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Population Status of Migratory Game Birds in Canada

November 2015

Canadian Wildlife Service
Waterfowl Committee

CWS Migratory Birds Regulatory Report Number 45



Canada

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Environment and Climate Change Canada
Public Inquiries Centre
7th Floor, Fontaine Building
200 Sacré-Coeur Boulevard
Gatineau QC K1A 0H3
Telephone: 819-997-2800
Toll Free: 1-800-668-6767 (in Canada only)
Email: ec.enviroinfo.ec@canada.ca

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Authors:

This report was prepared by the Canadian Wildlife Service Waterfowl Committee. The principal authors are Mélanie Cousineau, Renée Bergeron and Marc-André Cyr of the National Capital Region Office of the Canadian Wildlife Service.

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Director of Population Conservation and Management
Environment and Climate Change Canada
Canadian Wildlife Service
351 St. Joseph Boulevard, Gatineau QC K1A 0H3
Email: ec.scf-oismiggiibiers-cws-migggamebirds.ec@canada.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
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Ontario Region: 4905 Dufferin Street, Toronto ON M3H 5T4
Prairie and Northern Region: Twin Atria No. 2, 4999 98 Avenue, Edmonton AB T6B 2X3
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Executive Summaries

American Black Duck (*Anas rubripes*)

The American Black Duck breeds primarily in the eastern part of North America and has traditionally been one of the most abundant duck species encountered in this region; however, the species declined in abundance over the middle of the last century. Causes for this decline are thought to be the result of changes in breeding and wintering habitat quality, overharvesting, and interactions (competition, hybridization) with Mallards. The Black Duck population has remained relatively stable since the 1990s. The harvest of Black Duck in Canada has remained relatively stable since 2000, and the species remains one of the most sought-after waterfowl by hunters in both Canada and the United States.

American Coot (*Fulica americana*)

The American Coot breeds from British Columbia to Ontario, with the highest densities in the Prairie provinces. In the early 1900s, wetland loss and overhunting were thought to have led to significant population declines, but the population has since recovered and is increasing. In Canada, the harvest of American Coot has diminished over the years, contrary to the United States, where it has remained relatively constant.

American Wigeon (*Anas americana*)

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

American Woodcock (*Scolopax minor*)

There are two distinct American Woodcock populations: the Central Population, which includes the individuals breeding in Manitoba and Ontario, and the Eastern Population, which encompasses breeding birds in Quebec and the Maritimes. Both populations appear to have undergone a moderate decrease relative to that of the early 1970s. A possible reason for the decline is the loss of suitable (early successional) wintering and breeding habitat. The American Woodcock is a popular migratory game bird in Canada but is particularly sought after in the United States. The harvest of American Woodcock has declined in Canada and the U.S. since the 1970s, a trend that has continued during this past decade, especially in the United States.

Band-tailed Pigeon (*Patagioenas fasciata*)

In Canada, the Band-tailed Pigeon is found only in the forested habitats of coastal southern British Columbia. This species' population has shown a large decline since the 1970s, due in part to overhunting and habitat loss. 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 federal *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 under 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. The Western Population has shown a stable long-term trend since the past 20 years. Due to its localized distribution and the small number of hunters sampled during the National Harvest Survey in the Eastern Population region, it is not possible to provide accurate Canadian harvest estimates for this species.

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

number of breeding pairs of this species in southern Ontario and Quebec has shown a slow decline in the last two decades, following even more dramatic declines between the early 1970s and the mid-1990s. Agricultural development and habitat destruction in eastern Canada are possible reasons for the species' decline; consequently, restrictive regulations have been implemented in Quebec, although the harvest across Canada has remained relatively stable since the 1980s. 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: the Atlantic Population, the Eastern High Arctic Population, the Black Population and the Western High Arctic Population. Recent estimates of numbers for the Atlantic Population suggest a population size of approximately 200 000 birds. Eastern High Arctic Brant population numbers are estimated through counts on wintering grounds; the 2013 estimate 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 estimate the population size of each species' population. The Black Brant Population has been increasing in size during the last few decades, following a steady decline beginning in the early 1960s, and was estimated at approximately 150 000 birds in 2013. The Western Population has shown a stable trend since the 1960s and was estimated at approximately 16 000 birds in 2013. Harvest of the Atlantic Brant occurs mainly in the U.S., while the combined subsistence harvest of Atlantic and Eastern High Arctic Brant likely represents only a few thousand birds annually in Canada. In British Columbia, Black and Western High Arctic Brant are harvested during a short and late hunting season that was established in 1977 to reduce harvest on the local Brant population and to help increase local numbers of wintering birds.

Bufflehead (*Bucephala albeola*)

The Bufflehead, which uses tree cavities to nest, is the smallest of the North American diving ducks. The species is found from coast to coast, but is more abundant in the western regions of Canada. Overall, the continental population has been increasing since the 1960s. Since 2000, the Canadian harvest has remained relatively stable but is considerably smaller than 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 have doubled in size between the 1970s and the 2010s. Harvest levels for this species are high and have varied significantly from year to year since the beginning of the 21st 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, with the exception of the Southern James Bay and the Mississippi Valley Populations. The temperate-breeding populations, however, have grown so quickly in size that they have caused conflicts with humans, crop damage and even hazards in some areas (e.g., airports). Over the past 30 years, hunting regulations for temperate-breeding Canada goose populations have been gradually liberalized to mitigate these issues. Other management practices, including egg addling, prevention of nesting, and landscape management, have complemented the liberalized harvest. In Canada, the harvest of Canada Geese has been steadily increasing since the 1970s.

Canvasback (*Aythya valisineria*)

The Canvasback's core breeding area is in the Prairie provinces, but the species is found as far south as the U.S. Prairies and as far north as the Northwest Territories. Despite the fact that the Canvasback remains one of the least abundant waterfowl species in Canada, its population has increased since the beginning of the 1990s. Much of the interannual population fluctuations can be explained by annual

changes in water levels, which impact the number of wetland breeding habitat in the Prairies. Since 2001, the majority of Canvasbacks have been harvested in the Prairie provinces, but harvest in Ontario has historically represented about half of the Canadian harvest for this species.

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 outside of the breeding season. There are four subspecies of Common Eider worldwide. Information on population size and trends for the Common Eider, as for most sea ducks, is largely 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. Data suggest that in some regions, the harvest must be carefully monitored to ensure the long-term sustainability of the population. The harvest of this species in Canada has been highly variable since the 1990s, although there is an overall gradual decline in harvesting rates.

Common Gallinule (*Gallinula galeata*)

The Common Gallinule is a secretive marsh bird that is primarily found in southern Ontario and southwestern Quebec, but with some individuals also found in eastern New Brunswick and western Nova Scotia. Population estimates are not available for all of Canada, but data from Ontario suggest a significant population 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 gallinules 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 western Canadian population has shown a stable or decreasing trend in the last two decades following a long-term increase between the 1960s and the 1990s. The population trend in eastern Canada has remained stable over this period. The harvest of Common Goldeneyes has been decreasing since the 1980s, with most of the harvest taking place 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 trend for mergansers are not reliably known, as many aerial surveys do not distinguish between Common and Red-breasted Mergansers, whose breeding range overlap extensively. An important part of the species' breeding range, the boreal forest, is not covered by surveys. However, the three merganser species can be reliably identified during helicopter-based plot surveys such as those conducted in eastern Canada. In eastern Canada, Common Merganser numbers appear to have remained stable since 2000, a consistent trend since surveys first began in the 1990s. Overall, this species is not heavily harvested by hunters. The harvest of Common Mergansers has been decreasing since the 1980s, with most of the harvest occurring in eastern Canada.

Gadwall (*Anas strepera*)

The Gadwall is a common duck species in Canada, with its core breeding area located in the Prairies. Following a prolonged drought in the 1980s, the species' population has shown a dramatic increase in most of its range and has doubled in size since the 1990s, mainly because of improved wetland conditions in the Prairies. Harvest has been relatively stable over the past 30 years, despite the population increase. In Canada, the majority of the Gadwall harvest takes place in the Prairie provinces, but the Canadian harvest is much smaller than that 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 their overall appearance, which can cause difficulties in distinguishing them. The status of the breeding population of scaup (Greater and Lesser Scaup combined) in North America became a conservation concern due to apparent declines in the population size of these species compared to the historically high levels observed in the 1970s. Their populations have not yet fully recovered; 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 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 and 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 the harvest for this species represents about two thirds of the combined harvest for Canada. The harvest of Lesser Scaup and Greater Scaup in Canada has declined considerably since the 1970s and appears to have stabilized below 50 000 birds annually since 2000.

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, and a small part of the population recently began to migrate through eastern Ontario and northern New Brunswick. The Greater Snow Goose population underwent a dramatic increase from a few thousand individuals in the 1930s to one million birds in 1999. The Greater Snow Goose has been designated as “overabundant” and has been subject to special conservation measures to control the numbers. In fact, harvest regulations were liberalized and a spring conservation season was established in Quebec in 1998; it was subsequently extended in 2012 to southeastern Ontario. Since the implementation of special conservation measures, the population has remained relatively stable, fluctuating annually between approximately 700 000 and 1 million birds. The harvest of Greater Snow Geese has increased since the end of the 1980s and has more than doubled since the introduction of special conservation measures in Canada and the U.S.

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, which 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 takes place. The combined Canadian and U.S. harvest has more than doubled since the 1970s.

Green-winged Teal (*Anas crecca*)

The Green-winged Teal is a widely distributed and relatively abundant species in Canada. Unlike that of many other dabbling ducks, this species’ core breeding range is not in the Prairie Pothole Region but rather in the boreal forest. 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 period. The Green-winged Teal is the most hunted duck species in Canada after the Mallard and the Black Duck, although the harvest level has been declining steadily since the 1970s but especially so in the last decade. Most of the Canadian harvest takes place in Ontario and Quebec, and the Canadian harvest represents only a fraction of the U.S. harvest.

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, including with respect to its distribution and threats. For management purposes, there are two distinct populations of Harlequin Ducks in North

America: the Western Population along the Pacific coast, and the much smaller Eastern Population. The Western Population trend appears to be stable, with estimates ranging from 150 000 to 250 000 birds. The Western Population of Harlequin Duck is hunted, but under restrictive regulations: probably fewer than 1000 Harlequin ducks are harvested annually in Canada. The Eastern Population declined in the 1980s, likely because of overharvesting. In 2003, the Eastern Population of the Harlequin Duck was listed as a species of Special Concern under the Canadian *Species at Risk Act*. The population has increased, reaching approximately 6 800 individuals in the mid-2000s, in part because hunting of this population has been prohibited in eastern Canada since 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 is found 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 sea duck species 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, the Hooded Merganser is difficult to detect during fixed-wing aerial surveys, and an important part of its breeding range (the boreal forest) is not covered by surveys. Overall, mergansers are not heavily harvested by hunters. The Hooded Merganser is the most harvested of the three merganser species, and its harvest levels in Canada have slightly declined since the 1970s to approximately 11 000 birds annually during the last decade.

King Eider (*Somateria spectabilis*)

The King Eider has a circumpolar distribution. Among the sea ducks, this species is among the most northerly nesting. There are two populations of King Eider: the Western Arctic and the Eastern Arctic populations. Based on limited data, both populations appear to be locally stable or, in some areas, 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 over a million 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 Goose Population has increased dramatically since the 1970s from 2 million to more than 12 million in the last decade. Populations have remained stable 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. In 2014, the Western Arctic Population was also designated as overabundant, and special conservation measures to control the population were implemented in Alberta and the Northwest Territories. In recent years, the harvest of Lesser Snow Geese has slightly increased compared to harvest levels in the 1970s, although it appears to have stabilized in the last decade despite the implementation of special conservation measures.

Long-tailed Duck (*Clangula hyemalis*)

The Long-tailed Duck has a circumpolar distribution and, in North America, breeds at low densities in remote Arctic and Subarctic areas. During most of the year, this species is found primarily in coastal marine waters, often far offshore. Despite indications of long-term population declines, the Long-tailed Duck remains the most abundant Arctic sea duck in North America. The population appears to have remained relatively stable since the early 1990s. The Long-tailed Duck is not commonly harvested by recreational hunters in Canada due in part 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 in Newfoundland and Labrador. The species' population size has remained relatively stable or has

increased since the drought periods of the 1980s. Mallard harvest levels have declined in the 1970s to the 1980s but have since stabilized. It remains 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, at least 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. Results from this survey indicate that the population has increased markedly since 1970 but has levelled off during the most recent decade. A hunting season was opened in 2013 in Ontario, and approximately 22 000 birds were harvested in 2014. An annual Mourning Dove hunting season takes place in British Columbia since 1960, but harvest levels are a small fraction of their historical levels.

Murre

There are two species of murres: 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-billed Murres breeding in the western Arctic. Numbers for both species have been drastically reduced over the last century because of human disturbance, overharvesting, oil pollution and probably commercial fisheries development. Murres are hunted by residents of Newfoundland and Labrador and by Aboriginal people. Newfoundland residents were granted hunting rights soon after they entered Confederation in 1949. Harvest levels decreased significantly following the implementation of hunting regulations in 1994 but have since shown a significant increase.

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 nesting success and productivity estimates are closely correlated with precipitation levels in the Prairies: periods of extended drought have led to dramatic population declines. Since 1990, the population has been slowly increasing, but it has yet to recover completely. In Canada, the Northern Pintail harvest has remained relatively stable since 1990.

Northern Shoveler (*Anas clypeata*)

In Canada, the core breeding range of the Northern Shoveler is the Prairie Pothole and Parkland Region 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 an increase in this species' population size, 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 their populations and hunting individuals challenging. In Canada as a whole, the Virginia Rail population appears to be increasing, while the Sora population appears to be stable. The harvest for these two species is allowed in Ontario and Yukon, although it is thought to be very low. Conversely, Yellow and King Rail populations are believed to be declining. The Yellow Rail was listed in 2003 as a species of Special Concern under the federal *Species at Risk Act*, and the King Rail was listed the same year as Endangered. Neither the Yellow Rail nor the King Rail can be legally hunted in Canada.

Red-breasted Merganser (*Mergus serrator*)

The Red-breasted Merganser has a wide distribution 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 size 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. Both short- and long-term trends for this species appear to be increasing. Overall, mergansers are not heavily harvested by hunters, and the Red-breasted Merganser is the least harvested of the three species.

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, where harvest levels have increased since the 1970s. In Canada, harvest levels have been low compared to other duck species, averaging approximately 23 000 birds per year in the last decade.

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 declined over the last 20 years, but the species continues to be sought after by hunters. A much larger harvest occurs in the United States.

Ross's Goose (*Chen rossii*)

The vast majority of Ross's 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's Goose has shown increasing numbers since the mid-1990s. In the last decade, the population has shown further increase and is currently estimated at approximately 2.7 million birds. Ross's Goose has been designated as overabundant and is subject to special measures to control its numbers. The harvest of Ross's Geese in Canada and the U.S. increased slowly from the 1960s to the 1980s and then more rapidly through the 1990s.

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 the species' North American breeding range. The species is not an important game bird species in Canada, with harvest numbers averaging approximately 1 500 birds over the last 10 years.

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 larger of the two, breeds across Canada from eastern British Columbia to western Ontario, south to the Prairies and north to Yukon and the Northwest Territories. Its population is stable and above the North American Waterfowl Management Plan population objective. The Eastern Population of Sandhill Crane breeds in eastern Ontario, around the Great Lakes, as far north as James Bay, and in western Quebec. This population's numbers show a long-term increasing trend and are above the population objective. In Canada, the harvest of Sandhill Cranes is allowed only in Manitoba, Saskatchewan and Yukon. The harvest has been variable, but it 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 about any other group of sea ducks, but among the three species, the White-winged Scoter is the species for which the most information is available. 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 trend estimates for scoters. However, based on the available data, scoter numbers in western Canada for all three species have remained stable over the last

twenty years but are lower than the population levels in the 1960s. Additional information is needed to better assess the status of scoter populations in Canada. Overall, scoters are not heavily harvested by hunters, with harvest levels averaging less than 7 000 birds annually over the last decade.

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 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 in Manitoba. The three populations have reached or exceeded their population objectives and are increasing. Consequently, most of the swan release programs that had been implemented—and were aimed at restoring the species' population after it reached very low numbers in the 1930s—have now been discontinued. Hunting Trumpeter Swans is illegal in both 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 is an introduced species). Tundra Swans are managed as two distinct populations—the Eastern Population and the Western Population, primarily based on affiliations for each population with the major traditional wintering areas, along the Atlantic and Pacific coasts. Numbers for the Eastern Population appear to have increased slightly over the last decade, while the population trend for the Western Population appears stable. Historically, the Eastern Population has been slightly larger in size than the Western Population: the population sizes have averaged 100 000 and 85 000 swans, respectively, in the last decade. The hunting of Tundra Swans is legal but strictly regulated in the United States and prohibited 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 have been slightly increasing since the late 1960s and early 1970s. The species is hunted at low levels both in Canada and the United States. In both countries, the harvest levels had shown a gradual decline since the end of the 1970s but appear to have stabilized in the last decade.

Wood Duck (*Aix sponsa*)

The Wood Duck is a secretive cavity-nesting species commonly found in swamps, marshes and riparian habitats in Canada. In Canada, it breeds primarily in the eastern provinces, including in Ontario, Quebec and New Brunswick. In western Canada, the breeding population is small and scattered in locations between southern British Columbia and the extreme southwest of Alberta. Once threatened with extinction, this species' population is now stable or increasing in Canada. As a result of this population recovery, the Wood Duck now ranks as the second most abundant duck species in both Ontario and Quebec. The species is sought after by hunters, and an average of 68 000 birds have been taken annually in Canada over the past 10 years. Harvest levels have declined compared to levels in the 1970s and 1980s but have been stable in the last decade.

Background

Environment and Climate Change Canada is responsible for the conservation of migratory birds in Canada and the management of the sustainable hunting of these birds. The hunting regulations for migratory game birds are reviewed and amended biennially by Environment and Climate Change Canada, with input from provinces and territories, as well as from 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 informing management decisions that ensure the long-term sustainability of their population. Although hunting regulations are reviewed every two years, Environment and Climate Change 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/). The December report is published every second year, concurrently with the revision of hunting regulations.

The third report, *Migratory Birds Regulations in Canada* (commonly called the “July Report”), summarizes the hunting regulations that were approved for the next two hunting seasons. The July Report is published every second year, concurrently with the revision of hunting regulations.

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. They are also available on the Environment and Climate Change Canada website (www.ec.gc.ca/rcom-mbhr/).

Monitoring Migratory Game Birds in Canada

Environment and Climate Change 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 to assess 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 the management of waterfowl and the implementation of 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 the 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 parts of or entire provinces in 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 and Climate Change 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 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 they 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 they 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. Due to budget limitations, the number of plots flown annually in the Maritimes was reduced in 2013, and reduced further in 2015; however, the spatial extent of the surveys has been maintained.

❖ **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

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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 currently consists of counts conducted 4 times between early May and mid-June in a sample of wetlands. The 2015 survey sample included approximately 239 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 of 351 plots, each 0.64 km² 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 km² study area. Data from this survey have been important in monitoring the American Black Duck population in agricultural landscapes (under heavy human pressures) and the progression of the now-established population of temperate breeding Canada Geese in southern Quebec.

- 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, which 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.

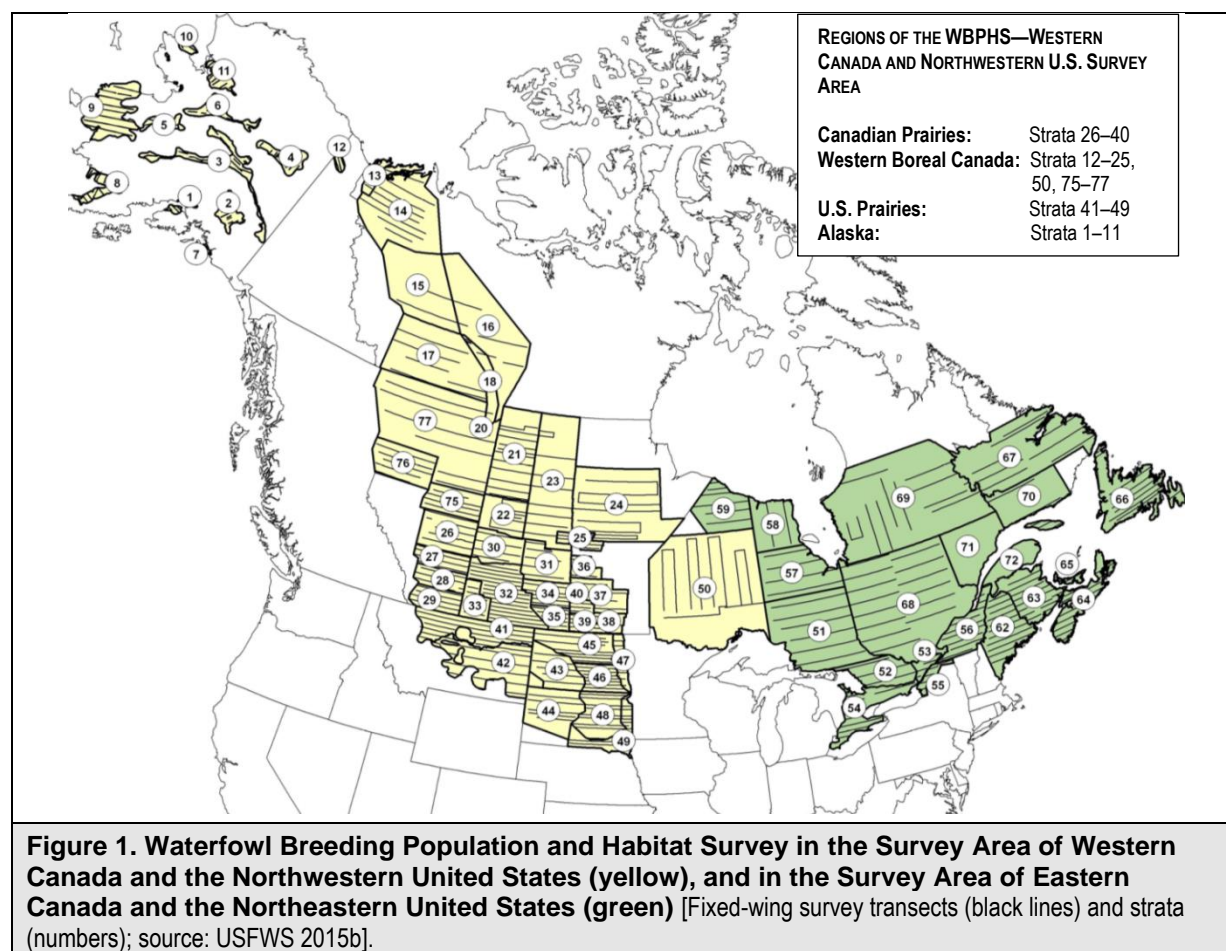
- **Sea Ducks**

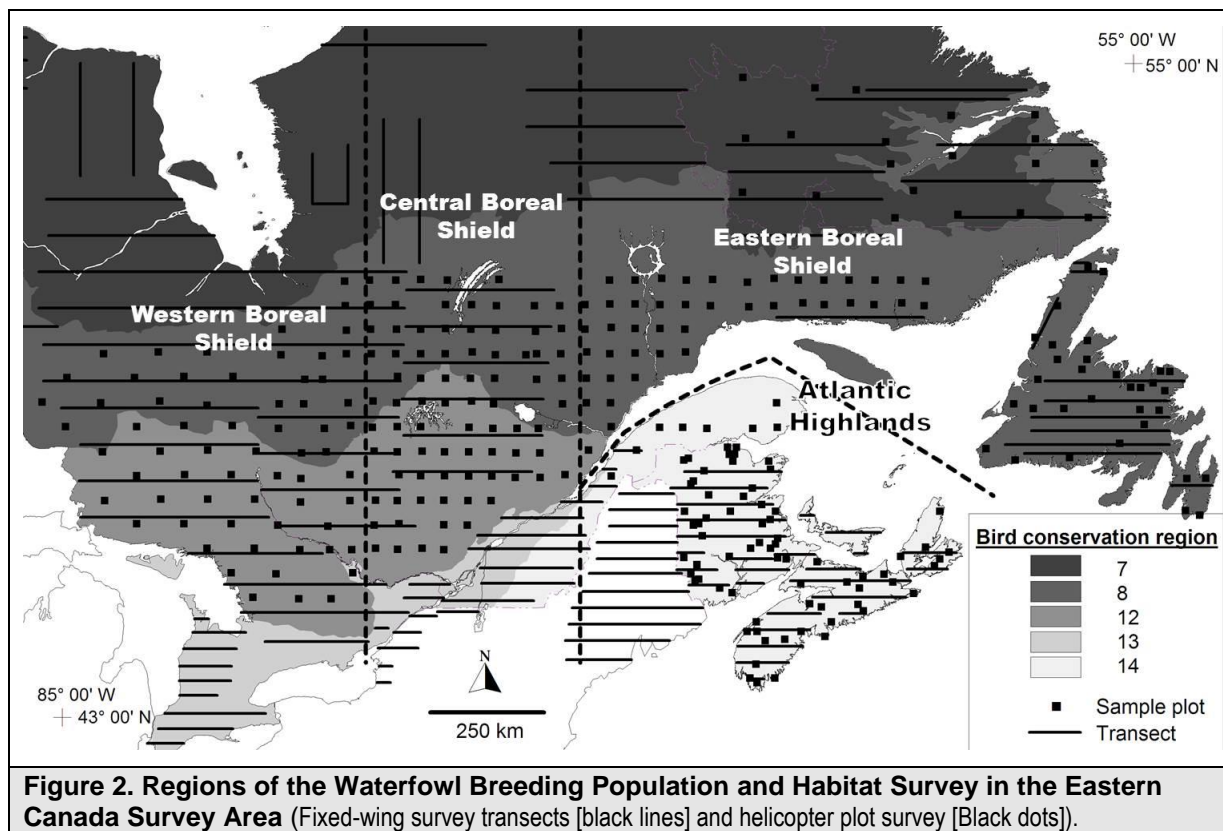
Most sea ducks breed in remote northern areas and spend the remainder of the year in marine and near-shore environments, making this group of birds difficult to survey. Information on sea duck populations comes mainly from localized studies (conducted in key locations or in a small portion of the species' 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 and Climate Change 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 western 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. High-resolution photos to confirm species identification and counts have been added in the recent years.





- COMMON EIDER WINTER SURVEY

Initiated in 2003, the Common Eider Winter Survey is conducted every three years by Environment and Climate Change Canada's CWS using fixed-wing aircraft, when the ice cover is at its maximum (usually in mid-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), the southern coast of Labrador, large parts of Newfoundland's coasts, 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 parameters, 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 parameters.

• Geese

Goose population estimates and trends in abundance are often derived from specific annual or occasional surveys carried out during the breeding season or, in some cases, during the migration or in wintering areas. Population estimates and trends in abundance can also be calculated from band

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recovery data and harvest estimates when sufficient banding data are available. 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
Greater Snow Goose	Spring Greater Snow Goose Survey	Annually since 1965 Conducted by the CWS	Spring migration	Quebec and Ontario: spring staging areas in the St. Lawrence Valley in southern Quebec (from Lake Champlain (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 Conducted by the CWS with support from Université Laval	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.
Greater Snow Goose	Long-term Nesting Studies of Arctic Geese	Annually since 1989 Conducted by Université Laval and the CWS	Breeding	Nunavut (Bylot Island)	Capture and banding of goose families, nest monitoring, vegetation monitoring
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	Long-term Nesting Studies of Arctic Geese	Since 1968 Conducted by the Hudson Bay Project Team	Breeding	Manitoba (La Pérouse Bay and Cape Churchill area)	Long-term transects, protected plots, recovery plots, short-term biomass plots, transplant experiments, and remote sensing and satellite imagery assessments
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

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Table 1. Goose Population Surveys in Canada					
Species	Survey	Year Initiated and Frequency	Time of Year	Geographic Coverage in Canada	Survey Method
Lesser Snow Goose and Ross's Goose	Colony Photo Surveys	Periodically (at intervals of 3 to 18 years) since 1973 Conducted by Environment and Climate Change Canada (CWS, S&T) and the USFWS	Spring	Northwest Territories, Nunavut, Manitoba, Ontario: major Ross's Goose and Lesser Snow Goose colonies in the Canadian Arctic (Baffin Island, Southampton Island, Akimiski Island, Cape Henrietta Maria, La Pérouse Bay, Queen Maud Gulf Region, Banks Island)	Fixed-wing transect survey: a sample of photographs is taken along transect lines over colonies. Photo analysis is performed subsequently.
Canada Goose and Lesser Snow Goose	Long-term Nesting Studies of Arctic Geese	Since 1993 (Nun.), and in 2001–2003 and 2007–current (Ont.) Conducted by the Ontario Ministry of Natural Resources	Breeding	Nunavut: Akimiski Island; Ontario: Burntpoint Creek and Polar Bear Provincial Park	Collection of information about laying date, hatch date, clutch size and nest density of nesting geese
Mid-continent Population White-fronted Geese	Fall Inventory of Mid-continent White-fronted Geese	Annually since 1992 Conducted cooperatively by the CWS and the USFWS	Fall migration	Saskatchewan and Alberta	Fixed-wing transect
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 N.L. 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 Conducted cooperatively by the CWS and the USFWS	Breeding	Coastal and interior areas of Ungava and Hudson bays of northern Quebec	Fixed-wing transect survey
Southern James Bay Population Canada Goose	Spring Population Survey for Southern James Bay Population Canada Geese	Annually since 1990 Conducted cooperatively by the Ontario Ministry of Natural Resources and Forestry and the CWS	Breeding	Akimiski Island and southwestern James Bay (coast and inland)	Fixed-wing transect
Mississippi Valley Population Canada Goose	Mississippi Valley Canada Goose Breeding Pairs Survey	Annually since 1989 Conducted cooperatively by the Ontario Ministry of Natural Resources and Forestry and the CWS	Breeding	Hudson Bay lowlands in Ontario	Fixed-wing transect

Table 1. Goose Population Surveys in Canada					
Species	Survey	Year Initiated and Frequency	Time of Year	Geographic Coverage in Canada	Survey Method
Eastern Prairie Population Canada Goose	Eastern Prairie Breeding Population Survey	Annually since 1972 Conducted cooperatively by the USFWS and the Province of Manitoba	Breeding	Northern Manitoba	Fixed-wing transect
Temperate-breeding Canada Goose – Maritimes	WBPHS – eastern Canada; Eastern Habitat Joint Venture (agricultural plots)	Annually since 1990	Breeding	New-Brunswick and Nova Scotia	Helicopter plot survey
Temperate-breeding Canada Goose – Quebec	St. Lawrence Lowlands Breeding Waterfowl Survey, Quebec	Annually since 2004	Breeding	St. Lawrence lowlands	Helicopter plot survey
Temperate-breeding Canada Goose – Ontario	Southern Ontario Waterfowl Plot Survey	Every 2–5 years from 1971 to 2005; annually, in a rotational survey since 2005. Conducted by the CWS	Breeding	Southern Ontario	Ground (with some aerial) plot survey
Temperate-breeding Canada Goose – Prairies	WBPHS – western survey area	Annually since 1955 Conducted by the CWS and the USFWS	Breeding	Southern Prairie provinces	Fixed-wing transect survey
Temperate-breeding Canada Goose – Southern British Columbia	Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C.	Annually since 2006 -Cooperative survey conducted by the CWS, Ducks Unlimited and the USFWS	Breeding	Southern British Columbia	Helicopter transect survey
Atlantic, Black and Western High Arctic Brant	USFWS Mid-winter Survey; CWS Ground Counts (Black and WHA Brant)	Annually 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

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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/]. 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.

The Mineral Site Survey (MSS) for **Band-tailed Pigeons** is conducted in the Pacific Flyway to provide an index of abundance. The survey is a coordinated effort among state and provincial wildlife agencies in California, Oregon, Washington, and British Columbia, and the USFWS and CWS. The MSS involves a visual count of Band-tailed Pigeons at 51 mineral sites throughout the population's range during July (Sanders 2014).

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 Columbia, Alberta and Ontario) and the United States. The survey is coordinated by the USFWS and Environment and Climate Change 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 and Climate Change 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 through the Yukon Spring Migration Survey. The program, initiated in 1986, consists of daily counts of swans from the ground at the location most heavily used by this species (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 murre in some specific colonies are counted. High-resolution photos are used to confirm species identification and counts. 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 of 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 breeding range are derived 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 and Climate Change 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/), 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 and territory 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.

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 early 1900s. As part of this program, ducks are caught on their breeding grounds at the end of the breeding season, either when they swim into baited traps or by an airboat. 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 and Climate Change 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, which 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 and Climate Change Canada 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.

Trend Analysis

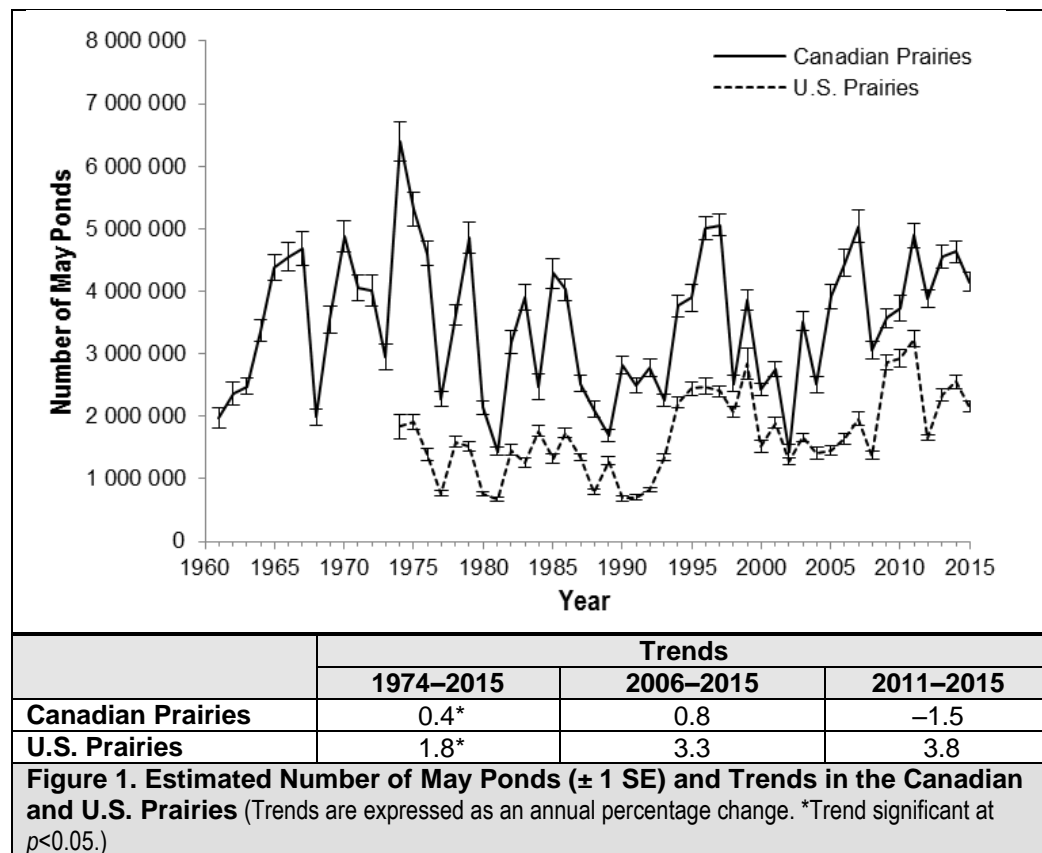
Trends in the numbers of May ponds and duck breeding populations in western Canada estimated from the WBPHS are calculated using the estimating equations technique (Link and Sauer 1994). A minimum of five strata (containing the aerial survey transects) was deemed necessary to perform a trend analysis. Since 2013, a trend analysis is no longer performed for Scoter species because of the lack of data in some strata covered by the survey.

2015 Breeding Habitat Conditions

Spring arrived earlier in 2015 than in the previous year in most areas in Canada. Overall, habitat conditions in the western area of the WBPHS were either similar to those of the previous year or slightly poorer. A total of 49.5 million ducks was estimated in the survey area in 2015. This estimate is similar to the estimate for 2014 (49.2 million birds) but remains 43% greater than the 1955–2014 long-term average (USFWS 2015b).

- 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 2015, the total pond estimate (Prairie Canada and U.S. combined) was of 6.3 million ponds. This was 12% below the 2014 estimate of 7.5 million ponds, but 21% above the long-term average of 5.2 million ponds (USFWS 2015b). The 2015 estimate in the Canadian Prairies was of 4.2 million ponds, similar to that of 2014 (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 30 years (1974–2015; Figure 1).



- WESTERN BOREAL FOREST

Breeding conditions varied within the Western Boreal Forest, with conditions somewhat drier than average, but were good overall in this portion of the traditional survey area. The boreal region and Alaska experienced drier than average conditions. An early spring and the absence of flooding in most areas likely contributed to good production for waterfowl species. In early June, snow cover was less extensive in Yukon and the Northwest Territories compared to the same date in 2014.

- CENTRAL BRITISH COLUMBIA

In general, the May 2015 habitat conditions were poor in the prime waterfowl areas of Southern British Columbia and fair to good in the northern part of the province. Winter precipitation levels were above average in the British Columbia interior during the 2014–2015 winter, as were temperatures (British Columbia Water Supply and Snow Survey, bcrcf.env.gov.bc.ca). Spring snowmelt took place earlier than normal throughout the entire province, and waterfowl migration appeared to be 1–2 weeks earlier than average for most species. Wetland water levels were generally low in the Southern Interior and average-to-high in the Northern Interior.

- CANADIAN ARCTIC AND SUBARCTIC REGIONS

Habitat conditions in spring and summer 2015 varied considerably between regions of the Canadian Arctic. The timing of the ice and snow melt was early in the western Arctic, average to late in the north-central and south-central Arctic, and variable in the eastern Arctic. Average nesting phenology was reported at Banks Island and at Karrak Lake. In early June, snow cover and ice cover were more extensive in the central Arctic and western coast of Hudson Bay compared to the same date in 2014. The northern portion of Baffin Island and further north experienced mild and very dry weather that persisted through the summer. In central and south Baffin Island and on Southampton Island, below-average temperatures and abundant precipitations persisted through the spring and the summer after an exceptionally cold winter.

- EASTERN CANADA (ONTARIO, QUEBEC AND ATLANTIC PROVINCES)

In the Maritimes this year, spring appeared to be somewhat delayed again in most areas of the survey. The ice cover in most areas was still significant and extensive in most areas at the time the survey began (early May), and the survey crew noted that ice conditions were the most extensive to be observed in the last 10 years or so of the survey. The ice cover remained extensive in the Cape Breton Highlands National Park and on large lakes in the northern portion of the province, but birds were seen taking advantage of available open water even in these areas. In the northern part of insular Newfoundland and most of Labrador, a large proportion of the ponds and lakes were partially ice covered and most of the forested areas had deep snow cover, delaying the start of the WBPHS in this region for a week compared to previous years.

Flooding appeared to be minimal in New Brunswick, but localized areas of south-central Nova Scotia remained flooded at the time of the survey, which may have contributed to nest loss for early ground-nesting species such as the American Black Duck.

The winter of 2014–2015 in Quebec was one of the top 20 coldest winters ever recorded, and consequently was one with very low snowfall levels, throughout most of the province. Thus in late April and May, when the uplands (boreal forest) survey took place, water levels in wetlands, lakes, etc., were low, resulting in generally below-normal habitat conditions for breeding waterfowl in the surveyed area. Spring water levels in the St. Lawrence agricultural lowlands were also extremely low, among the lowest ever seen by the survey team since the beginning of this survey, resulting in very poor habitat conditions for breeding waterfowl in that portion of the surveyed area. When not dry, small agricultural streams and dykes had only minimal water levels.

In southern and central Ontario, spring arrived late in 2015, and snow and cold temperatures were experienced throughout March and into early April. Temperatures increased significantly in late April however, reaching the mid and high 20°C, accompanied by high humidity. As a result, the survey took place slightly later in 2015. Precipitation levels were generally below average, but high snow pack and lake ice conditions contributed to some localized flooding. Water levels were generally average on most wetlands, lakes, etc. Extremely dry conditions contributed to poor habitat conditions in the southwest (i.e., Windsor area), but overall breeding habitat conditions for surveyed areas in Ontario were average.

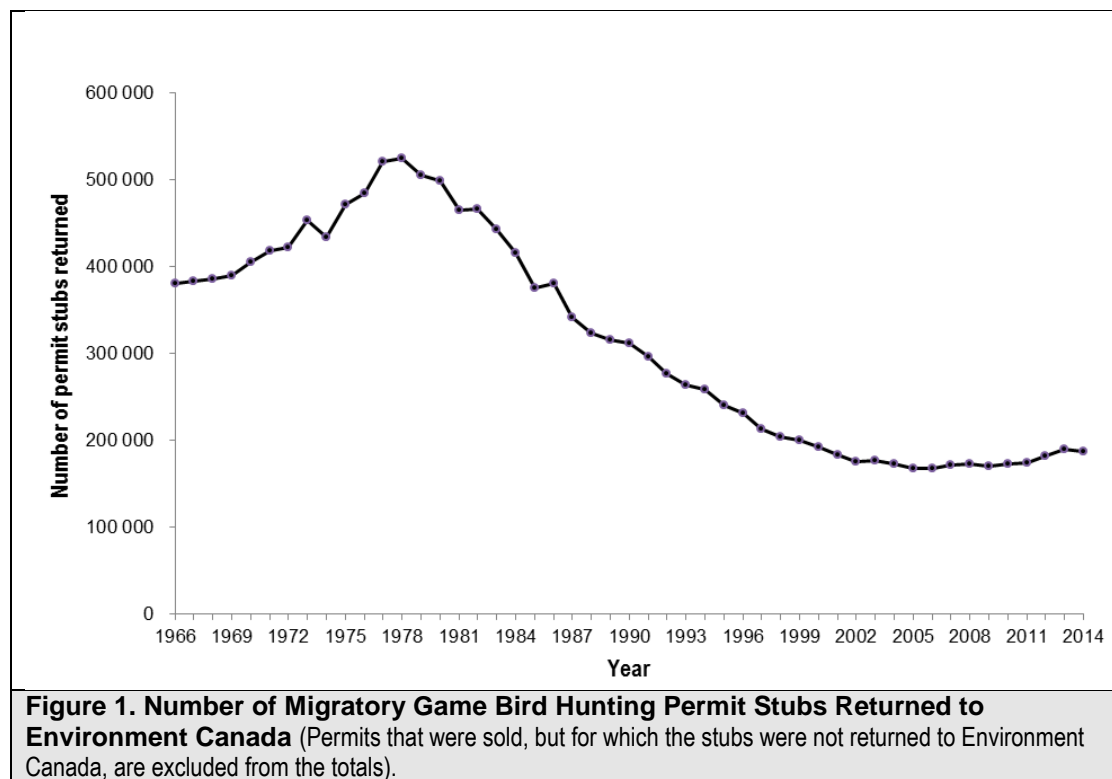
Trends in the Sale of Migratory Game Bird Hunting Permits in Canada

Information on the sale of Migratory Game Bird Hunting (MGBH) 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 187 165 permits sold in 2014.

In August 2014, Environment Canada launched a new online e-Permitting ordering system in order to improve hunters' access to MGBH permits. Originally, this system allowed hunters to purchase a permit online, and the permit (along with the Canadian Wildlife Habitat Conservation [CWHC] stamp) would then be mailed to the hunter within 3 to 5 business days. As of August 2015, hunters can purchase their MGBH stamp and CWHC stamp online, receive electronic copies of the stamp and permit by email and print these documents from the comfort of their own home. The e-Permitting system is accessible to hunters 24 hours a day, 7 days a week. In 2014, 3 611 hunters purchased their permit online, and this number is expected to increase significantly in 2015 based on sales to date.

The MGBH e-Permitting purchasing system makes it easier for hunters to respond to the questions on the permit, which help inform the National Harvest Survey. Data from this and other CWS surveys are used to assess the status of migratory game bird populations in Canada, their productivity, survival rates and amount of harvest they can sustain. This information also provides data to inform hunting regulations and harvest management plans for future years.

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



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 and Climate Change Canada is supportive of

migratory bird hunting and fully recognizes the value of hunters and anglers to conservation. Environment and Climate Change Canada has implemented a number of measures to recognize this contribution of hunters and Canadians more generally, including through 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 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 result of changes in breeding and wintering habitat quality, overharvesting, and interactions (competition, hybridization) with Mallards. Black Duck numbers appear to have stabilized in the last 20–30 years.

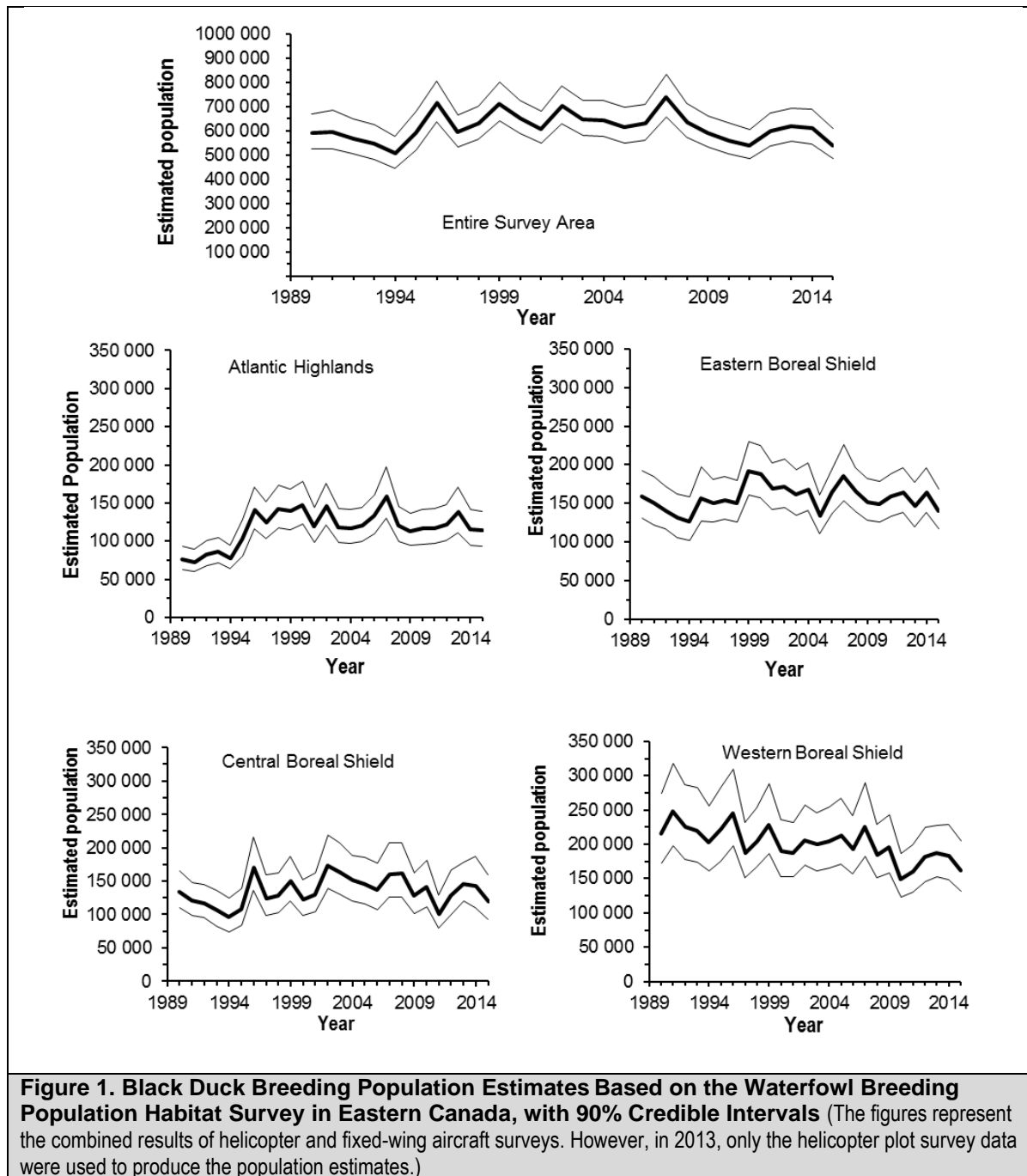
Abundance and Trends

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 (WBPHS) in eastern Canada (Figure 1, Monitoring section). Black Duck numbers are also monitored through other smaller-scale breeding waterfowl surveys such as the Southern Ontario Waterfowl Plot Survey and the St. Lawrence Lowlands Breeding Waterfowl Survey.

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

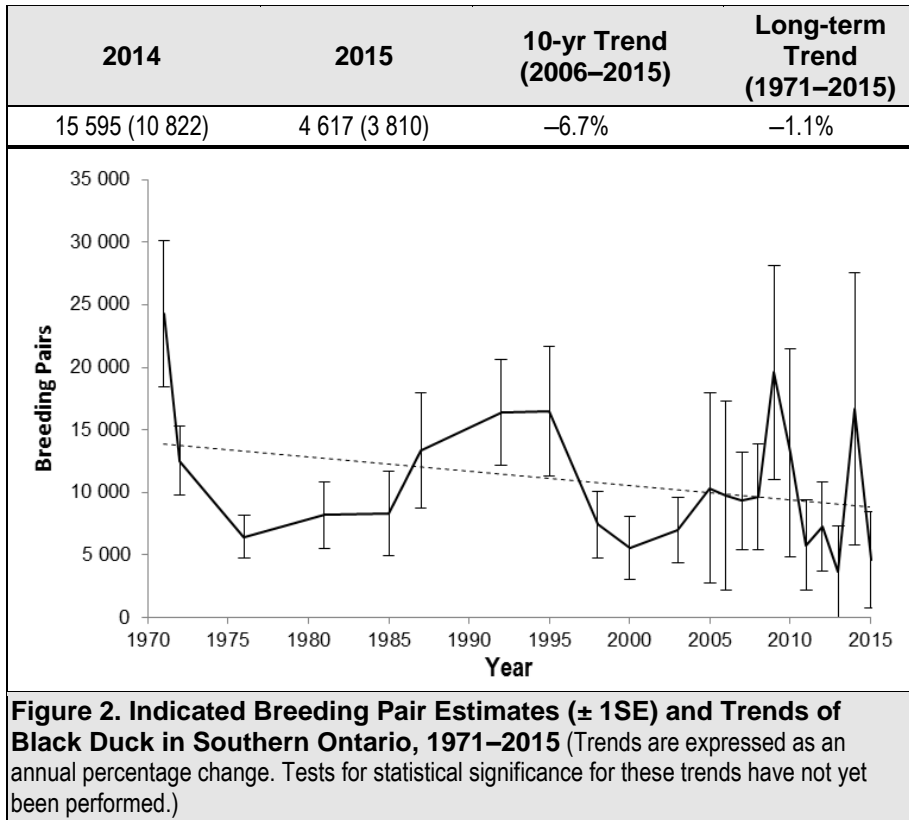
Black Duck breeding population estimates in the four regions of the survey area are presented in Table 1 and Figure 1. The Black Duck population trend is relatively stable in most survey strata, except in the Western Boreal Shield, where the population is declining. The population remains below the North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

Table 1. Black Duck Breeding Population Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Eastern Canada, with 90% Credible Intervals (The estimates are based on the combined results of helicopter and fixed-wing aircraft surveys)			
WBPHS—Eastern Canada	Breeding Population Estimates (in Thousands)		
	2014	2015	10-yr Average (2005–2014)
Entire Survey Area	610 (543–690)	541 (483–610)	607
Atlantic Highlands	116 (95–141)	114 (94–139)	126
Eastern Boreal Shield	164 (139–196)	140 (117–169)	158
Central Boreal Shield	143 (111–187)	120 (92–160)	139
Western Boreal Shield	184 (149–229)	162 (132–205)	187



- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

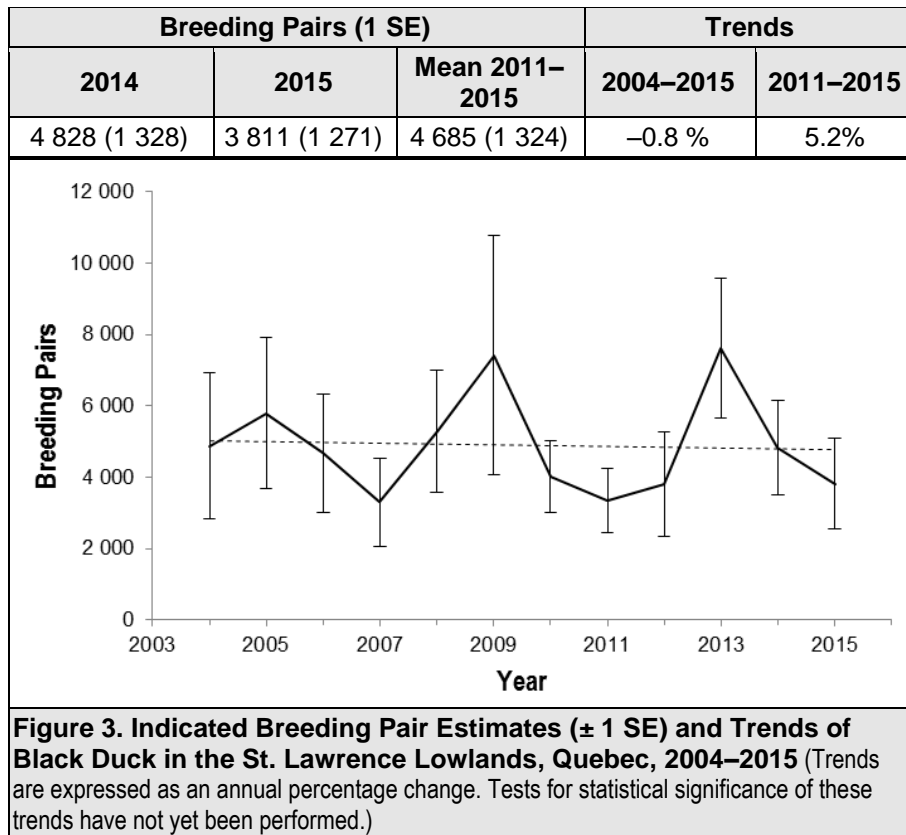
The Black Duck population in southern Ontario declined substantially in the early 1970s, and numbers have fluctuated considerably since then. The 2015 estimate of 4 600 pairs is well below the 10-year average of approximately 9 800 pairs and is slightly higher than the 2013 estimate of approximately 3 600 pairs, which was the lowest estimate ever recorded since the survey started in 1971 (Figure 2).



- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

In 2015 in the St. Lawrence lowlands, the Black Duck—usually second in importance behind the Mallard—was for the first time bypassed by the Wood Duck; therefore, it fell off as the third most abundant species in this landscape. Historically, the Black Duck was the dominant dabbling duck species in the St. Lawrence lowlands, but the St. Lawrence Lowlands Waterfowl Survey shows that the Black Duck has been definitely replaced by the Mallard as the most abundant breeding duck species in this area, and confirms that the Black Duck population is experiencing some difficulties (see also Cousineau et al. 2014; Roy et al. 2015).

The St. Lawrence lowlands host an average of approximately 4 700 breeding pairs of Black Duck annually for the period of 2011–2015. The 2015 estimate of 3 800 breeding pairs is amongst the lowest ones since 2004 (Figure 3). However, the Black Duck population seems to have remained quite stable in this landscape between 2004 and 2015 (Figure 3).



Harvest

Declines in Black Duck numbers observed on the wintering grounds during the mid-winter survey 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 and the stabilization of the population in the last few decades. Black Duck population declines in the western portion of the species' breeding range likely contributed to reducing the number of birds available to hunters. Nevertheless, in some areas, there are indications that hunting may be exerting an unsustainable pressure on segments of the Black Duck population, for example in the St. Lawrence Lowlands (Cousineau et al. 2014).

Historically, the harvest of Black Ducks in the U.S. and in Canada has approached parity (Table 2). The number of Black Ducks harvested in Canada in 2014 was lower than the estimate in 2013 and the lowest number on record (Table 2). Winter conditions, however, were extreme in 2014 and may have contributed to lower harvest in both Canada and the U.S.

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	100 187	199 973
2014	3 797	12 817	12 992	10 736	21 413	10 872							72 627	72 396	145 023

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

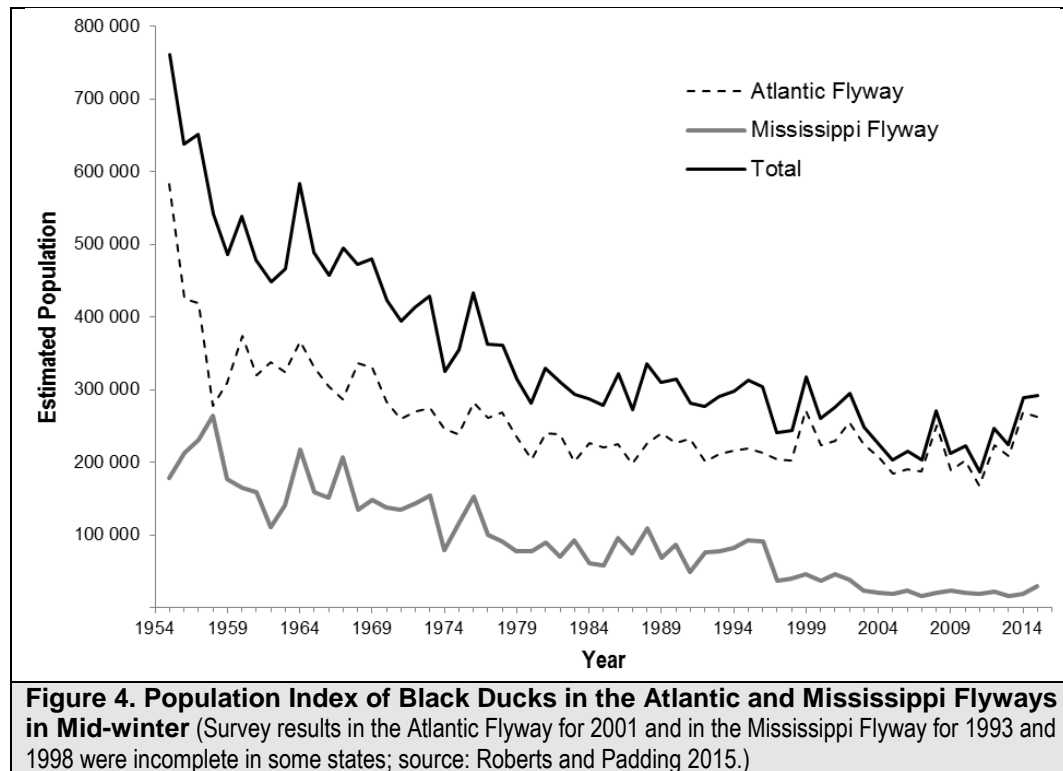
Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

Management and Conservation Concerns

Mid-winter surveys 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 based on the limited geographical extent of the mid-winter survey in Canada to the lower Great Lakes of Ontario. Three factors have been hypothesized to explain the dramatic decline in the Black Duck population: habitat loss (i.e., loss of carrying capacity) caused by urban and agricultural development—on both the breeding and wintering grounds; competition with mallards—whose population size and distribution are expanding in eastern Canada; and harvest, which has been addressed through the implementation of restrictive harvest 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 North American Waterfowl Management Plan (NAWMP) goal of 830 000 ducks (NAMWP 2012).



Management concerns on the Black Duck population prompted the CWS and the USFWS to adopt, in 2012, an International Black Duck Harvest Strategy with the objectives of maintaining sustainable population levels and equitable access to the Black Duck resource between the two countries. This adaptive management approach is designed to identify appropriate harvest levels in both Canada and the U.S. based on harvest objectives and population levels of Black Ducks and sympatric Mallards. In Canada, four regulatory packages have been developed with the moderate alternative defined as the 1997 to 2010 average rate. Harvest regulations under this strategy were first implemented in 2013–2014 under a liberal approach, promoting a 30% increase in mean harvest rate over the 1997–2010 mean harvest rate, and were followed by a return to moderate levels of harvest for the 2014–2015 hunting season. Hunting regulations, as well as the Black Duck harvest management approach, are published annually by Environment and Climate Change Canada in the *Migratory Birds Regulations in Canada* report.

Mallard (*Anas platyrhynchos*)

The Mallard is the most abundant and most 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 in Ontario. The population has been expanding eastward for decades and is now well established in New Brunswick and Nova Scotia, but Mallards remain rare in Prince Edward Island and in 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 (WBPHS) in western and eastern Canada, as well as the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. (Figure 1, Monitoring section). The species is also monitored by other smaller-scale breeding waterfowl surveys across the country, including the Southern Ontario Waterfowl Plot Survey, the St. Lawrence Lowlands Breeding Waterfowl Survey, and the Cooperative Yukon Roadside Waterfowl Breeding Population Survey.

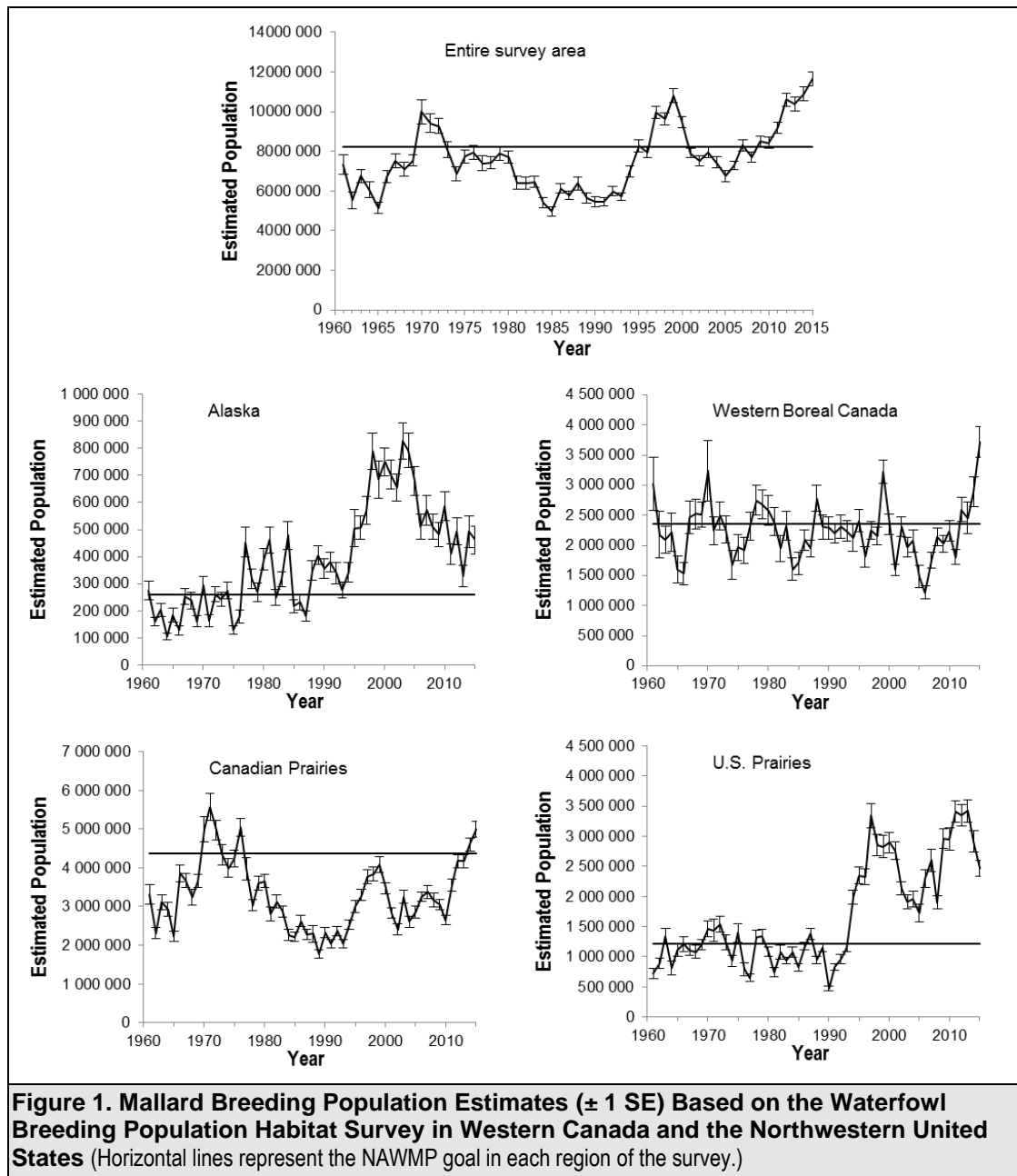
- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

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 (11.6 million birds in 2015). 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 2015 (5.0 million birds) was above the 2014 estimate of 4.6 million birds (Table 1) and above the NAWMP goal of 4.4 million birds for the second time since the mid-1970s (Figure 1). In western boreal Canada, the Mallard breeding population was 29% higher this year compared to the previous year, with an estimated 3.7 million birds (Table 1). There are significant increasing 5-year and 10-year trends in both Canadian regions.

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

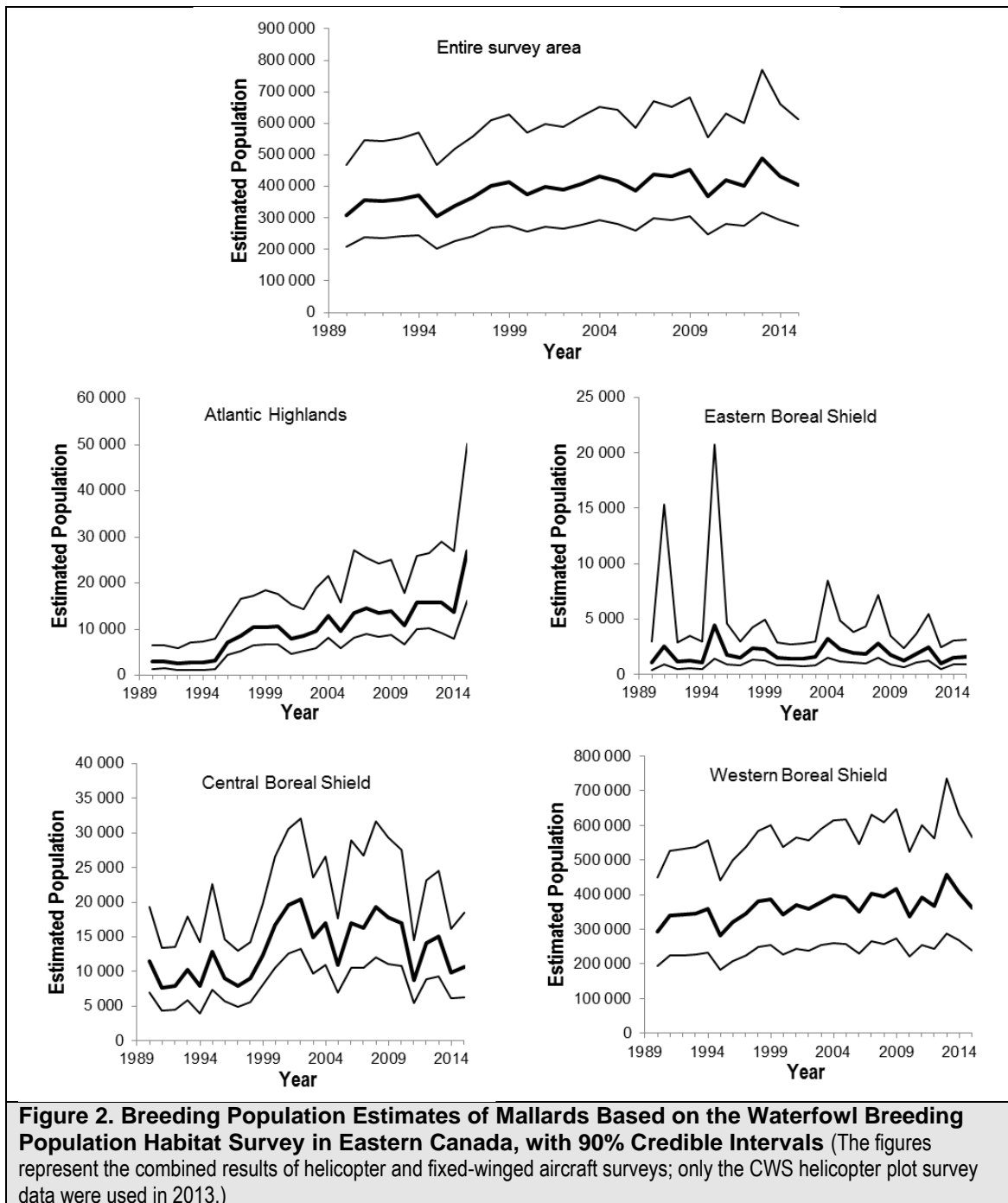
WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, [1 SE])			Trends in Numbers of Breeding Birds		
	2014	2015	10-yr Average (2005–2014)	1961–2015	2006–2015	2011–2015
Entire Survey Area	10 900 (348)	11 643 (362)	8 458	0.6	5.2*	5.2*
Canadian Prairies	4 599 (166)	4 998 (206)	3 280	–0.1	5.4*	8.1*
Western Boreal Canada	2 892 (246)	3 719 (259)	1 983	–0.1	9.3*	16.7*
U.S. Prairies (North Central)	2 917 (171)	2 465 (135)	2 573	2.3*	3.0*	–7.6*
Alaska	492 (57)	462 (51)	537	2.5*	–2.7*	2.4*



- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

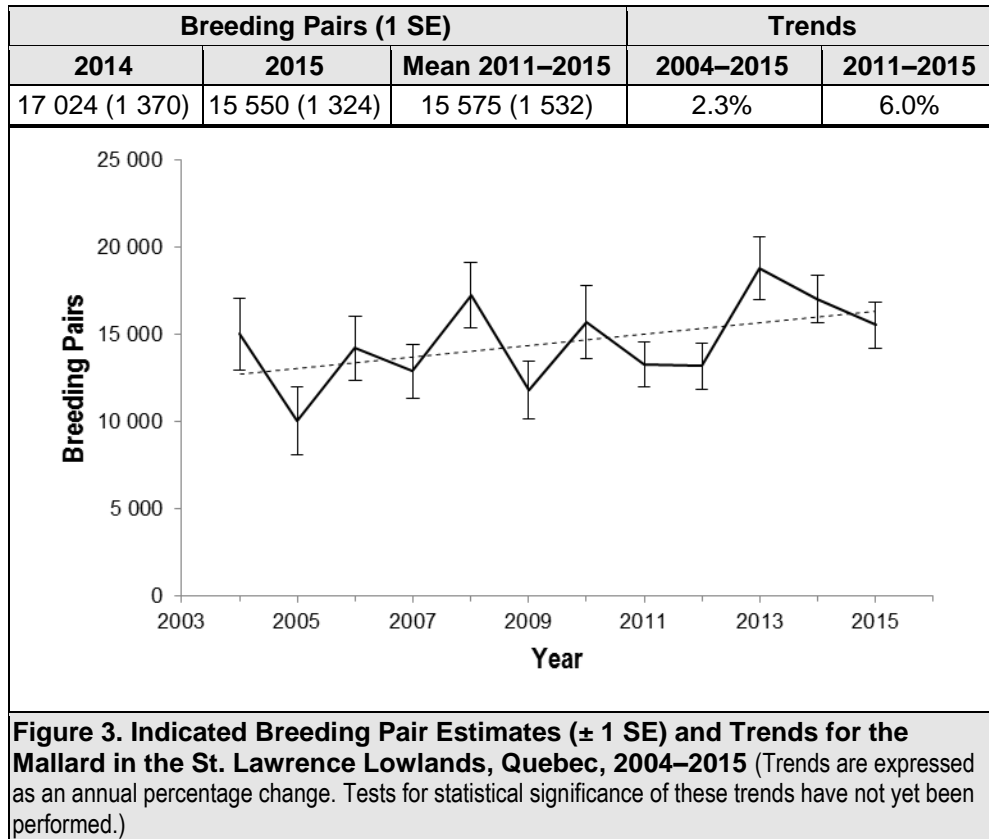
The estimated abundance of Mallards in the entire survey area decreased by 6% in 2015 compared to 2014 (Table 2). However, Mallard numbers continue to exhibit increasing trends in the Atlantic Highlands and Western Boreal Shield regions, and show stable trends in the Eastern and Central Boreal Shield regions covered by the WBPHS (Figure 2).

Table 2. Breeding Population Estimates (in Thousands) of Mallards Based on the Waterfowl Breeding Population Habitat Survey in Eastern Canada, with 90% Credible Intervals (Results from combined data from the helicopter and fixed-winged aircraft surveys; only the CWS helicopter plot survey data were used in 2013.)			
WBPHS—Eastern Canada	2014	2015	10-yr Average (2005–2014)
Entire Survey Area	432.4 (293.4–659.9)	405.7 (274.9–611.7)	423.5
Atlantic Highlands	13.8 (8.0–26.9)	27.0 (16.2–50.3)	13.7
Eastern Boreal Shield	1.6 (0.9–3.0)	1.6 (0.8–3.2)	1.9
Central Boreal Shield	9.8 (6.1–16.1)	10.6 (6.3–18.5)	14.6
Western Boreal Shield	405.5 (268.4–630.0)	362.2 (237.1–564.3)	391.5



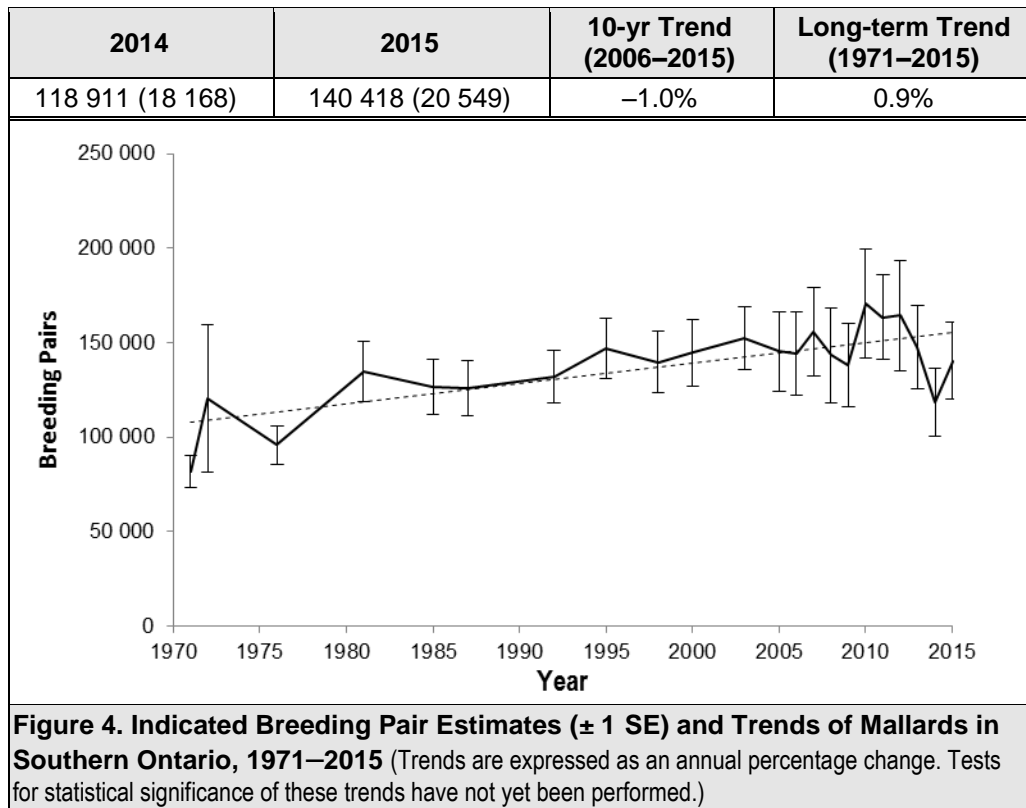
- *ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC*

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 2015 estimate reaching 15 550 indicated breeding pairs, slightly below the 5-year average. The species has experienced a slowly increasing long-term trend of 2.3% per year since 2004 (Figure 3).



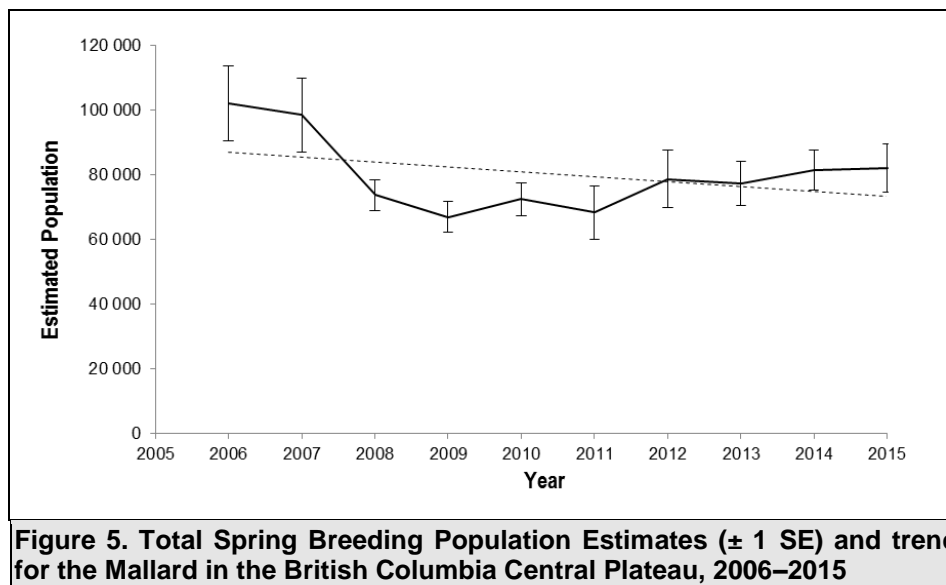
- *SOUTHERN ONTARIO WATERFOWL PLOT SURVEY*

Breeding numbers for the Mallard, the most abundant duck species in southern Ontario, have increased since the early 1980s. In 2015, there were approximately 140 000 breeding pairs in southern Ontario, a 19% increase compared to the 2014, but slightly less than the 10-year average of approximately 148 000 pairs (Figure 4).



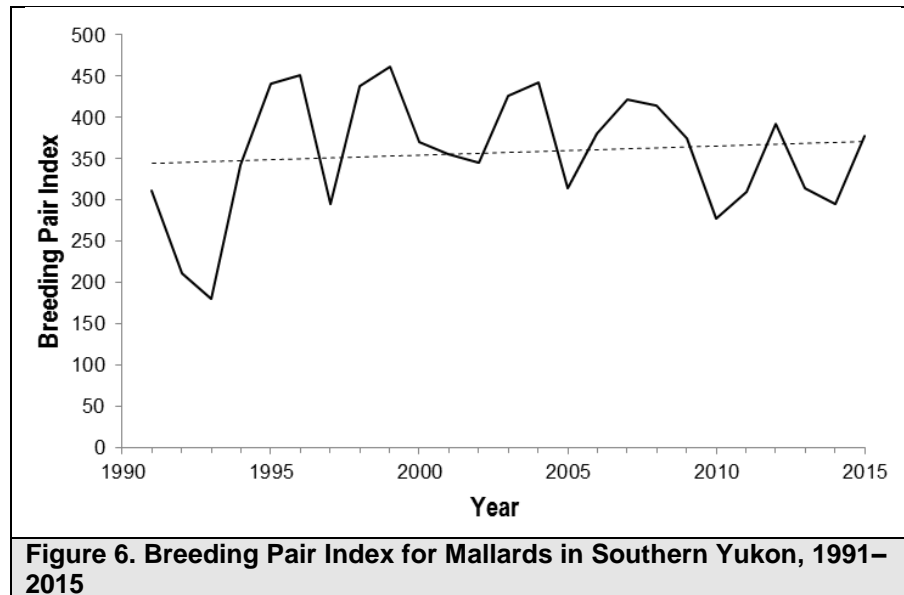
- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

The Mallard is the most abundant waterfowl species in central British Columbia. The species declined from 2006 to 2008 and has slowly increased since (Figure 5).



- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

In southern Yukon, the Mallard population index for 2015 increased slightly compared to 2014. Despite considerable variation, the population trend has been relatively stable since the mid-1990s (Figure 6).



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 on average for more than 40% of the total duck harvest. In 2014, the total estimated harvest for this species in Canada was of 500 114 birds.

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 decline of the Black Duck population. Consequently, the management of Mallards plays a key role in the management of the Black Duck population.

Inland Dabbling Ducks

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
2014	1 397	1 602	3 000	5 647	56 092	116 812	30 926	163 468	93 734	26 996		440	500 114	3 904 064	4 404 178

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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 (WBPHS) in western Canada, as well as the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. (Figure 1, Monitoring section). Northern Pintail numbers are also monitored outside of the WBPHS survey area by the Cooperative Yukon Roadside Waterfowl Breeding Population Survey.

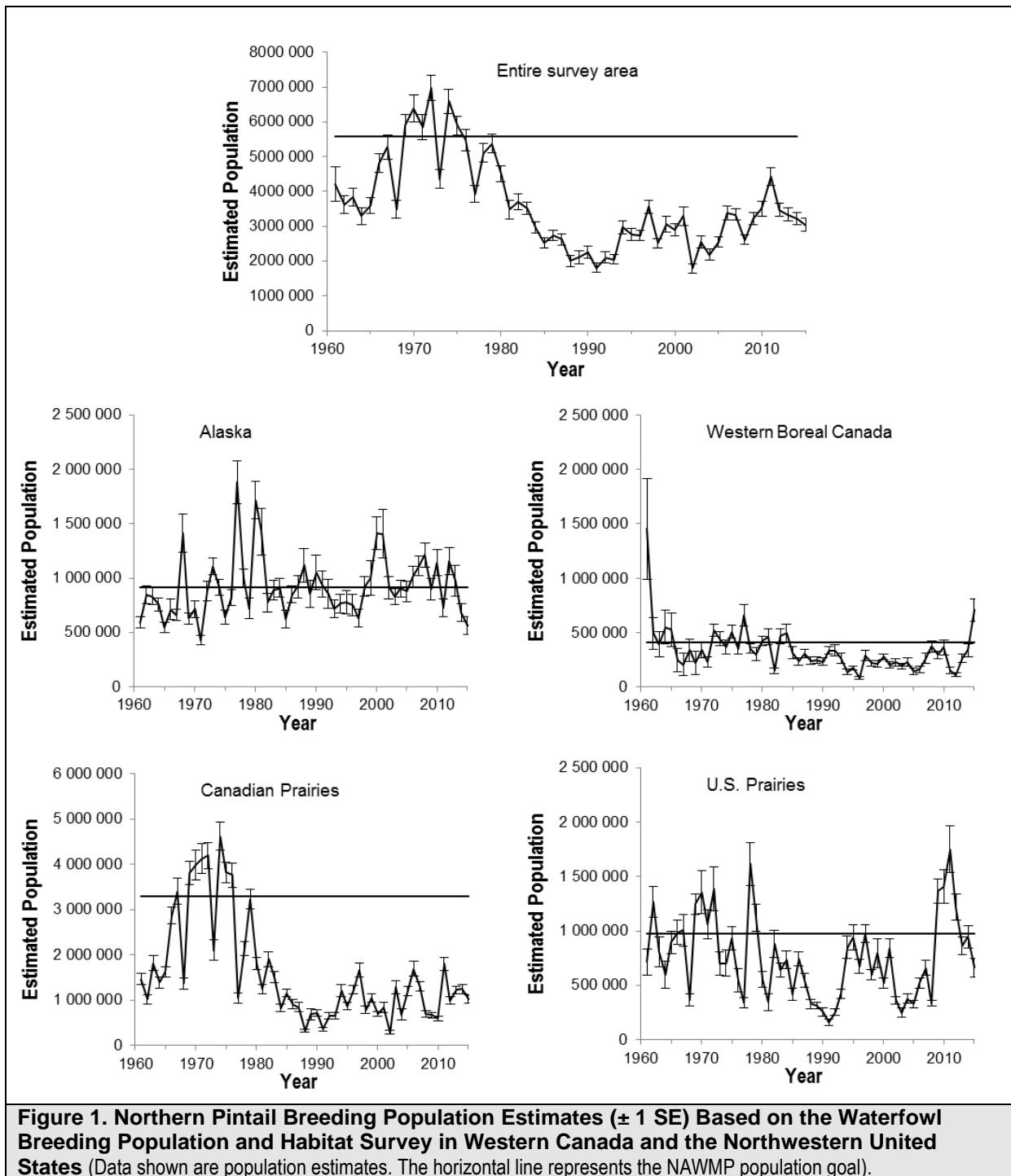
- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

After a sharp decline in the 1980s and early 1990s, in the late 1990s the breeding population of Northern Pintail in the WBPHS survey area showed signs of a recovery starting, 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 2015, the population estimate was of 3.0 million birds (Table 1), still well below the NAWMP goal of 5.6 million birds.

The 2015 breeding population estimate in the Canadian Prairies (1.02 million birds) was very similar to that for 2014 (Table 1). Habitat conditions in 2015 were poor compared to the previous year's, which may explain the lower population estimate. The Canadian Prairie population estimate remains well below the NAWMP goal of 3.3 million birds (NAWMP 2012). In the Western Boreal Region, Northern Pintail numbers more than doubled compared to 2014 (Table 1), significantly exceeding the NAWMP goal of 407 000 birds.

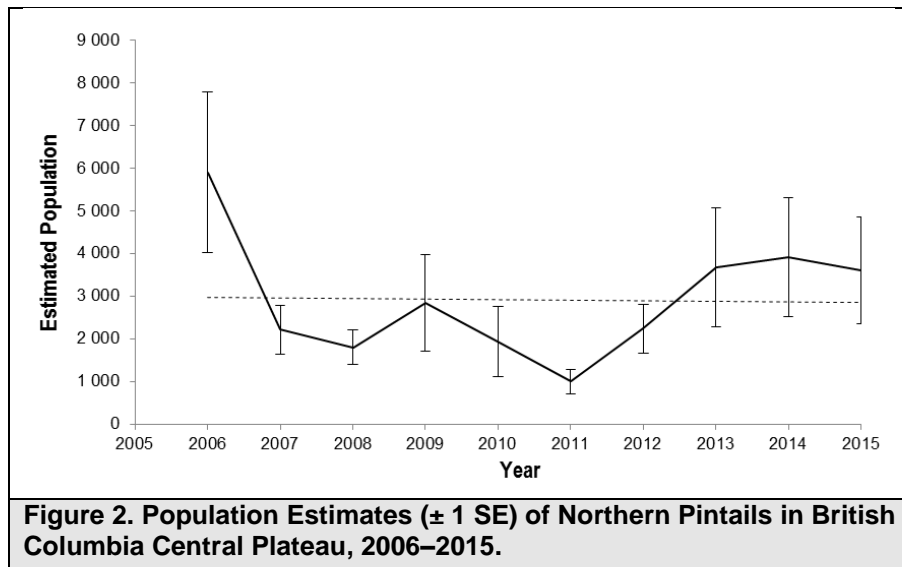
Table 1. Northern Pintail Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p < 0.05$).

WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, [1 SE])			Trends in Numbers of Breeding Birds		
	2014	2015	10-year average (2005–2014)	1961–2015	2006–2015	2011–2015
Entire Survey Area	3220 (180)	3 043 (182)	3 308	–1.1*	0.3	–8.0*
Canadian Prairies	1250 (102)	1 020 (94)	1 141	–2.2*	0.2	–8.6*
Western Boreal Canada	338 (63)	708 (104)	246	–1.4*	6.1	52.2*
U.S. Prairies (North Central)	947 (106)	663 (85)	941	–0.5	5.8	–19.7*
Alaska	686 (82)	651 (81)	980	0.4	–4.8*	–7.1*



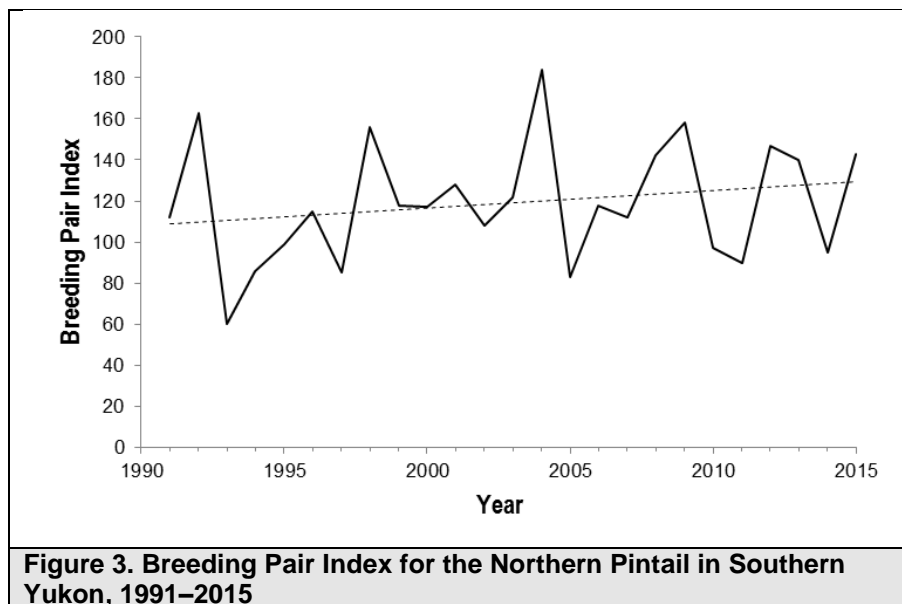
- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

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



- 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).



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
2014	88		533	109	2 729	3 350	3 903	30 717	20 996	3 604		440	66 469	471 466	537 935

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

Management and Conservation Concerns

Although the species is not considered to be threatened, population 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 disappearance of potential breeding habitats.

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 Pothole Region, 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 period.

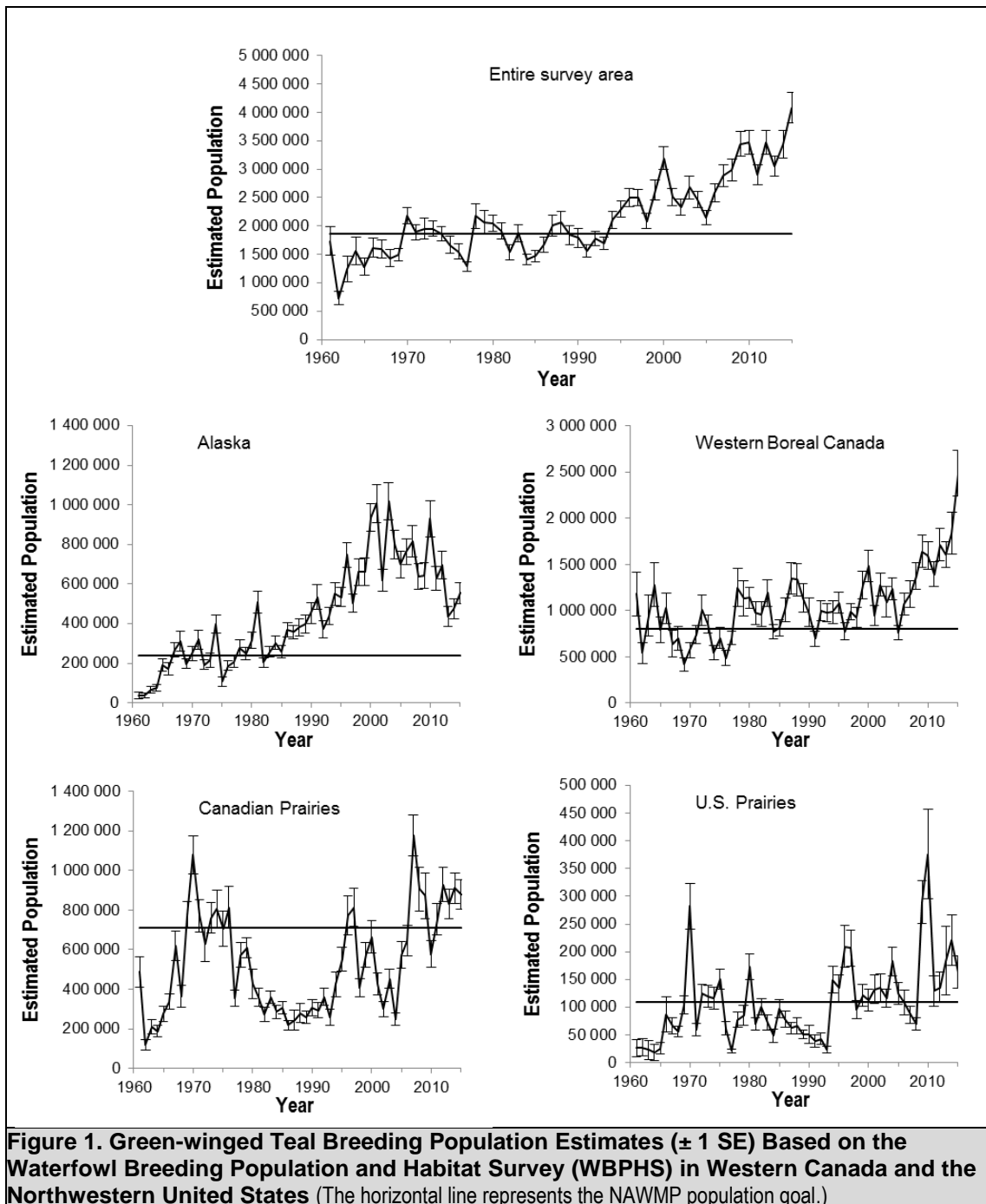
The Green-winged Teal population is monitored on its core breeding range through the Waterfowl Breeding Population and Habitat Survey (WBPHS) in western and eastern Canada, as well as the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. (Figure 1, Monitoring section). The species is also monitored outside of the WBPHS survey area by the Southern Ontario Waterfowl Plot Survey, the St. Lawrence Lowlands Breeding Waterfowl Survey, and the Cooperative Yukon Roadside Waterfowl Breeding Population Survey.

- 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 2015 estimates for the Canadian and U.S. Prairies are similar to the 2014 estimates, while those for the boreal region of Canada and Alaska show significant population increases (Table 1 and Figure 1). In all regions of the survey area, the long-term (1961–2015) population trends are significant and suggest that the Green-winged Teal population is increasing.

Table 1. Green-winged Teal Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (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		
	2014	2015	10-year Average (2005–2014)	1961–2015	2006–2015	2011–2015
Entire Survey Area	3 440 (247)	4 081 (270)	3 040	1.7*	3.4	7.6
Canadian Prairies	910 (78)	878 (75)	817	1.1*	2.2	2.9
Western Boreal Canada	1 835 (224)	2 482 (252)	1 415	1.4*	7.1*	12.7*
U.S. Prairies (North Central)	221 (46)	163 (29)	173	2.5*	7.4	10.0
Alaska	474 (52)	555 (54)	672	4.0*	-5.1*	-6.4*

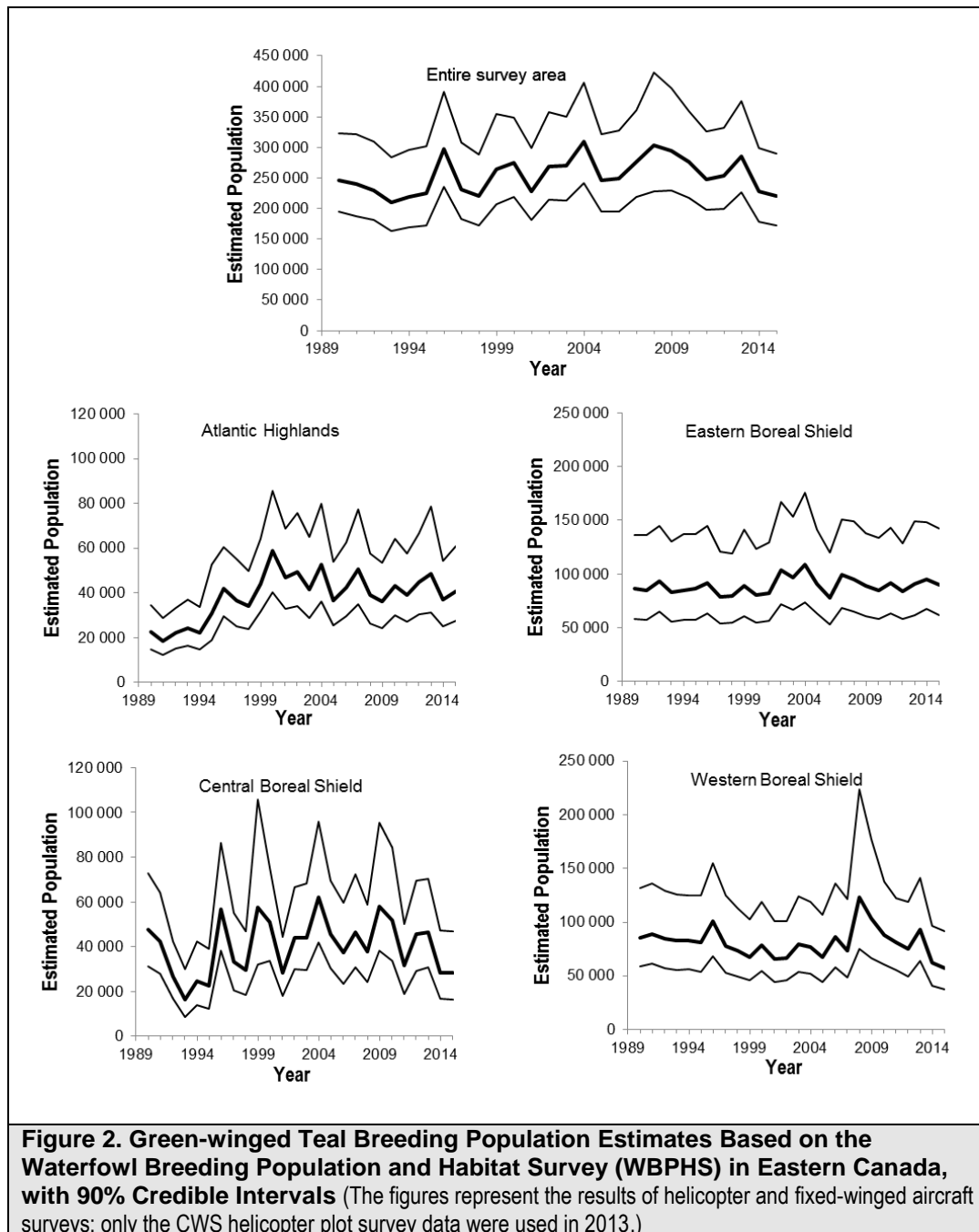


- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

The estimated abundance of Green-winged Teals in the entire survey area decreased by 17% in 2015 compared to the 2014 estimate (Table 2). This species continues to exhibit overall increasing trends in the eastern survey area of the WBPBS (Figure 2).

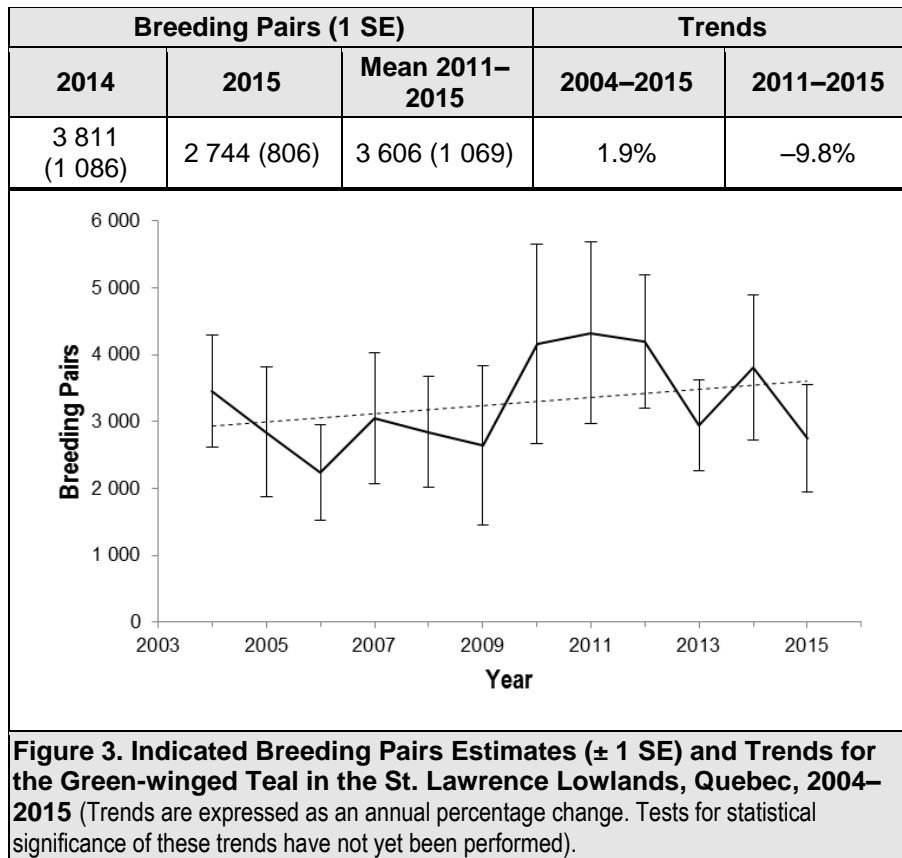
Table 2. Green-winged Teal Breeding Population Estimates (in Thousands) the Based on the Waterfowl Breeding Population and Habitat Survey (WBPBS) in Eastern Canada, with 90% Credible Intervals (Results combined data from the helicopter and fixed-winged aircraft surveys.)

WBPBS—Eastern Canada	2014	2015	10-year Average (2005–2014)
Entire Survey Area	229 (178–299)	221 (172–290)	266
Atlantic Highlands	37 (25–54)	41 (28–61)	42
Eastern Boreal Shield	95 (67–148)	90 (61–142)	90
Central Boreal Shield	28 (17–47)	28 (16–47)	43
Western Boreal Shield	62 (41–96)	57 (38–91)	85



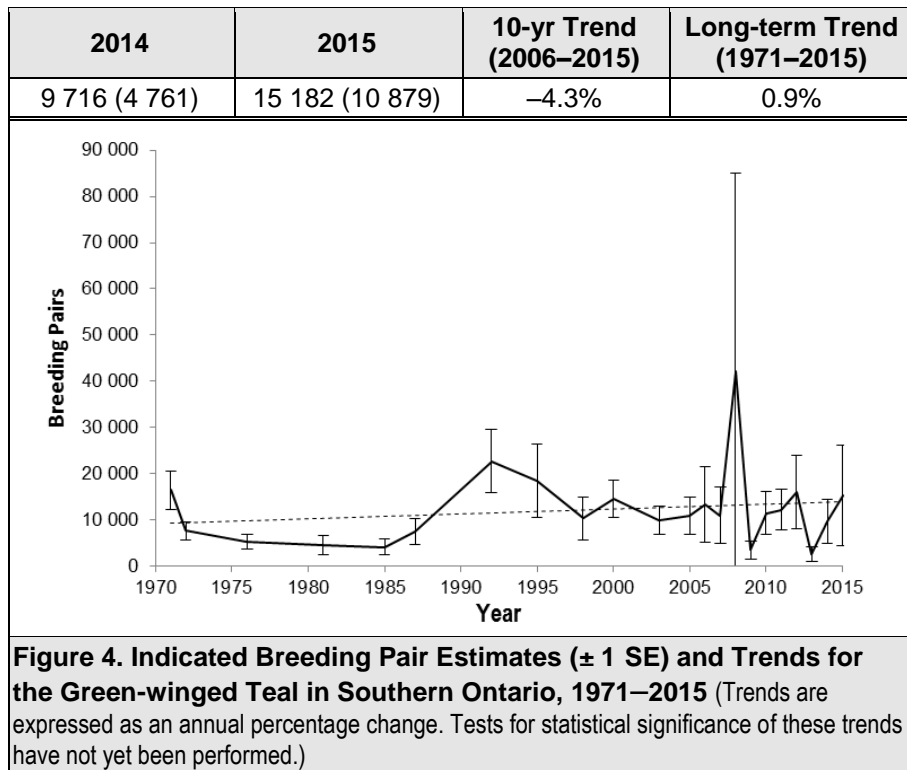
- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

The Green-winged Teal shows an increasing long-term trend in the St. Lawrence Lowlands and has shown large inter-annual variations (Figure 3). The breeding population in 2015 has declined compared to 2014 and has been decreasing in recent years.



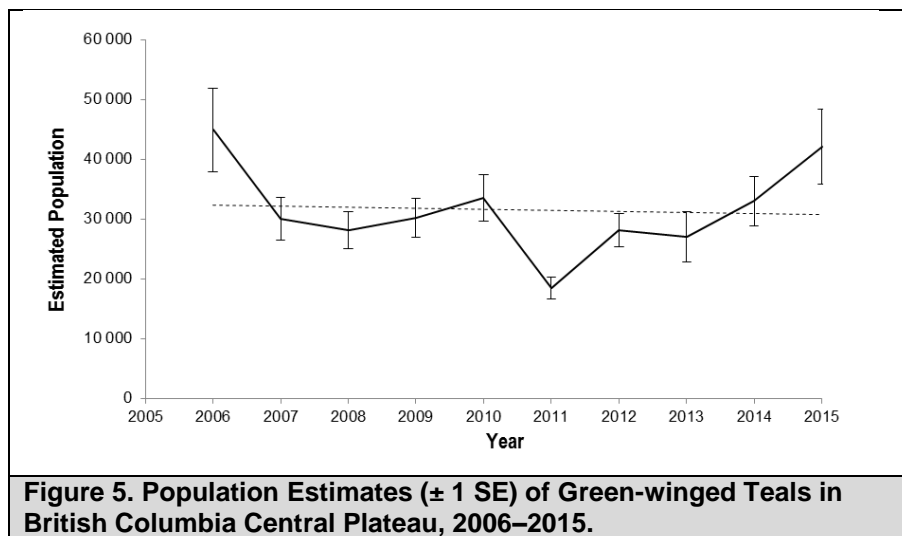
- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

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 stable trend in southern Ontario.



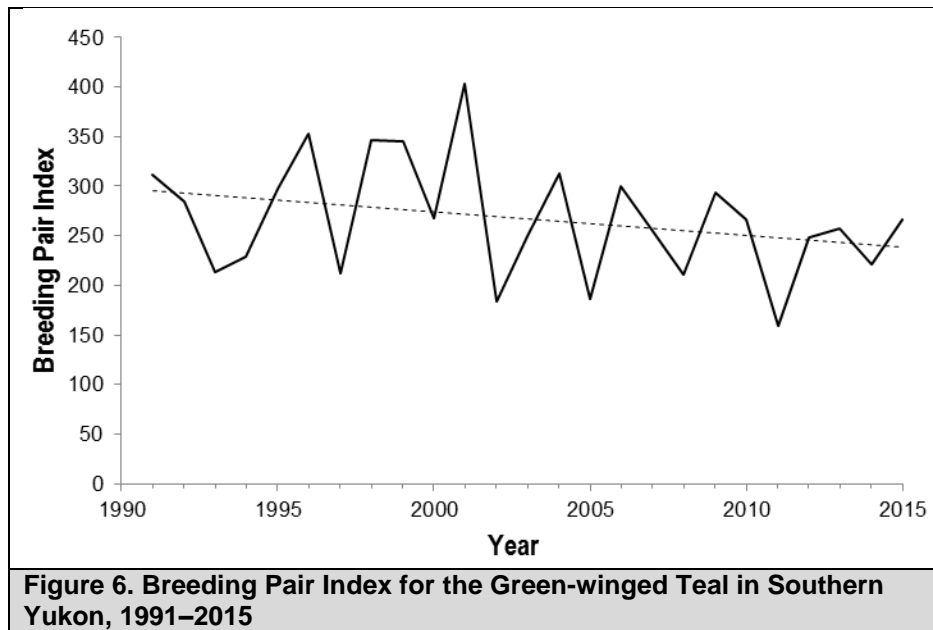
- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

Green-winged Teal numbers have fluctuated between 25 000 and 45 000 individuals between 2006 and 2015. They declined between 2006 and 2011 but have gradually increased since 2011 (Figure 5).



- 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).



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

There is no particular management concern with this species.

Inland Dabbling Ducks

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
2014	1 792		2 420	3 931	16 522	12 639	7 345	3 895	2 768	4 958			56 270	1 751 773	1 808 043

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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

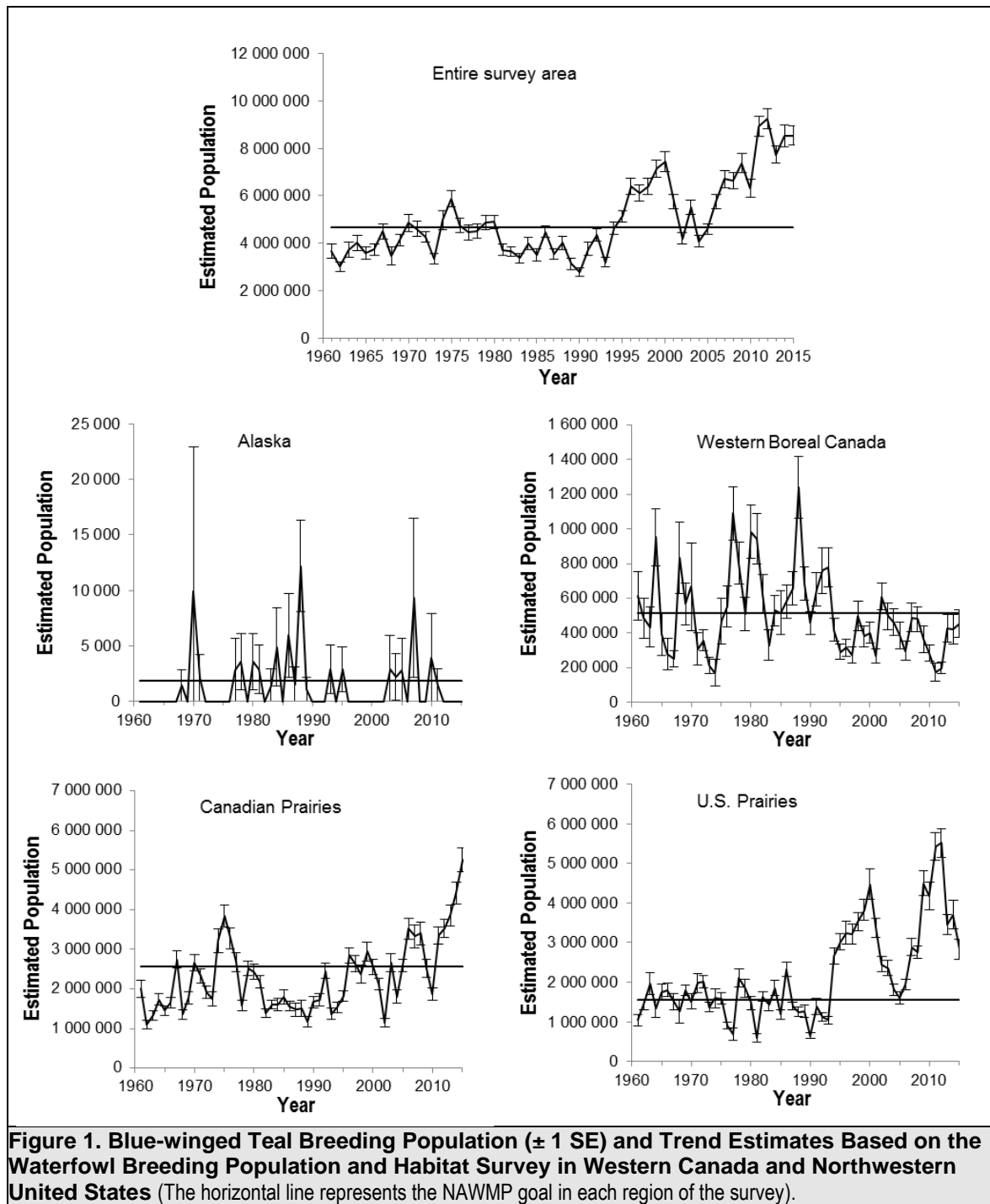
The Blue-winged Teal population is monitored on the species' core breeding range through the Waterfowl Breeding Population and Habitat Survey (WBPHS) in western Canada, as well as the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. (Figure 1, Monitoring section). The species is also monitored outside of the WBPHS survey area by the Southern Ontario Waterfowl Plot Survey and by the Cooperative Yukon Roadside Waterfowl Breeding Population Survey.

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

The population estimate for 2015 for the Blue-winged Teal is 19% above the 10-year average. The population in the whole survey area, as well as in the U.S. and Canadian Prairies, is well above its NAWMP goal (NAMWP 2012; Figure 1). However, the Western Boreal population has been below the NAWMP goal since the 1990s. Blue-winged Teal numbers show significant increasing short-term (2011–2015) trends in the Canadian and U.S. Prairies and in western boreal Canada (Table 1). Long-term (1961–2015) trends for this species are significant and positive in the U.S. Prairies and for the complete survey area.

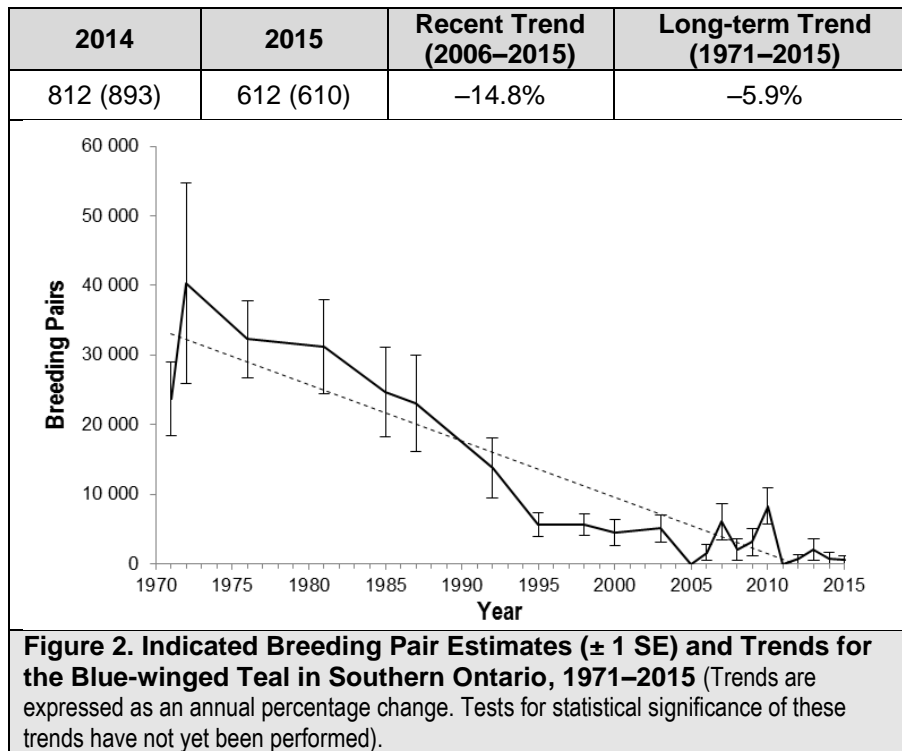
Table 1. Blue-winged Teal Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) Western Canada and Northwestern United States
(Trends are expressed as an annual percentage change. *Trend significant at $p < 0.05$.)

WBPHS—Western Canada and the Northwestern United States	Breeding Population Estimates (in Thousands, [1 SE])			Trends in Numbers of Breeding Birds		
	2014	2015	10-yr Average (2005–2014)	1961– 2015	2006– 2015	2011– 2015
Entire Survey Area	8 542 (462)	8 547 (401)	7 187	1.1*	4.3*	–1.5
Canadian Prairies	4 418 (281)	5 258 (300)	3 237	1.1	4.9	11.9*
Western Boreal Canada	423 (85)	454 (78)	352	–0.7	–0.3	29.7*
U.S. Prairies (North Central)	3 701 (356)	2 835 (255)	3 596	2.0*	4.4	–15.6*
Alaska	0	0	1 749	2.0	NA	NA



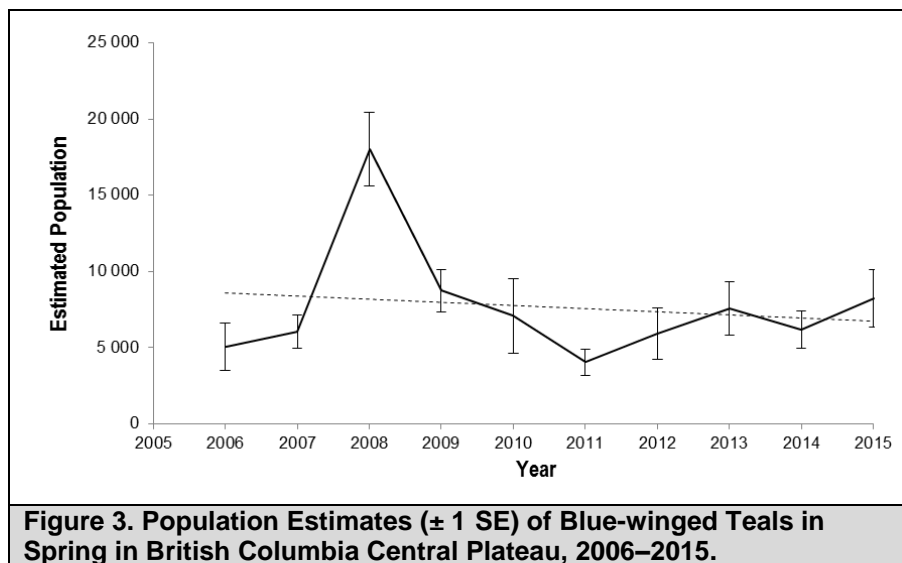
- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

The breeding population of Blue-winged Teal in Southern Ontario has exhibited a long-term declining trend since the early 1970s (5.9% annually; Figure 2). The specific causes of the decline are uncertain but could include habitat loss (Ross 2010) or breeding phenology in relation to survey timing (S. Meyer, CWS–Ontario Region, pers. comm.).



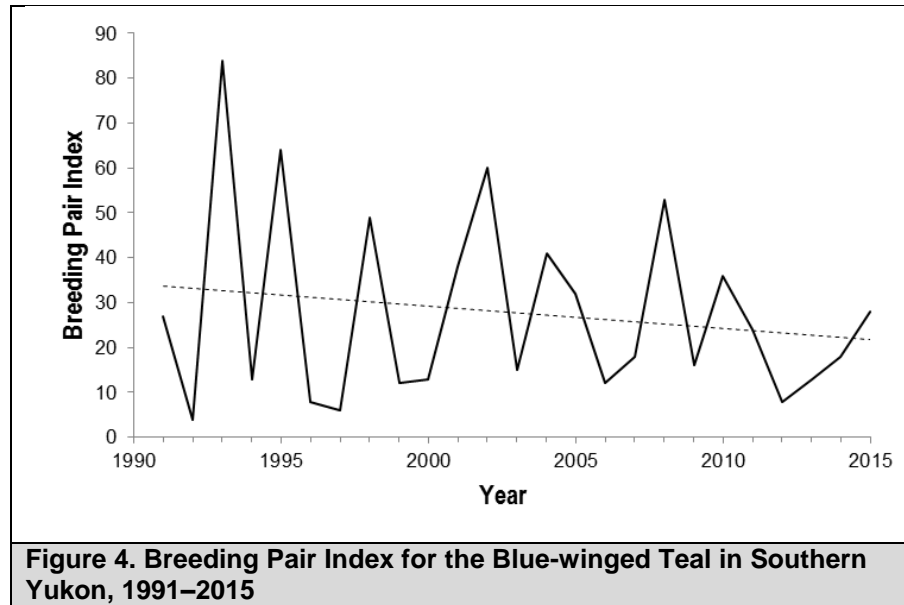
- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

The Blue-winged Teal is a common species in central British Columbia. Population numbers have shown important interannual variation between 2006 and 2009, while showing a slightly decline in population trend since the survey began in 2006 (Figure 3).



- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

In southern Yukon, the Blue-winged Teal population increased in 2015 compared to 2014. The population index has varied considerably since 1991, but appears to be decreasing slightly (non-significant trend; Figure 4).



Harvest

The Blue-winged Teal does not account for a significant portion of the 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 2013a), the CWS restricts the harvest of Blue-winged Teals.

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 2013a).

Inland Dabbling Ducks

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	NT/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
2014			245	1 218	1 639	5 856	10 493	25 278	6 377	539			51 645	1 155 489	1 207 134

¹Including harvest of Cinnamon Teal

²Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

³The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

American Wigeon (*Anas americana*)

The American Wigeon's breeding range is centered 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 Population and Habitat Survey (WBPHS) in western Canada, as well as the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. (Figure 1, Monitoring section). The species is also monitored outside of the WBPHS survey area by the Cooperative Yukon Roadside Waterfowl Breeding Population Survey.

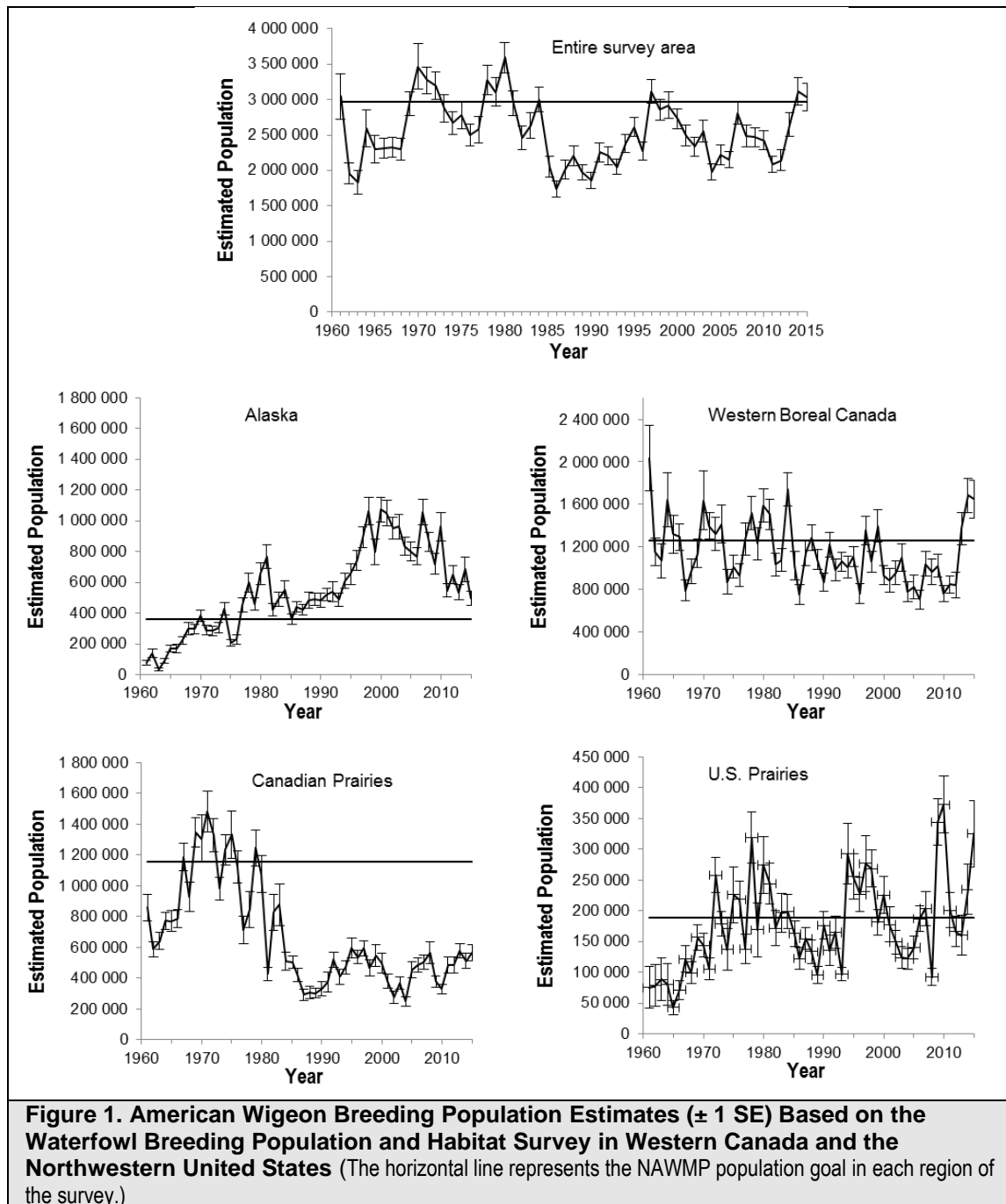
- *WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES*

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 2015 continental population estimate remains above the NAWMP population objective of 3.0 million birds (NAWMP 2012) for the second consecutive year since 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 (1.3 million birds) since 2013, this after a decade-long period during which it remained below the population objective.

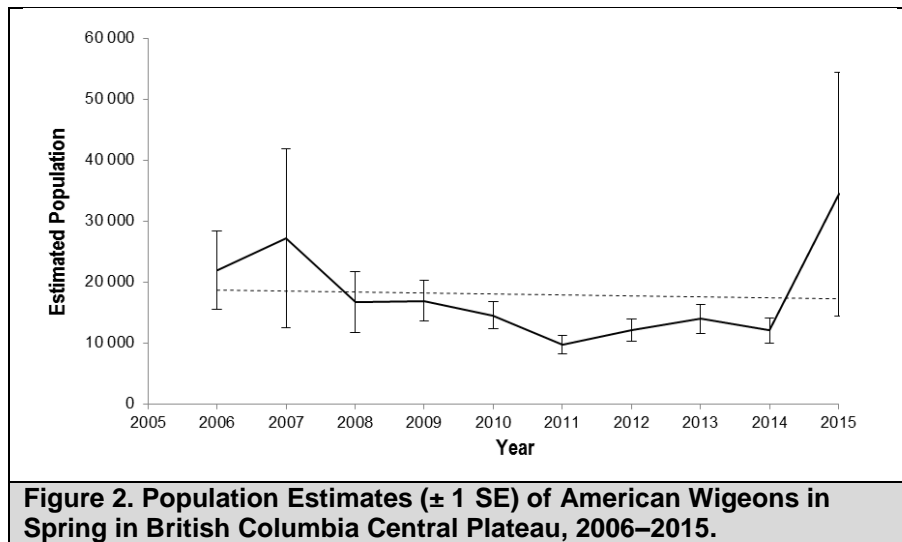
Table 1. American Wigeon Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p < 0.05$.)

WBPHS—Western Canada and the Northwestern U.S.	Breeding Population Estimates (in Thousands, [1 SE])			Trends in Numbers of Breeding Birds		
	2014	2015	10-year Average (2005–2014)	1961– 2015	2006– 2015	2011– 2015
Entire Survey Area	3 117 (190)	3 037 (199)	2 455	–0.1	2.3	12.5*
Canadian Prairies	511 (49)	564 (54)	477	–1.9*	1.6	3.6
Western Boreal Canada	1 685 (1 160)	1 648 (1 178)	1 008	–0.5	7.7*	22.3*
U.S. Prairies (North Central)	235 (41)	326 (54)	210	1.4	3.7	14.0
Alaska	686 (81)	498 (48)	760	3.5*	–6.0*	–1.4



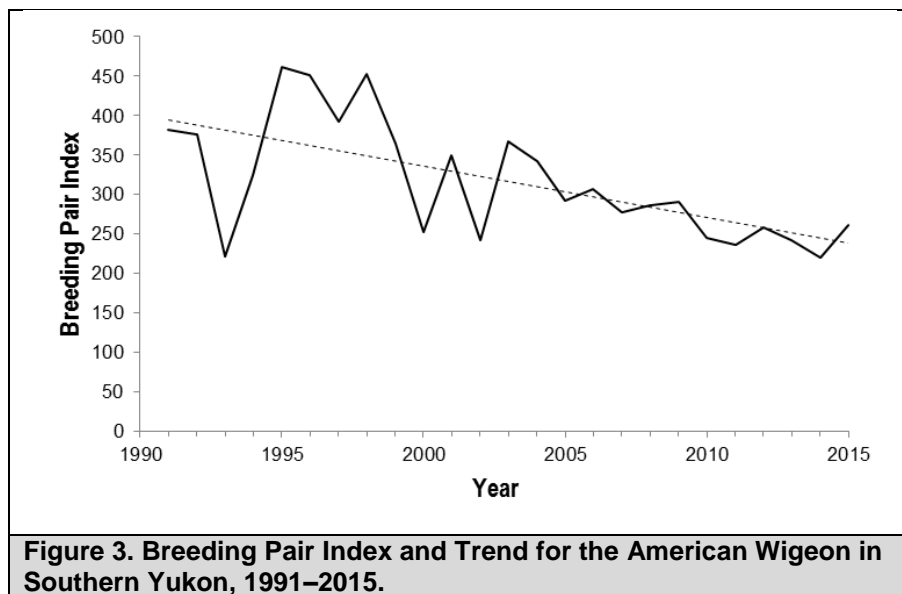
- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

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



- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

In southern Yukon, the American Wigeon population index increased in 2015 relative to previous years. Despite year-to-year variations, the population has been declining since the end of the 1990s (significant trend; Figure 3).



Harvest

Over the past two decades, 30 000 to 40 000 American Wigeons on average have been harvested by hunters every year in Canada. Most of the American Wigeon harvest takes place in the U.S., with an average annual harvest of 750 000 birds in the last decade. In Canada, the past decade has seen some of the lowest harvest rates for this species, but after sharp decreases in the annual harvest of this species in the 1970s and 1980s, the harvest appears to have stabilized since the last decade or so. The 2014 harvest of American Wigeon in Canada (38 098 birds) was the highest since 2006 (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
2014	28		113	485	1 564	8 892	2 953	4 316	11 777	7 970			38 098	610 915	649 013

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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 2015 were above the population objective for only the third 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 represent a serious problem for the American Wigeon (Mowbray 1999).

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 its population has doubled since the 1990s, following a period of prolonged drought in the 1980s.

Abundance and Trends

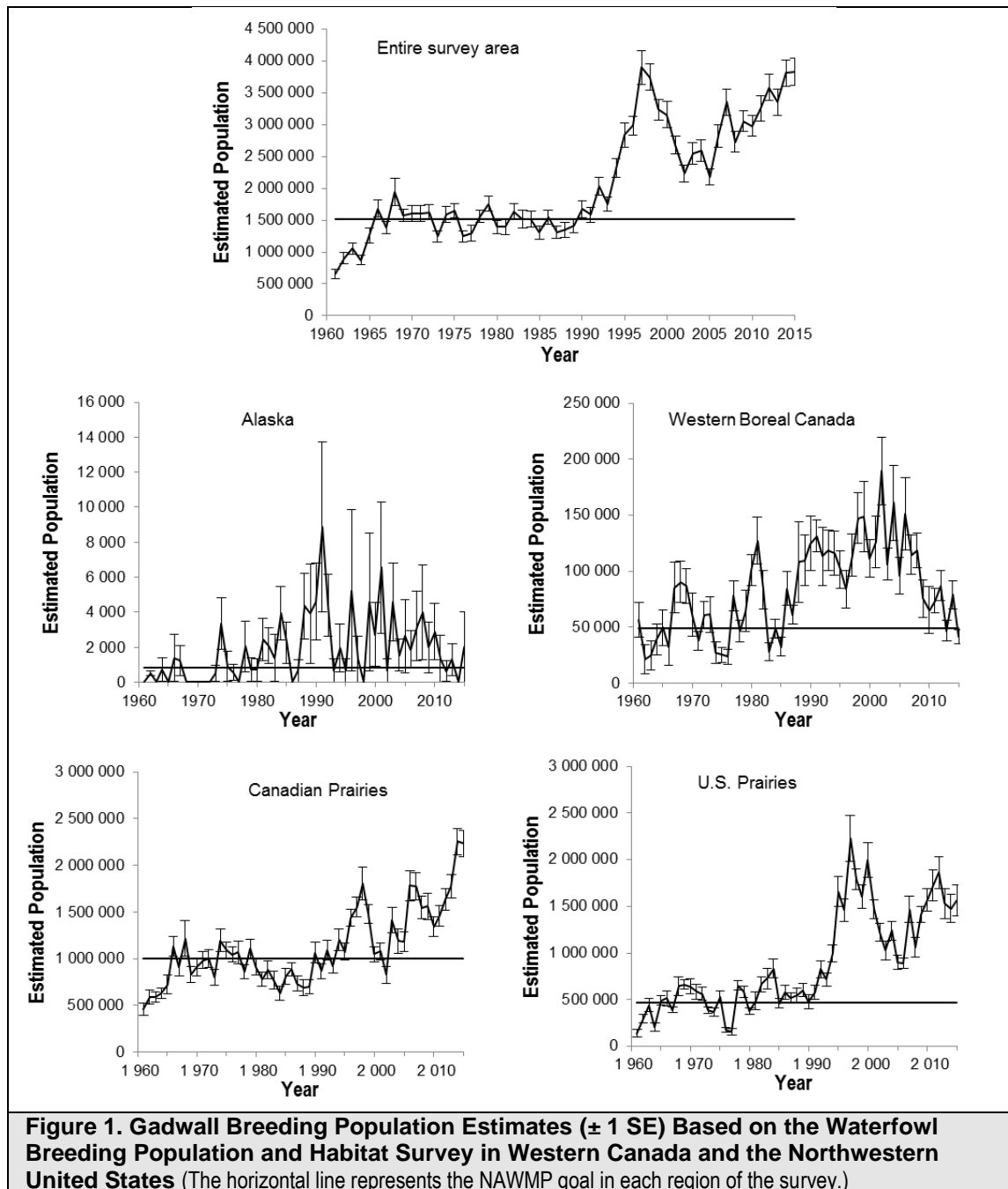
The Gadwall's core breeding area is located in the Prairie Provinces. The breeding population has been increasing in size since the early 1990s (Figure 1), and the breeding distribution has been expanding to eastern Canada and the northwestern U.S. (Leschack et al. 1997).

The Gadwall is monitored in its core breeding area mainly through the Waterfowl Breeding Population and Habitat Survey (WBPHS) in western Canada, as well as the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. (Figure 1, Monitoring section). The species is also monitored outside of the WBPHS survey area by the Cooperative Yukon Roadside Waterfowl Breeding Population Survey.

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

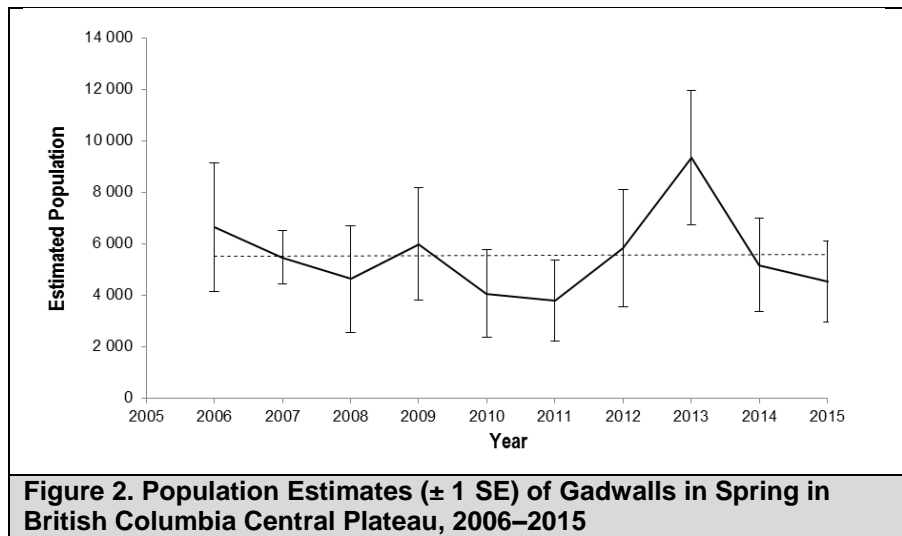
At the continental level, the Gadwall population has doubled in size since the 1990s (Figure 2) and shows significant increasing long-term and 10-year trends (Table 1). In the Canadian and U.S. Prairies, long-term and 10-year trends also suggest a significant increase in population numbers, while declines have been observed in the last 10 years in the Western Boreal Region. 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 Waterfowl Breeding Population and Habitat Survey (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		
	2014	2015	10-year Average (2005–2014)	1961–2015	2006–2015	2011–2015
Entire Survey Area	3 811 (206)	3 834 (219)	3 112	2.3*	3.1*	4.0
Canadian Prairies	2 256 (141)	2 232 (143)	1 630	1.6*	2.8	12.4*
Western Boreal Canada	79 (13)	41 (6)	91	1.8	–11.2*	–13.9
U.S. Prairies (North Central)	1 476 (150)	1 559 (166)	1 389	3.4*	4.9*	–4.2
Alaska	0	2 000 (2 014)	2	3.7	N/A	N/A



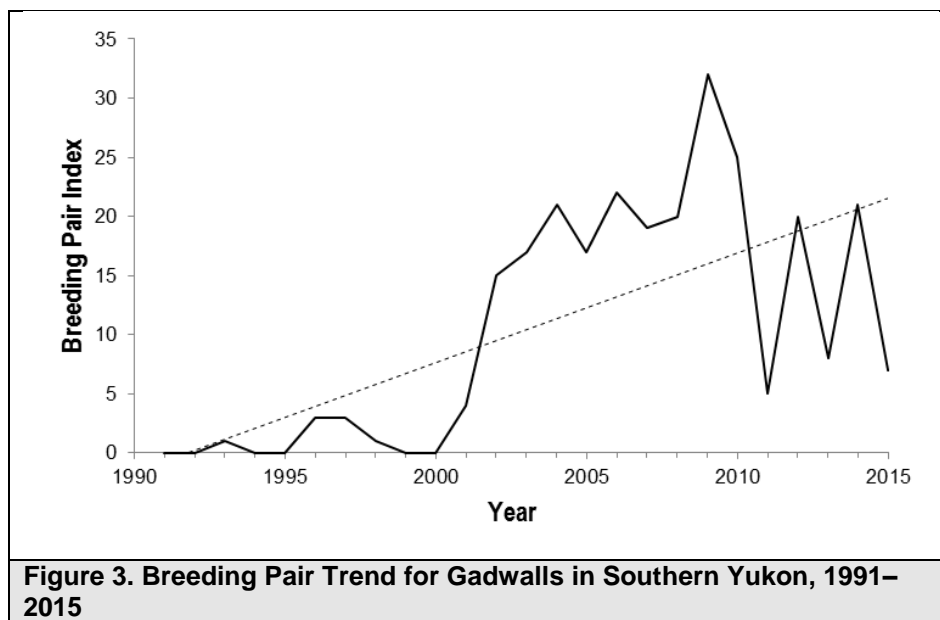
- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C

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



- 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).



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 42 000 Gadwalls have been harvested in Canada, compared to an average of more than 1.6 million birds per year in the United States.

Inland Dabbling Ducks

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
1974		211	88	65	2 912	4 330	11 113	43 412	58 769	1 991			122 891	651 864
1975	160				3 757	10 666	16 437	59 048	59 594	4 058			153 720	784 830
1976					6 418	6 672	10 312	41 374	62 412	1 307			128 495	858 794
1977			85		6 465	5 592	13 922	26 511	40 545	2 531			95 651	737 700
1978	120		53		7 283	11 316	12 528	37 873	35 451	1 646			106 270	976 788
1979					9 475	6 611	16 379	38 248	31 897	1 031	17		103 658	889 182
1980				59	10 827	7 028	10 801	22 132	42 540	653			94 040	770 205
1981		65	46		5 560	6 456	12 414	8 011	17 232	728			50 512	650 793
1982					7 760	10 766	10 438	26 825	35 506	6 118			97 413	889 397
1983			122	218	8 319	5 083	10 990	21 689	26 932	3 742			77 095	907 720
1984	124	93			5 145	2 744	8 533	14 391	22 731	1 732			55 493	781 930
1985		105	347		8 884	4 946	7 267	12 611	17 945	2 229			54 334	486 413
1986			28		5 223	3 415	7 462	16 492	17 712	1 146			51 478	560 617
1987				68	4 832	1 726	5 833	5 491	18 168	1 131			37 249	474 688
1988		139	122		4 834	2 610	2 791	2 607	7 487	2 534			23 124	214 210
1989		153			3 628	2 845	6 589	7 701	14 890	1 545			37 351	365 059
1990	95	213	144	91	3 599	2 368	4 567	10 683	12 653	2 040			36 453	382 342
1991	140	206		54	6 274	3 540	4 247	5 683	10 522	1 879			32 545	428 194
1992				237	6 289	3 192	6 725	8 860	6 830	2 740			34 873	375 624
1993			167	210	5 134	3 156	6 545	8 047	9 150	739			33 148	406 883
1994			125	150	4 559	2 416	4 084	7 638	15 568	1 802			36 342	655 501
1995		340		41	4 918	3 734	6 752	7 421	10 755	912			34 873	1 210 200
1996		235	46	179	3 283	4 135	9 111	15 954	16 026	1 134			50 103	1 428 393
1997		551		111	4 110	2 885	4 144	16 247	20 663	1 193			49 904	1 518 971
1998		100	36	272	3 573	3 295	11 294	16 467	13 302	2 228			50 567	1 787 170
1999 ²				254	3 108	3 490	9 589	9 241	14 013	1 549			41 244	1 821 696
2000		1 337	396		2 642	3 294	7 865	8 134	13 702	1 562			38 932	2 076 737
2001				224	2 285	2 730	10 164	7 451	9 027	1 448	19		33 348	1 493 667
2002		614	106	184	1 279	3 497	9 459	9 844	7 825	858			33 666	1 232 106
2003	42		31	190	2 502	2 301	8 109	14 822	11 390	1 619			41 006	1 466 578
2004			116	206	1 357	2 405	8 289	18 203	11 357	578			42 511	1 363 976
2005		72	126	244	2 498	3 067	3 228	15 782	14 399	573			39 989	1 363 953
2006		103	17	291	2 611	3 767	5 329	11 053	10 838	929			34 938	1 544 792
2007		414	305	220	1 467	1 205	6 745	13 839	14 522	1 273			39 990	1 475 301
2008		330	25	306	1 974	2 213	5 905	16 212	16 366	738			44 069	1 464 272
2009		106	315	112	1 495	2 921	2 649	17 720	9 539	1 082			35 939	1 401 775
2010		403	170		1 263	4 366	3 879	16 075	12 576	620			39 352	1 735 285
2011		705		218	940	3 934	7 225	29 404	8 532	596			51 554	2 312 705
2012		215	280	71	1 501	5 866	4 514	15 565	8 972	181			37 165	2 020 731
2013			171	312	1 748	4 191	3 665	15 565	10 706	237			36 595	1 674 772
2014			142	37	1 504	3 960	5 434	43 710	10 260	759			65 806	1 582 796

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

Management and Conservation Concerns

Gadwall numbers have increased considerably since the 1990s, with a doubling of the population in the last decade or so. No other dabbling duck species has shown a comparable population increase to that of the 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 2014).

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 (DuBow 1996). The continental population is currently increasing.

Abundance and Trends

The Northern Shoveler is monitored in its core breeding range through the Waterfowl Breeding Population and Habitat Survey (WBPHS), as well as the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. (Figure 1, Monitoring section). The species is also monitored outside of the WBPHS survey area by the Cooperative Yukon Roadside Waterfowl Breeding Population Survey.

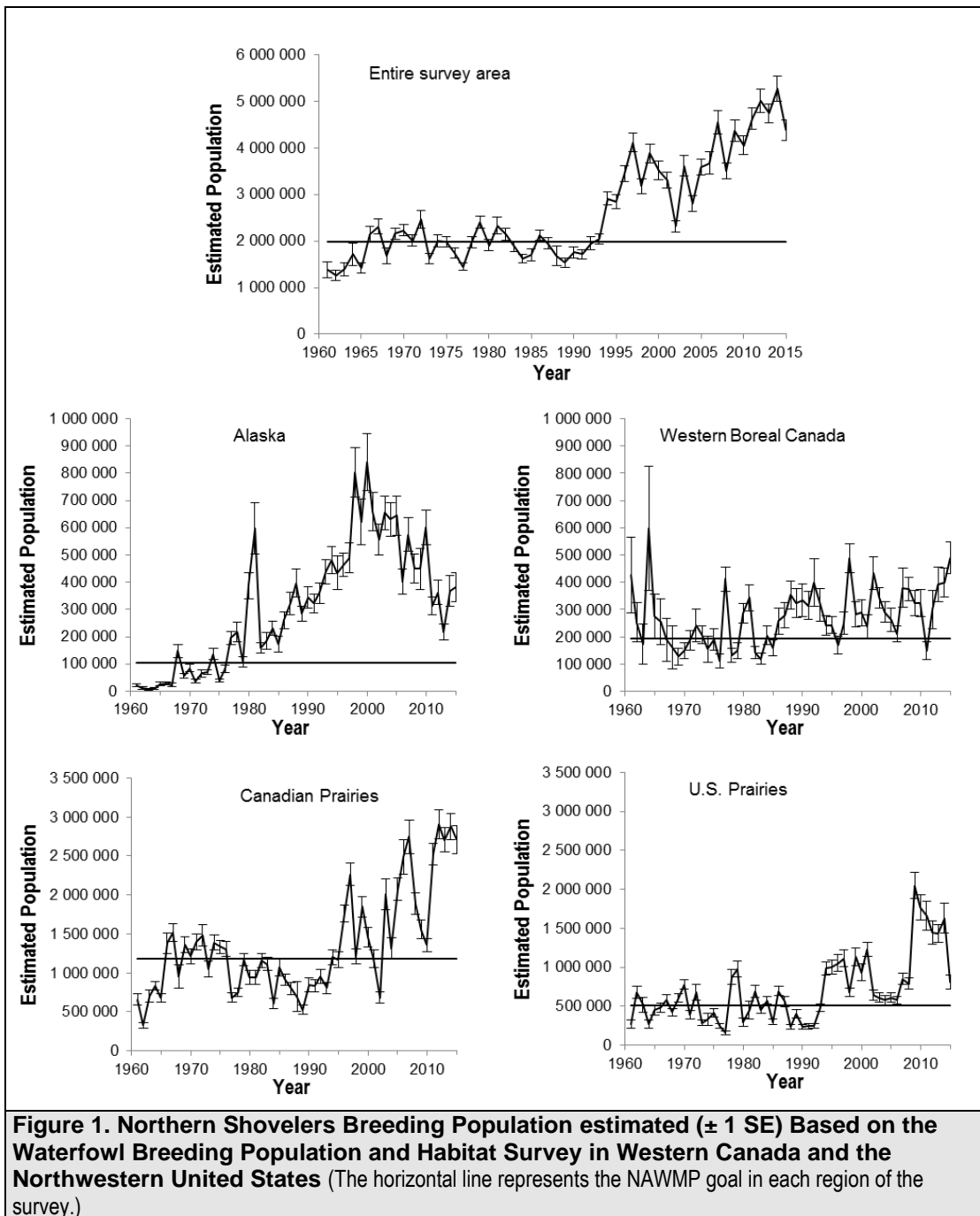
- *WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES*

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 trends in all regions but the Western Boreal, where the 5-year trend, however, does point to a significant increase in the population size. The 10-year trends suggest a significantly increasing population in the U.S. Prairies, but a significant decrease in Northern Shoveler numbers in Alaska. Short-term (5-year) trends are inconclusive except in the Western Boreal, where the trend suggests a significantly increasing population size, and in the U.S. Prairies, where recent years have seen declines in the number of Northern Shovelers (Table 1).

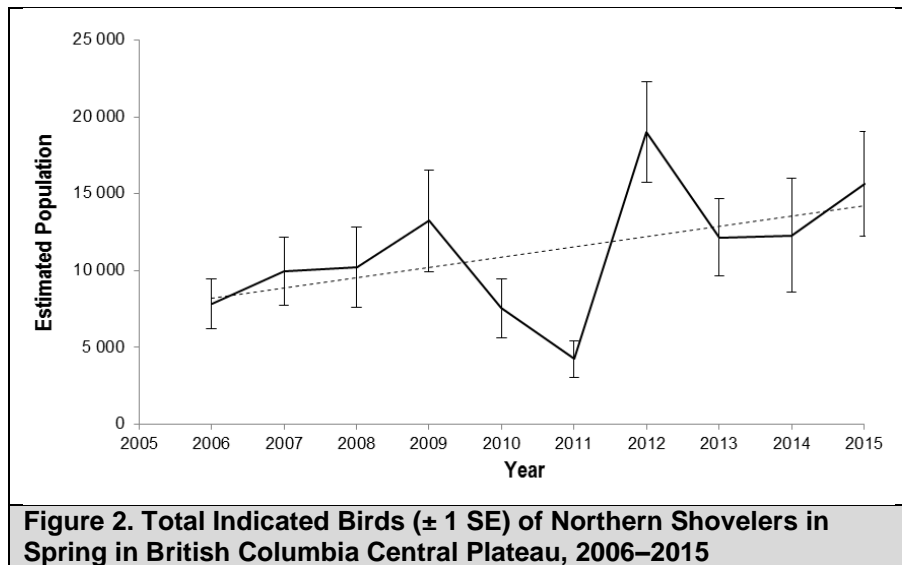
Table 1. Northern Shoveler Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p < 0.05$).

WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, [1 SE])			Trends in Numbers of Breeding Birds		
	2014	2015	10-yr Average (2005–2014)	1961– 2015	2006– 2015	2011– 2015
Entire Survey Area	5 279 (265)	4 391 (219)	4 345	2.1*	2.8	–0.6
Canadian Prairies	2 880 (166)	2 710 (183)	2 314	1.9*	3.3	1.3
Western Boreal Canada	400 (54)	489 (58)	312	0.9	4.0	28.4*
U.S. Prairies (North Central)	1 631 (192)	810 (90)	1 282	2.2*	5.9*	–12.3*
Alaska	368 (56)	382 (51)	438	6.4*	–5.0*	4.3



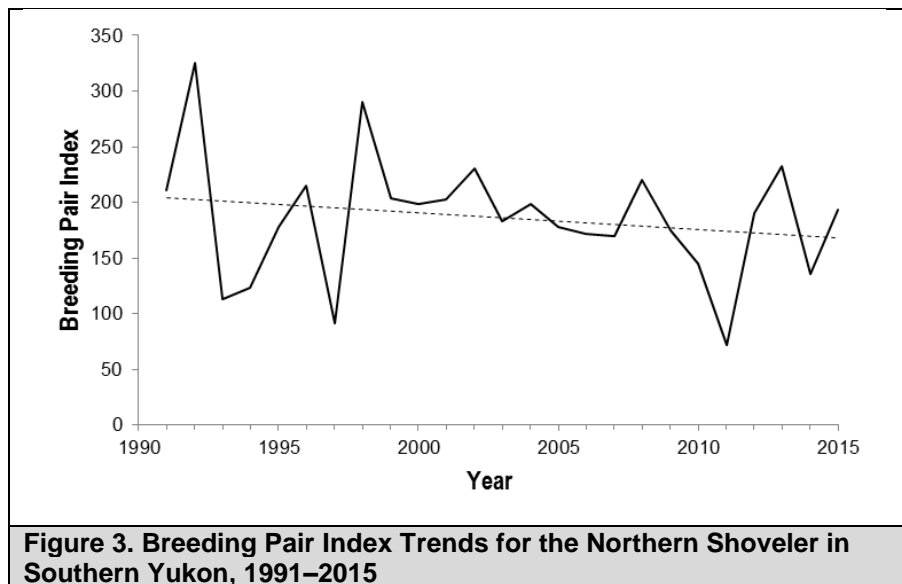
- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

The Northern Shoveler is one of the most common species in central British Columbia. Overall, the species' population in this region seems to have increased in number since 2006, although tests for statistical significance have not yet been performed (Figure 2).



- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

In southern Yukon, the Northern Shoveler population index was higher in 2015 compared to 2014. Population numbers have shown important interannual variation and appear to be decreasing in Yukon since 1991 (Figure 3).



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
2014			64		401	844	2 332	10 943	6 074	1 248			21 906	704 757	726 663

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.
²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.
Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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.

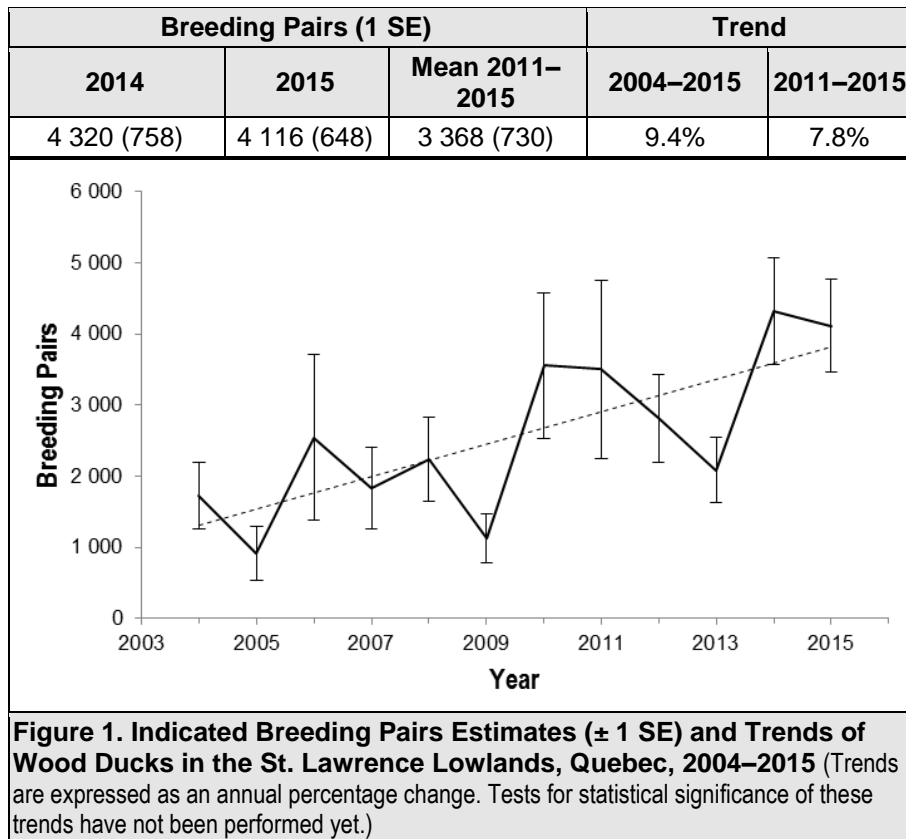
Abundance and Trends

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 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.

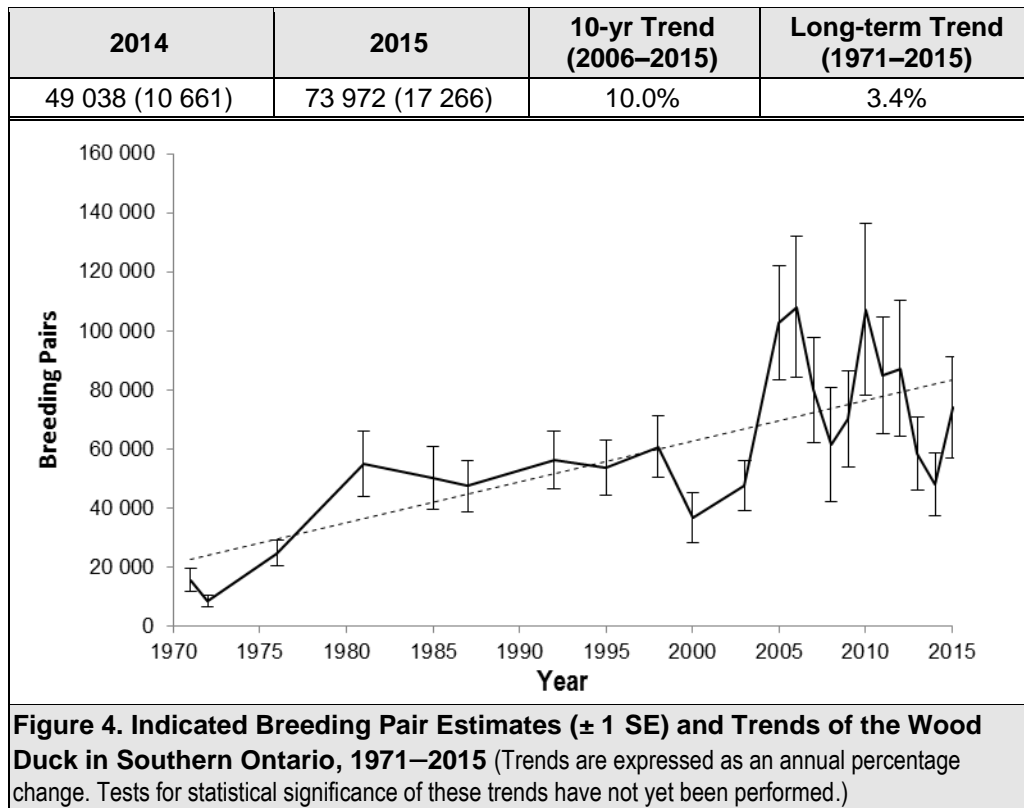
- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

In the St. Lawrence lowlands, the Wood Duck is a common species, and its population shows an increasing 5-year trend (Figure 1). Despite a slightly lower breeding pairs estimate in 2015 compared to 2014, the current numbers remain well above the 5-year average, and the population continues to show a long-term increasing trend for this region. This steady increase has led the Wood Duck to replace the Black Duck as the second most important species, in term of population numbers for this region, for the first year since the beginning of this survey.



- 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). In southern Ontario, the Wood Duck breeding population nearly doubled in 2015 compared to 2014 but is comparable to its 10-year average of approximately 78 000 breeding pairs.



Harvest

Wood Ducks are sought after by hunters and an average of 68 000 birds of this species have been taken annually in Canada over the past 10 years (Table 1). In the United States, more than a million Wood Ducks are harvested every year, accounting for more than 10% of the annual waterfowl harvest in the U.S.

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 in place between 1918 and 1941. The Wood Duck population recovered, and thus the hunt was reopened in 1941. The population is currently increasing or stable throughout much of the species' range.

Inland Dabbling Ducks

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	NT/NU/YK	Total	Total
1974			300	1 052	18 608	62 755				1 589		84 304	940 535
1975			296	1 994	16 155	85 586	384			1 686		106 101	1 203 135
1976	93		216	1 509	17 096	92 245	1 386			757		113 302	1 083 651
1977		45	589	1 794	21 843	101 157	780			2 011		128 219	1 026 946
1978		43	724	2 364	18 028	121 304	146			406		143 015	1 275 243
1979	2 174		877	1 392	18 530	89 125	952	107		706		113 863	1 251 269
1980	280		658	2 935	17 816	94 117	2 054			1 318		119 178	1 395 132
1981		83	524	2 429	24 481	91 912	1 764		274	1 662		123 129	1 364 309
1982		63	715	2 347	20 657	92 014	354			1 229		117 379	1 175 692
1983			435	3 181	24 800	111 558	2 171	96		1 955		144 196	1 377 079
1984	550		348	3 574	23 279	115 160	597			533		144 041	1 426 696
1985			395	2 080	23 553	113 046	604		215	817		140 710	833 400
1986			361	2 245	15 534	102 722	616			983		122 461	926 286
1987			873	3 543	23 192	115 867	1 018			259		144 752	1 024 443
1988			555	3 622	25 644	98 817	304			1 149		130 091	554 656
1989		51	788	3 005	24 955	99 571	1 118			1 188		130 676	684 719
1990			557	3 363	23 702	110 016	883			262		138 783	748 963
1991		459	350	3 063	20 991	100 552	821		332	763		127 331	834 280
1992			1 863	2 305	22 775	79 754	948	687		274	15	108 621	677 126
1993	138	76	979	3 857	27 643	87 302	655			310		120 960	865 817
1994			1 144	4 886	28 032	97 013	1 064	584		390		133 113	947 751
1995	85	218	467	3 942	19 098	84 708	183			195		108 896	1 161 021
1996	79		1 703	4 983	18 519	78 885	1 828		124	468		106 589	1 143 505
1997		249	745	3 475	21 070	75 262	858	120		710		102 489	1 352 695
1998	838		770	4 099	17 302	74 675	1 902			958		100 544	1 504 803
1999 ²	101	340	1 096	2 853	20 680	56 696	719	1 019	128	174		83 806	1 554 350
2000		129	815	3 032	15 160	58 335	111			153		77 735	1 364 808
2001	172	181	1 924	2 389	16 342	55 823	132			429		77 392	1 204 524
2002		78	780	2 662	14 124	54 970	991			114		73 719	1 165 957
2003	84		1 284	2 649	11 993	41 255	594	67		40		57 966	1 191 158
2004	428	54	1 027	2 002	11 538	47 969	965			182		64 165	1 105 505
2005		64	1 348	4 214	13 407	48 736	1 010			159		68 938	1 119 920
2006	121	130	1 285	3 399	10 550	42 226	1 320			113		59 144	1 076 201
2007	47	143	1 262	2 601	16 771	37 253	3 636			546		62 259	1 087 840
2008	133		578	2 169	14 620	46 824	1 803					66 127	1 143 819
2009			1 386	4 258	18 327	36 881	269	333				61 454	1 098 345
2010	94		1 103	3 684	12 511	43 159	515					61 066	1 478 889
2011			342	2 357	14 373	52 526	5 032			80		74 710	1 433 957
2012			599	2 673	15 775	53 244	3 824			166		76 281	1 433 957
2013			320	3 140	13 842	51 884	1 734			25		70 945	1 160 863
2014			599	3 048	17 518	58 568	1 315	1 387		146		82 581	1 079 574

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

Population Status of Inland 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 make it difficult to distinguish them from each other. 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 the historically high levels observed in the late 1970s (Austin et al. 2000).

The Greater Scaup is the larger of the two species and has 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 Peninsula—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 to western Labrador, with scattered breeding in Newfoundland, as well as further south in the Gulf of St. Lawrence on Anticosti and the Magdalen 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

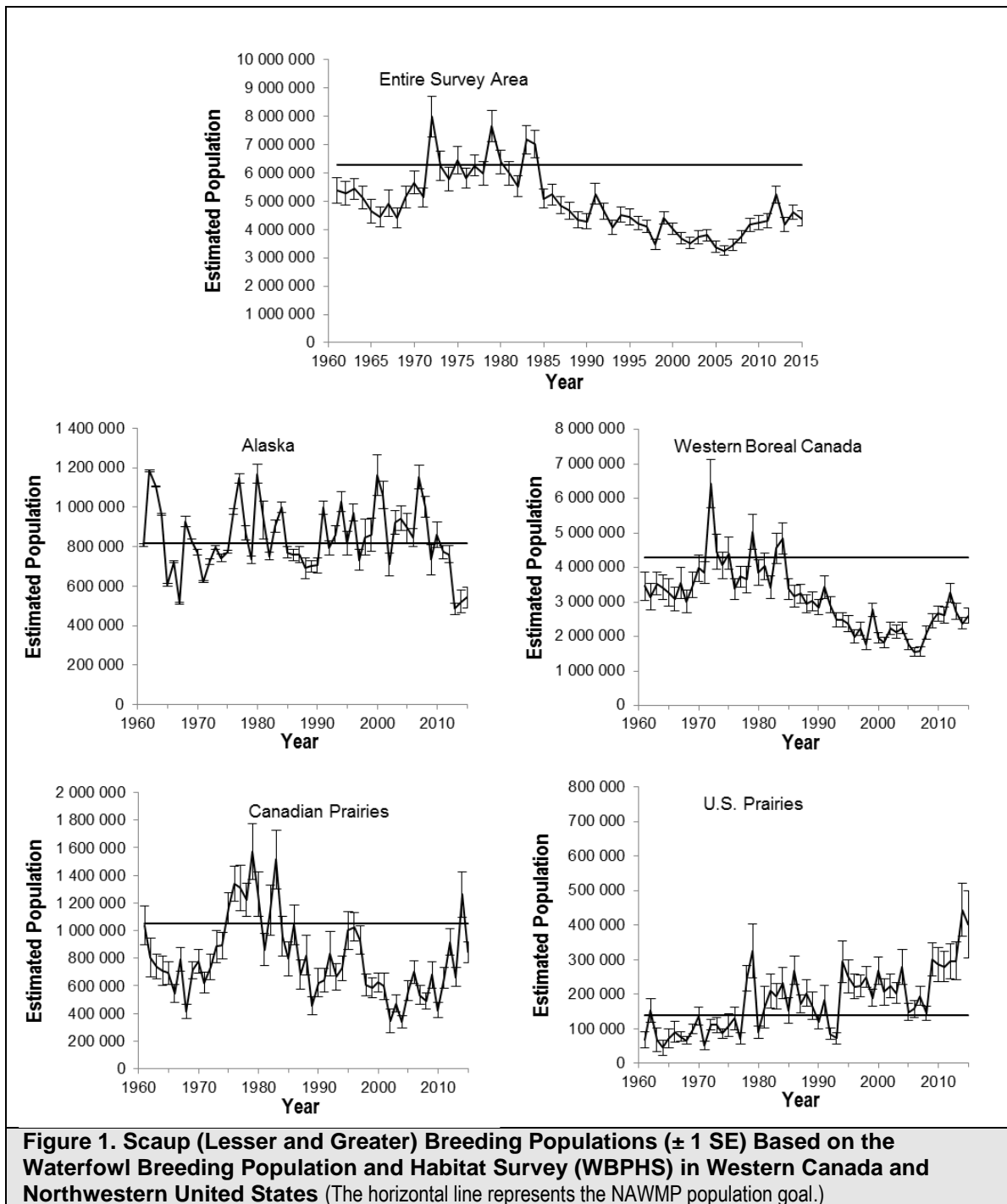
The Greater and Lesser Scaup are monitored within their core breeding ranges mainly through the Waterfowl Breeding Population and Habitat Survey (WBPHS), as well as the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. (Figure 1, Monitoring section). Both species are also monitored outside of the WBPHS survey area by the Cooperative Yukon Roadside Waterfowl Breeding Population Survey. 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 has generally showed an increasing trend, with the exception of the population in Alaska. However, the continental population remains below the NAWMP goal of 6.3 million birds (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 (Figure 1). The Canadian Prairies breeding population also remains below the NAWMP goal of 1.05 million birds despite showing significant 5- and 10-year increasing trends (Table 1).

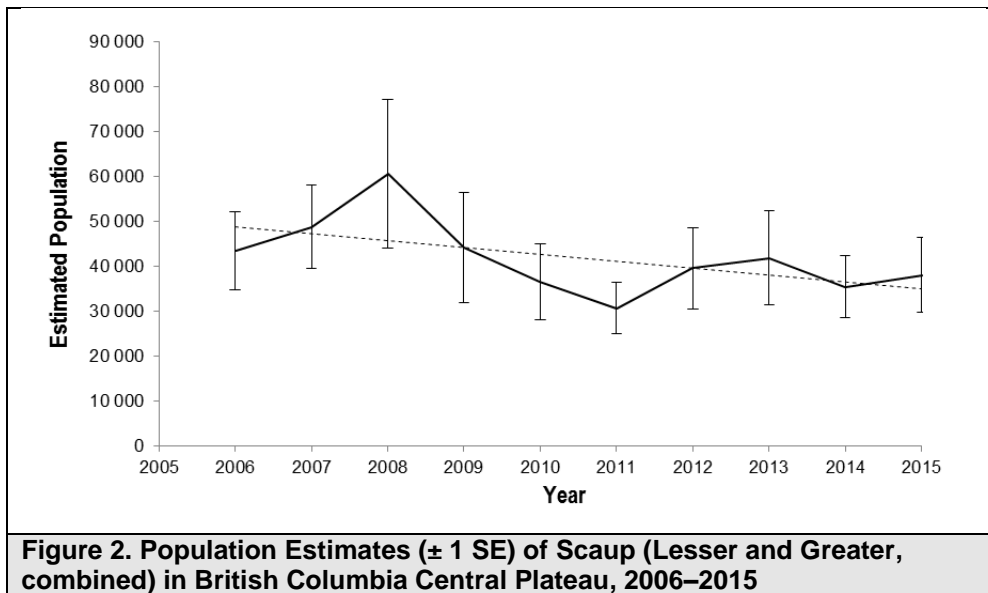
Table 1. Scaup (Lesser and Greater) Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change. *Trend significant at $p < 0.05$.)

WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, [1 SE])			Trends in Numbers of Breeding Birds		
	2014	2015	10-year Average (2005–2014)	1961– 2015	2006– 2015	2011– 2015
Entire Survey Area	4 611 (253)	4 395 (252)	4 057	–0.8*	3.7*	–0.8
Canadian Prairies	1 261 (167)	844 (76)	690	–0.6	6.6*	8.5*
Western Boreal Canada	2 383 (164)	2 604 (206)	2 309	–1.3*	6.1*	–3.1
U.S. Prairies(North Central)	444 (76)	402 (97)	254	2.6	11.4*	12.1
Alaska	522 (59)	542 (76)	804	–0.1	–7.7*	–10.3



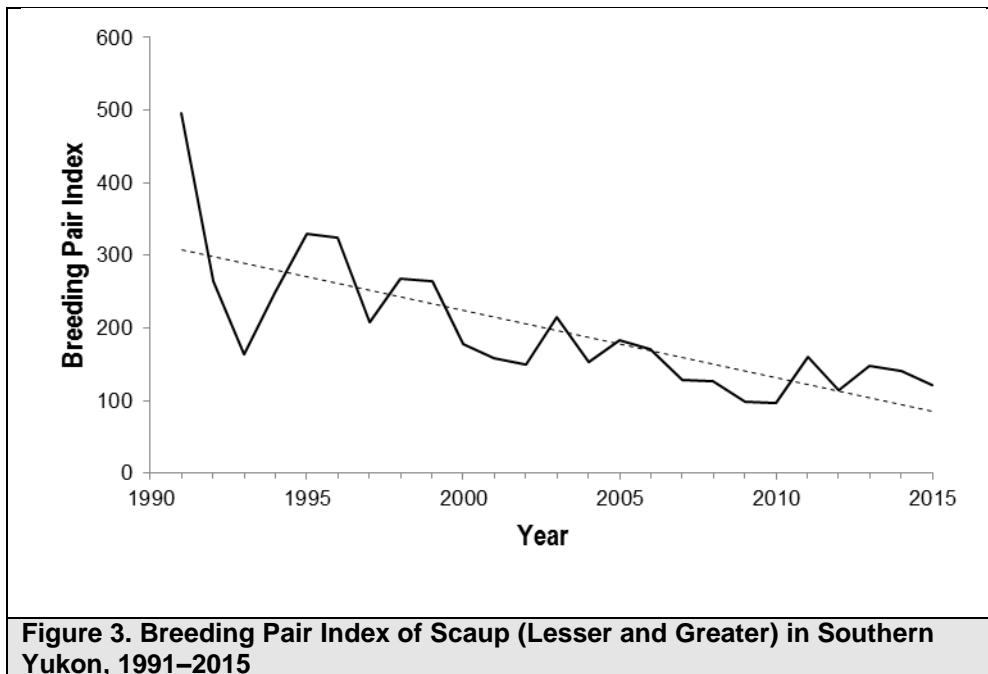
- *WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.*

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



- *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 (significant trend; Figure 3).



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) since the beginning of the survey in 1974. In 2014, 71 064 Greater Scaup were harvested in Canada and the U.S. combined, while the harvest for Lesser Scaup at the continental level was of 348 060 birds. In the past decade, the Canadian harvest of both the Lesser and Greater Scaup has accounted for about 10% of the total continental harvest.

Management and Conservation Concerns

The difficulty 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 the 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 subsequently. Scaup breeding in the boreal forest also declined during the 1980s, and numbers for this species still have not returned to levels observed in the 1970s. Reasons for this failure to return to 1970s numbers are unknown, but research is ongoing.

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
2014	866		81	407	1 226	5 715	14 376	528	2 411	525			26 135	321 925	348 060

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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	1 788	314	1 620	488	20 243	18 172	572	532	1 039				44 768	77 064	121 832
1975	1 321		2 401	283	25 353	36 056	1 136	176	1 215	2 986	69		70 996	65 390	136 386
1976	3 095		3 522	478	28 190	37 526	1 140	291		1 297			75 539	97 062	172 601
1977	2 436	217	1 895	244	21 126	44 900				617		64	71 499	114 931	186 430
1978	1 611		502	141	17 811	20 465	1 782			320		77	42 709	101 662	144 371
1979	637		959	97	20 315	26 367	677			1 391			50 443	49 750	100 193
1980	3 052	147	738	384	18 922	29 535	720			739			54 237	48 739	102 976
1981	344		170	818	22 891	23 762	1 139			548			49 672	86 283	135 955
1982	1 476	63	411	584	15 678	15 797				230			34 239	90 892	125 131
1983	427		1 289	574	13 443	38 628				924			55 285	67 843	123 128
1984	2 565	31	1 098	1 125	18 999	22 538	419	561	133	907			48 376	67 232	115 608
1985	2 423	428	759	272	17 880	28 128	1 022			134		63	51 109	60 013	111 122
1986	5 095	404	2 213	1 456	11 638	30 320	970	214	151	1 112			53 573	55 163	108 736
1987	1 103		672	1 323	6 941	13 103	746	131		318			24 337	39 712	64 049
1988	920		3 221	585	13 622	13 859				212			32 419	26 202	58 621
1989	5 264	51	2 547	1 498	9 380	14 701			182	242			33 865	25 082	58 947
1990	3 684	79	1 609	420	9 284	11 959	383		195	81			27 694	26 606	54 300
1991			1 657	267	6 314	9 815	626	474	387	153			19 693	18 877	38 570
1992	1 360		805	898	4 830	9 913	298			87			18 191	19 365	37 556
1993	5 959	176	1 161	362	8 589	8 651	163				21		25 082	27 152	52 234
1994	706		1 501	307	6 550	8 329	306			26			17 725	29 259	46 984
1995	508	82	920	542	5 080	12 861	268			97			20 358	53 018	73 376
1996	596	65	772	914	5 839	7 653	286		297				16 422	49 734	66 156
1997	677	83	919	1 119	3 627	6 002	157			379			12 963	62 883	75 846
1998	1 703	169	256	1 878	4 055	4 274	165		162				12 662	45 712	58 374
1999 ²	1 377		332	55	4 171	4 671	929					3	11 538	35 336	46 874
2000	1 075		1 157	659	2 961	3 190	120						9 162	42 453	51 615
2001	1 210		234	1 492	1 537	4 276	747			18			9 514	32 702	42 216
2002	1 125	77	437	1 517	2 725	4 816	690				151		11 538	72 258	83 796
2003	576	366	524	337	2 100	5 481			173				9 557	49 192	58 749
2004	964	39	90	503	3 040	7 029	285		161	26			12 137	71 127	83 264
2005	447		193	536	1 562	2 840	235						5 813	57 212	63 025
2006	705	287	191	430	4 002	3 010					19		8 644	47 780	56 424
2007	619	101	91	165	815	6 764	88			29			8 672	70 833	79 505
2008		41	414	243	1 445	5 876	343		140	35			8 537	49 465	58 002
2009			223	155	912	3 244	540					22	5 096	55 139	60 235
2010	442			2 624	939	2 835	46						6 886	69 814	76 700
2011					1 915	3 617							5 532	59 424	64 956
2012	224			197	1 758	4 022			186				6 387	97 900	104 287
2013	1 251	234	105	692	2 081	4 993	156						9 512	82 225	91 737
2014	1 151		48	1 349	386	3 484	2 552						8 970	62 094	71 064

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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

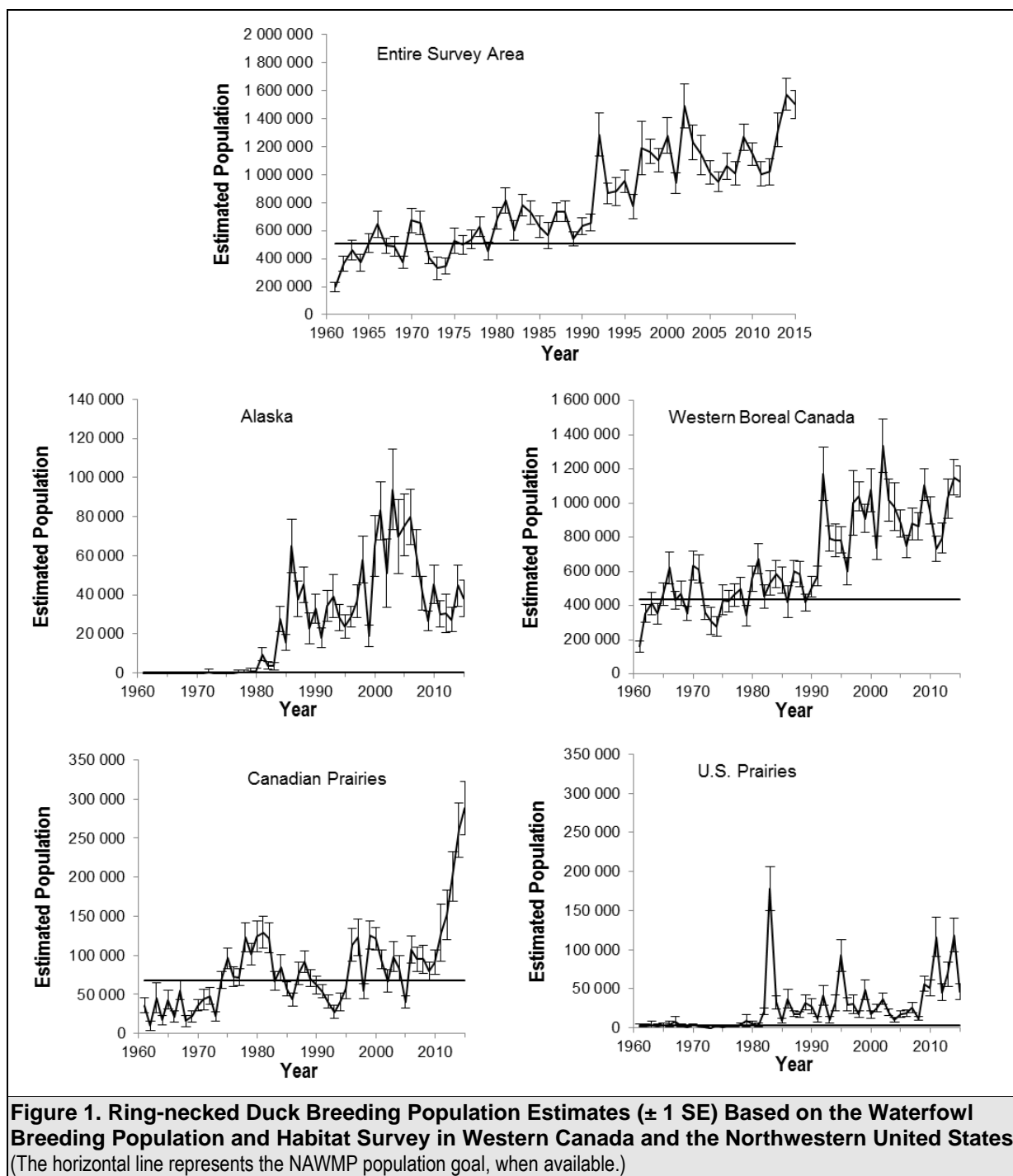
The Ring-necked Duck is monitored on its core breeding range through the Waterfowl Breeding Population and Habitat Survey (WBPHS) in western and eastern Canada, as well as the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. (Figure 1, Monitoring section). The species is also monitored by other small-scale regional breeding waterfowl surveys across the country, including the Southern Ontario Waterfowl Plot Survey, the St. Lawrence Lowlands Breeding Waterfowl Survey and the Cooperative Yukon Roadside Waterfowl Breeding Population Survey.

- 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-term (1961–2015) and short-term (2006–2015 and 2011–2015) trends (Table 1). Long-term trends (1961–2015) are positive and significant for all regions except the U.S. Prairies. Similarly, the medium-term (2006–2015) trends for the entire survey area, the Canadian and the U.S. Prairies are positive, but the trend for Alaska is negative. In the Western Boreal Region, the short-term trend suggests a decrease in the population size for the Ring-necked Duck (Table 1 and Figure 1).

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

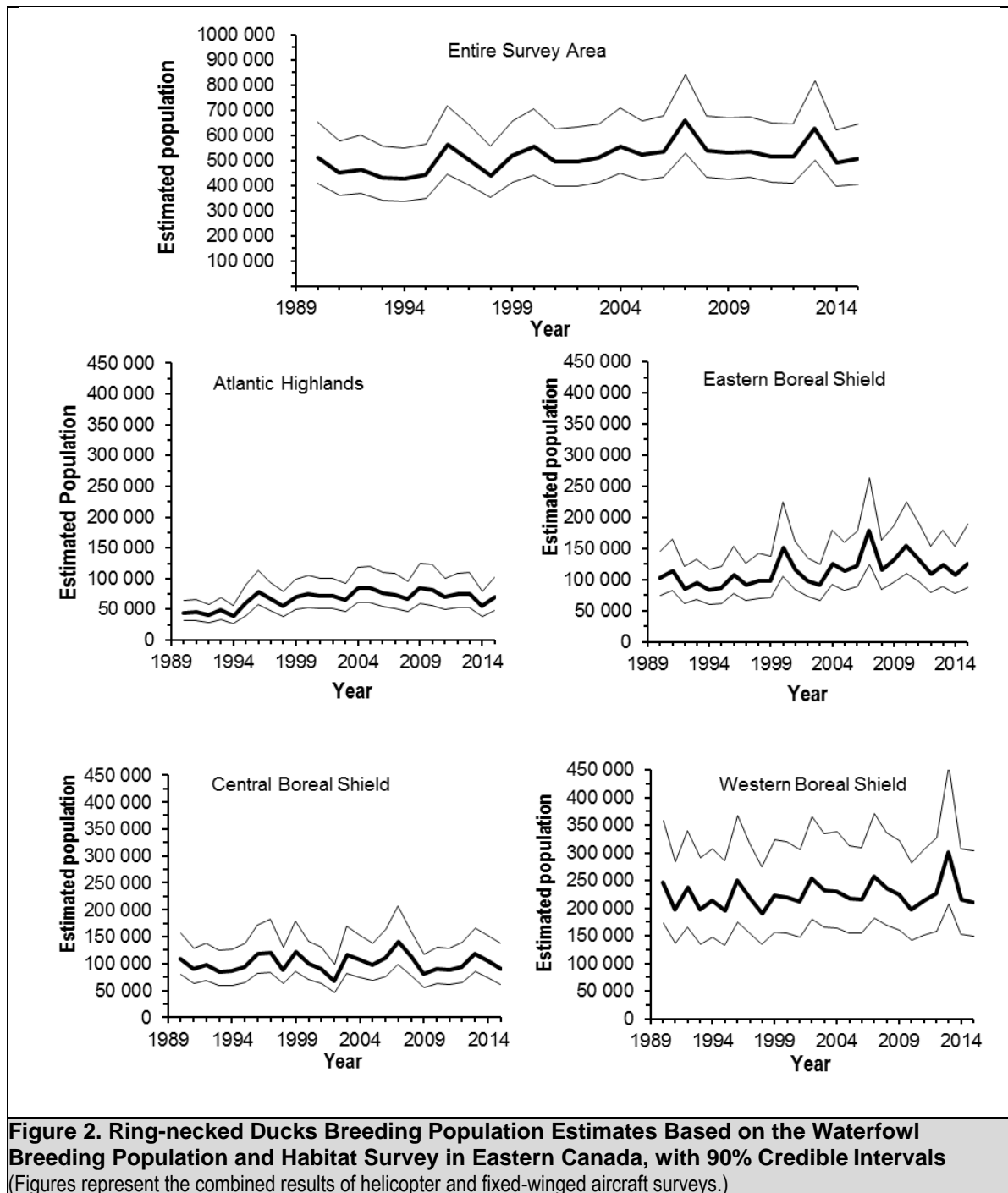
WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, [1 SE])			Trends in Numbers of Breeding Birds		
	2014	2015	10-yr Average (2005–2014)	1961– 2015	2006– 2015	2011– 2015
Entire Survey Area	1 574 (113)	1 503 (99)	1 138	2.5*	5.2*	15.4*
Canadian Prairies	261 (35)	288 (34)	125	2.9*	14.2*	24.0
Western Boreal Canada	1 150 (105)	1 127 (92)	913	2.3*	3.2	–13.0*
U.S. Prairies (North Central)	119 (22)	46 (10)	53	8.6	18.6*	–7.3
Alaska	45 (10)	38 (9)	46	41.5*	–6.4*	9.0



- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

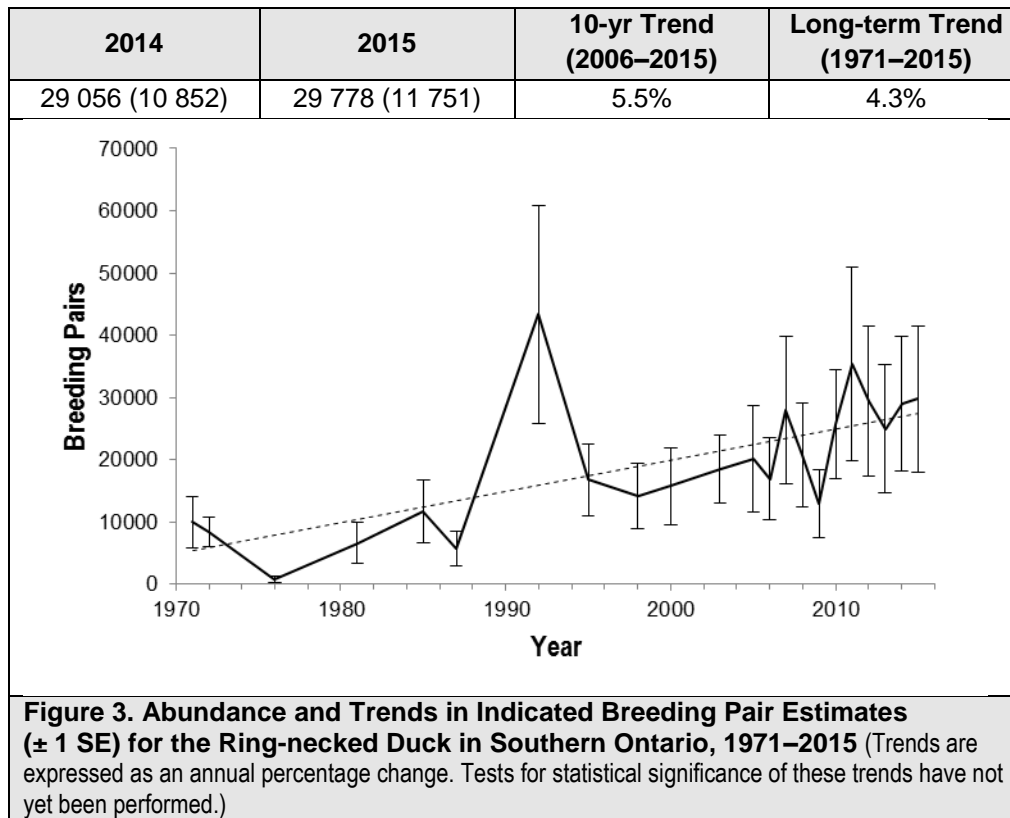
In eastern Canada, Ring-necked Ducks show a relatively stable trend in most regions of the survey area (Figure 2 and Table 2).

Table 2. Ring-necked Duck Breeding Population Estimates (in Thousands) Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Eastern Canada, with 90% Credible Intervals (Results combined data from the helicopter and fixed-winged aircraft surveys).			
WBPHS—Eastern Canada	2014	2015	10-yr Average (2005–2014)
Entire Survey Area	490 (395–623)	506 (405–643)	545
Atlantic Highlands	55 (39–79)	70 (49–102)	75
Eastern Boreal Shield	108 (78–153)	126 (87–189)	129
Central Boreal Shield	106 (74–153)	90 (61–137)	104
Western Boreal Shield	215 (152–307)	210 (149–303)	231



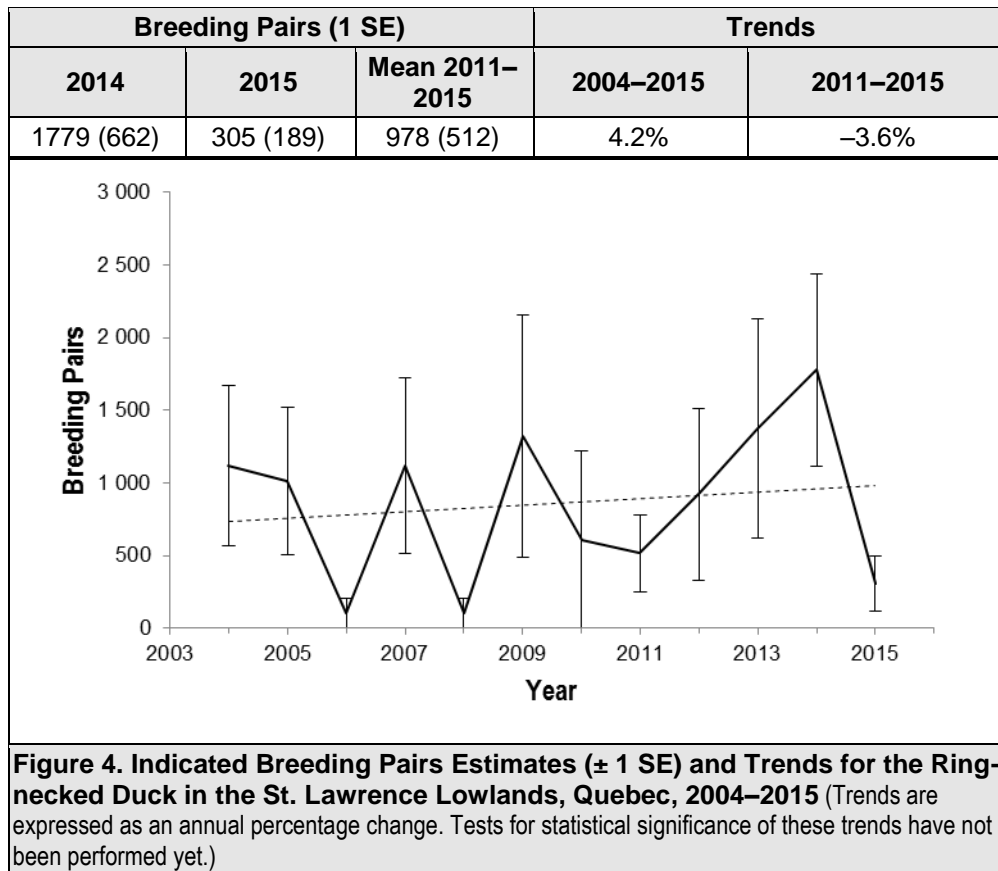
- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

Breeding population estimates for Ring-necked Duck in Southern Ontario show increasing 10-year and long-term trends, with 5.5% and 4.3% annual increases, respectively (Figure 3).



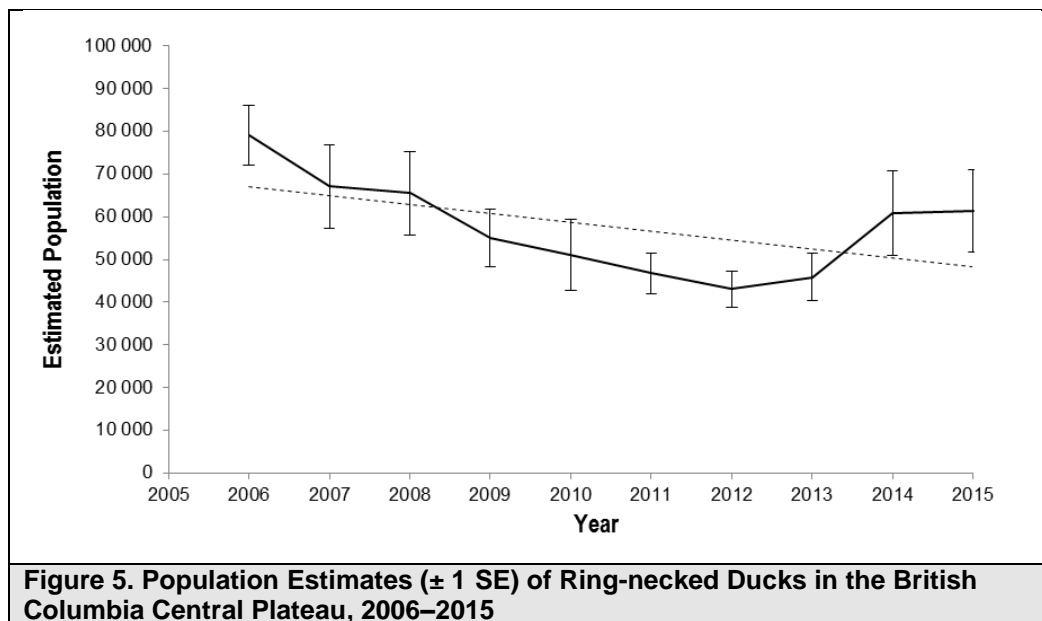
- ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

Breeding population estimates in the St. Lawrence Lowlands for the Ring-necked Duck show a slightly increasing long-term trend (Figure 4). The 2015 estimate of 305 breeding pairs represents an important decrease compared to the 2014 estimate, which was the highest since the survey began in 2004.



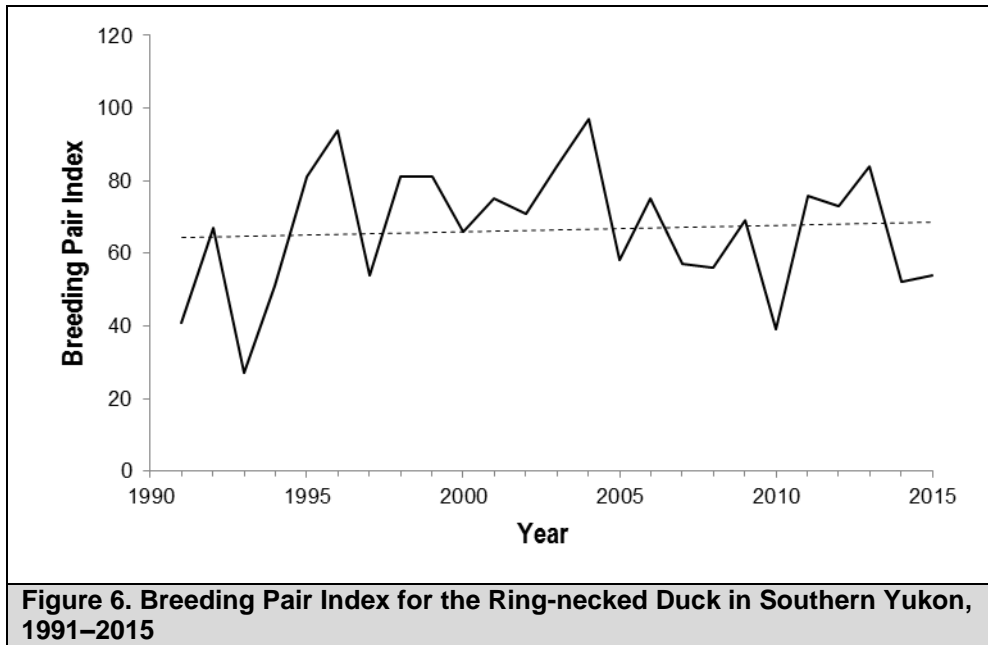
- WATERFOWL BREEDING POPULATION SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

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



- 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 or slightly increasing long-term trend has been observed since 1991 (Figure 6).



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), which represents approximately 7% of the combined U.S. and Canada harvest (e.g., 526 415 birds in 2014). Historically, the Ring-necked Duck has been, and remains, 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.

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
2014	3 471		625	1 456	6 871	11 590	3 136	19	140	1 049			28 357	498 058	526 415

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyw ays.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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 the entire survey area as well as in the Canadian and U.S. Prairies (Table 1). However, the short-term trend for the U.S. Prairies suggests the Redhead population in this region is undergoing a marked decline. Data suggest that the Alaska population of the Redhead has been drastically reduced over the long term, with no birds of this species observed since 2012 in the region. 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 Prairies (Figure 1).

Table 1. Redhead Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (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		
	2014	2015	10-yr Average (2005–2014)	1961– 2015	2006– 2015	2011– 2015
Entire Survey Area	1 279 (102)	1 196 (93)	1 079	1.4*	3.4*	–2.4
Canadian Prairies	900 (90)	873 (85)	649	1.5*	3.1*	8.7*
Western Boreal Canada	61 (13)	67 (16)	57	–0.2	–6.0	20.9
U.S. Prairies (North Central)	318 (47)	256 (34)	371	1.7*	7.4*	–21.8*
Alaska	0	0	1.6	–5.1	–83.2*	NA

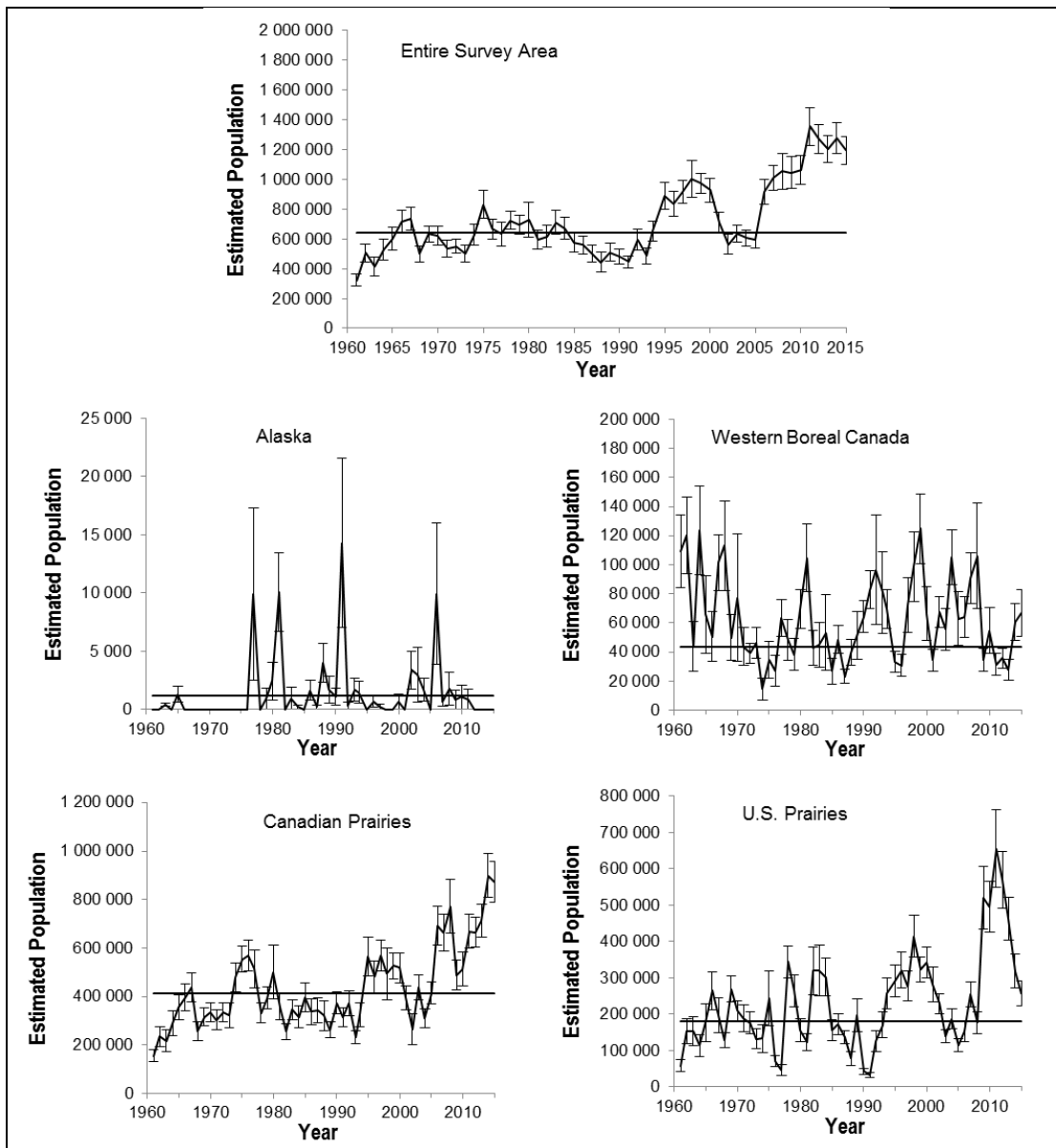


Figure 1. Redhead Breeding Populations Estimates (± 1 SE) Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Western Canada and Northwestern United States (Data shown are population estimates. The horizontal line represents the NAWMP population goal.)

Harvest

In 2005, the number of Redheads harvested in Canada (approximately 36 000 birds) reached a level that had not been observed since 1986, but the average harvest in Canada over the past 10 years has been of approximately 23 000 birds. The U.S. harvest of this species is about 10 times larger than the Canadian harvest, with approximately 230 000 birds harvested every year in the last decade (Table 2).

Management and Conservation Concerns

Not only does the abundance of wetlands in the Prairies play a key role in itself in the number of Redhead breeding pairs, but predation pressure, which increases during periods of drought and when water levels

drop, is important as well (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 2013d).

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				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
2014					358	8 372	13 693	3 460	3 517				29 400	331 735	361 135

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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

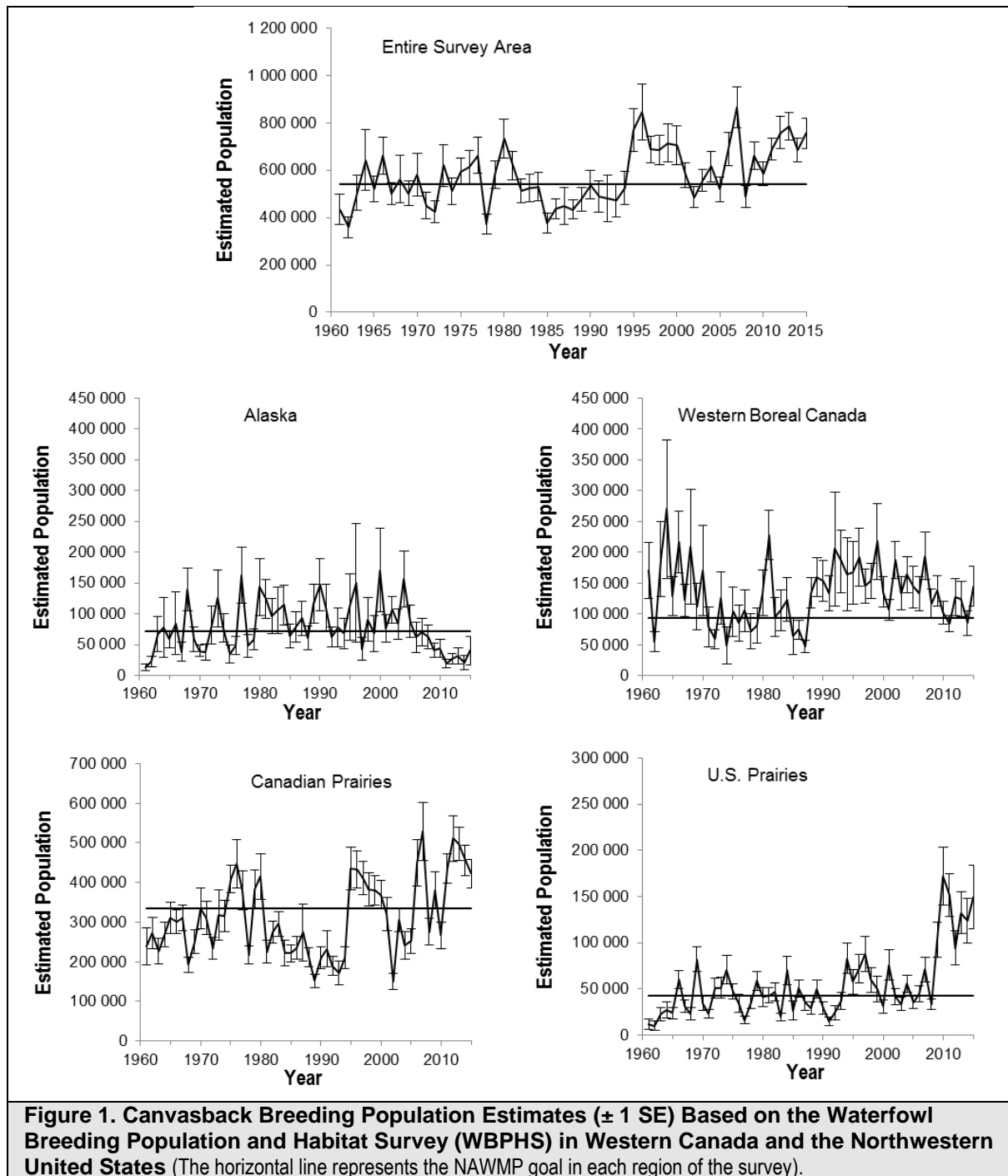
The core breeding area of the Canvasback is in the Prairie and Parklands Region of the Prairie Provinces, but the species is also found in the U.S. Prairies, Alaska, Yukon and areas of the western edge of the Northwest Territories. The Canvasback is monitored in its core breeding area mainly through the Waterfowl Breeding Population and Habitat Survey in western Canada (WBPHS; Figure 1, Monitoring section). The species is also monitored outside of the WBPHS survey area by the Cooperative Yukon Roadside Waterfowl Breeding Population Survey. The breeding pair index obtained from this survey shows important interannual variations for the Canvasback and no long-term trend can be reliably determined for this part of the species' range.

- 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, for the past two decades, remained most years above the NAMWP population objective, this following a period of decline in the early 1980s. The continental population of Canvasbacks shows significant increasing long-term (1961–2015) trends in the U.S. Prairies as well as in entire survey area (Table 1). However, the breeding population of Canvasbacks in Alaska appears to be decreasing (2006–2015). Overall, Canvasbacks are above or at the NAWMP goals in all regions of the survey area except Alaska (Figure 1).

Table 1. Canvasback Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (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		
	2014	2015	10-yr Average (2005–2014)	1961– 2015	2006– 2015	2011– 2015
Entire Survey Area	685 (51)	757 (63)	674	0.6*	1.3	1.0
Canadian Prairies	456 (38)	422 (35)	405	0.6	1.6	–1.8
Western Boreal Canada	85 (20)	145 (32)	125	0.2	–4.1	2.8
U.S. Prairies (North Central)	124 (25)	150 (35)	96	2.4*	13.7	2.5
Alaska	21 (11)	41 (23)	47	0.1	–10.3*	12.7



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).

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
1975					2 116	18 757	8 205	9 065	4 262	1 051		17	43 473	93 761
1976				20	2 117	17 817	5 321	7 454	3 773	1 360			37 862	127 001
1977					1 036	6 162	2 770	4 019	2 076	198		44	16 305	75 117
1978					3 293	11 996	4 596	4 544	2 424	233			27 086	64 092
1979					3 769	14 208	7 922	7 585	2 239				35 723	91 847
1980					3 301	10 966	4 746	1 420	5 431	1 269			27 133	66 329
1981					625	8 327	3 883	1 066	5 193	534			19 628	58 030
1982					1 440	6 223	7 669	3 236	344				18 912	45 050
1983					400	10 970	6 696	2 638	4 040	240			24 984	81 108
1984					214	8 279	1 819	4 716	3 620	210		37	18 895	71 263
1985					1 435	8 673	3 349	3 617	1 427	201			18 702	79 926
1986	216		461		1 082	14 385	3 145	5 242	3 951	956	53		29 491	23 983
1987					503	6 158	2 945	638	709	463			11 416	19 397
1988					504	2 153	2 744	1 491	385	230			7 507	826
1989						3 636	1 255	219	869	45	45		6 069	10 882
1990						5 902	1 392	508	697		23		8 522	7 903
1991					198	4 206	473	2 473	1 855	98			9 303	7 723
1992					134	3 194	788	282	194	35			4 627	11 581
1993					88	1 602	2 505	1 862	570	25			6 652	13 222
1994						1 331	3 695	1 141	1 843	164			8 174	69 386
1995						5 444	4 016	1 303	1 542	119			12 424	108 231
1996					74	4 219	2 965	3 914	1 385				12 557	109 217
1997						7 585	5 802	1 708	1 387	55			16 537	120 636
1998						5 266	2 012	392	663	83	233		8 649	93 048
1999 ²						2 133	5 065		787	51			8 036	88 171
2000					111	3 085	4 022	588	1 095	0	12		8 913	103 655
2001						896	4 223	411	464	136			6 130	36 225
2002						951	3 195	756	253	95			5 250	2 709
2003						971	5 962	1 325	954	55			9 267	35 384
2004					57	1 837	2 026	428	145				4 493	44 398
2005						971	7 563	3 716	825	82			13 157	64 068
2006						3 173	4 131	2 633	320	15	19		10 291	91 886
2007						1 812	2 344	4 905	3 334	26			12 421	125 207
2008						1 018	3 667	2 310	2 265	35			9 295	18 173
2009						958	7 897	456	797				10 108	70 393
2010					121	1 972	2 095	518	1 120	59			5 885	145 686
2011					90	3 913	2 051	6 150	794				12 998	140 862
2012						504	2 041	1 693	1 346				5 584	117 249
2013						1 979	5 318	761	6 051				14 109	159 712
2014						1 897	11 344	5 703	248	115			19 307	108 262

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

Management and Conservation Concerns

Canvasback breeding populations have increased since the 1990s 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 influence 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 2013c).

Ruddy Duck (*Oxyura jamaicensis*)

The Ruddy Duck is not an abundant species in Canada and 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 (Bruehl 2002). This species is not an important game species in Canada.

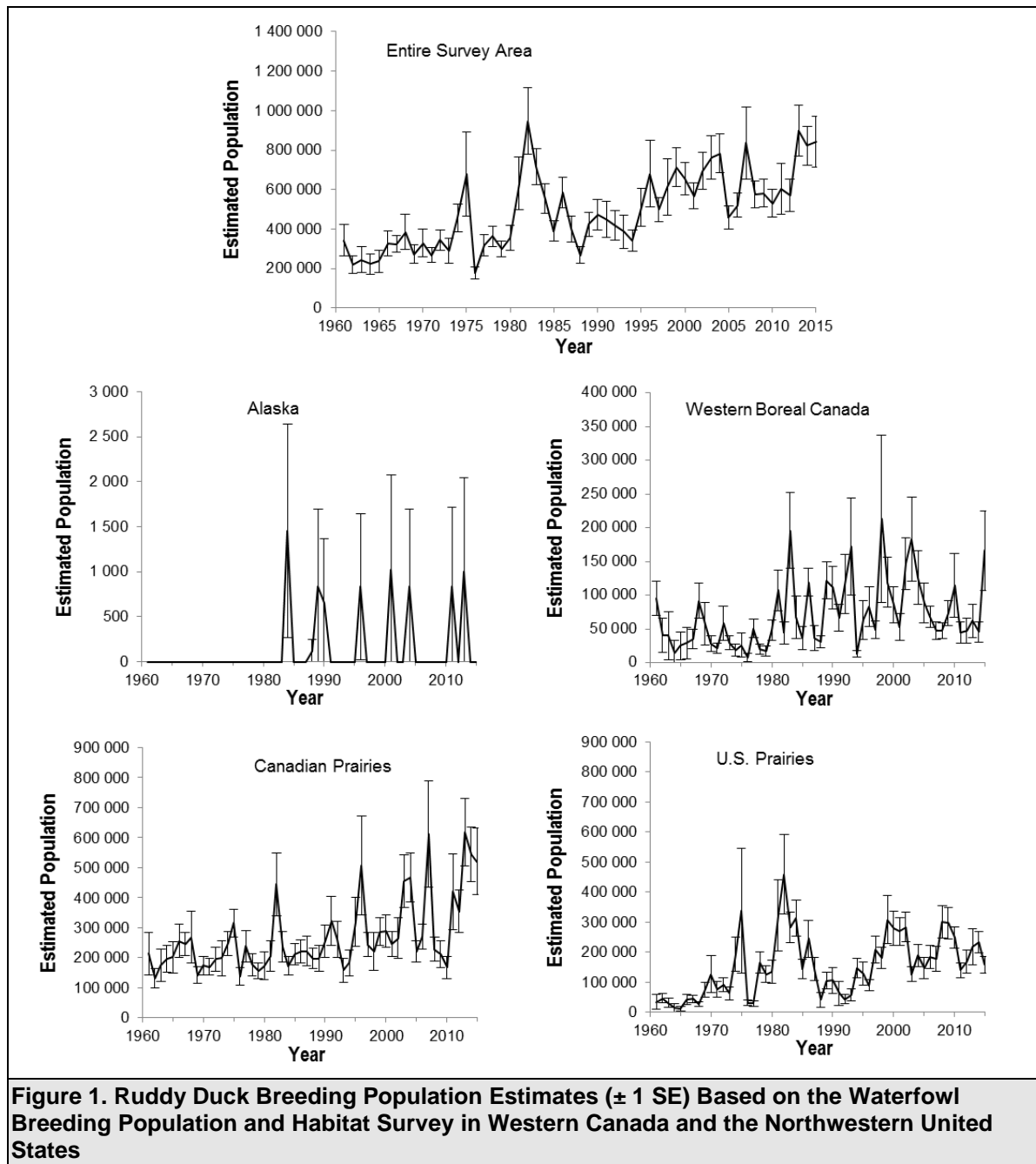
Abundance and Trends

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

The Ruddy Duck continental population and U.S. Prairies population have been showing a significant increasing long-term trend (Table 1). Despite yearly fluctuations, population numbers in Alaska have been low historically with no overall trend detected (Table 1 and Figure 1).

Table 1. Ruddy Duck Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (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		
	2014	2015	10-yr Average (2005–2014)	1961– 2015	2006– 2015	2011– 2015
Entire Survey Area	823 (99)	844 (129)	640	1.9*	3.3	9.7
Canadian Prairies	546 (91)	520 (111)	365	1.4	–7.9*	9.0
Western Boreal Canada	46 (15)	166 (59)	64	2.1	4.4	30.0
U.S. Prairies (North Central)	232 (35)	158 (29)	211	3.4*	–2.0	5.9
Alaska	0	0	0.2	N/A	N/A	N/A



Harvest

The 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 2 000 birds approximately, with most of the harvest taking place in Ontario (Table 2).

Management and Conservation Concerns

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

Table 2. Harvest Estimates of Ruddy Ducks in Canada.

	Canada												Total
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	
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					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
2014						1 806	479		154	129			2 568

Data source: M. H. Gendron and A. Smith 2015 (CWS)

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 in 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, sea ducks have not been banded in large numbers. The Waterfowl Breeding Population and Habitat Survey (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 duck populations. Issues arise from the fact that the core breeding range of about half of the sea duck species is not covered by the WBPHS, and also from the fact 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 WBPHS (e.g., scoters, goldeneyes, mergansers). Consequently, few reliable population estimates or trend data exist for any of the species of sea ducks. Indeed, 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 documented, partly because the Harvest Questionnaire Survey does not adequately 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 population 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 (according to the Continental Technical Team of the Sea Duck Joint Venture).

The Sea Duck Joint Venture (SDJV) was formed in 1999 under the auspices of the NAWMP 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 (U.S. and Canada), 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 range in Canada is extensive and covers 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, farther south 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. There are four subspecies of Common Eiders and two populations of King Eiders, and the two populations of King Eiders 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 (1916)

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, a harvest that provides a cash crop in areas with low employment, or that is used locally for insulation in Inuit parkas, supporting local economies.

Industrial activity in Canada's north is likely to increase in the next few 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 as well, 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 the breeding and wintering range of eiders, 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 absent 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 with 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. 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, as well as further south in 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; Quakenbush et al. 2009). These counts indicated a 53% decline over a 20-year period, from approximately 156 000 birds in 1976 to 73 000 birds in 1996. Counts in 2003 and 2004, however, suggested that 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.). Aerial surveys in the Bathurst Inlet area were conducted in late June 1995, and again between 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). Aerial surveys were conducted in the Queen Maud Gulf area

in late June 2014 and in Bathurst Inlet starting in 2015. The surveys were conducted to establish long-term monitoring of population trends by providing more extensive coverage of the breeding range of Pacific Common Eiders.

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 the Russian coast 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 is no recent information on population trend for most of the breeding area: 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. Adult males 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 was conducted again in February 2015 and the adult male population estimate is close to the estimates obtained during the 2003–2009 period, suggesting a stable or slightly increasing population trend since 2003.

Table 1. Adult Males Wintering Population (Canadian Component, [SE]) for the Northern Common Eider, 2003–2015	
Year	Abundance (adult males only)
2003	100 000 (6 350)
2006	91 000 (3 300)
2009	123 400 (13 100)
2012	168 400 (10 300)
2015	128 800 (6 300)

- *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 surveyed again 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 known significant winter mortality 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 is decreasing at about 3% per year since 1998 based on the five largest colonies (CWS–Quebec region, unpubl. data, 2015), but this trend is mostly driven by the decline observed on Bicquette Island because numbers in the other colonies are either stable or increasing (Pannetier Lebeuf and Giroux 2014). The segment of the population breeding along the Gulf of St. Lawrence is increasing at about 7% per year and is now more than three times higher than what numbers used to be between 1925 and 1988 (Rail and Cotter 2015).

The number of eiders breeding in northern Newfoundland and southern Labrador appears to be increasing (Bowman et al. 2015). There is little information on the status of the population segments breeding in the southern portion of the species' range. Eiders breeding in New Brunswick may be experiencing a long-term decline of about 3% per year (Bowman et al. 2015). The eider colonies in Maine were resurveyed in 2014, and preliminary results suggest the number of eider breeding in Maine have declined by half (B. Allen, Maine Department of Inland Fisheries and Wildlife, pers. comm.). Anecdotal information for Nova Scotia suggests declines in the number and size of breeding colonies in these areas as well.

Harvest

The National Harvest Survey provides some information regarding the harvest of eiders, but does not distinguish between the various subspecies of Common Eiders. The harvest of this species in Canada has been gradually declining since the 1970s, from an average of approximately 27 000 birds taken annually, to approximately 19 000 birds over the past decade (Table 2). The 2014 Canadian harvest estimate, at 8 694 birds, was the lowest for this species since the beginning of the survey. In the U.S., eider harvest occurs only in Alaska and states of the Atlantic Flyway. The 2014 harvest of eiders (all species together) was estimated at 13 679 birds (Raftovich et al. 2015). Local or subspecies-specific research and monitoring programs provide more detailed information on harvest for the Common Eider (see below).

- *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, Russia, 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 originating from Canadian breeding grounds. The subsistence harvest of Pacific Common Eiders in Canada and Alaska is estimated at 2 500 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 in the 1990s and early 2000s were unsustainable (Gilliland et al. 2009). Most of the harvest occurred in Greenland and on the island of Newfoundland, but a population model indicated that the harvest level in Greenland was 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. Pressures to liberalize harvest in Greenland and Newfoundland continue.

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 suggests 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 close to 20 000 birds 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 *borealis* subspecies was of about 9 000 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 6 000 birds in 1986 (Reed 1986). Egg and down collection takes place throughout the range during the breeding season, but its extent is unknown (SDJV 2013).

- 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 18 000 birds (2011–2014 average), which is below 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. In 2013, approximately 65% of the total harvest took place in the U.S. The harvest in Nova Scotia has declined from about 10 000 to 15 000 birds per year in the early 1990s to less than 1 000 birds per year since 2011.

American Common Eiders are harvested not only as part of the recreational harvest, but also for Aboriginal subsistence use. As such, the species is 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.

Table 2. Harvest Estimates of Common Eiders in Canada

	Canada												Total
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	
1974	3 044	188	4 991	1 965	5 915	114							16 217
1975	5 784	228	7 949	176	7 727								21 864
1976	14 365	45	7 819	549	9 136								31 914
1977	18 808	61	11 493	1 026	6 323								37 711
1978	15 378	43	7 749	515	7 570	218							31 473
1979	12 694		6 938	225	5 335	629							25 821
1980	12 084	59	8 143	378	7 109								27 773
1981	4 502		10 635	461	9 245								24 843
1982	13 353		6 089	128	3 557		471						23 598
1983	23 202		17 038	133	9 488								49 861
1984	19 844		6 144		7 555	209							33 752
1985	10 983		3 802	225	4 305	101							19 416
1986	19 678	102	6 794	516	2 984	73							30 147
1987	14 239		5 586	256	5 272		501						25 854
1988	15 854		4 122	391	1 765								22 132
1989	9 240		11 683		2 165						79		23 167
1990	8 220		13 385	1 348	3 462								26 415
1991	9 122		8 903	1 152	3 527		363						23 067
1992	17 643		16 663	1 140	3 494				235				39 175
1993	9 725		11 874	1 635	3 252								26 486
1994	11 530		7 404	71	3 072								22 077
1995	10 576		5 959	71	4 862					17	431		21 916
1996	8 482		6 275	86	4 246								19 089
1997	10 110		6 535	50	3 106								19 801
1998	4 437		2 891		3 499	69							10 896
1999	4 938		1 648		2 619								9 205
2000	10 456		1 603	705	2 325								15 089
2001	7 548		6 967	316	3 192								18 023
2002	8 314	159	7 965	111	2 882	145							19 576
2003	7 691	177	3 321	334	2 266		65				234		14 088
2004	4 696		5 668	330	1 719	435							12 848
2005	9 959	127	6 150	415	1 407								18 058
2006	15 038		4 284	524	2 505								22 351
2007	20 143		4 551	1 408	2 331	293							28 726
2008	20 869		3 540	2 255	2 568		863						30 095
2009	10 495		4 808	687	1 856								17 846
2010	6 767		2 981	1 172	671								11 591
2011	13 152		316	168	3 184								16 820
2012	12 906		974	314	2 120								16 314
2013	12 304		355	643	1 683								14 985
2014	5 514		841		2 339								8 694

Data source: M. H. Gendron and A. Smith 2015 (CWS)

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 through 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 both 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 high 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 likely play an important role in the dynamics of this population. Intermittent outbreaks of avian cholera have been reported throughout the species' range; in 2002, an estimated 6 000 adult females died at breeding colonies in the St. Lawrence Estuary (Joint Working Group on the Management of the Common Eider 2004). Cholera was detected on the East Bay Colony in 2005 (Descamps et al. 2012) and was subsequently detected at many colonies along the south coast of Hudson's Strait and Ungava Bay (Gilchrist and Soos 2012). 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. comm.). Another recent threat that has been identified for this population is a reduction in nest success resulting from an increase in the number and duration of polar bear incursion on colonies as the polar sea ice diminishes (Iverson et al. 2014).

In response to concerns for this population, the Atlantic Flyway Council has recommended to implement restrictions on the harvest of Common Eider (C. Lepage, CWS–Quebec Region, pers. comm.).

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

For the purposes of management, two King Eider populations are identified 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. 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; Quakenbush et al. 2009). 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 (Powell and Suydam 2012). 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 echoed 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, unpubl. 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 represented 2–5% 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 small (Cotter and Lepage 2013).

In the eastern Arctic, limited data on eider harvesting are available. 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) [Table 1].

Table 2. Harvest Estimates of King Eiders in Canada

	Canada												Total
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	
1974					251								251
1975													0
1976													0
1977			103										103
1978						82							82
1979			76		340								416
1980							278						278
1981					351								351
1982	927												927
1983													0
1984													0
1985	42				253								295
1986	1 299			46	148					29			1 522
1987	1 031		88		207								1 326
1988					62								62
1989			211										211
1990	210		232			107				42			591
1991	384												384
1992	216												216
1993	687		421										1 108
1994	140												140
1995	696												696
1996	204					99							303
1997					48								48
1998	14												14
1999	57												57
2000	632					38							670
2001	168												168
2002	156		63										219
2003													0
2004					228								228
2005													0
2006													0
2007													0
2008	186			17									203
2009													0
2010													0
2011													0
2012					24								24
2013	227					110							337
2014													0

Data source: M. H. Gendron and A. Smith 2015 (CWS)

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 of the 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 from year to year. A delay in the spring ice melt or 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 change 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. Canada has a core responsibility for managing eiders, but better collaboration is needed between Canadian northern wildlife management boards, Russia, Greenland, France (Saint-Pierre and Miquelon) and the United States if the species' population is to be managed sustainably.

Harlequin Duck (*Histrionicus histrionicus*)

Until the 1990s, little was known about 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 Quebec, 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 appears to show a slight upward trend (Bowman et al. 2015). Counts of Harlequin Ducks have been made at irregular intervals at key wintering sites in Atlantic Canada between 2001–2013. Results suggest a rapid increase of the species of about 9% per year during the last 12 years, but these counts are not random and were not standardized within or among sites (Bowman et al. 2015). The Eastern Population was estimated to be roughly 6 800 individuals in the mid-2000s (Robert 2013b). 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 2013b).

The size of the harlequin sub-population overwintering in Greenland is uncertain, but an estimate of 6 200 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 3 000 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 (Bowman et al. 2015). The 2014 Eastern population Barrow's Goldeneye Winter Survey in Quebec has reported about 200 Harlequin Ducks wintering between Port-Daniel and Newport along the south coast of the Gaspé Peninsula (C. Lepage, CWS–Quebec Region, pers. comm.).

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:

<http://publications.gc.ca/site/eng/309449/publication.html>

- 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 2 500 birds. Better information on harvest is needed (Robertson and Goudie 1999).

The hunting of 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, hydroelectric 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. Consequently, 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 America since 1990 (Atlantic Provinces, Ontario, Quebec and 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 eight to two birds in recognition of the continental importance of British Columbia for breeding and wintering birds.

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*). Little information about scoters is available compared to some other groups 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. Brown and Fredrickson (1997), Bordage and Savard (2011), and Anderson et al. (2015) 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/). There are currently no surveys that provide reliable 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.

Because the three species of scoters are difficult to distinguish from each other, they are counted together during fixed-wing aircraft surveys such as the WBPHS. 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 only in the Surf Scoter section.

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 as far as the Great Slave Lake in the Northwest Territories (SDJV 2015a). The Pacific Population breeds primarily in Alaska, but possibly also in northern Yukon and the northwestern Northwest Territories (Bordage and Savard 2011).

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. Aerial 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 2015a).

- James Bay

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) found between the Ontario/Manitoba border and Nelson River inlet (S. Badzinski, CWS–Ontario Region, unpubl. data).

Harvest

In Canada, the harvest includes only a few thousand birds in eastern Canada (Table 1). Most of the harvest takes place in the United States. In 2014, approximately 9 300 Black Scoters were harvested in the U.S., which represented approximately 90% of the total estimated harvests for this species.

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 2013a).

Table 1. Harvest Estimates of Black 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	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	6 286	10 060
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	8 124	11 734
2000	29		1 354	677	497	260							2 817	5 702	8 519
2001	928		2 646		947	682							5 203	4 556	9 759
2002	838	158	1 462	72	610	243							3 383	9 308	12 691
2003	536		821	74	655	221							2 307	20 435	22 742
2004			1 737	36	790	96							2 659	13 926	16 585
2005	754		1 580		239								2 573	20 529	23 102
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	16 111	20 739
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
2014			357		827	84							1 268	9 327	10 595

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and S.M. Olson 2015 (USFWS: U.S.).

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 2015b). 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 2013b). Therefore, targeted monitoring and research activities are conducted periodically.

The population abundance is roughly estimated at 700 000 birds for all North America (NAWMP 2012), with about 225 000 wintering along the Pacific Coast and from 150 000 to 400 000 wintering on the Atlantic Coast (SDJV 2015b).

- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA

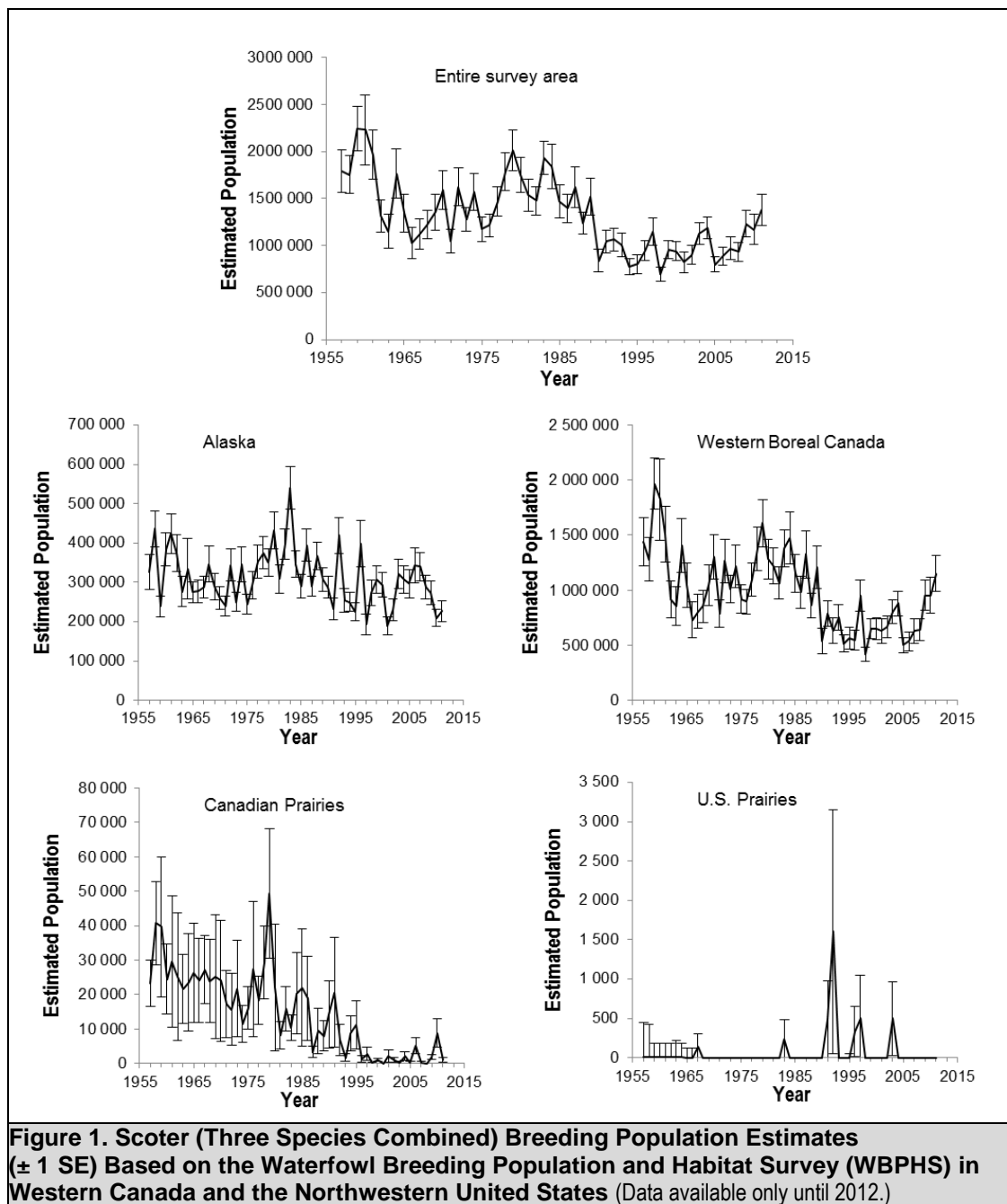
The Waterfowl Breeding Population and Habitat Survey (WBPHS) in western Canada covers a substantial portion of the Surf Scoter range.

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 are likely to 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 (Anderson et al. 2015). 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.

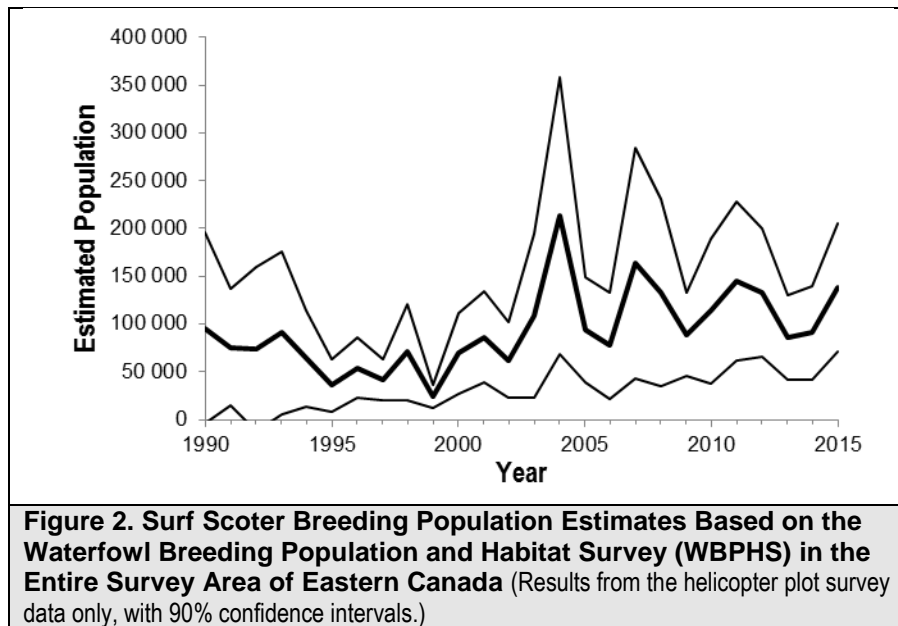
Table 1. Scoter (three species combined) Breeding Population Estimates and Trends Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Western Canada and the Northwestern United States (Trends are expressed as an annual percentage change.*Trend significant at $p < 0.05$. Data available only until 2012.)

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	1 379 (167)	1 062 (141)	1 058	–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	1 151 (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*



- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

In eastern Canada, Surf Scoters are counted during the helicopter plot survey component of the WBPHS, but the survey does not provide a reliable population index for this species because it only partially covers the southern edge of the Surf Scoter's range. The Surf Scoter's core breeding area is farther north and not covered by the survey. In 2015, the population estimates of 138 000 birds was greater than the 91 000 birds in 2014, and was above the 10-year average of 113 000 birds. 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 (Figure 2).



- 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 2013b; 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 many as 80 000 birds were counted there (J.-P. Savard, CWS–Quebec Region, pers. comm.).

In the St. Lawrence Estuary, efforts were made in October 2012 and 2013 by the CWS to mark Surf scoters with satellite transmitters, as part of the larger Atlantic and Great Lakes Sea Duck Migration Study (SDJV 2015a). These marked birds are providing valuable information on seasonal connectivity, timing and direction of movements, and site fidelity to wintering, breeding and moult sites (SDJV 2015a).

Harvest

The estimated Canadian harvest has been less than 5 000 Surf Scoters annually over the past decade (Table 2).

Table 2. 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
2014	224		507		1 368	301							2 400	25 268	27 668

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and S.M. Olson 2015 (USFWS: U.S.).

Management and Conservation Concerns

Large concentrations of Surf Scoters (intermixed 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. Initial assessment in British Columbia indicates that shore-based shellfish aquaculture has little impact on scoters (Žydelis et al. 2006), and off-bottom aquaculture may provide profitable feeding opportunities (Žydelis et al. 2009). However, it is not clear if aquaculture expansion might negatively affect scoters. The fact that this species feeds on farmed mussels and clams is also problematic for the industry (Anderson et al. 2015).

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 marine habitat. 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 (Anderson et al. 2015). Hydroelectric development is also a potential threat to the species in its breeding habitat (Lepage and Savard 2013b).

Anderson et al. (2015) provides an overview of the conservation threats to Surf Scoters.

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 (Anderson et al. 2015).

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 WBPHS (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 in 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 2015a].

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 2015a).

An estimated 5 000 individuals moult in the St. Lawrence Estuary and Gulf (Lepage and Savard 2013c), 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 species is estimated at only a few thousand individuals (Table 2).

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).

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
1974		113	1 105	46	9 676	4 611	291		251	174			16 267	33 517
1975			1 742	233	4 934	4 277	141		357	143		54	11 881	35 186
1976	95	204	2 792	193	8 245	4 122	396		648	61		164	16 920	20 172
1977			2 253		10 277	4 393	183		118	57		247	17 528	16 329
1978	1 105	153	417	283	5 042	3 310		381	334	265			11 290	15 839
1979	565		989	117	8 018	5 845		364	172				16 070	10 444
1980	3 483		3 497	92	10 829	3 142				102			21 145	17 010
1981	728		1 231	114	7 831	2 510				689	116		13 219	14 842
1982	767		1 459	151	7 798	2 000			1 484	1 259			14 918	15 341
1983	710		1 418	199	7 842	2 470		516		162			13 317	12 116
1984	1 645	30	2 253		11 052	3 636					408		19 024	34 053
1985	1 028		791	97	7 792	2 892	283		252	66	1 661		14 862	21 835
1986	215		401	46	2 359	1 443		213		297			4 974	10 718
1987			1 090	90	6 950	3 618			106	78			11 932	24 305
1988	2 190		1 963	60	7 072	1 403				51			12 739	18 720
1989	202		1 515	128	8 078	1 858							11 781	8 410
1990	899		2 200	139	5 297	801	789						10 125	15 474
1991			465	90	2 505	1 096							4 156	19 827
1992	283		1 638		5 213	441							7 575	11 804
1993	544	379	1 238	123	4 415	2 041	162				35		8 937	8 920
1994	344		2 132		5 932	1 343							9 751	6 683
1995			1 846		1 795	672							4 313	8 548
1996	89		1 034		2 464	1 175							4 762	13 954
1997	58		1 191		2 306	470							4 025	7 867
1998	598		758	198	3 363	291							5 208	6 119
1999 ²	41		412		1 337	260						3	2 053	3 500
2000	47		313		527	104					24		1 015	6 200
2001	72		227	199	1 021	379	159	157		26			2 240	23 200
2002		158	680	52	1 179	282							2 351	9 100
2003	409		636	43	789	97			173				2 147	11 100
2004			156		1 238	137							1 531	11 100
2005			151	34	908	78							1 171	6 547
2006			407	42	1 202	404							2 055	12 287
2007			130	85	281	334							830	8 009
2008			480	31	949		64						1 524	7 632
2009			506		1 048	126			226	19			1 925	8 742
2010	1 652		1 436		988	318							4 394	6 797
2011			1 075	56	1 381								2 512	11 034
2012			350	50	803	168							1 371	4 562
2013			279	110	1 015	193							1 597	7 109
2014			125		358								483	9 206

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and S.M. Olson 2015 (USFWS: U.S.).

Barrow's Goldeneye (*Bucephala islandica*)

Two geographically isolated populations of Barrow's Goldeneye are found 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

The size of the Eastern Population of Barrow's Goldeneye is estimated to be at about 7 000 individuals (Environment Canada 2013). 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 4 100 individuals (F. Bolduc, CWS–Quebec Region, unpubl. data), compared to 6 800 individuals in the 2009 survey. The 2014 Eastern Population Barrow's Goldeneye Winter Survey revealed a contingent of $6\,576 \pm 283$ birds (photo-corrected for species misidentification and counts) in the St. Lawrence Estuary and the western portion of the Gulf (Quebec and the Dalhousie area in New Brunswick), which indicates a quite stable trend (Table 1). More than 80% of this population winters along the St. Lawrence Estuary and Gulf (Robert and Savard 2006; Robert 2013a). About 500 individuals winter in the Maritimes provinces, and 100 individuals winter in Maine (Robert and Savard 2006; Environment Canada 2013).

Table 1. Eastern Population of Barrow's Goldeneye, 2005–2014 (Eastern Population Barrow's Goldeneye Winter Survey; *numbers corrected from photos [SE]; source: C. Lepage; CWS–Quebec Region, unpubl. data.)	
2005	6 139
2009	6 529
2011	4 905
2014*	6 576 (283)

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 2013a). 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 northeastern James, 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 3 000 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).

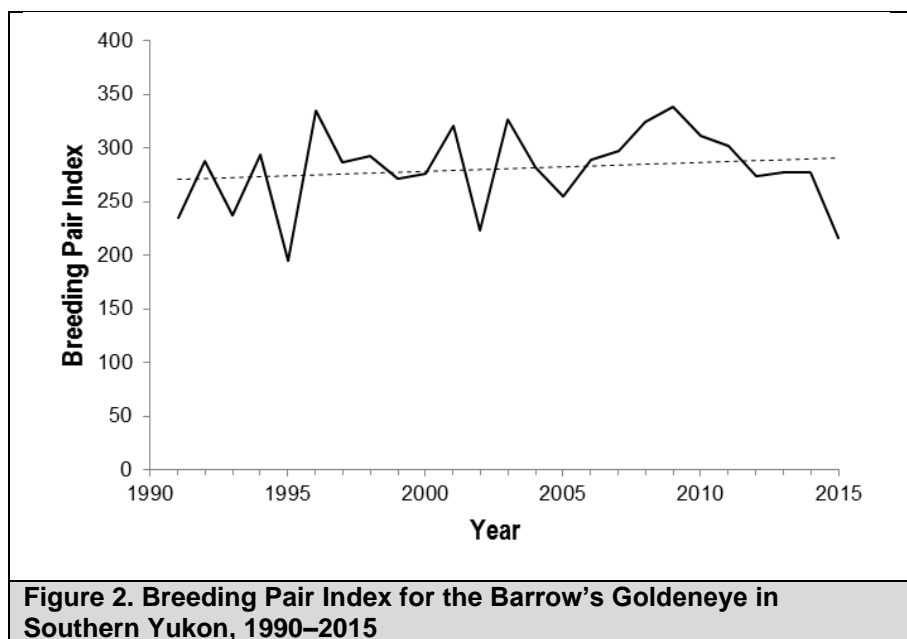
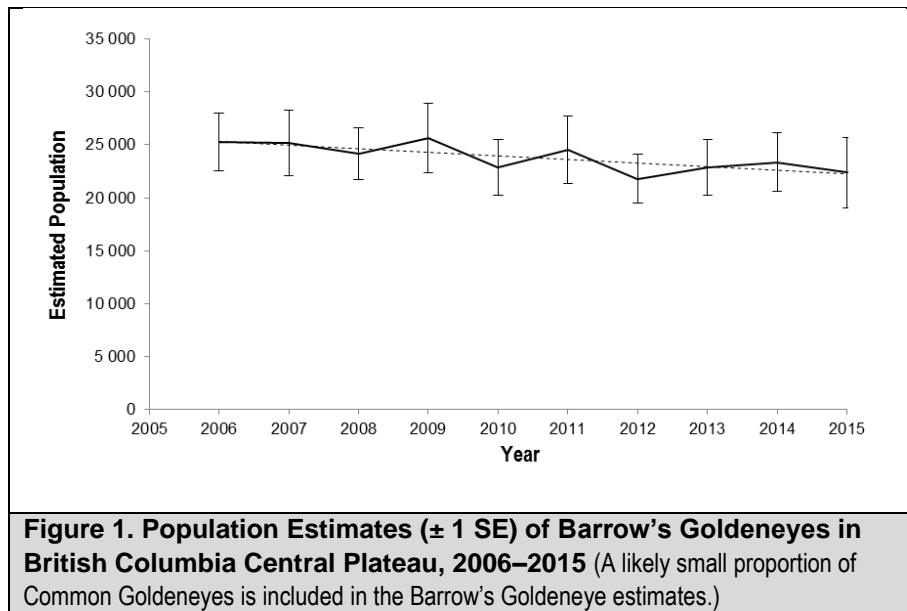
- RESEARCH HIGHLIGHTS IN EASTERN CANADA

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 northeastern James Bay in 2009 apparently moulted in the St. Lawrence Estuary in 2010 (Savard and Robert 2013). Both shores of the St. Lawrence Estuary might represent molting areas for Barrow's Goldeneye females (Savard and Robert 2013). All females that provided data (n = 4) returned to the same breeding area in 2010.

- 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 22 368 individuals in the Central Interior Plateau Region in 2015, comparable to the 2014 estimate (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 even 21 years.

The size of the Western Population of Barrow's Goldeneye is estimated at 250 000 individuals (NAWMP 2012).



- 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 5 000–6 000 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, B.C. 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 known, mainly because the National Harvest Survey does not provide reliable harvest estimates for species hunted at very low numbers.

In the past, there were concerns about the harvest of birds from the Eastern Population of this species. 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 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 of less than 1 000 individuals per year (Gendron and Smith 2015).

- WESTERN POPULATION

Hunting pressure on the Western Population is generally low. The Pacific Flyway sport harvest is estimated at less than 5 000 birds, which are mostly taken in Alaska, British Columbia, and Washington State. Estimates of subsistence harvest are also low, with fewer than 3 000 birds harvested in Alaska (SDJV2008).

Management and Conservation Concerns

In 2000, the Eastern Population of Barrow's Goldeneye was designated 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*. Hunting has been restricted in eastern Canada as this activity represents a potential threat to the long-term survival of this species. 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 associated with forest harvest are in British Columbia. There is also the threat of oil spills on its wintering grounds (Robert 2013a).

Common Goldeneye (*Bucephala clangula*)

In North America, the Common Goldeneye breeds across the boreal forest from Newfoundland to Alaska, as well as throughout montane forests, the Aspen Parkland Region, and the Acadian and Great Lakes forests, in essence wherever trees are large enough to provide suitable nesting cavities. The species winters in fresh water environments, as far north as open water remains ice-free winter, 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 (WBPHS) in western and eastern Canada. However, fixed-wing surveys in the western portion of the WBPHS do not distinguish Common Goldeneyes from Barrow's Goldeneyes, and can only track the combined population of the two species (although most birds are Common Goldeneye; Baldassarre 2014). This is particularly problematic in western Canada, where the two species' habitat overlaps extensively. However, in eastern Canada, both species are speciated during the helicopter plot survey component of the WBPHS.

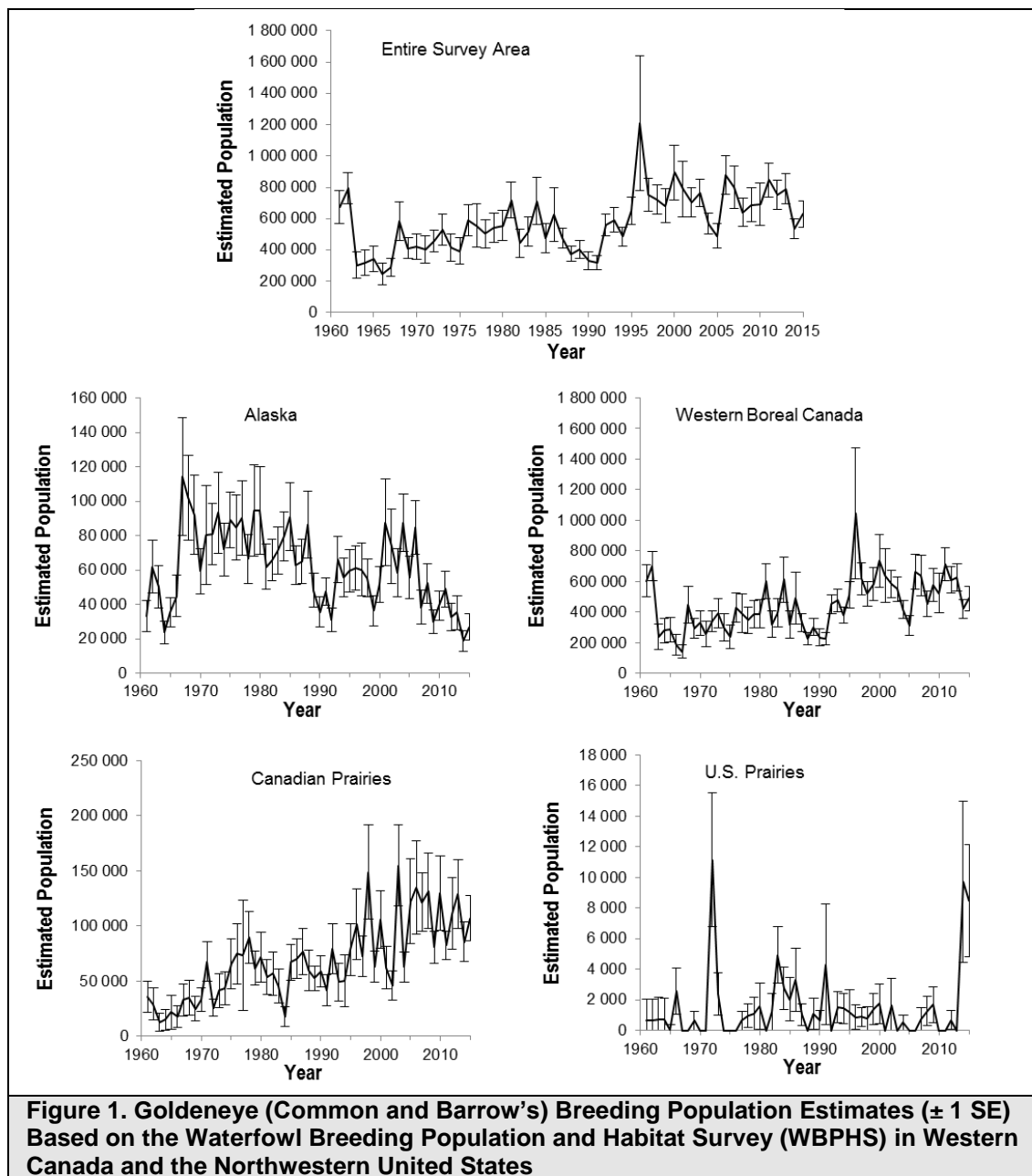
The North American Breeding Bird Survey (BBS) can yield some species-specific information on population trend (but not population size), though much of the species' breeding range lies outside the area covered by the BBS.

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

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

The estimated abundance of goldeneyes in 2015 in the entire survey area was above the 2014 estimate. Goldeneyes show significant increasing long-term (1961–2015) trends in the Canadian Prairies and at the continental level, but a decreasing medium-term (2006–2015) in Alaska (Table 1 and Figure 1).

Table 1. Goldeneye (both species) Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (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		
	2014	2015	10-yr Average (2005–2014)	1961–2015	2006–2015	2011–2015
Entire Survey Area	536	630	712	1.2*	–2.1	–7.4
Canadian Prairies	86	107	113	2.9*	–2.5	2.6
Western Boreal Canada	422	488	554	–1.3	–2.1	–10.6
U.S. Prairies (North Central)	9.7	8.5	1.4	–0.1	NA	NA
Alaska	19	27	44	–0.9	–9.7*	–16.1



- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

Results from the WBPHS in eastern Canada (helicopter plot survey only) indicate that the 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 Waterfowl Breeding Population and Habitat Survey (WBPHS) in Eastern Canada (The estimates are based on helicopter plot surveys only.)

WBPHS—Eastern Canada	2014	2015	10-yr Average (2005–2014)
Entire Survey Area	243	264	289
Atlantic Highlands	8.5	44	7.5
Eastern Boreal Shield	99	99	112
Central Boreal Shield	55	40	62
Western Boreal Shield	98	121	107

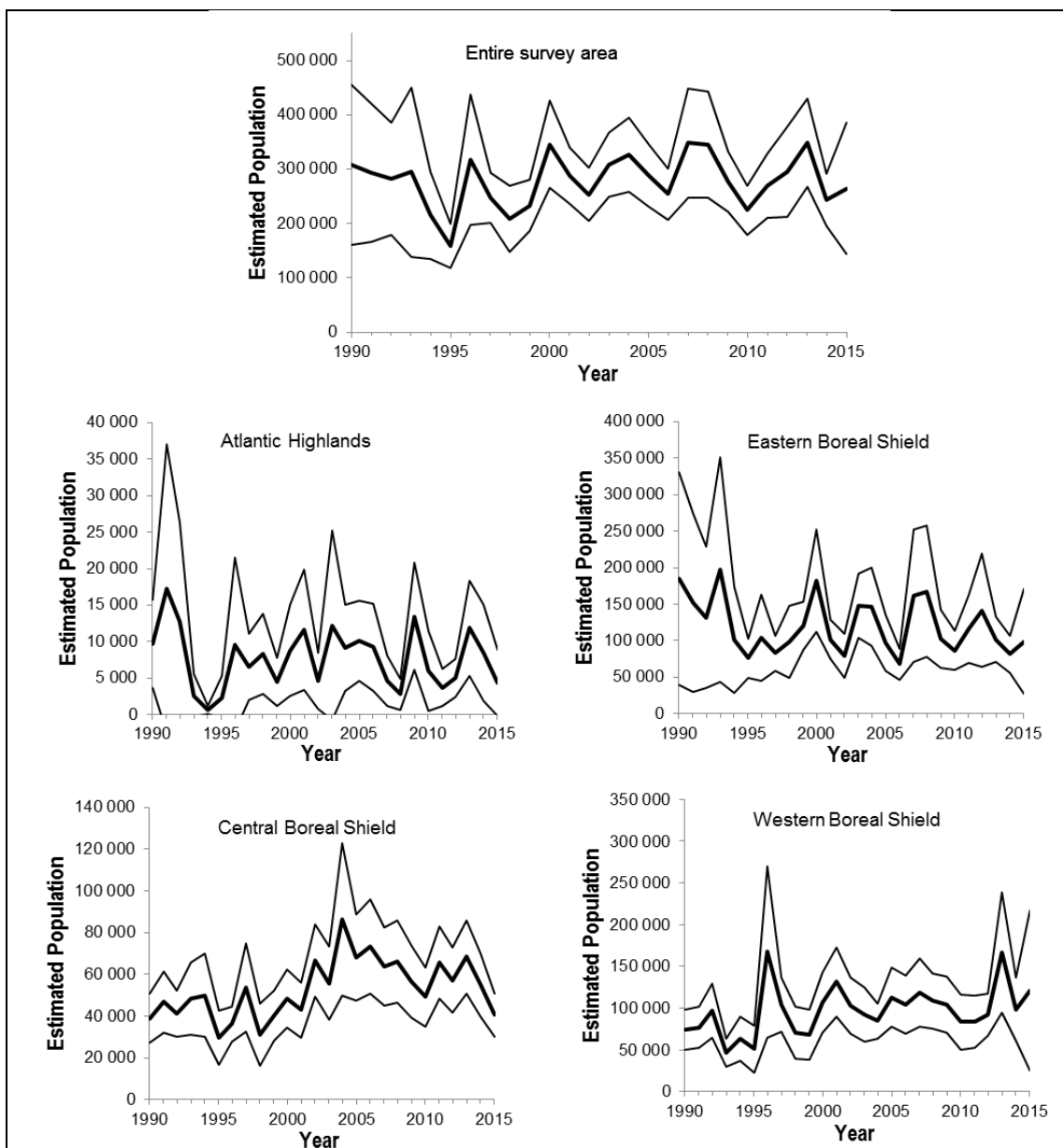


Figure 2. Common Goldeneye Breeding Population Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Eastern Canada, with 90% Credible Intervals (The figures represent the results of helicopter plot survey only.)

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.

	Canada												U.S. ¹	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total
1974	12 358	91	8 053	7 916	47 901	37 281	1 448	830	3 009	2 274			121 161	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	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	182 722
1977	12 710	45	4 950	5 205	23 761	52 494			459	84			99 708	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	207 247
1979	16 838	90	3 510	4 294	22 891	34 962	2 244	732	1 920	6 721		290	94 492	188 644
1980	15 163	414	5 375	4 388	26 492	46 443	2 318	327	1 699	947	74	108	103 748	184 527
1981	21 936	125	2 374	3 047	29 147	44 408	2 914	403	3 764	1 367			109 485	172 015
1982	16 593	488	2 058	2 301	19 514	40 209	3 095	344	1 354	756		531	87 243	152 206
1983	18 028	249	5 916	3 612	18 171	34 484	2 876	522	2 780	586		191	87 415	147 269
1984	9 263	186	3 386	3 740	18 000	37 126	7 463	1 859	4 193	1 078			86 294	186 480
1985	11 719	290	2 846	2 274	21 863	39 945	3 058		919	1 166			84 080	157 682
1986	17 238	584	4 381	4 770	15 833	31 865	982	450	255	1 112	57		77 527	142 481
1987	7 396		3 303	2 060	20 283	28 203	1 860		1 787	1 725	1 174	45	67 836	111 844
1988	15 085	582	4 161	5 757	17 176	36 789	148	458		1 031		68	81 255	112 674
1989	10 874		7 999	3 464	9 701	33 718	588	437	91	700	181		67 753	106 166
1990	14 882		4 312	3 609	17 400	33 176	1 976	336	510	385	106		76 692	113 132
1991	6 408	206	1 777	1 772	9 679	25 340	1 139		1 189	231			47 741	87 138
1992	5 077	213	2 425	2 394	12 336	21 968	591		1 027	264			46 295	81 211
1993	4 184	506	3 926	2 718	15 719	38 604	2 831		1 140	247		127	70 002	115 928
1994	7 315	666	3 290	914	8 027	18 564	494	213	1 692	287			41 462	95 579
1995	3 534		3 030	4 187	7 591	19 430			2 809	154			40 735	134 939
1996	4 496	731	1 366	6 489	9 848	17 596	1 660	354	1 198	351			44 089	144 273
1997	3 959		1 800	2 014	4 409	13 896	866		1 664	222	296	15	29 141	107 104
1998	4 758		1 736	2 795	4 726	8 530	1 550	295	979	258		276	25 903	114 331
1999 ²	4 578	494	1 309	6 082	5 126	11 602	1 718	2 358	681	131		7	34 086	84 735
2000	5 753		2 092	2 981	4 713	10 548	4 884			39	12		31 022	87 740
2001	2 620		1 066	2 095	5 549	11 052	365		739	67			23 553	72 172
2002	1 989	162	1 239	1 714	2 841	8 140	873		1 278	250		87	18 573	107 508
2003	3 234		2 215	3 297	3 561	10 517	193		1 818	187			25 022	120 369
2004	3 995	334	2 044	2 186	5 493	6 130	1 127		1 865	47			23 221	99 578
2005	1 714	158	1 549	1 412	4 897	4 811	3 154		1 943	59			19 697	91 144
2006	2 481	233	899	3 079	2 489	6 738	3 321	129	1 993	152			21 514	97 936
2007	3 016	362	2 989	1 114	1 210	7 862	1 626	264	1 384	75			19 902	98 311
2008	1 495	138	4 309	2 747	2 874	7 446	643		1 871	444			21 967	99 030
2009	1 417	179	1 077	2 975	3 077	9 499	1 839		368	593			21 024	105 365
2010	825		426	832	2 252	8 797	1 673		538	177			15 520	93 235
2011	410		389	1 790	6 480	11 851	1 138	243	2 067	67			24 435	116 166
2012	5 807	314	1 025	845	2 891	4 636	98		1 052	260			16 928	93 731
2013	4 107	434	1 386	1 696	1 701	4 545	1 065	1 590	1 778	232			18 534	100 509
2014	373		211	2 657	2 515	3 984	1 395	160	576	244			12 115	89 686

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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 (SDJV 2008).

Long-tailed Duck (*Clangula hyemalis*)

The Long-tailed Duck has a circumpolar distribution. 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). During most 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 Bering 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

There have been no comprehensive surveys of Long-tailed Duck abundance because this species breeds at low densities over a vast range. Like other sea ducks inhabiting offshore areas during the winter, as opposed to most other species of waterfowl, Long-tailed Ducks are 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 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, the Long-tailed Duck population appears to have been increasing for the 2008–2012 period (Bowman et al. 2015). Nevertheless, that survey covers only a small portion of Alaska and northwestern Canada, which represents a very small portion of their overall breeding range.

Table 1. Long-tailed Duck Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (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 are available after 2012.)

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

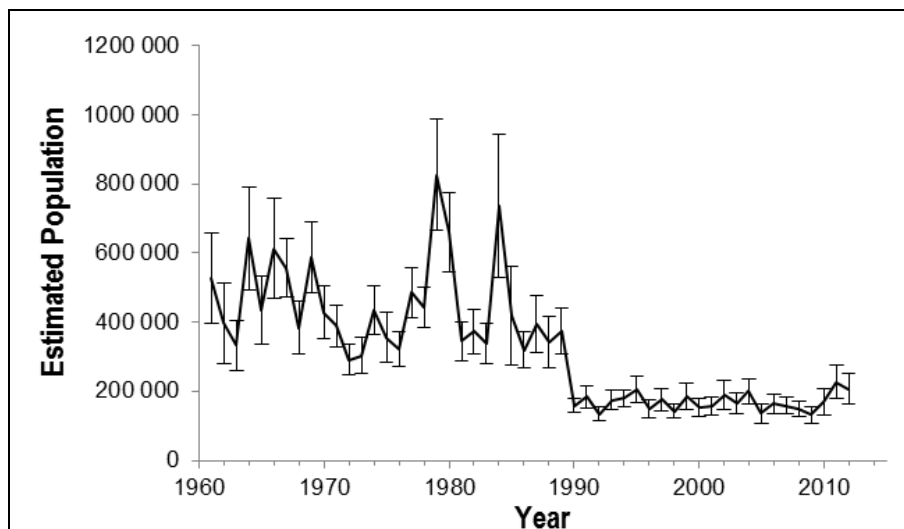


Figure 1. Long-tailed Duck Breeding Population Estimates (± 1 SE) Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Western Canada and the Northwestern United States (No data available for 2012 onwards.)

Research Highlights

There are many aspects of the basic biology of Long-tailed Ducks that are largely unknown, such as the location of major breeding, moulting, staging and wintering areas; the location of 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 2015a). More results of the Atlantic and Great Lakes Migration Study can be found at the SDJV website (seaduckjv.org/atlantic_migration_study).

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 an important species in the subsistence harvest in some northern communities. The extent 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												Total	E.-U.	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT		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	18 240	37 982
1977	768	474	2 437		4 743	1 925							10 347	9 560	19 907
1978		207	1 588		7 710	1 665	112				89		11 371	9 296	20 667
1979			5 562	424	12 648	3 747							22 381	18 407	40 788
1980	1 813	67	4 556	331	8 250	2 552	179						17 748	7 576	25 324
1981	977		1 800	972	8 326	2 406	640				101		15 222	19 750	34 972
1982	2 803		1 279	82	10 300	3 300							17 764	10 100	27 864
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	15 715	31 661
1987			3 255		5 548	2 514							11 317	13 995	25 312
1988	3 646		2 332	63	2 572	2 365				141			11 119	16 305	27 424
1989			2 681		6 385	438							9 504	7 714	17 218
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	19 844	24 368
1993	2 704		2 395	68	2 752	1 205				31			9 155	13 815	22 970
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	11 327	17 355
1996	1 534	256	1 941		4 782	1 527				54			10 094	20 158	30 252
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	11 962	18 814
1999 ²	38				2 033	535							2 606	15 107	17 713
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	20 894	24 808
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	27 782	29 644
2007	973		461	402	285	676							2 797	30 047	32 844
2008	559		131	62	301	725							1 778	37 013	38 791
2009			889		305	513							1 707	22 182	23 889
2010	1 996		1 054	91	632								3 773	26 240	30 013
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
2014	269		98		388	335	283						1 373	13 228	14 601

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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.

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 (SDJV 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.

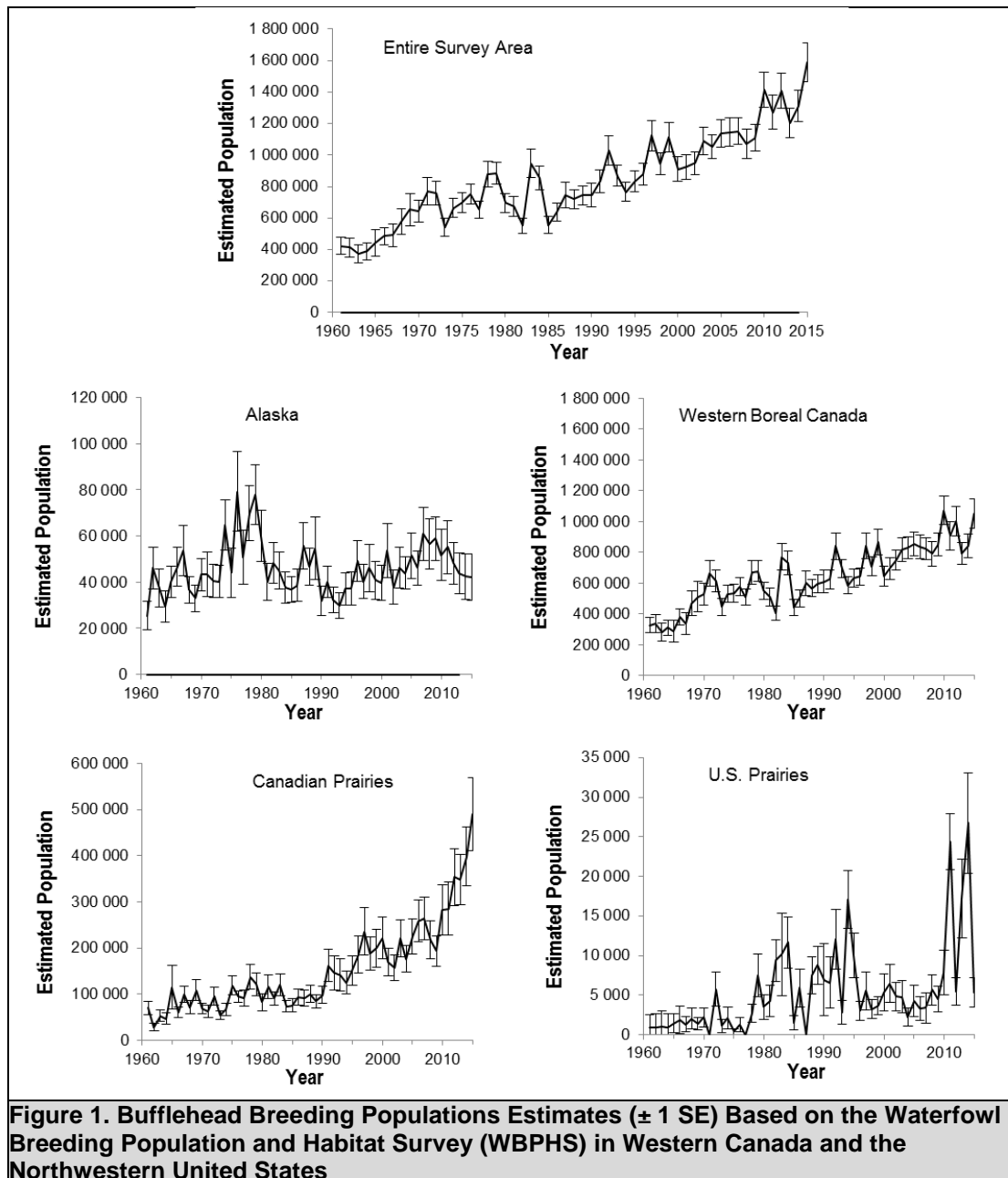
- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA AND THE NORTHWESTERN UNITED STATES

Population estimates of Buffleheads in 2015 were similar to or higher than those of 2014 in all regions of the survey area except the U.S. prairies, where the 2015 estimate was significantly lower. Population numbers for this species are showing increasing long-term (1961–2015) trends in all areas of the survey except Alaska, where the population has remained relatively stable overall (Table 1 and Figure 1). The short-term (2011–2015) trend suggests a significant increase in Bufflehead numbers in the Canadian Prairies, but a decrease in the U.S. Prairies and in Alaska (Table 1).

Table 1. Bufflehead Breeding Population and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Western Canada and the Northwestern United States

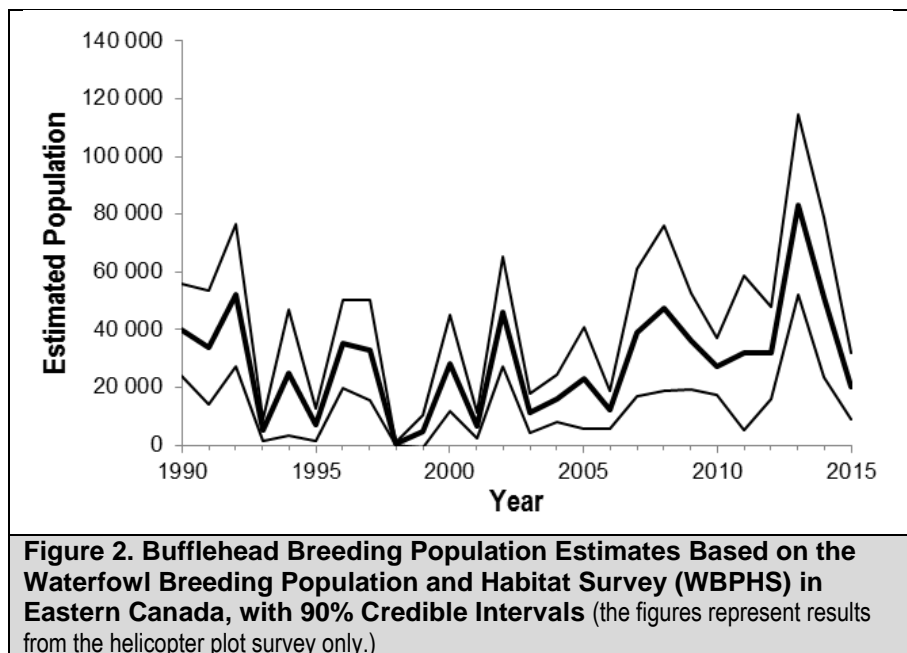
(Trends are expressed as an annual percentage change. *Trend significant at $p < 0.05$.)

WBPHS—Western Canada and Northwestern U.S.	Breeding Population Estimates (in Thousands, [1 SE])			Trends in Numbers of Breeding Birds		
	2014	2015	10-yr Average (2005–2014)	1961– 2015	2006– 2015	2011– 2015
Entire Survey Area	1 312 (100)	1 588 (125)	1 222	2.0*	2.9*	3.5
Canadian Prairies	398 (64)	490 (79)	283	3.4*	8.0*	12.7*
Western Boreal Canada	844 (76)	1 050 (96)	878	1.8*	1.6	1.3
U.S. Prairies (North Central)	27 (6)	5 (2)	10	6.5*	17.1	–13.5
Alaska	43 (10)	42 (10)	52	0.2	–3.1*	–6.4*



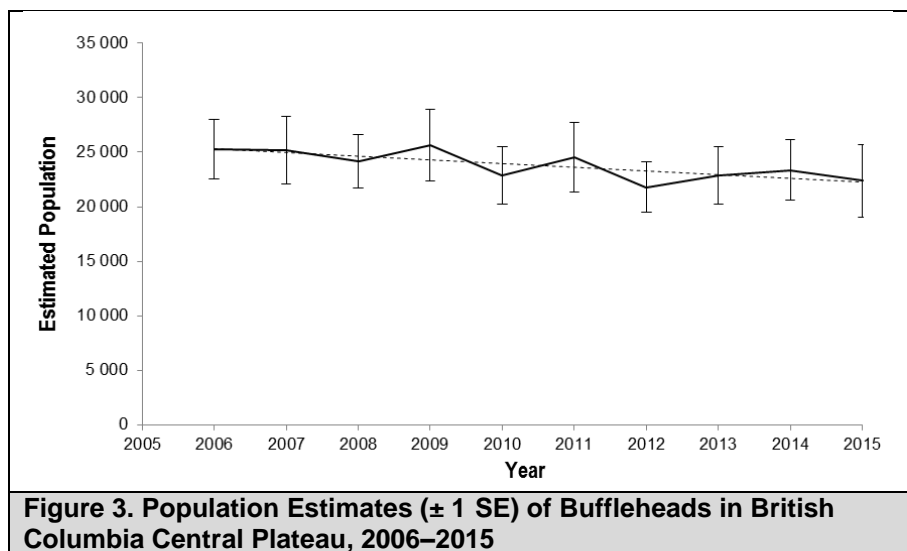
- WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN EASTERN CANADA

Since the beginning of the survey in 1990, Bufflehead numbers have been very 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 2013b).



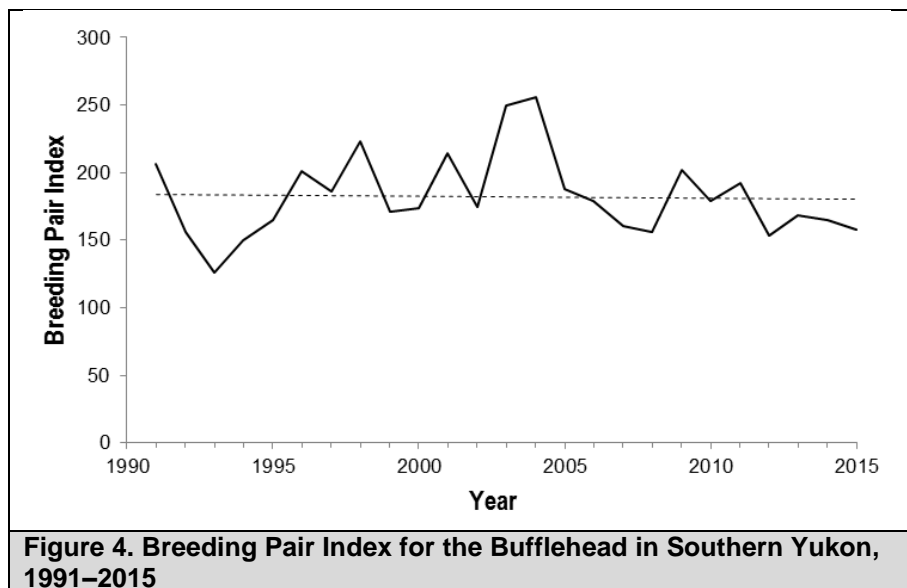
- WATERFOWL BREEDING PAIR SURVEY OF THE CENTRAL INTERIOR PLATEAU OF B.C.

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



- COOPERATIVE YUKON ROADSIDE WATERFOWL BREEDING POPULATION SURVEY

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



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 (SDJV 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
2014			43		407	7 035	1 647	389	4 999	1 677			16 197	206 089	222 286

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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 between Common 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 the Southern Ontario Waterfowl Plot Survey.

Continentially, the combined population trends for mergansers are positive (SDJV 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 following a decline in the continental population from 700 000 individuals in 2004 (NAMWP 2004) to 400 000 birds in 2012 (NAWMP 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 WBPHS 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 in Figure 2. The Red-breasted Merganser nests later than the other merganser species (and as a consequence, there may still be migrating birds in the breeding counts) and the WBPHS only covers part of its breeding range (Lepage 2013b).

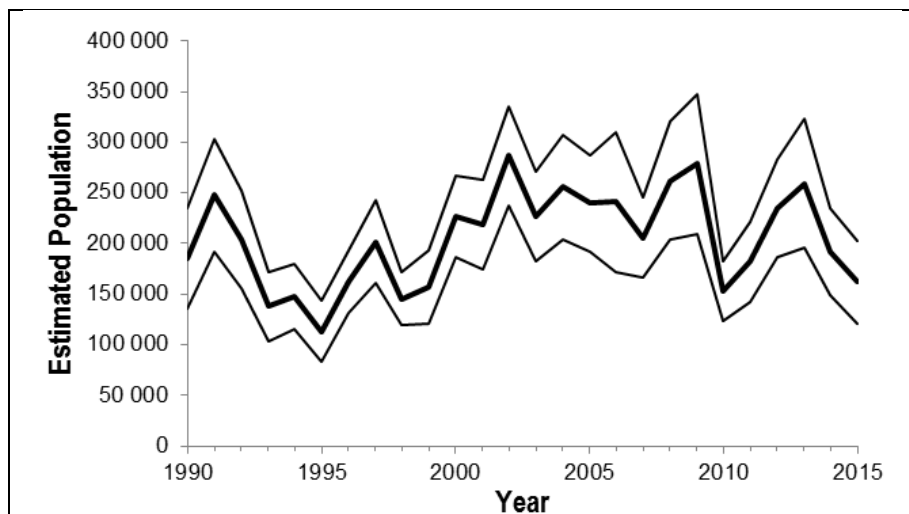


Figure 1. Common Merganser Breeding Population Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Eastern Canada; Estimated Number of Indicated Birds, with 90% Credible Intervals (The figure represents the results of the helicopter plot survey only.)

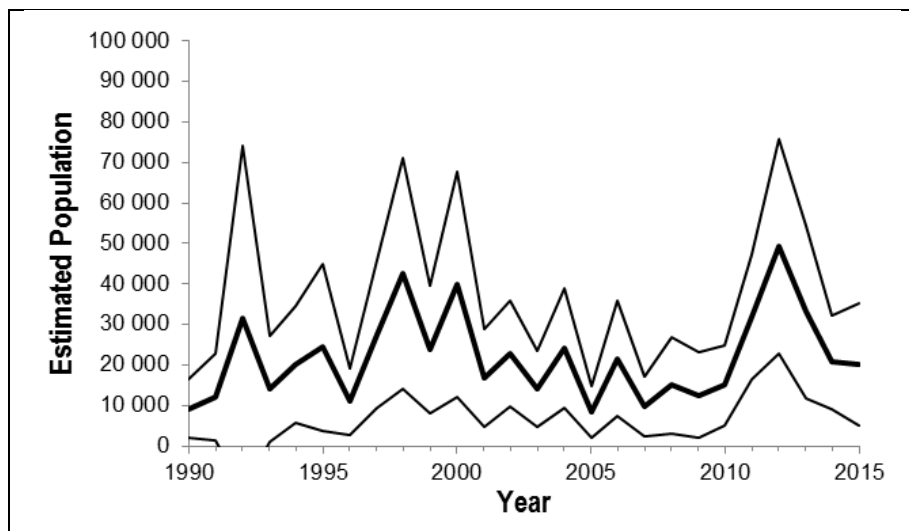
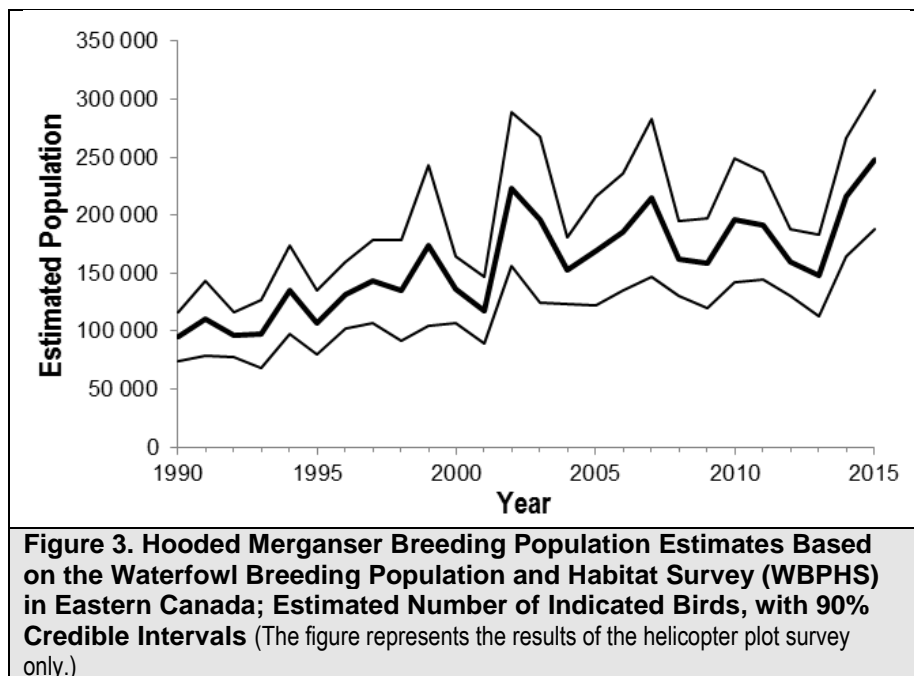
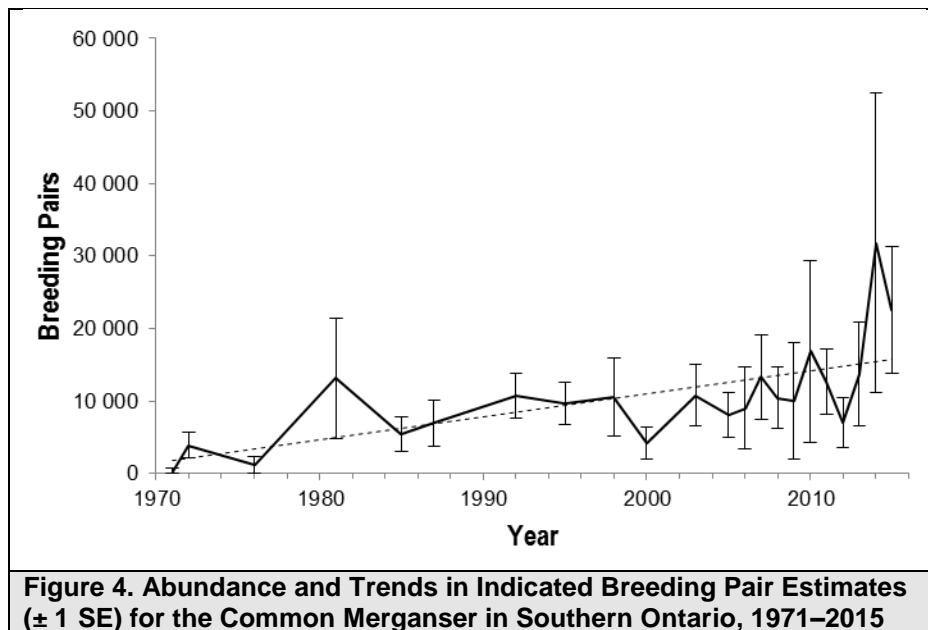


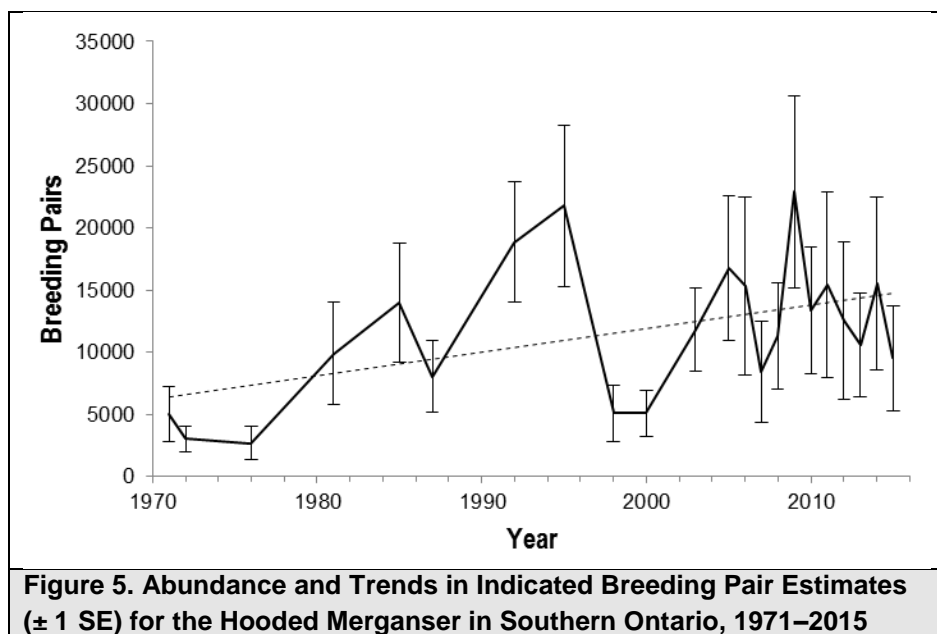
Figure 2. Red-breasted Merganser Breeding Population Estimates Based on the Waterfowl Breeding Population and Habitat Survey (WBPHS) in Eastern Canada (Estimated number of indicated birds, with 90% credible intervals. The figure represents the results of the helicopter plot survey only.)



- SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

In southern Ontario, numbers of breeding Common Mergansers have increased significantly since the early 1970s and more rapidly in the last decade (Figure 4). However, numbers of breeding Hooded Mergansers show high variability and a slight overall increase on the long term (Figure 5).





Harvest

Overall, hunters do not heavily harvest mergansers. The harvest, however, may be important locally (SDJV 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 (SDJV 2008).

- RED-BREASTED MERGANSER

The ecology of the Red-breasted Merganser is not well known in North America and has received little attention (Lepage 2013b). 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 2013a).

Table 1. Harvest Estimates of Common Mergansers 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	8 079	158	3 050	440	9 736	3 155	540			483			25 641	7 858	33 499
1975	5 970	83	5 097	227	12 829	4 569	128			1 141		101	30 145	11 099	41 244
1976	3 913		710	584	13 453	3 574				167			22 401	21 731	44 132
1977	4 379	270	2 486	1 006	10 017	3 695				97	246		22 196	11 110	33 306
1978	11 226	110	2 349	580	14 230	5 335	282			66		29	34 207	14 434	48 641
1979	6 701	315	1 093	852	12 111	4 969			345	69			26 455	13 390	39 845
1980	3 939		1 925	576	15 993	7 256				52	301		30 042	18 059	48 101
1981	6 795		2 125	995	13 464	5 367		178	347	397			29 668	16 582	46 250
1982	4 834		1 020	1 654	16 713	3 851	1 043			235			29 350	13 873	43 223
1983	5 428		1 365	960	14 258	8 423	67			110			30 611	14 544	45 155
1984	4 851	155	1 455	895	13 707	5 304			887	286			27 540	15 719	43 259
1985	10 009		1 556	599	11 839	4 116			136	76			28 331	12 543	40 874
1986	9 429	51	1 293	1 170	11 329	6 726			291	242	159		30 690	12 060	42 750
1987	8 628		1 052	1 268	10 729	2 881	652			233			25 443	14 190	39 633
1988	8 912		1 065	737	7 766	4 971			166	273			23 890	7 502	31 392
1989	5 265		2 220	1 356	7 531	2 497			150				19 019	12 191	31 210
1990	4 586		1 127	430	11 062	3 264			368				20 837	7 619	28 456
1991	373		832	568	9 946	2 380				69			14 168	7 028	21 196
1992	5 693	113	813	559	7 658	5 403							20 239	10 549	30 788
1993	3 711		1 332	137	5 252	1 723				67		53	12 275	9 816	22 091
1994	6 908		1 146	331	6 403	2 666				130		64	17 648	13 192	30 840
1995	4 614	675	1 763	93	8 474	1 220							16 839	14 743	31 582
1996	5 031	831	1 690	455	5 300	2 669			181				16 157	18 287	34 444
1997	4 382		2 087	199	5 976	2 304							14 948	10 871	25 819
1998	4 020		2 398		3 851	2 208				82			12 559	14 271	26 830
1999 ²	2 580		664	155	4 372	2 151							9 922	14 141	24 063
2000	3 084	309	368	90	2 906	1 215				36			8 008	22 079	30 087
2001	3 270		691	372	2 826	1 087							8 246	14 498	22 744
2002	2 235	487	670	390	2 172	942							6 896	26 192	33 088
2003	2 387		1 212	291	2 243	928			103				7 164	26 606	33 770
2004	4 994	124	951	187	1 815	586				59			8 716	22 123	30 839
2005	3 436	64	611	29	693	610				121			5 564	13 954	19 518
2006	721	287	463		1 177	1 245			426				4 319	17 271	21 590
2007	3 467	330	1 032	122	1 864	904							7 719	19 430	27 149
2008	2 100	94	555	31	983	926				32			4 721	21 377	26 098
2009	3 693	370	872		1 094	2 711							8 740	17 880	26 620
2010	3 808		1 563	514	1 648	709							8 242	18 600	26 842
2011	1 045	354	1 450		2 636	1 933							7 418	17 698	25 116
2012	1 597	1 167	435	133	2 375	930				21			6 658	15 456	22 114
2013	1 472	487	623	55	900	766				32			4 335	18 671	23 006
2014	2 403		85		793	5 250				164			8 695	19 056	27 751

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and S.M. Olson 2015 (USFWS: U.S.).

Table 2. Harvest Estimates of Red-breasted Mergansers 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	5 549	1 760	2 059	450	3 956	2 754							16 528	19 253	35 781
1975	3 380	865	2 633	335	5 485	1 661				64			14 423	31 682	46 105
1976	7 265	2 468	1 757	1 152	4 748	4 545						84	22 019	21 811	43 830
1977	5 343	295	3 293	443	5 760	2 726				142	137		18 139	19 343	37 482
1978	3 445	43	892	61	1 370	439							6 250	12 034	18 284
1979	3 106	273	2 310	270	3 212	1 405				227			10 803	12 033	22 836
1980	7 102		1 963	114	3 431	667						247	13 524	9 479	23 003
1981	3 494	330	4 021	339	3 898	1 503							13 585	22 174	35 759
1982	5 472	470	2 450	1 363	7 994	1 197	1 244						20 190	13 458	33 648
1983	4 202	702	3 135	776	4 594	4 342							17 751	24 207	41 958
1984	4 230	534	3 151	119	4 032	1 303							13 369	20 314	33 683
1985	6 879	404	3 209	326	6 262	3 255							20 335	21 703	42 038
1986	6 599		3 137	741	6 837	2 292				44			19 650	18 912	38 562
1987	3 313		1 104	238	2 993	762							8 410	12 800	21 210
1988	2 052	92	1 576	202	3 345	1 141				26			8 434	8 641	17 075
1989	7 557	118	3 123	49	3 793	1 578							16 218	10 997	27 215
1990	4 115	116	1 565	156	3 192	681							9 825	10 052	19 877
1991	3 793		1 363		4 052	835				39			10 082	12 657	22 739
1992	4 709		5 465	435	2 361	1 323							14 293	16 246	30 539
1993	5 445	177	5 192	196	4 024	767			59			6	15 866	10 946	26 812
1994	6 136	656	2 835	53	1 484	1 055							12 219	12 347	24 566
1995	4 800	232	3 048	357	912	913				17			10 279	19 077	29 356
1996	2 156	292	1 131	621	1 707	398			139				6 444	16 300	22 744
1997	2 114		1 947	186	1 598	1 359							7 204	28 288	35 492
1998	2 728		4 906		2 311	770			60				10 775	23 309	34 084
1999 ²	2 238		1 693	151	2 487	445							7 014	13 525	20 539
2000	511		1 039		838	648							3 036	11 114	14 150
2001	2 460		709	193	710	738							4 810	10 913	15 723
2002	2 550		496	173	1 297	766							5 282	13 172	18 454
2003	3 932	275	572	200	961	362							6 302	17 469	23 771
2004	2 098		1 006	39	882	387							4 412	17 050	21 462
2005	2 747		756	78	639	256							4 476	14 067	18 543
2006	2 616		624		1 287	553			487				5 567	17 011	22 578
2007	4 820		875	29	431	1 021							7 176	12 939	20 115
2008	1 705		1 117	100	740	792							4 454	16 505	20 959
2009	8 463		481		577	932							10 453	22 835	33 288
2010	7 693		902		725	272							9 592	12 108	21 700
2011	10 028	106	632		914	106							11 786	17 446	29 232
2012	771	92	185		633	159							1 840	19 659	21 499
2013	6 521		115		477	983							8 096	16 452	24 548
2014			497		431	847				0			6 169	13 349	19 518

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and S.M. Olson 2015 (USFWS: U.S.).

Table 3. Harvest Estimates of Hooded Mergansers 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	
1974			50	294	8 383	19 885	431	144		357			29 544	54 339	83 883
1975			417	128	9 334	23 283	474					101	33 737	48 599	82 336
1976			397	455	13 550	21 437	118	277		125			36 359	65 635	101 994
1977		61	690	298	11 547	27 908	443			391			41 338	70 653	111 991
1978			307	893	11 035	21 910	421	589					35 155	69 726	104 881
1979	41		639	458	10 780	18 873	421						31 212	49 931	81 143
1980	1 152		45	481	8 588	20 176	473	154		118			31 187	62 291	93 478
1981	264	117	397	952	9 856	22 632	818			227			35 263	63 021	98 284
1982			191	153	9 924	17 397	396						28 061	54 407	82 468
1983	701		250	342	7 966	18 379	462		173	182			28 455	48 551	77 006
1984	1 029	62	230	423	10 424	18 117	833			91			31 209	57 160	88 369
1985	1 747		262	605	11 028	14 439				512			28 593	54 451	83 044
1986	536	102	587	827	7 620	17 073	1 263	214	119	194			28 535	58 881	87 416
1987	396		201	870	9 100	13 276	174		155	361			24 533	49 763	74 296
1988		70	263	672	5 622	17 522	156			464			24 769	35 412	60 181
1989			699	182	11 870	12 894	337	287		162			26 431	37 329	63 760
1990	502	37		45	7 652	15 935		181		45			24 397	44 011	68 408
1991	1 405	571	564	684	10 286	15 326	629						29 465	44 719	74 184
1992	422	83	220	301	10 277	14 489	969			86			26 847	45 027	71 874
1993			775	355	8 858	10 066	594	21	100	85			20 854	50 642	71 496
1994	1 190		1 823	513	8 119	12 894	996	196		165			25 896	58 392	84 288
1995		154	519	585	7 774	13 992	378			27			23 429	75 713	99 142
1996	176		582	734	5 241	10 282	333			188			17 536	81 183	98 719
1997	363		174	409	5 603	8 054	288						14 891	91 008	105 899
1998	1 051		291	293	4 972	8 215	819		167				15 808	87 608	103 416
1999 ²	73		901	824	3 859	8 929	794		208	98			15 686	93 451	109 137
2000	168		175	171	6 185	6 748	233		236	36			13 952	94 321	108 273
2001	337		132	504	3 169	7 272	193						11 607	85 802	97 409
2002	302		638	299	2 886	5 080	833		115	46			10 199	103 546	113 745
2003	187		744	734	2 336	4 817	86						8 904	93 507	102 411
2004	106	27	337	560	1 897	4 216	636		199	33			8 011	83 256	91 267
2005	241		636	352	2 536	3 868	1 785	282	281	39			10 020	77 318	87 338
2006	37		511	626	2 961	4 482	455						9 072	82 600	91 672
2007	76		340	432	3 955	4 950	598		338	65			10 754	91 230	101 984
2008	147	205	371	798	3 387	3 884	579		191	248			9 810	89 652	99 462
2009		327	338	37	2 335	5 573	1 003	270	187				10 070	96 344	106 414
2010	468		859	160	4 930	2 475	184		49	71			9 196	95 886	105 082
2011	524		761	313	3 426	3 771	363	2 647	85	40			11 930	110 813	122 743
2012	1 936	337	1 012	50	3 651	4 999	989	627		97			13 698	99 837	113 535
2013	216	539	940	141	3 553	4 093	680			213			10 375	98 552	108 927
2014	88		1 195	336	4 475	8 192	315			198			14 799	97 806	112 605

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and S.M. Olson 2015 (USFWS: U.S.).

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 (*Chen caerulescens 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 1900s to between 700 000 and 1 million birds in the last decade. This species was designated as “overabundant” in 1998.

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 a small portion of the population also migrates through eastern Ontario and northern New Brunswick.

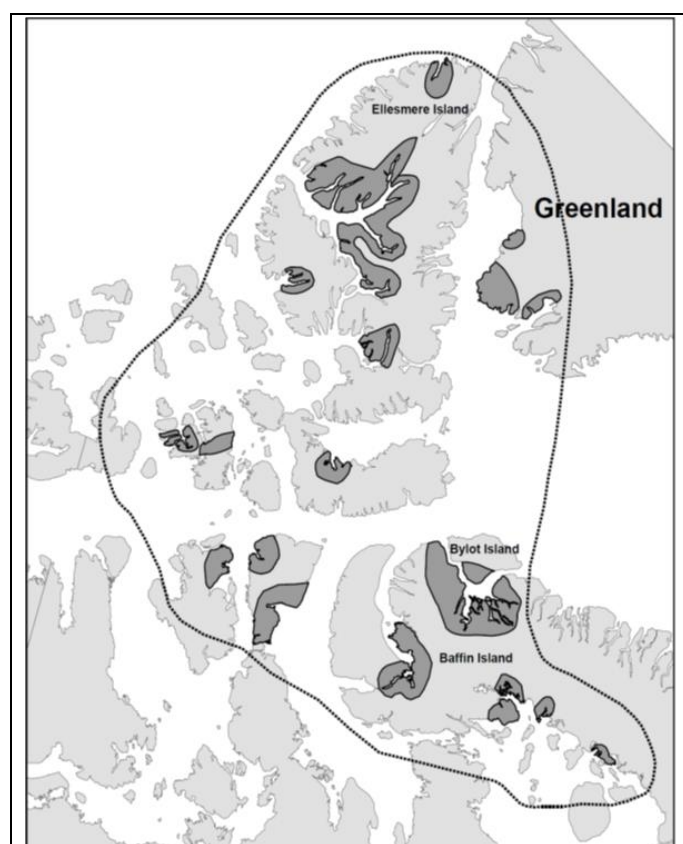


Figure 1. Greater Snow Goose Breeding Range in the Canadian Arctic

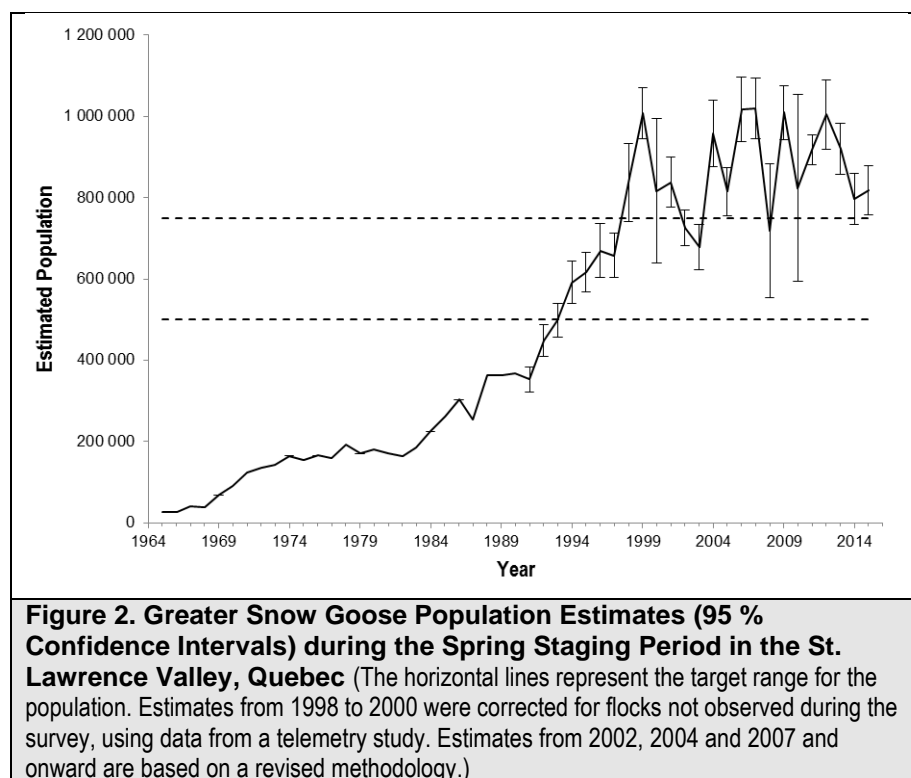
Abundance and Trends

The Greater Snow Goose population has been monitored in its spring staging areas in southern Quebec 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). Since 1998, the Greater Snow Goose population has fluctuated between 700 000 and 1 million birds in response to the implementation and effectiveness of the special conservation measures in Canada and the United States. The population has appeared to be decreasing in the last three years and to have stabilized below one million birds. The 2015 spring estimate of 818 000 geese was slightly above last year's estimate, but below the maximum estimated population of 1 million birds (Figure 2, Lefebvre 2015).

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, where the presence of migrating Greater Snow Geese is now well established, although numbers appear to have remained stable there.



Harvest

In order to reduce the population size and the population growth rate, measures were put in place in hunting season 1998–1999 to increase the Greater Snow Goose harvest in Canada and in the United States. Harvest regulations were liberalized (bag and possession limits, season length) in both countries, and special conservation measures in Canada allowed the use of different hunting methods during the regular hunting seasons such electronic calls and bait. 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 1998 (Table 1). In Canada, in 2014, the fall goose harvest was estimated at 89 125 birds, well above the 2013 harvest estimate of 57 277 birds, and above the 2009–2013 5-year average (65 495 birds). This increase in harvest might be explained by a good production of goslings during summer 2014, the second highest production since 2009 (J. Lefebvre, CWS–Quebec Region, unpubl. data). In the U.S., liberalized bag and possession limits were implemented in 1999, and a slight increase in the harvest was observed in the following years. In 2014, the fall harvest was estimated at 21 684 birds, which was lower than the previous year's estimate and the year before (2013: 30 482, 2012: 41 251; Raftovich et al. 2015).

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 participating hunters. An estimated 24 746 birds were harvested during spring 2015 in Quebec (Figure 3, Smith and Gendron 2015a).

A spring conservation harvest was also implemented for the first time in southeastern Ontario in the spring of 2012. In 2015, an estimated 2 089 geese were harvested, a number higher than the 2014 estimate (864 birds) and the 2013 estimate (1 397 birds, Smith and Gendron 2015b).

In the spring of 2009, a Conservation Order for Greater Snow Geese was put in place for the first time in several U.S. states in the Atlantic Flyway. An average of 50 227 geese (shot and retrieved) were harvested annually during the spring between 2010 and 2014. In the spring of 2015, the estimated (shot and retrieved) harvest of Greater Snow Geese was 86 641 birds (Figure 3, Atlantic Flyway Council 2015).

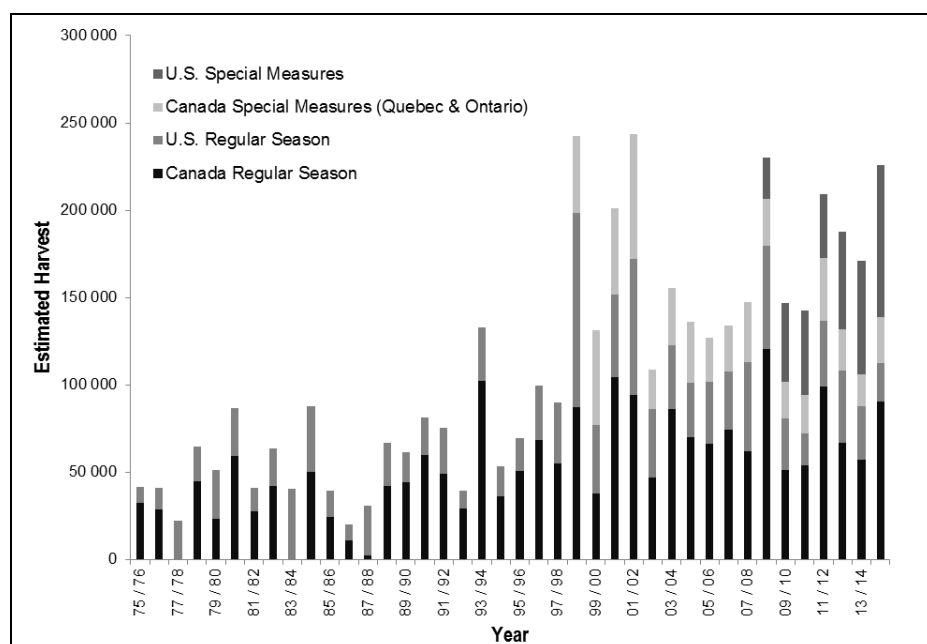


Figure 3. Harvest of Greater Snow Geese in Spring and Fall (Numbers include geese harvested during special conservation measures initiated in spring 1999 in Canada and in 2009 in the U.S.; source: Smith and Gendron 2015a, 2015b; Raftovich et al. 2015.)

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. Starting in mid-1980s, 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 increasing the harvest of geese by hunters through the use of additional hunting methods such as the liberalization of daily bag and possession limits, and offering a spring conservation harvest (the latter 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 harvest 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 fluctuated between about 700 000 and 1 million birds (Table 1 and Figure 1).

More information on the issue of overabundant species can be found in the Management of Overabundant Geese 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 1989. 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
1975		32 436		153	32 589	41 789
1976		28 866	66		28 932	41 032
1977						22 200
1978		42 763	1 312	612	44 687	64 787
1979		23 190			23 190	51 190
1980		59 120	103		59 223	86 523
1981	33	27 475	107		27 615	41 115
1982	50	40 697	832	505	42 084	63 784
1983						40 400
1984	177	45 538	624	4 001	50 340	87 940
1985		24 660			24 660	39 460
1986	55	11 077			11 132	20 032
1987		2 125			2 125	30 625
1988		41 827		88	41 915	66 815
1989		44 185	253		44 438	61 538
1990	294	59 223		205	59 722	81 222
1991		48 568		621	49 189	75 589
1992	295	26 988	926	976	29 185	39 585
1993		97 539	429	4 292	102 260	132 660
1994		35 903	112		36 015	53 615
1995	21	50 267	252	391	50 931	69 731
1996	1 981	66 111	111	115	68 318	99 718
1997		55 056	164		55 220	89 920
1998	502	86 791	64	118	87 475	198 375
1999 ³	774	36 821	105	86	37 786	76 886
2000		103 615		888	104 503	151 503
2001		94 011		68	94 079	171 881
2002	225	45 890		751	46 866	86 161
2003		86 028	111	286	86 425	121 492
2004	433	66 326	1 394	1 693	69 846	101 394
2005		66 238			66 238	101 632
2006	135	73 585	331	364	74 415	107 671
2007	578	61 652			62 230	112 972
2008	284	114 776	51	5 555	115 111	173 863
2009	257	50 535	661		51 453	80 879
2010		52 606	301	1 428	52 907	71 200
2011		96 144	2 836		98 980	136 572
2012		66 858			66 858	108 109
2013		57 210	67		57 277	87 759
2014	1 438	89 125			90 563	112 247

¹Prairie Provinces, BC, NWT and YK

²Atlantic Flyway.

³The 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 2015 (CWS: Canadian), R.V. Raftovich et al. 2015 (USFWS: U.S.)

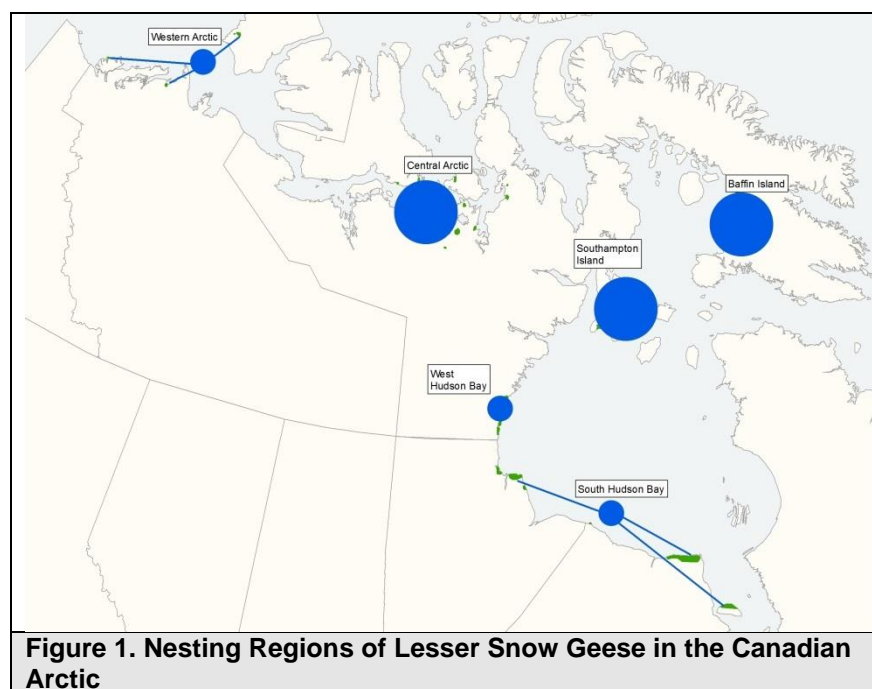
Lesser Snow Goose (*Chen caerulescens caerulescens*)

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

The size of the Mid-continent Lesser Snow Goose population estimated using banding and harvest data averaged approximately 2.3 million adults during the 1970s and approximately 13.2 million in 2004–2013, representing an increase of approximately 11 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. For management purposes, colonies are grouped into three regions: 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.



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 and 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, 1965–2014, Based on Photo Surveys (* Combined results from 2005–2006; source: K. M. Meeres, CWS–PNR, 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	
2011					2 459 100
2014				1 038 000	

Table 2. Estimated Numbers of Lesser Snow Geese in the Western Arctic Colonies, 1976–2013, Based on Photo Surveys Unless Noted Otherwise (^aGround survey, ^bHelicopter survey, ^cDigital imagery survey; no survey conducted in 2014 or 2015; 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	58 ^b	
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 3.5 million geese in 2015 (Fronczak 2015; Figure 2).

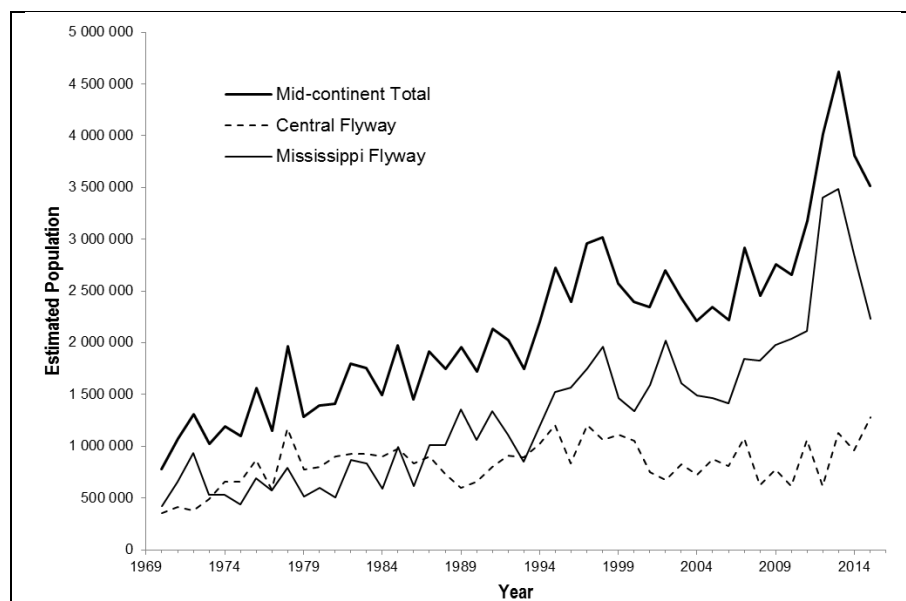


Figure 2. Mid-continent Lesser Snow Goose Populations in Mid-winter (Counts include some Ross's Geese; Source: Fronczak 2015.)

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 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 12 million adults from 2004–2013 (Figure 3; J. Leafloor, CWS–PNR, unpubl. data).

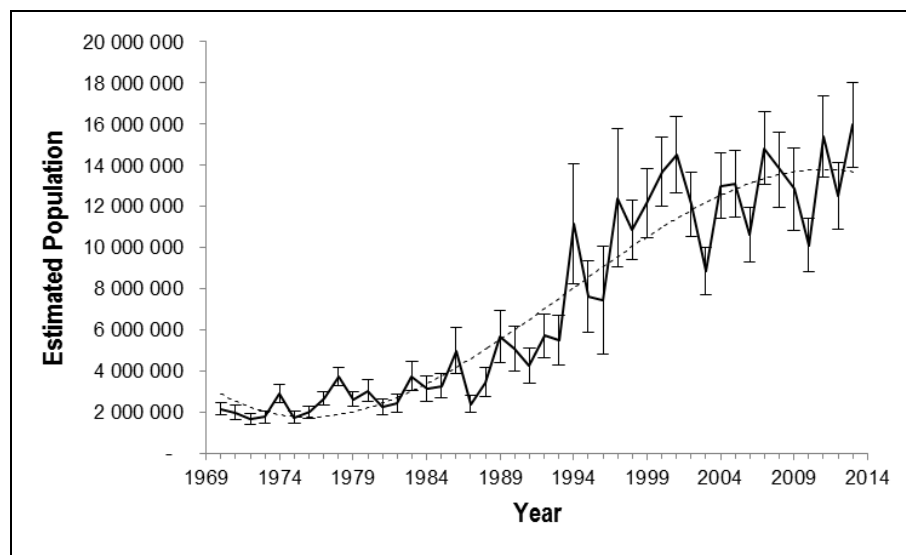
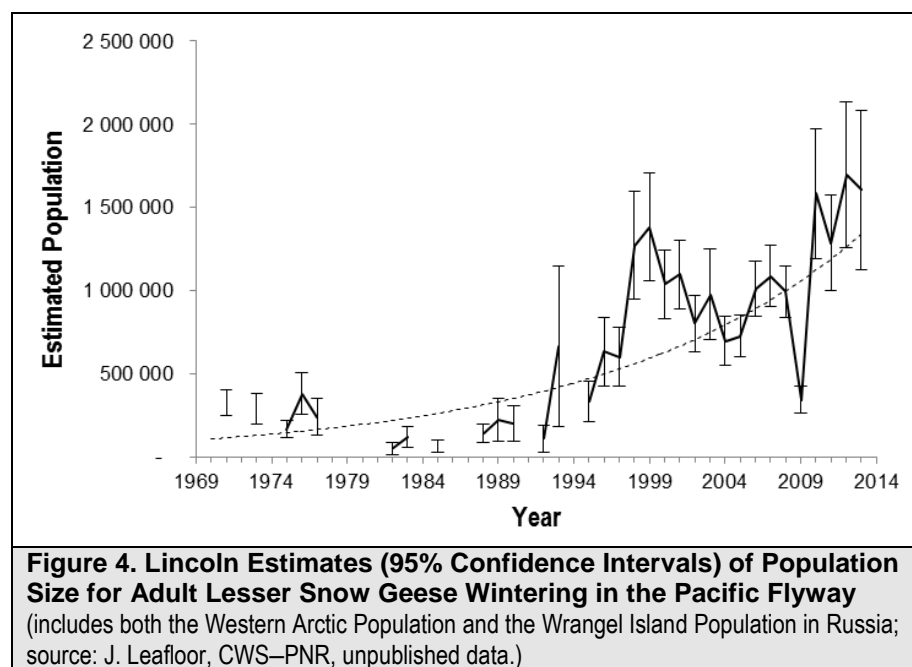


Figure 3. Lincoln Estimates (95% Confidence Intervals) of Population Size for Adult Lesser Snow Geese Wintering in the Mid-continent Region of North America (source: J. Leafloor, CWS–PNR, unpubl. data.)

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

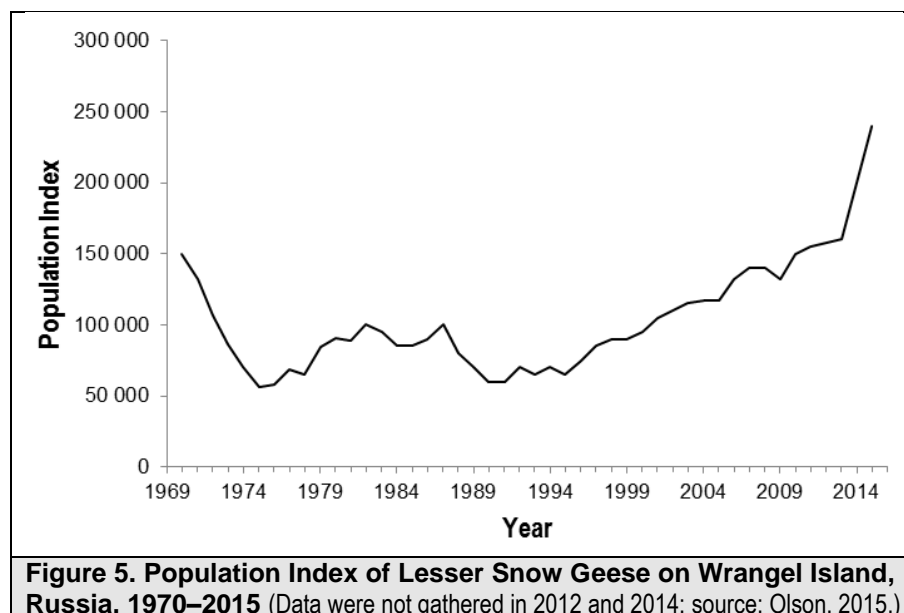
the techniques described by Alisauskas et al. (2009, 2011 and 2012). These estimates assumed that harvest estimates for adult Lesser Snow Geese in the Pacific Flyway states were overestimated by approximately 40%, and therefore harvest estimates were adjusted downward as suggested by Padding and Royle (2012). The preliminary estimates indicate that the combined population of adult Lesser Snow Geese averaged approximately 300 000 birds in the 1970s, and approximately 1.1 million adults between 2004 and 2013 (Figure 4, R.T. Alisauskas, EC–Science and Technology Branch, unpubl. 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 Lesser Snow Geese population has been undergoing a dramatic increase since 1990 reaching the highest numbers since surveys were initiated in 1969, with approximately 240 000 birds in 2015 (Figure 5; Olson, 2015).

The number of birds wintering in the Fraser–Skagit area has roughly doubled since the early 1990s, increasing to approximately 100 000 birds in 2007–2008, the highest abundance ever recorded. Increased harvest rates combined with poor breeding years caused the population to decline to about 57 000 birds in 2008–2009. The 2014–2015 wintering population was estimated at 64 630 birds, with 8.5% of the birds being young (S. Boyd, EC–Pacific and Yukon Region, pers. comm.).



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. Harvest estimates varied from a low of 748 birds in 1990 to a high of 3 607 birds in 2013. The 2014–2015 harvest was estimated at 1 336 birds (Figure 6), 63% less than the 3 607 birds harvested in 2013–2014

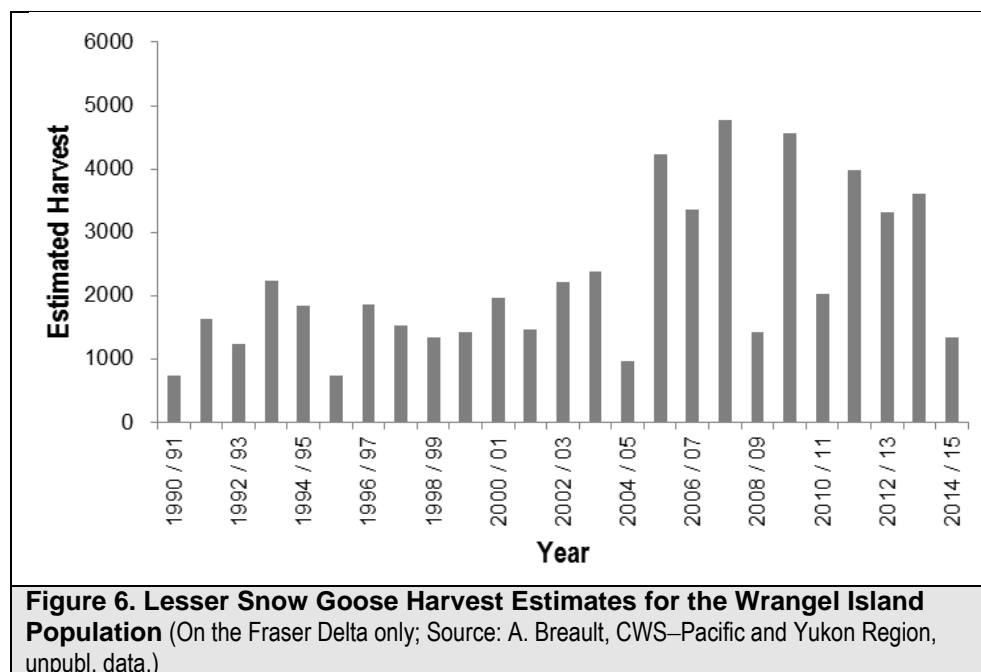
Table 3. Harvest Estimates of Lesser Snow Geese for Canada and the United States in Fall (In the U.S., an unknown proportion of Lesser Snow Geese are also harvested in the Atlantic Flyway and are included with the Greater Snow Goose estimates.)

	Canada								U.S. ¹		Continental
	Maritimes	QC	ON	MB	SK	AB	BC	NT/NU/YT	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
2014		1 248		14 307	121 092	47 254	836		184 737	374 978	559 715

¹Includes data from the Mississippi, Central and Pacific (including Alaska) Flyways.

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).



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 benefited 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 1998 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 Snow 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 were implemented (a liberalization of the harvest and a spring conservation season established in 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. When the Fraser–Skagit winter population increased above 60 000 birds in the early 2000s, geese of the northern wintering segment caused crop depredation complaints, aircraft safety concerns at the Vancouver International Airport, nuisance issues in urban areas, and bulrush habitat degradation in area marshes. In recent years, winter cover crop programs and coordinated deterrence efforts by the airport and municipalities have reduced conflicts. In addition, increased grubbing rates in tidal marshes have resulted in a severe reduction in bulrush biomass; data from a long-term monitoring program suggests that large parts of the tidal marsh could move to a state of “functional extinction” if the number of geese remain high (S. Boyd, EC–Pacific and Yukon Region, pers. comm.). A harvest strategy has been implemented to maintain the Fraser–Skagit winter population within 50 000–70 000 total geese so that the marsh habitat remains at a 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 occurs on the Skagit Delta in Washington State.

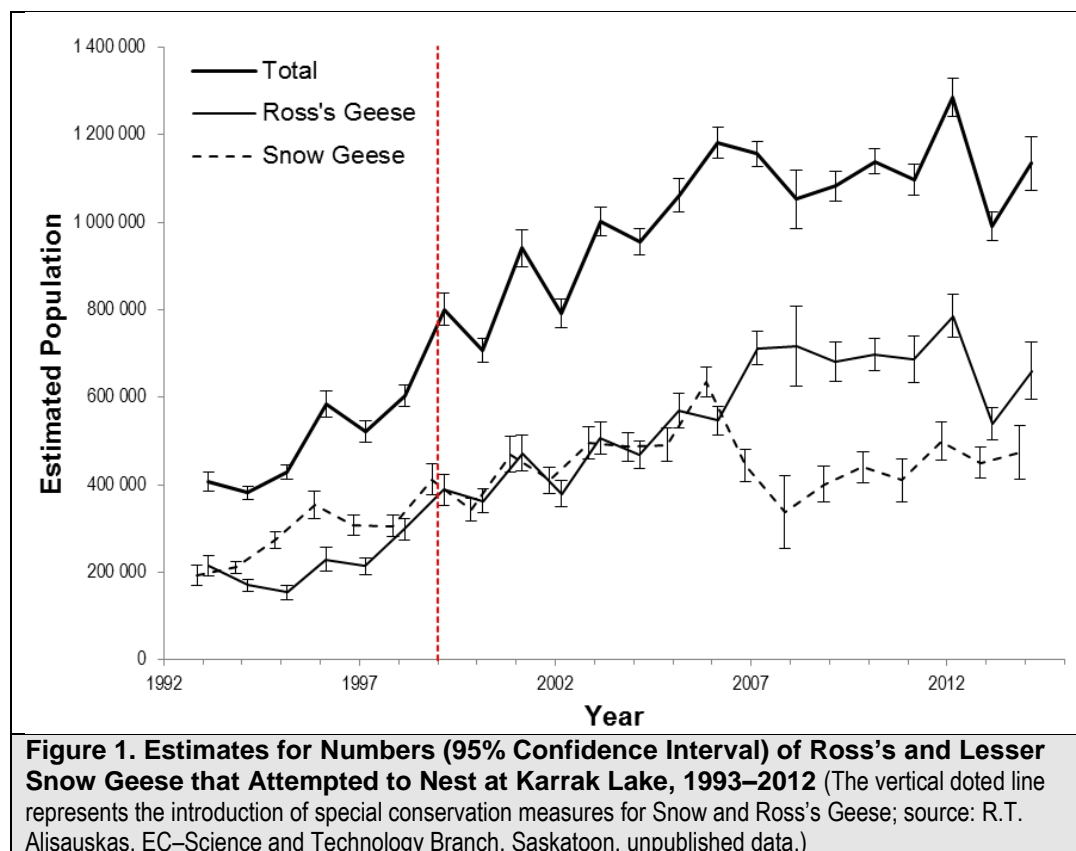
Ross’s Goose (*Chen rossii*)

Ross’s Goose was considered a rare species in the early part of the last century, but its numbers are now increasing, and 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

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 659 578 geese in 2014, up from about 539 034 birds in 2013 (Figure 1). Population growth over the longer term seems to have slowed and stabilized at about 700 000 nesting Ross’s Geese (R. Alisauskas and D. Kellet, EC–Science and Technology Branch, unpubl. data.). Estimates of the number of Ross’s Geese nesting at Karrak Lake, and timing of ice breakup and nesting phenology are not yet available for 2015.

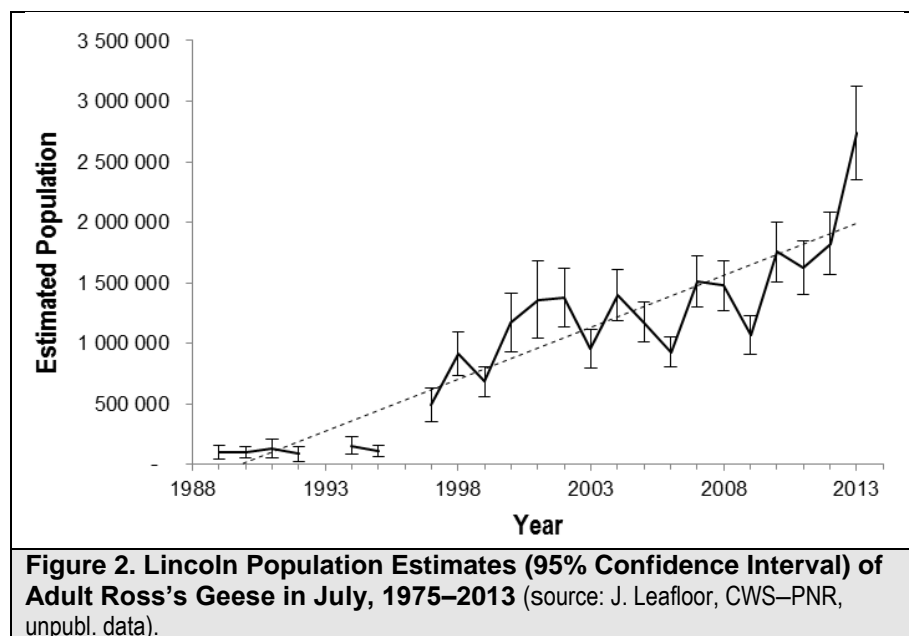
Increasing numbers of Ross’s Geese are being found along the western coast of Hudson Bay, on Baffin, Southampton and Banks islands, at La Perouse Bay, Manitoba, and at Cape Henrietta Maria, Ontario (Kerbes 1994; Alisauskas et al. 2012; K. Abraham, Ontario Ministry of Natural Resources, pers. comm.). 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. 2006b).



The estimated population of Ross's Geese in the early 1900s was between 5 000 and 6 000 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. 2006b, 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 2 250 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 2.7 million adults in the population, a dramatic increase compared to the 2012–2003 average of 1.3 million geese (Figure 2; J. Leafloor, CWS–PNR, unpubl. data).



In 2015, nesting conditions over much of the breeding range were poor for Ross's Geese. In the central Arctic, several days of rain and cold temperatures coincided with peak hatch dates of nesting Ross's Geese, and this appears to have wiped out most of the goslings, because few were seen on brood rearing areas in August (K. Drake, Ducks Unlimited Canada, pers. comm.). Likewise, a late spring thaw and prevailing cold and wet conditions appeared to limit production of Ross's Geese on Southampton and Baffin islands, where few goslings were seen on brood rearing areas in July and August (J. Leafloor, CWS–PNR, pers. comm.).

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. 2006a, 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													U.S. ¹	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974							817	5 273	1 104				7 194	8 659	15 853
1975						438	1 044	4 009	2 133				7 624	7 313	14 937
1976		126					99	3 179	1 786				5 190	9 992	15 182
1977						95		1 150	2 776				4 021	4 489	8 510
1978							660	3 706	485				4 851	2 359	7 210
1979							628	6 602	1 001				8 231	6 633	14 864
1980							789	3 018	858				4 665	3 804	8 469
1981							704	2 275	395				3 374	9 673	13 047
1982							658	3 309	411				4 378	13 955	18 333
1983							274	4 141					4 415	9 317	13 732
1984							297	3 471	1 302				5 070	14 950	20 020
1985							470	6 026	1 130				7 626	14 329	21 955
1986							592	506	2 280				3 378	7 542	10 920
1987							3 405	1 633	323				5 361	3 117	8 478
1988							1 144	1 321	2 053				4 518	5 419	9 937
1989							316	2 933	1 722				4 971	13 936	18 907
1990							111	5 899	3 091				9 101	11 300	20 401
1991							437	2 034	1 394				3 865	11 001	14 866
1992						80	1 645	1 330	1 650				4 705	8 266	12 971
1993							66	1 482	926				2 474	15 141	17 615
1994					181		1 119	6 374	2 184	15			9 873	19 874	29 747
1995					139		4 389	7 281	3 542				15 351	28 644	43 995
1996						156	2 066	15 598	1 587				19 407	37 648	57 055
1997					324	82	391	14 441	4 219				19 457	28 664	48 121
1998					258		3 833	23 086	1 386				28 563	53 220	81 783
1999 ²					69		162	20 643	1 826			49	22 749	103 260	126 009
2000					249		1 724	14 333	1 529	54		6	17 895	59 671	77 566
2001							665	14 573	5 747				20 985	106 471	127 456
2002							1 987	27 842	4 127				33 956	83 618	117 574
2003						95	1 320	27 407	1 447				30 269	89 083	119 352
2004						109	1 794	19 174	1 015				22 092	62 075	84 167
2005							1 823	11 499	1 427				14 749	66 419	81 168
2006							2 503	22 976	1 233				26 712	53 431	80 143
2007							4 210	12 893	934				18 037	48 351	66 388
2008		301				141	10 151	35 227	2 345				48 165	72 787	120 952
2009							2 399	20 655	982				24 036	35 494	59 530
2010							2 088	26 406	6 304				34 798	45 084	79 882
2011							3 073	34 682	2 197				39 952	52 947	92 899
2012							3 280	20 876	616				24 772	54 265	79 037
2013						231	1 448	29 478	3 798				34 955	52 769	87 724
2014							865	30 269	10 152				41 286	91 821	133 107

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

²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

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 Subarctic 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 reducing 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 spring conservation harvest season 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 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). The combined implementation of special conservation measures in Canada, including the spring conservation harvest, the liberalization of hunting regulations, and the Conservation Order in the U.S. appear to have led to a population decline since 2013 (Lefebvre 2015).

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 implemented 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 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"

Following publication of the *Arctic 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.

Based on the recommendation of the Arctic Goose Joint Venture (Leafloor et al. 2012), the Ross's Goose was designated as overabundant in 2014 by the CWS.

Ross's Geese contribute to habitat degradation in nesting and staging areas where they occur in large numbers (Alisauskas et al. 2006a, 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 (Melnychuk 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

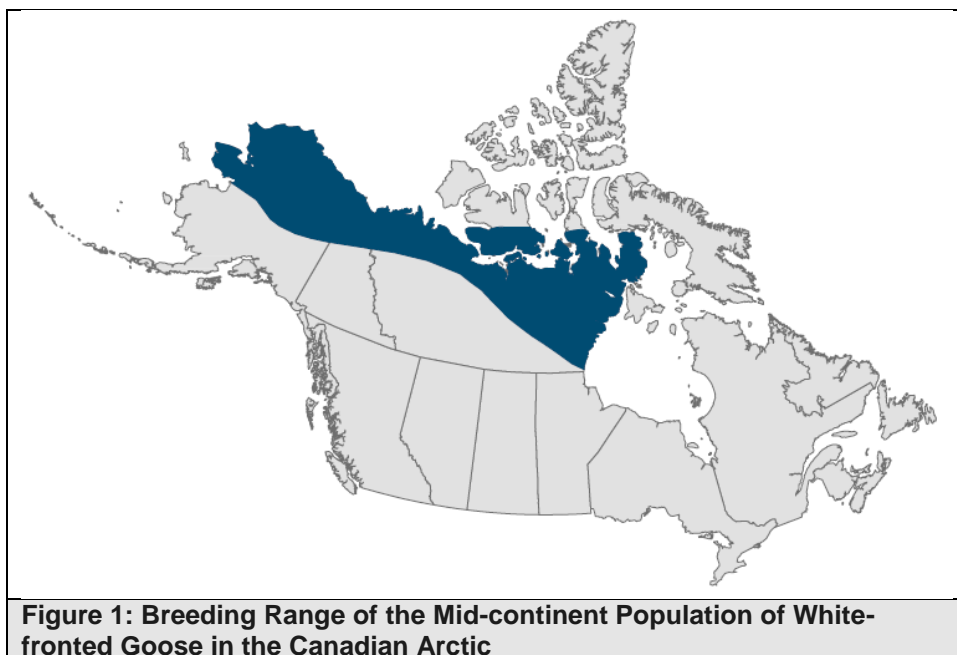
objective for Ross's Geese has been 100 000 birds since the inception in 1986 of the North American Waterfowl Management Plan. By the mid-2000s, the Ross's Goose had expanded its range eastward in both the nesting and wintering areas (Alisauskas et al. 2006b), and the population was estimated between 1.5 and 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. 2006b, 2012; Dufour et al. 2012).

Greater White-fronted Goose (*Anser albifrons*)

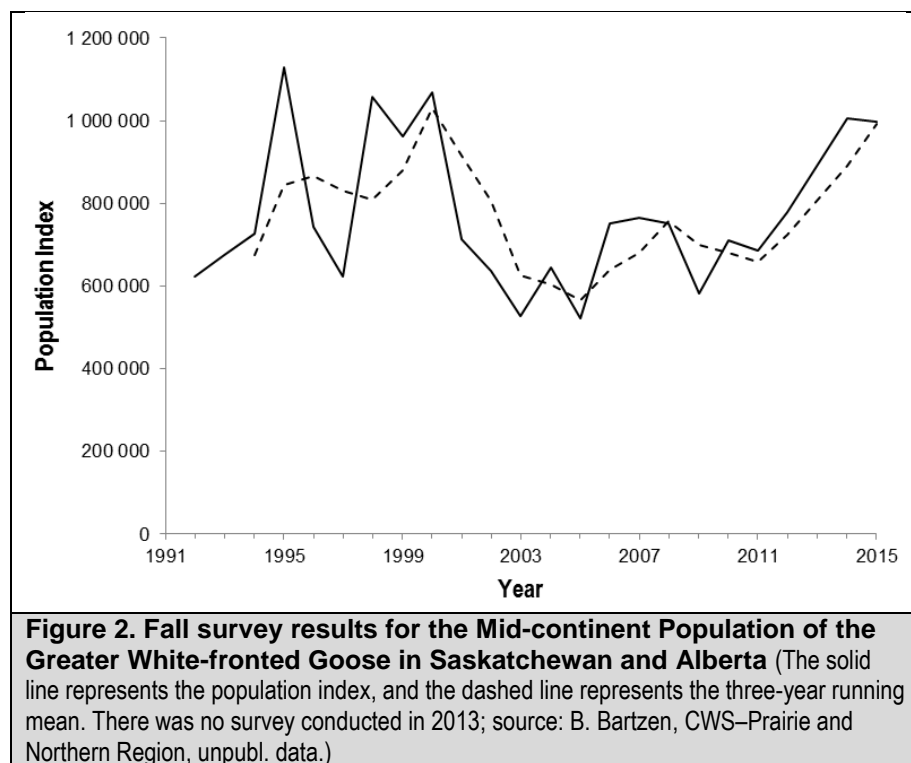
The Greater White-fronted Goose has one of the largest ranges of any species of goose in the world. In North America, the species nests across a broad region of the Arctic from Alaska to the west coast of Hudson Bay. There are three populations of Greater White-fronted Geese in North America: the Mid-continent 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 that 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.



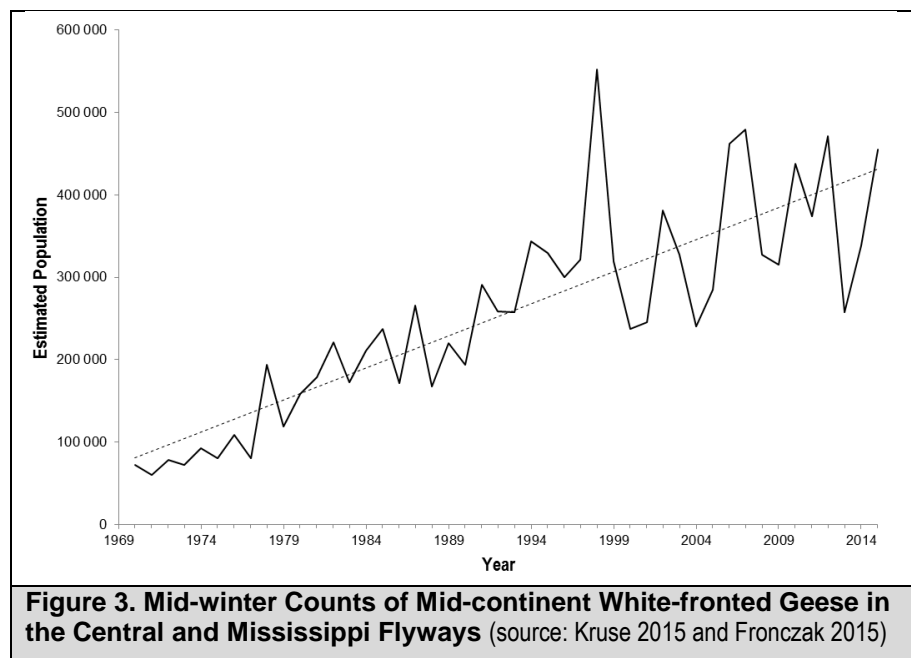
Abundance and Trends

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 1992–2015. The fall 2015 population index was of 997 375 geese, comparable to last year's estimate. The 3-year average population index was 991 500 geese, an increase of 11% (Figure 2). The population is currently above its NAWMP population objective of 600 000 birds (NAWMP 2012).



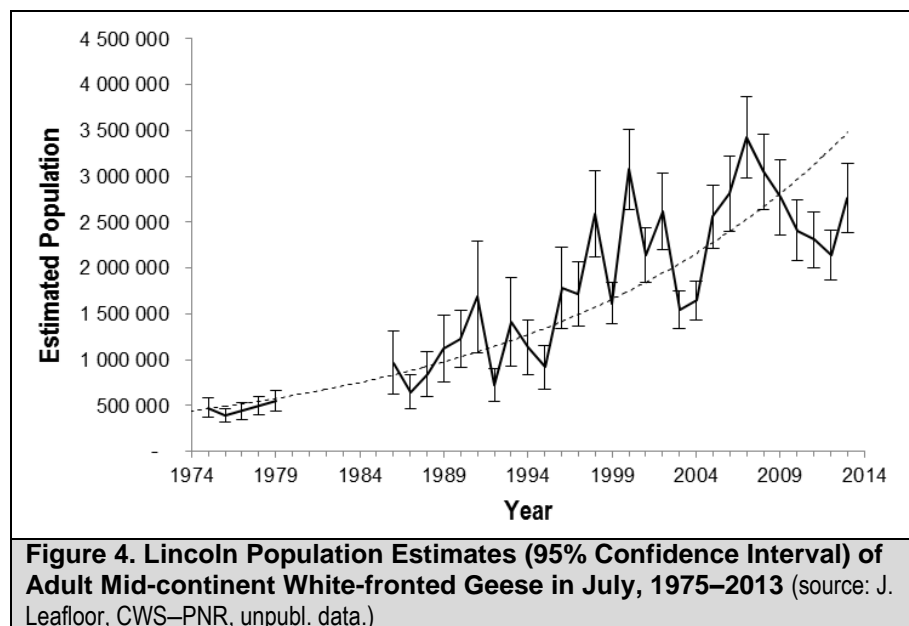
Other monitoring programs for Mid-continent White-fronted Geese have shown increasing trends over the past four decades. Mid-winter numbers increased approximately seven-fold between 1969 and 2015 (Figure 3). Indices from regional breeding ground surveys in northern and central Alaska more than doubled from 1986–2012 (Stehn et al. 2013).



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 five-fold increase from 1975 to 2013; the most recent estimates (2004–2013) suggest a population size of about 2.5 million adults (Figure 4; J. Leafloor, CWS–PNR, unpubl. data).



Harvest

Table 1 shows the harvest of White-fronted Geese over time. Harvests in Canada averaged about 70 000 birds per year from 2005–2014. 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 270 000 birds in 2005–2014. The total continental harvest of Mid-continent White-fronted Geese has also increased over time.

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.

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
	Eastern Canada ²	MB	SK	AB	BC	NT/NU	YT	Total	Total
1974								86 317	86 317
1975	281	451	45 687	14 345	389	122	142	61 417	115 388
1976		825	51 876	9 300			45	62 046	101 217
1977			43 341	15 862	82		2	59 287	103 380
1978		379	50 987	11 343	246		121	63 076	115 576
1979		101	47 200	12 092	72		247	59 712	108 169
1980		2 309	56 164	20 037	61			78 571	123 960
1981		1 505	36 781	14 648	303		5	53 242	198 608
1982		263	39 822	15 435				55 520	131 696
1983		119	46 947	5 634		570		53 270	130 868
1984	153	115	38 797	14 367	126		37	53 595	153 730
1985			37 605	12 482	277			50 364	114 033
1986	23	497	37 753	20 598				58 871	76 743
1987		125	36 856	11 184	84			48 249	98 126
1988			21 643	18 125	102			39 870	101 908
1989	88	119	34 374	18 738	48			53 367	139 596
1990	294	111	26 849	16 525	117	97		43 993	151 608
1991	133	549	31 649	11 540	65			43 936	138 367
1992		623	22 099	8 651	24			31 397	109 926
1993	221		21 822	7 016				29 059	120 669
1994			30 199	9 606	81			39 886	163 602
1995		79	45 011	14 888	42		64	60 084	143 003
1996	321	924	57 676	17 939	138			76 998	214 517
1997	180	296	37 326	15 009			37	52 848	209 518
1998		1 046	51 204	26 671	242			79 163	185 319
1999 ³			47 316	15 033				62 349	254 902
2000			86 587	19 964	187			106 738	307 972
2001			61 391	31 722	81			93 194	229 673
2002		1 048	39 870	10 691			6	51 615	219 317
2003	101		49 733	15 348	86			65 268	216 781
2004		238	54 419	9 956				64 613	182 507
2005		172	55 315	19 947	130			75 564	251 786
2006	51		36 967	17 892	273			55 183	282 487
2007		992	42 467	26 300	199			69 958	352 362
2008		139	55 647	37 893	183			93 862	319 332
2009			30 882	22 173	158			53 213	205 244
2010	121		33 746	22 144	188			56 199	268 759
2011		630	52 762	27 650				81 042	234 808
2012		781	36 128	21 861	700			59 470	210 220
2013			42 181	32 799	133			75 113	256 368
2014			65 463	21 711	420			87 594	339 559

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.

²Eastern Canada: NF, NB, NS, PEI, QC, ON

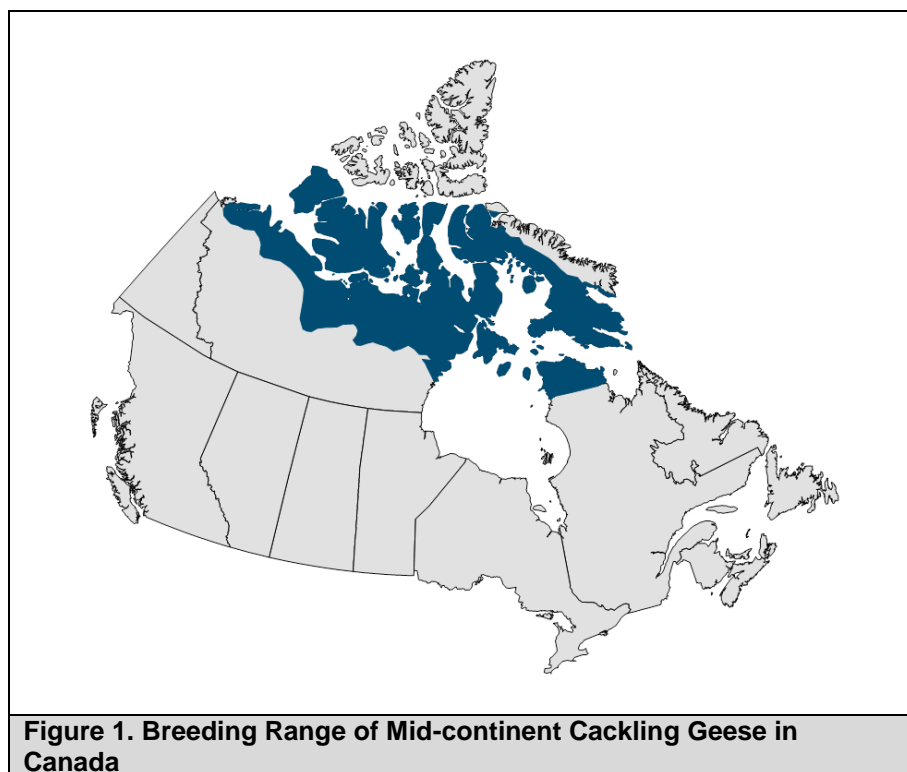
³The USFWS implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data sources: M.Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.)

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 southern states of the Central and Mississippi Flyway.



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. 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 685 000 birds from 2006-2015, inclusive (Figure 2).

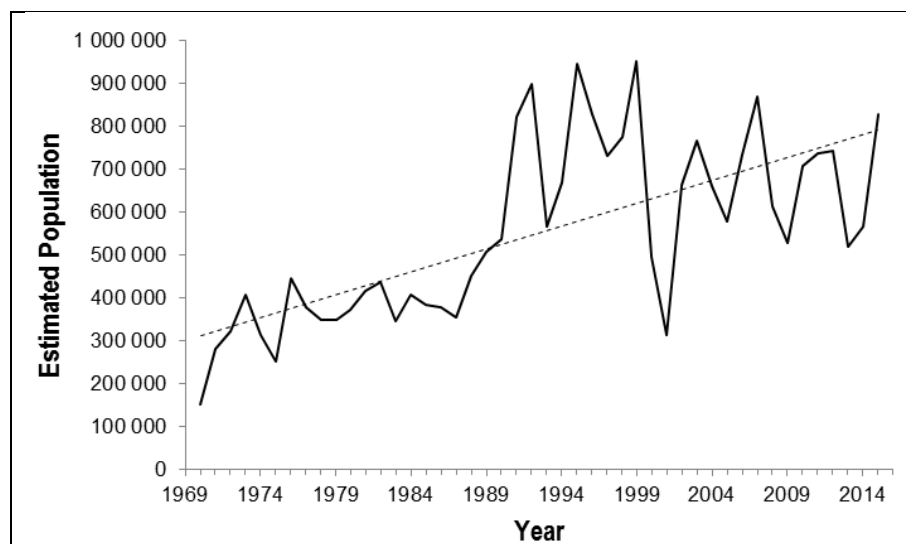


Figure 2. Mid-winter Counts of Cackling Geese in the Central and Mississippi Flyways, 1970–2015 (The dashed line represents the population trend. Note that midwinter counts of Cackling Geese were discontinued in the Mississippi Flyway after 1997; source: Kruse and Fronczak 2015.)

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 3). The population estimates averaged approximately 414 000 adult birds from 1975–1979, and approximately 3.3 million adults from 2004–2013 (J. Leafloor, CWS–Prairie and Northern Region, unpubl. data).

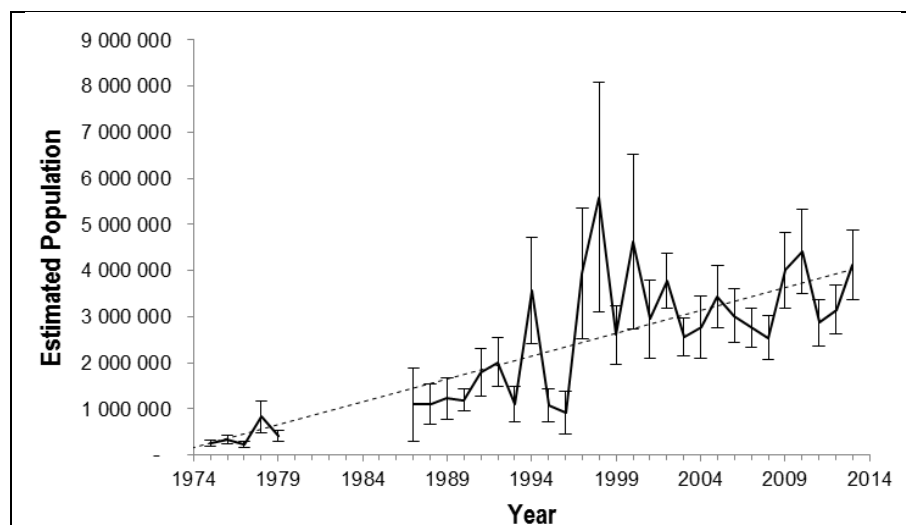
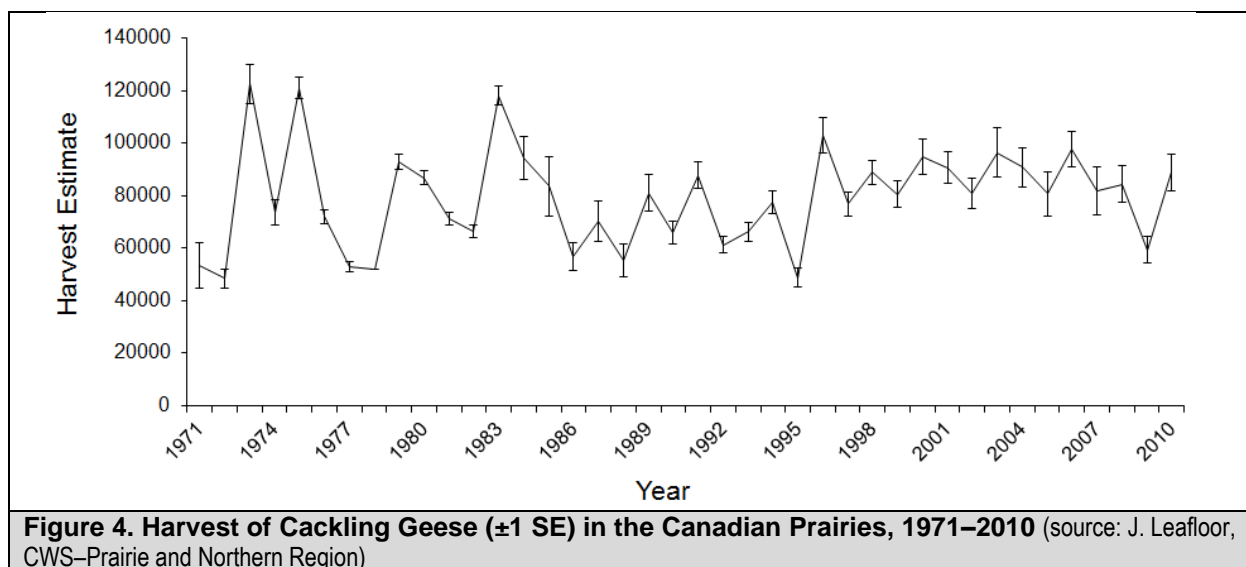


Figure 3. Lincoln Population Estimates (± 1 SE) of Mid-continent Cackling Geese, 1975–2013 (source: J. Leafloor, CWS–Prairie and Northern Region.)

Harvest

Estimated harvests of Cackling Geese in the Canadian Prairies have shown important interannual variation since 1971, averaging 85 178 birds per year from 2001–2010 (Figure 4).



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, these Cackling Geese are now managed as the Mid-continent Population.

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

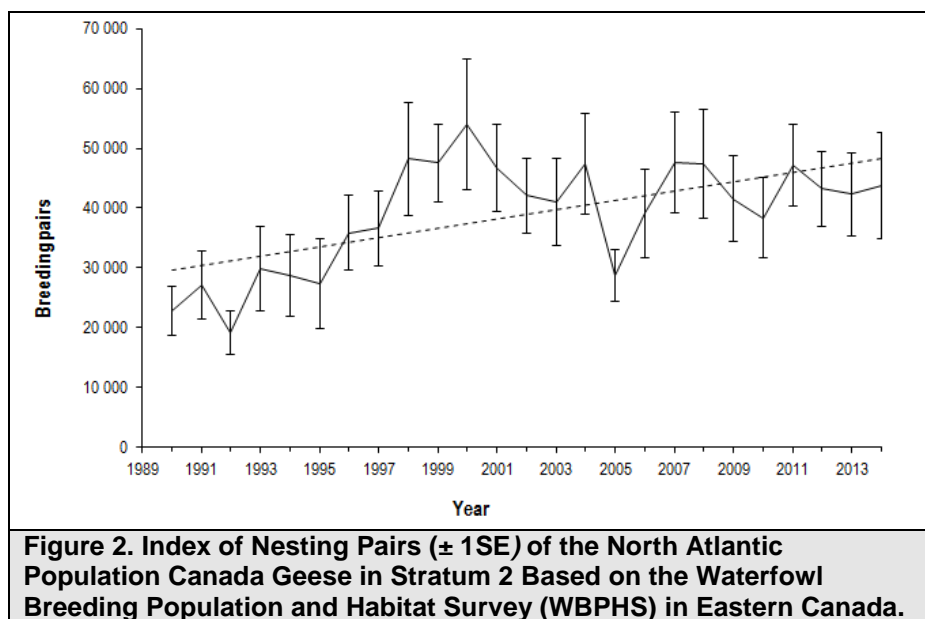
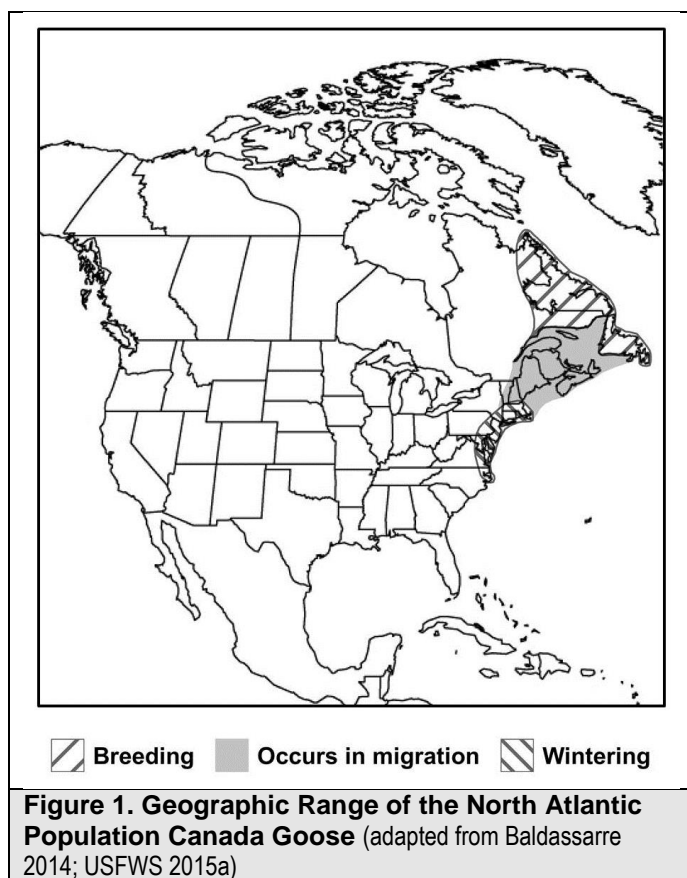
- NORTH ATLANTIC POPULATION CANADA GOOSE

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, Scribner et al. 2003, Fox and Glahder 2010, and Fox et al. 2011). 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, 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 44 000 breeding pairs in 2014, which represents about 60% of the total NAP Canada Goose Population, estimated at 130 000 geese (Rodrigue 2013c, Figure 2). In 2015, the population index was not produced in time to be published in this report.



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

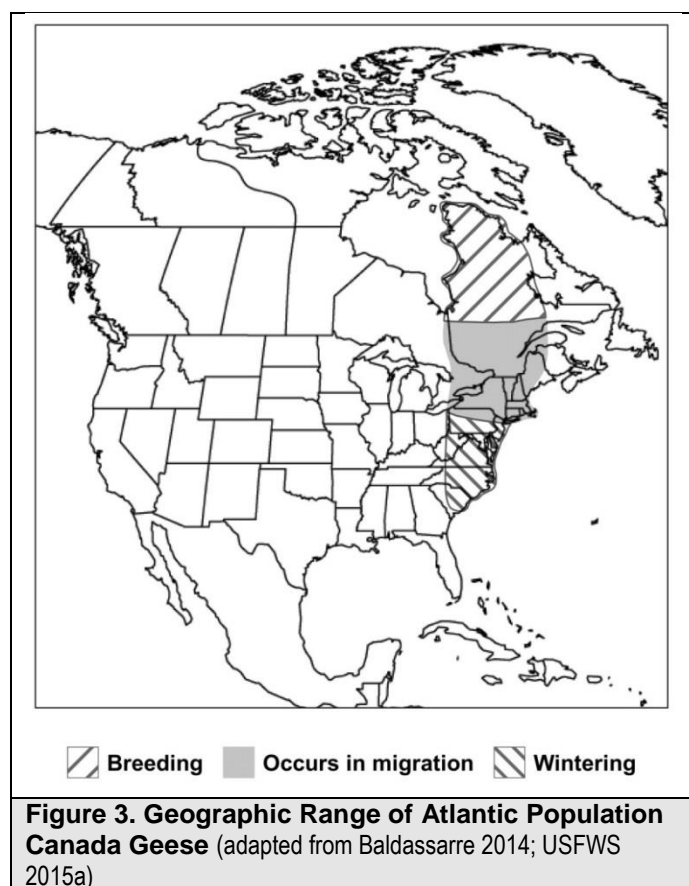
attempt to band geese breeding on the Island of Newfoundland as well as in Labrador, this banding effort was broadened. Banding operations were suspended in 2013 pending review of results to date.

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).

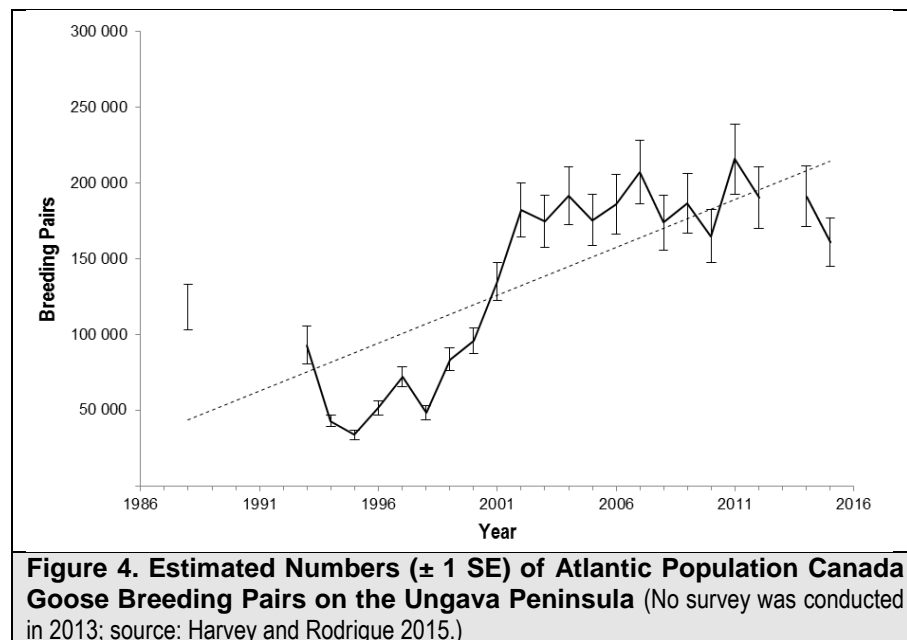


Abundance and Trends

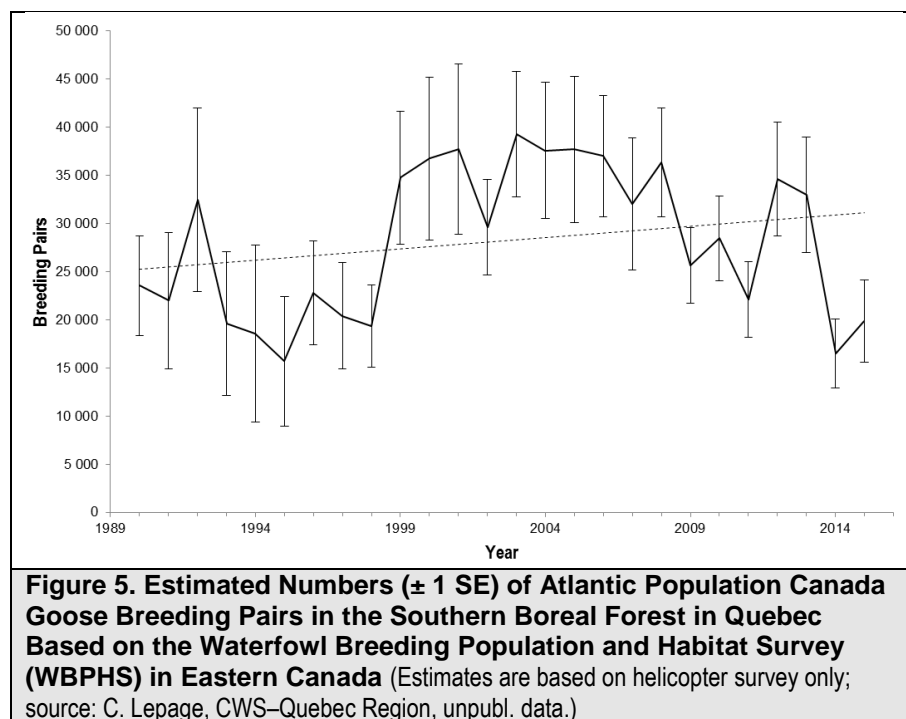
A breeding ground survey has been conducted every year since 1993 to estimate the number of breeding pairs on the Ungava Peninsula in northern Quebec. This survey covers the two regions that were shown previously to include the highest densities of nesting geese: the region of flat coastal tundra of Ungava Bay and Hudson Bay and the region of taiga and inland tundra (Malecki and Trost 1990; Rodrigue 2013b; Harvey and Rodrigue 2015). 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 a record low level of about 30 000 pairs. The most recent 10-year average is 186 000 breeding pairs (Harvey and Rodrigue 2015), which puts the population below the management objective of 225 000 breeding pairs of AP geese in the Ungava Region of northern Quebec (Atlantic Flyway Council 2008).

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.



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 2015, the population in the southern boreal forest was estimated at 19 900 breeding pairs, well below the 10-year average of 29 400 breeding pairs. Breeding pair numbers have not been that low in the area since 1995 (Figure 5). The population shows a 10-year declining trend of 6% (C. Lepage, CWS–Quebec Region, unpubl. data).

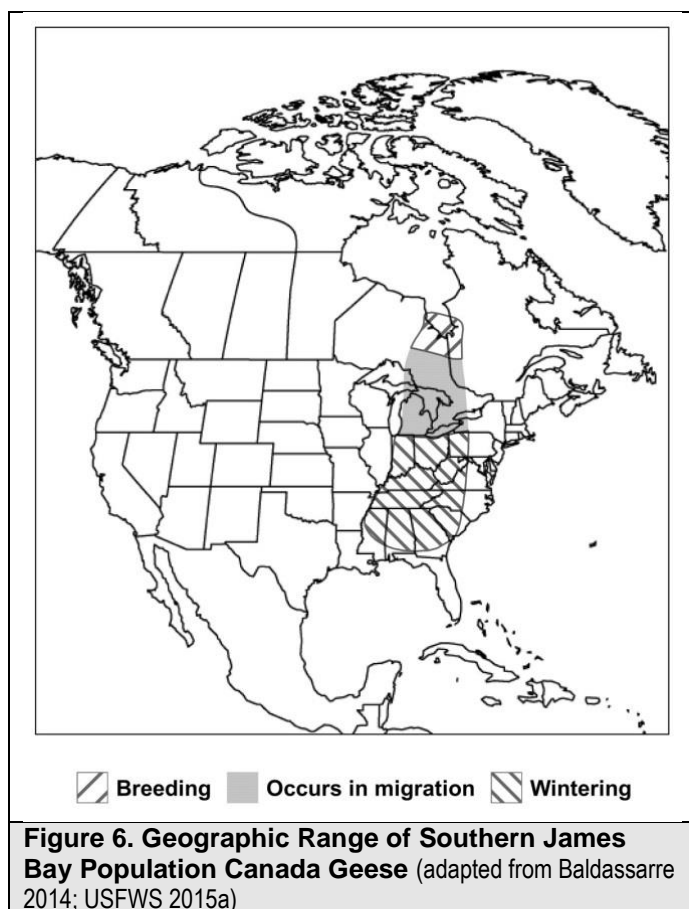


This once-heavily hunted population peaked at nearly 1 million birds during the 1970s, before experiencing a sharp decline during the late 1980s and early 1990s that prompted the establishment of breeding ground surveys in 1988 in northern Quebec. In 1993, the number of breeding pairs of Canada Geese 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 AP until 1999. In the following years, the population has recovered rapidly and, since 2002, has appeared to be stable in its core breeding range (Figure 4) and decreasing in its southern breeding range (Figure 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).

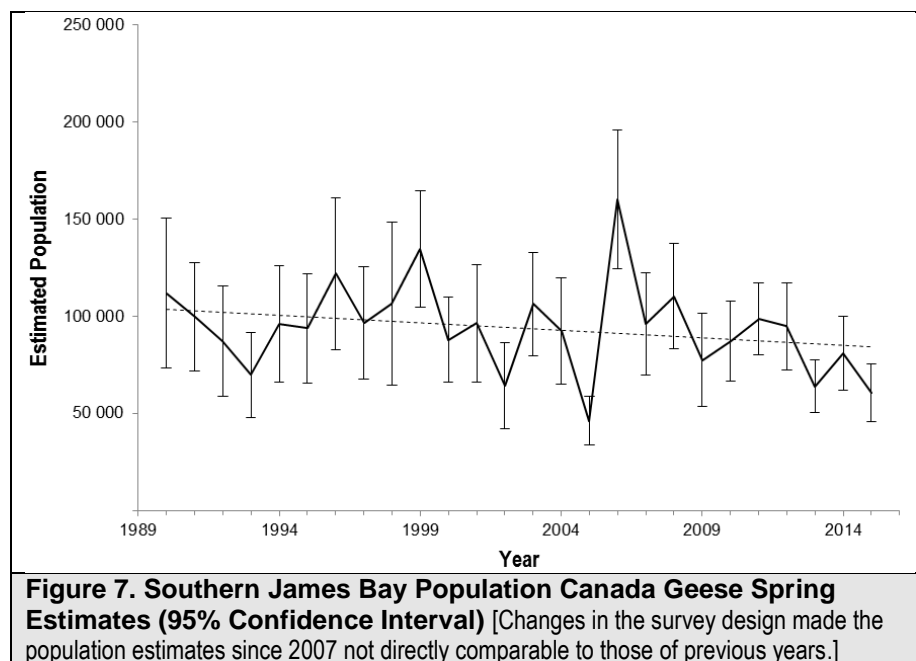
Monitoring of the SJBP includes spring population surveys, ground searches for nests, and banding, all of which contribute information for management of this population.



Abundance and Trends

The spring population (indicated breeding pairs X 2 + non-breeders) has been surveyed annually since 1990. The total spring population in 2015 was estimated at 60 684 geese. The SJB Canada Goose population shows a slight decreasing trend since the beginning of the survey in 1990 (Brook and Badzinski 2015a; Figure 7).

The 2015 estimate of 54 347 breeding birds for Akimiski Island and the mainland combined was lower than in 2014 and is slightly above the threshold level of 50 000 birds, below which changes to harvest regulations would be considered (Abraham et al. 2008). The reason for this diminution in 2015 is unknown (S. Badzinski, CWS–Ontario Region, pers. comm.).

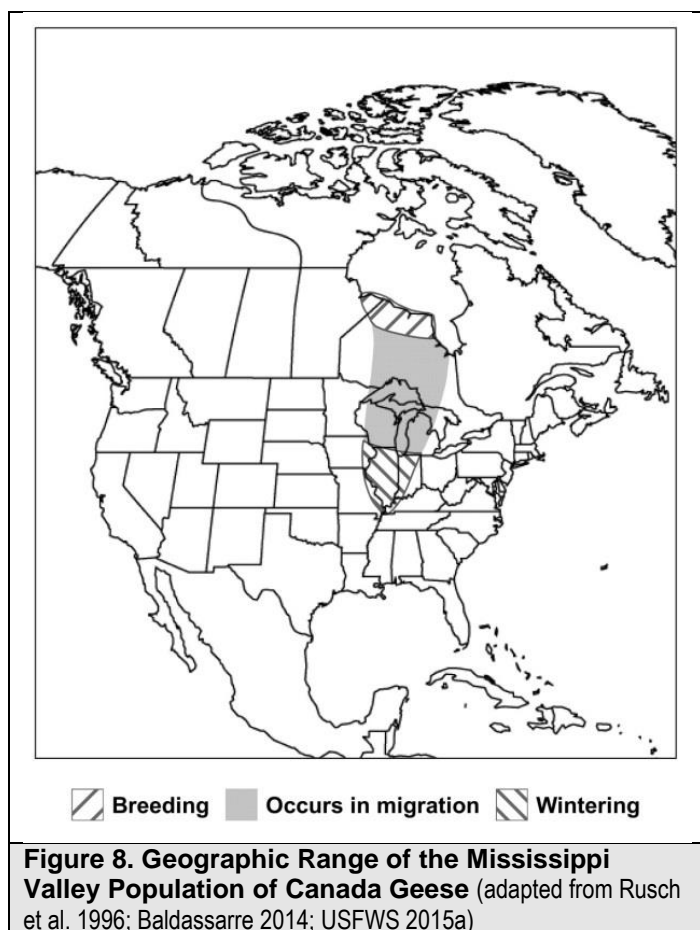


Monitoring of the SJBP also includes nesting studies and a banding program, both of which contribute essential information for management of this population. Nesting ecology studies began in 1993 and have been conducted on Akimiski Island since then (Bennett et al. 2013). The banding program in the SJBP 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.



Abundance and Trends

The spring population (indicated breeding pairs X 2 + non-breeders) has been surveyed annually since 1989. In 2015 the total spring population was estimated at 254 824 geese, lower than the 2014 estimate (Brook and Badzinski 2015b; Figure 9). The MVP shows a decreasing trend since the beginning of the survey in 1990 (Figure 9).

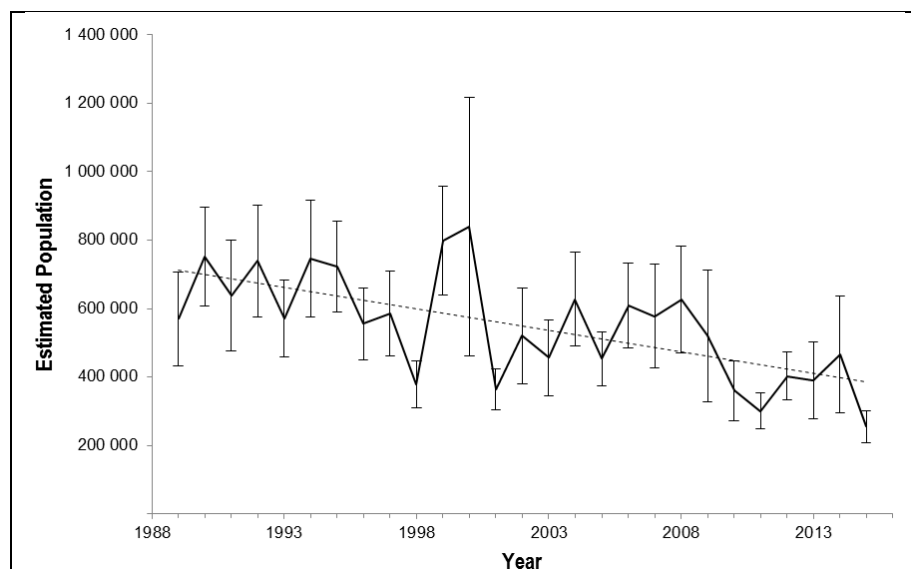


Figure 9. Mississippi Valley Population Canada Geese Spring Estimates (95% Confidence Interval)

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 95 000 birds between 2006 and 2015 (Figure 10); reasons for the recent increase are unclear.

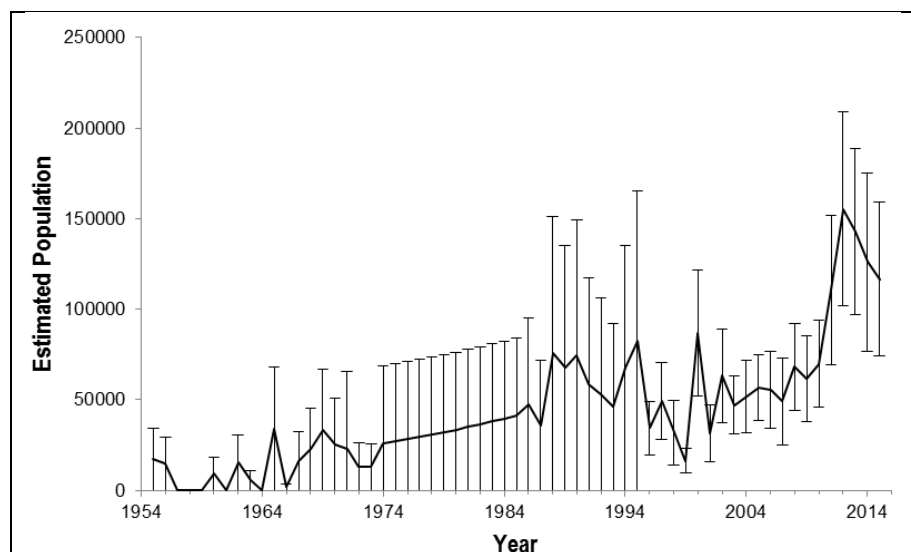


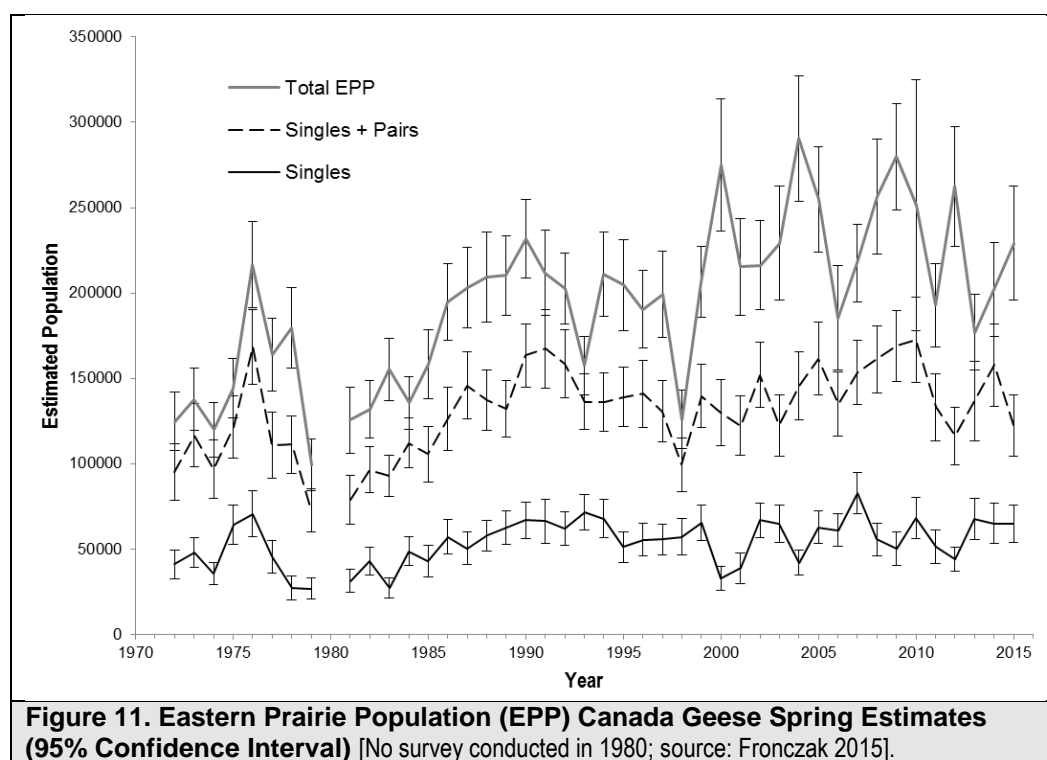
Figure 10. Numbers (± 1 SE) of Canada Geese in the Waterfowl Breeding Population and Habitat Survey Stratum 50, 1955–2015

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).

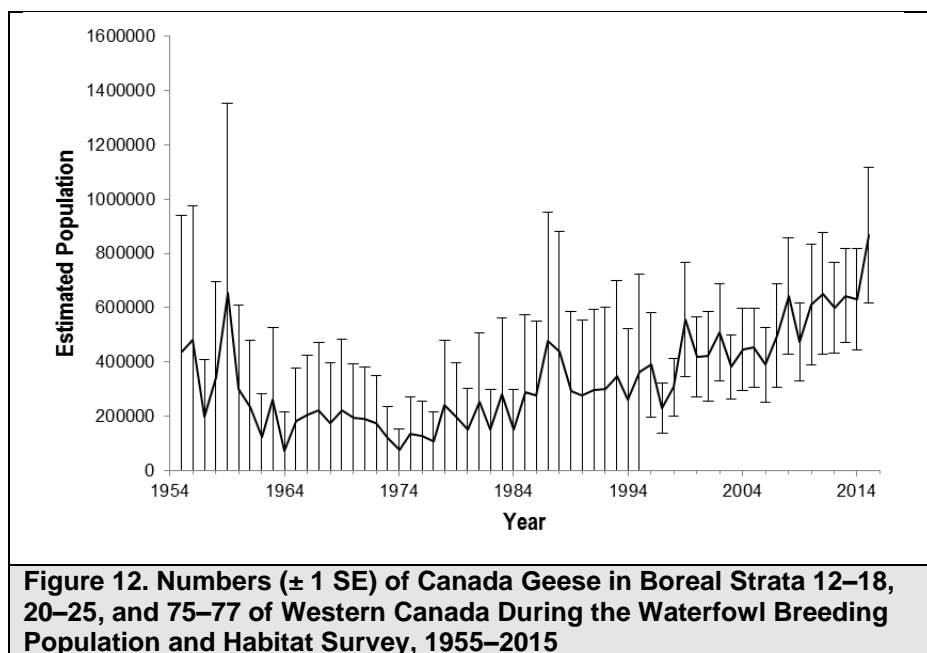
- EASTERN PRAIRIE POPULATION CANADA GOOSE

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 2015 survey estimate of single and paired EPP geese was 122 382, similar to last year's estimate. The 2015 total spring population was estimated at 185 600 birds, and was similar to the 2014 estimate (Figure 11, Fronczak 2015).



Boreal habitats in Alberta, Saskatchewan, Manitoba 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, Monitoring section). In the 1970s, the number of Canada Geese in all of these strata combined averaged about 156 000 birds per year. From 2006–2015, these strata averaged approximately 600 000 Canada Geese per year (Figure 12).



- 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).



Breeding Pacific Canada Geese are surveyed in the course of the Waterfowl Breeding Population and Habitat Survey. The Pacific Population index in 2015 was 256 800 geese, 59% higher than the prior year's count of 161 800 (USFWS 2015b).

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 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, and 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	Population Objectives
Maritime Provinces	6 200 ¹ pairs	3 000–6 000 pairs
Southern Quebec	11 300 pairs	2 000–3 000 pairs
Southern Ontario	83 000 ² pairs	40 000–80 000 pairs
Southern Prairie Provinces	970 000 birds	400 000–800 000 geese
Southern British Columbia	37 828 birds	10 000–15 000 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.		

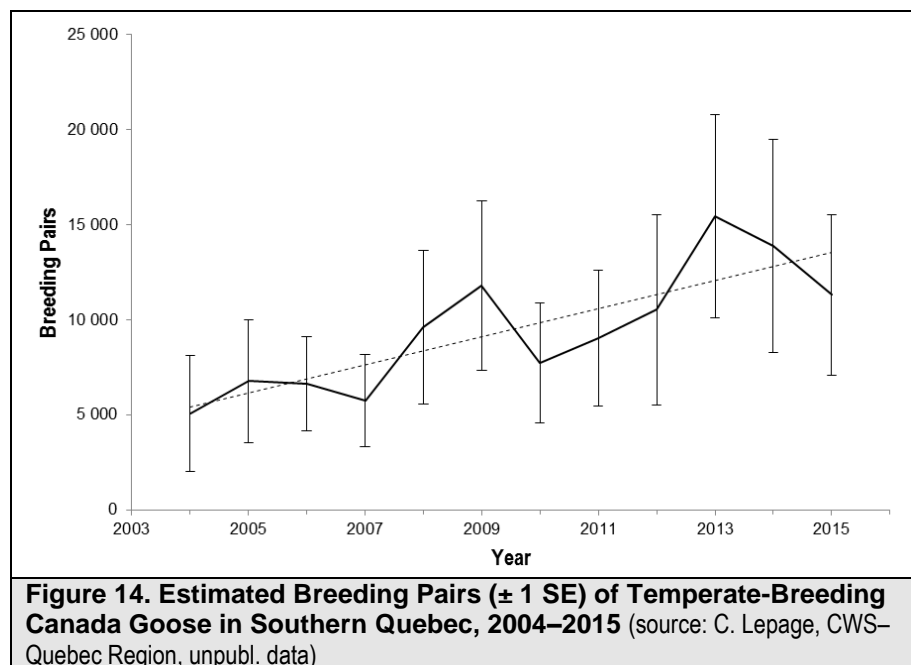
- MARITIME PROVINCES

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 6 200 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 3 000 Canada Geese have been banded in the Maritimes in the past 8 years.

- SOUTHERN QUEBEC

In 2015, the number of breeding pairs in southern Quebec (combination of northern 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 11 300 (C. Lepage, CWS–Quebec Region, unpubl. data). The species has expanded rapidly into southwestern Quebec since the early 2000s (Rodrigue 2013a), with an increasing trend of 8% annually since 2004 (Figure 14).



- 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 practices, increase in waterfront lawns, golf courses, stormwater ponds), combined with 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 85 000 breeding pairs (Figure 15). Increasing at a rate of 9.0% annually from 1971 to 2015, the population growth rate now appears to have stabilized, with an average annual increase of 1.0% since 2006. The 2015 breeding pair estimate was 91 463 breeding pairs (Figure 15).

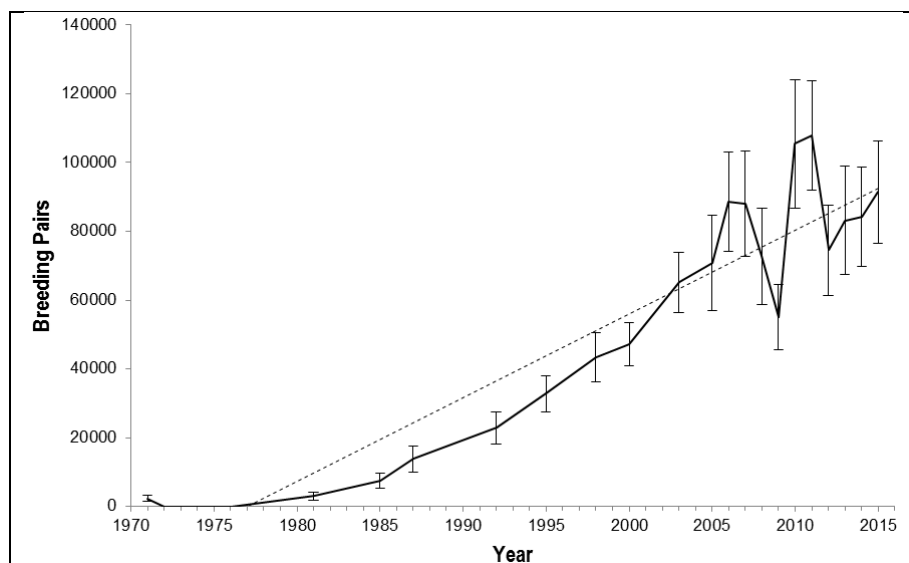


Figure 15. Estimated Breeding Pairs (± 1 SE) of Temperate-Breeding Canada Geese in Southern Ontario, 1971–2015 (source: S. Meyer, CWS–Ontario Region, unpubl. data)

- SOUTHERN PRAIRIE PROVINCES (PRAIRIE–PARKLAND CANADA GEESE)

Most Canada Geese that nest in prairie and 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).

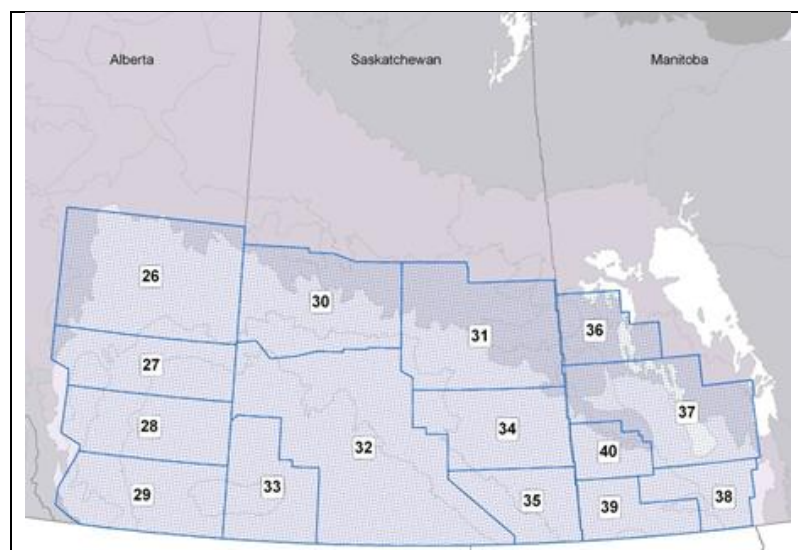
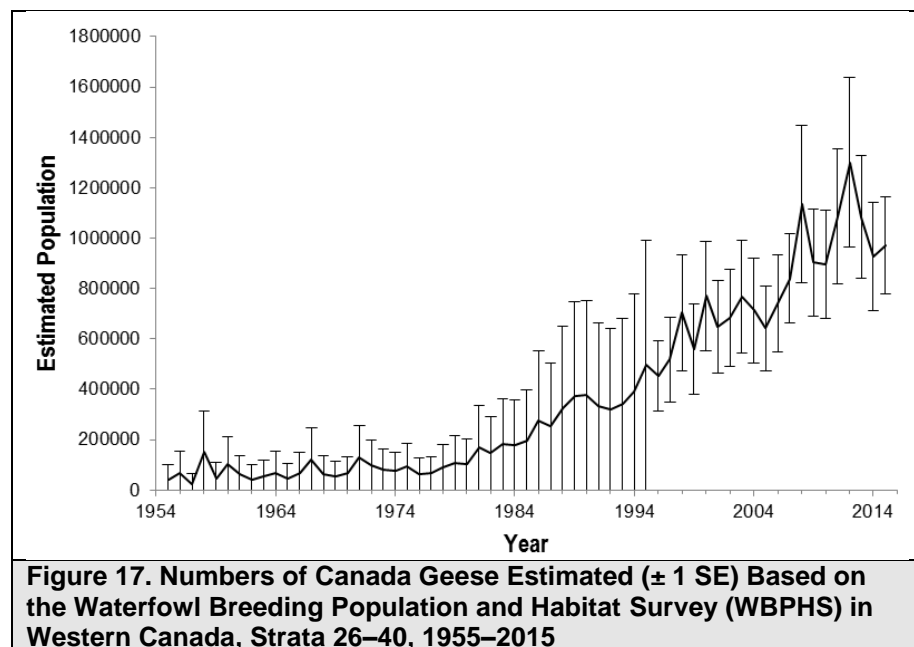


Figure 16. Strata 26–40 of the Waterfowl Breeding Population and Habitat Survey Cover the Prairie Ecozone (light grey area), Which Includes Both Prairie and Parkland Habitats in Alberta, Saskatchewan and Manitoba

Canada Geese in Prairie strata of western Canada averaged approximately 87 000 birds annually from 1970–1979 but grew to about 970 000 birds by 2015 (Figure 17).



- 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 Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. since 2006. The 2015 breeding population was estimated at 37 828 individuals in 2015, 9% more than in 2014 (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													U.S. ¹	Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	Total	Total
1974														949 249	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	1 042 411	1 400 588
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	1 051 936	1 369 141
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	1 167 580	1 500 635
1978	12 743	11 987	6 707	3 239	65 536	53 563	83 152	70 254	77 226	10 837		325	395 569	1 206 509	1 602 078
1979	13 494	10 827	5 830	2 141	50 816	64 036	95 291	80 354	80 252	13 337		289	416 667	995 336	1 412 003
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	1 166 301	1 616 548
1981	10 170	14 264	7 494	3 911	21 578	50 380	57 956	83 421	95 509	16 052		234	360 969	1 039 450	1 400 419
1982	11 186	13 296	5 378	2 817	25 897	69 234	74 265	86 257	94 170	13 696			396 196	1 093 911	1 490 107
1983	13 653	15 780	9 657	7 376	34 984	69 997	72 578	124 109	106 144	14 877		397	469 552	1 243 425	1 712 977
1984	13 995	13 962	6 508	3 048	22 379	63 612	88 937	94 123	97 422	15 835		270	420 091	1 154 514	1 574 605
1985	9 886	17 226	6 911	3 958	28 004	76 399	106 352	87 182	101 925	14 559		96	452 498	1 187 431	1 639 929
1986	16 829	21 970	8 785	5 677	38 877	85 310	92 206	81 626	87 528	14 836		190	453 834	1 110 912	1 564 746
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	1 039 969	1 546 702
1988	9 380	24 906	9 671	3 374	19 922	76 755	56 679	79 879	99 787	15 146		174	395 673	1 119 116	1 514 789
1989	8 845	23 144	15 666	6 617	55 285	101 618	78 471	84 848	119 082	16 427	367		510 003	1 321 128	1 831 131
1990	6 521	25 207	6 580	7 273	52 350	97 514	73 822	95 962	121 504	14 831	96		501 564	1 280 150	1 781 714
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	1 301 151	1 773 058
1992	6 436	11 640	4 290	5 350	27 182	79 880	57 464	81 009	91 103	15 961		154	380 469	1 152 108	1 532 577
1993	9 759	19 168	13 294	6 916	40 593	83 889	73 498	79 823	93 614	13 509		94	434 157	1 428 646	1 862 803
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	1 592 634	2 006 833
1995	9 527	16 967	8 306	5 467	9 560	88 140	49 639	82 155	114 818	11 297		128	396 004	1 638 218	2 034 222
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	1 912 588	2 412 276
1997	5 165	16 769	7 542	6 105	11 748	89 680	107 304	104 934	125 629	14 602			489 478	1 918 433	2 407 911
1998	9 746	23 781	10 802	6 225	16 882	109 731	94 033	136 736	104 831	18 586			531 353	2 014 378	2 545 731
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	1 883 870	2 449 087
2000	8 223	25 932	13 507	8 418	38 941	125 308	74 632	167 929	132 609	16 544			612 043	2 245 887	2 857 930
2001	5 553	25 136	10 554	5 615	67 763	148 705	102 034	146 829	111 751	13 076			637 016	2 452 847	3 089 863
2002	6 744	22 126	10 831	4 962	87 177	160 474	108 306	125 588	108 758	10 459		239	645 664	2 480 441	3 126 105
2003	5 004	20 983	4 915	11 245	112 807	160 197	90 183	135 123	116 844	14 353			671 654	2 855 575	3 527 229
2004	4 481	15 028	5 996	6 100	75 316	148 893	92 512	135 759	134 551	8 165			626 801	2 443 344	3 070 145
2005	5 516	16 109	5 240	6 908	104 530	155 746	118 570	139 194	148 589	11 640			712 042	2 655 730	3 367 772
2006	4 364	11 245	4 769	6 940	79 569	174 538	105 039	157 414	124 785	9 348			678 011	2 645 665	3 323 676
2007	5 848	13 586	7 544	9 098	100 811	179 459	97 069	169 206	110 830	9 892		514	703 857	2 676 194	3 380 051
2008	6 871	16 468	10 040	9 916	114 167	194 293	91 804	155 728	125 624	10 642			735 553	2 844 840	3 580 393
2009	4 025	11 926	9 056	9 638	126 678	190 433	99 955	140 922	102 591	15 873		116	711 213	2 705 672	3 416 885
2010	4 336	15 618	12 651	10 641	122 436	170 886	88 963	150 150	104 970	10 511			691 162	2 535 270	3 226 432
2011	4 118	14 970	7 719	11 475	119 596	199 396	86 956	173 045	98 639	14 402			730 316	2 185 054	2 915 370
2012	6 499	16 605	8 732	10 196	125 578	179 138	101 055	178 544	98 183	16 356			740 886	2 510 574	3 251 460
2013	7 201	14 370	12 616	12 153	136 417	199 784	109 547	141 655	80 546	11 639		154	726 082	2 657 761	3 383 843
2014	3 659	14 766	8 416	12 793	135 896	222 530	82 894	161 815	100 409	14 370			757 548	2 485 076	3 242 624

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and R.V. Raftovich et al. 2015 (USFWS: U.S.).

Management and Conservation Concerns

Sub-arctic breeding populations

Populations of subarctic-nesting geese are relatively stable, with the exception of the Southern James Bay and the Mississippi Valley populations of Canada Geese. Numbers of Canada Geese nesting on Akimiski Island in James Bay have declined from approximately 75 000 birds in 1985 to approximately 12 000 birds in 2013 (Leafloor et al. 1996; Brook and Hughes 2014). The specific causes of the decline are uncertain, but could be 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). Similarly, numbers of the Mississippi Valley Population of Canada Geese have declined since the beginning of the survey in 1989 and the specific causes of the decline are uncertain. Canada Goose populations will continue to be monitored closely. Although the decline in the Mississippi Valley Population is concerning, the current management plan states that management action should not be considered until it is clear that the breeding population stays consistently below the threshold level for three consecutive years and that other population dynamic metrics, such as productivity, survival, and harvest rate, concur with the decline (S. Badzinski, CWS–Ontario Region, pers. comm.).

Temperate-breeding populations

Human-geese 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 Environment and Climate Change Canada's website: www.ec.gc.ca/mbc-com/

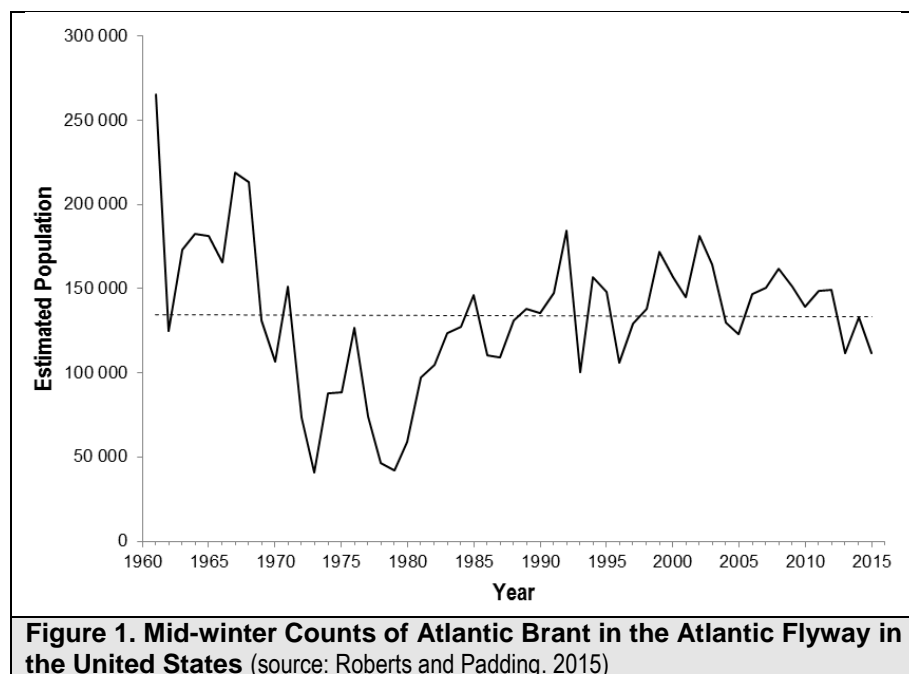
Brant (*Branta bernicla*)

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.

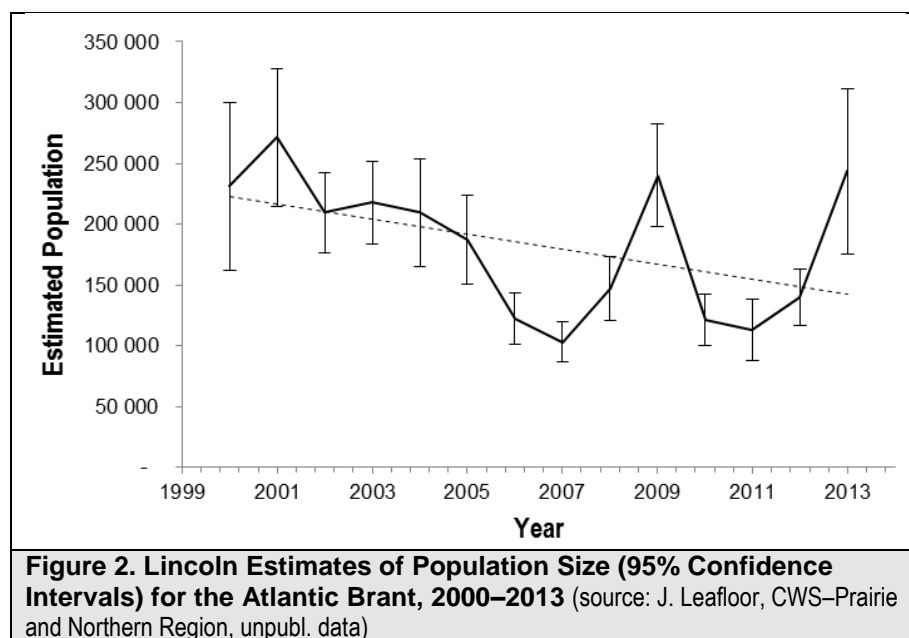
Abundance and Trends

- 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).



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 that has 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 has varied annually, and it averaged approximately 163 000 birds from 2004–2013 (Figure 2).

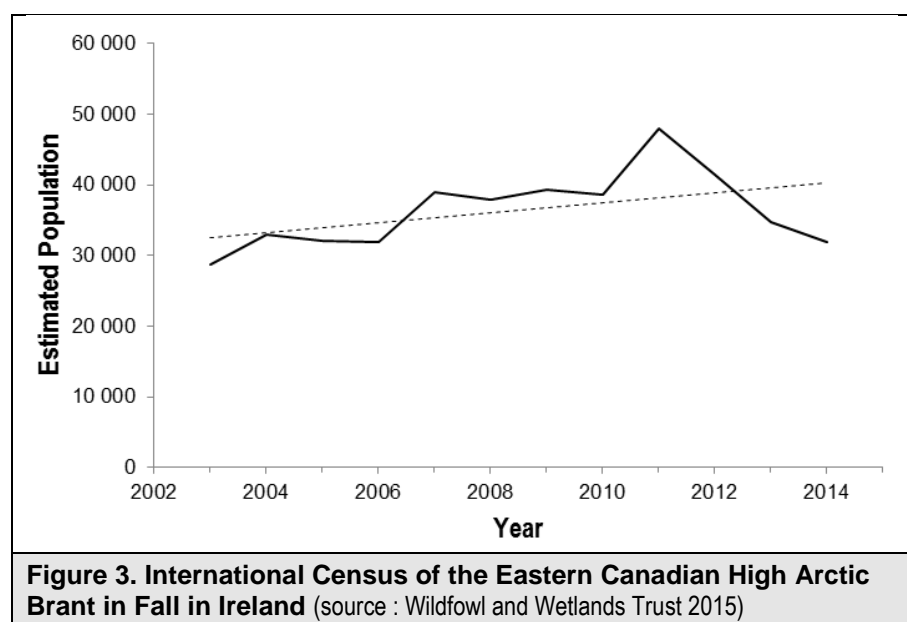


- *EASTERN HIGH ARCTIC BRANT* (*B. b. hrota*)

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 2014 International Census estimated a population of 31 985 geese, a decrease from the 2013 count of 34 985 birds (Figure 3; Wildfowl and Wetlands Trust 2015).

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. In 2014, the number of young accounted for 4.1% of the fall population, an important increase compared to 2013 which represented the lowest percentage ever recorded (Wildfowl and Wetlands Trust 2015). Following the peak count in 2011 (48 002 birds), two consecutive years with very low breeding success (< 2%) have led to a halt in the growth of the population (Wildfowl and Wetlands Trust 2015).



- 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 125 776 birds in 2015, lower than the 2014 estimate of 155 830 birds (Figure 4; Olson 2015). 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 3 000 and 7 000 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 1 000 and 10 000 Black Brant spent the winter in British Columbia. Recent estimates of the wintering population in B.C. indicate that approximately 2 500 individuals are found in three major wintering locations: the Fraser River Delta (more than 2 000 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 1 636 brant during the 2014–2015 winter, a 26% decrease from the 2 204 birds observed in the 2013–2014 winter (A. Breault, CWS–Pacific and Yukon Region, pers. comm.). However, these are 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 Port Susan in Washington State, there were 10 706 brant estimated in 2015, a number 38% lower than the 2014 estimate (17 485 birds; Olson 2015). This estimate also includes an unknown number of Black Brant.

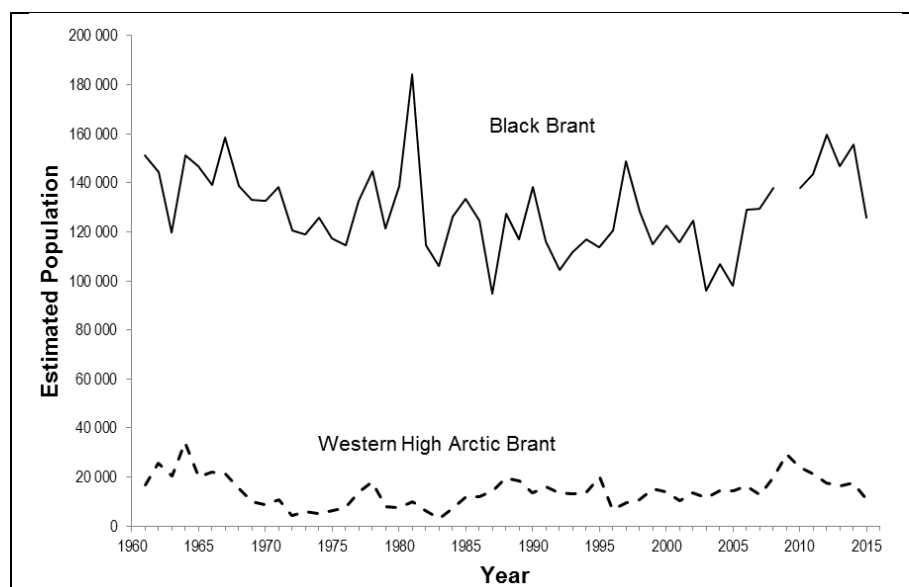


Figure 4. Mid-winter Inventory of Black and Western High Arctic Brant (Note: Beginning in 1986, Black Brant numbers include counts along the Alaska coast. No survey was conducted in 2009; source: Olson 2015.)

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.

Table 1. Harvest Estimates for the Atlantic Brant in Canada and the United States (source: Gendron and Smith 2014 and Raftovich et al. 2015)		
Year	Canada	U.S. 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
2014	No data	7 280

- 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 2015, the local harvest has ranged from 68 to 250 birds.

- EASTERN HIGH ARCTIC BRANT

For Eastern High Arctic Brant, there is a small subsistence harvest in Canada (<100 birds annually) and subsistence hunting also occurs in Greenland. No hunting of Eastern High Arctic Brant is permitted on its wintering grounds.

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.).

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. The Mute Swan (*Cygnus olor*) is also found in both the U.S. and Canada, but it is an introduced species originating from Eurasia. As the Tundra Swan's common name implies, the species breeds on lakes, ponds and wetlands associated primarily with coastal river deltas within tundra habitat, this throughout Arctic and Subarctic regions of Canada and Alaska (Limpert and Earnst 1994). Recent data have extended the known breeding range of this species as far north as the island of Igloolik, northwest Foxe Basin, Nunavut (Lecompte and Giroux, 2015). The Tundra Swan is managed as two populations—the Eastern and Western Populations—primarily based on affiliations of the species with each of its traditional major wintering areas, which occur along the Atlantic and Pacific coasts. The mid-winter survey is used as the primary means of tracking annual abundances and trends of each Tundra Swan population.

Birds of the Eastern Population typically breed in areas extending from the Seward Peninsula of Alaska to the northeast shore of Hudson Bay and Baffin Island. They 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 in southern Ontario (Ad Hoc Eastern Population Tundra Swan Committee 2007). Birds 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 in southern British Columbia (Pacific Flyway Council 2001).

Abundance and Trends

- EASTERN POPULATION

During the 2015 mid-winter survey, 117 100 swans were observed in Ontario and the Atlantic and Mississippi flyway states, an estimate 12% higher than that of 105 000 birds counted in 2014 (USFWS 2015b). 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).

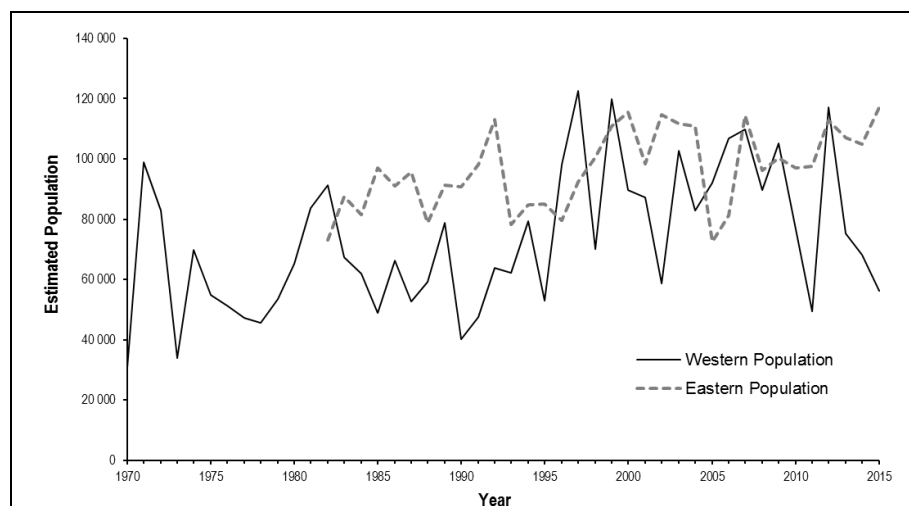


Figure 1. Number of Tundra Swans Counted During the United States' Mid-Winter Survey (In 2010 and 2011, several important wintering areas in California were not covered during the mid-winter survey; source: USFWS 2015b.)

- WESTERN POPULATION

Since the 1970s, when surveys for this species began, annual counts of the Western Population have fluctuated significantly (Figure 1). During the 2015 mid-winter survey, 56 300 Western Population Tundra Swans were counted on the wintering grounds (U.S. and northwest Pacific), 10% lower than the previous year's estimate of 68 200 birds (Figure 1). The mid-winter survey estimates suggest a stable trend since the beginning of the survey (USFWS 2015b). The Western Population of the Tundra Swan is above its population objective of 60 000 birds (NAWMP 2012).

Harvest

The 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, as well as on wintering grounds in some U.S. states of the Atlantic Flyway.

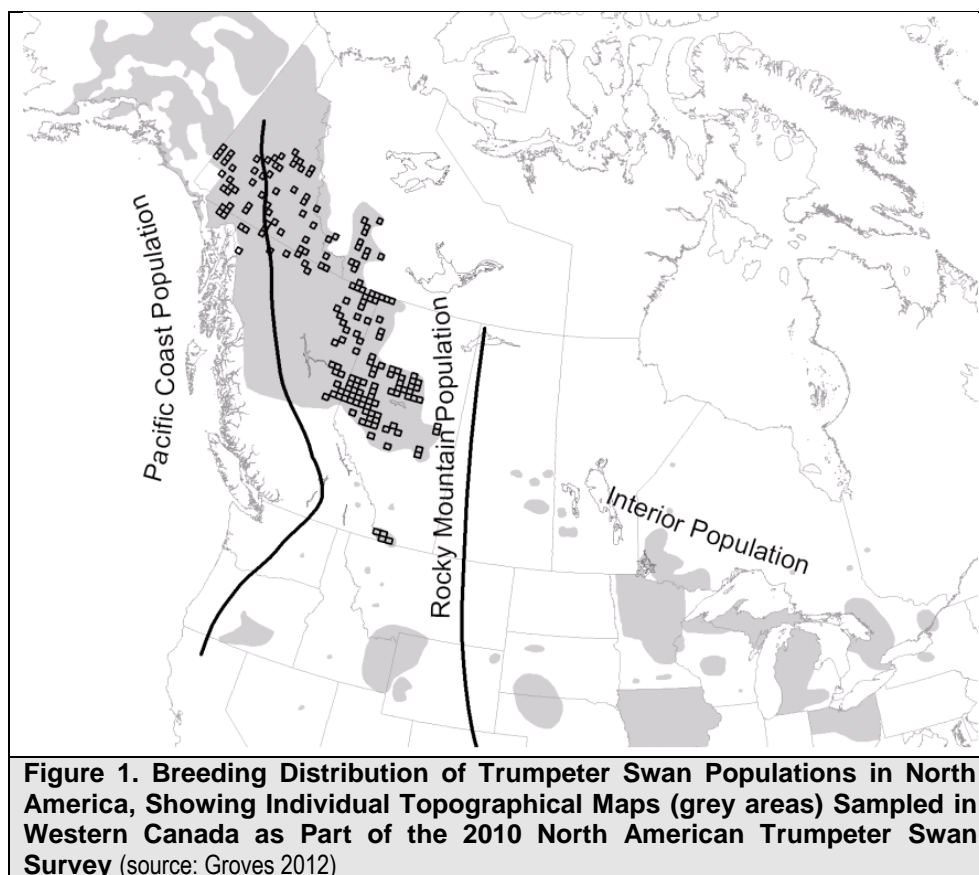
Management and Conservation Concerns

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 establish goals for collecting more information, such as improving the mid-winter survey to obtain better counts, 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.

Trumpeter Swan (*Cygnus buccinator*)

The Trumpeter Swan is North America's largest waterfowl species, found only in North America. Once a widespread and abundant species in North America—found from Alaska to California, and British Columbia to Newfoundland (Mitchell and Eichholz 2010)—increasing hunting pressure and habitat loss in the early 1900s drastically reduced the Trumpeter Swan population to only a few individuals. However, through significant conservation efforts to protect nesting habitat and with reintroduction and translocation programs, Trumpeter Swan populations across North America have increased in size and continue to do so.

There are three Trumpeter Swan populations in North America: the Pacific Coast Population, the Rocky Mountain Population, and the Interior Population (Figure 1). All three populations are increasing in size (Groves 2012). The Pacific Coast Population breeds mainly in Alaska, but also in Yukon and in 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 in 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: 2 000 birds; NAWMP 2012). Consequently, most swan-release programs, which were aimed at restoring the species' population after it reached very low numbers in the 1930s, have now been discontinued (Groves 2012).

The abundance and distribution of Trumpeter Swan populations are assessed at five-year intervals with 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 species' North American breeding range (Figure 1). The first survey, which was conducted in 1968, estimated the continental population at 3 722 Trumpeter Swans. The most recent survey was completed in the fall of 2015, but data were not yet available at the time of the publication of this report. The last complete survey done in 2010 estimated the continental population at 46 225 birds, an increase of 33% compared to the previous survey. 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 America Based on the Five-year North American Trumpeter Swan Survey (Data from the 2015 survey available for Canada only; source: Groves 2012; A. Breault, CWS–Pacific and Yukon Region Region, unpubl. data. 2015.)

Population	2005	2010	2015	% Change (2005–2010)	Annual Growth Rate (2010–2015)
<i>Pacific Coast Population</i>					
Alaska	23 692	25 347		7%	
Yukon and Northwestern British Columbia	1 236	1 443	2 979	17%	106%
Total	24 928	26 790		7%	
<i>Rocky Mountain Population</i>					
Canada	4 718	8 950	16 143	90%	80%
Montana, Wyoming and Idaho	453	487		8%	
Other U.S. areas	57	189		232%	
Total	5 228	9 626		84%	
<i>Interior Population</i>					
High Plain (U.S.)	471	573		22%	
Mississippi and Atlantic Flyways	4 176	9 236		121%	
Total	4 647	9 809		111%	
North American Total	34 803	46 225		33%	

- PACIFIC COAST AND ROCKY MOUNTAIN POPULATIONS

During early 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 2015 estimate for the Canadian portion of the Rocky Mountain Population was 16 143, an 80% increase compared to the 8 950 estimate for 2010 (Table 1). The 2015 estimate for the Canadian portion of the Pacific Coast Population was 2 979, a 106% increase compared to the 1 443 estimate for 2010. All Canadian areas of the Rocky Mountain Population exhibited growth since the 2010 survey.

Changes to the survey methodology in 2010, range extension and the random selection of areas that were not covered by the 2010 survey, are thought to explain part of the increase in the size of both the Rocky Mountain and Pacific Coast populations of Trumpeter Swans in Canada. Previous surveys in these areas likely underestimated their true abundance.

During the winter period, more than 40% of the Pacific Coast Trumpeter Swan Population is present on the coastline, and in 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, but the centre of abundance has since moved to the northern portion of Puget Sound in Washington State. Aerial surveys were conducted every three years in southwestern B.C. between 1970 and 2006, but they have since been discontinued. During the most recent survey, which was conducted in January

and February of 2006, 7 570 swans were counted, which represented an 11.7% increase from the 6 775 swans observed in 2000–2001.

- INTERIOR POPULATION

The only formal survey conducted in Canada of the Interior Population of Trumpeter Swans was in 2010, in Riding Mountain National Park, 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 both Canada and the United States.

Management and Conservation Concerns

The main management concerns for the Pacific Population of Trumpeter Swans are 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 lost approximately 2 500 individuals to lead poisoning and power line strikes since 1999 (L.K. Wilson, CWS–Pacific and Yukon Region, pers. comm. 2015). 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 (2006–2009): 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.K. Wilson, CWS–Pacific and Yukon Region, pers. comm. 2014]. 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. 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. From November 2014 to March 2015, 201 swan mortalities were documented in the study area, but the winter population continued to grow at an estimated rate of 5% (S. Boyd, EC–Pacific and Yukon Region, pers. comm. 2014).

In Ontario, a swan re-introduction program, initiated in 1982, had achieved its goal of at least 500 free-living swans by 2005 (H. Lumsden, Ontario Ministry of Natural Resources, unpubl. data). The captive-breeding and release program ended in 2006. Surveys conducted in 2015 as part of the continental five-year survey showed a total minimum population of 2 000 swans in Ontario (Badzinski and Earsom 2015, unpubl. report). The southern and eastern Ontario flocks have continued to grow, and in 2015, 924 swans were counted during winter aerial and ground-based surveys. Breeding Trumpeter Swans also occur in northwestern Ontario, where in late summer of 2015, data from aerial surveys, combined with anecdotal observations, yielded a total count of 1 076 birds in the areas west and north of Thunder Bay, an increase compared to the 274 birds counted in 2010.

Population Status of Other Hunted Species

Murres

There are only two species of murres, the Common Murre (*Uria aalge*) and the Thick-billed Murre (*Uria lomvia*), and both are found in North America. These seabirds occur in the 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, where they build their nest directly on cliff ledges. Common Murres breed primarily in Boreal and Low Arctic waters, whereas most Thick-billed Murres breed farther north in Low and High Arctic waters. Both species move south in the winter to stay free of frozen 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 murres harvested in Canada breed in the Arctic regions of Canada, 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 more abundant on the Atlantic Coast than the Pacific Coast. Small numbers of Common Murres breed in B.C., and a small number of Thick-billed Murres breed in the western Arctic. With the exception of a few colonies of Common Murres, long-term monitoring programs indicate that the population numbers for 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). Colony size estimates using new methodologies (i.e., digital photography and geographic information systems) show that the size of some large colonies was previously underestimated (A. Gaston, unpubl. data; S. Wilhelm, unpubl. data).

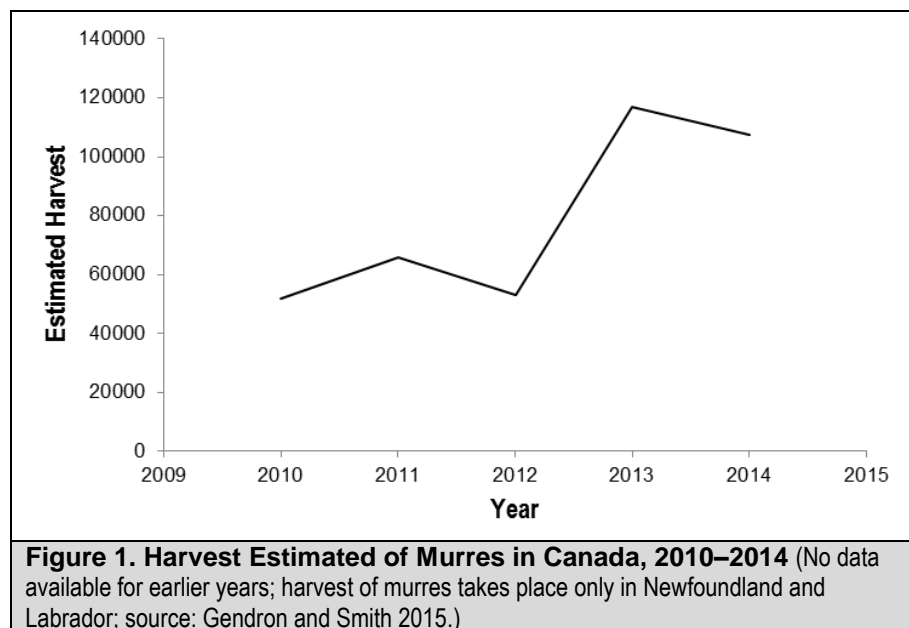
Harvest

Thick-billed Murres, as well as a very small number of Common Murres, are hunted as they migrate, and Aboriginal peoples in Canada also harvest an estimated few thousand birds near the breeding colonies each year.

Thick-billed Murres have traditionally been hunted in the winter in coastal areas of Newfoundland and Labrador. Murres are not considered migratory game birds, but 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 both species in Newfoundland and Labrador (Chardine et al. 2008).

Throughout the 1970s to the mid-1990s, the outcomes of large unregulated harvests warranted improved hunter education, regulatory changes, as well as increased enforcement (Elliot 1991). These efforts, along with harvest restrictions implemented in the mid-1990s, 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 2014 was approximately 107 000 birds (Figure 1; Gendron and Smith 2015). However, concerns have been expressed regarding the accuracy of the existing harvest estimates. Work is being conducted to refine these estimates and to improve the assessment of harvest levels. A 2009 Hunter Opinion Survey conducted by the CWS in Newfoundland and Labrador suggested that the murre harvest was approximately 62 000 murres per year in 2009, which is within the limit of sustainable harvest for these species.



Management and Conservation Concerns

Population 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 peoples for generations. The hunt is managed through the *Migratory Birds 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 of murres that could be legally killed, and daily takes could exceed 500 birds per hunting crew (2 to 3 hunters). Between 600 000 and 900 000 birds were shot annually during the 1970s and 1980s, but current harvest is much less than that.

American Woodcock (*Scolopax minor*)

The American Woodcock (hereafter “Woodcock”) is a popular migratory game bird in Canada, and much more so in the U.S. The species has experienced a long-term decline at least since the mid-20th century, with the main cause of this decline likely the loss of early successional habitat. Results from the Singing-ground Survey suggest a moderate decrease in population size relative to the early 1970s (Cooper and Rau 2015).

In Canada, the Woodcock breeds from southeastern Manitoba across south and south-central Ontario, southern Quebec, the Maritimes and southern Newfoundland. The species also breeds 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 2015). 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 2015). The survey covers the central and northern portions of the Woodcock breeding range and includes areas mostly in the eastern U.S., but areas in Canada north of the Great Lakes and the St. Lawrence valley are included in the survey as well (Cooper and Rau, 2015). Analyses of band recoveries indicate that there are two relatively discrete populations with little crossover between them (Krohn et al. 1974), which conforms to the boundary between the Atlantic and Mississippi Flyways. As a result, Woodcock are managed based on two regions: the Eastern Region and the Central Region, as recommended by Owen et al. (1971). 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.

The Singing-ground Survey data for 2015 indicate a significant declining 10-year trend (2005–2015) of -1.6% for Woodcock in the Eastern Management Region for the second year in a row, but the trend for the Central Management Region was not significant after showing a decline for the previous year (Cooper and Rau 2015). Both management regions continue to show a significant, long-term (1968–2015) declining trend (-1.1% per year for the Eastern Management Region and -0.7% per year for the Central Management Region; Figure 1) [Cooper and Rau 2015].

In Canada, the number of Woodcock estimated from the surveys over the long-term period (1968–2015) showed significant declines for Ontario and the Maritime provinces, but not Quebec or Manitoba: Ontario, -0.95%/year; New Brunswick, -1.0%/year; Nova Scotia, -1.0%/year; Prince Edward Island, -1.1%/year.

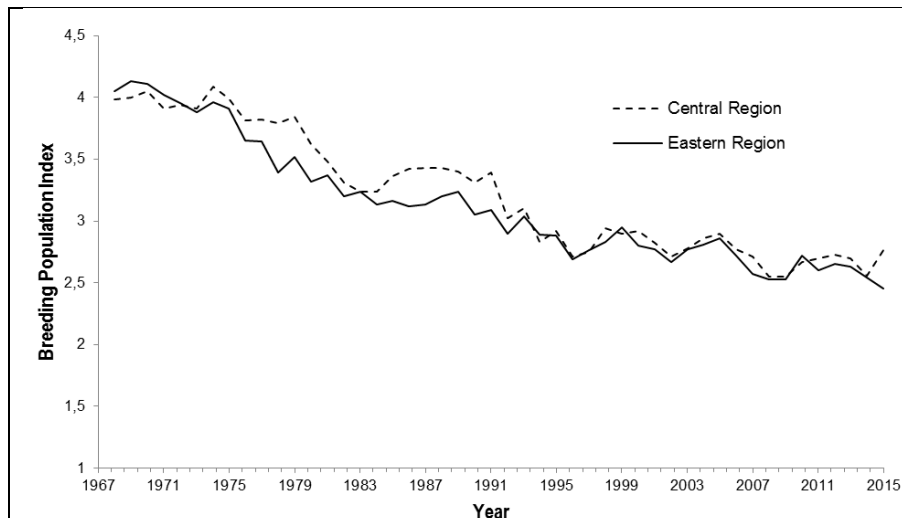


Figure 1. American Woodcock Breeding Population Indices (Singing-ground Survey; source: Cooper and Rau 2015)

An indirect measurement of recruitment or annual productivity of Woodcock is derived from age ratios (number of immature birds per adult female) of wings collected from the U.S. national harvest (Wing-collection Survey). Data for 2015 indicate an index in the Eastern Management Region (U.S. portion of survey only) of 1.49, which represents a 6.9%/year decrease from 2013 and a 8.9%/year decrease from the long-term (1963–2013) regional index. In the Central Management Region (U.S. only), the recruitment index was 1.39, representing a 9.6%/year decrease from 2013 and a 10.6%/year decrease from the long-term regional index. The 2014 recruitment index in Canada (i.e., Ontario, Quebec, Nova Scotia and New Brunswick) was 1.89, which is comparable to the 5-year average (2009–2013) of 1.70 (Gendron and Smith 2015).

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, has been much more pronounced in the U.S. (Figure 2). In 2014, there were 25 682 Woodcock harvested in Canada, a number only 0.1% below the 10-year (2004–2013) average of 25 709 birds per year. 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 2 000–4 000 annually in the past ten years. In the U.S., the 2014 harvest was estimated at 200 100 Woodcock, a decrease of 18% from the 2013 harvest of 243 100 birds, and a value 30% below the 10-year average (2004–2013).

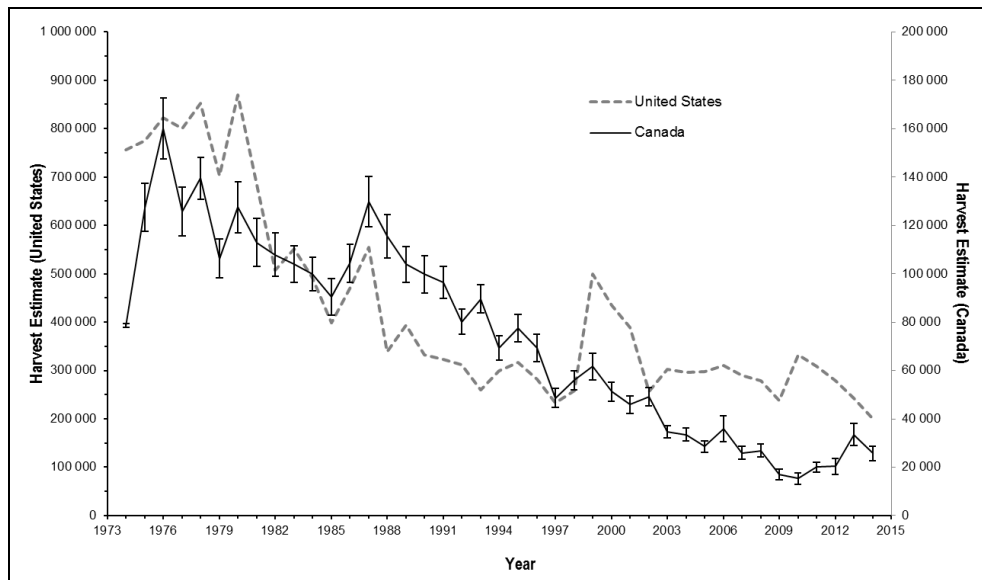


Figure 2. American Woodcock Harvest Estimates in Canada and the United States (sources: M. Gendron and A. Smith 2015 [CWS, Canadian data], and Cooper and Rau 2015 [USFWS, U.S. data])

Management and Conservation Concerns

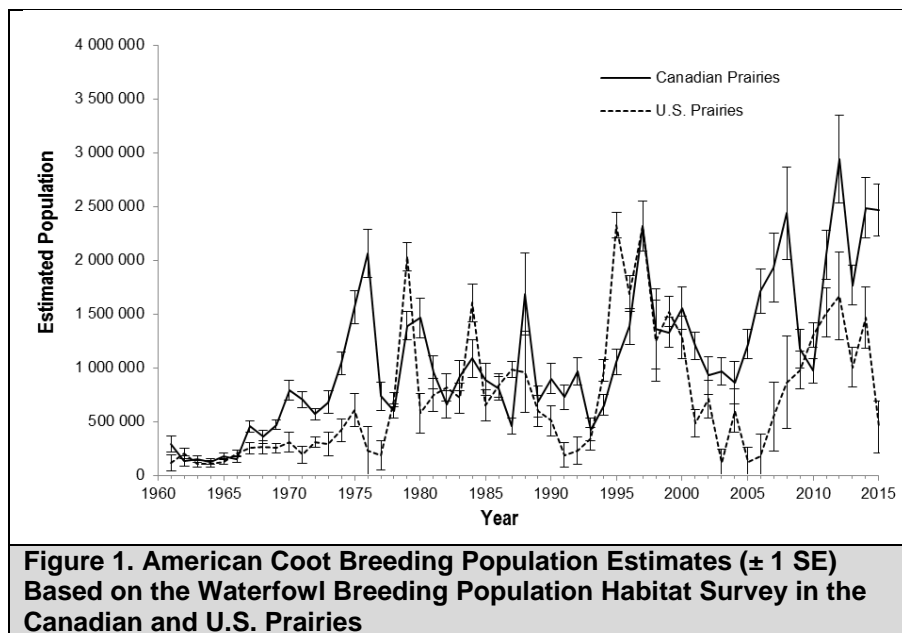
Woodcock populations have been experiencing a long-term decline since the 1960s. Causes of this decline are thought to result in large part from the degradation and loss of early successional habitat on both breeding and wintering grounds (Kelley et al. 2008), through fire suppression, urban development, and increased forest succession following land abandonment. Woodcock prefer young or recently disturbed forest; abandoned farmland mixed with forest is ideal. The species also makes use of open habitat types (fields, pasture, regenerated clear-cuts) during its life cycle, especially at night. The maturation of forests, the suppression of fire, agricultural intensification, and urbanization may all have contributed to the decreases observed in American Woodcock populations.

American Coot (*Fulica americana*)

The American Coot is a common bird of North America, and in Canada it breeds from British Columbia to Ontario, with the highest densities found in the Prairie provinces. The species is often mistaken for a duck and is often found in rafts of mixed waterfowl, but it belongs to a distinct order (Gruiformes). The species winters in the southeastern U.S., Mexico and Central America, as far south as Panama. American Coots were more abundant in Canada prior to a population decline in the early 20th century, which is thought to have been linked to wetland loss and overhunting (Brisbin and Mowbray 2002). The population is now increasing or has stabilized.

Abundance and Trends

Information on the population status of the American Coot at a continental level comes from the Breeding Bird Survey (Environment Canada 2014a). In Canada, the species' abundance is showing a large increase (Environment Canada 2014b), but the BBS is poorly designed for monitoring population trends of marsh birds. American Coots are also surveyed during the Waterfowl Breeding Population and Habitat Survey (WBPHS) in the Canadian Prairies. Results of this survey 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 estimate (2.5 million birds) was 46% above the 10-year average of 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 Sanders 2010).



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 3 000 birds per year for the 10-year period between 2004 and 2013 (Table 1). In the U.S., harvest has varied considerably through the years, with an average of approximately 290 000 birds taken annually in the last decade.

Table 1. Harvest Estimates of American Coots in Canada and the United States

	Canada									U.S. ¹	Continental
	Atl.	QC	ON	MB	SK	AB	BC	NT/NU	YT	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
2000	669	2 493	296	180	315	181				4 134	104 509
2001	666	366	149	579	119	767				2 646	284 440
2002	407	343	748	213	60	229				2 000	205 372
2003	517	283	789	420	362	66		125		2 562	193 976
2004	844	248	413	163	865	71				2 604	181 262
2005	1 141	953	1 156	491	551	115				4 407	273 781
2006	103	258	210	1 334	327	75				2 307	199 079
2007	429	502	982	537	1 168	127				3 745	201 324
2008	1 051	508	489	495	153	58				2 754	275 869
2009	222	443	285	1 103	376	37				2 466	219 032
2010	24	86	38	414	315	20				897	593 394
2011	609	296	55	582	486	15				2 043	416 628
2012	444	188	127	25	1 255	229				2 268	163 700
2013	379	213	445	596	520	31				2 184	254 900
2014	353	80	977	568	326	52				2 356	294 100

¹Includes data from the Atlantic, Mississippi, Central and Pacific (including Alaska) Flyways.²The USFWS implemented an improved national harvest survey in 1999. Results for years prior to 1999 are not directly comparable to those after 1999.

Data source: M. H. Gendron and A. Smith 2015 (CWS: Canada), and S.M. Olson 2015 (USFWS: U.S.).

Management and Conservation Concerns

While the loss of wetland habitat has contributed to the historical decline of the American Coot population, 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).

Common Gallinule (*Gallinula galeata*)

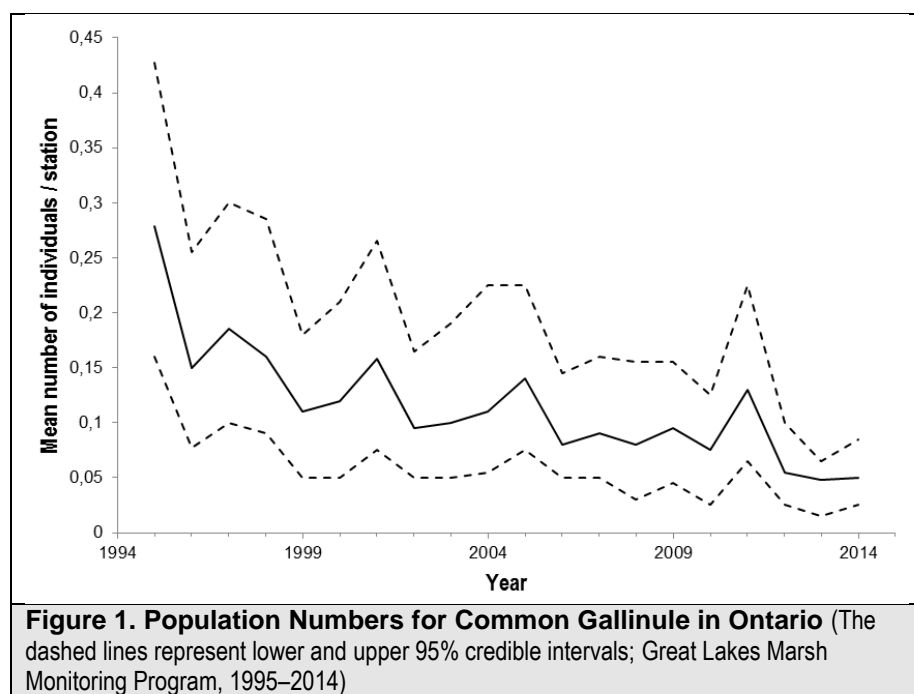
The Common Gallinule is a secretive marsh bird that is found primarily in southern Ontario and southwestern Quebec, with some birds also observed in eastern New Brunswick and western Nova Scotia. In Canada, the species breeds primarily in well interspersed freshwater marshes, but also uses human-made 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 the Great Lakes Marsh Monitoring Program show a significantly declining population trend over the past two decades (1995–2014). Longer term data are not available (Figure 1). Data from the Breeding Bird Survey show a relatively stable population trend in both the last decade (2004–2014) and on the long term (1966–2014) [J. Saucer, USGS, unpubl. Data].

For more information on the Great Lakes Marsh Monitoring Program, see:

www.bsc-eoc.org/volunteer/glmp/



Harvest

The estimated gallinule harvest in the U.S. averaged 20 800 birds per year from 2004 to 2013. In 2014, the total estimated harvest of Common Gallinule and Purple Gallinule (*Porphyrio martinicus*) combined, was 5 200 birds, an important decrease from the 21 300 birds harvested in 2013 (Raftovich et al. 2015). 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 (Case and Sanders 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, in partnership with the Ontario Ministry of Natural Resources and Forestry, initiated in 2012 a pilot banding project of gallinules in Ontario. Since then, over 253 Common Gallinules have been banded in Ontario during pre-hunting season duck banding activities. To date, three gallinules have been recaptured during banding operations and one has been reported by a hunter. In 2014, feathers were collected to examine the use of stable isotopes or elemental concentrations to link up harvest (through hunter-returned wings) to natal origin: investigations are ongoing.

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 commonly breeds in urban and rural areas across southern Canada, but the greatest breeding densities are found around the Lower Great Lakes and in the 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.

Abundance and Trends

The Mourning Dove is monitored in Canada through the Breeding Bird Survey (BBS). Results from the survey indicate that the population has increased markedly since 1970, but has levelled off during the most recent decade (Environment Canada 2014a). The estimated population in Canada is 500 000 to 5 million adults. The long-term trend (1970–2014) for the Canadian portion of this species' population is indicative of an increase in population since the 1970s, but the 10-year trend is not significant (stable population) [Environment Canada 2014b].

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 to 2013 but subsequently discontinued. Since 2014, Mourning Doves are monitored only through the BBS (Seamans and Sanders 2014). The species is managed based on three regions, as the breeding, migratory and wintering distribution of dove populations are largely independent (Seamans 2015). 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 (1966–2014) and 10-year term (2004–2013) [Seamans 2015]. 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 of Mourning Doves 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 5 391 doves killed in 1977 to 89 birds during the 2013 season. During the 2014 hunting season in Ontario, 21 730 birds were harvested (Gendron and Smith 2015).

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 2014, approximately 13.8 million birds were harvested in the United States by approximately 840 000 hunters, an estimate similar to that for the 2013 hunting season (Seamans 2015).

Management and Conservation Concerns

As a habitat generalist, the Mourning Dove has well adapted 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).

Wilson's Snipe (*Gallinago delicata*)

Wilson's Snipe is one of the most abundant and widespread shorebird species 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.

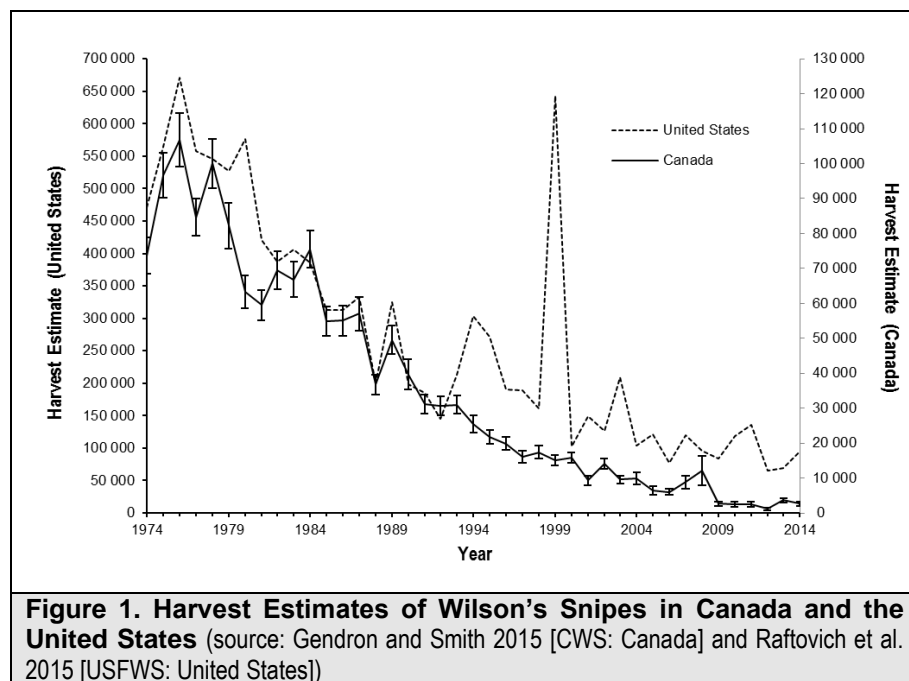
Abundance and Trends

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 data from this survey should be interpreted with caution.

Long-term trend data from the BBS 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 2014a). The Canadian population—birds breeding and migrating—is estimated at 1 million individuals (Environment Canada 2014b).

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 Snipe 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).



Management and Conservation Concerns

Given that the Wilson's Snipe depends on wetlands throughout its life cycle, the draining and conversion of wetlands is detrimental to this species. Other threats 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 national monitoring programs aiming at identifying populations' sizes and trends in abundance, 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). In Canada and the United States, the Great Lakes Marsh Monitoring Program implements these recommendations by monitoring the population numbers and habitat of rail and snipe species, including the Wilson's Snipe (Tozer 2013).

Sandhill Crane (*Grus canadensis*)

Two Sandhill Crane populations breed in Canada, namely the Mid-continent Population and the Eastern Population. The Mid-continent Population, the largest of the two populations, breeds across Canada from eastern British Columbia to western Ontario, south from the Prairies and north to Yukon and the Northwest Territories. Its population is stable and above its population objective. The Eastern Population of Sandhill Crane breeds in eastern Ontario, around the Great Lakes up to James Bay, and western Quebec. This population shows a long-term increasing trend and is above its management population objective (3-year fall average of 30 000 cranes).

Abundance and Trends

- MID-CONTINENT POPULATION

The Mid-continent Population is the largest of all North American crane populations and consists of a mixture of various subspecies of the Sandhill Crane: approximately two-thirds Lesser Cranes (*Grus canadensis canadensis*), one-fourth Canadian Sandhill Cranes (*G. c. rowani*) and the remainder, Greater Sandhill Cranes (*G. c. tabida*). Sandhill Cranes of this population breed from southern Ontario northwestward through the Arctic and Alaska and into eastern Siberia. Individuals of this population winter 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, as more than 90% of the Mid-continent Population is found in that area at the time of the annual survey (Kruse and Dubovsky 2015). Population indices corrected for visibility bias have been available since 1982. The Sandhill Crane population has been relatively stable since the early 1980s, but the trend has been increasing slightly over the past few years. The uncorrected (preliminary) population index in the spring of 2015 was 325 956 birds, which was 4% lower than the long-term average (Kruse and Dubovsky 2015; Figure 1). The photo-corrected three-year average for 2012–2014 was 620 481 birds, which is above the established population objective range of 349 000–472 000 cranes.

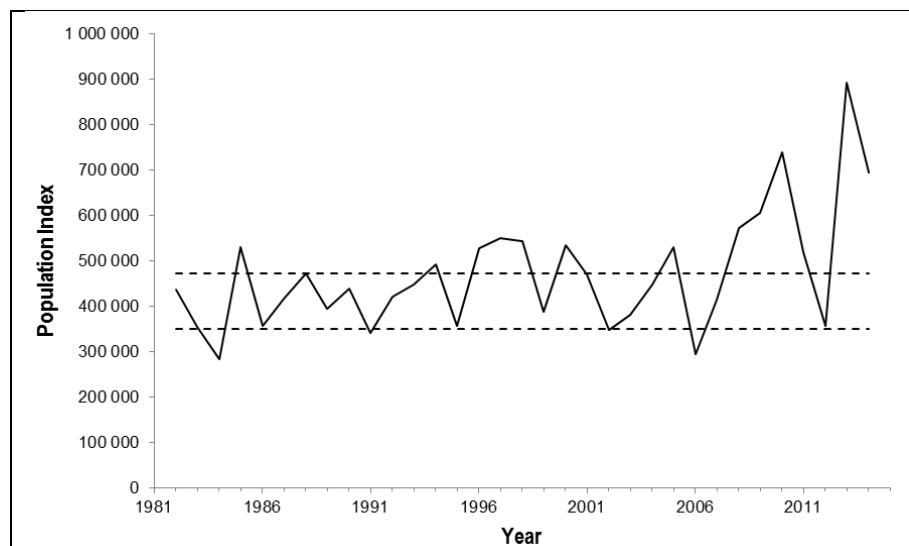


Figure 1: Spring Population Indices for Mid-continent Sandhill Cranes in Their Spring Staging Areas (Central Platte River Valley, Nebraska and Adjacent Areas) [The 2015 value is not corrected for visibility bias, but values for previous years are; the dashed lines represent the lower and upper limits of the population objective; source: Kruse and Dubovsky 2015]

- 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 and Dubovsky 2015). Strict regulation of the harvest, combined with the protection and restoration of habitat, has allowed the population to expand both in size and in geographic range (Meine and Archibald 1996; Case and Sanders 2009).

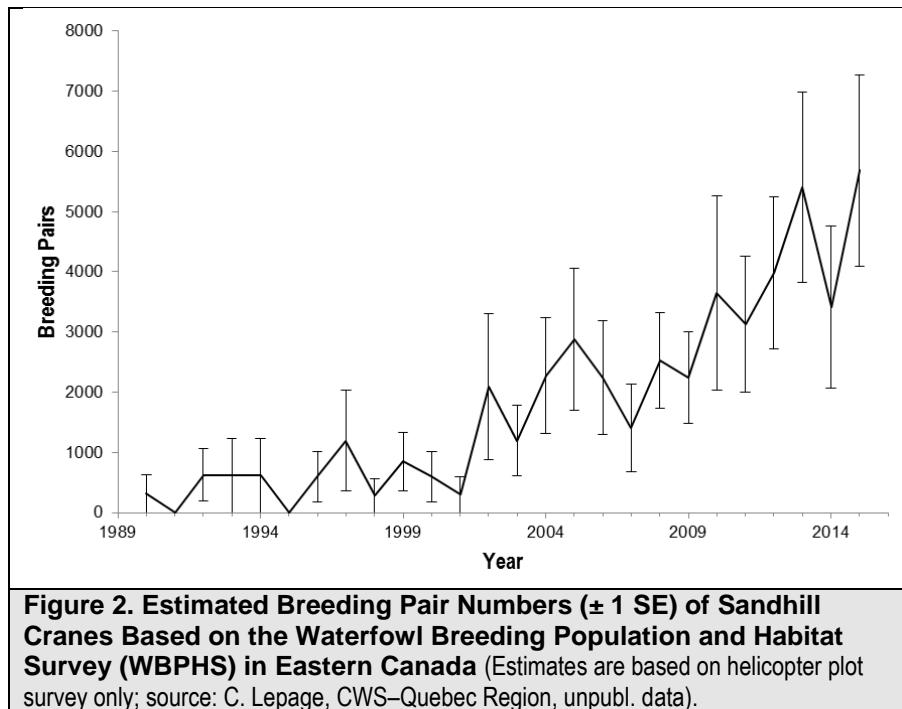
The Eastern Population of Sandhill Cranes breeds in Ontario, Quebec and several Great Lakes states. Since 1979, the USFWS conducts a survey of this population while the birds are in their major migratory staging areas in the Mississippi and Atlantic Flyways. The survey is conducted each year in late 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 (Amundson and Johnson 2010). The 2014 count was of 83 479 cranes, an increase of 30% compared to numbers from 2013 (Kruse and Dubovsky 2015).

In Ontario, surveys of staging Sandhill Crane have been conducted for close to 40 years 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 fall migration period. Numbers reached an all-time high in October 2009 (8 895 birds), likely due in part 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 CWS, 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, 2014 and 2015, the minimum population counts were of 7 207, 7 490 and 10 971 cranes, respectively. This included the area from Sault Ste. Marie to Mattawa (excluding Manitoulin Island) and north to Cochrane. Productivity (ratio of juveniles relative to adults in the fall population) was estimated at 0.11 in 2014 and 0.13 in 2015. Note, however, that counts between years are not comparable due to differences in survey coverage and effort.

In Quebec, the 2015 population estimate from the helicopter plot survey component of the WBPHS was 5 700 indicated breeding pairs, an increase compared to the 10-year average of 3 400 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 1996–2015 trend shows an increase of 13% 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).

Research Highlight

In Ontario, a study conducted by Long Point Waterfowl has been examining the Eastern Population Sandhill Crane migration and ecology. Final results are expected over the coming year and will provide more detailed insight towards Ontario-specific migration chronology and autumn foraging ecology. To date, satellite telemetry data show that the current USFWS fall crane survey is likely missing as much as 29–31% of cranes that summer in Wisconsin and Michigan, and annual survival rates for adult cranes was estimated at 95.0% from data spanning 2009–2014. Overall, this study will inform fall Eastern Population Sandhill Crane staging surveys in the U.S. and Canada, which should improve future monitoring of this population.

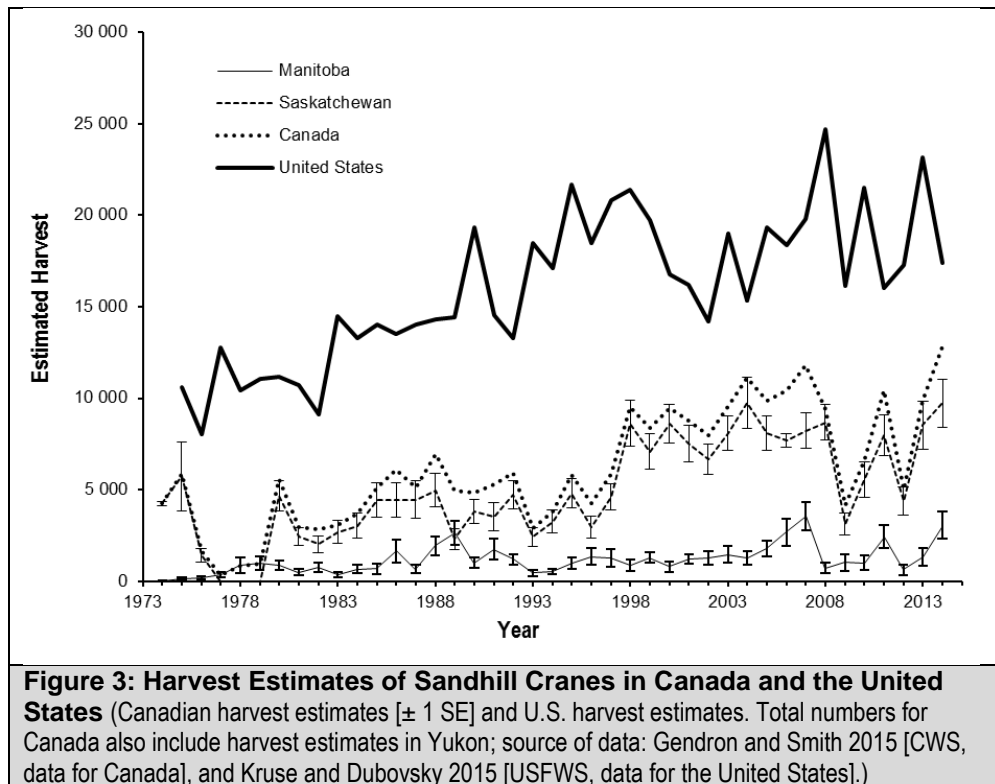


Harvest

- 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 it has 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 12 812 birds in 2014, up 30% from 2013 (9 883 birds; Figure 3, Gendron and Smith 2015).

In the United States, the harvest of Sandhill Cranes from the Mid-continent Population has increased over time. In 2014, the harvest increased to 17 420 birds, a 25% decrease compared to the harvest for the previous year (23 191 birds; Figure 3; Kruse and Dubovsky 2015).



- EASTERN POPULATION

Eastern Population Sandhill Cranes are presently not harvested in Canada. However, they are hunted in two states in the U.S.: Kentucky and Tennessee. In 2014, the state of Kentucky held its fourth Eastern Population Sandhill Cranes hunting season, while the state of Tennessee held its second hunting season, with a total of 401 cranes harvested in the two states combined (Kruse and Dubovsky 2015).

Management and Conservation Concerns

Sandhill Crane populations endured significant declines throughout North America during the first half of the 20th century, primarily due to habitat loss, increased human encroachment, and overhunting (Gerber et al. 2014). The conservation of Sandhill Crane critical habitat (e.g. roosting habitat) is likely 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 thought to be habitat availability (Gerber et al. 2014).

Band-tailed Pigeon (*Patagioenas fasciata*)

In Canada, the Band-tailed Pigeon only occurs in forested habitats of coastal British Columbia. The species has a very low reproductive rate (clutch size of one egg), but some birds nest twice in a season. The species' population has suffered a large decrease since the 1970s, in part due to overharvesting. To address this decline, the harvest has been severely limited in Canada for the past 20 years. The Band-tailed Pigeon was listed as a species of "Special Concern" 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 (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

The BBS has provided an annual index of the abundance of the Band-tailed Pigeon since 1970. Results from this survey indicate a 4% annual population decline over the long term (1970–2014), but the short term (2002–2014) suggests that the population is stable in British Columbia (Environment Canada 2014a). Extrapolation from this survey suggests a population of approximately 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 2015). Pigeons gather at mineral sites (50–200 individuals) to ingest sodium (COSEWIC 2008). The Mineral Site Survey consists of visual counts of Band-tailed Pigeons at 51 mineral sites located in California, Washington State, Oregon and British Columbia. Results from the Mineral Site Survey were inconclusive for trend in the median annual count of Pacific Coast Band-tailed Pigeons seen at mineral sites since the survey became operational in 2004 (Sanders 2015). Results for British Columbia however point to a 8.7% decline in population size for the species since 2004 (Tables 1; Sanders 2015).

Table 1. Estimated Trend (Lower and Upper 95% Credible Intervals) in Band-tailed Pigeon Abundance from the Mineral Site Survey in British Columbia (Trends are expressed as the percent change per year; source: Sanders 2015.)			
Period	Trend	LCI	UCI
2004–2014	–8.7	–15.4	–1.7
2009–2014	–8.4	–16.7	1.7

Harvest

The Canadian hunting season for the Band-tailed Pigeon was closed between 1994 and 2000 in response to the low number of birds suspected to occur in British Columbia and declines in Washington State. Population increases in Washington State and research results that indicated that the provincial population was much larger than initially thought 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, when between 5 000 and 8 000 birds were harvested annually. At least 6 Band-tailed Pigeons were harvested in Canada in 2014, a number comparable to that for 2013 (13) [Gendron and Smith 2015]. The estimated total harvest for 2014 in the

United States was 1 500 pigeons, considerably fewer than the 8 000 birds harvested in 2013 (Sanders 2015).

Management and Conservation Concerns

The causes of the historical continental-scale decline of the Band-tailed Pigeon population are uncertain, but past excessive harvest in the United States is thought to be a major cause. Habitat loss is likely also a contributing factor, at least in Pacific Coast population declines. Band-tailed Pigeons are also 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 2015).

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 because of concerns over long-term population declines, as well as habitat loss (COSEWIC 2008). Information on the legal status of this species under the *Species at Risk Act*, as well as assessment and recovery documents, are available online at www.registrelep-sararegistry.gc.ca/species/. The species is listed as a conservation priority in one or more Bird Conservation Strategies in Canada (www.ec.gc.ca/mbc-com/).

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.

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 survey 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 1970–2014 period. Long-term population trends for Ontario, as well as Canada as a whole, suggest an increase in the size of the Virginia Rail Population, but trends for Manitoba and Saskatchewan are inconclusive (Environment Canada 2014b). For the period 2004–2014, no trends are significant for this species (Environment Canada 2014b).

The Virginia Rail is also monitored in Ontario during surveys conducted as part of the Great Lakes Marsh Monitoring Program by Bird Studies Canada. The abundance of this species in the Great Lakes area appears to show a relatively constant decline since the mid-1990s (Figure 1).

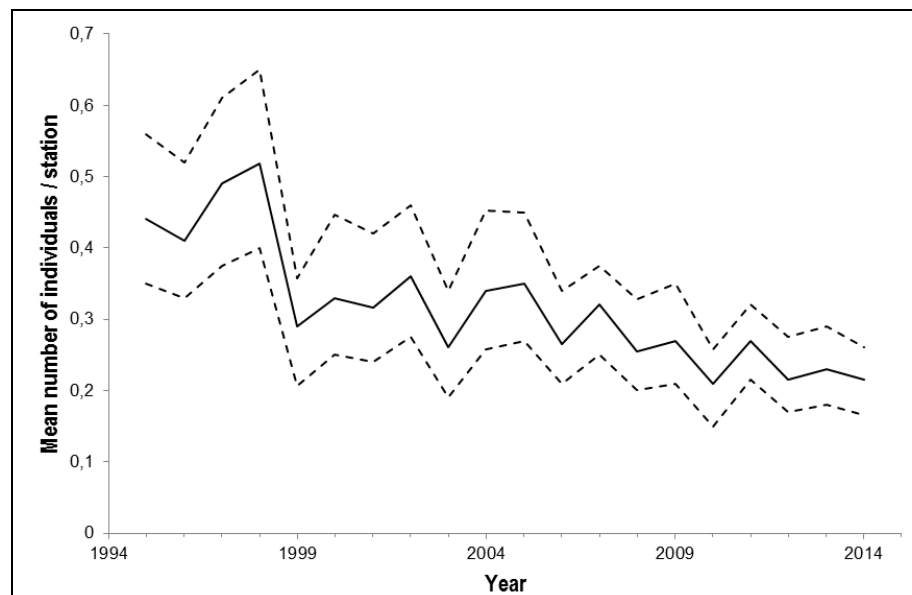


Figure 1. Population Numbers for Virginia Rail in Ontario (The dashed lines represent lower and upper 95% credible intervals; source: Great Lakes Marsh Monitoring Program, 1995–2014.)

- KING RAIL

In Canada, the King Rail essentially breeds only 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. Based on results from targeted surveys, the population is estimated at fewer than 100 breeding King Rails (Environment Canada 2014). The population has experienced a large

decline since the late 1960s and early 1970s, likely as a result of wetland habitat loss and degradation due to human development and draining for agriculture (Pickens and Meanley 2015).

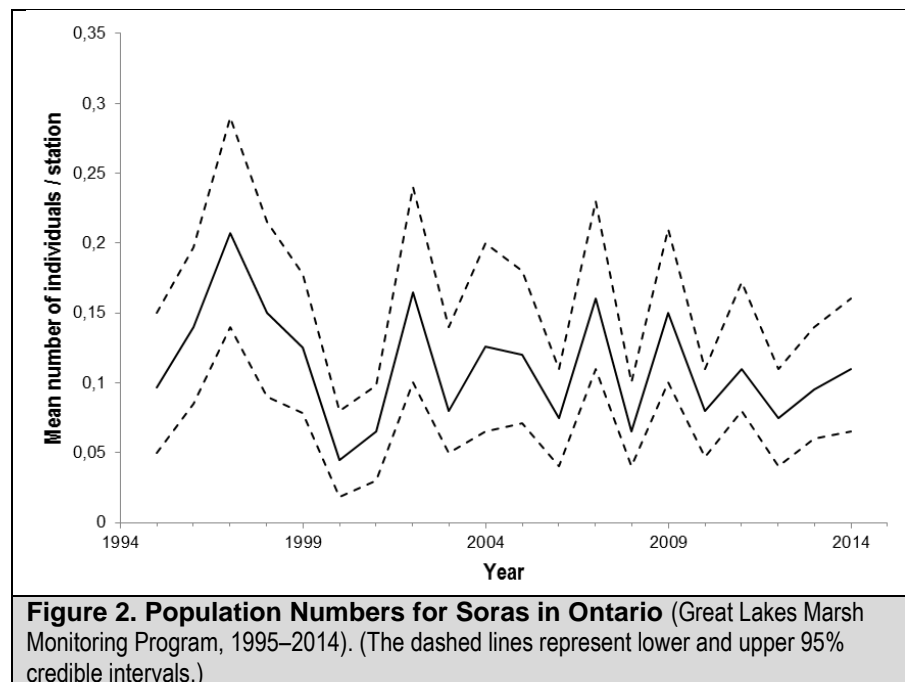
- YELLOW RAIL

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 2014b). The population is estimated at 10 000 to 25 000 breeding birds in Canada (Environment Canada 2014a).

- SORA

Soras breed in wetlands across Canada, and population trends are available for Canada and all provinces. Since 1970, the population size has been showing large inter-annual fluctuations, but with little change in the overall population size (Environment Canada 2014b). Long-term trends (1970–2014) for this species suggest a relatively stable population in Canada overall, as well as in all provinces and territories except Saskatchewan, where the trend suggest an increase (Environment Canada 2014a). Results for short-term trends (10-year period from 2004 to 2014) are similar (Environment Canada 2014a).

The Sora is also monitored in Ontario during surveys conducted as part of the Great Lakes Marsh Monitoring Program (Bird Studies Canada). The abundance of the species in the Great Lakes area show important annual fluctuations, but it appears to be stable since the mid-1990s (Figure 2).



Harvest

Despite the Virginia Rail's status as a game bird in North America, the species is rarely hunted (Conway 1995). Ontario and 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 rail harvest has been reported in Canada in 2012, 2013 or 2014 (Gendron and Smith 2015).

Currently, the hunting of King Rails and Yellow Rails is prohibited in Canada.

Management and Conservation Concerns

Wetlands are critical in maintaining the breeding population of rails in Canada. Thus, continued wetland degradation and loss may represent the greatest threat to the long-term sustainability of the King Rail (Environment Canada 2014b).

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). In recent years, a focus on improving harvest data gathering and monitoring the abundance of secretive marsh bird species in North America, such as rails, resulted in 2011 in the implementation of the Standardized North American Marsh Bird Monitoring Protocol (Conway 2011).

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). Its status was re-assessed as Endangered (in 1994 and 2000) because of the species' small population size, its rapid population decline and existing 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 COSEWIC in 1999 (re-confirmed in 2001 and 2009) because of its low abundance, of suspected local population declines, as well as ongoing threats to both its breeding and wintering habitat (Environment Canada 2014). In 2003, the species was listed as one of "Special Concern" under the *Species at Risk Act*.

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Additional information can be obtained at:

Environment and Climate Change Canada

Public Inquiries Centre

7th Floor, Fontaine Building

200 Sacré-Coeur Boulevard

Gatineau QC K1A 0H3

Telephone: 1-800-668-6767 (in Canada only) or 819-997-2800

Email: ec.enviroinfo.ec@canada.ca

