

Population Status of Migratory Game Birds in Canada – 2021

Canadian Wildlife Service
Waterfowl Technical Committee
CWS Migratory Birds Regulatory Report
Numéro 55



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For more information on migratory birds, please visit the Government of Canada's website: www.canada.ca/en/environment-climate-change/services/migratory-bird-conservation.html

Cover Art

The 2021 Canadian Wildlife Habitat Conservation Stamp image, entitled “On Golden Pond – Common Goldeneye” features the Common Goldeneye duck. It is a creation of the Canadian wildlife artist Ric Sluiter.

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1 Executive Summary

Due to COVID-19 restrictions, most survey operations were suspended in 2020 and 2021. Therefore, this report presents the recent available data.

1.1 Western range

In 2019, there were approximately 37.1 million ducks (excluding sea ducks) in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey (WBPHS). In the Traditional Survey Area, numbers of Green-winged Teal, Blue-winged Teal, Gadwall, Northern Shoveler, Redhead, and Ruddy Duck have increased since 1970. Numbers of Northern Pintail and scaups have decreased. Other duck species (American Wigeon, Canvasback, Mallard, and Ring-necked Duck) have fluctuated but showed no trend since 1970. From 2015 to 2019, numbers of Blue-winged Teal, Gadwall, Mallard, Northern Pintail, Northern Shoveler, Redhead, Ring-necked Duck, Ruddy Duck, and scaups have decreased, and numbers of all other species have shown no trend (Green-winged Teal, American Wigeon, and Canvasback). In 2019, the most common species were Mallard (9.42 million), Blue-winged Teal (5.43 million), Northern Shoveler (3.65 million), scaup (3.59 million), and Gadwall (3.26 million).

1.2 Eastern range

In 2019, there were approximately 1.65 million ducks (excluding sea ducks) in the Eastern Waterfowl Breeding Ground Survey area. Since 1990, scaups have decreased and all other duck species (American Black Duck, Green-winged Teal, American Wigeon, Mallard, and Ring-necked Duck) have shown no trend. From 2015 to 2019, no species have shown consistent trends. In 2019, the most common species were American Black (563 thousand) Duck, Ring-necked Duck (504 thousand), mergansers (489 thousand), Mallard (365 thousand), and goldeneyes (361 thousand).

1.3 Geese

There are seven populations of geese monitored through Lincoln estimates. From the long-term record, one population has decreased (Atlantic Brant (2000-2019)), and five populations have increased (Cackling Goose (1976-2019), Greater White-fronted Goose (1975-2019), Mid-Continent Lesser Snow Goose (1970-2019), Western Arctic Lesser Snow Goose (1971-2019), and Ross's Goose (1970-2019)). Since 2015, one population has decreased (Mid-Continent Lesser Snow Goose), and five populations have shown no trend (Atlantic Brant, Cackling Goose, Greater White-fronted Goose, Mid-Continent and Western Arctic Lesser Snow Goose and Ross's Goose).

2 Background

Environment and Climate Change Canada (ECCC) is responsible for the conservation and management of migratory birds in Canada. The hunting regulations for migratory game birds are developed to ensure that harvest is sustainable and are reviewed and amended biennially by ECCC, with input from the 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 *Population Status of Migratory Game Birds in Canada* to evaluate the status of migratory game birds and reviews hunting regulations every two years. Additionally, CWS analyzes population trends after surveys and banding are completed.

The second report, *Proposals to Amend the Canadian Migratory Birds Regulations*, outlines the proposed changes to the hunting regulations and overabundant species regulations, as well as any other proposed amendments to the *Migratory Birds Regulations*. Proposed changes to the hunting regulations are developed in accordance with the [Objectives and Guidelines for the Establishment of National Regulations for Migratory Bird Hunting](#). This report is also published every two years, concurrently with the revision of hunting regulations.

The third report, *Migratory Birds Regulations in Canada*, summarizes the hunting regulations that were approved for the next two hunting seasons. This report is published every two years, 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](#).

3 Migratory Game Bird Hunting Permit Sales and Harvest

Information on the sale of Migratory Game Bird Hunting (MGBH) permits is available from 1966 onwards (Figure 3.1). Annual sales peaked in 1978 (524 946 permits sold) and subsequently declined to an all time low in 2020, when sales were down to 147185 permits.

In August 2014, ECCC launched a new online e-Permitting 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. Since the establishment of the e-Permitting system, the number of hunters that buy their permit online has been steadily increasing and in 2020, 34% of the hunters bought their permit online. More information on MGBH permit sales in Canada is available on the [ECCC website](#).

In Canada, the [National Harvest Survey](#) was initiated in 1969 to estimate the annual harvest of migratory game birds (and murre) and determine trends in hunter activity across Canada. Coordinated by CWS, the survey uses data from hunters to determine the geographic distribution of the harvest and estimate annual species-specific harvest in Canada, provincially and, if possible, at the Hunting District/Zone level. 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 (Smith, Villeneuve, and Gendron 2021), and the data are used in harvest management decisions. Supplemental surveys are undertaken to estimate the numbers of geese harvested during the Spring Conservation Hunt, a special conservation measure put in place to attempt to control overabundant snow geese, Ross's Geese and some Canada Geese.

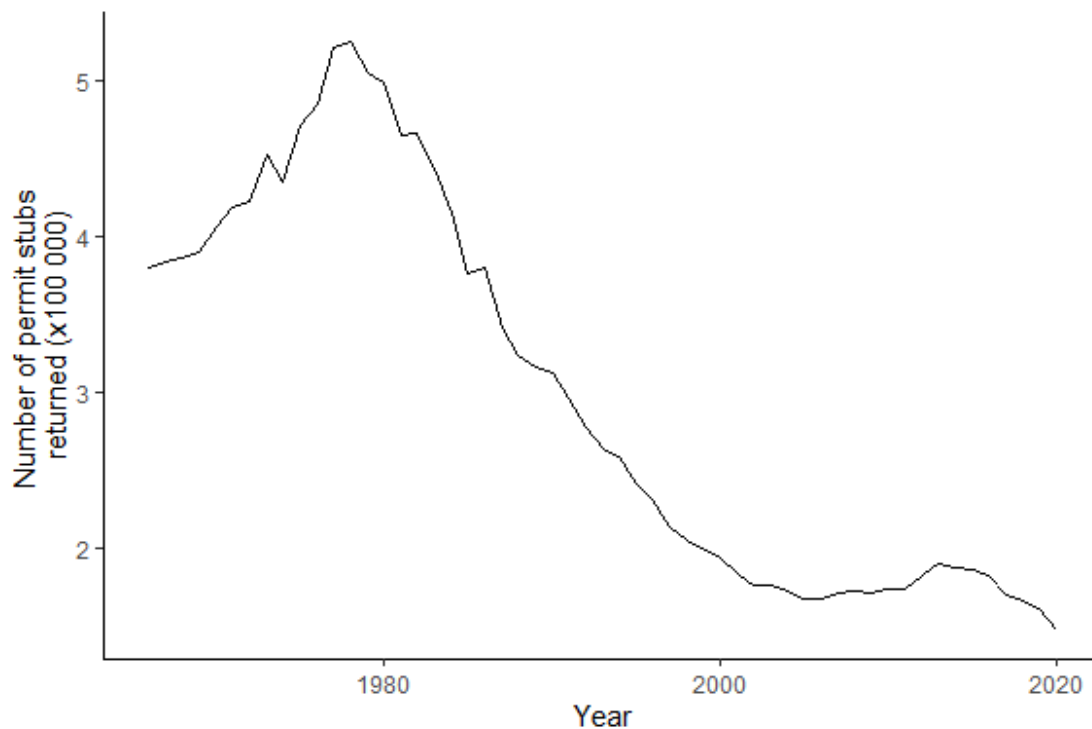


Figure 3.1: The number of Migratory Game Bird Hunting Permit stubs returned to Environment and Climate Change Canada. Note that permits that were sold, but for which the stubs were not returned to Environment and Climate Change Canada, are excluded from the totals.

4 Population Surveys

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, 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, productivity, and assess the impacts of hunting regulations on those populations. The data obtained from these monitoring programs are presented 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. CWS uses this information to ensure that hunting does not jeopardize the sustainability of the migratory game bird populations that are harvested. Due to COVID-19 restrictions, it was not possible to conduct most surveys in 2020 and 2021.

4.1 Waterfowl Breeding Population and Habitat Survey

The Waterfowl Breeding Population and Habitat Survey (WBPHS) in western Canada and the northwestern United States of America (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 4.1).

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. Those visibility correction factors are obtained from ground counts conducted by the CWS on a subset of transects in the Canadian Prairies and by the U.S. Fish and Wildlife Service (USFWS) on a subset of transects in the northern U.S.. In roadless areas of the Canadian Boreal forest, correction factors are derived from a comparison of fixed-wing and helicopter counts conducted in the 1980s. Estimates of abundance derived from this survey provide important information used to set regulations for duck hunting in both Canada and the U.S.

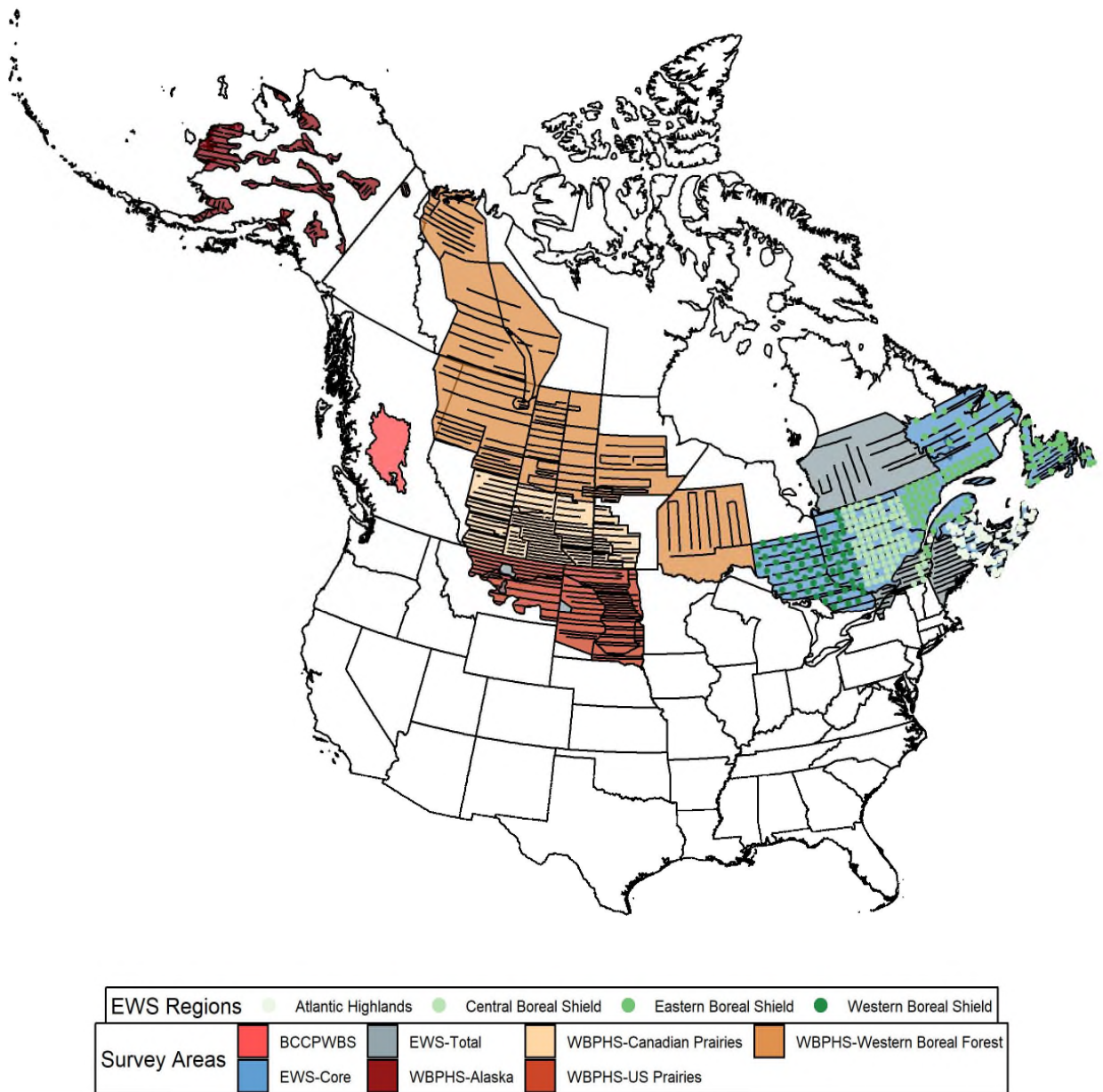


Figure 4.1: The Waterfowl Breeding Population and Habitat Survey (WBPHS) in Western Canada and Northwestern U.S., the Eastern Waterfowl Survey (EWS), and the British Columbia Central Plateau Waterfowl Breeding Survey (BCCPWBS). Lines represent fixed-wing aircraft survey transects; dots represent helicopter survey plots.

4.2 Eastern Waterfowl Survey

The Eastern Waterfowl Survey (EWS) 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 4.1). The USFWS conducts the fixed-wing transect survey in parts of eastern Canada and the northeastern U.S. The EWS is usually conducted from late April to early June, depending on the regional spring phenology.

Though originally designed to survey American Black Ducks in eastern Canada, the survey provides quantitative information on other duck species, Canada Geese, and Sandhill Crane. 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. The EWS results are analysed based on four regions of the core EWS area: the Atlantic Highlands, the Eastern Boreal Shield, the Central Boreal Shield, and the Western Boreal Shield.

4.3 Other waterfowl surveys

British Columbia, Nunavut, and the Yukon are the only provinces and territories not covered (at least in part) by the WBPHS and EWS. British Columbia has instead monitored waterfowl using the Waterfowl Breeding Population Survey of the Central Interior Plateau of British Columbia (BCCPWBS), a small-scale helicopter survey since 2006. This survey is run cooperatively by the CWS, Ducks Unlimited Canada and the USFWS and covers 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.

Arctic goose population estimates and trends in abundance are now mainly calculated from band recovery data and total harvest estimates using the Lincoln methods (Alisauskas, Drake, and Nichols 2009). Lincoln estimates represent the population abundance during the goose banding season (July-August) and are typically not available for the current year because of the timing of data collection. Some subarctic and temperate breeding Canada Goose populations (e.g., Atlantic Population, Southern Hudson Bay Canada Geese) are still monitored by surveys conducted while geese are paired on nests. The Greater Snow Goose population is monitored by a survey on the staging areas in spring.

The Southern Ontario Waterfowl Plot Survey (SOWPS) 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, primarily outside of the EWS area. Data from this survey have also been important in monitoring the population of temperate breeding Canada Geese in southern Ontario.

Supplemental information on waterfowl populations is provided by Mid-Winter Waterfowl Surveys (hereafter Mid-Winter Surveys) that are conducted in January on the wintering grounds in Ontario and the U.S. The Mid-Winter Surveys provide population indices for many species of waterfowl 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.

4.4 Impacts of COVID-19

Due to COVID-19 restrictions, it was not possible to conduct most surveys in 2020 and 2021. This report presents estimates from the most recent survey year, five-year trends, and trends across the whole survey; in most cases the most recent data available is from 2019, prior to the COVID-19 pandemic disruptions. In particular, the WBPHS, EWS, and BCCPWBS were not conducted in 2020 or 2021, leaving 2019 the most recent year with population estimates. Lincoln Estimates based on banding and harvest reports are available up through 2019 for most species. The Breeding Bird Survey was suspended in 2020; 2019 abundance indices are the most recent available. The Southern Ontario Wetland Plot Survey and the Great Lakes Marsh Monitoring Program were last conducted in 2018.

5 Habitat Conditions

Environmental conditions on the breeding grounds influence counts during surveys in many ways. First, high quality habitat can increase the *true* abundance of migratory birds on the landscape by increasing breeding success or attracting migrants. Second, environmental conditions can influence migratory birds' arrival and breeding phenology, changing the *perceived* abundance at the time of survey.

Moisture conditions in the Prairies are cyclic and heavily influence breeding success in the region by influencing the number of wetlands available for breeding and the persistence of these ponds through the breeding season. During the WBPHS, observers count the number of ponds on the landscape in May as an indication of breeding conditions (Figure 5.1). The Palmer Drought Index is another widely used measure of habitat conditions in Southern Canada. This index combines precipitation and temperature data to estimate overall dryness, with lower numbers representing drought conditions and higher numbers representing wet conditions (Figure 5.2).

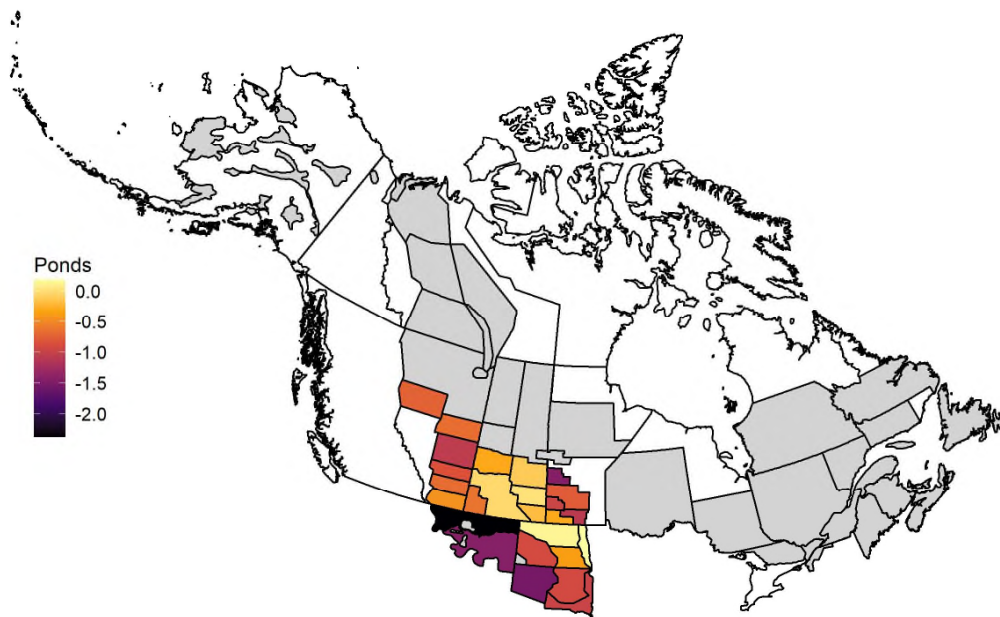


Figure 5.1: The 2019 May Pond Index of the Waterfowl Breeding Population and Habitat Survey compared to the 10-year regional average. Comparisons are mean centered and scaled by standard deviation within each strata. Positive values represent areas with more ponds than the 10-year regional average, while negative values represent areas with fewer ponds than average. Grey areas represent strata of the WBPBS where ponds are not surveyed.

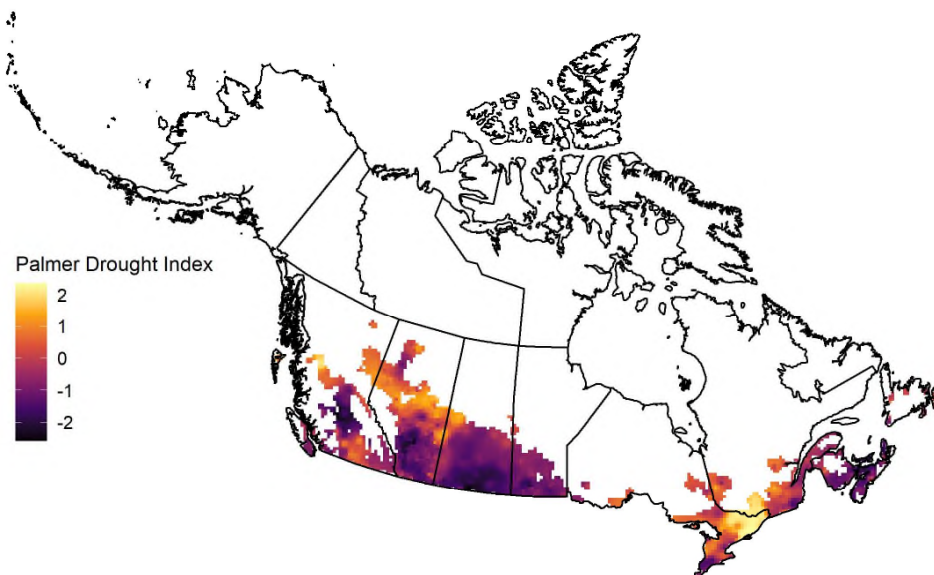


Figure 5.2: The 2020 agricultural year Palmer Drought Index (September 2019- August 2020) compared to the 10-year average. Comparisons are mean centered and scaled by standard

deviation by location. Positive values represent areas that are wetter than the 10-year average for the area, while negative values represent areas that are dryer than average. Agriculture and Agri-Food Canada, 2021.

The timing of the spring thaw also influences counts. Surveys must occur during the breeding period to provide accurate counts of breeding birds on the landscape. Spring temperatures and snow conditions influence when breeding begins for many species (Figures 5.3 and 5.4). Colder springs with late snowmelt may delay breeding, resulting in fewer birds being detected in the northern breeding areas and/or higher counts in southern areas if the survey is conducted while birds are still migrating through the area (Naugle et al. 2000; Roy et al. 2019; Schummer et al. 2018).

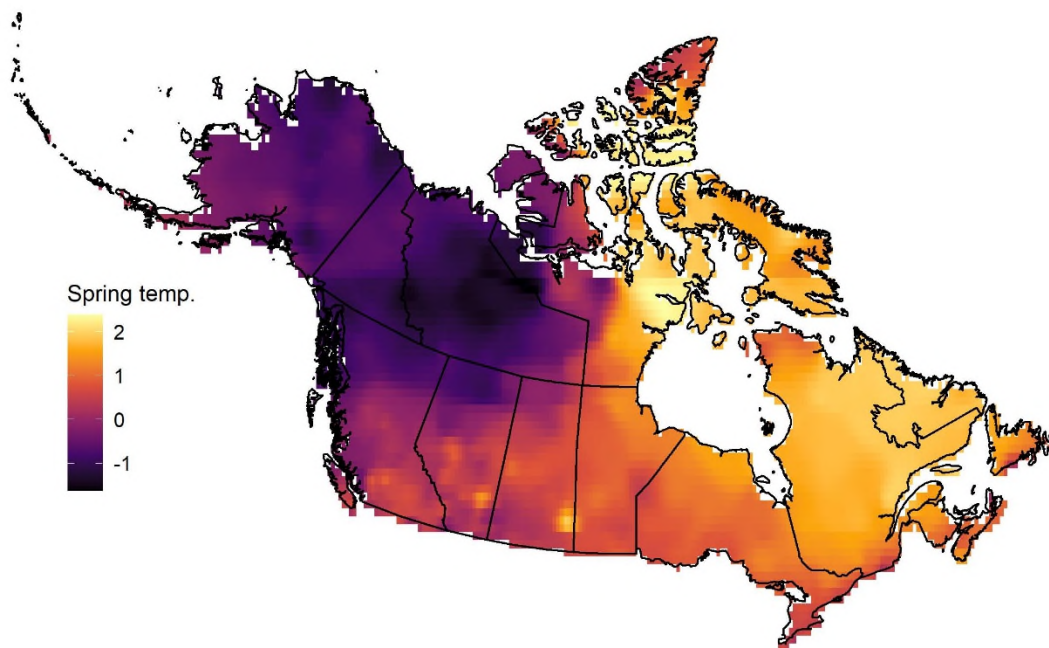


Figure 5.3: The 2021 spring temperatures (mean daily highs for January to April) compared to the 10-year average. Comparisons are mean centered and scaled by standard deviation by location. Positive values represent areas with warmer spring temperatures compared to the 10-year average for the area, while negative values represent areas with colder spring temperatures than average. Source: CPC Global Temperature data 2021 provided by the NOAA/OAR/ESRL PSL, Boulder, Colorado, USA.

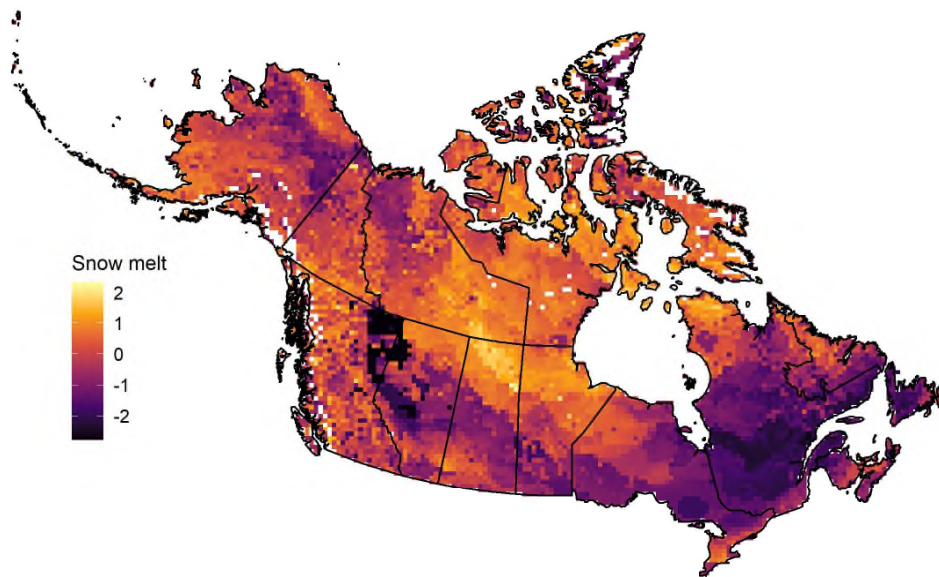


Figure 5.4: The 2021 snowmelt date compared to the 10-year average. Comparisons are mean centered and scaled by standard deviation by location. Positive values represent areas where the snow melted later than 10-year average for the area, while negative values represent areas where snow melted earlier than average. Source: U.S. National Ice Center 2008.

6 Dabbling and diving ducks

6.1 Primary Surveys for Dabbling and diving Ducks

Most dabbling and diving ducks are monitored through the WBPHS, which covers western Canada and the northwestern U.S., the EWS, which covers eastern Canada, and the BCCPWBS, which covers interior British Columbia. Multiple smaller scale waterfowl surveys provide additional regional information on waterfowl abundance and in some cases provide more detailed information for species that have restricted ranges or those that are not captured well by large-scale surveys. Unless the WBPHS, EWS, and BCCPWBS do not provide adequate information about a species' population status across their range, this report does not refer to smaller scale waterfowl surveys.

6.2 Population Status of Dabbling and Diving Ducks

Abundances of most species of dabbling and diving ducks have no trend or are increasing in Canada. Of the 12 species of dabbling and diving ducks found in western Canada that are monitored by the WBPHS, four species have shown no trend since 1970, six have increased, and two have decreased. In the past five years, three species have shown no trend, and nine have decreased. Of the seven species found in eastern Canada, the EWS indicated that six species have shown no trend since 1990, and one has decreased. In the short-term, all seven species have shown no trend since 2015.

There are currently approximately 37.1 million ducks in the WBPHS survey area; the most common species are Mallard, Blue-winged Teal, Northern Shoveler, and scaups. In the EWS survey area, there are 1.65 million ducks, with American Black Duck, Ring-necked Duck, Mallard, and Green-winged Teal being the most common species. In British Columbia, there are 338 thousand breeding pairs and the most common species are Ring-necked Duck, Mallard, Green-winged Teal, and scaups.

6.2.1 American Black Duck

In the core area of the EWS, the population of American Black Duck has shown no trend since 1990 and in the past five years (Figure 6.4). The Atlantic Highlands population has significantly increased since 1990 and the Western Boreal Shield population has significantly decreased since 1990. Populations in all other regions of the EWS have shown no trend during this time. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 563 (486-648) thousand American Black Ducks. This is similar to the 10-year average of 563 thousand birds.

6.2.2 Mallard

In the core area of the EWS, the population of Mallard has shown no trend since 1990 and in the past five years (Figure 6.4). The Atlantic Highlands population has significantly increased since 1990. Populations in all other regions of the EWS have shown no trend during this time. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 365 (216-552) thousand Mallards. This represents a 9% decrease from the 10-year average of 401 thousand birds.

In Southern Ontario, since 1971, the population of Mallard has significantly increased, but in the past five years, the population has shown no trend. In 2018, there were 161 (117-205) thousand Mallard breeding pairs (Figure 6.1). This represents a 5.7% increase from the 10-year average of 152 thousand birds.

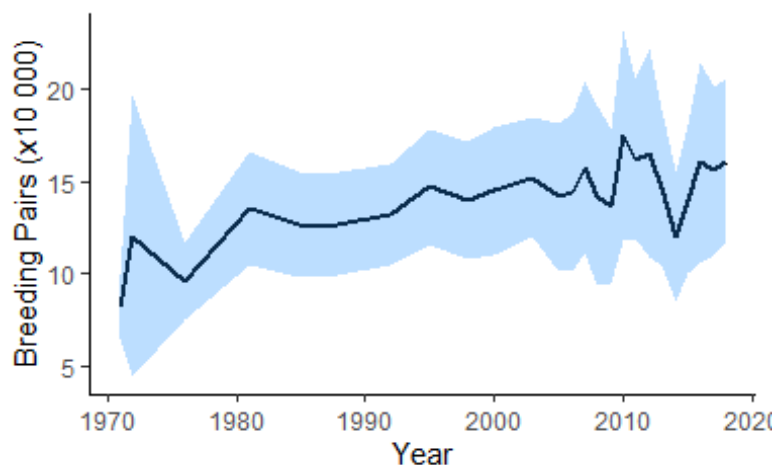


Figure 6.1: Indicated breeding pairs of Mallard in southern Ontario; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Interval.

In the Traditional Survey Area of the WBPHS, the population of Mallard has showed no trend since 1970 (Figure 6.5). Regionally, the populations in Alaska, and the U.S. Prairies showed long-term significant increases, the populations in the Canadian Prairies showed long-term significant decreases, and populations in all other regions have showed no trend. Short-term trends in the past five years indicate that the population has significantly decreased. Regionally, the populations in the U.S. Prairies showed significant short-term increases, the populations in Alaska, the Western Boreal Forest, and the Canadian Prairies showed short-term significant decreases, and populations in all other regions have showed no trends. In 2019, there were 9.42 (8.87-9.98) million Mallards in the traditional survey area of the WBPHS. This represents a 7.7% decrease from the 10-year average of 10.2 million birds. The 2019 Mallard population in this region was above the NAWMP goal of 7.73 million birds.

In the British Columbia Central Plateau, since 2006, the population of Mallard has significantly decreased, but in the past five years, the population has showed no trend (Figure 6.6). In 2019, there were 74.5 (59.8-89.2) thousand Mallard. This is similar to the 10-year average of 75.9 thousand birds.

6.2.3 Northern Pintail

In the Traditional Survey Area of the WBPHS, the population of Northern Pintail has significantly decreased since 1970 (Figure 6.5). Regionally, the populations in the Western Boreal Forest showed long-term significant increases, the populations in the Canadian Prairies, and the U.S. Prairies showed long-term significant decreases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has significantly decreased. Regionally, the populations in the U.S. Prairies showed significant short-term increases, the populations in Alaska, and the Canadian Prairies showed short-term significant decreases, and populations in all other regions have shown no trends. In 2019, there were 2.27 (2.03-2.51) million Northern Pintails in the traditional survey area of the WBPHS. This represents a 27% decrease from the 10-year average of 3.12 million birds. The 2019 Northern Pintail population in this region is below the NAWMP goal of 4 million birds.

In the British Columbia Central Plateau, the population of Northern Pintail has showed no trend since 2006 and in the past five years (Figure 6.6). In 2019, there were 2.95 (1.06-4.85) thousand Northern Pintail. This represents a 9.9% decrease from the 10-year average of 3.28 thousand birds.

6.2.4 Green-winged Teal

In the core area of the EWS, the population of Green-winged Teal has shown no trend since 1990 and in the past five years (Figure 6.4). There are no significant long-term trends in any region of the EWS. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 195 (144-258) thousand Green-winged Teals. This represents a 17% decrease from the 10-year average of 236 thousand birds.

In the Traditional Survey Area of the WBPHS, the population of Green-winged Teal has significantly increased since 1970 (Figure 6.5). Regionally, the populations in Alaska, and the Western Boreal Forest showed long-term significant increases, the populations in the Canadian Prairies showed long-term significant decreases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has showed no trend. Regionally, the populations in the Canadian Prairies showed short-term significant decreases, and populations in all other regions have shown no trends. In 2019, there were 3.18 (2.82-3.54) million Green-winged Teals in the traditional survey area of the WBPHS. This represents a 7.9% decrease from the 10-year average of 3.45 million birds. The 2019 Green-winged Teal population in this region is above the NAWMP goal of 2.06 million birds.

In the British Columbia Central Plateau, since 2006, the population of Green-winged Teal has showed no trend, but in the past five years, the population has significantly increased (Figure 6.6). In 2019, there were 63 (40.5-85.4) thousand Green-winged Teal. This represents an 80% increase from the 10-year average of 35 thousand birds.

6.2.5 Blue-winged Teal

In the Traditional Survey Area of the WBPHS, the population of Blue-winged Teal has significantly increased since 1970 (Figure 6.5). Regionally, the populations in the U.S. Prairies showed long-term significant increases, the populations in the Canadian Prairies showed long-term significant decreases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has significantly decreased. Regionally, the populations in the Western Boreal Forest showed significant short-term increases, the populations in the Canadian Prairies showed short-term significant decreases, and populations in all other regions have shown no trends. In 2019, there were 5.43 (4.8-6.05) million Blue-winged Teals in the traditional survey area of the WBPHS. This represents a 28% decrease from the 10-year average of 7.58 million birds. The 2019 Blue-winged Teal population in this region is above the NAWMP goal of 4.95 million birds.

In the British Columbia Central Plateau, the population of Blue-winged Teal has showed no trend since 2006 and in the past five years (Figure 6.6). In 2019, there were 5.32 (2.38-8.26) thousand Blue-winged Teal. This represents a 25% decrease from the 10-year average of 7.11 thousand birds.

6.2.6 American Wigeon

In the core area of the EWS, the population of American Wigeon has showed no trend since 1990 and in the past five years (Figure 6.4). There are no significant long-term trends in any region of the EWS. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 13.5 (0-27.1) thousand American Wigeons. This represents a 13% increase from the 10-year average of 11.9 thousand birds.

In the Traditional Survey Area of the WBPHS, the population of American Wigeon has showed no trend since 1970 (Figure 6.5). Regionally, the populations in Alaska, and the U.S. Prairies showed long-term significant increases, the populations in the Canadian Prairies

showed long-term significant decreases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has showed no trend. Regionally, the populations in Alaska showed short-term significant decreases, and populations in all other regions have shown no trends. In 2019, there were 2.83 (2.41-3.26) million American Wigeons in the traditional survey area of the WBPHS. This represents a 3.8% increase from the 10-year average of 2.73 million birds. The 2019 American Wigeon population in this region is above the NAWMP goal of 2.6 million birds.

In the British Columbia Central Plateau, the population of American Wigeon has showed no trend since 2006 and in the past five years (Figure 6.6). In 2019, there were 24.6 (14-35.2) thousand American Wigeon. This represents a 45% increase from the 10-year average of 17 thousand birds.

6.2.7 *Gadwall*

In the Traditional Survey Area of the WBPHS, the population of Gadwall has significantly increased since 1970 (Figure 6.5). Regionally, the populations in the Western Boreal Forest, the Canadian Prairies, and the U.S. Prairies showed long-term significant increases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has significantly decreased. Regionally, the populations in the Canadian Prairies showed short-term significant decreases, and populations in all other regions have shown no trends. In 2019, there were 3.26 (2.92-3.6) million Gadwalls in the traditional survey area of the WBPHS. This represents a 6.5% decrease from the 10-year average of 3.49 million birds. The 2019 Gadwall population in this region is above the NAWMP goal of 1.92 million birds.

In the British Columbia Central Plateau, the population of Gadwall has showed no trend since 2006 and in the past five years (Figure 6.6). In 2019, there were 4.79 (0.812-8.77) thousand Gadwall. This represents a 11% decrease from the 10-year average of 5.36 thousand birds.

6.2.8 *Northern Shoveler*

In the Traditional Survey Area of the WBPHS, the population of Northern Shoveler has significantly increased since 1970 (Figure 6.5). Regionally, the populations in Alaska, the Western Boreal Forest, the Canadian Prairies, and the U.S. Prairies showed long-term significant increases, and Short-term trends in the past five years indicate that the population has significantly decreased. Regionally, the populations in the U.S. Prairies showed significant short-term increases, the populations in the Canadian Prairies showed short-term significant decreases, and in 2019, there were 3.65 (3.32-3.98) million Northern Shovelers in the traditional survey area of the WBPHS. This represents a 18% decrease from the 10-year average of 4.43 million birds.

In the British Columbia Central Plateau, since 2006, the population of Northern Shoveler has significantly increased, but in the past five years, the population has showed no trend (Figure 6.6). In 2019, there were 17.4 (9.68-25.1) thousand Northern Shoveler. This represents a 28% increase from the 10-year average of 13.5 thousand birds.

6.2.9 Wood Duck

Estimating the breeding population of Wood Duck is difficult because the species' breeding behaviour and habitat use result in low detection from traditional fixed-wing surveys (Zimmerman et al. 2015). In the southeastern portion of its range, the Wood Duck is best surveyed by the SOWPS. Since 1971, the population of Wood Duck has significantly increased, but in the past five years, the population has showed no trend. In 2018, there were 77.1 (0-154) thousand Wood Duck breeding pairs in southern Ontario (Figure 6.2). This represents an 8.5% decrease from the 10-year average of 84.3 thousand breeding pairs.

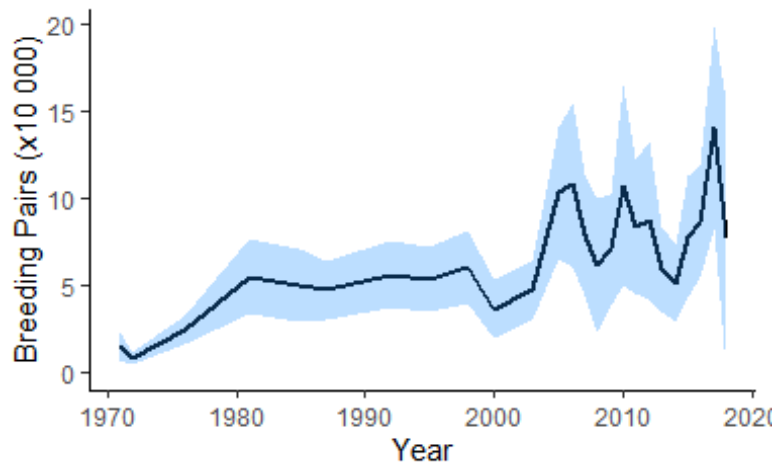


Figure 6.2: Indicated breeding pairs of Wood Duck in southern Ontario; black line represents the breeding pair estimate while the shaded area represents the 95% Confidence Interval.

Wood ducks are also monitored through Lincoln estimates in the east and west of North America. The Lincoln method estimated that there were 4.71 (4.19-5.24) million Eastern Wood Ducks in 2020 (Figure 6.3). The Eastern population of Wood Duck has significantly increased since 1961 and in the past five years. The 2020 estimates represents a 110% increase from the 10-year average of 2.29 million birds. The Lincoln method indicates that the Eastern population peaked in 2020 at 4.71 (4.19-5.24) million.

The Lincoln method estimated that there were 58.2 (24.2-92.2) thousand Western Wood Ducks in 2020 (Figure 6.3). Since 1961, the Western population of Wood Duck has significantly increased, but in the past five years, the population has showed no trend. The 2020 estimates represents a 5.1% increase from the 10-year average of 55.4 thousand birds. The Lincoln method indicates that the Western population peaked in 2007 at 122 (85.6-158) thousand.

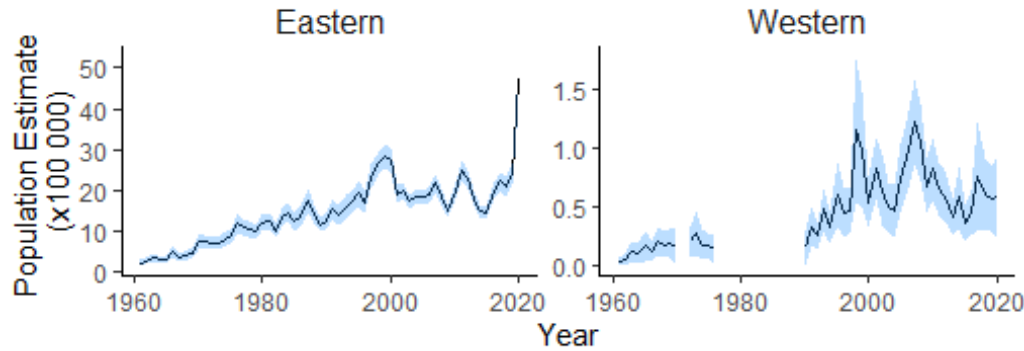


Figure 6.3: Lincoln estimates of population size for adult Wood Ducks; lines represents the population estimate while the shaded area represents the 95% confidence intervals. (Source: R. Alisauskas, ECCC - S&T, unpubl. data).

6.2.10 Ring-necked Duck

In the core area of the EWS, the population of Ring-necked Duck has shown no trend since 1990 and in the past five years (Figure 6.4). The Atlantic Highlands population has significantly increased since 1990. Populations in all other regions of the EWS have shown no trend during this time. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 504 (382-656) thousand Ring-necked Ducks. This is similar to the 10-year average of 511 thousand birds.

In the Traditional Survey Area of the WBPHS, the population of Ring-necked Duck has showed no trend since 1970 (Figure 6.5). Regionally, the populations in Alaska, and the U.S. Prairies showed long-term significant increases, the populations in the Canadian Prairies showed long-term significant decreases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has significantly decreased. Regionally, the populations in the U.S. Prairies showed significant short-term increases, the populations in the Western Boreal Forest, and the Canadian Prairies showed short-term significant decreases, and populations in all other regions have shown no trends. In 2019, there were 1.54 (1.23-1.85) million Ring-necked Ducks in the traditional survey area of the WBPHS. This represents a 5.4% increase from the 10-year average of 1.46 million birds.

In the British Columbia Central Plateau, since 2006, the population of Ring-necked Duck has showed no trend, but in the past five years, the population has significantly increased (Figure 6.6). In 2019, there were 87.9 (66.6-109) thousand Ring-necked Duck. This represents a 49% increase from the 10-year average of 58.8 thousand birds.

6.2.11 Redhead

In the Traditional Survey Area of the WBPHS, the population of Redhead has significantly increased since 1970 (Figure 6.5). Regionally, the populations in Alaska, the Canadian Prairies, and the U.S. Prairies showed long-term significant increases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that

the population has significantly decreased. Regionally, the populations in the Canadian Prairies showed short-term significant decreases, and populations in all other regions have shown no trends. In 2019, there were 0.732 (0.607-0.857) million Redheads in the traditional survey area of the WBPHS. This represents a 36% decrease from the 10-year average of 1.15 million birds. The 2019 Redhead population in this region is above the NAWMP goal of 0.701 million birds.

6.2.12 Canvasback

In the Traditional Survey Area of the WBPHS, the population of Canvasback has showed no trend since 1970 (Figure 6.5). Regionally, the populations in the U.S. Prairies showed long-term significant increases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has showed no trend. Regionally, populations in all other regions have shown no trends. In 2019, there were 0.652 (0.556-0.748) million Canvasbacks in the traditional survey area of the WBPHS. This represents a 7.8% decrease from the 10-year average of 707 thousand birds. The 2019 Canvasback population in this region is above the NAWMP goal of 581 thousand birds.

6.2.13 Ruddy Duck

In the Traditional Survey Area of the WBPHS, the population of Ruddy Duck has significantly increased since 1970 (Figure 6.5). Regionally, the populations in the Canadian Prairies, and the U.S. Prairies showed long-term significant increases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has significantly decreased. Regionally, the populations in the Canadian Prairies showed short-term significant decreases, and populations in all other regions have shown no trends. In 2019, there were 0.515 (0.385-0.645) million Ruddy Ducks in the traditional survey area of the WBPHS. This represents a 32% decrease from the 10-year average of 0.755 million birds.

In the British Columbia Central Plateau, the population of Ruddy Duck has showed no trend since 2006 and in the past five years (Figure 6.6). In 2019, there were 3.99 (1.26-6.73) thousand Ruddy Duck. This is similar to the 10-year average of 4.01 thousand birds.

6.2.14 Scaup species

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, particularly when observing them from the air. As such, the abundance of Greater Scaup and Lesser Scaup are combined into scaup for reporting; Lesser Scaup make up a larger proportion of the continental scaup population than do Greater Scaup (Anteau et al. 2020).

In the core area of the EWS, since 1990, the population of scaup has significantly decreased, but in the past five years, the population has shown no trend (Figure 6.4). There are no significant long-term trends in any region of the EWS. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 0.476 (0-1.41) thousand scaup. This represents a 96% decrease from the 10-year average of 11 thousand birds.

In the Traditional Survey Area of the WBPHS, the population of scaup has significantly decreased since 1970 (Figure 6.5). Regionally, the populations in the U.S. Prairies showed long-term significant increases, the populations in Alaska, and the Western Boreal Forest showed long-term significant decreases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has significantly decreased. Regionally, populations in all other regions have shown no trends. In 2019, there were 3.59 (3.19-4) million scaup in the traditional survey area of the WBPHS. This represents a 18% decrease from the 10-year average of 4.39 million birds.

In the British Columbia Central Plateau, the population of scaup has showed no trend since 2006 and in the past five years (Figure 6.6). In 2019, there were 52.3 (21.9-82.6) thousand scaup. This represents a 30% increase from the 10-year average of 40.2 thousand birds.

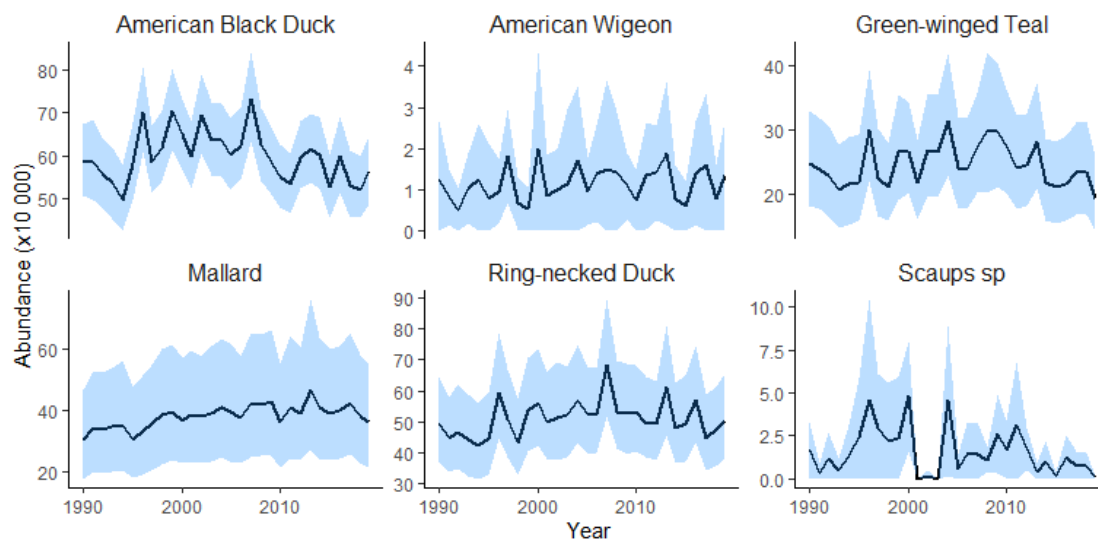


Figure 6.4: Breeding population estimates for dabbling and diving ducks in the Eastern Waterfowl Survey. Black line represents the population estimate while the shaded area represents the 95% Credible Interval. The figure represents the combined results of helicopter and fixed-wing aircraft surveys across the core survey area.

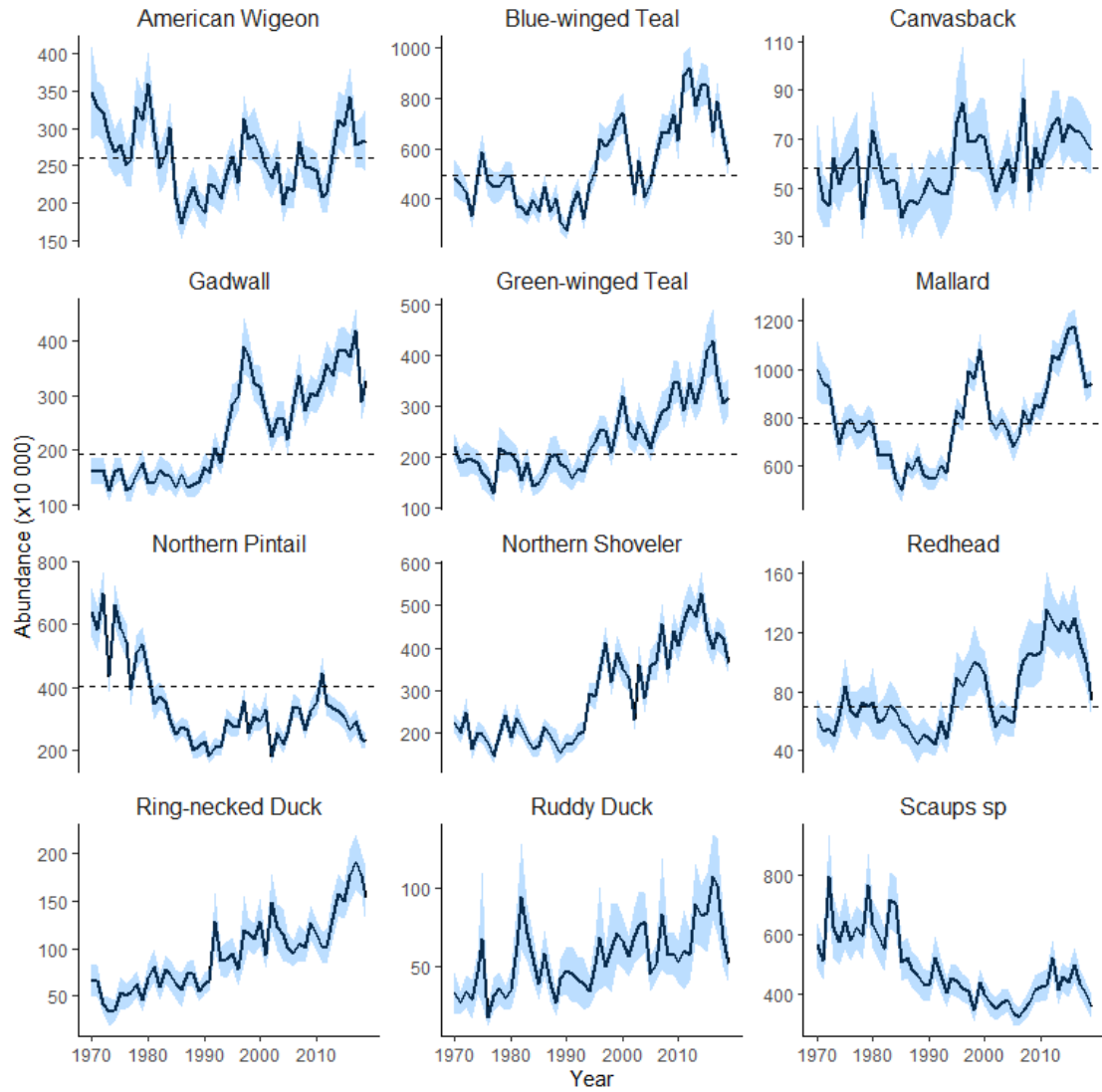


Figure 6.5: Dabbling and diving duck breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S. Black line represents the population estimate in the Traditional Survey Area while the shaded area represents the 95% Confidence Interval (Horizontal dashed lines represent the NAWMP goal for the survey area).

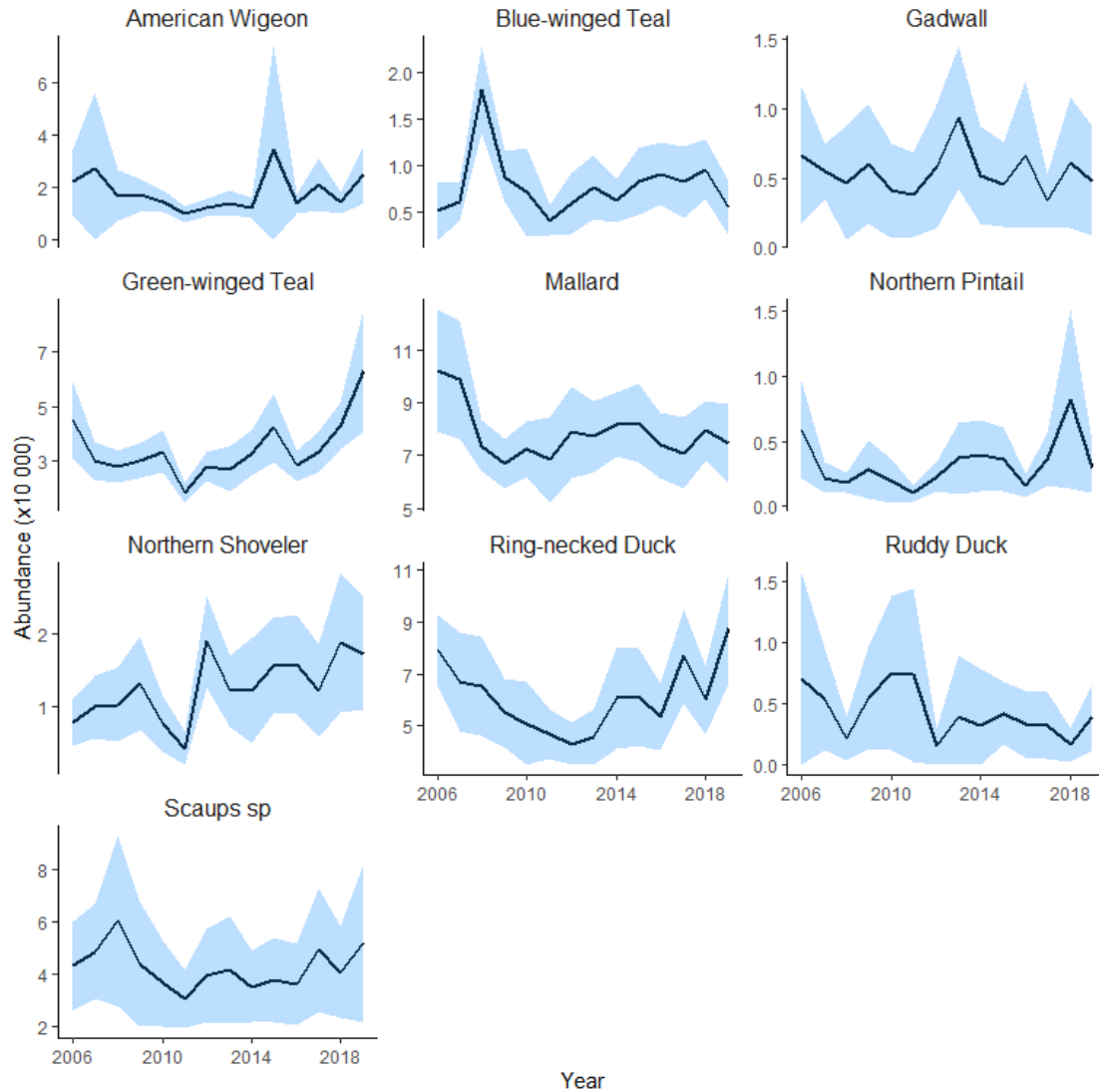


Figure 6.6: Breeding population estimates for dabbling and diving ducks in the British Columbia Central Plateau; black lines represent the population estimate while the shaded area represent the 95% Confidence Interval.

6.3 Harvest of Dabbling and Diving Ducks

Annual duck harvest (not including sea ducks) peaked in 1976 when approximately 3.79 million ducks were harvested in Canada (Figure 6.7). Following the decline in MGBH permit sales, harvest of American Black Duck, Green-winged Teal, American Wigeon, Blue-winged Teal, Canvasback, Gadwall, Greater Scaup, Lesser Scaup, Mallard, Northern Pintail, Northern Shoveler, Redhead, Ring-necked Duck, Ruddy Duck, and Wood Duck has significantly decreased since first surveyed. Harvest of American Black Duck, Green-winged Teal, American Wigeon, Blue-winged Teal, Canvasback, Gadwall, Mallard, Northern Pintail, Ring-necked Duck, and Wood Duck has significantly decreased in the past five years. Harvest of Greater Scaup, Lesser Scaup, Northern Shoveler, Redhead, and Ruddy Duck has

remained stable over this period. In 2019, there were approximately 804 thousand ducks harvested. Mallards comprised 49% of the duck harvest, followed by Wood Duck, American Black Duck, Green-winged Teal, and Blue-winged Teal (8.6, 6.2, 5.7, and 4.7% respectively).

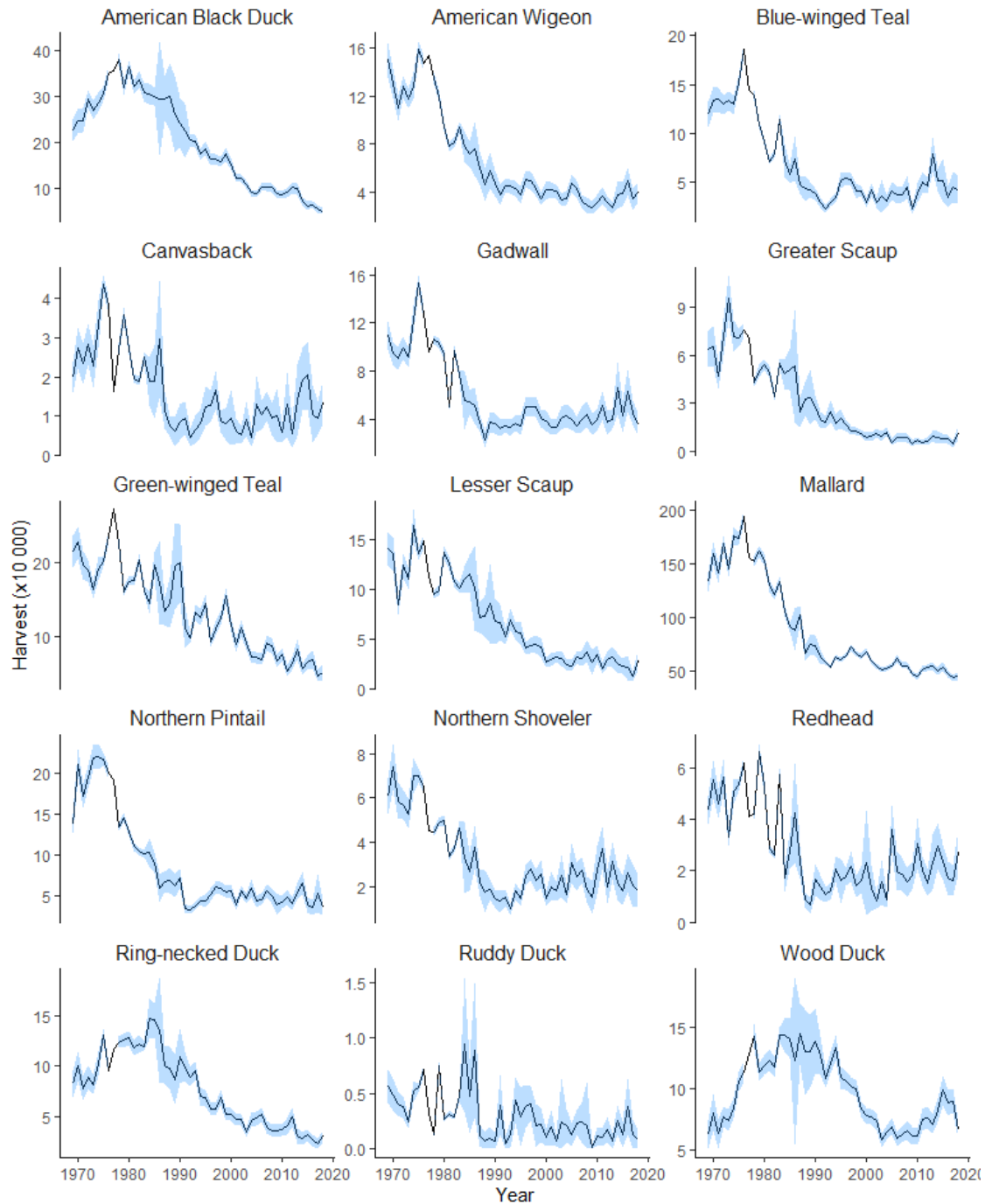


Figure 6.7: Estimated harvest in Canada of dabbling and diving ducks (not including sea ducks) by species. Canadian harvest data were obtained from the National Harvest Survey (Smith, Villeneuve, and Gendron 2021).

7 Sea Ducks

7.1 Primary Surveys for Sea Ducks

Most species of sea ducks are poorly monitored by traditional waterfowl surveys. In particular, the WBPHS, which is used as a basis for monitoring the population and setting population goals for many North American waterfowl, is not well suited to surveying sea duck populations. The core breeding range of half the sea duck species is not covered and the survey is conducted too early to effectively count breeding sea ducks, which generally nest later than dabbling and diving ducks. Additionally, some groups of sea ducks are difficult to distinguish from a fixed-wing aircraft and therefore WBPHS estimates represent pooled counts (e.g., scoters, goldeneyes, mergansers). Helicopter surveys such as the EWS do allow observers to distinguish between species but survey timing is earlier than is optimal to count breeding sea ducks.

7.2 Population Status of Sea Ducks

7.2.1 *Bufflehead*

The breeding range of Bufflehead is primarily restricted to the Western Boreal Shield region of the EWS. In this region, since 1990, the population of Bufflehead has significantly decreased, but in the past five years, the population has shown no trend (Figure 7.5). In 2019, across the Western Boreal Shield region of the EWS, there were 12.3 (1.73-22.9) thousand Buffleheads. This represents a 56% decrease from the 10-year average of 27.8 thousand birds.

In the Traditional Survey Area of the WBPHS, the population of Bufflehead has significantly increased since 1970 (Figure 7.4). Regionally, the populations in the Western Boreal Forest, and the Canadian Prairies showed long-term significant increases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has showed no trend. Regionally, populations in all other regions have shown no trends. In 2019, there were 1.15 (0.962-1.35) million Buffleheads in the traditional survey area of the WBPHS. This represents a 13% decrease from the 10-year average of 1.33 million birds.

In the British Columbia Central Plateau, the population of Bufflehead has showed no trend since 2006 and in the past five years (Figure 7.6). In 2019, there were 52 (42.2-61.9) thousand Bufflehead. This represents a 26% increase from the 10-year average of 41.5 thousand birds.

7.2.2 *Long-tailed Duck*

Because of its breeding distribution, the Long-tailed Duck is not regularly surveyed by any current monitoring program.

7.2.3 *Harlequin Duck*

There are two populations of Harlequin Ducks; the Eastern and the Western Population. Neither population is surveyed regularly by any current monitoring program.

The Eastern 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 (Quebec, Maritimes and Maine) and there appears to be little interbreeding (Scribner et al. 2000; Robert et al. 2008; Thomas et al. 2008). The Eastern Population declined in the 1980s and was listed as Special Concern under the Canadian Species at Risk Act in 2003. Hunting of this population has been closed since 1990 and the population has increased relative to the 1990s.

The Western Population breeds in Alaska, Yukon, British Columbia, Alberta, Montana, Wyoming, Idaho, and Washington. The Western Population appears stable.

7.2.4 *Common Goldeneye*

The Common Goldeneye is surveyed in the east by the EWS and in the west by the WBPHS. Fixed-wing airplane survey protocols do not distinguish between the Common Goldeneye and the Barrow's Goldeneye, but Common Goldeneye largely dominates in WBPHS survey area. Therefore, numbers presented for the WBPHS predominately represent Common Goldeneye.

In the core area of the EWS, the population of Common Goldeneye has shown no trend since 1990 and in the past five years (Figure 7.5). The Central Boreal Shield population has significantly increased since 1990. Populations in all other regions of the EWS have shown no trend during this time. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 224 (151-297) thousand Common Goldeneyes. This represents a 17% decrease from the 10-year average of 269 thousand birds.

In the Traditional Survey Area of the WBPHS, the population of Common Goldeneye has significantly increased since 1970 (Figure 7.4). Regionally, the populations in the Canadian Prairies showed long-term significant increases, the populations in Alaska showed long-term significant decreases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has showed no trend. Regionally, the populations in the Canadian Prairies showed significant short-term increases, and populations in all other regions have shown no trends. In 2019, there were 0.663 (0.492-0.834) million Common Goldeneyes in the traditional survey area of the WBPHS. This represents a 2% decrease from the 10-year average of 0.677 million birds.

7.2.5 *Barrow's Goldeneye*

Since 2005, the Eastern Population of Barrow's Goldeneye has been surveyed every three years by the Barrow's Goldeneye Winter Survey. This survey, conducted in helicopter to allow the distinction of the Barrow's Goldeneye and the Common Goldeneye, covers the St. Lawrence Estuary and the western portion of the Gulf, where more than 90% of the

Eastern Population winters (Robert and Savard 2006; Robert 2013). In 2017, there were 7.72 (7.28-8.17) thousand Barrow’s Goldeneye, an increase of 31% since 2014 when the survey was last conducted (Figure 7.1).

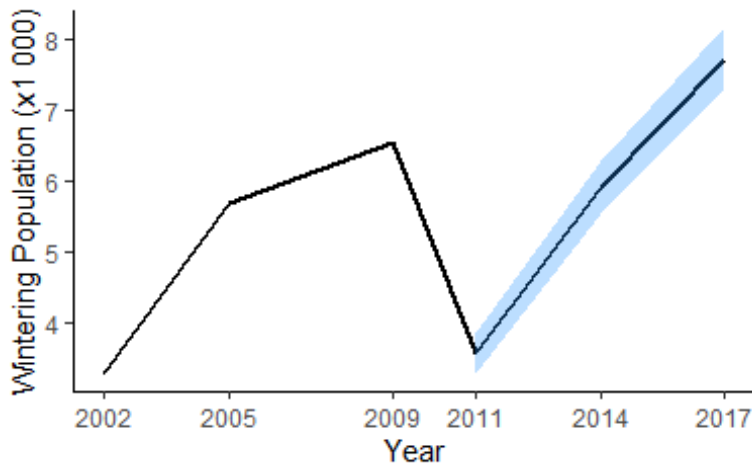


Figure 7.1: Eastern Population Barrow’s Goldeneye Winter Survey. From 2011 onward the numbers are corrected from photos. Black line represents the population estimate while the shaded area represents the 95% Confidence Interval.

The British-Columbia Central Plateau Waterfowl Breeding Survey best monitors the Western population of Barrow’s Goldeneye. Though the survey does not distinguish between Common Goldeneye and Barrows Goldeneye in the region, Barrow’s Goldeneye heavily dominates the counts. In 2019, there were 18.3 (14.1-22.5) thousand Barrow’s Goldeneye breeding pairs in the British Columbia Central Plateau (Figure 7.6).

7.2.6 Common Eider

There are four populations of Common Eider (Pacific, Northern, Hudson Bay and American). The Pacific Common Eider and the Hudson Bay Common Eider are not monitored regularly.

The Northern Common Eider has been monitored on its wintering grounds in eastern Canada (and Saint-Pierre and Miquelon, France) since 2003. When this survey was last conducted in 2018, there were 160 (125-195) thousand male Common Eiders. This is a 23% increase since 2015, when there were 130 (117-143) thousand male Common Eiders (Figure 7.2).

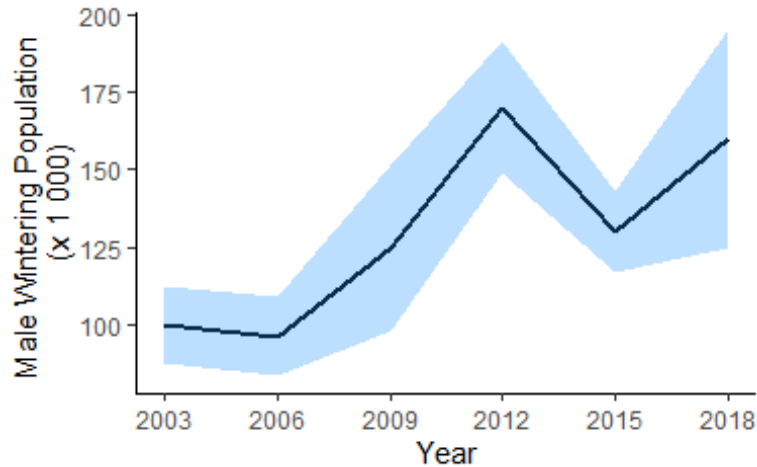


Figure 7.2: Estimated number of wintering adult male Northern Common Eider. Black line represents the population estimate while the shaded area represents the 95% Confidence Interval.

American Common Eider have been monitored during the breeding season on the New Brunswick coast since 1991 and in the St. Lawrence Estuary and Gulf in Quebec since 2003. Both surveys indicate long-term population declines (Figure 7.3). In New Brunswick, Common Eider are surveyed every three years; in 2017, there were 2560 breeding pairs (Figure 7.3a). In 2021, there were 12.5 thousand Common Eider nests in the four largest breeding colonies in the St. Lawrence Estuary, Quebec (Figure 7.3b).

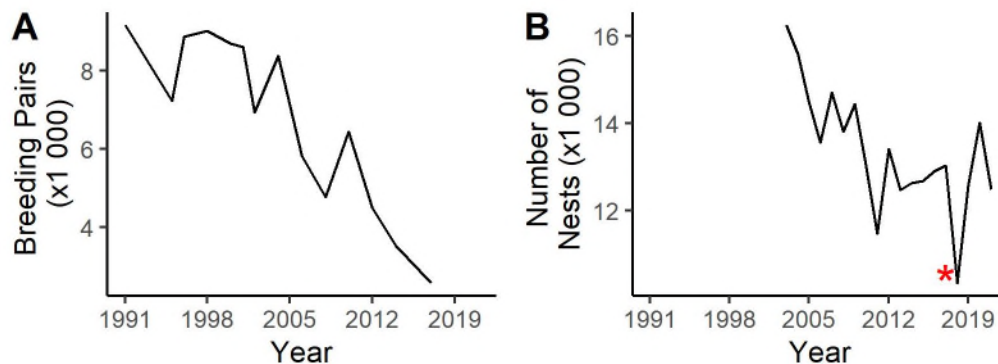


Figure 7.3: American Common Eider breeding populations. A) Estimated number of breeding pairs of American Common Eider in New Brunswick. B) Number of American Common Eider nests for the four largest breeding colonies in the St. Lawrence Estuary, Quebec. These colonies are Bicquette Island (SPEE, unpubl. data), Pommès, Blanche and Fraises Islands (Société Duvetnor Ltée, unpubl. data). The star indicates a year with known presence of a fox on Pommès.

7.2.7 King Eider

Because of its breeding distribution, the King Eider is not regularly surveyed by any current monitoring program.

7.2.8 *Merganser species*

Neither the WBPHS nor the BCCPWBS distinguish between the three species of North American Mergansers (Common, Red-breasted, and Hooded Mergansers). Abundance counts of mergansers provided by the WBPHS represent all three species and those provided by the BCCPWBS represent combined counts of Common and Hooded Mergansers. In the eastern Canada, the EWS does provide abundance counts for each of the three species, given the distinction of the species is possible during this helicopter survey. However, the EWS does not capture the Red-breasted Merganser well because it only covers part of their breeding range and they nest too late to be appropriately captured by this survey. Migrating individuals may therefore be erroneously included in the breeding counts (Lepage 2013).

In the core area of the EWS, the population of Common Merganser has significantly increased since 1990 and in the past five years (Figure 7.5). The Eastern Boreal Shield, and Western Boreal Shield population has significantly increased since 1990. Populations in all other regions of the EWS have shown no trend during this time. The Central Boreal Shield, and Western Boreal Shield population has significantly increased since 2015. Populations in all other regions of the EWS have shown no trend from 2015 to 2019. In 2019, in the core survey area of the EWS, there were 322 (235-408) thousand Common Mergansers. This represents a 25% increase from the 10-year average of 258 thousand birds.

In the core area of the EWS, since 1990, the population of Red-breasted Merganser has significantly increased, but in the past five years, the population has shown no trend (Figure 7.5). The Atlantic Highlands, Eastern Boreal Shield, Central Boreal Shield, and Western Boreal Shield population has significantly increased since 1990. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 19.2 (0.901-37.6) thousand Red-breasted Mergansers. This represents a 25% decrease from the 10-year average of 25.8 thousand birds.

In the core area of the EWS, since 1990, the population of Hooded Merganser has significantly increased, but in the past five years, the population has shown no trend (Figure 7.5). The Atlantic Highlands, Eastern Boreal Shield, Central Boreal Shield, and Western Boreal Shield population has significantly increased since 1990. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 235 (185-284) thousand Hooded Mergansers. This represents an 18% increase from the 10-year average of 199 thousand birds.

In the Traditional Survey Area of the WBPHS, the population of mergansers has significantly increased since 1970 (Figure 7.4). Regionally, the populations in Alaska, and the Western Boreal Forest showed long-term significant increases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has showed no trend. Regionally, populations in all other regions have shown no trends. In 2019, there were 0.663 (0.484-0.842) million mergansers in the traditional survey area of the WBPHS. This represents a 16% decrease from the 10-year average of 0.786 million birds.

In the British Columbia Central Plateau, the population of mergansers has showed no trend since 2006 and in the past five years (Figure 7.6). In 2019, there were 11 (7.11-14.9) thousand mergansers. This represents a 5.7% increase from the 10-year average of 10.4 thousand birds.

7.2.9 *Scoter species*

Scoters are poorly surveyed across Canada, although CWS biologists, in collaboration with the Sea Duck Joint Venture, are working to develop a survey methodology that will provide reliable breeding population estimates. Neither the WBPHS nor the BCCPWBS distinguishes between the three species of North American scoters (White-winged, Surf, and Black Scoters). The EWS does distinguish between scoter species but only covers a portion of each species' breeding range.

In the core area of the EWS, the population of Surf Scoter has shown no trend since 1990 and in the past five years (Figure 7.5). The Central Boreal Shield population has significantly increased since 1990. Populations in all other regions of the EWS have shown no trend during this time. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 130 (37.3-222) thousand Surf Scoters. This represents a 6.2% increase from the 10-year average of 122 thousand birds.

In the core area of the EWS, since 1990, the population of Black Scoter has significantly increased, but in the past five years, the population has shown no trend (Figure 7.5). The Central Boreal Shield population has significantly increased since 1990. Populations in all other regions of the EWS have shown no trend during this time. There are no significant five-year trends in any region of the EWS. In 2019, in the core survey area of the EWS, there were 40.7 (0-110) thousand Black Scoters. This represents a 50% increase from the 10-year average of 27.1 thousand birds.

In the Traditional Survey Area of the WBPHS, the population of all three species of scoters has significantly decreased since 1970 (Figure 7.4). Regionally, the populations in the Western Boreal Forest, and the Canadian Prairies showed long-term significant decreases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has showed no trend. Regionally, populations in all other regions have shown no trends. In 2019, there were 1.05 (0.822-1.29) million scoters in the traditional survey area of the WBPHS. This represents a 10% decrease from the 10-year average of 1.17 million birds.

In the British Columbia Central Plateau, since 2006, the population of scoters has significantly increased, but in the past five years, the population has showed no trend (Figure 7.6). In 2019, there were 11.8 (4.53-19.1) thousand scoters. This represents a 27% increase from the 10-year average of 9.34 thousand birds.

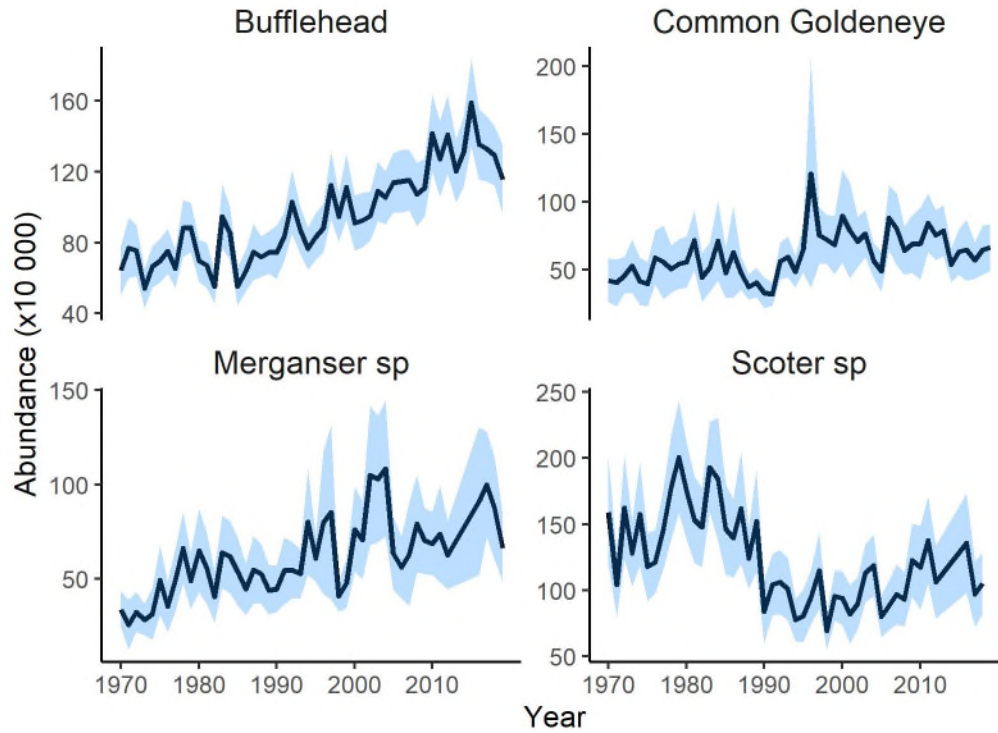


Figure 7.4: Sea duck breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S.. Black line represents the population estimate in the Traditional Survey Area while the shaded area represents the 95% Confidence Interval.

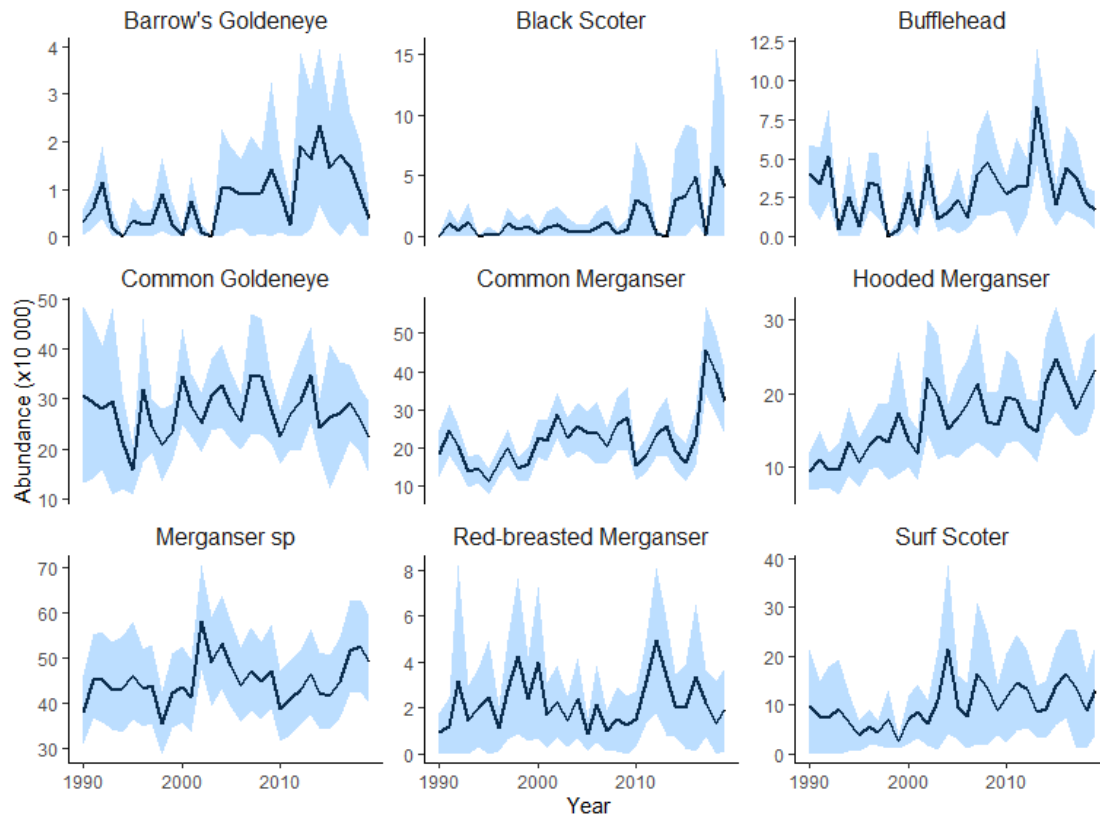


Figure 7.5: Breeding population estimates for sea ducks in the Eastern Waterfowl Survey. Black line represents the population estimate while the shaded area represents the 95% Credible Interval. The figure represents the combined results of helicopter and fixed-wing aircraft surveys across the core survey area.

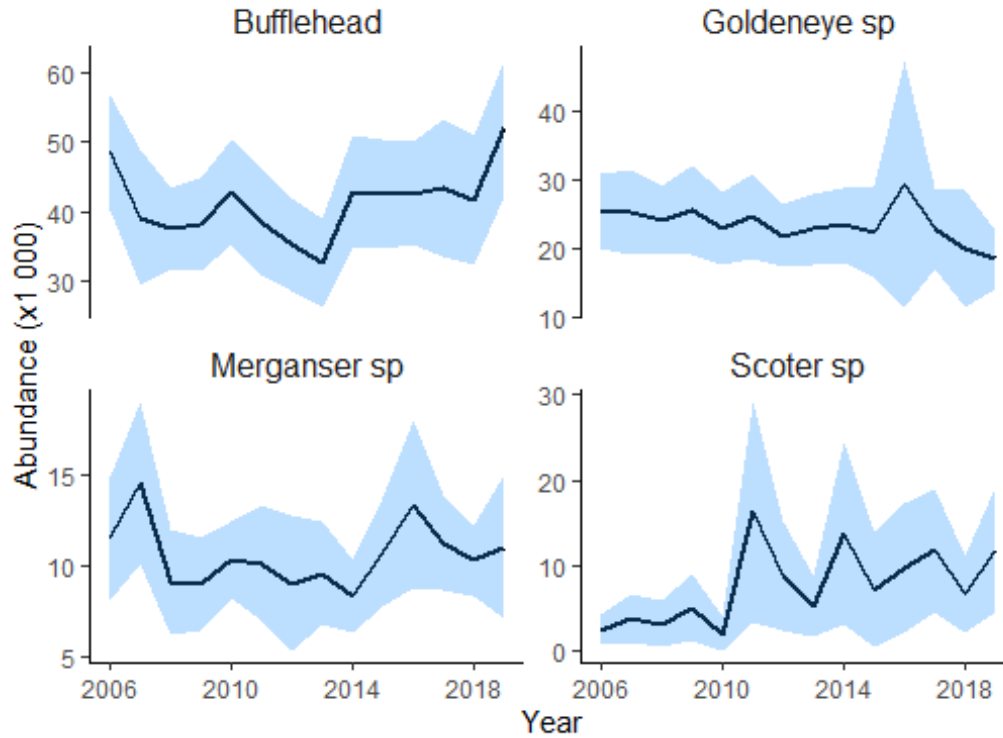


Figure 7.6: Total spring breeding population estimates for sea ducks in the British Columbia Central Plateau; black lines represent the population estimate while the shaded areas represent the 95% Confidence Interval.

7.3 Harvest of Sea Ducks

Annual sea duck harvest peaked in 1974 when approximately 399 thousand sea ducks were harvested in Canada (Figure 7.7). Following the decline in MGBH permit sales, harvest of Barrow's Goldeneye, Black Scoter, Bufflehead, Common Eider, Common Goldeneye, Common Merganser, Harlequin Duck, Hooded Merganser, King Eider, Long-tailed Duck, Red-breasted Merganser, Surf Scoter, and White-winged Scoter has significantly decreased since first surveyed. Harvest of Common Eider, Common Merganser, and Hooded Merganser has significantly decreased in the past five years. Harvest of Barrow's Goldeneye, Black Scoter, Bufflehead, Common Goldeneye, Harlequin Duck, King Eider, Long-tailed Duck, Red-breasted Merganser, Surf Scoter, and White-winged Scoter has been stable in the past five years. In 2019, there were approximately 82.9 thousand sea ducks harvested. Buffleheads comprised 29% of the sea duck harvest, followed by Common Goldeneyes, Common Eiders, Hooded Mergansers, and Common Merganser (20, 12, 11, and 6.3% respectively).

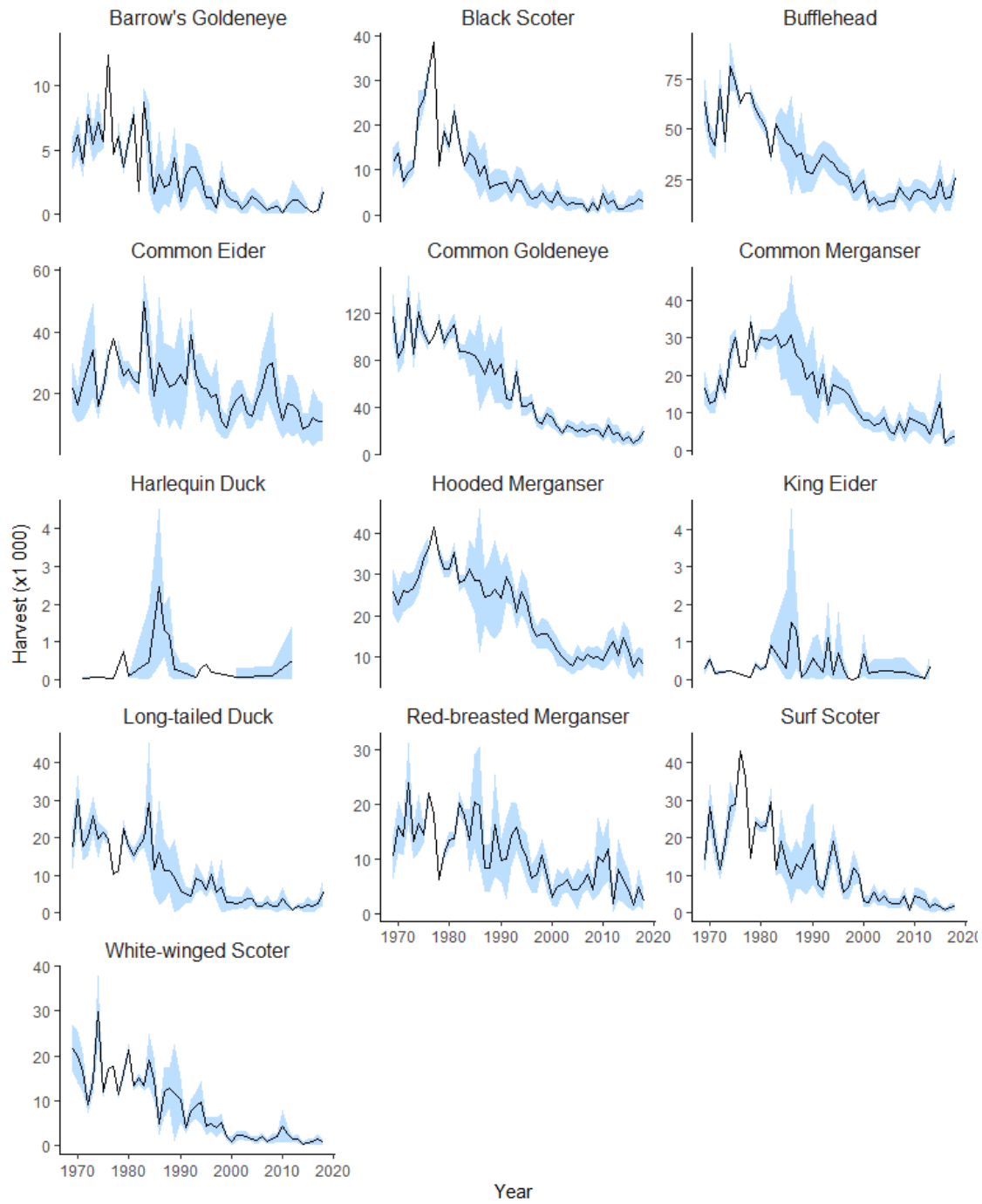


Figure 7.7: Estimated harvest in Canada of sea ducks by species. Canadian harvest data were obtained from the National Harvest Survey (Smith, Villeneuve, and Gendron 2021).

8 Geese and Swans

8.1 Primary Surveys for Geese and Swans

Most goose population estimates and trends in abundance are primarily calculated from band recovery data and harvest estimates using the Lincoln methods. Some goose and swan 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.

8.2 Population Status of Geese

8.2.1 Population Status of Overabundant Geese

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.' Light Goose (Lesser Snow Goose, Greater Snow Goose, and Ross's Goose) foraging significantly alters plant communities in Arctic and Subarctic staging and nesting areas where abundance is particularly high. In these areas, foraging has reduced groundcover by their preferred forage plant species and changed the soil chemistry (Iacobelli and Jefferies 1991; Alisauskas, Charlwood, and Kellett 2006). 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.

Concerns about the impact of light geese on sensitive Arctic and Subarctic ecosystems 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 *Migratory Bird Treaty Act* in the U.S. to allow harvests to occur outside of the normal hunting season (i.e., September to March). In 1998, Greater Snow Geese were designated as overabundant, and in 1999 designation of the Mid-continent Lesser Snow Geese population followed. Ross's Geese were declared overabundant in the U.S. in 1999, and in Canada beginning in 2014. The Western Arctic Population of Lesser Snow Goose was also designated as overabundant in Canada in 2014. Additionally, in response to rapid population growth and agricultural damage and human safety concerns, temperate-breeding Canada Geese were designated as overabundant in southern Manitoba in 2020.

8.2.1.1 Lesser Snow Goose

There are three populations of Lesser Snow Goose: the Mid-continent population, the Western Arctic population, and the Wrangel Island population. 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, these colonies are grouped into three regions: eastern, central, and western Arctic regions. 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, migrate through Alberta and western Saskatchewan, and mainly winter in the Pacific Flyway. The Wrangel Island population nests on Wrangel Island, off the northeast coast of Siberia, and winters on the Pacific Coast at the mouth of the Fraser-Skagit Rivers in British Columbia and Washington, in the Central Valley of California, and in smaller numbers in Oregon. All three populations overlap somewhat during migration and at wintering areas.

The Lincoln method estimated that there were 7.23 (5.89-8.58) million adult Mid-continent Lesser Snow Geese in 2019 (Figure 8.8). Since 1970, the Mid-Continent population of Lesser Snow Goose has significantly increased, but in the past five years, the population has significantly decreased. This represents a 16% decrease from the 10-year average of 8.63 million geese. The Lincoln method indicates that the Mid-continent population peaked in 2007 at 19.1 (16.2-22) million.

The Western Arctic population of Lesser Snow Geese is monitored through Lincoln estimates. Harvest estimates for adult Lesser Snow Geese in the Pacific Flyway states are thought to be overestimated by approximately 40% and were adjusted downwards for use in the Lincoln estimates as suggested by Padding and Royle (2012). The Lincoln method estimated that there were 1.09 (0.768-1.41) million adult Western Arctic Lesser Snow Geese in 2019 (Figure 8.8). Since 1971, the Western Arctic population of Lesser Snow Goose has significantly increased, but in the past five years, the population has showed no trend. This represents a 17% increase from the 10-year average of 930 thousand birds. The Lincoln method indicates that the Western Arctic population peaked in 2018 at 1.89 (1.28-2.49) million.

The Wrangel Island population of Lesser Snow Geese are monitored through a ground survey conducted by Russian biologists during the breeding season. The Wrangel Island population of Lesser Snow Goose has showed no trend since 1992 and in the past five years. In 2019, there were approximately 442 thousand Lesser Snow Geese on Wrangel Island (Figure 8.1). This represents a 77% increase from the 10-year average of 250 thousand birds.

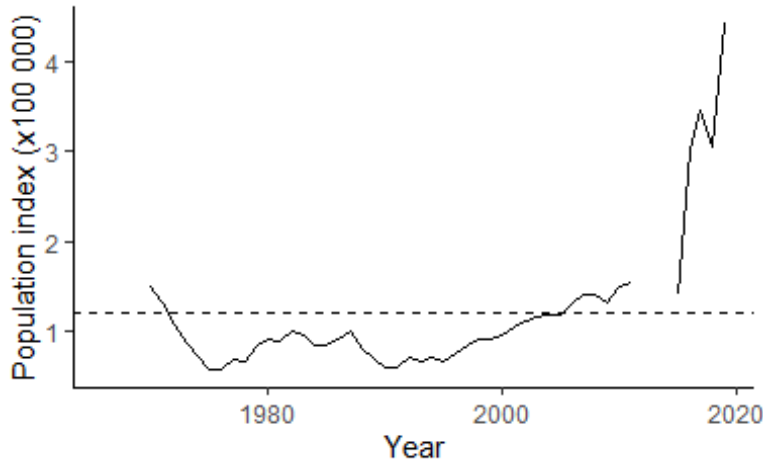


Figure 8.1: Population index of Lesser Snow Geese on Wrangel Island, Russia. Data were not gathered in 2012 and 2014; Source: Olson 2019 (Horizontal dashed lines represent the NAWMP goal for the survey area).

8.2.1.2 Greater Snow Goose

Greater Snow Geese are monitored on their spring staging areas in southern Quebec and eastern Ontario, where they have been surveyed during spring migration since 1965. 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). Since 1965, the population of Greater Snow Goose has significantly increased, but in the past five years, the population has shown no trend. (Figure 8.2). Since being designated as overabundant in 1998, the Greater Snow Goose population has fluctuated between 714 thousand and 1.01 million birds. In 2019, there were 714 (630-798) thousand Greater Snow Geese. The 2019 Greater Snow Goose population is considered to be within the NAWMP goal of 500-700 thousand birds.

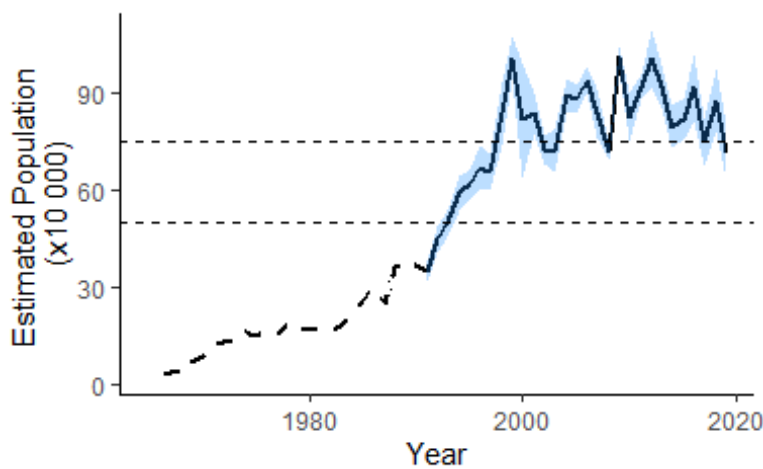


Figure 8.2: Greater Snow Goose population estimates during the spring staging period in southern Quebec and eastern Ontario. Shaded area represents the 95% confidence intervals

(Estimates from 1998 to 2000 were corrected for flocks not observed during the survey, using data from a telemetry study. Estimates from 2004 and onward are based on a revised methodology). (Horizontal dashed lines represent the NAWMP upper and lower goals for the survey area).

8.2.1.3 Ross's Goose

The Lincoln method estimated that there were 1.59 (1.15-2.03) million adult Ross's Goose in 2019 (Figure 8.8). Since 1971, the population of Ross's Goose has significantly increased, but in the past five years, the population has showed no trend. This represents a 11% decrease from the 10-year average of 1.79 million birds. The Lincoln method indicates that the population peaked in 2013 at 2.83 (2.1-3.57) million.

In addition to being monitored through Lincoln methods, a single colony of Ross's Goose has been monitored at Karrak Lake in the Queen Maud Gulf (Ahiak) Bird Sanctuary, Nunavut since 1993. Since 1993, the population of Ross's Goose has showed no trend, but in the past five years, the population has significantly decreased. In 2019, there were 233 (212-254) thousand Ross's Goose nesting at Karrak Lake (Figure 8.3). This represents a 60% decrease from the 10-year average of 583 thousand birds.

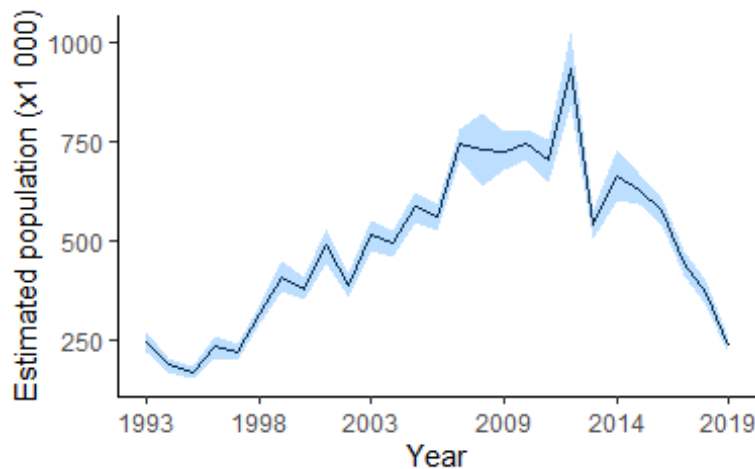


Figure 8.3: Estimated numbers of Ross's Goose that attempted to nest at Karrak Lake, Nunavut, 1993-2019; black line represents the population estimate, shaded area represents the 95% Confidence Interval.

8.2.2 Population Status of Other Geese and Swans

8.2.2.1 Canada Goose

Canada geese are divided into subarctic breeding populations and temperate breeding populations.

8.2.2.1.1 Subarctic Canada Geese

There are three populations of subarctic breeding Canada Geese: the North Atlantic, the Atlantic, and the Southern Hudson Bay Populations.

The North Atlantic population breeds in Labrador, insular Newfoundland, eastern Quebec, and western Greenland and winters primarily in southern Atlantic Canada and New England. The North Atlantic population is monitored by the EWS. The North Atlantic population of Canada Goose has showed no trend since 1990 and in the past five years. There were 52.5 (38.7-72.1) thousand Canada Goose breeding pairs in 2019 (Figure 8.4). This is similar to the 10-year average of 52 thousand breeding pairs.

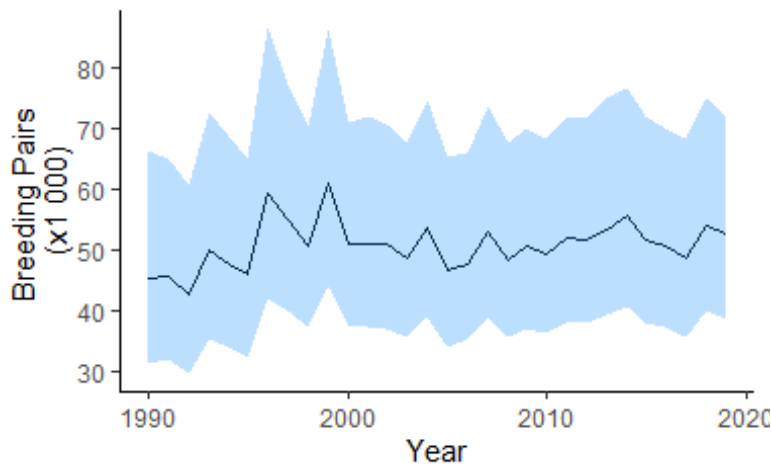


Figure 8.4: Estimated number of North Atlantic population Canada Goose breeding pairs based on integrated fixed-wing airplane and helicopter counts from the EWS.

The Atlantic population nests in 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. The Atlantic population has been monitored on the breeding ground since 1993. The breeding season survey covers the flat coastal tundra of Ungava Bay and Hudson Bay and associated taiga and inland tundra, the areas of highest densities (Malecki and Trost 1990; Rodrigue 2013; Harvey et al. 2019). The southern part of the Atlantic population range is monitored by the EWS in the Quebec boreal forest.

On the Ungava peninsula, since 1988, the Atlantic population of Canada Goose has significantly increased, but in the past five years, the population has significantly decreased. There were 120 (96-143) thousand Canada Goose breeding pairs in 2019 (Figure 8.5a). This represents a 29% decrease from the 10-year average of 168 thousand breeding pairs. The Atlantic population in Ungava is below the management objective of 225 000 breeding pairs. In the Quebec boreal forest, the Atlantic population of Canada Goose has showed no trend since 1990 and in the past five years. There were 13.6 (7.51-19.6) thousand breeding pairs in 2019 (Figure 8.5b). This represents a 42% decrease from the 10-year average of 23.4 thousand breeding pairs.

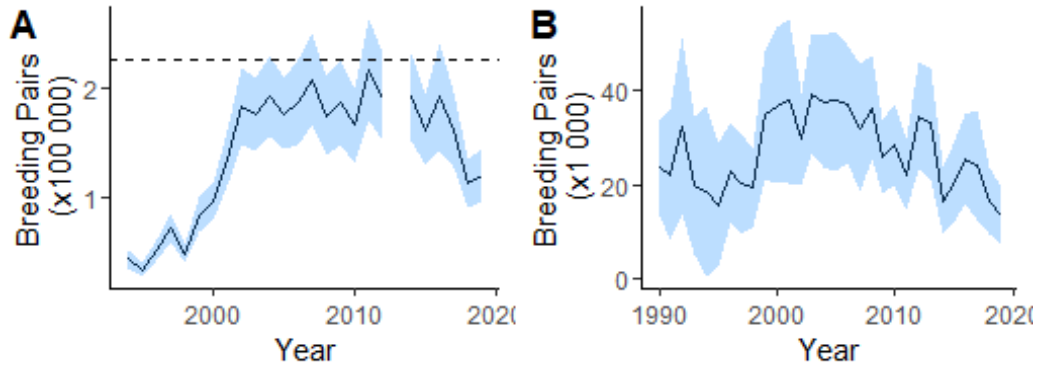


Figure 8.5: A) Estimated number of Atlantic population Canada Goose breeding pairs on the Ungava Peninsula. B) Estimated numbers of Atlantic population Canada Goose breeding pairs in the boreal forest in Quebec based on the EWS (Helicopter portion of the survey only). Black line represents the breeding pair estimate and the shaded area represents the 95% Confidence Intervals. Horizontal dashed lines represent the NAWMP goal for the survey area.

The Southern Hudson Bay population nests along western and southern James Bay, southern Hudson Bay, and in the adjacent interior lowland muskeg of Ontario and Manitoba and winters primarily in the Mississippi Flyway. Stratum 50 of the WBPBS overlaps with the Southern Hudson Bay population’s breeding range. Since 1970, the population of Canada Goose has significantly increased, but in the past five years, the population has shown no trend.

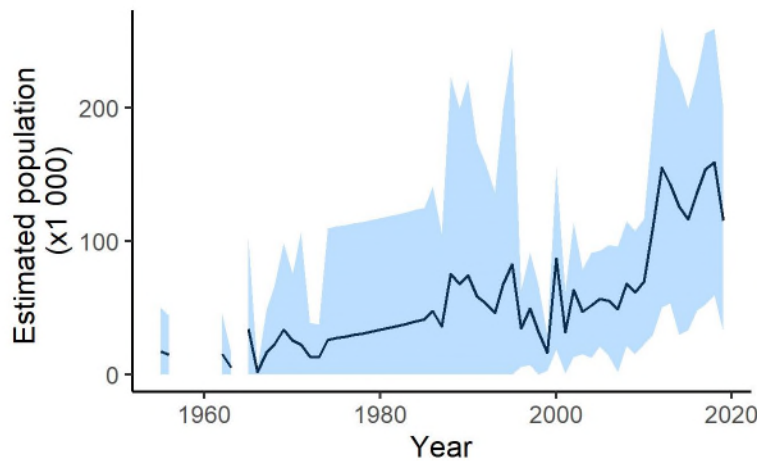


Figure 8.6: Abundance of Southern Hudson Bay lowlands population of Canada Geese in the Waterfowl Breeding Population and Habitat Survey (WBPBS) Stratum 50: black line represents the population estimate and the shaded area represents the 95% Confidence Interval.

8.2.2.1.2 Temperate Canada Geese

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 southern Quebec, temperate Canada Geese are monitored by the EWS and the St. Lawrence Lowlands Breeding Waterfowl Survey, a helicopter plot survey. Since 2004, the population of Canada Goose has significantly increased, but in the past five years, the population has showed no trend. Combining numbers obtained through these surveys, there were 11 (7.32-14.6) thousand breeding pairs of temperate Canada Geese in Quebec in 2019 (Figure 8.7a). This represents a 10% decrease from the 10-year average of 12.2 thousand breeding pairs.

In southern Ontario, temperate Canada Geese are monitored by the SOWPS. Since 1971, the population of Canada Goose has significantly increased, but in the past five years, the population has shown no trend. In 2018, there were 96.6 (64.3-129) thousand breeding pairs of Canada Geese in southern Ontario (Figure 8.7b). This represents a 12% increase from the 10-year average of 86.3 thousand breeding pairs.

Temperate Canada Geese nesting in the Prairie Parklands are monitored by the WBPHS in strata 26–40. The population of Canada Goose has significantly increased since 1970 and in the past five years. In 2019, there were 1.21 (1.05-1.36) million Canada Geese in the Prairie Parklands (Figure 8.7c). This represents a 15% increase from the 10-year average of 1.05 million geese.

Temperate Canada Geese nesting in southern British Columbia lands are monitored by the BCCPWBS. The population of Canada Goose has showed no trend since 2006 and in the past five years. In 2019, there were 30.9 (23-38.7) thousand breeding pairs of Canada Geese on the Central Plateau (Figure 8.7d). This represents a 15% decrease from the 10-year average of 36.2 thousand breeding pairs.

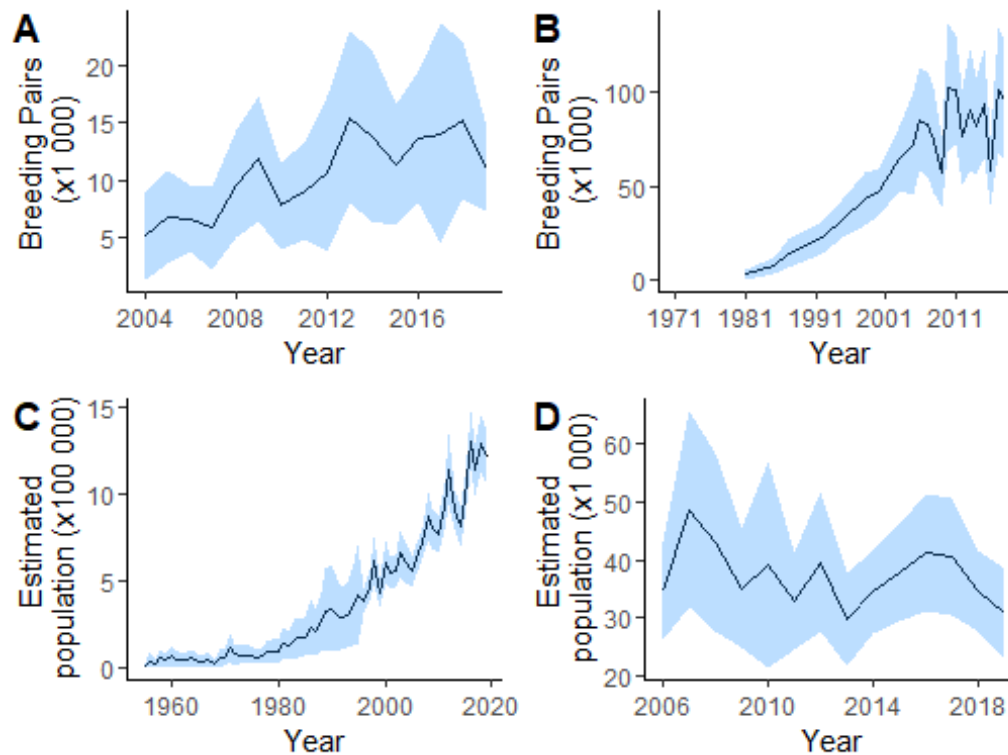


Figure 8.7: Temperate-breeding Canada Geese. A) estimated breeding pairs in southern Quebec based on the St. Lawrence Lowlands Survey and the EWS, B) estimated breeding pairs in southern Ontario based on the SOWPS, C) estimated population in strata 26-40 of the WBPHS and D) estimated population in the British Columbia Central Plateau based on the BCCPWBS; black line represents the breeding pair estimate and shaded area represents the 95% Confidence Interval.

8.2.2.2 Cackling Goose

The Lincoln method estimated that there were 2.33 (1.79-2.86) million adult Cackling Goose in 2019 (Figure 8.8). Since 1976, the population of Cackling Goose has significantly increased, but in the past five years, the population has showed no trend. This represents a 25% decrease from the 10-year average of 3.1 million birds. The Lincoln method indicates that the Mid-Continent population peaked in 2010 at 4.21 (3.05-5.37) million.

8.2.2.3 Greater White-fronted Goose

There are three populations of Greater White-fronted Goose: the Mid-continent, Tule, and Pacific populations. The Tule and Pacific populations breed in southern Alaska and winter primarily in California and are not discussed in this report. The Mid-continent population includes all White-fronted Geese that breed in Canada and interior and northern Alaska that winter in the Central and Mississippi Flyways of the U.S.

The Lincoln method estimated that there were 1.81 (1.26-2.36) million adult Greater White-fronted Goose in 2019 (Figure 8.8). Since 1975, the population of Greater White-fronted Goose has significantly increased, but in the past five years, the population has

showed no trend. This represents a 14% decrease from the 10-year average of 2.11 million birds. The Lincoln method indicates that the Arctic population peaked in 2007 at 3.08 (2.42-3.74) million.

The Midwinter Survey in the Mississippi Flyway also provides an abundance index for the Greater White-fronted Goose. This survey indicates that there were 602 thousand Greater White-fronted Goose in 2019. This represents a 49% increase from the 10-year average of 405 thousand birds.

8.2.2.4 Brant

There are four distinct populations of Brant recognized in North America: the Atlantic, Eastern High Arctic, Black, and Western High Arctic populations. The Atlantic Brant population nests on islands in the Canadian eastern low arctic and winters on the Atlantic coast from Massachusetts to North Carolina. The Eastern High Arctic population breeds on islands of Canada's eastern high arctic, and winters in Ireland; this population is not surveyed in Canada. Black Brant nest in the central and western Canadian low arctic, in Alaska, and in western Russia and winters along the Pacific Coast. Western High Arctic Brant nest on islands in the western high arctic and winter mainly in the Puget Sound, Washington.

The Lincoln method estimated that there were 106 (75-138) thousand Atlantic Brant in 2019 (Figure 8.8). Since 2000, the population of Atlantic Brant has significantly decreased, but in the past five years, the population has showed no trend. This represents a 39% decrease from the 10-year average of 174 thousand birds. The Lincoln method indicates that the Atlantic population peaked in 2013 at 0.283 (0.137-0.43) million.

Black and Western High Arctic Brant are surveyed annually during the Midwinter Survey in the Pacific. During aerial surveys, it is difficult to separate the two types of Brant that winter on the west coast of North America. However, the Midwinter Survey indicates that there were 161 thousand Brant in 2019. This represents a 2.9% increase from the 10-year average of 157 thousand birds. The Midwinter Survey indicates that the Brant population size peaked in 2012 at 177 thousand.

8.2.2.5 Tundra Swan

The Midwinter Survey provides an abundance index for the Tundra Swan. This survey indicates that there were 112 thousand Tundra Swan in 2018. This represents a 3.3% increase from the 10-year average of 108 thousand birds.

8.2.2.6 Trumpeter Swan

There are no recent surveys for Trumpeter Swan.

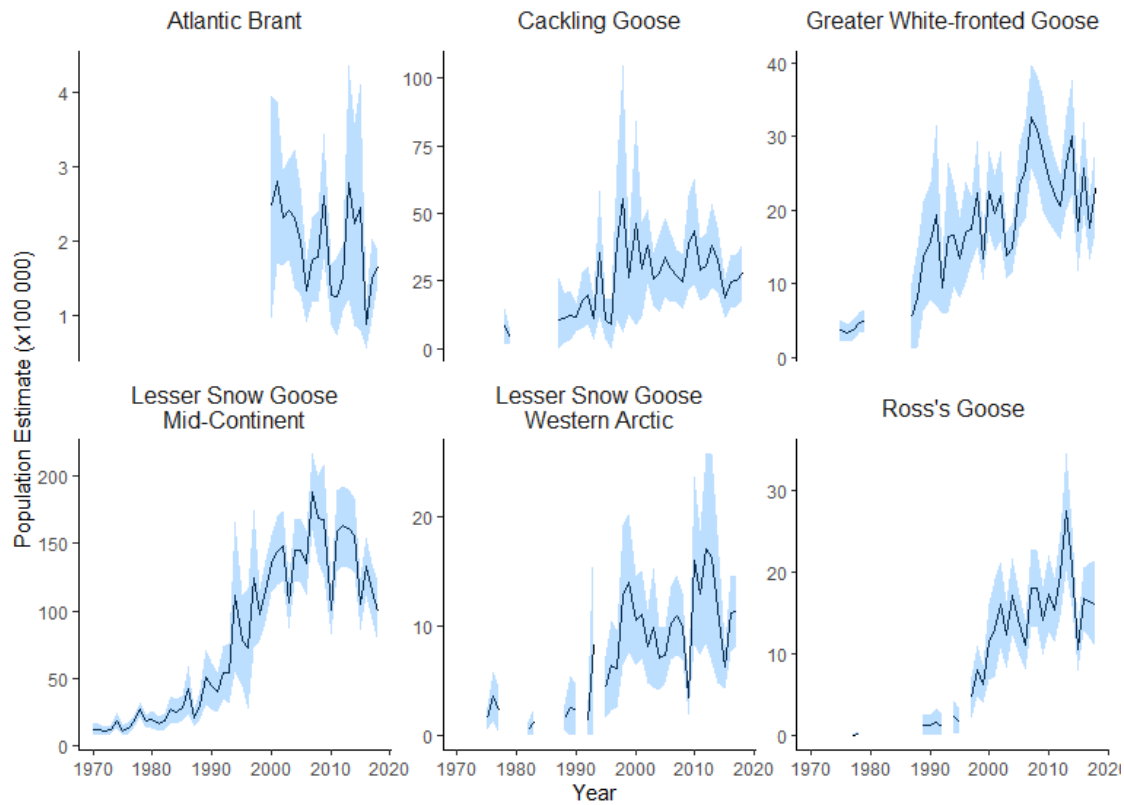


Figure 8.8: Lincoln estimates of population size for adult geese; lines represents the population estimate while the shaded area represents the 95% confidence intervals. (Source: R. Alisauskas, ECCC - S&T, unpubl. data).

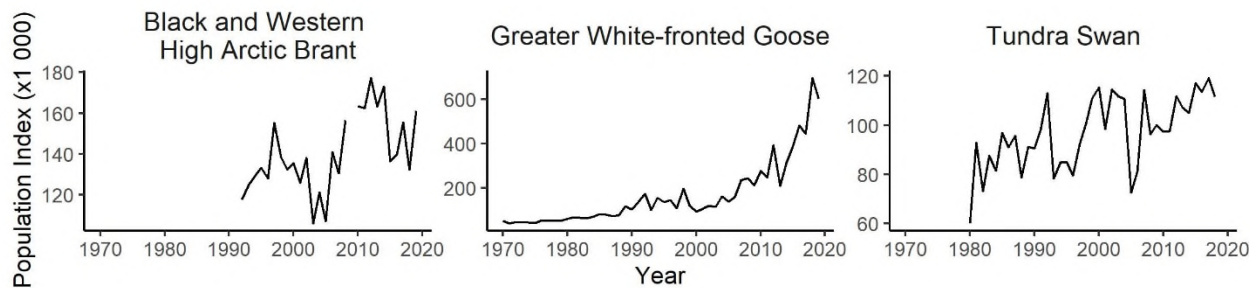


Figure 8.9: Mid-winter population index from the Mid-winter Waterfowl Survey.

8.3 Harvest of Geese and Swans

Goose harvest has not declined following declines in MGBH permit sales, instead increasing since the late 1990s. Harvest of Lesser Snow Goose has significantly decreased since first surveyed. Harvest of Canada Goose, Greater Snow Goose, and Ross's Goose has significantly increased. Harvest of Atlantic Brant, Cackling Goose, and Greater White-fronted Goose has showed no trend since first surveyed. Harvest of Greater Snow Goose has significantly

increased in the past five years. Harvest of Lesser Snow Goose has significantly decreased in the past five years. Harvest of Atlantic Brant, Cackling Goose, Canada Goose, Greater White-fronted Goose, and Ross's Goose has remained stable in the past five years. In 2019, there were 1.01 million geese harvested in Canada. Canada Goose composed 68% of the harvest, followed by Greater Snow Goose, Cackling Goose, Lesser Snow Goose, and Greater White-fronted Goose (8.3, 7.4, 7.1, and 5.8% respectively). Harvest of swans is currently prohibited in Canada, though there are hunting seasons in several Central and Atlantic Flyway states.

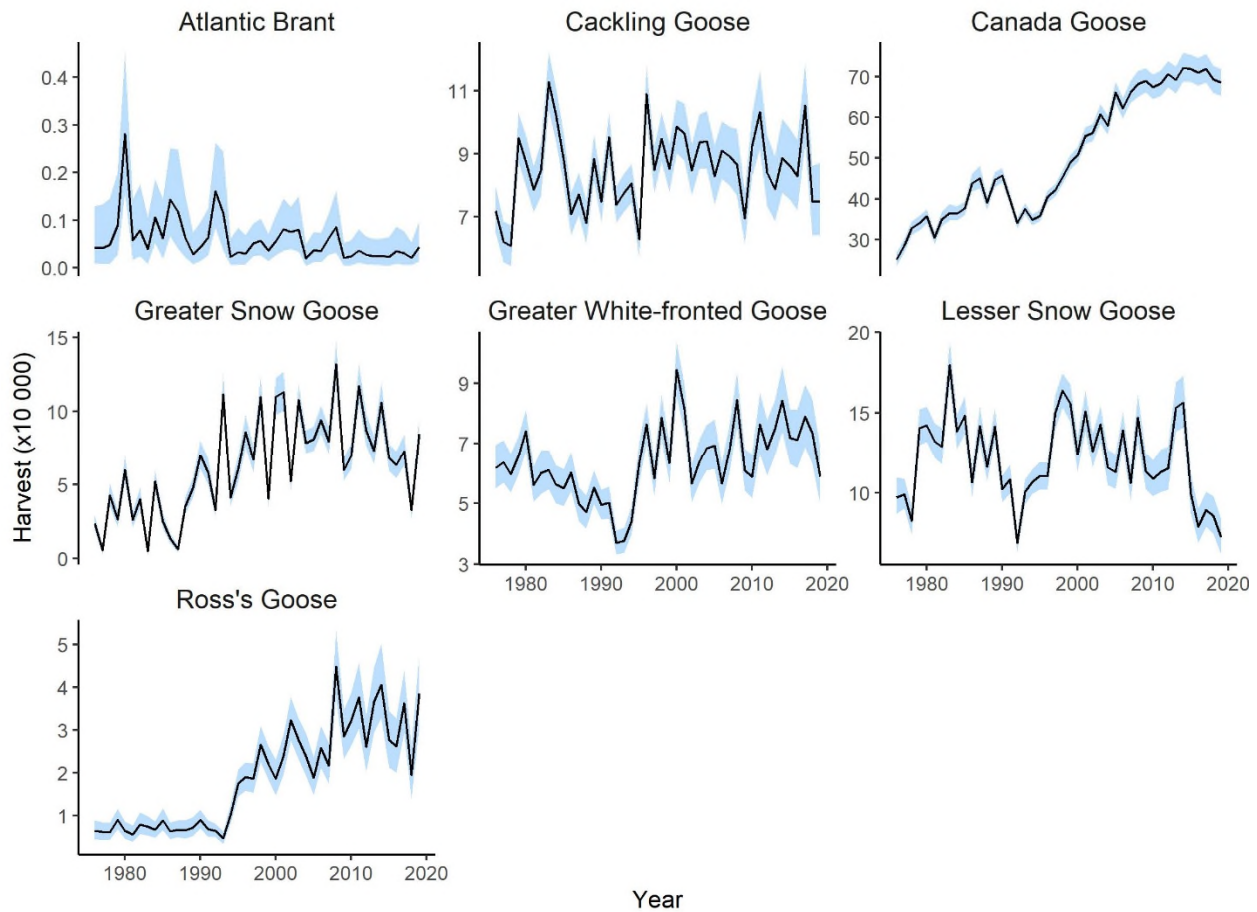


Figure 8.10: Estimated harvest in Canada of geese by species. Canadian harvest data were obtained from the National Harvest Survey (Smith, Villeneuve, and Gendron 2021).

9 Other Harvested Species

9.1 Primary Surveys for Other Harvested Species

There is no unifying survey used to monitor the population of other harvested game birds across Canada. Instead, many of these species have species-specific monitoring strategies or are monitored only at localized sites. Species-specific surveys are described along with their results.

Band-tailed Pigeon, Wilson’s Snipe, Rails and Mourning Dove are monitored by the [North American Breeding Bird Survey \(BBS\)](#). 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 and primarily focuses on landbirds.

The Great Lakes Marsh Monitoring Program (GLMMP) surveys Sora, Virginia Rail, and Common Gallinule. The GLMMP is a bi-national, long-term monitoring program that has coordinated citizen scientists throughout the Great Lakes basin of Ontario and the U.S. since 1995. The program is designed to collect information about the presence and abundance of bird and amphibian species in Great Lakes coastal and inland marshes.

9.2 Population Status of Other Harvested Species

9.2.1 Thick-billed Murre

Because of its breeding distribution, the Thick-billed Murre is not regularly surveyed by any monitoring program.

9.2.2 Common Murre

Because of its breeding distribution, the Common Murre is not regularly surveyed by any monitoring program.

9.2.3 American Woodcock

American Woodcock in North America are monitored through indices from the American Woodcock 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 American Woodcock breeding range. Currently, American Woodcock in Canada are managed based on two regions: the Eastern Management Region and the Central Management Region. In Canada, woodcock breeding in Manitoba and Ontario belong to the Central Management Region, while those breeding in Quebec and the Maritimes are part of the Eastern Management Region.

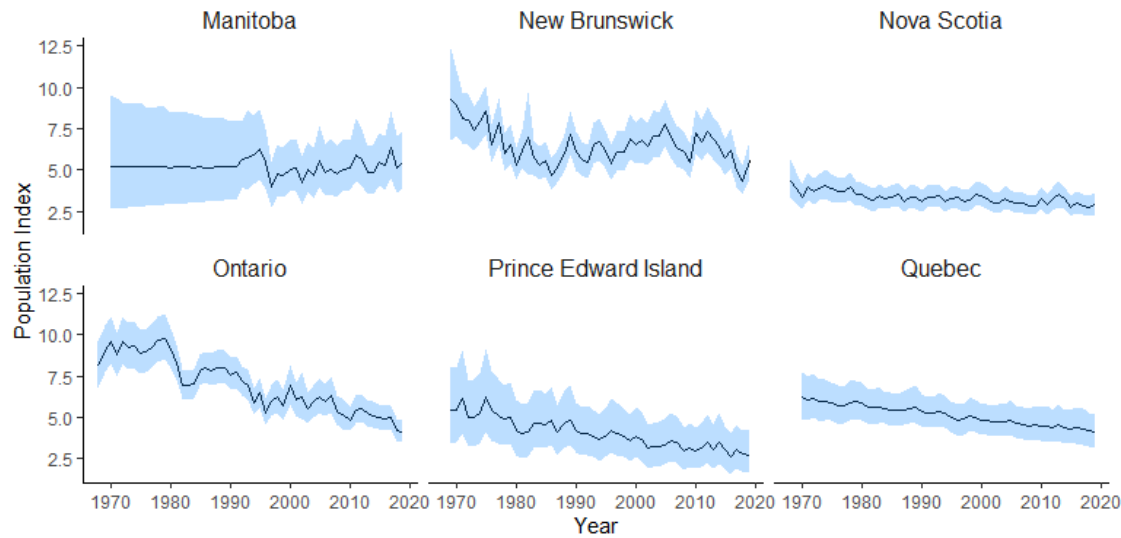


Figure 9.1: American Woodcock breeding population indices for each province; black lines represent the population estimate and blue shaded areas represents the 95% Confidence Interval (Source: Seamans and Rau 2019).

9.2.4 American Coot

In the Traditional Survey Area of the WBPHS, the population of American Coot has significantly increased since 1970 (Figure 9.2). Regionally, the populations in the U.S. Prairies showed long-term significant increases, and populations in all other regions have shown no trend. Short-term trends in the past five years indicate that the population has significantly decreased. Regionally, the populations in the U.S. Prairies showed significant short-term increases, the populations in the Canadian Prairies showed short-term significant decreases, and populations in all other regions have shown no trends. In 2019, there were 1.64 (1.28-2.01) million American Coots in the traditional survey area of the WBPHS. This represents a 43% decrease from the 10-year average of 2.88 million birds.

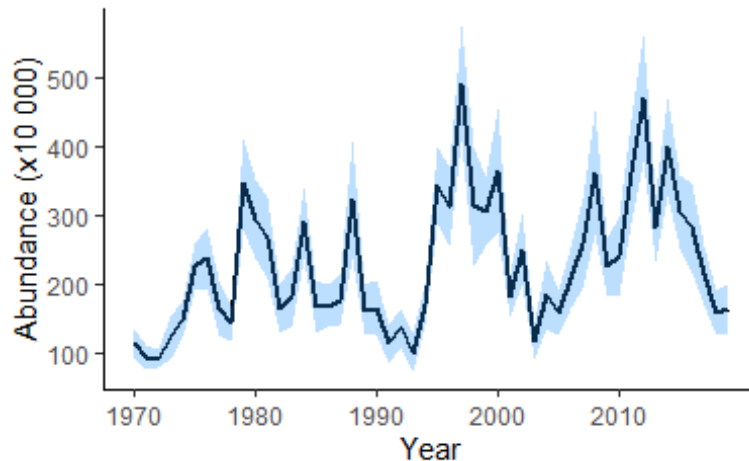


Figure 9.2: American Coot breeding population estimates based on the Waterfowl Breeding Population and Habitat Survey in Western Canada and the Northwestern U.S.. Black line represents the population estimate in the Traditional Survey Area while the shaded area represents the 95% Confidence Interval.

9.2.5 Common Gallinule

In Ontario, the GLMMP indicates that there were 0.169 (0.227-0.126) Common Gallinules per monitoring station in 2018. The population of Common Gallinule has shown no trend since 1995 and in the past five years. This represents a 49% increase from the 10-year average of 0.114 birds per station. (Figure 9.4).

9.2.6 Mourning Dove

The Mourning Dove is monitored through the BBS (Figure 9.5). Across the Canadian range, Mourning Dove has shown no trend in the short-term (2009-2019) and has significantly increased in the long-term (1970-2019). Since 1970, populations in New Brunswick, Newfoundland and Labrador, Ontario, Quebec, and Saskatchewan have significantly increased, populations in British Columbia have significantly decreased, and populations in Alberta, and Manitoba have been stable. In the short-term, populations in Alberta, Manitoba, and Saskatchewan have significantly increased, populations in Ontario, and Quebec have significantly decreased, and populations in British Columbia, New Brunswick, and Newfoundland and Labrador have been stable.

9.2.7 Wilson's Snipe

The Wilson's Snipe is monitored through the BBS (Figure 9.5). Across the Canadian range, Wilson's Snipe has shown no trend in the short-term (2009-2019) and long-term (1970-2019). Since 1970, populations in Manitoba and Saskatchewan have significantly increased, populations in New Brunswick have significantly decreased, and populations in Alberta, British Columbia, Newfoundland and Labrador, Northwest Territories, Ontario, Quebec, and Yukon have been stable. In the short-term, populations in Alberta, and Saskatchewan have significantly increased, populations in New Brunswick have significantly decreased,

and populations in British Columbia, Manitoba, Newfoundland and Labrador, Northwest Territories, Ontario, Quebec, and Yukon have been stable.

9.2.8 Sandhill Crane

There are three Sandhill Crane populations in Canada (the Central Valley Population, the Mid-continent Population and the Eastern Population). The Central Valley Population primarily breeds in California, but its range extends to the lower Fraser Valley and northern Vancouver Island in British Columbia. There are no surveys to monitor the Canadian portion of this population.

The Mid-continent Population breeds across Canada from eastern British Columbia to northern Ontario, south from the Prairies and north to Siberia, Alaska, the Yukon, Northwest Territories and Nunavut; approximately two-thirds of the population are Lesser Sandhill Cranes (*Grus canadensis canadensis*), and the remainder, Greater Sandhill Cranes (*G. c. tabida*) (Rhymer et al. 2001; Jones et al. 2005). 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 2019). The population of Mid-continent Sandhill Crane has significantly increased since 1982 and in the past five years. The photo corrected population index in 2019 was 946 thousand Sandhill Cranes, which was 6% lower than 2018 and the photo-corrected three-year average (2017–2019) is 840 thousand birds (Figure 9.3a). This represents a 50% increase from the 10-year average of 631 thousand cranes.

The Eastern Population of Sandhill Crane breeds from central Quebec through eastern Ontario and down to the lower Great Lakes. This population is monitored by the fall index survey of migratory staging areas in the Mississippi and Atlantic Flyways. The Eastern population of Sandhill Crane has both significantly increased since 1979 and in the past five years (Seamans 2021). In 2020, there were 94.9 thousand Sandhill Cranes surveyed (Figure 9.3b). This represents an 11% increase from the 10-year average of 85.2 thousand.

In Quebec, the EWS monitors a large breeding area of Sandhill Cranes . The Quebec population of Sandhill Crane has significantly increased since 1990 and in the past five years. In 2019, there were 9.2 (4.2-14.2) thousand Sandhill Crane breeding pairs surveyed (Figure 9.3c). This represents a 76% increase from the 10-year average of 5.21 thousand breeding pairs.

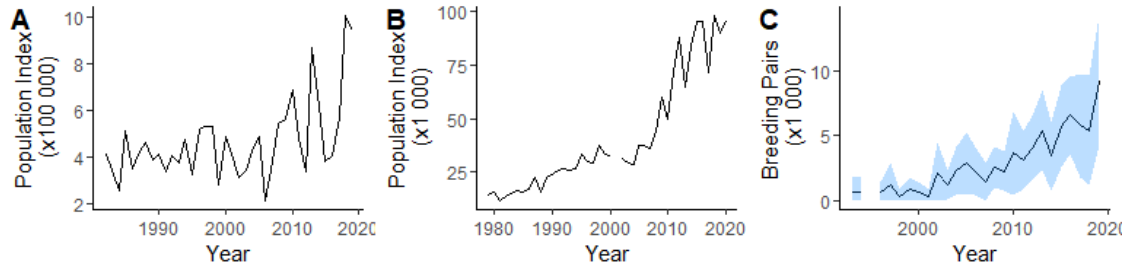


Figure 9.3: Sandhill Crane populations A) Spring population indices for Mid-continent Sandhill Cranes in their spring staging areas (e.g. Central Platte River Valley, Nebraska and Adjacent Areas) (Source: Dubovsky 2019). B) Fall population indices for Eastern Sandhill Cranes in their fall staging areas (Source: Seamans 2021). C) Breeding pairs in Quebec based on the EWS; (Estimates are based on helicopter plot survey only; Source: C. Lepage, CWS-Quebec Region, unpubl. data). In panels A and B, black line represents the population index. In panel C, black line represents the breeding pair estimate and the shaded area represents the 95% Confidence Interval.

9.2.9 Band-tailed Pigeon

The Band-tailed Pigeon is monitored through the BBS (Figure 9.5). In Canada, the Band-tailed Pigeon is found only in British Columbia. Since 1970, populations in British Columbia have significantly decreased. In the short term, populations in British Columbia have been stable.

9.2.10 Sora

In Ontario, the GLMMP indicates that there were 0.09 (0.129-0.063) Soras per monitoring station in 2018. The population of Sora has shown no trend since 1995 and in the past five years. This represents a 23% decrease from the 10-year average of 0.117 birds per station (Figure 9.4).

9.2.11 Virginia Rail

In Ontario, the GLMMP indicates that there were 0.25 (0.303-0.207) Virginia Rails per monitoring station in 2018. The population of Virginia Rail has shown no trend since 1995 and in the past five years. This is similar to the 10-year average of 0.248 birds per station (Figure 9.4).

The Virginia Rail is also monitored through the BBS (Figure 9.5). Across the Canadian range, Virginia Rail has shown no trend in the short-term (2009-2019) and long-term (1970-2019). Since 1970, populations in British Columbia, Manitoba, Ontario, Quebec, Saskatchewan, and Alberta have been stable. In the short-term, populations in British Columbia, Manitoba, Ontario, Quebec, Saskatchewan, and Alberta have been stable.

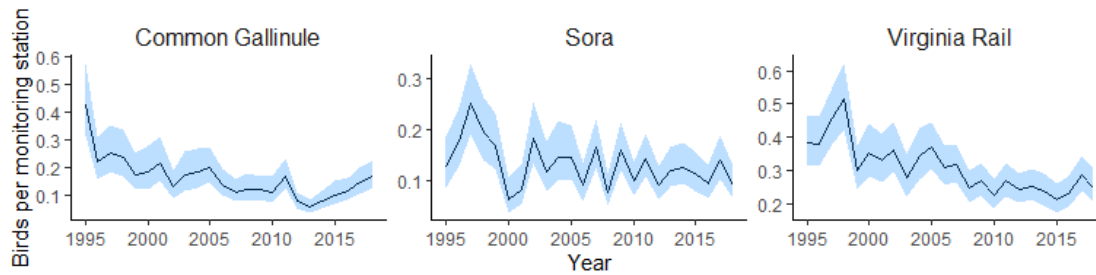


Figure 9.4: Population indices for the Common Gallinule, Sora, and Virginia Rail based on the Great Lakes Marsh Monitoring Program in Ontario; black line represents the population estimate while the shaded area represents the 95% Confidence Intervals.

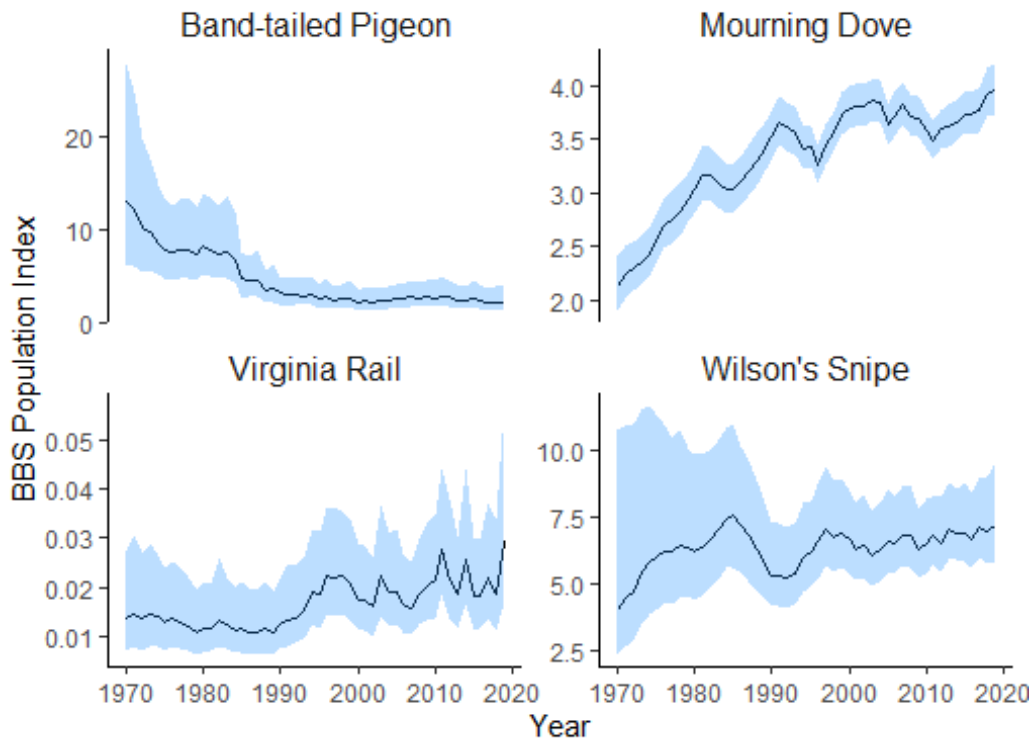


Figure 9.5: Canada-wide population indices for the Band-tailed Pigeon, Wilson's Snipe, Virginia Rail, and Mourning Dove based on the Breeding Bird Survey; black line represents the population index while the shaded area represents the 95% Credible Intervals.

9.3 Harvest of Other Harvested Species

Annual harvest of American Coot, American Woodcock, Band-tailed Pigeon, and Wilson's Snipe has decreased since the 1970s (Figure 9.6). Harvest of the Sandhill Crane has significantly increased over the long-term. Harvest of American Coot, American Woodcock, Band-tailed Pigeon, and Wilson's Snipe has significantly decreased since first surveyed. Harvest of American Woodcock has significantly decreased in the past five years. Harvest of American Coot, Band-tailed Pigeon, Sandhill Crane, and Wilson's Snipe has remained stable over this period. In 2019, there were 2.95 (2.12-4.14) thousand American Coots, 16.1 (12.4-21.5) thousand Sandhill Cranes, 239 (108-426) Band-tailed Pigeons, 2.99 (2.13-4.34)

thousand Wilson’s Snipes, and 20.6 (17.9-23.5) thousand American Woodcocks harvested in Canada.

Mourning Dove harvest has significantly increased over the long-term, following the establishment of open seasons in Ontario in 2013 and Quebec in 2016; previously only British Columbia had an open season. In the past five years, Mourning Dove harvest has showed no trend. In 2019, there were 22.9 (17.4-30.1) thousand Mourning Dove harvested in Canada, primarily in Ontario.

There is no data for murre harvest prior to 2013, although harvest restrictions implemented in the mid-1990s appear to have reduced the annual harvest from approximately 750 thousand murre to approximately 250 thousand by the early 2000s (Chardine et al. 1999). In 2019, there were 21.9 (16.3-28.4) thousand Common Murres, and 37.9 (29.4-48.0) thousand Thick-billed Murres harvested in Canada.

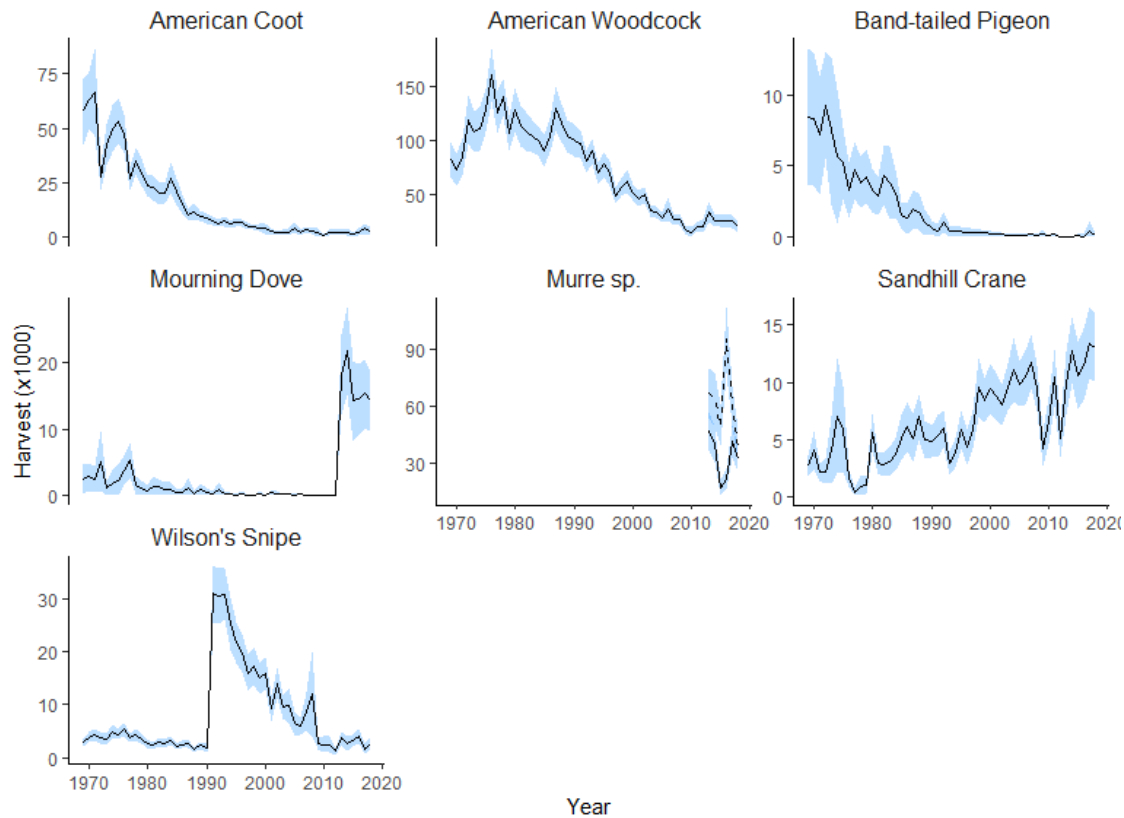


Figure 9.6: Estimated harvest in Canada of other hunted species by species. Canadian harvest data were obtained from the National Harvest Survey (Smith, Villeneuve, and Gendron 2021). For murre species, the solid line represents harvest of Thick-billed Murre and the dashed line represents harvest of Common Murre.

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11 Appendix A

11.1 Breeding Population Estimates and Trends of Ducks from the EWS

Table 11.1: Breeding population estimates (in thousands) with 95% credible intervals (CI) and trend estimates in the core survey area of the Eastern Waterfowl 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 ($p < 0.05$) are indicated with a star [].*

Species	2019 Breeding Population Estimate	5-yr Trend	1990 to 2019 Trend
American Black Duck	563 (486-648)	-0.6 (-3.26-2.2)	-0.16 (-0.59-0.2)
American Wigeon	13.5 (0-27.1)	1.27 (-7.23-12.2)	0.79 (-1.42-3)
Black Scoter	40.7 (0-110)	4.35 (-31.45-52.7)	13 (6.85-20.03)*
Bufflehead	17.3 (5.2-29.5)	-7.68 (-25.77-14.5)	-2.71 (-4.97- -0.33)*
Common Goldeneye	224 (151-297)	-0.91 (-6.64-3.9)	0.06 (-1.09-1)
Common Merganser	322 (235-408)	15.5 (6.27-25.69)*	2.09 (0.99-3.19)*
Greater Scaup	12 (0-34.3)	-7.97 (-35.58-24.3)	-0.28 (-4.77-3.9)
Green-winged Teal	195 (144-258)	-0.73 (-4.72-2.6)	-0.13 (-0.92-0.5)
Hooded Merganser	235 (185-284)	2.65 (-1.36-6.4)	2.9 (2.23-3.64)*
Mallard	365 (216-552)	0.63 (-4.25-4.4)	0.92 (-0.18-2)
Mergansers	489 (399-594)	1.98 (-0.92-6.2)	0.69 (0.16-1.31)*
Red-breasted Merganser	19.2 (0.901-37.6)	2.65 (-1.36-6.4)	2.9 (2.23-3.64)*
Ring-necked Duck	504 (382-656)	-0.02 (-3.04-2.6)	0.3 (-0.33-0.8)
Scaups	0.476 (0-1.41)	-20.2 (-44.8-9.7)	-6.85 (-11.77- -2.32)*
Surf Scoter	130 (37.3-222)	1.11 (-11.8-12.8)	2.69 (-0.18-5.1)
White-winged Scoter	0 (0-0)	16.9 (-40.86-106.1)	6.2 (-6.65-20.1)

11.2 Breeding Population Estimate and Trends of Game Birds from the WBPBS

Table 11.2: Breeding population estimates (in thousands) with 95% confidence intervals (CI) and trend estimates for the Traditional Survey area of the Waterfowl Breeding Population and Habitat Survey of Western Canada and the Northwestern U.S.. Trends are expressed as an annual percentage change. Significant trends ($p < 0.05$) are indicated with a star [*].

Species	2019 Breeding Population Estimate	5-yr trend	1970 to 2019 trend
American Coot	1640 (1280-2010)	-13.6 (-19.2- -4.54)*	0.94 (0.4-1.79)*
American Wigeon	2830 (2410-3260)	-1.62 (-4.52-1.2)	-0.25 (-0.51-0)
Blue-winged Teal	5430 (4800-6050)	-9.1 (-11.92- -6.11)*	0.47 (0.21-0.74)*
Bufflehead	1150 (962-1350)	-0.3 (-2.59-1.9)	1.51 (1.26-1.76)*
Canvasback	652 (556-748)	-2.42 (-5.87-1.1)	0.42 (-0.17-0.8)
Common Goldeneye	663 (492-834)	1.55 (-4.02-7.5)	0.7 (0.17-1.25)*
Gadwall	3260 (2920-3600)	-3.21 (-6.1- -0.46)*	1.59 (1.32-1.85)*
Green-winged Teal	3180 (2820-3540)	-3.58 (-7.06-0)	0.93 (0.66-1.22)*
Mallard	9420 (8870-9980)	-3.8 (-5.35- -2.29)*	0.12 (-0.04-0.2)
Mergansers	663 (484-842)	-1.98 (-9.41-5.1)	1.72 (1.2-2.25)*
Northern Pintail	2270 (2030-2510)	-5.09 (-8.1- -2.12)*	-1.88 (-2.13- -1.62)*
Northern Shoveler	3650 (3320-3980)	-3.22 (-5.84- -0.52)*	1.17 (0.95-1.4)*
Redhead	732 (607-857)	-8.96 (-12.79- -4.99)*	0.72 (0.36-1.07)*
Ring-necked Duck	1540 (1230-1850)	-3.79 (-5.33- -2.22)*	0.13 (-0.04-0.2)
Ruddy Duck	515 (385-645)	-8.12 (-14.01- -2.34)*	1.22 (0.56-1.8)*
Scaups	3590 (3190-4000)	-2.57 (-4.78- -0.35)*	-0.72 (-0.92- -0.52)*

11.3 Breeding Population Estimate and Trends in Ducks from the BCCPWBS

Table 11.3: Number of breeding pairs (in thousands) with 95% credible intervals (CI) and trend estimates in the Central Plateau of British Columbia from the BCCPWBS. Trends are expressed as an annual percentage change. Significant trends ($p < 0.05$) are indicated with a star [*].

Species	2019 Breeding Population Estimate	5-yr Trend	2006 to 2019 Trend
American Wigeon	24.6 (14-35.2)	7.01 (-5.01-21.3)	-0.38 (-3.97-3.5)
Blue-winged Teal	5.32 (2.38-8.26)	-6.2 (-19.81-8.4)	1.11 (-3.64-5.7)
Bufflehead	52 (42.2-61.9)	3.63 (-1.36-9.1)	0.31 (-1.17-1.7)
Canada Goose	30.9 (23-38.7)	-1.7 (-7.58-2.5)	-0.56 (-2.39-1.2)
Canvasback	0.244 (0.00374-0.484)	-7.56 (-24.65-19.5)	-11.1 (-17.31- -4.3)*
Gadwall	4.79 (0.812-8.77)	-1.75 (-14.21-11.8)	-1.66 (-6.11-3)
Goldeneyes	18.3 (14.1-22.5)	-2.52 (-7.16-0.8)	-1.87 (-3.49- -0.25)*
Green-winged Teal	63 (40.5-85.4)	10.7 (0.5-21.77)*	2.24 (-0.59-5.2)
Long-tailed Duck	1.14 (0-3.33)	-0.37 (-30.08-31.8)	2.59 (-11.18-18.6)
Mallard	74.5 (59.8-89.2)	-1.32 (-5.93-3.3)	-1.91 (-3.52- -0.35)*
Mergansers	11 (7.11-14.9)	0.47 (-5.56-7.2)	-0.58 (-2.74-1.5)
Northern Pintail	2.95 (1.06-4.85)	1.82 (-16.72-22.1)	-3.18 (-8.75-2.4)
Northern Shoveler	17.4 (9.68-25.1)	4.58 (-7.76-16.7)	6.25 (2.48-10)*
Redhead	0.61 (0-1.43)	-3.01 (-28.22-20.1)	5.45 (-2.85-14.2)
Ring-necked Duck	87.9 (66.6-109)	8.1 (0.69-16.45)*	0.21 (-1.61-2.1)
Ruddy Duck	3.99 (1.26-6.73)	-3.97 (-16.84-11.6)	-4.75 (-10.35-1.2)
Scaups	52.3 (21.9-82.6)	2.31 (-5.41-14)	-0.25 (-3.32-3.1)
Scoter	11.8 (4.53-19.1)	6.97 (-9.42-23.9)	11.5 (6.25-16.85)*

11.4 Breeding Population Estimate and Trends in Geese and Ducks from Lincoln Estimates.

Table 11.4: Estimated population (in thousands) with 95% credible intervals (CI) and trend estimates based on Lincoln estimates. Trends are expressed as an annual percentage change. Significant trends ($p < 0.05$) are indicated with a star [*]. Data presented up to 2019 for all geese species, and up to 2020 for Wood Duck.

Species	Region	Breeding Population Estimate	5-yr Trend	Long-term Trend
Atlantic Brant		106 (74.7-138)	-10.7 (-21.8 - 0.2)	-3.35 (-5.58 - -1.17)*
Cackling Goose		2330 (1790-2860)	3.33 (-4.33 - 11.3)	4.64 (3.89 - 5.36)*
Greater Snow Goose		647 (269-1020)	-10.4 (-23.79 - 4)	6.5 (5.09 - 7.9)*
Greater White-fronted Goose	Arctic	1810 (1260-2360)	-1.88 (-9.49 - 6.3)	3.85 (3.07 - 4.64)*
Lesser Snow Goose	Mid-Continent	7230 (5890-8580)	-10.3 (-15.33 - -5.06)*	4.41 (3.82 - 5.02)*
Lesser Snow Goose	Western Arctic	1090 (768-1410)	10.1 (-0.13 - 21.1)	3.61 (2.74 - 4.52)*
Ross's Goose		1590 (1150-2030)	4.62 (-3.67 - 13.6)	8.85 (6.58 - 11.26)*
Wood Duck	Eastern	4710 (4190-5240)	23.1 (18.74 - 27.7)*	5.17 (4.77 - 5.55)*
Wood Duck	Western	58.2 (24.2-92.2)	5.57 (-6.32 - 18.4)	4.36 (3.29 - 5.5)*