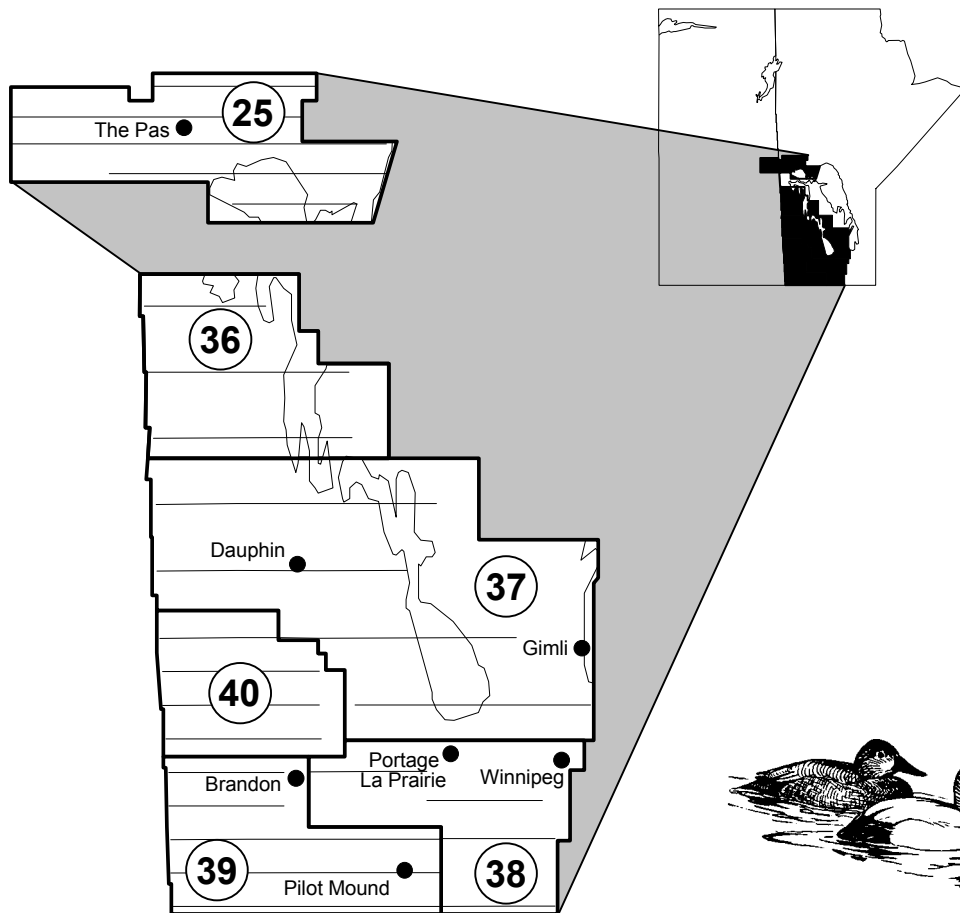


# Waterfowl Breeding Population Survey

MAY 2008

Southern Manitoba and Saskatchewan River Delta



UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE

AND

ENVIRONMENT CANADA  
CANADIAN WILDLIFE SERVICE



TITLE: Waterfowl Breeding Population and Habitat Survey for  
Southern Manitoba and the Saskatchewan River Delta – 2008

STRATA SURVEYED: 25, and 36 – 40

DATES: 08 – 23 May 2008  
08 – 22 May: Strata: 36 – 40  
22 – 23 May: Strata: 25

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

**Strata 36, 37, 38, 39, and 40**

Aerial Crew  
Pilot/Observer  
Observer

Karen S. Bollinger, Wildlife Biologist/Pilot, USFWS  
Guthrie Zimmerman, Wildlife Biologist, USFWS

Ground Crew  
Crew Leaders

Marc Schuster, Wildlife Technician, CWS  
Pat Rakowski, Wildlife Biologist, CWS  
Dale Caswell, Wildlife Biologist, CWS  
Jason Caswell, Wildlife Technician, DUC  
Garth Ball, Habitat Biologist, Manitoba Conservation

Assistants

Cameron Meuckon, Hunter Recruitment Director, Delta Waterfowl  
Darin Walker, Wildlife Technician, CWS  
Nathanial Astleford, Student Technician, CWS  
Daniel Routhier, Student Technician, CWS

**Stratum 25**

Aerial Crew  
Pilot/Observer  
Observer

Fred Roetker, Flyway Biologist, USFWS  
Paul Yakupzack, Wildlife Biologist, USFWS

**ABSTRACT:** The 2008 Waterfowl Breeding Population and Habitat Surveys of Southern Manitoba and the Saskatchewan River Basin were conducted from 08-23 May. Survey design was consistent with previous years. Wetland and upland habitat conditions were dry to extremely dry across most of southern Manitoba during the 2008 survey. The one exception to these dry conditions was the northwestern part of stratum 40 (northwest of Brandon) where wetlands were full. Spring phenology, as judged by leaf out, was late in 2008 as compared to recent years. Based on drought conditions and late phenology, waterfowl nesting conditions overall were judged to be poor, and consequently, production and recruitment are expected to be poor. The May pond estimate (597,700) was -26.6%, -0.7%, and -11.8% lower and the total duck populations estimate (1,503,900) was -10.2%, -18.4%, and -25.1% lower than the 2007 estimate, the 10-year mean, and the long-term mean, respectively. Dabblers were similar to the 2007 estimate (-2.5%), but lower than the 10-year (-19.8%) and the long-term (-27.3%) means. Divers were consistently lower than previous estimates (-29.4%, -22.4%, and -27.4% for the 2007 estimate, 10-year mean, and long-term mean, respectively). Mergansers were higher in comparison to previous estimates. Canada geese were similar to the previous year, but 200% higher than the long-term mean. Coot estimates increased compared to 2007, but were lower than either the 10-year or long-term mean.

Data for the selected species are presented below:

	2008 Indices (thousands)	Percent Change From		
		2007	1998-2007 mean (10 yr)	1955-2007 mean
Mallard	438.1	-2.9	-11.9	-11.1
Gadwall	115.9	0.9	-2.7	150.2
Green-winged teal	60.1	51.8	21.4	-3.8
Blue-winged teal	277.7	-10.1	-29.1	-39.5
Northern pintail	17.1	69.2	-44.8	-76.2
Redhead	65.4	-14.7	-39.6	-25.8
Canvasback	49.9	-47.2	-40.3	-38.9
Scaups	72.7	-10.3	-18.8	-62.7
Mergansers	62.0	43.5	120.9	164.3
Canada Goose	143.1	7.0	60.7	232.2
American coot	142.0	61.8	-43.7	-31.7

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

Southern Manitoba and the Saskatchewan River Delta survey area is comprised of six strata, numbers 25, 36, 37, 38, 39 and 40. As part of the traditional Breeding Waterfowl and Habitat Survey, these strata were first surveyed in 1955; and thus 2008, represents the 54<sup>th</sup> year that these strata have been flown. In the prairie strata (36 – 40), pond abundance has been recorded since 1961, with 2008 representing the 48<sup>th</sup> year (Table 2).

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 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 lat/long position in the resulting database.

Air-ground comparison segments in the Prairie and Parkland portion of the survey area (strata 36-40) were used to provide visibility correction factors for waterfowl, American coots, and pond number estimates that we obtained from the air. The visibility correction factors applied to stratum 25, which is located in the northern portion of the traditional survey area, were derived from comparisons of airplane and helicopter counts that had been flown in previous years. A more detailed explanation of how these VCF's are calculated can be found in "*A critical review of the aerial and ground surveys of breeding waterfowl in North America*" (Smith 1995).

2008 represents the eighth year that the summary data from Stratum 25 has been included in these survey results. The DMBM-PHAB (Population and Habitat Assessment Branch) calculated all data from previous Stratum 25 summaries, which are included in Table 3, and Appendices 1 and 2. Pond data were not collected in Stratum 25.

The aerial survey crew changed in 2008 with a different pilot/biologist flying strata 36-40. Karen, pilot/biologist, had previously flown this survey area in 2002, along with Rod King; and is very experienced in waterfowl surveys. This was Guthrie's second consecutive year as observer in this survey area, having first flown it in 2007; and he has also had other previous experience with aerial surveys. Fred Roetker and Paul Yakupzack flew stratum 25 in 2008. Fred, flyway biologist, had previously flown this stratum and also is very experienced in waterfowl surveys. This was Paul's second year of serving as observer on these aerial surveys in Canada. The ground crew for strata 36-40 remained the same as in 2007, except that there was one less person. All ground crew leaders have been involved with conducting the ground survey for numerous years.

On 04 May, the crew departed the South St Paul Airport (KSGS) enroute to the survey area in N728, a Cessna 206 amphibian aircraft. A reconnaissance/training flight was flown on 7 May, and the survey begun on 8 May. Strata 36-40 was completed on 22 May. Stratum 25 was flown on 22-23 May in N723, also a Cessna 206 amphibian aircraft. Total flight time to complete the survey in strata 36-40 and stratum 25 was 37.6 hrs and 7 hrs, respectively. We also collected waterfowl population estimates and habitat

conditions for southeastern Saskatchewan (strata 34-35) and these data have been forwarded to the crew leader for that area, Phil Thorpe, for inclusion in the southern Saskatchewan report. To collect these data, we flew an additional 23.1 hrs. Upon completion of strata 36-40, N728 was ferried back to South St. Paul on 23 May. The entire survey, including transit time, took 20 days and a total of 75.5 flight hours in N728 and 7 flight hours in N723. Pre and post survey ferry/reconnaissance flight time totaled 9.7 and 5.1 hrs, respectively. During the 15 day interval of the survey, there were three non-flight days due to inclement weather.

All segments of the survey design and all air-ground comparison segments were flown in 2008. There were 24 air-ground segments flown in strata 36-40 and 16 air-ground segments flown in strata 34-35.

WEATHER AND HABITAT: Description of Area: Strata 36-40, located in southern Manitoba, (see figure on cover sheet) can be characterized as prairie and parkland habitat; while stratum 25 can mainly be characterized as boreal forest.

Habitat conditions were dry throughout most of southern Manitoba and spring phenology appeared to be late. At the beginning of the survey none of the trees had started to leaf out and it was not until near the end of the survey that buds first appeared. In the prairie strata, conditions were judged to be extremely dry in stratum 38, except for the Turtle Mountains, and in all of stratum 39. However, in prairie stratum 40, conditions were judged to be fair to good. Conditions were dry in the parkland habitat of strata 36 and 37, whereas the boreal forest habitat of stratum 25 was fair to poor. The unusually dry conditions in the prairies resulted in numerous dry potholes and ponds that were normally categorized as class 3 wetlands. Many of these dry wetlands had been tilled, several burned, and a few bulldozed of all vegetation and trees.

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).

A total of 11 Climate Regions have been classified by Environment Canada and two of these encompass the Southern Manitoba and Saskatchewan River Delta survey area. These two regions are: i) the Prairie Region, outlining the prairie areas of southern Manitoba, Saskatchewan, and Alberta, and ii) the Northwestern Forest Region, encompassing the northern two-thirds of Manitoba, Saskatchewan, Alberta, and northeastern British Columbia.

Below are presented: i) the mean temperature (°C) difference from normal, and ii) percent of normal precipitation; and the ranks of these variables for the 61 year interval from 1948 to 2007/2008 for these two Climate Regions. The variables are summarized by season: i) Spring (March, April, May), ii) Summer (June, July, August), iii) Autumn (September, October, November), and iv) Winter (December, January, February).

Conditions in these regions in Spring 2008 were relatively cool and precipitation much below normal, as compared to Spring 2007, when temperatures were much warmer and precipitation much above normal. Temperatures for both regions were about normal over the past year, however. For the Prairie Region, precipitation has been below normal since last summer; and for the Northwestern Forest Region, precipitation has only been average, at best, since summer 2007.

## Prairies Region (Canadian Climate Region)

	<u>Spring 07</u>	<u>Summer 07</u>	<u>Autumn 07</u>	<u>Winter 07/08</u>	<u>Spring 08</u>
Mean Temp. (°C)					
Diff from Normal	+1.9	+0.9	+0.3	+0.3	+0.3
Rank 1948 – 2007/08	17	9	26	37	38
% of Normal					
Precipitation	+41.5	-26.6	-4.7	-40.2	-11.2
Rank 1948 – 2007/08	7	54	38	56	37

## Northwestern Forest Region (Canadian Climate Region)

	<u>Spring 07</u>	<u>Summer 07</u>	<u>Autumn 07</u>	<u>Winter 07/08</u>	<u>Spring 08</u>
Mean Temp. (°C)					
Diff from Normal	+0.7	+0.5	+0.1	+0.6	-0.6
Rank 1948 – 2007/08	28	21	31	36	42
% of Normal					
Precipitation	+31.8	+4.6	+4.5	-8.6	-14.7
Rank 1948 – 2007/08	4	18	24	31	48

Weather more specific to the southern Manitoba and Saskatchewan River Delta was obtained by compiling monthly averages from weather observations at stations located in strata 25, 36 – 40. These results are presented below. The same trends (cooler temperatures and below normal precipitation) are exhibited by these monthly averages as also shown by the more general Climate Regions data. These more specific data, however, do better depict the cool spring temperatures in 2008 with temperatures averaging below normal since February.

## Prairie and Parkland Southern Manitoba: strata 36-40

	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>
Mean Temp. (°C)									
Diff from Normal	+1.7	+1.1	-0.1	+1.1	-3.9	-1.2	-0.9	-3.0	-1.0
% of Normal									
Snowfall	12	78	167	24	65	140	109	313	-
% of Normal									
Precipitation	112	64	138	25	66	128	68	80	147

Boreal Forest: stratum 25

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Mean Temp. (°C)									
Diff from Normal	+2.1	-0.5	-0.2	+1.9	-4.0	-3.3	-0.9	-1.8	+0.3
% of Normal									
Snowfall	67	133	87	130	129	121	17	5	-
% of Normal									
Precipitation	85	135	83	104	128	118	21	24	66

The 2008 pond estimate (597,700) decreased 26.6% from the 2007 estimate (814,600), was similar to the 10-year mean (-0.7%) and less than the long-term mean (-11.8%) (Tables 2 and 3, Appendices 1 and 2). The 2008 estimate ranked 27<sup>th</sup> in the 48-year long-term trend of pond estimates from 1961-2008. The decrease in number of ponds from 2007 was apparent in all strata, but the largest declines in pond estimates occurred in strata 36, 37, and 39.

**BREEDING POPULATION ESTIMATES:** The 2008 total duck population estimate of 1,503.9 million birds for Southern Manitoba and the Saskatchewan River Delta decreased from the 2007 estimate (-10.2%) and was also lower relative to the 10-year and long-term means (-18.4% and -25.1%, respectively; Table 3). The 2008 estimate ranked 47<sup>th</sup> in the 54-year long-term trend of duck population estimates from 1955 – 2008 as shown in Appendices 1 and 2.

The 2008 dabbling duck population estimate of 1,043.5 million birds remained relatively unchanged from 2007 (-2.5%), but was lower relative to both the 10-year and long-term means (-19.8% and -27.3%, respectively; Table 3). In comparison to 2007, blue-winged teal and northern shoveler estimates were lower; mallard and gadwall, unchanged; and American wigeon, American green-winged teal, and northern pintail, higher. In comparison to the 10-year and long-term means, all 2008 dabbling estimates were lower except for gadwall and green-wings.

The 2008 diving duck population estimate of 396.7 million birds was consistently lower in comparison to the 2007 estimate and the 10-year and long-term means (-29.4%, -22.4%, and -27.4%, respectively; Table 3). Individual species comparisons to previous years and means were mostly lower; however, 2008 estimates for ring-necked ducks, goldeneyes, and bufflehead were higher than the long-term means.

The 2008 miscellaneous duck population of 63.6 million birds (almost exclusively mergansers) was much higher than that estimated in 2007 (+43.5%) and also well above both the 10-year and long-term means (+120.9% and +164.3%, respectively; Table 3).

Dabbling ducks made up 69.4%; diving ducks, 26.4%; and miscellaneous ducks, 4.2% of the 1.5 million ducks estimated in Southern Manitoba. Individual species percentages were: mallards - 29.1%; blue-winged teal - 18.5%; gadwall - 7.7%; northern shoveler - 7.0%; scaup - 4.8%; redhead - 4.3%; mergansers - 4.1%; and ring-necked ducks - 3.9%.

The 2008 Canada goose estimate increased only slightly over that of 2007 (+7%), but was well above both the 10-year and long-term means (+60.7% and +232.2%, respectively; Table 3).

The 2008 American coot estimate increased greatly from 2007 (+61.8%), but was well below both the 10-year and long-term means (-43.7% and -31.7%, respectively; Table 3).

**CONCLUSIONS:** The dry habitat conditions and late spring phenology observed in 2008 resulted in a decrease in the total duck estimate from 2007. We delayed the start of the survey only two days, even though spring phenology was estimated to be 7-10 days behind normal. This was estimated using waterfowl surveys conducted by CWS biologists in late April, leaf out, and local knowledge. We began the survey after the reconnaissance flight on 7 May showed good pairing of waterfowl. Survey timing appeared normal (i.e., paired birds and only small groups of flocked drakes), even though vegetation phenology remained behind normal throughout the duration of the survey.

Given the drought conditions in 2008, the decrease in the total 2008 duck estimate from 2007 was expected. Increases in individual duck species estimates from 2007 to 2008 were not expected, however. This was especially true for northern pintail, whose estimates increased 69.2% from 2007, a relatively wet year. Northern pintails typically overfly the prairies during years having dry habitat or drought conditions, such as in 2008. Also surprising was the increase in the estimate of coots from 2007 to 2008. Coots are generally considered to indicate good water conditions. Coot numbers were not compared for individual stratum, however. Other species estimates that also increased from 2007 to 2008 were American green-winged teal, American wigeon, and mergansers.

Appendix 2 gives a graphical representation of the population trends for both individual species and species groupings over the 54-year history of the survey. Although there is much annual variation and most species do not exhibit a definite trend, a few species do exhibit either a definite decreasing or increasing population trend over the entire period in this survey area. Most notable are American wigeon, northern pintail, and scaups, and to a lesser extent, blue-winged teal, that show a very definite decreasing population trend. Even though, pintails estimates were higher in 2008 as compared to 2007, they were still the fourth lowest estimate recorded. The 2007 estimate was the lowest at 17.4 million birds, followed by 1989 and 1991 estimates. American wigeon estimates for 2008 were the fifth lowest estimate recorded. The 2004 estimate was the lowest recorded at 6.6 million birds, followed by 2007, 2003, and 2006. Blue-winged teal estimates were also the fifth lowest estimate recorded, with only the years 1984, 1985, 1991, and 1994 being lower. The 2008 scaup estimate was the third lowest recorded, with only 2002 and 2004 having lower estimates. Species seemingly exhibiting an increasing population trend in this survey area are gadwall, bufflehead, and especially Canada geese.



The drought conditions experienced in southern Manitoba and the Saskatchewan River Delta during spring 2008 resulted in habitat conditions from poor to only fair over most areas. As a result, production and consequently, recruitment, are expected to be poor. Rainfall received in this area in June after the survey, however, might have eased drought conditions somewhat, perhaps resulting in improved habitat conditions for late nesters. Thus the success rate of those waterfowl that did not initially overfly the area and those that made re-nesting attempts might have increased.

#### ACKNOWLEDGMENTS

Thanks to the staff at Maple Leaf Aviation, Brandon, Manitoba, especially Dave and Jim Wall for their continued excellent maintenance and care of N728, their friendship, advice, and local weather knowledge. Thanks also to the hard work, cooperation, and comraderie of the Canadian Wildlife Service ground crew.

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Table 1. Survey design and May 2008 coverage for Southern Manitoba and the Saskatchewan River Delta.

	Stratum						Total
	25	36	37	38	39	40	
Survey design:							
Square miles in stratum	7,644	5,500	16,485	5,655	6,552	4,536	46,372
Square miles in sample – waterfowl	135.0	58.5	135.0	54.0	121.5	67.5	571.5
Square miles in sample – ponds	--	29.2	67.5	27.0	60.7	33.7	218.2
Linear miles in sample	540	234	540	216	486	270	2,286
Number of transects in sample	5	3	4	3	5	4	24
Number of segments in sample	30	13	30	12	27	15	127
Expansion factor	58.57	111.11	122.11	104.72	53.93	67.20	
May 2008 coverage:							
Square miles in stratum	7,644	5,500	16,485	5,655	6,552	4,536	46,372
Square miles in sample – waterfowl	135.0	58.5	135.0	54.0	121.5	67.5	571.5
Square miles in sample – ponds	--	29.2	67.5	27.0	60.7	33.7	218.2
Linear miles in sample	540	234	540	216	486	270	2,286
Number of transects in sample	5	3	4	3	5	4	24
Number of segments in sample	30	13	30	12	27	15	127
Expansion factor	58.57	111.11	122.11	104.72	53.93	67.20	

Table 2: Long-term trend in adjusted May pond estimates (thousands) by stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean for southern Manitoba (1961-2008). Estimates Prior to 1974 were not adjusted for visibility bias, if applicable.

Year	Stratum 2008					Total
	36	37	38	39	40	
1961	33.1	289.8	36.3	117.7	109.6	586.6
1962	25.2	313.5	31.9	74.8	88.2	533.6
1963	47.8	247.7	53.2	162.5	168.8	679.9
1964	77.4	289.6	38.6	253.2	250.3	909.1
1965	141.8	443.8	72.6	246.0	218.4	1122.6
1966	115.8	433.2	62.8	242.0	212.4	1066.3
1967	129.0	503.3	70.1	182.7	234.9	1120.0
1968	39.8	153.9	27.4	46.3	67.9	335.3
1969	59.6	153.1	36.8	126.3	87.3	463.1
1970	79.4	368.2	63.1	262.2	262.2	1035.2
1971	69.9	239.9	60.5	200.7	183.5	754.6
1972	103.8	431.5	48.1	180.4	250.0	1013.7
1973	82.6	137.6	33.6	97.7	82.4	433.9
1974	141.7	559.5	67.2	324.6	356.2	1449.1
1975	59.7	264.2	53.3	296.2	264.1	937.6
1976	75.5	444.0	61.7	376.4	231.0	1188.7
1977	35.6	208.2	39.2	67.0	90.0	439.9
1978	129.9	312.5	31.7	114.9	191.3	780.3
1979	67.6	268.5	42.1	202.5	211.7	792.4
1980	32.4	103.2	31.6	58.5	60.9	286.7
1981	30.4	107.8	23.1	47.5	54.0	262.8
1982	27.0	131.1	25.3	88.2	87.4	359.0
1983	89.2	271.7	34.3	163.3	153.9	712.4
1984	69.3	159.1	36.5	86.3	58.2	409.4
1985	45.4	234.6	29.0	83.7	103.6	496.3
1986	94.3	383.8	70.2	197.1	202.2	947.5
1987	42.1	165.2	37.6	119.4	133.8	498.1
1988	108.2	318.5	43.4	48.8	113.6	632.5
1989	36.6	99.1	38.2	63.5	46.8	284.2
1990	80.7	348.5	35.7	52.4	145.2	662.4
1991	28.8	147.1	32.4	70.8	114.0	393.1
1992	61.9	261.9	54.0	150.3	136.6	664.8
1993	48.3	216.8	55.7	63.4	99.2	483.4
1994	45.8	157.9	37.0	89.4	65.6	395.7
1995	79.7	332.1	65.2	239.5	172.9	889.4
1996	76.9	371.2	54.5	177.2	150.1	829.8
1997	99.9	467.5	84.5	157.4	159.2	968.5
1998	43.0	194.9	44.3	124.1	85.7	492.1
1999	36.8	185.6	32.6	204.6	151.1	610.7
2000	45.6	184.0	27.5	91.3	117.3	465.7
2001	31.1	324.7	122.9	144.0	163.1	785.8
2002	64.4	77.8	45.8	52.0	87.2	327.2
2003	44.0	143.1	59.6	140.3	103.9	490.9
2004	47.0	219.9	32.3	126.8	114.5	540.6
2005	56.8	312.4	38.4	139.3	208.3	755.2
2006	77.0	262.5	59.1	185.9	150.3	734.8
2007	134.0	363.4	39.6	111.0	166.6	814.6
2008	71.8	265.6	37.3	69.1	154.0	597.7
10-year Mean	58.0	226.8	50.2	131.9	134.8	601.7
Long-term Mean	67.9	268.2	47.2	145.7	148.2	677.3
Percent Change:						
From 2008	-46.4	-26.9	-6.0	-37.7	-7.6	-26.6
From 10-year Mean	23.9	17.1	-25.8	-47.6	14.2	-0.7
From Long-term Mean	5.7	-1.0	-21.2	-52.6	3.9	-11.8

Table 3: Status of waterfowl population estimates (thousands, adjusted for visibility bias), by species and stratum with comparison for the previous year, the previous 10-year mean, and the long-term mean for southern Manitoba, May 2008.

Species/Ponds	Stratum 2008						2008 Total	2007 Total	10-Year Mean	Long-Term Mean	% Change From		
	25	36	37	38	39	40					2007	10-Year Mean	Long-term Mean
Ducks													
Dabblers													
Mallard	57.2	18.3	121.1	30.0	101.7	109.8	438.1	451.0	497.5	492.9	-2.9	-11.9	-11.1
American black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	--	-100.0	-100.0
Gadwall	3.4	2.9	19.4	2.4	38.8	49.1	115.9	114.9	119.1	78.5	0.9	-2.7	47.8
American wigeon	5.8	0.3	1.7	0.4	3.0	6.7	17.8	14.2	27.7	90.5	25.3	-35.9	-80.4
American green-winged teal	12.3	1.8	19.4	1.0	9.8	15.9	60.1	39.6	49.5	62.5	51.8	21.4	-3.8
Blue-winged teal	12.8	9.7	68.9	6.7	50.5	129.1	277.7	309.0	391.8	459.2	-10.1	-29.1	-39.5
Northern shoveler	15.0	3.8	17.4	3.6	25.6	39.2	104.6	123.8	162.5	127.7	-15.6	-35.7	-18.1
Northern pintail	0.0	1.2	7.8	0.5	2.8	17.1	29.4	17.4	53.3	123.8	69.2	-44.8	-76.2
Subtotal	106.5	38.1	255.7	44.5	232.0	366.8	1043.5	1069.9	1301.9	1435.5	-2.5	-19.8	-27.3
Divers													
Redhead	9.5	0.2	6.1	1.3	15.6	32.8	65.4	76.6	108.3	88.2	-14.7	-39.6	-25.8
Canvasback	19.3	0.5	11.3	0.6	6.4	11.7	49.9	94.5	83.5	81.6	-47.2	-40.3	-38.9
Scaups	12.9	2.2	21.9	1.1	16.4	18.1	72.7	81.0	89.5	194.7	-10.3	-18.8	-62.7
Ring-necked duck	35.0	3.3	7.3	0.5	6.8	6.3	59.2	81.8	55.8	46.5	-27.6	6.2	27.5
Goldeneye's	25.2	8.8	12.1	0.0	1.3	5.6	53.0	107.9	54.3	36.4	-50.9	-2.4	45.8
Bufflehead	8.3	4.8	20.7	1.1	3.7	11.3	49.9	70.4	53.5	34.4	-29.0	-6.6	45.3
Ruddy duck	0.7	0.2	8.1	1.2	19.0	17.5	46.6	49.4	66.6	64.7	-5.7	-30.0	-27.9
Subtotal	110.8	20.0	87.5	5.9	69.2	103.2	396.7	561.6	511.4	546.4	-29.4	-22.4	-27.4
Miscellaneous													
Mergansers	5.4	21.7	25.5	0.0	6.1	3.3	62.0	43.2	28.1	23.5	43.5	120.9	164.3
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	--	-100.0	-100.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	--	-100.0	-100.0
Scoters	1.6	0.0	0.0	0.0	0.0	0.0	1.6	0.0	1.4	3.4	--	15.3	-52.2
Subtotal	7.0	21.7	25.5	0.0	6.1	3.3	63.6	43.2	29.7	27.0	47.3	114.6	136.0
Total Ducks	224.4	79.8	368.7	50.4	307.3	473.3	1503.9	1674.6	1842.9	2008.9	-10.2	-18.4	-25.1
Canada Goose	17.2	10.3	43.9	10.1	16.9	44.6	143.1	133.7	89.0	43.1	7.0	60.7	232.2
American coot	12.0	1.8	17.1	0.0	8.8	102.3	142.0	87.7	252.3	207.8	61.8	-43.7	-31.7
Ponds	--	71.8	265.6	37.3	69.1	154.0	597.7	814.6	601.7	640.6	-26.6	-0.7	-6.7

Appendix. 1: Long-term trend in adjusted waterfowl breeding population estimates (thousands) for southern Manitoba, 1955-2008.

Species/Ponds	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Ducks										
Dabblers										
Mallard	549.9	811.4	852.4	1116.5	702.5	647.2	442.6	292.5	428.6	534.7
American black duck	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.5	2.1	0.5
Gadwall	31.4	18.9	23.6	34.1	35.5	28.0	62.2	41.2	84.3	70.7
American wigeon	162.3	140.2	120.8	392.7	292.2	106.4	130.4	100.1	118.4	166.3
Green-winged teal	36.9	17.8	29.6	74.7	57.1	21.7	67.3	21.0	69.3	10.7
Blue-winged teal	514.8	313.3	399.1	1198.2	1302.2	729.2	543.5	439.2	538.4	490.9
Northern shoveler	57.4	66.5	93.4	84.3	198.3	158.0	138.1	75.9	159.9	167.8
Northern pintail	335.1	296.2	210.4	208.6	148.9	256.7	115.3	122.5	196.4	141.6
Subtotal	1687.9	1665.1	1729.1	3109.1	2736.7	1947.1	1499.4	1093.0	1597.3	1583.2
Divers										
Redhead	66.3	69.9	55.2	99.1	123.7	88.6	77.7	50.6	105.7	117.9
Canvasback	80.5	79.6	54.4	138.3	109.0	131.3	123.1	58.3	100.6	101.3
Scaups	225.3	235.3	281.6	598.0	416.6	289.1	271.1	184.3	269.5	218.6
Ring-necked duck	27.2	25.3	7.0	18.4	55.7	13.0	17.7	21.2	46.2	24.1
Goldeneye's	17.8	13.3	17.5	34.6	87.7	53.9	25.4	29.0	16.4	10.6
Bufflehead	16.3	7.5	2.9	10.9	14.7	9.6	23.1	7.8	20.6	14.3
Ruddy duck	28.9	28.6	24.9	24.6	81.3	62.5	95.3	55.0	106.2	74.9
Subtotal	462.3	459.7	443.4	923.9	888.8	648.0	633.4	406.2	665.3	561.7
Miscellaneous										
Mergansers	14.2	2.6	0.6	1.2	1.6	5.0	1.9	4.7	8.7	19.3
Long-tailed duck	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	3.4	7.5	0.9	10.3	10.1	0.0	1.6	0.5	1.4	2.2
Subtotal	17.6	10.1	1.6	11.4	11.7	5.0	3.5	5.3	10.1	21.6
Total Ducks	2167.8	2134.9	2174.1	4044.4	3637.1	2600.2	2136.3	1504.5	2272.7	2166.4
Canada Goose	5.6	31.5	0.0	8.8	3.5	9.5	7.4	11.0	9.0	8.4
American coot	18.8	45.7	27.8	77.0	286.6	121.5	239.7	52.0	112.5	117.2
Ponds	1562.5	1056.2	721.0	643.8	675.9	583.6	586.6	533.6	679.9	909.1

Species/Ponds	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Ducks										
Dabblers										
Mallard	372.0	431.5	468.3	435.1	659.7	757.2	458.3	576.6	370.1	421.0
American black duck	0.1	0.4	1.1	1.6	0.2	0.2	0.3	0.0	0.0	0.0
Gadwall	54.5	86.6	98.0	71.0	58.5	59.8	51.8	86.5	86.9	58.1
American wigeon	177.0	130.4	96.3	144.5	173.5	155.3	112.6	150.9	163.6	108.3
Green-winged teal	39.4	60.9	83.2	58.5	174.8	92.3	135.1	125.7	134.1	112.9
Blue-winged teal	360.5	285.1	679.3	496.9	575.5	819.4	450.0	533.6	478.7	703.6
Northern shoveler	141.0	135.7	202.1	99.1	172.7	147.0	93.1	146.3	76.8	106.1
Northern pintail	145.5	110.0	180.5	82.5	311.3	276.2	169.0	227.8	95.6	310.5
Subtotal	1290.0	1240.6	1808.8	1389.2	2126.2	2307.4	1470.1	1847.4	1405.8	1820.5
Divers										
Redhead	175.4	106.2	113.2	72.9	85.9	101.0	82.7	75.8	76.7	91.8
Canvasback	126.7	93.3	109.4	80.2	73.8	71.2	80.2	42.8	68.4	40.7
Scaups	205.4	183.1	246.9	188.3	158.9	227.1	188.2	191.3	138.2	348.4
Ring-necked duck	31.6	35.8	53.9	97.3	35.5	53.5	72.3	47.4	29.8	54.6
Goldeneye's	16.9	7.6	19.6	9.5	17.5	23.6	39.2	16.0	15.6	34.7
Bufflehead	21.3	19.2	49.1	25.7	34.5	21.4	31.2	28.6	11.3	27.6
Ruddy duck	76.2	102.3	82.5	131.2	58.0	69.5	59.8	34.5	49.7	62.8
Subtotal	653.4	547.5	674.6	605.1	464.2	567.4	553.5	436.4	389.7	660.6
Miscellaneous										
Mergansers	15.0	22.9	7.0	12.4	15.0	11.2	7.4	16.6	13.0	27.3
Long-tailed duck	0.0	0.0	0.0	0.1	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	2.2	5.7	3.0	9.1	1.3	5.3	6.1	1.7	5.6	17.4
Subtotal	17.2	28.7	10.0	21.7	16.4	16.5	13.5	18.3	18.5	44.7
Total Ducks	1960.6	1816.7	2493.4	2016.0	2606.7	2891.4	2037.1	2302.0	1814.1	2525.7
Canada Goose	8.1	9.7	4.4	21.0	17.1	21.0	25.1	22.2	30.4	22.3
American coot	121.0	62.5	150.3	433.8	139.3	184.2	148.0	172.8	127.3	242.4
Ponds	1122.6	1066.3	1120.0	335.3	463.1	1035.2	754.6	1013.7	433.9	1449.1

Appendix. 1: Long-term trend in adjusted waterfowl breeding population estimates (thousands) for southern Manitoba, 1955-2008.

Species/Ponds	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Ducks										
Dabblers										
Mallard	476.5	679.8	482.8	429.9	417.1	596.2	467.5	521.2	427.7	233.4
American black duck	0.5	0.5	0.9	0.4	0.6	1.2	0.0	0.0	0.0	0.0
Gadwall	52.5	62.2	81.8	61.7	81.0	144.5	70.7	58.3	52.6	17.3
American wigeon	77.6	78.6	41.7	73.2	82.4	121.1	103.9	67.0	48.4	38.5
Green-winged teal	66.0	122.5	70.3	141.2	40.1	35.9	40.7	36.2	52.9	43.2
Blue-winged teal	410.2	722.5	435.8	383.6	536.8	528.0	386.0	496.2	314.3	201.6
Northern shoveler	69.3	166.3	62.1	89.6	95.2	75.8	116.1	157.8	135.5	65.3
Northern pintail	225.9	263.5	43.1	107.1	201.2	73.6	71.6	110.5	106.2	31.8
Subtotal	1378.5	2095.9	1218.6	1286.6	1454.5	1576.2	1256.6	1447.1	1137.7	631.1
Divers										
Redhead	82.7	86.2	108.8	80.6	76.5	65.4	150.9	94.8	60.5	20.1
Canvasback	90.9	127.4	74.3	57.7	60.9	75.9	101.1	65.5	48.0	56.2
Scaups	312.0	267.9	164.6	307.2	149.8	222.0	249.1	169.3	243.5	120.2
Ring-necked duck	59.7	21.8	14.6	35.8	44.6	88.3	87.8	47.6	50.0	17.5
Goldeneye's	43.7	42.5	14.4	78.2	39.9	33.2	85.9	41.9	42.8	7.4
Bufflehead	29.6	42.8	32.5	45.9	20.3	33.0	35.6	30.3	32.8	26.5
Ruddy duck	52.6	45.7	40.2	56.3	23.3	104.7	117.0	161.8	60.6	38.9
Subtotal	671.2	634.3	449.4	661.6	415.4	622.6	827.3	611.0	538.2	286.8
Miscellaneous										
Mergansers	36.8	12.5	15.0	25.7	43.0	54.9	51.9	15.9	70.6	24.9
Long-tailed duck	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	12.1	6.1	4.2	4.1	9.0	0.8	1.0	1.5	6.0	1.5
Subtotal	49.0	18.6	19.1	29.8	52.0	55.8	52.9	17.5	76.6	26.4
Total Ducks	2098.7	2748.8	1687.1	1978.1	1921.8	2254.5	2136.8	2075.7	1752.4	944.3
Canada Goose	20.9	9.3	24.3	27.5	25.7	39.5	35.8	31.9	47.1	40.2
American coot	312.5	485.5	267.4	128.0	196.3	499.7	404.2	197.7	135.2	55.6
Ponds	937.6	1188.7	439.9	780.3	792.4	286.7	262.8	359.0	712.4	409.4

Species/Ponds	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Ducks										
Dabblers										
Mallard	329.2	431.8	332.0	340.4	315.3	363.1	340.6	389.4	354.7	436.5
American black duck	0.6	0.8	0.7	0.2	0.2	0.2	0.4	1.1	0.0	0.3
Gadwall	64.3	105.7	71.2	70.3	69.6	120.1	79.7	111.9	94.4	57.6
American wigeon	53.5	63.4	39.5	43.6	56.1	58.1	55.0	52.5	31.9	47.3
Green-winged teal	24.2	55.4	46.2	38.3	40.4	41.2	39.2	138.5	24.5	32.1
Blue-winged teal	225.2	386.0	291.5	369.0	314.5	343.1	272.2	430.4	355.6	172.2
Northern shoveler	99.9	165.5	115.6	122.8	79.2	95.2	88.9	151.3	79.5	64.8
Northern pintail	45.8	124.0	77.9	36.4	19.6	57.4	26.6	100.2	40.5	52.5
Subtotal	842.6	1332.5	974.5	1021.0	894.9	1078.4	902.6	1375.3	981.1	863.3
Divers										
Redhead	51.3	38.3	52.2	53.6	33.5	85.0	99.9	116.3	44.2	51.2
Canvasback	60.4	57.1	42.5	56.0	53.4	68.5	65.3	80.0	69.5	100.2
Scaups	155.6	309.1	169.5	151.1	101.9	152.9	101.4	221.2	123.0	154.7
Ring-necked duck	42.7	34.5	55.5	57.2	33.8	49.3	47.4	113.8	52.6	42.2
Goldeneye's	66.7	22.8	33.8	34.5	21.1	40.6	15.0	36.1	24.8	6.5
Bufflehead	41.7	31.9	40.3	33.1	33.8	35.6	48.2	67.2	28.0	49.1
Ruddy duck	44.5	69.9	81.0	68.1	57.9	72.7	80.5	60.8	74.6	15.1
Subtotal	462.8	563.7	474.8	453.7	335.4	504.6	457.6	695.5	416.5	419.0
Miscellaneous										
Mergansers	35.6	28.0	23.6	28.3	25.1	47.8	23.6	27.2	24.8	26.1
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.3
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	3.6	0.3	1.6	3.4	0.2	0.3	1.8	4.8	3.0	1.5
Subtotal	39.2	28.3	25.2	31.6	25.3	48.1	25.3	32.0	28.3	28.8
Total Ducks	1344.7	1924.5	1474.5	1506.3	1255.6	1631.2	1385.6	2102.8	1426.0	1311.1
Canada Goose	43.2	45.2	38.5	74.6	97.0	52.9	61.1	67.2	74.4	52.6
American coot	78.7	217.9	163.2	773.9	129.8	180.3	129.1	266.0	173.5	44.6
Ponds	496.3	947.5	498.1	632.5	284.2	662.4	393.1	664.8	483.4	395.7

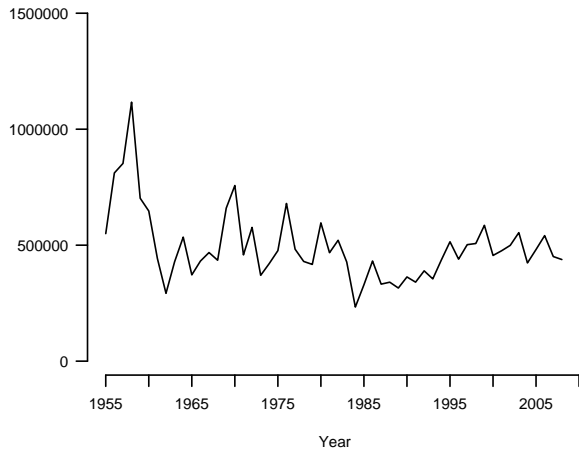
Appendix. 1: Long-term trend in adjusted waterfowl breeding population estimates (thousands) for southern Manitoba, 1955-2008.

Species/Ponds	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Ducks										
Dabblers										
Mallard	514.8	439.6	502.2	507.2	585.6	455.7	476.0	499.2	554.2	423.4
American black duck	0.6	0.0	0.0	0.7	0.0	3.0	0.0	0.3	0.6	0.0
Gadwall	94.4	106.1	97.7	106.1	118.1	90.9	114.1	144.9	101.9	151.7
American wigeon	50.4	50.9	41.8	34.0	42.8	42.0	22.2	43.7	16.6	6.6
Green-winged teal	55.6	132.0	75.5	48.7	48.9	63.5	33.7	43.6	49.6	27.8
Blue-winged teal	328.9	340.4	326.0	303.9	497.6	401.0	520.6	335.7	447.5	304.0
Northern shoveler	172.8	187.4	166.5	115.4	169.5	194.0	215.2	119.5	129.4	155.5
Northern pintail	123.8	85.4	65.0	64.9	62.8	45.7	100.7	34.0	39.6	40.4
Subtotal	1341.2	1341.7	1274.7	1180.8	1525.3	1295.9	1482.5	1220.9	1339.4	1109.3
Divers										
Redhead	133.5	89.7	79.4	170.7	87.4	125.6	124.5	79.5	82.1	126.4
Canvasback	111.3	115.6	90.7	88.9	98.1	94.8	74.4	86.4	50.1	89.0
Scaups	183.9	215.0	116.4	77.2	120.6	83.4	88.3	68.6	78.3	53.2
Ring-necked duck	46.2	45.4	49.5	41.0	37.1	70.7	66.5	93.3	63.1	41.5
Goldeneye's	41.3	64.6	40.0	51.9	44.0	50.7	52.5	37.6	84.2	40.4
Bufflehead	50.7	36.5	63.0	47.7	62.2	46.0	46.5	40.0	44.0	58.7
Ruddy duck	47.5	40.7	39.1	15.7	56.0	48.8	66.2	121.3	52.1	170.3
Subtotal	614.4	607.6	478.2	493.1	505.5	519.9	519.0	526.8	453.8	579.5
Miscellaneous										
Mergansers	14.1	32.2	67.4	18.5	50.7	31.8	38.7	16.0	13.4	10.6
Long-tailed duck	0.5	0.0	0.0	0.9	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	0.7	1.4	3.4	3.0	0.8	0.7	0.0	1.2	1.0	1.3
Subtotal	15.2	33.6	70.8	22.4	51.5	32.5	38.7	17.2	14.4	11.9
Total Ducks	1970.9	1982.9	1823.6	1696.3	2082.3	1848.3	2040.2	1764.9	1807.6	1700.6
Canada Goose	62.1	66.9	79.2	60.3	50.9	57.3	53.9	92.9	85.5	140.2
American coot	199.7	284.9	288.5	537.4	182.4	410.2	346.1	439.8	113.7	114.8
Ponds	889.4	829.8	968.5	492.1	610.7	465.7	785.8	327.2	490.9	540.6

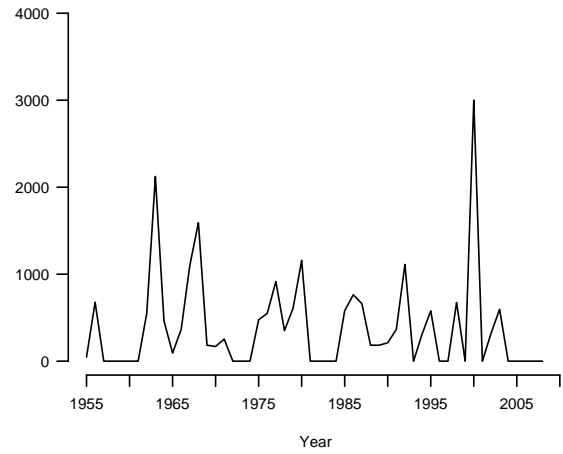
Species/Ponds	2005	2006	2007	2008
Ducks				
Dabblers				
Mallard	481.4	541.4	451.0	438.1
American black duck	0.0	0.0	0.0	0.0
Gadwall	122.0	126.2	114.9	115.9
American wigeon	37.7	17.5	14.2	17.8
Green-winged teal	61.1	78.3	39.6	60.1
Blue-winged teal	355.7	443.0	309.0	277.7
Northern shoveler	219.8	183.1	123.8	104.6
Northern pintail	68.7	58.7	17.4	29.4
Subtotal	1346.4	1448.2	1069.9	1043.5
Divers				
Redhead	103.6	106.6	76.6	65.4
Canvasback	60.4	98.5	94.5	49.9
Scaups	98.7	146.0	81.0	72.7
Ring-necked duck	30.9	31.6	81.8	59.2
Goldeneye's	43.4	30.4	107.9	53.0
Bufflehead	63.8	55.5	70.4	49.9
Ruddy duck	42.2	43.6	49.4	46.6
Subtotal	443.0	512.2	561.6	396.7
Miscellaneous				
Mergansers	20.2	37.5	43.2	62.0
Long-tailed duck	0.0	0.0	0.0	0.0
Eiders	0.0	0.8	0.0	0.0
Scoters	3.6	2.7	0.0	1.6
Subtotal	23.8	40.9	43.2	63.6
Total Ducks	1813.2	2001.3	1674.6	1503.9
Canada Goose	65.1	150.4	133.7	143.1
American coot	184.6	106.3	87.7	142.0
Ponds	755.2	734.8	814.6	597.7

Appendix 2: Long-term trends in adjusted waterfowl breeding population estimates for southern Manitoba, 1955-2008.

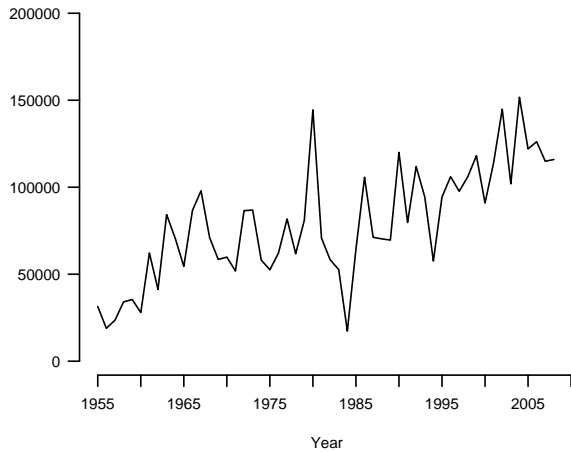
**Strata 25,36,37,38,39,40 Mallard**



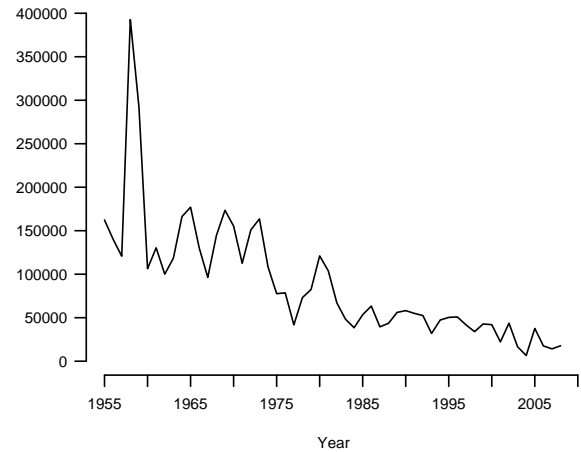
**Strata 25,36,37,38,39,40 American Black Duck**



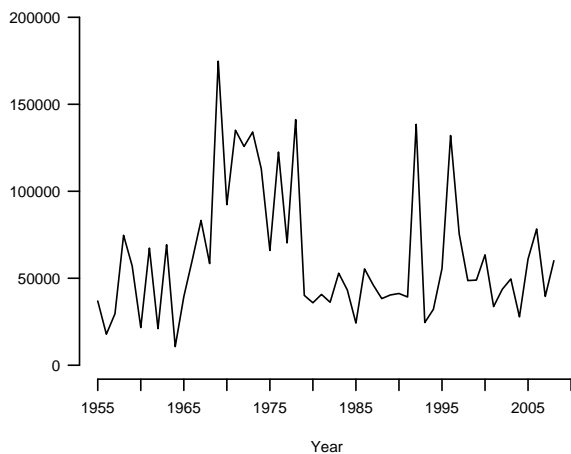
**Strata 25,36,37,38,39,40 Gadwall**



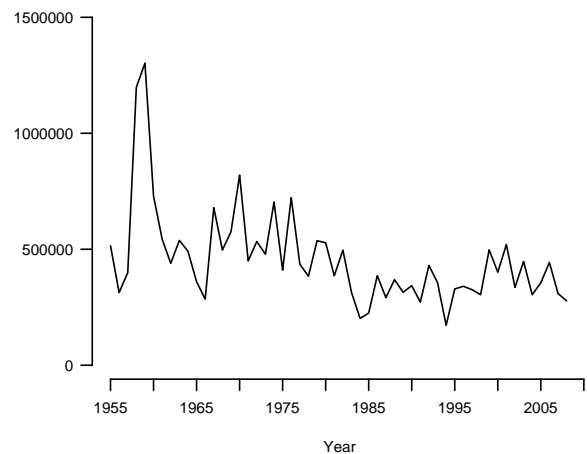
**Strata 25,36,37,38,39,40 American wigeon**



**Strata 25,36,37,38,39,40 Green-winged teal**



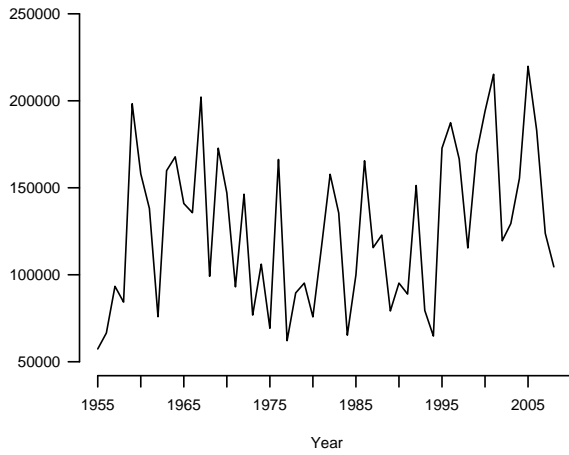
**Strata 25,36,37,38,39,40 Blue-winged teal**



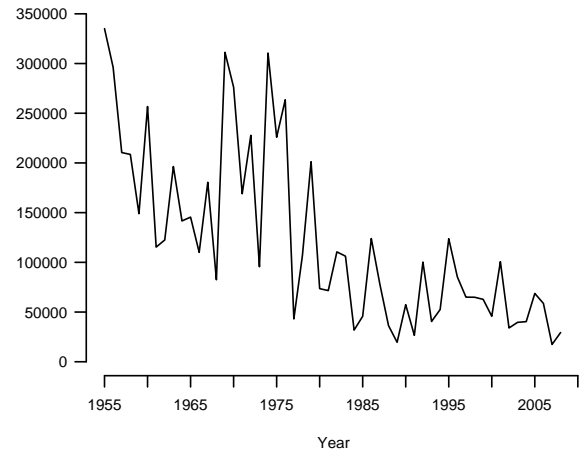


Appendix 2: Continued.

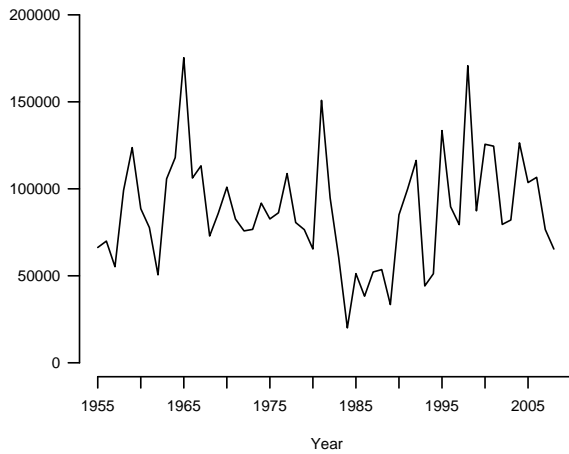
**Strata 25,36,37,38,39,40 Northern shoveler**



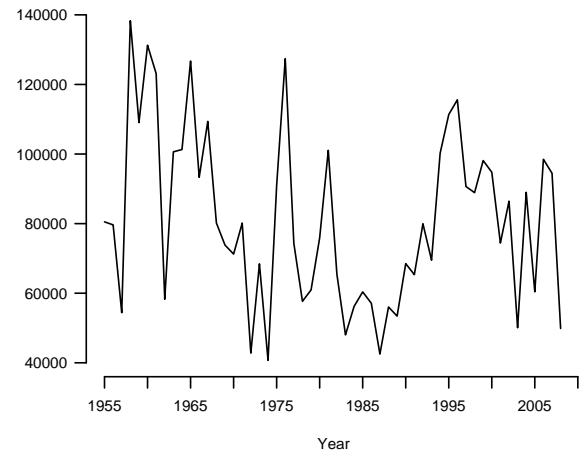
**Strata 25,36,37,38,39,40 Northern pintail**



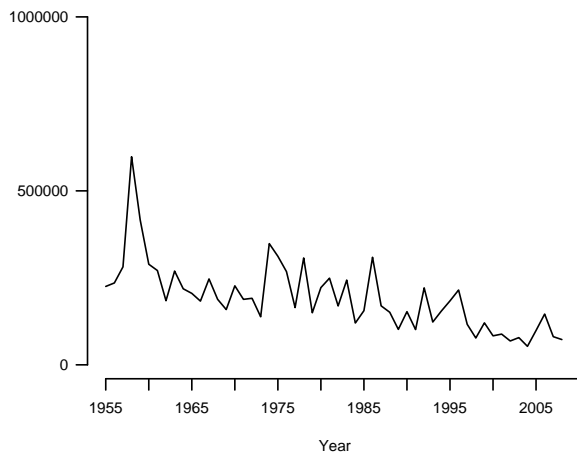
**Strata 25,36,37,38,39,40 Redhead**



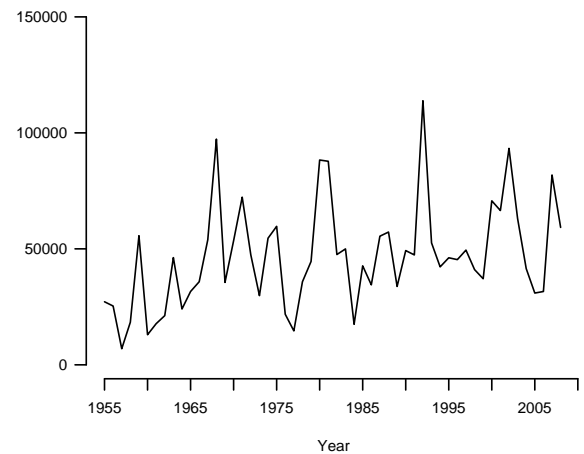
**Strata 25,36,37,38,39,40 Canvasback**



**Strata 25,36,37,38,39,40 Scaups**

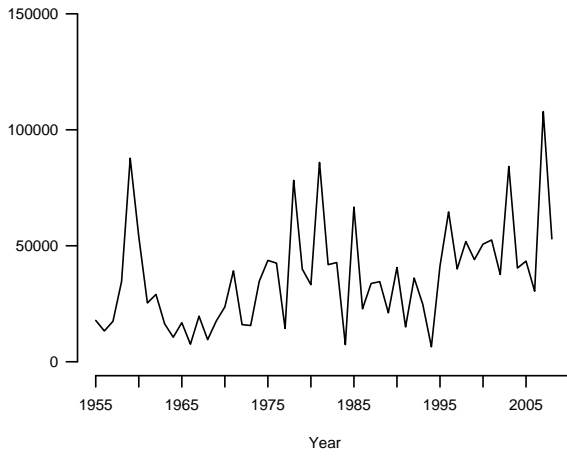


**Strata 25,36,37,38,39,40 Ring-necked duck**

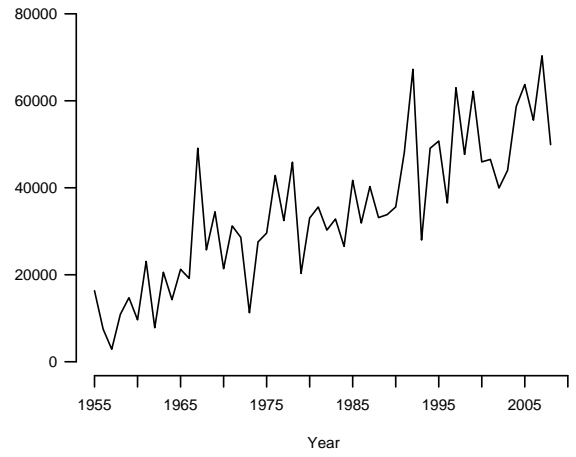


Appendix 2: Continued.

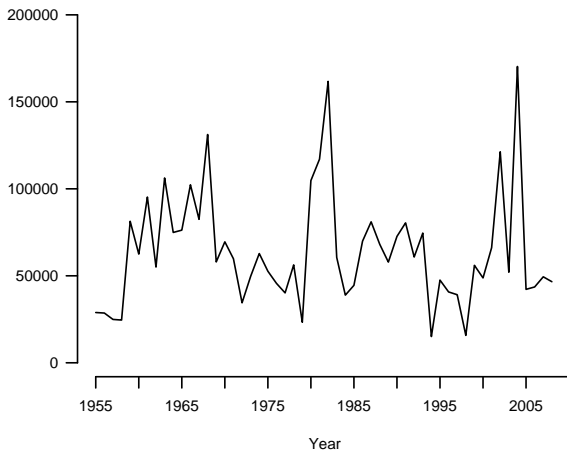
**Strata 25,36,37,38,39,40 Goldeneye's**



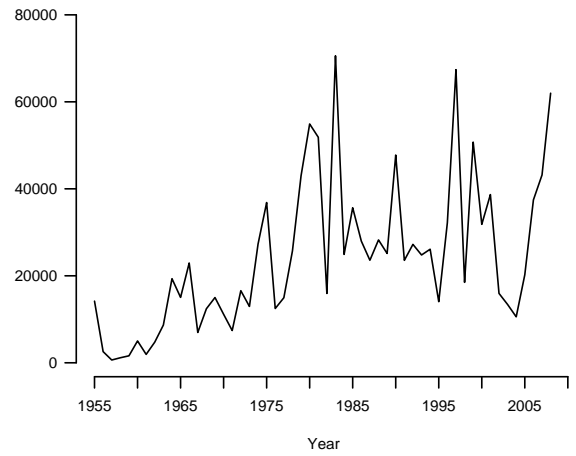
**Strata 25,36,37,38,39,40 Bufflehead**



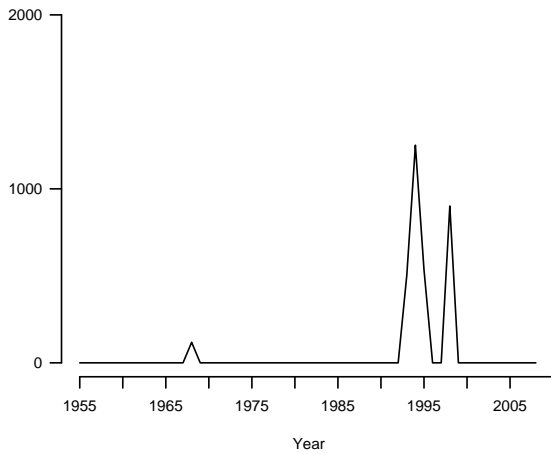
**Strata 25,36,37,38,39,40 Ruddy Duck**



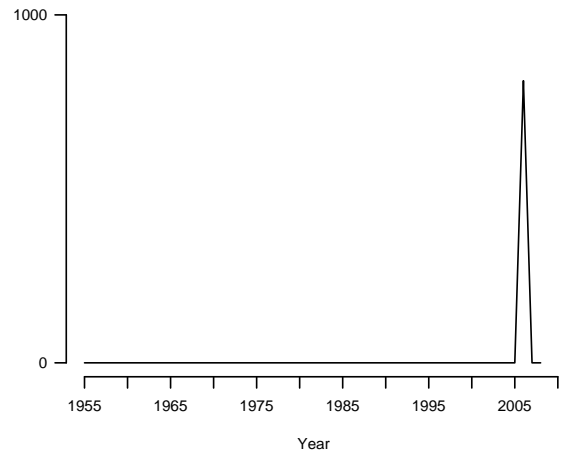
**Strata 25,36,37,38,39,40 Mergansers**



**Strata 25,36,37,38,39,40 Long-tailed duck**

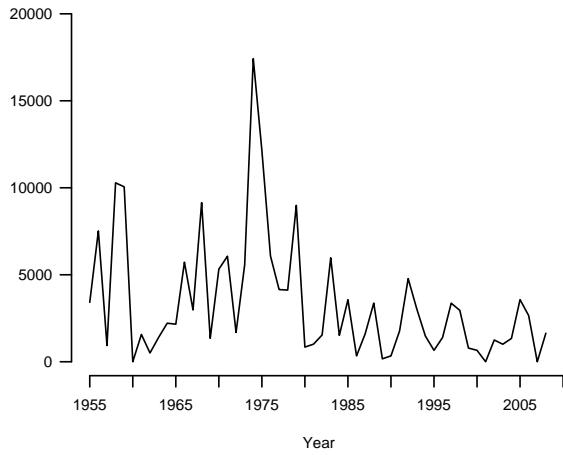


**Strata 25,36,37,38,39,40 Eiders**

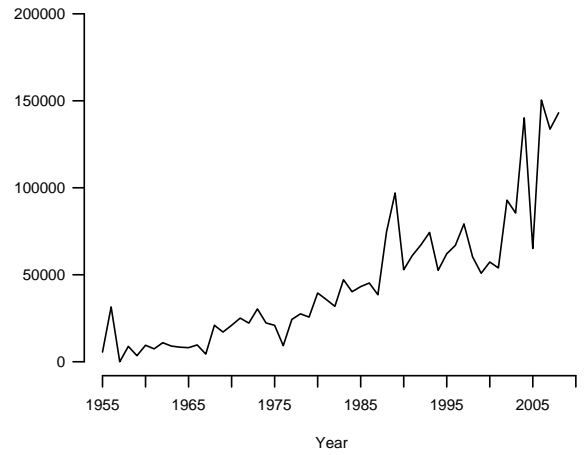


Appendix 2: Continued.

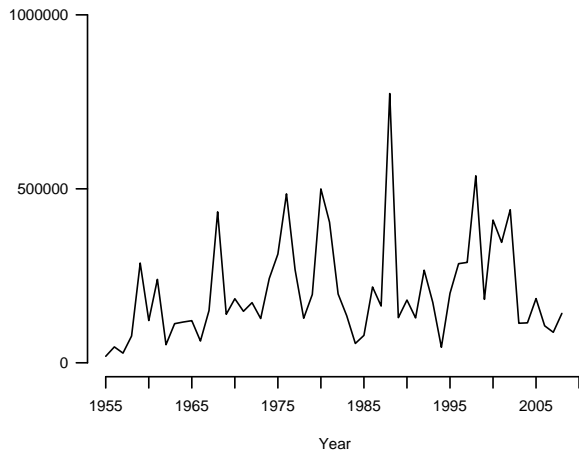
**Strata 25,36,37,38,39,40 Scoters**



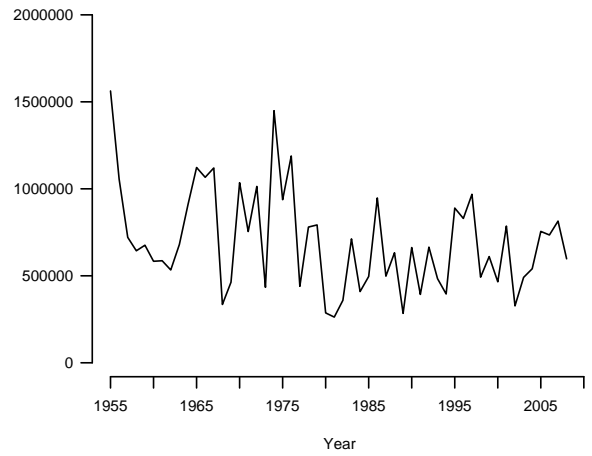
**Strata 25,36,37,38,39,40 Canada Goose**



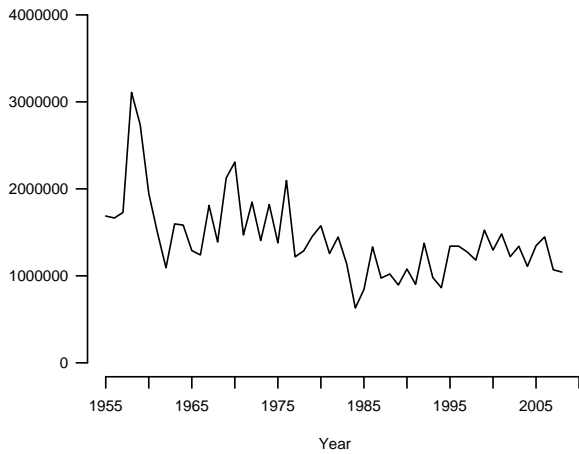
**Strata 25,36,37,38,39,40 American coot**



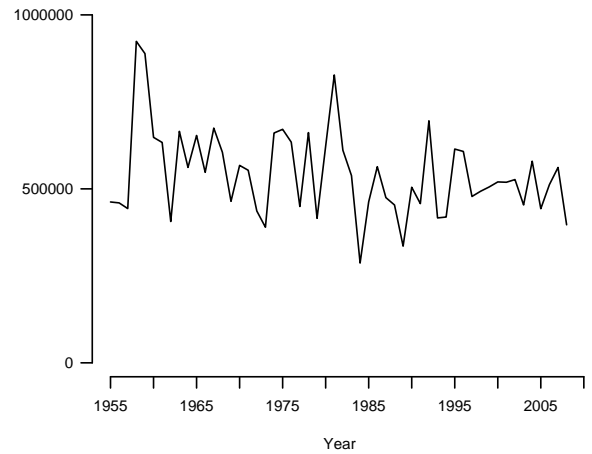
**Strata 25,36,37,38,39,40 Ponds**



**Strata 25,36,37,38,39,40 Dabblers**

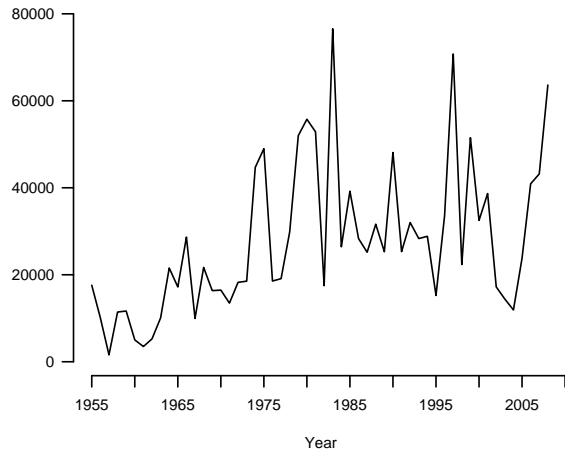


**Strata 25,36,37,38,39,40 Divers**



Appendix 2: Continued.

**Strata 25,36,37,38,39,40 Miscellaneous**



**Strata 25,36,37,38,39,40 Total Ducks**

