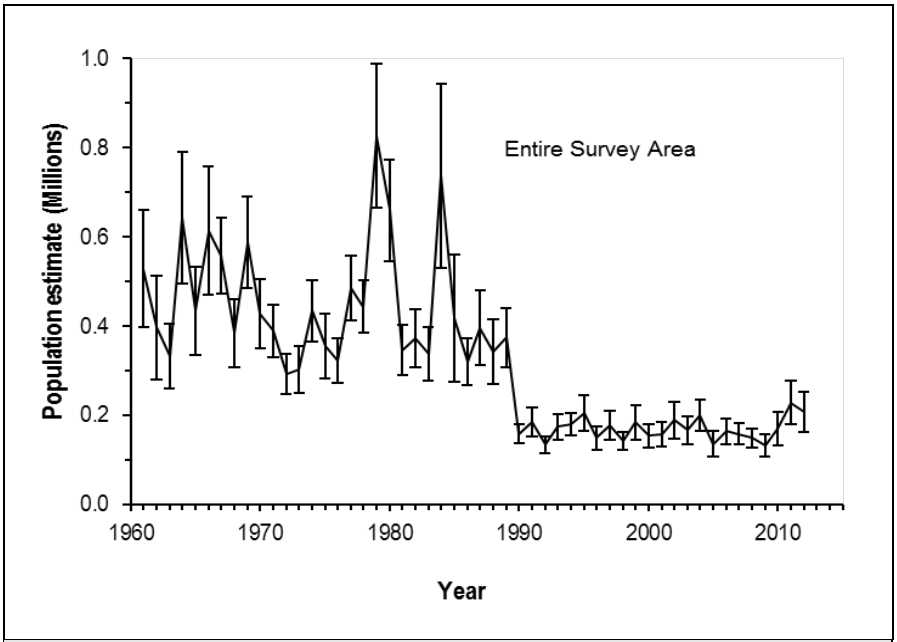

Figure 1. Long-tailed Duck Breeding Population Estimates (± 1 SE) Based on the WBPHS in Western Canada and the Northwestern United States (no data available for 2012 and 2013).

Research Highlights

There are many aspects of the basic biology of Long-tailed Ducks that are largely unknown, such as for example the location of major breeding, moulting, staging and wintering areas, and spring and fall migration travel corridors; habitat use and movement patterns in seasonally important use areas, and; connectivity, annual affiliation and fidelity of birds to major use areas. Sea Duck Joint Venture (SDJV) partners have undertaken a multi-year, large-scale satellite telemetry study in eastern North America to address many of these information gaps for the Long-tailed Duck. Some of the preliminary findings include: 1) females marked at Atlantic coast or Lake Ontario wintering locales do not appear to segregate by winter area affiliation after settling at their Arctic breeding areas; 2) a possible major moulting area for males may exist in the Arctic Ocean near the Adelaide Peninsula and King William Island, Nunavut; 3) Hudson Bay, most notably around the Belcher Islands, appears to be a key staging area for many of the marked birds, particularly during fall migration; and 4) birds of both sexes exhibited site fidelity for Great Lakes or Atlantic coast wintering areas where they were captured and marked (SDJV 2014). More results of The Atlantic and Great Lakes Migration Study can be found at the SDJV website (http://seaduckjv.org/atlantic_migration_study.html).

Harvest

The Long-tailed Duck is not a widely hunted species in Canada or the United States. The ducks are generally considered poor table fare because of their strong taste. However, they are a significant species in the subsistence harvest in some northern communities. The size of the harvest by Aboriginal people is unknown.

The harvest of Long-tailed Ducks in Canada has declined over time, probably in relation to the decline of hunter numbers. In Canada, most of the harvest occurs in the eastern provinces (Table 2).

Table 2. Harvest Estimates of Long-tailed Ducks in Canada and the United States.

	Canada								United States[1]	Continental
	NF	PE	NS	NB	QC	ON	Prairies, BC, NWT & YK	Total	Total	Total
1974	98	531	2 244	356	10 972	5 337	72	19 610	13 442	33 052
1975		1 248	1 952	336	5 850	11 676	277	21 339	24 849	46 188
1976	1 849	565	2 436	389	12 065	2 438		19 742	17 205	36 947
1977	768	474	2 437		4 743	1 925		10 347	9 560	19 907
1978		207	1 588		7 710	1 665	201	11 371	7 060	18 431
1979			5 562	424	12 648	3 747		22 381	18 243	40 624
1980	1 813	67	4 556	331	8 250	2 552	179	17 748	7 392	25 140
1981	977		1 800	972	8 326	2 406	741	15 222	19 750	34 972
1982	2 803		1 279	82	10 300	3 300		17 764	9 831	27 595
1983	4 819		4 761	399	9 050	749		19 778	7 538	27 316
1984	7 965		2 422	739	14 048	3 870	55	29 099	32 353	61 452
1985		856	2 227	353	6 115	1 776	131	11 458	16 233	27 691
1986			3 478		5 554	6 914		15 946	14 916	30 862
1987			3 255		5 548	2 514		11 317	13 782	25 099
1988	3 646		2 332	63	2 572	2 365	141	11 119	15 922	27 041
1989			2 681		6 385	438		9 504	7 565	17 069
1990	854		1 758		1 724	1 624		5 960	19 819	25 779
1991			914	304	3 133	610		4 961	13 155	18 116
1992	103		1 183	440	2 240	558		4 524	19 485	24 009
1993	2 704		2 395	68	2 752	1 205	31	9 155	13 503	22 658
1994	1 312		2 823	35	3 398	852		8 420	12 816	21 236
1995	2 876		1 035		1 948	169		6 028	11 081	17 109
1996	1 534	256	1 941		4 782	1 527	54	10 094	19 468	29 562
1997	747		500		2 971	1 225		5 443	19 403	24 846
1998	1 005	3 430	88		1 612	679	38	6 852	11 377	18 229
1999[2]	38				2 033	535		2 606	14 960	17 566
2000	1 068			49	1 285	248		2 650	13 604	16 254
2001	473		569	29	821	545		2 437	20 238	22 675
2002	866		896		536	356		2 654	15 803	18 457
2003	1 919		364	76	1 020	535		3 914	19 651	23 565
2004	800		768		1 356	773		3 697	26 357	30 054
2005	164	79	737		709	37		1 726	20 181	21 907
2006	287		413		320	842		1 862	27 266	29 128
2007	973		461	402	285	676		2 797	29 361	32 158
2008	559		131	62	301	725		1 778	37 013	38 791
2009			889		305	513		1 707	20 790	22 497
2010	1 996		1 054	91	632			3 773	25 584	29 357
2011	214				456	1 362		2 032	16 281	18 313
2012	422				108	112		642	28 526	29 168
2013	183		361		657	675		1 876	29 224	31 100

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich et al. 2014 (USFWS).

Management and Conservation Concerns

The Long-tailed duck is a relatively abundant sea duck and, despite a significant long-term decline in its breeding population, it is not considered a threatened or endangered species. According to the Sea Duck Joint Venture's Technical Team (SDJV 2003), the main management and conservation concerns pertaining to the Long-tailed Duck are: 1) the lack of an adequate annual survey on the breeding or wintering grounds; and 2) the risk of heavy metal contamination, either through the diet or from oil spills,

particularly on the wintering grounds (including Greenland) and in staging areas where the birds are concentrated.

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Bufflehead (*Bucephala albeola*)

The Bufflehead is the smallest of the North American diving ducks. The species occurs from coast to coast, but is more abundant in western regions of Canada. The continental population is increasing (Sea Duck Joint Venture Management Board 2008).

Abundance and Trends

The Bufflehead is found only in North America and breeds primarily in Alaska, British Columbia, Alberta and Saskatchewan. Breeding also occurs at lower densities further to the east in Manitoba, Ontario and Quebec. Buffleheads winter along both the Atlantic and Pacific coasts, as well as throughout the continental United States. The continental population of Buffleheads is estimated at more than 1.67 million individuals (NAWMP 2012).

The Bufflehead is monitored in its core breeding range through the Waterfowl Breeding Population and Habitat Survey (WBPHS; Figure 1, Monitoring section) in western and eastern Canada. The species is also monitored in British Columbia by the Central Interior Plateau Waterfowl Breeding Pair Survey and in the Yukon by the Roadside Waterfowl Breeding Population Survey.

- Waterfowl Breeding Population and Habitat Survey in Western Canada and the northwestern United States

Population estimates of Buffleheads in 2014 were similar to those in 2013 in all regions of the survey area. The species numbers in the Prairies are showing increasing trends (Table 1, Figure 1).

Table 1. Bufflehead Breeding Population and Trend Estimates Based on the WBPHS in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p<0.05$).

WBPHS – Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, ± 1 SE)			Trends in Numbers of Breeding Birds		
	2013	2014	10-yr Average (2004–2013)	1961–2014	2005–2014	2010–2014
Entire Survey Area	1204 (91)	1312 (100)	1197	1.9*	1.8	–2.6
Canadian Prairies	348 (55)	398 (63)	261	3.3*	6.7*	9.2*
Western Boreal Canada	794 (72)	844 (76)	876	1.8*	0.7	-5.9*
U.S. Prairies (North Central)	17 (5)	27 (5)	8	6.7*	23.9*	23.4
Alaska	44 (9)	43 (10)	52	0.3	–2.1	-6.0

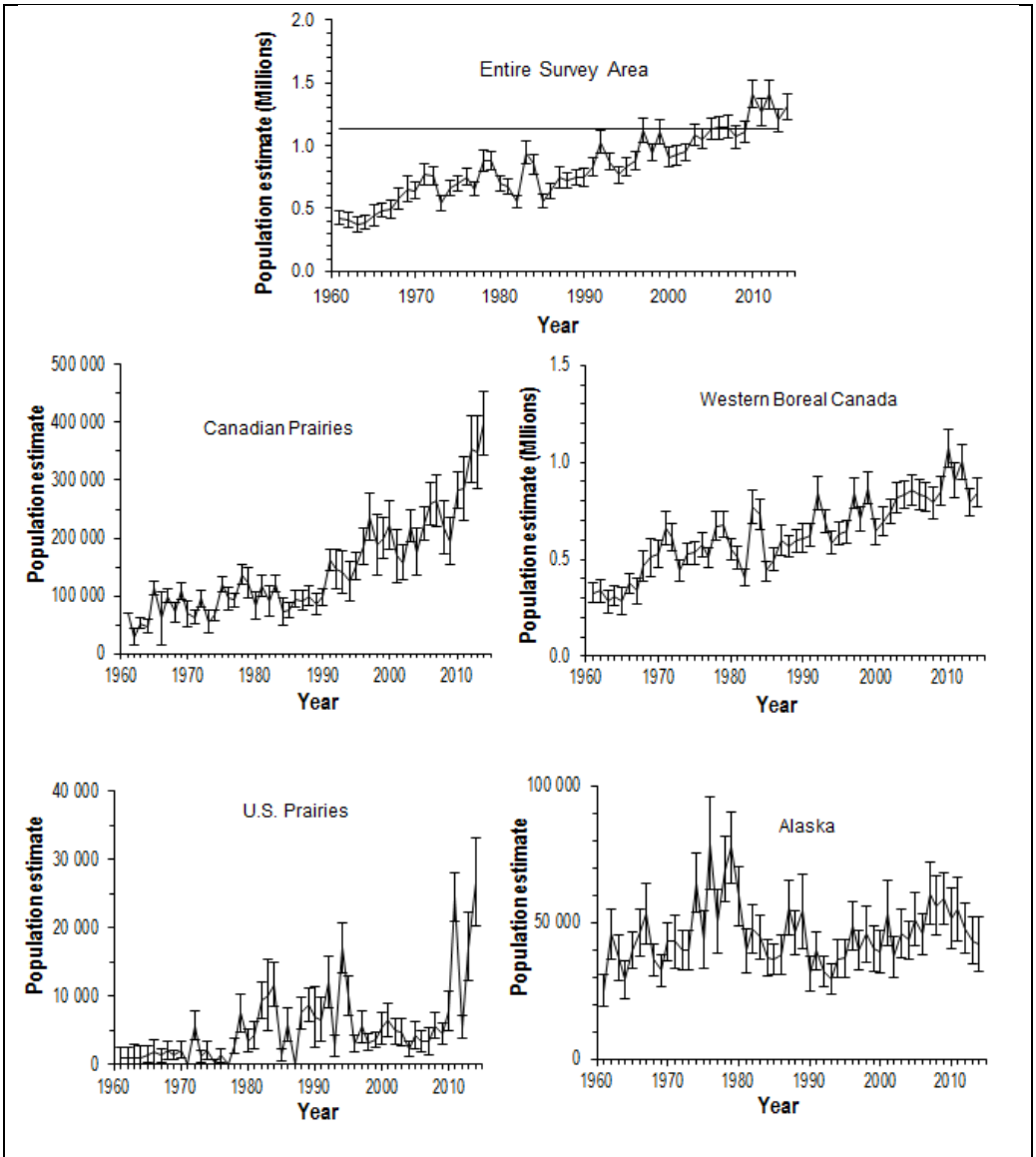

Figure 1. Bufflehead Breeding Populations Estimates (± 1 SE) Based on the WBPHS in Western and the Northwestern United States (Data shown are population estimates.The horizontal line represents the NAWMP population goal).

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

Since the beginning of the survey in 1990, Bufflehead numbers have been highly variable (Figure 2). Several factors could explain this variability: the survey period is not suitable for the species as most Buffleheads, like other sea ducks, are still migrating when the survey is carried out; the species' boreal breeding range is only partially covered by the survey; and Buffleheads breed in low density within the survey area (Brousseau and Lepage 2013).

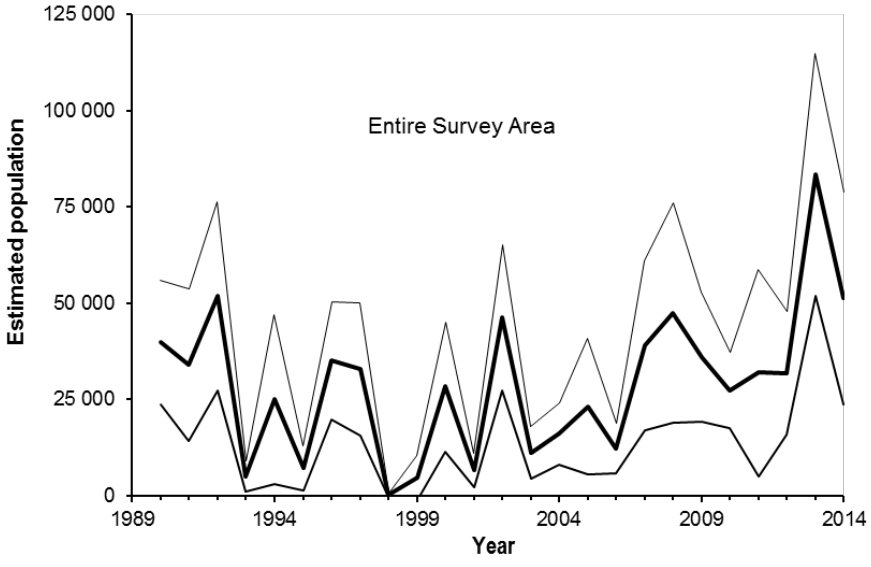

Figure 2. Bufflehead Breeding Population Estimates Based on the WBPHS in Eastern Canada, with 90% Credible Intervals (The figures represent results from the helicopter plot survey only).

- WATERFOWL BREEDING PAIR SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

Breeding Pair Surveys in the central Interior Plateau Region of British Columbia show a stable or slightly declining long-term trend (Figure 3).

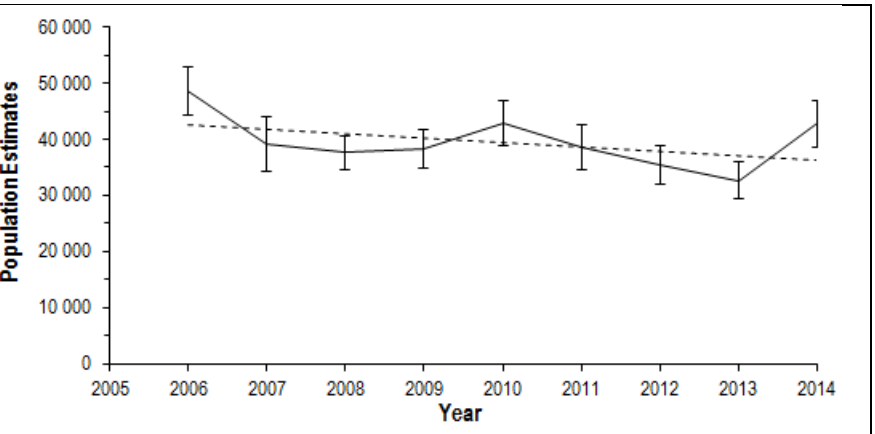

Figure 3. Population Estimates (± 1 SE) of Buffleheads in British Columbia Central Plateau, 2006–2014.

- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

The Yukon Roadside Waterfowl Breeding Population Survey suggests a stable or slightly increasing long-term trend for Bufflehead (Figure 4).

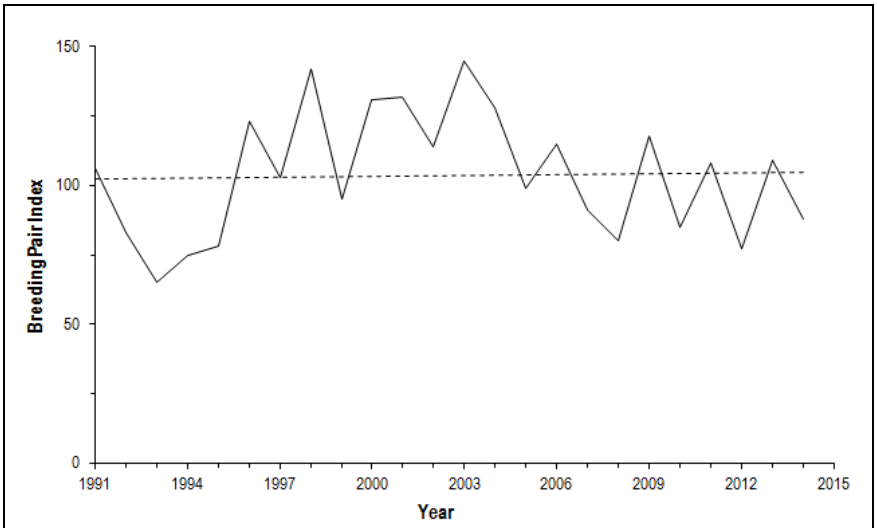

Figure 4. Breeding Pair Index for the Bufflehead in Southern Yukon, 1991–2014.

Harvest

In Canada, the number of Buffleheads harvested has declined, in correspondence with a general decline in the number of waterfowl hunters. In the U.S., where the majority of Buffleheads are taken, the number of birds harvested has been variable, but has generally been increasing since 2000 (Table 2).

Management and Conservation Concerns

The Bufflehead breeding distribution is influenced by the distribution and availability of nesting cavities. Loss of cavity-bearing trees due to agricultural expansion and in the boreal forest due to logging, particularly in the Aspen Parkland, is a potential concern (Sea Duck Joint Venture Management Board 2008).

Table 2. Harvest Estimates of Buffleheads in Canada and the United States.

	Canada													US[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974		479	5 033	1 079	13 340	51 085	4 201	777	2 357	2 888			81 239	126 115	207 354
1975	1 010	501	4 636	2 430	9 969	44 666	3 867	1 324	639	4 657	125	76	73 900	130 824	204 724
1976			1 788	233	7 992	42 747	3 876	525	2 464	3 230	70	286	63 211	121 403	184 614
1977	449		3 003	784	4 567	48 001	3 109	228	3 248	4 203	152	223	67 967	154 479	222 446
1978			592	319	9 734	45 984	2 533	856	3 753	3 872		163	67 806	163 784	231 590
1979			1 627	343	7 364	37 688	3 083	1 555	4 135	4 102	44		59 941	141 872	201 813
1980			1 310	163	4 960	35 756	2 044	1 629	2 802	6 546	136		55 346	147 013	202 359
1981		39	857	83	9 281	35 448	1 052	302	1 772	1 986			50 820	132 596	183 416
1982	205		1 061	220	4 186	23 291	3 631	199	1 544	1 491		531	36 359	122 049	158 408
1983		104	1 851	133	5 771	33 548	4 624		3 266	2 199		1 362	52 858	103 994	156 852
1984		62	2 083	737	5 677	24 276	2 615	1 431	5 236	5 587		18	47 722	146 035	193 757
1985			2 717	650	3 687	31 721	1 804		525	2 483			43 587	154 759	198 346
1986			1 026	642	2 128	32 231	2 981	214	100	2 606	121	10	42 059	123 631	165 690
1987			687	437	4 938	23 979	2 000	321	383	3 662		45	36 452	108 367	144 819
1988		291	2 074	52	5 353	25 628	1 593	371	607	1 881		127	37 977	82 153	120 130
1989			1 060	358	4 764	20 101	1 180	321		632			28 416	74 073	102 489
1990			2 362	571	3 765	17 967	1 575	561	471	529			27 801	84 007	111 808
1991	627		676	339	2 299	20 276	4 726	1 643	2 076	653	6		33 321	74 894	108 215
1992			1 869	178	8 362	23 262	2 255		520	1 161	160	49	37 816	97 350	135 166
1993			1 010	214	3 656	25 934	2 158	300	1 329	650	14	20	35 285	91 663	126 948
1994			873	151	2 974	22 335	1 501	3 125	1 336	809		35	33 139	113 037	146 176
1995			1 072	423	1 871	22 818	1 250	722	870	350			29 376	163 362	192 738
1996			351	326	2 497	20 542	1 156	734	1 595	710			27 911	189 447	217 358
1997	97		1 123	123	1 615	19 628	1 373	820	890	213		196	26 078	217 410	243 488
1998			1 136	795	1 387	13 583	223	99	720	416			18 359	163 420	181 779
1999[2]	86		1 730	184	2 403	9 653	2 652	3 130	1 365	218		7	21 428	200 305	221 733
2000			933		1 039	13 885	6 967		1 317	302	113		24 556	131 055	155 611
2001				126	1 044	10 208	1 348		607	376		20	13 729	145 434	159 163
2002			864	210	922	9 657	1 085	952	2 222	320			16 232	179 065	195 297
2003			968	96	939	7 292	799	139	847	747		438	12 265	176 706	188 971
2004		16	1 215	198	226	6 349	2 739	144	263	472	1 101		12 723	171 057	183 780
2005		79	435	328	777	5 763	1 520		4 835	342			14 079	141 713	155 792
2006			412		498	9 071	2 018	1 422		380	38		13 839	191 363	205 202
2007		49	2 231	321	633	11 734	3 752	231	2 183	149			21 283	197 487	218 770
2008			869	429	440	9 345	2 039	611	2 609	735			17 077	243 009	260 086
2009				40	746	8 057	3 391	413	2 138	30			14 815	231 901	246 716
2010			284	160	2 077	6 919	2 661	629	5 892	751			19 373	199 488	218 861
2011			1 100	1 912	1 059	11 575	3 104		608	201			19 559	214 961	234 520
2012			617	251	1 692	13 335	1 670		467	446	388		18 866	246 730	265 596
2013			55	620		1 126	9 535	1 500	358	1 755	495		15 444	223 995	239 439

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway. PF: Pacific Flyway including Alaska

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich *et al.* 2014 (USFWS).

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Mergansers

- COMMON MERGANSER (MERGUS MERGANSER)

The Common Merganser is the largest of the three North American merganser species. It breeds across Canada wherever trees are large enough to support suitable nesting cavities. Common Mergansers winter along both the Pacific and Atlantic coasts, and across the continental U.S., as far north as open water remains available (Mallory and Metz 1999). The Common Merganser is the most abundant merganser species.

- RED-BREASTED MERGANSER (*MERGUS SERRATOR*)

The Red-breasted Merganser has a wide range in North America, and is known to breed at high latitudes (up to 75°N), but is more likely to spend winters on the coast. Its population status and numbers are difficult to estimate because aerial surveys of breeding birds do not differentiate common between and Red-breasted mergansers and the two species are combined in counts.

- HOODED MERGANSER (LOPHODYTES CUCULLATUS)

The Hooded Merganser is the smallest of the three merganser species and is the only one that occurs solely in North America. It is mostly found in the southern regions of Canada. The Hooded Merganser breeds mostly in eastern Canada, where it shows the highest densities in the Great Lakes region in southern Ontario, and in Quebec. The species also occurs in southeast Saskatchewan, southern Manitoba, New Brunswick and Prince Edward Island.

Its population status and numbers are difficult to estimate accurately due to the species' secretive nature, the remoteness of some of its breeding range, and its tree cavity-nesting habits.

Abundance and Trends

The population size and trends for mergansers are not reliably known, as many aerial surveys do not distinguish between the three species, whose breeding ranges overlap extensively. An important part of the merganser breeding range—in the boreal forest—is not covered by the surveys. However, the three species can be reliably identified during helicopter-based plot surveys conducted as part of the WBPHS in eastern Canada. Mergansers are also monitored by smaller-scale surveys across the country.

Continentally, the combined population trends for mergansers are positive (Sea Duck Joint Venture Management Board 2008). The continental Common Merganser population size is estimated at 1.2 million birds (NAWMP 2012). Recent Red-breasted Merganser numbers show increasing short- and long-term trends (SDJV 2007), this after a following a decline in the continental population from 700 000 individuals in 2004 (NAMWP 2004) to 400 000 birds in 2012 (NAWMP 2012).

Based on the limited information available, the continental Hooded Merganser population appears to be currently stable, this following an increase in the continental population from 350 000 individuals to 1 million birds between 2004 and 2012 (NAMWP 2012).

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

Both the Common and Red-breasted Mergansers show stable trends in eastern Canada (Figures 1 and 2), while the Hooded Merganser population is increasing (Figure 3). While the Common and the Hooded Mergansers are well captured by the helicopter plot survey component of the RPRHS in eastern Canada (timing and range), this is not the case with the Red-breasted Merganser, as can be seen with the high variability illustrated on Figure 2. The Red-breasted Merganser nests later than the other mergansers species (and as a consequence, there might still be migrating birds in the breeding counts) and the WBPHS only covers part of its breeding range (Lepage 2013a).

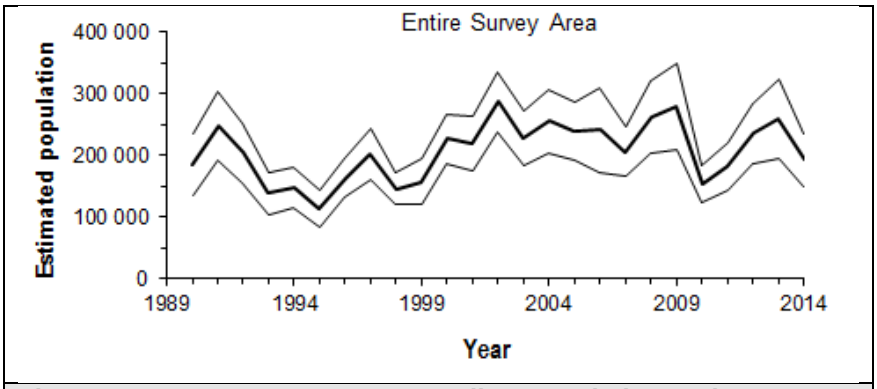

Figure 1. Common Merganser Breeding Population Estimates Based on the WBPHS in Eastern Canada. Estimated Number of Indicated Birds, with 90% Credible Intervals (The figure represents the results of the helicopter plot survey only).

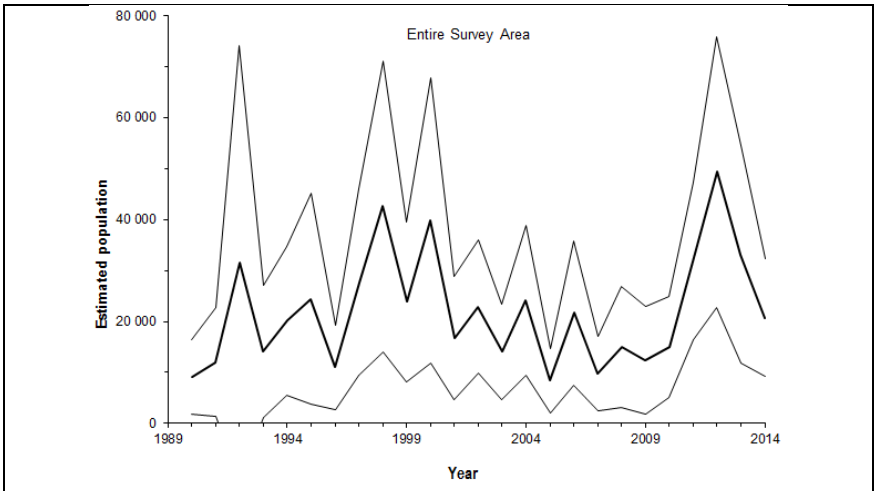

Figure 2. Red-breasted Merganser Breeding Population Estimates Based on the WBPHS in Eastern Canada (Estimated number of indicated birds, with 90% credible intervals. The figure represents the results of the helicopter plot survey only).

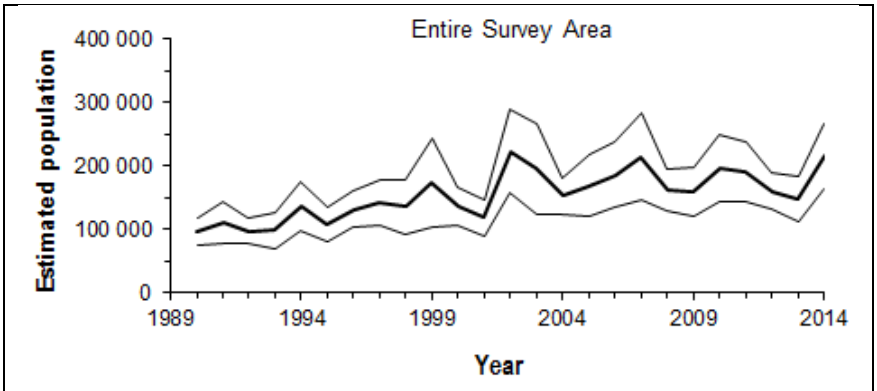

Figure 3. Hooded Merganser Breeding Population Estimates Based on the WBPHS in Eastern Canada. Estimated Number of Indicated Birds, with 90% Credible Intervals (The figure represents the results of the helicopter plot survey only).

- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

In southern Ontario, numbers of breeding Common and Hooded Mergansers have increased slightly since the early 1970s (Figures 4 and 5).

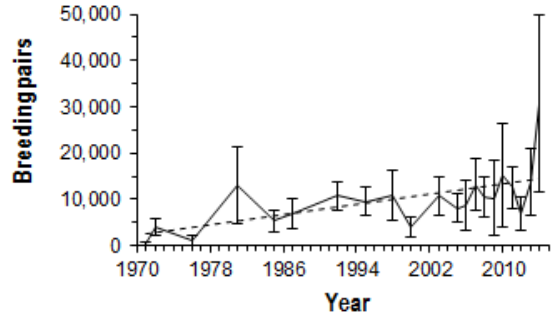

Figure 4. Abundance and Trends in Indicated Breeding Pair Estimates (± 1 SE) for the Common Merganser in Southern Ontario, 1971–2014.

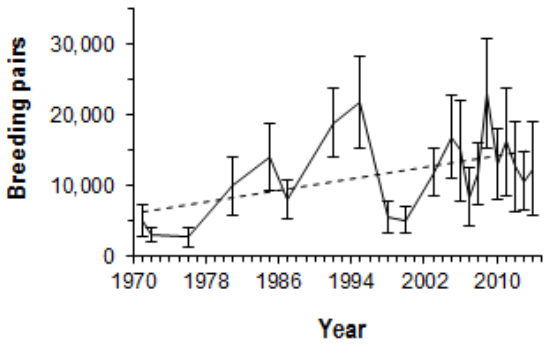

Figure 5. Abundance and Trends in Indicated Breeding Pair Estimates (± 1 SE) for the Hooded Merganser in Southern Ontario, 1971–2014.

Harvest

Overall, mergansers are not heavily harvested by hunters. The harvest, however, may be important locally (Sea Duck Joint Venture Management Board 2008). In Canada, mergansers are hunted predominantly in the Atlantic Provinces, Quebec and Ontario, as well as to a lesser extent in British Columbia (Tables 1–3).

Management and Conservation Concerns

- COMMON MERGANSER

The most important factor limiting the population size and breeding distribution of the Common Merganser is probably the availability of suitable nesting cavities, but fish availability can also play a role locally. In areas that were or are being logged, forestry practices may have reduced the availability of cavities suitable for nesting. Lake acidification and associated declines in fish populations can also reduce habitat quality (Mallory and Metz 1999). Due to their trophic level, Common Mergansers are vulnerable to contaminants (*e.g.,* mercury, lead), and may be useful bioindicator species for fish-bearing streams and lakes (Sea Duck Joint Venture Management Board 2008).

- RED-BREASTED MERGANSER

The ecology of the Red-breasted Merganser is not well known in North America and has received little attention (Lepage 2013a). This species is not a popular game bird among hunters, and the continental harvest is not well known.

- HOODED MERGANSER

The Sea Duck Joint Venture (2008) has identified that the highest priority needs for this species are improved information on population size, population trends and population delineation. This species is not a highly sought-after or commonly harvested game bird in Canada, but, like many other sea ducks, impacts from hunting are unknown. Deforestation and acid rain may be potential threats for this species in some parts of its range. Other conservation concerns for the Hooded Merganser include the availability of large trees to provide suitable nesting cavities, and the degradation and loss of wetlands (Lepage 2013b).

Table 1. Harvest Estimates of Common Mergansers in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	T/NU	YT	Total	Total	Total
1974	8 079	158	3 050	440	9 736	3 155	540			483			25 641	7858	33499
1975	5 970	83	5 097	227	12 829	4 569	128			1 141		101	30 145	11099	41244
1976	3 913		710	584	13 453	3 574				167			22 401	21731	44132
1977	4 379	270	2 486	1 006	10 017	3 695				97	246		22 196	11110	33306
1978	11 226	110	2 349	580	14 230	5 335	282			66		29	34 207	14434	48641
1979	6 701	315	1 093	852	12 111	4 969			345	69			26 455	13390	39845
1980	3 939		1 925	576	15 993	7 256				52	301		30 042	18059	48101
1981	6 795		2 125	995	13 464	5 367		178	347	397			29 668	16582	46250
1982	4 834		1 020	1 654	16 713	3 851	1 043			235			29 350	13873	43223
1983	5 428		1 365	960	14 258	8 423	67			110			30 611	14544	45155
1984	4 851	155	1 455	895	13 707	5 304			887	286			27 540	15719	43259
1985	10 009		1 556	599	11 839	4 116			136	76			28 331	12543	40874
1986	9 429	51	1 293	1 170	11 329	6 726			291	242	159		30 690	12060	42750
1987	8 628		1 052	1 268	10 729	2 881	652			233			25 443	14190	39633
1988	8 912		1 065	737	7 766	4 971			166	273			23 890	7502	31392
1989	5 265		2 220	1 356	7 531	2 497			150				19 019	12191	31210
1990	4 586		1 127	430	11 062	3 264			368				20 837	7619	28456
1991	373		832	568	9 946	2 380				69			14 168	7028	21196
1992	5 693	113	813	559	7 658	5 403							20 239	10549	30788
1993	3 711		1 332	137	5 252	1 723				67		53	12 275	9816	22091
1994	6 908		1 146	331	6 403	2 666				130		64	17 648	13192	30840
1995	4 614	675	1 763	93	8 474	1 220							16 839	14743	31582
1996	5 031	831	1 690	455	5 300	2 669			181				16 157	18287	34444
1997	4 382		2 087	199	5 976	2 304							14 948	10871	25819
1998	4 020		2 398		3 851	2 208				82			12 559	14271	26830
1999 [2]	2 580		664	155	4 372	2 151							9 922	14141	24063
2000	3 084	309	368	90	2 906	1 215				36			8 008	22079	30087
2001	3 270		691	372	2 826	1 087							8 246	14498	22744
2002	2 235	487	670	390	2 172	942							6 896	26192	33088
2003	2 387		1 212	291	2 243	928			103				7 164	26606	33770
2004	4 994	124	951	187	1 815	586				59			8 716	22123	30839
2005	3 436	64	611	29	693	610				121			5 564	13954	19518
2006	721	287	463		1 177	1 245			426				4 319	17271	21590
2007	3 467	330	1 032	122	1 864	904							7 719	19430	27149
2008	2 100	94	555	31	983	926				32			4 721	21377	26098
2009	3 693	370	872		1 094	2 711							8 740	17880	26620
2010	3 808		1 563	514	1 648	709							8 242	18600	26842
2011	1 045	354	1 450		2 636	1 933							7 418	17698	25116
2012	1 597	1 167	435	133	2 375	930				21			6 658	15456	22114
2013	1 472	487	623	55	900	766				32			4 335	18671	23006

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 oward

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich et al. 2014 (USFWS).

Table 2. Harvest Estimates of Red-breasted Mergansers in Canada and the United States.

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974	5 549	1 760	2 059	450	3 956	2 754							16 528	19253	35781
1975	3 380	865	2 633	335	5 485	1 661				64			14 423	31682	46105
1976	7 265	2 468	1 757	1 152	4 748	4 545						84	22 019	21811	43830
1977	5 343	295	3 293	443	5 760	2 726				142	137		18 139	19343	37482
1978	3 445	43	892	61	1 370	439							6 250	12034	18284
1979	3 106	273	2 310	270	3 212	1 405				227			10 803	12033	22836
1980	7 102		1 963	114	3 431	667					247		13 524	9479	23003
1981	3 494	330	4 021	339	3 898	1 503							13 585	22174	35759
1982	5 472	470	2 450	1 363	7 994	1 197	1 244						20 190	13458	33648
1983	4 202	702	3 135	776	4 594	4 342							17 751	24207	41958
1984	4 230	534	3 151	119	4 032	1 303							13 369	20314	33683
1985	6 879	404	3 209	326	6 262	3 255							20 335	21703	42038
1986	6 599		3 137	741	6 837	2 292				44			19 650	18912	38562
1987	3 313		1 104	238	2 993	762							8 410	12800	21210
1988	2 052	92	1 576	202	3 345	1 141				26			8 434	8641	17075
1989	7 557	118	3 123	49	3 793	1 578							16 218	10997	27215
1990	4 115	116	1 565	156	3 192	681							9 825	10052	19877
1991	3 793		1 363		4 052	835				39			10 082	12657	22739
1992	4 709		5 465	435	2 361	1 323							14 293	16246	30539
1993	5 445	177	5 192	196	4 024	767			59			6	15 866	10946	26812
1994	6 136	656	2 835	53	1 484	1 055							12 219	12347	24566
1995	4 800	232	3 048	357	912	913				17			10 279	19077	29356
1996	2 156	292	1 131	621	1 707	398			139				6 444	16300	22744
1997	2 114		1 947	186	1 598	1 359							7 204	28288	35492
1998	2 728		4 906		2 311	770			60				10 775	23309	34084
1999 [2]	2 238		1 693	151	2 487	445							7 014	13525	20539
2000	511		1 039		838	648							3 036	11114	14150
2001	2 460		709	193	710	738							4 810	10913	15723
2002	2 550		496	173	1 297	766							5 282	13172	18454
2003	3 932	275	572	200	961	362							6 302	17469	23771
2004	2 098		1 006	39	882	387							4 412	17050	21462
2005	2 747		756	78	639	256							4 476	14067	18543
2006	2 616		624		1 287	553			487				5 567	17011	22578
2007	4 820		875	29	431	1 021							7 176	12939	20115
2008	1 705		1 117	100	740	792							4 454	16505	20959
2009	8 463		481		577	932							10 453	22835	33288
2010	7 693		902		725	272							9 592	12108	21700
2011	10 028	106	632		914	106							11 786	17446	29232
2012	771	92	185		633	159							1 840	19659	21499
2013	6 521		115		477	983							8 096	16452	24548

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway.

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich et al. 2014 (USFWS

Table 3. Harvest Estimates of Hooded Mergansers in Canada and the United States.

	Canada												U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	T/NU	YT	Total	Total	Total
1974			50	294	8 383	19 885	431	144		357			29 544	54339	83 883
1975			417	128	9 334	23 283	474					101	33 737	48599	82 336
1976			397	455	13 550	21 437	118	277		125			36 359	65635	101 994
1977		61	690	298	11 547	27 908	443			391			41 338	70653	111 991
1978			307	893	11 035	21 910	421	589					35 155	69726	104 881
1979	41		639	458	10 780	18 873	421						31 212	49931	81 143
1980	1 152		45	481	8 588	20 176	473	154		118			31 187	62291	93 478
1981	264	117	397	952	9 856	22 632	818			227			35 263	63021	98 284
1982			191	153	9 924	17 397	396						28 061	54407	82 468
1983	701		250	342	7 966	18 379	462		173	182			28 455	48551	77 006
1984	1 029	62	230	423	10 424	18 117	833			91			31 209	57160	88 369
1985	1 747		262	605	11 028	14 439				512			28 593	54451	83 044
1986	536	102	587	827	7 620	17 073	1 263	214	119	194			28 535	58881	87 416
1987	396		201	870	9 100	13 276	174		155	361			24 533	49763	74 296
1988		70	263	672	5 622	17 522	156			464			24 769	35412	60 181
1989			699	182	11 870	12 894	337	287		162			26 431	37329	63 760
1990	502	37		45	7 652	15 935		181		45			24 397	44011	68 408
1991	1 405	571	564	684	10 286	15 326	629						29 465	44719	74 184
1992	422	83	220	301	10 277	14 489	969			86			26 847	45027	71 874
1993			775	355	8 858	10 066	594	21	100	85			20 854	50642	71 496
1994	1 190		1 823	513	8 119	12 894	996	196		165			25 896	58392	84 288
1995		154	519	585	7 774	13 992	378			27			23 429	75713	99 142
1996	176		582	734	5 241	10 282	333			188			17 536	81183	98 719
1997	363		174	409	5 603	8 054	288						14 891	91008	105 899
1998	1 051		291	293	4 972	8 215	819		167				15 808	87608	103 416
1999 [2]	73		901	824	3 859	8 929	794		208	98			15 686	93451	109 137
2000	168		175	171	6 185	6 748	233		236	36			13 952	94321	108 273
2001	337		132	504	3 169	7 272	193						11 607	85802	97 409
2002	302		638	299	2 886	5 080	833		115	46			10 199	103546	113 745
2003	187		744	734	2 336	4 817	86						8 904	93507	102 411
2004	106	27	337	560	1 897	4 216	636		199	33			8 011	83256	91 267
2005	241		636	352	2 536	3 868	1 785	282	281	39			10 020	77318	87 338
2006	37		511	626	2 961	4 482	455						9 072	82600	91 672
2007	76		340	432	3 955	4 950	598		338	65			10 754	91230	101 984
2008	147	205	371	798	3 387	3 884	579		191	248			9 810	89652	99 462
2009		327	338	37	2 335	5 573	1 003	270	187				10 070	96344	106 414
2010	468		859	160	4 930	2 475	184		49	71			9 196	95886	105 082
2011	524		761	313	3 426	3 771	363	2 647	85	40			11 930	110813	122 743
2012	1 936	337	1 012	50	3 651	4 999	989	627		97			13 698	99837	113 535
2013	216	539	940	141	3 553	4 093	680			213			10 375	98552	108 927

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich *et al.* 2014 (USFWS).

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Population Status of Geese

There are six species of geese that nest in Canada: the Snow Goose, the Canada Goose, the Cackling Goose, the White-fronted Goose, Ross's Goose and the Brant. The species are often subdivided by subspecies or population for regional management purposes. Geese are present almost everywhere in North America, though very few birds spend their entire annual cycle in Canada. Most migrate north–south and are shared between Canada, the United States and Mexico. A few migrate east–west and are shared with other countries (Russia, Greenland, northern Europe). Most populations of geese are either stable or increasing in abundance. Some have benefitted from human-induced changes to the landscape and have become so abundant that they require special population management measures to reduce their impacts.

Foraging by large numbers of Snow Geese has resulted in significant alteration of plant communities in Arctic and subarctic staging and nesting areas. This has led to reductions in the availability of their preferred forage plant species, as well as to secondary effects on soil chemical characteristics. The amount of habitat affected by foraging geese has increased as the populations have grown, and there are concerns that continued expansion of the area affected by geese eventually could lead to loss of ecosystem function or lead to significant impacts for other species. Concern over potential impacts of geese on their habitats prompted managers to undertake measures to increase in 1999 hunter harvest of mid-continent Lesser Snow Geese and Greater Snow Geese: the species were designated as "overabundant". This was done through liberalization of hunting regulations, and amendments to the *Migratory Birds Regulations* in Canada and the United States to allow harvests to occur outside of normal hunting seasons. Ross's Geese were declared overabundant in the United States in 1999, and in Canada beginning in 2014. The CWS also recently designated the Lesser Snow Geese nesting in the western Arctic as overabundant, and thus they are now subject to special conservation measures to increase harvest in western Canada.

Temperate-breeding Canada Geese also have been increasing in abundance, but no population has yet been designated as overabundant in Canada. Most conflicts with humans occur in urban areas in southern Canada (e.g., golf courses, urban parks, private lands), and permits are often issued to reduce conflicts where Canada Geese cause damage or threaten human safety.

Snow Goose

Two subspecies of Snow Goose are recognized for management purposes: the Lesser Snow Goose *(C. c. caerulescens)* and the Greater Snow Goose *(C. c. atlantica)*.

Greater Snow Goose (*Chen caerulescens atlantica*)

The Greater Snow Goose population has undergone a dramatic increase, from a few thousand individuals in the 1930s to between 700 000 and 1 million birds in the last decade. This species was designated as “overabundant” in 2014.

Greater Snow Geese breed in the Canadian Eastern High Arctic from the Foxe Basin to Alert on northern Ellesmere Island, with the largest nesting colony located on Bylot Island, Nunavut. Some breeding colonies can also be found on the western coast of Greenland (Figure 1). The birds winter along the mid-Atlantic coast from New Jersey to North Carolina. In the past, during migration the entire population would stage in the marshes and agricultural lands of southern Quebec, but recently a small portion of the population began to migrate through eastern Ontario and northern New Brunswick.

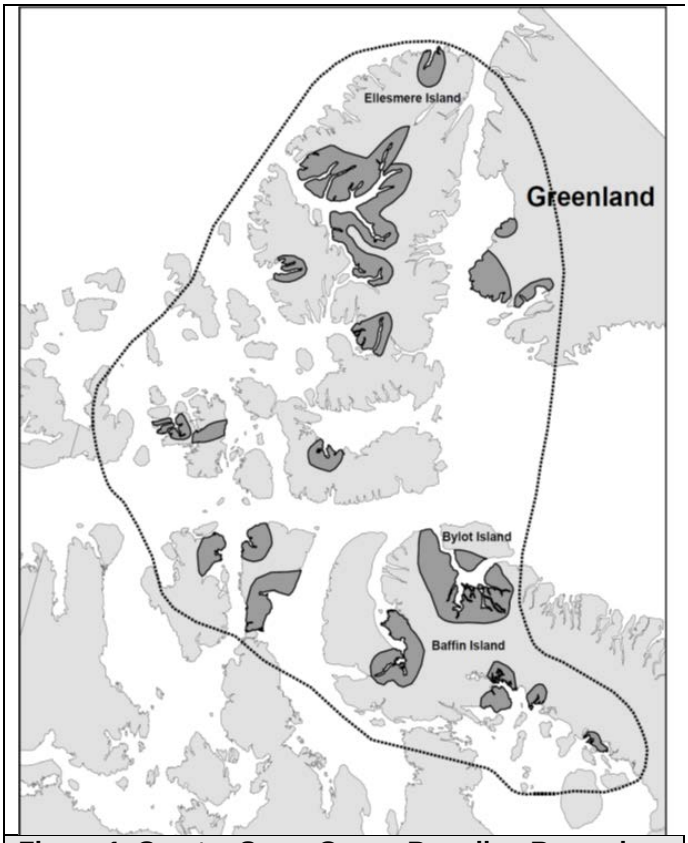

Figure 1. Greater Snow Goose Breeding Range in the Canadian Arctic.

Abundance and Trends

The Greater Snow Goose population has been monitored in its spring staging areas in the St. Lawrence River Valley since 1965. During the spring migration, the population concentrates in a smaller area than during the breeding or wintering periods when the birds are more dispersed. The spring survey has expanded greatly since the 1960s and now covers a large territory extending from Lac Champlain (south) to Lac St-Jean (north), and from eastern Ontario (west) to Chaleur Bay (east). Five aircraft are used

simultaneously to ensure complete coverage during a one-day survey each spring.

The Greater Snow Goose population experienced a rapid growth in the late 1960s, followed by a period of relative stability from 1974 to 1982. Subsequently, population growth resumed, reaching an average annual rate of increase of 9.9% between 1982 and 1999 (Figure 2, Reed and Calvert 2007). Population growth was halted, and eventually reversed, following the implementation in Canada of special conservation measures in the fall of 1998 and spring conservation harvests in 1999 (Reed and Calvert 2007). The population now appears to have stabilized below one million birds. The 2014 spring estimate of 796 000 geese was below last year's estimate and below the maximum estimated population of 1 million birds (Figure 2, Dionne 2014). This decrease could result in part from poor reproductive success in 2012 and 2013, and from the special spring conservation season implemented in the United States in 2009 (M. Dionne, CWS-Quebec Region, pers. comm.).

Greater Snow Geese are now being observed in greater numbers on agricultural lands in eastern Ontario at the western edge of the spring staging range. A similar situation has been observed in recent years on the tidal marsh habitats in and around Restigouche County in New Brunswick.

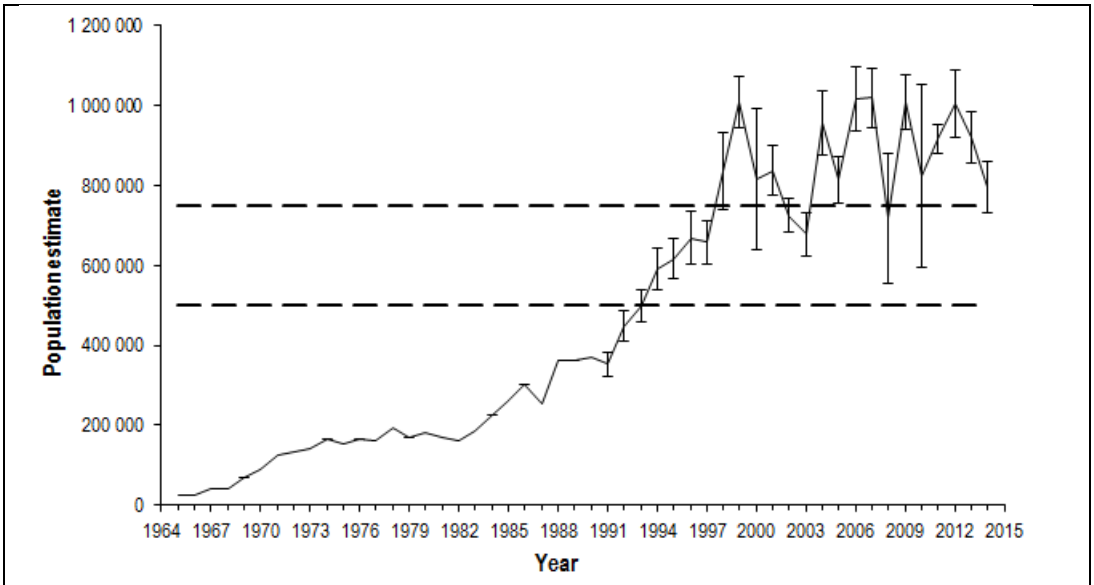

Figure 2. Greater Snow Goose Population Estimates (95% Confidence Intervals) during the Spring Staging Period in the St. Lawrence Valley, Quebec (The horizontal lines represent the target range for the population. Estimates from 1998 to 2000 were corrected for flocks not observed during the survey, using data from a telemetry study. Estimates from 2002, 2008 and onward are based on a revised methodology).

Harvest

In order to reduce the population size and the population growth rate, measures were put in place during the late 1990s to increase the Snow Goose harvest in Canada and in the United States. Harvest regulations were liberalized (bag and possession limits, season length) and special conservation measures allowed the use of different hunting methods during the regular hunting seasons such as unplugged shotguns (U.S. only), electronic calls (Canada and the U.S.) and bait (Canada only). Special conservation seasons were also established in Canada (Quebec), during which hunter are permitted to harvest Greater Snow Geese in the spring, when hunting is normally prohibited.

The average number of Greater Snow Geese harvested annually in the fall in Canada increased slightly after the implementation of special conservation measures in 1999 (Table 1). In Canada, in 2013, the fall goose harvest was estimated at 57 277 birds, comparable to the 2012 harvest (66 858 birds) but below the most recent 5-year average (2009–2013, 65 781 birds). In the U.S., special fall conservation

measures were also implemented in 1999, and a slight increase in the harvest was observed in the following years. In 2013, the fall harvest was estimated at 30 482 birds, which was lower than the previous year's estimate (41 251).

In the early years of the special conservation measures (1999–2002) in Quebec, the average number of Greater Snow Geese harvested in the spring was of about 55 000 birds per year (Figure 3). However, the spring harvest has since declined to an average of about 27 000 birds annually from 2003 to 2013, largely due to a decrease in the number of hunters participating in the spring hunt. An estimated 17 708 birds were harvested during the special conservation measures in spring 2014 in Quebec, which is slightly less than the previous year's estimate (Figure 3, Smith and Gendron 2014a).

A special conservation season was also implemented for the first time in southeastern Ontario in the spring of 2012. In 2014, an estimated 864 geese were harvested, a number lower than the 2013 estimate (1397 birds), but higher than that of 2012 (250 birds, Smith and Gendron 2014b).

In the spring of 2009, spring conservation seasons for Greater Snow Geese were put in place for the first time in several U.S. states in the Atlantic Flyway. An average of 42 010 geese (shot and retrieved) were harvested annually during the spring between 2009 and 2013. In the spring of 2014, the estimated (shot and retrieved) harvest of Greater Snow Geese was 64 846 birds, with an additional 2466 birds shot and lost (Figure 3, Snow Goose, Brant and Swan Committee of the Atlantic Flyway Council 2014).

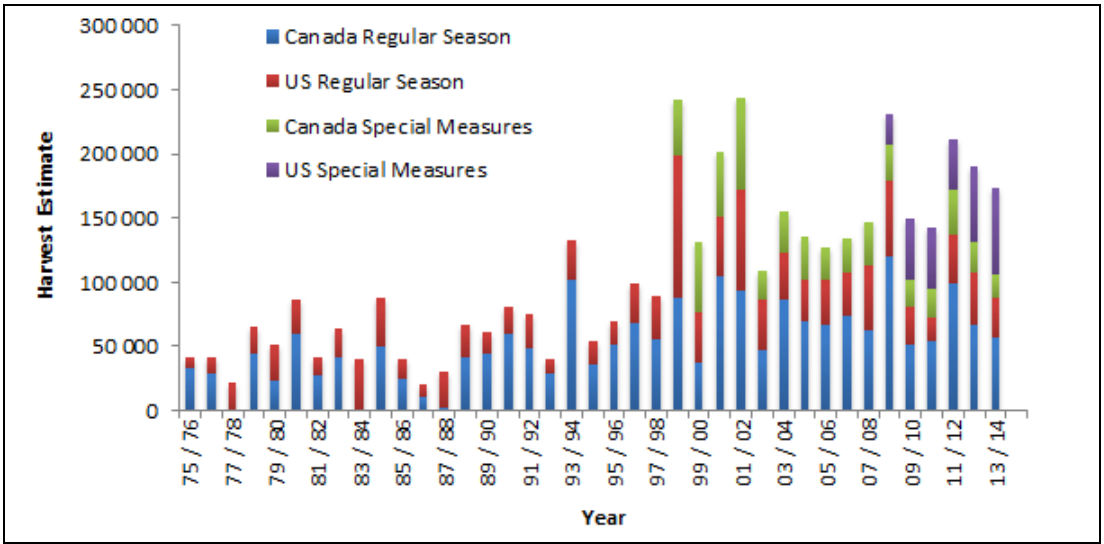

Figure 3. Harvest of Greater Snow Geese in Spring and Fall (Numbers include geese harvested during special conservation measures initiated in spring 1999 in Canada and in 2009 in U.S.) (Source:Smith and Gendron 2014a, Raftovich et al. 2014).

Management and Conservation Concerns

In 1965, the Greater Snow Goose population was estimated at 25 000 geese. The population grew and reached 100 000 birds by the 1970s. In subsequent decades, the population entered a period of rapid growth, and reached 1 million birds in 1999.

Before the mid-1970s, the Greater Snow Goose relied mainly on marshland vegetation for sustenance. Since then, changes in agricultural practices have led to extensive foraging in farm fields. In particular, the development of large-scale monoculture farming operations, such as for corn or cereal, have provided an unlimited supplement to the snow goose's traditional diet, and led to improved survival of the geese during the winter and during migratory stopovers. This shift has increased over time to the point where the birds now obtain the majority of their food from these sources. Modern agricultural practices featuring monocultures and ever-larger fields have contributed to the growing use of agricultural foods by the birds.

This “agricultural subsidy” has increased the survival and reproductive output of Greater Snow Geese and is largely responsible for their explosive population growth.
the Greater Snow Goose population had increased to the point where the geese were causing significant crop damage and negatively affecting staging and Arctic breeding habitats (Batt 1998), and were designated as overabundant.

In an effort to stop population growth and reduce the Greater Snow Goose population size, special conservation measures were put in place in Quebec in the fall of 1998. The special measures were aimed at increaseing the harvest of geese by hunters through the use of additional hunting methods, the liberalization of daily bag and possession limits and offering a spring conservation season (the later was implemented in spring 1999). Subject to specific controls, the use of special methods and equipment, such as electronic calls and bait was allowed in fall and spring. At the same time, the number of days permitted for hunting during the fall hunting season has been maximized. Very liberal daily bag and possession limits for Snow Geese continue to be recommended. The first spring conservation season was established in 1999 in Quebec, and was extended to Ontario in 2012.

Following the implementation of special conservation measures, the growth of the Greater Snow Goose population appears to have stabilized (Reed and Calvert 2007). Spring survey data suggest that the population has been relatively stable since 1999, fluctuating between about 700 000 and 1 000 000 birds (Table 1 and Figure 1).

More information on the issue of overabundant species can be found in the Overabundant Species section.

Research Highlight

A detailed study of the reproductive ecology of Greater Snow Geese at the Bylot Island breeding colony in Nunavut has been conducted annually since 1988. Bylot Island is located off the northern end of Baffin Island in the eastern High Arctic and harbours, on its southwest plain, the largest breeding colony of Greater Snow Geese. More information is available about this research project at: www.cen.ulaval.ca/bylot.

Table 1. Fall Harvest Estimates of Greater Snow Geese in Canada and the United States
(An unknown but likely small proportion of the Atlantic Flyway harvest is composed of Lesser Snow Geese).

	Canada					United States[2]	Continental
	Maritimes	QC	ON	Western and Northern Canada[1]	Total	Total	Total
1975		32 436		153	32 589	9 200	41 789
1976		28 866	66		28 932	12 100	41 032
1977						22 200	22 200
1978		42 763	1 312	612	44 687	20 100	64 787
1979		23 190			23 190	28 000	51 190
1980		59 120	103		59 223	27 300	86 523
1981	33	27 475	107		27 615	13 500	41 115
1982	50	40 697	832	505	42 084	21 700	63 784
1983						40 400	40 400
1984	177	45 538	624	4 001	50 340	37 600	87 940
1985		24 660			24 660	14 800	39 460
1986	55	11 077			11 132	8 900	20 032
1987		2 125			2 125	28 500	30 625
1988		41 827		88	41 915	24 900	66 815
1989		44 185	253		44 438	17 100	61 538
1990	294	59 223		205	59 722	21 500	81 222
1991		48 568		621	49 189	26 400	75 589
1992	295	26 988	926	976	29 185	10 400	39 585
1993		97 539	429	4 292	102 260	30 400	132 660
1994		35 903	112		36 015	17 600	53 615
1995	21	50 267	252	391	50 931	18 800	69 731
1996	1 981	66 111	111	115	68 318	31 400	99 718
1997		55 056	164		55 220	34 700	89 920
1998	502	86 791	64	118	87 475	110 900	198 375
1999[3]	774	36 821	105	86	37 786	39 100	76 886
2000		103 615		888	104 503	47 000	151 503
2001		94 011		68	94 079	77 802	171 881
2002	225	45 890		751	46 866	39 295	86 161
2003		86 028	111	286	86 425	35 067	121 492
2004	433	66 326	1 394	1 693	69 846	31 548	101 394
2005		66 238			66 238	35 394	101 632
2006	135	73 585	331	364	74 415	33 256	107 671
2007	578	61 652			62 230	50 742	112 972
2008	284	114 776	51	5 555	115 111	58 752	173 863
2009	257	50 535	661		51 453	29 426	80 879
2010		52 606	301	1 428	52 907	18 293	71 200
2011		96 144	2 836		98 980	37 592	136 572
2012		66 858			66 858	41 251	108 109
2013		57 210	67		57 277	30 482	87 759

[1]Prairie Provinces, BC, NWT and YK

[2]Atlantic Flyway.

[3]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data);R.V. Raftovich et al. 2014 (USFWS, US data)

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Lesser Snow Goose (*Chen caerulescens caerulescens*)

The Lesser Snow Goose populations have increased dramatically since the 1970s. The mid-continent Lesser Snow Goose population has been designated as “overabundant” and has been subject to special measures to control the species’ abundance since 1998. In 2014, the Western Arctic Population was also designated as “overabundant”.

The size of Mid-continent Lesser Snow Goose population estimated using banding and harvest data, averaged approximately 2.3 million adults during the 1970s and approximately 12.5 million in 2003–2012, representing an increase of approximately 10 million geese over a 30-year period (Figure 3). Population growth has slowed since 2000 and may have stabilized in recent years (Figure 3).

Lesser Snow Geese are colonial birds, nesting in coastal and inland areas of the Arctic in colonies that range from a few hundred to several hundred thousand birds. These colonies can be grouped according to three regions, these are: the eastern, central, and western Arctic regions (Figure 1). The eastern and central Arctic colonies collectively form the Mid-continent Population of Lesser Snow Geese, while those nesting on Banks Island, on the mainland near the Mackenzie River delta, and on the north slope of Alaska comprise the Western Arctic Population. Snow Geese of these two populations winter mainly in the Central and Mississippi Flyways. Another population of Lesser Snow Geese nests on Wrangel Island, off the northeast coast of Siberia, and winters mainly along the Pacific coast at the mouth of the Fraser-Skagit Rivers in B.C. and Washington, in California, and in smaller numbers in Oregon. All three populations overlap somewhat in the migration and wintering areas.

Mid-continent Snow Geese migrate through the prairies in Canada and the United States, and winter mainly in the southern United States.

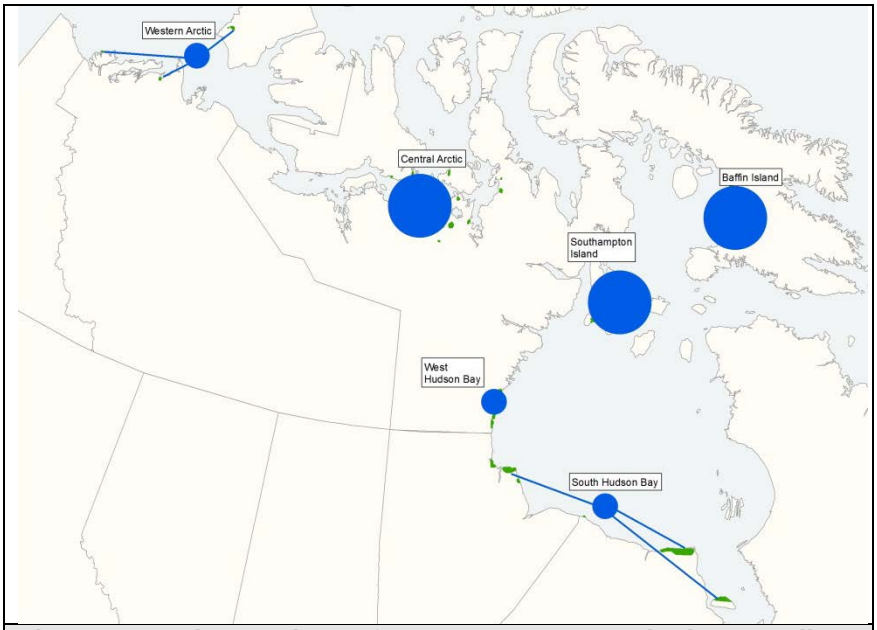

Figure 1. Nesting Regions of Lesser Snow Geese in the Canadian Arctic.

Abundance and Trends

Lesser Snow Geese nest in remote locations in several colonies in the Arctic, and for that reason, it is difficult and expensive to survey populations. Photographic surveys have been used since the 1960s to monitor major Lesser Snow Goose nesting colonies (Mid-continent and Western Arctic Populations). These surveys are not done every year and cover only known colonies that have been identified based

on other surveys. The number of Mid-continent Lesser Snow Geese and Ross's Geese (combined) are also indexed by surveys on wintering areas in January. Each year, Lesser Snow Geese are also banded on their breeding grounds in the Arctic. Recently, band recovery data and harvest estimates have been used to estimate the population size and trend (Alisauskas et al. 2009, Alisauskas et al. 2011, Alisauskas et al. 2012). The colony of Lesser Snow Geese on Wrangel Island is monitored through ground surveys conducted by Russian biologists (Kerbes et al. 1999).

All Lesser Snow Goose populations are above their NAWMP population objectives, which are: Mid-continent population, 1 500 000 birds; Western Arctic population, 200 000 birds; and Wrangel Island population, 120 000 birds (NAWMP 2012).

- MID-CONTINENT (EASTERN AND CENTRAL ARCTIC COLONIES) AND WESTERN ARCTIC POPULATIONS

Breeding ground surveys have indicated substantial growth in the size of Lesser Snow Goose colonies, as well as the establishment of new colonies in recent years (e.g., Kerbes et al. 2006, Kerbes et al. 2014). Photographic surveys conducted at all known major nesting areas in the eastern, central and western Arctic have also shown substantial population growth (Tables 1 and 2).

Table 1. Estimate Number of Nesting Lesser Snow Geese in the Canadian Arctic, 1965–2008, Based on Photo Surveys (* combined results from 2005–2006; source: K. M. Meeres, Saskatoon, CWS, unpubl. data).

Year	Central Arctic	West Hudson Bay	South Hudson Bay	Southampton Island	Baffin Island
1965–67	10 300				
1973		390 200	64 800	155 800	446 600
1976	56 400				
1977		353 200			
1978		331 800			
1979			118 900	233 000	454 800
1980		317 400			
1982	105 700				
1985		436 400			
1988	317 100				
1990		201 900			
1997		211 600	408 700	721 200	1 733 500
1998	740 600				
2003		261 100			
2004				652 500	
2005					1 618 600
2006	1 463 800		478 200*		
2008		246 300		939 700	

Table 2. Estimated Numbers of Lesser Snow Geese in the Western Arctic Colonies, 1976–2013, Based on Photo Surveys Unless Noted Otherwise ([a]Ground survey, [b]Helicopter survey, [c]Digital imagery survey) (source: K. M. Meeres, Saskatoon, CWS, unpublished data).

Year	Egg River	Anderson River	Kendall Island	Total
1976	165 000	3800	800	169 600
1981	198 100	8400	1000	207 500
1987	196 500	7200	1400	205 100
1995	479 400	3600	3000	486 000
1996	436 000[a]	2788[b]	210[b]	438 998
1997	264 000[a]	806[b]	2506[b]	267 312
1998	452 000[a]	596[b]	736[b]	453 332
1999		246[b]	1608[b]	
2000		1142[b]	472[b]	
2001		1327[b]	1199[b]	
2002	570 500	1900	6900	579 300
2003		502[b]	58b	
2004		26[b]	1914[b]	
2005		1472[a]	2236[b]	
2006		2334[a]	2242[b]	
2007	295 100	4100	4600	303 800
2008		1504[b]	1724[b]	
2009[c]	427 000	200	300	427 500
2013	419 814	111	203	420 128

The Mid-continent Population of the Lesser Snow Goose has also been monitored in January in wintering areas since 1970 (Figure 2). Winter counts are used to provide an index of the population level, but do not represent a complete count of all birds, and are not based on a statistical sampling framework. Therefore the relation between counts and the actual population size is unknown (Alisauskas et al. 2012). Winter counts include Ross's Geese, a small proportion of the Lesser Snow Goose that originates from western Arctic colonies, and juvenile birds of both species. Mid-winter counts underestimate actual population levels (Mowbray et al. 2000, Alisauskas et al. 2012). Mid-winter counts increased from 0.78 million geese in 1970 to about 3.8 million geese in 2014 (Fronczak 2014; Figure 2).

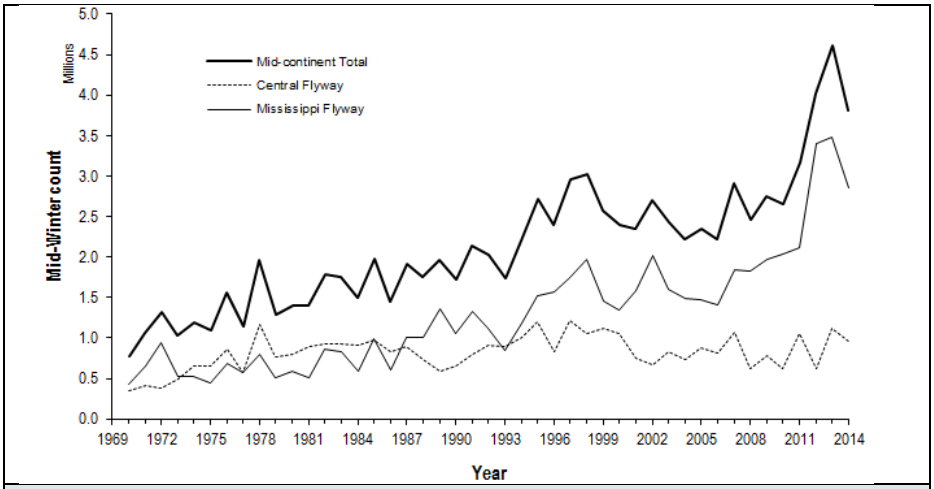

Figure 2. Mid-continent Lesser Snow Goose Populations in Mid-winter (Counts Include some Ross's Geese; Source: Fronczak 2014).

Recently, the size of the Mid-continent Lesser Snow Goose population has been estimated using band recovery data and harvest estimates from the mid-continent region of North America (mainly Manitoba, Saskatchewan, and states of the Mississippi and Central Flyways) [Lincoln 1930, Alisauskas et al. 2009, Alisauskas et al. 2011, Alisauskas et al. 2012]. Estimates derived from harvest and banding data suggest numbers that are considerably higher than previously thought, and much higher than those reported from either photographic surveys or mid-winter counts. Lincoln estimates of population size for mid-continent Lesser Snow Geese averaged 2.3 million adults in the 1970s, 3.5 million adults in the 1980s, 8 million adults in the 1990s, and almost 13 million adults from 2000–2012 (Figure 3; R.T. Alisauskas, EC-PNR, unpubl. data).

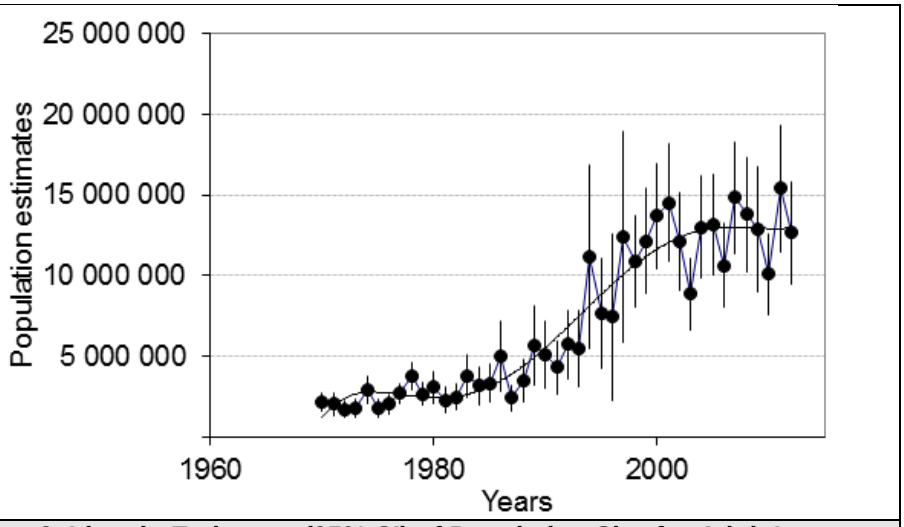

Figure 3. Lincoln Estimates (95% CI) of Population Size for Adult Lesser Snow Geese Wintering in the Mid-Continent Region of North America
(source: R.T. Alisauskas, EC, unpubl. data).

Similarly, harvest estimates and band recoveries of adult Lesser Snow Geese from the Western Arctic and Wrangel Island Populations were used to estimate the combined size of these adult populations using the techniques described by Alisauskas et al. (2009, 2011, and 2012). These estimates assumed that harvest estimates for adult Lesser Snow Geese in the Pacific Flyway states were overestimated by approximately 40%, and therefore harvest estimates were adjusted downward as suggested by Padding and Royle (2012). The preliminary estimates indicate that the combined population of adult Lesser Snow Geese averaged approximately 300 000 birds in the 1970s, and approximately 1 million adults between 2003 and 2012 (Figure 4, R.T. Alisauskas, EC-PNR, unpubl. data).

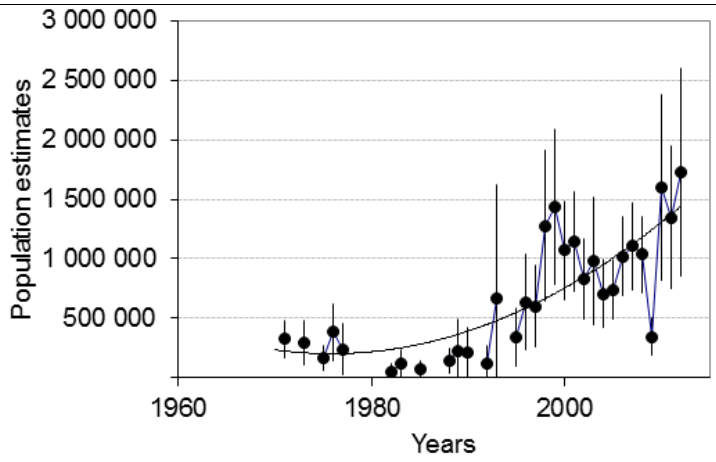

Figure 4. Lincoln Estimates (95% CI) of Population Size for Adult Lesser Snow Geese Wintering in the Pacific Flyway, including those from the Western Arctic Population, and those that nest on Wrangel Island, Russia (Source: R.T. Alisauskas, Environment Canada, Saskatoon, unpublished data).

- WRANGEL ISLAND POPULATION

Lesser Snow Geese nesting on Wrangel Island, Russia, are of great interest to Canada, because this population migrates through western Canada in the fall and spring, and because more than half of the population winters in the Fraser Delta (British Columbia) and in the nearby Skagit Delta (Washington). The present colony of Lesser Snow Geese on Wrangel Island is all that remains of several colonies that existed in Siberia a century ago. Russian biologists monitoring the colony documented a decline in the early 1970s, but the population began to rebound in the late 1990s, reaching approximately 150 000 birds by 2011 (Figure 5; V. Baranyuk, Wrangel Island Reserve, Russia, pers. comm.). No recent estimates are available from Russia on the size of the breeding population.

The number of birds wintering in the Fraser–Skagit area has roughly doubled since the early 1990s, increasing to approximately 100 000 birds in 2006–2007, the highest abundance ever recorded. Increased harvest rates combined with poor breeding years caused the population to decline to about 75 000 birds in 2009–2010 and about 65 000 birds in 2010–2011. The 2012–2013 wintering population was estimated at 69 964 birds, with 20.6% of the birds being young (S. Boyd, EC-Pacific and Yukon Region, pers. comm.).

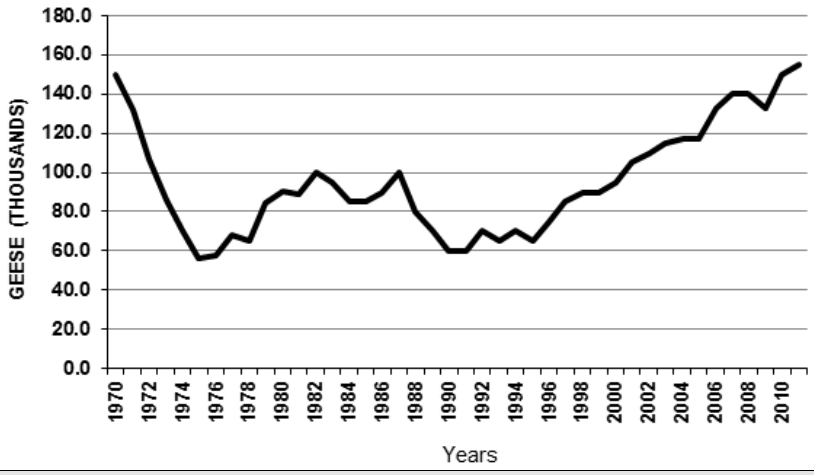

Figure 5. Population Index of Lesser Snow Geese on Wrangel Island, Russia, 1970–2011 (Source: V. Baranyuk, unpubl.).

Harvest

Overall, the harvest of Lesser Snow Geese during regular seasons, combined with spring conservation harvest, increased in years following the implementation of special conservation measures in 1999 (Table 3). In recent years, the harvest has declined somewhat or at least stabilized, perhaps due to waning interest by hunters, and satiation effects as harvest levels have reached their maximum, or because the birds have responded behaviourally to the increased harvest pressure from hunters (Alisauskas et al. 2011, Johnson et al. 2012). In the United States, the harvest of mid-continent Lesser Snow Geese when the spring Conservation Order is in effect adds significantly to the harvest during the fall and winter hunting seasons, but spring harvest estimates include both Ross's Geese and Lesser Snow Geese (Alisauskas et al. 2011, Johnson et al. 2012).

In Canada, most harvest of mid-continent Lesser Snow Geese takes place in Saskatchewan. In the United States, Lesser Snow Geese are mainly harvested in three flyways. Geese harvested in the Mississippi and Central flyways belong to the Mid-continent Population, while geese harvested in the Pacific Flyway come from the Western Arctic and Wrangel Island Populations (Table 3).

Since 1990, the CWS Pacific and Yukon Region has conducted a special annual harvest survey of Lesser Snow Geese from the Wrangel Island Population. Prior to 2003, harvest estimates varied from a low of 623 birds in 1990 to a high of 1989 birds in 2003 (A. Breault, unpubl. data). The 2013–2014 harvest was estimated at 3607 birds (Figure 6), 9% more than the 3317 birds harvested in 2012–2013.

Table 3. Harvest Estimates of Lesser Snow Geese for Canada and the United States in Fall.
(In the U.S., an unknown proportion of Lesser Snow Geese are also harvested in the Atlantic Flyway and are included with the Greater Snow Goose estimates).

	Canada									U.S.[1]	Continental
	Maritimes	QC	ON	MB	SK	AB	BC	NT/NU/YK	Total	Total	Total
1975		6 545	18 075	51 180	13 159	14 911	2 625	324	106 495	610 628	717 123
1976		234	11 963	31 603	21 269	31 027	2 131	260	98 227	503 001	601 228
1977		20 695	7 012	31 006	13 061	29 709	508		101 991	514 943	616 934
1978	76	519	6 577	39 766	11 582	16 517	394		75 431	353 840	429 271
1979		5 300	9 898	98 426	13 276	11 399	1 944	552	140 243	536 619	676 862
1980	62	12 294	8 276	90 882	16 241	9 451	1 628		138 834	432 131	570 965
1981		593	6 734	87 996	14 947	14 065	3 055		127 390	461 878	589 268
1982		1 632	3 027	81 900	22 229	6 094	1 896		116 778	399 018	515 796
1983		46 188	1 502	81 880	32 584	6 932			169 086	479 877	648 963
1984		2 578	1 097	76 630	32 340	8 791	2 704		124 140	459 024	583 164
1985	50	390	2 010	103 348	33 698	11 768	4 096		155 360	398 291	553 651
1986			2 169	48 950	31 326	9 629			92 074	256 973	349 047
1987		37 803	4 845	69 524	23 320	4 091	2 122		141 705	277 221	418 926
1988		3 952	2 313	71 322	24 204	9 664	1 657		113 112	345 670	458 782
1989		1 183	5 609	92 892	26 752	11 020	917		138 373	416 526	554 899
1990	452	2 228	2 834	53 754	31 818	10 179	141	746	101 813	331 460	433 273
1991		2 710	2 819	65 871	22 407	5 510	2 642		101 959	391 849	493 808
1992	56	591	589	26 786	21 240	9 123	467		58 852	238 865	297 717
1993		7 649	2 543	51 314	19 674	5 304	2 094		88 578	397 328	485 906
1994		5 855	657	56 221	30 258	6 987	2 174	105	102 152	399 012	501 164
1995		855	1 286	61 603	31 323	8 680	1 589	306	105 336	560 964	666 300
1996		3 486	1 028	46 163	34 546	4 185	2 863		92 271	589 357	681 628
1997		8 853	336	69 683	62 635	9 261			150 768	623 490	774 258
1998	16	16 732	954	52 121	68 985	14 890	1 797		155 495	742 869	898 364
1999 [2]		6 747	115	14 150	116 313	15 416	1 990		154 731	856 355	1 011 086
2000		5 686	1 350	31 699	68 377	12 881	2 559	128	122 680	653 896	776 576
2001		4 427	982	25 335	100 525	13 367	2 354		146 990	705 219	852 209
2002		2 699	697	24 252	85 933	9 612	7 284		130 477	512 395	642 872
2003		3 941	901	26 970	108 457	10 539	1 312		152 120	576 869	728 989
2004		82	642	23 158	76 709	3 654	1 188		105 433	449 069	554 502
2005		1 090	383	13 669	81 946	6 490	2 443		106 021	616 770	722 791
2006	131	1 349	1 122	31 936	116 278	11 430	3 170		165 416	540 748	706 164
2007		703	254	19 452	66 934	14 976	4 626		106 945	511 993	618 938
2008		1 678	70	31 601	112 986	9 570	2 406		158 311	496 353	654 664
2009		730	311	9 123	80 753	11 613	1 316		103 846	312 115	415 961
2010		1 377	422	11 854	78 415	15 162	983		108 213	301 727	409 940
2011		852	198	12 899	85 848	14 970			114 767	355 833	470 600
2012		1 899	1 061	10 864	95 611	7 287	2 110		118 832	343 803	462 635
2013		1 381	951	6 703	127 835	29 213	1 559		167 642	350 092	517 734

[1]AF: MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999.

The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich et al. 2014 (USFWS, US data)

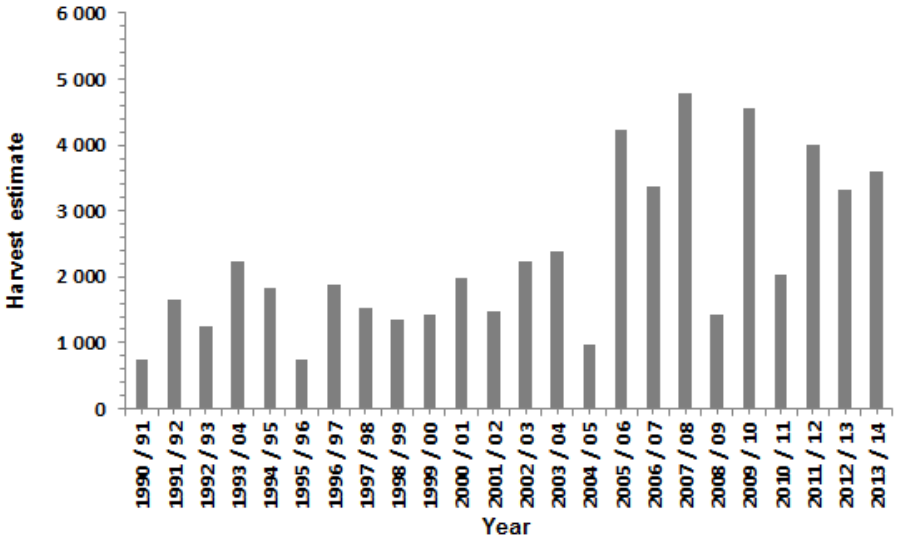

Figure 6. Lesser Snow Goose Harvest Estimates for the Wrangel Island Population
(On the Fraser Delta only; Source: A.Breault, CWS-Pacific and Yukon Region, unpubl. data).

Management and Conservation Concerns

The Mid-continent Population of Lesser Snow Geese has increased rapidly over the past few decades and remains at high levels. The increase is tied to large-scale changes in land use, mainly involving the conversion of much of the North American landscape into agricultural crop land. Spillage from mechanized harvesting leaves, literally, millions of bushels of waste grain lying on the ground, and geese are one group of birds that have greatly benefitted from this superabundant food source. This is particularly true in the mid-continent region of North America, where populations of Canada Geese, Cackling Geese, White-fronted Geese, Ross's Geese, and Lesser Snow Geese all show similar demographic trends, and populations today are much larger than they were in the 1970s. Adult survival rates have increased over the past several decades, most likely as a result of superabundant food leading to higher overwinter survival. In turn, population sizes have increased, and harvest rates by hunters have decreased, due mainly to declining hunter numbers and dramatically higher numbers of geese. In fact, it is very likely that the Mid-continent Population of Lesser Snow Geese (and some others to the east and west of there) can no longer be controlled through hunting, and it remains to be seen what might eventually limit their numbers (Leafloor et al. 2012). Snow Goose populations have become so large that they are affecting the plant communities at staging areas and Arctic breeding grounds on which they and other species rely. These geese alter Arctic habitats during the spring and summer, cause crop depredation during the fall and winter, and create potential dangers to other species and their habitats. This conservation issue was first identified in the mid-1990s (Ankney 1996, Batt 1997 and Moser 2001) and it continues to be a concern for waterfowl managers today, although Mid-continent Lesser Snow Geese appear to have stabilized since analyses conducted by Alisauskas et al. (2011).

The Mid-continent Lesser Snow Goose Population was designated as "overabundant" in 1999, and since then the United States and Canada have liberalized hunting regulations applying to this population in an attempt to stop or reverse the rapid population growth. In 1999, special conservation measures were implemented that allowed the harvest outside the traditional hunting period, as well as the use of special hunting equipment for both the fall hunting seasons and the spring conservation harvest. The first spring conservation season was established in Manitoba in 1999 and extended to Saskatchewan and Nunavut in subsequent years.

The Western Arctic Population of the Lesser Sow Goose is showing a pattern of population growth that is similar to that which has been observed in other populations of Snow Geese and Ross's Geese. The population was designated as "overabundant" in 2014 and special conservation measures are being implemented (a liberalization of the harvest and a spring conservation season beginning in spring 2015)

in Alberta and Northwest Territories. Such a designation will help to control the population before it reaches a level that cannot be controlled through increased harvest by hunters.

Even the smallest population of Lesser Snow Geese, i.e., the population nesting on Wrangel Island, can cause management concerns. For example, when the Fraser–Skagit winter population increased above 60 000 birds in the early 2000s, increased conflicts (socio-economic) occurred with local farms, schools, and the Vancouver International Airport on the Fraser Delta, and increased grubbing rates in tidal marshes resulted in a severe reduction in bulrush biomass. Data from a long-term monitoring program suggested that large parts of the tidal marsh will move to a state of "functional extinction" if the number of geese remain high (S. Boyd, EC-Pacific and Yukon Region, pers. comm.). To help address these concerns, management agencies in British Columbia and Washington implemented amendments to hunting regulations in 2003 and again in 2007 to reduce the number of geese. This was followed by the implementation of a harvest strategy to maintain the Fraser–Skagit winter population within 50 000–70 000 total geese so that the marsh habitat remains at a healthy, sustainable level, and that socio-economic concerns are minimized. The primary goal of the harvest strategy is to make hunting regulations, and hence harvest rates, responsive to goose abundance. For a variety of reasons, the large majority of this harvest will occur on the Skagit Delta in Washington State.

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Ross's Goose (*Chen rossii*)

Ross's Goose was considered a rare species in the early part of the last century, but its numbers are now increasing. The population is estimated to be between 1.5 to 2.5 million birds. Therefore, there are concerns about the impact that foraging Ross's Geese have on their Arctic breeding areas. Ross's Geese have been designated as "overabundant" and are subject to special conservation measures to control their numbers.

Abundance and Trends

Nesting colonies of Ross's Geese are often interspersed with those of Lesser Snow Geese, so it can be difficult to accurately evaluate the size of Ross's Goose population using traditional survey techniques.

The most recent estimates available suggest that the Ross's Goose population likely exceeds 1.5 million adult birds and is increasing at a faster rate than are mid-continent Lesser Snow Geese in recent years (Alisauskas et al. 2012). Continued growth of the Ross's Goose population is predicted to occur (Alisauskas et al. 2006a, Alisauskas et al. 2012, Dufour et al. 2012). The Ross's Goose population is well above its population objective of 100 000 birds (NAWMP 2012), though this population objective likely originated in the 1960s, when the size of the population was thought to be much lower.

In 2014, large numbers of Ross's geese on Baffin Island were accompanied by large numbers of goslings in August, suggesting that production was again high in the eastern arctic of Canada, as had been the case in 2012 and 2013 (J.O. Leafloor, CWS-Prairie and Northern Region, pers. comm.).

Approximately 95% of all Ross's Geese nest in the Queen Maud Gulf Region of the central Canadian Arctic; recent counts at the Karrak Lake colony estimated the population at 539 034 geese in 2013, down from about 765 000 birds in 2012 (Figure 1). Estimates of the number of Ross's Geese nesting at Karrak Lake are not yet available for 2014, but the spring arrived about 8 days earlier than in 2013, and production was expected to be above average.

Increasing numbers of Ross's Geese are being found along the western coast of Hudson Bay, on Baffin Southampton and Banks Islands, at La Perouse Bay, Manitoba, and at Cape Henrietta Maria, Ontario (Kerbes 1994; Alisauskas et al. 2012; K. Abraham, Ontario Ministry of Natural Resources, pers. comm.). The species traditionally wintered mostly in California, New Mexico, Texas, and Mexico, but has expanded its range eastward in North America in the past two decades (Alisauskas et al. 2006a).

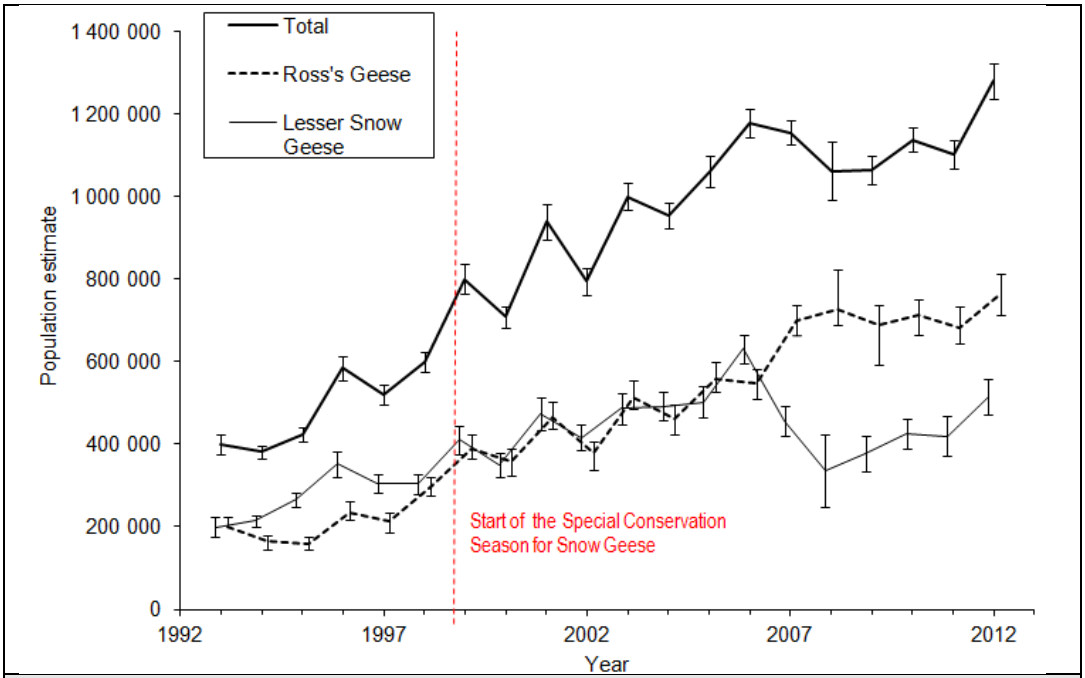

Figure 1. Estimates for Numbers (95% CI) of Ross's and Lesser Snow Geese that Attempted to Nest at Karrak Lake, 1993–2012 (source: R.T. Alisauskas, Environment Canada, Saskatoon, unpublished data).

The estimated population of Ross's Geese in the early 1900s was between 5000 and 6000 birds (Kerbes 1994). In the 1960s, the population was estimated at about 100 000 birds (Kerbes 1994). By 1988, photo survey estimates of the number of nesting birds suggested the population had increased to more than 188 000 birds in the Queen Maud Gulf Migratory Bird Sanctuary (Kerbes 1994; Ryder and Alisauskas 1995) and to about 495 000 birds in 1998 (Kerbes et al. 2014). By the mid-2000s, Ross's Geese had expanded their range eastward on both nesting and wintering areas (Alisauskas et al. 2006a, 2012), and the number of nesting Ross's Geese estimated by photo survey in the central Arctic of Canada was approximately 1.3 million birds in 2006 (Kerbes et al. 2014).

Helicopter surveys on Baffin Island, in conjunction with the banding in August, suggested that there were at least 20 000 Ross's Geese present there by 2009 (Alisauskas et al. 2012). A new colony of nesting Ross's Geese also became established near the McConnell River, Nunavut, in the early 1990s, and its size was estimated at more than 70 000 birds in 2003. The colony continued to increase and was estimated at about 90 000 nesting birds in 2005 (Caswell 2009). Information gathered while banding Lesser Snow Geese near Cape Henrietta Maria, Ontario, indicated that the Ross's Goose population there may be as large as 2250 pairs (Abraham 2002).

Total numbers of Ross's Geese are difficult to estimate using traditional survey techniques due to the sheer size and remoteness of their nesting range, the high densities of nesting birds, and their complete overlap with snow geese during the nesting season (e.g., Alisauskas et al. 2012). Recently, Alisauskas et al. (2009, 2012) suggested that Lincoln's (1930) approach could be used to estimate population size of Ross's Geese. This method can be used to estimate population size of adult and juvenile birds in August (i.e., at the time of banding) from banding data and harvest estimates. Ross's Geese have been banded annually since 1989 in numbers sufficient to estimate their rapid increasing population size. The most recent estimates of adult population size suggest that there are about 1.8 million adults in the population (Figure 2; R.T. Alisauskas, EC-PNR, unpubl. data).

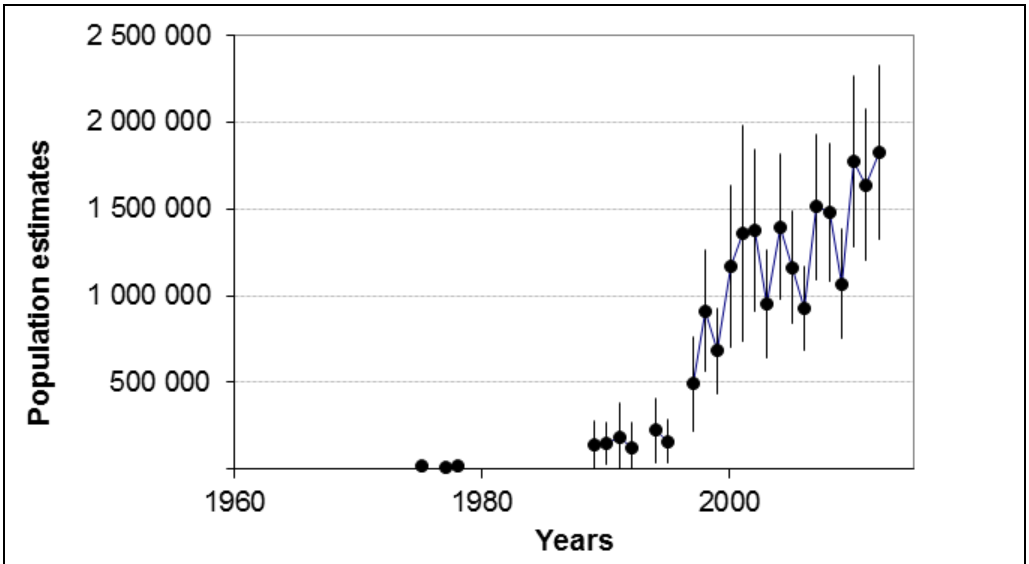

Figure 2. Lincoln Population Estimates (95% CI) of Adult Ross's Geese in July, 1975–2012 (Source: R.T. Alisauskas, EC Saskatoon, unpubl. data).

Harvest

The estimated harvest of Ross's Geese in the U.S. and Canada increased slowly from the 1960s to the 1980s and then more rapidly through the 1990s. In Canada, the majority of Ross's Geese are harvested in the Prairies, more specifically in Saskatchewan (Table 1). Despite the increase in the harvest over time, harvest rates (the proportion of birds shot by hunters each year) have declined, and in recent years only about 2% of adult Ross's Geese are harvested annually by hunters.

Management and Conservation Concerns

Increasing numbers of Ross's Geese contribute to the degradation of their breeding and staging areas through foraging and nest building activities (Alisauskas et al. 2006b, Abraham et al. 2012). In Canada, the Ross's Goose was designated as "overabundant" in June 2014. Harvest has been liberalized and a special conservation season has been established, beginning in spring 2015. In the U.S., special conservation measures have been in place for Ross's Geese since 1999.

Table 1. Harvest Estimates of Ross's Geese in Canada and the United States.

	Canada								United States[1]					Continental
	Eastern Canada	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total	Total
1974		817	5 273	1 104				7 194			195	8 464	8 659	15 853
1975	438	1 044	4 009	2 133				7 624			146	7 167	7 313	14 937
1976	126	99	3 179	1 786				5 190			1 783	8 209	9 992	15 182
1977	95		1 150	2 776				4 021			299	4 190	4 489	8 510
1978		660	3 706	485				4 851				2 359	2 359	7 210
1979		628	6 602	1 001				8 231			1 598	5 035	6 633	14 864
1980		789	3 018	858				4 665			510	3 294	3 804	8 469
1981		704	2 275	395				3 374			2 705	6 968	9 673	13 047
1982		658	3 309	411				4 378		4 297	2 116	7 542	13 955	18 333
1983		274	4 141					4 415		276	1 674	7 367	9 317	13 732
1984		297	3 471	1 302				5 070			5 944	9 006	14 950	20 020
1985		470	6 026	1 130				7 626		108	3 832	10 389	14 329	21 955
1986		592	506	2 280				3 378		705	2 554	4 283	7 542	10 920
1987		3 405	1 633	323				5 361		155	404	2 558	3 117	8 478
1988		1 144	1 321	2 053				4 518		568	3 747	1 104	5 419	9 937
1989		316	2 933	1 722				4 971			8 415	5 521	13 936	18 907
1990		111	5 899	3 091				9 101		1 021	7 007	3 272	11 300	20 401
1991		437	2 034	1 394				3 865		329	7 179	3 493	11 001	14 866
1992	80	1 645	1 330	1 650				4 705		240	4 833	3 193	8 266	12 971
1993		66	1 482	926				2 474			7 352	7 789	15 141	17 615
1994	181	1 119	6 374	2 184	15			9 873		2 812	9 073	7 989	19 874	29 747
1995	139	4 389	7 281	3 542				15 351		3 635	19 700	5 309	28 644	43 995
1996	156	2 066	15 598	1 587				19 407	71	8 237	15 542	13 798	37 648	57 055
1997	406	391	14 441	4 219				19 457		8 131	12 436	8 097	28 664	48 121
1998	258	3 833	23 086	1 386				28 563		9 030	36 566	7 624	53 220	81 783
1999 [2]	69	162	20 643	1 826		49		22 749		10 919	64 023	28 318	103 260	126 009
2000	249	1 724	14 333	1 529	54	6		17 895		8 298	44 523	6 850	59 671	77 566
2001		665	14 573	5 747				20 985		23 826	68 469	14 176	106 471	127 456
2002		1 987	27 842	4 127				33 956		20 179	49 881	13 558	83 618	117 574
2003	95	1 320	27 407	1 447				30 269		27 850	44 329	16 904	89 083	119 352
2004	109	1 794	19 174	1 015				22 092		4 958	46 047	11 070	62 075	84 167
2005		1 823	11 499	1 427				14 749		4 936	53 457	8 026	66 419	81 168
2006		2 503	22 976	1 233				26 712	82	10 484	36 238	6 627	53 431	80 143
2007		4 210	12 893	934				18 037	1 500	8 836	29 233	8 782	48 351	66 388
2008	442	10 151	35 227	2 345				48 165	170	14 625	42 379	15 613	72 787	120 952
2009		2 399	20 655	982				24 036	145	6 842	18 579	9 928	35 494	59 530
2010		2 088	26 406	6 304				34 798		4 608	23 601	16 875	45 084	79 882
2011		3 073	34 682	2 197				39 952		4 821	32 211	15 915	52 947	92 899
2012		3 280	20 876	616				24 772		8 720	29 472	16 073	54 265	79 037
2013	231	1 448	29 478	3 798				34 955		6 258	30 378	16 133	52 769	87 724

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 on ward

Data source: M. H. Gendron and A. Smith 2014 (CWS), and R.V. Raftovich et al. 2014 (USFWS).

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Management of Overabundant Geese

- CONSERVATION ISSUE

The Snow Goose and Ross's Goose populations are well above their population objectives (NAWMP 2012). Such a situation becomes an important conservation issue when the rapid growth and increasing abundance affects the habitats on which they, and other species, depend. This issue was first highlighted 15 years ago, through comprehensive assessments of the environmental effects of the rapidly growing populations of mid-continent Lesser Snow Geese (*Chen caerulescens caerulescens*) and Greater Snow Geese (*Chen caerulescens atlantica*). The analyses, completed by Canadian and American experts, are contained in the reports *Arctic Ecosystems in Peril—Report of the Arctic Goose Habitat Working Group* (Batt 1997) and *The Greater Snow Goose—Report of the Arctic Goose Habitat Working Group* (Batt 1998).

These working groups concluded that the increase in Snow Goose populations was primarily human-induced. Changing farming practices supplied a reliable, highly nutritious food source for migrating and wintering geese. Combined with the safety found in refuges, this improved nutritional status led to increased survival and reproductive rates for Snow Geese. These populations have become so large that in staging areas and on breeding grounds they are affecting the plant communities on which they and other species rely. Grubbing by geese not only permanently removes vegetation, but it also changes soil salinity, nitrogen dynamics and moisture levels. The result is the alteration or even elimination of plant communities. Although the Arctic is vast, the areas that support migrating and breeding geese and other companion species are limited in extent, and some areas are likely to become inhospitable for decade-long periods. Increasing crop damage is another undesirable consequence of the growing goose populations.

- MANAGEMENT RESPONSE

Initial management efforts focused on the Mid-continent Lesser Snow Geese and Greater Snow Geese populations where there was strong evidence of detrimental effects on habitats. Canada, the United States, and Mexico agreed that the habitat damage being caused was a significant conservation issue, and that the populations were overabundant, this to the detriment of the Arctic and sub-arctic ecosystems. As a result, several concurrent management measures to curtail the rapid population growth and reduce population size to a level consistent with the carrying capacity of the habitat were initiated. Population models showed that, of all the potential management techniques available, the most successful approach to controlling population growth involved reducin survival rates for adult geese.

Therefore, beginning in 1999, Canada amended its *Migratory Birds Regulations* and created new tools that could be used to help manage overabundant species. These included special conditions that encouraged hunters to increase their harvest during the regular hunting season as well as during the special spring harvest season for conservation reasons and, in some cases and subject to specific controls, that allowed hunters to use exceptional methods and equipment, such as electronic calls and bait. The special conservation measures for Snow Geese were implemented in 1999 in selected areas of Quebec and Manitoba, and were expanded in 2001 to Saskatchewan and Nunavut, and in 2012 to southeastern Ontario. The dates and locations of application of these special conservation measures were determined in consultation with the provincial governments, other organizations and local communities.

- EFFECTIVENESS OF SPECIAL CONSERVATION MEASURES

The evaluation report shows that the special conservation measures have had mixed success. In the case of Greater Snow Geese, the measures were successful in reducing the annual survival rate of adults from 83% to about 72.5% (Calvert and Gauthier 2005). Thus the growth of the population was halted, but the special measures have not succeeded in reducing the size of the population, which appears to have stabilized at approximately 1 million birds in the spring (Lefebvre 2013). Models showed that, without the special take by hunters in the spring, the population would resume rapid growth (Gauthier and Reed

2007).

For mid-continent Lesser Snow Geese, the evaluation concluded that the population has continued to grow, although perhaps at a reduced rate (Leafloor et al. 2012). It also concluded that, although the annual harvest increased as a result of the conservation measures, it failed to reduce the population size. It is clear that measures implemeted to date have not been successful in reducing the population size and that other measures would be required if population control were deemed essential. The report recommended that special conservation measures be maintained, and that additional measures to increase harvest be sought.

The evaluation report also suggested that the conditions for overabundance designation are met by Ross's Geese (*Chen rossii*), and predicted that continued growth and expansion of Lesser Snow Goose populations was especially likely in the central and western Arctic of Canada (Leafloor et al. 2012).

- SIGNIFICANCE OF OVERABUNDANT POPULATION

An overabundant population is one for which the rate of population growth has resulted in, or will result in, a population whose abundance directly threatens the conservation of migratory birds (themselves or others) or their habitats, or is injurious to or threatens agricultural, environmental or other similar interests. As such, designation provides tools to liberalize harvest under special conservation measures, such as spring harvest, use of electronic calls, and baiting, in order to help reduce the population size and growth of the population through hunting.

- DESIGNATION OF THE WESTERN ARCTIC POPULATION OF LESSER SNOW GEESE AS "OVERABUNDANT"

Based on the recommendation of the Arctic Goose Joint Venture (Leafloor et al. 2012), the Western Arctic Population of the Lesser Snow Goose was designated 2014 as "overabundant" by the CWS. Experience has shown that serious habitat loss from the destructive foraging activities of Lesser Snow Geese and Ross's Geese occurred in parallel with very rapid population growth in the central and eastern Arctic (Batt 1997). Some localized habitat damage has already occurred on Banks Island (Hines et al. 2010). If the western Arctic population continues to increase at the present rate, the negative impacts to habitat and other species are predicted to expand.

The Western Arctic Population of Lesser Snow Geese breeds primarily on Banks Island, Northwest Territories, with smaller breeding colonies present on the mainland of the Northwest Territories and Alaska. The population migrates mainly through Alberta and western Saskatchewan in the spring and autumn. The majority of birds winter in the Pacific Flyway, mostly in California, where they mix with the Wrangel Island population of Lesser Snow Geese and Ross's Geese. Some birds also winter in the western Central Flyway, where they mix with mid-continent Snow Geese.

Western Arctic Snow Geese numbers are already well above the spring population objective of 200 000 birds (NAWMP 2012). Photographic surveys of the nesting colonies indicate that the number of nesting birds has grown from approximately 171 000 adults in 1976 to approximately 500 000 adults in recent years (Kerbes et al. 1999; Hines et al. 2010; CWS, unpubl. data). The fall estimate combining the Western Arctic Population and the Wrangel Island Snow Geese Population in the Pacific Flyway was of over 1 million birds in 2011, which represents an average increase of 6% per year from 2003 to 2011 (USFWS 2012). Increases have also been observed in the the western Central Flyway population of Snow Geese (U.S. Fish and Wildlife Service 2012).

Based on band return data, adults from the Western Arctic Population have an 85% chance of surviving from one year to the next (CWS, unpubl. data). This is a high survival rate and is similar to estimates of other increasing white goose populations. Recent recovery rates for banded adult birds were only 2–3%, suggesting that non-hunting mortality is currently higher than hunting mortality (CWS, unpubl. data).

Conversely, increased survival is thought to be mainly due to increased agricultural food supplies, the increased use of refuges during migration and winter, and reduced harvest rates by hunters (Abraham et

al. 1996; Abraham and Jefferies 1997).

The Western Arctic Population is showing a pattern of rapid population growth similar to that which has been observed in other populations of Snow Geese and Ross's Geese. For this reason, it is important to consider the implementation of special conservation measures, such as a spring harvest, before the Western Arctic Population reaches a level that cannot be controlled through increased harvest by hunters. Similar efforts to stabilize Greater Snow Goose numbers in eastern North America were successful because the population was still small enough to be controlled through increased harvest (Reed and Calvert 2007). Based on experience with the Mid-continent Population of Lesser Snow Geese and Ross's Geese, it is likely easier to recover goose populations that reach low levels than to reduce them after they experience runaway growth (Leafloor et al. 2012). It may still be possible to stabilize the Western Arctic Population if liberalized harvest measures are implemented soon.

- DESIGNATION OF ROSS'S GEESE AS "OVERABUNDANT"

Based on the recommendation of the Arctic Goose Joint Venture (Leafloor et al. 2012), the Ross's Goose has been designated as overabundant by the CWS. Following publication of the *Ecosystems in Peril report* (Batt 1997), in 1999, unprecedented management actions were initiated to reduce damage caused to Arctic and subarctic ecosystems by the foraging activities of increasing numbers of Lesser Snow Geese and Ross's Geese (Batt 1997; Moser 2001). Most of these actions were aimed at reducing the survival of adult geese through increased harvest by hunters throughout the range of the Mid-continent Population, which was thought to be the most efficient means of reducing population size (Rockwell et al. 1997). Hunting regulations were liberalized during regular seasons, traditional hunting restrictions (e.g., prohibition on use of electronic calls, requirement for plugged shotguns, bag and possession limits) were relaxed or removed to promote increased harvest, and habitat management regimes in some refuges were altered to increase the exposure of the birds to hunting activities outside of refuge areas. Additional amendments to the *Migratory Birds Regulations* in Canada and the United States were made to allow the conservation harvests of these overabundant species to occur outside of the regular hunting seasons.

Though most attention has been focused on the overabundance of Lesser Snow Geese, Ross's Geese were designated as overabundant in the United States in 1999, and have been included in regulations allowing spring conservation harvests in that country since that time. In Canada, a 1999 court decision determined that overabundance regulations could not be applied to Ross's Geese because it had not been demonstrated that the species was contributing to the habitat damage observed at that time.

It is now clear that Ross's Geese contribute to habitat degradation in nesting and staging areas where they occur in large numbers (Alisauskas et al. 2006b, Abraham et al. 2012). Like Lesser Snow Geese, Ross's Geese grub during nest building and spring staging, when a large portion of their diet is composed of the roots and rhizomes of sedges and grasses (Ryder and Alisauskas 1995). Alisauskas et al. (2006b) found that vegetative cover was removed in areas occupied by nesting Ross's Geese, resulting in exposure of mineral substrate and peat. This led to reduced vegetative species richness that worsened over time, particularly in low-lying habitats preferred by Ross's Geese for nesting. Reduced graminoid abundance caused by foraging geese has also led to dramatic declines in small mammal abundance around dense nesting colonies (Samelius and Alisauskas 2009). Didiuk et al. (2001) suggested that the use by Ross's Geese of nesting areas previously degraded by Lesser Snow Geese (e.g., on the west coast of Hudson Bay) may slow the recovery of those areas, because of the lasting effects of foraging and nest building. The smaller bill morphology of Ross's Geese may allow them to crop vegetation more closely to the ground compared to Lesser Snow Geese, adding to the intensity of grazing pressure.

Ross's Geese are closely related to Lesser Snow Geese and co-occur with this species throughout the year. The behavioural and morphological similarity of these two species has led to the aggregation in 1978 of harvest management strategies for the two species (Moser and Duncan 2001). In the mid-1960s, most Ross's Geese (> 90%) nested in the central Arctic of Canada and wintered in the Central Valley of California (Melinchuk and Ryder 1980). Although comprehensive estimates of population size were not available until recently, photographic surveys in the mid-1960s of known nesting areas indicated the presence of fewer than 100 000 nesting Ross's Geese (Kerbes 1994). The continental population

objective for Ross's Geese has been 100 000 birds since the inception in 1986 of the North American Waterfowl Management Plan. By the mid-2000s, the Ross's Goose had expanded its range eastward in both the nesting and wintering areas (Alisauskas et al. 2006a) and the population was estimated between 1.5–2.5 million adult birds (Alisauskas et al. 2009, 2011, 2012), despite efforts to stop the population growth through increased harvest by hunters.

Alisauskas et al. (2006a) analyzed hunter recoveries of Ross's Geese captured and marked in the Queen Maud Gulf Region of the central Canadian Arctic, and found that survival of adults had declined during the 1994–2000 period, reaching a low of approximately 0.80, apparently in response to concurrent increases in harvest. The authors noted, however, that during this same time period, the Ross's Goose population at one of the largest known breeding colonies in the Queen Maud Gulf Region had shown sustained growth, suggesting that an adult survival rate of 0.80 was unlikely to have negative consequences for continental Ross's Goose populations. Since 2001 (the last year Alisauskas et al. [2006a] considered in their analysis), the continental harvest of adult Ross's Geese has apparently stabilized, and harvest rates (the annual proportion of the adult population harvested by hunters) have declined to only about 0.02–0.03 (Alisauskas et al. 2009, 2012; Dufour et al. 2012). Annual survival of Ross's Geese declined from 0.897 to a low of 0.827 during the 1989–1997 period, then increased steadily from 1998 onward, reaching a high of 0.950 in 2009. Notably, this reversal of the survival trajectory occurred in spite of some of the highest annual harvest levels estimated for adult Ross's Geese since 1989 (Alisauskas et al. 2012).

Multiple lines of evidence indicate that Ross's Goose populations have continued to grow, both in the central Arctic and at the continental level (Alisauskas et al. 2009, 2012). Collectively, these observations suggest that, as for Snow Geese, increases in harvest of Ross's Geese have been outpaced by concurrent increases in abundance, thereby diminishing the effects of harvests on adult survival (Dufour et al. 2012). In fact, Ross's Goose numbers have continued to increase at a higher rate than those for the Lesser Snow Goose since the implementation in 1999 of conservation actions, and continued growth of the Ross's Goose population is predicted to occur (Alisauskas et al. 2006a, 2012; Dufour et al. 2012).

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Greater White-fronted Goose (*Anser albifrons*)

The Greater White-fronted Goose has one of the largest ranges of any species of goose in the world. In North America, the species nests across a broad region of the Arctic from Alaska to the west coast of Hudson Bay. There are three populations of Greater White-fronted Geese in North America: the Mid-continent population, the Tule population, and the Pacific White-fronted Geese population. The Tule and Pacific Populations breed in southern Alaska and winter primarily in California. The Mid-continent Population includes all White-fronted Geese that breed in Canada as well as those in interior and northern Alaska, and winter in the Central and Mississippi Flyways of the United States (Figure 1). Most mid-continent White-fronted Geese migrate through Alberta and Saskatchewan in the fall.

Figure 1: Breeding Range of the Mid-continent Population of White-fronted Goose in the Canadian Arctic.

Abundance and Trends

The Mid-continent Population of White-fronted Geese is currently monitored in a fall staging survey in the Canadian Prairies, which is the basis for the NAWMP population objective. Initially, this population was surveyed during spring staging, but the survey was deemed problematic and, in 1992, was replaced by a fall survey in southern Saskatchewan and Alberta, which provides an annual index of the population size.

Fall surveys in the Canadian Prairies have fluctuated between years with an increasing trend from 1992–2014. The fall 2014 population index was of 1 006 000 geese, which represented a 29% increase over 2012 (survey was not done in 2013). The 3-year average population index was 892 000 geese, an increase of 23% (Figure 2). The population is currently above its NAWMP population objective of 600 000 birds (NAWMP 2012).

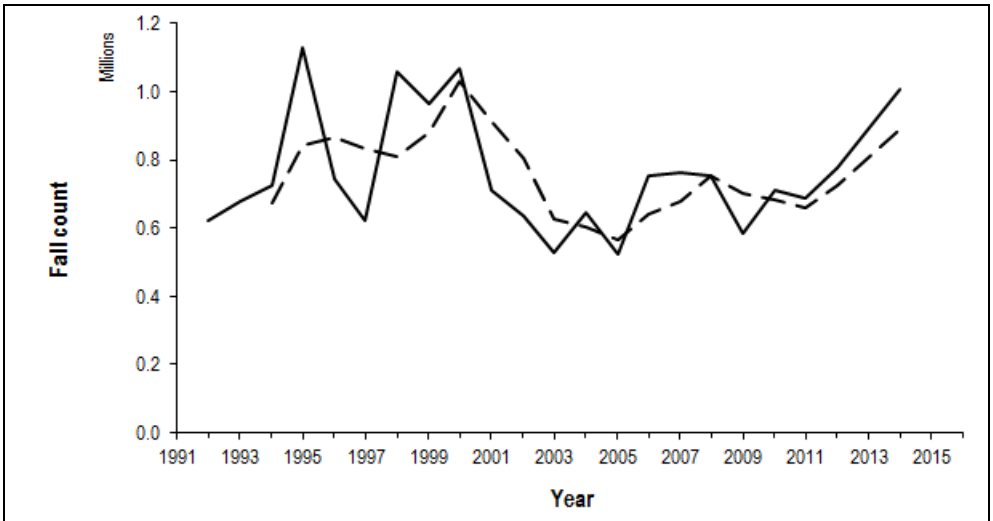

Figure 2. Fall survey results for the Mid-continent Population of the Greater White-fronted Goose in Saskatchewan and Alberta (The solid line represents the population index, and the dashed line represents the three-year running mean. There was no survey conducted in 2013) (Source: B. Bartzen and K. Warner, CWS-Prairie and Northern Region).

Other monitoring programs for mid-continent White-fronted Geese have shown increasing trends over the past four decades. Mid-winter numbers increased approximately four-fold between 1969 and 2011 (Figure 3). Indices from regional breeding ground surveys in northern and central Alaska more than doubled from 1986–2012 (Stehn et al. 2013). The reasons for the differing trends among surveys are unclear.

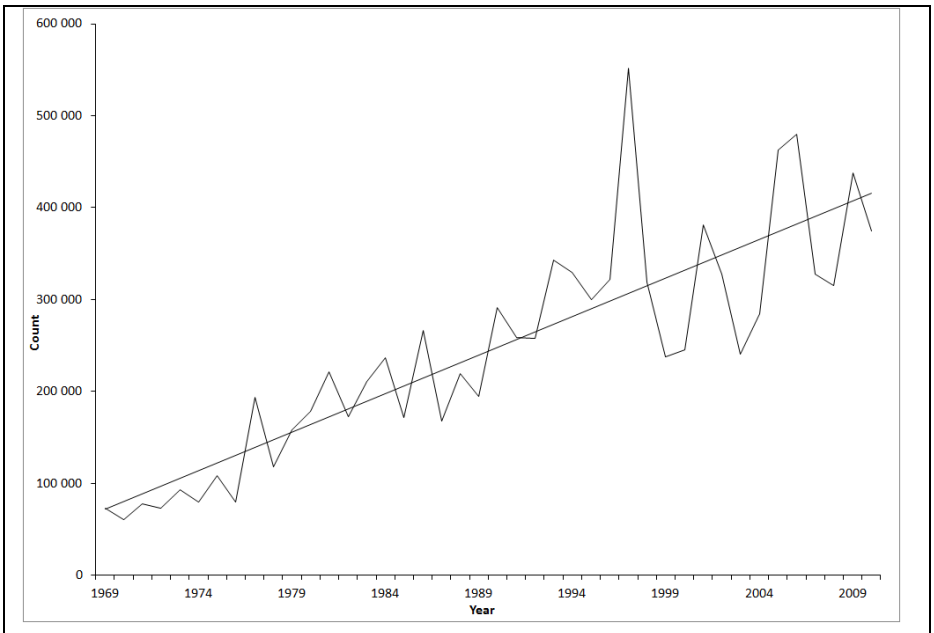

Figure 3. Mid-winter Counts of Mid-continent White-fronted Geese in the Central and Mississippi Flyways (source: Kruse 2014).

Each year, mid-continent White-fronted Geese are banded on their breeding grounds in northern Canada and Alaska. In Canada, banding began in 1990 in the Queen Maud Gulf Migratory Bird Sanctuary. Recoveries of banded birds provide information on distribution of harvest, annual survival, and harvest

rates. Band recovery data and harvest estimates have recently been used to estimate population size and trend (Lincoln 1930; Alisauskas et al. 2009).

Estimates of population size derived using the Lincoln method show an approximately four-fold increase from 1975 to 2012; the most recent estimates (2003–2012) suggest a population size of about 2.4 million adults (Figure 4; R.T. Alisauskas, EC Saskatoon, unpubl. data).

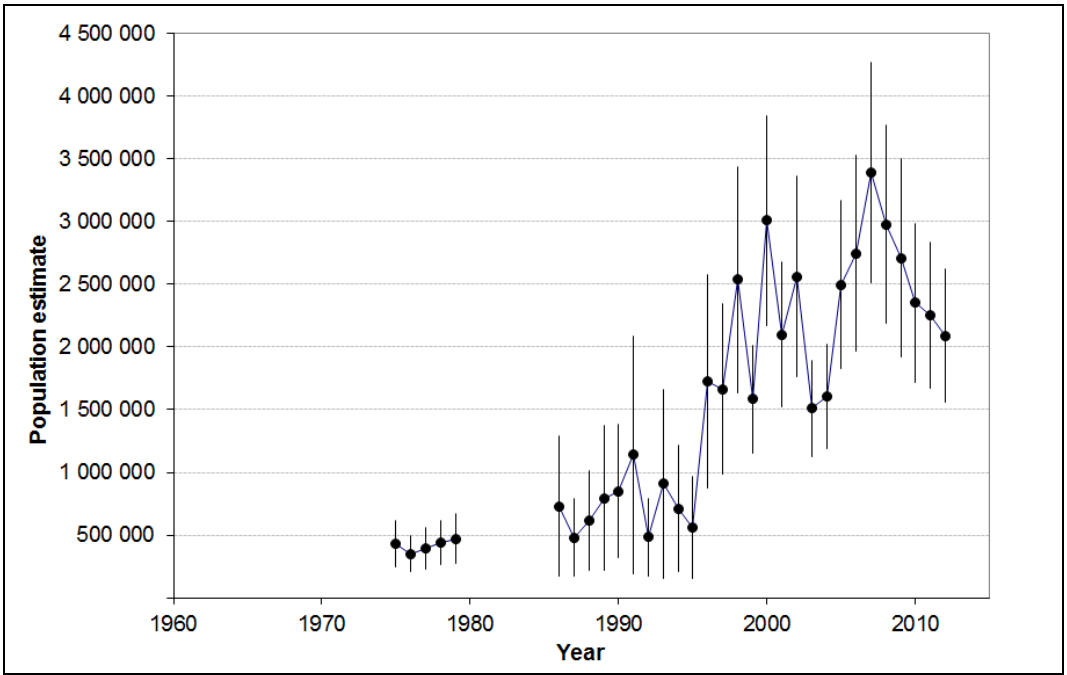

Figure 4. Lincoln Population Estimates (95% CI) of Adult Mid-continent White-fronted Geese in July, 1975–2012 (Source: R. Alisauskas, EC, Saskatoon, unpubl. data).

Harvest

Table 1 shows the harvest of White-fronted Geese over time. Harvests in Canada averaged about 68 000 birds per year from 2004–2013. Almost all of the Canadian harvest takes place in the provinces of Alberta and Saskatchewan, and although estimated harvests have been more erratic in the past few years, there has been an increase in the harvest in Canada (Table 1). In the United States, the harvest of mid-continent White-fronted Geese averaged approximately 105 000 birds per year in the 1970s but increased to approximately 256 000 birds in 2004–2013. The total continental harvest of Mid-continent White-fronted Geese has also clearly increased over time.

Table 1. Harvest Estimates of Mid-continent White-fronted Geese in Canada and the United States (Note: Mid-continent White-fronted Geese are rarely harvested in Canada east of Saskatchewan and those harvested in British Columbia belong to the Pacific population).

	Canada													U.S.[1]	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974														86 317	86 317
1975			281				451	45 687	14 345	389	122	142	61 295	115 388	176 683
1976							825	51 876	9 300			45	62 046	101 217	163 263
1977								43 341	15 862	82		2	59 287	103 380	162 667
1978							379	50 987	11 343	246		121	63 076	115 576	178 652
1979							101	47 200	12 092	72		247	59 712	108 169	167 881
1980							2 309	56 164	20 037	61			78 571	123 960	202 531
1981							1 505	36 781	14 648	303		5	53 242	198 608	251 850
1982							263	39 822	15 435				55 520	131 696	187 216
1983							119	46 947	5 634		570		52 700	130 868	183 568
1984						153	115	38 797	14 367	126		37	53 595	153 730	207 325
1985								37 605	12 482	277			50 364	114 033	164 397
1986					23		497	37 753	20 598				58 871	76 743	135 614
1987							125	36 856	11 184	84			48 249	98 126	146 375
1988								21 643	18 125	102			39 870	101 908	141 778
1989			43			45	119	34 374	18 738	48			53 367	139 596	192 963
1990	294						111	26 849	16 525	117	97		43 896	151 608	195 504
1991			51		82		549	31 649	11 540	65			43 936	138 367	182 303
1992							623	22 099	8 651	24			31 397	109 926	141 323
1993			50			171		21 822	7 016				29 059	120 669	149 728
1994								30 199	9 606	81			39 886	163 602	203 488
1995							79	45 011	14 888	42		64	60 084	143 003	203 087
1996			252			69	924	57 676	17 939	138			76 998	214 517	291 515
1997					180		296	37 326	15 009			37	52 848	209 518	262 366
1998							1 046	51 204	26 671	242			79 163	185 319	264 482
1999 [2]								47 316	15 033				62 349	254 902	317 251
2000								86 587	19 964	187			106 738	307 972	414 710
2001								61 391	31 722	81			93 194	229 673	322 867
2002							1 048	39 870	10 691			6	51 615	219 317	270 932
2003						101		49 733	15 348	86			65 268	216 781	282 049
2004							238	54 419	9 956				64 613	182 507	247 120
2005							172	55 315	19 947	130			75 564	251 786	327 350
2006					51			36 967	17 892	273			55 183	282 487	337 670
2007							992	42 467	26 300	199			69 958	352 362	422 320
2008							139	55 647	37 893	183			93 862	319 332	413 194
2009								30 882	22 173	158			53 213	205 244	258 457
2010					121			33 746	22 144	188			56 199	268 759	324 958
2011							630	52 762	27 650				81 042	234 808	315 850
2012							781	36 128	21 861	700			59 470	210 220	269 690
2013								42 181	32 799	133			75 113	256 368	331 481

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich *et al.* 2014 (USFWS, US data)

Management and Conservation Concerns

There are no serious management concerns for the White-fronted Goose. Most monitoring programs for White-fronted Geese suggest that the population has increased significantly in size over the past several decades. Winter counts and breeding productivity surveys and studies must be continued to monitor the population.

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Cackling Goose (*Branta hutchinsii*)

In 2004, the American Ornithologists' Union identified two species of geese from the one species previously referred to as the Canada Goose (*Branta canadensis;* Banks et al. 2004): the Canada Goose and the Cackling Goose. The two species are similar in appearance, but Cackling Geese are generally much smaller, nest mainly in Arctic tundra and coastal habitats, and can be distinguished conclusively from Canada Geese based on genetic evidence. The Cackling Goose has been divided into 4 subspecies (*minima, hutchinsii, leucopareia, and taverneri*), but only *hutchinsii* is known to nest in Canada.

In Canada, the Mid-continent Population of Cackling Geese includes all Cackling Geese that nest in the Arctic, north of the tree line (Figure 1); they mostly migrate through the Prairies and winter mainly in the United States in the Central and Mississippi Flyway States.

Figure 1. Breeding Range of Mid-continent Cackling Geese in Canada.

Abundance and Trends

Total numbers of Cackling Geese are difficult to estimate with traditional survey techniques, due to the extensive size and the remoteness of their breeding range, and intermixing with Canada Geese on their wintering grounds. However, trends based on mid-winter counts and local breeding ground counts suggest the population is stable or increasing (Mississippi Flyway Technical Section 2013). For example, on western Baffin Island, annual helicopter transect surveys were conducted in August from 1996 to 2009. The estimated number of Cackling Geese that occupied the Great Plain of Koukdjuak on Baffin Island ranged from about 124 000 to 202 000 birds, averaging approximately 160 000 birds, with no clear trend over that time (Figure 2). Mid-winter counts of Cackling Geese in the Central and Mississippi Flyways in the United States averaged about 325 000 birds in the 1970s and increased to an average of about 687 000 birds from 2002–2011, inclusive (Figure 3).

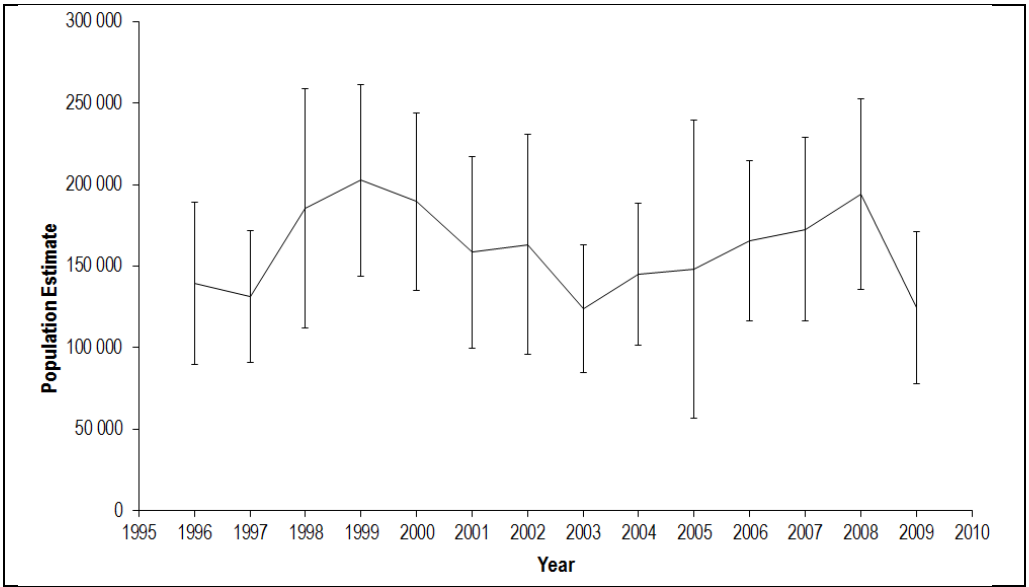

Figure 2. Estimated Number (95% CI) of Adult Cackling Geese on the Great Plain of Koukdjuak, Baffin Island, Nunavut, 1996–2009 (Based on August helicopter surveys) (Source: J. Leafloor, CWS-Prairie and Northern Region, unpubl. data).

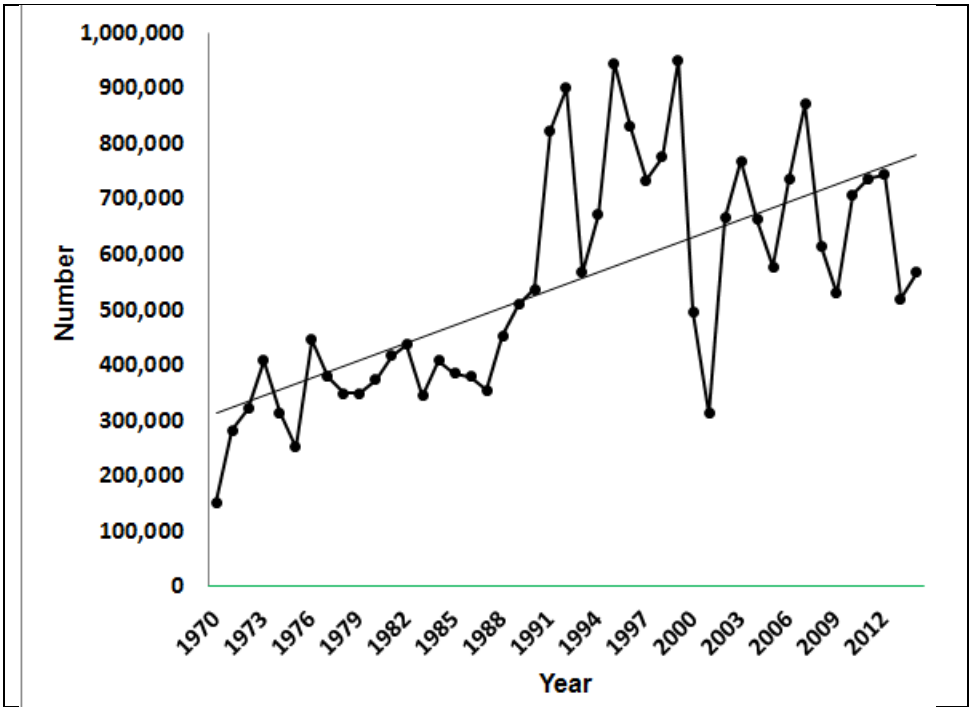

Figure 3. Mid-winter Counts of Cackling Geese in the Central and Mississippi Flyways, 1970–2014 (The dashed line represents the population trend. Note that midwinter counts of Cackling Geese were discontinued in the Mississippi Flyway after 1997) (Source: Kruse 2014).

Recently, Alisauskas et al. (2009) suggested that Lincoln's (1930) approach could be used to estimate the population size of several species of Arctic-nesting geese for which band recovery data and age-specific harvest estimates were available. From trends in population size for all years where sufficient data were available, it appears that mid-continent Cackling Geese numbers have increased markedly

since the 1970s based on Lincoln estimates (Figure 4). The population estimates averaged approximately 368 000 adult birds from 1975–1979, and appoximately 3.3 million adults from 2003–2012 (J. Leafloor and R. Alisauskas, EC-Prairie and Northern Region, unpubl. data).

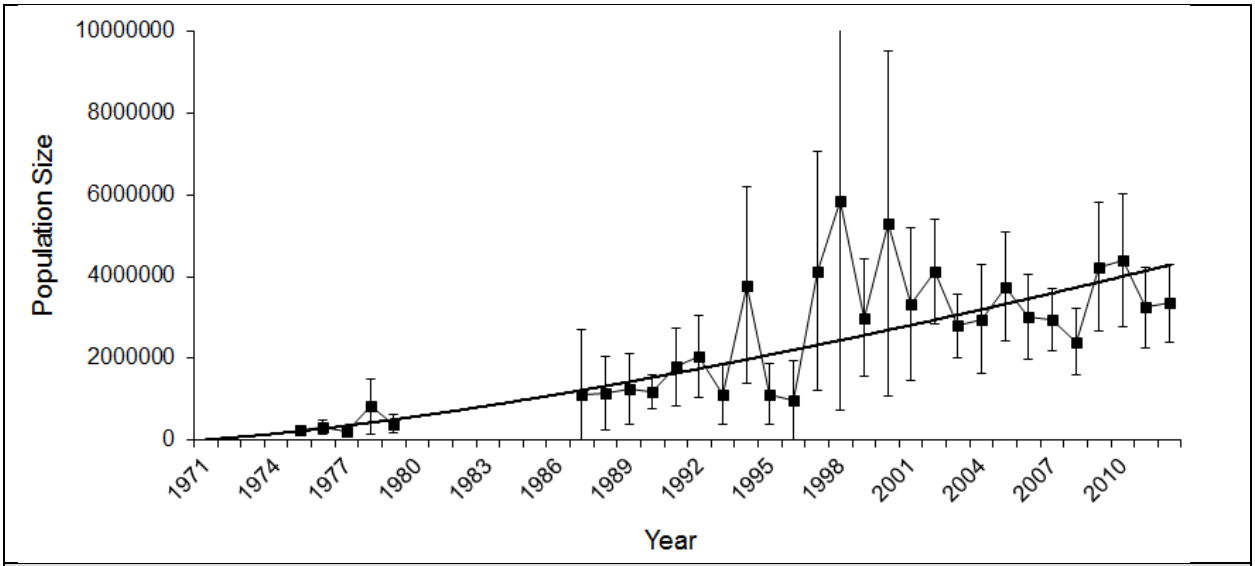

Figure 4. Lincoln Population Estimates (± 1 SE) of Mid-continent Cackling Geese, 1975–2012 (Source: J. Leafloor, CWS-Prairie and Northern Region).

Harvest

Estimated harvests of Cackling Geese in the Canadian Prairies have been relatively stable, averaging 85 178 birds per year from 2001–2010 (Figure 5).

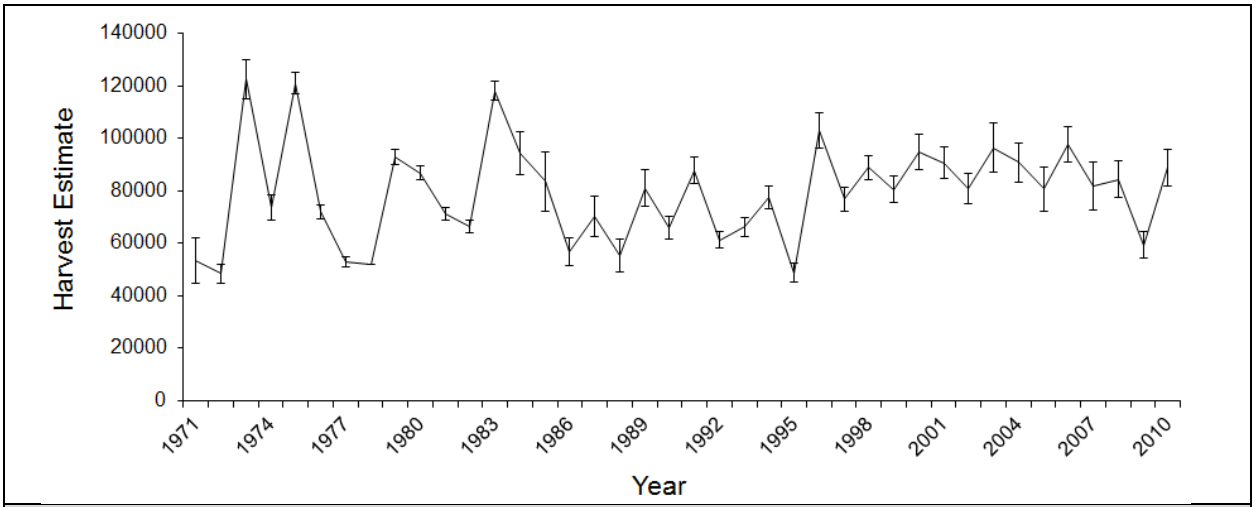

Figure 5. Harvest of Cackling Geese (±1 SE) in the Canadian Prairies, 1971–2010 (source: J. Leafloor, CWS-Prairie and Northern Region).

Management and Conservation Concerns

There is no conservation concern for the Cackling Goose. The population shows an increasing trend. Traditionally, Cackling Geese were managed as two populations in the Central and Mississippi Flyways: the Short Grass Prairie Population, and the Tall Grass Prairie population, respectively. However, because these populations are comprised of geese that are genetically indistinguishable, and because birds from many breeding areas overlap in winter, mid-continent Cackling Geese are now managed as one population, the Mid-continent Population.

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Canada Goose (*Branta canadensis*)

Canada Geese that have part of their breeding range in Canada are grouped into different management populations based on their breeding and wintering ranges (Dickson 2000). Canada Geese can be divided into subarctic-breeding and temperate-breeding populations.

Subarctic Breeding Populations

- NORTH ATLANTIC POPULATION CANADA GOOSE

The North Atlantic Population (NAP) of Canada Geese breeds in Labrador, insular Newfoundland and eastern Quebec (north shore), including Anticosti Island. There appears to be a contribution to the NAP by birds that breed in western Greenland, which are increasing and expanding (Fox et al. 1996, Fox et al. 2011, Scribner et al. 2003, Fox and Glahder 2010). The majority of the NAP overwinters in southern Atlantic Canada and New England. A small portion of the NAP winters from New Jersey south to North Carolina (Figure 1).

Abundance and Trends

Canada Geese from several subarctic breeding populations (North Atlantic, Atlantic and Southern James Bay Populations) intermix with temperate-breeding Canada Geese on wintering grounds in the Atlantic Flyway. The best method to evaluate the NAP population status is to count birds during the breeding period, when they tend to occupy relatively discrete ranges with little overlap among neighbouring populations.

The NAP breeding population is surveyed by the helicopter plot survey of the Waterfowl Breeding Population and Habitat Survey in eastern Canada, which only covers the southern part of the population's range (Figure 2 in the Monitoring section). Indeed, the helicopter plot survey was initiated in 2001 when it became evident that neither the original Eastern Waterfowl Survey nor the fixed-wing transects carried out by the USFWS adequately covered the breeding range of this population. Efforts to integrate data from the two survey platforms (helicopter plot survey and Fixed-wing survey) are ongoing. In the interim, only the data from the helicopter plot survey are presented; the population index is at approximately 40 000 breeding pairs, which represents about 60% of the total NAP Canada Goose Population, estimated at 130 000 geese (Rodrigue 2013a, Figure 2).

Figure 1. Geographic Range of the North Atlantic Population Canada Goose.

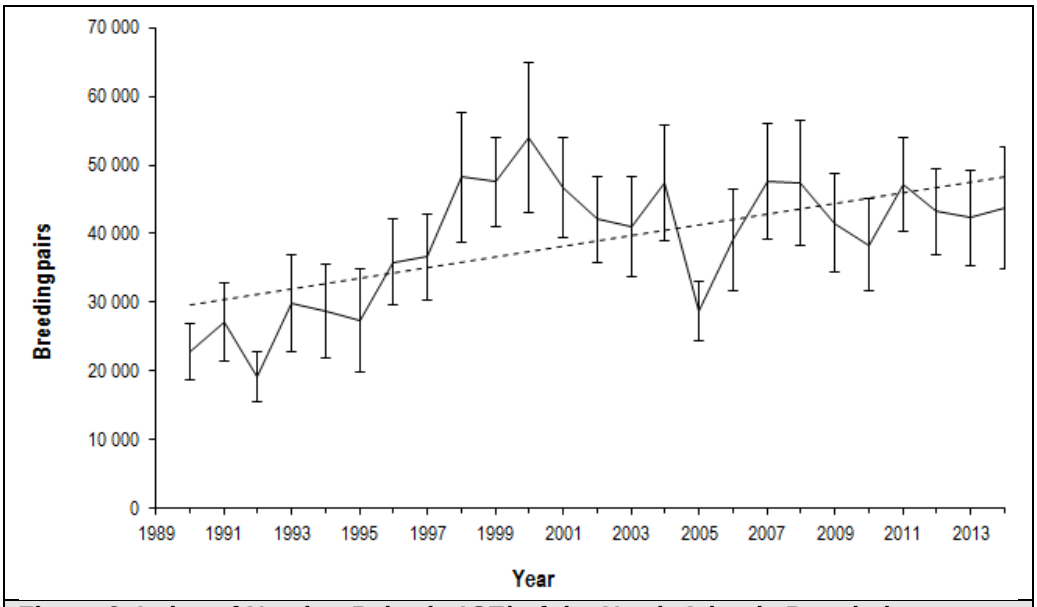

Figure 2. Index of Nesting Pairs (± 1SE) of the North Atlantic Population Canada Geese in Stratum 2 of the WBPHS in eastern Canada.

One of the critical needs for managing the NAP of Canada Geese is a reliable estimate of the number of NAP geese taken by hunters. Limited banding of NAP geese had been conducted for several years in the spring where geese stage on Prince Edward Island. However, this banding effort has not produced a number of bandings sufficient to estimate survival and harvest rates. Efforts to band geese breeding in southern Labrador were initiated in the summer of 2007 and continued in 2009 and 2011. In 2012, in an attempt to band geese breeding on the Island of Newfoundland as well as in Labrador, this banding effort was broadened. Banding operations were suspended in 2013 pending review of results to date.

Of particular note is the fact that banding operations during the summer of 2007 identified the presence of Canada Geese banded as juveniles in several U.S. states. As has been documented for other Canada Goose populations, the presence of moulting temperate-breeding migrant geese is a concern in terms of both the accuracy of breeding survey estimates and the potential effects on North Atlantic Canada Goose Population due to competition for resources.

The utility of banding NAP Canada Geese on the breeding grounds is still under review by program partners to determine if delivery of this program has the ability to meet management needs.

- ATLANTIC POPULATION CANADA GOOSE

Atlantic Population (AP) Canada Geese nest throughout northern Quebec, especially along the shores of Ungava Bay and eastern Hudson Bay (where 80% of the breeding birds are found), and in the interior of the Ungava Peninsula. AP Canada Geese winter from New England to South Carolina, with the largest concentration occurring on the Delmarva Peninsula (Figure 3).

Figure 3. Geographic Range of Atlantic Population Canada Geese.

Abundance and Trends

A breeding ground survey has been conducted every year since 1993 to estimate the number of breeding pairs on the Ungava Peninsula in northern Quebec. This survey covers the two regions that were shown previously to include the highest densities of nesting geese: the region of flat coastal tundra of Ungava Bay and Hudson Bay and the region of taiga and inland tundra (Malecki and Trost 1990; Rodrigue 2013b; Harvey and Rodrigue 2014). Estimates produced by this survey are not adjusted for visibility bias, and thus represent an index to the population. The estimated number of Canada Goose breeding pairs is shown in Figure 4. The breeding pair estimates have risen nearly five-fold since 1995, year of record low level of about 30 000 pairs. The most recent 10-year average is 187 000 breeding pairs (Harvey and Rodrigue 2014), which put the population below the management objective of 225 000 breeding pairs of AP geese in the Ungava Region of northern Quebec (Canada Goose Committee, Atlantic Flyway Council Game Bird Technical Section 2008). No survey was conducted in 2013.

In the southern boreal forest of Quebec, AP Canada Geese are counted as part of the WBPHS in eastern Canada. The region covered by the survey is at the southern limit of the nesting range of AP Canada Geese. In 2014, the population in the southern boreal forest was estimated at 16 500 breeding pairs, 50% below the 10-year average of 30 400 breeding pairs. Breeding pair numbers have not been that low in that area since 1995 (Figure 5). The population shows a 10-year declining trend of 5.6% (C. Lepage, CWS-Quebec Region, unpubl. data)

In parallel with the monitoring program, a recruitment study was conducted in the Ungava Peninsula in Nunavik, northern Quebec, from 1996 to 2012, and discontinued in 2013 (R. Cotter, CWS-Quebec Region, pers. comm.). Since 1997, a pre-season banding program has been in place for AP Canada Geese breeding in the Ungava Peninsula, along the northern Hudson Bay coast and along the south and west coasts of Ungava Bay.

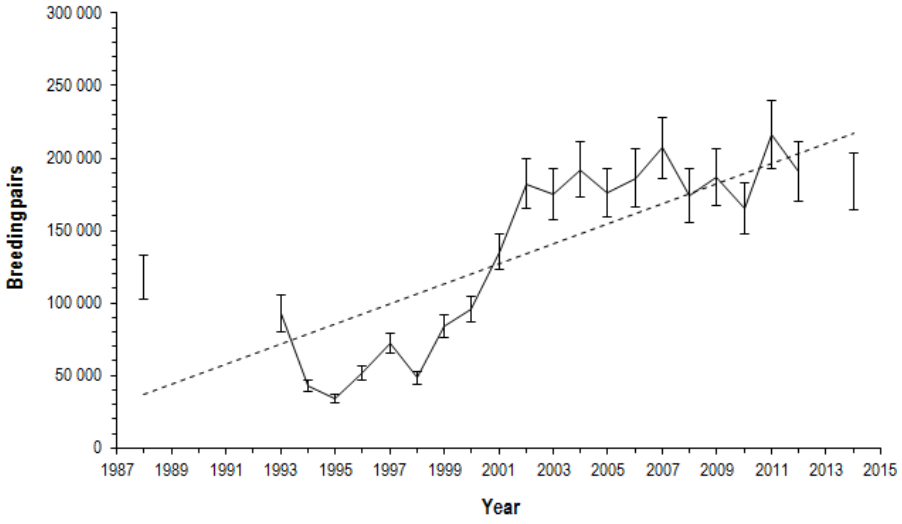

Figure 4. Estimated Numbers (± 1 SE) of Atlantic Population Canada Goose Breeding Pairs on the Ungava Peninsula (Source: Harvey and Rodrigue 2014).

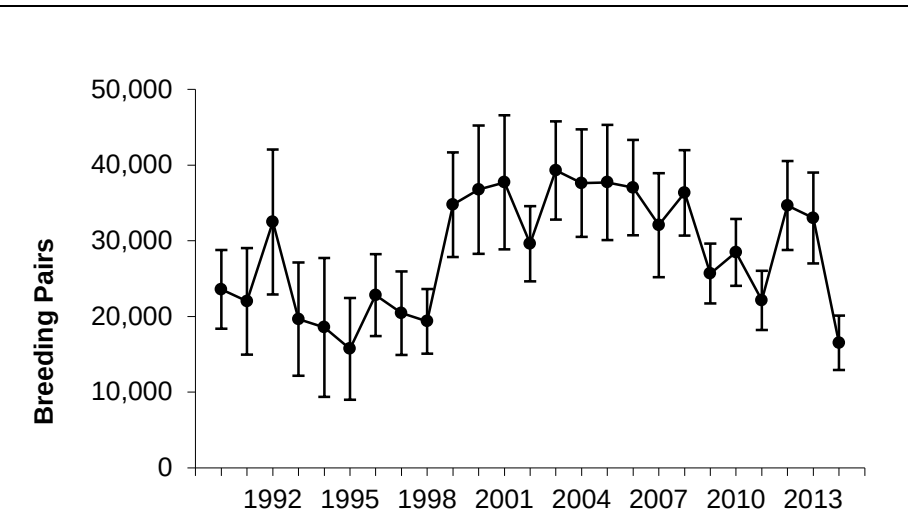

Figure 5. Estimated Numbers (± 1 SE) of Atlantic Population Canada Goose Breeding Pairs in the Southern Boreal Forest in Quebec Covered by the WBPHS in Eastern Canada (Estimates are based on helicopter survey only; Source: C. Lepage, CWS-Quebec Region, unpubl. data).

This once heavily hunted population peaked at nearly 1 million birds during the 1970s, before experiencing a sharp decline during the late 1980s and early 1990s that prompted the establishment of breeding ground surveys in 1988 in northern Quebec. In 1993, the number of breeding pairs of Canada Geese in the Ungava Peninsula was estimated at 91 300, a 23% decrease from the 1988 count. The population continued to decline until 1995, when it reached a historic low of 29 300 breeding pairs: this sharp drop prompted authorities to completely close the sport hunting season for the Atlantic Population until 1999. Since then, the population has recovered rapidly and, since 2002, has appeared to be stable (see Figures 4 and 5). All hunting restrictions on the species were lifted in Canada in 2002 (Rodrigue 2013b). However, the harvest continues to be managed carefully even though the population is now restored.

- *SOUTHERN JAMES BAY POPULATION CANADA GOOSE*

The Southern James Bay Population (SJBP) is composed of Canada Geese that nest on the southwestern James Bay coast and interior lowland muskeg of Ontario and on Akimiski Island, Nunavut. This population winters in an area extending from southern Ontario, Michigan and Ohio to Mississippi, Alabama and South Carolina (Figure 6).

Monitoring of the SJBP includes spring population surveys, ground searches for nests, and banding, all of which contribute information for management of this population.

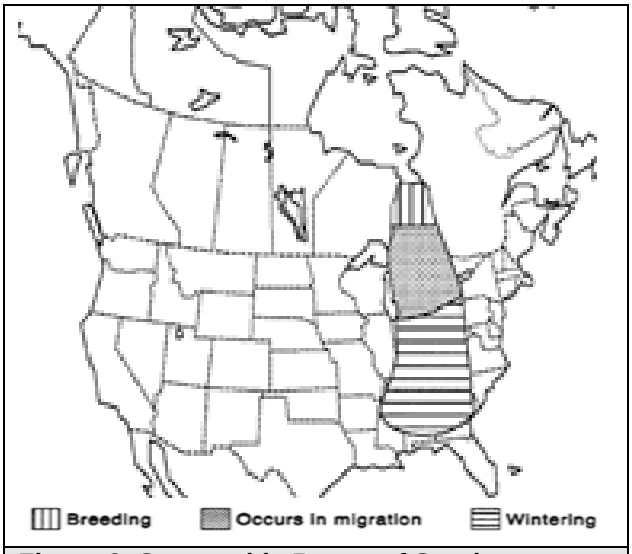

Figure 6. Geographic Range of Southern James Bay Population Canada Geese.

Abundance and Trends

The spring population (indicated breeding pairs X 2 + non-breeders) has been surveyed annually since 1990. The total spring population in 2014 was estimated at 81 301 geese. The SJB Canada Goose population shows a slight decreasing trend since the beginning of the survey in 1990 (Brook and Hughes 2014a; Figure 7).

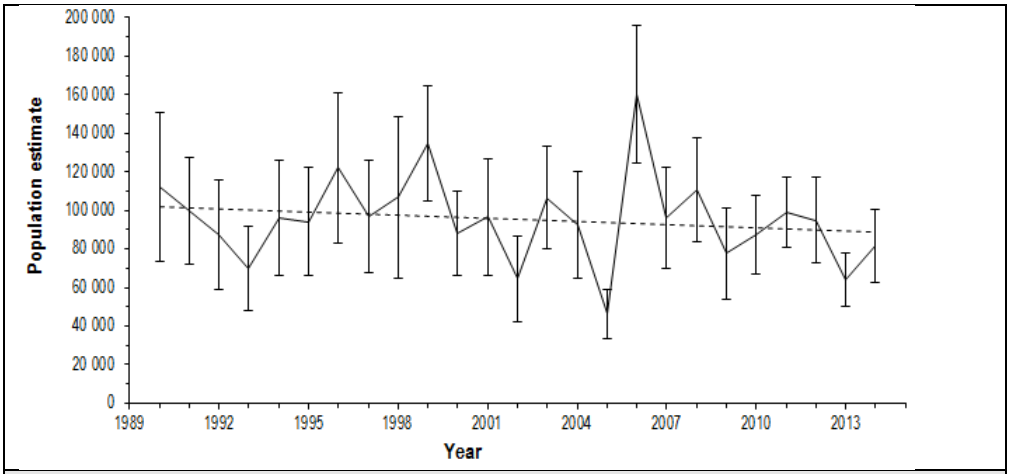

Figure 7. Southern James Bay Population Canada Geese Spring Estimates (95% CI) (Changes in the survey design made the population estimates since 2007 not directly comparable to those of previous years).

The 2014 estimate of 78 173 breeding birds for Akimiski Island and the mainland combined was higher than in 2013 and is still above the threshold level of 50 000 birds, below which changes to harvest regulations would be considered (Abraham et al 2008).

Monitoring of the SJBP also includes nesting studies and a banding program, both of which contribute essential information for management of this population. Nesting ecology studies began in 1993 and have been conducted on Akimiski Island since then (Bennett et al. 2013). Banding program in the SJBP range began in 1971 and has been conducted annually since 1974 on the coast of James Bay and Akimiski Island (Hagey et al. 2013).

- MISSISSIPPI VALLEY POPULATION CANADA GOOSE

The Mississippi Valley Population (MVP) of Canada Geese is bounded by the Eastern Prairie Population to the west and the SJBP to the east. This population nests in northern Ontario, principally in the Hudson Bay Lowlands, west of Hudson and James bays (Figure 8), and winters in southern Illinois, southern Indiana, western Kentucky and western Tennessee.

Monitoring of the MVP includes spring population surveys, ground searches for nests, and banding, all of which contribute information for management of this population.

Figure 8. Geographic Range of the Mississippi Valley Population of Canada Geese.

Abundance and Trends

The spring population (indicated breeding pairs X 2 + non-breeders) has been surveyed annually since 1989. In 2014 the total spring population was estimated at 466 650 geese, higher than the 2013 estimate (Brook and Hughes 2014b; Figure 9). The MVP Population shows a decreasing trend since the beginning of the survey in 1990 (Figure 9).

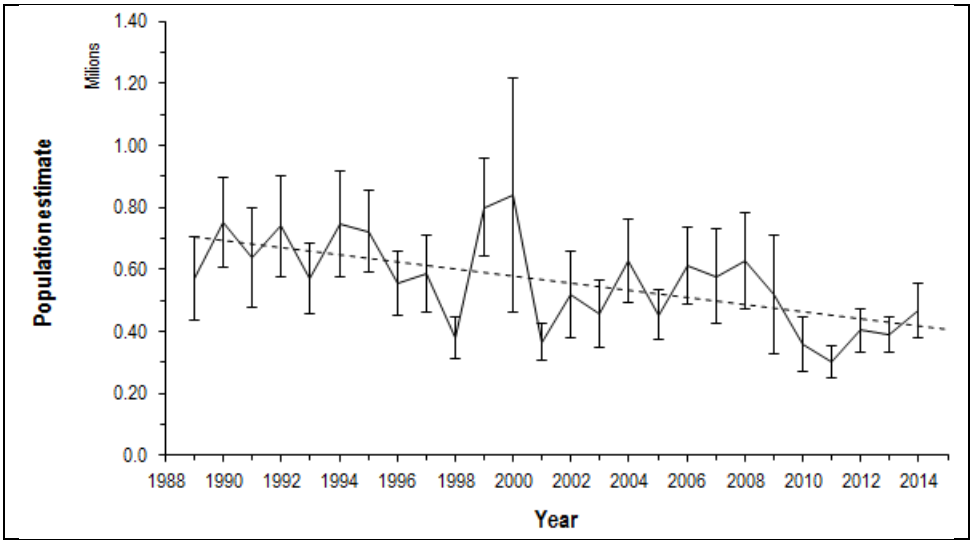

Figure 9. Mississippi Valley Population Canada Geese Spring Estimates (95% CI).

South of the Hudson Bay Lowlands in northwestern Ontario, Canada Geese are counted during the Waterfowl Breeding Population and Habitat Survey in boreal habitats of stratum 50 (Figure 1, Monitoring section). In the 1970s, there were an average of about 25 000 Canada Geese in this area, but estimates averaged around 90 000 birds between 2005 and 2014 (Figure 10); reasons for the recent increase are unclear.

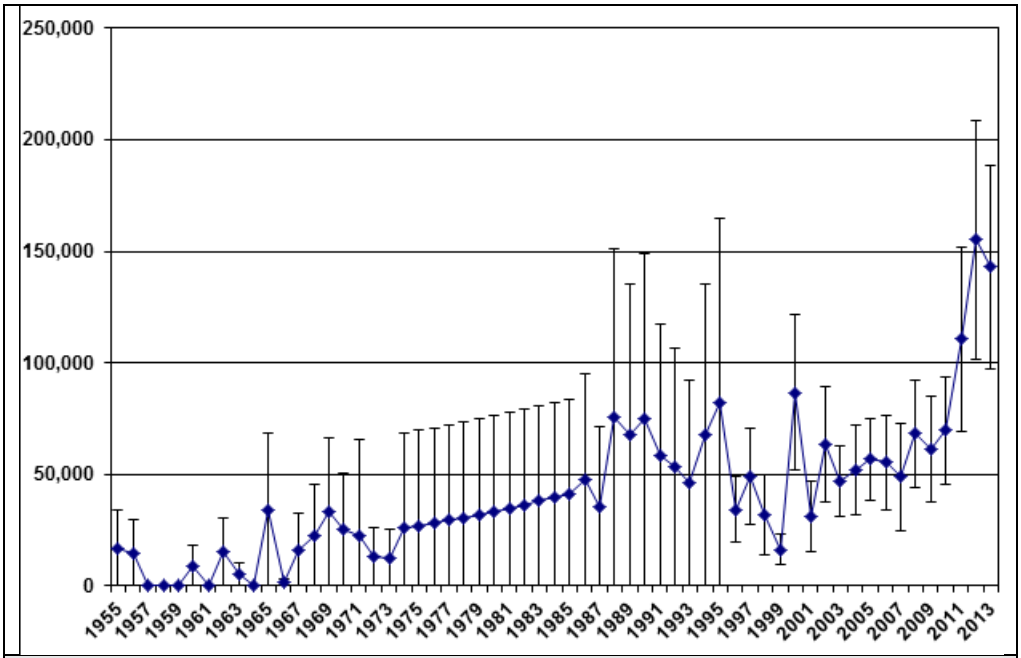

Figure 10. Numbers (± 1 SE) of Canada Geese in the Waterfowl Breeding Population and Habitat Survey Stratum 50, 1955–2013 (Source: USFWS 2014).

Monitoring of the MVP Canada Geese also includes nesting ecology studies and a banding program, both of which contribute essential information to the management of this population. Nesting ecology studies have been conducted annually at the Burnt Creek study site on the Hudson Bay coast from 2001–2003 and since 2007 (Bennett et al. 2013). A banding program along the Ontario Hudson Bay coast and the James Bay coast north of the Attawapiskat River has been conducted since 1977 (Hagey et al. 2013).

- EASTERN PRAIRIE POPULATION CANADA GOOSE

This Canada Goose population nests in the Hudson Bay lowlands of Manitoba. The birds overwinter mainly in Minnesota, Illinois, Iowa and Missouri. Spring surveys of the Eastern Prairie Population (EPP) Canada Geese have been flown annually since 1972, providing good baseline data for this population.

The spring population of EPP Canada Geese has been slightly increasing since the beginning of the survey in 1972. The 2014 survey estimate of single and paired EPP geese was 157 800, similar to last year's estimate. The 2014 total spring population was estimated at 202 000 birds, and was also similar to the 2013 estimate (Figure 11, F. Baldwin, MB Conservation and Water Stewardship, pers.comm.).

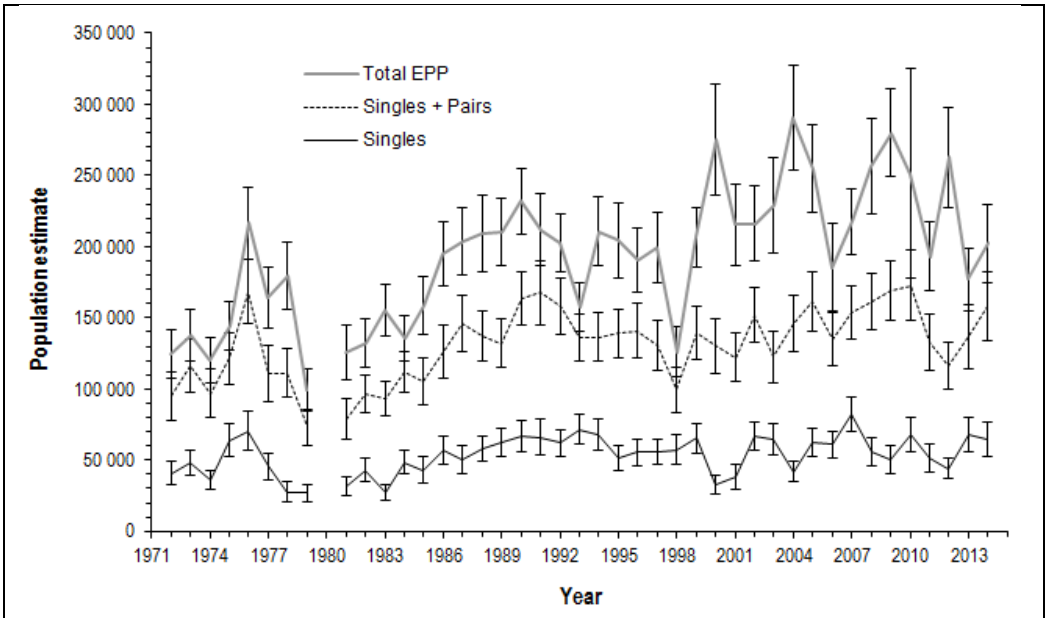

Figure 11. Eastern Prairie Population Canada Geese Spring Estimates (95% CI) (Source: F. Baldwin, MB Conservation and Water Stewardship, pers. comm.).

Boreal habitats in the three Prairie provinces (AB, SK, and MB) and the Northwest Territories are surveyed during the Waterfowl Breeding Population and Habitat Survey in strata 12–18, 20–25, and 75–77 (Figure 1 in the Monitoring section). In the 1970s, the number of Canada Geese in all of these strata combined averaged about 156 000 birds per year. From 2005–2014, these strata averaged approximately 559 000 Canada Geese per year (Figure 12).

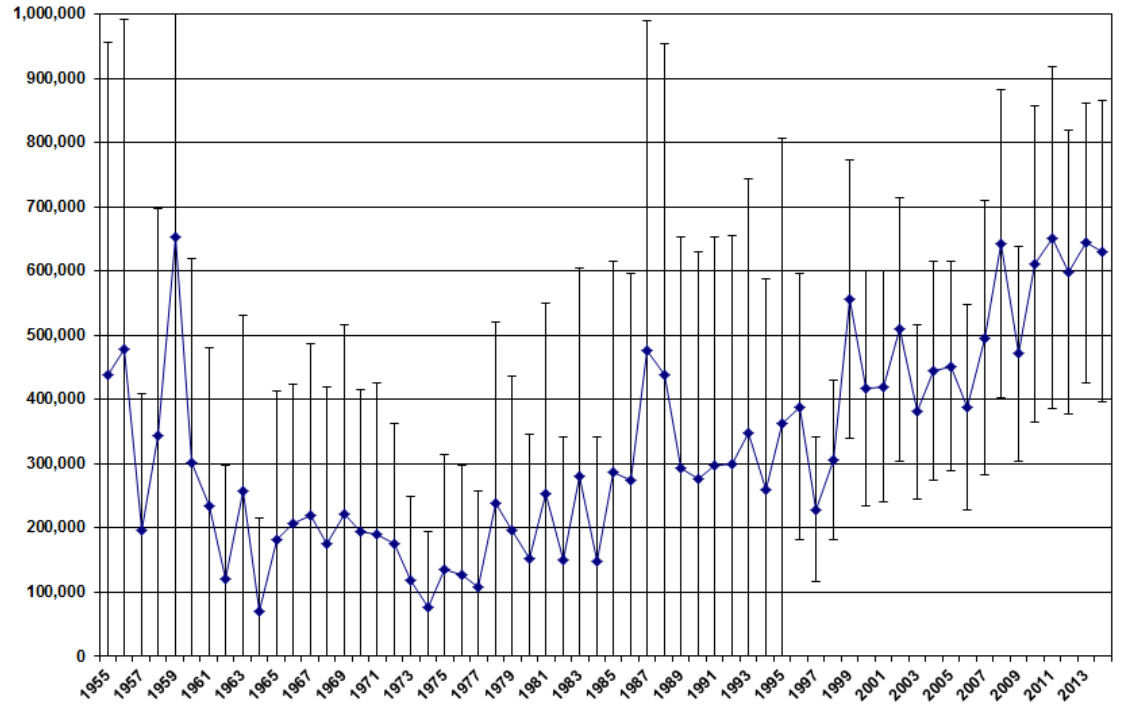

Figure 12. Numbers (± 1 SE) of Canada Geese in Boreal Strata 12–18, 20–25, and 75–77 of Western Canada During the Waterfowl Breeding Population and Habitat Survey, 1955–2014 (Source: USFWS 2014).

- PACIFIC POPULATION CANADA GOOSE

The Pacific Population of Canada Geese nest and winter west of the Rocky Mountains from northern Alberta and B.C. south through the Pacific Northwest to California (Figure 13).

Figure 13. Geographic Range of Pacific Population Canada Geese.

Breeding Pacific Canada Geese are surveyed in the course of the Waterfowl Breeding Population and Habitat Survey. The Pacific Population index in 2014 was 161 800 geese, 26% lower than the prior year's count of 220 400 (USFWS 2014).

Temperate-Breeding Populations

Temperate-breeding Canada Geese breed in central and southern Ontario, southern Quebec, New Brunswick, Nova Scotia and Prince Edward Island. They also breed in western Canada in the southern areas of Prairie provinces and British Columbia. In Atlantic Canada, some population growth and expansion of the breeding range is the result of deliberate re-establishment of local Canada Goose flocks beginning in the late 1960s. Although temperate-breeding geese are sometimes referred to as "residents" because they do not migrate to far northern regions for the breeding season, some do migrate long distances. In May and early June, sub-adults and failed breeders will migrate to subarctic and Arctic regions of Canada for the summer to moult their feathers. Temperate-breeding Canada Geese will also migrate south during severe winter weather in search of open water and food. In addition to the growing numbers in Canada, Temperate-breeding Canada Geese in the United States have also increased rapidly, and large numbers of subadults and failed breeders migrate in to Canada for the moulting period (e.g., Abraham et al. 1999, and Luukkonen et al. 2008). The status of temperate-breeding Canada Goose populations in all regions in Canada are at or well above management population objectives (Table 1).

Temperate-breeding populations of Canada Geese have grown rapidly to the point that they are causing conflicts with humans (e.g., fouling parks, golf courses and private lands), crop damage, and danger (e.g., collisions at airports, territorial aggression towards passers-by, concerns about disease transmission) in local areas. Regulatory amendments liberalizing the harvest of temperate-breeding Canada Geese in southern Canada were adopted in recent years to reduce population size and conflicts with humans.

Table 1. Population Objective for Temperate-breeding Canada Geese in Southern Canada.

Geographic Populations	Abundance (2014)	Population Objectives
Maritime Provinces	6200[1] pairs	3000–6000 pairs
Southern Quebec	13 900 pairs	2000–3000 pairs
Southern Ontario	83 490[2] pairs	40 000–80 000 pairs
Southern Prairie provinces	925 000	400 000–800 000 geese
Southern British Columbia	34 639	10 000–5 000 geese

[1] Abundance for Maritime Canada is estimated from 2008–2010 data.
[2] Abundance estimate is based on a four year average (2011–2014) of indicated breeding pairs from the Southern Ontario Waterfowl Plot Survey.

- MARITIME PROVINCES

The temperate-breeding Population in New Brunswick, Nova Scotia and Prince Edward Island is growing, probably due to the deliberate re-establishment of local Canada Goose flocks beginning in the late 1960s. There are no temperate-breeding Canada Geese in Newfoundland and Labrador (geese breeding in Newfoundland and Labrador belong to the subarctic population referred to as the North Atlantic Population).

Contemporary estimates of breeding effort in Maritime Canada (as derived from the Eastern Waterfowl and Agricultural Landscape survey plots) suggest an average of roughly 6200 indicated breeding pairs broadly distributed across the region in spring, with the highest densities found in agricultural areas. Banding operations initiated in Maritime Canada in 2007 continued through 2014 in an attempt to assess the contribution of this population to overall goose harvest in the region. Approximately 3000 Canada Geese have been banded in the Maritimes in the past 8 years.

- SOUTHERN QUEBEC

In 2014, the number of breeding pairs in southern Quebec (combination of southern part of the Waterfowl Breeding Population and Habitat Survey in eastern Canada survey area and the St. Lawrence Lowlands Breeding Waterfowl Survey) was estimated at 13 900 (C. Lepage, CWS-Quebec Region, unpubl. data). The species has expanded rapidly into southwestern Quebec since the early 2000s (Rodrigue 2013c), with an increasing trend of 9% annually since 2004 (Figure 14).

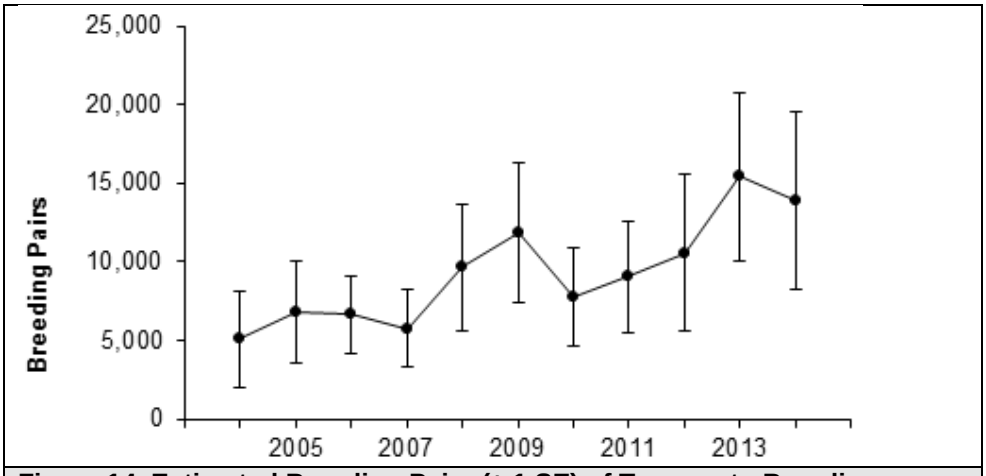

Figure 14. Estimated Breeding Pairs (± 1 SE) of Temperate-Breeding Canada Goose in Southern Quebec, 2004–2014 (Source: C. Lepage, CWS-Quebec Region, unpubl. data).

- SOUTHERN ONTARIO

As recently as 1970, Canada Geese did not commonly nest throughout southern Ontario. But anthropogenic changes on the southern Ontario landscape (e.g., shifts in agricultural practises, increase in waterfront lawns, golf courses, stormwater ponds), combined to favourable environmental conditions, resulted in the creation of ideal habitat conditions for the Canada Goose, allowing the population to grow rapidly. Results from the Southern Ontario Waterfowl Plot Survey show that the population south of the French and Mattawa Rivers has grown from a few thousand pairs in the 1970s to a recent 10-year average of just over 82 000 breeding pairs (Figure 15). Increasing at a rate of 9.2% annually from 1971 to 2014, the population growth rate now appears to have stabilized, with an average annual increase of 0.7% since 2005. The 2014 breeding pair estimate was 78 213 breeding pairs (Figure 15). The 2014 fall flight for the Ontario temperate-breeding Population was estimated to be around 455 000 individuals (which also includes non-breeders and young of the year; S. Meyer, CWS-Ontario Region, pers.com.). In 2014, 4159 temperate-breeding Canada Geese were banded in southern and central Ontario.

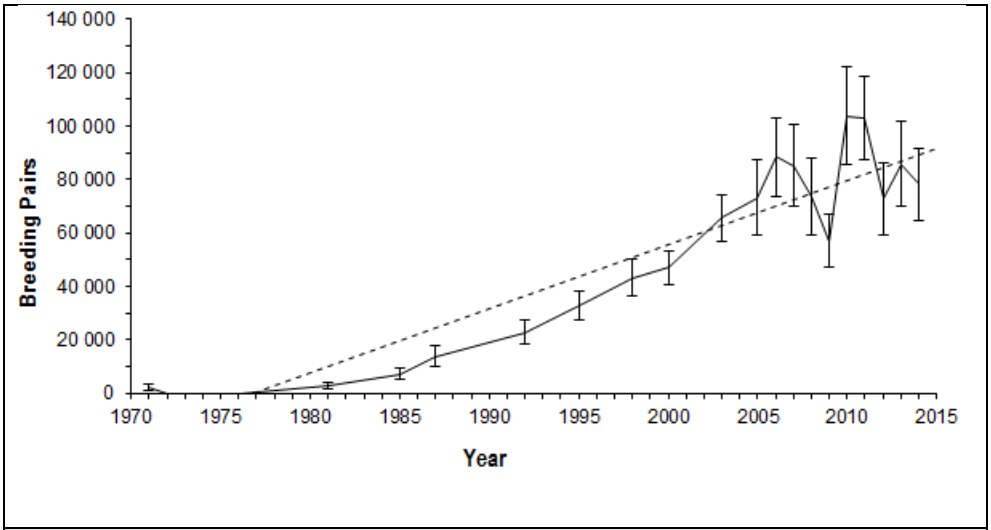

Figure 15. Estimated Breeding Pairs (± 1 SE) of Temperate-Breeding Canada Geese in Southern Ontario, 1971–2014 (Source: S. Meyer, CWS-Ontario Region, unpubl. data).

- SOUTHERN PRAIRIE PROVINCES (PRAIRIE–PARKLAND CANADA GEESE)

Most Canada Geese that nest in prairie/parkland habitats of the Prairie Provinces are monitored annually through the Waterfowl Breeding and Habitat Population Survey. Historically, Canada Geese in this region were divided into several units for harvest management purposes: Western Prairie/Great Plains Population, Hi-Line Population, and the Rocky Mountain Population. As temperate-breeding populations of Canada Geese in the United States and Canada have grown and expanded, the need for such subdivisions has declined, and instead we report on trends observed in Prairie Canada (strata 26–40, Figure 16).

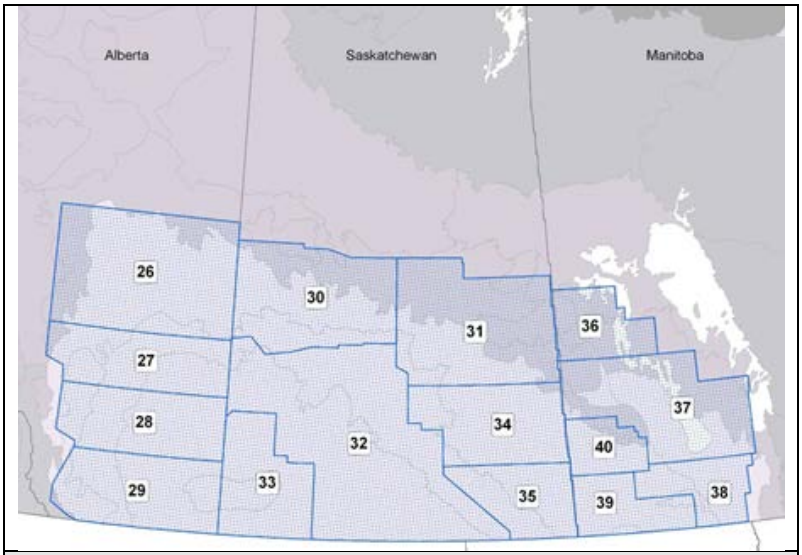

Figure 16. Strata 26–40 of the Waterfowl Breeding Population and Habitat Survey Cover the Prairie Ecozone (light grey area), which includes both Prairie and Parkland Habitats in Alberta, Saskatchewan, and Manitoba.

Canada Geese in Prairie strata of western Canada averaged approximately 87 000 birds annually from 1970–1979 but grew to about 925 000 birds by 2014 (Figure 17).

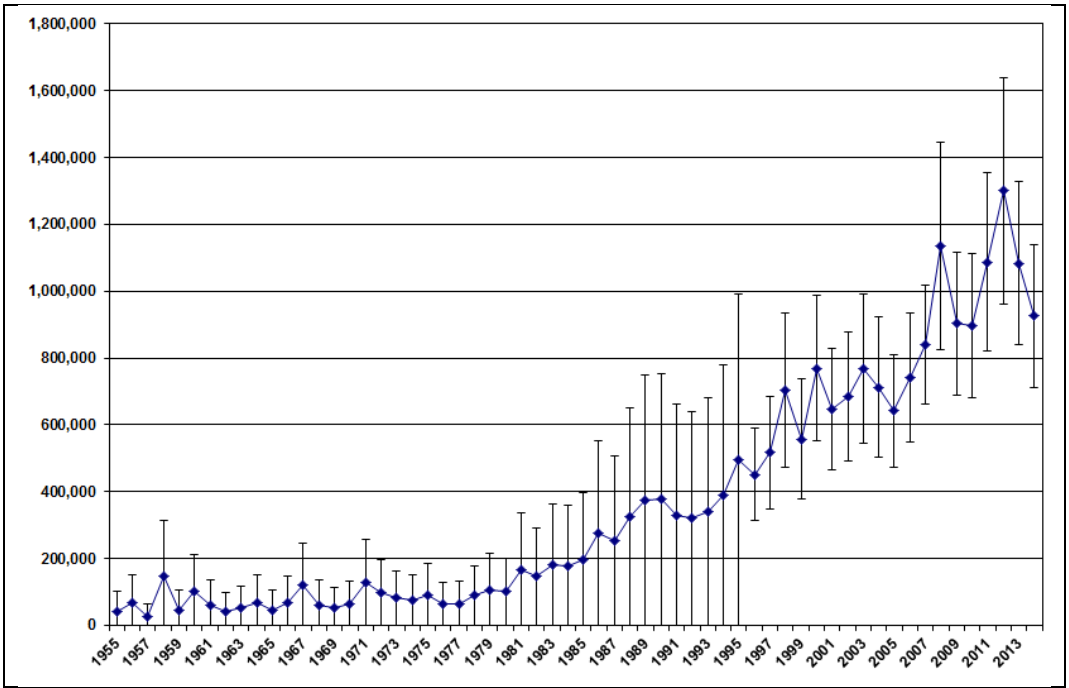

Figure 17. Numbers of Canada Geese Estimated (± 1 SE) from the WBPHS in Western Canada, strata 26–40, 1955–2014.

- SOUTHERN BRITISH COLUMBIA

Historically, Canada Goose populations in southern B.C. occurred at very low densities and in scattered distribution, but through transplant programs and natural dispersal, these have expanded their distribution and abundance significantly over the last three decades.

The temperate-breeding Canada Geese in central and southern B.C. are monitored by the aerial survey of the B.C. Interior since 2006. The population was estimated at 34 639 individuals in 2014, 16% more than in 2013 (A. Breault, CWS-Pacific and Yukon Region, pers. comm.).

Harvest

Table 2 presents overall harvest estimates of Canada Geese for Canada and the United States. These numbers include a portion of Cackling Geese. Harvest of Canada Geese has been on the rise, with the continental harvest surpassing 3 million annually since 2001.

Table 2. Harvest estimates of Canada Geese in Canada and the United States in Fall, all populations combined (Numbers include Cackling Geese which may represents a significant portion in some regions).

	Canada													United States[1] (PF includes Alaska)				
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total
1974													0	338 700	289 000	133 136	188 413	949 249
1975	8 185	6 407	9 140	2 872	14 126	31 525	97 586	95 037	83 734	9 423		142	358 177	357 900	330 400	172 717	181 394	1 042 411
1976	8 443	17 949	11 192	6 087	24 322	37 216	65 993	71 148	67 533	7 159	52	163	317 205	366 700	340 600	172 467	172 169	1 051 936
1977	12 578	18 788	8 693	2 179	51 269	58 611	45 426	65 402	60 894	9 088	218	127	333 055	465 900	357 600	158 871	185 209	1 167 580
1978	12 743	11 987	6 707	3 239	65 536	53 563	83 152	70 254	77 226	10 837		325	395 569	327 000	425 800	200 815	252 894	1 206 509
1979	13 494	10 827	5 830	2 141	50 816	64 036	95 291	80 354	80 252	13 337		289	416 667	296 900	325 300	185 740	187 396	995 336
1980	10 242	19 137	8 219	2 854	49 377	74 352	74 517	93 609	100 652	16 763	497	525	450 247	474 900	316 300	187 176	187 925	1 166 301
1981	10 170	14 264	7 494	3 911	21 578	50 380	57 956	83 421	95 509	16 052		234	360 969	328 800	308 900	206 747	195 003	1 039 450
1982	11 186	13 296	5 378	2 817	25 897	69 234	74 265	86 257	94 170	13 696			396 196	383 700	290 100	213 544	206 567	1 093 911
1983	13 653	15 780	9 657	7 376	34 984	69 997	72 578	124 109	106 144	14 877		397	469 552	491 000	288 800	233 447	230 178	1 243 425
1984	13 995	13 962	6 508	3 048	22 379	63 612	88 937	94 123	97 422	15 835		270	420 091	408 900	310 400	235 786	199 428	1 154 514
1985	9 886	17 226	6 911	3 958	28 004	76 399	106 352	87 182	101 925	14 559		96	452 498	360 800	336 100	289 670	200 861	1 187 431
1986	16 829	21 970	8 785	5 677	38 877	85 310	92 206	81 626	87 528	14 836		190	453 834	413 900	337 000	212 901	147 111	1 110 912
1987	12 509	21 387	10 942	3 015	57 761	88 450	79 557	102 562	115 355	15 030	550	165	506 733	359 300	319 700	198 227	162 742	1 039 969
1988	9 380	24 906	9 671	3 374	19 922	76 755	56 679	79 879	99 787	15 146		174	395 673	268 900	446 200	240 786	163 230	1 119 116
1989	8 845	23 144	15 666	6 617	55 285	101 618	78 471	84 848	119 082	16 427	367		510 003	318 500	580 100	273 324	149 204	1 321 128
1990	6 521	25 207	6 580	7 273	52 350	97 514	73 822	95 962	121 504	14 831	96		501 564	302 000	510 400	282 879	184 871	1 280 150
1991	5 799	21 459	9 848	5 229	51 837	83 791	72 617	90 821	111 826	18 170	275	510	471 907	306 200	543 600	276 400	174 951	1 301 151
1992	6 436	11 640	4 290	5 350	27 182	79 880	57 464	81 009	91 103	15 961		154	380 469	247 400	484 300	223 610	196 798	1 152 108
1993	9 759	19 168	13 294	6 916	40 593	83 889	73 498	79 823	93 614	13 509		94	434 157	286 900	598 900	319 462	223 384	1 428 646
1994	6 924	28 216	6 935	5 820	15 879	85 233	60 302	82 753	107 925	14 072	21	140	414 199	306 400	644 400	382 799	259 035	1 592 634
1995	9 527	16 967	8 306	5 467	9 560	88 140	49 639	82 155	114 818	11 297		128	396 004	144 000	771 800	483 322	239 096	1 638 218
1996	7 503	22 451	8 758	4 470	10 822	87 781	93 437	111 467	137 440	15 477	417	82	499 688	219 400	814 800	610 074	268 314	1 912 588
1997	5 165	16 769	7 542	6 105	11 748	89 680	107 304	104 934	125 629	14 602			489 478	296 200	833 400	546 274	242 559	1 918 433
1998	9 746	23 781	10 802	6 225	16 882	109 731	94 033	136 736	104 831	18 586			531 353	330 600	738 900	672 326	272 552	2 014 378
1999 [2]	5 464	32 944	12 633	6 079	38 702	100 751	68 822	146 112	137 527	16 093	25	90	565 217	342 800	813 400	493 320	234 350	1 883 870
2000	8 223	25 932	13 507	8 418	38 941	125 308	74 632	167 929	132 609	16 544			612 043	371 000	896 400	662 562	315 925	2 245 887
2001	5 553	25 136	10 554	5 615	67 763	148 705	102 034	146 829	111 751	13 076			637 016	687 904	858 422	627 052	279 469	2 452 847
2002	6 744	22 126	10 831	4 962	87 177	160 474	108 306	125 588	108 758	10 459		239	645 664	716 689	906 351	587 253	270 148	2 480 441
2003	5 004	20 983	4 915	11 245	112 807	160 197	90 183	135 123	116 844	14 353			671 654	657 910	1103 880	734 402	359 383	2 855 575
2004	4 481	15 028	5 996	6 100	75 316	148 893	92 512	135 759	134 551	8 165			626 801	633 289	952 120	535 606	322 329	2 443 344
2005	5 516	16 109	5 240	6 908	104 530	155 746	118 570	139 194	148 589	11 640			712 042	774 515	928 457	621 738	331 020	2 655 730
2006	4 364	11 245	4 769	6 940	79 569	174 538	105 039	157 414	124 785	9 348			678 011	662 449	1078 650	565 467	339 099	2 645 665
2007	5 848	13 586	7 544	9 098	100 811	179 459	97 069	169 206	110 830	9 892		514	703 857	860 743	996 677	503 413	315 361	2 676 194
2008	6 871	16 468	10 040	9 916	114 167	194 293	91 804	155 728	125 624	10 642			735 553	919 976	1021 696	565 939	337 229	2 844 840
2009	4 025	11 926	9 056	9 638	126 678	190 433	99 955	140 922	102 591	15 873		116	711 213	854 268	975 895	565 387	310 122	2 705 672
2010	4 336	15 618	12 651	10 641	122 436	170 886	88 963	150 150	104 970	10 511			691 162	796 229	938 413	529 406	271 222	2 535 270
2011	4 118	14 970	7 719	11 475	119 596	199 396	86 956	173 045	98 639	14 402			730 316	530 630	883 440	474 715	296 269	2 185 054
2012	6 499	16 605	8 732	10 196	125 578	179 138	101 055	178 544	98 183	16 356			740 886	696 220	825 546	647 651	341 157	2 510 574
2013	7 201	14 370	12 616	12 153	136 417	199 784	109 547	141 655	80 546	11 639		154	726 082	675 031	933 368	770 924	276 743	2 656 066

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2]The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those fr

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich et al 2014 (USFWS, US data)

Management and Conservation Concerns

Human-goose conflicts are the most significant management concern for Canada Geese, and these usually occur in urban areas. Problem populations of resident and urban Canada Geese are primarily controlled by municipal initiatives and through federal hunting regulations. Key management practices include egg addling, prevention of nesting, landscape management, and relocation of moulting flocks to areas where they can be subjected to hunting mortality. More information about the management and population control of Canada and Cackling Geese in southern Canada could be found on the Environment Canada's website: www.ec.gc.ca/mbc-com/default.asp?lang=En&n=6D2B893B-1.

Populations of subarctic-nesting geese are relatively stable, with the exception of Canada Geese nesting on Akimiski Island in James Bay, for which numbers have declined from approximately 75 000 birds in 1985 to approximately 12 000 birds in 2013 (Leafloor et al. 1996; Brook and Hughes 2014). This decline in Canada Geese numbers is probably related to poor growth conditions for goslings (Hill et al. 2003) resulting from habitat degradation by staging Lesser Snow Geese in brood-rearing areas (Jefferies et al. 2006).

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Brant (*Branta bernicla*)

Based on differences in breeding and wintering ranges, four distinct populations of Brant are recognized in North America, these are the Atlantic, Eastern High Arctic, Black and Western High Arctic Populations.

Abundance and Trends

- ATLANTIC BRANT (B. B. HROTA)

This population of the subspecies *B. b. hrota* nests on islands in the Canadian eastern low Arctic. The Atlantic Brant Population is surveyed annually in its wintering area in the U.S. (Atlantic Coast from Massachusetts to North Carolina). Winter counts have been conducted along the Atlantic coast in the United States since 1961, and have averaged approximately 136 000 birds from 2010–2014 (USFWS 2014; Figure 1).

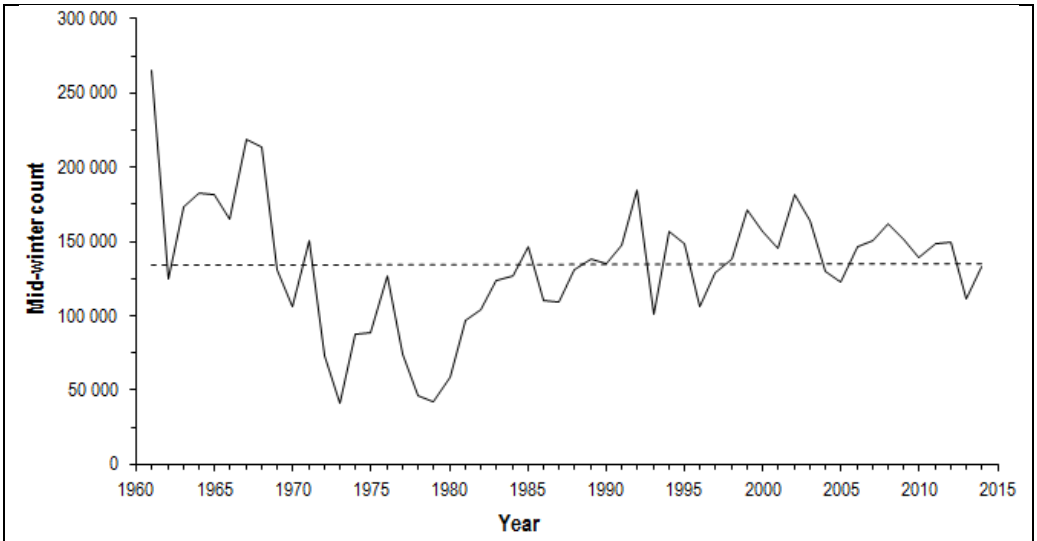

Figure 1. Mid-winter Counts of Atlantic Brant in the Atlantic Flyway in the United States.

Recently, Alisauskas et al. (2009) used harvest and band recovery data to estimate the population size of several species of Arctic-nesting geese, a technique had been used recently to estimate the size of the Atlantic Brant population (J. Leafloor, CWS-Prairie and Northern Region, unpubl. data). The adult population of Atlantic Brant averaged approximately 200 000 birds from 2000–2012 and currently shows a declining trend (Figure 2).

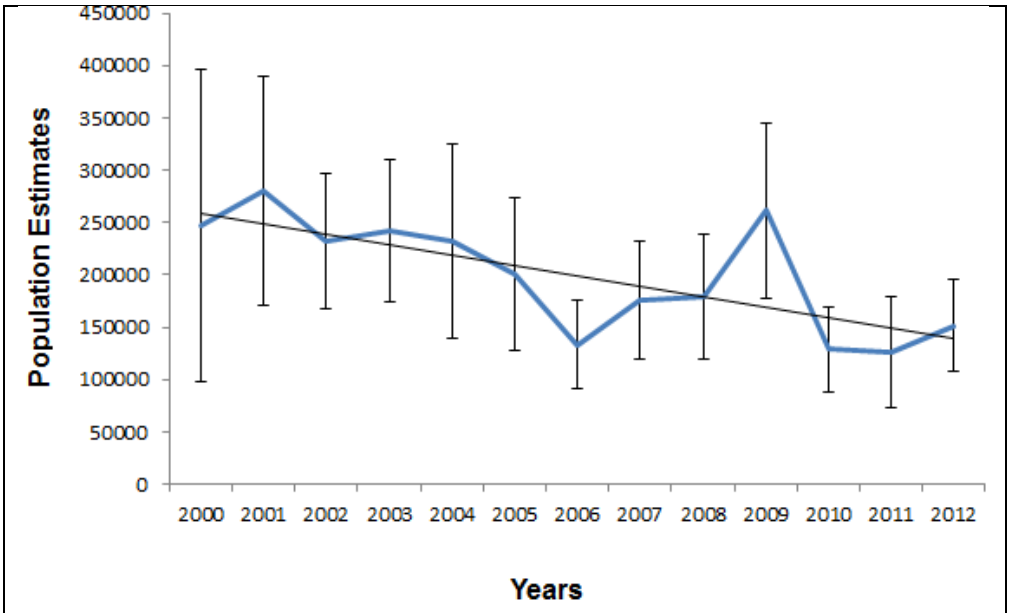

Figure 2. Lincoln Estimates of Population Size (95% CI) for the Atlantic Brant, 2000–2012 (Source: J. Leafloor, CWS-Prairie and Northern Region, unpubl. data).

- EASTERN HIGH ARCTIC BRANT (B. B. HROTA)

This group of the subspecies *B. b. hrota* breeds on islands of Canada's Eastern High Arctic, migrating via Greenland and Iceland to winter in Ireland (Reed et al. 1998). No surveys are currently being conducted on the Canadian breeding grounds, and little information is available about the birds' distribution within the breeding range. The number of Eastern High Arctic Brant is estimated through counts on the wintering grounds in Ireland, where the population grew from fewer than 10 000 birds in the late 1960s to more than 33 000 birds in 2004–2005 (Arctic Goose Joint Venture 2013). Results of the 2013 International Census estimated a population of 34 734 geese, a decrease from the 2012 count of 41 465 birds (Figure 3; Wildfowl and Wetlands Trust 2014).

The percentage of young is also assessed during the fall census. As is the case for most Arctic birds, productivity fluctuates markedly between years: only 1–2% of the population is composed of young birds in poor years, while this percentage increases to values as high as 20–30% in good years. The 2013 season was an extremely poor production year with the young accounting for only 0.04% of the fall population, the lowest percentage ever recorded (Wildfowl and Wetlands Trust 2014). Following the peak count in 2011 (48 002), two consecutive years with very low breeding success (< 2%) have led to a halt in the growth of the population (Wildfowl and Wetlands Trust 2014).

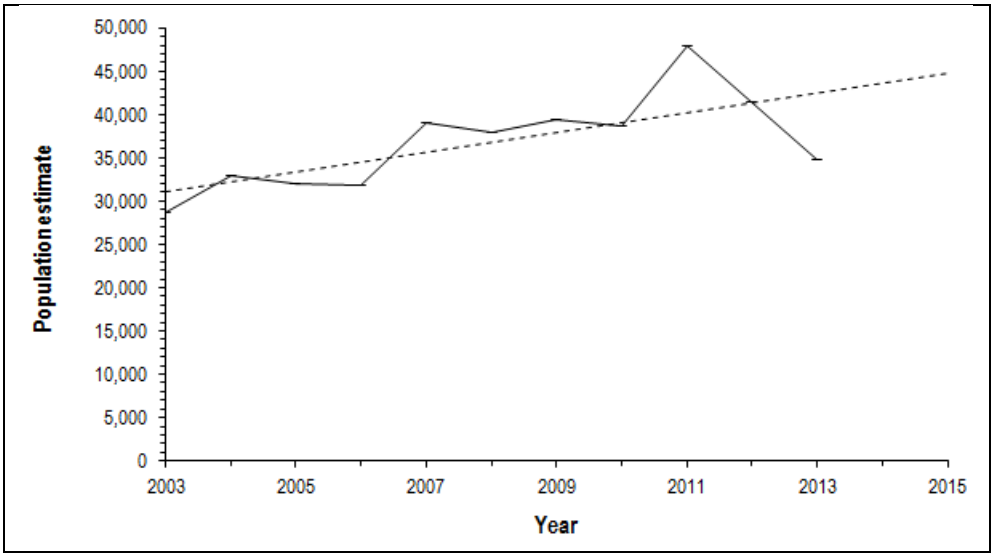

Figure 3. International Census of the Eastern Canadian High Arctic Brant in Fall in Ireland (Source : Wildfowl and Wetlands Trust 2014).

- BLACK BRANT AND WESTERN HIGH ARCTIC BRANT

Black and Western High-Arctic Brant numbers are assessed annually during mid-winter aerial and ground surveys in January. During surveys, it is difficult to separate the two types of brant that winter on the west coast of North America.

Black Brant

Black Brant nest in the central and western low Canadian Arctic, in Alaska, and in western Russia. The population winters along the Pacific Coast, mainly in Mexico (Reed et al. 1998). The last mid-winter index for the Black Brant in the Pacific flyway was 146 846 birds in 2013, slightly higher than the estimate for 2010, when the full survey was completed (Figure 4; Olson 2014). Black Brant counts could include an unknown proportion of Western High Arctic Brant.

There are no regular surveys of breeding grounds, and in fact, the Canadian distribution and abundance of breeding Black Brant are not well known.

Part of the Black Brant Population stages along the coast of British Columbia during the spring migration. It is estimated that between 3000 and 7000 brant stop over in the Queen Charlotte Islands on their way to northern breeding grounds. Roughly 25 000–30 000 Black Brant stage in the spring in the Strait of Georgia, B.C., with the two most important sites being the Fraser River Delta and the Parksville–Qualicum area on Vancouver Island.

Historically, between 1000 and 10 000 Black Brant spent the winter in British Columbia. Recent estimates of the wintering population in B.C. indicate that approximately 2500 individuals are found in three major wintering locations: the Fraser River Delta (more than 2000 birds), the Queen Charlotte Islands (more than 200 birds) and Vancouver Island (a few dozen birds a decade ago to 150 brant overwintering in the Parksville–Qualicum area in 2013–2014; S. Boyd, EC-Pacific and Yukon Region, pers. comm.). In the areas of Boundary Bay and Robert's Banks of the Fraser River Delta, the wintering brant population has been generally increasing since 1992. The British Columbia peak winter population was estimated at 2204 brant during the 2013–2014 winter, a 79% increase from the 1229 birds observed in the 2012–2013 winter (A. Breault, CWS-Pacific and Yukon Region, pers. comm.). These are however rough estimates that exhibit large year-to-year variation.

Western High Arctic Brant

The Western High Arctic Brant is intermediate in appearance between *B. b. nigricans* and *B. b. hrota*, and is thought by some biologists to be a distinct subspecies. It breeds on islands of the western High Arctic and winters mainly in a small area in Puget Sound, Washington (Reed et al. 1998). Mid-winter counts suggest relatively large historical fluctuations in the population size of the Western High Arctic Brant (Figure 4). Although Western High Arctic Brant intermix with Black Brant during the fall migration and in winter, historically, mid-winter counts from the core wintering area in Washington State have been used as an index of the population size because most of the population is thought to winter there. Based on the counts at State Port Susan in Washington, there were 16 454 brant estimated in 2013, a number 6% lower than the 2012 estimate (17 502 birds; Olson 2014). This estimate also includes an unknown number of Black Brant. Recent information suggests that the index is not reliable and that many WHA Brant are missed because they winter elsewhere (A. Breault, CWS-Pacific and Yukon Region, pers. com.). Nevertheless, until more information is gathered regarding wintering areas, the CWS will continue to rely on the index described above.

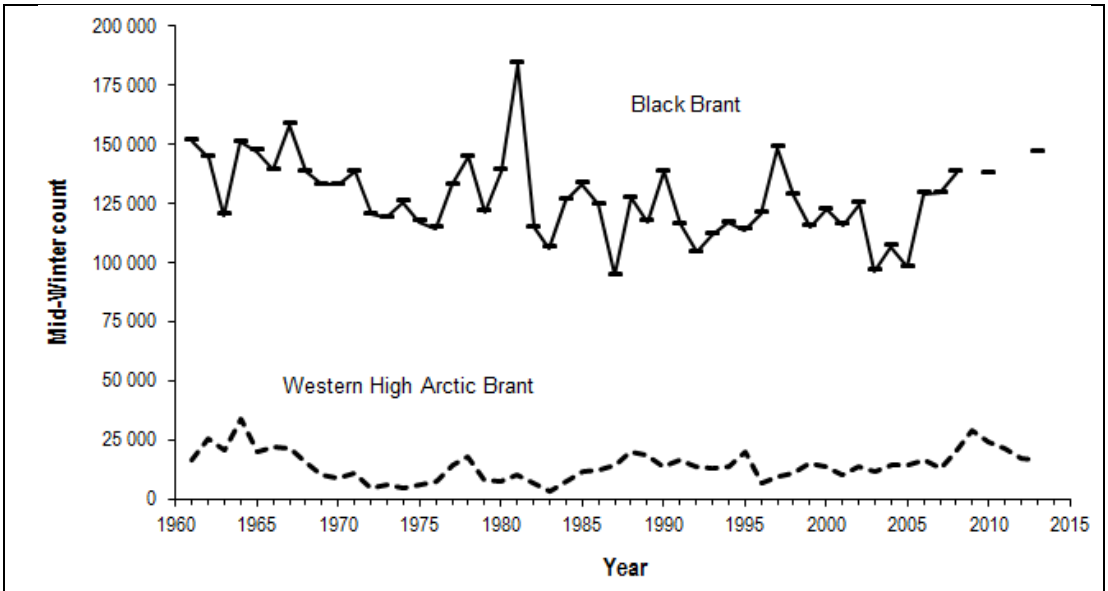

Figure 4. Mid-winter Inventory of Black and Western High Arctic Brant
(Note: beginning in 1986, Black Brant numbers include counts along the Alaska coast. No survey was conducted in 2009, 2011, 2012 or 2014) (Source: Olson 2014).

Harvest

- ATLANTIC BRANT

Harvest of the Atlantic Brant has the potential to be near the maximum supportable, as the population is relatively small, and the Atlantic Brant is a highly valued game species, particularly in the United States. Relatively few Atlantic Brant are harvested in Canada (Table 1), and the number taken by subsistence hunters is not presently known. It is likely that the latter harvest represents a few thousand birds annually.

- BLACK AND WESTERN HIGH ARCTIC BRANT

In British Columbia, hunting of brant is not allowed except for a reduced and late hunting season from March 1 to 10 in the Fraser River delta. This hunt was established in 1977 to shift the harvest pressure on the much larger Pacific Flyway Population of Black Brant that winter south of British Columbia, thereby reducing harvest on the local population and helping to increase local numbers of wintering birds. Between 1990 and 2014, the local harvest has ranged from 68 to 250 birds.

Table 1. Harvest Estimates for the Atlantic Brant in Canada and the United States (Source: Gendron and Smith 2014).

Year	Canada	US Atlantic
1999	200	18 300
2000	601	24 900
2001	804	24 900
2002	635	33 400
2003	572	44 900
2004	No data	17 600
2005	181	30 400
2006	128	18 500
2007	657	22 300
2008	548	27 200
2009	No data	35 100
2010	No data	18 100
2011	198	11 400
2012	251	27 600
2013	No data	11 910

- EASTERN HIGH ARCTIC BRANT

For EHA Brant, there is a small subsistence harvest in Canada (<100 birds annually) and subsistence hunting also occurs in Greenland. No hunting of EHA Brant is permitted on its wintering grounds.

Research Highlights

- BLACK BRANT AND WESTERN HIGH ARCTIC BRANT

Each spring, Black Brant and Western High Arctic Brant stage in the Parksville–Qualicum area on the east coast of Vancouver Island, British Columbia. A field study using abdominal profile index (API) as a surrogate of body condition to measure fat accumulation was conducted between 1999 and 2004 and at reduced efforts since then (S. Boyd, EC-Pacific and Yukon Region, pers. comm.). Mean API scores were high in 1999 and 2000 and did not differ significantly, whereas scores were significantly lower in the following four years (2001–2004 inclusively). Moreover, API slopes (fat deposition rates) estimated from marked birds declined significantly, to the point where Brant did not accumulate fat reserves in 2004. The Parksville–Qualicum area occasionally supports a large Pacific Herring (*Clupea pallasi*) spawn and, in addition to foraging on eelgrass, Brant forage intensively on herring eggs when these are available. Disturbance rates are among the highest recorded globally, with the largest single source of disturbance being Bald Eagles (*Haliaeetus leucocephalus*). Eagle numbers have been increasing and both eagle, and human and dog disturbance rates have increased in recent years. The high levels of disturbance in the Parksville–Qualicum area may have caused a reduction in fat accumulation rates, which, in turn, may have had negative effects on the spring migration and egg laying. Conservation measures (e.g., prohibition of dogs on key beaches during the spring staging period) introduced in the early 2000s were strictly enforced beginning in 2006 and this corresponded to (and may have caused) Brant API rates to return to their previous relatively high levels. To better manage spring staging Brant in British Columbia, further research is needed to understand the relationship between: 1) staging variables of individual body condition, timing of migration and length of stay, 2) staging variables and food availability, and rates and sources of disturbance, and 3) staging variables and fitness (annual survival and reproductive rates).

Management and Conservation Concerns

Brant are more vulnerable to sporadic heavy losses from starvation and periodic nesting failures than most other geese because of their strong dependence on specific plants for foraging and the harsh environments where some populations live. Among North America's goose species, the Brant is the only

species for which no population of Brant has begun using agricultural landscapes to any great extent: for the most part the species' is restricted to natural marine marshes. This means that the birds may not have been able to capitalize on the landscape features that are driving the exponential population growth of other species. Their comparative vulnerability requires careful regulation of hunting and monitoring of the status of populations (Reed et al. 1998). The protection of staging areas and wintering grounds, as well as the limiting of disturbance and other impacts to Brant populations, are probably the most important actions that can be taken to protect Brant.

Western High Arctic Brant are of particular management concern given their relatively small number, restricted winter distribution, and potentially unique subspecies status. They are also vulnerable to petroleum spills, especially given that the majority of geese overwinter in Padilla and Samish Bays, adjacent to tankers and an oil refinery at Anacortes. They are also vulnerable because of starvation and periodic nesting failures, and because of their dependence on specific forage plants in harsh Arctic environments. Finally, these geese fly long distances in the spring and fall between breeding and wintering areas and are therefore subject to poor weather conditions during migration and an unknown hunting pressure at staging areas (S. Boyd, EC-Pacific and Yukon Region, pers. comm.).

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Population Status of Swans

Tundra Swan (*Cygnus columbianus*)

The Tundra Swan is the most abundant and widespread of the two swan species native to the continent. As its name implies, this species breeds on lakes, ponds and wetlands associated primarily with coastal river deltas within tundra habitat throughout Arctic and subarctic regions of Canada and Alaska (Limpert and Earnst 1994). The Tundra Swan is managed as two populations—the Eastern Population and Western Population—primarily based on affiliations of the species with each of their traditional major wintering areas occurring along the Atlantic and Pacific coasts.

Swans of the Eastern Population typically breed from the Seward Peninsula of Alaska to the northeast shore of Hudson Bay and Baffin Island and migrate through the interior of the continent, with most birds wintering in coastal areas from Maryland to North Carolina and relatively smaller numbers within the lower Great Lakes region, including southern Ontario (Ad Hoc Eastern Population Tundra Swan Committee 2007). Swans of the Western Population typically breed along the coastal lowlands of western Alaska and migrate through western Canada and along the Pacific coast, with most birds wintering in California, Utah and the Pacific Northwest, including southern British Columbia (Pacific Flyway Council 2001).

The mid-winter survey is used as the primary means of tracking annual abundances and trends of each Tundra Swan population.

Abundance and Trends

- EASTERN POPULATION

During the 2014 mid-winter Survey, 105 000 swans were observed in Ontario and the Atlantic and Mississippi flyway States, an estimate 2% lower than that of 107 100 birds counted in 2013 (USFWS 2014). Annual counts have varied from year to year, but the population trend has been stable over the last 10 years (Figure 1). The Eastern Population is above its population objective of 80 000 birds (NAWMP 2012).

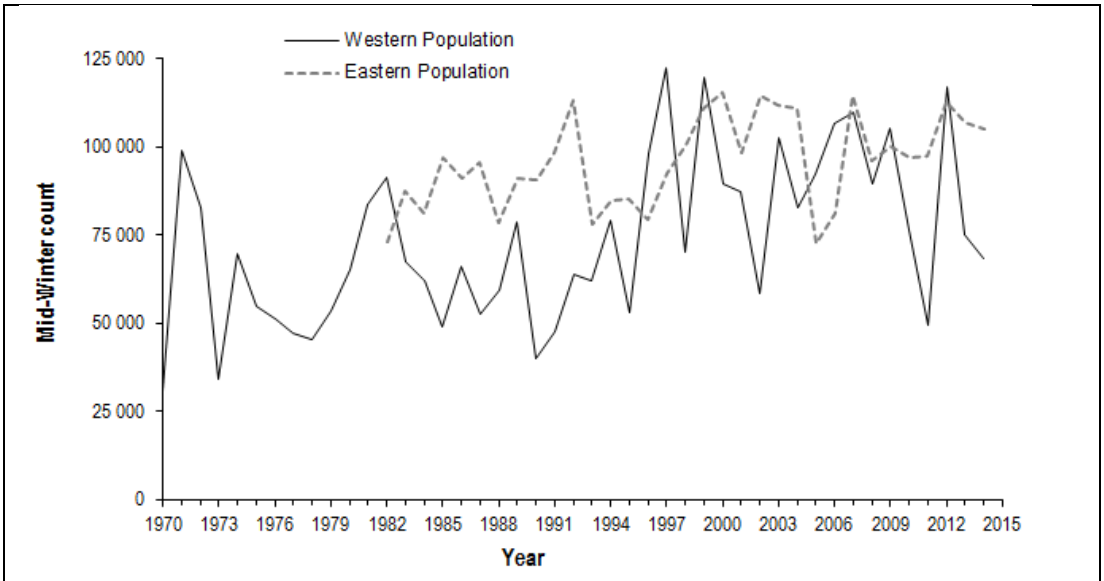

Figure 1. Number of Tundra Swans Counted During the United States Mid-Winter Survey (In 2010 and 2011, several important wintering areas in California were not covered during the mid-winter survey (Source: USFWS 2014).

- WESTERN POPULATION

Since the 1970s, annual counts have shown large fluctuations (Figure 1). During the 2014 mid-winter survey, 68 200 Western Population Tundra Swans were counted on the wintering grounds (U.S. and northwest Pacific), 9% lower than the previous year's estimate of 75 300 birds (Figure 1). The mid-winter survey estimates suggest a stable trend over the last 10 years (USFWS 2014). The Western Population of Tundra Swans is above its population objective of 60 000 birds (NAWMP 2012).

Harvest

Hunting of Tundra Swans is currently prohibited in Canada. However, Tundra Swans in the Eastern and Western Populations have been managed by closely regulated annual harvests in the U.S. since 1983 and 1962, respectively. Hunting is currently allowed during the fall migration in some U.S. states of the Pacific and Central Flyways and on wintering grounds in some U.S. states of the Atlantic Flyway.

Management and Conservation Concerns

The Tundra Swan populations have been relatively stable in the past decade and have remained near or above their population objectives. However, management plans for both populations established goals for collecting more information, such as improving the mid-winter survey to obtain better counts of swans, developing breeding ground surveys to estimate breeding populations and trends, identifying and protecting of breeding, staging and wintering habitats, and gathering more information on the aboriginal harvest to better estimate the total harvest.

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Trumpeter Swan (*Cygnus buccinator*)

The Trumpeter Swan is North America's largest waterfowl species. There are three Trumpeter Swan populations in North America: the Pacific Coast population, the Rocky Mountain population, and the Interior population (Figure 1). The three populations are increasing (Groves 2012).

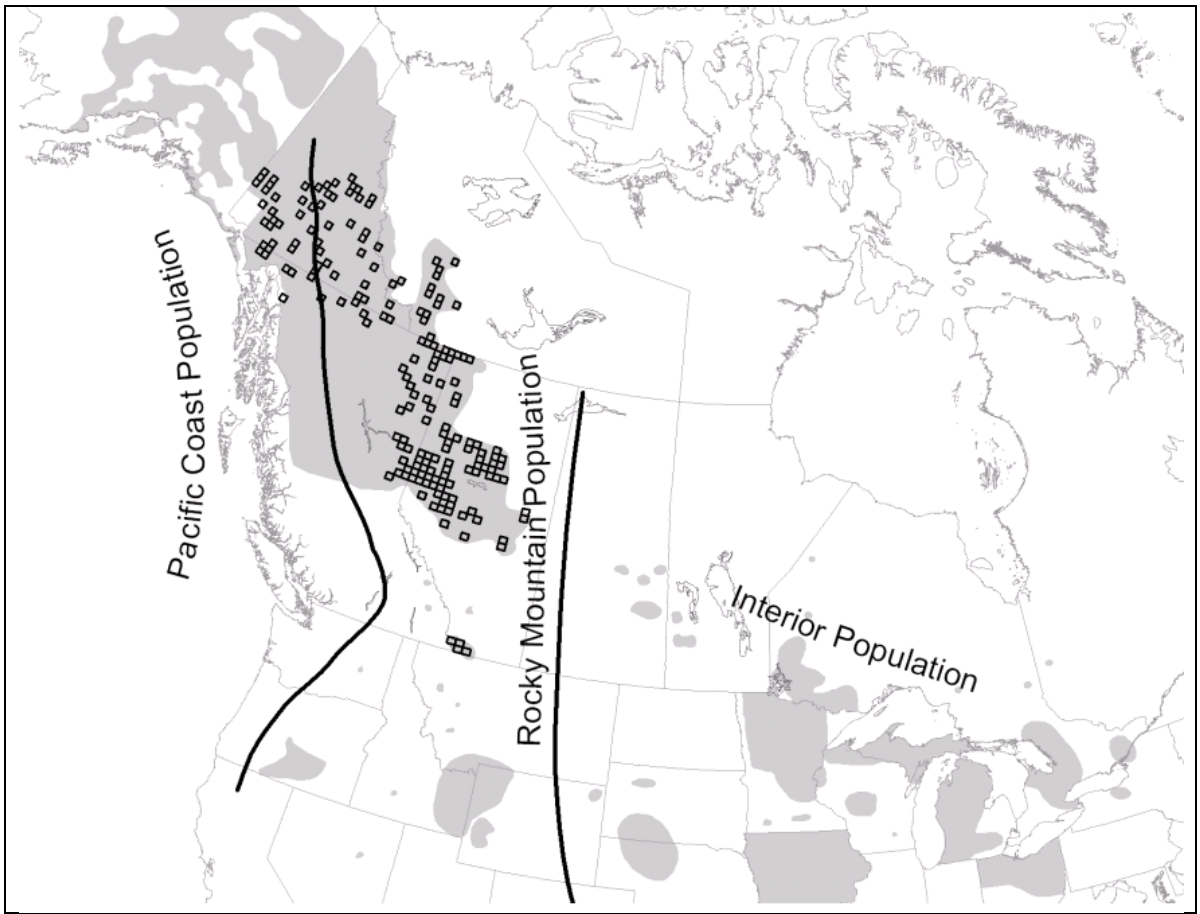

Figure 1. Breeding Distribution of Trumpeter Swan Populations in North America, Showing Individual Topographical Maps Sampled in Western Canada as Part of the 2010 North American Trumpeter Swan Survey (Source: Groves 2012).

In Canada, the Pacific Coast population breeds mainly in Alaska, but also in Yukon and northwestern British Columbia. The Rocky Mountain Population breeds mainly in Alberta, western Saskatchewan, southern Yukon, and the Northwest Territories. The Interior Population breeds primarily in Ontario, but small numbers have become established in eastern Saskatchewan and adjacent Manitoba.

Abundance and Trends

The three populations have reached or exceeded their population objective (Pacific Population: 25 000 swans; Rocky Mountain Population: 5% average annual growth in numbers of wintering birds, Interior population: 2000 birds; NAWMP 2012). Consequently, most swan-release programs have now been discontinued (Groves 2012).

The abundance and distribution of Trumpeter Swans populations are assessed at five-year intervals through the North American Trumpeter Swan Survey. This survey consists of several surveys conducted simultaneously by federal, provincial and state agencies in the United States and Canada throughout the Trumpeter Swan breeding range in North America (Figure 1). The first survey, in 1968, estimated the

continental population at 3722 Trumpeter Swans. The most recent survey, completed in 2010, estimated the continental population at 46 225 birds, an increase of 33% since 2005 and the highest recorded since the surveys began in 1968 (Table 1). Cygnets (young of the year) accounted for an estimated 26% of the total population, indicating a good production of young (Groves 2012). The continental population has been increasing at an annual growth rate of 6.2% since 1968 and 5.8% since 2005 (Groves 2012).

Table 1. Trumpeter Swan Population Abundance Estimates and Trends in North American Based on the Five-year American Trumpeter Swan Survey (Last two surveys: 2005 and 2010; Source: Groves 2012).

Population	2005	2010	% Change (2005–2010)	Annual Growth Rate 2005–2010
Pacific Coast Population				
Alaska	23 692	25 347	7%	1.4%
Yukon and Northwestern British Columbia	1236	1443	17%	3.1%
Total	24 928	26 790	7%	1.5%
Rocky Mountain Population				
Canadian	4 718	8950	90%	13.7%
Montana, Wyoming and Idaho	453	487	8%	1.5%
Other U.S. Flocks	57	189	232%	27.1%
Total	5228	9626	84%	13.0%
Interior Population				
High Plain (U.S.)	471	573	22	4.0%
Mississippi and Atlantic Flyways	4176	9236	121	17.2%
Total	4647	9809	111%	16.1%
North America Total	34 803	46 225	33%	5.8%

- PACIFIC COAST AND ROCKY MOUNTAIN POPULATIONS

In previous surveys, the range of the Pacific Coast Population in Canada and part of the Rocky Mountain Population range in Canada (Yukon, north-central/northwestern British Columbia) were surveyed using a statistical sampling procedure, and a total count was attempted in the remainder of the range. Because of the increasing abundance and expanding breeding range of this population, in 2010, for the first time, the entire Canadian breeding range of the Pacific Coast Population and Rocky Mountain Population (Yukon, British Columbia, Alberta and the Northwest Territories; excluding some very sparsely occupied regions of northern Yukon and north-central British Columbia) was surveyed using a sampling procedure (Figure 1).

The Canadian portion of the Pacific Coast Population grew by 17% from 1236 birds in the 2005 survey to 1443 birds in 2010 (Table 1). The Canadian portion of the Rocky Mountain Population was estimated at 8950 in the most recent survey in 2010 (Table 1), a 90% increase since the previous survey in 2005 (estimate of 4728 swans). All Canadian areas of the Rocky Mountain Population exhibited growth since the 2005 survey, ranging from a 17% increase in Yukon to an increase of more than 150% in Alberta.

Changes to the survey methodology in 2010 are thought explain some of the apparent increase in the Rocky Mountain Population in British Columbia, Alberta and the Northwest Territories: previous surveys in these areas were likely underestimating the population.

During the winter period, more than 40% of the Pacific Coast Trumpeter Swan Population is present on the coastline, wetlands and agricultural fields of Vancouver Island and the Fraser River Valley in British Columbia; this used to be the largest wintering Trumpeter Swan concentration in North America. Aerial surveys were conducted every three years in Southwestern B.C., but they have since been discontinued. During the most recent survey, which was conducted in January and February of 2006, 7570 swans were counted, which represents a 11.7% increase from the 6775 swans observed in 2000–2001.

Small numbers of Trumpeter Swans of the Pacific Coast Population are also encountered in the annual Yukon Roadside Waterfowl Breeding Population Survey. The results show highly significant increases over the past 10, 15 and 20 years (Figure 2).

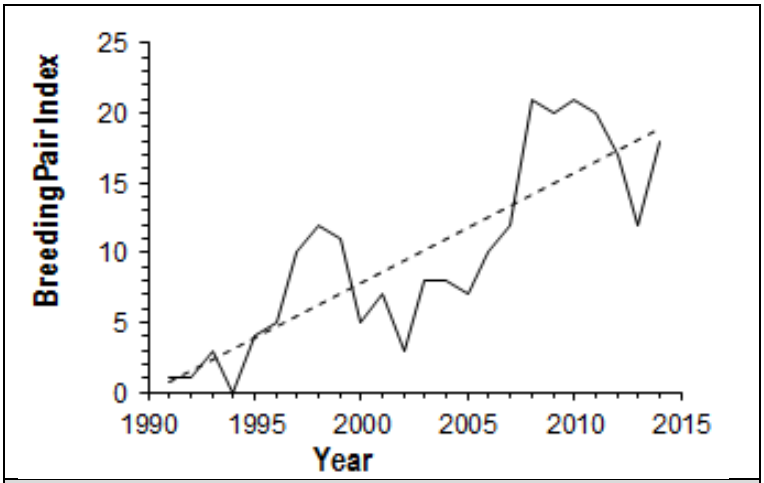

Figure 2. Breeding Pair Index for Trumpeter Swans in Southern Yukon, 1991–2014.

- INTERIOR POPULATION

The only formal survey in Canada of the Interior Population of Trumpeter Swans was conducted in 2010 in Riding Mountain National Park in Manitoba, where 49 swans were recorded, up from 30 in 2005 (Parks Canada, unpubl. data).

Harvest

In the past, hunting has led to declines and local extirpations in Trumpeter Swan populations. Hunting is now prohibited in Canada and the United States.

Management and Conservation Concerns

The top three management concerns for the Pacific Population of Trumpeter Swans are: losses by lead poisoning, habitat alteration, and crop depredation (Pacific Flyway Council 2006). Swan populations in northwest Washington State and on the Sumas Prairie, British Columbia, have since 1999 lost at least 2000 members to lead poisoning from the ingestion of lead pellets. International efforts were initiated in 2001 to locate the sources of lead. Telemetry studies identified Judson Lake, on the Canada–United States border, as a key site responsible for the lead shot poisoning. Swans were deterred from using Judson Lake through hazing activities (2006–09): an exclusion zone covering about half the lake was set up to prevent swans from accessing the section of the lake with the highest lead shot density (2009–present). Compared to the 5-year average prior to experimental management, lead-related swan mortalities have been reduced by 64% in the greater study area (Whatcom, Skagit and Snohomish Counties of Washington State and the Sumas Prairie of British Columbia) and 72% in the primary study area (Whatcom County and the Sumas Prairie) (L. Wilson, pers. com). Yellow (*Nuphar polysepala*) and fragrant pond lily (*Nymphaea odorata*) are the predominant floating plants on Judson Lake. Their extensive woody root systems may be preventing lead pellets from sinking deeper in the sediment, making the pellets accessible to swans, which represents a threat. The temporary removal of pond lilies from a portion of the lake is anticipated to reduce the amount of lead pellets available to swans by allowing them to sink deeper into the sediment. Although about 200 swans were, on average, dying every year from lead shot poisoning, the winter population continued to grow at an estimated rate of around 5% (S. Boyd, EC-Pacific and Yukon Region, pers.comm.).

In Ontario, a swan re-introduction program begun in 1982 had by 2005 achieved its goal of at least 500 free-living swans (H. Lumsden, ON Ministry of Natural Resources, unpubl. data). Surveys conducted in 2005 in Ontario as part of the continental five-year survey showed a total population of 644 swans in Ontario (Moser 2006). The captive-breeding and release program ended in 2006. The southern Ontario flock has continued to grow, and in 2010, 839 swans were estimated based on winter counts (H. Lumsden, ON Ministry of Natural Resources, unpubl. data). Breeding Trumpeter Swans have now also become established in northwestern Ontario, where in the summer of 2010, several aerial surveys and some anecdotal observations yielded a total of 274 birds in the regions west and north of Thunder Bay. Another flock has become established in eastern Ontario, numbering at least 54 swans during the summer of 2010 (H. Lumsden, ON Ministry of Natural Resources, unpubl. data).

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Population Status of Other Hunted Species

Murres

There are two species of murre: the Common Murre (*Uria aalge*) and the Thick-billed Murre (*Uria lomvia*). Murres occur in cooler waters of the North Pacific and North Atlantic oceans and adjacent parts of the Arctic Ocean. They often breed in dense colonies on coastal cliffs and islands. Common murres breed primarily in boreal and low arctic waters, whereas most Thick-billed Murres breed farther north in low and high arctic waters.

The Common Murre's breeding range in Canada is mostly limited to the Gulf of St. Lawrence, Quebec, and along the east coast of Newfoundland and south coast of Labrador (almost 90% of Common Murres breed in Newfoundland). Small numbers nest on islands off the coast of Nova Scotia and in the Bay of Fundy. They also breed on islands off the coast of British Columbia.

Some Thick-billed Murres breed in small numbers among Common Murres on the Pacific and Atlantic coasts, but most breed in the Arctic regions of Canada, Alaska, and Greenland north of the 60th parallel. They concentrate in a few very large colonies (i.e., more than 0.5 million breeding individuals) such as the colony on Digges Island in northern Hudson Bay.

The breeding distributions of the two species overlap extensively in the Pacific region, but less so in the Atlantic (Ainley et al. 2002).

Abundance and Trends

In Canada, both species are most abundant on the Atlantic coast. Small numbers of Common Murres breed in B.C. and a small number of Thick-bill Murres breed in the western Arctic as well.

With the exception of a few colonies of Common Murres, long-term monitoring programs indicate that the number of murres breeding at colonies in the Northwest Atlantic and the eastern Arctic are stable or increasing (Gaston 2002b; Chardine et al. 2003; Robertson et al. 2004; Regular et al. 2010). The use of new methodologies to estimate colony size (i.e., using digital photography and geographic information systems) shows that the size of some large colonies was previously underestimated, implying that population sizes may be larger than previously estimated (A. Gaston, unpubl. data; S. Wilhelm, unpubl. data).

Harvest

Most Thick-billed Murres, as well as a very small number of Common Murres, are hunted as they migrate off the coast of Greenland, and Aboriginal people in Canada harvest a few thousand near the breeding colonies each year.

Thick-billed Murres have been hunted traditionally in winter for generations off the coast of Newfoundland and Labrador. Murres are not considered migratory game birds. However, when the province joined Canada in 1949, the importance of murre hunting to residents of Newfoundland and Labrador was recognized, and a variety of legislative and regulatory amendments have since been made to allow for the legal harvest of murres in Newfoundland and Labrador (Chardine et al. 2008).

Through the 1970s and 1980s, large unregulated harvests necessitated improved hunter education, regulatory changes, and increased enforcement (Elliot 1991). These efforts appear to have been successful in reducing the annual harvest from 750 000 birds to approximately 250 000 birds by the early 2000s (Chardine et al. 1999). Reduced winter sea ice cover appears to have led to the redistribution of murres wintering off eastern Newfoundland, resulting in a reduction of the harvest pressure (Gaston 2002a; Gaston and Robertson 2010). Reductions in winter ice cover associated with climate change may further affect the number of birds available for harvest.

The estimated number of murres harvested in Newfoundland and Labrador in 2013 was 117 000 birds (Table 1; Gendron and Smith 2014). However, concerns have been expressed around the accuracy of the existing harvest estimates. Work is being conducted to refine these estimates and improve the assessment of harvest levels. A 2009 Hunter Opinion Survey conducted by the CWS in Newfoundland and Labrador indicated that the murre harvest was somewhere between 115 000 and 180 000 murres per year, with a sustainable harvest of 500 000 birds.

Table 1. Harvest Estimates of Murres in Canada, 2010–2013 (No data available for previous years).

2010	51 697
2011	65 852
2012	52 875
2013	116 792

Management and Conservation Concerns

Numbers of both species have been significantly reduced over the last century because of human disturbance, hunting, oil pollution and probably commercial fisheries development. Murres have been hunted by residents of Newfoundland and Labrador and by Aboriginal people for generations. The hunt is legally managed through the *Migratory Bird Regulations* and Newfoundland residents were granted hunting rights soon after they entered Confederation, in 1949. However, until 1994, there was no limit to the number that could be legally killed, and daily takes often exceeded 500 birds per hunter. Between 600 000 and 900 000 birds were shot annually during the 1970s and 1980s, but current levels are between 200 000 and 400 000 birds each year. Although regulations now exist, enforcement is difficult and murres are often harvested illegaly, which could negatively impact the species' populations.

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American Woodcock (*Scolopax minor*)

The American Woodcock (hereafter “woodcock”) is a popular migratory game bird in Canada and the U.S. A dedicated survey for the American Woodcock suggests a moderate decrease in population size relative to the early 1970s.

Woodcock breed in Canada from southeastern Manitoba across south and south-central Ontario, southern Quebec, the Maritimes and southern Newfoundland. They also breed throughout the eastern United States. Woodcock winter in southern parts of the breeding range in the southeastern United States.

Abundance and Trends

Reliable annual population estimates and harvest estimates are essential for comprehensive Woodcock management. However, such information is difficult to obtain. Woodcock are difficult to find and count because of their cryptic colouration, small size, and preference for areas that are densely vegetated (Cooper and Rau 2014). Thus, the status of Woodcock in North America is monitored through the Singing-ground Survey, which consists of a spring count of male courtship displays at dusk. Counts of singing males provide indices of Woodcock populations and can be used to monitor annual population changes (Cooper and Rau 2014). The survey covers the central and northern portions of the woodcock breeding range. Analyses of band recoveries indicate that there are two relatively discrete populations, and as a result, Woodcock are managed on the basis of two regions: the eastern region and the central region. In Canada, Woodcock breeding in Manitoba and Ontario belong to the Central Population, while those breeding in Quebec and the Maritimes are part of the Eastern Population.

Woodcock Singing-ground Survey data for 2014 indicate that the index for singing Woodcock males in the Eastern Management Region was not significantly different from 2013, while there was a significant decline of 7.3% in the Central Management Region (Figure 1; Cooper and Rau 2014). There was a significant declining 10-year trend for Woodcock in both management regions for the 2004–2014 period. This marks the first time in 10 years that there has been a declining 10-year trend in the Eastern Management Region and the first time in 3 years there has been a declining 10-year trend in the Central Management Region. Both regions showed a significant, long-term (1968–2014) declining trend (–1.0% per year for the Eastern Management Region and –0.9% per year for the Central Management Region) (Cooper and Rau 2014).

In Canada, the number of Woodcock estimated from the surveys over the long-term period (1968–2014) showed a significant decline (–0.9%) in Ontario. There were no significant trends in Quebec or in the Maritime provinces.

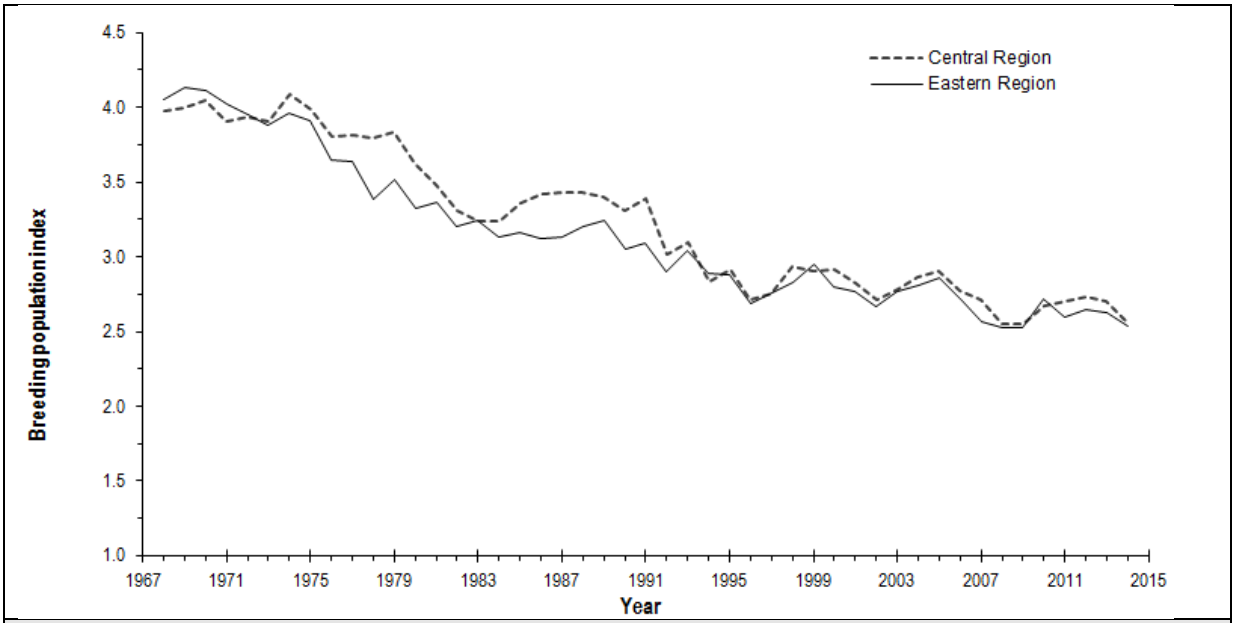

Figure 1. American Woodcock Breeding Population Indices (Singing-ground Survey; source: Cooper and Rau 2014).

An indirect measurement of recruitment or annual productivity of Woodcock is derived from age ratios of wings collected from the U.S. national harvest (Wing-collection Survey). In the U.S., the 2013 recruitment index of 1.60 immatures per adult female for the eastern region populations represents a decrease from the estimate of 1.70 recorded in 2012, as well as a decline from the long-term (1963–2012) average. The index of 1.54 for the Central Region was lower than the 2012 index of 1.70, and below the long-term average of 1.56 (Cooper and Rau 2014). The 2013 recruitment index in Canada (i.e. Ontario, Quebec, Nova Scotia and New Brunswick) of 1.59 was comparable to the 5-year average (2008–2012) of 1.76 (Gendron and Smith 2014).

Harvest

The harvest of American Woodcock in Canada and the U.S. had been declining over the past decades, but has recently stabilized. The decline, however, was much more pronounced in the U.S. (Figure 2). In 2013, there were 33 533 Woodcock harvested in Canada, a number 30% above the 10-year average. Nevertheless, the number of woodcock hunters in Canada has been undergoing a long-term decline, from about 20 000 hunters in the late 1970s to about 2000–4000 annually in the past ten years. In the U.S., the 2013 harvest was estimated at 243 100 Woodcock, a decrease from the harvest of 279 500 birds in 2012 and a value 6% below the 10-year average.

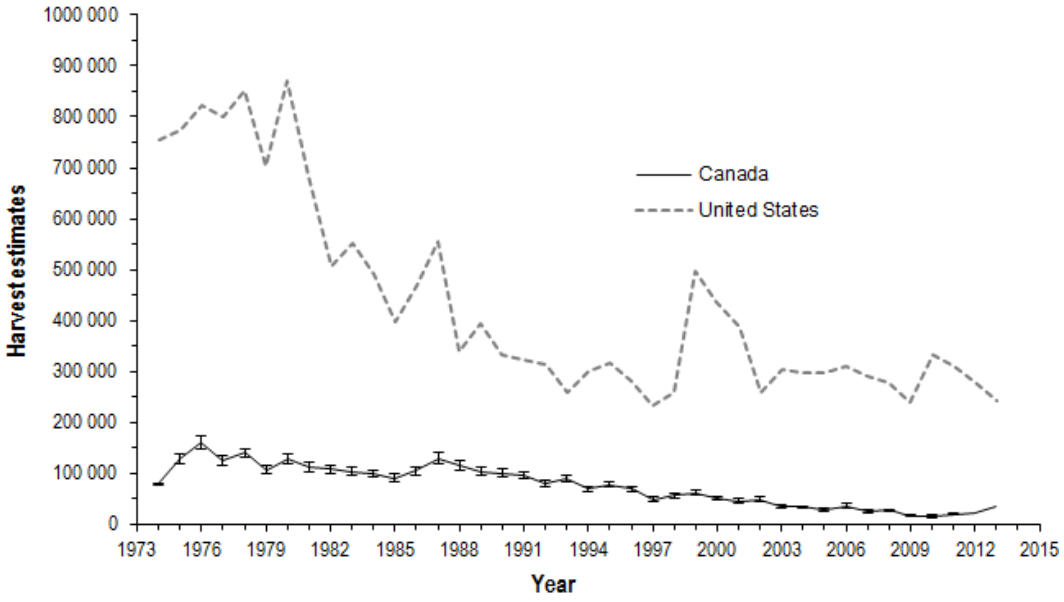

Figure 2. American Woodcock Harvest Estimates in Canada and the United States
[Sources: M. Gendron and A. Smith 2014 (CWS, Canadian data), and Cooper and Rau 2014 (USFWS, U.S. data)].

Management and Conservation Concerns

The major causes of American Woodcock population declines are believed to be the degradation and loss of suitable (early succession) habitat on both the wintering and breeding grounds (Kelley et al. 2008). Woodcock prefer young or recently disturbed forest; abandoned farmland mixed with forest is ideal. The maturation of forests, the suppression of fire, agricultural intensification, and urbanization may all have contributed to the decreases observed in American Woodcock populations.

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American Coot (*Fulica americana*)

The American Coot breeds from British Columbia to Ontario, with high densities in the Prairie provinces. American Coots were more abundant in Canada prior to a decline in the early 20th century related to wetland loss and overhunting (Brisbin and Mowbray 2002).

Abundance and Trends

Information on population status of the American Coot at a continental level comes from the Breeding Bird Survey (Environment Canada 2011a). In Canada, the species' abundance is showing a moderate increase (Environment Canada 2011b), but the BBS is poorly designed for monitoring population trends of marsh birds.

American Coots are also recorded during the Waterfowl Breeding Population and Habitat Survey (WBPHS) in the Canadian Prairies. Results show that population estimates have fluctuated greatly since the 1970s (Figure 1), with a tendency towards an increasing trend. In the Canadian Prairies, the 2014 (2.5 million birds) estimate was 46% above the 10-year average (1.7 million birds). Although the WBPHS covers the core of the American Coot breeding range, many individuals breed outside of the area covered by the survey (Case and Associates 2010).

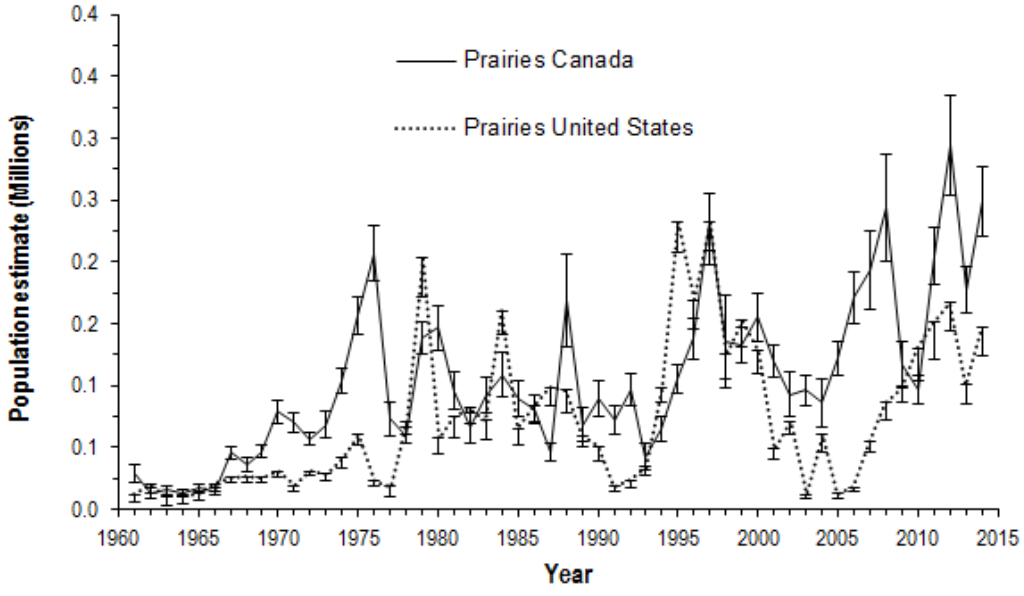

Figure 1. American Coot Breeding Population Estimates (± 1 SE) Based on the WBPHS in the Canadian and U.S. Prairies.

Harvest

The harvest of American Coots in Canada has fallen considerably over time, from an average of 40 000 birds per year in the mid-1970s to fewer than 3000 birds per year for the 10-year period from 2004–2013 (Table 1). In the U.S., harvest has remained more stable through the years.

Table 1. Harvest Estimates of American Coots in Canada and the United States.

	Canada									U.S.[1]	Continental
	Atlantic	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974		6 151	11 916	4 828	18 772	5 462	2 617			49 746		
1975		5 563	17 478	5 491	15 370	8 624	858			53 384		
1976		6 929	12 727	4 296	10 755	10 720	2 560			47 987		
1977		4 078	3 751	3 341	6 276	7 235	2 170	46	20	26 917		
1978		6 412	9 704	4 543	5 293	7 434	1 275	218	32	34 911		
1979		4 988	10 659	3 618	5 581	4 222	948	64		30 080		
1980		7 477	5 972	1 661	5 115	3 003	402	53	4	23 687		
1981		8 038	4 342	1 293	3 486	3 729	1 946	27	7	22 868		
1982		6 752	6 005	2 271	2 005	1 548	1 567	5		20 153		
1983		9 130	3 766	1 264	1 978	3 947	304			20 389		
1984		11 361	6 273	860	4 407	3 558	921	14		27 394		
1985		5 991	5 633	1 528	5 106	1 719	1 027	106		21 110		
1986		5 639	4 454	989	2 370	959	895		23	15 329		
1987		4 050	2 387	379	1 121	1 569	990			10 496		
1988		5 862	2 800	600	933	442	882			11 519		
1989		4 470	2 329	1 140	1 122	205	648			9 914		
1990		4 996	2 058	631	382	462	341			8 870		
1991		3 653	2 170	517	527	610	250	4		7 731		
1992		2 072	1 692	467	886	823	650			6 590		
1993		2 887	1 392	1 254	245	1 098	517			7 393		
1994		1 070	2 252	327	1 441	720	484	3		6 297		
1995		2 534	1 442	623	1 129	961	237	13		6 939		
1996		1 404	1 289	556	1 814	1 598	169			6 830		
1997		1 318	1 535	954	392	642	412			5 253		
1998		1 443	1 450	491	339	487	503			4 713		
1999[(2)]		669	2 493	500	1 078	506	276			5 522	236 009	241 531
2000		669	2 493	296	180	315	181			4 134	104 509	108 643
2001		666	366	149	579	119	767			2 646	284 440	287 086
2002		407	343	748	213	60	229			2 000	205 372	207 372
2003		517	283	789	420	362	66	125		2 562	193 976	196 538
2004		844	248	413	163	865	71			2 604	181 262	183 866
2005		1 141	953	1 156	491	551	115			4 407	273 781	278 188
2006		103	258	210	1 334	327	75			2 307	199 079	201 386
2007		429	502	982	537	1 168	127			3 745	201 324	205 069
2008		1 051	508	489	495	153	58			2 754	275 869	278 623
2009		222	443	285	1 103	376	37			2 466	219 032	221 498
2010		24	86	38	414	315	20			897	593 394	594 291
2011		609	296	55	582	486	15			2 043	416 628	418 671
2012		444	188	127	25	1 255	229			2 268	163 700	165 968
2013		379	213	445	596	520	31			2 184	254 900	257 084

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway

[2]The USFWS implemented an improved national harvest survey in 1999.

The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2014 (CWS, Canadian data), and R.V. Raftovich *et al.* 2014 (USFWS, US data)

Management and Conservation Concerns

While the loss of wetland habitat has contributed to the historical decline of American Coots, this species has likely been less affected by habitat change than other marsh birds (Brisbin and Mowbray 2002). The preference of the American Coot for seasonal or temporary wetlands, along with its ability to successfully colonize new sites when water levels change, has minimized the impacts of habitat alteration, although

drought conditions have been known to contribute to sudden temporary declines (Brisbin and Mowbray 2002).

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Common Gallinule (*Gallinula galeata*)

The Common Gallinule is a secretive marsh bird that is primarily found in southern Ontario and southwestern Quebec, with some birds also detected in eastern New Brunswick and western Nova Scotia. In Canada, the species breeds primarily in well interspersed freshwater marshes, but also uses man-made impoundments and sewage lagoons.

Abundance and Trends

No population estimate for the Common Gallinule is currently available for Canada. Data from the Ontario Breeding Bird Atlas and Great Lakes Marsh Monitoring Program show a large declining population trend over the past 20 years. Yowever, long-term data are not available (Figure 1).

For more information on the Great Lakes Marsh Monitoring Program see: www.bsc-eoc.org/volunteer/glmmp/index.jsp?lang=EN&targetpg=index.

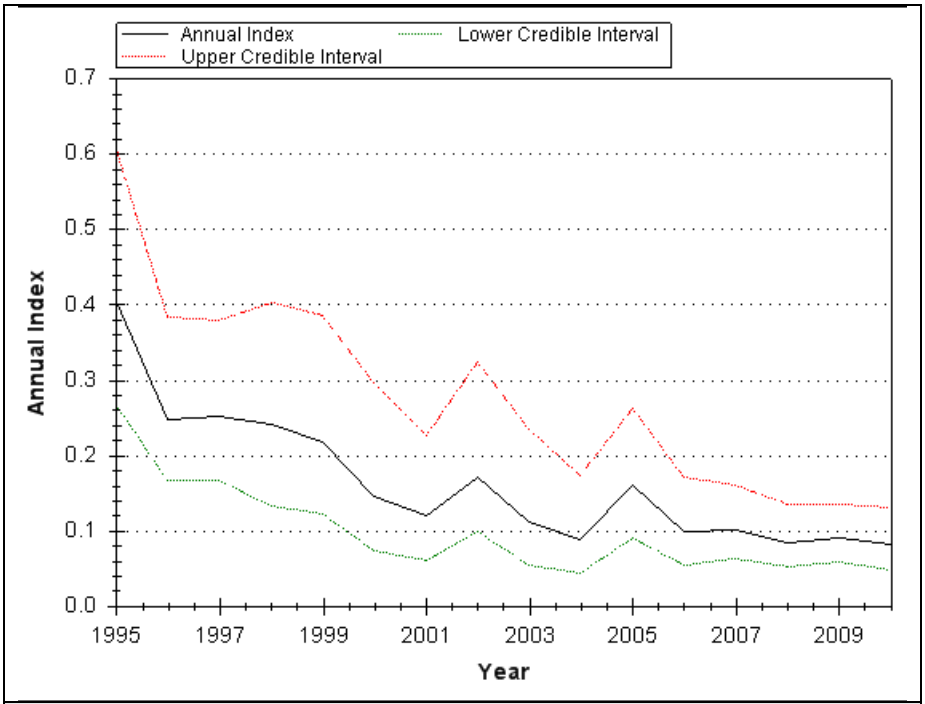

Figure 1. Population Trend for Common Gallinule in Ontario (Great Lakes Marsh Monitoring Program, 1995–2010).

Harvest

The estimated U.S. gallinule harvest averaged 44 597 birds per year from 1977 to 1992. However, these estimates do not distinguish between the Common Gallinule and the Purple Gallinule (Bannor et al. 2002). The harvest of Common Gallinules in Canada is very small. Too few birds are reported as part of the National Harvest Survey to generate reliable harvest estimates.

Management and Conservation Concerns

In recent years, efforts have been made to improve the collection of harvest information) and the monitoring of secretive marsh bird populations across North America, especially in Canada, where no data are available (D.J. Case and Associates 2010; Seamans et al. 2013). Given the significant population decline of the Common Gallinule in Ontario over the last 20 years, the species is listed as a

priority species in Ontario with the associated objective of reversing its decline (Zeran et al. 2009). Consequently, , the CWS (Ontario Region), initiated in 2012 a pilot banding project of gallinule in Ontario in partnership with the Ontario Ministry of Natural Resources and Forestry. From 2012 to 2014, 212 Common Gallinules were banded in Ontario during pre-season duck banding activities. To date, two gallinules have been recaptured during banding operations but no bands have been recovered by hunters. Thus the use of stable isotopes or elemental concentrations to link up harvest (through hunter-returned wings) to natal origin is being investigated.

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Mourning Dove (*Zenaida macroura*)

The Mourning Dove is one of the most familiar and heavily harvested migratory game birds (especially in the United States), as well as one of the most abundant and widespread avian species in North America. The species is a common breeder in urban and rural areas across southern Canada reaching, but the greatest breeding densities are found within the Lower Great Lakes and St. Lawrence Plain Region of Ontario and Quebec in the east, and in the Prairie Pothole Region of Manitoba, Saskatchewan and Alberta in the west.

The Mourning Dove is monitored in Canada through the Breeding Bird Survey (BBS). Results from the survey indicate that the population increased markedly since 1970, but has leveled off during the most recent decade (Environment Canada 2011). The estimated population in Canada is 500 000 to 5 million adults (Environment Canada 2011). BBS data from 2013 and 2014 were not available at the time this report was produced.

In the United States, Mourning Dove populations were in the past monitored through the Mourning Dove Call-count Survey (CCS). The CCS was conducted from 1966–2013 but subsequently discontinued. Since 2014, Mourning Doves are only monitored by the BBS (Seamans and Sanders 2014). Mourning Doves are managed on the basis of three regions where dove populations are largely independent. These areas are referred to as the Eastern, Central and Western Management Units. Results from the BBS indicate that the abundance of doves increased in the Eastern Management Units during the long term (1966–2013) and 10-year term (2004–2013). There was evidence of a decline in the Central and Western Management Units over the long and 10-year term periods. The 2014 BBS data were not available at the time this report was produced.

In 2013 the population size in the United States was estimated at approximately 274 million birds (Seamans and Sanders 2014).

Harvest

In Canada, there has been an annual hunting season for the hunting season since 1960 in British Columbia, and in 2013 a dove hunting season was introduced in Ontario. The harvest in British Columbia has declined considerably over the years, ranging from 5391 doves killed in 1977 to 89 birds during the 2013 season. During the first hunting season in Ontario, 17 990 birds were harvested (Gendron and Smith 2014).

Dove hunting is permitted in 40 of the 50 states, where 15–20 million birds are harvested annually (representing 5–10% of the continental dove population, Otis et al. 2008). In 2013, approximately 14.5 million birds were harvested in the United States by approximately 850 000 hunters, an estimate similar to the estimate for the 2012 hunting season (Seamans and Sanders 2014).

Management and Conservation Concerns

A habitat generalist, the Mourning Dove has adapted well to the presence of humans and to human-induced changes in both urban and rural landscapes. Currently, there are no major threats to the species (Otis et al. 2008).

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Wilson's Snipe (*Gallinago delicata*)

Wilson's Snipe is one of the most abundant and widespread shorebird in North America. Its numbers have been relatively stable since the late 1960s or 1970s. The species is hunted in both Canada and the United States.

Abundance and Trends

The Wilson's Snipe is difficult to monitor because of its inconspicuous nature. It is monitored in Canada through the Breeding Bird Survey (BBS), but this survey was not designed to monitor population trends for this species and it covers only a portion of its large range. As a result, population trends based on these data should be interpreted with caution.

BBS data suggest that snipe numbers have been increasing since the 1970s. Increasing trends have also been observed in Manitoba and Saskatchewan, but population numbers appear to be declining in New Brunswick, the Northwest Territories, Nova Scotia and Prince Edward Island in this same period (Environment Canada 2014). The Canadian population—birds breeding and migrating—is estimated at 1 million individuals (Environment Canada 2011).

Harvest

The species is hunted by a relatively small number of hunters compared to other species of waterfowl, and these hunters harvest a relatively small number of birds (Case and McCool 2009). The harvest of Wilson's Snipes has declined in Canada and the United States since the 1970s, but it appears to have stabilized at a low level over the past few decades (Figure 1).

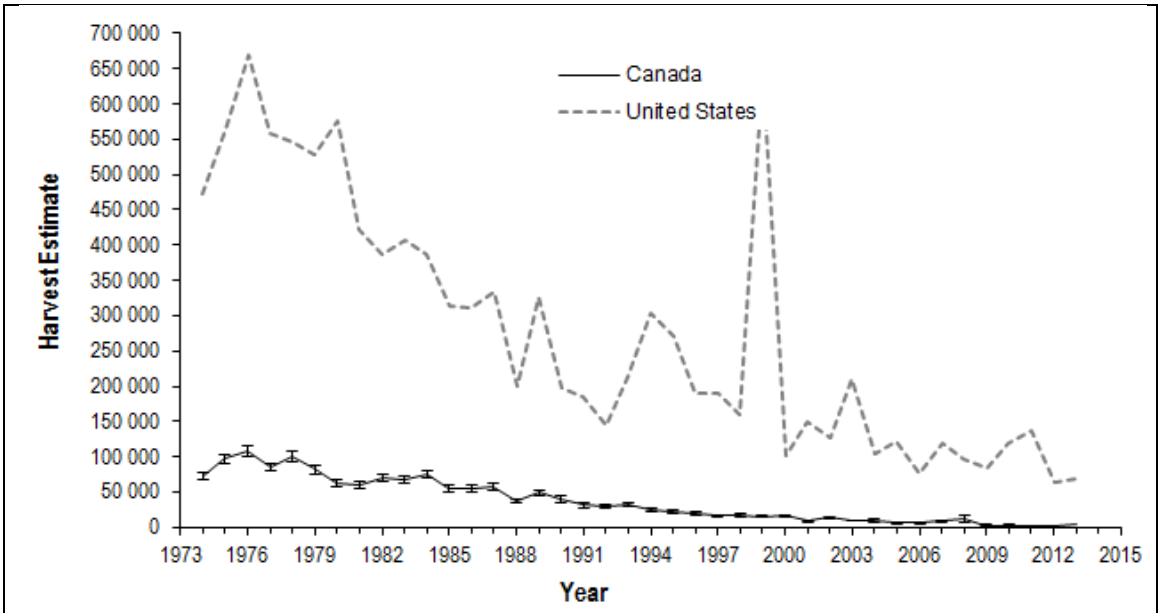

Figure 1. Harvest Estimates of Wilson's Snipes in Canada and the United States
(Source: Gendron and Smith 2014, CWS and Raftovich et al. 2014, USFWS).

Management and Conservation Concerns

Given that the Wilson's Snipe depends on wetlands, the draining and conversion of wetlands is detrimental to this species. Other threats to the specids include collisions with lighthouses, communication towers, buildings, and cars (Mueller 1999).

An assessment was conducted in 2009 to identify priority information needs for rails and snipes (Case and McCool 2009). One of the resulting recommendations was to undertake information gathering and evaluate the potential importance of habitats and harvest levels at the range-wide scale, including in Canada, the U.S. and Mexico (Case and McCool 2009).

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Sandhill Crane (*Grus canadensis*)

Two Sandhill Crane populations breed in Canada: the Mid-continent Population and the Eastern Population. The Mid-continent Population, numerically the most abundant, is stable and is above the population objective, while the Eastern Population shows a long-term increasing trend.

Abundance and Trends

- MID-CONTINENT POPULATION

The Mid-continent Population is the largest of all North American crane populations. The population is composed of approximately two-thirds Lesser Cranes (*Grus canadensis canadensis*), one-fourth Canadian Sandhill Cranes (*G. c. rowani*) and the remainder of Greater Sandhill Cranes (*G. c. tabida*). Mid-continent Sandhill Cranes breed from southern Ontario northwestward through the Arctic and Alaska and into eastern Siberia. This population winters in western Oklahoma, New Mexico, southeastern Arizona, Texas and Mexico.

The Mid-continent Population of Sandhill Cranes is monitored through a spring aerial transect survey in its key staging areas in Nebraska, United States (>90% of the Mid-continent Population is found in that area at the time of the annual survey, Kruse et al. 2014). Population indices corrected for visibility bias have been available since 1982. The Sandhill Crane population has been relatively stable since the early 1980s. The uncorrected population index in spring 2014 was 444 144 birds, which was 30% higher than the long-term average (Kruse et al. 2014; Figure 1). The photo-corrected three-year average for 2011–2013 was 563 167 birds, which is above the established population objective range of 349 000−472 000 cranes.

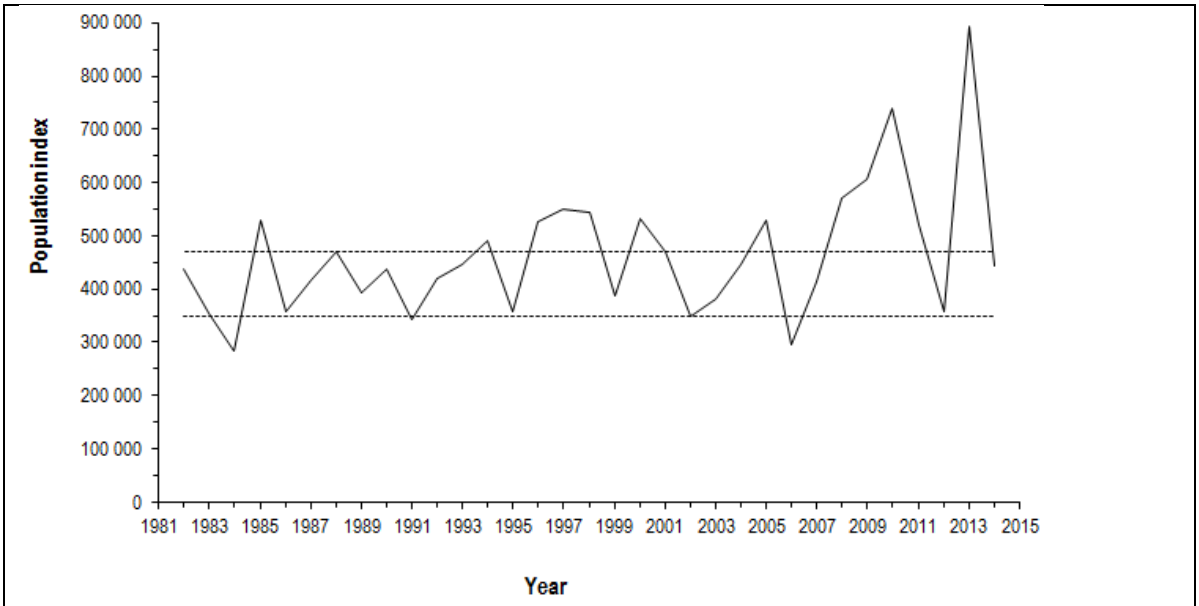

Figure 1: Spring Population Indices for Mid-continent Sandhill Cranes in their Spring Staging Areas (Central Platte River Valley, Nebraska and Adjacent Areas) (The 2014 value is not corrected for visibility bias, but values for previous years are) (The dashed lines represent the lower and upper limits of the population objective) (Source: Kruse et al. 2014).

- EASTERN POPULATION

The Eastern Population of Sandhill Cranes has rebounded from near-extirpation in the late 1800s to a level that exceeded 30 000 cranes in 1996 (Kruse et al. 2013). Strict regulation of the harvest, combined with the protection and restoration of habitat, has allowed the population to expand both in size and

geographic range (Case and Sanders 2009).

The Eastern Population of Sandhill Cranes breeds in Ontario, Quebec, and several Great Lakes states. Since 1979, the USFWS has conducted a survey of this population while the birds are in their major migratory staging areas in the Mississippi and Atlantic Flyways. The survey is conducted each year during the last week of October and provides a fall index of the population abundance. The survey has documented a long-term (1979−2009) increasing trend of 3.9% per year in the population abundance (Kruse et al. 2013). The 2013 count was of 64 322 cranes, a decrease of 27% compared to numbers from 2012 (Kruse et al. 2014).

In Ontario, surveys of staging Sandhill Crane have been conducted for over two decades on Manitoulin Island and on the north shore of Lake Huron. These surveys were, until 2013, coordinated by the Manitoulin Island Nature Club and took place during the peak migration period. Numbers reached an all-time high in October 2009—likely due to increased survey effort, and have since then fluctuated as a function of the availability and interest of volunteers. In 2014, the crane survey conducted by the Manitoulin Island Nature Club was discontinued. The Canadian Wildlife Service (Ontario Region) initiated in 2013 a study to develop an operational survey of the Eastern Population Sandhill Crane in Ontario. During the fall of 2013 and 2014, the minimum population counts were of 7207 and 7490 cranes, respectively. Note, however, that counts between years are not comparable due to differences in survey coverage and effort.

In Quebec, the 2014 population estimate from the helicopter plot survey component of the WBPHS was 3400 indicated breeding pairs, an increase compared to the 10-year average of 3100 birds, but a decrease compared to the 2013 estimates of 5400 birds (Figure 2). The survey covers only the southern portion of what is thought to be the core breeding area of Sandhill Cranes in Quebec. The 1996–2014 trend shows an increase of 11% annually (C. Lepage, CWS-Quebec Region, unpubl. data.). A comparison of the 2010–2014 and the 1984–1989 population distributions in Quebec shows the dramatic expansion of the species in the province (www.atlas-oiseaux.qc.ca/donneesqc/cartes.jsp?lang=en).

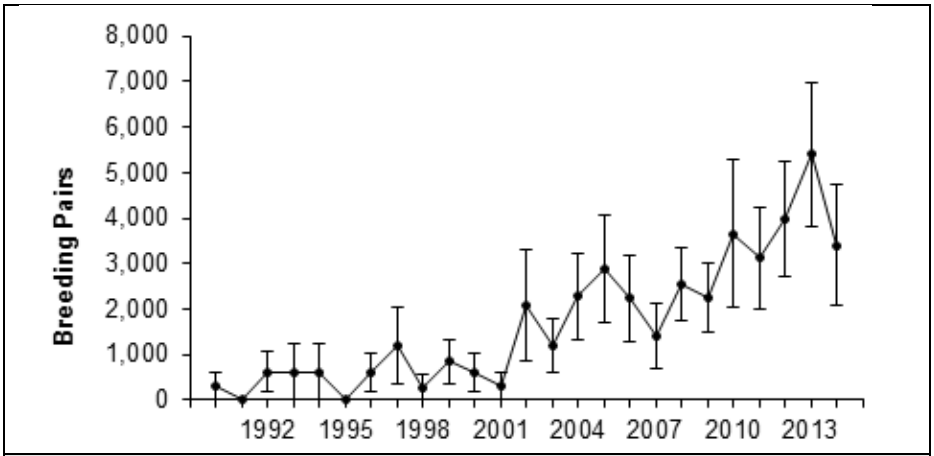

Figure 2. Estimated Breeding Pair Numbers (± 1 SE) of Sandhill Cranes in the WBPHS in Eastern Canada (Estimates are based on helicopter plot survey only; Source: C. Lepage, CWS- Quebec Region, unpubl. data).

Research Highlight

A study by the Long Point Waterfowl Research Centre is examining the behaviour and habitat use of cranes along the northern shore of Lake Huron. Telemetry data of marked cranes from this study show that these birds overwinter as far south as Florida, but that during mild winters, some birds may overwinter in more northerly states, such as Indiana. It is expected that the study's final results will be available in 2015 (S. Meyer, CWS-Ontario Region, pers. comm.).

Harvest

- MID-CONTINENT POPULATION

The Canadian hunting season for the Mid-continent Sandhill Crane Population is currently open only in Manitoba, Saskatchewan and Yukon. The harvest has been quite variable, but hs been trending upward in Canada since the 1970s (Figure 3). The harvest in both Manitoba and Saskatchewan, however, showed sharp declines in the late 2000s. The Canadian harvest of this population of Sandhill Cranes is largely driven by non-Canadian hunters. Typically, over 50% of the harvest is by non-Canadian residents and, in recent years that proportion has been 70–80% (G. Raven, CWS-Prairie and Northern Region, pers. comm.). The overall Canadian harvest of Mid-continent Population Sandhill Cranes was 9883 birds in 2013, up 96% from 2012 (5041 birds; Figure 3, Gendron and Smith 2014).

In the United States, the harvest of Sandhill Cranes from the Mid-continent Population has increased over time. In 2013, the harvest increased to 23 191 birds, a 34% increase compared to the harvest for the previous year (17 295 birds; Figure 3; Kruse et al. 2014).

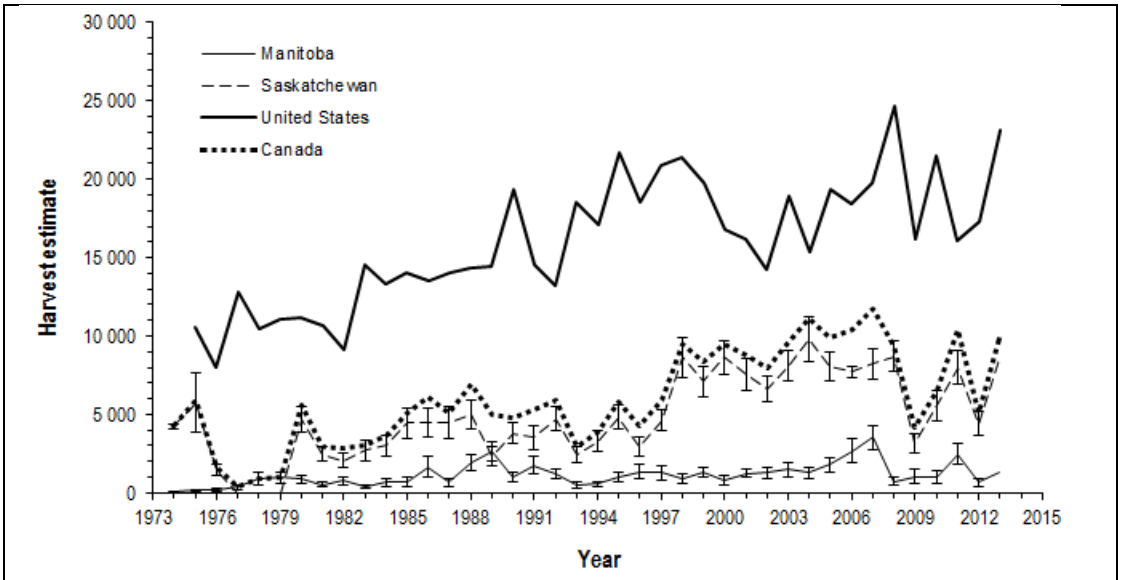

Figure 3: Harvest Estimates of Sandhill Cranes in Canada and the United States
(Canadian harvest estimates (SE) and U.S. harvest estimates. Total numbers for Canada also include harvest estimates in the Yukon [Source of data: Gendron and Smith 2014 (CWS, data for Canada), and Kruse et al. 2014 (USFWS, data for United States].

- EASTERN POPULATION

Eastern Population Sandhill Cranes are presently not harvested in Canada. However, they are hunted in two states in the U.S. The states of Kentucky and Tennessee held their third hunting season for Eastern Population Sandhill Cranes in 2013: a total of 437 cranes were harvested in the two states combined (Kruse et al. 2014).

Management and Conservation Concerns

Sandhill Crane populations endured significant declines throughout North America during the first half of the twentieth century, primarily due to habitat loss, increased human encroachnment, and overhunting (Gerber et al. 2014). The conservation of Sandhill Crane critical habitat is the most important factor to consider for the long-term conservation of the population. In fact, the single most important factor regulating Sandhill Crane populations is habitat availability (Tacha et al. 1992).

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Band-tailed Pigeon (*Patagioenas fasciata*)

In Canada, the Band-tailed Pigeon is found in forested habitats of coastal British Columbia. The species has a very low reproductive rate (clutch size of one egg), but some birds will nest twice in a season. The species' population has suffered a large decrease since the 1970s, in part due to overharvesting. The harvest has been severely limited in Canada for the past 20 years. The Band-tailed Pigeon has been identified as a species of "Special Concern" and was listed in 2011 under the Species at risk Act.

Abundance and Trends

Two surveys provide an annual index of the size and trend of the Band-tailed Pigeon population in Canada: the Breeding Bird Survey (BBS, which covers only 50% of the species' breeding range in Canada) and the Mineral Site Survey, which was developed in 2001 and implemented in 2004 by the Pacific Flyway Study Committee to provide an annual index of the abundance of Pacific coast Band-tailed Pigeons. Results from these surveys indicate a decline in the population over the last decade (COSEWIC 2008). However, no precise estimate of the size of the Canadian population is available.

- BREEDING BIRD SURVEY (BBS)

The BBS has provided an annual index of the abundance of the Band-tailed Pigeon since 1970. Results from this survey indicate a declining trend in the population over the long (1970–2012) and short terms (2002–2012) in British Columbia. Pigeon abundance declined annually by 4% in Canada from 1973 to 2012 (Environment Canada 2014). Extrapolations from this survey suggest an estimated population of 160 000 Band-tailed Pigeons in Canada (Partners in Flight Science Committee 2013).

- MINERAL SITE SURVEY

The Mineral Site Survey was developed as an alternative method to assess population trends of Pacific coast Band-tailed Pigeons (Sanders 2014). Pigeons gather at mineral sites (50−200 individuals) to ingest sodium (COSEWIC 2008). The Mineral Site Survey involves a visual count of Band-tailed Pigeons at several of these mineral sites throughout the population's range (California, Washington State, Oregon and British Columbia). Results from the 2014 survey were inconclusive for the Pacific coast Band-tailed Pigeon (Sanders 2014). In British Columbia, the Band-tailed Pigeon population showed a 7% decline trend over the last 10- and 5-year periods (Tables 1, Sanders 2014).

Table 1. Estimated Trend (Lower and Upper 95% Credible Intervals) in Band-tailed Pigeon Abundance on Mineral Site Survey in British Columbia During the 10- (2004–2013) and 5-year (2009–2013) Periods (Trends are expressed as the percent change per year) (Source: Sanders 2014).

Period	Trend	LC	UC
2004–2013	–7.7	–15.7	2.0
2009–2013	–7.3	–16.6	5.0

Harvest

The Canadian hunting season for the Band-tailed Pigeon was closed between 1994 and 2000. Population increases in Washington State were primarily responsible for the limited re-opening that was implemented in British Columbia in 2001.

The Canadian harvest has been declining since the early 1970s, at which time between 5000 and 8000 birds were harvested annually. At least 13 Band-tailed Pigeons were harvested in Canada in 2013, a number comparable to that for 2012. The estimated total harvest in 2013 in the United States was 8300 pigeons, fewer than the 13 700 birds harvested in 2012 (Sanders 2014).

Management and Conservation Concerns

The causes of the historical continental-scale decline of the Band-tailed Pigeon population are unknown, but past excessive harvest in the United States is thought to be a major cause. Habitat loss is likely also a contributing factor in Pacific Coast population declines. Band-tailed Pigeons are subject to trichomoniasis, a parasitic disease caused by the protozoan parasite *Trichomonas gallinae*. This parasite has caused major mortality events in this species, in addition to some less-easily detected chronic losses (Sanders 2014).

The Band-tailed Pigeon was identified in 2008 by the Committee on the Status of Endangered Wildlife as a species of "Special Concern" in Canada the because of concerns over long-term population declines and habitat loss (COSEWIC 2008). Information on the legal status of this species under the Species at Risk Act (SARA) and assessment and recovery documents is available at: www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1013). The species is listed as a conservation priority in one or more Bird Conservation Strategies in Canada (www.ec.gc.ca/mbc-com/default.asp?lang=En&n=3C2CA334-1).

In much of its range, the Band-tailed Pigeon seeks a mineral supplement to its diet of berries, which contain few minerals (Jarvis and Passmore 1992). Mineral sites have been known for many years to be important areas that are used by Band-tailed Pigeons (Sanders 2000). In the interior, springs (e.g., hot springs) are used by the birds to obtain the necessary minerals, while in coastal areas the birds find the minerals in intertidal flats. Logging may negatively affect habitat availability and quality for this species by creating dense second-growth forests that harbour few berry-producing shrubs (COSEWIC 2008). However, the immediate effects of logging are to open up the canopy and promote the growth of shrubs, which may benefit the species in the short term.

The single greatest challenge in the monitoring and management of Band-tailed Pigeon populations is the lack of reliable information on population size. Existing surveys provide only trends in abundance and no reliable information is available on the total population size.

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Rails

Four species of rails are found in Canada: the Virginia Rail (*Rallus limicola*), the Yellow Rail (*Coturnicops noveboracensis*), the King Rail (*Rallus elegans*) and the Sora (*Porzana carolina*). Rails are secretive marsh birds that breed and stage in many wetlands in Canada. Most often, they remain hidden in dense emergent vegetation, which makes surveying and hunting them challenging.

Abundance and Trends

Although rails are counted during the Breeding Bird Survey (BBS), their secretive behaviour and infrequent calling habits result in low detectability during surveying. Population trends based on these results should therefore be interpreted with caution.

- VIRGINIA RAIL

In Canada, Virginia Rails breed in the southern part of most provinces. Population trends are available for Canada, Ontario and Manitoba for the 1970–2012 and the 2002–2012 time periods. Population trends for Canada and both provinces show an increase over the long-term (Environment Canada 2014).

- KING RAIL

In Canada, the King Rail breeds essentially in southern Ontario. There are insufficient data to estimate a recent population trend for King Rails because of the relatively low numbers of this species that are detected during the BBS survey. Based on results from targeted surveys, the population is estimated at fewer than 100 breeding King Rails (Environment Canada 2011). The population has experienced a large decline since the late 1960s and early 1970s.

- YELLOW RAIL

The breeding distribution and population abundance of Yellow Rail in Canada is poorly known and data are insufficient to determine a population trend (Environment Canada 2011). The population is estimated at 10 000 to 25 000 breeding birds in Canada (Environment Canada 2011).

- SORA

Sora breed in wetlands across Canada and population trends are available for Canada and all provinces. Since 1970 the population shows large inter-annual fluctuations, but with little change in the overall population size (Environment Canada 2014). Long-term trends (1970–2012) suggest an increase for numbers in Canada overall, as well as for the Maritimes, Quebec, Alberta, Saskatchewan and British Columbia. In Yukon, Alberta, Saskatchewan and the Maritime provinces, population estimates show an increasing trend for the 10-year period (Environment Canada 2014).

Harvest

Despite the Virginia Rail's status as a game bird in North America, the species is rarely hunted (Conway 1995). Ontario and the Yukon are the only province and territory with a hunting season for Virginia Rails and Sora. Other provinces have had hunting seasons in the past, but they have since been closed. The collection of harvest data for rails began in 1989 as part of the National Harvest Survey. Since that time, the harvest has been decreasing. No rails were reportedly harvested in 2012 and 2013 in Canada.

Currently, the hunt of King Rails and Yellow Rails is prohibited in Canada.

Management and Conservation Concerns

Wetland loss (quantity and quality) is a critical factor in maintaining the breeding population of rails in Canada and may represent the greatest threat to the long-term sustainability of the King Rail (Environment Canada 2011).

The monitoring of rail populations is difficult because of the birds' secretive behaviour, their cryptic colouration and their infrequent vocalizations, as well as difficult access to the dense marshes that characterize their habitat (Case and McCool 2009). A strategy was developed in 2009 to identify priority information needs for rails and snipe (Case and McCool 2009).

The King Rail was first designated in 1985 as a species of "Special Concern" in Canada by the Committee on the Status of Endangered Wildlife (COSEWIC. It was re-assessed as "Endangered" (1994 and 2000) because of its small population size, rapid population decline, and threats to its habitat (Environment Canada 2012). The species was listed in 2006 as "Endangered" under the *Species at Risk Act*.

The Yellow Rail was designated as a species of "Special Concern" by the COSEWIC in 1999 (re-confirmed in 2001 and 2009) because of its low abundance, suspected local population declines, and ongoing threats to both its breeding and wintering habitat (Environment Canada 2011). In 2003, the species was listed as one of "Special Concern" under the *Species at Risk Act*.

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APPENDIX A—The Canadian Wildlife Service is Considering the Establishment of a Hunting Season for the Mourning Dove in Manitoba for the 2016–2017 Hunting Season

A notice of intent is given that the opening of an annual Mourning Dove hunting season in Manitoba is being considered for the hunting season 2016–2017. A summary of preliminary findings is provided below.

Mourning Doves are one of the most abundant, widely distributed and harvested game birds in North America. They are hunted in 40 states and in two provinces. Ontario established a hunting season in 2013: the evaluation of long-term data sets concluded that the harvest was already occurring in the United States, and would be sustainable in Ontario. Similar data exist for Manitoba (Breeding Bird Survey [BBS]) and indicate that the dove population is stable and widely distributed across the southern portion of the province, with a relative abundance similar to that observed in other jurisdictions with hunting seasons. Calculations from BBS data suggest a breeding population of 800 000 doves in Manitoba. The Manitoba Lodges and Outfitters Association and the Manitoba Wildlife Federation have expressed interest in Mourning Dove hunting opportunity if the harvest is biologically sustainable. A formal assessment of the feasibility of a Mourning Dove hunt will be conducted by the CWS—Prairie and Northern Region and reported on in the fall of 2015 through the CWS regulatory report series.

APPENDIX B—The Canadian Wildlife Service is Considering the Establishment of a Hunting Season for the Mourning Dove in Quebec for the 2016–2017 Hunting Season

A notice of intent is given that an annual Mourning Dove hunting season in Quebec is under consideration for the 2016–2017hunting season. A summary of preliminary findings is provided below.

Mourning Doves are one of the most abundant, widely distributed and harvested game birds in North America. They are hunted in 40 states and two provinces. Ontario established a season in 2013, after evaluation of long-term data sets concluded that the harvest is already occurring in the United States, and would be sustainable in Quebec. Similar data exist for Quebec (Breeding Bird Survey [BBS]) and indicate that the dove population is actually stable, widely distributed across the southern portion of the province, with relative abundance similar to jurisdictions with hunting seasons. Calculations from BBS data suggest a breeding population of 760 000 doves in Quebec. The Fédération québécoise des chasseurs et des pêcheurs has expressed interest in Mourning Dove hunting opportunity if the harvest is biologically sustainable. A formal assessment of the feasibility of a Mourning Dove hunt will be conducted by the CWS Quebec Region and reported in the fall of 2015 through the CWS regulatory report series.

APPENDIX C—Proposals to Modernize Canada’s Migratory Birds Regulations to Improve the Management of Hunting in Canada

Consultations were held between April 9 and June 9, 2014. Numerous comments were received by Environment Canada from 22 different stakeholder organizations, as well as individuals, expressing interest in the management of migratory game bird hunting in Canada.

In general, Canadians appreciate Environment Canada’s and the CWS' effort to reform the *Migratory Birds Regulations* to make it easier for hunters to enjoy hunting migratory birds in Canada. Canadians also appreciated the opportunity to comment on the proposed changes.

All comments received were carefully considered, and Environment Canada's CWS is developing the final set of proposals to amend aspects of the *Migratory Birds Regulations* related to the management of hunting in Canada.