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POPULATION STATUS OF MIGRATORY GAME BIRDS IN CANADA

November 2019



Canadian Wildlife Service
Waterfowl Committee

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Regulatory Report

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Canadian Wildlife Service Waterfowl Committee

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2. Executive Summaries

American Black Duck (*Anas rubripes*)

The American Black Duck breeds primarily in northeastern North America and was historically one of the most abundant duck species encountered in this region. However, its abundance declined over the middle of the last century, particularly in the Mississippi Flyway. This decline likely resulted from changes in breeding and wintering habitat quality, overharvesting, and competition with Mallards. The American Black Duck population has remained relatively stable since the 1990s, as has the harvest since 2000. The species remains one of the most sought-after waterfowl by hunters in eastern Canada and the U.S.

American Coot (*Fulica americana*)

The American Coot breeds from British Columbia to Ontario, with the highest densities in the Prairie provinces. In Canada, the harvest of American Coot has diminished over the years and is now fairly small. In contrast, harvest has remained relatively consistently high in the U.S.

American Wigeon (*Mareca americana*)

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

American Woodcock (*Scolopax minor*)

There are two management units for American Woodcock in Canada: the Central Population, which includes 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 decline relative to the early 1970s. A possible reason for the decline is the loss of suitable wintering and breeding habitat. Since the 1970s, American Woodcock harvest has declined in both Canada and the U.S.

Band-tailed Pigeon (*Patagioenas fasciata*)

In Canada, Band-tailed Pigeons are restricted to forested habitats of coastal southern British Columbia. The 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 according to the species management plan. The Western Population has shown a stable long-term trend over the past 20 years. Harvest estimates are only possible for the Western population where they remain relatively low and stable. For the eastern population, there are no reliable estimates because of the low population size and limited number of hunters sampled.

Blue-winged Teal (*Spatula 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 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.

Brant (*Branta bernicla*)

Brant are Arctic-nesting geese. There are four distinct populations of Brant recognized in North America: Atlantic Brant, the Eastern High Arctic Population, Black Brant, and the Western High Arctic Population. The Atlantic Brant population was estimated at 200 000 birds from 2012-2016, the Eastern High Arctic Brant population at 35 000 in 2013 and the Black Brant and the Western High Arctic populations combined at 125 000 in 2018. Brant harvest in Canada is minimal, though harvest of the Atlantic population is likely at the maximum levels sustainable.

Bufflehead (*Bucephala albeola*)

The Bufflehead, which nests in tree cavities, is the smallest of the North American sea ducks. The species is found from coast to coast, but is more abundant in western Canada. The continental population has been increasing since the 1960s. Since 2000, the Canadian harvest has remained relatively stable but remains lower 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 Prairie provinces and winter mainly in areas of the Central and Mississippi Flyways. Numbers of Midcontinent Cackling Geese have increased greatly since the 1970s, and Lincoln estimates of population size averaged about 2.5 million adults from 2014-2018.

Canada Goose (*Branta canadensis*)

Canada Geese are grouped into different management populations based on their breeding and wintering ranges. Most subarctic-breeding populations have remained relatively stable since the early 2000s. 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 and nest removal, and landscape management, have complemented liberalized harvest. Canada Goose harvest in Canada has steadily increased since the 1970s.

Canvasback (*Aythya valisineria*)

The core breeding area for Canvasback is in the Prairie provinces, but the species is found as far south as Colorado and as far north as the Northwest Territories. Canvasbacks are not abundant in Canada, but the population has increased since the beginning of the 1990s. Much of the inter-annual population fluctuations correlates to the amount of wetland breeding habitat in the Prairies. Since 2001, Canadian Canvasback harvest has primarily occurred in the Prairie provinces and Ontario.

Common Eider (*Somateria mollissima*)

Common Eiders inhabit Arctic and Subarctic coastal marine habitats in 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 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, and the lack of regular population surveys. In Arctic Canada, Common

Eiders are harvested for Aboriginal subsistence purposes (adults, eggs and down). They are also harvested recreationally, and their down is collected for commercial purposes. Data suggest there may be significant declines in some regions. The harvest of this species in Canada has been highly variable since the 1990s, although there is an overall gradual decline in harvest.

Common Gallinule (*Gallinula galeata*)

The Common Gallinule is a secretive marsh bird primarily found in southern Ontario and southwestern Quebec which also occurs 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. The species is listed as a priority species in Ontario with the objective of reversing its decline. There are no annual harvest estimates for Common Gallinules in Canada because the National Harvest Survey does not provide reliable harvest estimates for species hunted at very low numbers.

Common Goldeneye (*Bucephala clangula*)

In North America, the Common Goldeneye breeds in tree cavities in Canadian and Alaskan forests. 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 Goldeneye 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, primarily in trees large enough to support suitable nesting cavities. Across Canada, the population size and trend for mergansers are unclear because most aerial surveys do not distinguish between Common and Red-breasted Mergansers, whose breeding range overlap extensively. However, in eastern Canada, the three merganser species can be reliably identified during helicopter and ground based plot surveys. There, Common Merganser numbers appear to have been stable since the 1990s. This species is not heavily harvested by hunters and harvest has been decreasing since the 1980s, with most of the harvest occurring in eastern Canada.

Gadwall (*Mareca 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 and the Canadian harvest is much smaller than the U.S. harvest.

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

Two Scaup species occur in North America: the Greater Scaup and the Lesser Scaup. Though visually nearly identical, the Greater Scaup is larger and widely distributed across Arctic and Subarctic regions. The smaller Lesser Scaup is the most abundant and widespread diving duck in North America; its core breeding area spreads across the Western Boreal and Prairie and Parkland regions, but it also nests at lower densities in eastern Canada and British Columbia. Scaup populations (Greater and Lesser Scaup combined) in North America became a conservation concern following continental declines in population size compared to the historically high levels observed in the 1970s. Scaup populations have not yet fully recovered and ongoing research is attempting to determine the cause(s) of the decline. Canadian harvest of Scaup has declined considerably since the 1970s and appears to have stabilized at 50 000 to 75 000 birds annually since 2000. Two thirds of this harvest is of Lesser Scaup.

Greater Snow Goose (*Anser caerulescens atlantica*)

The Greater Snow Goose breeds 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 has begun 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 1999; 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 United States.

Greater White-fronted Goose (*Anser albifrons*)

The Greater White-fronted Goose has one of the largest ranges of any goose species 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 1970s. Lincoln estimates of population size averaged about 2.3 million adults from 2014-2018. 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 fourth most hunted duck species in Canada, although harvest has been declining since the 1970s, especially in the last decade. Most Canadian harvest takes place in Ontario and Quebec, but Canadian harvest represents only a fraction of the continental harvest.

Harlequin Duck (*Histrionicus histrionicus*)

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 numbers appear stable, with estimates ranging from 150 000 to 250 000 birds. The Western Population of Harlequin Duck is hunted under restrictive regulations and the best available information indicates that annual harvest is probably in the low hundreds in Canada. The Eastern Population declined in the 1980s. 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 Quebec. Historically, continental population status and numbers have been difficult to determine because of its secretive nature, association with forested wetlands, and cavity nests, all of which decreases detectability from fixed-wing aircraft. However, in eastern Canada helicopter and ground based plot surveys identify the species reliably and show a continuous increase in numbers since the surveys began in 1990. The Hooded Merganser is the most harvested of the three merganser species. Its Canadian harvest has 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 with two populations: the Western Arctic and the Eastern Arctic populations. This species is among the most northerly nesting of the sea ducks. Based on limited data, both populations appear to be locally stable or, in some areas, declining. Subsistence Aboriginal harvest in Canada, Greenland, Alaska, and Russia represents the majority of the take for this species. Information on population trends and harvest is limited.

Lesser Snow Goose (*Anser 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 that nest in or migrate through Canada: the Mid-continent population, the Western Arctic population and the Wrangel Island population. The Mid-continent Population of Lesser Snow Geese has increased dramatically from just below 2 million in the 1970s to more than 13 million adults in the last decade. This population was designated as overabundant in 1999, and has since then been subjected to special measures to increase harvest in an attempt to control the population size and growth. The Western Arctic Population has also increased significantly, from approximately 300 000 in the 1970's to over 1 100 000 in 2016. In 2014, the Western Arctic Population was also designated as overabundant and special conservation measures to control the population were implemented in Alberta, the Northwest Territories, and the Yukon. The Wrangle Island population has increased dramatically since the 1990s, now including 440 000 birds. Recently, the harvest of Lesser Snow Geese has slightly increased compared to harvest levels in the 1970s.

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 and their numbers appear to have recently stabilized, although data are limited. The Long-tailed Duck is not commonly harvested by non-Indigenous hunters in Canada. However, it is believed to be an important species in the Aboriginal subsistence harvest.

Mallard (*Anas platyrhynchos*)

The Mallard is the most abundant and 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 the Maritimes, though they remain rare 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 declined from the 1970s to the 1980s but have since stabilized. It remains the most extensively hunted duck species across Canada.

Mourning Dove (*Zenaida macroura*)

The Mourning Dove is one of the most familiar and most heavily harvested migratory game bird in North America. Additionally, it is also one of the most abundant and most widespread bird species. This species is a common breeder in 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 Breeding Bird Survey indicates that the population has increased markedly since 1970 but has stabilized during the past decade. Mourning Doves have been hunted in British Columbia since 1960, but harvest levels are a small fraction of their historical levels. A hunting season was opened in 2013 in Ontario and in 2016 in Quebec.

Murres: Common Murre (*Uria aalge*) and the Thick-billed Murre (*Uria lomvia*)

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 British Columbia and small numbers of Thick-billed Murres breeding in the western Arctic. Numbers for both species breeding at colonies in the Northwest Atlantic and the eastern Arctic are stable or increasing. Approximately 72 000 Murres were harvested in Newfoundland in 2018, well below the maximum sustained harvest estimate of 250 000 birds.

Northern Pintail (*Anas acuta*)

The Northern Pintail is found across the country, with its core breeding range located in the Prairie Pothole Region of western Canada. Periods of extended drought brought on by changing land-use practices may have caused the dramatic population declines by decreasing nesting success. Since 1990, the population has been slowly increasing, but unlike other species, it has yet to recover to 1970s levels. Agricultural intensification in the Prairie Pothole Region likely explains the slow recovery. In Canada, Northern Pintail harvest has remained relatively stable since 1990.

Northern Shoveler (*Spatula 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

Rails, which include the Virginia Rail (*Rallus limicola*) and Sora (*Porzana carolina*), are secretive marsh birds that breed and stage in wetlands in Canada. Most often, they hide in dense emergent vegetation, which makes surveying and hunting these species difficult. In Canada, the Virginia Rail population appears to be increasing, while the Sora population appears stable. Rails are only hunted in Ontario and the Yukon. There are no annual harvest estimates for rails in Canada because the National Harvest Survey does not provide reliable harvest estimates for species hunted at very low numbers.

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 sea ducks in Canada, but its population status and size are difficult to determine accurately mostly due to the species' secretive nature and the remoteness of parts of its breeding range. 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 U.S. 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 U.S., where harvest has increased since the 1970s. In Canada, harvest levels have been low compared to other duck species, averaging approximately 22 000 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 it is still in the top ten duck species harvested by hunters in Canada. A much larger harvest occurs in the U.S.

Ross's Goose (*Anser rossii*)

Ross's Geese mainly breed in the Queen Maud Gulf Region in the central Canadian Arctic, but numbers are increasing along the western coast of Hudson Bay, and on Southampton and Baffin Island. Their wintering range has also expanded eastward from historical wintering areas in California. Considered a rare species in the early part of the last century, Ross's Geese have shown increasing numbers since the 1960s, and are among the fastest growing populations of arctic-nesting geese in recent years. Ross's geese were declared overabundant in the midcontinent region of the U.S. in 1999 and in western Canada in 2014. Lincoln estimates of population size averaged around 1.6 million adults from 2014-2018. 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 averaging approximately 1 500 birds annually over the last 10 years.

Sandhill Crane (*Antigone canadensis*)

Three Sandhill Crane populations breed in Canada, namely the Central Valley Population, the Mid-continent Population and the Eastern Population. The Central Valley Population breeds mainly in California, but its range extends to the lower Fraser Valley and northern Vancouver Island in British Columbia. The Mid-continent Population, which is the largest of the three, breeds across Canada from eastern British Columbia to northern 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 to central Quebec. This population shows a long-term increasing trend and is above the population objective. In Canada, hunting seasons occur in Manitoba, Saskatchewan and Yukon. Harvest varies annually but has increased since the 1970s.

Scoters (*Melanitta* spp.)

Three species of Scoters breed in Canada: Black Scoter (*Melanitta americana*), Surf Scoter (*M. perspicillata*) and White-winged Scoter (*M. deglandi*). 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 Scoter breeding, moulting and wintering ecology. There are currently no national surveys that provide 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 Canadian hunters, with harvest levels averaging less than 6 500 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, northeastern British Columbia, western Saskatchewan, and southern Yukon and the Northwest Territories. The Interior Population breeds primarily in Ontario, but small numbers have become established in eastern Saskatchewan and in much of Manitoba. The three populations have reached or exceeded their population objectives and are increasing. Hunting Trumpeter Swans is currently illegal in Canada and in most parts of the U.S.

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 with traditional wintering areas along the Atlantic and Pacific coasts. The Eastern Population increased slightly over the last decade, while 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. Tundra Swans are currently hunted in some states but not 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 accurately. Nevertheless, its overall numbers appear to have been slightly increasing since the late 1960s or early 1970s. Harvest of the species is low in both Canada and the U.S. and has gradually declined since the end of the 1970s.

Wood Duck (*Aix sponsa*)

The Wood Duck is a cavity-nesting species commonly found in swamps, marshes and riparian habitats in Canada. In Canada, it nests primarily in the eastern provinces. In western Canada, the population is small and scattered. Once threatened with extinction, this species is now stable or increasing in Canada. As a result of this recovery, the Wood Duck now ranks as one of the most abundant duck species in both southern Ontario and southern Quebec. The species is sought after by hunters, and an average of 77 000 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.

3. Background

Environment and Climate Change Canada (ECCC) 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 ECCC, with input from provinces, territories, and 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*, 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. ECCC publishes the November Report to evaluate the status of migratory game birds and reviews hunting regulations every two years. Additionally, CWS analyzes population trends annually.

The second report, *Proposals to Amend the Canadian Migratory Birds Regulations*, outlines the proposed changes to the hunting regulations and 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. 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 ECCC website (www.canada.ca/en/environment-climate-change/services/migratory-game-bird-hunting/consultation-process-regulations/report-series.html).

3.1 Monitoring Migratory Game Birds in Canada

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

3.1.1 Population Surveys

DABBLING AND DIVING DUCKS SURVEYS

Breeding duck populations are monitored at the continental level by the 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

WBPHS is coordinated by the U.S. Fish and Wildlife Service (USFWS) and the CWS, and is conducted annually. The survey has two components: one covering much of central and western Canada and the northwestern U.S. (hereafter “WBPHS in western Canada and the northwestern U.S.”), and the other covering much of eastern Canada and the northeastern U.S. (hereafter “Eastern Waterfowl Breeding Ground Survey”; northeastern U.S. survey area results are not presented in this report) [Figure 3.1-1].

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 3.1-1). 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) EASTERN WATERFOWL BREEDING GROUND SURVEY

The Eastern Waterfowl Breeding Ground Survey has been conducted annually since 1990. The survey has two components: a helicopter plot survey and a fixed-wing transect survey. 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, and New Brunswick and Nova Scotia; Figure 3.1-2). The USFWS conducts the airplane transect survey (fixed-wing aircraft) in parts of eastern Canada and the northeastern U.S. (Figures 3.1-1 and 3.1-2). Though originally designed to survey American Black Ducks in eastern Canada, as part of the Black Duck Joint Venture, the survey also provides quantitative information on other duck species (such as Wood Ducks, Green-winged Teal, Ring-necked Ducks, goldeneyes and mergansers), Canada Geese, and Eastern Population Sandhill Crane, 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 substantial overlap in geographic coverage. The two components were integrated into one survey in 2004. Population estimates obtained from this survey were used to inform the hunting regulations for American Black Duck in Canada and the U.S. through the International Black Duck Harvest Strategy and direct conservation planning activities.

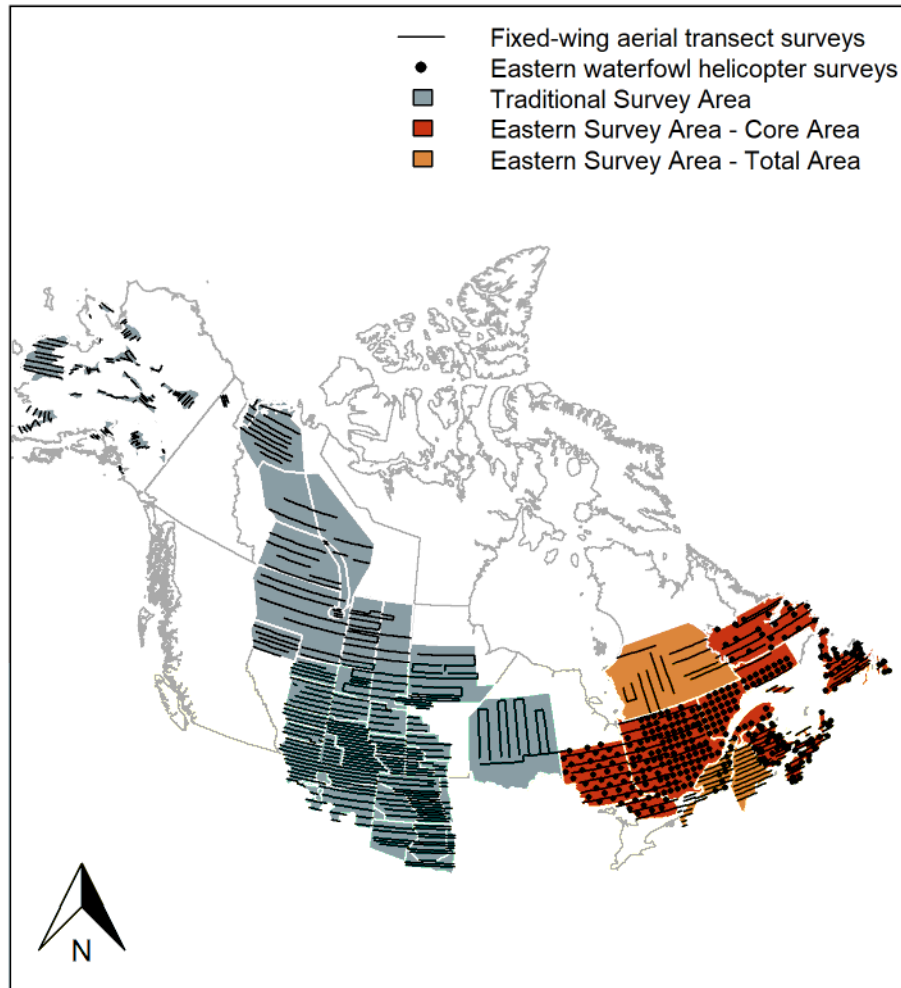


Figure 3.1-1 The Waterfowl Breeding Population and Habitat Survey in Western Canada and Northwestern U.S. (grey), and the Eastern Waterfowl Breeding Ground Survey (orange and red).

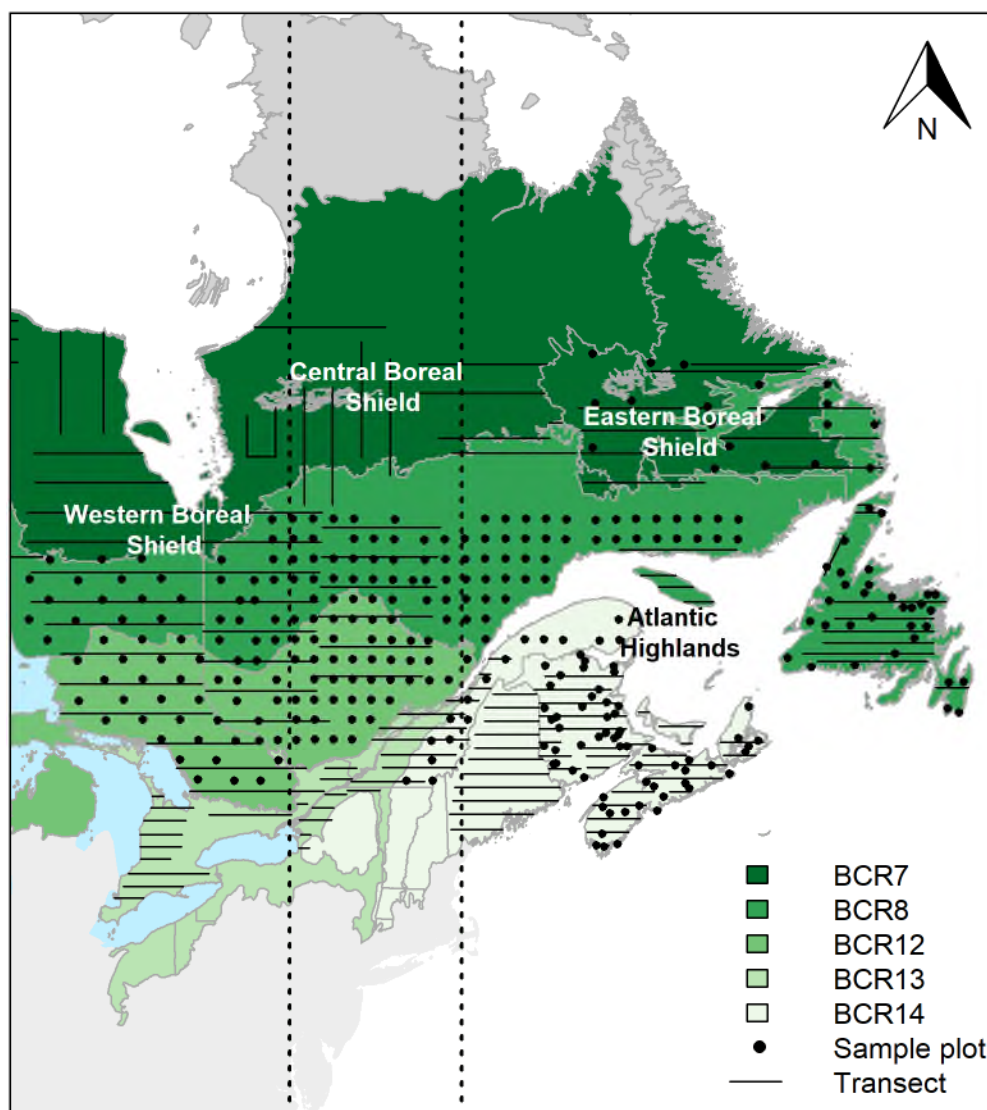


Figure 3.1-2 Regions of the Eastern Waterfowl Breeding Ground Survey. Fixed-wing survey transects are represented by black lines and helicopter plot survey by black dots squares.

SMALLER-SCALE WATERFOWL SURVEYS

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

1) NORTHWEST TERRITORIES BOREAL WATERFOWL AND WATERBIRDS SURVEY

The CWS has gathered information on abundance and productivity of waterfowl and other water birds near Yellowknife, Northwest Territories, since 1985. Data are collected on the Yellowknife Study Area (YKSA), a 38-km² study area that borders the Yellowknife Highway #3. Since 2008, surveys have been done every second year. Surveys are conducted from the ground with wetlands within the study area visited four times during the summer: two pair surveys timed for early and late-nesting species, and two brood surveys (early and late-nesting species) to assess productivity. All species of waterfowl, waterbirds

and predators are recorded during the survey. There is a lack of information on the ecology of northern ducks and other aquatic birds such as grebes and loons, and the contribution of boreal populations to the overall North American populations of aquatic birds is largely unknown.

2) 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. 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 support the development of species distribution and habitat use models.

3) SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

In southern Ontario, a plot survey was initiated in 1971 to monitor the status and trends of early nesting duck 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 also been important in monitoring the population of temperate breeding Canada Geese in southern Ontario. Due to logistic constraints the southern Ontario plot survey was not completed in 2019 and the results presented in the report refer to the 2018 breeding season.

4) 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 and Mallard populations in agricultural landscapes (under heavy human pressures) and the progression of the now-established population of temperate breeding Canada Geese in southern Quebec.

5) MIDWINTER WATERFOWL SURVEYS

Additional information on waterfowl populations is provided by Mid-Winter Waterfowl Surveys (hereafter Mid-Winter Surveys) that are conducted on the wintering grounds in Ontario and the U.S. The Mid-Winter Surveys provide population indices for most species of waterfowl. It has been conducted annually since 1935. The Mid-Winter Surveys are not based on a statistical sampling plan, and some wintering habitats are not covered, so results are best used for the evaluation of relative abundance and distribution in select wintering areas.

SEA DUCKS SURVEYS

Most sea ducks breed in remote northern areas and spend the remainder of the year in marine and nearshore 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 waterfowl, so even where surveys cover part of their breeding range, sea ducks are not monitored well. The following surveys are designed specifically to monitor specific sea duck populations:

1) EASTERN POPULATION BARROW'S GOLDENEYE WINTER SURVEY

Established in 1999, this helicopter survey is carried out by the CWS every three years to monitor the population trend of the Barrow's Goldeneye, a species of Special Concern. The survey is conducted

when there is substantial ice cover—between late January and mid-February—and covers coastal habitats in Quebec and extreme western NB 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 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 recent years.

2) COMMON EIDER WINTER SURVEY

Initiated in 2003, the Common Eider Winter Survey is conducted every three years by the 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 (Quebec 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). Large parts of the coastlines of New Brunswick and Nova Scotia were included in the survey in 2006, 2012, 2016 and 2019. A ratio estimator is used to relate visual estimates of all eider flocks with counts of a certain number of flocks from photographs.

3) CENTRAL CANADIAN ARCTIC PACIFIC COMMON EIDER SURVEY

Aerial surveys of pacific Common Eiders (*Somateria mollissima v. nigra*) have been conducted intermittently by the CWS since 1995 in the Bathurst Inlet and Queen Maud Gulf areas of Nunavut. This area is thought to include 25% of the Canadian breeding population. The survey, flown by helicopter, is timed to occur when eiders aggregate around colonies at the onset of nesting and generally occur in late June and early July. This survey is a census of the two sites and since 2006 has employed a double-observer approach to allow population estimates to be corrected for the proportion of birds missed by observers.

4) LONG-TERM NESTING STUDIES OF SEA DUCKS

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 deglandi*) 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.

5) NEW BRUNSWICK COMMON EIDER BREEDING SURVEY

Aerial surveys of American Common Eiders (*Somateria mollissima dresseri*) have been conducted bi-annually by the NB-NRED and CWS every two years since 1991. The survey, flown by fixed-wing, is timed to occur when eiders aggregate around colonies at the onset of nesting and generally occur mid-May.

GOOSE SURVEYS

Goose population estimates and trends in abundance are now mainly calculated from band recovery data and harvest estimates using the Lincoln methods. Some populations are also monitored through specific annual or occasional surveys carried out during the breeding season or, in some cases, during migration or wintering periods.

SURVEYS FOR OTHER MIGRATORY GAME BIRD SPECIES

Other migratory game birds are monitored either through species specific surveys or through large multi-species surveys that cover large areas.

1) AMERICAN WOODCOCK SINGING GROUND SURVEY

American Woodcock are monitored through the Singing Ground Survey in Canada and the U.S., which consists of a spring count of male courtship displays at dusk.

2) NORTH AMERICAN BREEDING BIRD SURVEY

Band-tailed Pigeon, Wilson's Snipe, Rails and Mourning Dove are monitored by the North American Breeding Bird Survey (BBS) (www.canada.ca/en/environment-climate-change/services/bird-surveys/landbird/north-american-breeding/overview.html); The BBS is an international avian survey conducted annually since 1966 in the U.S. 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.

3) BAND-TAILED PIGEON MINERAL SITE SURVEY

The Band-tailed Pigeon Mineral Site Survey (MSS) is the official management index used by the Pacific Flyway Council to estimate population trends of the Band-tailed Pigeon. 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 52 mineral sites throughout the population's range in July.

4) GREAT LAKE MARSH MONITORING PROGRAM

Rails and Common Gallinules are also monitored by the Great Lakes Marsh Monitoring Program. The Great Lakes Marsh Monitoring Program is a bi-national, long-term monitoring program that coordinates the skills and dedication of hundreds of volunteer Citizen Scientists throughout the Great Lakes basin of Ontario and the U.S. The program is designed to collect information about the presence and abundance of bird and amphibian species in Great Lakes coastal and inland marshes, to contribute to our understanding of these species and their habitat needs.

5) SANDHILL CRANE SURVEYS

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 staging survey in the U.S. In Ontario, CWS conducted a fall staging survey from 2013 to 2017. Estimates for the northeastern portion of the breeding range are also derived from the Eastern Waterfowl Breeding Ground Survey (helicopter plot survey only).

CANADIAN AND UNITED STATES HARVEST SURVEYS

In Canada, the National Harvest Survey was initiated in the late 1960s to estimate the annual harvest of migratory game birds (and murre) and determine trends in hunter activity across Canada. Coordinated by the CWS, the survey uses data from hunters to determine the geographic distribution of the hunt and estimate annual species specific harvest in Canada, provincially and, if possible, at Hunting District levels. Participants (hunters) are randomly selected from the pool of permit holders, and responses are voluntary. The survey has two components: the Harvest Questionnaire Survey, which is used to estimate the total number of migratory game 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.canada.ca/en/environment-climate-

change/services/bird-surveys/waterfowl/national-harvest/overview.html), 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 Mail Questionnaire Survey. A new survey, however—the Migratory Bird 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 woodcock, doves and snipe. 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, territory and in some cases provincial Hunting District in 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.

3.1.2 Migratory Game Bird 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 AND GOOSE BANDING PROGRAMS

The Canadian duck banding program began over 100 years ago. As part of this program, ducks are captured on their breeding grounds at the end of the breeding season but before the hunting season begins. Captured birds are aged, sexed, identified to species, and an individually numbered metal band is attached to one leg before release. This program targets adult and juvenile ducks of multiple species.

Arctic goose banding programs have been conducted in Canada since the 1930s. 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. Each goose receives an individually numbered metal band on one leg, which can be used to identify individuals across sightings.

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

If a person encounters a banded bird, or if a hunter shoots a banded bird, they are encouraged to report it to ECCC's Bird Banding Office, via telephone at 1-800-327-BAND (2263) or online at www.reportband.gov. Biologists use the information from banded birds to assess survival rate, harvest rate and distribution. The data also feed into harvest management decisions.

3.2 Trend Analysis

Trends in the numbers of May ponds and duck breeding populations in western Canada from the WBPHS are calculated using the estimating equations technique (Link and Sauer 1994).

3.3 2019 Breeding Habitat Conditions

3.3.1 Canadian Arctic and Subarctic Regions

Habitat conditions in spring and summer of 2019 varied considerably between regions of the Canadian Arctic.

In the western Arctic, Sachs Harbour Inuvialuit reported a very early and warm spring on Banks Island, coinciding with the pre-laying and early egg-laying period, followed by a long period of below average temperatures and poor weather. The cold and damp conditions persisted into the incubation and pre-fledging period. Lemmings were also very scarce, likely resulting in increased predation on goose nests and young. Consequently, Western Arctic Population Snow Goose recruitment was low and appears to be similar to that observed in 2018 (E. Reed – CWS Northern Region, pers. Comm.).

Spring phenology timing in the Hudson Bay Lowlands was mixed. The winter snow pack throughout the Hudson Bay lowlands was well above average and was record setting in some areas. Spring was slow and snowmelt was protracted with snow drifts in some areas persisting to the end of June due to colder than average temperatures and near continuous cloud cover. On the Manitoba coast, there appeared to be an early spring near Churchill which stalled in early May with the reappearance of cold weather that slowed spring phenology. Spring in Manitoba resembled more of an average year in 2019. Although snowmelt was protracted on the Hudson Bay coast, geese were able to find open nesting habitat and nest initiation was not as late as expected based on the slow snowmelt and cold temperatures. Spring phenology in southern James Bay and on Akimiski Island were closer to normal being only slightly later than average. With the larger than normal snow pack to melt and poor drying conditions through June, the Lowlands were wetter than normal during the nesting period (Rod Brook, OMNR).

In the central arctic, spring phenology was later than average, and summer conditions were wet and overcast. Production of Lesser Snow and Ross's Geese was better than 2018, but was still well below average, and goslings accounted for only 6% of Lesser Snow and Ross's Goose captures in August. In years of above-average production of these species, goslings represent 30-40% of August captures.

On Southampton Island, spring phenology was average, and banding crews reported average to above average production of Lesser Snow, Ross's and Cackling Geese. Estimates of production are not given for Southampton Island because banding there occurs in July when only non-breeding geese are captured.

On Baffin Island, spring phenology was earlier than average, with the Foxe Basin becoming ice-free earlier than normal. Banders reported excellent production of Cackling Geese (1.3 goslings per adult captured), and average production of Lesser Snow (4% of captures goslings) and Ross's Geese (13% of captures goslings). Although production of Atlantic Brant was better than in 2018, production was still relatively poor (11% of captures were goslings).

On Bylot Island, snow cover was below the long-term average and the onset of spring in 2019 was one of the earliest observed since monitoring began 30 years ago. Weather conditions remained mild throughout the breeding season (hatching, nesting of young) and continued during banding activities. The high percentage of young (32%) in the Greater Snow Goose population during fall migration confirms that the weather conditions were good throughout the breeding areas of this population (J. Lefebvre, CWS-Québec Region, pers. comm.).

3.3.2 Central British Columbia

Spring 2019 habitat conditions in Central British Columbia were influenced by El Niño conditions encountered during the 2018-2019 winter. Typically, El Niño is linked to warmer winters across British Columbia, with a trend towards a lower than normal snowpack. This year's low snowpack followed this

trend for El Niño winters, although it was not the result of warmer winter temperatures typically expected during El Niño winter but was due to persistent colder than normal temperatures and extremely dry weather through February and March. No regions of British Columbia had normal or above normal snowpacks. Warm weather in late March 2019 led to an early melt of low to mid-elevation (<1600m) snowpacks 2-3 weeks ahead of usual and snow had completely disappeared by early May 2019. Conversely, cooler weather in late March and April led to 1-2 weeks snow melt delays at higher elevation (>1600m). Water levels were below normal in most of Central British Columbia although some areas affected by the 2017 and 2018 wildfires experienced spring flooding. The May 2019 habitat conditions were below average in most of Central British Columbia (A. Breault, CWS – Pacific Region, pers. comm. 2018).

3.3.3 Prairie Pothole Region

Wetlands in the Canadian and U.S. prairies are sensitive to weather variability (Larson 1995; Roy 2015) and the region is characterized by a very distinct wet-drought cycle (Johnson *et al.* 2005). Nesting effort, nest success, and duckling survival in the prairies have all been linked to the wetlands conditions (Greenwood *et al.* 1995; Howerter *et al.* 2014) and the abundance of waterfowl populations is strongly linked to the abundance of wetlands in the spring during the previous year (Johnson and Grier 1988; Viljugrein *et al.* 2005). Since 1961, spring habitat conditions have been assessed based on an estimate of the number of ponds in May (Figure 3.2-1). In 2019, there were 5.0 million ponds in the Prairie Potholes (Canada and U.S. combined), close to the long-term average of 5.2 million ponds observed since 1970. In 2019, there were 2.9 million ponds in the Canadian Prairies (Figure 3.3-1), slightly below the average since 1970 (3.5 million).

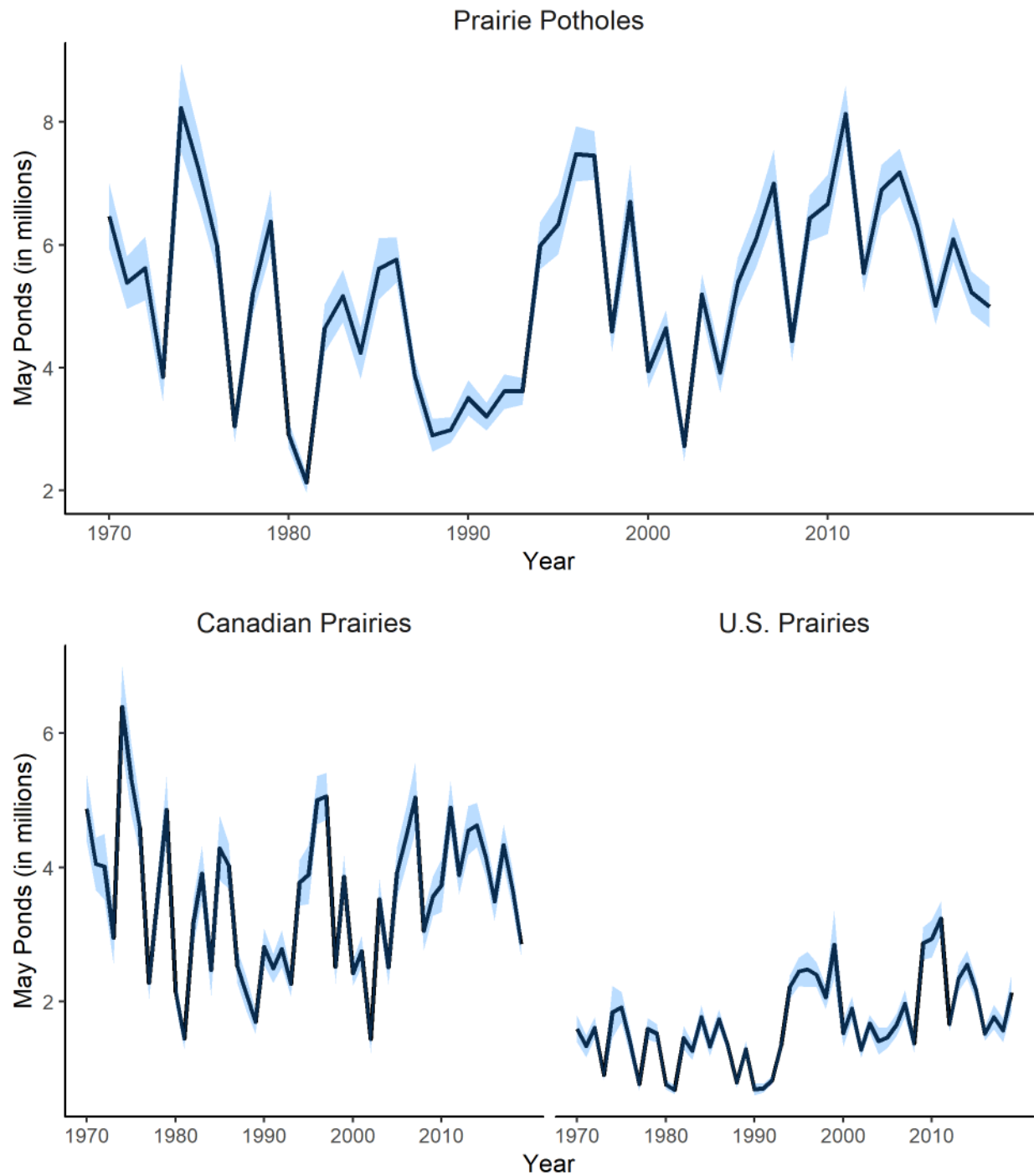


Figure 3.3-1 Estimated number of May ponds in the Canadian and U.S. prairies, black line represents the estimated mean numbers of ponds and the shaded area represents the 95% Confidence Intervals.

3.3.4 Western Boreal Forest

Breeding conditions varied within the Western Boreal Forest, with northern Alberta and southern Northwest Territories experiencing average winter conditions while further north the winter temperatures were above average and precipitation below average. Dry conditions in the southern portion of the Boreal lead to a major forest fire in the vicinity of High Level, which lead to the evacuation of the town and canceled 18 survey segments. In the more northern portions of the Boreal, water levels were good, spring thaw was somewhat delayed, but overall breeding conditions were considered to be good. In the Northwest Territories, spring arrived late, with ice-out delayed by over three weeks.

3.3.5 Eastern Canada (Ontario, Quebec and Atlantic Provinces)

In central and northeastern Ontario, the arrival of spring was delayed again in 2019, similar to 2018. Spring temperatures remained cold into late-April with conditions not improving until early May when spring rains helped to break up ice on large lakes; most streams and beaver ponds were open before. After snowmelt, water levels were generally below average to average with the exception being areas in southeast Bird Conservation Region 12 where water levels were higher than normal. Nest initiation had started by early May for most early nesting waterfowl as evident by the ratio of paired drakes to the number of lone or grouped drake black ducks and mallards (CWS – Ontario, 2019 Ontario Eastern Waterfowl Survey – Plot Component Report, unpublished report).

In the southern tier of Quebec, winter 2019 was long and snowy, with close to record high snow precipitation in many regions. Spring 2019 was one of the coldest and wettest recorded. April and May were colder than usual, leading to slow melting of accumulated snow, and creating important flooding in some areas that were more severe than those observed in 2017. As a result, the St. Lawrence Lowlands survey was delayed and conducted only in early May (rather than during the third week of April); still, several agricultural fields were flooded at the time of survey, which made it difficult to assess the breeding status (local breeders or migrants) of waterfowl pairs seen. In this landscape, high risk of nest flooding for early ground-nesting species such as American Black Duck, Mallard and Canada Goose was expected. The survey of the boreal forest was conducted after mid-May, approximately 10 days later than usual. Despite this delay, the higher elevation eastern half of the surveyed area still had a larger proportion of ponds and lakes partially ice covered; nevertheless, breeding pairs were seen taking advantage of available open water to forage (C. Lepage, CWS – Québec Region, pers. comm.)

Habitat conditions in Nova Scotia and New Brunswick were generally favourable for nesting waterfowl in 2019. Some flooding was observed in southern Nova Scotia. Although the region generally experienced a cool spring, very little snow was encountered during the survey, and most water bodies were ice-free at that time.

Conditions in Newfoundland and Labrador were similar to Ontario and Quebec. Snow accumulation was light across central and eastern Newfoundland, and heavy across most the Northern Peninsula and Labrador. Similar to 2018, there was significant snow and ice cover throughout eastern and central Labrador during the survey.

3.4 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 from 1966 onwards (Figure 3.4-1). 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. After a few years of sales being around 185 000, 2017 dropped down to 169 052 permits sold, the lowest since 2006.

In August 2014, ECCC launched a new online e-Permitting ordering system 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. The e-Permitting system is accessible to hunters 24 hours a day, 7 days a week. Since the establishment of the e-Permitting system, the number of hunters that buy their permit online has been steadily increasing and in 2018, 29% of the hunters bought their permit online.

The MGBH e-Permitting purchasing system makes it easier for hunters to respond to the questions on the permit application, which helps to 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.canada.ca/en/environment-climate-change/services/migratory-bird-permits.html

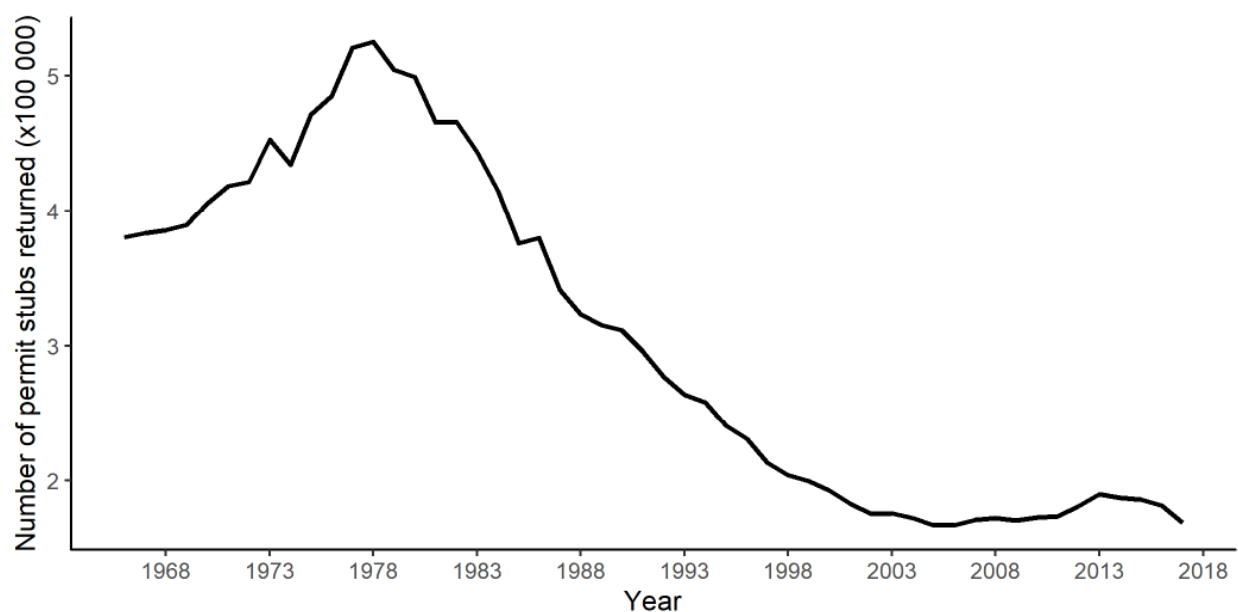


Figure 3.4-1 Number of migratory bird hunting permit stubs returned to Environment and Climate Change Canada. Permits that were sold, but for which the stubs were not returned to Environment and Climate Change Canada, are excluded from the totals.

4. Population Status of Inland Dabbling Ducks

4.1 American Black Duck (*Anas rubripes*)

The American Black Duck (hereafter Black Duck) breeds primarily in northeastern North America where it historically was one of the most abundant duck species (Longcore *et al.* 2000). However, its abundance started declining in the 1950s possibly due to changes in breeding and wintering habitat quality, overharvesting, and interactions (competition, hybridization) with Mallards (Conroy *et al.* 2002). Black Duck numbers appear to have stabilized over the last 20–30 years.

4.1.1 Abundance and Trends

The Black Duck breeding population is monitored annually through the Eastern Waterfowl Breeding Ground Survey (Figure 3.1-2, Monitoring section). Black Ducks 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.

LARGE-SCALE WATERFOWL SURVEY

EASTERN WATERFOWL BREEDING GROUND SURVEY

Black Duck breeding population estimates in the four regions of the survey area are presented in Table 4.1-1 and Figure 4.1-1. The long-term population trend is stable in the core breeding area. However, the population increased significantly in the Atlantic Highlands (1990–2019) and decreased significantly in the Western Boreal Shield (1990–2019). Recent trends (2015–2019) in all four regions show a declining trend. The total population in the core survey area in 2019 was approximately 464 000 ducks.

Table 4.1-1 American Black Duck Breeding Population Estimates with 95% Credible Intervals (CI) and Trend Estimates Based on the Eastern Waterfowl Breeding Ground Survey (The estimates are based on the combined results of helicopter and fixed-wing aircraft surveys. Trends are expressed as an annual percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates in Core Area (in thousands)	1990–2019 Trend (long term)	2015–2019 Trend (5 years)
Atlantic Highlands	101.79 (78.62 – 128.48)	1.05 (0.27 – 1.88)*	-1.99 (-6.35 – 2.42)
Central Boreal Shield	154.37 (123.17 – 192.02)	0.07 (-0.50 – 0.65)	-0.54 (-3.36 – 2.01)
Eastern Boreal Shield	125.95 (88.46 – 170.11)	0.16 (-0.59 – 0.86)	-0.57 (-4.08 – 2.79)
Western Boreal Shield	177.29 (132.84 – 229.94)	-0.76 (-1.35 – -0.13)*	-0.65 (-2.68 – 1.77)
Total Survey Area	563.27 (486.39 – 647.76)	-0.05 (-0.38 – 0.30)	-0.85 (-2.35 – 0.67)

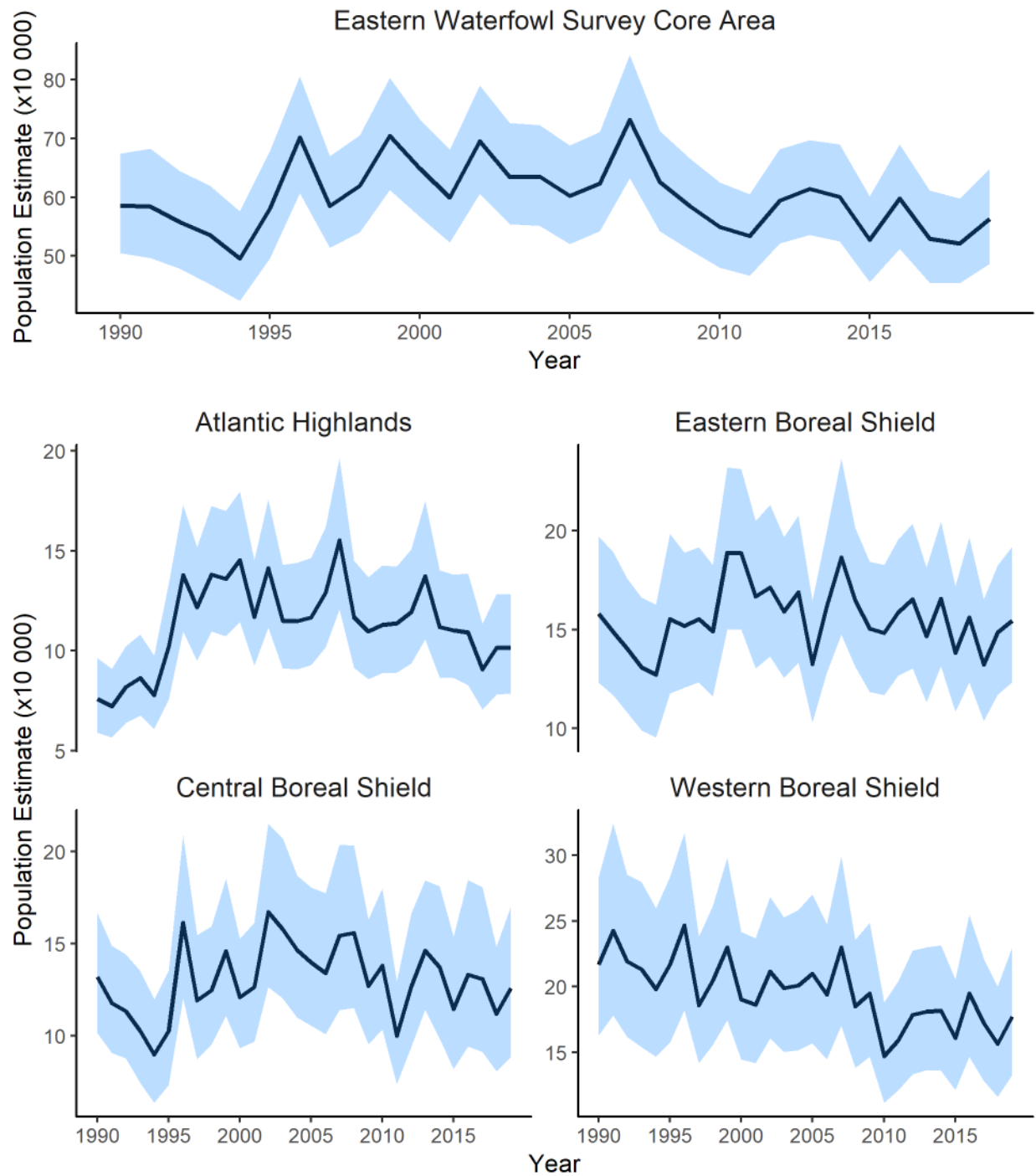


Figure 4.1-1 Black Duck breeding population estimates based on the Eastern Waterfowl Breeding Ground Survey, black line represents the population estimate while the shaded area represents the 95% Credible Interval.

SMALL-SCALE WATERFOWL SURVEYS

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, mainly because of the species' generally low abundance within the survey area now. The 2018 estimate of 11 000 pairs is on par with the 10-year average of 10 600 pairs and is considerably higher than the 2013 estimate of approximately 3 600 pairs, which was the lowest estimate ever recorded since the survey started in 1971 (Figure 4.1-2).

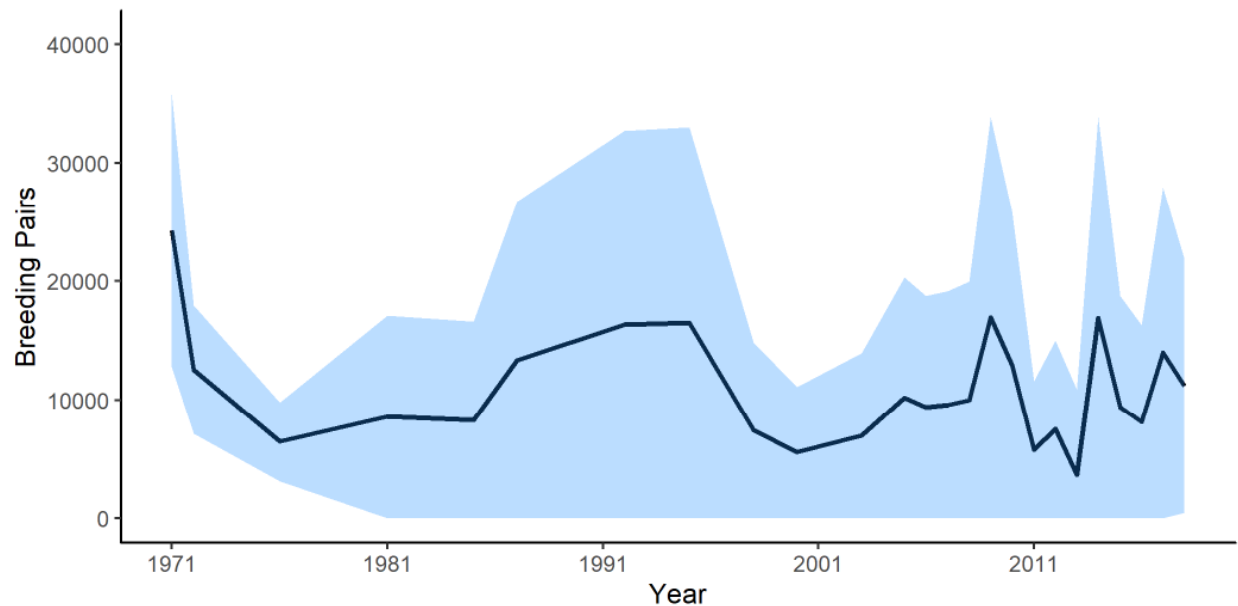


Figure 4.1-2 Indicated breeding pairs of American Black Ducks in Southern Ontario; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Intervals.

ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

Historically, the Black Duck was the dominant dabbling duck species in the St. Lawrence lowlands, but this is no longer the case. The Black Duck is currently the third most abundant, following the Mallard and the Wood Duck.

The St. Lawrence lowlands hosted an average of approximately 3 100 breeding pairs of Black Duck annually for the period of 2014–2019. The 2019 estimate of 1 598 breeding pairs is the lowest in the past decade (Figure 4.1-3). While this population has negative trends both in the long term, and in the past five years, neither are significant (Figure 4.1-3).

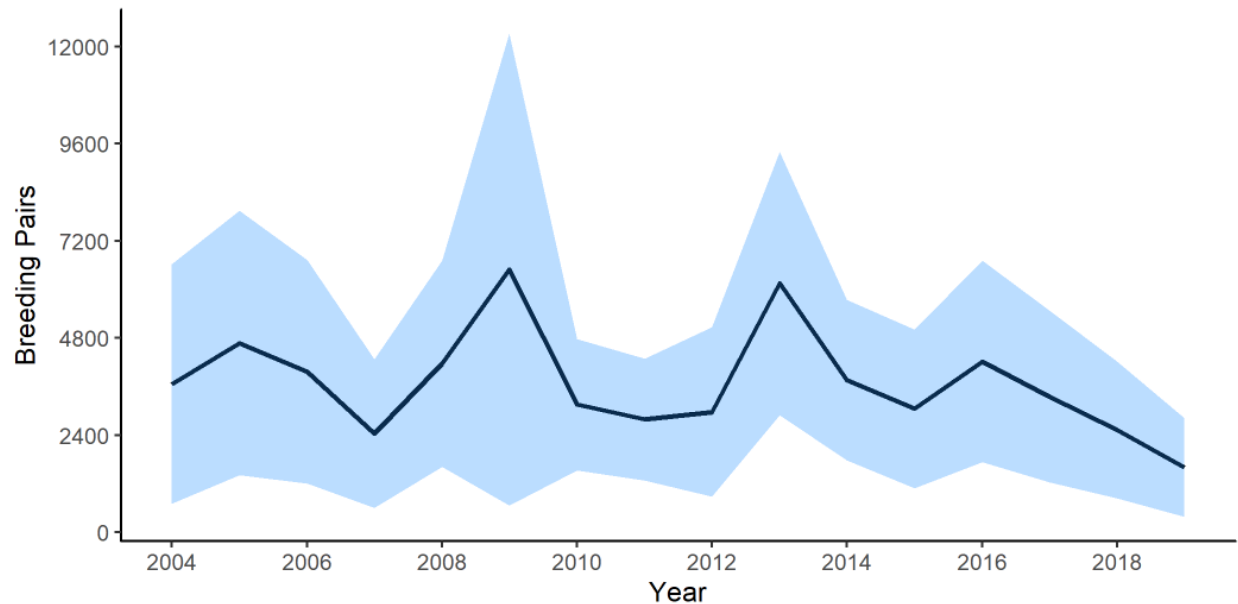


Figure 4.1-3 Estimated number of American Black Duck Indicated Breeding Pairs in the St. Lawrence Lowlands, Quebec; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Intervals.

4.1.2 Harvest

Declines in Black Duck abundance on the wintering grounds noted by the Mid-Winter Survey prompted the U.S. government to change regulations and reduce the harvest in 1983. Canada joined the initiative in 1984 by imposing restrictions on harvest. Between 1984 and 1988, the harvest in the U.S. decreased gradually, while harvest remained stable in Canada. In 1989 and 1990, Canada implemented more restrictive hunting regulations. The annual Canadian Black Duck harvest declined by approximately 3% annually between 1990 and 2010, while the U.S. declined 1% annually. (Figure 4.1-4). These restrictive harvest regulations and a decline in the number of waterfowl hunters likely caused Black Duck harvest to decline and the population to stabilize over 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; Roy *et al.* 2015).

Historically, the harvest of Black Ducks in the U.S. and in Canada has approached parity (Figure 4.1-4). The number of Black Ducks harvested in Canada in 2018 was one of the lowest numbers on record, at an estimated 52 500 birds (Figure 4.1-4).

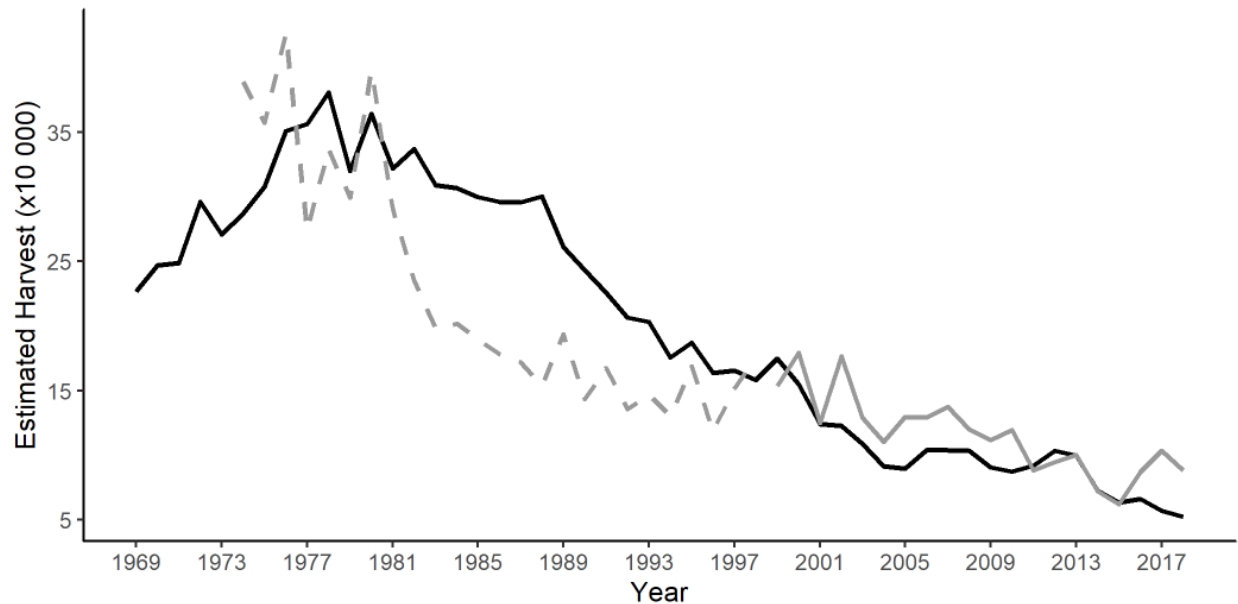


Figure 4.1-4 Estimated American Black Duck harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1330>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

4.1.3 Management and Conservation Concerns

Mid-Winter Survey results 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. This decline in the Mid-Winter Survey resulted in the implementation of restrictive harvest regulations aimed at reducing harvest. Since then, the winter population has 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 which could explain in part the decline observed in the Mid-Winter Survey (Brook *et al.* 2009; Robertson *et al.* 2017). Three factors have been hypothesized to explain the 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).

Because of the limitations of the winter surveys, the Black Duck Joint Venture began a large-scale aerial survey (the Eastern Waterfowl Breeding Ground Survey) in 1990 by the to monitor Black Duck numbers on their breeding grounds (Atlantic provinces, boreal forest in Quebec and northeastern Ontario) and improve monitoring of the population (Figure 3.1-2, Monitoring section). Data from this survey show that the population has remained relatively stable since 1990.

In 2012, the CWS and the USFWS to adopted an International Black Duck Harvest Strategy to maintain sustainable population levels and share 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 package defined as the 1997

to 2010 average harvest rate. Harvest regulations under this strategy were first implemented in 2013–2014 under a liberal package. Moderate levels of harvest were implemented briefly for the hunting seasons from 2014–2017 but since the 2018-2019 hunting season, harvest regulations in Canada are implemented under a liberal package. Harvest was liberalized because recent analysis shows that harvest affects the population size minimally under the restrictive (U.S.) and moderate (Canada) regulatory regimes—instead breeding success is the main factor. Hunting regulations and the Black Duck harvest management approach are published annually by ECCC in the *Migratory Birds Regulations in Canada* report.

Hybridization between Black Duck and Mallard has been a concern for the management of the Black duck (Conroy *et al.* 2002). However, hybrids are not outcompeting Black Ducks despite the high hybridization rate between the two species (Lavretsky *et al.* 2019). The role of the Mallard in the observed decline of Black duck in eastern North America has yet to be established, though recent analyses of the adaptive harvest management models suggests minimal influence of Mallards on black duck population.

4.2 Mallard (*Anas platyrhynchos*)

The Mallard is the most abundant, widely distributed, and harvested duck species in Canada with the highest abundance in the Prairie provinces and in Ontario. Mallards have been expanding eastward for decades and are now well established in the Maritimes, but continue to remain rare in Newfoundland and Labrador (Drilling *et al.* 2002).

4.2.1 Abundance and Trends

The Mallard is monitored in its core breeding range through the WBPHS in western Canada and the northwestern U.S., the Eastern Waterfowl Breeding Ground Survey, and the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. 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, the Northwest Territories Boreal Waterfowl and Waterbirds Survey.

LARGE-SCALE WATERFOWL SURVEYS

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, and in 2019, is estimated to contain 9.4 million birds, this is above the NAWMP goal of 7.7 million birds (NAWMP 2018, Figure 4.2-1). The long term trend is stable, however the trend in the past five years has been significant and negative (Table 4.2-1).

The estimated abundance of Mallards in the Canadian Prairies in 2019 (3.1 million birds) is well below the NAWMP goal of 4.4 million birds (Figure 4.2-1). There is a significant negative trend in the Canadian prairies in both the long term, and in the past five years. In western boreal Canada, the Mallard breeding population has had a significant short term decline, but in the long term is stable (Table 4.2-1).

Table 4.2-1. Mallard Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970–2019 Trend (long term)	2015–2019 Trend (5 years)
Traditional Survey Area	9423.55 (8866.00 — 9981.10)	0.12 (-0.04 — 0.28)	-3.80 (-5.35 — -2.29)*
Alaska	355.30 (286.25 — 424.36)	0.91 (0.49 — 1.33)*	-4.63 (-9.29 — -0.01)*
Western Boreal Canada	2811.85 (2423.27 — 3200.43)	0.24 (-0.13 — 0.58)	-4.17 (-7.44 — -0.84)*
Canadian Prairies	3125.45 (2886.54 — 3364.36)	-0.73 (-0.92 — -0.53)*	-8.49 (-10.41 — -6.41)*
U.S. Prairies (North Central)	3130.95 (2817.87 — 3444.03)	1.55 (1.25 — 1.85)*	4.18 (1.02 — 7.43)*

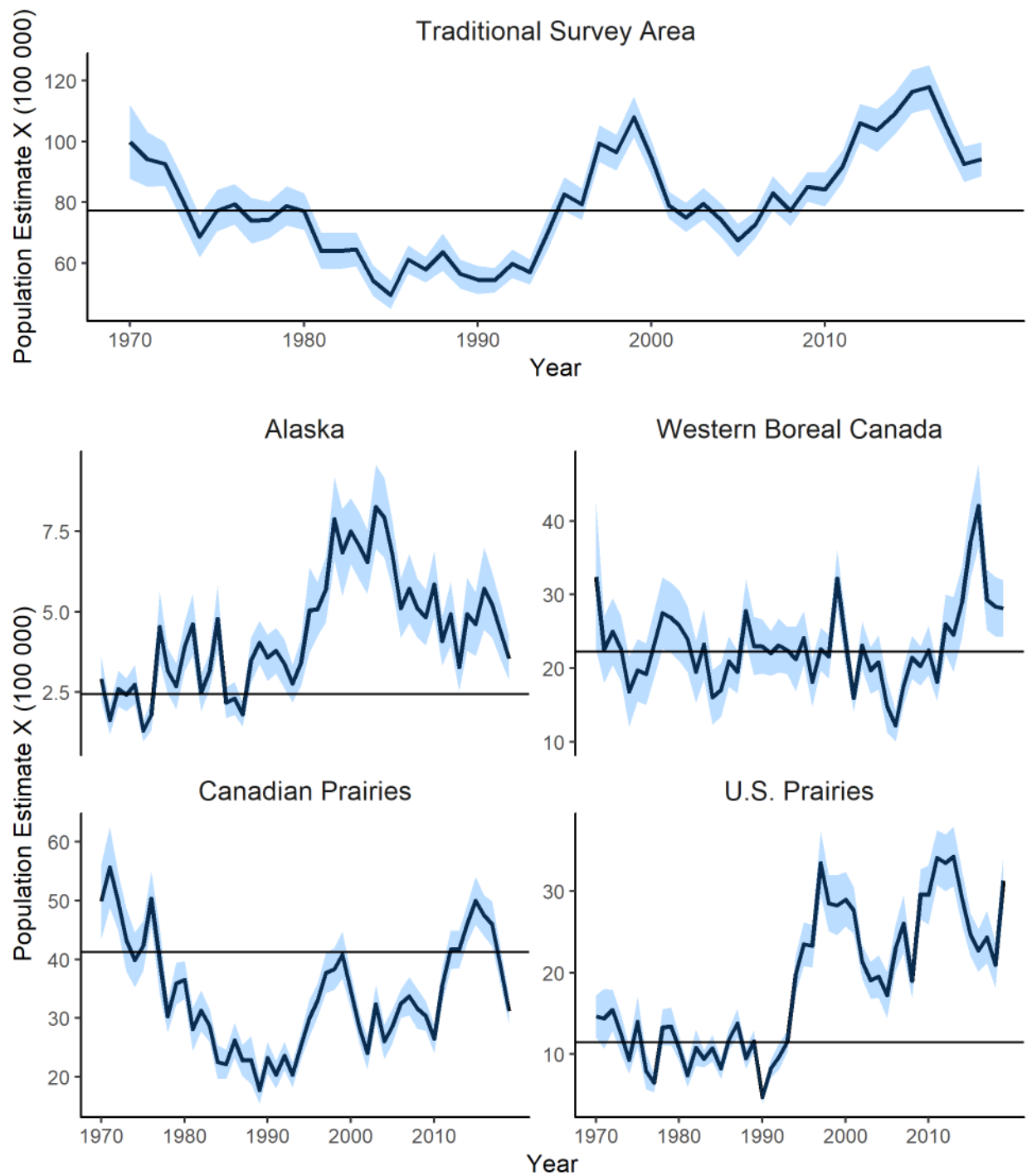


Figure 4.2-1 Mallard breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Interval (Horizontal lines represent the NAWMP goal in each region of the survey).

EASTERN WATERFOWL BREEDING GROUND SURVEY

Mallards exhibit stable trends in all areas surveyed (Figure 4.2-2). Though the Central Boreal Shield shows both long term and short term declining trends, neither are significant. The only significant trend is in the Atlantic highlands, which has a significant positive trend since 1990 (Table 4.2-2).

Table 4.2-2 Mallard Breeding Population Estimates with 95% Credible Intervals (CI) and Trend Estimates Based on the Eastern Waterfowl Breeding Ground Survey (The estimates are based on the combined results of helicopter and fixed-wing aircraft surveys. Trends are expressed as an annual percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates in Core Area (in thousands)	1990-2019 Trend (long-term)	2015–2019 Trend (5 years)
Atlantic Highlands	20 (11 - 35)	6.90 (4.65 - 9.32)	5.04 (-5.06 - 14.35)
Central Boreal Shield	9 (4 - 14)	0.77 (-0.95 - 2.37)	0.20 (-7.60 - 8.33)
Eastern Boreal Shield	1 (0 - 4)	-1.72 (-7.00 - 3.15)	-2.54 (-22.73 - 16.50)
Western Boreal Shield	332 (189 - 514)	0.71 (-0.44 - 1.84)	0.32 (-4.05 - 3.89)
Eastern Survey Area	365 (216 - 552)	0.87 (-0.21 - 1.94)	0.56 (-3.54 - 3.94)

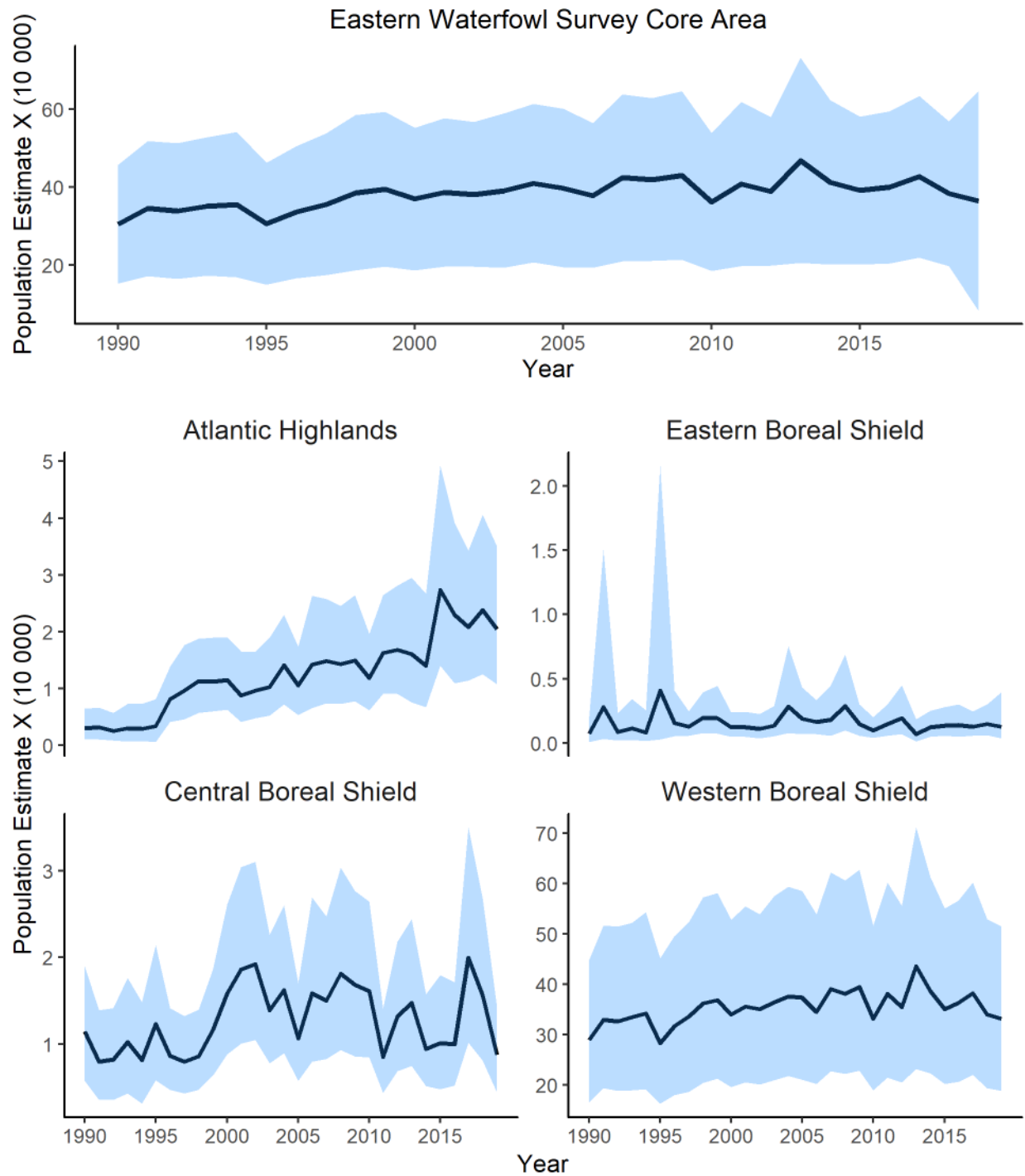


Figure 4.2-2 Mallard breeding population estimates based on the Eastern Waterfowl Breeding Ground Survey, black line represents the population estimate while the shaded area represents the 95% Credible Interval (The figures represent the combined results of helicopter and fixed-wing aircraft surveys.)

SMALL-SCALE WATERFOWL SURVEYS

NORTHWEST TERRITORIES BOREAL WATERFOWL AND WATERBIRDS SURVEY

Mallard observed densities have varied considerably throughout the survey period. Although densities in 2018 were significantly higher than at the beginning of the survey, they were similar to previous high counts. The densities were lowest in 2005 (Figure 4.2-3) but have been on the increase since then.

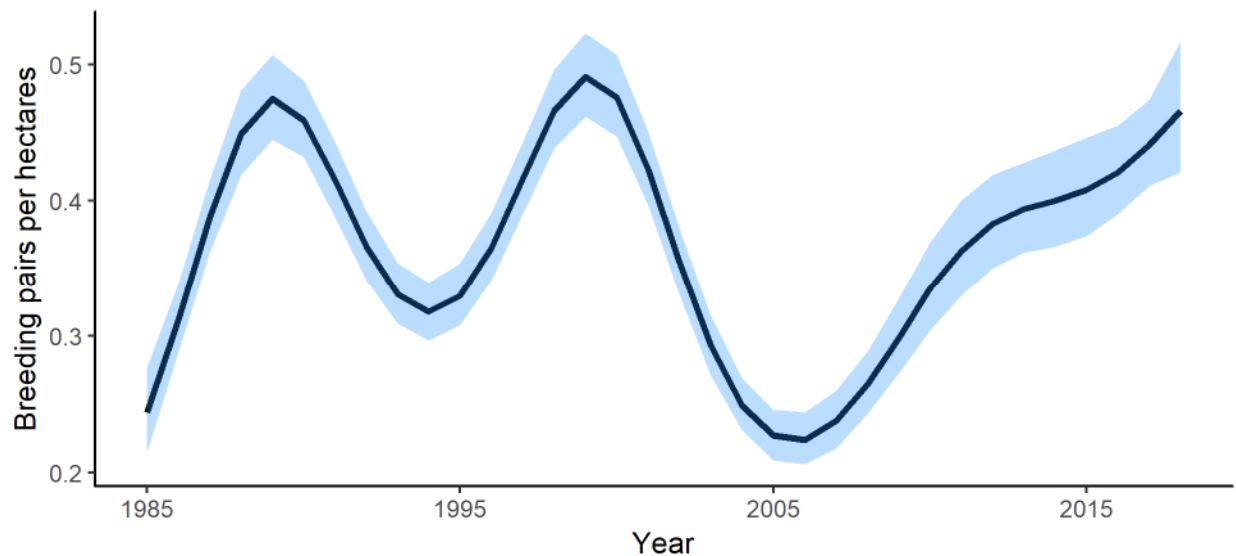


Figure 4.2-3 Density of Mallard breeding pairs observed during spring surveys near Yellowknife, NT.

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

The Mallard has been the most abundant waterfowl species in central British Columbia. However, the species is experiencing a significant decline over the long-term (Figure 4.2-4). Because of this decline, in 2019, the Mallard was second in abundance to the ring-necked duck.

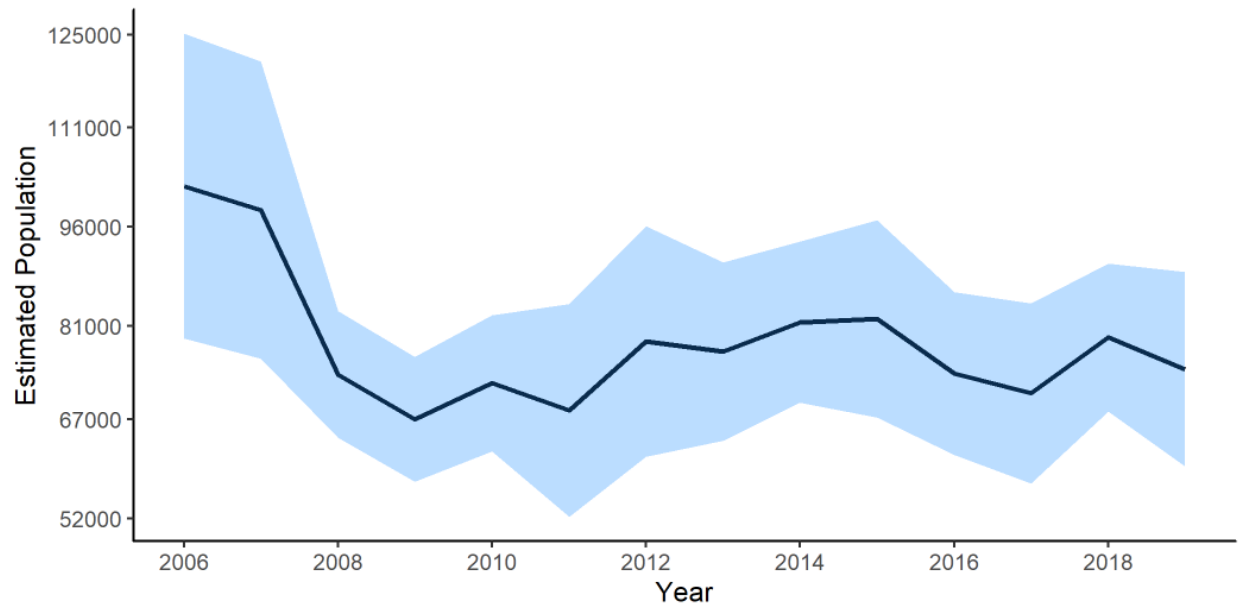


Figure 4.2-4 Total spring breeding population estimates for the Mallard in the British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Interval.

SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

The number of breeding Mallards in southern Ontario has increased since the early 1980s. In 2018, there were approximately 161 000 breeding pairs in southern Ontario, higher than the 10-year average of approximately 152 000 pairs (Figure 4.2-5). In this region, Mallards are exhibiting a significant, positive long term trend.

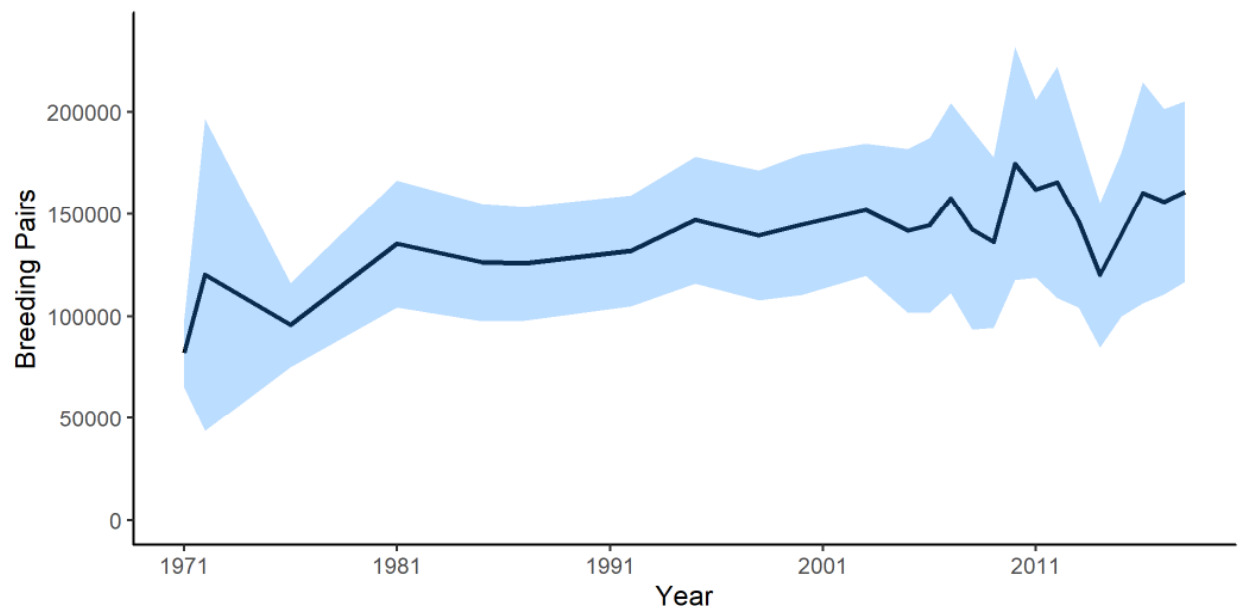


Figure 4.2-5 Estimated number of Mallard indicated breeding pairs in Southern Ontario; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Interval.

ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

The Mallard is by far the most abundant species in the St. Lawrence Lowlands with the 2019 estimate reaching 15 000 indicated breeding pairs, slightly below the 5-year average of 16 130. In this region, Mallards are experiencing a small positive trend in the long term, but a small negative trend in the past five years. Neither of these trends are significant however (Figure 4.2-6).

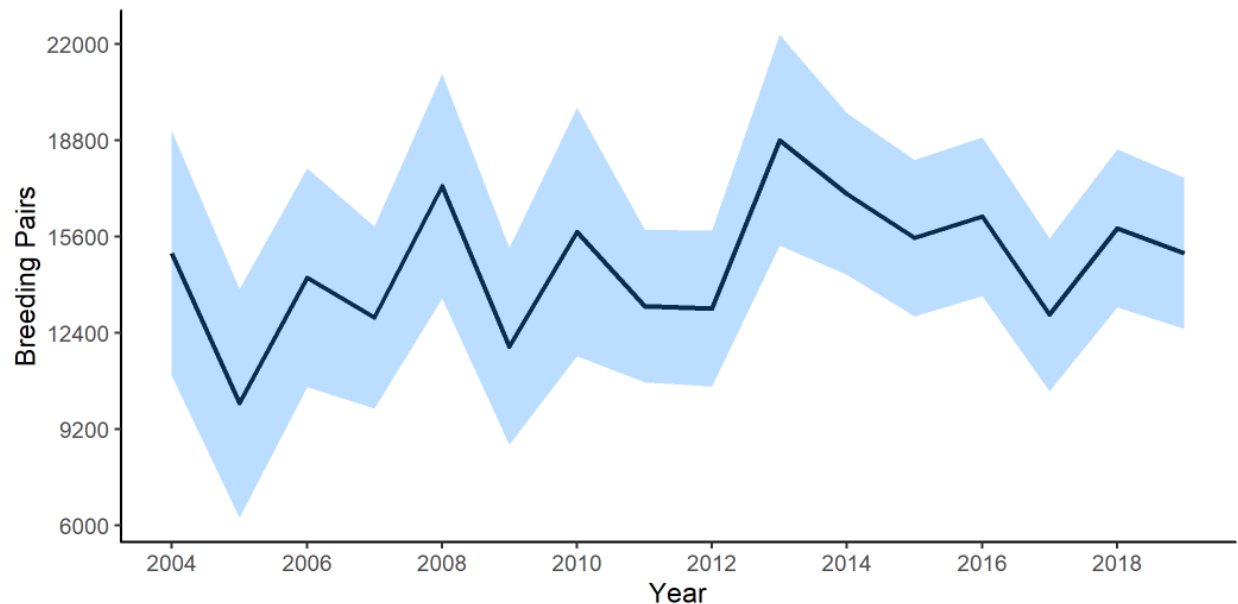


Figure 4.2-6 Estimated number of Mallard indicated breeding pairs in the St. Lawrence lowlands, Quebec; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Intervals.

4.2.2 Harvest

The Canadian Mallard harvest has declined over time, reaching an all-time low in 2010 (Figure 4.2-7). 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 2018, the total estimated harvest for this species in Canada was 451 000 birds.

4.2.3 Management and Conservation Concerns

Mallards are among the most heavily hunted waterfowl species in North America (Boomer *et al.* 2013). 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 towards their management than for any other North American duck species (Drilling *et al.* 2002).

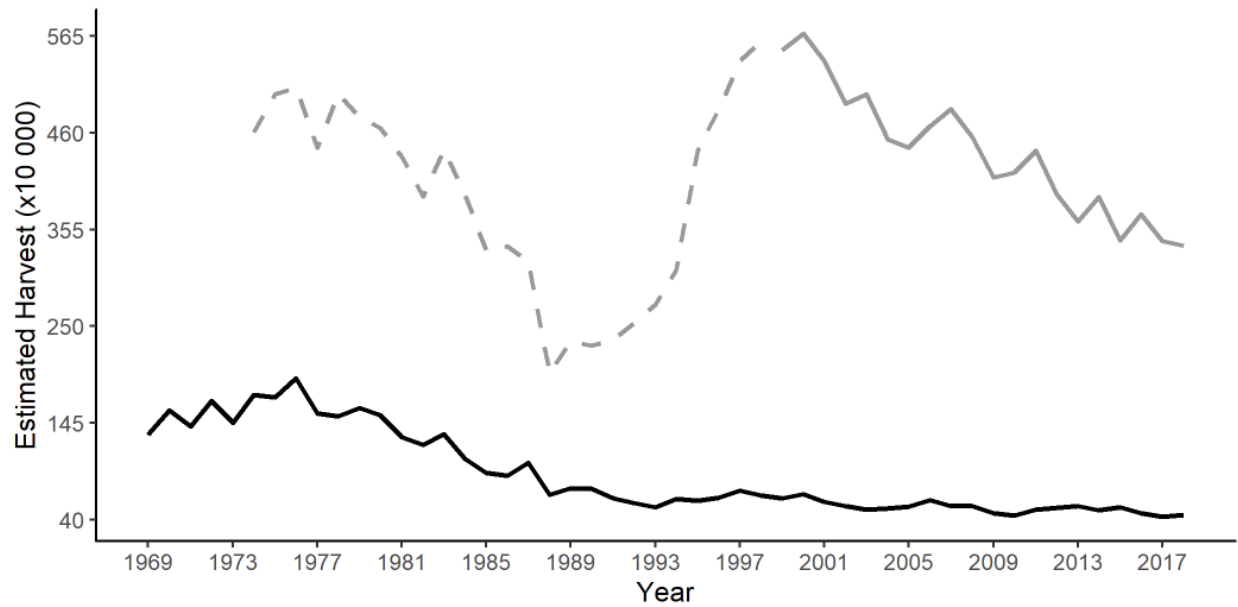


Figure 4.2-7. Estimated Mallard harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1320>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

4.3 Northern Pintail (*Anas acuta*)

The Northern Pintail breeds throughout Canada but its core breeding range is in the Prairie Pothole Region (Clark *et al.* 2014). Annual nest success and productivity vary with water conditions in the Prairies (Johnson and Grier 1988; Hestbeck 1995). As such, periods of extended drought have caused dramatic population declines, most notably in the Canadian Prairies.

4.3.1 Abundance and Trends

The Northern Pintail breeding population is monitored annually in western Canada through the WBPHS and the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. Northern Pintail numbers were also formerly monitored outside of the WBPHS survey area by the Northwest Territories Boreal Waterfowl and Waterbirds Survey.

LARGE-SCALE WATERFOWL 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, the breeding population of Northern Pintail in the WBPHS survey area showed signs of a recovery, increasing to 3.6 million birds by 1997 (Figure 4.3-1). 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 2019, the population estimate was 2.2 million birds (Table 4.3-1), about half of the NAWMP goal of 4.0 million birds (NAWMP 2018).

The 2019 breeding population estimate in the Canadian Prairies (310 670 birds) is about half of 2018's estimate of 623 600 birds (Table 4.3-1). The Canadian Prairie population estimates still remain well below the NAWMP goal of 3.3 million birds in this region (NAWMP 2012). In the Western Boreal Region, the Northern Pintail population is estimated to contain around 543 500 birds (Table 4.3-1), exceeding the NAWMP goal of 407 000 birds for this region.

Table 4.3-1. Northern Pintail Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970–2019 Trend (long term)	2015–2019 Trend (5 years)
Traditional Survey Area	2268.60 (2026.88 — 2510.33)	-1.88 (-2.13 — -1.62)*	-5.09 (-8.10 — -2.12)*
Alaska	420.25 (319.25 — 521.25)	-0.36 (-0.74 — 0.03)	-5.26 (-9.92 — -0.59)*
Western Boreal Canada	543.49 (409.97 — 677.01)	1.55 (0.91 — 2.16)*	-1.71 (-9.19 — 6.18)
Canadian Prairies	310.67 (260.56 — 360.78)	-4.85 (-5.23 — -4.47)*	-23.33 (-27.47 — -19.12)*
U.S. Prairies (North Central)	994.18 (827.18 — 1161.19)	-0.60 (-1.12 — -0.08)*	8.84 (1.98 — 15.94)*

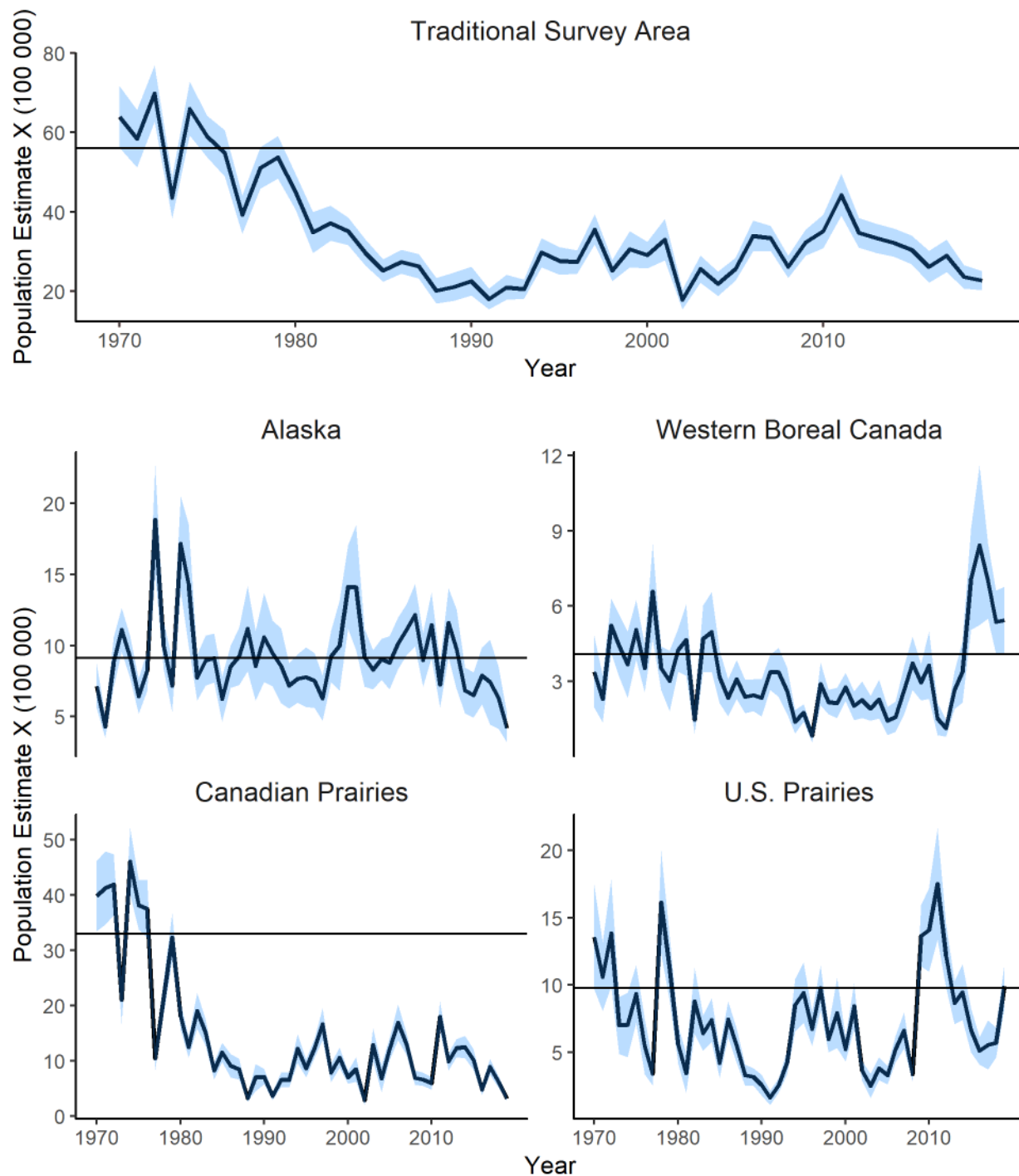


Figure 4.3-1 Northern Pintail breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Interval (Horizontal lines represent the NAWMP goal in each region of the survey).

SMALL-SCALE WATERFOWL SURVEYS

NORTHWEST TERRITORIES BOREAL WATERFOWL AND WATERBIRDS SURVEY

Northern Pintail densities have significantly decreased since 1990. There was a brief increase in the 1990 (Figure 4.3-2) but the population has steadily decreased until 2005 when it stabilized itself at around 0.01 breeding pairs per hectare.

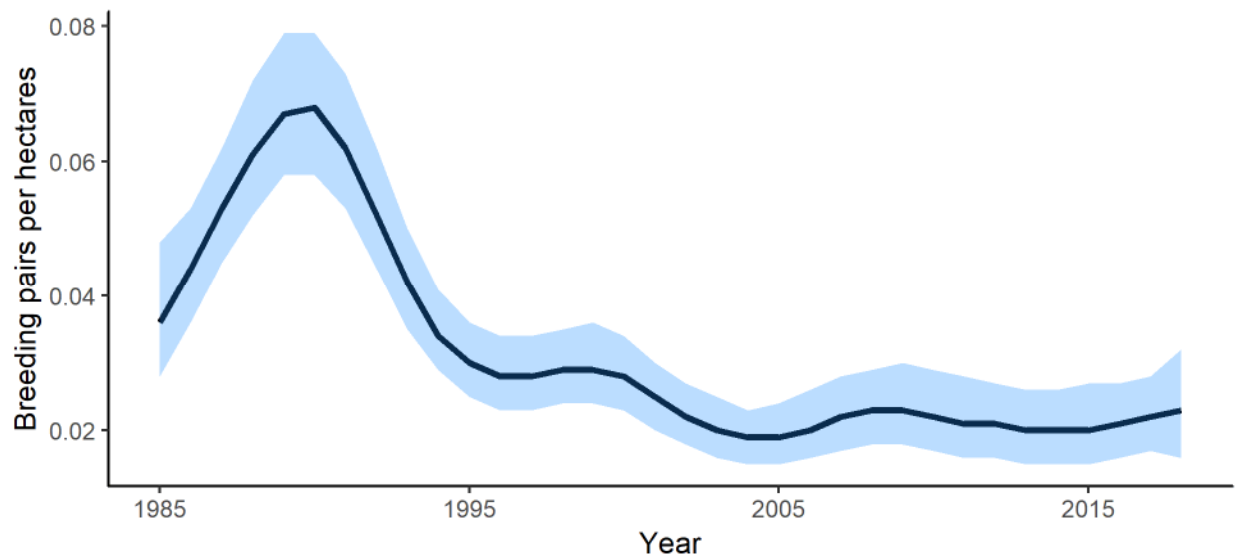


Figure 4.3-2 Density of Northern Pintail breeding pairs observed during spring surveys near Yellowknife, NT.

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

Despite important inter-annual variation, the Northern Pintail population in the central interior plateau of B.C. has not changed significantly since the beginning of the survey, in 2006 (Figure 4.3-3).

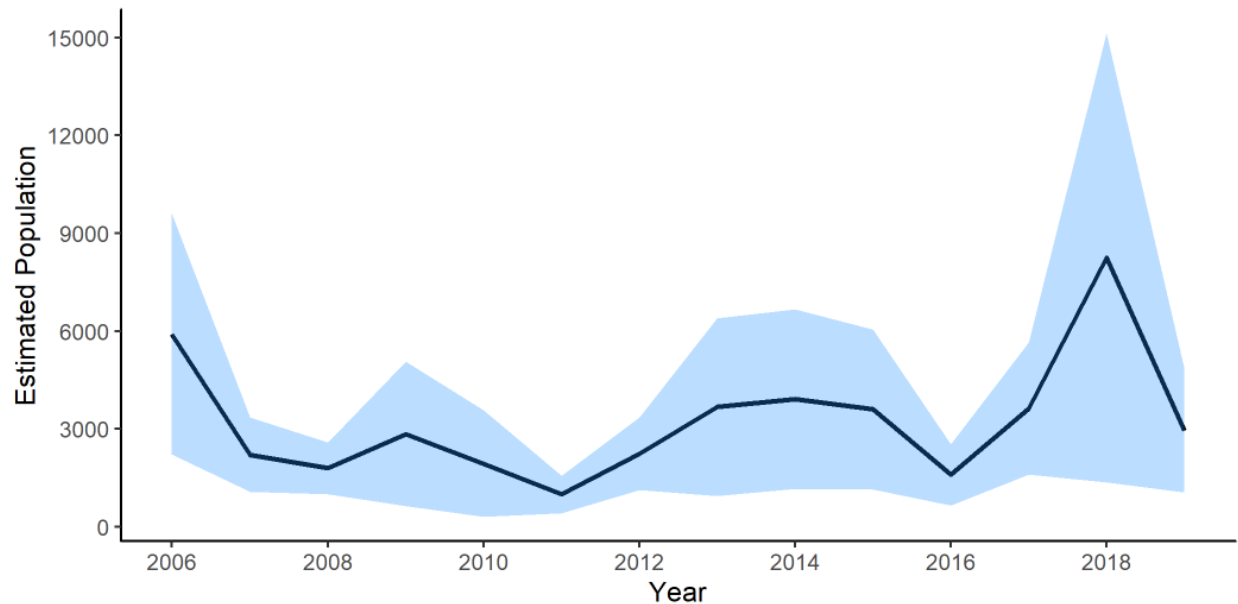


Figure 4.3-3 Population estimates of Northern Pintails in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Interval.

4.3.2 Harvest

In Canada, the Northern Pintail harvest has decreased by approximately 70–80% since the 1980s and for the last ten years has averaged at 46 000. Such a decline is consistent with the decrease in abundance observed for the population and in hunter numbers (Figure 4.3-4).

4.3.3 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). Agriculture and changes in farming practices likely contribute to the disappearance of breeding habitat (Podruzny *et al.* 2002). Agricultural intensification in the Prairies potholes regions negatively affects breeding productivity and largely explains the slow recovery of the population (Zhao *et al.* 2019).

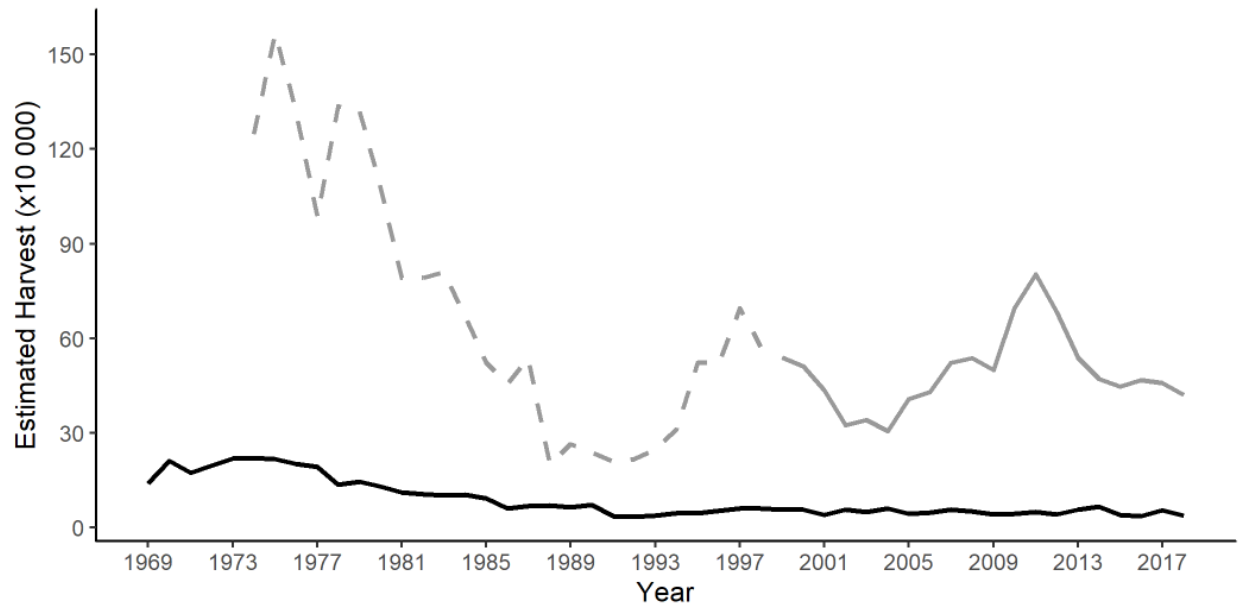


Figure 4.3-4 Estimated Northern Pintail harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1430>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

4.4 Green-winged Teal (*Anas crecca*)

The Green-winged Teal is a widely distributed and relatively abundant species across Canada; it primarily breeds in forest wetlands, with its core breeding range in the boreal forest. In 2018, the Green-winged Teal was the fourth most harvested duck species in Canada after the Mallard, Wood Duck and Black Duck.

4.4.1 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 WBPHS in western Canada, the Eastern Waterfowl Breeding Ground Survey, and the Cooperative Yukon Roadside Waterfowl Breeding Population Survey, the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. The species is also monitored by the Southern Ontario Waterfowl Plot Survey, and the St. Lawrence Lowlands Breeding Waterfowl Survey.

LARGE-SCALE WATERFOWL SURVEYS

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

The population shows a significant long-term increase in the traditional survey area (Table 4.4-1) and exceeds the NAWMP population objective of 2.1 million birds (NAWMP 2018; Figure 4.4-1). Alaska and Western Boreal Canada populations increased in the long term and the U.S. Prairies has shown no significant trends in the long term. In the Canadian Prairies region, the Green-Winged Teal has significant declines in both the long and short term. No other region shows significant trends in the short term.

Table 4.4-1. American Green-winged Teal Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970-2019 Trend (long term)	2015-2019 Trend (5 years)
Traditional Survey Area	3178.55 (2817.07 — 3540.04)	0.93 (0.66 — 1.22)*	-3.58 (-7.06 — 0.07)
Alaska	413.01 (324.93 — 501.09)	1.42 (0.93 — 1.90)*	-3.85 (-8.75 — 1.21)
Western Boreal Canada	1903.26 (1573.69 — 2232.83)	2.46 (1.96 — 2.95)*	-3.03 (-8.34 — 2.79)
Canadian Prairies	650.70 (543.32 — 758.09)	-0.94 (-1.29 — -0.59)*	-7.17 (-11.32 — -2.83)*
U.S. Prairies (North Central)	211.58 (158.97 — 264.20)	-0.30 (-0.90 — 0.28)	6.73 (-2.21 — 16.39)

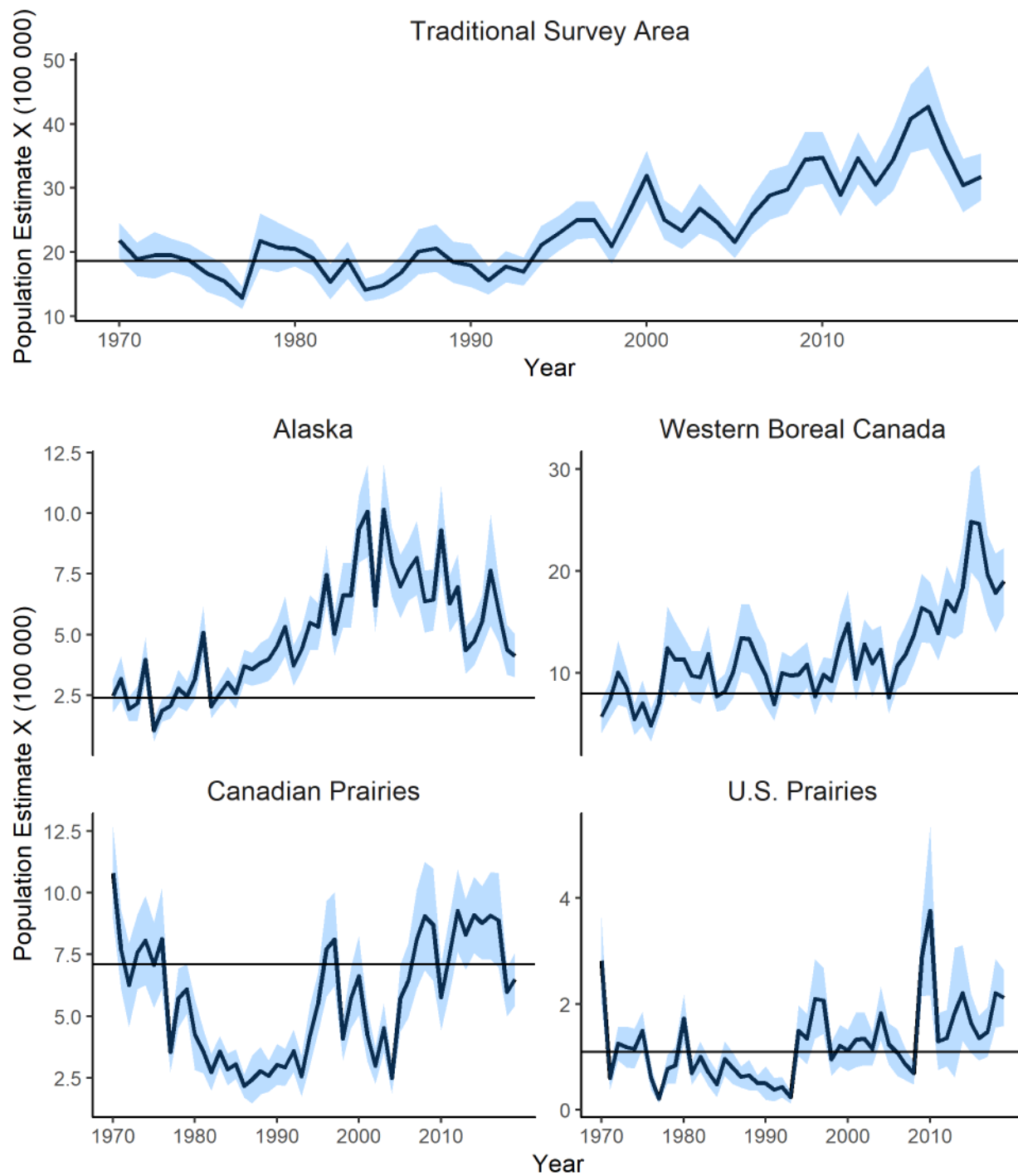


Figure 4.4-1 Green-Winged Teal breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Interval (Horizontal lines represent the NAWMP goal in each region of the survey).

EASTERN WATERFOWL BREEDING GROUND SURVEY

The estimated abundance of Green-winged Teal in the core survey area in 2019 is lower than the 2018 estimate, at approximately 195 000 ducks (Table 4.4-2). This species exhibits stable trends in the core area of the Eastern Waterfowl Breeding Ground Survey (Figure 4.4-2), and it is below the population objective of 263 000 individuals in the Eastern Survey Area (NAWMP 2018). The only region showing significant change is the Atlantic highlands which has grown since 1990.

Table 4.4-2 Green-winged teal Breeding Population Estimates with 95% Credible Intervals (CI) and Trend Estimates Based on the Eastern Waterfowl Breeding Ground Survey (The estimates are based on the combined results of helicopter and fixed-wing aircraft surveys. Trends are expressed as an annual percentage change. Significant trends are indicated with a star [*])			
	2018 Breeding Population Estimates in Core Area (in thousands)	1990-2018 Trend (long term)	2015-2018 Trend (5 years)
Atlantic Highlands	31.12 (18.26 — 47.78)	1.64 (0.22 — 3.09)*	-1.64 (-10.03 — 5.81)
Central Boreal Shield	84.08 (52.36 — 125.96)	0.31 (-0.73 — 1.42)	0.22 (-3.71 — 4.03)
Eastern Boreal Shield	41.61 (17.86 — 84.36)	-1.43 (-3.72 — 0.70)	-1.85 (-15.36 — 14.93)
Western Boreal Shield	70.98 (39.60 — 111.34)	-0.46 (-1.69 — 0.71)	-0.37 (-5.55 — 4.95)
Total Survey Area	234.16 (169.79 — 314.46)	-0.03 (-0.72 — 0.68)	-0.49 (-3.59 — 2.75)

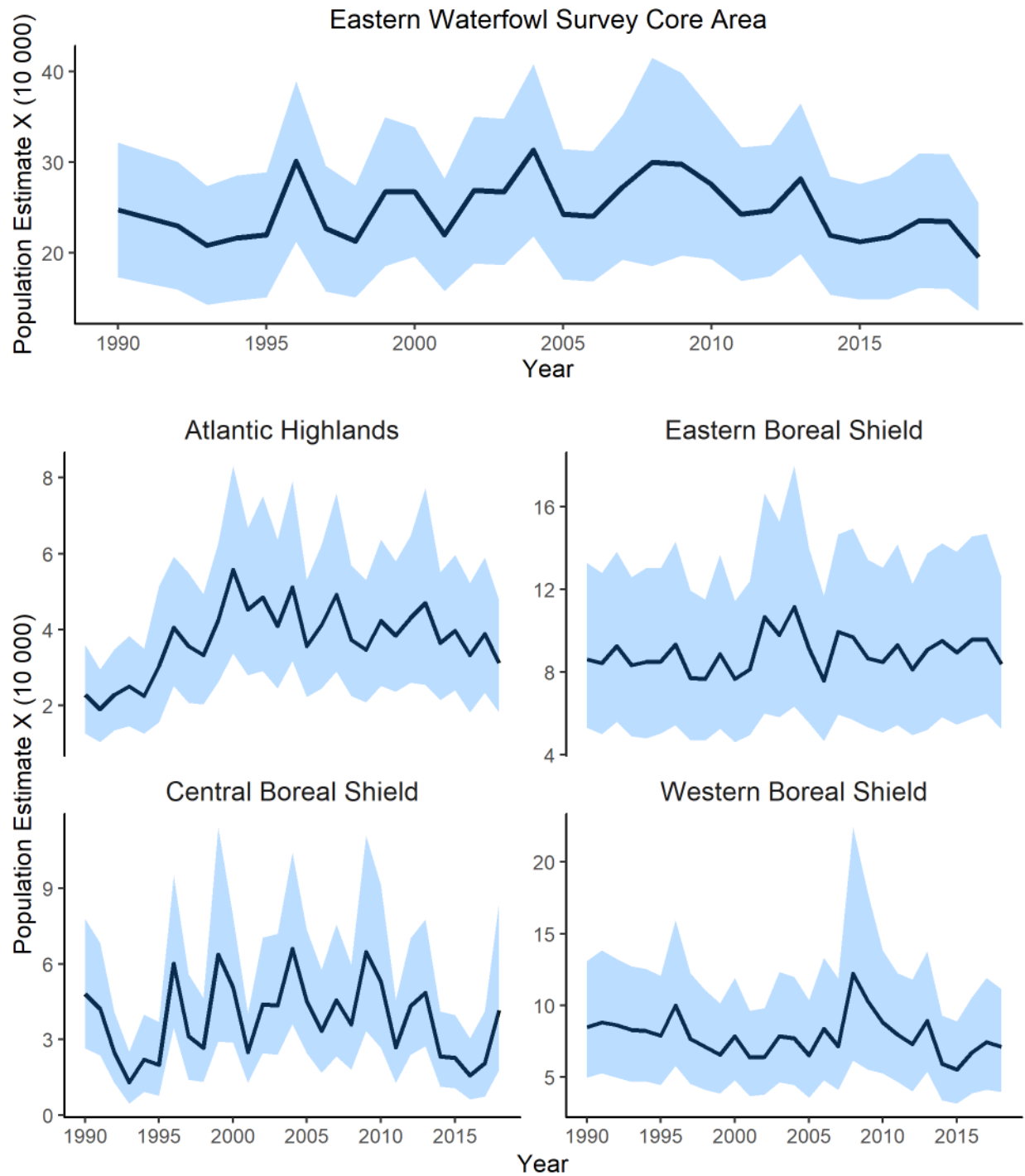


Figure 4.4-2 Green-Winged Teal breeding population estimates based on the Eastern Waterfowl Breeding Ground Survey, black line represents the population estimate while the shaded area represents the 95% Credible Interval (The figures represent the combined results of helicopter and fixed-wing aircraft surveys.)

SMALL-SCALE WATERFOWL SURVEYS

NORTHWEST TERRITORIES BOREAL WATERFOWL AND WATERBIRDS SURVEY

Green-winged Teal densities have decreased since the early 1990s, when there was a brief increase in population sized. However, the survey suggests that populations have been stable since the late 1990s and are comparable to the densities observed in 1985 (~0.2 breeding pairs per hectare; Figure 4.4-3).

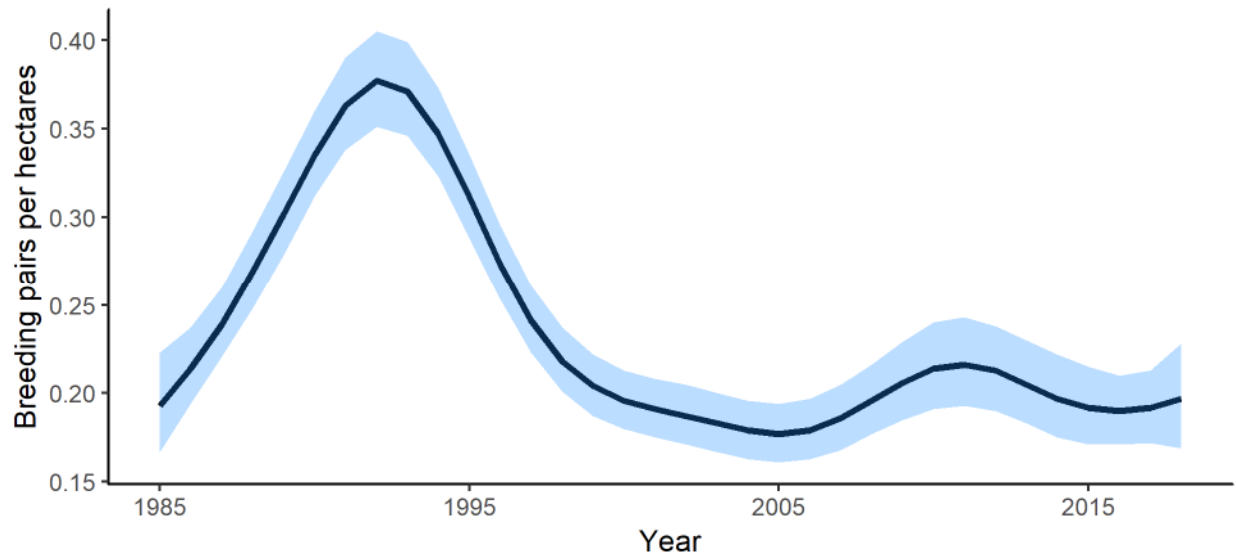


Figure 4.4-3 Density of Green-winged Teal breeding pairs observed during spring surveys near Yellowknife, NT.

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 2017. They declined between 2006 and 2011 but have gradually increased since 2011. In 2019 Green-winged Teal numbers were the highest on record, at approximately 63 000 individuals (Figure 4.4-4).

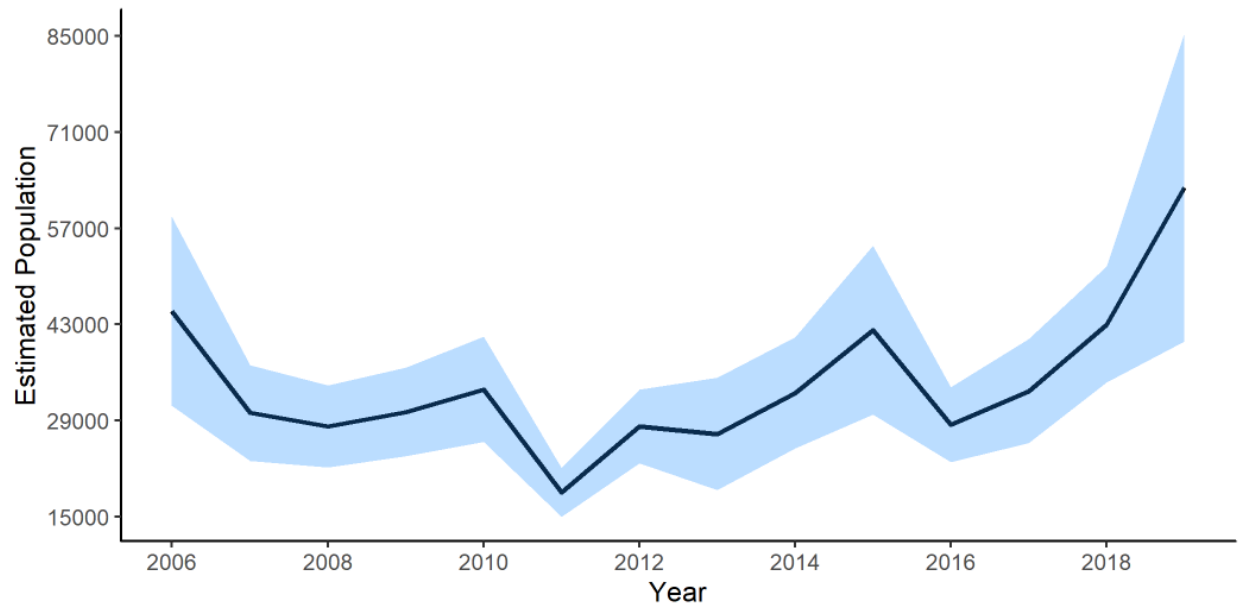


Figure 4.4-4 Population estimates of Green-winged Teal in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Interval

SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

Breeding pair estimates for the Green-winged Teal vary annually because of the species' generally low abundance within the survey area (Figure 4.4-5). However, this variation is not statistically significant and the Green-winged Teal shows an overall stable trend in southern Ontario.

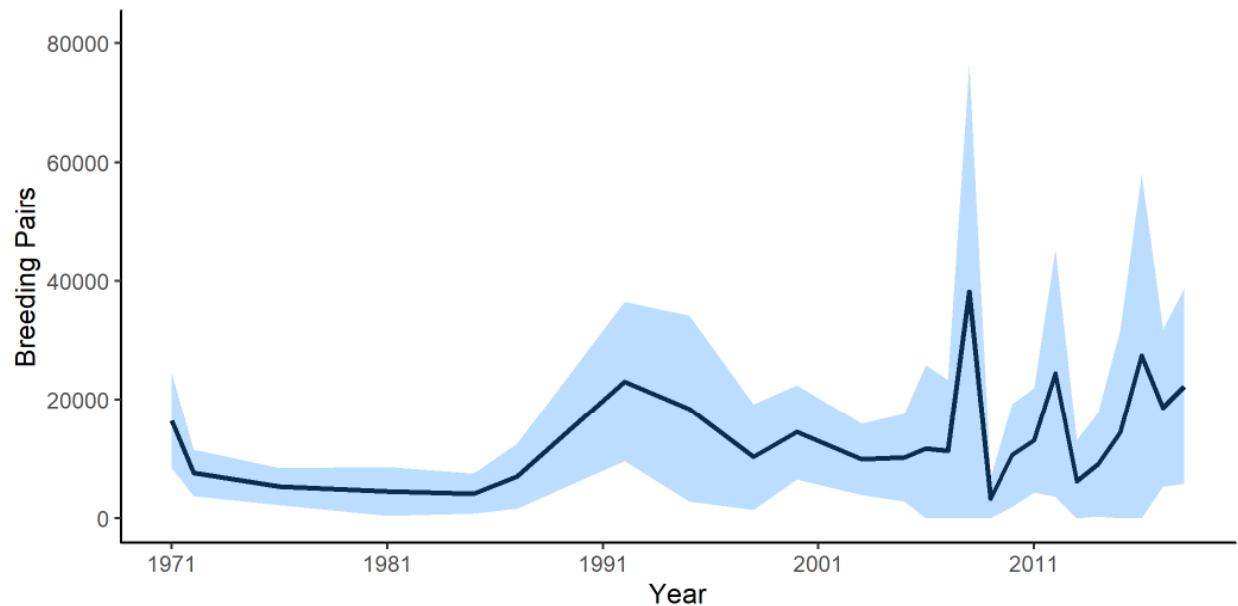


Figure 4.4-5 Indicated breeding pairs of Green-Winged Teal in Southern Ontario; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Interval.

ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

The Green-winged Teal population in the St Lawrence Lowlands is stable (Figure 4.4-6). However, the breeding population in 2019 was estimated at 2 100 pairs, lower than the 5-year average of 2800 pairs.

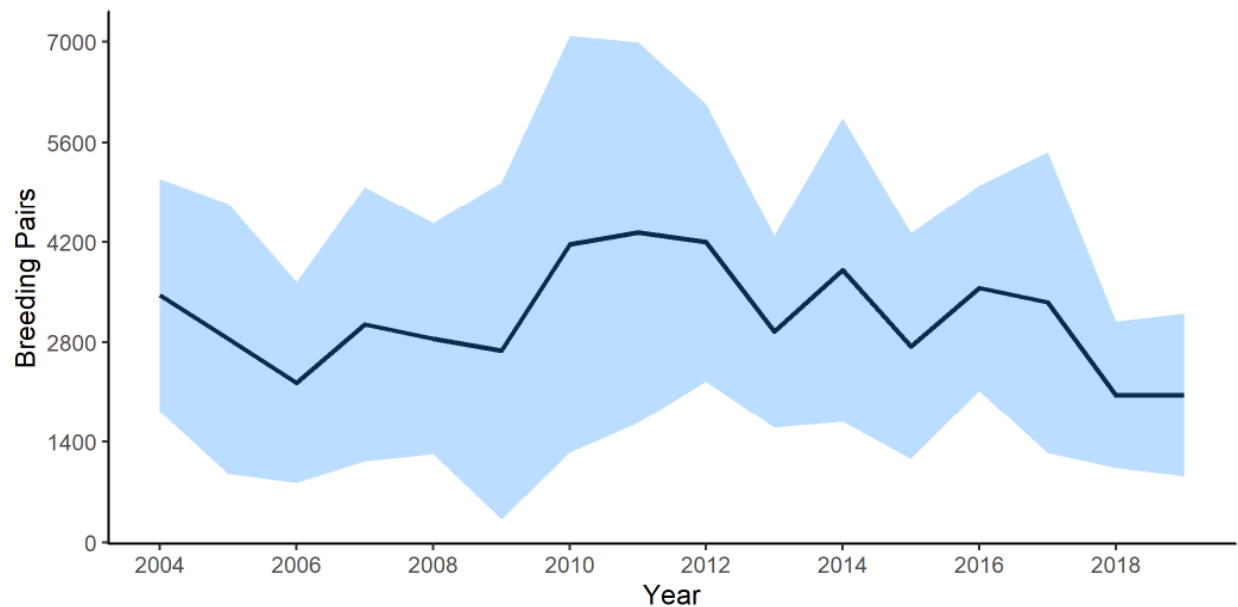


Figure 4.4-6 Estimated number of indicated breeding pairs for the Green-winged Teal in the St. Lawrence lowlands, Quebec; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Interval.

4.4.2 Harvest

In Canada, the Green-winged Teal harvest has been declining steadily since the survey began in the late 1960s (Figure 4.4-8). The U.S. harvest varies substantially between 2010 and 2018.

4.4.3 Management and Conservation Concerns

Green-winged Teal are abundant, widely distributed, and their population has increased over recent decades. An important segment of the Green-winged teal population breeds in the boreal forest, unlike other dabbling ducks. Given their reliance on the boreal forest for breeding habitat, any changes in this ecosystem could negatively affect green-winged teal.

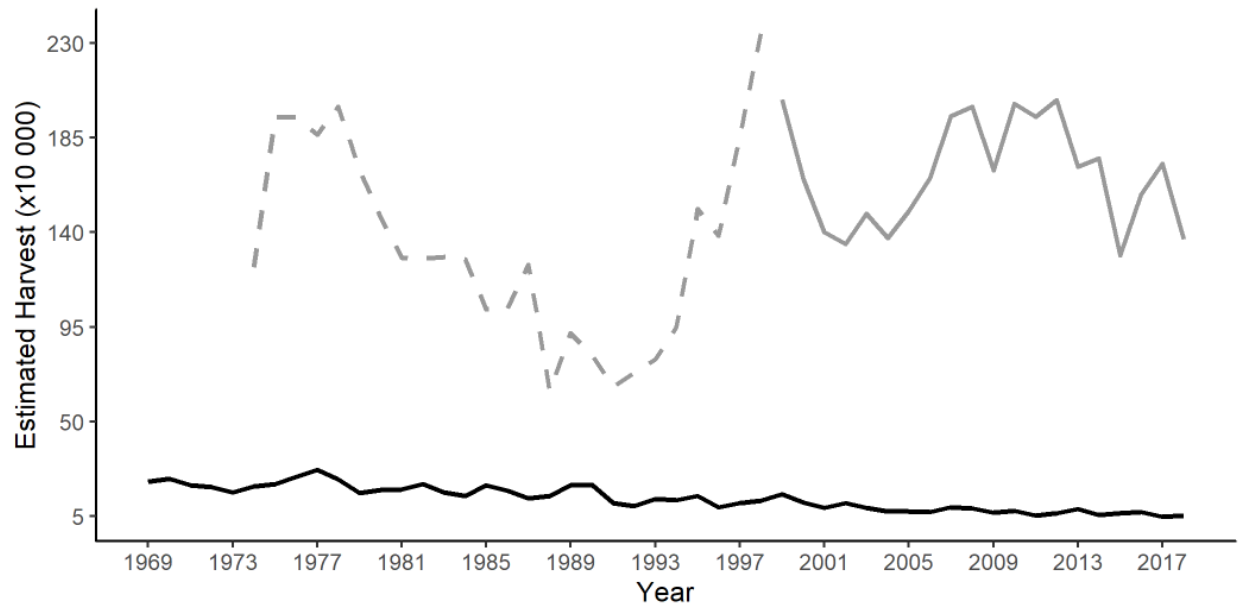


Figure 4.4-8 Estimated Green-winged Teal harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1390>) and U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. (<https://flyways.us/regulations-and-harvest/harvest-trends>). For U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

4.5 Blue-winged Teal (*Spatula discors*)

The Blue-winged Teal breeds throughout much of Canada, but its core breeding range is located in the Prairie Pothole Region. 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.

4.5.1 Abundance and Trends

Blue-winged Teal populations are monitored on the species' core breeding range through the WBPHS in western Canada and the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. The species is also monitored outside of the WBPHS survey area by the Southern Ontario Waterfowl Plot Survey.

LARGE-SCALE WATERFOWL SURVEY

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

The population estimate for 2019 for the Blue-Winged Teal is 16% lower than the 2018 estimate, going from about 6.5 million in 2018 to 5.4 million in 2019. The Blue-Winged Teal increased slightly since 1970 in the Traditional survey areas and the U.S. Prairies, but remained stable in Western Boreal Canada and decreased slightly in the Canadian Prairies. In the short-term, from 2015-2019, there was a significant decline across the Traditional Survey Area and Canadian Prairies. In Western Boreal Canada, Blue-Winged Teal have increased significantly in the past five years.

Table 4.5-1. Blue-winged Teal Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970-2019 Trend (long term)	2015-2019 Trend (5 years)
Traditional Survey Area	5427.85 (4803.10 — 6052.60)	0.47 (0.21 — 0.74)*	-9.10 (-11.92 — -6.11)*
Alaska	0.00 (0.00 — 0.00)	NA (NA — NA)	NA (NA — NA)
Western Boreal Canada	716.60 (496.01 — 937.19)	0.55 (-0.28 — 1.36)	13.01 (2.95 — 23.93)*
Canadian Prairies	1796.44 (1526.80 — 2066.09)	-0.36 (-0.68 — -0.04)*	-19.46 (-22.56 — -16.27)*
U.S. Prairies (North Central)	2914.80 (2396.20 — 3433.41)	1.37 (0.90 — 1.86)*	-0.07 (-5.28 — 5.54)

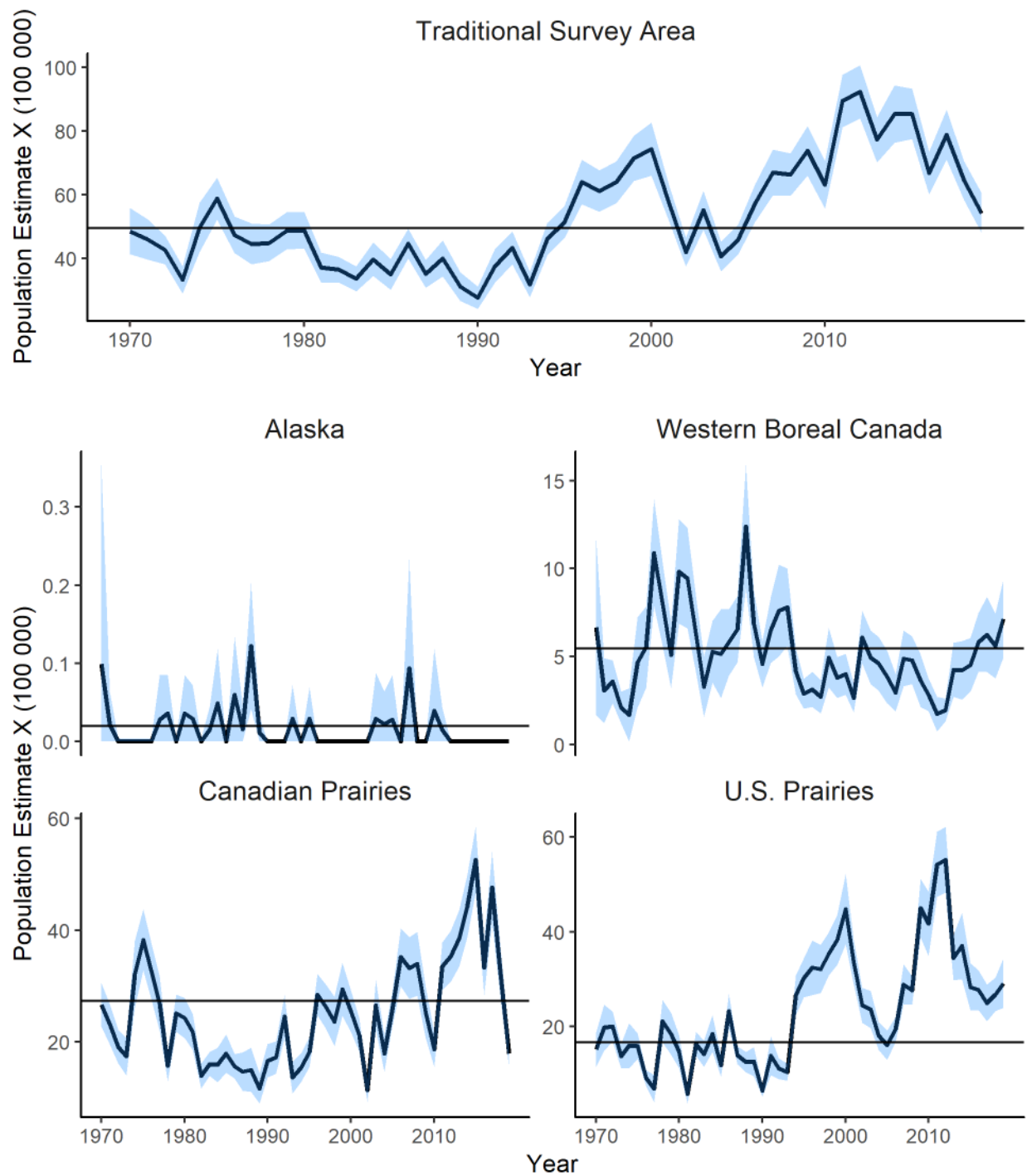


Figure 4.5-1 Blue-Winged Teal breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Interval (Horizontal lines represent the NAWMP goal in each region of the survey).

SMALL-SCALE WATERFOWL SURVEYS

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

The Blue-winged Teal is a common species in central British Columbia. Aside from a small population spiked in 2008, the Blue-winged Teal has displayed a largely stable population since the survey began in 2006 (Figure 4.5-3).

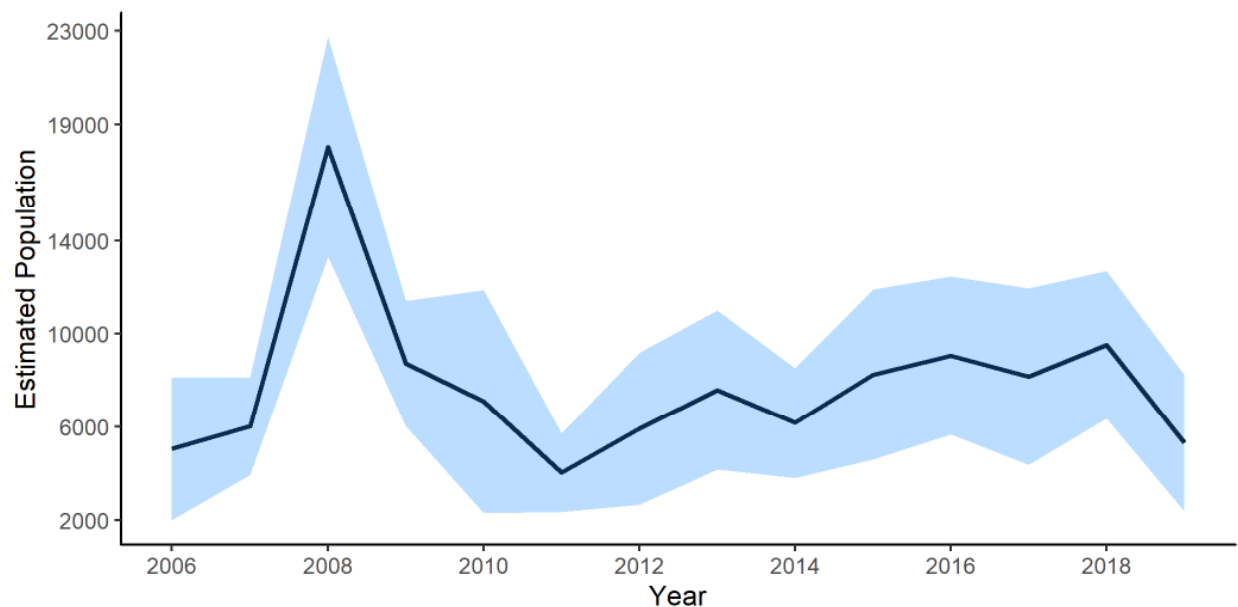


Figure 4.5-3 Population estimates of Blue-winged Teal in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Interval.

SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

The breeding population of Blue-winged Teal in Southern Ontario has declined significantly since the early 1970s (Figure 4.5-4). The specific causes of the decline are unknown but could include habitat loss (Ross 2010) or breeding phenology in relation to the timing of the survey (S. Meyer, CWS – Ontario Region, pers. comm.).

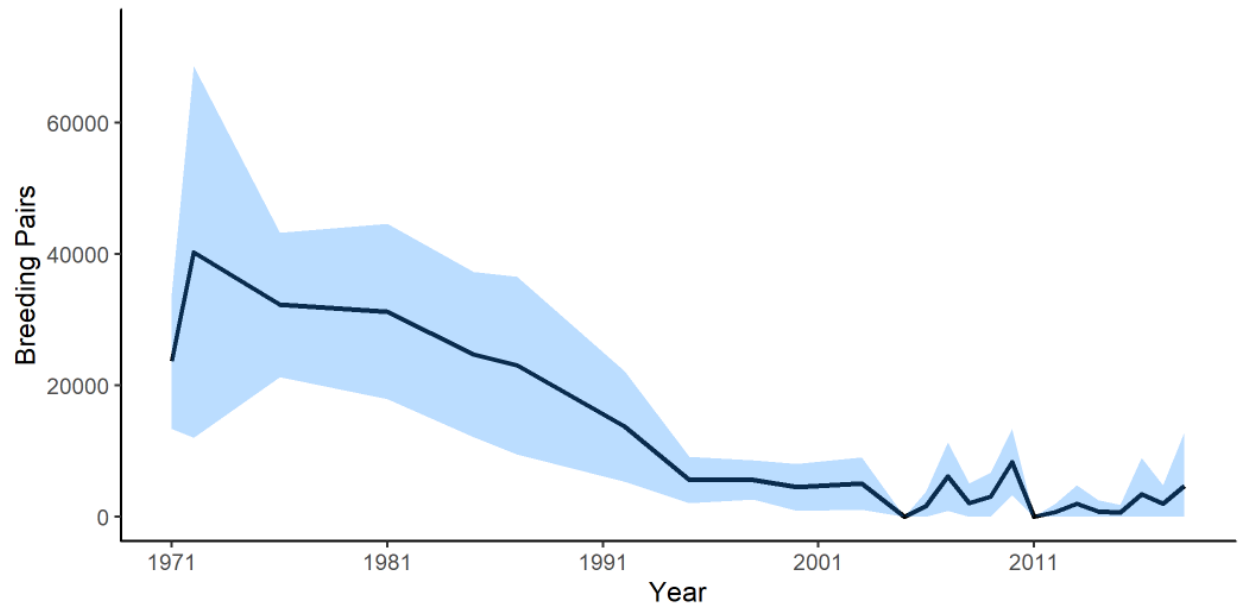


Figure 4.5-4 Indicated breeding pairs of Blue-winged Teal in southern Ontario; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Intervals.

4.5.2 Harvest

Blue-winged Teal are not a significant portion of the waterfowl harvest in Canada. It is one of the earliest fall migrants so 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 (Figure 4.5-5). Most Blue-winged Teal overwinter in areas south of the U.S., which also limits the harvest in the U.S. In Quebec, because of the long-term decline observed in the species' population (Brousseau and Lepage 2013a), the CWS restricts the harvest of Blue-winged Teal.

4.5.3 Management and Conservation Concerns

The population status of the Blue-winged Teal is influenced by wetland conditions on the prairie breeding grounds. In eastern Canada, agricultural intensification and increased destruction of favourable habitat 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).

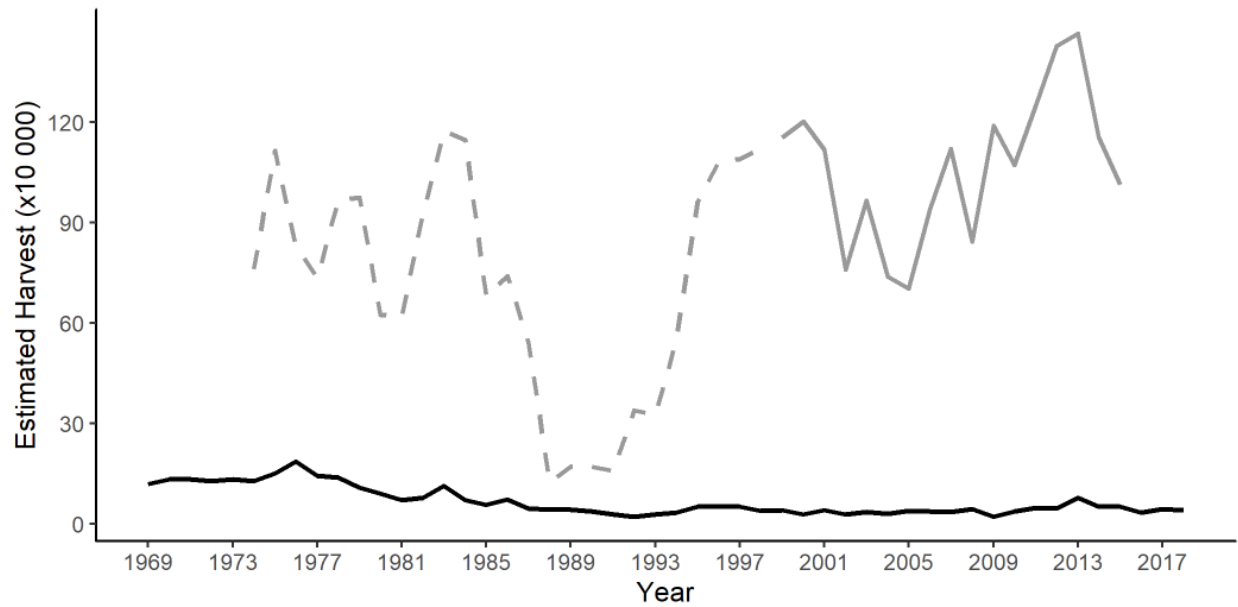


Figure 4.5-5 Estimated Blue-Winged Teal harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1400>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

4.6 American Wigeon (*Mareca americana*)

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

4.6.1 Abundance and Trends

The American Wigeon is monitored on its core breeding range through the WBPHS in western Canada, the Northwest Territories Boreal Waterfowl and Waterbirds Survey, and the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C.

LARGE-SCALE WATERFOWL SURVEY

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

Breeding densities for the American Wigeon 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 4.6-1 and Figure 4.6-1. The 2019 population estimate in the WBPHS is above the NAWMP population objective of 2.6 million birds, currently sitting at around 2.8 million birds (NAWMP 2018). In the Canadian Prairies, the American Wigeon population has been well below the NAWMP population goal of 1.2 million birds for decades, and this trend continues in 2019 (Figure 4.6-1). The population in the Canadian Prairies is experiencing a significant decline in the long term. In the U.S., there is a positive, significant long term trend in the North Central Prairies and Alaska. Alaskan populations have however significantly declined in the past five years. In the Western Boreal Region, the population has been above the NAWMP goal (1.3 million birds) since 2013 and has remained stable in both the short and long-term.

Table 4.6-1. American Wigeon Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970–2019 Trend (long term)	2015–2019 Trend (5 years)
Traditional Survey Area	2832.32 (2409.39 — 3255.26)	-0.25 (-0.51 — 0.01)	-1.62 (-4.52 — 1.25)
Alaska	373.28 (310.31 — 436.25)	0.60 (0.24 — 0.95)*	-4.77 (-8.68 — -0.81)*
Western Boreal Canada	1686.87 (1291.85 — 2081.89)	0.29 (-0.12 — 0.69)	-0.34 (-4.96 — 4.26)
Canadian Prairies	504.13 (403.03 — 605.23)	-1.97 (-2.36 — -1.59)*	-1.53 (-6.15 — 3.12)
U.S. Prairies (North Central)	268.05 (175.07 — 361.03)	1.20 (0.53 — 1.89)*	-3.17 (-11.27 — 6.09)

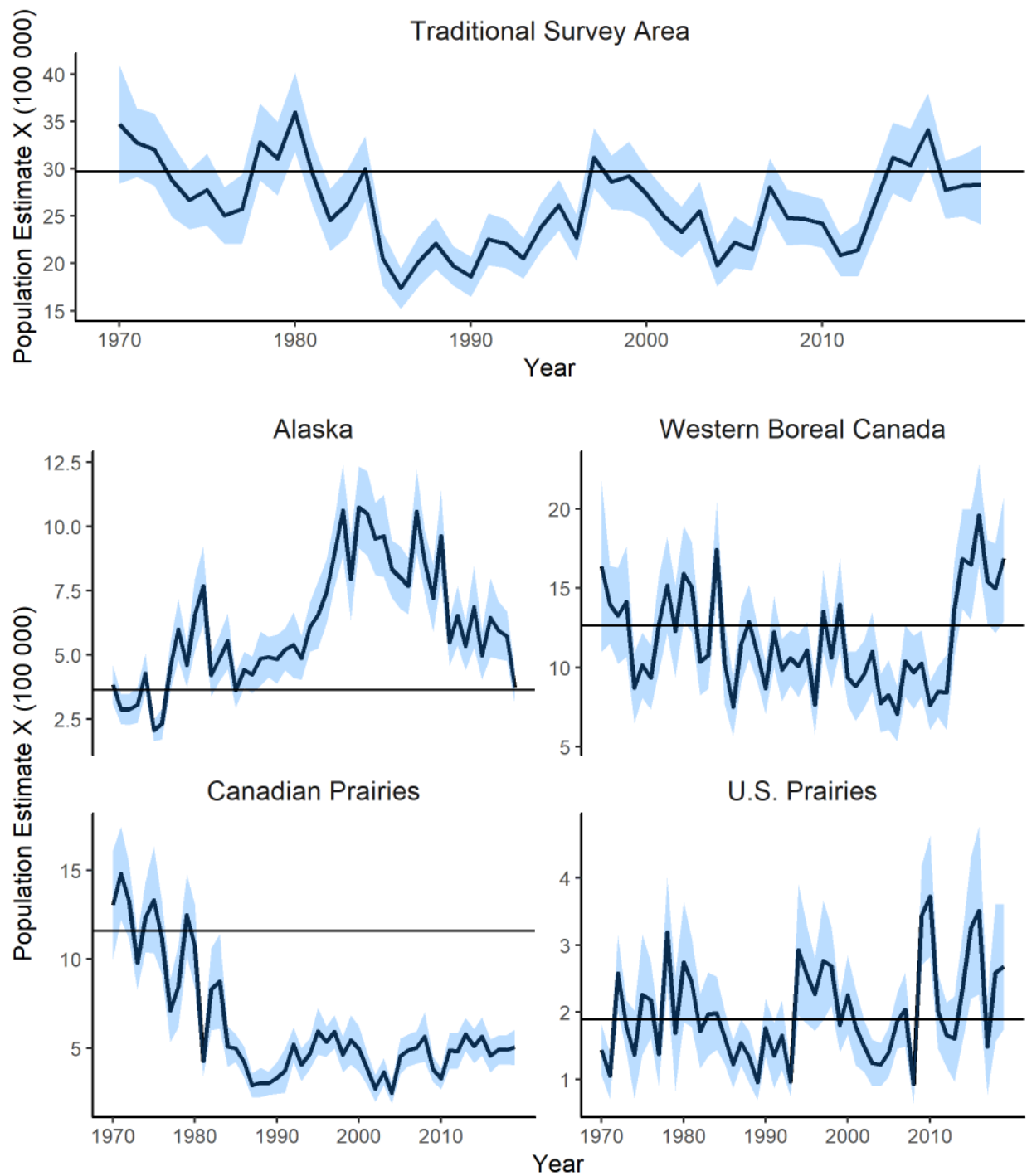


Figure 4.6-1 American Wigeon breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Interval (Horizontal lines represent the NAWMP goal in each region of the survey).

SMALL-SCALE WATERFOWL SURVEYS

NORTHWEST TERRITORIES BOREAL WATERFOWL AND WATERBIRDS SURVEY

The densities of American Wigeon have varied since the beginning of the survey but have been steadily increasing since 2006 (Figure 4.6-3) and the densities observed in the 2018 survey are significantly higher than those observed in 1985 at the beginning of the survey.

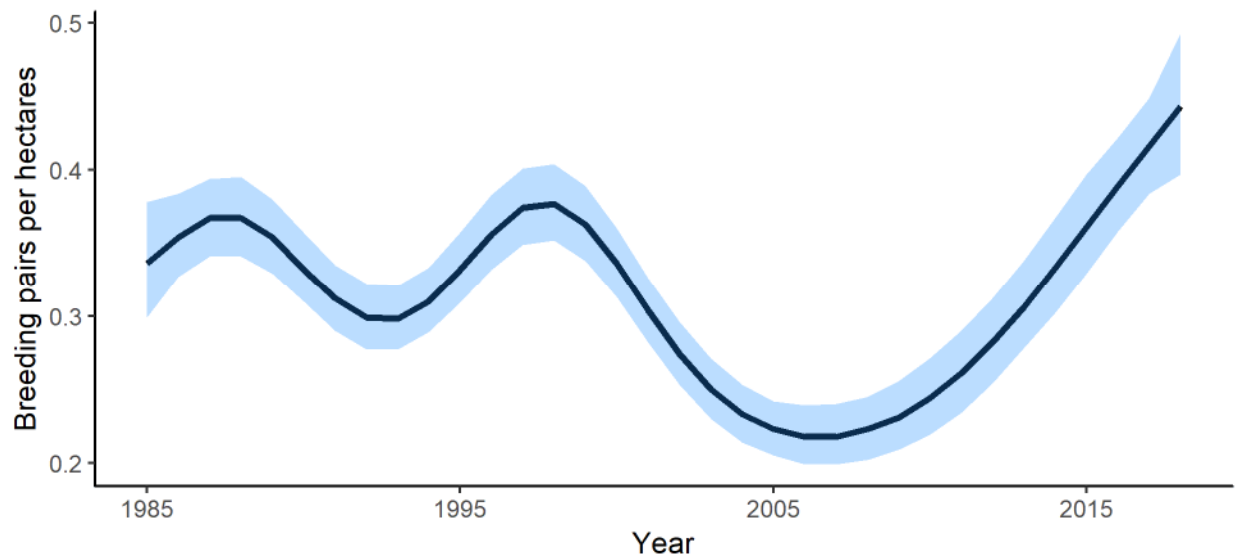


Figure 4.6-3 Density of American Wigeon breeding pairs observed during spring surveys near Yellowknife, NT.

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 4.6-4). In 2019, it is estimated there are about 25 000 birds breeding in central British Columbia.

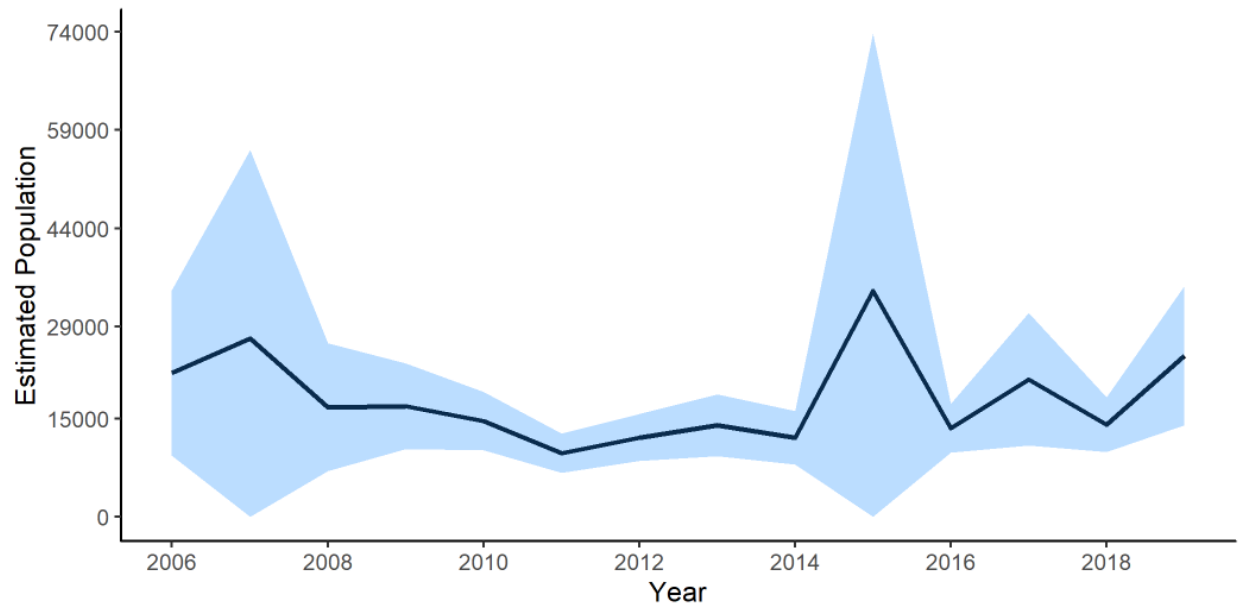


Figure 4.6-4 Population estimates of American Wigeon in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

4.6.2 Harvest

In Canada, after sharp decreases in the annual harvest of this species in the 1970s and 1980s, the harvest appears to have since stabilized. Over the past decade, an average of 36 000 American Wigeon were harvested annually in Canada. Canadian harvest for 2018 is slightly above this average, at around 40 000 ducks. Most of the continental American Wigeon harvest takes place in the U.S., with an average annual harvest of 677 000 birds in the last decade (Figure 4.6-5).

4.6.3 Management and Conservation Concerns

Wetland abundance in the Prairies is a determining factor in the success of breeding populations of American Wigeon in western and central portions of the continent (Mini *et al.* 2014). The continental population declined in the 1980s due to 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 partially recover in recent years. In the Canadian Prairies, the expansion of agriculture has significantly reduced the habitat for many waterfowl species while in the U.S., the loss and degradation of habitat on staging and wintering areas represent a serious problem for the American Wigeon (Mini *et al.* 2014).

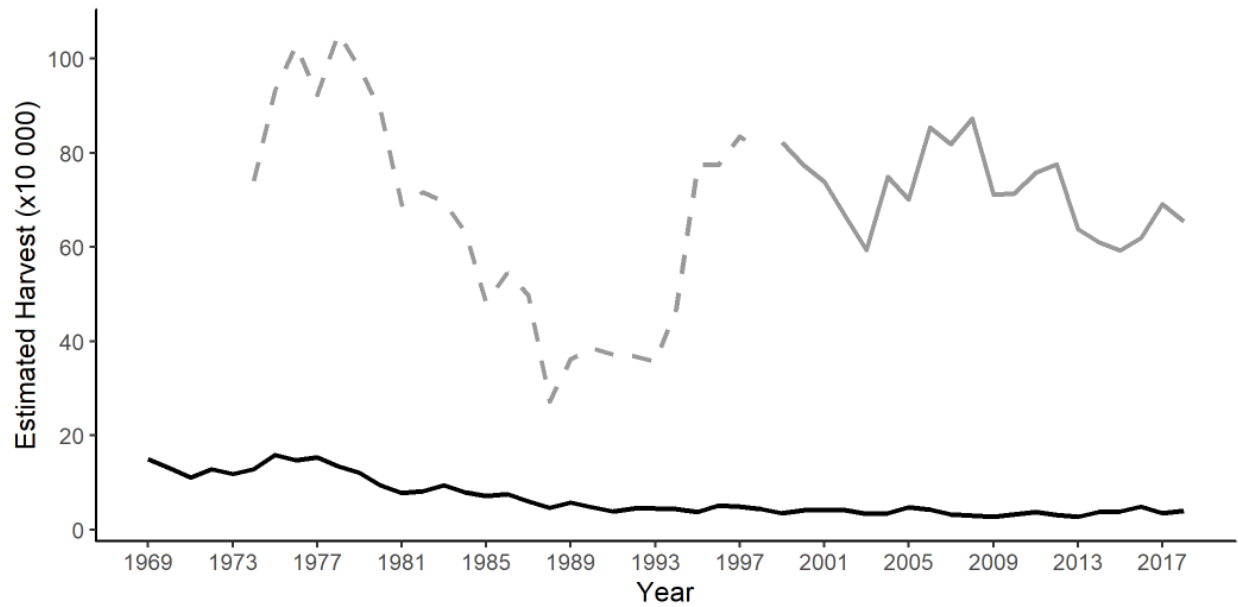


Figure 4.6-5 Estimated American Wigeon harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1370>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

4.7 Gadwall (*Mareca 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, doubling since the 1990s, following a period of prolonged drought in the 1980s (Leschack *et al.* 1997).

4.7.1 Abundance and Trends

The Gadwall is monitored in its core breeding area mainly through the WBPHS in western Canada and the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. The species was also previously monitored outside of the WBPHS survey area by the Cooperative Yukon Roadside Waterfowl Breeding Population Survey until 2016.

LARGE-SCALE WATERFOWL SURVEY

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

Within the traditional survey area, the Gadwall population has doubled in size since the 1990s (Figure 4.7-1) and shows a significant increasing long term trend (Table 4.7-1). Western Boreal Canada and both the Canadian and U.S. Prairies exhibit significant long term positive trends. Within the Traditional Survey Area and the Canadian Prairies, there have been significant short term declines. Gadwall populations are above the NAWMP goals in most parts of the survey area, with the only Alaska below the goal (NAWMP 2018; Figure 4.7-1). The population size in the traditional survey area is more than the objective of 1.9 million birds, currently sitting at around 3.3 million birds.

Table 4.7-1. Gadwall Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970–2019 Trend (long term)	2015–2019 Trend (5 years)
Traditional Survey Area	3258.85 (2918.76 — 3598.94)	1.59 (1.32 — 1.85)*	-3.21 (-6.10 — -0.46)*
Alaska	0.46 (-0.35 — 1.28)	-0.25 (-5.09 — 3.50)	2.07 (-28.20 — 37.66)
Western Boreal Canada	81.68 (48.53 — 114.83)	1.15 (0.41 — 1.86)*	4.83 (-2.31 — 12.74)
Canadian Prairies	1839.30 (1569.36 — 2109.24)	1.60 (1.26 — 1.94)*	-3.53 (-7.03 — -0.10)*
U.S. Prairies (North Central)	1337.41 (1133.21 — 1541.60)	1.60 (1.19 — 2.04)*	-3.14 (-8.00 — 2.10)

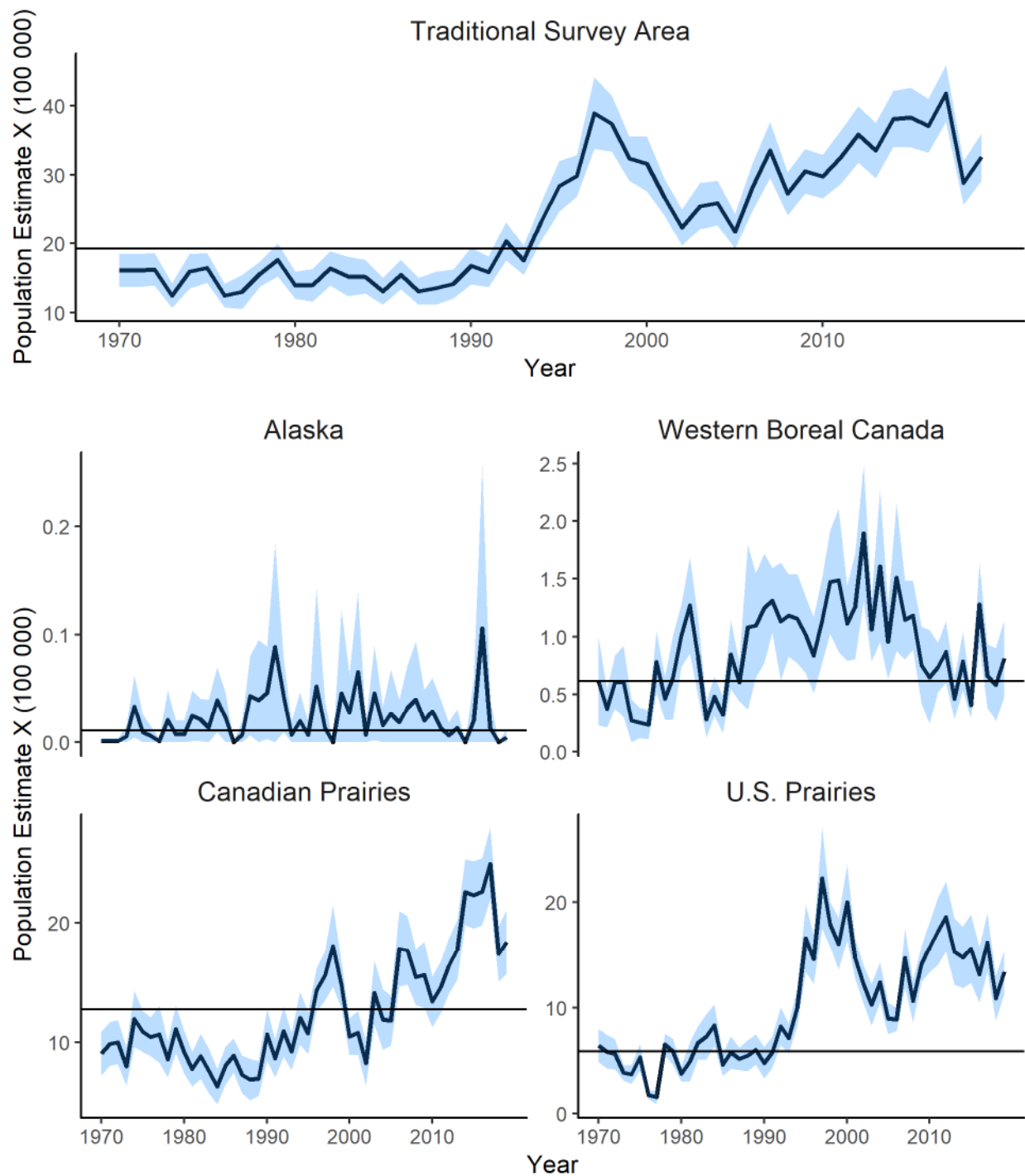


Figure 4.7-1 Gadwall breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Interval (Horizontal lines represent the NAWMP goal in each region of the survey).

SMALL-SCALE WATERFOWL SURVEYS

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

The Gadwall is a relatively common species in central British Columbia. In B.C. the species has both a long and short term declining trend, however these are not at significant levels (Figure 4.7-2).

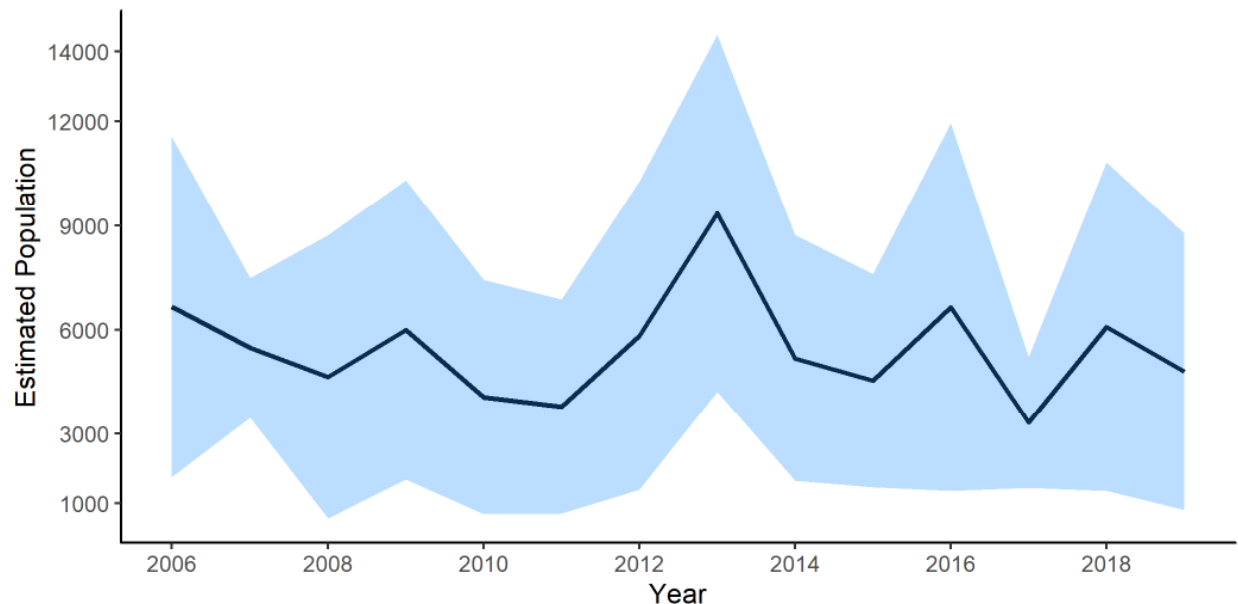


Figure 4.7-2. Spring population estimates of Gadwalls in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Interval.

4.7.2 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 U.S. (Figure 4.7-4). Indeed, during the past 10 years, an average of 46 000 Gadwalls have been harvested in Canada, compared to an average of approximately 1.5 million birds per year in the U.S.

4.7.3 Management and Conservation Concerns

Gadwall numbers have increased considerably since the 1990s. 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). The increases in breeding numbers are linked to better wetland conditions in the Prairie Pothole Region and enhanced habitat management actions (Baldassarre 2014).

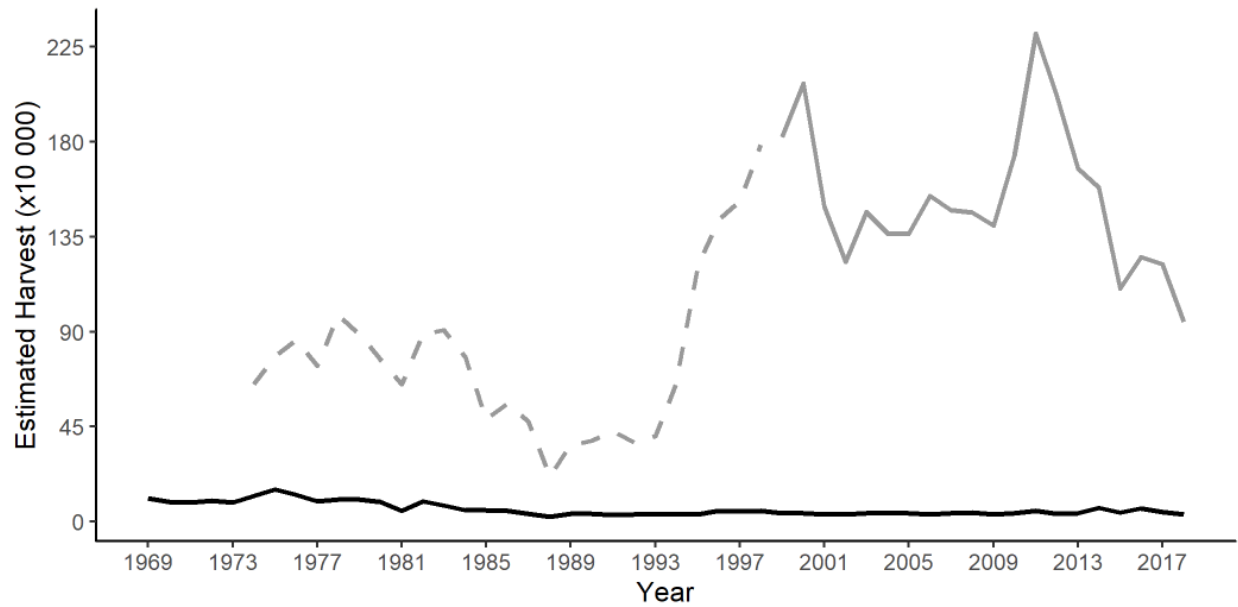


Figure 4.7-3 Estimated Gadwall harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1350>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

4.8 Northern Shoveler (*Spatula clypeata*)

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

4.8.1 Abundance and Trends

The Northern Shoveler is monitored in its core breeding range through the WBPHS, the Northwest Territories Boreal Waterfowl and Waterbirds Survey, and the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C.

LARGE-SCALE WATERFOWL SURVEY

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

The survey area population of the Northern Shoveler is increasing and well above the NAWMP goal of 2.5 million ducks, currently standing at 3.6 million ducks (NAWMP 2018; Figure 4.8-1).

Northern Shoveler has increased significantly in all survey regions since 1970. Short-term (5-year) trends show significant decreases in the Canadian Prairies and the traditional survey area, and significant increases in U.S. Prairies (Table 4.8-1).

Table 4.8-1. Northern Shoveler Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970–2019 Trend (long term)	2015–2019 Trend (5 years)
Traditional Survey Area	3649.41 (3318.15 — 3980.66)	1.17 (0.95 — 1.40)*	-3.22 (-5.84 — -0.52)*
Alaska	311.33 (238.17 — 384.49)	3.21 (2.67 — 3.76)*	-3.21 (-9.39 — 3.25)
Western Boreal Canada	365.59 (266.75 — 464.42)	1.94 (1.25 — 2.56)*	-4.09 (-10.37 — 2.41)
Canadian Prairies	1596.61 (1390.07 — 1803.15)	0.74 (0.43 — 1.05)*	-9.95 (-13.35 — -6.42)*
U.S. Prairies (North Central)	1375.87 (1147.94 — 1603.80)	1.26 (0.87 — 1.65)*	11.60 (5.01 — 18.32)*

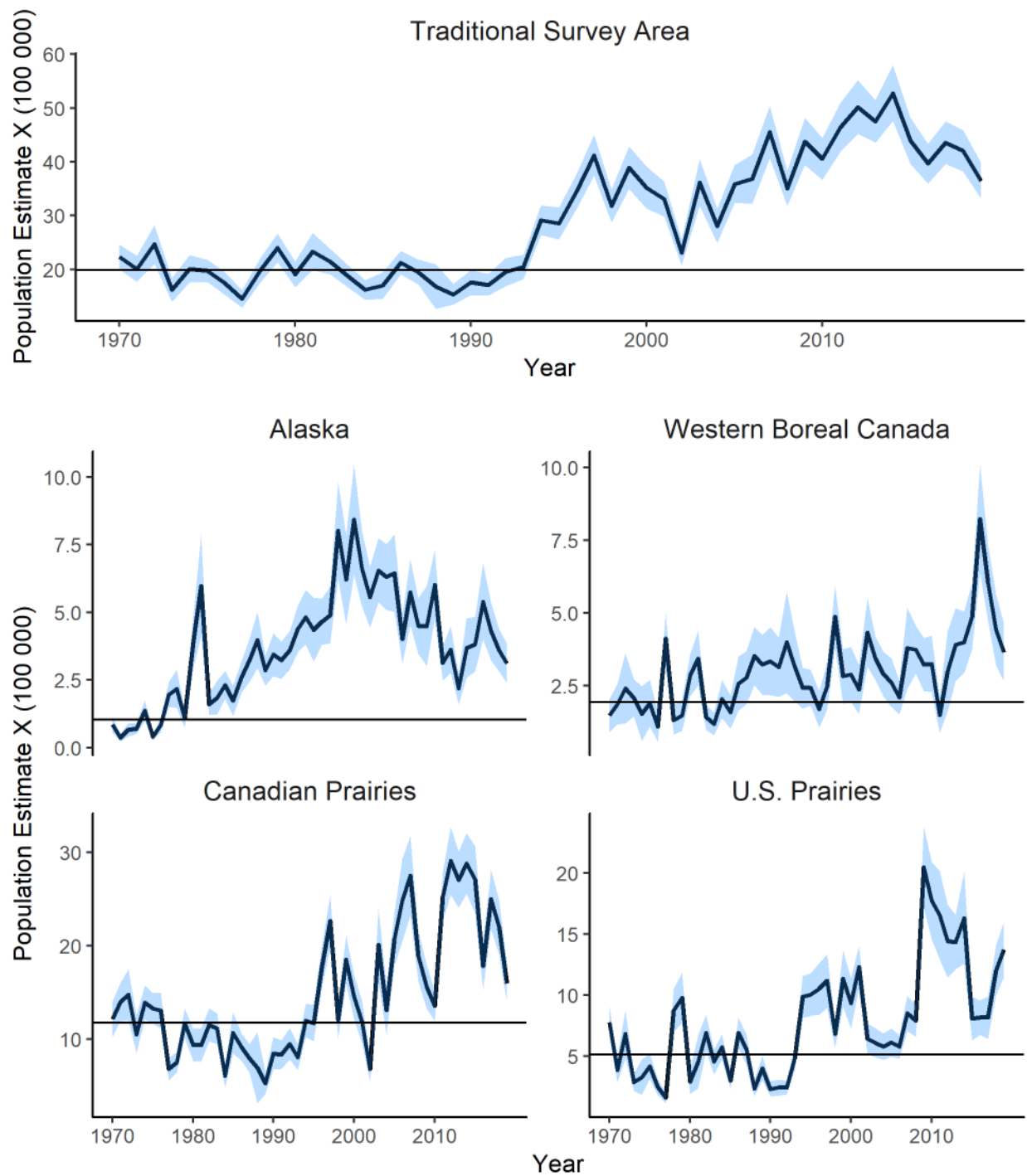


Figure 4.8-1 Northern Shoveler breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey, black line represents the population estimate while the shaded area represents the 95% Confidence Interval (Horizontal lines represent the NAWMP goal in each region of the survey).

SMALL-SCALE WATERFOWL SURVEYS

NORTHWEST TERRITORIES BOREAL WATERFOWL AND WATERBIRDS SURVEY

The Northern Shoveler densities have increased rapidly in the past five years, such that densities approach the peak densities initially seen in the late 1980s.

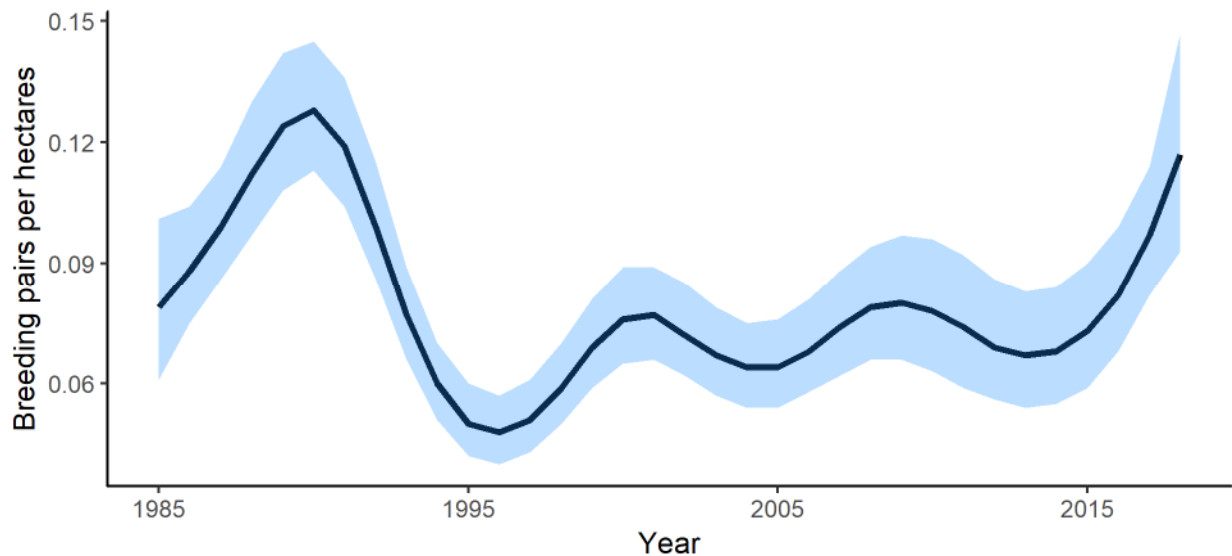


Figure 4.8-2 Density of Northern Shoveler breeding pairs observed during spring surveys near Yellowknife, NT.

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. The Northern Shoveler is currently experiencing significant growth in the long term in British Columbia (Figure 4.8-3).

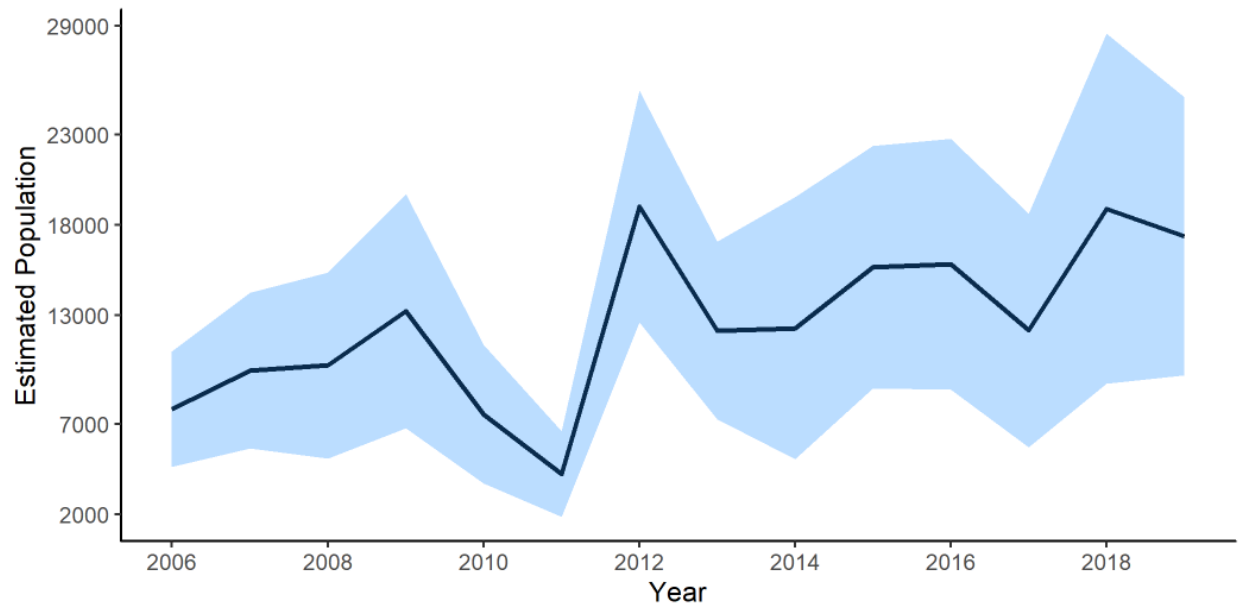


Figure 4.8-3. Population estimates of Northern Shoveler in spring in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

4.8.2 Harvest

The Canadian Northern Shoveler harvest takes place primarily in Saskatchewan and Alberta, but the bulk of the harvest takes place in the U.S. (Figure 4.8-4). Despite a steady population increase, the Canadian harvest of the Northern Shoveler has remained constant, with a ten year average of 24 000 birds harvested.

4.8.3 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.

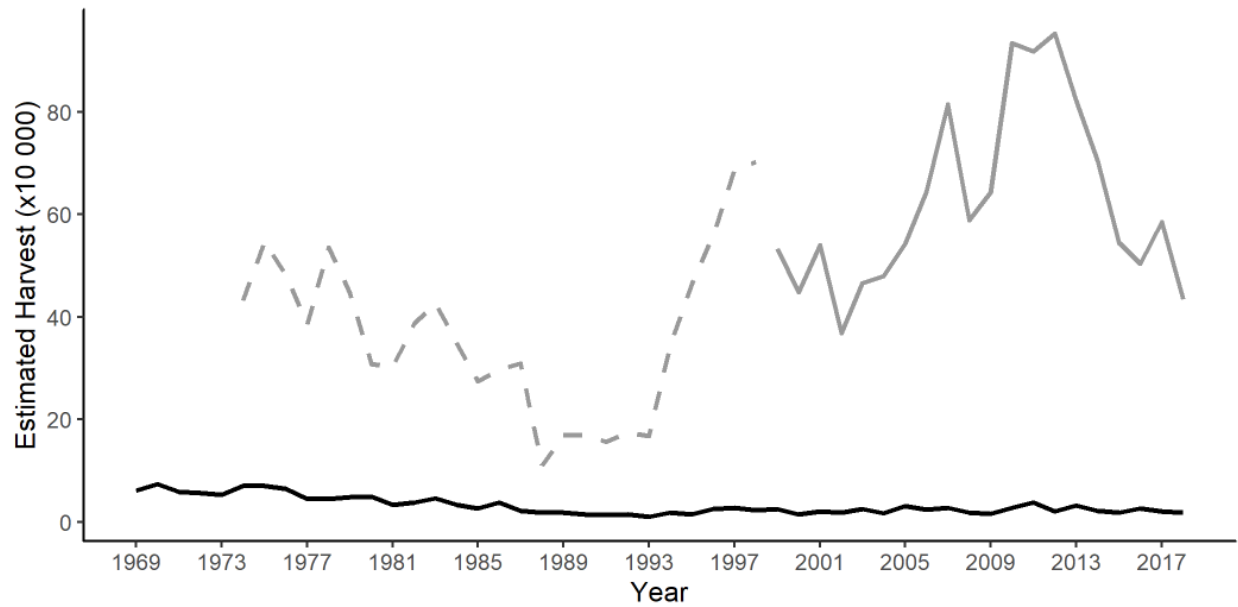


Figure 4.8-4 Estimated Northern Shoveler harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1420>) while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

4.9 Wood Duck (*Aix sponsa*)

The Wood Duck is a cavity-nesting species that is commonly found in riparian habitats, swamps and marshes (Hepp and Bellrose 2013). In Canada, it breeds primarily in Ontario, Quebec and New Brunswick. There are also small numbers breeding in the west in scattered locations from southern British Columbia to the extreme southwest portion of Alberta. Once threatened with extinction, the Wood Duck populations are now stable or increasing throughout its breeding range (Baldassarre 2014).

4.9.1 Abundance and Trends

Estimating the breeding population of Wood Duck is difficult because the species' elusive behaviour and its use of densely vegetated habitats causes low detectability from traditional fixed-wing surveys (Zimmerman *et al.* 2015). Helicopter surveys and ground-based surveys provide better estimates, but broad range data are less available. Targeted waterfowl surveys are conducted in southern Ontario and Quebec to provide information on local breeding populations. Although population trends are also available from the BBS, because BBS routes follow the roadsides, the BBS has relatively few observations which limits data extrapolation.

According to the NAWMP, the population estimate 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 were stable or increasing in that period in North America. The most recent NAWMP update (2018) does not provide any objective nor population size.

SMALL-SCALE WATERFOWL SURVEYS

SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

The Wood Duck is the second most abundant duck species in southern Ontario after the Mallard, and the population in this region is currently showing significant positive trends in both the long term and short term. 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 4.9-1). In southern Ontario, the Wood Duck breeding population was lower in 2018 compared to 2017, at 77 000 breeding pairs, this is just below the 10-year average of approximately 84 000 breeding pairs.

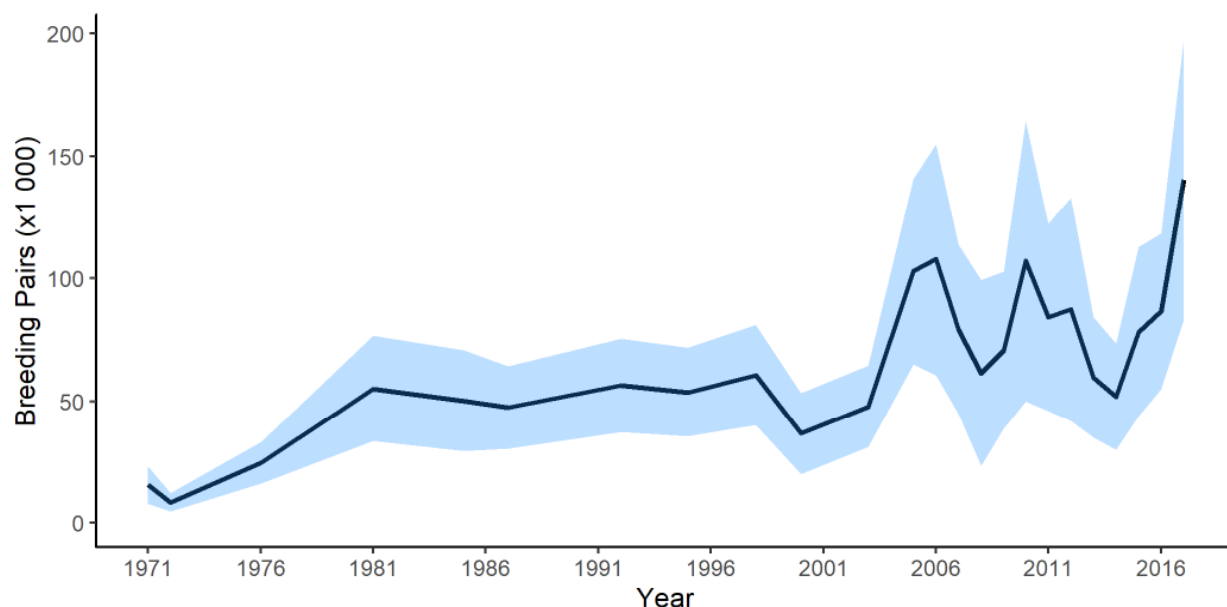


Figure 4.9-1 Indicated breeding pairs of Wood Duck in southern Ontario; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Interval.

ST. LAWRENCE LOWLANDS BREEDING WATERFOWL SURVEY, QUEBEC

In the St. Lawrence Lowlands, the Wood Duck is a common species, and its population shows a significant increasing long-term trend (Figure 4.9-2). The number of breeding pairs reached a peak of 5 400 in 2019, above the 5-year average of 3 600 pairs. This increase has led the Wood Duck to replace the Black Duck as the second most abundant species, behind the Mallard, for this survey region, for the second year since the beginning of this survey.

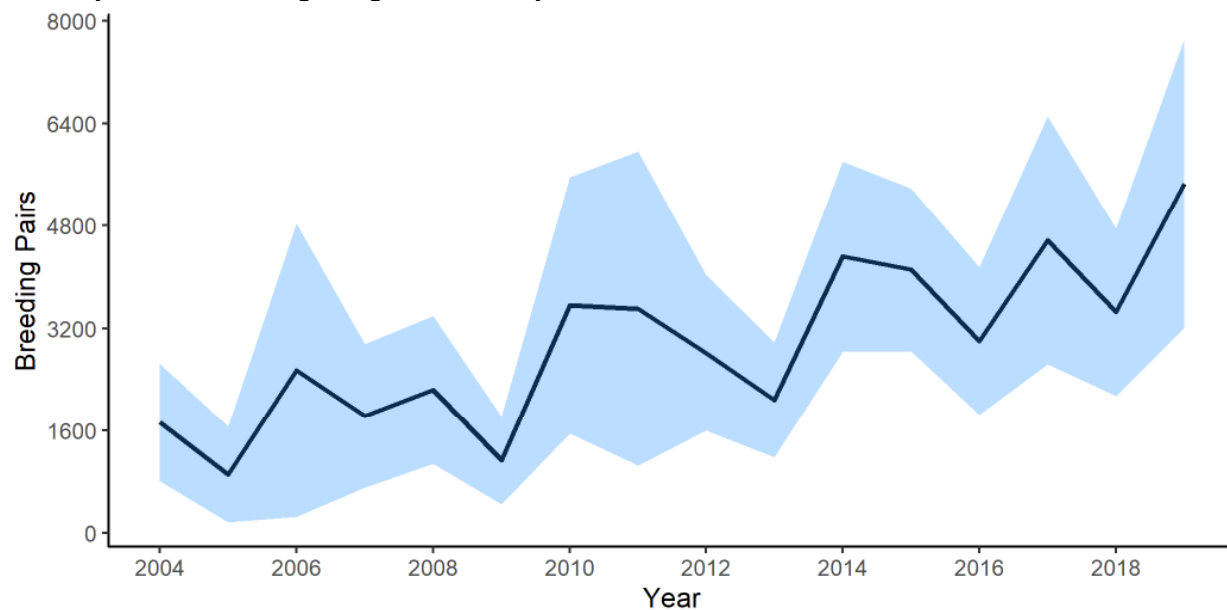


Figure 4.9-2 Indicated breeding pairs of Wood Duck in the St. Lawrence lowlands, Quebec; black line represents breeding pair estimate while the shaded area represents the 95% Confidence Interval.

4.9.2 Harvest

An average of 77 000 Wood Ducks have been harvested annually in Canada over the past 10 years which represents the second most harvested duck in Canada (Figure 4.9-3). Comparatively, in the U.S., an average of 1.2 million Wood ducks have been harvested annually during this period.

4.9.3 Management and Conservation Concerns

Following population collapse in the late 1800s and early 1980s, the Wood Duck population recovered, and the hunt was reopened in 1941. The population is currently increasing or stable throughout much of the species' range, based on recent various breeding bird atlases in eastern Canada and northeastern U.S. (Baldassarre 2014; Zimmerman *et al.* 2015). Given its reliance on tree cavities for nesting, many nest box programs have been developed which have benefited this species and other cavity nesting birds.

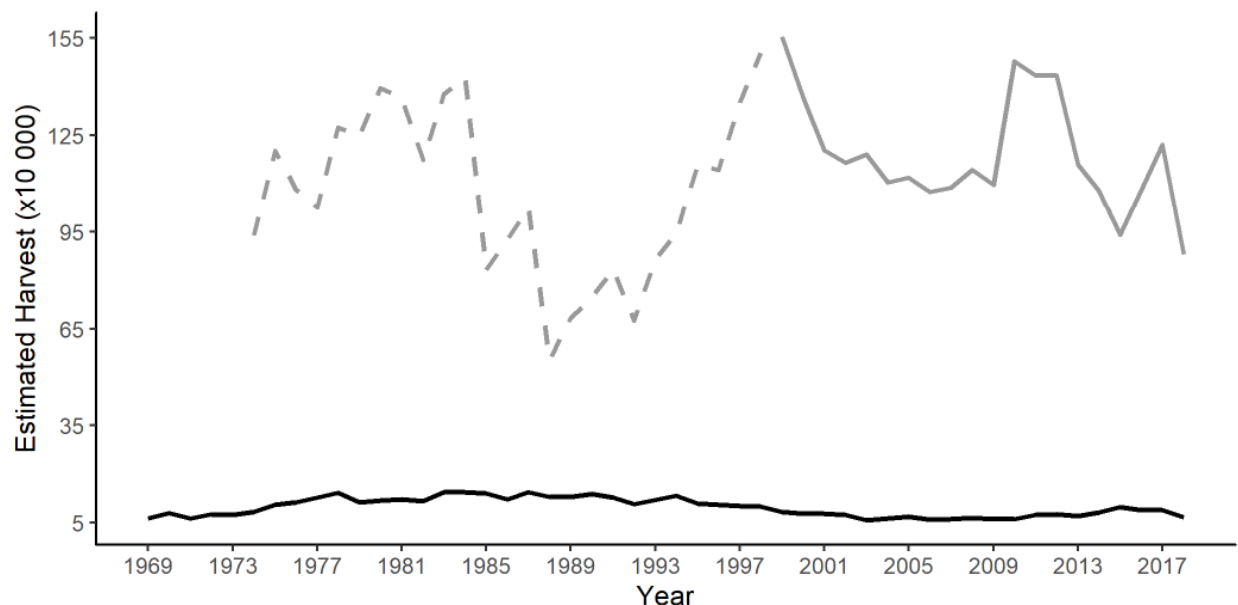


Figure 4.9-3 Estimated Wood Duck harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1440>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

5. Population Status of Inland Diving Ducks

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

Lesser and Greater Scaup are closely related and 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.

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 (Anteau *et al.* 2014).

5.1.1 Abundance and Trends

Greater and Lesser Scaup are monitored within their core breeding ranges mainly through the WBPHS, the Northwest Territories Boreal Waterfowl and Waterbirds Survey, and the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. 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. Lesser Scaup make up a larger proportion of the continental Scaup population than do Greater Scaup (Anteau *et al.* 2014).

LARGE-SCALE WATERFOWL SURVEY

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

The continental population of Scaup declined between the mid-1980s and the mid-2000s. Current Scaup numbers (3.6 million birds) remain below the NAWMP goal of 6.3 million birds (NAMWP 2012; Table 5.1-1). The number of Scaup in the Canadian Western Boreal Region accounts for nearly two-thirds of the continental total. However, the population remains well below the NAWMP population goal of 4.3 million birds for the Western Boreal Region (Figure 5.1-1). The Western Boreal and Alaskan breeding populations show significant long term declines. The Traditional Survey Area exhibits significant declining trends in both the short and long terms. The Canadian Prairies breeding population also remains below the NAWMP goal of 1.05 million birds (Table 5.1-1). Currently, the only region with significant long term growth is the U.S. Prairies.

Table 5.1-1. Scaup sp. Breeding Population with 95% Confidence Intervals (CI) and Trend Estimates Based on the Waterfowl Breeding Population and Habitat Survey in Western Canada
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and the Northwestern United States (Trends are expressed as an annual percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970–2019 Trend (long term)	2015–2019 Trend (5 years)
Traditional Survey Area	3590.90 (3185.18 — 3996.62)	-0.72 (-0.92 — -0.52)*	-2.57 (-4.78 — -0.35)*
Alaska	455.61 (363.11 — 548.12)	-0.64 (-0.96 — -0.33)*	-0.41 (-3.90 — 3.32)
Western Boreal Canada	2095.42 (1743.13 — 2447.71)	-1.08 (-1.37 — -0.80)*	-2.75 (-5.82 — 0.38)
Canadian Prairies	774.58 (612.33 — 936.84)	0.02 (-0.37 — 0.41)	-2.49 (-7.02 — 1.95)
U.S. Prairies (North Central)	265.28 (190.34 — 340.22)	1.95 (1.30 — 2.57)*	-4.85 (-12.78 — 2.92)

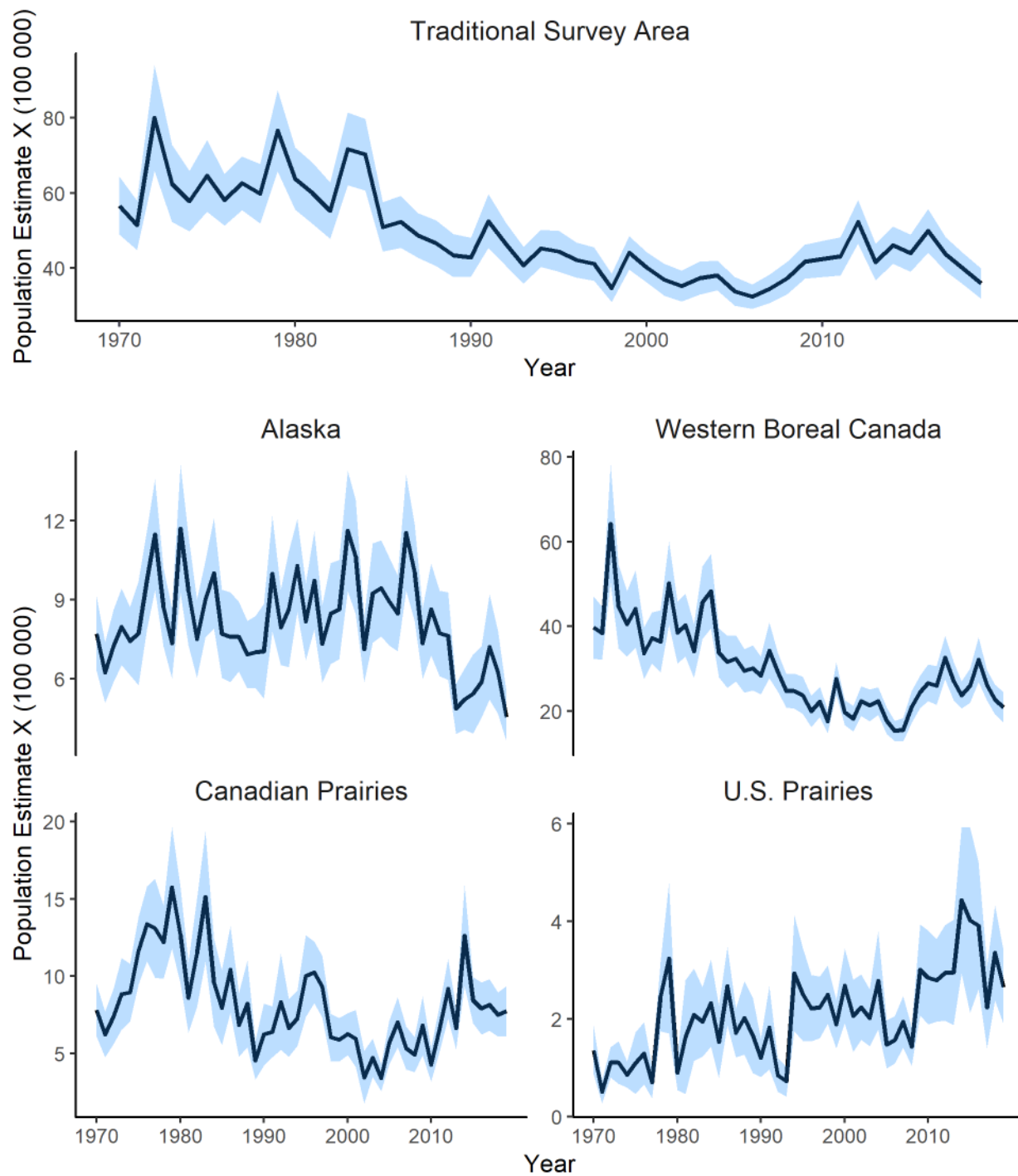


Figure 5.1-1 Scaup (Lesser and Greater) breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

SMALL-SCALE WATERFOWL SURVEYS

NORTHWEST TERRITORIES BOREAL WATERFOWL AND WATERBIRDS SURVEY

The densities observed in 2018 are significantly lower than those observed in 1985 but there has been a dramatic increase over the last 5 year that may indicate that the population has recovered (Figure 5.1-3).

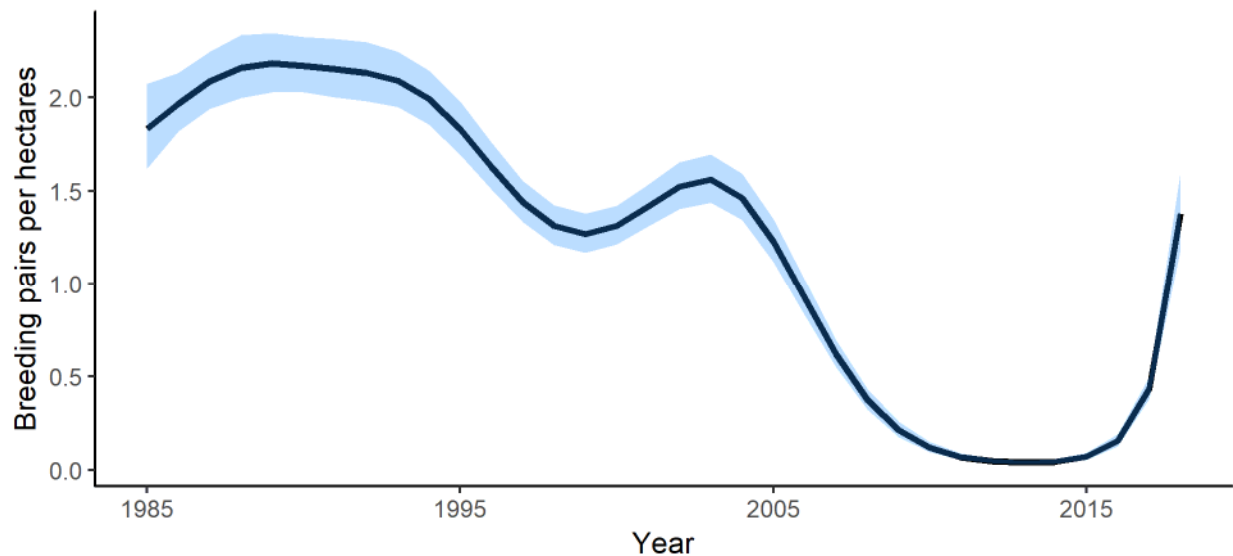


Figure 5.1-3 Density of Lesser Scaup breeding pairs observed during spring surveys near Yellowknife, NT.

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

Scaup in the central Plateau B.C. have shown a relatively stable trend since 2006 (Figure 5.1-4).

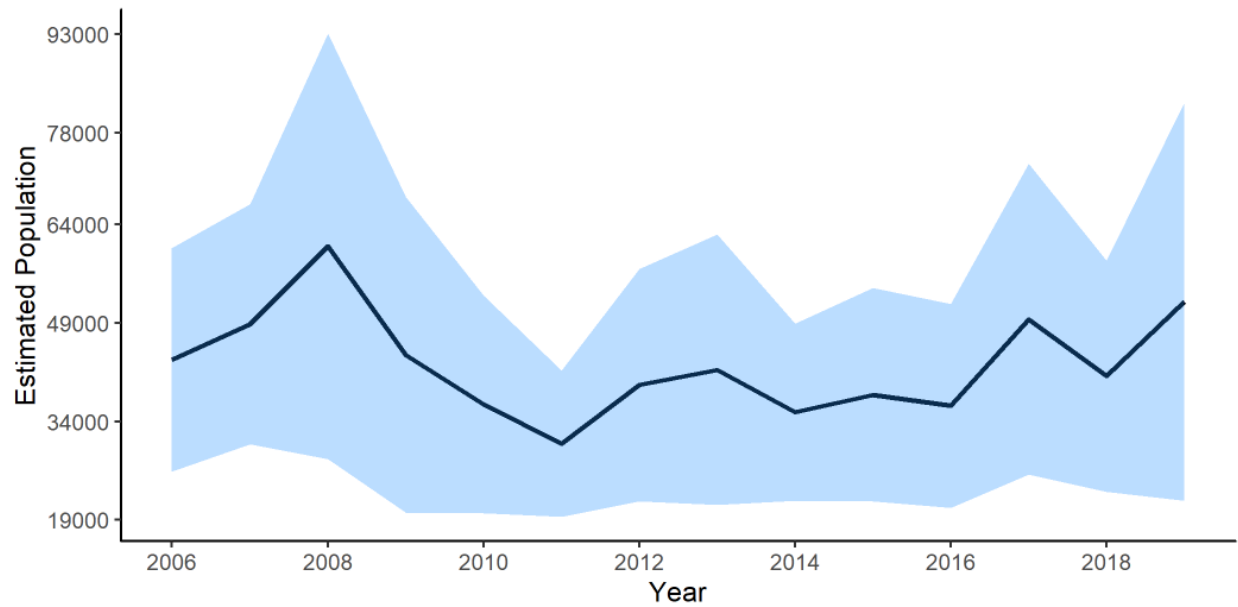


Figure 5.1-4 Population estimates of Scaup (Lesser and Greater) in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

5.1.2 Harvest

The harvest of Lesser Scaup and Greater Scaup in Canada has declined considerably since 1969 (Figure 5.1-5 and 5.1-6). In the U.S., Scaup harvest has varied considerably (Figure 5.1-5 and 5.1-6) since the beginning of the survey in 1974. In 2018, 94 000 Greater Scaup were harvested in Canada and the U.S. combined, while the harvest for Lesser Scaup at the continental level was of 232 000 birds. In the past decade about 9% of the total continental harvest of Lesser and Greater Scaup occurred in Canada.

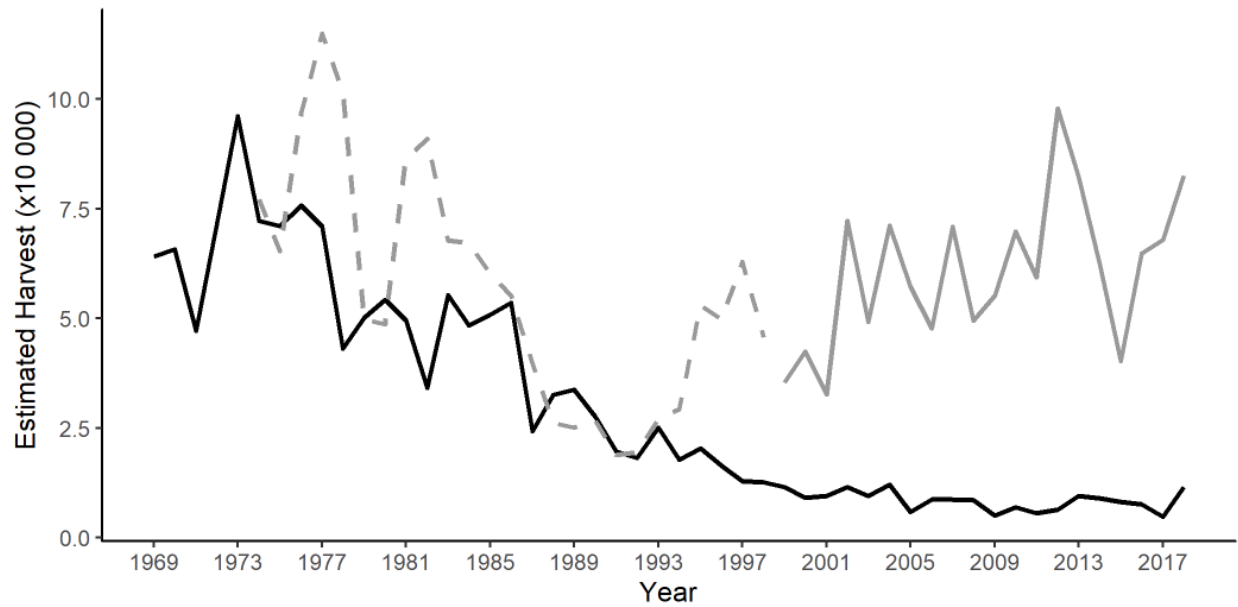


Figure 5.1-5 Estimated Greater Scaup harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1480>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

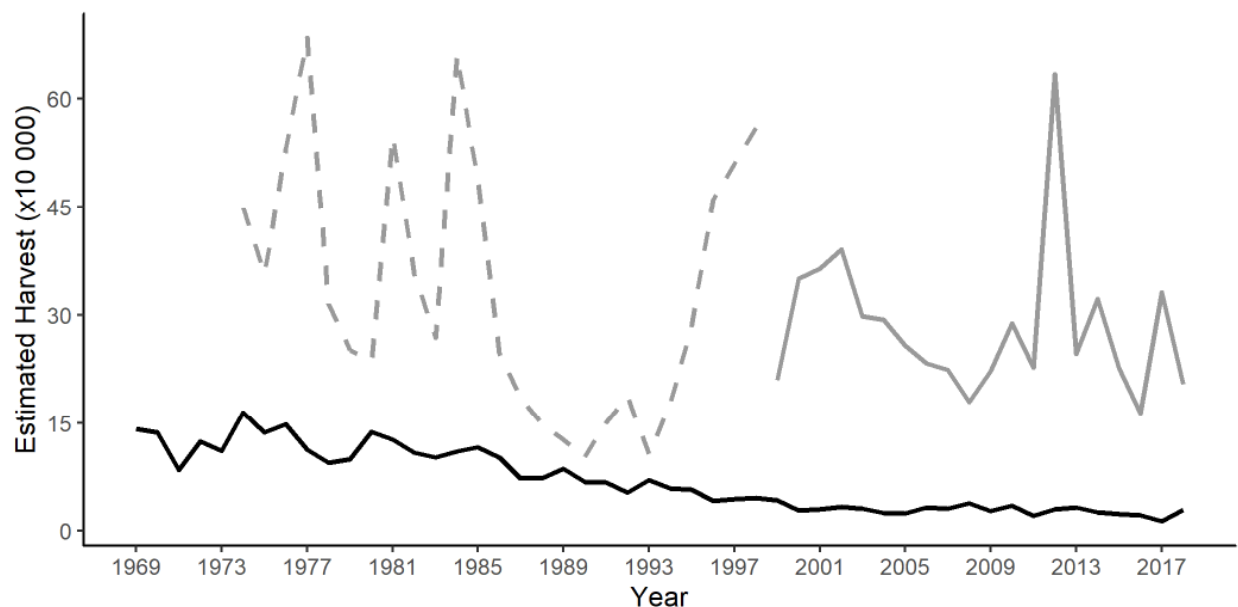


Figure 5.1-6 Estimated Lesser Scaup harvest in U.S. (broken line) and Canada (solid line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1490>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at

<https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 are not directly comparable to those after 1999.

5.1.3 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. Both species of Scaup are also late migrants which can make the traditional aerial waterfowl surveys less reliable for these species (Finger *et al.* 2016).

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 (Austin *et al.* 2000; Anteau *et al.* 2014). Scaup breeding in the boreal forest also declined during the 1980s, and numbers 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 (Ross *et al.* 2015; Arnold *et al.* 2016; Koons *et al.* 2017).

5.2 Ring-necked Duck (*Aythya collaris*)

The Ring-necked Duck is a common diving duck that breeds throughout the boreal forest (Roy *et al.* 2012). In Canada, its range extends from southern Yukon to Newfoundland, with some breeding recorded in Labrador. The Ring-necked Duck commonly nests in dense emergent vegetation in shallow wetlands.

5.2.1 Abundance and Trends

The Ring-necked Duck is monitored on its core breeding range through the WBPHS in western and eastern Canada, the Northwest Territories Boreal Waterfowl and Waterbirds Survey, and the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. The species is also monitored by other small-scale regional breeding waterfowl surveys across the country, including the Southern Ontario Waterfowl Plot Survey.

LARGE-SCALE WATERFOWL SURVEYS

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

Within the Traditional Survey Area, the population has been stable in the long-term but in the past five years there has been a significant decline. Regionally, populations in Alaska and the U.S. Prairies have seen long-term increases while the Canadian Prairies' population has declined and Western Boreal Canada's population has remained stable. In the short-term, the Western Boreal Canada and Canadian Prairies populations have significant declines, while the U.S. Prairies population has a significant increase.

Table 5.2-1. Ring-necked Duck Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970-2019 Trend (long term)	2015-2019 Trend (5 years)
Traditional Survey Area	1537.90 (1225.49 — 1850.32)	0.13 (-0.04 — 0.28)	-3.79 (-5.33 — -2.22)*
Alaska	47.39 (27.97 — 66.81)	0.92 (0.50 — 1.32)*	-4.57 (-9.35 — 0.33)
Western Boreal Canada	1266.86 (961.27 — 1572.46)	0.24 (-0.14 — 0.58)	-4.16 (-7.42 — -0.70)*
Canadian Prairies	162.66 (109.57 — 215.74)	-0.73 (-0.94 — -0.52)*	-8.47 (-10.45 — -6.36)*
U.S. Prairies (North Central)	61.00 (29.05 — 92.95)	1.55 (1.25 — 1.85)*	4.17 (0.96 — 7.42)*

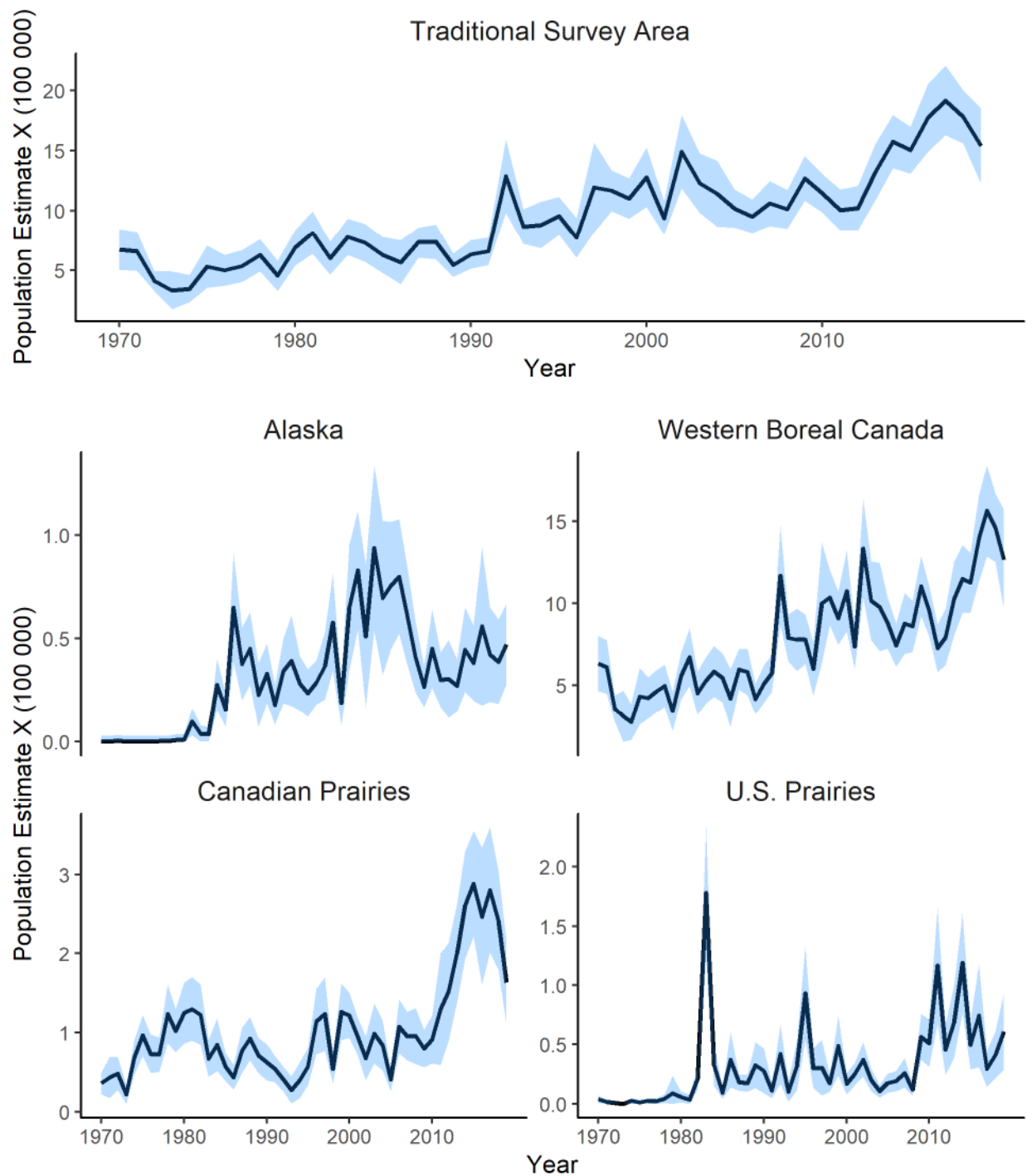


Figure 5.2-1 Ring-Necked Duck breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Intervals (Horizontal lines represent the NAWMP goal in each region of the survey).

EASTERN WATERFOWL BREEDING GROUND SURVEY

In eastern Canada, Ring-necked Ducks show stable short term and long term trends, with the exception of the Atlantic Highlands where the population has increased significantly since 1990 (Figure 5.2-2 and Table 5.2-2).

Table 5.2-2 Ring-necked duck Breeding Population Estimates with 95% Credible Intervals (CI) and Trend Estimates Based on the Eastern Waterfowl Breeding Ground Survey (The estimates are based on the combined results of helicopter and fixed-wing aircraft surveys. Trends are expressed as an annual percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates in Core Area (in thousands)	1990–2019 Trend (long term)	2015–2019 Trend (5 years)
Atlantic Highlands	65.98 (41.39 — 93.97)	1.37 (0.29 — 2.49)*	0.31 (-4.78 — 5.37)
Central Boreal Shield	129.62 (82.21 — 196.73)	0.68 (-0.33 — 1.64)	0.11 (-4.28 — 4.17)
Eastern Boreal Shield	103.19 (61.96 — 160.12)	0.08 (-0.86 — 0.96)	0.07 (-3.27 — 3.35)
Western Boreal Shield	196.32 (123.21 — 297.60)	-0.03 (-1.01 — 0.90)	-0.27 (-3.94 — 2.71)
Total Survey Area	503.60 (382.06 — 655.96)	0.32 (-0.27 — 0.87)	-0.02 (-2.12 — 1.77)

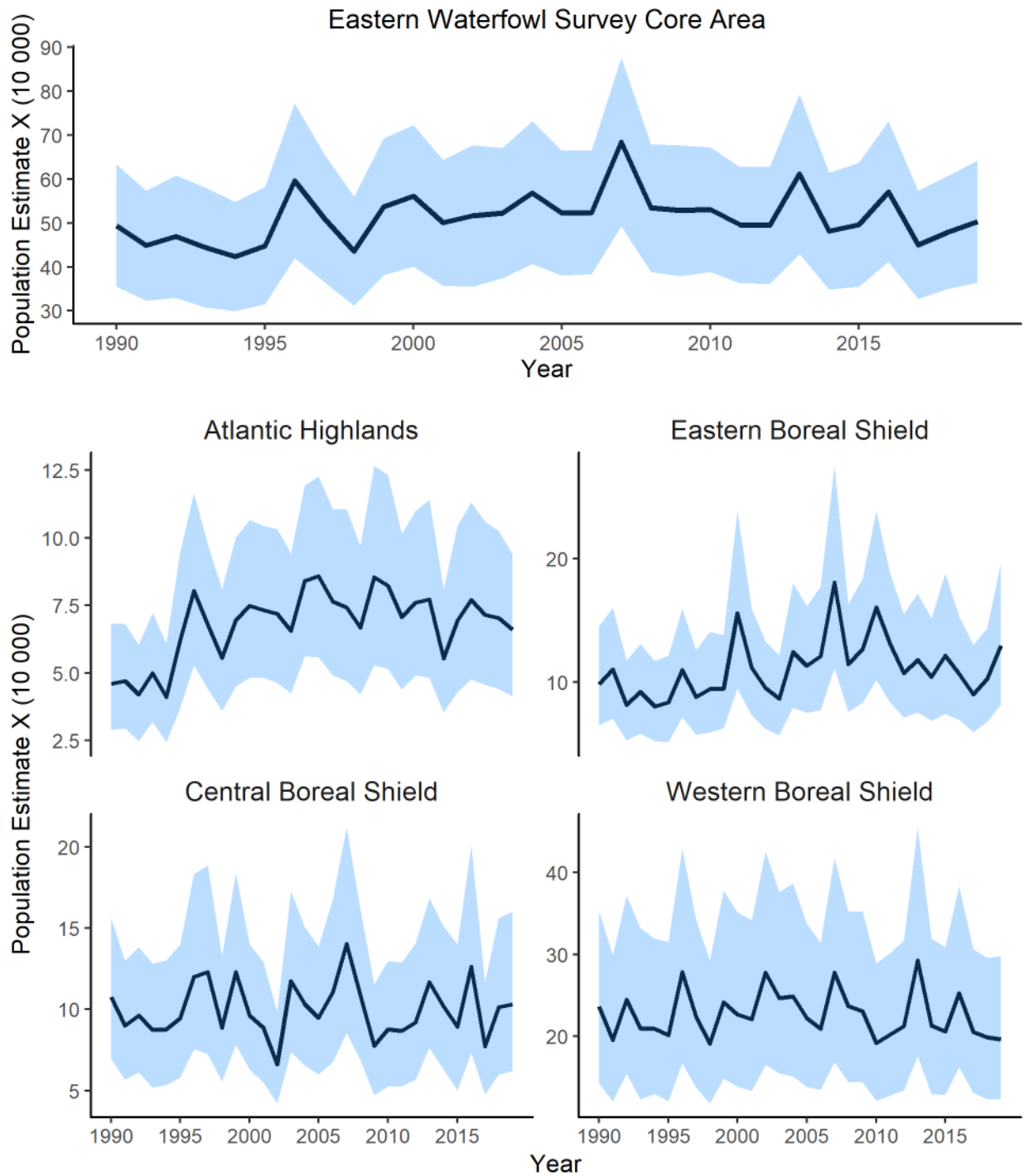


Figure 5.2-2 Ring-Necked Duck breeding population estimates based on the Eastern Waterfowl Breeding Ground Survey; black line represents the population estimate while the shaded area represents the 95% Credible Intervals (The figures represent the combined results of helicopter and fixed-wing aircraft surveys).

SMALL-SCALE WATERFOWL SURVEYS

NORTHWEST TERRITORIES BOREAL WATERFOWL AND WATERBIRDS SURVEY

The observed densities of Ring-necked ducks have doubled since 1985. However, the densities have been stable over the last 5 years (Figure 5-2.3).

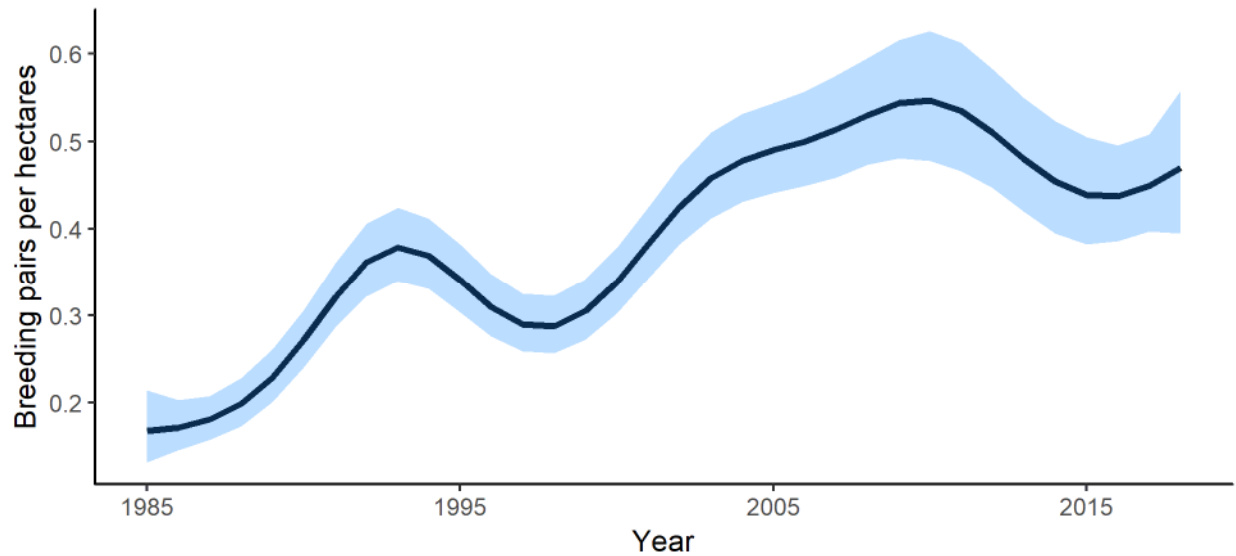


Figure 5.2-3 Density of Ring-necked duck breeding pairs observed during spring surveys near Yellowknife, NT.

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

The Ring-necked Duck is a common species in central British Columbia. Over the past five years, the Ring-necked Duck population in British Columbia has shown a significant increasing trend.

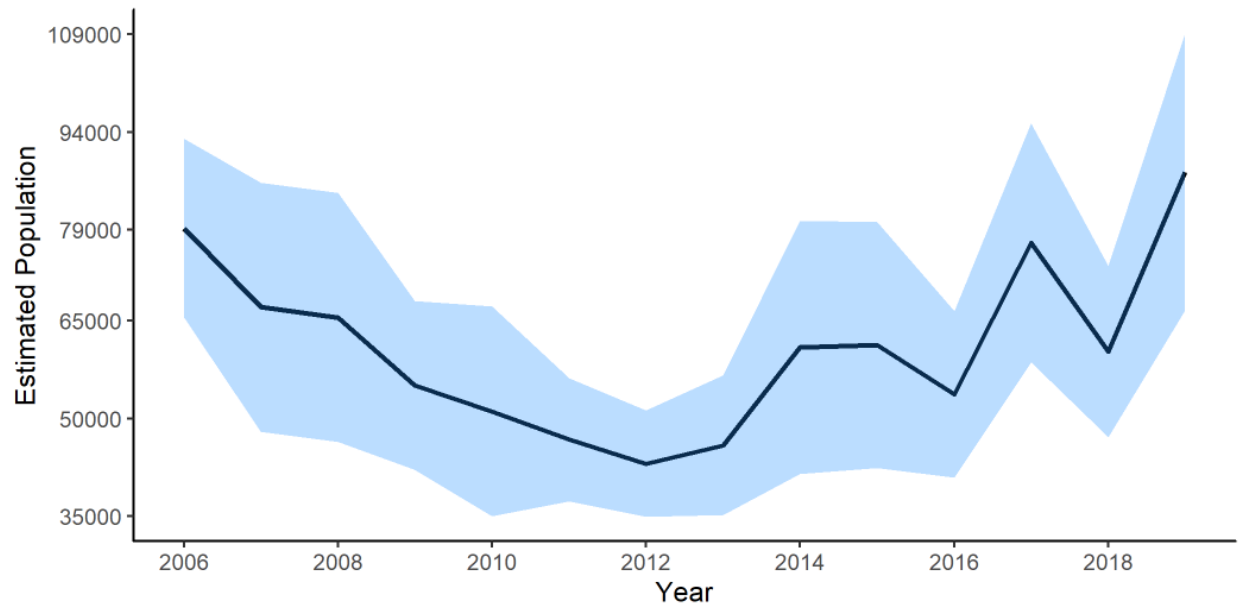


Figure 5.2-4 Population estimates of Ring-Necked Duck in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

Annual breeding population estimates for Ring-necked Duck in Southern Ontario are variable given the timing of the survey in relation to its breeding phenology. There are no significant short or long-term trends.

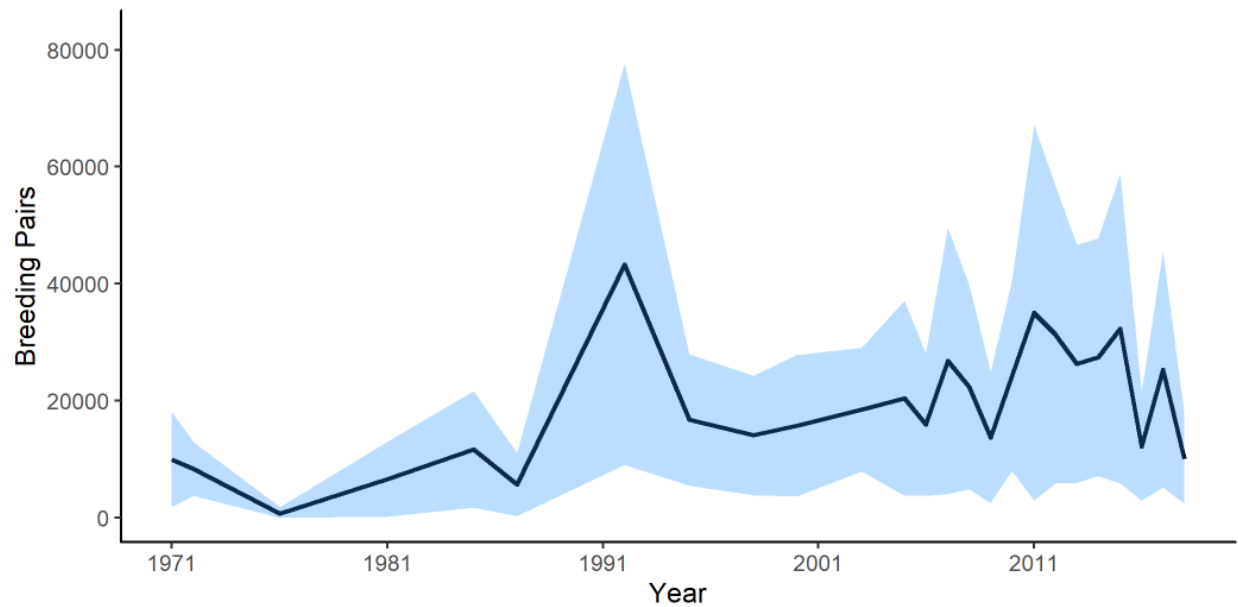


Figure 5.2-5 Indicated breeding pairs of Ring-Necked Duck in Southern Ontario; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Intervals.

5.2.2 Harvest

More Ring-necked Duck harvest occurs in the U.S. than Canada. An average of 33 000 Ring-necked ducks have been harvested annually in Canada over the past 10 years, compared to 490 000 in the U.S. (Figure 5.2-6).

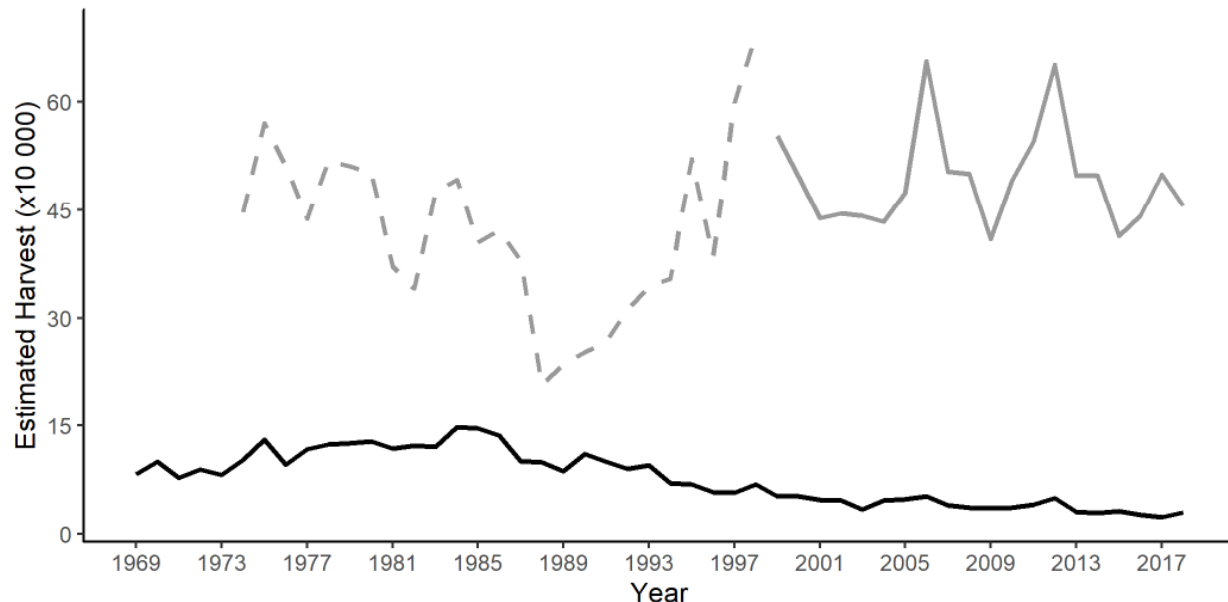


Figure 5.2-6 Estimated Ring-Necked Duck harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1500>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

5.2.3 Management and Conservation Concerns

The Ring-necked Duck use permanent wetlands in remote northern areas; thus, opportunities for management of breeding and post breeding habitats are limited. Acidification may have contributed to reduced reproductive success in some northern wetlands (McAuley and Longcore 1988) but the population has increased continentally since the 1970. Conserving staging habitat in high use areas for this species, however, is still warranted.

5.3 Redhead (*Aythya americana*)

The Redhead breeds exclusively in North America and primarily in the Prairie Pothole Region of the U.S. and Canada. Nests are constructed overwater in dense emergent vegetation of deep marshes. Additionally, Redhead females often exhibit facultative brood parasitism, laying additional eggs in the nests of other Redheads or even other species altogether (Woodin and Michot 2002).

5.3.1 Abundance and Trends

The Redhead is monitored mainly in its core breeding range through the WBPHS in western Canada.

LARGE-SCALE WATERFOWL SURVEY

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

Redhead numbers have increased significantly in the Traditional Survey Area and in the Canadian Prairies since 1970, however both of these have seen significant declines in these populations in the past years. The Alaskan and U.S. Prairies populations show long term significant increases, with stable short term trends. Western Boreal Canada is stable in both the long and short term. With an estimated 732 000 birds in 2019, the population in the total survey area is above the NAMWP goal of 701 000 birds (NAWMP 2018) (Figure 5.3-1).

Table 5.3-1. Redhead Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970–2019 Trend (long term)	2015–2019 Trend (5 years)
Traditional Survey Area	732.31 (607.44 — 857.18)	0.72 (0.36 — 1.07)*	-8.96 (-12.79 — -4.99)*
Alaska	0.46 (-0.41 — 1.32)	5.97 (0.31 — 10.01)*	6.17 (-17.34 — 28.12)
Western Boreal Canada	64.60 (20.16 — 109.05)	0.18 (-1.05 — 1.41)	3.16 (-9.67 — 17.58)
Canadian Prairies	375.61 (280.95 — 470.28)	0.84 (0.37 — 1.32)*	-14.17 (-18.97 — -9.28)*
U.S. Prairies (North Central)	291.64 (223.42 — 359.86)	0.65 (0.11 — 1.20)*	1.60 (-5.43 — 9.20)

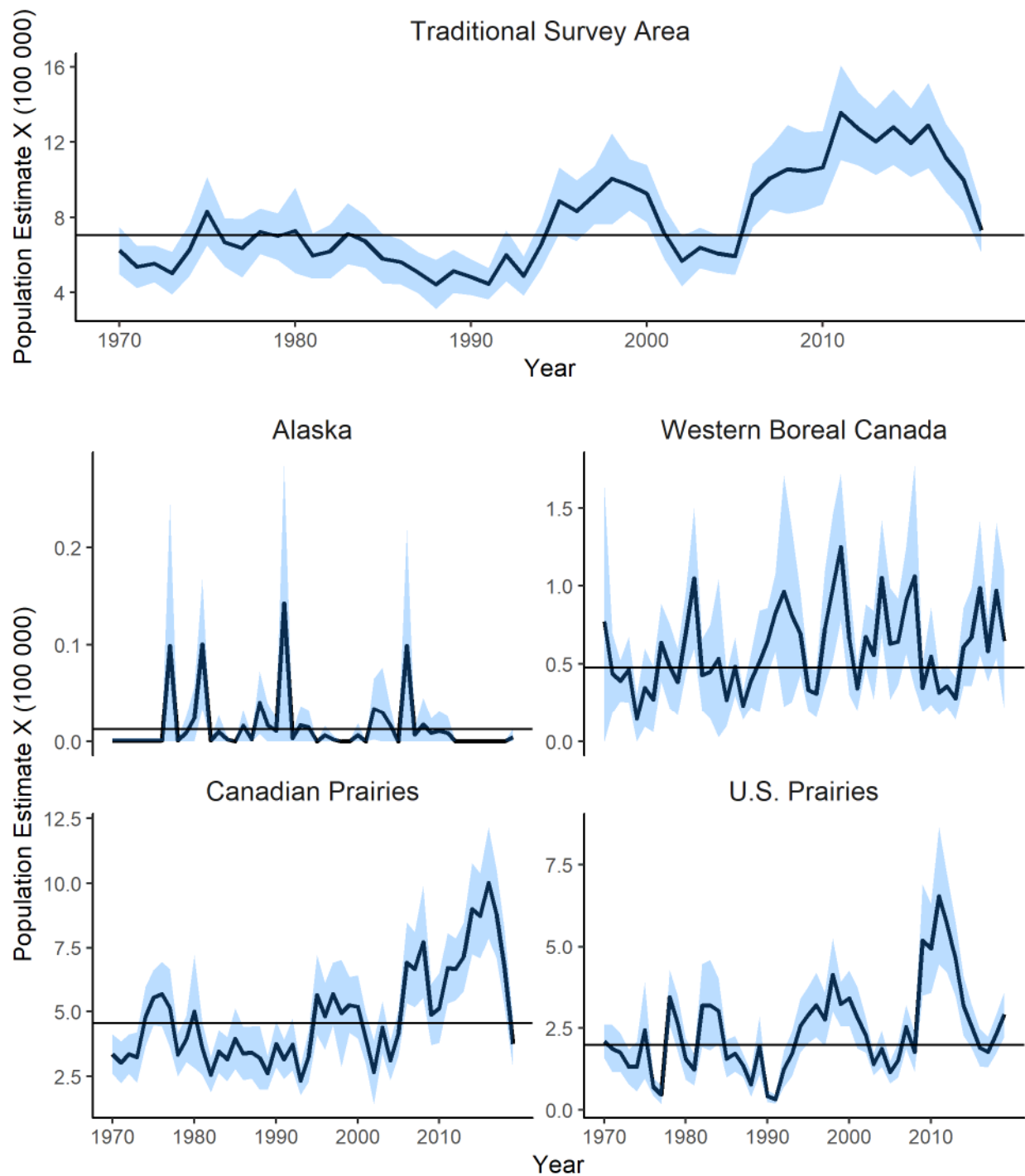


Figure 5.3-1 Redhead Breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Intervals (Horizontal lines represent the NAWMP goal in each region of the survey).

SMALL-SCALE WATERFOWL SURVEY

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

Population estimates for Redhead in the Central Interior Plateau of British Columbia show no significant long or short-term trends.

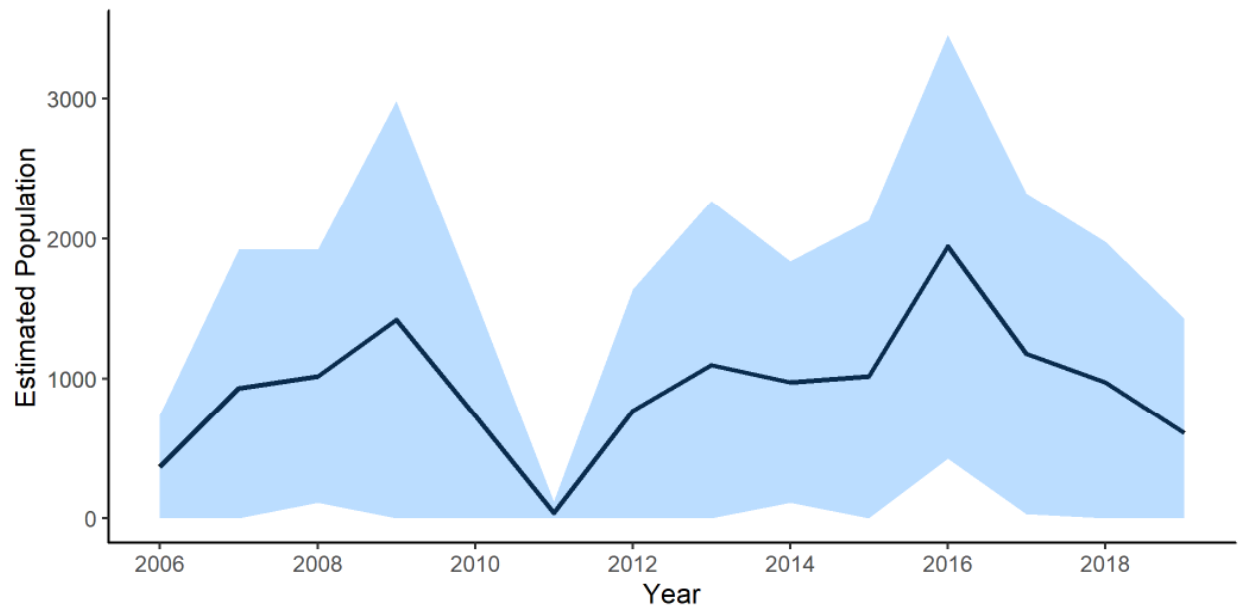


Figure 5.3-2 Population estimates of Redheads in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

5.3.2 Harvest

The average harvest in Canada over the past 10 years has been of approximately 22 000 birds. The U.S. harvest of this species is about 5 times larger than the Canadian harvest, with an average of 243 000 birds harvested every year in the last decade (Figure 5.3-3).

5.3.3 Management and Conservation Concerns

The abundance of wetlands in the Prairies play a key role 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). Redhead hens are also more prone to parasitize Canvasback nests during drought, which affects the community dynamic of both species (Péron and Koons 2012).

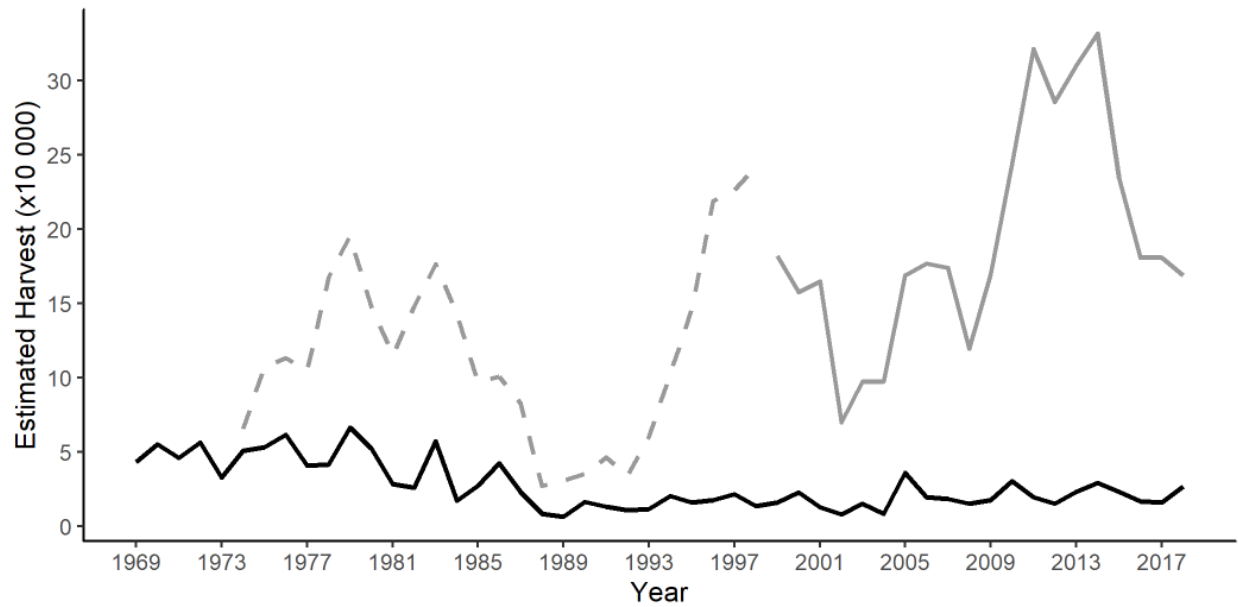


Figure 5.3-3 Estimated Redhead harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1460>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

5.4 Canvasback (*Aythya valisineria*)

The Canvasback is the largest diving duck species in North America. It is also one of the least abundant waterfowl species in Canada. The Canvasback is a primary host for parasitic egg-laying by the Redhead and brood parasitism is an important factor affecting its nesting success (Mowbray 2002).

5.4.1 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, British Columbia, Yukon and the Northwest Territories. The Canvasback is monitored in its core breeding area mainly through the WBPHS in western Canada (WBPHS; Figure 5.4-1).

LARGE-SCALE WATERFOWL SURVEY

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

In most of the survey regions, Canvasback numbers have largely remained above the NAMWP population objective of 581 000 individuals for the past two decades. Canvasback numbers do not exhibit any significant trends, with an exception in the U.S. Prairies where the population has shown a significant long term increase (Table 5.4-1; Figure 5.4-1).

Table 5.4-1. Canvasback Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970-2019 Trend (long term)	2015-2019 Trend (5 years)
Traditional Survey Area	652.04 (555.83 — 748.25)	0.42 (-0.17 — 0.82)	-2.42 (-5.87 — 1.11)
Alaska	64.52 (28.60 — 100.43)	0.14 (-1.09 — 1.22)	7.48 (-4.40 — 21.54)
Western Boreal Canada	144.40 (91.50 — 197.29)	0.06 (-1.62 — 1.02)	3.63 (-5.12 — 12.84)
Canadian Prairies	349.41 (280.87 — 417.95)	0.40 (-0.04 — 0.85)	-4.00 (-8.23 — 0.44)
U.S. Prairies (North Central)	93.71 (72.04 — 115.39)	1.91 (1.24 — 2.56)*	-7.74 (-16.63 — 1.12)

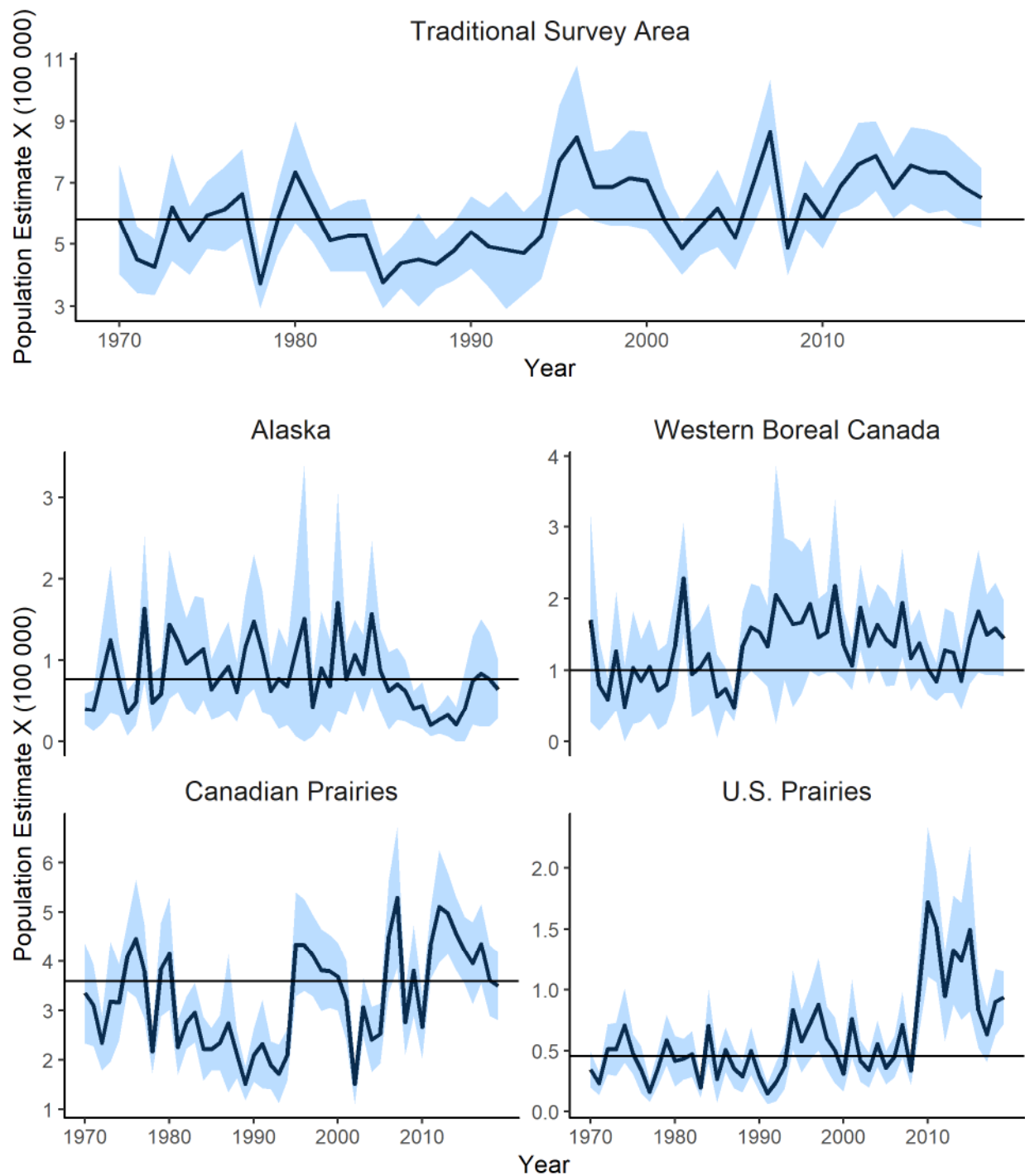


Figure 5.4-1 Canvasback breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Intervals (Horizontal lines represent the NAWMP goal in each region of the survey).

SMALL-SCALE WATERFOWL SURVEYS

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

Canvasback populations have not been consistently above 244 birds since 2014. Between 2014 and 2019, estimates range between 163 and 244 birds. Canvasback are experiencing a significant decline in population in this area (-11.36%; Table 5.4-2, Figure 5.4-2).

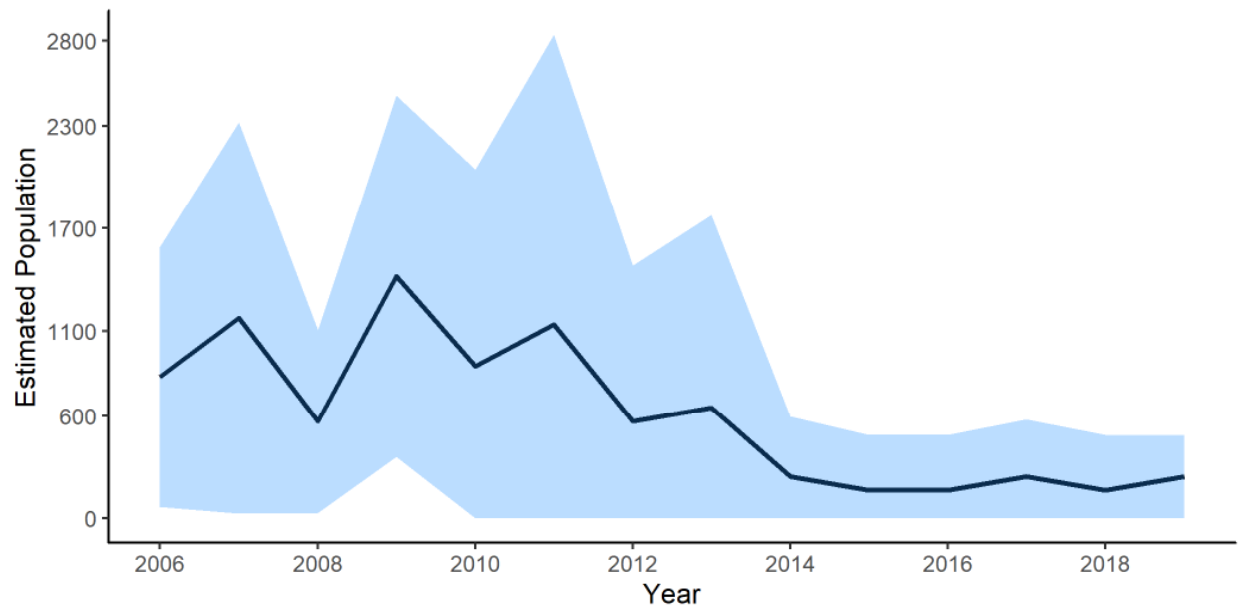


Figure 5.4-2 Population estimates of Canvasback in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

5.4.2 Harvest

In Canada, Canvasbacks are mostly harvested in the Prairie Provinces. Harvest restrictions are in place in British Columbia and Manitoba. Outside of these areas, harvest has declined in part because of the reduced number of hunters. The majority of the continental harvest takes place in the U.S. (Figure 5.4-3).

5.4.3 Management and Conservation Concerns

Canvasback breeding populations have increased since the 1990s and have remained above or near the NAWMP goal (NAWMP 2018) since then. Increased population levels have coincided with the return of favourable breeding conditions in the Prairies. Much of the variation in this species' abundance is due to changes in the abundance of wetland on the Prairies breeding ground due the wet-dry cycle of the region.

Coastal development and reduced water quality in wintering areas likely reduce the size of the continental population. In addition, Canvasback nests are often parasitized by Redheads. Parasitized nests are often deserted, thereby reducing Canvasback nesting success and productivity (Mowbray 2002; Péron and Koons 2012)

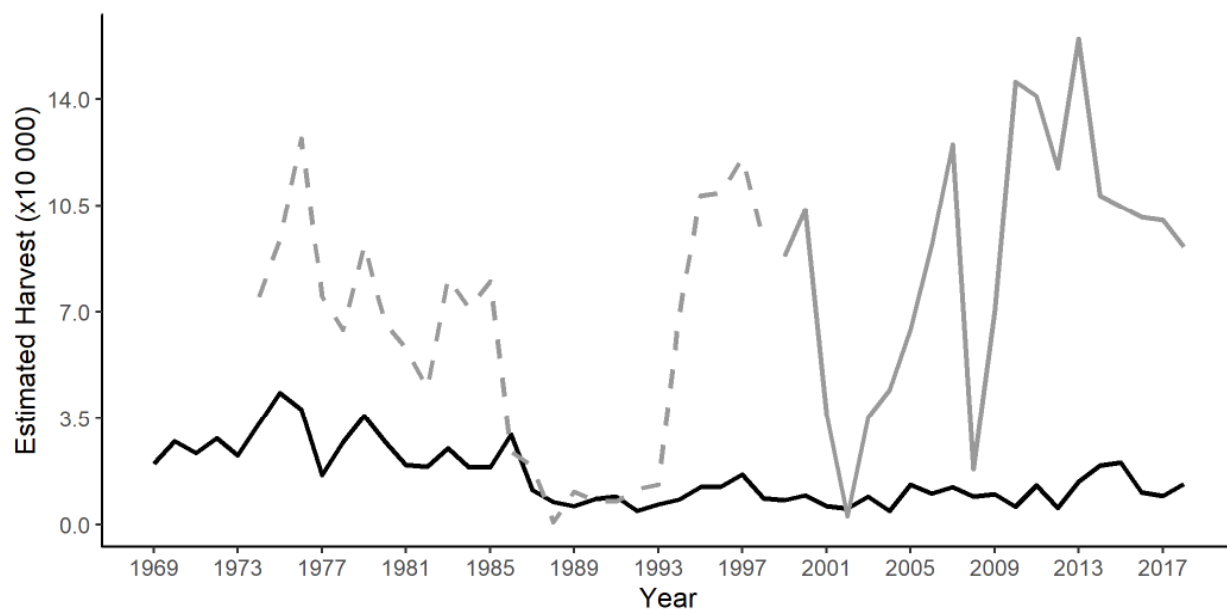


Figure 5.4-3 Estimated Canvasback harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1470>) while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

5.5 Ruddy Duck (*Oxyura jamaicensis*)

The Ruddy Duck is not abundant in Canada and the species 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 (Brua 2002). Ruddy Duck numbers are stable or increasing throughout most of the species' breeding range. It is one of the least harvested ducks in Canada.

5.5.1 Abundance and Trends

The core breeding area of the Ruddy Duck is in the Prairie and Parklands, but the breeding range extends into British Columbia. In Canada, the Ruddy Duck is monitored in its core breeding area mainly through the WBPHS in western Canada (WBPHS; Figure 5.5-1), and the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C (Figure 5.5-2).

LARGE-SCALE WATERFOWL SURVEY

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

In the Traditional Survey Area, there is a significant long term increase, but a significant short term decrease (Table 5.5-1). Both the Canadian and U.S. Prairies breeding populations show significant long term increases. However, the population in the Canadian Prairies has significantly declined in the past 5 years. The Western Boreal Canada population shows no long or short-term trends.

Table 5.5-1. Ruddy Duck Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970-2019 Trend (long term)	2015-2019 Trend (5 years)
Traditional Survey Area	515.19 (385.65 — 644.74)	1.22 (0.56 — 1.80)*	-8.12 (-14.01 — -2.34)*
Alaska	NA	NA	NA
Western Boreal Canada	54.62 (18.81 — 90.43)	1.36 (-0.72 — 3.00)	-1.21 (-15.33 — 14.53)
Canadian Prairies	256.56 (152.43 — 360.70)	1.06 (0.41 — 1.72)*	-14.68 (-22.09 — -6.84)*
U.S. Prairies (North Central)	204.01 (135.78 — 272.24)	1.44 (0.26 — 2.55)*	2.03 (-7.64 — 12.67)

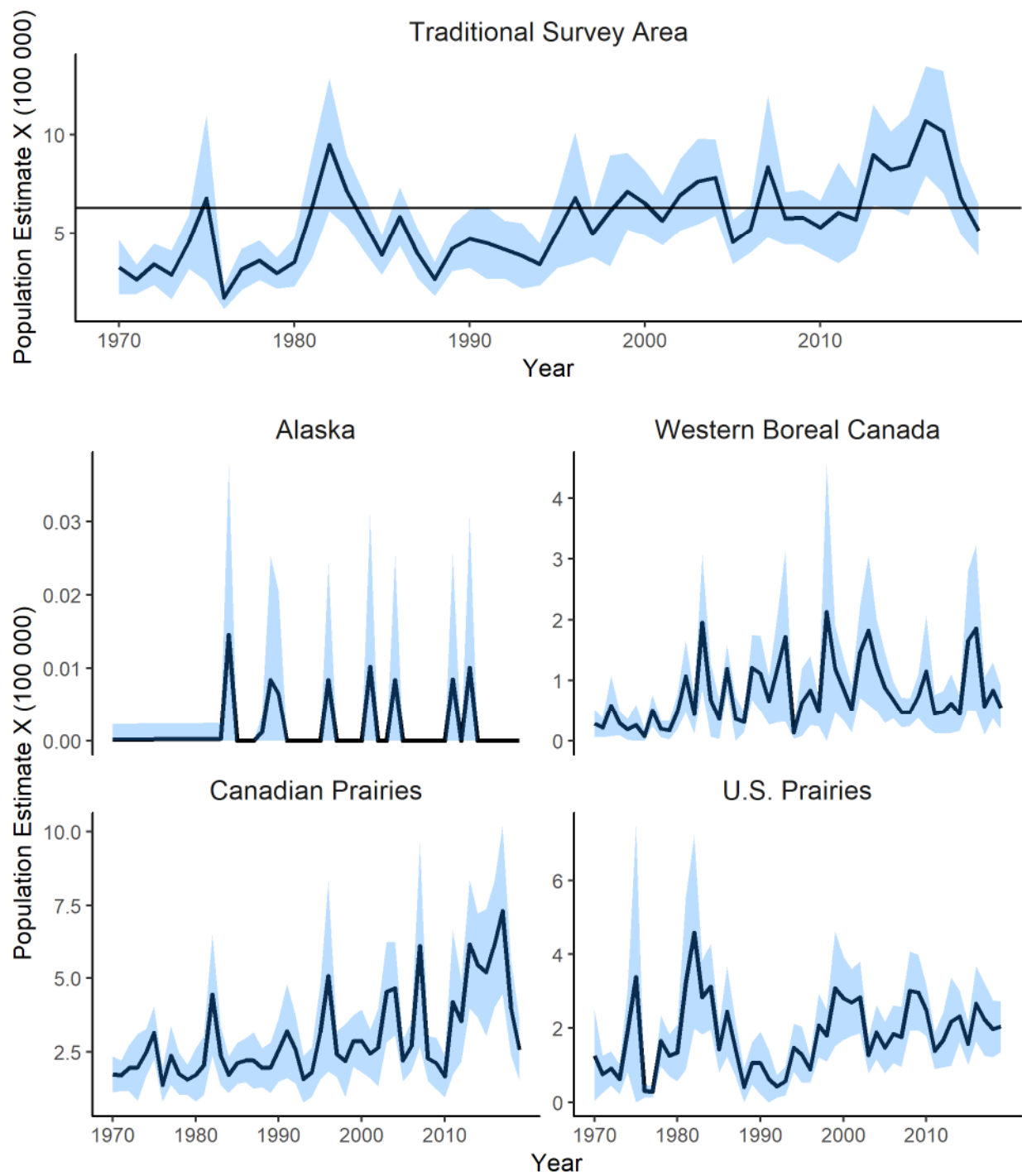


Figure 5.5-1 Ruddy Duck breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

SMALL-SCALE WATERFOWL SURVEY

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

The Ruddy Duck has shown variability in population from year to year, but exhibits no significant trends in the long or short term (Figure 5.5-2).

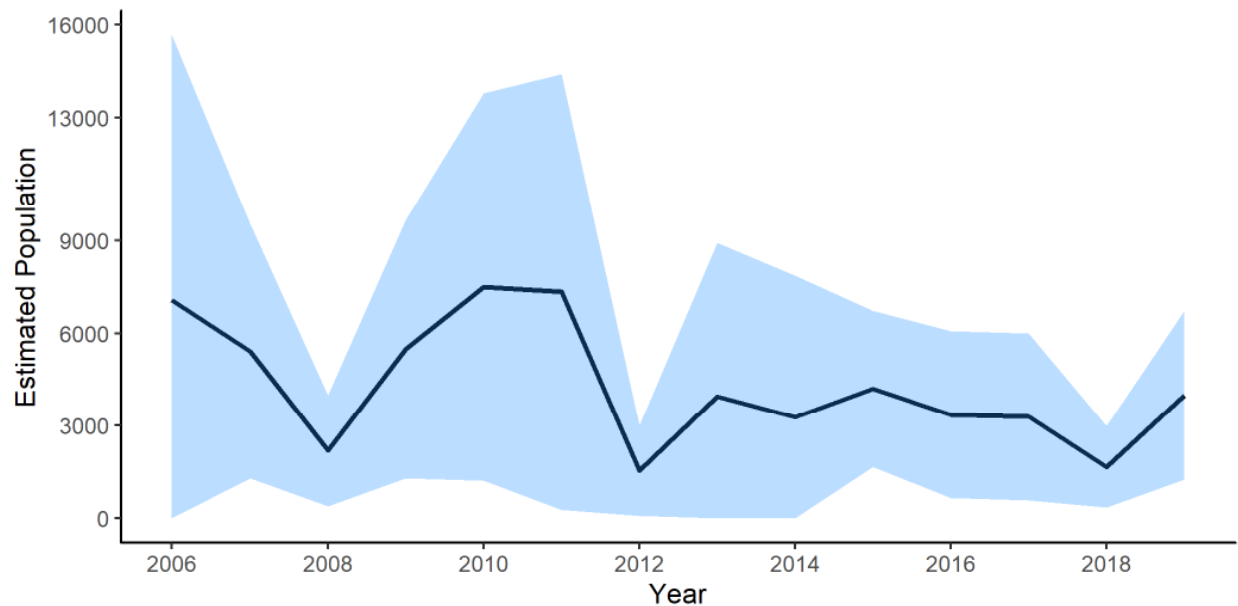


Figure 5.5-2 Population estimates of Ruddy Duck in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

5.5.2 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 1 500 birds, with most of the harvest taking place in Ontario, though in 2018 less than 100 ducks were harvested in Ontario (Figure 5.5-3). In 2018, Canadians harvested approximately 870 Ruddy Ducks.

5.5.3 Management and Conservation Concerns

Ruddy Ducks accumulate contaminants such as polychlorinated biphenyls, selenium and heavy metals including lead because of their diet (Brua 2002). Degradation of wintering habitat in the Salton Sea in California and Chesapeake Bay in Virginia and Maryland could also be a threat to this species (Brua 2002).

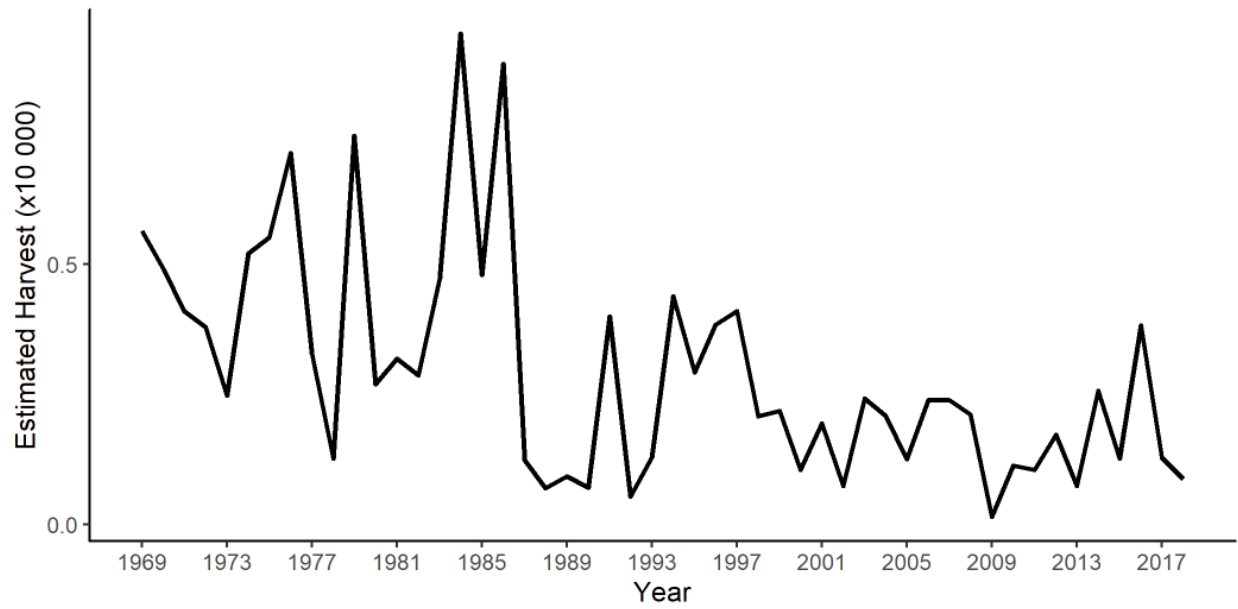


Figure 5.5-3 Estimated Ruddy Duck harvest in Canada. Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1670>).

6. Population Status of Sea Ducks

There are 15 North American species of sea ducks (Bowman *et al.* 2015). Most sea ducks breed at low densities over broad geographic areas, though moulting and wintering birds often gather on large lakes and in coastal waters. Thus, surveying sea ducks is challenging and expensive. Most species of sea ducks are poorly monitored by traditional waterfowl surveys and population size and trend data is often unreliable (Bowman *et al.* 2015). The WBPHS, which is used as a basis for setting population goals for many North American waterfowl, is not well designed to survey sea duck populations because the core breeding range of half the sea duck species is not covered and the survey is too early to effectively count 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). Furthermore, sea ducks have not been banded in large numbers. Much of our knowledge is therefore based on a very few, localized studies.

Based on limited data, 10 of the 15 species were declining in the 1980s and 1990s (Boyd *et al.* 2015; Koneff *et al.* 2017). Recent analysis indicates that most species are currently stable, albeit at a lower level than populations that have been observed in the past. The causes of past and present declines remain largely unknown (Bowman *et al.* 2015).

Sea duck are characterized by high adult survival, delayed maturation, and low reproductive rates which make their populations sensitive to factors that influence adult survival such as harvest (Koneff *et al.* 2017). Even though harvest rates are low for sea ducks, it is believed that reductions in harvest levels may be needed to help stabilize these populations. Determining what the annual harvest should be is a priority to achieve sustainability (Rothe *et al.* 2015). In Canada, harvest levels are poorly documented, in part because the Harvest Questionnaire Survey, a national survey, does not adequately sample sea duck hunters that are living predominantly in the coastal regions.

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 (Sea Duck Joint Venture Management Board 2014). 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. To access the most recent SDJV Strategic Plan, see the following web page: <https://seaduckjv.org/science-resources/#strategicplan>. This plan identifies information needs for sea ducks and describes general strategies to address those needs.

6.1 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 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 that are thought to be demographically distinctive, as they experience different climatic conditions and locally specific threats.

Eiders are exploited for food and eiderdown, and more recently they have become the focus of outfitted hunts along the eastern seaboard of the U.S. 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 commercial and subsistence harvests of eiderdown.

Industrial activity in Canada's north will likely increase in subsequent 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 will likely also increase in the Arctic, especially in the Hudson Strait. Both the Beaufort Sea and the Hudson Strait have important marine resting and feeding areas used by thousands of eiders during certain times of the year. Increased human activity may harm eider populations due to 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, and with Russia, Greenland, France (Saint-Pierre and Miquelon), and the U.S.

6.2 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 nonbreeding season. There are four subspecies of Common Eiders; Pacific, Northern, Hudson Bay, and American.

6.2.1 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, and further south in the Aleutian Region.

Pacific Common Eiders are monitored intermittently by aerial surveys conducted in the core of the Canadian breeding range in the Central Arctic region. 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 (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 2014–2016 and in Bathurst Inlet in 2015 and 2016.

The Canadian aerial surveys indicate that the population declined by 50% between 1995 and 2007–2008 at key breeding sites in Bathurst Inlet, NU. Surveys conducted in 2015 and 2016 showed that the population had stabilized but there were no signs of recovery towards 1995 numbers. The declines observed in Queen Maud Gulf are more severe, with 78% fewer eiders detected there in 2016 than in 1995. In addition, counts every ~10 years during the spring migration at Point Barrow, Alaska show declines of 53% over a 20-year period, from approximately 156 000 birds in 1976 to 73 000 birds in 1996 (Suydam *et al.* 2000; Quakenbush *et al.* 2009). Counts in 2003 and 2004, however, suggested that this subspecies numbers had increased to over 100 000 eiders.

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's Gulf of St. Lawrence, and southwest Greenland.

There is no recent trend estimates for most of this subspecies' breeding area; its very large distribution in the Canadian Arctic makes it difficult to monitor. Historical data exist for a few areas only: these are Ungava Bay, coastal Labrador, East Bay Southampton Island and Hell Gate (High Arctic), and Digges Sound.

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. Estimates of adult male Eiders from 2003–2009 suggest that the Canadian overwintering component has been stable over this period, but the 2012 estimate was significantly greater than previous estimates (Figure 6.2-1). In February 2015, the adult male population estimate was close to the estimates obtained during the 2003–2009 period. The most recent survey in 2018 gave a similarly high estimate to 2012. The population trend since 2003 is stable.

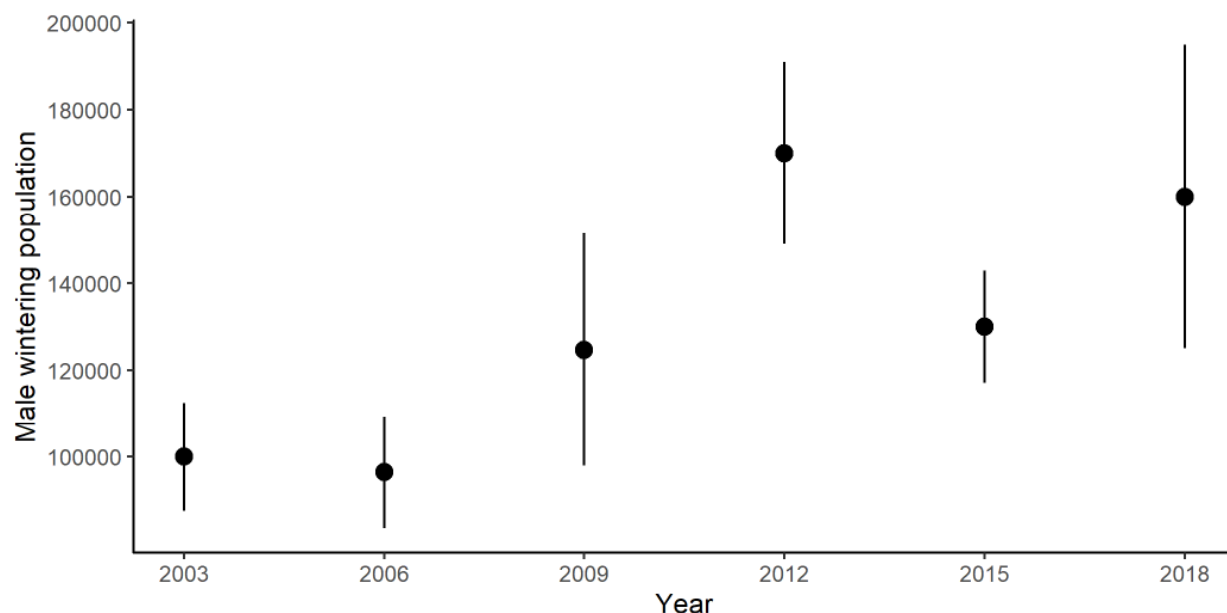


Figure 6.2-1. Estimated number of wintering adult male Northern Common Eider. Black dots represent the population size while the black line represent the 95% Confidence Intervals.

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 approximately 250 000 birds, based on a few regional surveys and experts' opinions in the population distribution range (NAWMP 2018). Reliable data for breeding areas exist only for segments of the population that breed in colonies in the St. Lawrence Estuary and the North Shore of the Gulf of St. Lawrence, Quebec. Recent numbers in Quebec's surveyed areas total about 44 000 breeding pairs (Lepage 2019a). The 2013–2019 population

trend in the estuary is mostly stable (based on the four largest colonies; Figure 6.2-2), although numbers on Bicquette Island have been declining since 2002, year of a cholera event in the estuary. The segment of the population breeding on migratory bird sanctuaries along the Quebec coast of the Gulf of St. Lawrence is now more than three times higher than what numbers used to be between 1925 and 1988 (Rail and Cotter 2015); however, breeding pairs there seem to have stabilized in the present decade (Table 6.2-1; J.-F. Rail, CWS–Quebec Region, unpubl. data).

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 this subspecies' range. Eiders breeding in New Brunswick have been experiencing a long-term decline of about 3% per year (Bowman *et al.* 2015) which has continued through 2017 (K. Conner, unpubl. data; Figure 6.2-3). Anecdotal information for Nova Scotia suggests declines in the number and size of breeding colonies in these areas as well.

Aerial surveys conducted in the Estuary and Gulf of St. Lawrence in August 2010 reported 152 000 moulting eiders (CWS–Quebec Region, unpubl. data), which represent a large proportion of this subspecies' population at that time of the year. The winter Northern Common eider surveys in Quebec, and Newfoundland-and-Labrador covered the Maritimes in 2006, 2012, 2016 and 2019. The number of eiders wintering in the Maritimes, which are thought to be mostly *dresseri*, has declined from about 70 000 in 2006 to less than 20 000 in winter 2019 (Table 6.2-2).

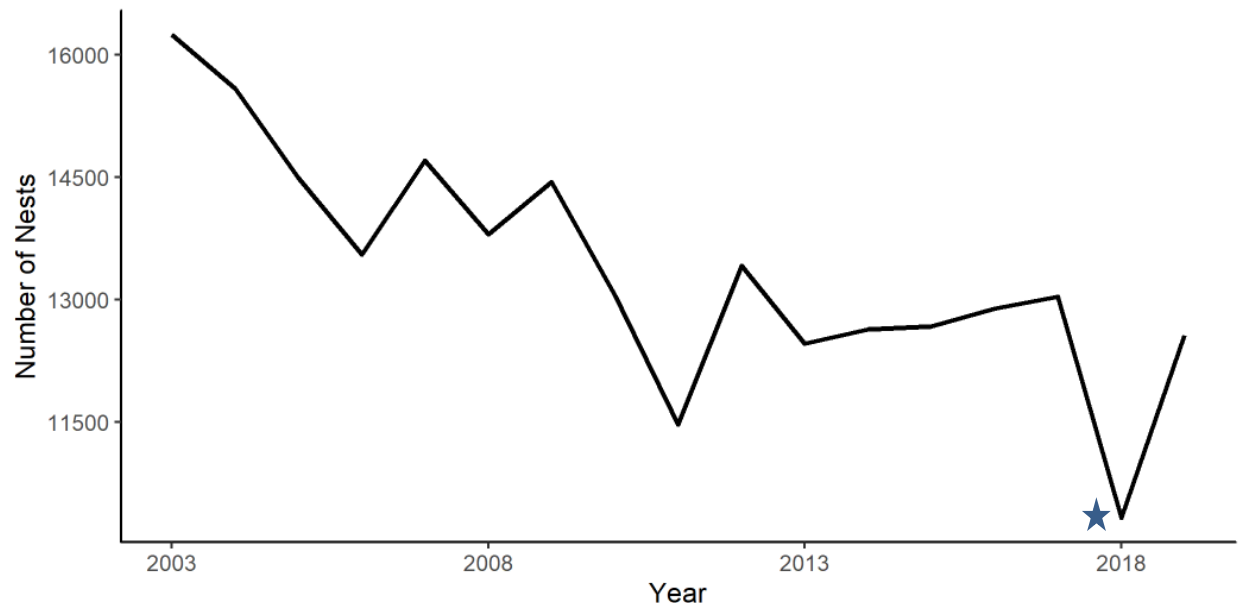


Figure 6.2-2. Number of American Common Eider nests for the four largest breeding colonies in the St. Lawrence Estuary, Quebec. These colonies are Bicquette Island (SPEE, unpubl. data), Pommes, Blanche and aux Pommes Islands (Société Duvetnor Ltée, unpubl. data). The star indicates a year with known presence of a fox on Pommes.

Table 6.2-1. Number of nests of American Common Eider in the Gulf of St. Lawrence Migratory Bird Sanctuaries	
Year	Nests number
1993	7 274
1998–1999	6 536
2005	12 858
2010	13 875
2015	12 480

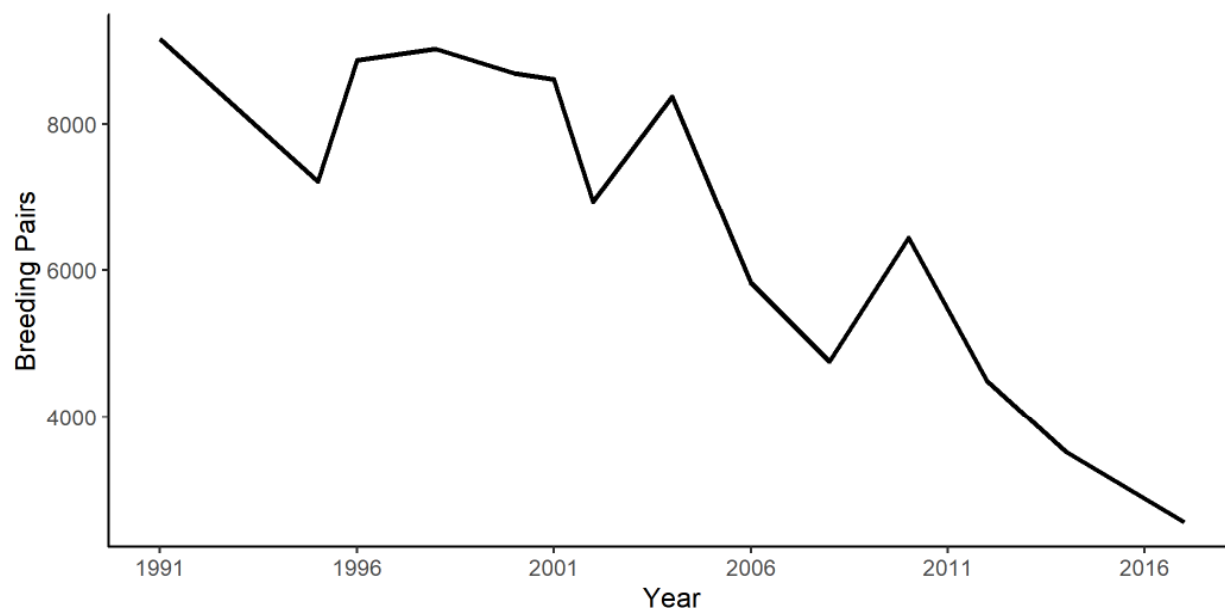


Figure 6.2-3. Estimated number of breeding pairs of American Common Eider in New Brunswick.

Table 6.2-2. Number of American Common Eider wintering in Nova Scotia and New Brunswick	
Year	Estimated number
2006	71 929
2012	34 108
2016	37 277
2019	19 233

6.2.2 Harvest

The National Harvest Survey provides 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 13 000 birds over the past decade (Figure 6.2-4). The 2018 Canadian harvest estimate, at 10 897 birds, was one of the lowest for this species since the beginning of the survey with harvests in Nova Scotia and New Brunswick being near zero. In the U.S., eider harvest occurs only in Alaska and states of the Atlantic Flyway. The 2018 harvest of eiders (all subspecies together) was

estimated at 17 600 birds (Roberts 2019). 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) but it is unclear how many of these are from Canadian Breeding grounds (E. E. Syroechkovski Jr., Russian Institute of Ecology and Evolution, pers. comm.). The subsistence harvest of Pacific Common Eiders in Canada and Alaska was 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 and 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.

AMERICAN COMMON EIDER

American Common Eiders were 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 15 000 birds per year in the early 1990s to less than 1 000 birds per year during 2011–2017; however, harvest estimate for 2018 went up to 3 800 eiders.

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 economic activity in the St. Lawrence Estuary.



Figure 6.2-4. Estimated Common Eider harvest in Canada (solid line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1590>).

6.2.3 Management and Conservation Concerns

PACIFIC COMMON EIDER

Pacific Common Eiders are particularly vulnerable to shipping disturbance and 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 subspecies' population.

NORTHERN COMMON EIDER

Emerging threats for Northern Eiders include disease, disturbance of breeding colonies by polar bears, increased shipping through the Hudson Strait, mortality from oil spills, and high harvest in Newfoundland. 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 (Iverson *et al.* 2016). 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 (Iverson *et al.* 2014).

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 subspecies is harvested by Aboriginal subsistence hunters (adults, egg and down

collection) throughout the year. Little information on harvest levels is available.

AMERICAN COMMON EIDER

Diseases likely play an important role in the dynamics of this subspecies, particularly avian cholera. Many predator populations, including river otters, mink, Great Black-backed Gulls and Bald Eagles, have recently recovered, likely increasing predation and disturbance in American Eider breeding colonies in Nova Scotia, New Brunswick and Maine (S. Gilliland, CWS–Atlantic Region, pers. comm.). Melting sea ice also means that polar bears are entering colonies more often (Iverson *et al.* 2014). Additionally, Blue Mussels, Common Eiders' preferred prey are declining on the wintering grounds (Sorte *et al.* 2017; S. Gilliland, CWS–Atlantic Region, unpubl. data) and may be responsible for recent declines of eiders in the southern portion of the range. In response to concerns for this subspecies, a restriction on the harvest of Common Eider was put in place in 2016 in the U.S. and the Maritime Provinces.

6.3 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). The species nests along the Arctic coastline from the Bering Sea, Alaska in the west to Victoria Island, Nunavut in the east. There are two King Eider populations identified based on the species' wintering areas: the Western Arctic population that winter off the coast of Alaska and the Eastern Arctic population that winter off the coast of the Maritimes. Birds breeding west of the Adelaide Peninsula, Nunavut are likely from the western population and to the east are likely the eastern population, though both populations nest on Melville and Prince Patrick Island, Nunavut.

6.3.1 Abundance and Trends

No annual surveys covering the King Eider are carried out in North America. The continental population is estimated at 600 000 individuals (NAWMP 2018).

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–Quebec Region, 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.).

6.3.2 Harvest

The King Eider is hunted for subsistence in Canada, Greenland, 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) [Figure 6.3-1].

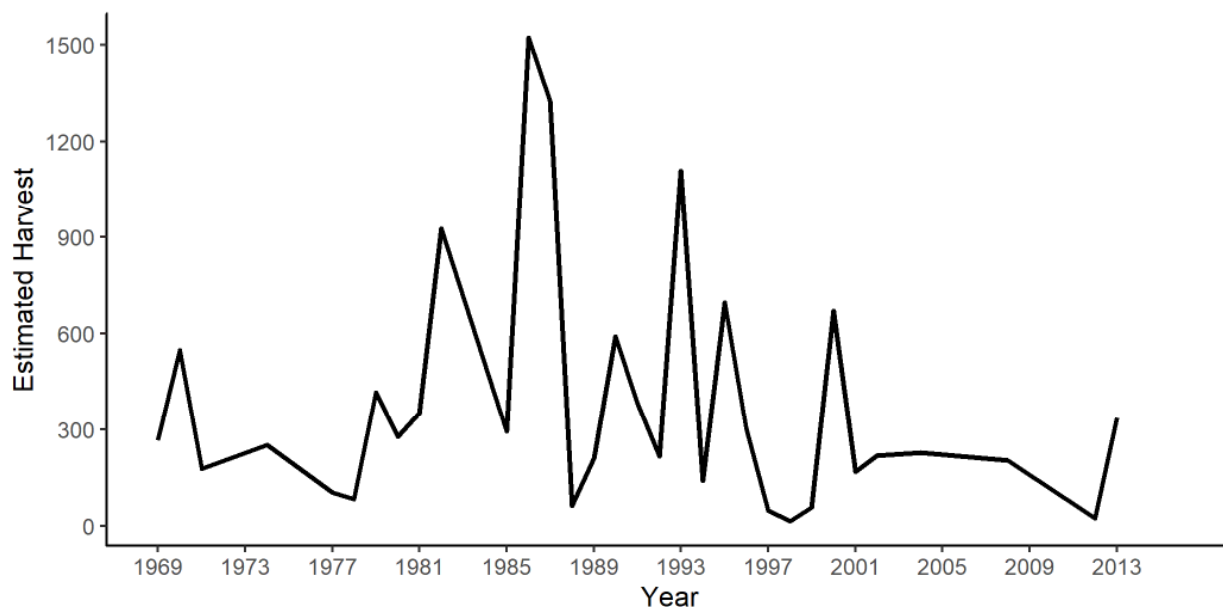


Figure 6.3-1 Estimated King Eider harvest in Canada (solid line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1620>).

6.3.3 Management and Conservation Concerns

Subsistence harvesting by Aboriginal people and starvation are two major sources of mortality for King Eiders (Cotter and Lepage 2013). 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 (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 U.S. if the species' population is to be managed sustainably.

6.4 Harlequin Duck (*Histrionicus histrionicus*)

Unlike most other waterfowl, the Harlequin Duck breeds near clear, fast rivers and streams. 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 declined in the 1980s, probably because of overharvesting, and is currently listed as Special Concern under the Canadian *Species at Risk Act*. However, the population has increased since the 1990s. The Western Population appears stable.

6.4.1 Abundance and Trends

EASTERN POPULATION

This population contains two distinct subpopulations that winter separately. Harlequin Ducks that breed in northern Quebec and Labrador, winter in Greenland, while those that breed in southern Labrador, Newfoundland, New Brunswick and the Gaspé Peninsula of Quebec winter mostly in eastern North America (Maritimes and Maine) and there appears to be little interbreeding (Scribner *et al.* 2000; Robert *et al.* 2008; Thomas *et al.* 2009).

The Eastern Population declined to historic low numbers in the 1980s and early 1990s, likely following overharvesting (Goudie 1991). Since then, the population appears have increased slightly (Bowman *et al.* 2015). Counts of Harlequin Ducks made at irregular intervals at key wintering sites in Atlantic Canada between 2001 and 2013 show rapid population growth (9% per year) during the last 12 years (Bowman *et al.* 2015). However, these counts were not random and were not standardized within or among sites. The Eastern Population was estimated to be roughly 6 800 individuals in the mid-2000s, with approximately ~80% of pairs breeding in northern Quebec (Robert 2013b).

The size of the Harlequin subpopulation overwintering in Greenland is uncertain, but surveys along the western coast of Greenland estimate 6 200 moulting Harlequins there in 1999 (Boertmann and Mosbech 2002).

The subpopulation 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 (Robertson and Goudie 1999; Mittelhauser 2008). 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). While the 2014 Eastern population Barrow's Goldeneye Winter Survey in Quebec has reported about 235 Harlequin Ducks wintering between Port-Daniel and Newport along the south coast of the Gaspé Peninsula, this estimates was at 210 individuals in 2017 (CWS–Quebec Region, unpubl. data).

Environment Canada (2007) 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 apparently winters in the Aleutian Islands in the Northern Pacific Ocean (Bowman *et al.* 2015).

6.4.2 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. Harlequin Ducks harvest by sport hunters is probably in the low 100's along the West Coast, 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.

6.4.3 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, habitat loss, and disturbance from recreation (boats) and development (aquaculture and fisheries, hydroelectric developments) all likely contributed to their decline (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 hunting was banned throughout the Atlantic Flyway. Later, after new information showed that there were more Harlequins breeding in eastern Canada than originally believed, the Eastern Population was listed as of Special Concern in 2001 (Environment Canada 2007). The Eastern Population has been increasing, possibly because hunting has been prohibited everywhere in eastern North America since 1990 (COSEWIC 2013). Public awareness campaigns about the population's precarious status have probably also contributed to the increase in population numbers. Although hunting of Harlequin Ducks has been prohibited in eastern Canada since 1990, the species remains extremely vulnerable to hunting because they are tame, feed close to shore, and females and juveniles resemble other species that may be hunted legally.

Hunting closures have not been implemented in western Canada, where hunting of the species is rare. However, data from the B.C. Coastal Waterbird Survey suggest that the Western Population might currently 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.

6.5 Scoters

The three species of Scoters that breed in Canada are the Black Soter (*Melanitta americana*), the Surf Soter (*M. perspicillata*) and the White-winged Soter (*M. deglandi*). Scoters are relatively understudies compared to other sea ducks, but among the three species, the White-winged Soter is the most studied. Research efforts in recent years have led to a better understanding of the breeding, moulting and wintering ecology of this group. There are currently no surveys that provide reliable population or trend estimates for Scoters, but the SDJV is developing some. There are no NAWMP population objectives available for these species (NAWMP 2018).

6.5.1 Abundance and Trends

LARGE-SCALE WATERFOWL SURVEYS

WATERFOWL BREEDING POPULATION AND HABITAT SURVEY IN WESTERN CANADA

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. 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 Scoters (3 species combined) are found at very low densities in the Canadian Prairies, results of the WBPHS suggest that Soter numbers have significantly declined over the long term (Table 6.5-1 and Figure 6.5-1). The same is true in Western Boreal Canada and in the Traditional 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 6.5-1. Scoters sp. Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2018 Breeding Population Estimates (in thousands)	1970-2019 Trend (long term)	2015-2019 Trend (5 years)
Traditional Survey Area	1053.65 (821.65 — 1285.66)	-0.55 (-0.98 — -0.13)*	-2.08 (-7.89 — 3.22)
Alaska	281.66 (197.67 — 365.64)	-0.08 (-0.50 — 0.33)	-0.07 (-9.63 — 6.63)
Western Boreal Canada	765.15 (549.04 — 981.26)	-0.64 (-1.18 — -0.12)*	-2.55 (-9.19 — 4.00)
Canadian Prairies	6.84 (-1.50 — 15.19)	-4.98 (-7.29 — -2.65)*	-3.43 (-32.44 — 29.22)
U.S. Prairies (North Central)	NA	NA	NA

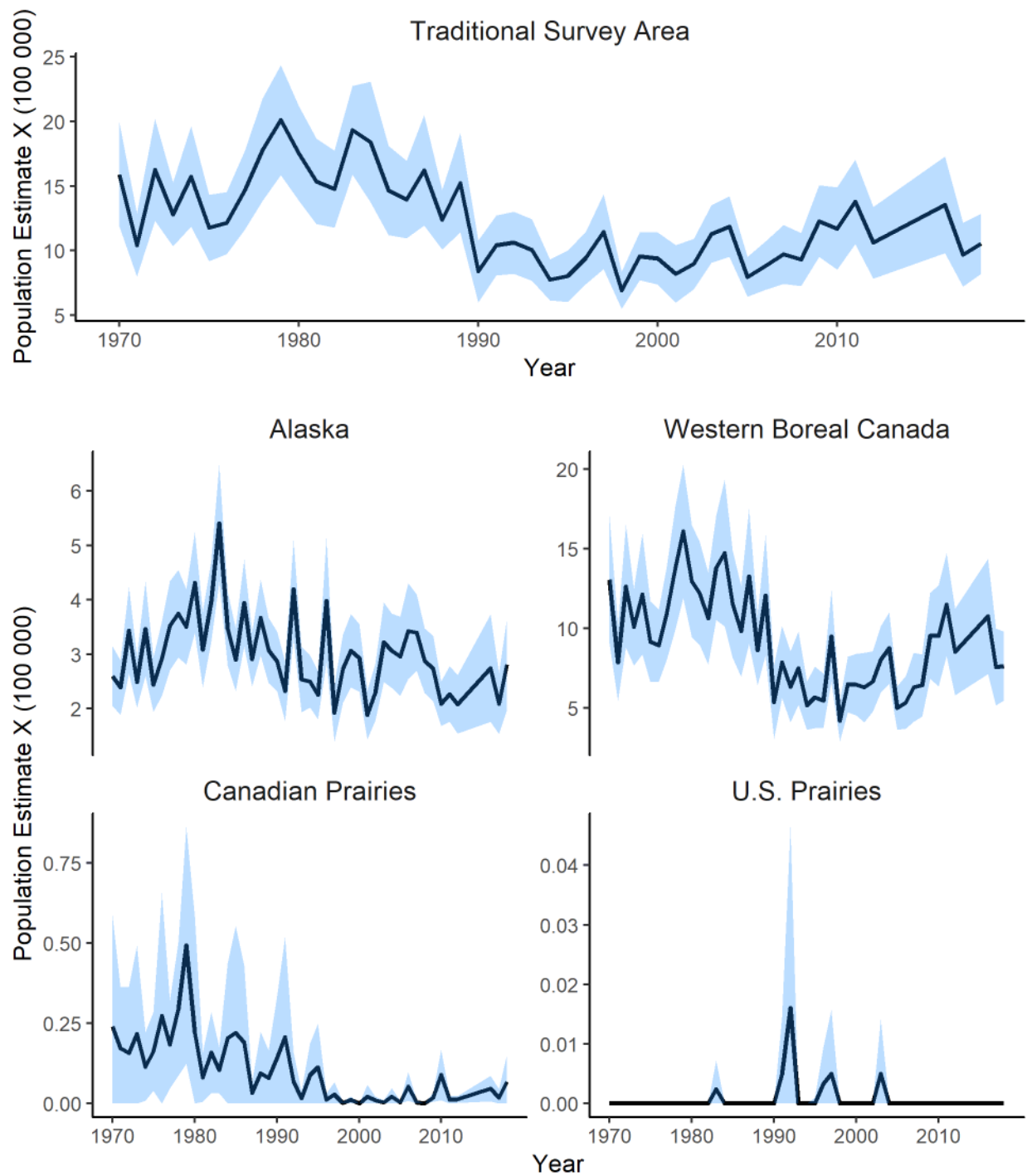


Figure 6.5-1 Scoter (three species combined) breeding population estimates based on the Waterfowl

breeding Population and Habitat Survey, black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

SMALL-SCALE WATERFOWL SURVEYS

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

Scoters have shown a significantly increasing population trend over the long term in this area (Figure 6.7-2).

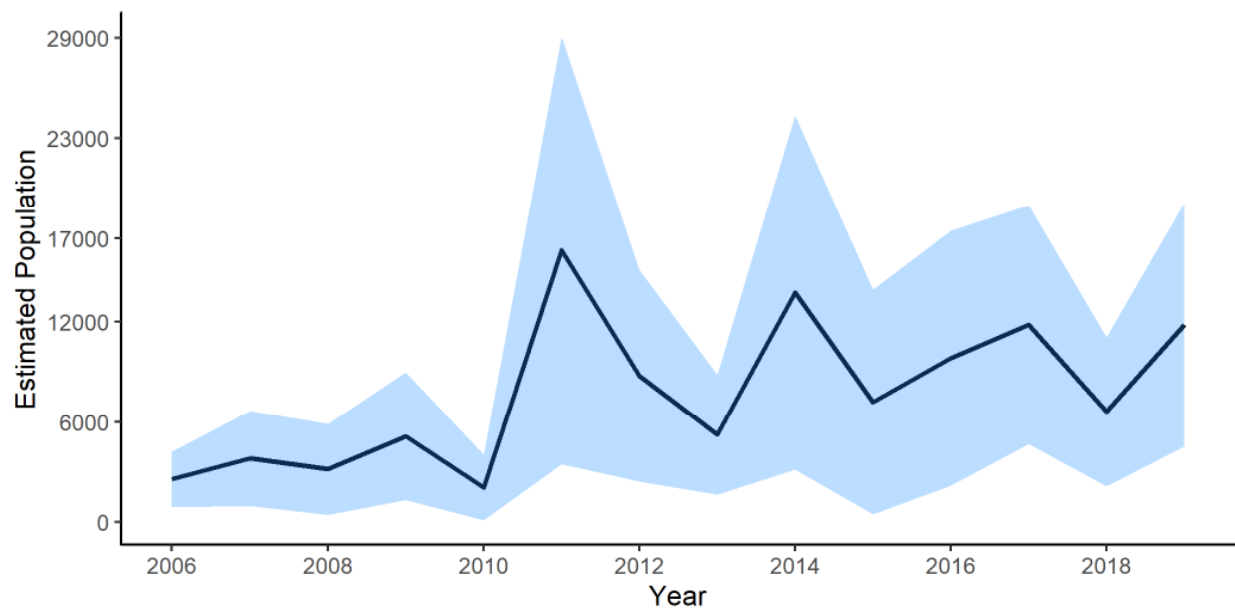


Figure 6.7-2 Population estimates of Scoters (all three species) in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

6.6 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 and aerial surveys show that pairs also breed from the Hudson Bay coast of Manitoba west-northwest as far as the Great Slave Lake in the Northwest Territories, with the core of the breeding range occurring in the Taiga Shield ecozone of Manitoba, Nunavut and 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).

6.6.1 Abundance and Trends

The continental Black Scoter population totals approximately 500 000 birds (300 000 birds in the Pacific Population and 200 000 birds in the Atlantic Population; NAWMP 2018).

The Black Scoter population is monitored partially through the WBPHS (Figure 3.1-1, 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

• SPRING STAGING

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 provided information on seasonal connectivity, timing and direction of movements, and site fidelity to wintering, breeding and moult sites (Lamb *et al.* 2019; SDJV 2015a).

• MOULTING

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 (Badzinski *et al.* 2013).

6.6.2 Harvest

In Canada, the harvest includes only a few thousand birds in eastern Canada (Figure 6.6-1). Most of the harvest takes place in the U.S. In 2018, approximately 35 000 Black Scoters were harvested in the U.S., which represented approximately 85% of the total estimated harvest for this species.

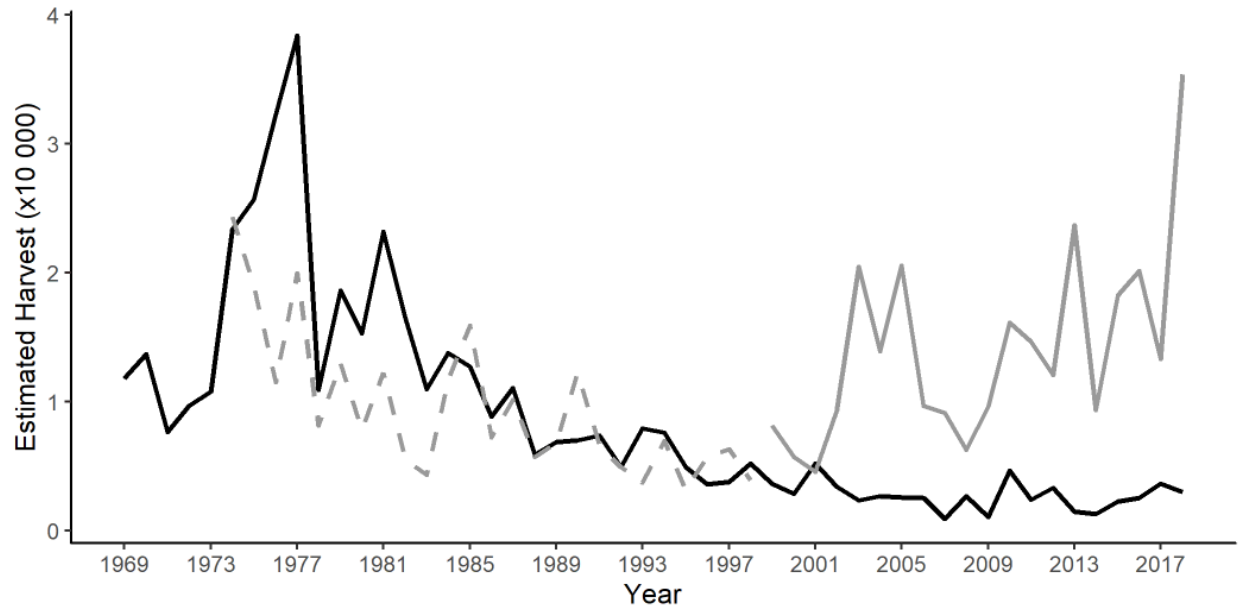


Figure 6.6-1 Estimated Black Scoter harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1630>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

6.6.3 Management and Conservation Concerns

Many 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 may be sensitive to mortality from hunting.

The fact that this species congregates during moulting and in winter makes it highly vulnerable to oil spills and exposure to other toxic substances. The Black Scoter could also face threats from the expected development of offshore wind energy and aquaculture. 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).

6.7 Surf Scoter (*Melanitta perspicillata*)

There are two populations of Surf Scoters in North America: one wintering in the Pacific, the other in the Atlantic. The Eastern Population breeds in the Northwest Territories, 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, where it overlaps the Eastern population, and to a lesser degree in northern B.C., Alberta and Saskatchewan.

6.7.1 Abundance and Trends

LARGE-SCALE WATERFOWL SURVEYS

Scoters are monitored through the WBPBS in the western part of their range. The WBPBS does not differentiate between the three species which appear similar from a fixed-wing aircraft. In eastern Canada, the WBPBS only partially covers the southern edge of the Surf Scoter's range. WBPBS is also not optimally timed optimally to monitor the late-breeding Surf Scoters. Suboptimal timing causes the annual population estimates to 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 estimated at 700 000 birds in North America (NAWMP 2018), with about 225 000 known to winter along the Pacific Coast and from 150 000 to 400 000 wintering on the Atlantic Coast (SDJV 2015d).

EASTERN WATERFOWL BREEDING GROUND SURVEY

In eastern Canada, Surf Scoters are counted during the helicopter plot survey component of the Eastern Waterfowl Breeding Ground Survey, but the survey provides only a partial population index for this species because it only 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 2019, the population estimate of 130 000 birds was an increase from the 89 000 birds counted in 2018, and is above the 10-year average of 122 000 birds. Population estimates from the traditional survey area fluctuate widely on an annual basis, but Surf Scoters in eastern Canada have increased (Figure 6.7-1).

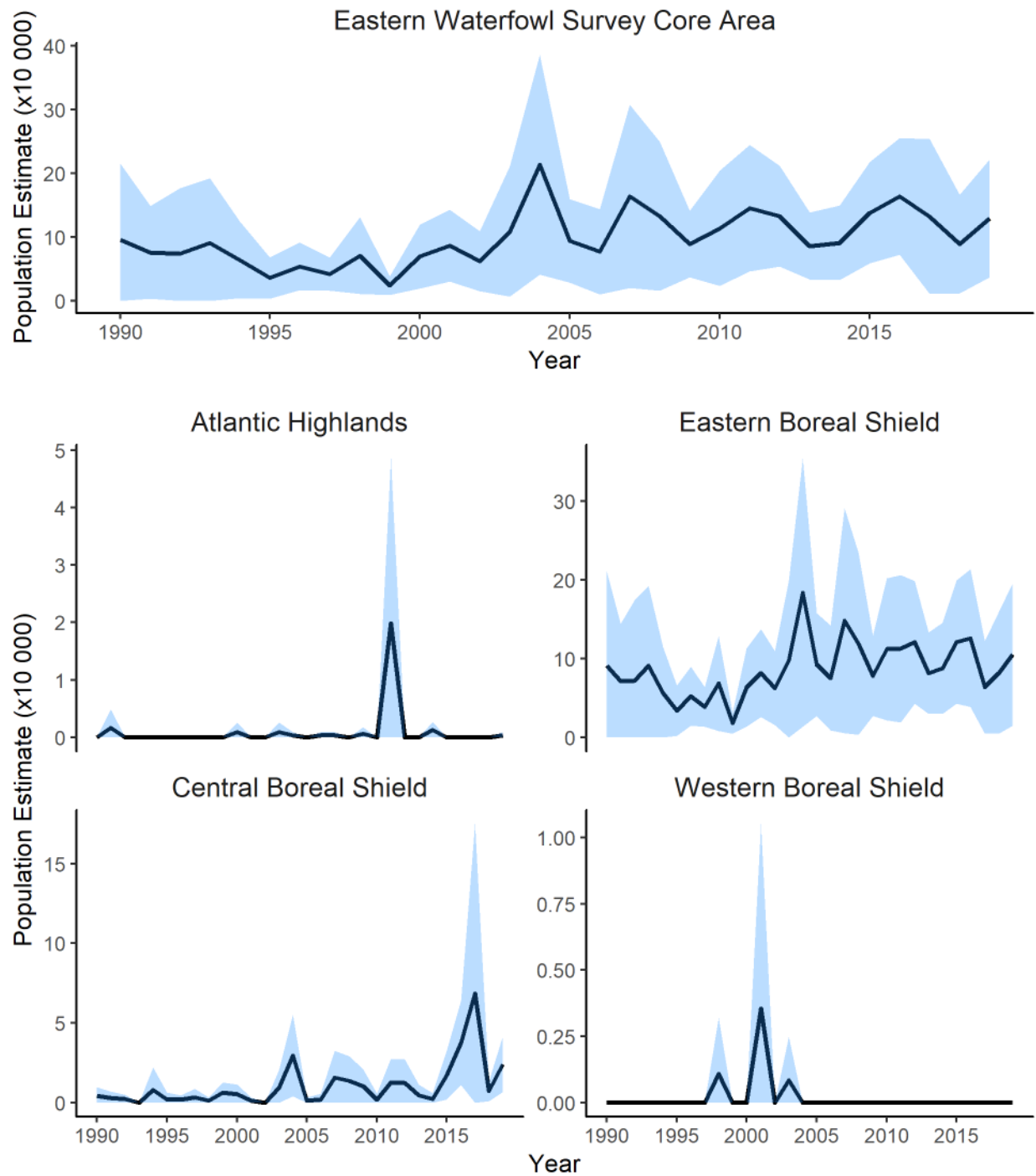


Figure 6.7-1 Surf Scoter breeding population estimates based on the Eastern Waterfowl Breeding Ground Survey, black line represents the population estimate while the shaded area represents the 95% Credible Intervals (Results from the helicopter plot survey data only).

OTHER MONITORING

• SPRING STAGING

The Chaleur Bay area (Quebec and New Brunswick) and the St. Lawrence Estuary and Gulf are major spring staging areas for Scoters (SDJV 2015d). 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.

• MOULTING

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.). An aerial survey conducted in the Estuary and Gulf of St. Lawrence in August 2010 reported more than 90 000 moulting Scoters, 95% of which were Surf Scoters (F. Bolduc, CWS–Quebec Region, unpubl. data). 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 (Badzinski *et al.* 2013).

• FALL STAGING

Surveys in September and October 2006 indicated that the St. Lawrence Estuary is an important staging area for Surf Scoters in the fall, as many as 80 000 birds were counted there (J.-P. Savard, S&T–ECCC, pers. comm.).

In the St. Lawrence Estuary, efforts were made in October 2012 and 2013 by the CWS and American partners 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 provided valuable information on seasonal connectivity, timing and direction of movements, site fidelity to wintering, and breeding and moult sites (Lamb *et al.* 2019; SDJV 2015a).

6.7.2 Harvest

On average, an estimated 2 300 Surf Scoters were harvested annually in Canada over the past decade, compared to 28 000 in the U.S. (Figure 6.7-3). Surf Scoter harvest has declined in Canada but not the U.S.

6.7.3 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) but it is unclear if this is the case in other locations. Because Surf Scoters feed on farmed mussels and clams, they can be 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 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).

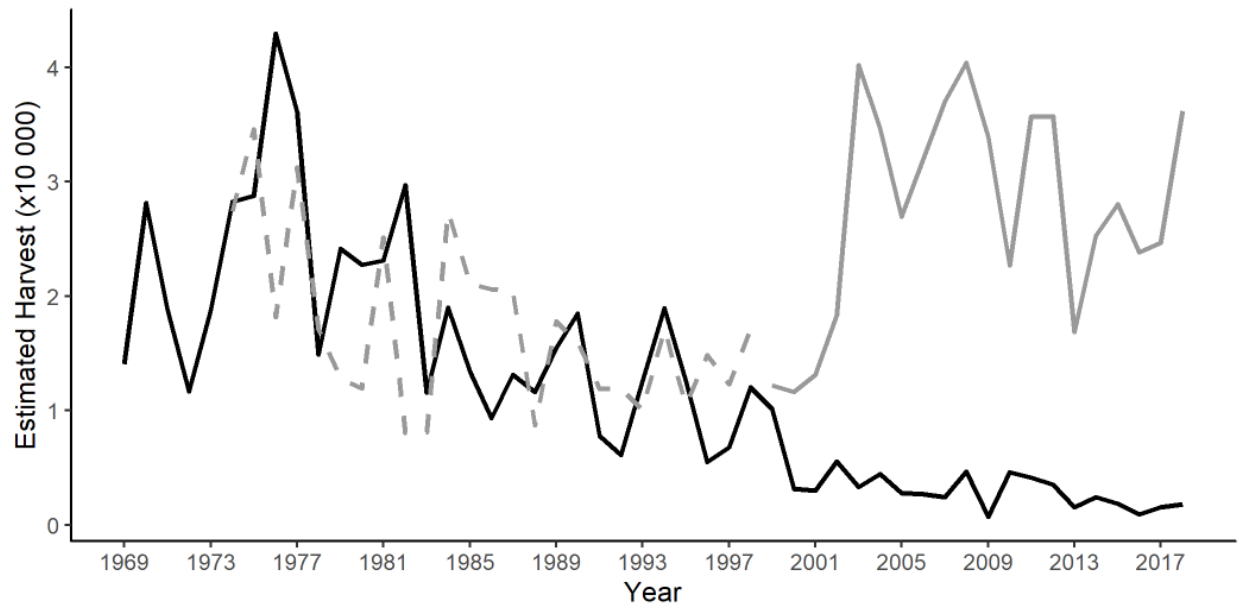


Figure 6.7-3 Estimated Surf Scoter harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1660>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

6.8 White-winged Scoter (*Melanitta deglandi*)

Of the three Scoter species that breed in Canada, the White-winged Scoter is the most studied (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.

6.8.1 Abundance and Trends

WESTERN CANADA

The Waterfowl Breeding Population and Habitat Survey 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 6.5-1 and Figure 6.5-1).

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 (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).

6.8.2 Harvest

The annual harvest of White-winged Scoters for 2018 was under 800 birds. Over the past decade, an average of 1 600 birds were harvested annually (Figure 6.8-1). White-winged Scoter harvest has declined in Canada since the 1970s.

6.8.3 Management and Conservation Concerns

The White-winged Scoter may accumulate a number of contaminants, making it potentially vulnerable to poisoning (Brown and Fredrickson 1997). Spills of hydrocarbons and other toxic substances on White-winged Scoter moulting or wintering grounds may harm the species since the species is often present in high densities along oil transportation routes (Vermeer and Vermeer 1975; Ohlendorf and Fleming 1988).

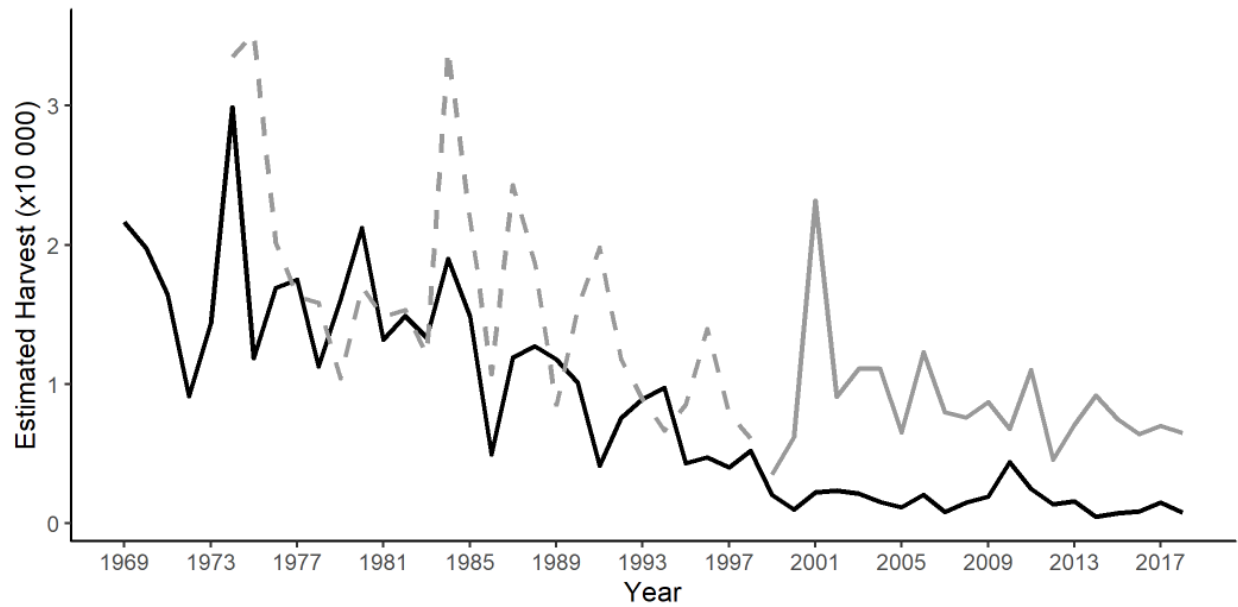


Figure 6.8-1 Estimated White-Winged Scoter harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1650>) while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

6.9 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).

6.9.1 Abundance and Trends

EASTERN POPULATION

The size of the Eastern Population of Barrow's Goldeneye is estimated to be at about 8 300 individuals (Environment Canada 2013). Since 2005, a triennial winter survey has been conducted in Quebec and parts of New Brunswick. The 2014 Eastern Population Barrow's Goldeneye Winter Survey was estimated at 5 900 (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 stable trend (Figure 6.9-1). However, the latest survey held in 2017 showed a ~30% increase, with a record high abundance of about 7 700 individuals. More than 80% of this population winters along the St. Lawrence Estuary and Gulf (Robert and Savard 2006; Robert 2013a). Approximately 500 individuals winter in the Maritimes provinces, and 100 individuals winter in Maine (Robert and Savard 2006; Environment Canada 2013).

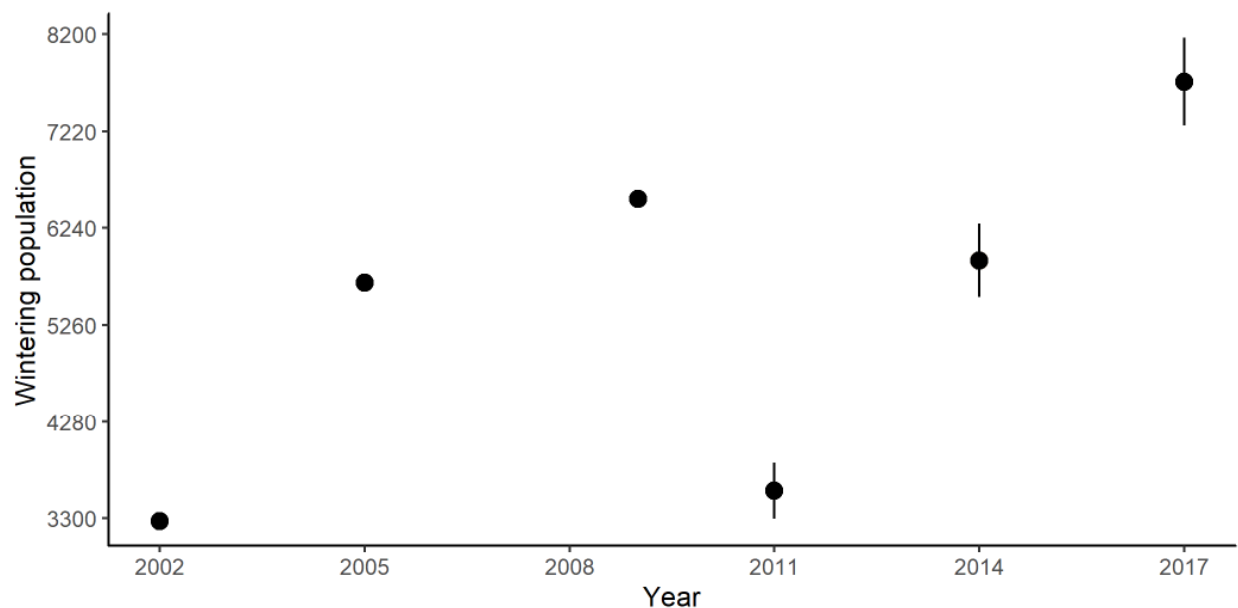


Figure 6.9-1: Eastern population Barrow's Goldeneye Winter Survey. From 2011 onward the numbers are corrected from photos.

WESTERN POPULATION

Some data are available for this population from the breeding waterfowl surveys of the southern Yukon (Figure 6.9-2), where there has been no discernible trend in the population over the past 10, 15 or even 21 years. 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 18 300 individuals in the Central Interior Plateau Region in 2019, comparable to the 2018 estimate (Figure 6.9-2). The size of the Western Population of Barrow's Goldeneye is estimated at 260

000 individuals (NAWMP 2018).

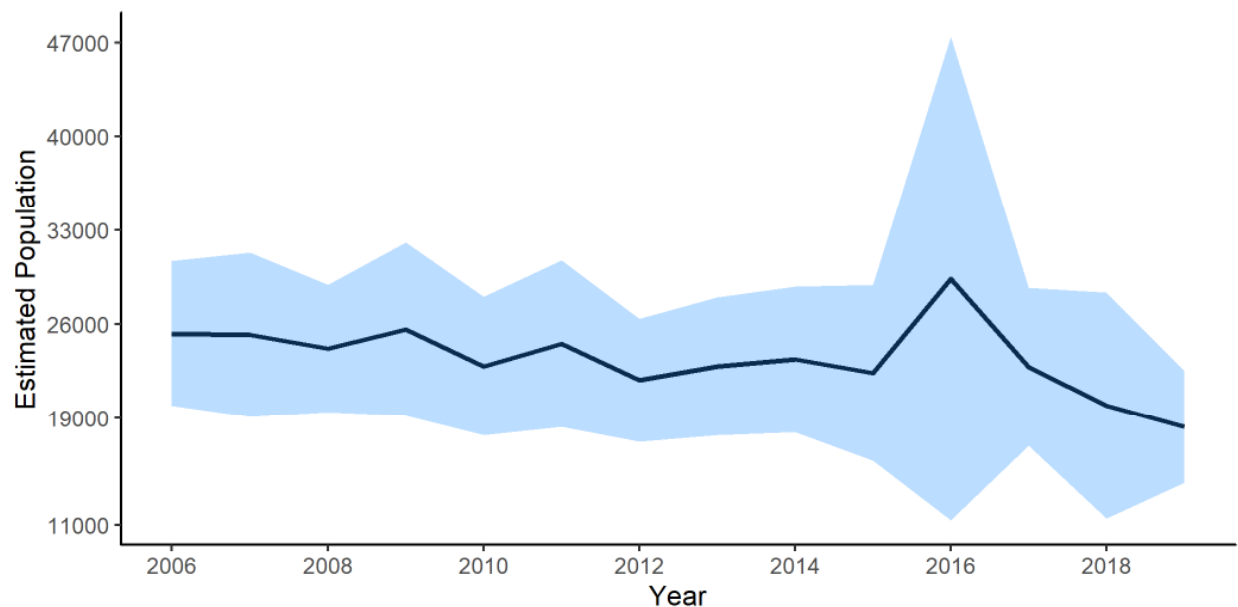


Figure 6.9-2 Population estimates of Barrow's Goldeneyes in British Columbia Central Plateau, 2006-2017, black line represent mean while the shaded area represent the 95% Confidence Intervals (A likely small portion of Common Goldeneyes is included in the Barrow's Goldeneye estimates).

6.9.2 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, restrictive regulations were implemented throughout eastern Canada after the population was designated as a species of Special Concern under the federal *Species at Risk Act*. Since 2012 hunters have been restricted to one bird as both the daily bag and possession limits, which allows for the accidental harvest of this species. Annual harvest of Barrow's Goldeneye in the five eastern provinces (Atlantic Canada and Quebec) is typically less than 1 000 individuals per year (Gendron and Smith 2019). 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.

6.9.3 Management and Conservation Concerns

In 2000, the Eastern Population of Barrow's Goldeneye was designated as 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 overharvest may threaten the long-term survival of this species. Because Barrow's Goldeneye is an arboreal species, forestry operations on its breeding grounds are possible threats (Robert, Drolet and Savard 2008b). The Mountain Pine Beetle infestation that started in the early 1990's and forest fires have destroyed many mature forests in Central British Columbia. There is also the threat of oil spills on its wintering grounds (Robert 2013a). Recreational sport fishing may reduce food availability and boats may cause fleeing broods to enter into neighboring birds territories and be aggressively attacked (Eadie et al. 2000).

6.10 Common Goldeneye (*Bucephala clangula*)

In North America, the Common Goldeneye breeds across the boreal forest from Newfoundland to Alaska and throughout montane forests. It also breeds in the Aspen Parkland Region, and the Acadian and Great Lakes forests, usually in areas where trees are large enough to provide suitable nesting cavities. The species winters in freshwater environments, as far north as open water remains ice-free during winter, and along both the Pacific and Atlantic coasts (Eadie *et al.* 1995).

6.10.1 Abundance and Trends

In Canada, goldeneyes are monitored through the WBPHS and Eastern Waterfowl Breeding Ground Survey. However, fixed-wing surveys do not distinguish Common Goldeneyes from Barrow's Goldeneyes, and can only track the combined population of the two species. However, most birds observed during both surveys are Common Goldeneye (Baldassarre 2014). In eastern Canada, both species are observed during the helicopter plot survey component of the Eastern Waterfowl Breeding Ground Survey.

LARGE-SCALE WATERFOWL SURVEYS

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

The estimated abundance of goldeneyes in 2019 in the Traditional Survey Area was 663 000 birds, similar to the 2018 estimate of 645 000 birds. Goldeneyes show significant increasing long term (1970–2019) trends in the Canadian Prairies and in the Traditional Survey Area, but a significant decreasing long term trends in Alaska. The population in the Canadian Prairies shows significant growth in the past five years (Table 6.10-1 and Figure 6.10-1).

Table 6.10-1. Goldeneyes sp. Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970–2019 Trend (long term)	2015–2019 Trend (5 years)
Traditional Survey Area	663.36 (492.60 — 834.12)	0.70 (0.17 — 1.25)*	1.55 (-4.02 — 7.50)
Alaska	18.35 (7.12 — 29.58)	-1.45 (-2.17 — -0.69)*	-2.02 (-8.58 — 5.43)
Western Boreal Canada	475.16 (318.88 — 631.45)	0.63 (-0.08 — 1.34)	0.78 (-6.58 — 8.90)
Canadian Prairies	169.84 (101.96 — 237.73)	2.21 (1.49 — 2.84)*	5.18 (0.37 — 10.64)*
U.S. Prairies (North Central)	NA	NA	NA

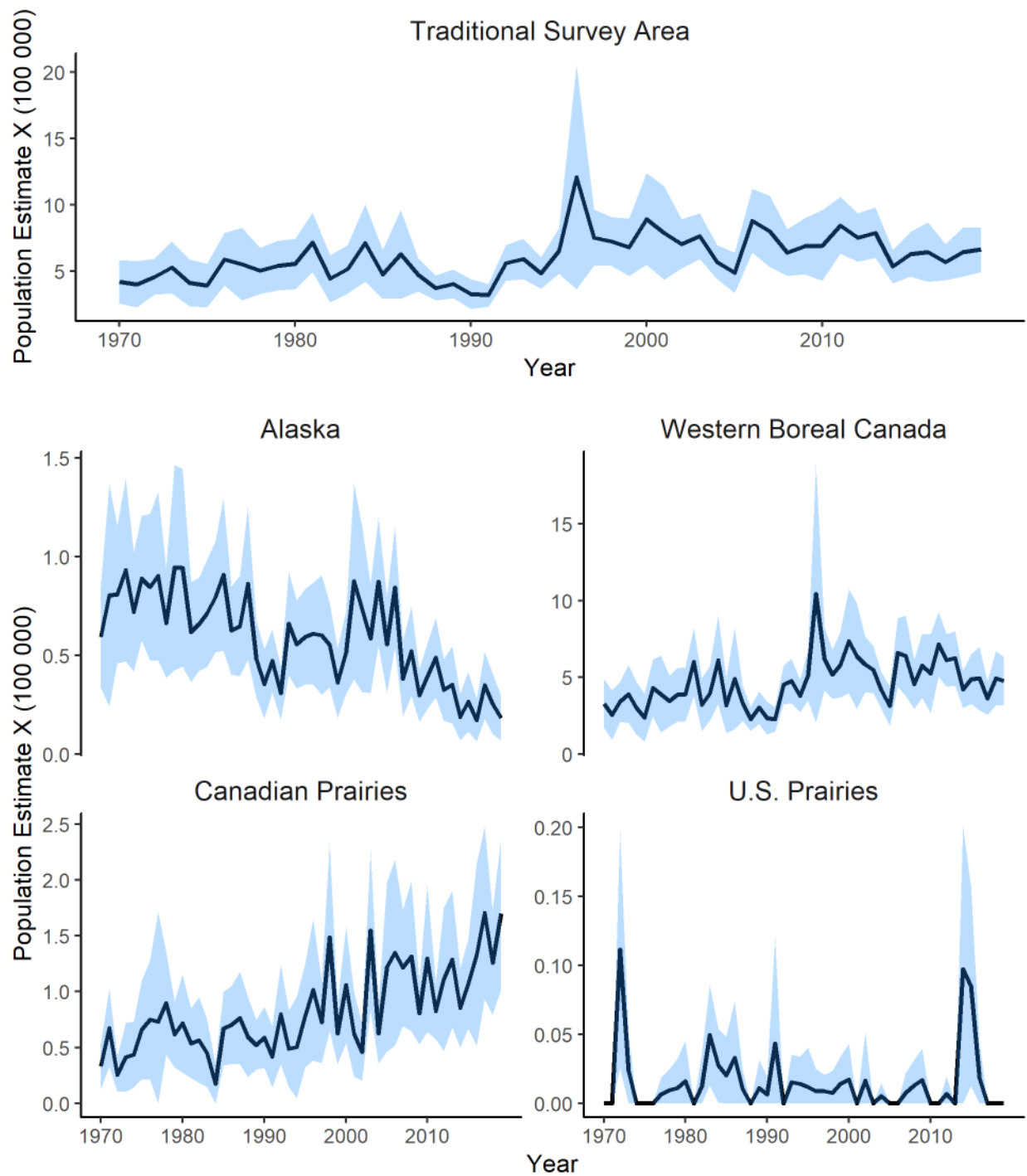


Figure 6.10-1 Common and Barrow's Goldeneye breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

EASTERN WATERFOWL BREEDING GROUND SURVEY

Results from the Eastern Waterfowl Breeding Ground Survey (helicopter plot survey only) indicate that the Common Goldeneye population trend is relatively stable in most survey strata (Table 6.10-2 and Figure 6.10-2).

Table 6.10-2 Common Goldeneye Breeding Population Estimates with 95% Credible Intervals (CI) and Trend Estimates Based on the Eastern Waterfowl Breeding Ground Survey (Trends are expressed as an annual percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates in Core Area (in thousands)	1990-2019 Trend (long term)	2015-2019 Trend (5 years)
Atlantic Highlands	8.46 (3.92 - 14.69)	0.82 (-0.76 - 2.64)	1.09 (-4.02 - 7.74)
Central Boreal Shield	167.95 (117.02 - 230.69)	0.04 (-0.70 - 0.80)	-0.06 (-2.81 - 2.32)
Eastern Boreal Shield	70.67 (35.44 - 129.82)	-0.29 (-1.65 - 0.99)	-1.36 (-7.75 - 3.89)
Western Boreal Shield	107.11 (62.03 - 169.41)	-0.19 (-1.48 - 1.14)	-1.72 (-8.71 - 5.24)
Total Survey Area	361.12 (262.56 - 482.09)	-0.08 (-0.69 - 0.55)	-0.78 (-3.47 - 1.80)

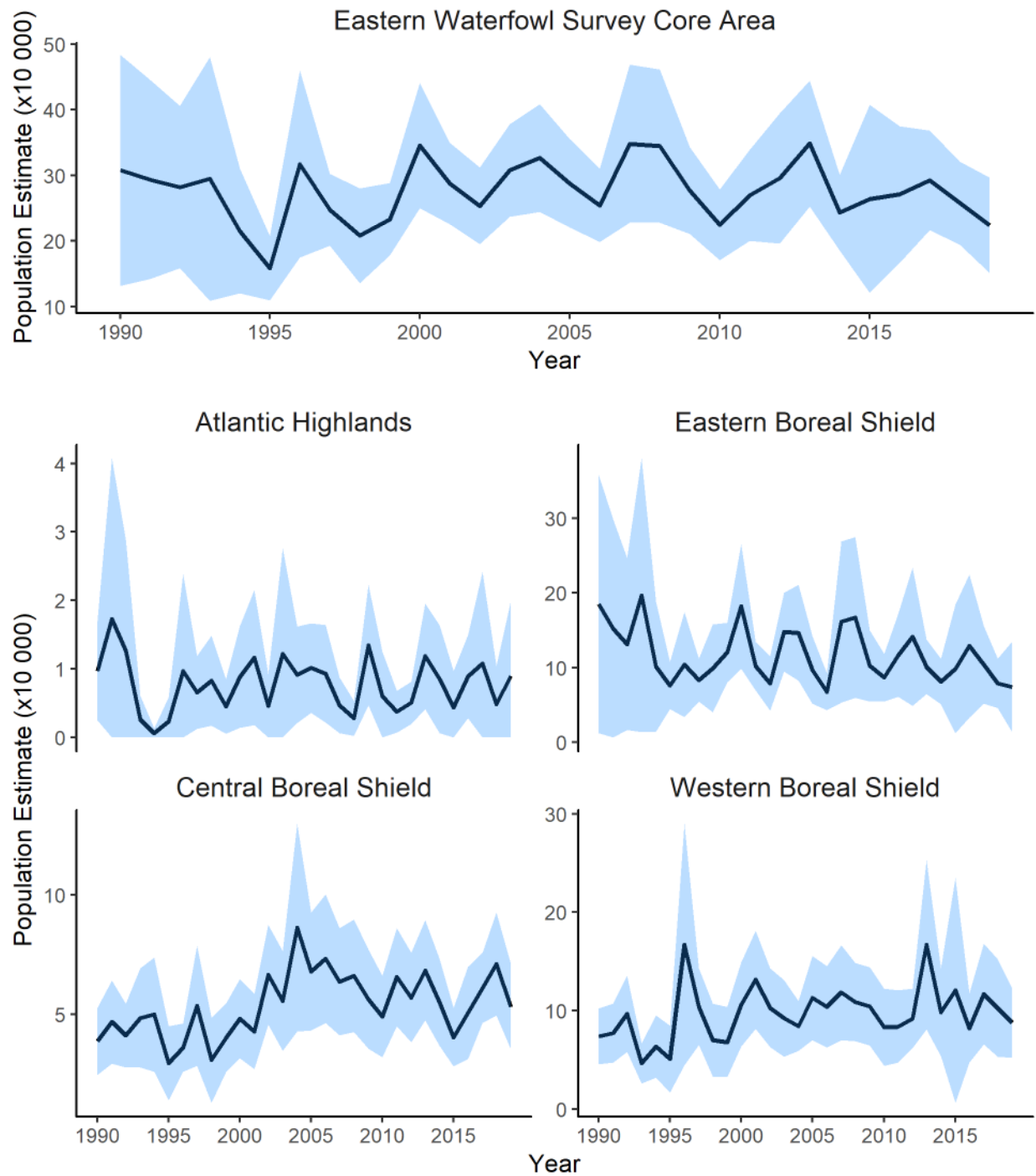


Figure 6.10-2 Common Goldeneye breeding population estimates based on the Eastern Waterfowl Breeding Ground Survey, black line represents the population estimate while the shaded area represents the 95% Confidence Intervals (The figures represent the results of helicopter plot surveys only).

6.10.2 Harvest

Common Goldeneyes are hunted across Canada, with the largest number traditionally taken in eastern Canada, with the most harvested in Ontario (Figure 6.10-3). The total number of Common Goldeneyes taken in Canada has been decreasing since the 1980s and for the past decade has averaged at 17 000.

6.10.3 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). 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 which many localities have set up to promote breeding activity (Pöysä and Pöysä 2002; Corrigan *et al.* 2011).

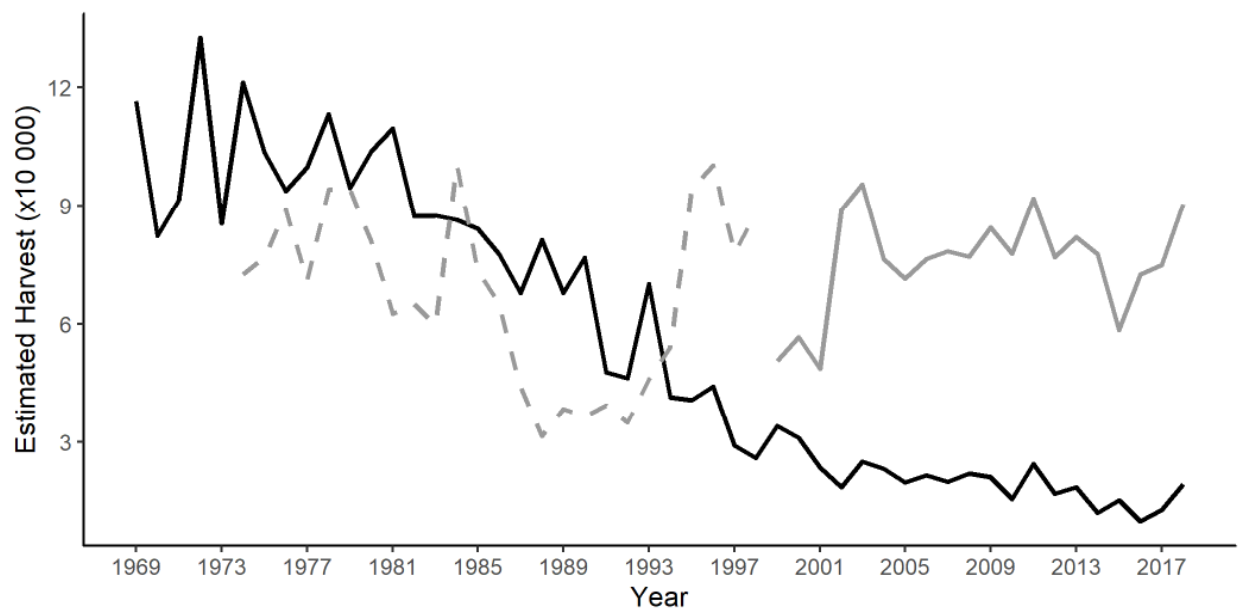


Figure 6.10-3 Estimated Common Goldeneye harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1510>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

6.11 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, to Ellesmere Island in the north and the Hudson Bay Lowlands in the south, to the east coast of Labrador (SDJV 2015c). Long-tailed Ducks spend most of the year in coastal marine waters, often far offshore (Robertson and Savard 2002). In the west, they winter along the Pacific Coast from Alaska to southern California. In the east, they winter along the Atlantic Coast between Labrador and North Carolina and in open water in the Hudson Bay and the Great Lakes (SDJV 2015c).

6.11.1 Abundance and Trends

There are no comprehensive surveys of Long-tailed Duck abundance because this species breeds at low densities over a vast range. Like other sea ducks that winter offshore, Long-tailed Ducks are poorly monitored by mid-winter waterfowl surveys. However, the continental population is estimated to be 1 million birds (NAWMP 2018).

The WBPHS shows that breeding populations of Long-tailed Ducks have declined approximately 3% annually since the survey began in 1957 to 2012. However, the Long-tailed Duck population appears to have been increasing for the 2008–2012 period (Bowman *et al.* 2015). Estimates from 2018 indicate only about 173 000 birds. Nevertheless, that survey covers only a small portion of Alaska and northwestern Canada, which represents a very small portion of their overall breeding range.

6.11.2 Harvest

The Long-tailed Duck is not a widely hunted species in Canada or the U.S. However, they are an important species in the subsistence harvest in some northern communities. The extent of the harvest by Aboriginal people is unknown. Long-tailed Duck harvest in Canada has declined over time. In Canada, most of the harvest occurs in the eastern provinces (Figure 6.11-1).

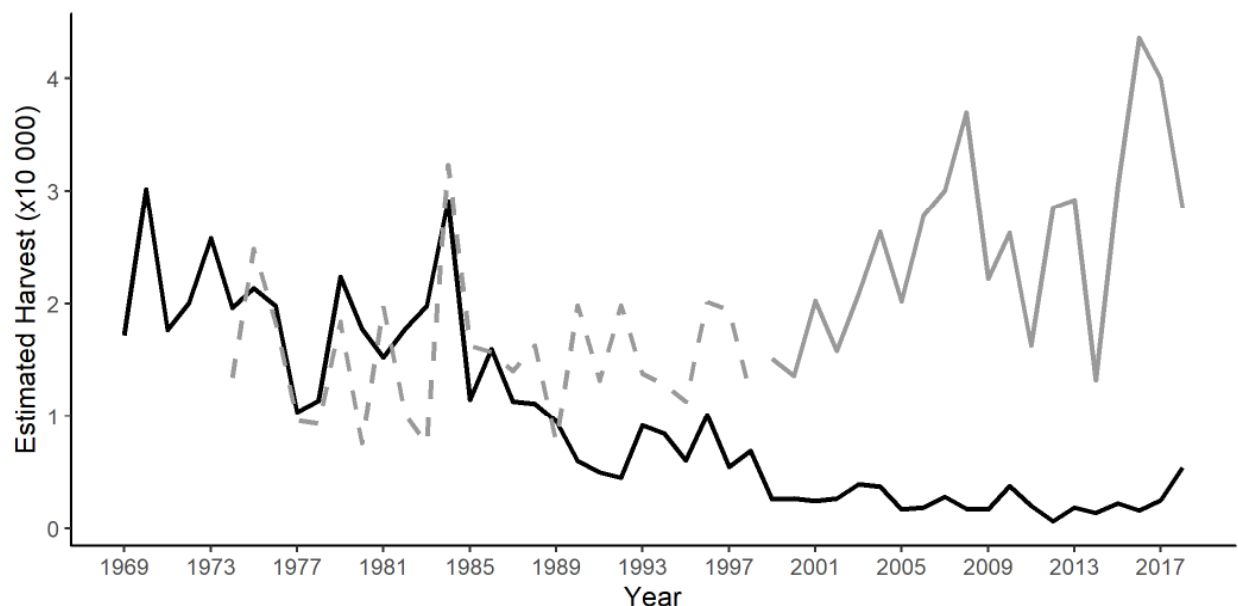


Figure 6.11-1 Estimated Long-Tailed Duck harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1540>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at

<https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

6.11.3 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, there are no concerns over the population size. According to the SDJV Technical Team, one of the main management and conservation concerns pertaining to the Long-tailed Duck is the lack of an adequate annual survey on the breeding or wintering grounds (SDJV 2015c).

6.12 Bufflehead (*Bucephala albeola*)

The Bufflehead is the smallest of the North American sea ducks. The species occurs from coast to coast, but is more abundant in western regions of Canada. The continental population is increasing (Gauthier 2014).

6.12.1 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 and throughout the continental U.S. The continental population of Buffleheads is estimated to be more than 1.3 million individuals (NAWMP 2018).

The Bufflehead is monitored in its core breeding range through the WBPHS in western Canada and through the Eastern Waterfowl Breeding Ground Survey in the east. The species is also monitored in British Columbia by the Central Interior Plateau Waterfowl Breeding Pair Survey and the Northwest Territories Boreal Waterfowl and Waterbirds Survey.

LARGE-SCALE WATERFOWL SURVEYS

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

The total estimated population of Bufflehead for 2019 has gone down a little since 2018, going from about 1.29 million to 1.15 million. However, populations show significant increases in the long-term (1970–2019) in Western Boreal Canada, the Canadian Prairies and the Traditional Survey Area (Table 6.12-1; Figure 6.12-1). In the short term, all populations are stable.

Table 6.12-1. Bufflehead Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970-2019 Trend (long term)	2015-2019 Trend (5 years)
Traditional Survey Area	1154.35 (962.54 — 1346.16)	1.51 (1.26 — 1.76)*	-0.30 (-2.59 — 1.97)
Alaska	38.23 (22.22 — 54.23)	0.13 (-0.39 — 0.65)	-0.49 (-5.73 — 4.78)
Western Boreal Canada	725.20 (563.28 — 887.12)	1.04 (0.74 — 1.34)*	-1.21 (-4.12 — 1.54)
Canadian Prairies	363.74 (263.64 — 463.85)	3.73 (3.26 — 4.20)*	1.57 (-3.07 — 5.88)
U.S. Prairies (North Central)	27.18 (9.97 — 44.39)	1.67 (-0.16 — 3.03)	5.99 (-2.91 — 15.88)

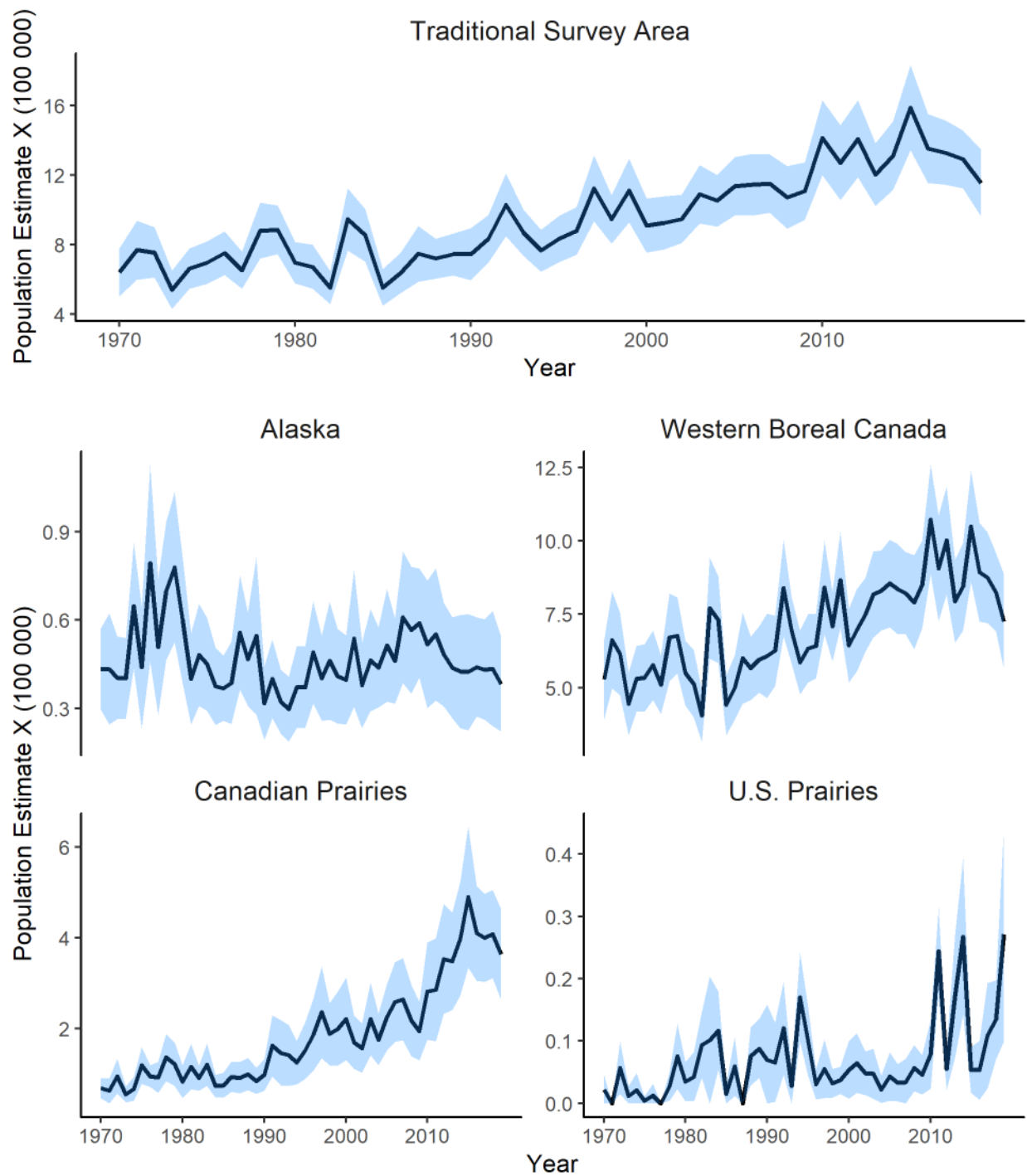


Figure 6.12-1 Bufflehead breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S., black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

EASTERN WATERFOWL BREEDING GROUND SURVEY

While Eastern and Central Boreal Shield populations do not have any significant trends in the long or short term, the Western Boreal Shield and Traditional Survey Area populations are declining significantly in the long and short term (Table 6.12-2 and Figure 6.12-2).

Table 6.12-2 Bufflehead Breeding Population Estimates with 95% Credible Intervals (CI) and Trend Estimates Based on the Eastern Waterfowl Breeding Ground Survey (The estimates are based on the combined results of helicopter and fixed-wing aircraft surveys. Trends are expressed as an annual percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates in Core Area (in thousands)	1990-2019 Trend (long term)	2015-2019 Trend (5 years)
Atlantic Highlands	NA	NA	NA
Central Boreal Shield	2.62 (0.00 - 7.77)	3.35 (-8.02 - 13.90)	0.45 (-22.85 - 24.34)
Eastern Boreal Shield	2.38 (0.00 - 5.42)	-2.86 (-6.38 - 0.57)	-12.28 (-28.81 - 6.36)
Western Boreal Shield	12.34 (1.73 - 22.95)	-3.04 (-5.82 - -0.20)*	-20.89 (-35.38 - -4.71)*
Total Survey Area	17.34 (5.17 - 29.52)	-2.61 (-4.89 - -0.43)*	-17.60 (-29.20 - -4.61)*

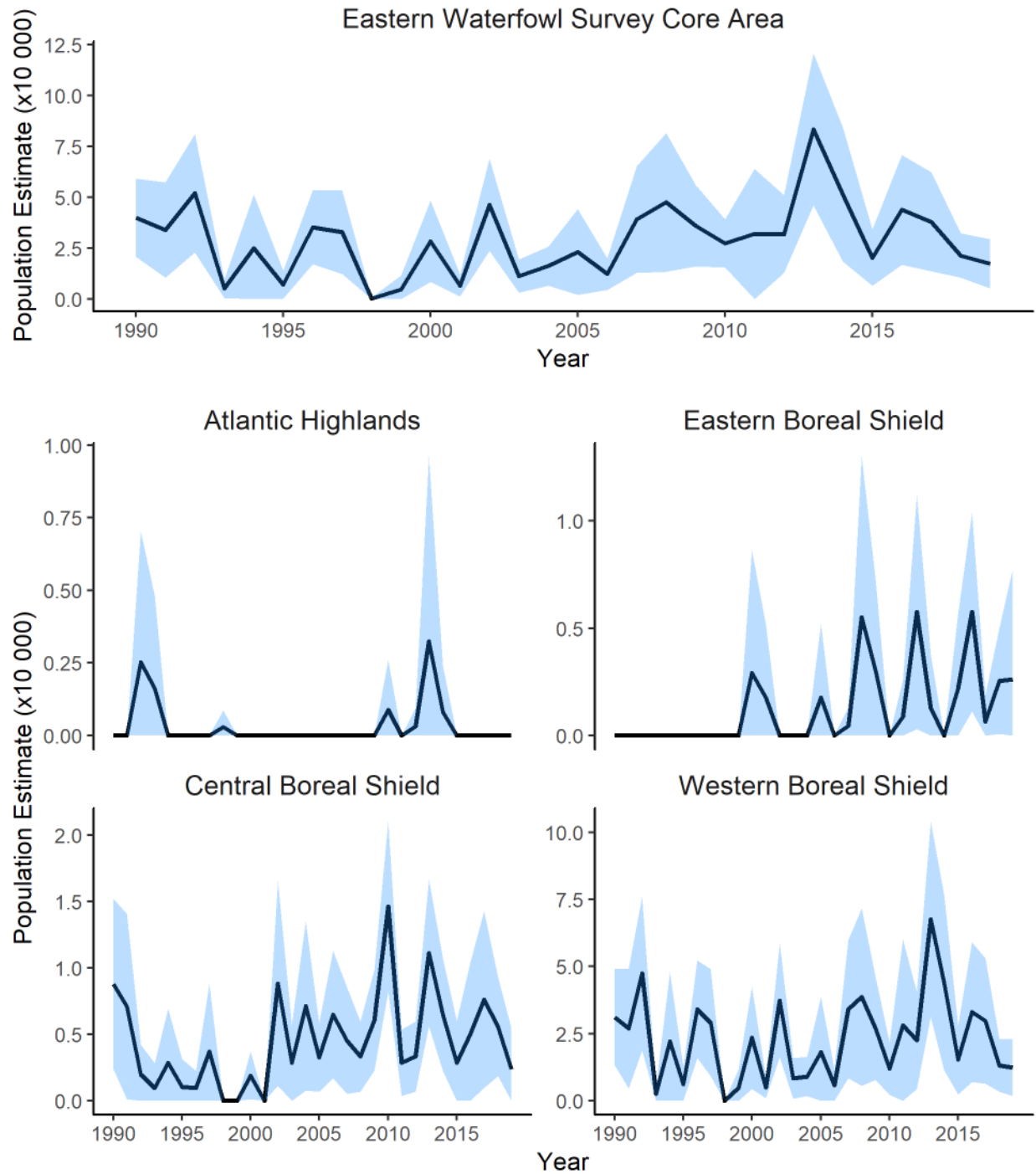


Figure 6.12-2 Bufflehead breeding population estimates based the Eastern Waterfowl Breeding Ground Survey, black line represents the population estimate and the shaded area represents the 95% Confidence Intervals (The figures represent the results of helicopter plot surveys only).

SMALL-SCALE WATERFOWL SURVEYS

NORTHWEST TERRITORIES BOREAL WATERFOWL AND WATERBIRDS SURVEY

The densities of Bufflehead increased steadily between 1985 and the early 2000's. The population plateaued at about 0.2 breeding pairs per hectares from 2000 to 2014, but breeding density has been increasing in the last 5 years.

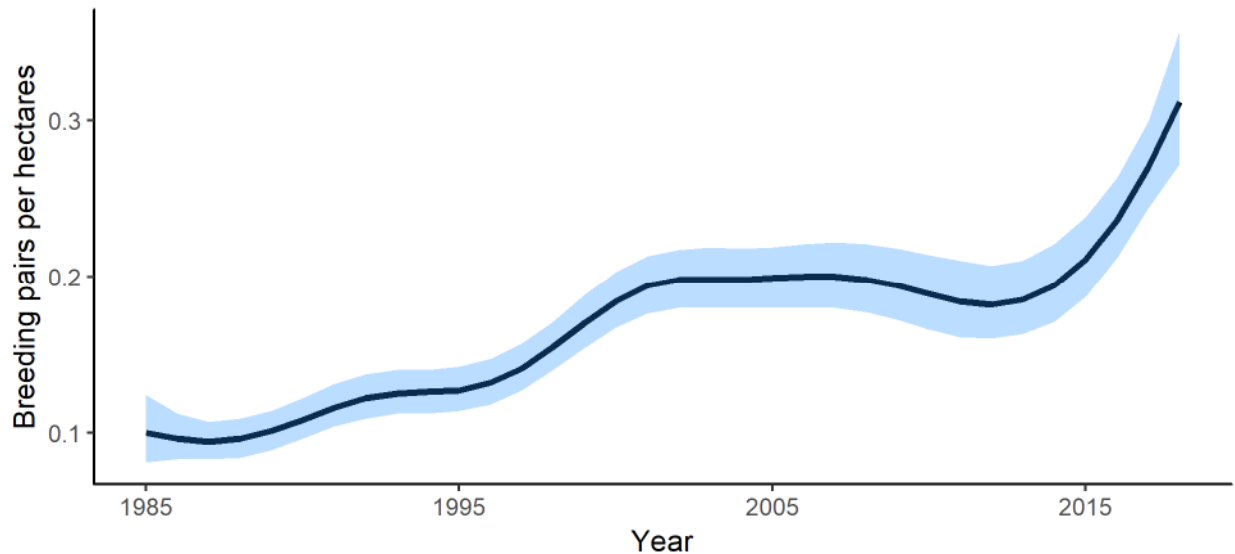


Figure 6.12-3 Density of Bufflehead breeding pairs observed during spring surveys near Yellowknife, NT.

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

Breeding Pair Surveys in the central Interior Plateau Region of British Columbia for the Bufflehead species show a stable long-term trend (Figure 6.12-4). The estimated population for 2019 is the highest since the survey started in 2006, with an estimated 52 000 birds.

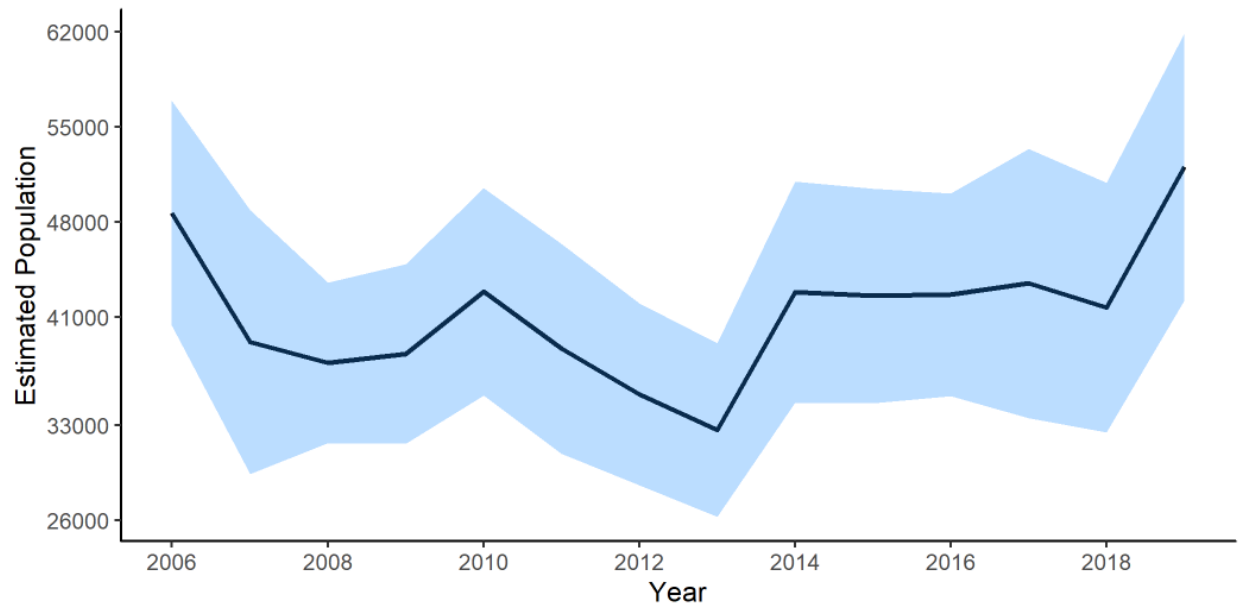


Figure 6.12-4 Population estimates of Buffleheads in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

6.12.2 Harvest

In Canada, Buffleheads harvest has declined. In the U.S., where the majority of Buffleheads are taken, the number of birds harvested has generally increased since 2000 (Figure 6.12-5). Over the past decade, Canadian harvest averages at 18 600 annually, while the U.S. harvest averages at 225 000.

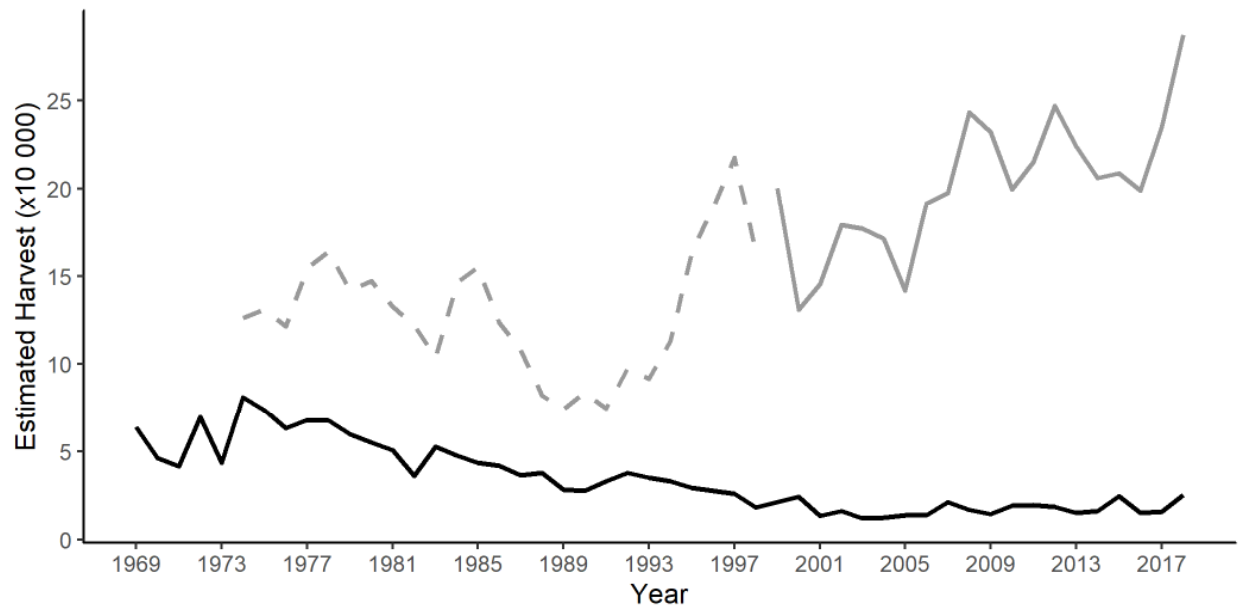


Figure 6.12-5 Estimated Bufflehead harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest->

[survey/p006/a002/?lang=e&p=XX&z=&s=1530](#)), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

6.12.3 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 forestry in the Aspen Parkland is a potential concern (Gauthier 2014).

6.13 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 (Pearce *et al.* 2015). The Common Merganser is the most abundant merganser species.

6.13.1 Abundance and Trends

The continental population size and trends for mergansers are not reliable, as many aerial surveys do not distinguish among the three species, whose breeding ranges overlap extensively. Additionally, the boreal forest, where many mergansers breed, is not covered very well by many surveys. However, the three species can be reliably identified during helicopter-based plot surveys conducted as part of the Eastern Waterfowl Breeding Ground Survey. Common Mergansers are also monitored by the Southern Ontario Waterfowl Plot Survey.

LARGE-SCALE WATERFOWL SURVEY

EASTERN WATERFOWL BREEDING GROUND SURVEY

The Common Mergansers show a long term significant increase in eastern Canada (Figures 6.13-1). The increase is mainly due to a strong population increase that occurred during the last five years. The sudden spike in birds seen in 2017 has begun to drop back down. In the past two years, it is estimated the population has decreased from 455 100 to 321 500 birds.

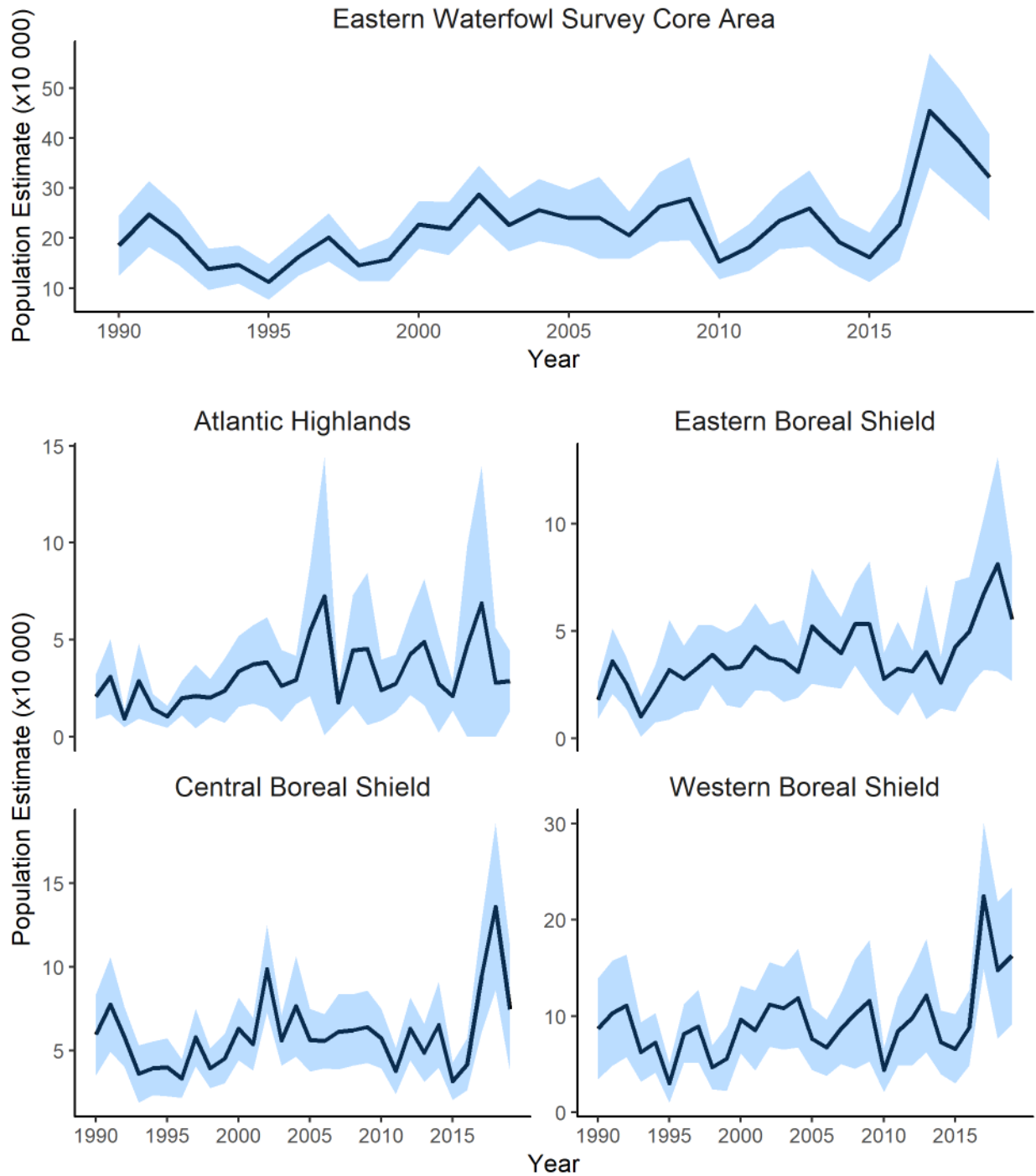


Figure 6.13-1 Common Merganser breeding population estimates based on the Eastern Waterfowl Breeding Ground Survey, black line represents the population estimate and the shaded area represents the 95% Confidence Intervals (The figure represents results from the helicopter plot survey only).

SMALL-SCALE WATERFOWL SURVEYS

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 6.13-2). The past two years have seen the population jump from an estimated 19 000 to 40 000 Common Mergansers.

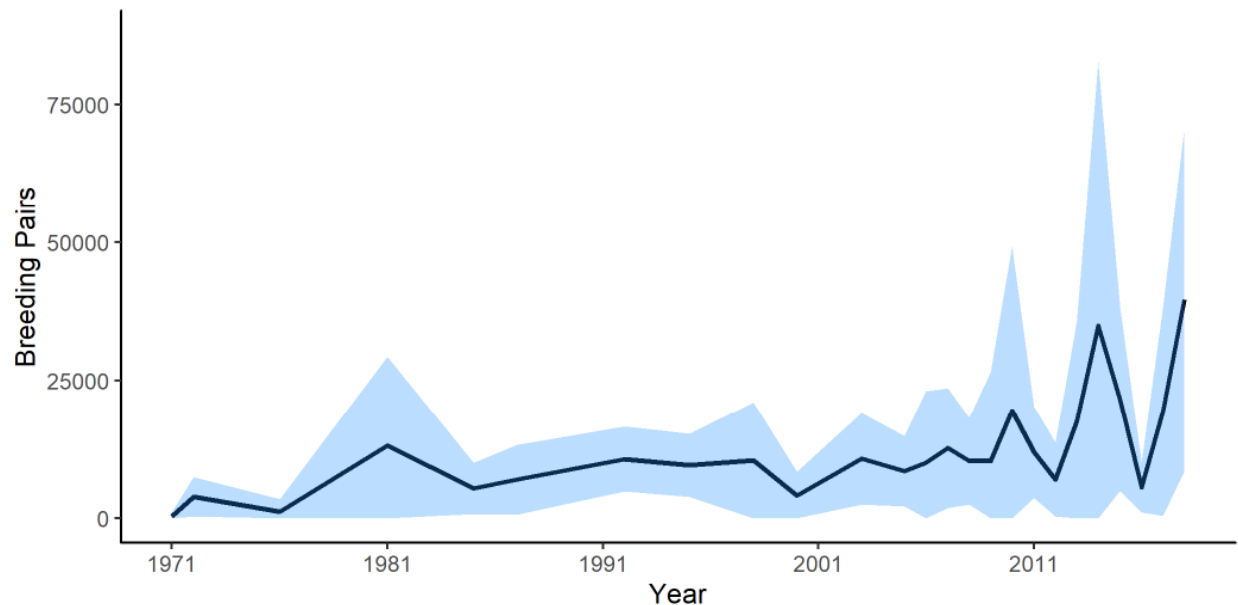


Figure 6.13-2 Indicated breeding pairs of Common Merganser in southern Ontario, black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Intervals.

6.13.2 Harvest

Overall, hunters do not heavily harvest mergansers. In Canada, mergansers are hunted predominantly in the Atlantic Provinces, Quebec and Ontario, and to a lesser extent in British Columbia (Figures 6.13-3).

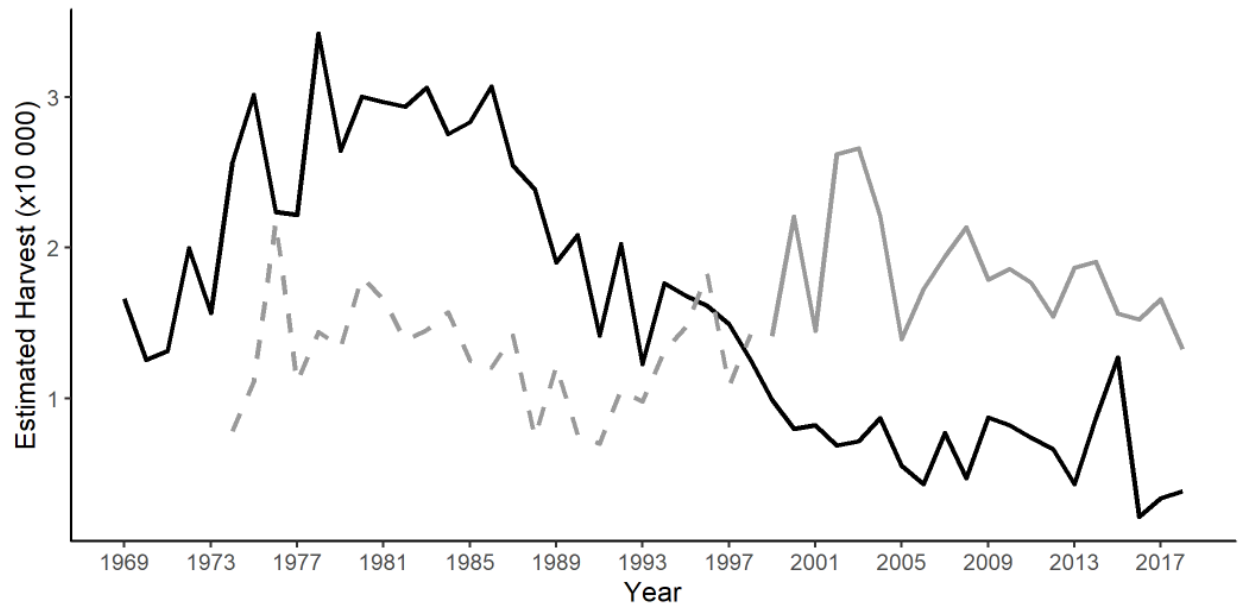


Figure 6.13-3. Estimated Common Merganser harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1290>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

6.13.3 Management and Conservation Concerns

Fish availability and, to a lesser extent, cavity availability limit the population size and breeding distribution of the Common Merganser. In areas with current or historic logging, cavities for nesting may be unavailable. Lake acidification historically caused fish population declines and reduced habitat quality (Pearce *et al.* 2015). Due to their high trophic level, Common Mergansers are vulnerable to contaminants (e.g., mercury, lead), and may be a useful bio-indicator species for fish-bearing streams and lakes (Pearce *et al.* 2015).

6.14 Red-breasted Merganser (*Mergus serrator*)

Red-breasted Mergansers breed across northern Canada and throughout most of Manitoba, Ontario, Quebec and the Maritimes. They winter along the Atlantic from New Brunswick to the Gulf Coast and the Pacific coast from British Columbia to the Gulf of California. It is difficult to determine the species' population status and size because aerial surveys of breeding birds do not differentiate between the three species of mergansers (Craik *et al.* 2015).

6.14.1 Abundance and Trends

The population size and trends for mergansers are not reliably known, as many aerial surveys do not distinguish among the three species, whose breeding ranges overlap extensively. In addition, the boreal forest, which is an important part of the merganser breeding range, is not covered very well by many surveys. However, the three species can be reliably identified during helicopter-based plot surveys conducted as part of the Eastern Waterfowl Breeding Ground Survey.

LARGE-SCALE WATERFOWL SURVEY

EASTERN WATERFOWL BREEDING GROUND SURVEY

The Red-breasted mergansers show stable trends in eastern Canada (Figure 6.14-1). Unlike the well captured Common and the Hooded Mergansers, the helicopter plot survey component of the Eastern Waterfowl Breeding Ground Survey does not capture the Red-breasted Merganser well because they nest later than the other mergansers species so migrating individuals may be erroneously included in the breeding counts and the EWS only covers part of their breeding range (Lepage 2013b).

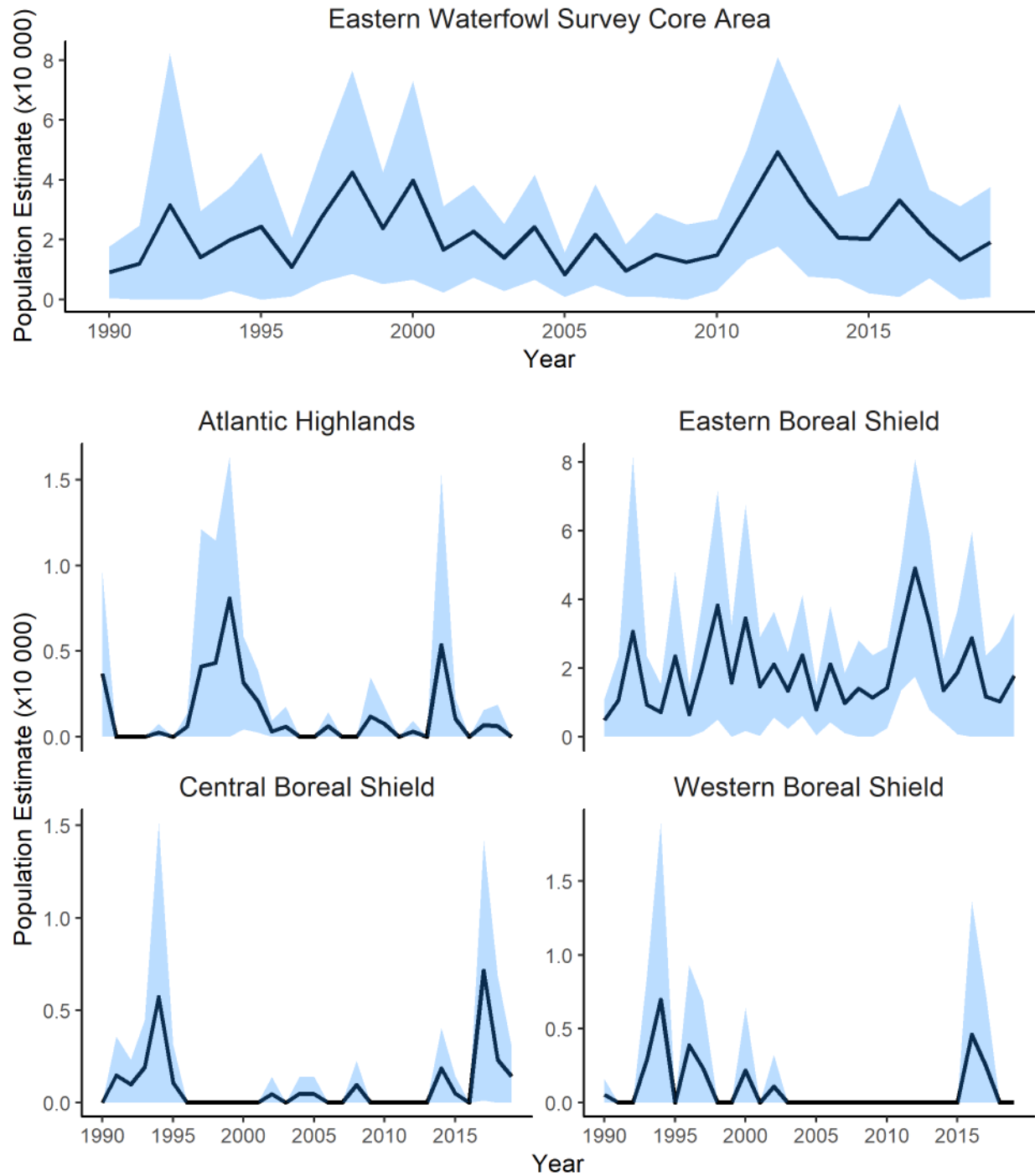


Figure 6.14-1 Red-Breasted Merganser breeding population estimates based on the Eastern Waterfowl Breeding Ground Survey, black line represents the population estimate and the shaded area represents the 95% Confidence Intervals (The figure represents results from the helicopter plot survey only).

6.14.2 Harvest

Hunters do not heavily target Red-breasted Mergansers in Canada or the U.S. The average harvest in Canada for the past decade has been 6 100 individuals. The U.S. harvest is slightly higher, averaging 17 000 annually in the last decade. In Canada, mergansers are hunted predominantly in the Atlantic Provinces, Quebec and Ontario, and to a lesser extent in British Columbia (Figure 6.14-2).

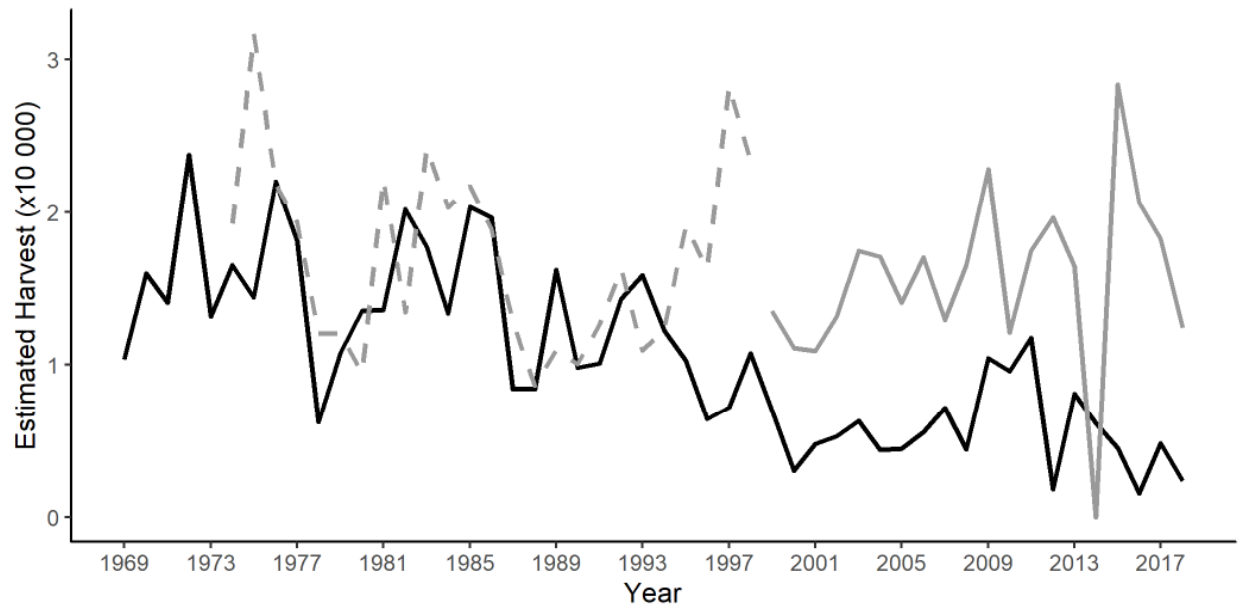


Figure 6.14-2 Estimated Red-Breasted Merganser harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1300>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

6.14.3 Management and Conservation Concerns

The ecology of the Red-breasted Merganser is not well known throughout its North American range and has received little attention (Lepage 2013b). The lack of a reliable survey for this species could hamper conservation efforts in the future.

6.15 Hooded Merganser (*Lophodytes cucullatus*)

The Hooded Merganser is the smallest of the three merganser species and the only one found only in North America (Dugger *et al.* 2009). Hooded Mergansers breeds mostly in eastern Canada, with the highest densities in Quebec and the Great Lakes region of southern Ontario. The species also occurs in southeast Saskatchewan, southern Manitoba, and the Maritimes. Hooded Mergansers are difficult to monitor at the continental level because of the species' secretive nature, remote breeding range, and tree cavity-nesting habits (Dugger *et al.* 2009).

6.15.1 Abundance and Trends

The population size and trends for mergansers are not reliably known, as many aerial surveys do not distinguish among the three species, whose breeding ranges overlap extensively. In addition, the boreal forest, which is an important part of the merganser breeding range, is not covered very well by many surveys. However, the three species can be reliably identified during helicopter-based plot surveys conducted as part of the Eastern Waterfowl Breeding Ground Survey. The Hooded Merganser is also monitored by the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C and the Southern Ontario Waterfowl Plot Survey.

LARGE-SCALE WATERFOWL SURVEY

EASTERN WATERFOWL BREEDING GROUND SURVEY

Hooded Merganser populations in all regions show a significant increasing trend in the long term. In the short term, the only significant trend is a positive trend in the Eastern Boreal Shield population (Table 6.15-1 and Figure 6.15-1).

Table 6.15-1 Hooded Merganser Breeding Population Estimates with 95% Credible Intervals (CI) and Trend Estimates Based on the Eastern Waterfowl Breeding Ground Survey (The estimates are based on the combined results of helicopter and fixed-wing aircraft surveys. Trends are expressed as an annual percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates in Core Area (in thousands)	1990–2019 Trend (long term)	2015–2019 Trend (5 years)
Atlantic Highlands	16.54 (5.64 — 27.45)	4.61 (1.65 — 7.35)*	-2.49 (-15.39 — 10.48)
Central Boreal Shield	10.07 (0.53 — 19.61)	5.75 (2.40 — 9.12)*	-8.67 (-25.75 — 8.14)
Eastern Boreal Shield	59.24 (42.27 — 76.21)	3.72 (2.40 — 5.17)*	7.10 (0.50 — 14.67)*
Western Boreal Shield	148.68 (104.61 — 192.74)	2.51 (1.60 — 3.55)*	3.04 (-1.12 — 8.35)
Total Survey Area	234.53 (185.14 - 283.93)	3.02 (2.28 - 3.83)*	2.60 (-0.94 - 6.63)

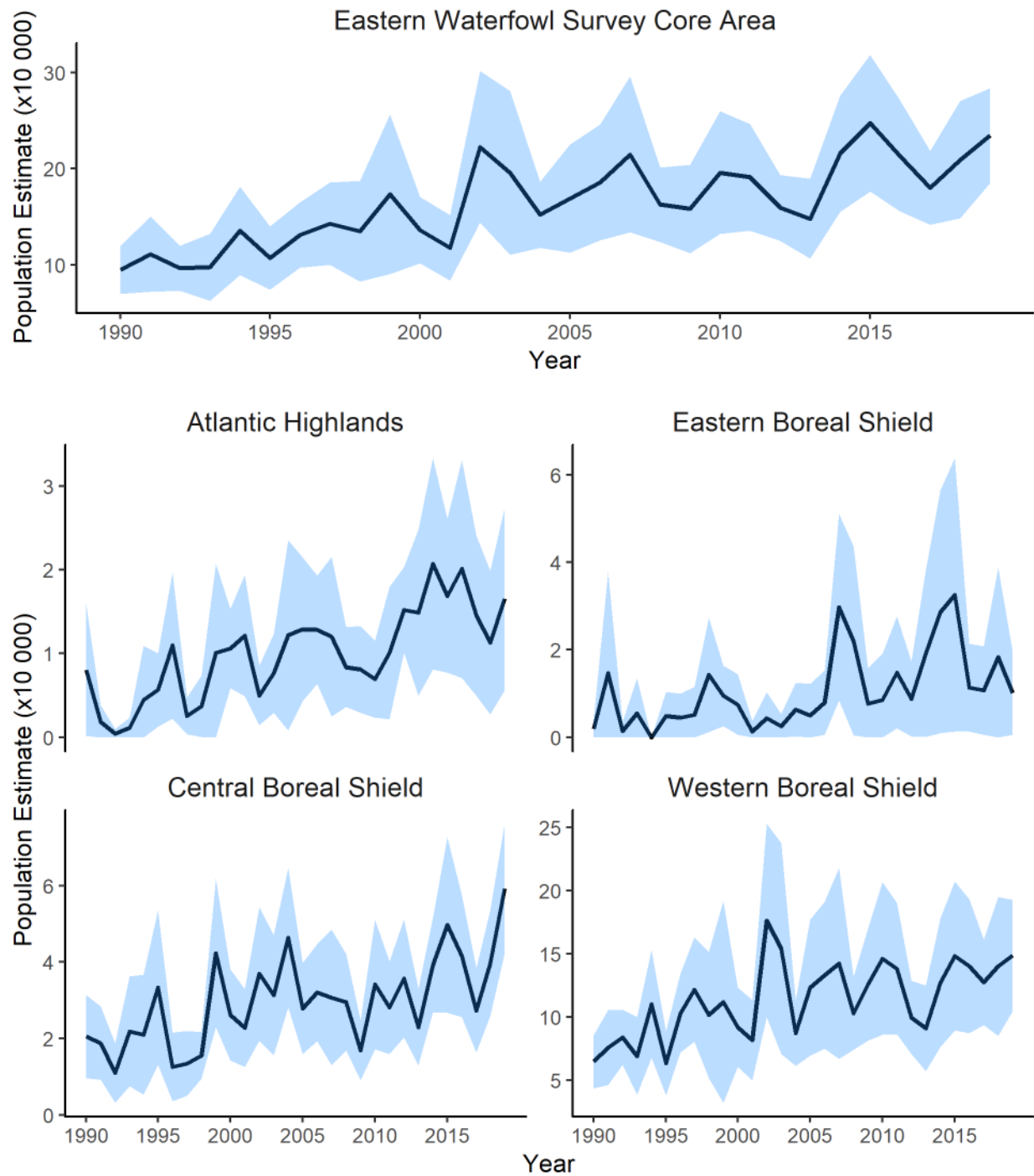


Figure 6.15-1 Hooded Merganser breeding population estimates based on the Eastern Waterfowl Breeding Ground Survey, black line represents the population estimate and the shaded area represents the 95% Confidence Intervals (The figure represents results from the helicopter plot survey only).

SMALL-SCALE WATERFOWL SURVEYS

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

The survey of Mergansers in B.C. consists of mainly of Hooded Mergansers (~80%), and a smaller portion of Common Mergansers (~20%). The Merganser population in this region has shown a relatively stable trend over the long-term of this survey (2006-2019; Figure 6.15-2).

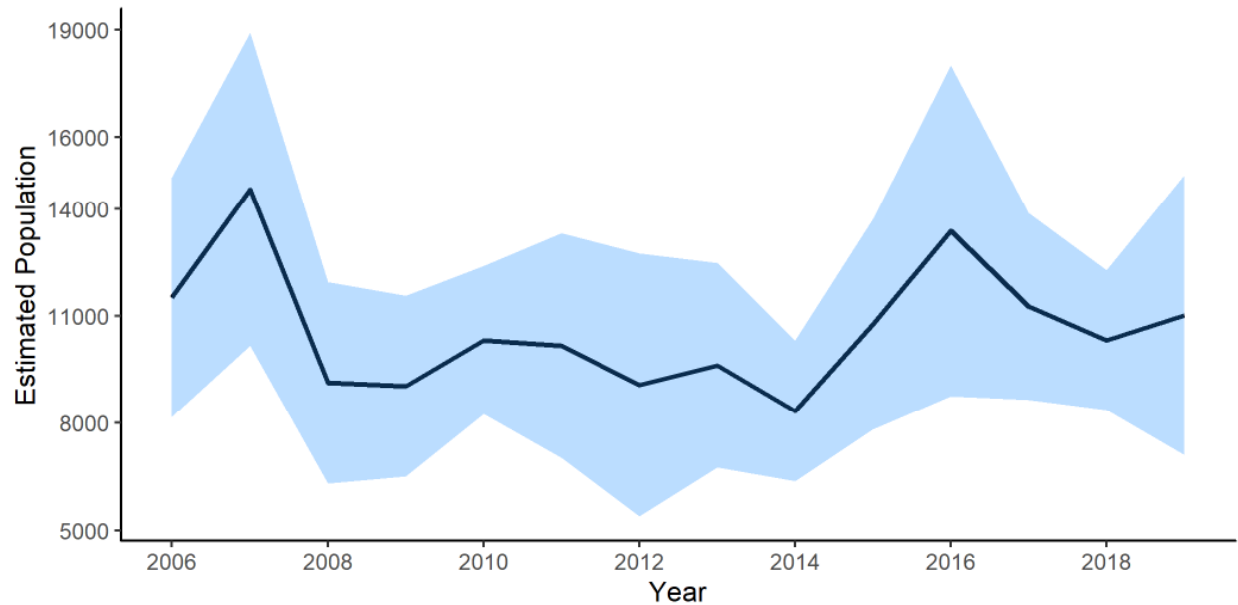


Figure 6.15-2 Population estimates of Mergansers (Hooded and Common) in British Columbia Central Plateau; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

SOUTHERN ONTARIO WATERFOWL PLOT SURVEY

In southern Ontario, numbers of breeding Hooded Mergansers vary annually, but the population has significantly increased in the long-term (Figure 6.15-3).

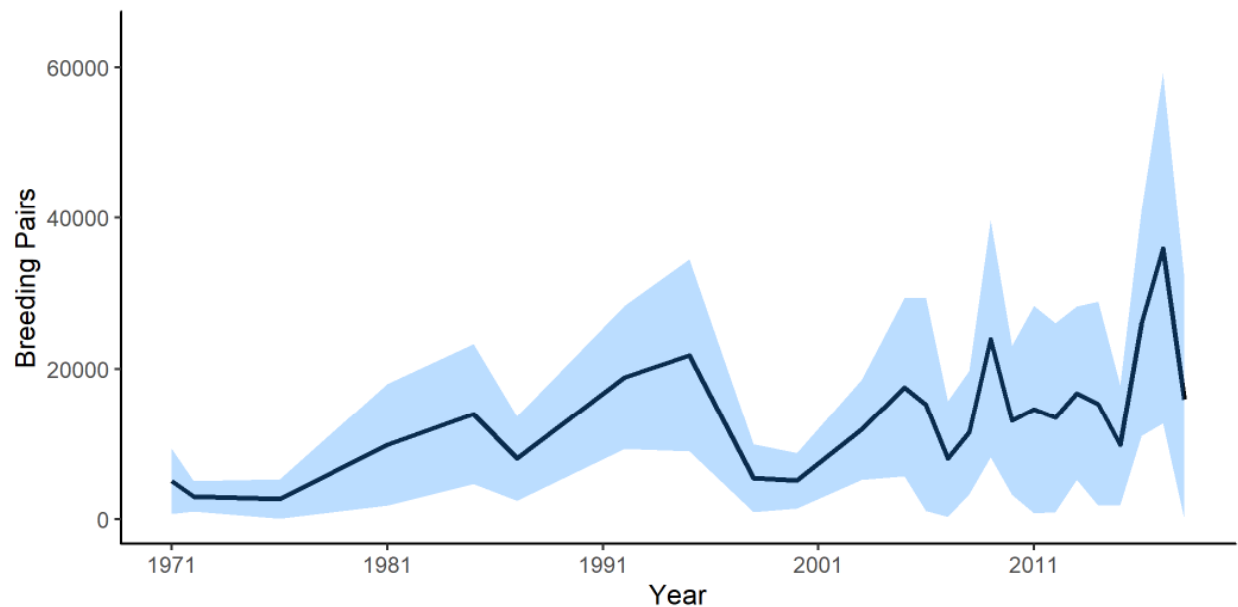


Figure 6.15-3 Indicated breeding pairs of Hooded Merganser in southern Ontario; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Intervals.

6.15.2 Harvest

The average harvest in Canada for the past decade has been 11 000 individuals. The U.S. harvest is slightly higher, averaging 96 000 annually in the last decade. In Canada, mergansers are hunted predominantly in the Atlantic Provinces, Quebec and Ontario, and to a lesser extent in British Columbia (Figures 6.15-4).

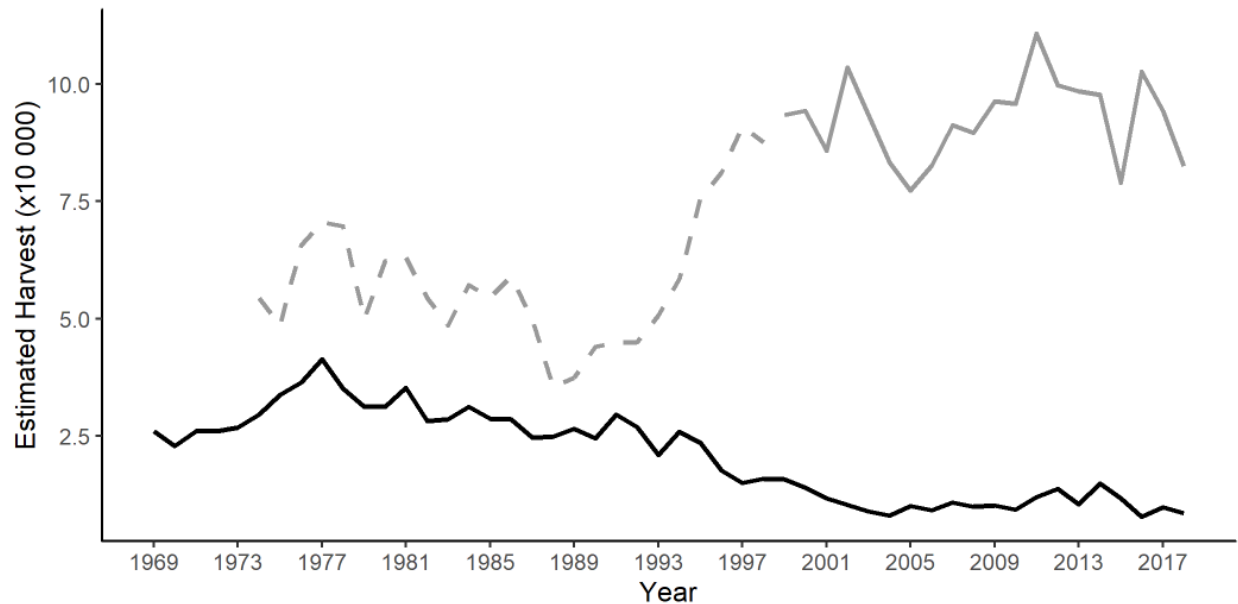


Figure 6.15-4 Estimated Hooded Merganser harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1310>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

6.15.3 Management and Conservation Concerns

This species is not a highly sought-after duck in Canada but like many other sea ducks, impacts from hunting are unknown (Dugger *et al.* 2009). 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 lack of suitable nesting cavities and the degradation or loss of wetlands (Lepage 2013a).

7. Population Status of Geese

There are six species of goose that nest in Canada: the Snow Goose, the Canada Goose, the Cackling Goose, the White-fronted Goose, Ross's Goose and the Brant. To inform regional management, each species is often subdivided into subspecies or populations. 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 U.S. and Mexico. A few migrate east–west and are shared with other countries including Russia, Greenland, and northern Europe. Most populations of geese are either stable or increasing in abundance. Some have benefitted from human landscape practices so heavily that they have become overabundant and require special population management measures to reduce their impacts on their surroundings.

Snow Goose foraging significantly alters plant communities in Arctic and Subarctic staging and nesting areas where abundance is particularly high. In some areas, this foraging has reduced the availability of their preferred forage plant species and changed the soil's 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 and significant impacts on other species. These concerns prompted managers to increase hunter harvest of some geese species by liberalizing their hunting regulations and amending the *Migratory Birds Regulations* in Canada and the U.S. to allow harvests to occur outside of the normal hunting season. Lesser Snow Geese and Greater Snow Geese were designated as overabundant in 1999, and Ross's Geese were declared overabundant in the U.S. in 1999, and in Canada beginning in 2014. An overabundant species is defined in the *Migratory Birds Regulations* as one that, 'as a result of the rate of increase of the population of that species or its overabundance, is injurious to or threatens agricultural, environmental or other similar interests'. 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 have also increased 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.

7.1 Snow Goose

There are two subspecies of Snow Goose recognized for management purposes: the Lesser Snow Goose (*Anser caerulescens caerulescens*) and the Greater Snow Goose (*A. c. atlantica*).

7.2 Greater Snow Goose (*Anser caerulescens atlantica*)

The Greater Snow Goose population increased 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 7-1). The birds winter along the mid-Atlantic coast from New Jersey to North Carolina. During migration, most of the population stages 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.

7.2.1 Abundance and Trends

Greater Snow Geese have been monitored at their 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 survey simultaneously to ensure complete coverage during a one-day survey each spring.

The Greater Snow Goose population rapidly grew 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 7.2-1; Reed and Calvert 2007). Growth stopped when Canada implemented 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 U.S. The population appears to have stabilized below one million birds, and over the last 5 years has decreased 4.5% annually (2015-2019). The 2019 spring estimate of 714 000 geese was the lowest estimate since 1997 (Figure 7.2-1; Lefebvre *et al.* 2017).

Greater Snow Geese are now increasing on agricultural lands in eastern Ontario at the western edge of the spring staging range. A similar situation has been observed 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.

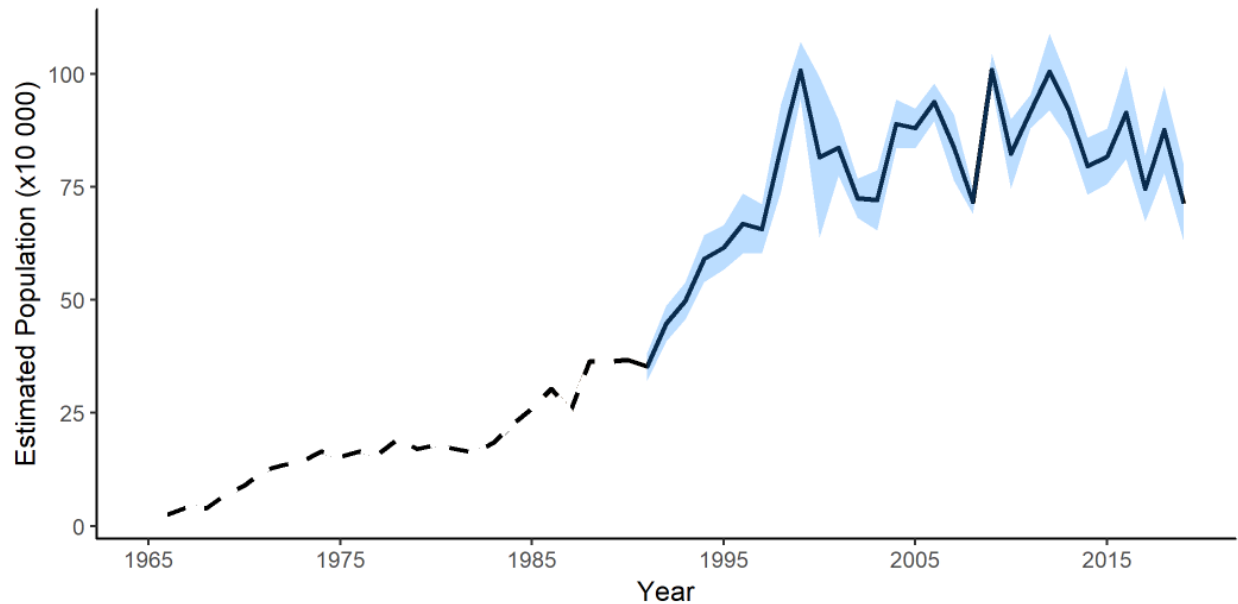


Figure 7.2-1 Greater Snow Goose population estimates during the spring staging period in southern Quebec. Shaded area represents the 95% confidence intervals (Estimates from 1998 to 2000 were corrected for flocks not observed during the survey, using data from a telemetry study. Estimates from 2002 and onward are based on a revised methodology).

The Lincoln method has also estimated Greater Snow Goose abundance, using data from band recoveries and harvest estimates to estimate population size. In 2017 and 2018, Lincoln estimates averaged approximately 780 000 adult birds, similar to recent estimates from spring counts.

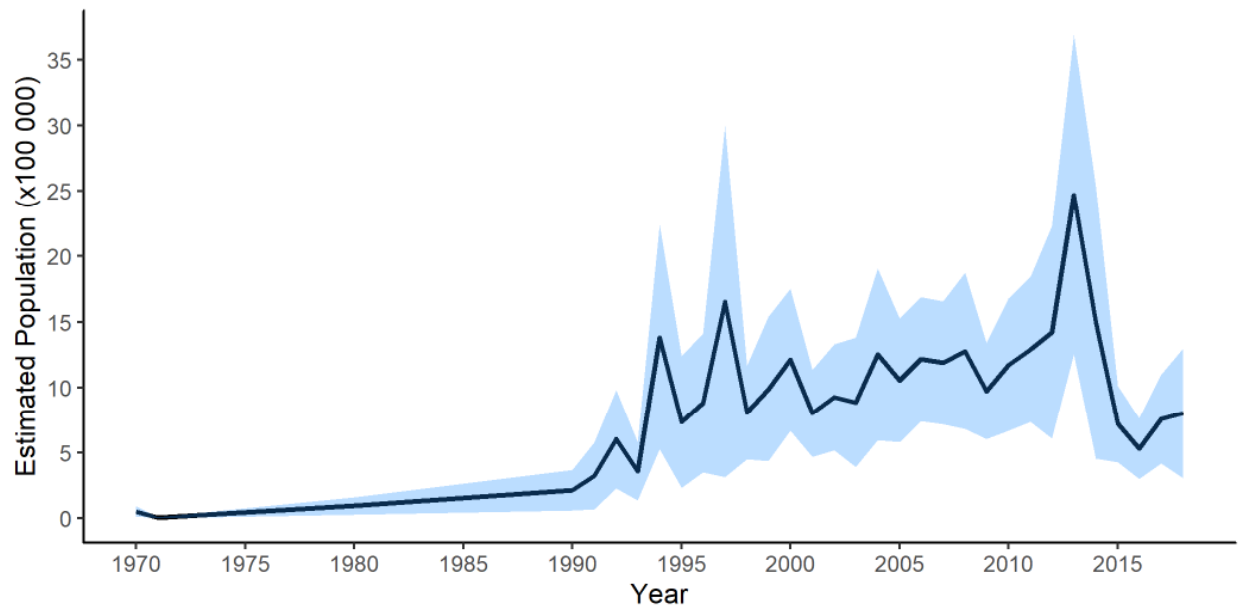


Figure 7.2-2 Lincoln estimates of population size for adult greater Snow Geese; black line represents the population estimate while the shaded area represents the 95% confidence intervals. (Source: R. Alisauskas, ECCC - S&T, unpubl. data).

7.2.2 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 U.S. 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 as electronic calls and bait. Special conservation seasons were also established in Canada (Quebec), during which hunters 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 (Figure 7.2-3). In Canada, in 2018, the fall goose harvest was estimated at 20 600 birds, well below the 5-year average of 63 555 (2012-2016). 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 2018-19, the fall harvest was estimated at approximately 245 128 Geese, which was lower to the previous year's estimate of 495 443 Geese (Raftovich *et al.* 2019). A spring conservation harvest was implemented in Quebec in the spring of 1999 and in Ontario in the spring of 2012. 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. However, the spring harvest has decreased. In 2018, an estimated 3 846 geese were harvested (Smith and Gendron 2019).

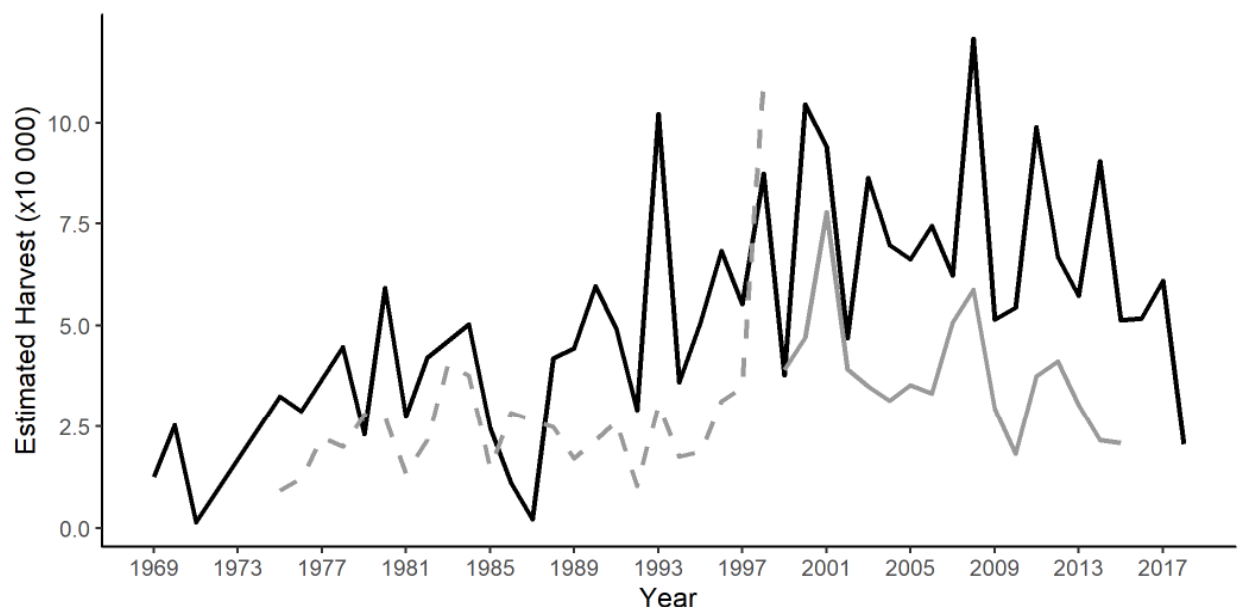


Figure 7.2-3 Estimated Greater Snow Goose harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1699>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

7.2.3 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. These practices increase the survival and reproduction of Greater Snow Geese and are the main cause of population growth.

In an effort to stop population growth and reduce the Greater Snow Goose population, 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 first spring conservation harvest was established in 1999 in Quebec, and was expanded to eastern Ontario in 2012. 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 was maximized. Very liberal daily bag and possession limits for Snow Geese continue to be recommended.

Following the implementation of special conservation measures, the growth of the Greater Snow Goose population appears to have stabilized (Reed and Calvert 2007; Lefebvre *et al.* 2017). Spring survey data suggest that the population has fluctuated between about 700 000 and 1 million birds since 1998 (Figure 7.2-1).

7.3 Lesser Snow Goose (*Anser caerulescens caerulescens*)

Lesser Snow Goose populations have increased dramatically since the 1970s. The Mid-continent Lesser Snow Goose population was designated as overabundant in 1999 and has since been subject to special measures to control the species' abundance. In 2014, the Western Arctic Population was also designated as overabundant in Canada.

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. Between 2015 and 2019 population estimates had an average of 3.6 million adults (Figure 7.3-2).

Lesser Snow Geese nest 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 7-1). The eastern and central Arctic colonies collectively form the Mid-continent Population of Lesser Snow Geese, which migrates through the Prairie provinces and mainly winters in the Central and Mississippi Flyways. 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, which migrates through Alberta and western Saskatchewan, and mainly winters in the Pacific Flyway. 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 the Central Valley of California, and in smaller numbers in Oregon. All three populations overlap somewhat on migration and wintering areas.

7.3.1 Abundance and Trends

Lesser Snow Geese nest in several remote colonies in the Arctic, and for that reason, it is difficult and expensive to survey populations using traditional aerial survey methods. Photographic surveys were used from the 1960s through 2014 to monitor major Lesser Snow Goose nesting colonies (Mid-continent and Western Arctic Populations). These surveys were not done every year and covered only known colonies that had 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 population size and trend (Alisauskas *et al.* 2009; Alisauskas *et al.* 2011; Alisauskas *et al.* 2012). The colony of Lesser Snow Geese on Wrangel Island is monitored through ground surveys conducted by Russian biologists (Kerbes *et al.* 1999).

All Lesser Snow Goose populations are above their NAWMP population objectives, which are: Mid-continent population, 5 000 000 birds; Western Arctic population, 200 000 birds; and Wrangel Island population, 120 000 birds (NAWMP 2018).

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

The Mid-continent Population of the Lesser Snow Goose has also been monitored in January in wintering areas since 1970 (Figure 7.3-1). 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 3.9 million geese in 2019 (Figure 7.3-1; Fronczak 2017).

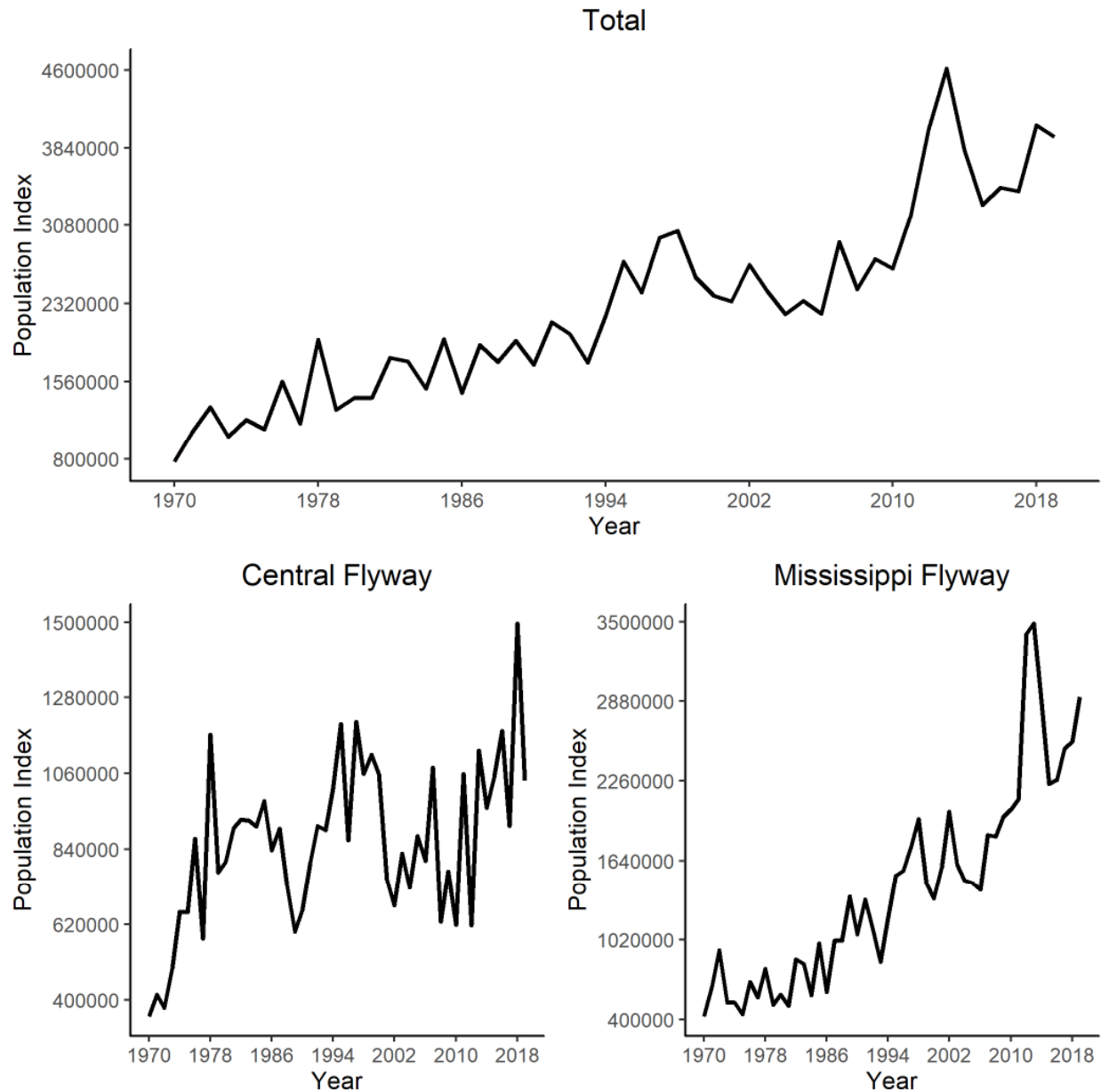


Figure 7.3-1 Mid-continent Lesser Snow Goose Populations in Mid-winter (Counts include some Ross's Geese, Source: Fronczak 2017).

Estimates obtained 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 13.6 million adults from 2009–2018 (Figure 7.3-2). Despite a significant increasing long-term trend, the 5-year and 10-year trends both suggest a declining population.

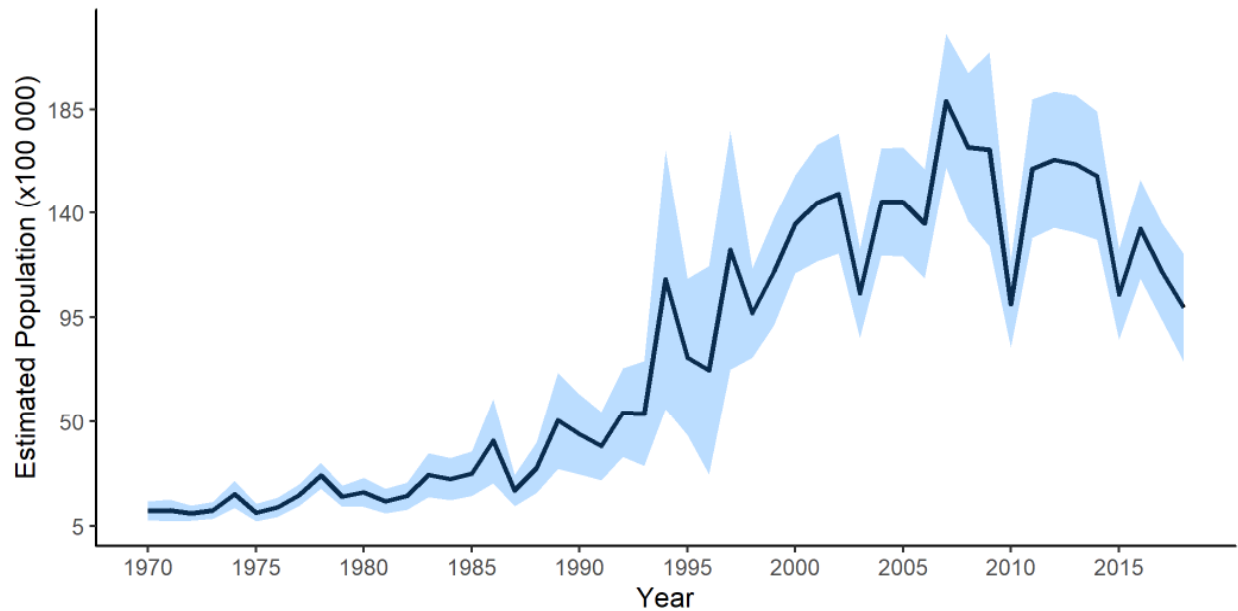


Figure 7.3-2 Lincoln estimates of population size for Midcontinent adult Lesser Snow Geese 1970-2018; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals. (Source: R. Alisauskas, ECC - S&T, unpubl. data).

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 has risen to an average of approximately 1.3 million geese in the past five years (Figure 7.3-3). Both the mid-continent and Western Arctic and Wrangel Island populations of Lesser Snow Goose have significant and positive long term trends.

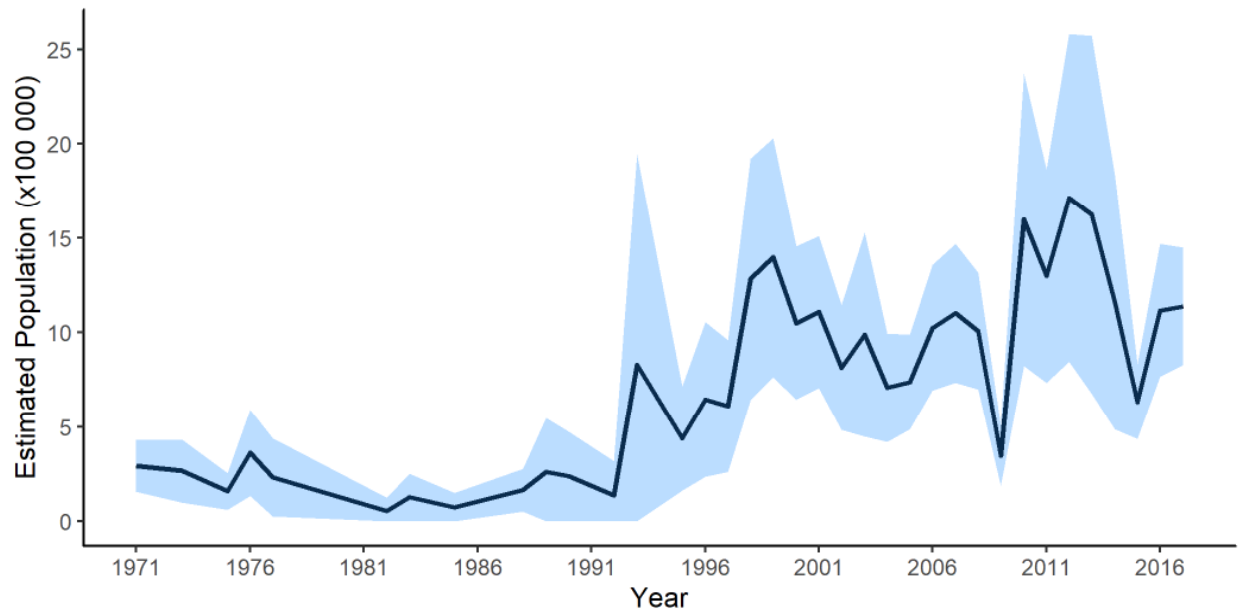


Figure 7.3-3 Lincoln estimate of population size for adult Lesser Snow Geese wintering in the Pacific Flyway; black represents the mean and the shaded blue area represents the 95% Confidence Interval (includes both the Western Arctic Population and the Wrangel Island Population in Russia; Source: R. Alisauskas, ECC - S&T, 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 Goose population has undergone a dramatic increase since 1990 reaching the highest numbers since surveys were initiated in 1969, with approximately 442 000 birds in 2019 (Figure 7.3-4; Pacific Flyway unpubl. data 2017).

The number of birds wintering in the Fraser–Skagit area has roughly doubled since the early 1990s. An estimated 109 000 Snow Geese were present in the area in 2018-2019, with 21% of the birds being young (A. Breault CWS-Pacific, pers. comm.). Increased harvest rates combined with poor breeding years caused the wintering population in this area to decline to about 57 000 birds in 2008–2009. The 2016–2017 mid-winter population in the Fraser-Skagit area was estimated at 99 000 birds, with 25% of the birds being young (A. Breault, CWS–Pacific, pers. comm.).

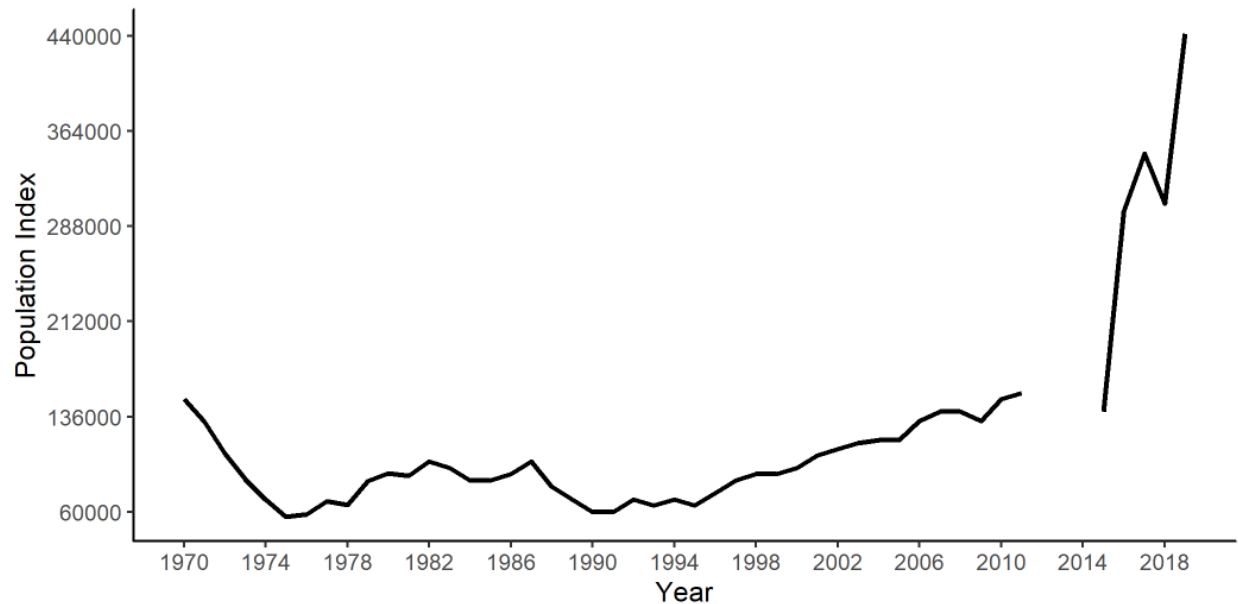


Figure 7.3-4 Population index of Lesser Snow Geese on Wrangel Island, Russia, 1970–2019 (Data were not gathered in 2012 and 2014; Source: Olson 2019).

7.3.2 Harvest

In Canada, most harvest of Mid-continent Lesser Snow Geese takes place in Saskatchewan. In the U.S., 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 (Figure 7.3-5).

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. In recent years, the harvest has declined somewhat or at least stabilized, perhaps due to waning interest by hunters, satiation effects as harvest levels have reached their maximum, or because the birds have responded behaviorally to the increased harvest pressure from hunters (Alisauskas *et al.* 2011; Johnson *et al.* 2012). In the U.S., 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). Despite the overall increase in harvest over time, harvest rates (the proportion of birds shot by hunters each year) have actually declined, and in recent years only about 2% of adult Lesser Snow Geese are harvested annually by hunters.

Since 1990, the CWS Pacific Region has conducted a special annual harvest survey of Lesser Snow Geese from the Wrangel Island Population. The 2018-2019 Snow Goose harvest estimate for the Fraser River delta was 1 610 birds, within the historic harvest estimate range of 748 birds (1990) and 3 680 birds (2016–2017) (Figure 7.3-6).

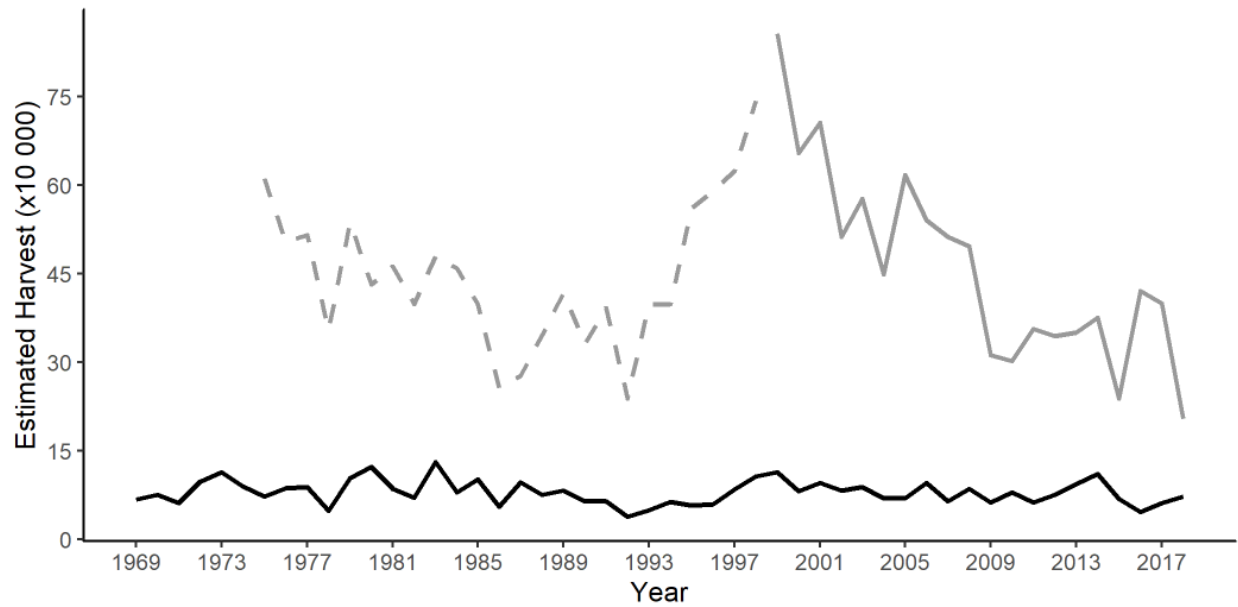


Figure 7.3-5 Estimated Lesser Snow Goose regular season harvest in U.S. (gray line) and Canada (black line). These data do not include estimated harvests from spring conservation orders in the U.S. and Canada. Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/P006/A002/?lang=e&p=XX&z=&s=1690> and <https://wildlife-species.canada.ca/harvest-survey/P006/A002/?lang=e&p=XX&z=&s=1691>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

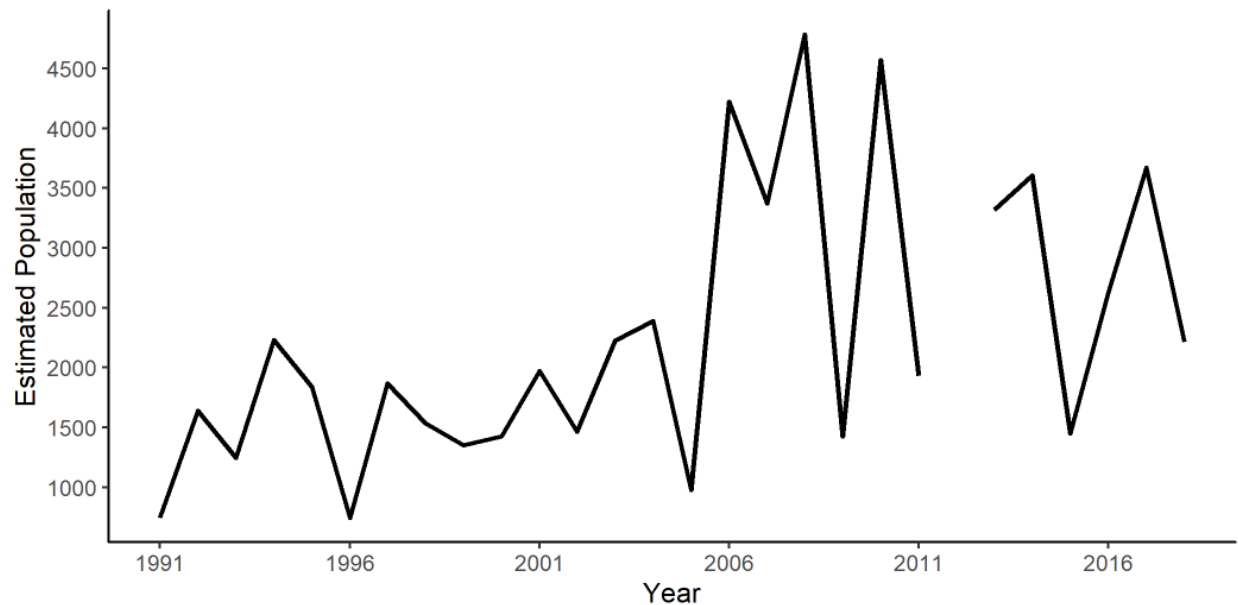


Figure 7.3-6 Lesser Snow Goose Harvest for the Wrangel Island Population (On the Fraser Delta only, source; A. Breault, CWS-Pacific Region, unpubl. data).

7.3.3 Management and Conservation Concerns

The Mid-continent Population of Lesser Snow Geese increased greatly over the past few decades, but has declined over the last 10 years. The overall increase is tied to large-scale changes in land use, mainly converting great swaths of land to agricultural crop land. Spillage from mechanized harvesting leaves millions of bushels of waste grain lying on the ground, and geese 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 population increases since the 1970s. Adult survival increased over the past several decades, likely because superabundant food reduced winter mortality. Population numbers swelled and hunter harvest declined due in part to declining hunter numbers. In fact, the Mid-continent Population of Lesser Snow Geese (and some others to the east and west of there) likely can no longer be controlled through hunting alone (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 (Flemming *et al.* 2019a,b). 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 concern was first identified in the mid-1990s (Ankney 1996; Batt 1997) and it continues to be a concern for waterfowl managers today.

The Mid-continent Lesser Snow Goose Population was designated as overabundant in 1999, and since then the U.S. 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 harvest outside the traditional hunting period and 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. Though increased harvest by hunters was not sufficient to reduce adult survival (Alisauskas *et al.* 2011, 2012), the decline in population size over the last 10-12 years is likely caused by reduced productivity due to effects of climate change and increased competition for food on brood rearing areas (Ross *et al.* 2017, 2018).

The Western Arctic Population of Lesser Snow Geese shows similar population growth to that of other populations of Snow Geese and Ross's Geese. The population was designated as overabundant in Canada in 2014 and special conservation measures were implemented (liberalizing harvest and establishing a spring conservation season) in Alberta and Northwest Territories in 2015 and the Yukon in 2016.

Though comparatively much smaller, even Wrangel Island population 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 triggered 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 in tidal marshes has reduced bulrush biomass; long-term monitoring suggests that large parts of the tidal marsh could become non-functional if the number of geese remains high (S. Boyd, ECCC - S&T, pers. comm.). Managers implemented a harvest strategy to maintain the Fraser–Skagit winter population within 50 000–70 000 total geese to protect the marsh habitat and minimize socio-economic concerns by making hunting regulations, and hence harvest rates, responsive to goose abundance. The majority of this harvest occurs on the Skagit Delta in Washington State.

7.4 Ross's Goose (*Anser rossii*)

The Ross's Goose was considered a rare species in the early 1900s, but its numbers have increased greatly over the last 50+ years (Alisauskas *et al.* 2012). Ross's Geese were designated as overabundant in Canada in 2014, and are subject to special conservation measures to control their numbers in western Canada.

7.4.1 Abundance and Trends

Most Ross's Geese nest in the Queen Maud Gulf Region of the central Canadian Arctic. After a period of population growth beginning in 1993, the growth of the nesting colony at Karrak Lake seems to have slowed and returned to numbers similar to those seen in the 1990s. Recent counts at the Karrak Lake colony estimated the population at approximately 233 000 geese in 2019, continuing the steady decline from the peak of 932 000 geese in 2012 (Figure 7.4-1). (R. Alisauskas and D. Kellett, EC–Science and Technology Branch, unpubl. data).

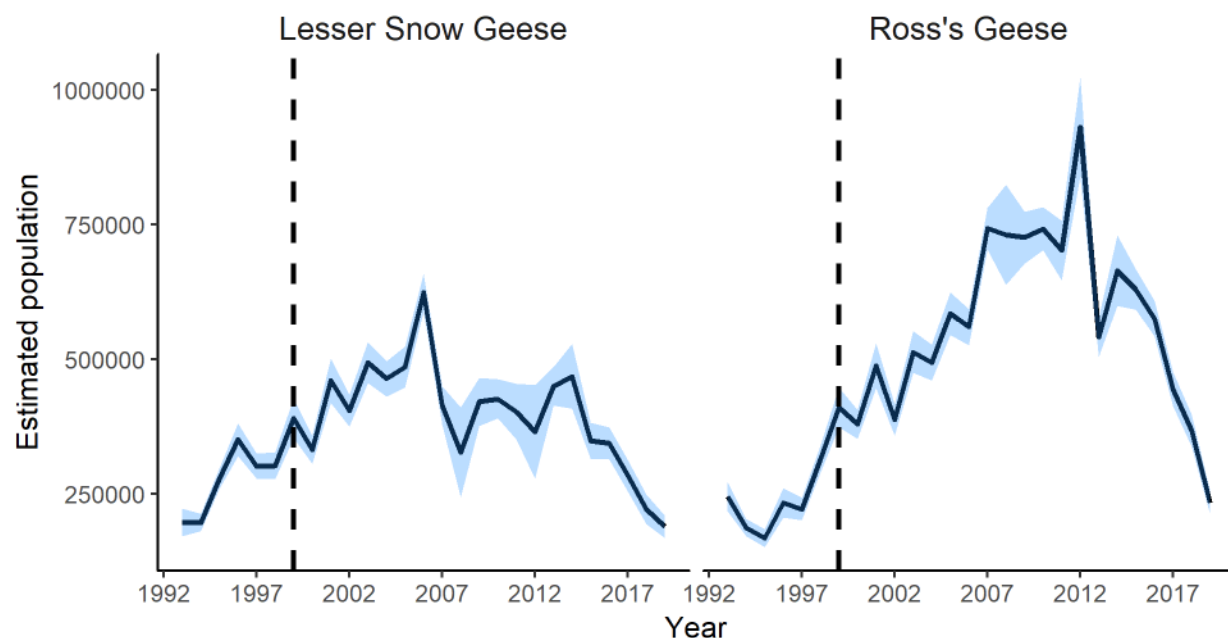


Figure 7.4-1 Estimated numbers of Ross's and Lesser Snow Geese that attempted to nest at Karrak Lake, Nunavut, 1993-2019; black line represents the population estimate, shaded area represents the 95% Confidence Interval, and the vertical dotted line indicates the introduction of special conservation measures (Source: R. Alisauskas, ECCC - S&T, unpubl. data).

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). 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; most US band recoveries from Ross's geese now occur in the midcontinent region of the U.S., and not the Pacific Flyway (Alisauskas *et al.* 2006b).

The population of Ross's Geese in the early 1900s was thought to be 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; Jónsson *et al.* 2013) 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.* 2006; Alisauskas *et al.* 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 and the August banding suggested that there were at least 20 000 Ross's Geese present there by 2009 (Alisauskas *et al.* 2012). Recent observations during annual banding operations suggest that the numbers of Ross's geese are much higher than that (J. Leafloor, CWS – Prairies Region, pers. comm.), but no new estimates are available. 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 nearly complete overlap with snow geese throughout the year (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 Lincoln estimate of adult population size suggests that there were about 1.6 million adults in the population in 2018, which matches the 5-year average of 1.6 million from 2014-2018 (Figure 7.4-2).

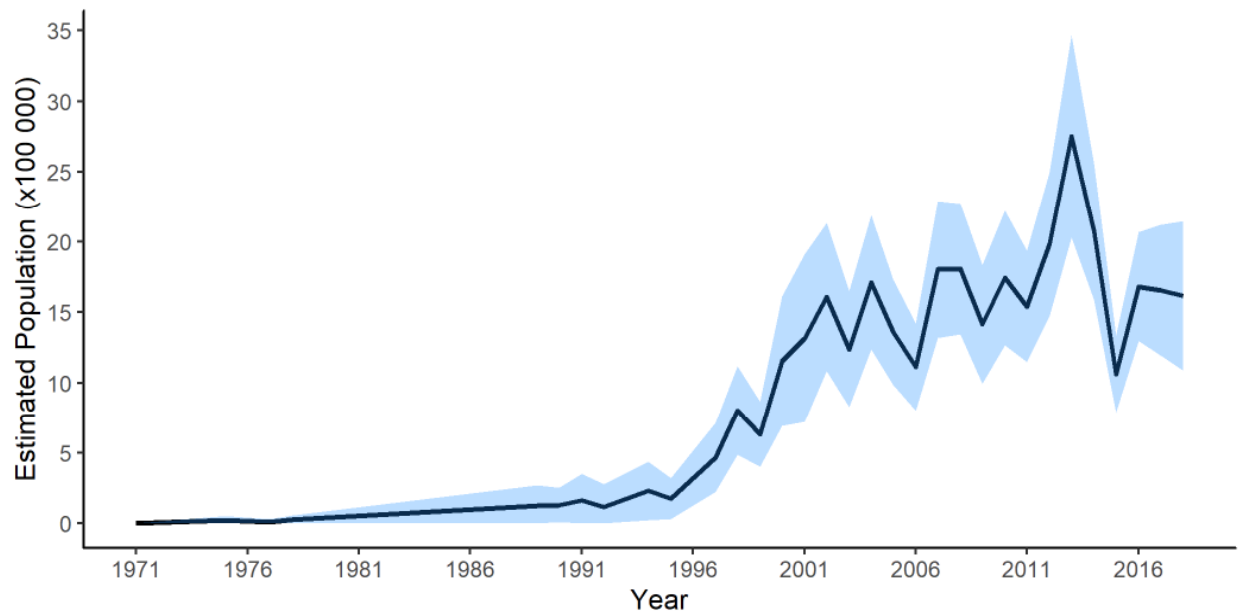


Figure 7.4-2 Lincoln population estimates of adult Ross's Geese in July; black line represents the population estimates while the shaded area represents the 95% Confidence Intervals. (Source: R. Alisauskas, ECC - S&T, unpubl. data).

7.4.2 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 (Figure 7.4-3). 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.

7.4.3 Management and Conservation Concerns

Increasing numbers of Ross's Geese contribute to alteration 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 special conservation seasons were established in spring of 2015. In the U.S., special conservation measures have been in place for Ross's Geese since 1999.

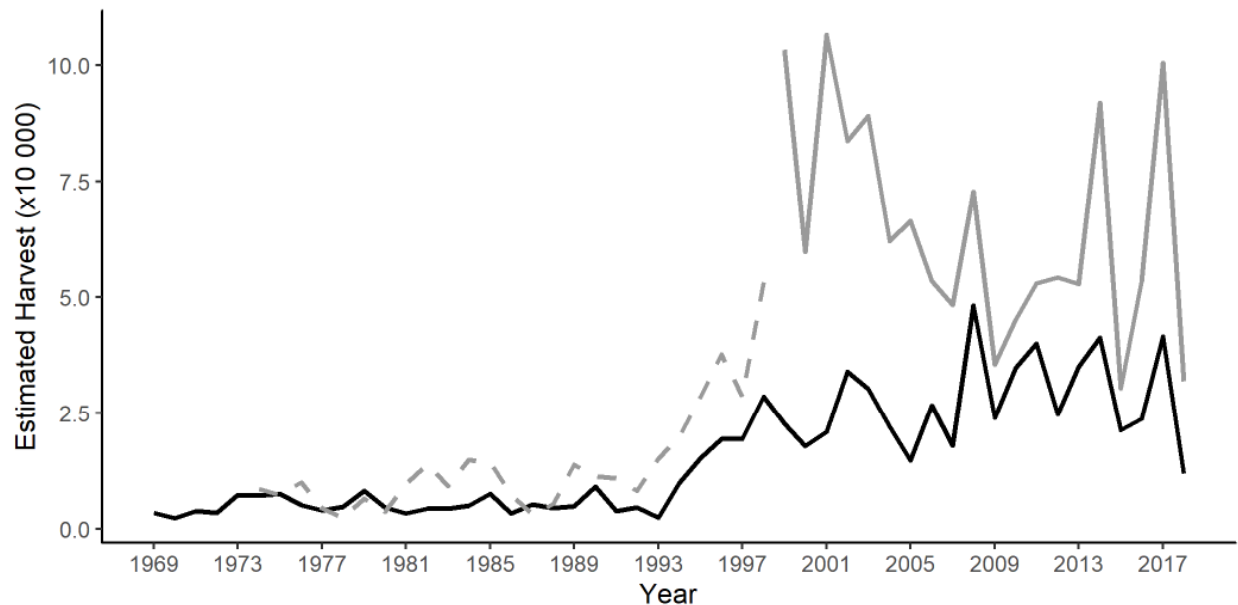


Figure 7.4-3 Estimated Ross's Goose harvest during fall/winter hunting seasons in U.S. (gray line) and Canada (black line). These estimates do not include harvest from spring conservation seasons in either country. Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1700>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

7.5 Greater White-fronted Goose (*Anser albifrons*)

The Greater White-fronted Goose has one of the largest ranges of any goose worldwide. 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 and in interior and northern Alaska that winter in the Central and Mississippi Flyways of the U.S. (Figure 7-1). Most Mid-continent White-fronted Geese migrate through Alberta and Saskatchewan in the fall.

7.5.1 Abundance and Trends

The Mid-continent Population of White-fronted Geese is currently monitored by a fall staging survey in the Canadian Prairies, which is the basis for the NAWMP population objective of 600,000 birds. 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 1992–2019. The most recent 3-year average population index was 994 271 geese (Figure 7.5-1). The population is currently above its NAWMP population objective of 600 000 birds based on fall counts (NAWMP 2012).

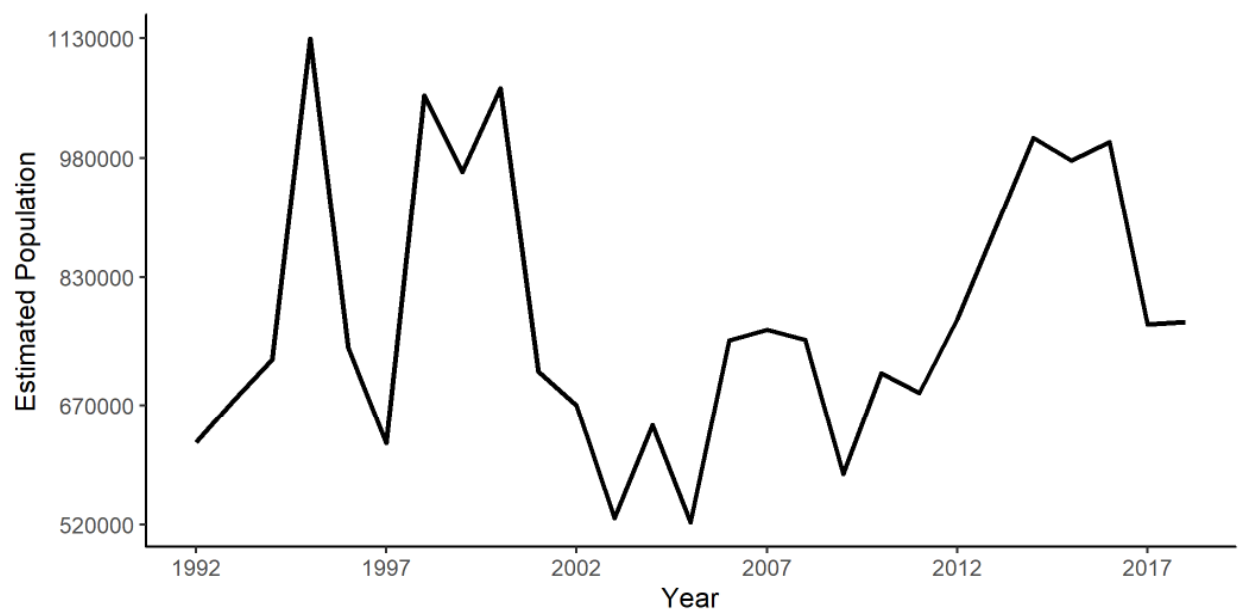


Figure 7.5-1 Fall survey results for the Mid-continent population of the Greater White-fronted Goose in Saskatchewan and Alberta 1992-2018 (There was no survey conducted in 2013; Source: Blake Bartzen, CWS-Prairie Region, unpubl. data).

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 2019 (Figure 7.5-2). Indices from regional breeding ground surveys in northern and central Alaska more than doubled from 1986–2012 (Stehn *et al.* 2013).

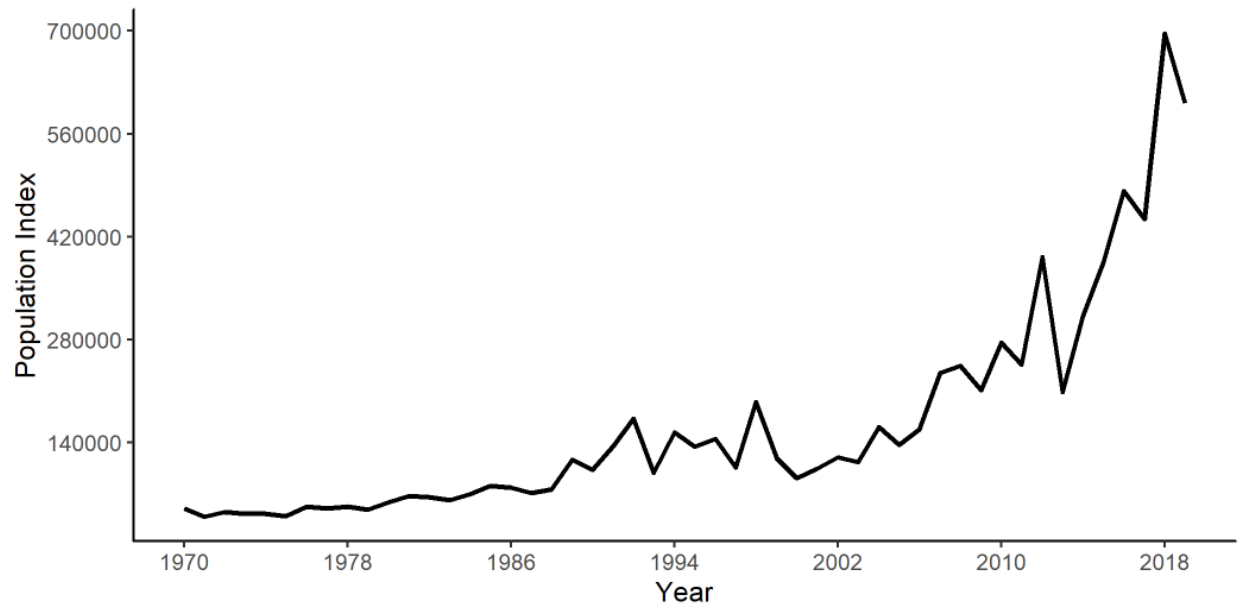


Figure 7.5-2 Mid-winter counts of Mississippi Flyway White-fronted Geese (Source: Fronczak 2019).

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 2016; the most recent 2018 estimate suggests a population size of about 2.3 million adults (Figure 7.5-3).

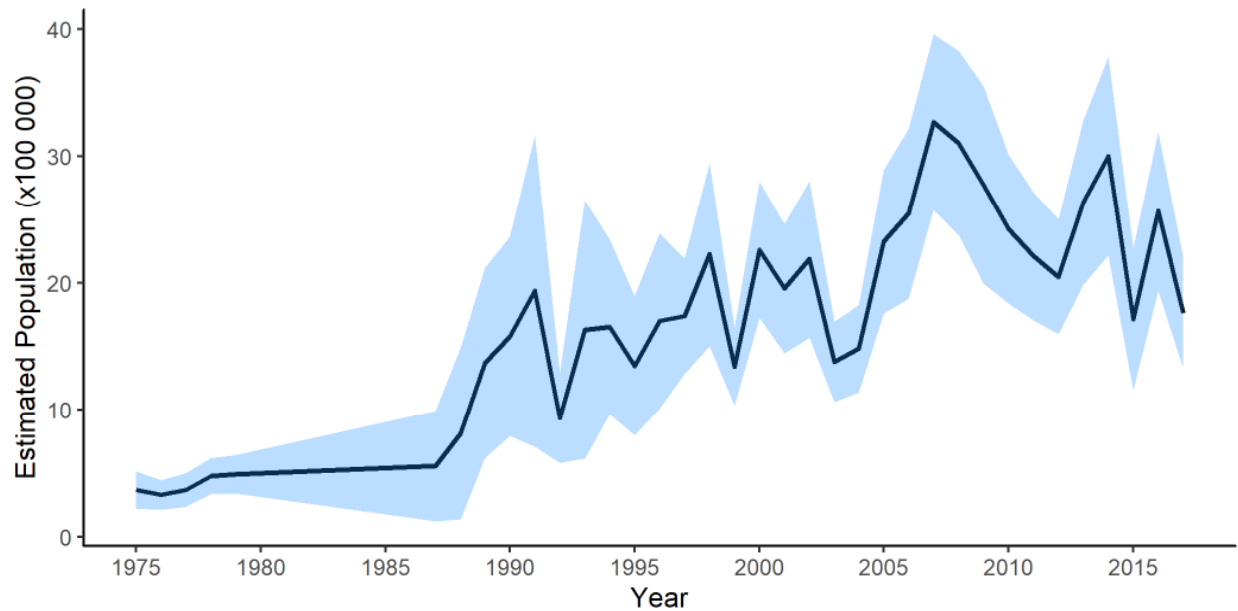


Figure 7.5-3 Lincoln population estimates of adult Mid-continent White-fronted Geese, 1975-2018; black line represents the population estimate, and the shaded area represents the 95% Confidence Interval (Source: R. Alisauskas, ECCC - S&T, unpubl. data).

7.5.2 Harvest

Figure 7.5-4 shows the harvest of White-fronted Geese over time. Harvests in Canada averaged about 71 000 birds per year from 2009–2018. 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 (Figure 7.5-4). In the U.S., the harvest of Mid-continent White-fronted Geese averaged approximately 105 000 birds per year in the 1970s but increased to approximately 222 000 birds in 2018. The total continental harvest of Mid-continent White-fronted Geese has also increased over time.

7.5.3 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.



Figure 7.5-4 Estimated White-Fronted Goose harvest in Canada (solid line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1710>).

7.6 Cackling Goose (*Branta hutchinsii*)

In 2004, the American Ornithologists' Union split the species previously referred to as the Canada Goose (*Branta canadensis*) into two different species: the Canada Goose and the Cackling Goose (Banks *et al.* 2004). 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 from Canada Geese based on their mitochondrial DNA. The Cackling Goose has been divided into 4 subspecies (*minima*, *hutchinsii*, *leucopareia*, and *taverneri*), but only *hutchinsii* is known to nest in Canada.

Traditionally, Cackling Geese were managed as two separate populations in the Mississippi and Central Flyways: the Tall Grass Prairie and Short Grass Prairie Populations. Due to extensive overlap in wintering areas, the two populations were merged into the Mid-Continent Population of Cackling Geese in 2013. The Mid-continent Population of Cackling Geese includes all Cackling Geese that nest north of the tree line in Canada; they mostly migrate through the Prairie provinces and winter in the southern states of the Central and Mississippi Flyway.

7.6.1 Abundance and Trends

Numbers of Cackling Geese are difficult to estimate with traditional survey techniques, due to the extensive size and remoteness of their breeding range, and intermixing with Canada Geese on their wintering grounds. Mid-continent Cackling Geese have increased markedly since the 1970s based on Lincoln estimates of population size (Figure 7.6-2). Estimates averaged approximately 2.6 million adults from 2014–2018 (J. Leafloor, CWS–Prairie Region, unpubl. data).

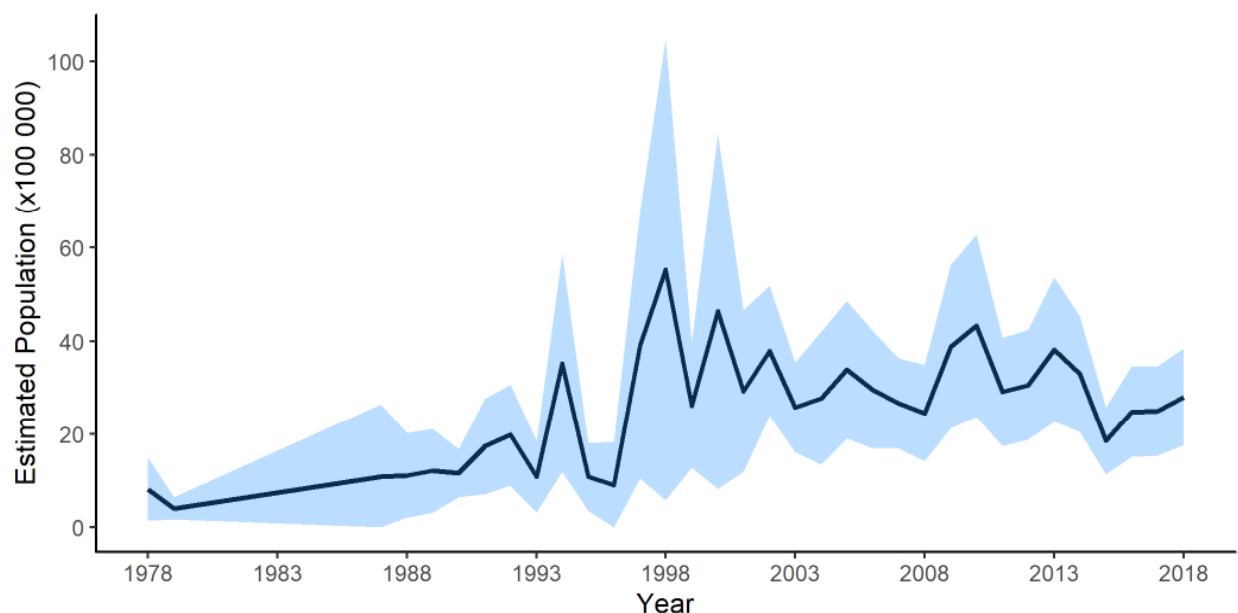


Figure 7.6-1 Lincoln population estimates of Mid-continent Cackling Geese 1975-2018; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals (J. Leafloor, CWS–Prairie Region, unpubl. data).

7.6.2 Harvest

Estimated harvests of Cackling Geese in the Canadian Prairies have shown considerable inter-annual variation since 1971, but have increased over the long term (Figure 7.6-3).

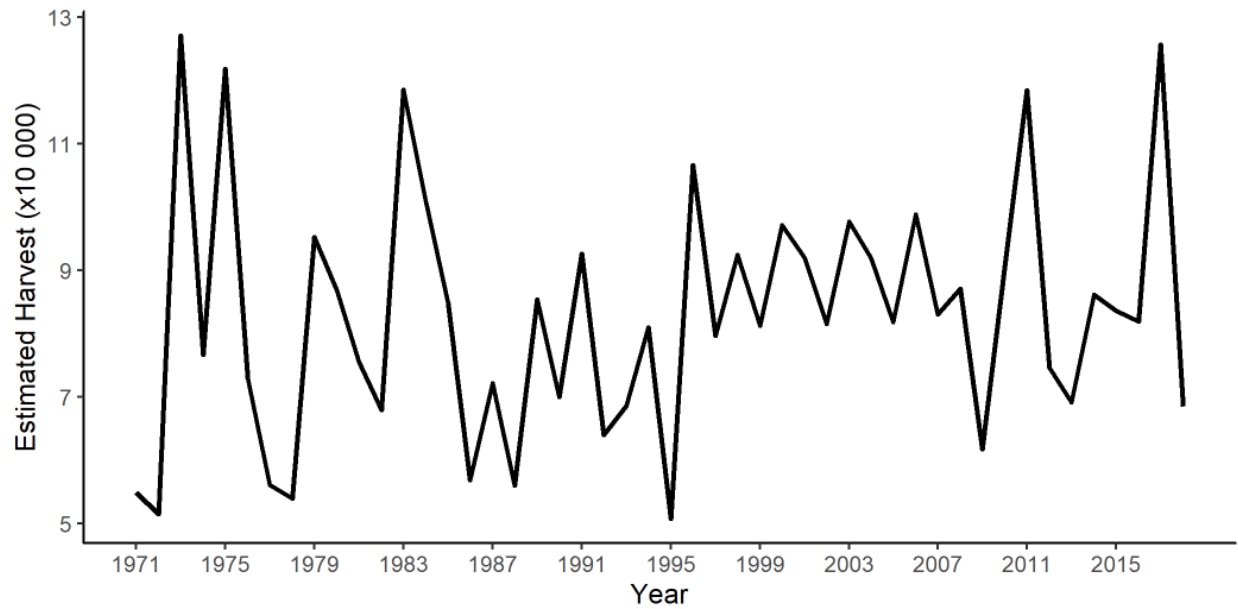


Figure 7.6-3 Estimated Cackling Goose harvest in Canada, 1971-2018. Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1721>).

7.6.3 Management and Conservation Concerns

There is no conservation concern for the Cackling Goose in Canada.

7.7 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.

7.7.1 Subarctic Breeding Populations

NORTH ATLANTIC POPULATION CANADA GOOSE

The North Atlantic population of Canada Geese breeds in Labrador, insular Newfoundland and eastern Quebec (North Shore), including Anticosti Island. Birds breeding in western Greenland, which are increasing and expanding also appear to contribute to this population (Fox *et al.* 1996; Scribner *et al.* 2003; Fox and Glahder 2010; Fox *et al.* 2013). The majority of the population winters in southern Atlantic Canada and New England but a small portion winters from New Jersey south to North Carolina.

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 North Atlantic population is to count birds during the breeding period, when they tend to occupy relatively discrete ranges with little overlap between neighboring populations.

Both the helicopter plot survey and fixed-wing survey of the Eastern Waterfowl Breeding Ground Survey (Figure 3.1-2, Monitoring section) cover the North Atlantic population of Canada Geese. The population index is at approximately 53 800 breeding pairs in 2018, which represents about 41% of the North Atlantic population, estimated at 130 000 geese. This population of Canada Geese has stayed relatively stable since surveying began in 1990.

ATLANTIC POPULATION CANADA GOOSE

Atlantic population 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. The Atlantic population winters from New England to South Carolina, with the largest concentration occurring on the Delmarva Peninsula.

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 2019). 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 7.7-1. The breeding pair estimates have risen nearly five-fold since 1995, a year with a record low level of about 30 000 pairs. The most recent 10-year average is 165 000 breeding pairs (Harvey *et al.* 2019), which puts the population below the management objective of 225 000 breeding pairs of Atlantic population in the Ungava Region of northern Quebec.

Since 1997, a pre-season banding program has been in place for AP Canada Geese breeding in the Ungava Peninsula, along the northern Hudson Bay coast, and along the south and west coasts of Ungava Bay.

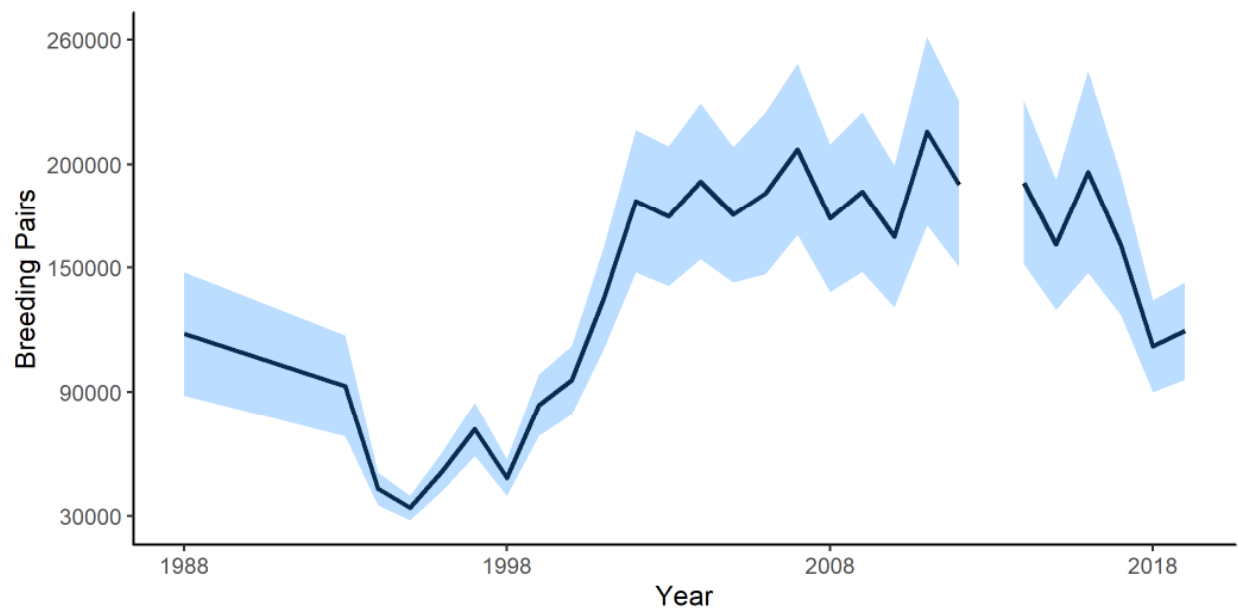


Figure 7.7-1 Estimated number of Atlantic population Canada Goose breeding pairs on the Ungava Peninsula; black line represents the breeding pair estimate and the shaded area represents the 95% Confidence Intervals (No survey was conducted in 2013; Source: Harvey and Rodrigue 2019).

In the Quebec boreal forest, the Eastern Waterfowl Breeding Ground Survey covers the southern nesting range of AP Canada Geese. In 2019, the population in the boreal forest was estimated at 13 550 breeding pairs, well below the 10-year average of 23 400 breeding pairs (Figure 7.7-2). The population shows a 5-year declining trend of 3% (C. Lepage, CWS–Quebec Region, unpubl. data), and a longer-term (2000-2016) decline of 4% (Lepage 2019b).

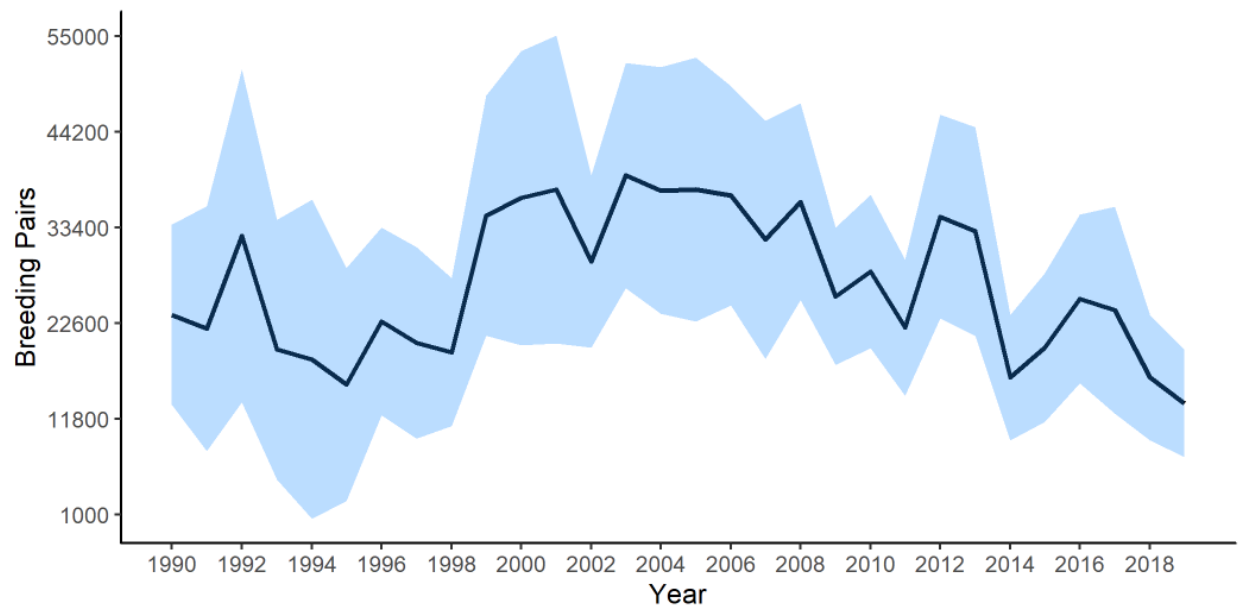


Figure 7.7-2 Estimated numbers of Atlantic population Canada Goose breeding pairs in the boreal forest in Quebec based on the Eastern Waterfowl Breeding Ground Survey (EWS), black line represents the breeding pair estimate and the shaded area represents the 95% Confidence Intervals (Estimates are based on helicopter survey only; Source: C. Lepage, CWS–Quebec Region, unpubl. data).

This once-heavily hunted population peaked at nearly 1 million birds during the 1970s, before experiencing a sharp decline during the late 1980s and early 1990s that prompted the establishment of breeding ground surveys in 1988 in northern Quebec. In 1993, the number of breeding pairs of Canada Geese in the Ungava Peninsula was estimated at 91 300, a 23% decrease from the 1988 count. The population continued to decline until 1995, when it reached a historic low of 29 300 breeding pairs: this sharp drop prompted authorities to completely close the sport hunting season for the 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 7.7-1) and decreasing in its southern breeding range (Figure 7.7-2). 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 HUDSON BAY POPULATION CANADA GOOSE

The Southern Hudson Bay population (SHBP) is composed of Canada Geese that nest in coastal habitats along western and southern James Bay (including Akimiski Island, Nunavut) and southern Hudson Bay and in the adjacent interior lowland muskeg of Ontario and Manitoba. The winter range of this population includes most states in the Mississippi Flyway, from Minnesota southward to Arkansas in the west and from Ohio southward to Alabama in the east. The Southern Hudson Bay population consists of the combined former Southern James Bay population, Mississippi Valley population, and Eastern Prairie population of Canada Geese. This population was designated starting in 2016 to streamline and improve management and monitoring of Canada Geese within the Mississippi Flyway (Luukkonen and Leafloor 2017).

Monitoring the Southern Hudson Bay population includes a spring population survey and a summer banding program, each of which are conducted throughout the coastal part of their breeding and brood rearing areas. These programs provide information about population status, productivity and harvest, all of which are required for management of this population. In 2016, a single redesigned spring breeding population survey was initiated within the breeding range in the southern Hudson Bay, replacing the 3 former population-specific surveys (Brook and Badzinski 2016). This survey was created to improve cost

and time efficiencies, survey coverage (particularly of higher density coastal breeding areas), detection of breeding density changes at finer spatial scales, quality of survey data and analytical methodologies (Luukkonen and Leafloor 2017). However, the population estimates from the current, ongoing Southern Hudson Bay population survey are not directly comparable to those of the discontinued Southern James Bay, Mississippi Valley and Eastern Prairie population surveys. The Southern Hudson Bay population survey provides information on annual changes in breeding pair densities and distributions throughout the breeding range of Canada Geese. The primary purpose of the redesigned Southern Hudson Bay population survey is detection of temporal and spatial changes in the distribution of the breeding pairs in two survey areas, the Ontario and Manitoba mainland and Akimiski Island (Brook et al. 2019a). Distribution, density and abundance of Interior Canada Geese breeding within the surveyed area was estimated from spatial statistics (Empirical Bayesian Kriging [EBK], Krivoruchko 2012) using counts and locations of breeding birds (indicated breeding pairs x 2) observed during the survey; estimates have been recalculated and refined.

ABUNDANCE AND TRENDS

The estimated 2019 breeding pair index (EBK derived number of indicated pairs x 2) was 64 000 for the mainland and 11 000 for Akimiski Island (Brook et al. 2019a). The estimated 2019 breeding pair index for the mainland was lower than the 3-year average (70 000), but was similar at Akimiski Island. As the survey continues and several more years of data are collected, more robust change detection analyses will be evaluated to determine the most appropriate technique to monitor changes in the population and its distribution.

South of the Hudson Bay Lowlands in northwestern Ontario, Canada Geese are counted during the WBPBS in boreal habitats of stratum 50. In the 1970s, there were an average of about 25 000 Canada Geese in this area, however the population has been steadily increasing since and the 2019 estimate reached approximately 116 000 birds, a slight decline from last year's estimate of 159 000 (Figure 7.7-3).

Boreal habitats in Alberta, Saskatchewan, Manitoba and the Northwest Territories are surveyed during the WBPBS in strata 12–18, 20–25, and 75–77 (Figure 3.1-1, Monitoring section). In the 1970s, the number of Canada Geese in all of these strata combined averaged about 156 000 birds per year. The 2019 estimate of 785 000 birds is much higher than last year's estimate of 691 000 geese, and is slightly above the 10-year average of approximately 610 000 (Figure 7.7-4).

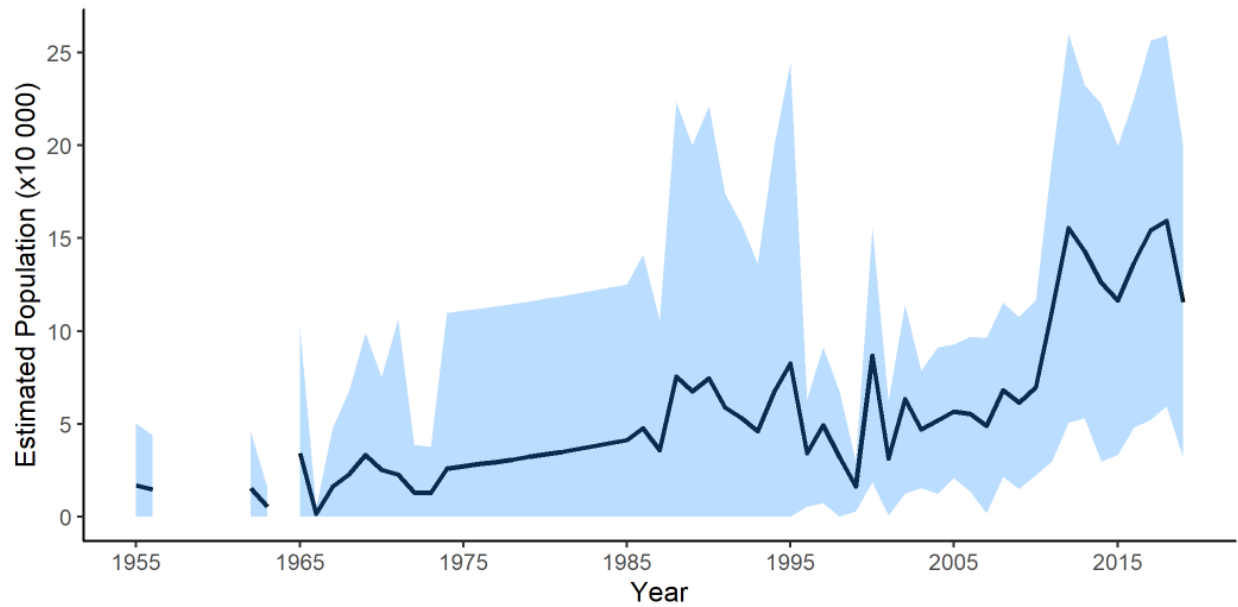


Figure 7.7-3 Numbers of Canada Geese in the Waterfowl Breeding Population and Habitat Survey (WBPHS) Stratum 50; black line represents the population estimate and the shaded area represents the 95% Confidence Interval.

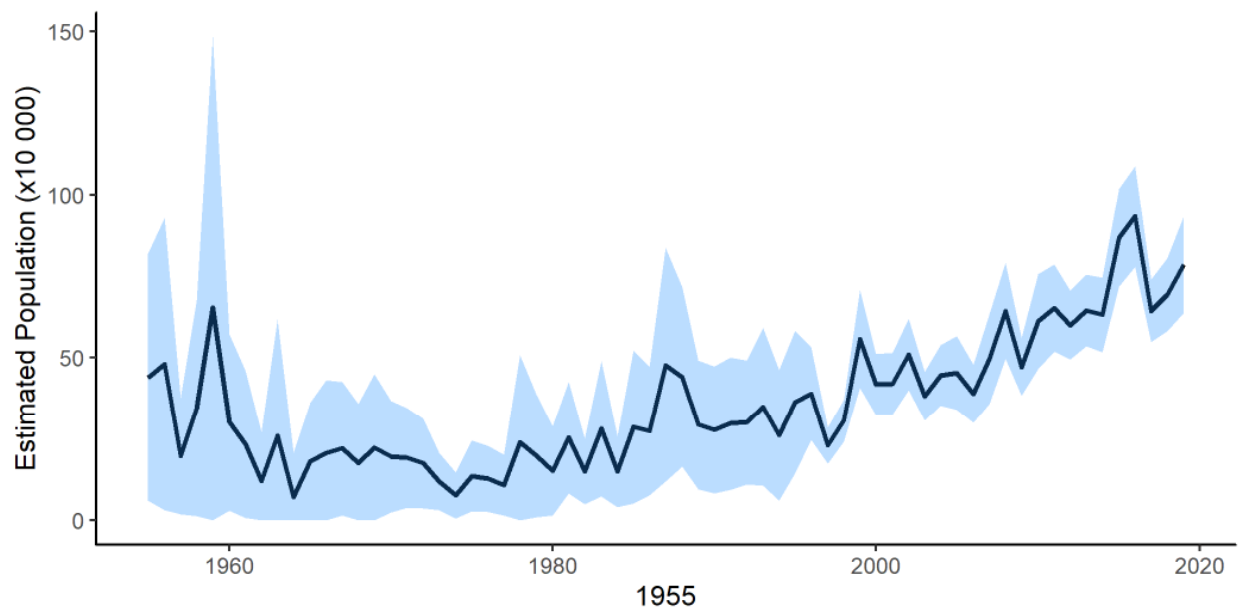


Figure 7.7-4 Numbers of Canada Geese in boreal strata 12–18, 20–25, and 75–77 of western Canada during the Waterfowl Breeding Population and Habitat Survey; black line represents the population estimate and the shaded area represents the 95% Confidence Interval.

7.7.2 Temperate-breeding Populations

Temperate-breeding Canada Geese breed in central and southern Ontario, southern Quebec, the Maritimes, in the southern areas of Prairie provinces, and British Columbia. In the Maritimes, 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, most 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 U.S. have also increased rapidly, and large numbers of sub adults and failed breeders migrate to Canada for the moulting period (Abraham *et al.* 1999; 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 7.7-1).

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 7.7-1. Population Objective for Temperate-breeding Canada Geese in Southern Canada		
Geographic Populations	Abundance	Population Objectives
Southern Quebec	11 000 pairs	2 000–3 000 pairs
Southern Ontario	87 800 ² pairs	40 000–80 000 pairs
Southern Prairie Provinces	1 200 000 ³ geese	400 000–800 000 geese
Southern British Columbia	30 900 geese	10 000–15 000 geese
¹ Average (2010-2015) model-based estimates from USFWS fixed-wing surveys in Maritime Canada (strata 63, 64, and 65). ² Abundance estimate is based on four-year average (2015-2018) of indicated breeding pairs from the Southern Ontario Waterfowl Plot Survey ³ Average estimate from 2018-19 WBPHS, strata 26-40 (southern prairie and parklands)		

MARITIME PROVINCES

The temperate-breeding population in the Maritimes is growing, probably due to the deliberate re-establishment of local Canada Goose flocks in the late 1960s and again in the 1990s. 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 USFWS Fixed-wing surveys) suggest an average of roughly 11 654 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 2019 in an attempt to assess the contribution of this population to overall goose harvest in the region.

SOUTHERN QUEBEC

In 2019, the number of breeding pairs in southern Quebec (obtained from combining numbers counted in the southern half of the Eastern Waterfowl Breeding Ground Survey area and the St. Lawrence Lowlands Breeding Waterfowl Survey) was estimated at 11 100 (C. Lepage, CWS–Quebec Region, unpubl. data). The species has expanded rapidly into southwestern Quebec since the early 2000s (Rodrigue 2013a),

with a significant increasing trend of 7% annually since 2004 (Figure 7.7-5). The species is now present almost everywhere in southwestern Quebec (Lepage 2019b).

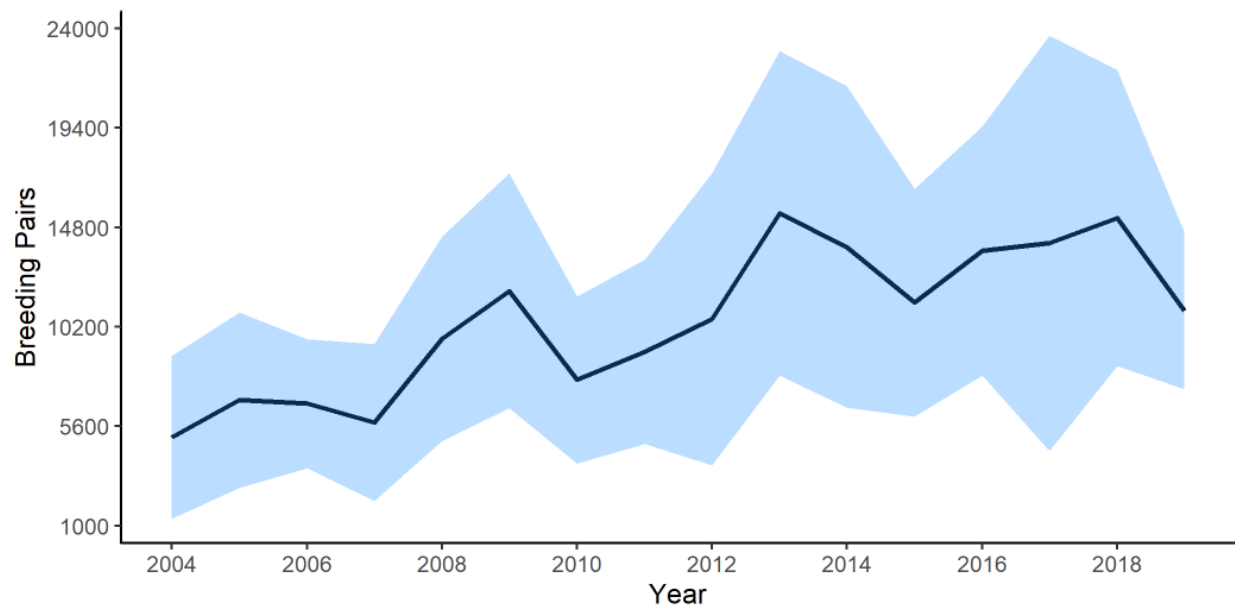


Figure 7.7-5 Estimated breeding pairs of temperate-breeding Canada Geese in southern Quebec; black line represents the breeding pair estimate and the shaded area represents the 95% Confidence interval (Source: C. Lepage, CWS–Quebec Region, unpubl. data).

SOUTHERN ONTARIO

As recently as 1970, Canada Geese did not commonly nest throughout southern Ontario. But anthropogenic changes on the southern Ontario landscape (e.g., shifts in agricultural 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 86 300 breeding pairs (Figure 7.7-6). Increasing at a rate of 8.4% annually from 1971 to 2018, the population growth rate now appears to have stabilized, with an average annual increase of 0.7% since 2008. The 2018 breeding pair estimate was 96 600 breeding pairs (Figure 7.7-6).

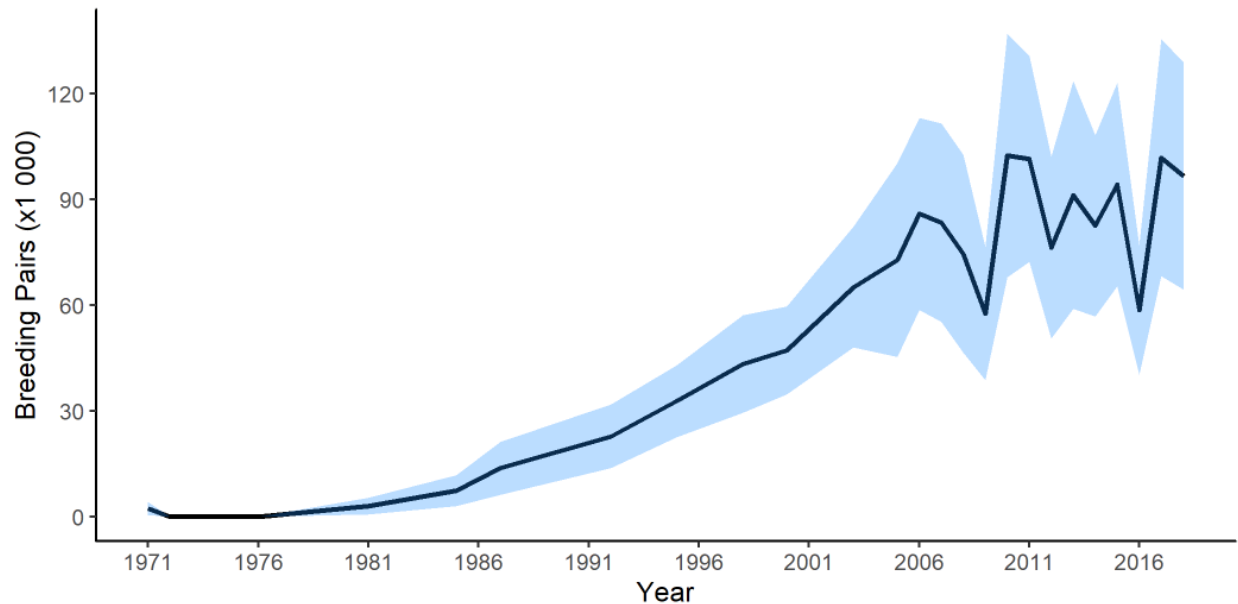


Figure 7.7-6 Estimated breeding pairs of temperate-breeding Canada Geese in southern Ontario; black line represents the breeding pair estimate and shaded area represents the 95% Confidence Interval (Source: S. Meyer, CWS–Ontario Region, unpubl. data).

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 U.S. and Canada have grown and expanded, the need for such subdivisions has declined, and instead we report on trends observed in Prairie Canada.

Canada Geese in Prairie strata of western Canada averaged approximately 87 000 birds annually from 1970–1979 but grew to about 1.2 million birds by 2019 (Figure 7.7-7).

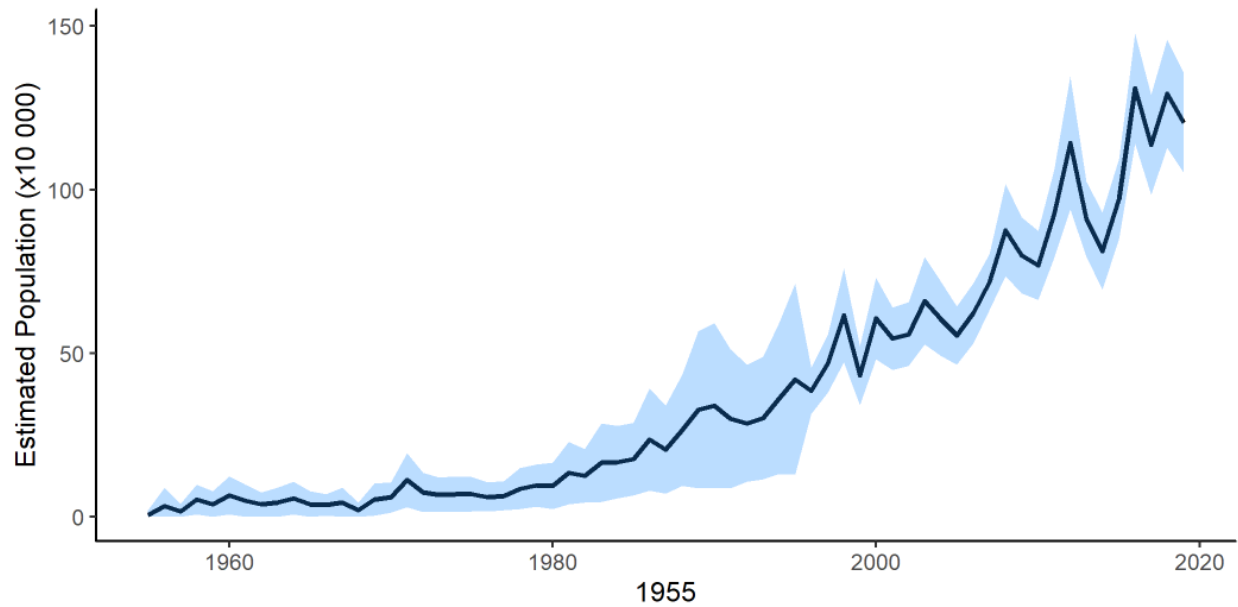


Figure 7.7-7 Numbers of Canada Geese estimated based on the Waterfowl Breeding Population and Habitat Survey in prairie and parkland habitats of western Canada, Strata 26–40, 1955–2017; black line represents the population estimate and the shaded area represents the 95% Confidence Intervals.

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. have been monitored by the Waterfowl Breeding Population Survey of the Central Interior Plateau of B.C. since 2006. The 2019 breeding population was estimated at 30 900 individuals, a little lower than the estimates for 2018 (Figure 7.7-8) (A. Breault, CWS–Pacific Region, pers. comm.).

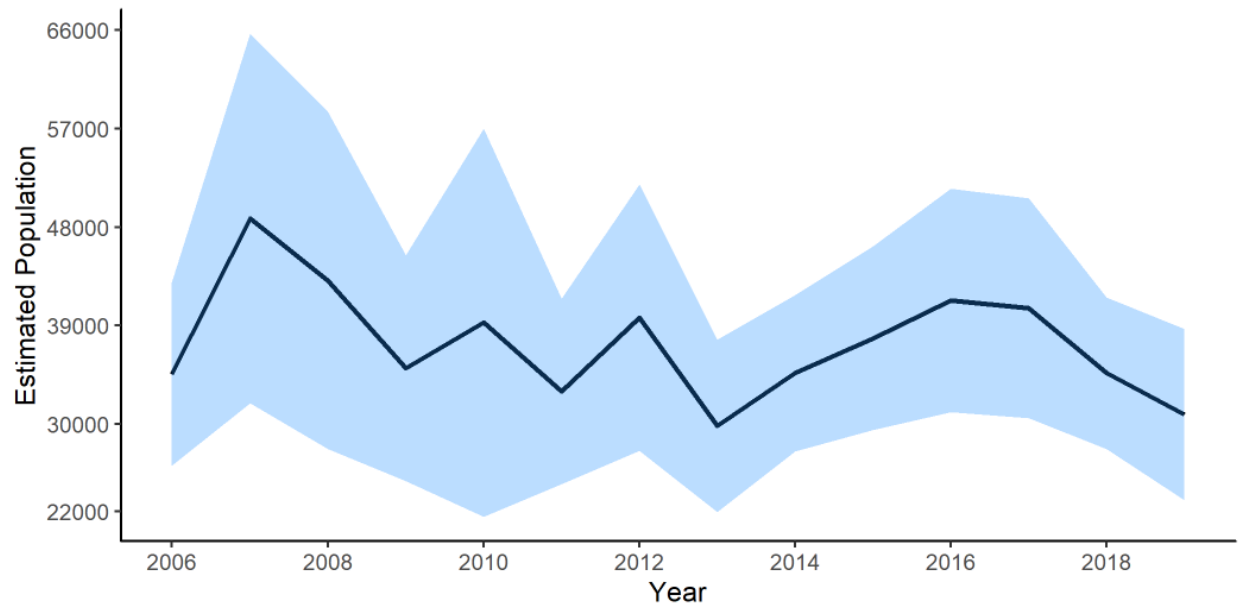


Figure 7.7-8 Population estimates of Canada Geese in British Columbia Central Plateau, 2006-2019; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

7.7.3 Harvest

Figure 7.7-9 presents overall harvest estimates of Canada Geese for Canada and the U.S. 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.

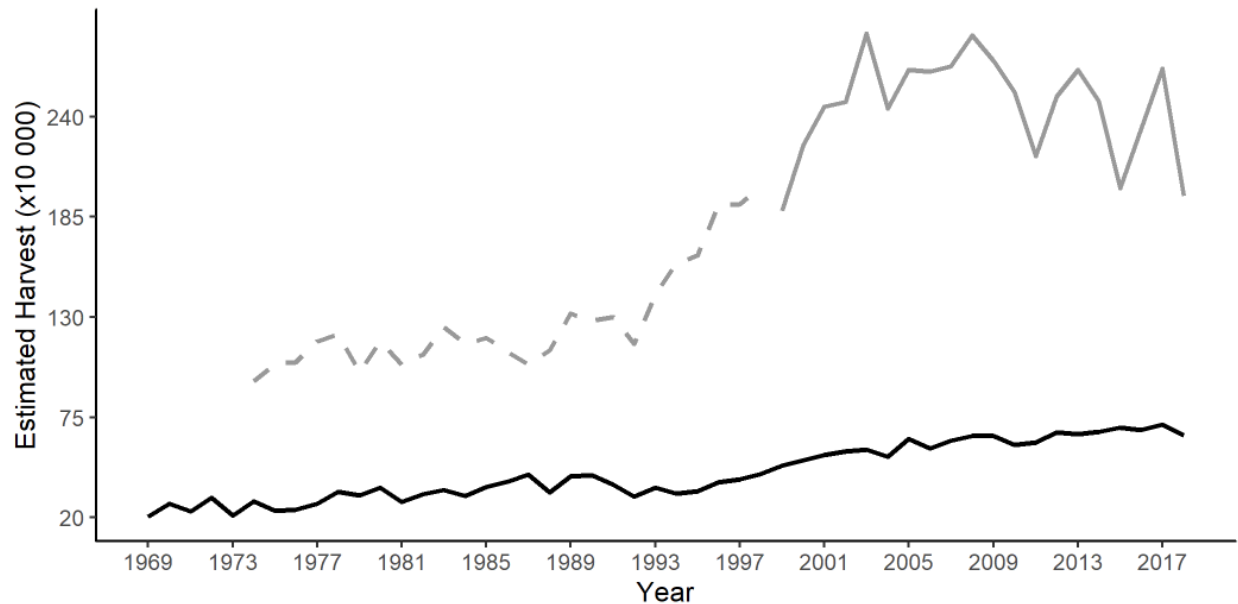


Figure 7.7-9 Estimated Canada Goose harvest in U.S. (gray line) and Canada (black line), 1969-2018. Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1720>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

7.7.4 Management and Conservation Concerns

SUB-ARCTIC BREEDING POPULATIONS

Overall, numbers of subarctic-nesting, Southern Hudson Bay Population Canada Geese are relatively stable. However, the segment of the population nesting on Akimiski Island in James Bay has declined from about 75 000 birds in 1985 to about 11 000 birds in 2019 (Brook *et al.* 2019a). The specific causes of the decline are likely related to poor growth conditions for goslings (Hill *et al.* 2003, Brook *et al.* 2015, Brook *et al.* 2019b) resulting from habitat degradation by resident and staging geese in brood-rearing areas (Jefferies *et al.* 2006). Southern Hudson Bay Population Canada Geese will continue to be monitored closely for changes in numbers and distribution throughout their breeding range to inform management actions outlined in the current management plan for Canada Geese in the Mississippi Flyway (Luukkonen and Leafloor 2017).

TEMPERATE-BREEDING POPULATIONS

Human-geese conflicts are the most significant management concern for Canada Geese, and these usually occur in urban areas. Problem temperate-breeding populations of Canada Geese are primarily controlled by municipal initiatives and through federal hunting regulations. Key management practices include egg adding, prevention of nesting, landscape management, and relocation of moulting flocks to areas where they can be hunted. More information about the management and population control of Canada and Cackling Geese in southern Canada could be found on ECCC's website:

<https://www.canada.ca/en/environment-climate-change/services/migratory-bird-conservation/publications/handbook-managing-cackling-geese-southern.html>

7.8 Brant (*Branta bernicla*)

Based on differences in breeding and wintering ranges, four distinct populations of Brant are recognized in North America; the Atlantic, Eastern High Arctic, Black, and Western High Arctic populations.

7.8.1 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 U.S. since 1961, and the 2018 Midwinter Survey index was 169 700 which was 5% greater than the 2017 count of 161 700 (USFWS 2019).

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 Region, unpubl. data). Lincoln estimates have been quite variable in recent years, and averaged approximately 175 000 birds from 2014–2018 (Figure 7.8-2).

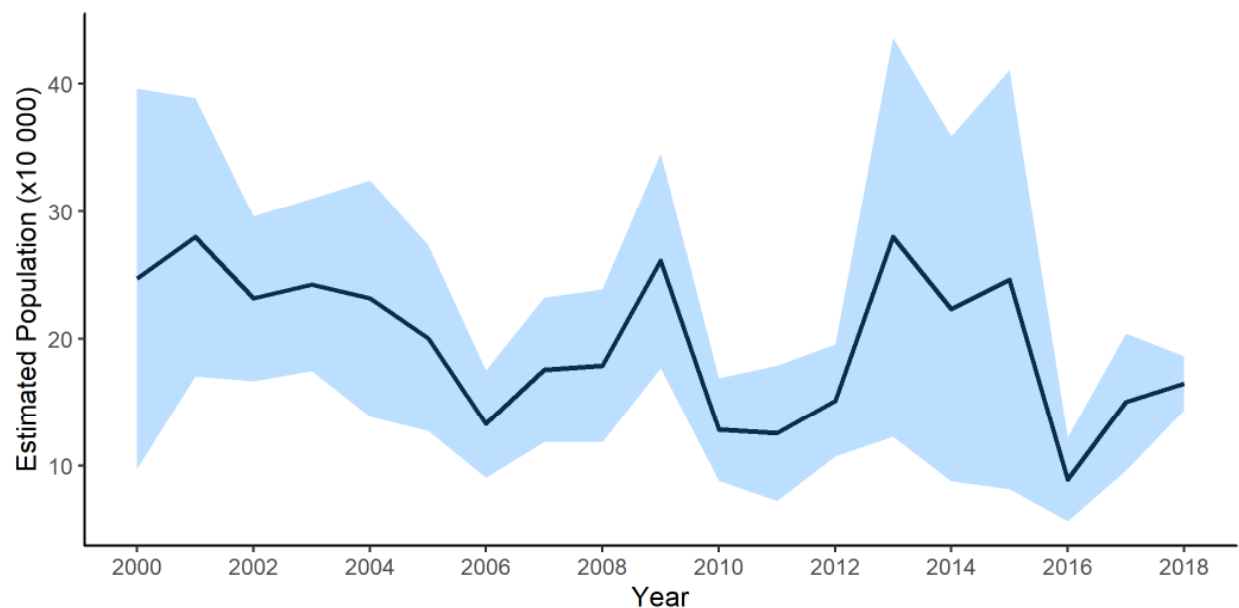


Figure 7.8-1 Lincoln estimates of population size for the Atlantic Brant, 2000–2018, black line represents the population estimate while the shaded area represents the 95% Confidence Intervals (source; J. Leafloor, CWS–Prairie Region, unpubl. data).

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

This group of the subspecies *B. b. hrota* breeds on islands of Canada's Eastern High Arctic, migrating via Greenland and Iceland to winter in Ireland (Reed *et al.* 1998). No surveys are currently being conducted on the Canadian breeding grounds, and little information is available about the birds' distribution within the breeding range. The number of Eastern High Arctic Brant is estimated through counts on the wintering grounds in Ireland, where the population grew from fewer than 10 000 birds in the late 1960s to more than 33 000 birds in 2004–2005 (Lewis *et al.* 2013). Results of the 2014 International Census estimated a population of 31 985 geese, a decrease from the 2013 count of 34 985 birds.

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, 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 population growth (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 161 159 birds in 2019, up from the 2018 estimate of 132 450 birds (Olson 2019). Black Brant counts include an unknown, small proportion of Western High Arctic Brant. There are no regular surveys of breeding grounds in Canada, 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. Between 3 000 and 7 000 Brant stopover 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, ECCC - S&T, 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 2 100 birds during the 2018 winter, lower than the 2 800 brant seen in the winter of 2017 (A. Breault, CWS–Pacific, pers. comm.).

WESTERN HIGH ARCTIC BRANT

The Western High Arctic Brant includes individuals that are intermediate in appearance between *B. b. nigricans* and *B. b. hrota*, and is thought by some biologists to be a distinct subspecies. Recent evidence from genetic studies suggests that western high arctic nesting areas are occupied by both subspecies, and that hybridization may occur in areas where the two groups overlap (S. Talbot, USGS, unpublished data). Nesting occurs on islands of the western High Arctic and wintering occurs 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 7.8-3). 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 8194 Brant estimated in 2019, lower than the 2018 estimate of 12 625 Brant (Olson 2019). This estimate also includes an unknown number of Black Brant.

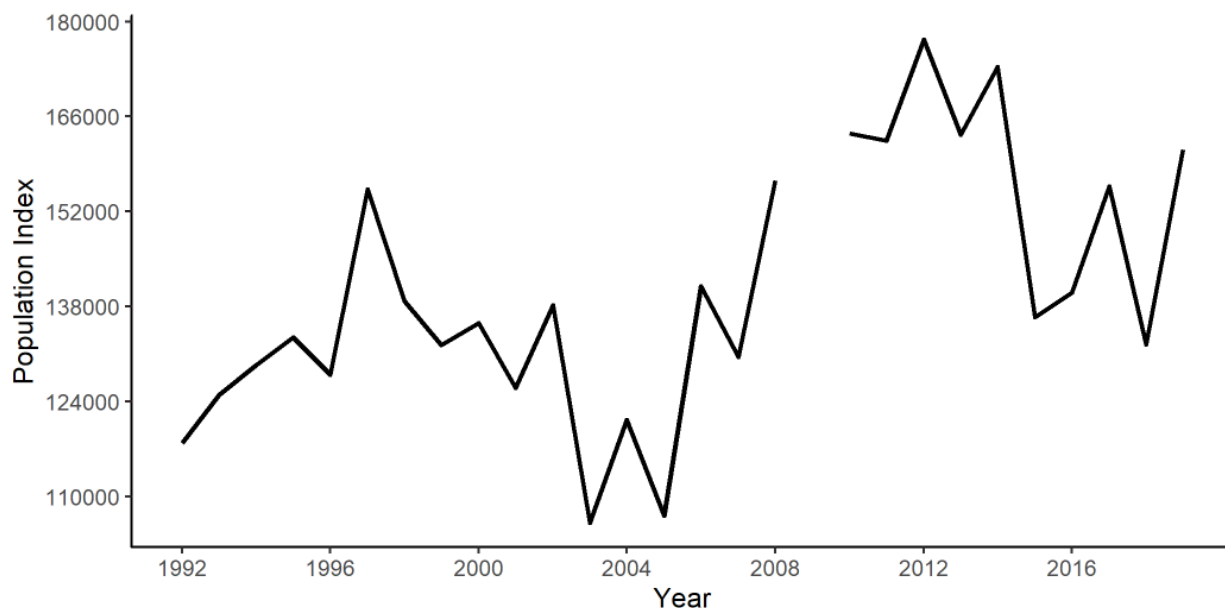


Figure 7.8-2 Mid-winter population index Pacific Brant from the Mid-winter Waterfowl Survey. (No survey was conducted in 2009; Source: Olson 2019).

7.8.2 Harvest

ATLANTIC BRANT

Harvest of the Atlantic Brant has the potential to be near the maximum supportable, as the population is one of the smallest among North American geese. Annual harvest rates of adult Atlantic Brant have fluctuated between about 1.5% and 10% of the population since 2000. Relatively few Atlantic Brant are harvested in Canada (Figure 7.8-3). Subsistence harvest is unquantified but likely represents no more than a few thousand birds annually.

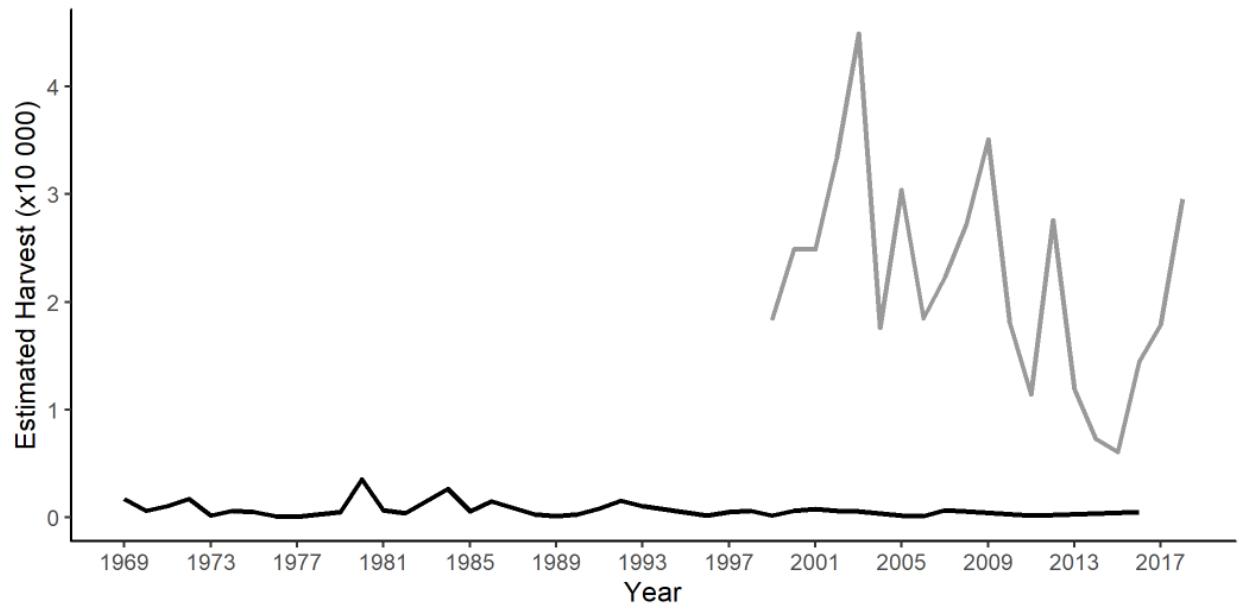


Figure 7.8-3 Estimated Atlantic Brant harvest in U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1730>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>.

BLACK AND WESTERN HIGH ARCTIC BRANT

In British Columbia, hunting of Brant is only allowed during 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 2019, the local harvest has ranged from 68 to 300 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.

7.8.3 Management and Conservation Concerns

Brant experience sporadic but heavy mortality from starvation and periodic nesting failures largely because they depend on specific plants for foraging and are vulnerable to harsh high arctic environments where some populations live. Among North America's goose species, only Brant do not use agricultural landscapes to any great extent. They remain restricted to natural marine marshes and may not capitalize on the landscape features that are driving the exponential population growth in other geese. Their comparative vulnerability requires careful regulation of hunting and monitoring of the status of populations (Reed *et al.* 1998). Protecting staging areas and wintering grounds and limiting disturbance and other impacts to Brant populations will be important to conserving 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.

8. Population Status of Swans

8.1 Tundra Swan (*Cygnus columbianus*)

The Tundra Swan is the most abundant and widespread of the two native swan species, breeding on lakes, ponds and wetlands associated primarily with coastal river deltas within tundra habitat. The Tundra Swan is managed as two populations—the Eastern and Western Populations. The Eastern population breeds in areas extending from the Seward Peninsula of Alaska to the northeast shore of Hudson Bay and Baffin Island, and winter in coastal areas from Maryland to North Carolina and relatively smaller numbers within the lower Great Lakes region (Ad Hoc Eastern Population Tundra Swan Committee 2007). The Western population breeds 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). The Mid-Winter Survey is the primary means of tracking annual abundances and trends of Tundra Swans.

8.1.1 Abundance and Trends

EASTERN POPULATION

During the 2019 Mid-Winter Survey, 93 000 swans were observed in Ontario and the Atlantic and Mississippi Flyway states, relatively low compared to the 2018 estimate of 112 000 swans. Annual counts have varied from year to year, but the population trend has been stable over the last 10 years (Figure 8.1-1). The Eastern Population is above its population objective of 80 000 birds (NAWMP 2018).

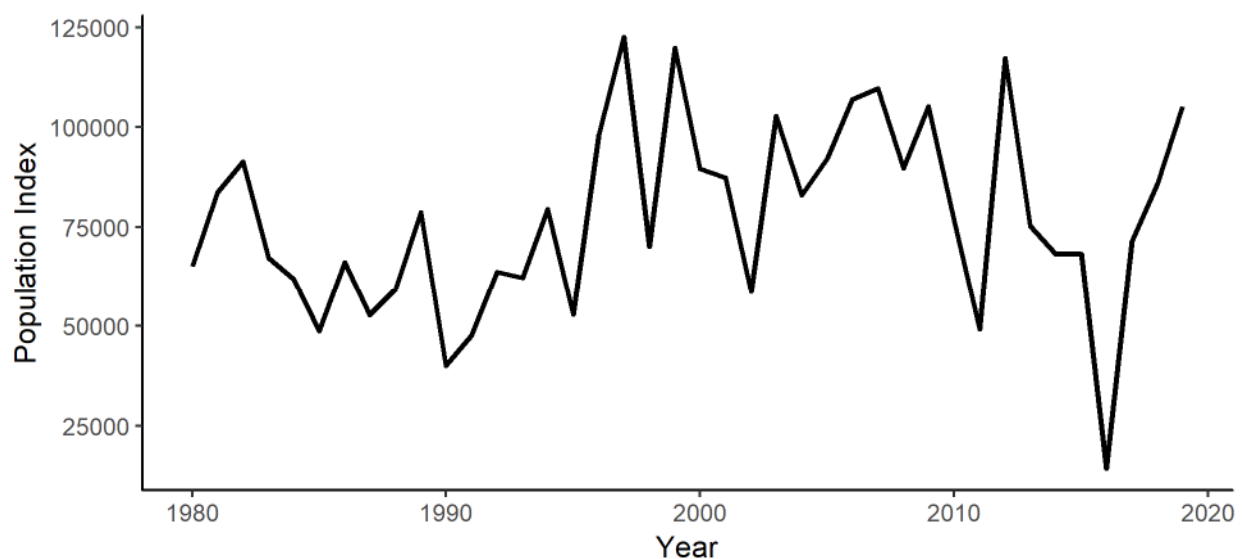


Figure 8.1-1 Number of Tundra Swans counted during the Mid-Winter Survey (In 2010, 2011 and 2016, several important wintering areas in California were not covered during the mid-winter survey; Source: Olson 2019).

WESTERN POPULATION

Since the 1970s, annual counts of the Western Population have fluctuated markedly. During the 2019 mid-winter survey, 105 115 Tundra Swans were counted on the wintering grounds of the Western Population (U.S. and northwest Pacific), 22% higher than the 2018 estimate of 85 951 birds. The Western Population of the Tundra Swan is above its population objective of 60 000 birds (NAWMP 2018).

8.1.2 Harvest

The hunting of Tundra Swans is currently prohibited in Canada. However, Tundra Swans of the Eastern population have been hunted in the Atlantic U.S. states since 1983, and Tundra Swans of the Western populations have been hunted in the U.S. states of the Central and Pacific Flyways since 1962.

8.1.3 Management and Conservation Concerns

Tundra Swan populations have remained near or above their population objectives in the past decade. 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 improve total harvest estimates.

8.2 Trumpeter Swan (*Cygnus buccinator*)

The Trumpeter Swan is the 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—increasing hunting pressure and habitat loss in the early 1900s drastically reduced the Trumpeter Swan population to only a few individuals (Mitchell and Eichholz 2010). 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. All three populations are increasing in size (Groves 2017). 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, British Columbia, 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.

8.2.1 Abundance and Trends

The three populations have reached or exceeded their population objective (Pacific Population: 25 000 total birds; Rocky Mountain Population: 10 000 adults and subadults; Interior Population: 2 000 total birds; NAWMP 2018). 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 2017).

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 U.S. and Canada throughout the species' North American breeding range (Table 8.2-1). 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. The last complete survey estimated the continental population at 63 016 birds, an increase of 36% compared to the previous survey in 2010 (Groves 2017).

Table 8.2-1. Trumpeter Swan Population Abundance Estimates and Trends in North America Based on the Five-year North American Trumpeter Swan Survey (source: Groves 2017)			
Population	2005	2010	2015
<i>Pacific Coast Population</i>			
Alaska	17 245	19 638 (923) ^a	22 015 (1 113) ^a
Yukon and North Western British Columbia	867 (41) ^a	1 141 (294) ^a	2 225 (436) ^a
Total	18 112	20 779 (969)^a	24 240 (1 195)^a
<i>Rocky Mountain Population</i>			
Canada	3 270	5 773 (295) ^a	10 957 (227) ^a
Tri-State Area	355	380	548
Other U.S. Flocks	49	163	216
Total	3 674	6 316	11 721
<i>Interior Population</i>			
High Plains	362	384	464
Mississippi and Atlantic Flyways	2 858	6 770	26 591
Total	3 220	7 154	27 055^b
North American Total	25 006	34 249	63 016^b

^a Population estimate was obtained from a statistical sample. Standard error of the estimate is in parentheses

^b Several cooperators in the Mississippi Flyway used different survey methods in 2015 than in previous years

PACIFIC COAST AND ROCKY MOUNTAIN POPULATIONS

Before 2010, the Pacific Coast Population and part of the Rocky Mountain Population 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. In 2010, since abundance had increased and the range had expanded, 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 8.2-1). Changes to the survey methodology in 2010, range extension, and the random selection of areas that were not covered by the 2010 survey likely explain some changes 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.

The 2015 estimate for the Canadian portion of the Rocky Mountain Population was 10 957, an 89% increase compared to the 5 773 estimate for 2010 (Table 8.2-1). The 2015 estimate for the Canadian portion of the Pacific Coast Population was 2 225, a 95% increase compared to the 1 141 estimate for 2010. All Canadian areas of the Rocky Mountain Population exhibited growth since the 2010 survey.

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 center 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. The most recent survey, conducted in January and February of 2006, counted 7 570 swans, 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 2015, in Riding Mountain National Park, Manitoba, where 97 swans were recorded, an increase from the 49 counted in 2010 (Groves 2017).

8.2.2 Harvest

In the past, hunting has led to declines and local extirpations in Trumpeter Swan populations. Hunting has been prohibited in both Canada and the U.S since 1918.

8.2.3 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 Region, pers. comm.). Telemetry studies identified Judson Lake, on the Canada–U.S. 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 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 may 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, ECCC - S&T, pers. comm.).

In Ontario, a swan re-introduction program, initiated in 1982, 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 (S. Badzinski, CWS–Ontario Region, unpubl. data). The southern and eastern Ontario flocks have continued to grow, and in 2015, 924 swans were counted during winter aerial and ground-based surveys. Trumpeter Swans also breed in northwestern Ontario, where in late summer of 2015, aerial surveys and 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.

9. Population Status of other Hunted Species

9.1 Murres

There are two species of Murres: the Common Murre (*Uria aalge*) and the Thick-billed Murre (*Uria lomvia*). These seabirds occur in the colder waters of the North Pacific and North Atlantic oceans and adjacent parts of the Arctic Ocean. They 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.

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. The Common Murre 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 Thick-billed 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).

9.1.1 Abundance and Trends

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 (Chardine *et al.* 2003; Robertson, Wilhelm and Taylor 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).

9.1.2 Harvest

Thick-billed Murres and 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 and St. Pierre & Miquelon, France. Murres were not originally included as migratory game birds in the MBCA, 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, and 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 approximately 750 000 birds to approximately 250 000 birds by the early 2000s (Chardine *et al.* 1999). The estimated number of Murres harvested in Newfoundland and Labrador in 2018 was approximately 72 000 birds a decrease from in 2017 (Figure 9.1-1). Concerns have been expressed regarding the accuracy of the existing harvest estimates and work is being conducted to refine these estimates and improve the assessment of harvest levels.

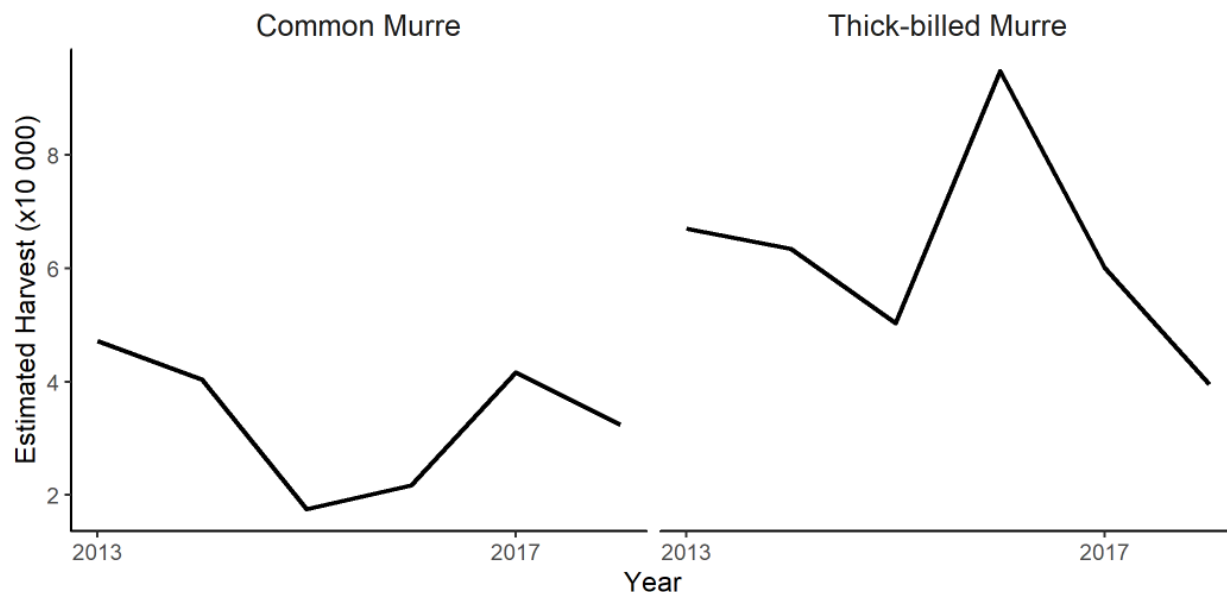


Figure 9.1-1 Estimated harvest of Murre in Canada, 2013-2018. Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=1730>) and <https://wildlife-species.canada.ca/harvest-survey/p006/a002/?lang=e&p=XX&z=&s=0310>) [No data available for earlier years; harvest of Murres takes place only in Newfoundland and Labrador.]

9.1.3 Management and Conservation Concerns

Population numbers of both species of Murres were significantly reduced over the last century because of human disturbance, hunting, oil pollution and commercial fisheries. In recent years, Murre populations have increased due in part to reductions in chronic oil pollution, gill net fisheries and harvest. Murres have been hunted by residents of Newfoundland and Labrador and by Aboriginal peoples for generations. Newfoundland residents were granted hunting rights soon after they entered Confederation in 1949 and the hunt by residents of Newfoundland and Labrador is managed through the *Migratory Birds Regulations*. 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. 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 2002; Gaston and Robertson 2010). Reductions in winter ice cover associated with climate change may change the susceptibility of birds to hunting. Harvests levels have been well below the maximum sustained harvest estimate of 250 000 birds since the introduction of bag and possession limits, and reductions in season length in 1994.

9.2 American Woodcock (*Scolopax minor*)

The American Woodcock (hereafter “Woodcock”) is a popular migratory game bird in Canada. The species has experienced a long-term population decline at least since the mid-20th century, with the main cause of this decline likely related to the loss of early successional forests. Results from the Singing-ground Survey suggest a moderate decrease in population size relative to the early 1970s (Seamans and Rau 2019).

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 U.S. Woodcock winter in southern parts of the breeding range in the southeastern U.S.

9.2.1 Abundance and Trends

Woodcock in North America are monitored through indices from the Singing-ground Survey, which consists of a spring count of male courtship displays at dusk (Seamans and Rau 2019). 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 also included (Seamans and Rau 2019). Previous analyses of band recoveries indicated that there were two relatively discrete populations (Krohn *et al.* 1974) which conforms to the boundary between the Atlantic and Mississippi Flyways. New research, however, suggests that mixing may be occurring on the wintering grounds especially with eastern North American woodcock (Moore and Kremetz 2017, Eastern Woodcock Migration Research Cooperative 2019). Currently, however, Woodcock are managed based on two regions: the Eastern Management Region and the Central Management Region, as recommended by Owen *et al.* (1977). 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 2019 indicate a significant declining 10-year trend (2009–2019) for Woodcock in the Central Management Region while the trend for the Eastern Management Region is not significant (Seamans and Rau 2019). Both management regions continue to show a significant, long-term (1968–2017) declining trend; 1% per year for the Eastern Management Region and 0.9% per year for the Central Management Region (Figure 9.2-1; Seamans and Rau 2019.) In Canada, the surveys show significant declines over the long-term period for Ontario, Quebec, and the Maritimes provinces.

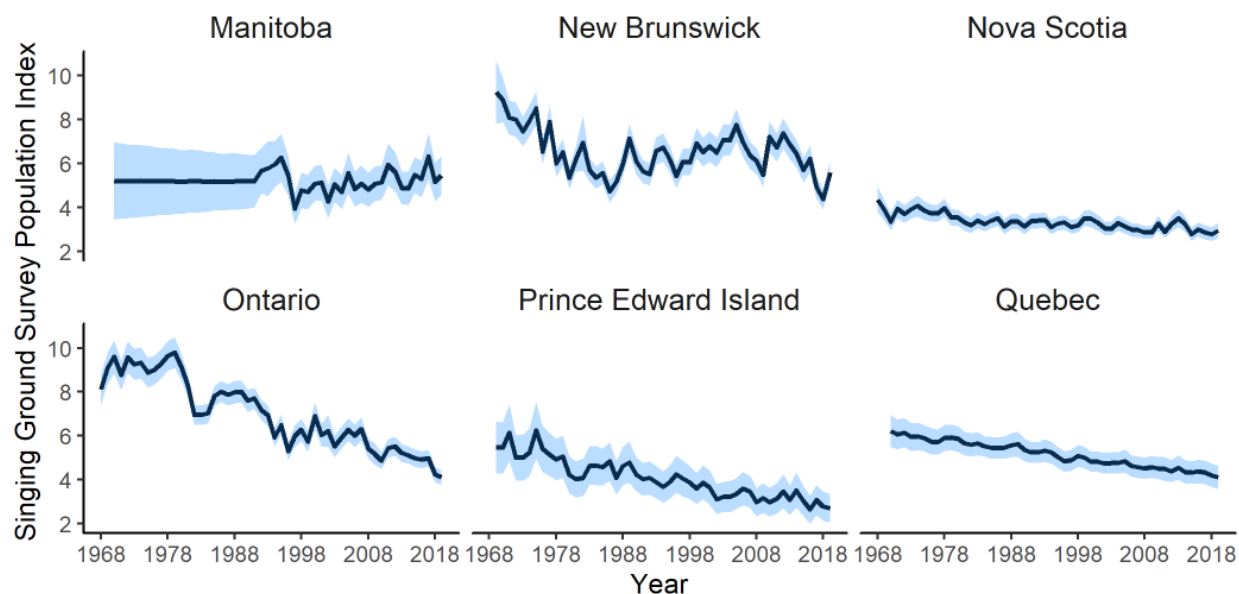


Figure 9.2-1 American Woodcock breeding population indices for each province; black lines represent the population estimate and blue shaded areas represents the 95% Confidence Interval (Source: Seamans and Rau 2017).

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 USFWS Migratory Bird Harvest Information Program (Wing-collection Survey). Data for 2018 indicate an index in the Eastern Management Region (U.S. portion of survey only) of 1.71, which represents a 5.6% increase from the long-term (1963–2017) regional index. In the Central Management Region (U.S. only), the recruitment index was 1.40 which is 14.3% less than the long-term regional index of 1.52. The 2018 recruitment index in Canada (i.e., Ontario, Quebec, Nova Scotia and New Brunswick) was 1.23, which is comparable to the 5-year average (2014–2018) of 1.25 (Gendron and Smith 2019).

9.2.2 Harvest

The harvest of Woodcock in Canada and the U.S. has been declining over the past few decades, but has recently stabilized. The decline, however, has been much more pronounced in the U.S. (Figure 9.2-2). 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 Canada, hunters harvested 19 926 woodcock during the 2018 season. In the U.S., the 2018-19 harvest was estimated at 180 200 Woodcock, which is below the long-term average (Seamans and Rau 2019).

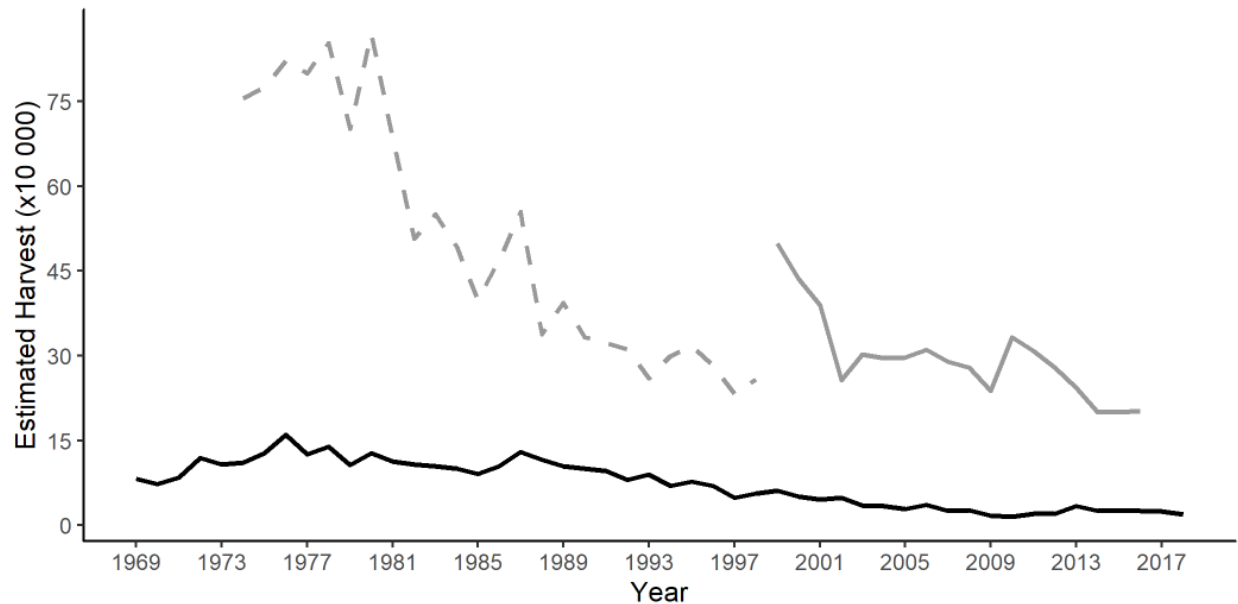


Figure 9.2-2 Estimated American Woodcock harvest in U.S. (gray line) and Canada (black line), 1969-2018. Canadian harvest data were obtained from the National Harvest Survey ([http://ec.gc.ca/reom-mbs/enp-National Harvest Survey/index.cfm?do=def&lang=e](http://ec.gc.ca/reom-mbs/enp-National%20Harvest%20Survey/index.cfm?do=def&lang=e)), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. For the U.S. data, results prior to 1999 (dashed line) are not directly comparable to those after 1999 (solid line).

9.2.3 Management and Conservation Concerns

Woodcock populations have been experiencing a long-term decline since the 1960s. The possible cause of this decline is 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 (e.g., fields, pasture, regenerating clear-cuts) during its life cycle, especially at night.

9.3 American Coot (*Fulica americana*)

The American Coot is a common bird in North America, breeding from British Columbia to Ontario in Canada, with the highest densities in the Prairie provinces. The species is often mistaken for a duck 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. Once more common than currently, American declined in the early 20th century, likely because of wetland loss and overhunting (Brisbin and Mowbray 2002).

9.3.1 Abundance and Trends

Information on the population status of the American Coot at a continental level comes from the BBS. In Canada, the species' abundance is showing a large increase, but the BBS is poorly designed for monitoring population trends of marsh birds (ECCC 2019). American Coots are also surveyed during the WBPHS. Results of this survey show that the total population estimates have fluctuated greatly since the 1970s (Figure 9.3-1), with a tendency towards a long-term increasing trend particularly in US. In the Canadian Prairies, the population experienced a swift decline over the last 5 years that brought back the population to a level comparable to the level observed in 1970's. Although the WBPHS covers the core of the American Coot breeding range, many individuals breed outside of the area covered by this survey (Case and Sanders 2010).

Table 6.12-1. American Coot Breeding Population with 95% Confidence Intervals (CI) 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 percentage change. Significant trends are indicated with a star [*])			
	2019 Breeding Population Estimates (in thousands)	1970-2019 Trend (long term)	2015-2019 Trend (5 years)
Traditional Survey Area	1645.13 (1283.63 - 2006.62)	0.94 (0.40 - 1.79)*	-13.56 (-19.20 - -4.54)*
Canadian Prairies	700.62 (453.74 - 947.50)	-0.17 (-0.82 - 0.47)	-27.34 (-33.03 - -21.03)*
U.S. Prairies (North Central)	878.43 (619.03 - 1137.83)	2.36 (1.70 - 3.06)*	14.65 (3.89 - 26.47)*

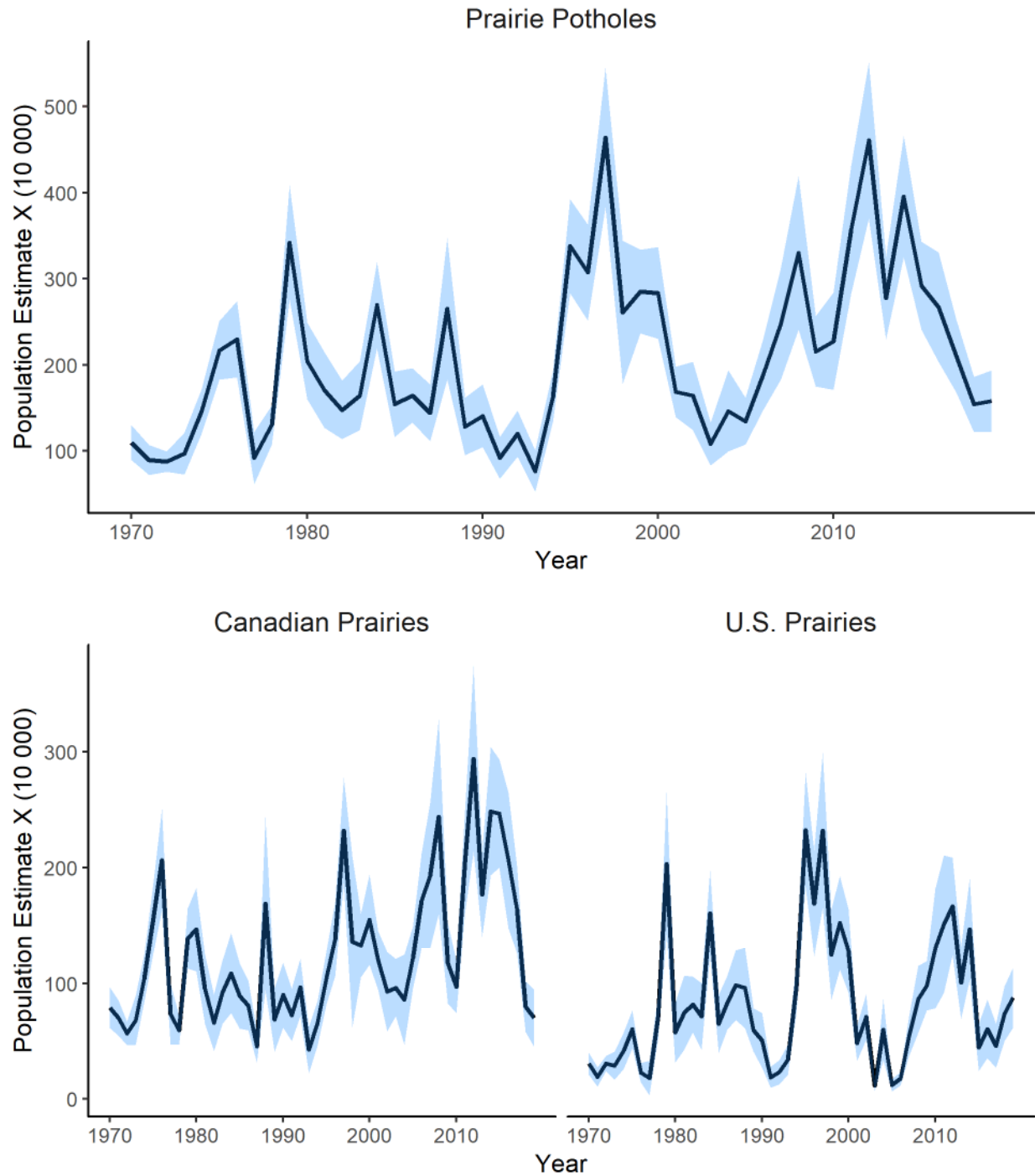


Figure 9.3-1 American Coot breeding population estimates based on the Waterfowl Breeding Population Habitat Survey (WBPHS) in the Canadian and U.S. Prairies; black line represents the population estimate and the shaded area represents the 95% Confidence Interval.

9.3.2 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 2 651 birds per year for the 5-year period between 2014 and 2018 (Figure 9.3-2).

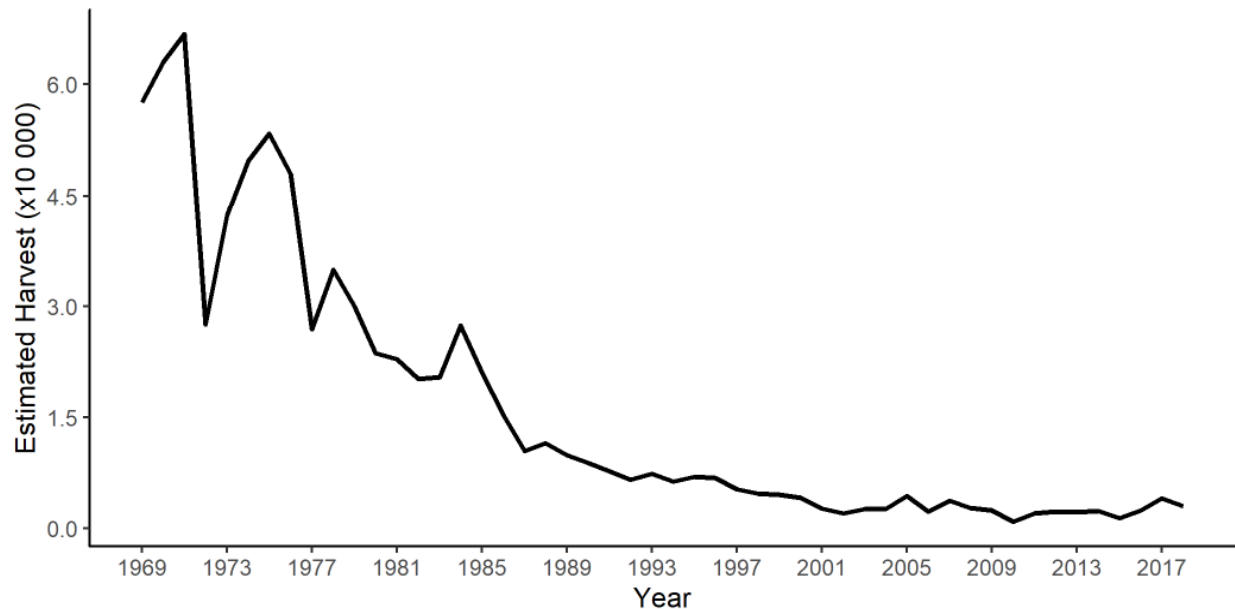


Figure 9.3-2 Estimated American Coot harvest in Canada, 1969-2018. Harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a001/?lang=e&p=XX&z=&v=COOTK&c=1>).

9.3.3 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).

9.4 Common Gallinule (*Gallinula galeata*)

The Common Gallinule is a secretive marsh bird that is found primarily in southern Ontario and southwestern Quebec. In Canada, the species breeds primarily in well interspersed freshwater marshes, but also uses human-made impoundments and sewage lagoons.

9.4.1 Abundance and Trends

No population estimate for the Common Gallinule is currently available for Canada. Data from the Ontario Great Lakes Marsh Monitoring Program show declines over the past two decades (1995–2018) but, in the last five years, this has reversed and the population is now increasing, likely due to recent water level increases on the lower Great Lakes (Figure 9.4-1). For more information on the Great Lakes Marsh Monitoring Program, see: www.bsc-eoc.org/volunteer/glmmp/

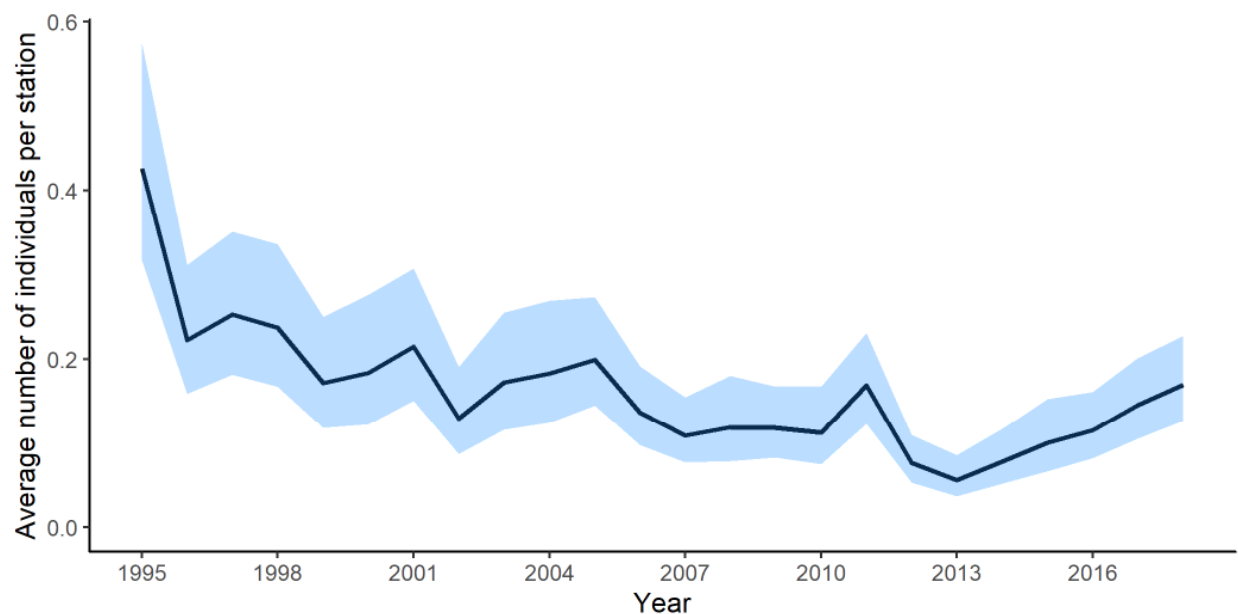


Figure 9.4-1 Population indices for Common Gallinule in Ontario; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals (Source: Great Lakes Marsh Monitoring Program, 1995–2018).

9.4.2 Harvest

Gallinule harvest is difficult to monitor in both Canada and the U.S. Too few birds are reported as part of the National Harvest Survey to generate reliable harvest estimates. In 2018 in the US, the total estimated harvest of Common Gallinule and Purple Gallinule (*Porphyrio martinicus*) combined, was 2,400 birds, a notable decrease from the 12,600 birds harvested in 2017 (Raftovich *et al.* 2019).

9.4.3 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 (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).

9.5 Mourning Dove (*Zenaida macroura*)

The Mourning Dove is one of the most familiar and heavily harvested migratory game birds (primarily in the U.S.), and 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 (Otis *et al.* 2008).

9.5.1 Abundance and Trends

The Mourning Dove is monitored in Canada through the BBS. Results from the survey indicate that the population has increased markedly since 1970, but has levelled off during the most recent decade (ECCC 2019). The estimated population in Canada is 500 000 to 5 million adults. The long-term trend (1970–2017) for the Canadian portion of this species' population is indicative of an increase in population since the 1970s. In the Central Hunting District in Ontario, the population has decreased since 2005 (Figure 9.5-1) but the population in the Southern Hunting District in Ontario stabilized over the last 5 years. In Quebec Hunting District F, where the species is hunted, the Mourning Dove population index has been declining over the last 5 years and the index has now returned to a level comparable to the one observed in the early 2000's (Figure 9.5-2).

In the U.S., 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 2019). The species is managed based on three regions, as the breeding, migratory and wintering distribution of dove populations are largely independent (Seamans 2019). These areas are referred to as the Eastern, Central and Western Management Units. In 2018, the population size of Mourning Doves in the U.S. was estimated at approximately 249 million birds (Seamans 2019). Results from the BBS indicate that the abundance of doves increased over the last 53 years in the Eastern Management Units but declined in the Central and Western Management Units.

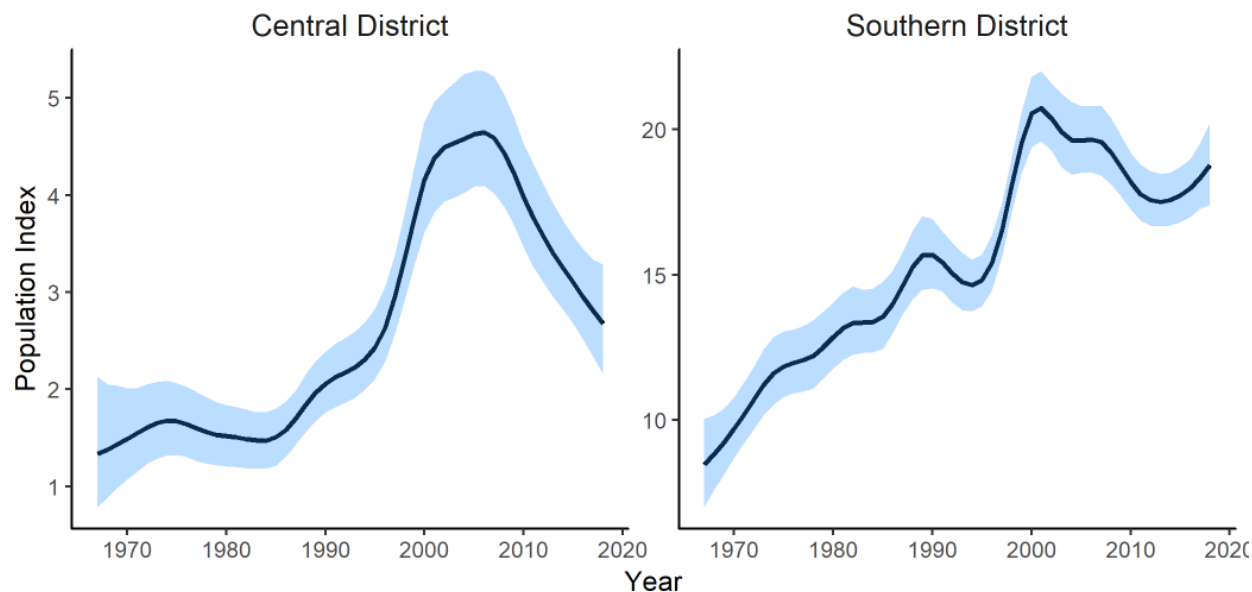


Figure 9.5-1 Annual indices of abundance from the Breeding Bird Survey for Mourning Dove in select Hunting Districts in Ontario. Black line represents the population estimate and shaded areas represent the 95% Credible Intervals.

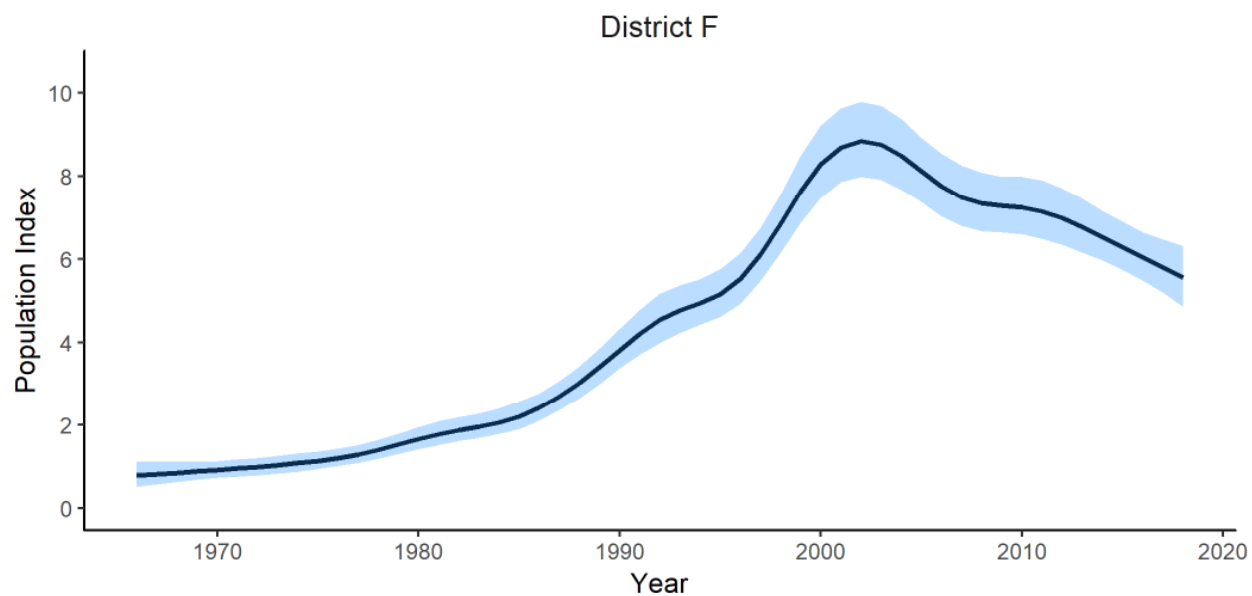


Figure 9.5-2. Annual population indices from the Breeding Bird Survey for Mourning Dove in Quebec F hunting District. Black line represents the population estimate and shaded areas represent the 95% Credible Intervals (Source: A. Smith, CWS - National Capital Region, unpubl. data).

9.5.2 Harvest

Dove hunting is permitted in 40 of the 50 states, where on average 15–20 million birds are harvested annually (representing 5–10% of the continental dove population, Otis *et al.* 2008). In 2018, approximately 10.3 million birds were harvested in the U.S. by approximately 694 300 hunters. Harvest and hunter participation has been in decline in the Eastern and Central Management Units of the U.S. (Seamans 2019).

In Canada, there have been annual hunting seasons since 1960 in British Columbia, since 2013 in Ontario and since 2016 in Quebec. The harvest in British Columbia has declined considerably since then, ranging from 5 400 doves killed in 1977 to 17 birds during the 2016 season. During the 2018 hunting season in Ontario, 13 900 birds were harvested which is the lowest harvest observed since the dove season opened. In Quebec, 950 doves were harvested during 2016, the first year that a hunting season was in place but harvest has declined to 290 birds in 2018.

9.5.3 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).

9.6 Wilson's Snipe (*Gallinago delicata*)

Wilson's snipe is one of the most abundant and widespread shorebird species in North America (Mueller 1999). Its numbers have been relatively stable in Canada since the late 1960s or 1970s. The species is hunted in both Canada and the U.S.

9.6.1 Abundance and Trends

The Wilson's snipe is difficult to monitor because of its inconspicuous nature. It is monitored in Canada through the 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 (1970-2017) suggest that snipe numbers have been increasing since the 1970s. The population increased in Manitoba and Alberta, but declined in New Brunswick, the Northwest Territories, Nova Scotia, Prince Edward Island and Newfoundland and Labrador in this same period (A. Smith *et al.* unpubl. data). The Canadian population—both breeding and migrating—is estimated at 1 million individuals (ECCC 2019).

9.6.2 Harvest

The harvest of Wilson's snipe has declined in Canada since the 1990's (Figure 9.6-1). The U.S. harvest is considerably higher, averaging at 91 000 birds annually over the past decade.

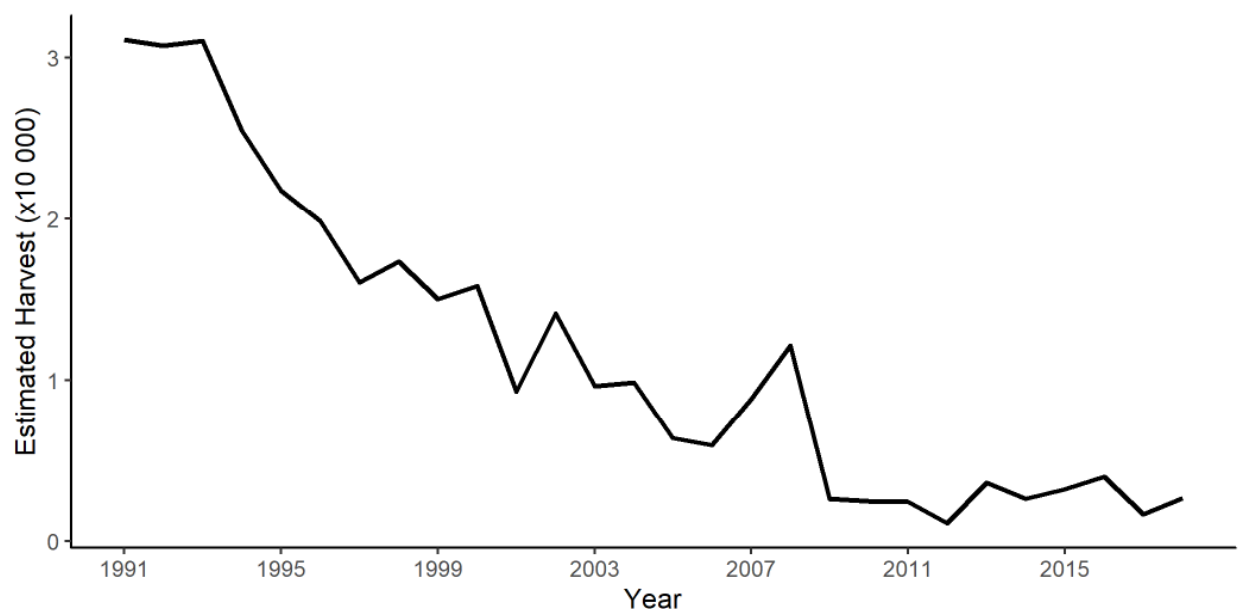


Figure 9.6-1 Estimated Canadian Wilson's Snipe harvest. Harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a001/?lang=e&p=XX&z=&v=SNIPK&c=1>).

9.6.3 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 communication towers, buildings and cars (Mueller 1999).

An assessment was conducted in 2009 to identify priority information needs for rails and snipe (Case and McCool 2009). One of the resulting recommendations was to undertake a monitoring program to estimate population size and trends of these species 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 U.S., the Great Lakes Marsh Monitoring Program helps to partially achieve these recommendations by including rails and snipe as target species (Tozer 2013).

9.7 Sandhill Crane (*Grus canadensis*)

Three Sandhill Crane populations breed in Canada, namely the Central Valley Population, the Mid-continent Population and the Eastern Population. The Central Valley Population breeds mainly in California, but its range extends to the lower Fraser Valley and northern Vancouver Island in British Columbia. The Mid-continent Population, the larger populations, breeds across Canada from eastern British Columbia to northern Ontario, south from the Prairies and north to Yukon and the Northwest Territories. The 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 from western to central Quebec.

9.7.1 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 from this population breed from northern 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, U.S., as more than 90% of the Mid-continent Population is found in that area at the time of the annual survey (Dubovsky 2018). 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 photo corrected population index in the spring of 2019 was 945 996 cranes which was 6% lower than 2018 (Dubovsky 2019; Figure 9.7-1). The photo-corrected three-year average (2017–2019) is 839 992 birds, which is above the established population objective range of 350 000–475 000 cranes.

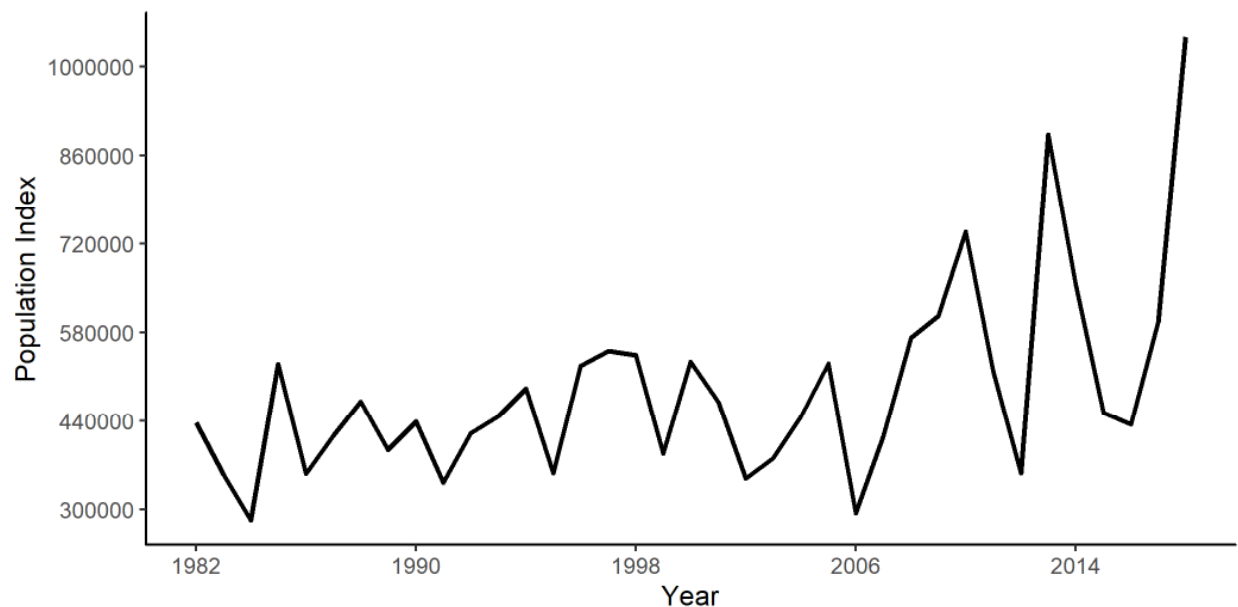


Figure 9.7-1 Spring population indices for Mid-continent Sandhill Cranes in their spring staging areas (e.g. Central Platte River Valley, Nebraska and Adjacent Areas) (Source: Dubovsky 2019).

EASTERN POPULATION

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 staging in their major migratory areas in the Mississippi and Atlantic Flyways. 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 most recent 3-yr average (2016–2018) count is of 88 000 cranes (Dubovsky 2019).

In 2013, CWS, Ontario Region, initiated a study to examine the feasibility of an operational survey of the Eastern Population Sandhill Crane in Ontario. From 2013 to 2017, cranes were counted during peak fall migration on their staging grounds in an area bounded by Sault Ste. Marie in the west, to Mattawa in the east and Cochrane in the north; Manitoulin Island was added to the survey in 2016 and 2017. During this time, the highest count occurred in 2017 when 14 100 cranes were counted during the most comprehensive survey. Productivity (ratio of juveniles relative to adults in the fall population) was estimated at 0.15 in 2015, 0.16 in 2016 and 0.17 in 2017.

In Quebec, the 2019 population estimate from the helicopter plot survey component of the Eastern Waterfowl Breeding Ground Survey was 9 200 indicated breeding pairs, an increase compared to the 10-year average of 4 200 birds (Figure 9.7-2). This waterfowl survey covers only the southern portion of what is thought to be the core breeding area of Sandhill Cranes in Quebec. The 2000–2016 trend shows an increase of 12% annually (Lepage 2019c). Comparing the 1984–1989 breeding distribution to the 2010–2014, the Sandhill Crane's range has expanded in Quebec (Lepage 2019c).

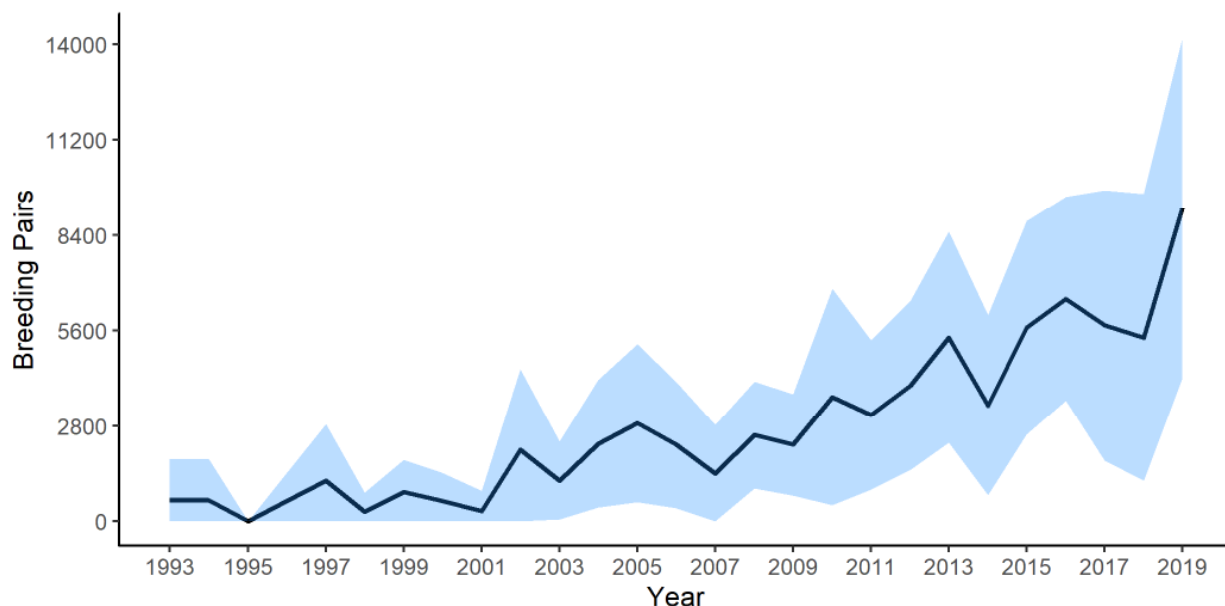


Figure 9.7-2 Estimated number of Sandhill Crane breeding pairs in Quebec based on the Eastern Waterfowl Breeding Ground Survey; black line represents the breeding pair estimate and the shaded area represents the 95% Confidence Interval (Estimates are based on helicopter plot survey only; Source: C. Lepage, CWS-Quebec Region, unpubl. data).

9.7.2 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 varies annually but has increased in Canada since the

1970s (Figure 9.7-3). 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%. The overall Canadian harvest of Mid-continent Population Sandhill Cranes was 9 700 in 2018 (Figure 9.7-3).

In the U.S., the harvest of Sandhill Cranes from the Mid-continent Population had remained relatively stable over time, until 2016. That year, 25 000 birds were harvested, a 96% increase compared to the harvest in 2015 (13 000 birds) and 28 000 birds were harvested in 2017, the largest harvest ever recorded (Figure 9.7-3). This increase may have to do with the 65% increase in the number of Central Flyway hunters that participated this season compared to previous years (Dubovsky 2018).

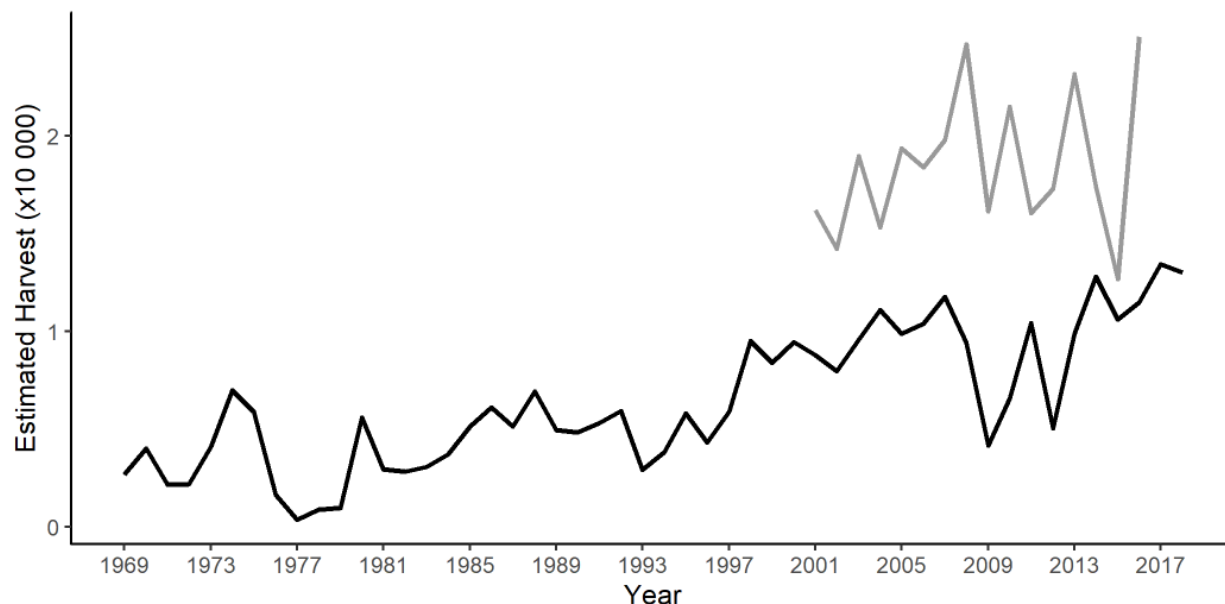


Figure 9.7-3 Estimated Canadian Sandhill Crane harvest for the U.S. (gray line) and Canada (black line). Canadian harvest data were obtained from the National Harvest Survey (<https://wildlife-species.canada.ca/harvest-survey/p006/a001/?lang=e&p=XX&z=&v=CRANK&c=1>), while the U.S. data were obtained from the Mail Questionnaire Survey and the Migratory Bird Harvest Information Program. U.S. data can be found at <https://flyways.us/regulations-and-harvest/harvest-trends>.

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, since 2011 and 2013, respectively; Alabama will begin an experimental hunting season in 2019.

9.7.3 Management and Conservation Concerns

Sandhill Crane populations declined 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, as habitat availability is likely the single most important factor in Sandhill Crane population dynamics (Gerber *et al.* 2014).

9.8 Band-tailed Pigeon (*Patagioenas fasciata*)

In Canada, the Band-tailed Pigeon only occurs in forested habitats of coastal southern British Columbia. Females lay only a single egg per nest, but may nest twice in a season. The declined dramatically 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 Special Concern in 2011 under the *Species at Risk Act*.

9.8.1 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). The Management Plan in the Species at Risk Act estimate the Canadian population around 43 000 to 170 000 birds representing 5% of the global population (ECCC 2019).

BREEDING BIRD SURVEY

The BBS indicate a 1.5% annual population decline over the long term (1968–2019), but trends for both 10- and 5-year periods were non-significant (Seamans 2019). 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

he Mineral Site Survey was developed as an alternative method to assess population trends of Pacific Coast Band-tailed Pigeons in 2004 (Seamans 2017a). 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 52 mineral sites located in California, Washington State, Oregon and British Columbia. Results from the Mineral Site Survey suggested insignificant trends since 2004 and in the last 5 years (Table 9.8-1; Seamans 2019).

Table 9.8-1. 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: Seamans 2019)			
Period	Trend	LCI	UCI
2004—2019	-2.1	-6.5	3.5
2015—2019	-0.4	-6.4	15.4

9.8.2 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 declined since the early 1970s, when between 5 000 and 8 000 birds were harvested annually. At least 67 Band-tailed Pigeons were harvested in Canada in 2016. The estimated

total harvest for 2016 in the U.S. was 6 700 pigeons, considerably fewer than the 13 500 birds harvested in 2014 (Seamans 2017a).

9.8.3 Management and Conservation Concerns

The causes of the historical continental-scale decline of the Band-tailed Pigeon population are uncertain, but historic overhunting in the U.S. is thought to be a major cause. Habitat loss likely also contributed, 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 (Seamans 2017a).

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 and habitat loss (COSEWIC 2008). Information on the legal status of this species under the *Species at Risk Act*, assessment and recovery documents are all 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/).

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.

9.9 Rails

Two species of rails are hunted in Canada: the Virginia Rail (*Rallus limicola*) and the Sora (*Porzana carolina*). Rails are secretive marsh birds that breed and stage in wetlands across Canada. Most often, they remain hidden in dense emergent vegetation, which makes surveying and hunting them challenging.

9.9.1 Abundance and Trends

Although rails are counted during the BBS, their secretive behaviour and infrequent calling habits result in low detectability during surveying. Population trends based on BBS results should therefore be interpreted with caution. In Ontario, rails are also monitored by the Great Lakes Marsh Monitoring Program (Bird Studies Canada) which includes protocols to increase the detectability of these secretive marsh birds and therefore, is more reflective of population trends in this area.

VIRGINIA RAIL

In Canada, Virginia Rails breed in the southern part of most provinces. Long-term BBS population trends (1970-2017) suggest that the population may be increasing slightly, though these trends are non-significant in all provinces and Canada as a whole (ECCC 2019). The short term (2007-2017) trends are also non-significant (A. Smith *et al.* unpubl. data).

Conversely, the Great Lakes Marsh Monitoring Program shows the abundance of this species in the Great Lakes area has declined since the mid-1990s (Figure 9.9-1).

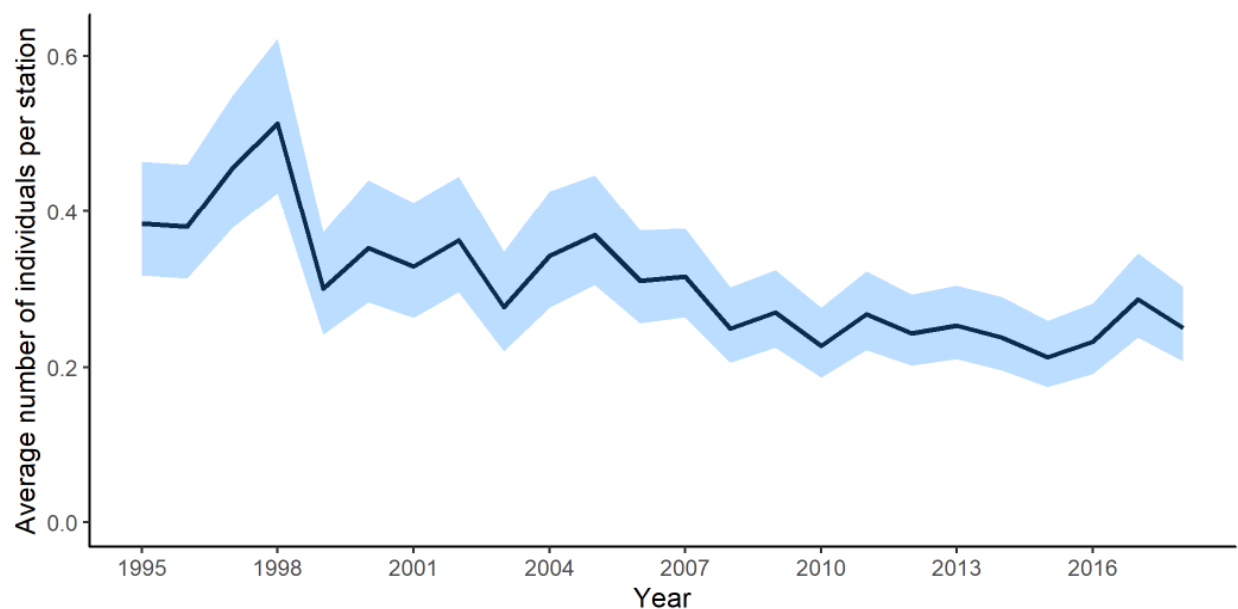


Figure 9.9-1 Population indices for Virginia Rail in Ontario; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals (Source: Great Lakes Marsh Monitoring Program, 1995–2018).

SORA

Sora 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 (ECCC 2019). Long-term trends (1970–2017) for this species suggest a

relatively stable population in Canada overall and in all provinces and territories except Saskatchewan, where the trend suggest an increase (ECCC 2019). However, from 2007 to 2017, the overall Canadian population has declined, likely because of declines in Ontario and Quebec (ECCC 2019).

Sora are also monitored in Ontario as part of the Great Lakes Marsh Monitoring Program. The abundance of the species in the Great Lakes area shows annual fluctuations, but it appears to be stable since the mid-1990s (Figure 9.9-2).

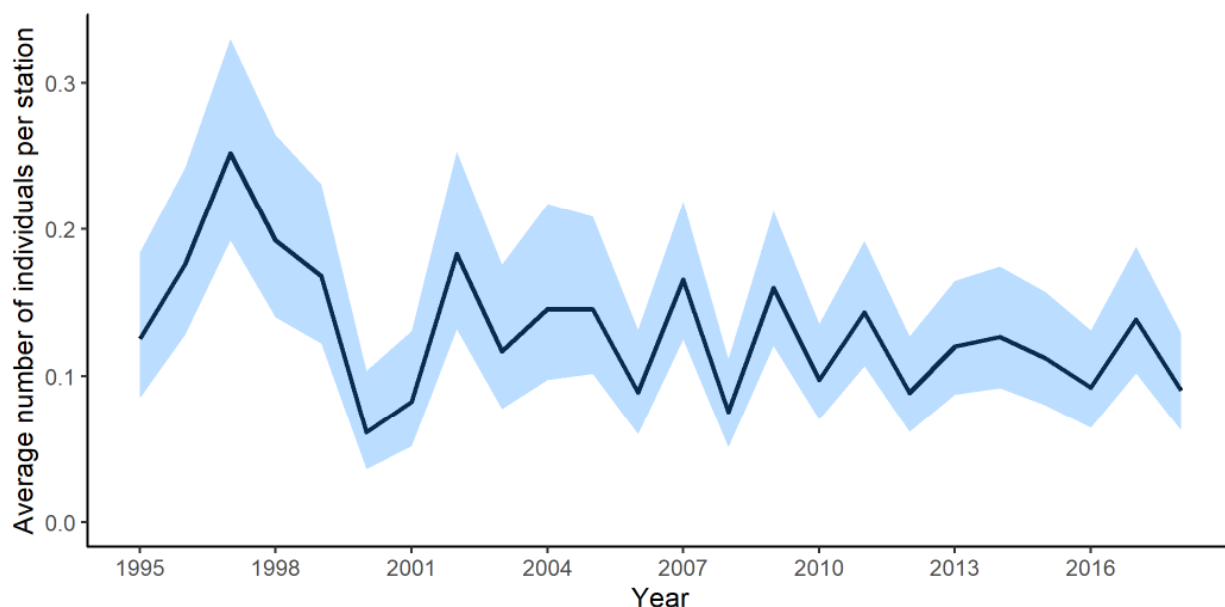


Figure 9.9-2 Population indices for Sora in Ontario; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals (Source: Great Lakes Marsh Monitoring Program, 1995–2018).

9.9.2 Harvest

Currently, the hunting of King Rails and Yellow Rails is prohibited in Canada. 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 of rails has been sporadic with 44 rails harvested in 2018 and 335 in 2017 (Gendron and Smith 2019).

9.9.3 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 Sora (ECCC 2019)

Monitoring rail populations is difficult because of the birds' secretive behavior, cryptic coloration, infrequent vocalizations, and the difficulty of accessing the dense marshes they prefer to breed in (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 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).

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