

TITLE: Waterfowl Breeding Population and Habitat Survey for
Western Ontario

STRATA SURVEYED: 50 - Western Ontario

DATES: 20 May – 01 June 2005

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

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ABSTRACT: The 2005 Waterfowl Breeding Population and Habitat Survey of Western Ontario (Stratum 50) was conducted from 20 May to 01 June. Survey design was consistent with previous years and coverage complete. Nesting conditions were judged to be good to excellent throughout this boreal forest habitat, given the somewhat early spring phenology and generally good water levels observed. In Western Ontario, the total duck population was estimated to be 1.2 million birds. This estimate, although 41.3% above the long-term mean (1955-2004), was less than both the 2004 estimate and 10-year mean (-28.3% and -7.6%, respectively). The dabbling duck population estimate of 679,600 birds, although similar to last year's estimate (4.9% above), was well above both the 10-year and long-term means (86.6% and 107.9%, respectively). Estimates of mallards, which comprised 73% of all dabblers observed, mimicked the percent comparisons for total dabblers noted above. Black ducks estimates were higher than previous years, continuing a somewhat slight upward trend; while estimates of American wigeon and blue-winged teal increased substantially from 2004 and those of American green-winged teal decreased substantially from 2004 (see below). Estimates of diver species were pretty uniformly negative for all three mean comparisons, with ring-necked ducks comprising 79% of this species category. Merganser estimates, although down from 2004 (-35.8%), still remained 94.9% above the long-term mean and reflected an overall upward trend. No observations were made of either scoters or scaup. Canada geese estimates were well above the long-term mean (70.7%), but increased only slightly above the 2004 estimate and the previous 10-year mean (9.4% and 14.7%, respectively). Waterfowl production is expected to be good to excellent in stratum 50 for 2005.

Data for the major species are presented below:

	2005 Indices (thousands)	Western Ontario - Stratum 50 Percent Change From		
		2004	1995-2004 mean (10 yr)	1955-2004 mean
Mallard	498.3	-6.0	80.8	110.7
American Black Duck	79.7	25.0	158.0	203.7
American Wigeon	29.5	450.0	211.8	46.4
Am Green-winged Teal	16.4	-63.6	-60.4	-41.3
Blue-winged Teal	54.0	-----	788.8	349.1
Ring-necked Duck	137.5	-61.6	-56.4	25.1
Goldeneyes	24.7	-66.8	-87.3	-79.4
Bufflehead	9.0	-19.1	-41.3	-55.4
Mergansers	354.1	-35.8	-6.7	94.9
Canada Geese	56.8	9.4	14.7	70.7

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*, (USFWS and CWS, 1987; Section III, A). Survey design was consistent with previous years and coverage of stratum 50 was complete (Table 1.)

Western Ontario (Stratum 50), 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. 2005 marks the 38th year of surveys to determine breeding waterfowl population estimates in Western Ontario.

Both waterfowl and habitat data were collected using an 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 a latitude / longitude position in the resulting database.

It is a known fact that aerial surveys by fixed wing aircraft do not provide complete counts. In order to account for those birds missed from the air, 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 fixed wing and helicopter 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 2005 aerial survey crew was composed of Karen S. Bollinger, pilot/observer, and Guy B. Foulks, observer. This was Foulks first year as aerial observer and he was provided initial training in both duck identification and survey procedures. His progress was monitored throughout the survey for accuracy in identification and compliance with established procedures.

On 10 May, the crew departed Maryland enroute to the survey area in N729, a Cessna 206 amphibian aircraft. Central Ontario (Stratum 51) was surveyed prior to beginning the survey in Western Ontario (Stratum 50) on 20 May. The Western Ontario survey was completed in 43.7 hrs of flight time over a 12 day period ending on 31 May. Upon completion of the survey, N729 was ferried to Madison, Wisconsin on 01 June. The entire survey for strata 50 and 51, including transit time, took 23 days and a total of 83.4 flight hours. This compares to 23 days, 70.0 hours and 16 days, 70.5 hours for this survey in 2004 and 2003, respectively. Pre- and post-survey ferry flight time totaled 7.3 and 5.2 hours, respectively. The increased number of flight hours needed to complete this year's survey as compared to the previous two years was due to both diversions caused by adverse weather and the need to repeat some segments due to equipment malfunction. During the 23 days of the survey, adverse weather prevented surveying during four full days and five partial days. N729 performed beautifully during the survey, with a scheduled oil change being the only maintenance required.

WEATHER AND HABITAT:

Description of Area: Stratum 50 located in Western Ontario can be characterized mainly as boreal forest habitat. Numerous lakes, as well as streams, marshes, and muskegs, occur throughout the area. The somewhat rolling terrain of the southern part of the area becomes generally more level as one moves north. Elevations up to 2000 ft in the south gradually decrease to below 1000 ft in the north; in this northern area, rivers flow 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 southwestern part of the stratum; and limited mining operations, more prevalent farther south, do extend into stratum 50. Extensive logging occurs throughout the southern one-third of stratum 50 and 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 stratum 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 the transect lines within this stratum is illustrated in the figure on the cover of this report. Survey coverage begins along the east-west oriented transect line (#1) in the southern part of stratum 50, where spring conditions first occur. The remaining four transect lines in this stratum are u-shaped with a north-south orientation. This orientation, originally designed in the 1950's because of limitations for fuel availability, makes 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; although this did not occur in 2005.

During the May 2005 survey, water levels were found to be average to high in both rivers and lakes, and spring phenology was observed to be somewhat early. Throughout the survey, trees had already leafed out, even in the most northern latitudes of the survey area. Only a few very isolated snow patches were observed and the only evidence of ice was small remnants of melting black ice floes on Big Trout Lake, located at the northern most area of the transect lines (latitude 53° 50'; see cover figure).

In attempts to understand the habitat conditions observed, precipitation and temperature records for the past year were reviewed on Environment Canada's web site (2005a, 2005b, and 2005c). Environment Canada has classified the nation into broad climate regions with one being the Northeastern Forest Region, which encompasses Ontario, Quebec, and part of Newfoundland as depicted on their website (2005a). Since last September, precipitation for this broad area has been about average (range 1.7% to -6.6% of average); while temperatures overall were +4°C, -0.2°C, +1.4°C of average for fall, winter, and spring, respectively.

Weather more specific to this stratum, however, was obtained by compiling monthly averages from weather observations at individual stations located within stratum 50 (Environment Canada 2005b). Observations from up to eight stations in stratum 50 for which data was available (Dryden, Geraldton, Kenora, Pickle Lake, Rawson Lake, Red Lake, and Sioux Lookout) were used to compile monthly averages and interpret trends (see summaries below). Based on these data, it can be seen that the early spring experienced in 2005 was probably the result of the well above normal temperatures that occurred in April; although this was arrested somewhat in May by below normal

temperatures. The water levels observed appeared to reflect not only the above average snowfall and rainfall received during May, but also the overall above average precipitation received since fall 2004. The below average snowfall received during four months (Oct., Nov., Mar., Apr.; see below) was probably partially due to above normal temperatures, as overall precipitation during two of those four months equaled or exceeded the average.

Western Ontario:

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Mean Temp. (°C)									
Diff from Normal	+3.1	+1.2	+3.9	-1.3	-1.3	+2.2	-1.2	+3.9	-0.8
% of Normal Snowfall	---	62	56	230	153	95	71	42	143
% of Normal Precipitation	164	160	50	223	154	89	78	102	160

This year, survey dates encompassed 20 - 31 May; as compared to 22 May - 02 June in 2004. Despite attempts to accurately assess spring phenology, survey timing this year was considered to be a little late, especially for early nesting dabblers. Pairs and small flocks of drakes were observed throughout the survey period; but so were somewhat larger groups of flocked drakes. It is believed, however, that no migrants were still present during the survey this year; unlike last year, when extensive ice cover was still present in northern areas and large concentrations of divers were observed.

BREEDING POPULATION ESTIMATES

The total duck population estimate of 1.2 million birds in Western Ontario was below both the 2004 estimate (-28.3%) and the 10-year mean (-7.6%; Table 2). This 2005 estimate was still well above the long-term mean (41.3%), however, and was consistent with the overall upward trend in estimates over the 51 year history of the survey (Fig. 1). The estimates were the seventh highest on record (Appendix 1).

The total dabbling duck population estimate, like that for total ducks, also continued to show an overall upward trend over the time span of the survey (Fig. 1). Estimates for dabblers, which were the highest on record (Appendix 1), were only slightly higher than in 2004 (4.9%), but substantially higher in comparison to both the 10-year and long-term means (86.6% and 107.9%, respectively; Table 2). Throughout the history of the survey in Western Ontario, mallards have comprised the large majority of the dabblers observed. As was expected, estimates of mallards, mimicked the percent comparisons for total dabblers noted above (i.e., -6.0%, 80.8%, and 110.7% in comparison to 2004, the 10-year mean, and long-term mean, respectively; Table 2). Black ducks continued a somewhat upward trend over the 51-year span of the survey (Fig.1). In comparison with 2004 estimates, 2005 estimates of American wigeon and

blue-winged teal increased substantially and those of American green-winged teal decreased substantially (Table 2, Fig. 1). Percent changes for these species compared to 2004, the 10-year mean, and the long-term mean are as follows: American black ducks, 25.0%, 158.0%, 203.7%; American wigeon, 450.0%, 211.8%, 46.4%; blue-winged teal, --, 788.8%, 349.1%; American green-winged teal, -63.6%, -60.4%, -41.3%.

In contrast, the total diving duck population estimate decreased from 2004 and in comparison to both the 10-year and long-term means (-61.2%, -67.5%, and -47.4%, respectively; Table 2); and was the 5th lowest estimate on record (Appendix 1). Despite this decrease in 2005, diving duck estimates still appear to show a slightly upward trend over the 51 year history of the survey (Fig. 1). As in recent years, ring-necked ducks comprised the large majority (79%) of divers observed, with goldeneye being a distant second in number (14%). Ring-neck estimates for 2005 still indicate an increase of 25.1% over the long-term mean, even though comparisons with 2004 and the 10-year mean both showed a decrease (-61.6% and -56.4%, respectively). 2005 estimates for both goldeneye (-66.8%, -87.3%, -79.4%) and bufflehead (-19.1%, -41.3%, -55.4%) were lower in comparison to 2004, the 10-year mean, and the long-term mean, respectively.

In 2005, mergansers were the only miscellaneous duck species observed; no observations were made of either scoters or scaup (Table 2). Both total miscellaneous ducks and merganser estimates, although down from 2004 (-39.7%, -35.8%, respectively) and the 10-year mean (-12.8%, -6.7%, respectively), were still above the long-term mean (80.8%, 94.9%, respectively) and reflected a long-term upward trend (Fig. 1) Merganser estimates in 2005 were the 6th highest on record (Appendix 1).

Canada Geese estimates in 2005 continued a long-term upward trend (Fig. 1) and were 70.7% above the long-term mean (Table 2, Appendix 1). This overall upward trend seems to have leveled off somewhat in recent years, however, as 2005 estimates were only slightly higher than in 2004 (9.4%) and the previous 10-year mean (14.7%).

DISCUSSION

As noted earlier, four of the five transect lines in stratum 50 are oriented north-south, with boundaries extending from 50° to 54° N latitude, a distance of approximately 240 miles. These lines were originally drawn in the 1950's when the survey was first started. At this time, regular air service to the remote northern villages was nonexistent, and because of only infrequent flights to these remote strips, fuel was unavailable. It was for this reason, that these transect lines were originally oriented north-south, rather than the traditional east-west orientation (J.R. Goldsberry, personal communication). Flying the transects from south to north and then returning from north to south on an adjacent line made it possible to access fuel available at airstrips located in the southern part of this stratum (i.e., Sioux Lookout, Dryden, Red Lake; see cover figure). Although the north-south orientation of the transect lines made it possible to survey this area, this same orientation made it difficult to fly this area at the same stage of spring breakup as dictated by the Standard Operating Procedures (SOP; USFWS & CWS, 1987). Over the course of the last 50 years of the survey, however, regular air service is now provided to most, if not all, of the villages located in the northern part of this stratum. Given this fact, it is feasible that fuel would now be available at these northern airstrips. If so, these transect lines could now be redrawn with east-west orientation, and thus allow coverage of the entire area at more similar phenological conditions.

As stated above, flying these north-south oriented lines often negate the SOP of surveying habitat at the same stage of spring breakup (USFWS & CWS, 1987). This concern was not as much of an issue in 2005 as it was in 2004. In 2005, phenological conditions were more consistent from south to north during this “early” year, when leaf out had already occurred and little evidence of ice still existed. In contrast, 2004 was a late year, however, when very notable differences in spring phenology existed between 50° and the 54° of latitude (i.e., no leaf out had occurred in the northern areas and extensive ice cover still remained on the northern lakes during the course of the survey).

The effect of these differences in survey timing on the resulting estimates for breeding ducks is unknown; but it is likely that population estimates obtained during a year of normal spring phenology when birds are already spread out into territories would differ from those obtained during a late year when flocked birds, holding to migrate further north, are observed and counted. In this boreal forest habitat, it is generally assumed that seasonal phenology, rather than water levels, has a greater influence on waterfowl nesting and ultimately, waterfowl production. This assumption is based on the fact that water level fluctuations tend to be less in this habitat as compared to the prairies. And so it follows that flying this survey area at the same stage of spring break-up from south to north is imperative to achieving bird estimates that more closely reflect the true breeding population from year to year. Given the current layout of transect lines, attempts to maximize the potential to consistently fly the survey at the correct and/or same 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. This would logistically be inefficient and would result in increased flight time and costs associated with completing the survey. Because of this, efforts should be made to explore the possibility of obtaining fuel at northern airstrips and redrawing transect lines in stratum 50 to an east-west orientation; whereby comparable spring phenology could be more easily maintained during the course of the survey along lines of the same latitude.

Compared to the prairies, relatively few duck species are observed in the mainly boreal forest habitat of Western Ontario. Over 80% of the total number of ducks observed in the last three years is comprised of only three species: mallards, mergansers, and ring-necked ducks (listed in decreasing order of abundance for 2005). And the remaining 20% of ducks observed is mainly comprised of only seven additional species (American black duck, American wigeon, American green-winged teal, blue-winged teal, goldeneye, bufflehead, and scoters); with numbers observed being highly variable among years.

In examining population estimates over the 51-year span of the survey in Western Ontario (Fig. 1), total ducks, dabblers, and Canada geese estimates all seem to indicate a definite upward trend; while diver and miscellaneous duck estimates seem to indicate only a slight upward trend.

Mallards, which comprise the majority of dabblers, also seem to exhibit an upward trend, as do American green-winged teal; while American black ducks seem to indicate a somewhat more stable or only slightly upward trend. Estimates for all three species are highly variable among years, however (Fig. 1). The remaining dabbler species represent relatively few birds with estimates also being highly variable among years. Northern pintail, with estimates up to 9,000 birds during the early years of the survey, have not been observed since 1990 in this stratum (Appendix 1).

The overall trend for divers and miscellaneous ducks seem to indicate a slight upward trend over the 51-year span of this survey. The major diver species observed has

changed, however, from scaup in the early years of the survey to ring-necked ducks during recent years. Estimates of these two species seemed to have reversed trends beginning in the early 1990's. Comparisons were made of the average population estimates for the intervals 1955-1992 versus 1993-2005; years based on imputed data (1971, 1974-1985) were excluded. Scaup estimates decreased eightfold from 97,300 to 12,200 individuals, while ring-neck estimates increased sevenfold from 40,270 to 281,300 individuals, when comparing these two intervals. It is unknown if this change is real or possibly the result of change in observers and misidentification of species. When considering miscellaneous ducks, estimates of mergansers have also increased substantially in Western Ontario since the early 1990's. Population average estimates for mergansers have increased threefold from 114,400 to 346,000 individuals when comparing the year intervals 1955-1991 and 1992-2005 (with years based on imputed data excluded).

Numbers of Canada geese over the 51-year history of the survey also appear to have definitely increased, as is also true throughout the Canadian provinces. Estimates averaged 12,800 individuals prior to 1974 (i.e., the beginning of the 12-year break in this survey), compared to 53,900 individuals after 1985 (i.e., the end of the 12-year break in this survey). Despite the variability in estimates among years, this over fourfold increase appears to be real.

Two areas representing extensive marsh habitat in stratum 50 (Albany River and Cobham River) are of special interest because of the relatively high concentrations of ducks observed there during the 2003 survey. These same concentrations of ducks were not observed during either the 2004 or 2005 survey, however.

For Western Ontario in 2005, waterfowl production is expected to be good to excellent. This prediction is based on the early spring phenology, adequate to high water levels, adequate brood habitat, and good waterfowl numbers.

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Table 1. Survey design and May 2005 coverage for Western Ontario, Stratum 50.

	Survey Design	May 2005 Coverage
Square miles in stratum	176,609	176,609
Square miles in sample - waterfowl	607.5	607.5
Linear miles in sample	2,430	2,430
Number of transects in sample	5	5
Number of segments in sample	135	135
Expansion factor	290.71	290.71

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	2005 Total	2004 Total	10-Year Mean	Long- Term Mean	2004	10-Year Mean	Long- Term Mean
Ducks								
Dabblers								
Mallard	498.3	498.3	530.0	275.6	236.5	-6.0%	80.8%	110.7%
Am. black duck	79.7	79.7	63.8	30.9	26.3	25.0%	158.0%	203.7%
Gadwall	1.8	1.8	1.8	0.5	1.2	0.0%	233.4%	53.4%
Am. wigeon	29.5	29.5	5.4	9.5	20.2	450.0%	211.8%	46.4%
Am. green-winged teal	16.4	16.4	45.0	41.3	27.9	-63.6%	-60.4%	-41.3%
Blue-winged teal	54.0	54.0	0.0	6.1	12.0	--	788.8%	349.1%
N. shoveler	0.0	0.0	2.0	0.2	1.0	-100.0%	-100.0%	-100.0%
N. pintail	0.0	0.0	0.0	0.0	1.9	--	--	-100.0%
Subtotal	679.6	679.6	648.0	364.2	326.9	4.9%	86.6%	107.9%
Divers								
Redhead	0.0	0.0	0.0	0.0	0.4	--	--	-100.0%
Canvasback	0.0	0.0	0.0	0.0	4.7	--	--	-100.0%
Scaups	0.0	0.0	6.3	9.5	75.6	-100.0%	-100.0%	-100.0%
Ring-necked duck	137.5	137.5	358.1	315.8	110.0	-61.6%	-56.4%	25.1%
Goldeneyes	24.7	24.7	74.4	194.6	119.8	-66.8%	-87.3%	-79.4%
Bufflehead	9.0	9.0	11.1	15.3	20.1	-19.1%	-41.3%	-55.4%
Ruddy Duck	3.5	3.5	0.0	1.5	1.6	--	129.4%	112.1%
Subtotal	174.6	174.6	449.9	536.7	332.1	-61.2%	-67.5%	-47.4%
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	0.0	0.0	36.3	25.4	13.7	-100.0%	-100.0%	-100.0%
Mergansers	354.1	354.1	551.1	379.3	181.7	-35.8%	-6.7%	94.9%
Subtotal	354.1	354.1	587.4	406.1	195.9	-39.7%	-12.8%	80.8%
Total Ducks	1208.3	1208.3	1685.3	1307.0	854.9	-28.3%	-7.6%	41.3%
Canada Goose	56.8	56.8	51.9	49.5	33.3	9.4%	14.7%	70.7%
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.

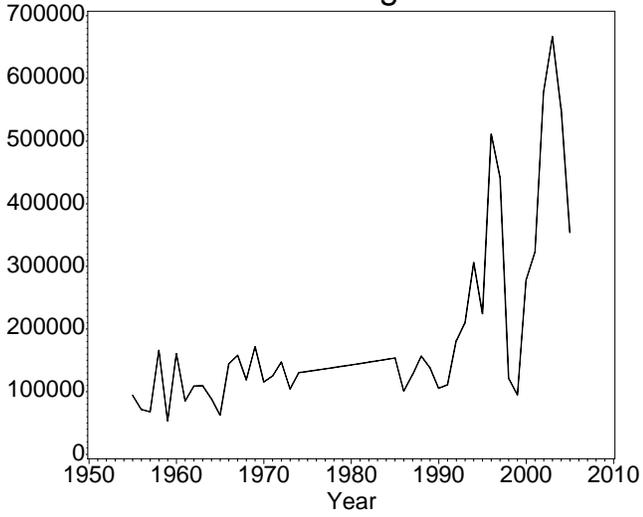
Species/Ponds	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Ducks										
Dabblers										
Mallard	41.2	183.8	69.4	144.0	127.3	196.9	163.6	362.1	185.7	220.0
Am. black duck	6.8	18.4	0.0	9.0	18.6	10.2	30.4	59.9	19.4	29.7
Gadwall	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	4.3
Am. wigeon	17.8	10.3	0.0	0.0	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

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

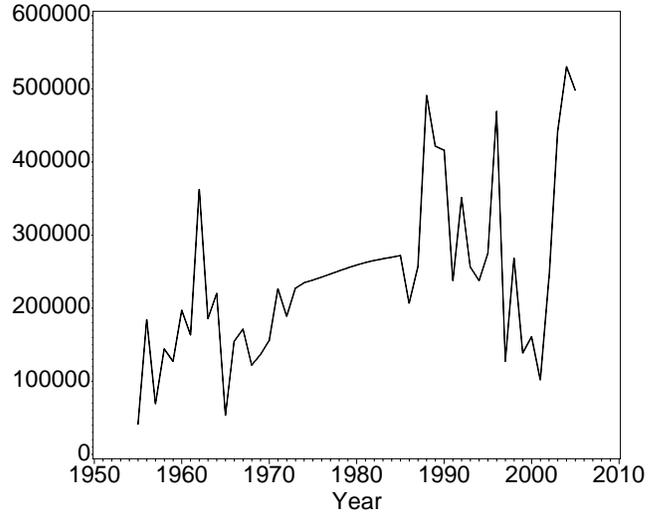
Species/Ponds	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Ducks										
Dabblers										
Mallard	274.7	469.0	127.6	267.9	138.9	160.7	102.1	241.8	443.8	530.0
Am. black duck	40.7	21.8	4.7	35.7	30.9	23.3	18.8	45.4	23.9	63.8
Gadwall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	1.8
Am. wigeon	7.1	18.4	15.2	0.0	19.2	10.3	11.0	5.4	2.7	5.4
Am. green-winged teal	12.3	113.0	76.9	13.7	7.8	27.6	14.0	63.5	39.6	45.0
Blue-winged teal	19.3	21.8	4.3	6.7	2.7	0.0	0.0	0.0	6.0	0.0
N. shoveler	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
N. pintail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	354.1	644.0	228.7	324.1	199.4	221.9	145.8	356.0	519.5	648.0
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										
Ring-necked duck	4.9	17.2	13.3	32.8	1.8	0.0	14.1	4.6	0.0	6.3
Goldeneyes	257.0	240.0	319.8	406.7	140.2	341.4	163.2	580.9	350.5	358.1
Bufflehead	23.5	702.9	171.2	108.6	226.3	393.7	73.2	129.9	42.9	74.4
Ruddy Duck	6.9	31.4	12.5	11.5	10.9	28.2	12.5	20.8	7.2	11.1
Subtotal	292.3	1002.0	516.7	559.5	383.7	763.3	263.0	736.2	400.7	449.9
Miscellaneous										
Oldsquaw	0.0	13.4	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	0.0	82.2	95.6	0.0	13.3	0.0	0.0	23.2	3.8	36.3
Mergansers	224.6	510.8	442.8	120.9	95.1	278.8	322.5	580.0	666.6	551.1
Subtotal	224.6	606.4	538.5	120.9	108.4	278.8	322.5	603.2	670.4	587.4
Total Ducks	871.0	2252.3	1283.9	1004.5	691.5	1264.0	731.4	1695.4	1590.5	1685.3
Canada Goose	82.6	34.4	49.3	31.9	16.3	86.8	31.5	63.3	47.1	51.9
Am. coot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Species/Ponds	2005
Ducks	
Dabblers	
Mallard	498.3
Am. black duck	79.7
Gadwall	1.8
Am. wigeon	29.5
Am. green-winged teal	16.4
Blue-winged teal	54.0
N. shoveler	0.0
N. pintail	0.0
Subtotal	679.6
Divers	
Redhead	0.0
Canvasback	0.0
Scaups	
Ring-necked duck	137.5
Goldeneyes	24.7
Bufflehead	9.0
Ruddy Duck	3.5
Subtotal	174.6
Miscellaneous	
Oldsquaw	0.0
Eiders	0.0
Scoters	0.0
Mergansers	354.1
Subtotal	354.1
Total Ducks	1208.3
Canada Goose	56.8
Am. coot	0.0

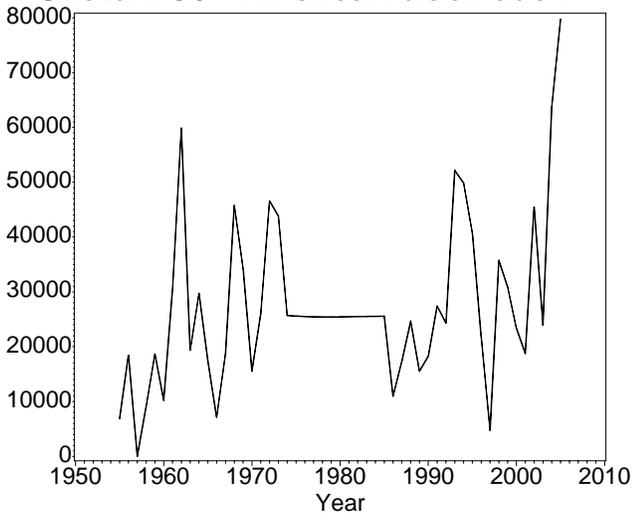
Stratum 50 Mergansers



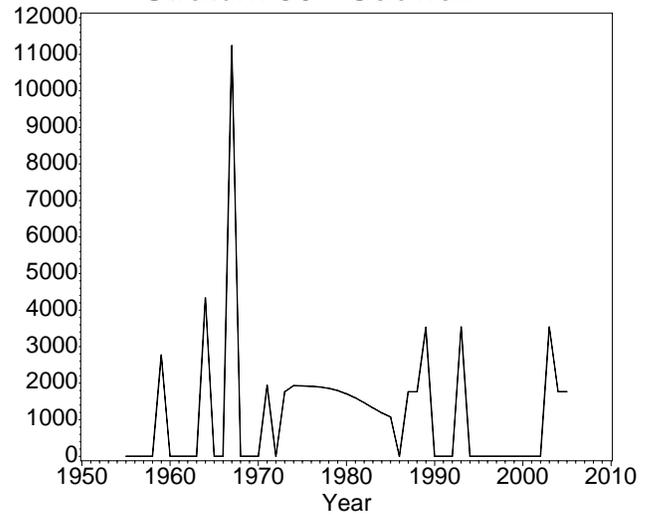
Stratum 50 Mallard



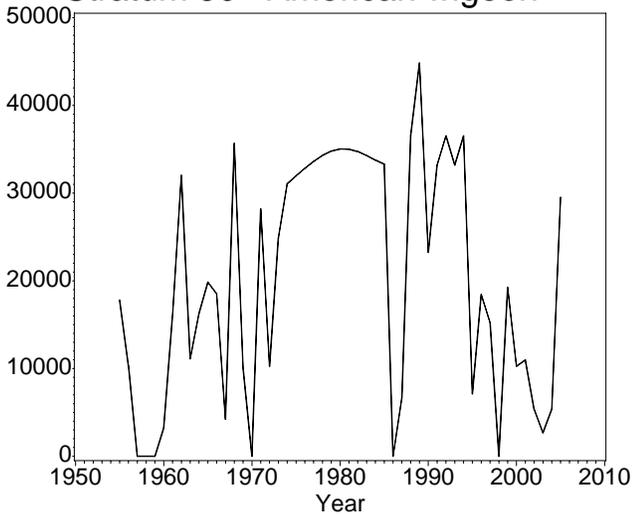
Stratum 50 American black duck



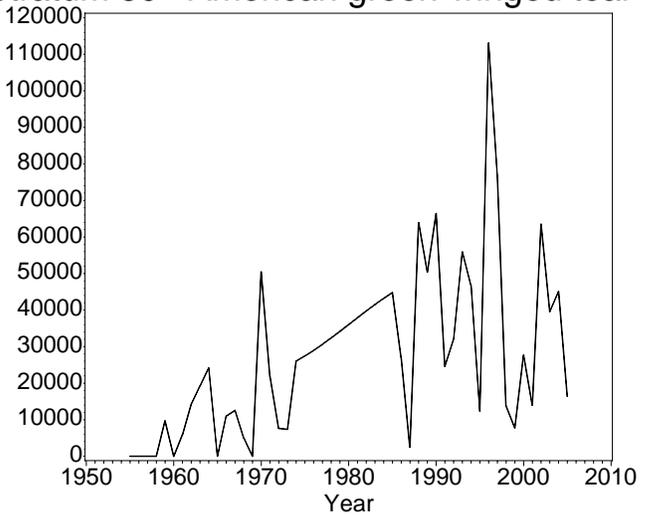
Stratum 50 Gadwall



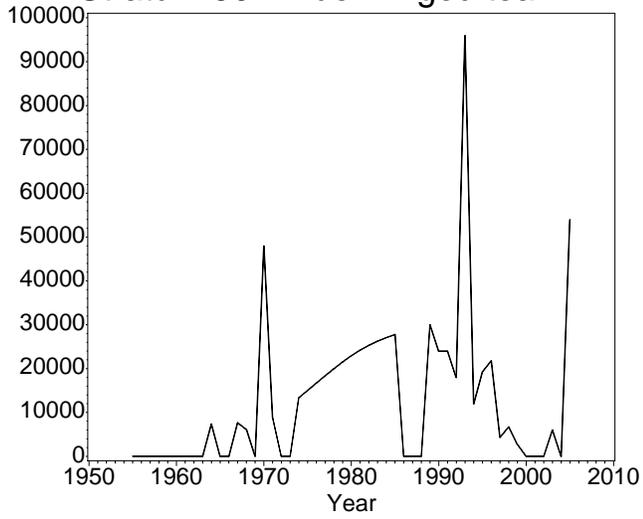
Stratum 50 American wigeon



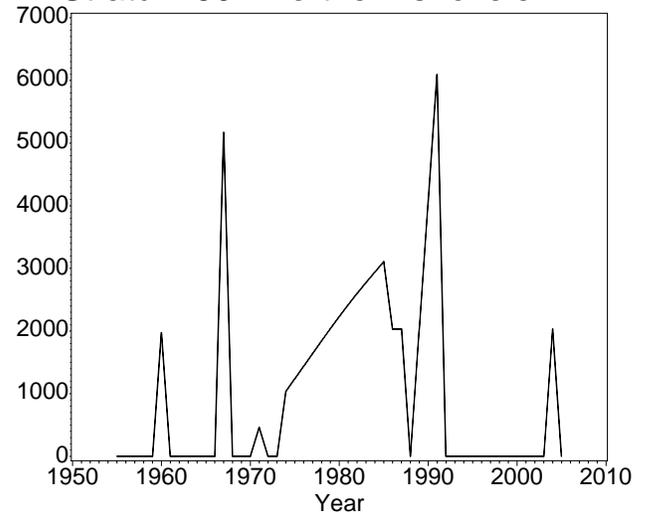
Stratum 50 American green-winged teal



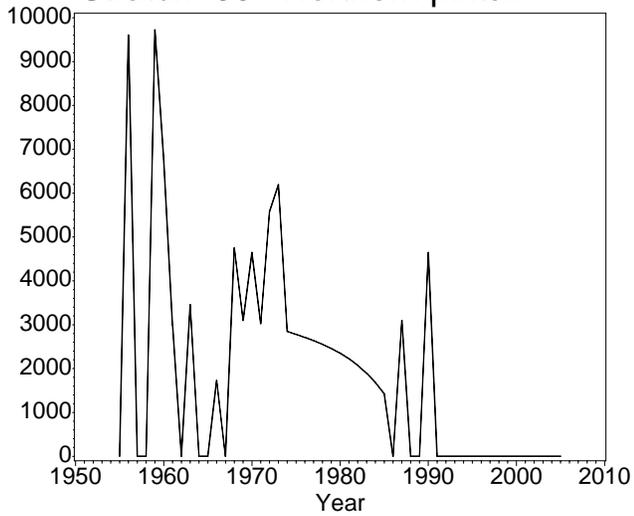
Stratum 50 Blue-winged teal



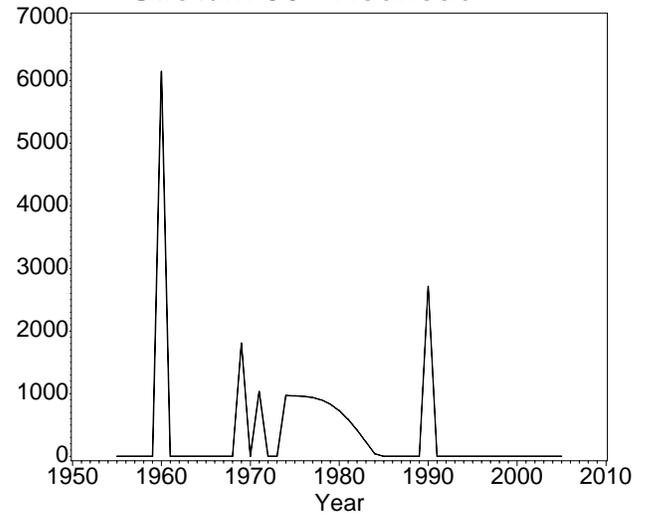
Stratum 50 Northern shoveler



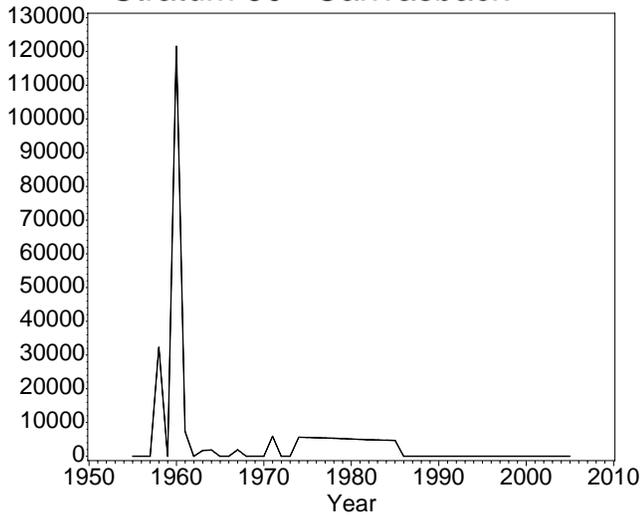
Stratum 50 Northern pintail



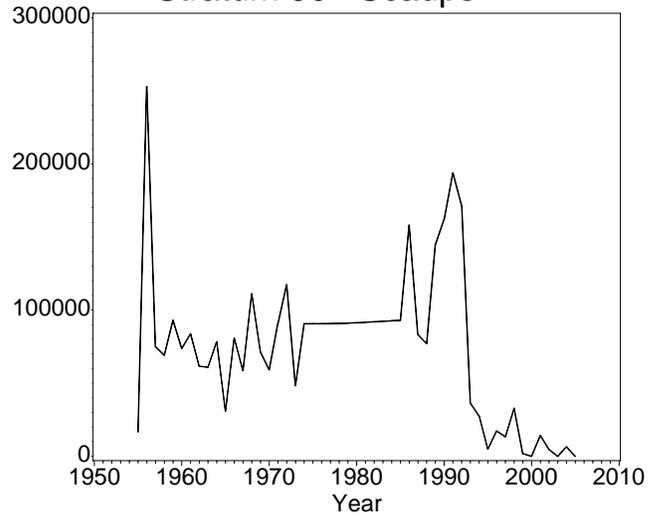
Stratum 50 Redhead



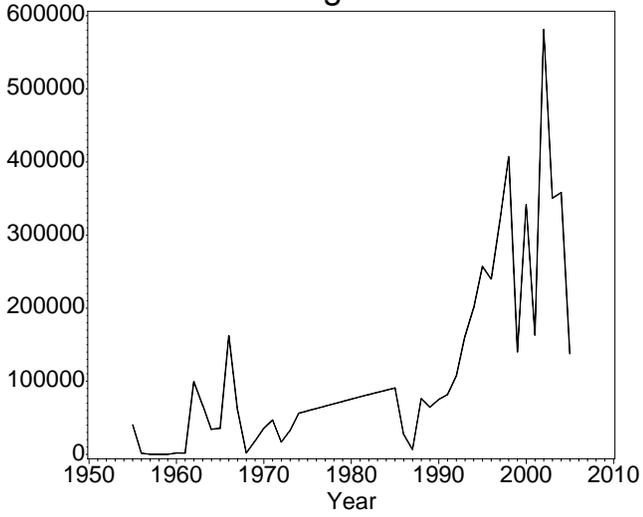
Stratum 50 Canvasback



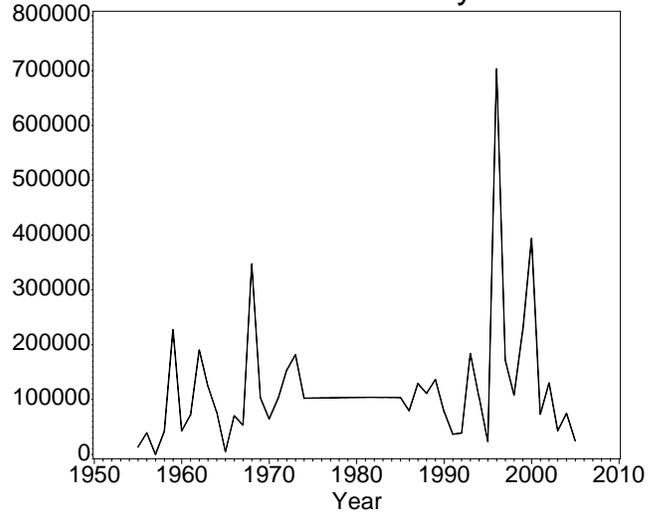
Stratum 50 Scaups



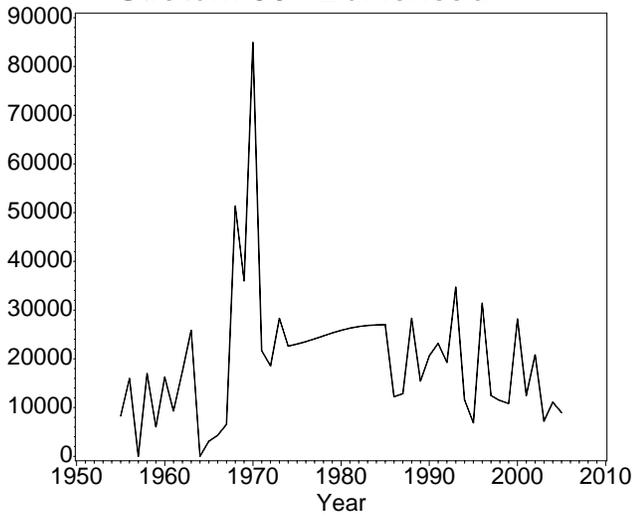
Stratum 50 Ring-necked duck



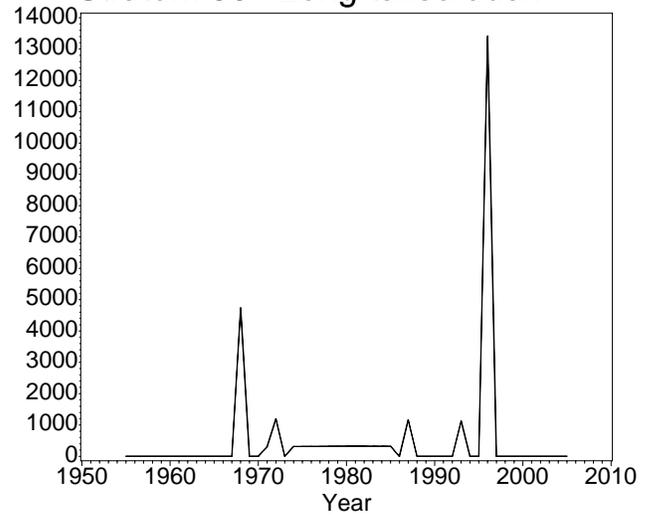
Stratum 50 Goldeneyes



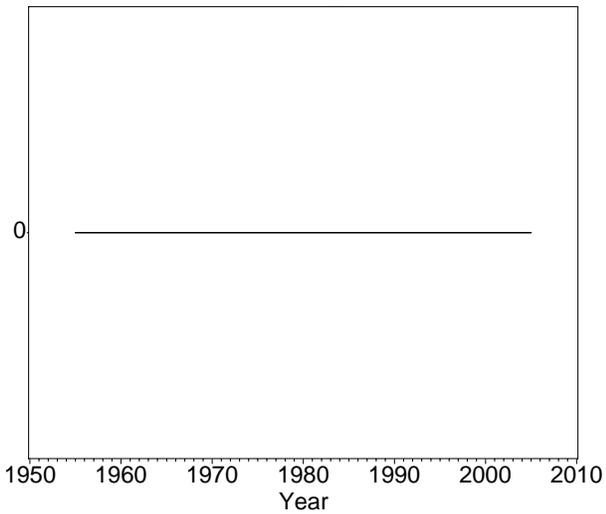
Stratum 50 Bufflehead



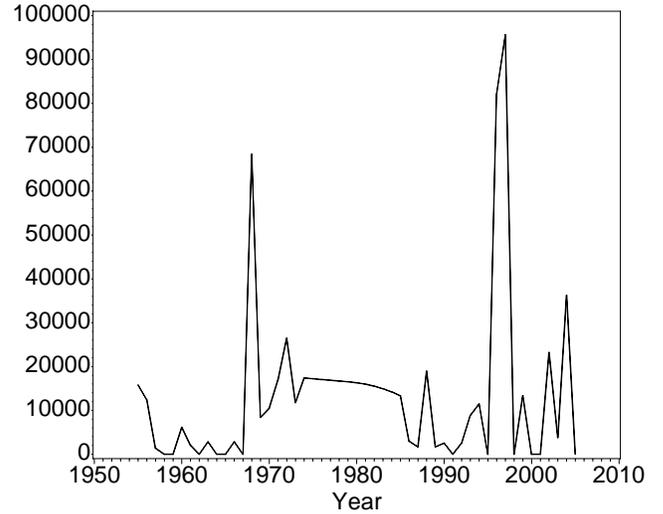
Stratum 50 Long-tailed duck



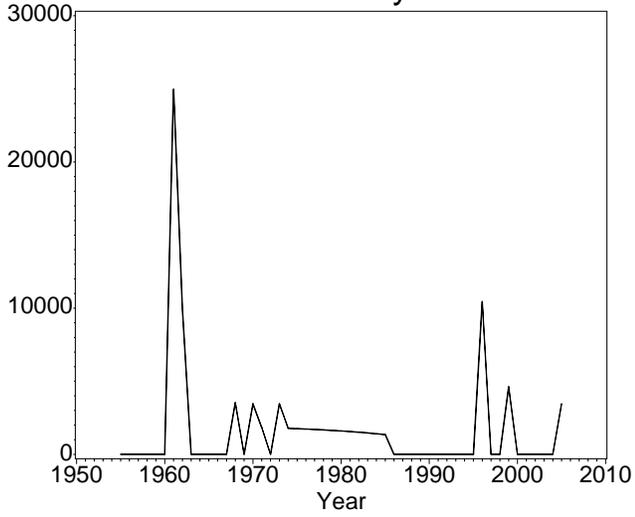
Stratum 50 Eiders



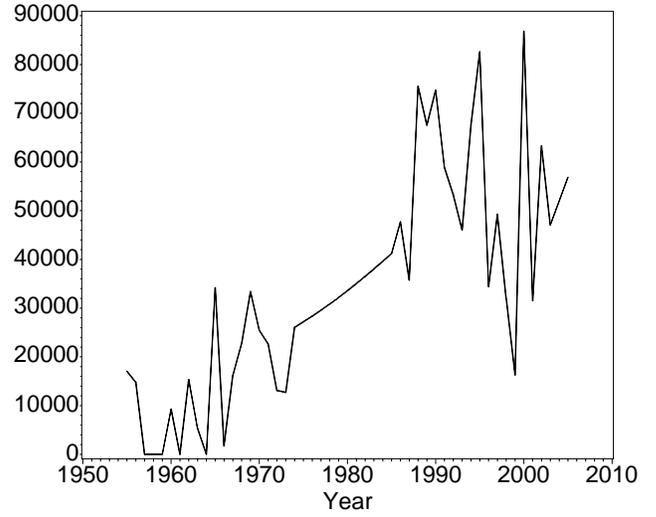
Stratum 50 Scoters



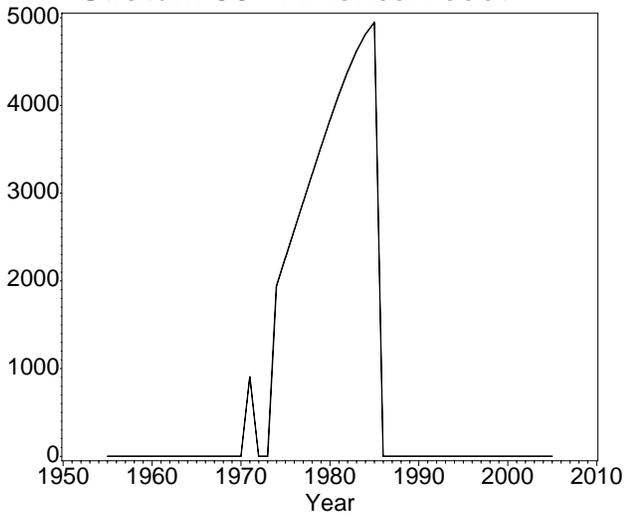
Stratum 50 Ruddy Duck



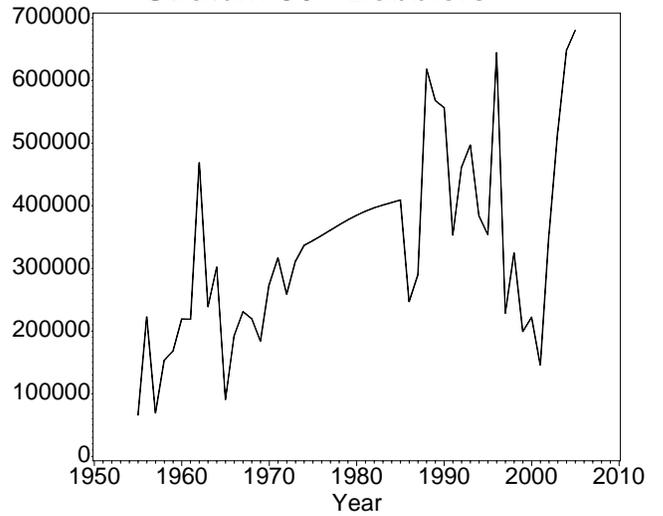
Stratum 50 Canada Goose



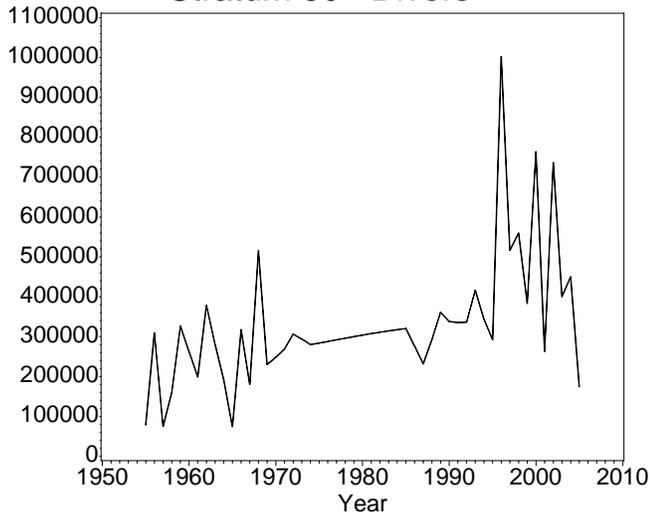
Stratum 50 American coot



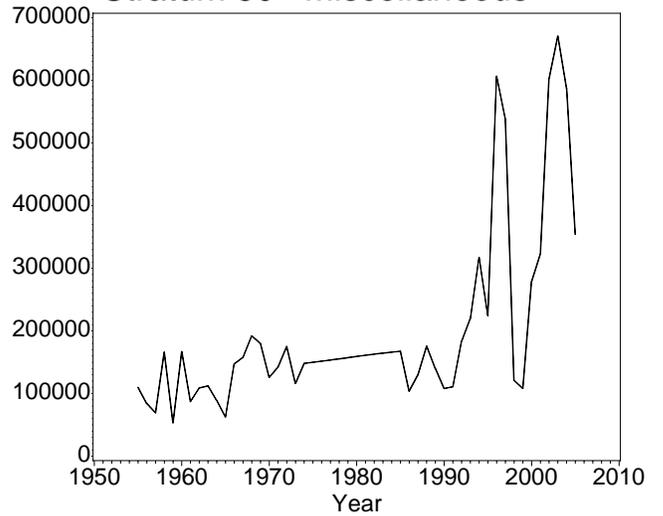
Stratum 50 Dabblers



Stratum 50 Divers



Stratum 50 Miscellaneous



Stratum 50 Total Ducks

