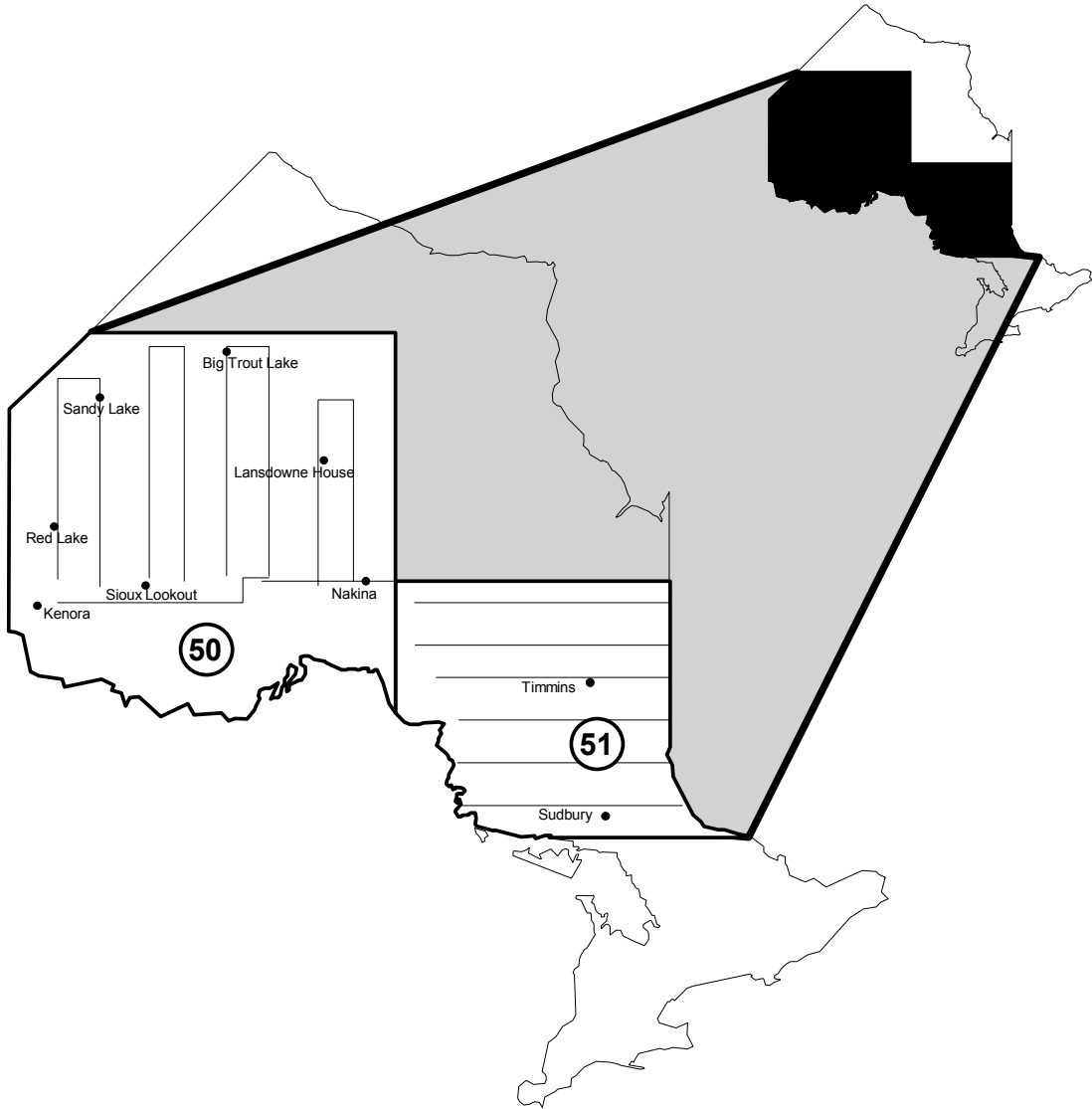


WESTERN AND CENTRAL ONTARIO

Waterfowl Breeding Population Survey

2004



The data presented in this report are preliminary. Final estimates are available from the U.S. Fish and Wildlife Service, Office of Migratory Bird Management, Patuxent Wildlife Research Center, Laurel, Maryland 20708-4016.

TITLE: Waterfowl Breeding Population and Habitat Survey for
Western and Central Ontario

STRATA SURVEYED: 50 - Western Ontario
51 - Central Ontario

DATES: 13 May – 04 June 2004
16 May – 21 May: Central Ontario
22 May – 02 June: Western Ontario

DATA SUPPLIED BY: United States Fish and Wildlife Service (USFWS)

AERIAL CREW:
Pilot/Observer Karen S. Bollinger, Flyway Biologist, USFWS
Pilot/Observer William I. Butler Jr., Service Aviation Manager, USFWS

ABSTRACT: The 2004 Waterfowl Breeding Population and Habitat Survey of Western and Central Ontario was conducted from 13 May to 04 June. Survey design was consistent with previous years and coverage complete. Even though spring phenology was late and water levels were high in 2004, waterfowl nesting conditions were judged to be good in this boreal forest habitat. In Western Ontario, the estimate for total duck populations was the third highest on record (1.7 million) and 101% above the long-term mean (1955-2003). In contrast, the estimate for total duck populations in Central Ontario was only slightly above the 14-year mean (7.0%); this 14-year mean encompasses the time interval since this survey was initiated in 1990. Estimates for the major dabbling species observed (mallard, black duck, and green-winged teal) were up in both strata in comparison to 2003 and to the 10-year and long-term means (with one exception). Trends among species of divers and miscellaneous ducks were not as consistent, however; variation existed among species and between strata.

Data for the major species in these two strata are presented below:

Western Ontario - Stratum 50

	2004 Indices (thousands)	Percent Change From		
		2003	1994-2003 mean (10 yr)	1955-2003 mean
Mallard	530.0	19.4	115.1	129.9
Black Duck	63.8	166.7	116.1	150.2
Green-winged Teal	45.0	13.8	8.5	63.6
Ring-necked Duck	358.1	2.2	19.3	241.3
Goldeneyes	74.4	73.4	-62.4	-38.4
Bufflehead	11.1	53.4	-27.7	-45.4
Scoters	36.3	855.5	57.9	174.7
Mergansers	551.1	-17.3	55.3	216.5

Central Ontario - Stratum 51

	2004 Indices (thousands)	Percent Change From		
		2003	1990-2003 mean (14 yr)	1955-2003 mean
Mallard	170.7	22.1	118.3	n.a.
Black Duck	56.5	37.5	3.3	n.a.
Green-winged Teal	25.9	20.5	-21.8	n.a.
Ring-necked Duck	122.2	31.8	-0.4	n.a.
Goldeneyes	15.1	-38.2	-83.1	n.a.
Bufflehead	3.9	-20.0	-75.9	n.a.
Scoters	4.2	n.a.	86.1	n.a.
Mergansers	170.3	10.8	51.0	n.a.

METHODS: The procedures used in conducting this year's annual survey are described in the *Standard Operating Procedures for Aerial Waterfowl Breeding Population and Habitat Surveys in North America*, Section III, revised 1987. Survey design was consistent with previous years and coverage of both strata was complete (Table 1.)

Western Ontario (Stratum 50), as part of the traditional Breeding Waterfowl and Habitat Survey, was first surveyed in 1955. This area continued to be surveyed annually through 1973, except for 1971. After a lapse of 12 years, this survey was resumed in 1986 and has continued annually to the present. Surveys in Central Ontario (Stratum 51) were not initiated until 1990, however. Expansion of this survey was in response to initiatives of the Black Duck Joint Venture (under the North American Waterfowl Management Plan). 2004 marks the 37th and 15th year of surveys to determine breeding waterfowl population numbers in Western and Central Ontario, respectively.

Both waterfowl and habitat data were collected using an aerial onboard computerized recording system. The survey program, written by John I. Hodges (Hodges and Thorpe, 2002), provided the basis for both recording observations and transcribing the data into electronic format. The software integrated each bird observation with point locations from the Global Positioning System unit (GPS) in the aircraft; thus allowing each observation to be matched with lat/long position in the resulting database.

Aerial surveys by fixed wing aircraft are known to not provide complete counts. In order to account for those birds missed, visibility correction factors (VCF's) are applied to the raw survey data in attempts to obtain more accurate estimates. In this survey area, these correction factors are based on comparisons of observations made from fixed wing (i.e., this survey) with those made from a helicopter (where visibility rates are assumed to be higher and counts more complete). Data from 23 segments flown by both media during previous years in Central Ontario were used in applying VCF's to this year's data. The missing data during the 13 years that the survey was not flown in Western Ontario also presents a challenge. In order to address this, estimates were obtained for those years by imputing the data. The Bayesian statistics used in calculating the VCF's and of how the imputed data was calculated are explained in "*A critical review of the aerial and ground surveys of breeding waterfowl in North America*" (Smith 1995).

The aerial survey crew was the same as in 2003 – Karen Bollinger and Bill Butler. Both are pilot biologists, and flying duties during the survey were shared. Bill has flown this survey area for the past nine years; and this was the second year that Karen surveyed in Western and Central Ontario. Karen has had experience in flying these May surveys since 1999, however; having flown in the Western Dakotas, Montana, Saskatchewan, and Manitoba.

On 13 May, the crew departed Maryland enroute to the survey area in N729, a Cessna 206 amphibian aircraft. The survey was begun in Central Ontario, Stratum 51, on 16 May. The Central Ontario survey was completed in 21.7 hrs of flight time over a six day period ending on 21 May. The survey continued in Western Ontario, Stratum 50, on 22 May. The Western Ontario survey was completed in 34.0 hrs of flight time over a 12 day period ending on 02 June. Upon completion of the survey, N729 was ferried back, reaching her home base, Easton, Maryland on 4 June. The entire survey, including transit time, took 23 days and a total of 70.0 flight hours (compared to 16 days and 70.5 flight hours in 2003). Pre and post survey ferry flight time totaled 5.8 and 8.5 hrs, respectively. During the 23 day interval of the survey, nine days were spent on the ground; six due to adverse weather and three for scheduled maintenance (100 hr inspection). Two of those three maintenance days would have also been weather days, however.

WEATHER AND HABITAT:

Description of Area: Strata 50 & 51, located in Western and Central Ontario, respectively, (see figure on cover sheet) can be characterized mainly as boreal forest habitat. Numerous lakes, as well as streams, marshes, and muskegs, occur throughout the area. The somewhat rugged terrain, characteristic of the southwestern part of stratum 51, blends into more rolling terrain as one moves north in both strata. Elevations of up to 2000 ft in the south gradually decrease to below 1000 ft in the north; in this northern area rivers begin flowing north into Hudson Bay. Visible human impacts, seen mainly in the southern part of this boreal forest landscape, include agricultural, mining, and logging operations. Farmland is present in the clay belt of east central stratum 51 and in the southwestern part of stratum 50. Mining is most extensive in the southern half of stratum 51, but limited operations do extend farther north and into stratum 50. Extensive logging occurs throughout stratum 51 and in the southern one-third of stratum 50. Fire also plays a dominant role in the ecosystem of the area. The entire area is a mosaic of various aged forest stands, resulting from both logging and fire. Human population, which is sparse throughout the area, becomes even more so the farther north one goes. The northern two-thirds of strata 50, relatively free of roads and of human presence, except for small native villages, does, however, support a major fly-in fishing industry.

The juxtaposition of strata 50 and 51 and the transect lines within these strata is illustrated in the figure on the cover of this report. As one would expect, survey coverage begins in the southern part of stratum 51. The east-west oriented transect lines in this stratum allows the survey to follow spring breakup as it advances north. From stratum 51, coverage then logically continues along the southern east-west oriented transect line (#1) in stratum 50. The north-south orientation of the remaining four transects in stratum 50, make it difficult to fly the remaining part of the survey at the same stage of breakup. The potential exists for wetland habitats to be open in the southern segments, while those located farther north can still be frozen.

During the May 2004 survey, water levels were found to be high in both rivers and lakes, and spring phenology was observed to be late. Throughout the survey, trees had not budded or were just starting to bud out. Scattered snow patches were present from the northern part of stratum 51 (transect 6), and throughout all of stratum 50 ($\geq 49^{\circ}50'N$); these patches were remnants of a late snow that fell in early May. All lakes in stratum 51 were completely ice free, except for a few, located on the most northern transect (#6), that had some black ice. While all smaller lakes and wetland areas were open in stratum 50, many of the larger lakes in the northern part ($\geq 52^{\circ}50'N$ latitude) were mostly frozen (Fig. 1). Most of these frozen lakes, except Big Trout Lake, had at least some open areas around the shore and the ice appeared as if it would soon melt (i.e., black rotten). The ice on Big Trout Lake was still solid white, however.

In attempts to understand the habitat conditions observed, precipitation and temperature records for the past year were reviewed on Environment Canada's web site (2004a, 2004b, and 2004c). The wet spring conditions observed seemed to be true for most of the Northeastern Forest Region in Canada (Ontario, Quebec, and Newfoundland), as this area was found to rank the 3rd wettest (25.4% above average) during the past 57

years (Environment Canada 2004a). Weather specific to each strata was obtained by compiling monthly averages from weather observations at stations located in each. Observations from eight stations in stratum 50 (Big Trout Lake, Dryden, Ear Falls, Geraldton, Kenora, Pickle Lake, Red Lake, and Sioux Lookout) and nine stations in stratum 51 (Chapleau, Earleton, Elliot Lake, Kakuskasing, North Bay, Sault Ste. Marie, Sudbury, Timmins, and Wawa) were used to compile monthly averages and interpret trends (Environment Canada 2004b). The late spring phenology seemed to have resulted mainly from lower than normal temperatures in April and May; as temperatures during the winter (December through March) were significantly higher than normal, except for January (see below). The high water levels observed appeared to reflect the abundant snowfall and rainfall received during May, which followed a mostly average or slightly higher precipitation trend over the winter (especially January and March).

Western Ontario:

	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>
Mean Temp. (°C)								
Diff from Normal	+0.4	-0.5	+5.7	-3.2	+4.3	+1.5	-0.4	-3.4
% of Normal Snowfall	115	70	101	205	88	191	23	875
% of Normal Precipitation	92	58	104	175	66	190	75	271

Central Ontario

	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>
Mean Temp. (°C)								
Diff from Normal	-0.4	+1.7	+3.8	-5.0	+3.3	+2.0	-0.8	-1.4
% of Normal Snowfall	99	108	128	109	113	123	47	345
% of Normal Precipitation	94	131	115	90	88	139	110	144

Habitat conditions and timing of the survey, except for the most northern segments, appeared to be good to very good, especially for early nesting dabblers. Most ducks were observed as singles and pairs. However, above 52°N latitude, where many of the larger lakes were mostly frozen, several large flocks of divers were observed, even though most of the smaller lakes in this same area were completely open.

BREEDING POPULATION ESTIMATES

Stratum 50:

The total duck population estimate for Western Ontario increased 6.0% from the 2003 estimate, and was 35.6% and 101.1% above the 10-year mean and long-term means, respectively (Table 2, Figure 2, Appendix 1).

The total dabbling duck population estimate was moderately higher than in 2003 (24.7%), and substantially higher in comparison to both the 10-year and long-term means (91.9% and 102.3%, respectively). Mallards, American black ducks, and American green-winged teal make up almost all the dabbling ducks observed (>97% in the last two years). Only moderate increases in both mallards and green-winged teal estimates over 2003 estimates were observed (19.4%, 13.8%, respectively). Black duck estimates, however, were more than double 2003 estimates (166.7%). 2004 estimates for both mallards and black ducks in Western Ontario were the highest recorded during the survey's history; and as a result, estimates for both species were substantially above their 10-year (115.1%, 116%, respectively) and long-term means (129.9%, 150.2%, respectively). 2004 estimates for American green-winged teal rank 10th in the 50 year survey period. Higher numbers of green-winged teal have been observed in the recent 30 years of the survey (1975-2004) as compared to the first 20 years (1955-1974); this is reflected in the modest increase over the 10-year mean (8.5%), as compared to the greater increase over the long-term mean (63.6%).

The total diving duck population estimate was somewhat higher than in 2003 (12.3%), lower than the 10-year mean (-14.5%), and moderately higher than the long-term mean (36.4%). During the last 2 years, over 95% of the diver numbers have been comprised of ring-necked ducks and goldeneyes. The remaining 5% have been comprised mainly of bufflehead and to a lesser extent, scaup, (at least in recent history). Estimates for ring-necked ducks in 2004 are the 3rd highest recorded during the survey's history; and as one would expect are higher in comparison to estimates for the previous year, 10-year, and long-term means (2.2%, 19.3%, and 241.3%, respectively). Estimates for both goldeneyes and bufflehead were substantially higher than in 2003 (+73.4%, +53.4%, respectively), but substantially lower than the 10-year (-62.4%, -27.7%, respectively) and long-term means (-38.4%, -45.4%, respectively).

The total miscellaneous duck population estimate was slightly lower than in 2003 (-12.4%), but substantially higher than the 10-year (+54.9%) and long-term (+212.6%) means. Estimates for mergansers, which are essentially the miscellaneous duck population, mimicked those estimates. Numbers of scoters, which are often not even observed, were relatively high in 2004. Scoter estimates were the 4th highest recorded during the survey's history; and as expected, were higher in comparison to 2003, and to the 10-year and the long-term means (855.5%, +57.9%, and 174.6%, respectively).

Canada goose estimates were higher in comparison to 2003 (10.3%), and to the 10-year (+1.7%), and the long-term mean (+57.9%).

Stratum 51:

The total duck population estimate for Central Ontario increased 18.6% from the 2003 estimate, and 7.0% from the 14-year mean (Table 3, Figure 3, Appendix 2).

Estimates for mallards were the highest recorded since the survey began in 1990. Although greater numbers of both American black ducks and American green-winged teal were observed than in 2003 (+37.5%, 20.5% respectively); estimates for black ducks were close to the 14-year mean (+3.3%), while green-winged teal were below the 14-year mean (-21.8%).

Estimates for ring-necked ducks, the predominant diver species observed in stratum 51, were in line with the 14-year average (-0.4%), but above last year's estimates (+31.8%). Both goldeneyes and buffleheads estimates were below estimates for the previous year (-38.2%, -20.0%, respectively) and the 14-year means (-83.1%, -75.9%, respectively).

Estimates for mergansers in 2004, the third highest recorded, were above those of 2003 (+10.8%) and the 14-year mean (+51.0%).

Fewer Canada geese were observed in 2004 as compared to 2003 (-61.8%), but estimates were somewhat higher than those of the 14-year mean (+25.3%).

DISCUSSION

In the Standard Operating Procedures (SOP; USFWS & CWS, 1987), guidelines are given as to when initiation of this survey should begin. For the bush (which fits the primarily boreal forest habitat of this region), the SOP lists the primary criteria used in the bush as being: i) spring breakup, ii) build-up of representative waterfowl in traditional breeding areas, and iii) dispersal of paired waterfowl into breeding territories. Another criterion listed for prairies, which could be applicable in the bush as well, is the statement that 'surveys should not begin until the majority of the more northern species have moved through.' References in previous editions of the SOP indicated that correct timing of the survey could also be correlated with the 'mouse ear' stage of tree budding.

Given these criteria, correct timing of the survey in Central Ontario, Stratum 51, could assumedly be easily accomplished. Since the lines are oriented east-west, spring breakup can be followed north along each transect line. The same strategy is not possible in flying the Western Ontario survey, however; with the exception of the first transect line which also runs east-west. The remaining four transect lines of stratum 50 are oriented north-south; and so in following these lines (from 50° to 54° N latitude), one cannot maintain the same stage of spring breakup throughout the stratum while flying the survey. If these transects are flown, based on the correct stage of spring breakup for the southern segments, then most likely, the northern segments will still have ice on the lakes and possibly a buildup of more northern species. This was the scenario in May 2004. To maximize the potential to consistently fly the survey at the correct stage of breakup, would require one to first fly the southern segments of these north-south oriented transect lines and then return to fly the northern segments. To do this, would logistically be inefficient and would result in increased flight time and costs associated with completing the survey.

Western and Central Ontario are both considered boreal forest habitat; an area where water level fluctuations tend to be moderate in comparison to the prairies. And because of this, it is generally assumed that seasonal phenology, rather than water levels, has a greater influence on waterfowl nesting and ultimately, waterfowl production, in this habitat. In 2004, breakup was late in both strata and many of the larger lakes located in the northern part of stratum 50 were frozen when the survey was flown. The smaller lakes and wetlands were completely open throughout the survey area, however. Breakup, even though late, however, was judged not to be so late as to substantially affect waterfowl nesting, especially for dabblers. Flocks of divers were observed in the northern area, however; assumedly, backed up by the lack of open water farther north. Scoter estimates, particularly, were substantially higher than in 2003 and the long term mean. Distribution of dabblers might also have been affected also, since 2004 estimates for both mallards and black ducks in Western Ontario were the highest recorded during the survey's history.

Weather during the span of the survey was mostly dominated by a consistent s-shaped jet stream pattern; this produced a series of cold fronts that resulted in mostly below seasonal temperatures and several days of rain. The late spring may actually have improved brood survival, however, as it was believed that most females were still incubating eggs during the rainy period in May, rather than tending newly hatched broods, which are particularly vulnerable to cold, wet weather.

Compared to the prairies, duck species richness in the mainly boreal forest habitat of Western and Central Ontario is very poor. Over 80% of the total number of ducks observed in the last two years is comprised of only three species: mergansers, mallards, and ring-necked ducks (listed in decreasing order of abundance). And the remaining 20% of ducks observed is mainly comprised of only five additional species (American black duck, American green-winged teal, goldeneyes, bufflehead, and scoters).

One species whose absence is particularly noticeable in recent years, however, is the scaup. During the 50 years of surveys in Western Ontario (1955-2004), estimates of both scaup and ring-necked ducks have changed dramatically. Estimates of both species seemed to have reversed trends beginning in the year 1993. If you compare estimates during the interval 1955-1992 with those from 1993-2004, scaup estimates have decreased dramatically (>7x), while ring-necked duck estimates have increased dramatically (>5x). Scaup average estimates were 95,300 (97,300) and 13,200 for these two intervals, respectively. Ring-necked duck average estimates were 52,100 (40,270), and 287,100, respectively. (The average estimate given in parenthesis excludes the years based on imputed data.)

As noted in the 2003 report, relatively high concentrations of ducks were observed in two marsh areas (Albany River and Cobham River) located in stratum 50 during last year's survey. These same concentrations were not observed during this year's survey, however.

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Submitted by: Karen S. Bollinger, Flyway Biologist, USFWS, DMBM, Laurel, Maryland
Date: July 2004

Table 1. Survey design and May 2004 coverage for Western and Central Ontario, Strata 50 and 51, respectively.

	Stratum	
	50	51
Survey design:		
Square miles in stratum	176,609	78,680
Square miles in sample - waterfowl	607.5	378.0
Linear miles in sample	2,430	1,512
Number of transects in sample	5	6
Number of segments in sample	135	84
Expansion factor	290.71	208.15
May 2004 coverage		
Square miles in stratum	176,609	78,680
Square miles in sample - waterfowl	607.5	378.0
Linear miles in sample	2,430	1,512
Number of transects in sample	5	6
Number of segments in sample	135	84
Expansion factor	290.71	208.15

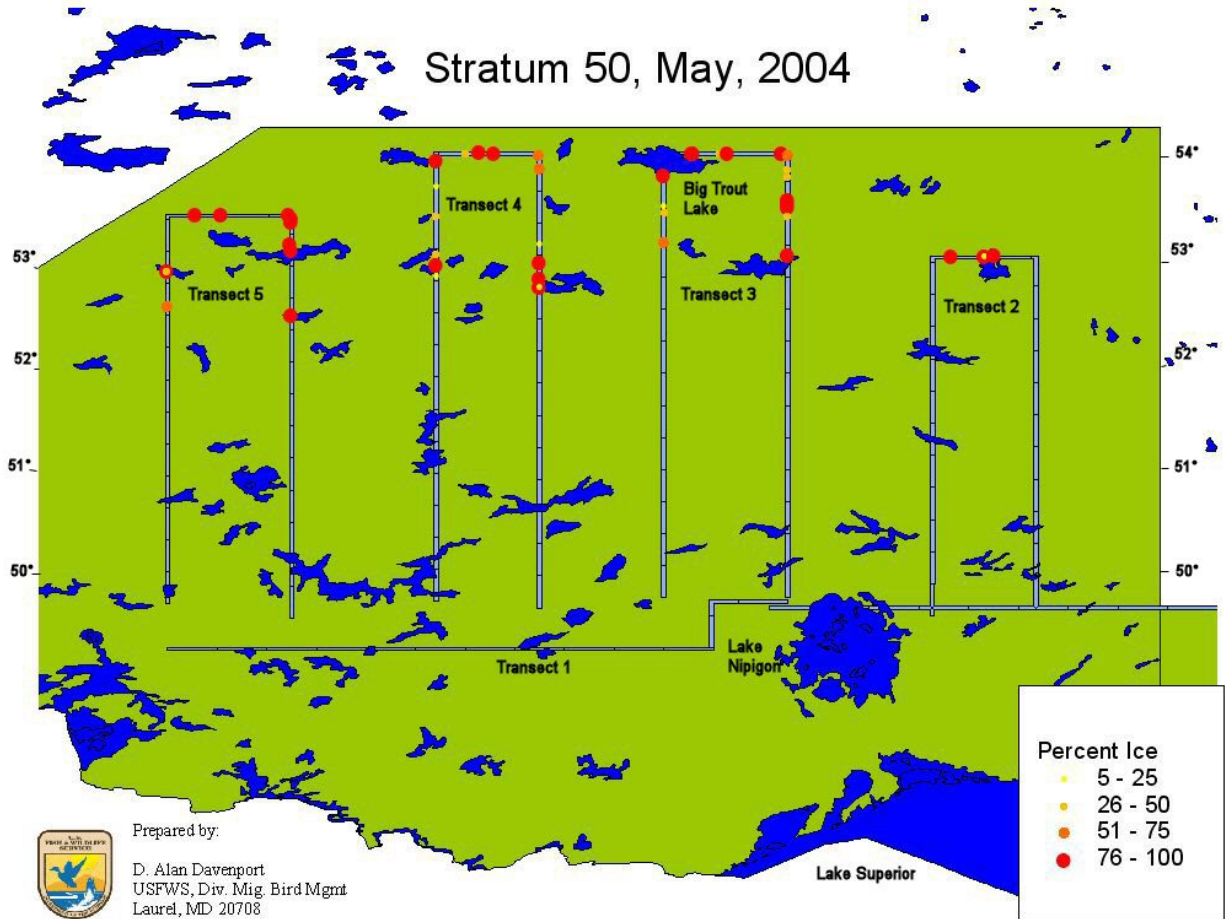


Figure 1. Illustration of lakes located in Western Ontario, stratum 50, that had ice present during the May 2004 waterfowl survey.

Table 2. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) and stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean for Western Ontario.

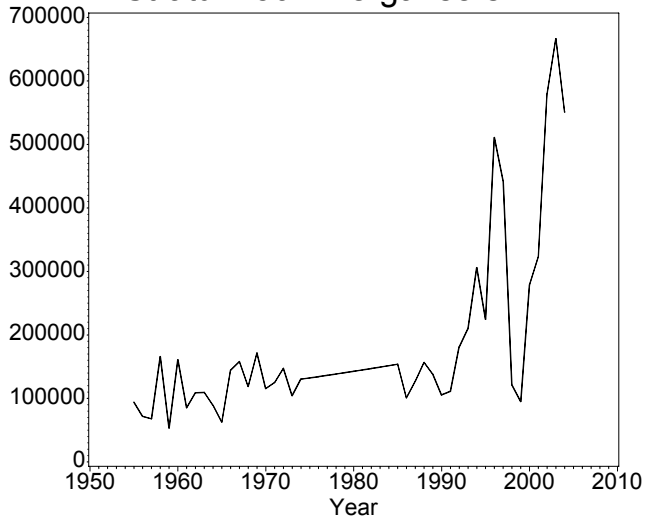
Species/Ponds	Stratum					% Change From		
	50	2004 Total	2003 Total	10-Year Mean	Long-Term Mean	2003	10-Year Mean	Long-Term Mean
Ducks								
Dabblers								
Mallard	530.0	530.0	443.8	246.4	230.5	19.4%	115.1%	129.9%
Am. black duck	63.8	63.8	23.9	29.5	25.5	166.7%	116.1%	150.2%
Gadwall	1.8	1.8	3.5	0.4	1.1	-50.0%	400.1%	55.1%
Am. wigeon	5.4	5.4	2.7	12.6	20.5	100.0%	-57.3%	-73.8%
Am. green-winged teal	45.0	45.0	39.6	41.5	27.5	13.8%	8.5%	63.6%
Blue-winged teal	0.0	0.0	6.0	7.3	12.3	-100.0%	-100.0%	-100.0%
N. shoveler	2.0	2.0	0.0	0.0	1.0	--	--	102.4%
N. pintail	0.0	0.0	0.0	0.0	2.0	--	--	-100.0%
Subtotal	648.0	648.0	519.5	337.6	320.4	24.7%	91.9%	102.3%
Divers								
Redhead	0.0	0.0	0.0	0.0	0.4	--	--	-100.0%
Canvasback	0.0	0.0	0.0	0.0	4.8	--	--	-100.0%
Scaups	6.3	6.3	0.0	11.6	77.0	--	-45.6%	-91.8%
Ring-necked duck	358.1	358.1	350.5	300.0	104.9	2.2%	19.3%	241.3%
Goldeneyes	74.4	74.4	42.9	197.6	120.7	73.4%	-62.4%	-38.4%
Bufflehead	11.1	11.1	7.2	15.3	20.3	53.4%	-27.7%	-45.4%
Ruddy Duck	0.0	0.0	0.0	1.5	1.7	--	-100.0%	-100.0%
Subtotal	449.9	449.9	400.7	526.1	329.7	12.3%	-14.5%	36.4%
Miscellaneous								
Long-tailed duck	0.0	0.0	0.0	1.3	0.5	--	-100.0%	-100.0%
Eiders	0.0	0.0	0.0	0.0	0.0	--	--	--
Scoters	36.3	36.3	3.8	23.0	13.2	855.5%	57.9%	174.7%
Mergansers	551.1	551.1	666.6	354.8	174.2	-17.3%	55.3%	216.5%
Subtotal	587.4	587.4	670.4	379.1	187.9	-12.4%	54.9%	212.6%
Total Ducks	1685.3	1685.3	1590.5	1242.8	838.0	6.0%	35.6%	101.1%
Canada Goose	51.9	51.9	47.1	51.1	32.9	10.3%	1.7%	57.9%
Am. coot	0.0	0.0	0.0	0.0	0.9	--	--	-100.0%

Appendix 1. Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Western Ontario.

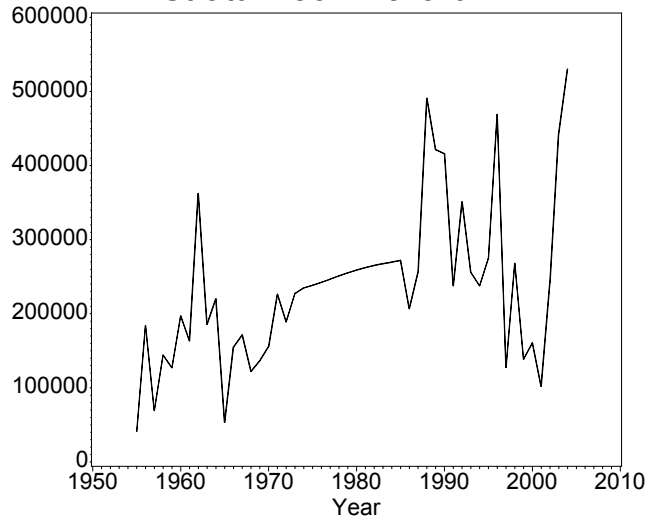
Species/Ponds	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Ducks										
Dabblers										
Mallard	41.2	183.8	69.4	144.0	127.3	196.9	163.6	362.1	185.7	220.0
Am. black duck	6.8	18.4	0.0	9.0	18.6	10.2	30.4	59.9	19.4	29.7
Gadwall	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	4.3
Am. wigeon	17.8	10.3	0.0	0.0	0.0	3.2	16.0	32.0	11.1	16.3
Am. green-winged teal	0.0	0.0	0.0	0.0	9.6	0.0	5.9	14.2	19.2	24.1
Blue-winged teal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4
N. shoveler	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
N. pintail	0.0	9.6	0.0	0.0	9.7	6.8	3.0	0.0	3.5	0.0
Subtotal	65.8	222.1	69.4	153.0	168.1	219.0	218.9	468.2	238.8	301.8
Divers										
Redhead	0.0	0.0	0.0	0.0	0.0	6.1	0.0	0.0	0.0	0.0
Canvasback	0.0	0.0	0.0	32.3	0.0	121.5	7.3	0.0	1.7	1.9
Scaups	16.6	252.8	74.8	69.1	92.9	73.7	83.7	61.5	60.9	78.3
Ring-necked duck	40.2	1.5	0.0	0.0	0.0	1.9	1.9	99.2	67.6	34.2
Goldeneyes	13.5	39.1	0.0	41.4	227.1	42.8	71.8	190.0	124.0	77.2
Bufflehead	8.3	16.0	0.0	16.9	6.1	16.2	9.3	17.4	25.8	0.0
Ruddy Duck	0.0	0.0	0.0	0.0	0.0	0.0	25.0	10.0	0.0	0.0
Subtotal	78.6	309.3	74.8	159.7	326.0	262.2	198.8	378.1	280.0	191.6
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	15.8	12.4	1.4	0.0	0.0	6.1	2.0	0.0	2.8	0.0
Mergansers	94.0	71.6	68.0	165.8	53.5	160.7	85.3	108.9	109.5	89.1
Subtotal	109.8	84.0	69.4	165.8	53.5	166.9	87.4	108.9	112.3	89.1
Total Ducks	254.1	615.4	213.6	478.5	547.6	648.1	505.0	955.2	631.1	582.4
Canada Goose	17.0	14.8	0.0	0.0	0.0	9.3	0.0	15.3	5.3	0.0
Am. coot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Species/Ponds	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Ducks										
Dabblers										
Mallard	53.5	154.7	171.2	122.2	136.6	155.8	226.1	189.1	227.2	234.9
Am. black duck	17.4	7.1	18.6	45.7	34.2	15.5	25.9	46.6	43.8	25.7
Gadwall	0.0	0.0	11.2	0.0	0.0	0.0	1.9	0.0	1.8	1.9
Am. wigeon	19.8	18.5	4.2	35.7	10.0	0.0	28.2	10.3	24.9	31.1
Am. green-winged teal	0.0	11.0	12.5	5.0	0.0	50.4	21.8	7.6	7.4	26.0
Blue-winged teal	0.0	0.0	7.6	6.1	0.0	47.9	8.8	0.0	0.0	13.3
N. shoveler	0.0	0.0	5.2	0.0	0.0	0.0	0.5	0.0	0.0	1.0
N. pintail	0.0	1.7	0.0	4.8	3.1	4.6	3.0	5.6	6.2	2.8
Subtotal	90.8	193.1	230.6	219.5	183.9	274.3	316.3	259.1	311.3	336.8
Divers										
Redhead	0.0	0.0	0.0	0.0	1.8	0.0	1.0	0.0	0.0	1.0
Canvasback	0.0	0.0	1.9	0.0	0.0	0.0	5.9	0.0	0.0	5.6
Scaups	30.9	80.8	58.6	111.1	71.3	59.2	90.7	117.3	48.3	90.6
Ring-necked duck	35.6	162.0	60.0	2.0	18.3	35.6	46.8	16.9	32.7	56.2
Goldeneyes	5.0	70.2	53.4	347.3	102.7	65.0	101.0	153.4	181.3	102.2
Bufflehead	3.1	4.3	6.6	51.3	36.0	84.9	21.6	18.6	28.3	22.6
Ruddy Duck	0.0	0.0	0.0	3.5	0.0	3.5	1.8	0.0	3.5	1.8
Subtotal	74.6	317.3	180.4	515.2	230.1	248.1	268.9	306.1	294.1	280.0
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	4.7	0.0	0.0	0.3	1.2	0.0	0.3
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	2.8	0.0	68.4	8.4	10.5	16.9	26.4	11.8	17.4
Mergansers	62.8	144.6	158.0	118.9	171.4	115.5	125.0	147.3	104.4	130.4
Subtotal	62.8	147.4	158.0	192.0	179.8	126.0	142.2	174.9	116.2	148.1
Total Ducks	228.2	657.8	569.0	926.7	593.8	648.4	727.4	740.1	721.5	764.9
Canada Goose	34.2	1.8	16.2	22.8	33.4	25.4	22.7	13.1	12.7	26.0
Am. coot	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	1.9

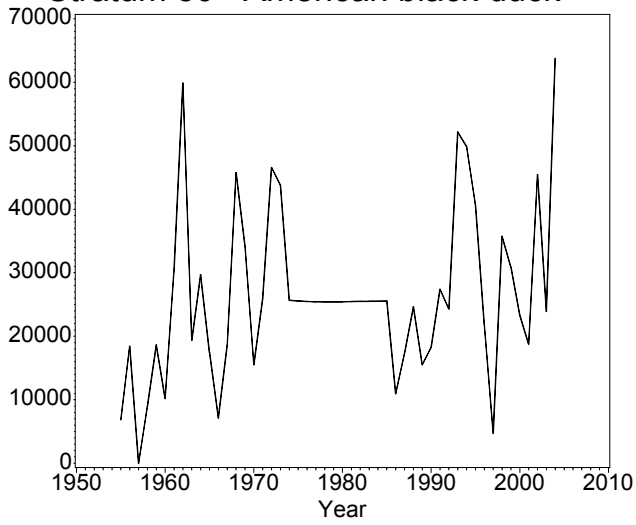
Stratum 50 Mergansers



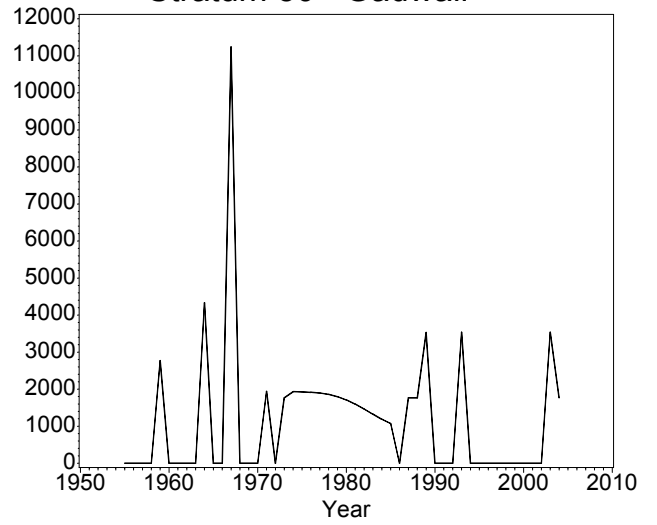
Stratum 50 Mallard



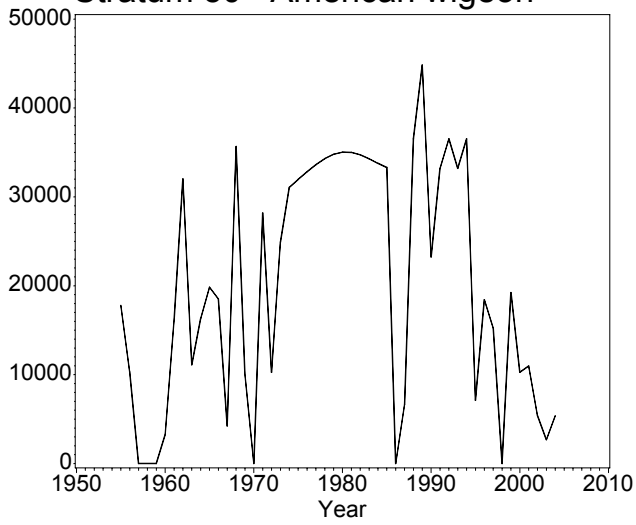
Stratum 50 American black duck



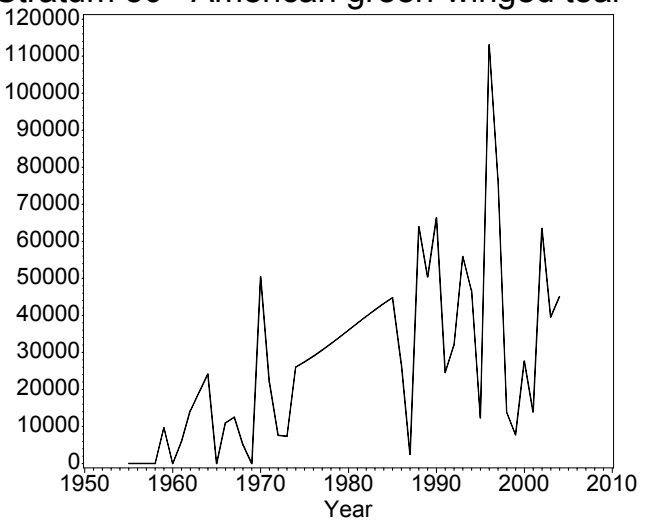
Stratum 50 Gadwall



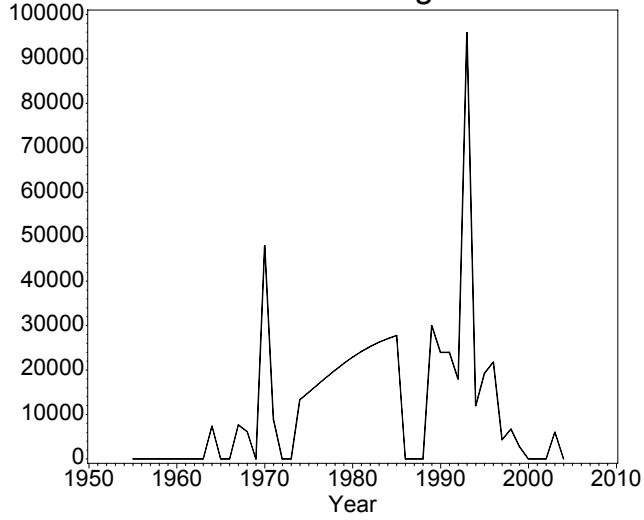
Stratum 50 American wigeon



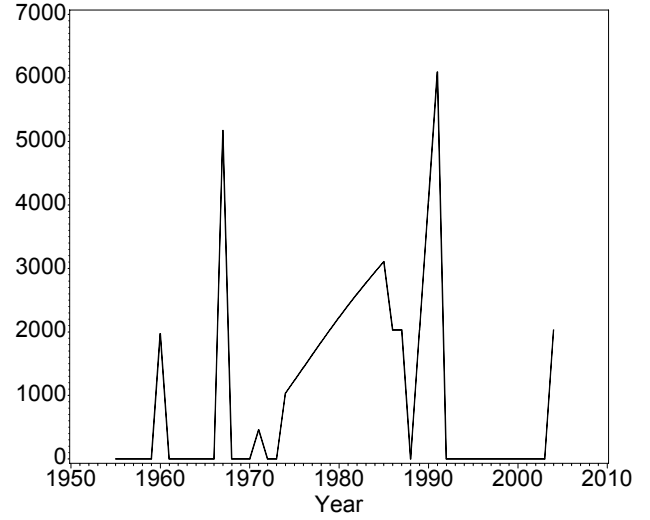
Stratum 50 American green-winged teal



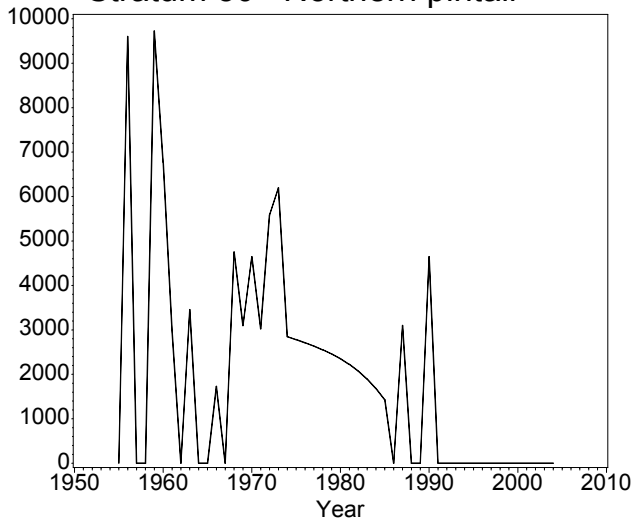
Stratum 50 Blue-winged teal



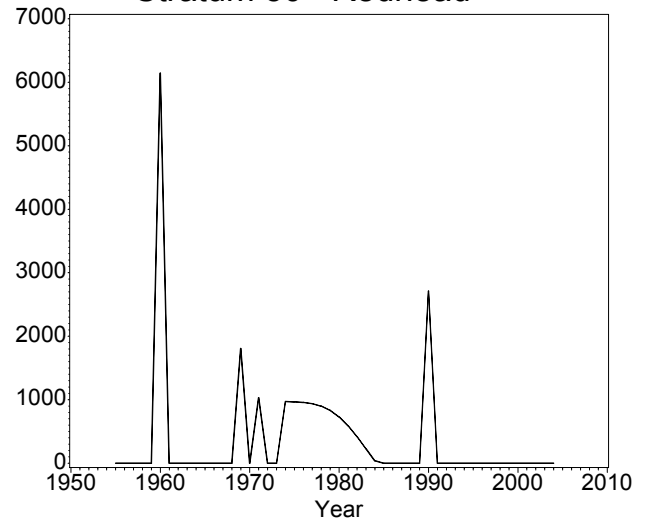
Stratum 50 Northern shoveler



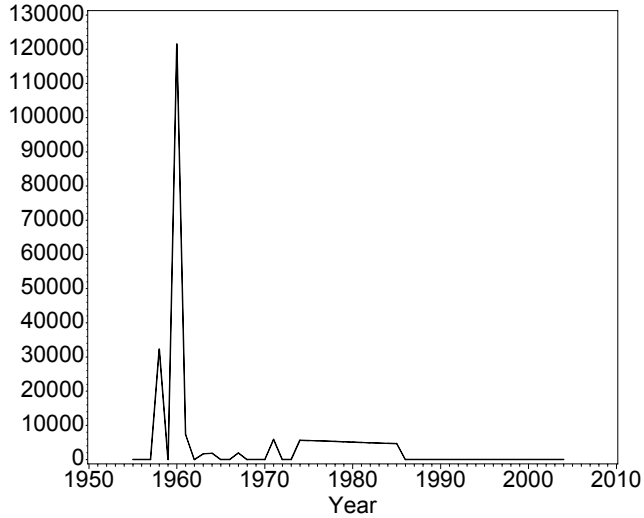
Stratum 50 Northern pintail



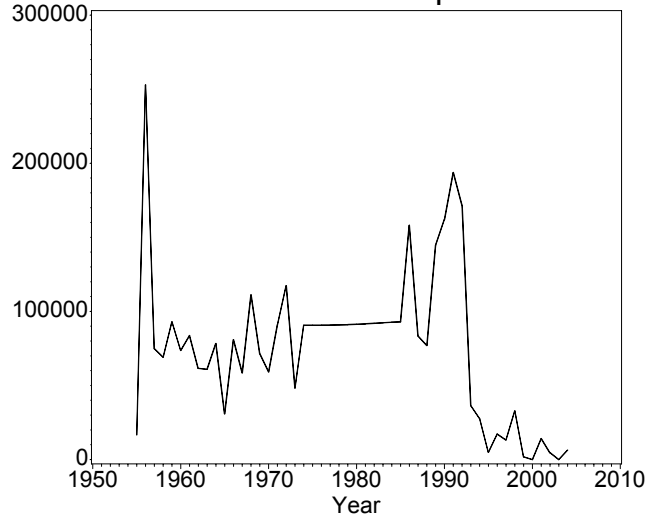
Stratum 50 Redhead



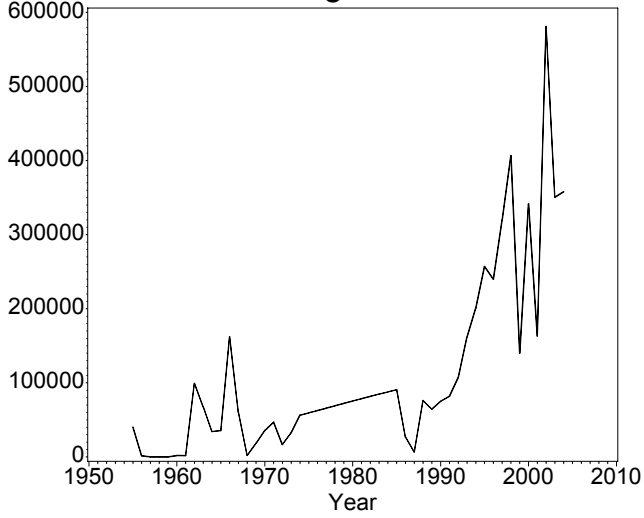
Stratum 50 Canvasback



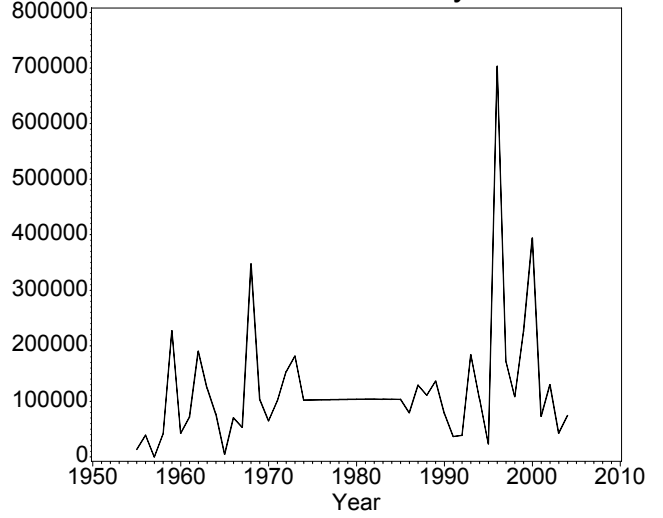
Stratum 50 Scaups



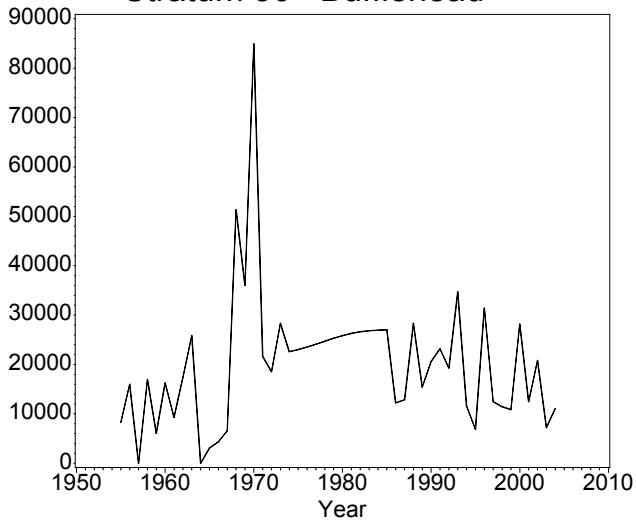
Stratum 50 Ring-necked duck



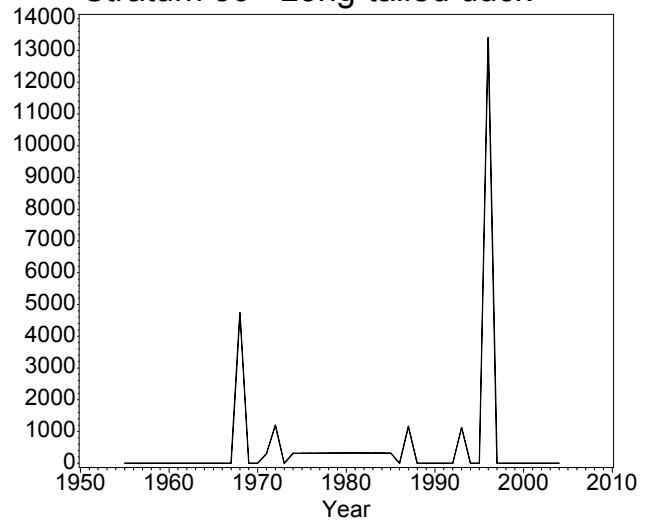
Stratum 50 Goldeneyes



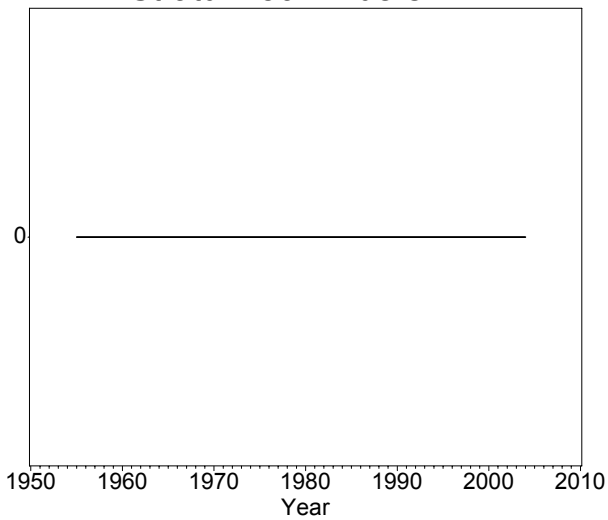
Stratum 50 Bufflehead



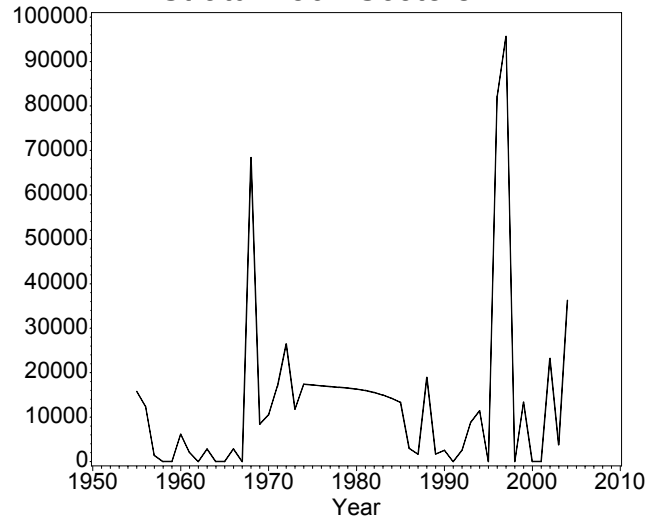
Stratum 50 Long-tailed duck



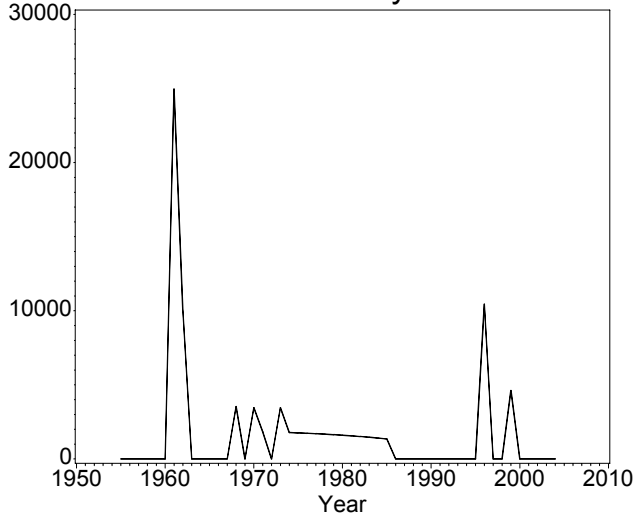
Stratum 50 Eiders



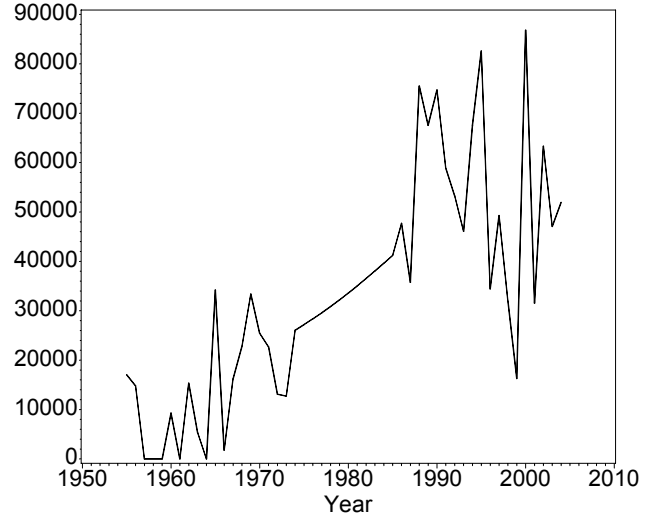
Stratum 50 Scoters



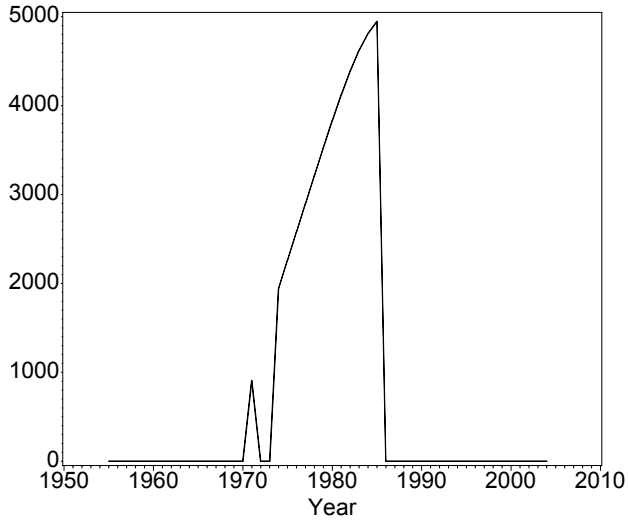
Stratum 50 Ruddy Duck



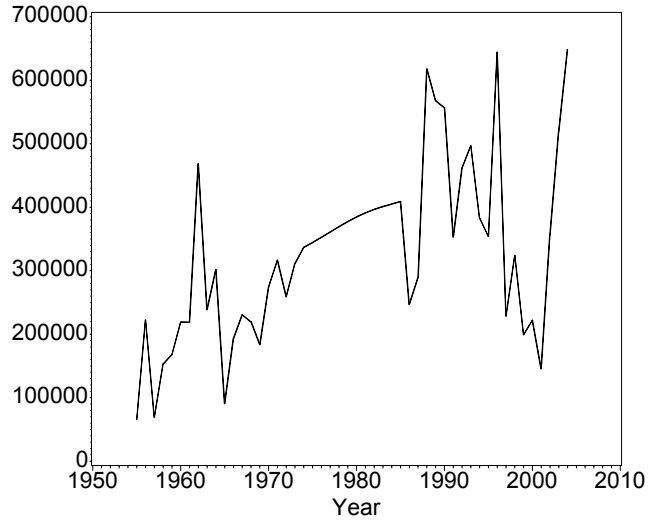
Stratum 50 Canada Goose



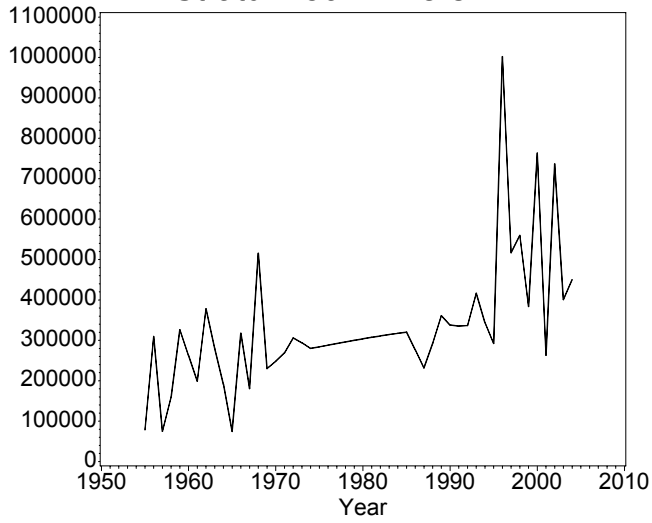
Stratum 50 American coot



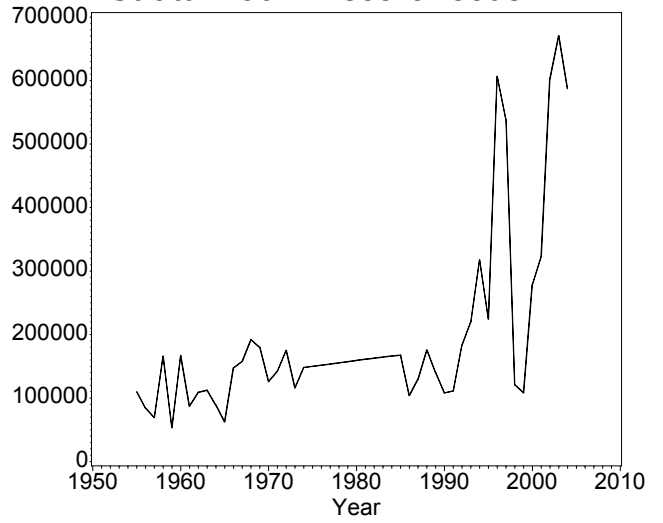
Stratum 50 Dabblers



Stratum 50 Divers



Stratum 50 Miscellaneous



Stratum 50 Total Ducks

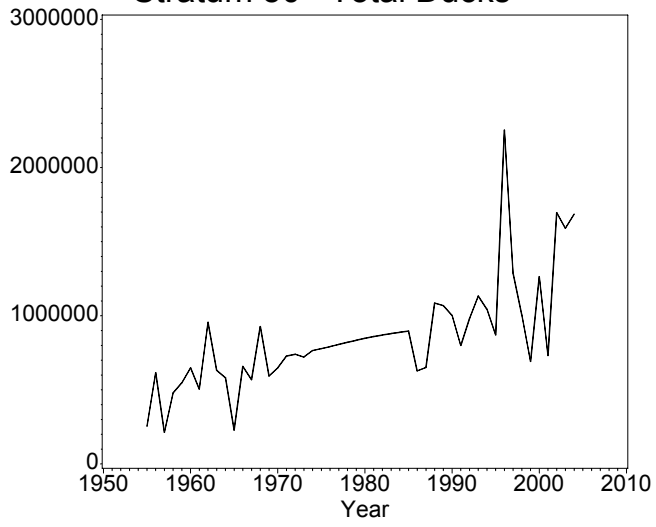


Table 3. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) bias species and stratum, with comparisons against the previous year and the long-term mean for Central Ontario.

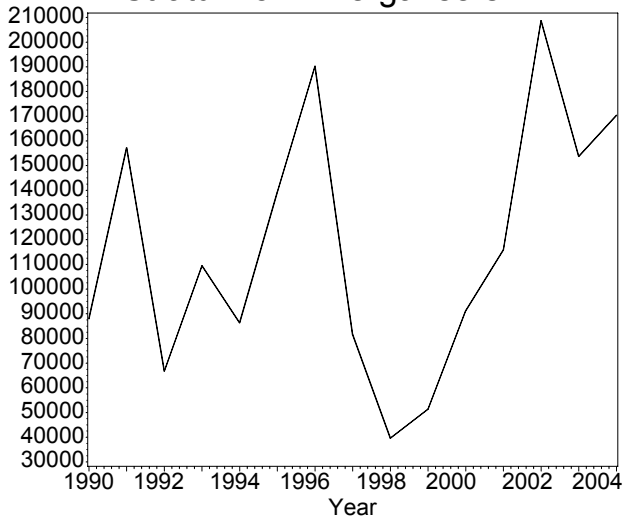
Species/Ponds	Stratum	% Change From				
	51	2004 Total	2003 Total	1990-2003 Mean	2003	1990-2003 Mean
Ducks						
Dabblers						
Mallard	170.7	170.7	139.8	78.2	22.1%	118.3%
Am. black duck	56.5	56.5	41.1	54.7	37.5%	3.3%
Gadwall	0.0	0.0	0.0	0.1	--	-100.0%
Am. wigeon	0.0	0.0	1.9	6.4	-100.0%	-100.0%
Am. green-winged teal	25.9	25.9	21.5	33.1	20.5%	-21.8%
Blue-winged teal	0.0	0.0	0.0	3.9	--	-100.0%
N. shoveler	1.5	1.5	0.0	0.1	--	1270.8%
N. pintail	0.0	0.0	1.1	0.1	-100.0%	-100.0%
Subtotal	254.5	254.5	205.4	176.5	23.9%	44.2%
Divers						
Redhead	0.0	0.0	0.0	0.0	--	-100.0%
Canvasback	0.0	0.0	0.0	0.0	--	--
Scaups	0.4	0.4	0.0	11.2	--	-96.3%
Ring-necked duck	122.2	122.2	92.7	122.6	31.8%	-0.4%
Goldeneyes	15.1	15.1	24.4	89.1	-38.2%	-83.1%
Bufflehead	3.9	3.9	4.9	16.3	-20.0%	-75.9%
Ruddy Duck	0.0	0.0	0.0	1.0	--	-100.0%
Subtotal	141.6	141.6	122.0	240.2	16.1%	-41.1%
Miscellaneous						
Long-tailed duck	0.0	0.0	0.0	1.5	--	-100.0%
Eiders	0.0	0.0	0.0	0.0	--	--
Scoters	4.2	4.2	0.0	2.3	--	86.1%
Mergansers	170.3	170.3	153.7	112.8	10.8%	51.0%
Subtotal	174.6	174.6	153.7	116.6	13.6%	49.8%
Total Ducks	570.6	570.6	481.1	533.2	18.6%	7.0%
Canada Goose	15.1	15.1	39.5	12.1	-61.8%	25.3%
Am. coot	0.0	0.0	0.0	0.1	--	-100.0%

Appendix 2. Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Central Ontario.

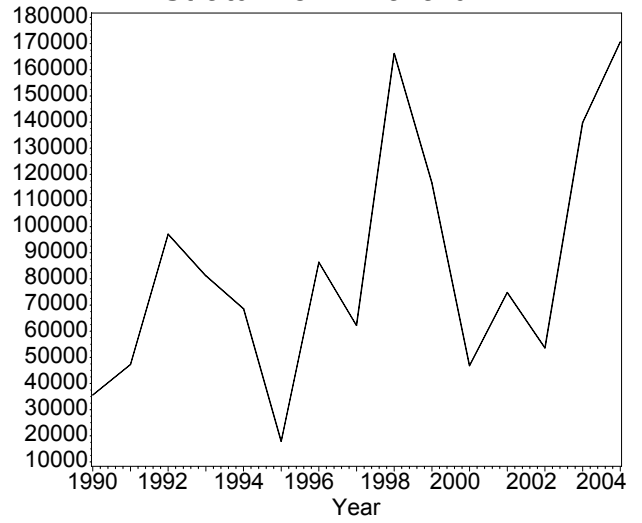
Species/Ponds	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Ducks										
Dabblers										
Mallard	35.6	47.3	97.1	81.2	68.6	17.9	86.4	62.2	166.2	116.8
Am. black duck	57.9	60.3	86.8	75.4	57.1	63.3	64.5	29.7	44.7	72.0
Gadwall	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Am. wigeon	2.2	10.3	8.7	0.0	4.3	0.0	14.5	8.8	16.6	14.3
Am. green-winged teal	18.3	20.5	24.6	25.4	62.3	51.8	74.4	53.5	38.5	16.3
Blue-winged teal	9.5	3.7	24.7	6.2	3.0	6.9	0.0	0.0	0.0	0.0
N. shoveler	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N. pintail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	125.1	142.1	243.2	188.1	195.3	139.9	239.8	154.2	266.0	219.3
Divers										
Redhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scaups	0.6	1.7	2.7	1.8	1.5	0.0	0.0	6.5	7.8	0.0
Ring-necked duck	41.7	113.3	145.7	184.3	64.7	101.5	192.4	171.2	114.8	173.7
Goldeneyes	59.3	117.9	141.4	67.5	44.3	3.6	115.1	62.0	44.7	276.5
Bufflehead	41.5	53.9	16.6	4.1	6.8	0.0	21.6	11.0	11.8	21.1
Ruddy Duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	143.0	286.8	306.4	257.8	117.3	105.1	329.1	250.7	179.1	471.3
Miscellaneous										
Oldsquaw	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.4	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	1.9	5.6	2.1	0.0	18.3	0.0	0.0	3.2	0.6	0.0
Mergansers	88.0	157.1	66.8	109.5	86.4	139.2	190.2	81.4	39.6	51.4
Subtotal	100.5	162.8	68.9	109.5	104.7	139.2	190.2	84.7	50.6	51.4
Total Ducks	368.6	591.6	618.5	555.4	417.4	384.3	759.1	489.6	495.7	742.0
Canada Goose	1.8	8.1	11.5	10.2	10.0	7.6	13.8	10.6	8.5	15.4
Am. coot	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Species/Ponds	2000	2001	2002	2003	2004
Ducks					
Dabblers					
Mallard	46.8	74.8	53.6	139.8	170.7
Am. black duck	37.8	42.2	33.1	41.1	56.5
Gadwall	0.0	0.0	0.0	0.0	0.0
Am. wigeon	0.0	3.8	3.8	1.9	0.0
Am. green-winged teal	23.0	13.7	19.5	21.5	25.9
Blue-winged teal	0.0	0.0	0.0	0.0	0.0
N. shoveler	0.0	0.0	0.0	0.0	1.5
N. pintail	0.0	0.0	0.0	1.1	0.0
Subtotal	107.6	134.5	110.1	205.4	254.5
Divers					
Redhead	0.6	0.0	0.0	0.0	0.0
Canvasback	0.0	0.0	0.0	0.0	0.0
Scaups	0.0	115.4	19.0	0.0	0.4
Ring-necked duck	102.4	84.4	133.8	92.7	122.2
Goldeneyes	155.7	46.5	87.8	24.4	15.1
Bufflehead	10.4	10.0	14.0	4.9	3.9
Ruddy Duck	0.0	0.0	13.6	0.0	0.0
Subtotal	269.2	256.2	268.2	122.0	141.6
Miscellaneous					
Oldsquaw	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	4.2
Mergansers	91.3	115.9	208.6	152.2	170.3
Subtotal	91.3	115.9	208.6	152.2	174.6
Total Ducks	468.1	506.7	587.0	479.6	570.6
Canada Goose	9.1	7.6	15.1	39.5	15.1
Am. coot	0.0	0.0	0.0	0.0	0.0

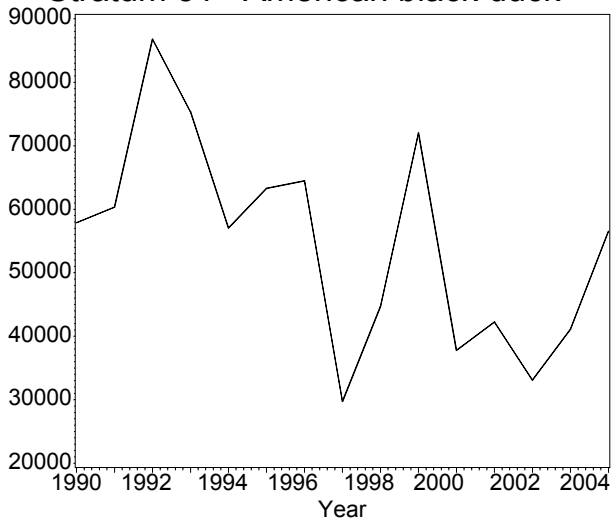
Stratum 51 Mergansers



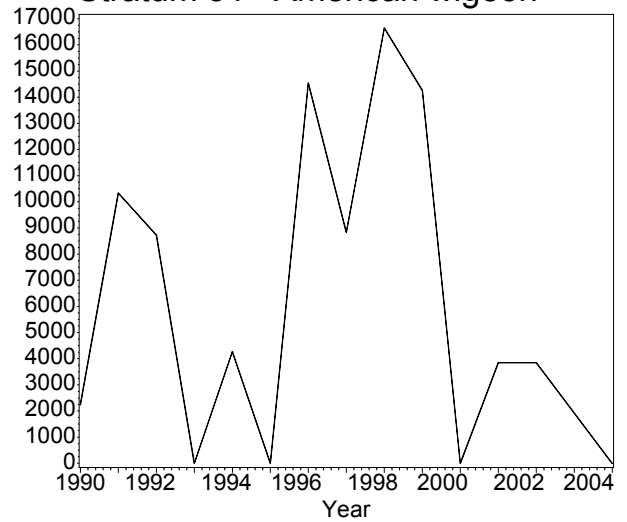
Stratum 51 Mallard



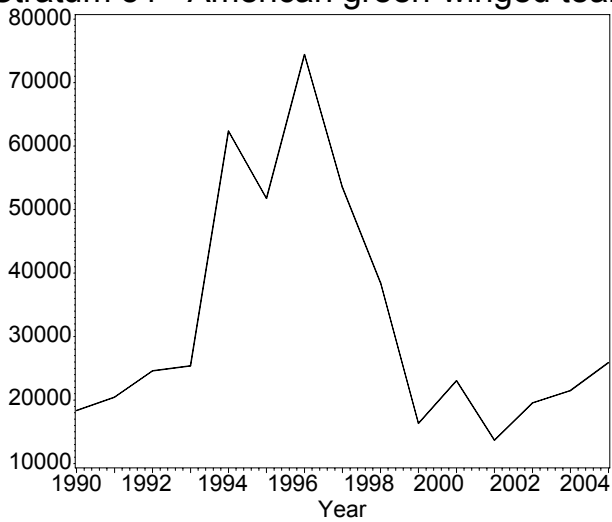
Stratum 51 American black duck



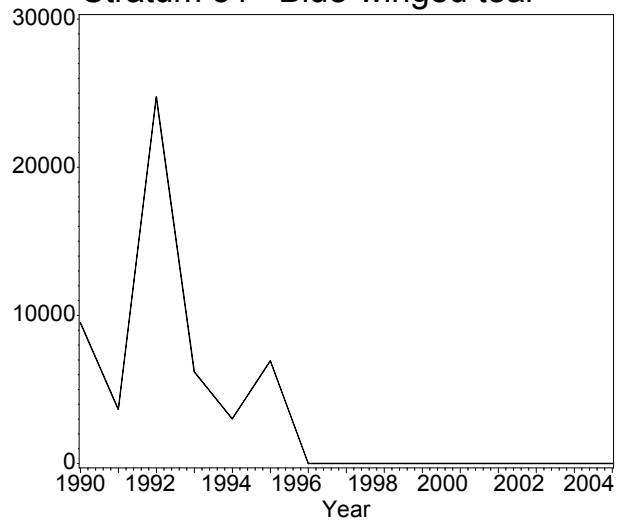
Stratum 51 American wigeon



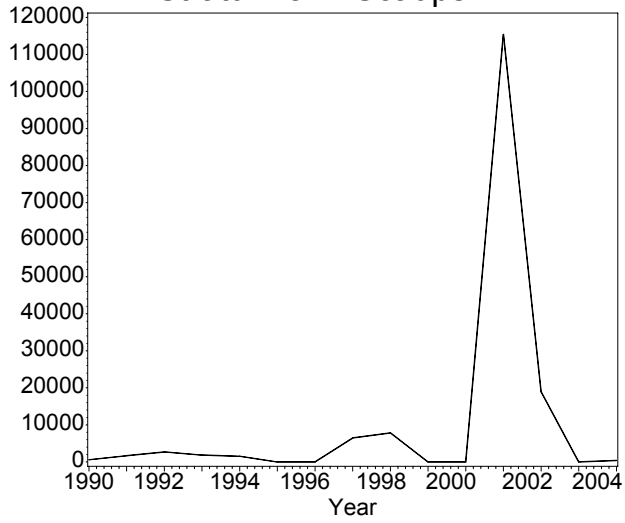
Stratum 51 American green-winged teal



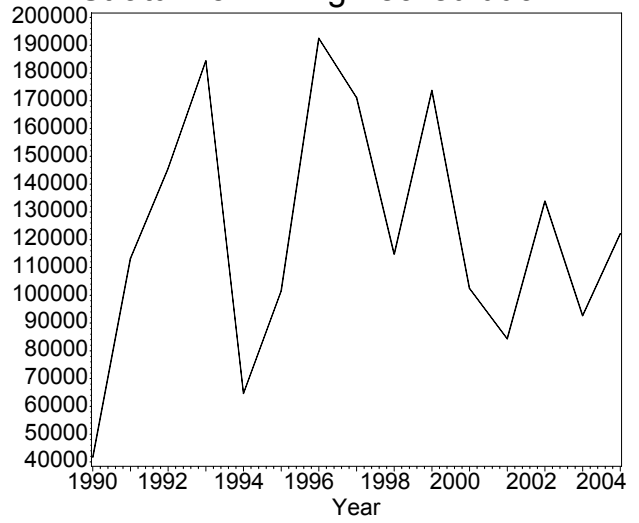
Stratum 51 Blue-winged teal



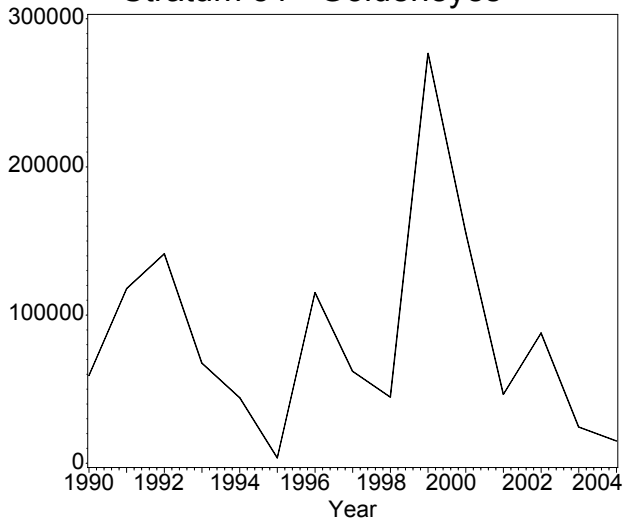
Stratum 51 Scaups



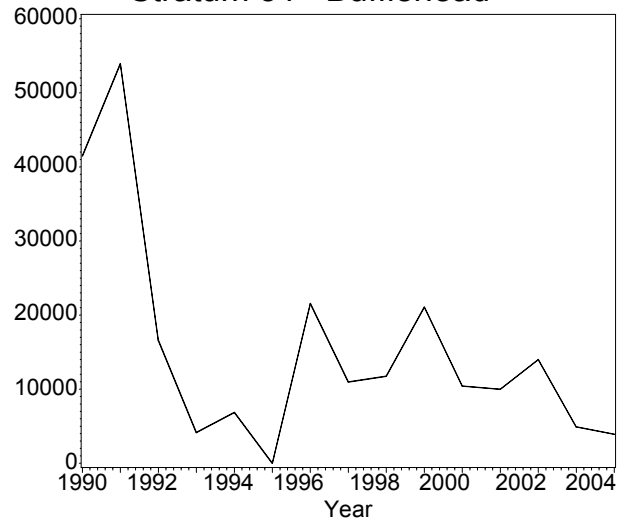
Stratum 51 Ring-necked duck



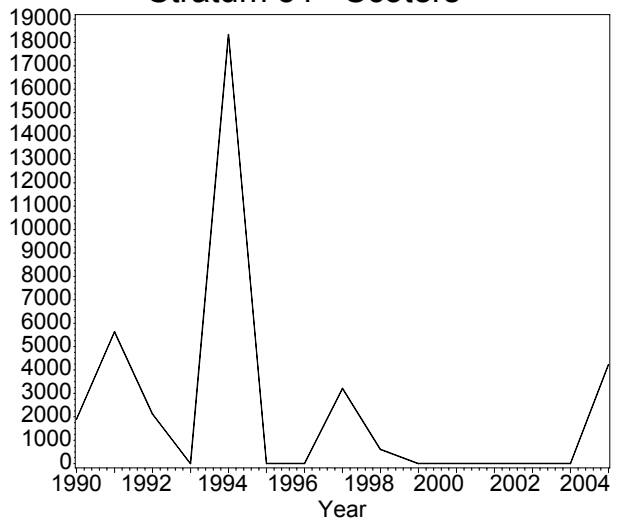
Stratum 51 Goldeneyes



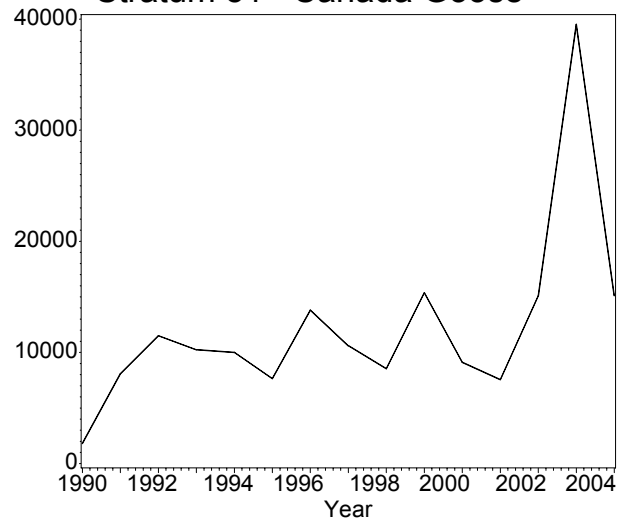
Stratum 51 Bufflehead



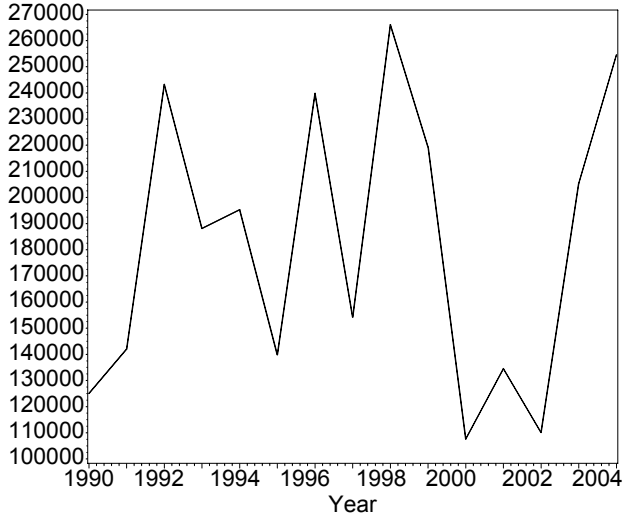
Stratum 51 Scoters



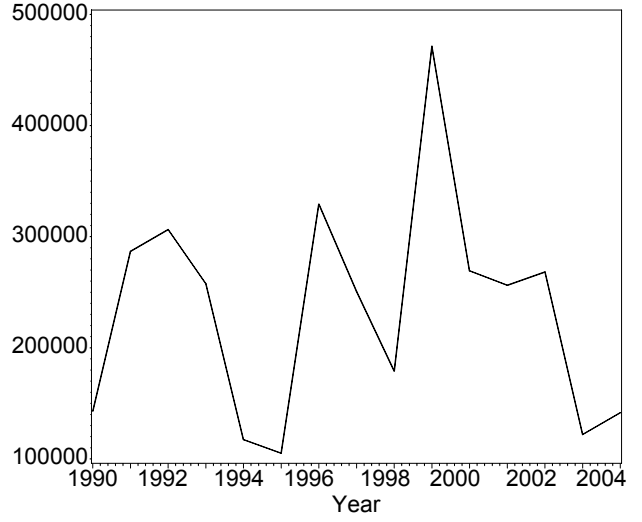
Stratum 51 Canada Goose



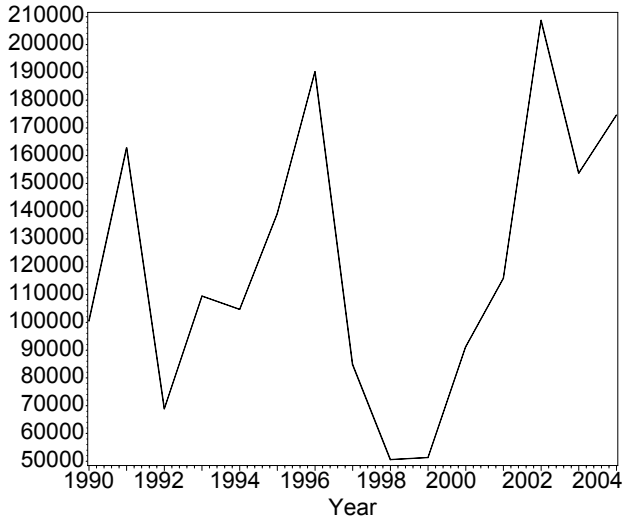
Stratum 51 Dabblers



Stratum 51 Divers



Stratum 51 Miscellaneous



Stratum 51 Total Ducks

