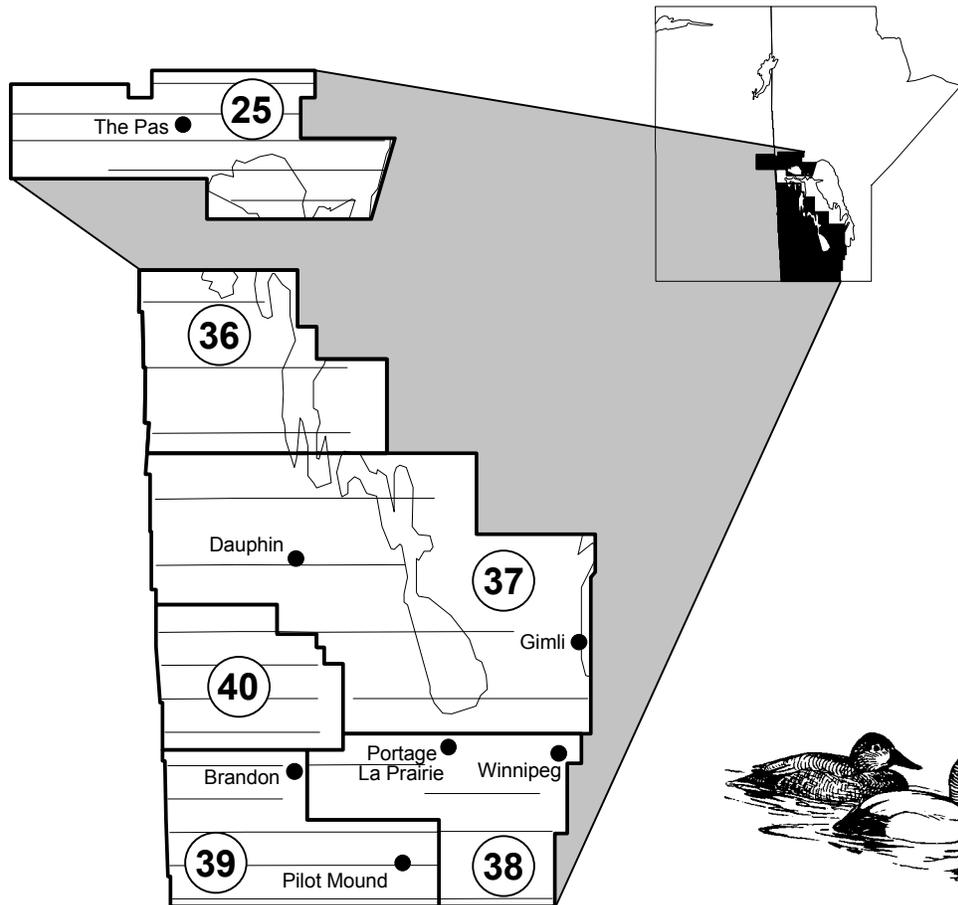


Waterfowl Breeding Population Survey

MAY 2005

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 - 2005

STRATA SURVEYED: 25, and 36 - 40

DATES: May 10 – 26, 2005

DATA SUPPLIED BY: United States Fish & Wildlife Service (USFWS)
Canadian Wildlife Service (CWS)
Manitoba Conservation (MC)
Ducks Unlimited, Canada (DUC)

Aerial Crew:

Pilot/Observer Rodney J. King, Flyway Biologist, USFWS
Observer Scott E. Frazer, Biologist, Kern NWR, USFWS

Ground Crew:

Crew Leaders: Dale Caswell, Wildlife Biologist, CWS
Jim Leafloor, Wildlife Biologist, CWS
Pat Rakowski, Wildlife Biologist, CWS
Marc Schuster, Wildlife Technician, CWS
Garth Ball, Habitat Biologist, MC

Assistants: Jason Caswell, Student Technician, CWS
Frank Baldwin, Student Technician, CWS
Cameron Meuckon, Student Technician, CWS
Laura Beaudoin, Student Technician, CWS
Shona Lawson, Wildlife Technician, DUC

ABSTRACT:

The 2005 survey began with an aerial reconnaissance for waterfowl identification training and estimating habitat phenology on 5 May and continued through 6 May. In the authors estimation phonological conditions for the survey appeared late. This was referenced by several small flocks of mixed sex birds on larger water bodies. Inclement weather set in for 3 days and the aerial surveys did not begin until 10 May. By that time it was believed that the majority of waterfowl species were well distributed and on breeding territories. Waterfowl population estimates for strata 25, and 36 – 40 were 6.6% higher than 2004, -3.1% lower than the 10 year mean, and

-10.2% lower than the Long Term Mean (LTM) from the surveys of 1955 through 2004 (Table 1). Total dabblers were 21.4% higher, 2.7% higher, and – 6.8% lower than 2004, the 10 year mean, and the LTM, respectively. Diving ducks, on the other hand were -23.5% lower, -16.4% lower and -19.3% lower than the 2004, 10 year mean, and LTM, respectively. Overall pond numbers (strata 36 – 40) were estimated to be 39.7% higher than 2004, 18% higher than the 10 year mean and 12.5% higher than the LTM (Table 2).

METHODS:

Methods used in this survey are described in the Standard Operating Procedures for Aerial Waterfowl Breeding Ground Population and Habitat Surveys in North America, Section III, revised in 1987. Waterfowl and wetland data were collected using laptop computers and transcribed into a program developed by Jack Hodges, Migratory Bird Management – Alaska.

This is the fifth year that the summary data from Stratum 25 has been included in these survey results. The MBM-PAS (Populations and Assessment Section) calculated all data from previous Stratum 25 summaries and it is included in Table 1, Appendix 1, and Figure 1. Pond data is not collected in Stratum 25.

This was the seventh year King was Pilot/Observer for the Manitoba strata and the first year Scott Frazer was an observer for MBM. A Cessna 206 amphibious aircraft (N728) was used for the survey. Total flight time to complete the survey in strata 36- 40 was just over 51 hours. We, also collect waterfowl population estimates and habitat conditions for Southeastern Saskatchewan (Strata 34-35) and forward it to Crew Leader Thorpe. To collect this data we also flew an additional 21 hours. Non-flight days included: 5 days due to inclement weather and 2 days while waiting for the ground crew to catch up to air crew.

Three segments of the survey design were not flown due to inclement weather. One segment in Strata 25 and 2 segments in Strata 36 (Table 3.). Only one air ground had to be flown twice to meet SOP requirements. All 40 of the scheduled air/ground segments were flown by the air crew and counted by the ground crew.

WEATHER AND HABITAT:

Weather

The Prairie Farm Rehabilitation Administration (PFRA) and Drought Watch – Environment Canada monitors drought conditions throughout the year in Canada. Because of significant precipitation during late summer and fall of 2004 saturation of the ground was much better than in previous years. Due to substantial accumulations of snow in several areas across southern Manitoba during winter 2004-05 drought risk was lowered. By the end of March most areas of Manitoba had received above average to precipitation. No spring soil moisture shortages were expected in Manitoba for 2005 and forage production was expected to be above average across the area.

Records kept for the past 58 years revealed that during March, April and May the Southern Prairies (Southern portions of Manitoba, Saskatchewan and Alberta) were – 8.5% drier than average and this spring was ranked as the 32nd driest (hard to believe now). Temperatures during the same period were +1.7 degrees C warmer and ranked the 19th warmest in 58 years of data.

May, 2005 gave the author the impression of being cooler, wetter and windier than in past years. Upon arrival on the survey area 5 May, vegetation appeared to be slightly retarded from average and condition and numbers of wetland varied between strata. During a general reconnaissance and waterfowl I.D. training over the next two days it was observed that wetland conditions had indeed improved over 2004, especially in the central and southwestern portion of Manitoba.

Although, the Prairies were classified as drier in the official Regional results, southern Manitoba was receiving regular doses of precipitation. In southwestern Manitoba precipitation totals were 150 – 200 percent above average by the end of May.

Habitat

When the survey crew arrived on 5 May, leaf out appeared to be less than average. This would indicate a cooler than average spring. Indeed, a much warmer than average March off set the cooler temperatures in mid-late April and thus caused the delay in vegetation growth. Many wetlands had benefited from the wet summer and residual vegetated growth seemed to have increased over 2004. Many areas in southwestern (Strata 39) and central (Strata 40) Manitoba appeared to be at good to excellent conditions. Areas in Strata 38 and 37 (where wetlands are not as defined) appeared to have more sheet water flooding and although the delay in farming activities from the rain kept machinery out of the field the benefits to waterfowl were still questionable.

Pond Estimates

The 2005 pond estimate of 671,100 is 39.7 % more than in 2004 (Table 2). Obviously significant precipitation was received during fall 2004 and spring 2005 which substantially increased the availability of wetland habitat. It was unclear as to the value this increase in water would have for ducks. In many areas we recorded water levels above any residual vegetation and in agricultural areas the only nesting habitat was the fallow field surrounding the wetland. The substantial increase in water levels should have a significant impact on the water “recharge” to existing permanent and semi-permanent wetlands for the future. In some of the southern strata “new” pond longevity was difficult to judge because of the almost daily increase in water depth from precipitation and run off.

Pond estimates for May 2005 were 18.0% and 12.5% more than the 10-year mean and the LTM, respectively.

BREEDING POPULATION ESTIMATES:

The 2005 breeding waterfowl population data are listed by strata and species in Table 1. Total duck populations for southern Manitoba were 6.6% higher than 2004, -3.1% below the 10-year mean, and -10.2% below the LTM. A comparison of duck populations for each stratum and each species is, also found in Table 1. The long term trend of duck population estimates by year (1955 to 2005) is found in Appendix 1.

Dabbling Ducks (Table 1.)

Dabbling duck populations were 21.4% higher than 2004, 2.7% higher than the 10-year mean and -6.8% less than the LTM. Dabbling ducks made up 74.2% of all ducks counted in the survey area. Of the 1.8 million ducks estimated in Southern Manitoba, mallard comprised 26.5%, blue-winged teal 19.6%, shoveler 12.1%, and gadwall 6.7%. All dabbling species indicated higher estimates than 2004 except gadwall which was - 19.6% lower than the previous year. Northern Pintail estimates were 70% higher than in 2004. Species with estimates above the LTM were gadwall at 60.8% higher, and shoveler 76.1% higher. Wigeon indicated the greatest decline over the LTM at - 60.2%.

Diving Ducks (Table 1.)

Diving ducks were -23.5 % lower than in 2004, -16.4% lower than the 10-year mean, and -19.3% lower than the LTM. This category made up 24.4% of all ducks in the survey area. Redhead accounted for 23.3% of all divers. Those species which indicated positive increase over 2004 were: scaups at +85.6% while bufflehead and goldeneyes increased 8.6% and 7.4%, respectively. Significant decreases of the following species in the diving duck category compared to 2004 were, ruddy (-75.2%), canvasback (-32.1%) and ring-necked (-25.4%).

CONCLUSIONS AND OBSERVATIONS:

May, 2005 began as a promising month for waterfowl with positive indications of better water levels and the possibility of more breeding ducks. As the month progressed, however, the prospects of a real “wet one” were evident in the continued increase in precipitation and resultant high water levels.

Some sections of the survey area had noticeable increase in sheet water, flooded pastures and rising water levels in rivers. This made estimating effects from this increased precipitation during May difficult to judge, i.e., the impact on nesting ducks. A few areas of Stratum 39 and 40 appeared to be good to excellent habitat, but very few birds were found in some of the quality wetland complexes. On the other hand the core areas of the parklands and the scattered islands of excellent wetland complexes indicated a significant increase in quality wetland habitat and resultant increase in duck numbers. Overall, the May breeding season appeared to have a positive impact on breeding birds and will have significant positive wetland gains for the year to come.

The impact from the increased water levels during breeding season will have questionable results on duckling production. If water levels continue to increase then the only available nesting habitat is the untillable fallow and stubble fields left over from fall 2004.

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.

Submitted by: Rodney J. King, Flyway Biologist, DMBM, Mare Island, CA

Table 1. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean for Southern Manitoba.

Species/Ponds	Stratum (2005)						% Change From						
	25	36	37	38	39	40	2005 Total	2004 Total	10-Year Mean	Long- Term Mean	2004	10-Year Mean	Long- Term Mean
Ducks													
Dabblers													
Mallard	26.6	18.8	155.3	53.8	96.9	130.0	481.4	423.4	495.8	493.0	13.7%	-2.9%	-2.4%
Am. 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	1.6	1.2	20.8	6.9	44.6	46.9	122.0	151.7	112.6	75.9	-19.6%	8.4%	60.8%
Am. wigeon	3.5	1.7	16.1	0.5	7.0	9.0	37.7	6.6	35.1	94.5	474.0%	7.3%	-60.2%
Am. green-winged teal	6.1	4.9	19.9	7.8	8.4	14.0	61.1	27.8	57.9	62.6	119.5%	5.5%	-2.5%
Blue-winged teal	17.0	2.1	73.7	35.3	125.0	102.5	355.7	304.0	380.6	464.6	17.0%	-6.5%	-23.5%
N. shoveler	9.3	1.4	66.4	9.2	82.4	51.1	219.8	155.5	162.5	124.8	41.4%	35.3%	76.1%
N. pintail	0.8	0.0	10.6	3.6	39.4	14.3	68.7	40.4	66.2	128.4	70.2%	3.8%	-46.5%
Subtotal	64.9	30.1	362.8	117.1	403.6	367.9	1346.4	1109.3	1311.2	1444.3	21.4%	2.7%	-6.8%
Divers													
Redhead	5.9	0.4	37.4	0.8	18.9	40.2	103.6	126.4	109.9	87.7	-18.0%	-5.7%	18.1%
Canvasback	12.7	0.0	19.8	0.0	4.7	23.2	60.4	89.0	89.9	81.5	-32.1%	-32.8%	-25.9%
Scaups	38.6	3.7	20.5	0.0	23.9	11.9	98.7	53.2	108.5	199.9	85.6%	-9.0%	-50.6%
Ring-necked duck	10.3	1.4	10.9	0.0	3.6	4.8	30.9	41.5	55.4	46.4	-25.4%	-44.2%	-33.3%
Goldeneyes	20.2	2.7	16.9	0.0	0.0	3.6	43.4	40.4	50.7	34.9	7.4%	-14.5%	24.3%
Bufflehead	8.8	3.4	20.3	0.5	4.3	26.4	63.8	58.7	49.5	32.6	8.6%	28.7%	95.4%
Ruddy Duck	0.9	0.2	13.5	0.0	11.8	15.9	42.2	170.3	65.8	65.9	-75.2%	-35.8%	-35.9%
Subtotal	97.5	11.7	139.2	1.4	67.3	126.0	443.0	579.5	529.8	548.9	-23.5%	-16.4%	-19.3%
Miscellaneous													
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	0.0	0.0	--	--	--
Scoters	3.6	0.0	0.0	0.0	0.0	0.0	3.6	1.3	1.3	3.5	166.3%	166.1%	1.7%
Mergansers	10.7	6.2	2.4	0.4	0.0	0.5	20.2	10.6	29.3	22.8	91.6%	-31.0%	-11.4%
Subtotal	14.3	6.2	2.4	0.4	0.0	0.5	23.8	11.9	30.8	26.4	100.1%	-22.7%	-9.9%
Total Ducks	176.6	48.0	504.4	118.9	470.9	494.4	1813.2	1700.6	1871.8	2019.6	6.6%	-3.1%	-10.2%
Canada Goose	6.8	9.0	22.5	1.8	6.6	18.5	65.1	140.2	74.9	38.7	-53.6%	-13.1%	68.3%
Am. coot	9.2	0.9	23.8	2.3	48.9	99.5	184.6	114.8	291.7	212.7	60.9%	-36.7%	-13.2%
Ponds		56.8	312.4	38.4	139.3	208.3	755.2	540.6	640.1	671.1	39.7%	18.0%	12.5%

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. Note that ponds are not counted in stratum 25.

Year	Stratum						Total
	25	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
10-year Mean		56.8	250.1	56.9	145.7	130.5	640.1
Long-term Mean		66.5	265.2	47.4	145.8	146.4	671.1
Percent Change:							
From 2004		20.80%	42.10%	18.80%	9.80%	81.90%	39.70%
From 10-year Mean		0.00%	24.90%	-32.60%	-4.40%	59.60%	18.00%
From Long-term Mean		-14.50%	17.80%	-18.90%	-4.40%	42.30%	12.50%

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

Species/Ponds	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Ducks										
Dabblers										
Mallard	549.9	811.4	852.4	1116.6	702.5	647.2	442.6	292.5	428.6	534.7
Am. 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
Am. wigeon	162.3	140.2	120.8	392.7	292.2	106.4	130.4	100.1	118.4	166.3
Am. 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
N. shoveler	57.4	66.5	93.4	84.3	198.3	158.0	138.1	75.9	159.9	167.8
N. pintail	335.1	296.2	210.4	208.6	149.0	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
Goldeneyes	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										
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	3.4	7.5	0.9	10.3	10.1	0.0	1.6	0.5	1.4	2.2
Mergansers	14.2	2.6	0.6	1.2	1.6	5.0	1.9	4.7	8.7	19.3
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
Am. coot	18.8	45.7	27.8	77.0	286.6	121.5	239.7	52.0	112.5	117.2
Ponds							586.6	533.6	679.9	909.1
<hr/>										
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
Am. 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
Am. wigeon	177.0	130.4	96.3	144.5	173.5	155.3	112.6	150.9	163.6	108.3
Am. 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
N. shoveler	141.0	135.7	202.1	99.1	172.7	147.0	93.1	146.3	76.8	106.1
N. 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
Goldeneyes	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										
Oldsquaw	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
Mergansers	15.0	22.9	7.0	12.4	15.0	11.2	7.4	16.6	13.0	27.3
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
Am. 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 (continued). Long-term trend in adjusted waterfowl breeding population estimates (thousands).

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
Am. 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
Am. wigeon	77.6	78.6	41.7	73.2	82.4	121.1	103.9	67.0	48.4	38.5
Am. 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
N. shoveler	69.3	166.3	62.1	89.6	95.2	75.8	116.1	157.8	135.5	65.3
N. 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
Goldeneyes	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										
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	12.1	6.1	4.2	4.1	9.0	0.8	1.0	1.5	6.0	1.5
Mergansers	36.8	12.5	15.0	25.7	43.0	54.9	51.9	15.9	70.6	24.9
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
Am. 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
Am. 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
Am. wigeon	53.5	63.4	39.5	43.6	56.1	58.1	55.0	52.5	31.9	47.3
Am. green-winged teal	24.2	55.4	46.2	38.3	40.4	41.2	39.3	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
N. shoveler	99.9	165.5	115.6	122.8	79.2	95.2	88.9	151.3	79.5	64.8
N. 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
Goldeneyes	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										
Oldsquaw	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
Mergansers	35.6	28.0	23.6	28.3	25.1	47.8	23.6	27.2	24.8	26.1
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
Am. 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 (continued). Long-term trend in adjusted waterfowl breeding population estimates (thousands).

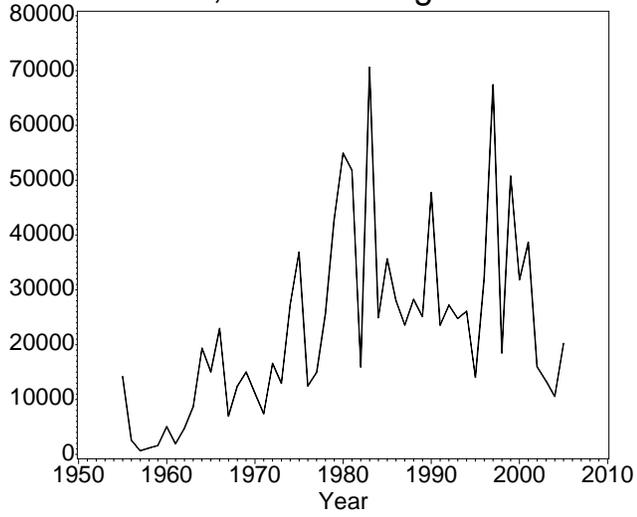
Species/Ponds	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Ducks										
Dabblers										
Mallard	514.8	439.6	502.2	507.2	585.6	455.7	476.0	499.2	554.2	423.4
Am. black duck	0.6	0.0	0.0	0.7	0.0	3.0	0.0	0.3	0.6	0.0
Gadwall	94.4	106.1	97.7	106.1	118.1	90.9	114.1	144.9	101.9	151.7
Am. wigeon	50.4	50.9	41.8	34.0	42.8	42.0	22.2	43.7	16.6	6.6
Am. 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
N. shoveler	172.8	187.4	166.5	115.4	169.5	194.0	215.2	119.5	129.4	155.5
N. 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	41.1	37.1	70.7	66.5	93.3	63.1	41.5
Goldeneyes	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										
Oldsquaw	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	1.3	1.0	1.3
Mergansers	14.1	32.2	67.4	18.5	50.7	31.8	38.7	16.0	13.4	10.6
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
Am. 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
Ducks	
Dabblers	
Mallard	481.4
Am. black duck	0.0
Gadwall	122.0
Am. wigeon	37.7
Am. green-winged teal	61.1
Blue-winged teal	355.7
N. shoveler	219.8
N. pintail	68.7
Subtotal	1346.4
Divers	
Redhead	103.6
Canvasback	60.4
Scaups	98.7
Ring-necked duck	30.9
Goldeneyes	43.4
Bufflehead	63.8
Ruddy Duck	42.2
Subtotal	443.0
Miscellaneous	
Oldsquaw	0.0
Eiders	0.0
Scoters	3.6
Mergansers	20.2
Subtotal	23.8
Total Ducks	1813.2
Canada Goose	65.1
Am. coot	184.6
Ponds	755.2

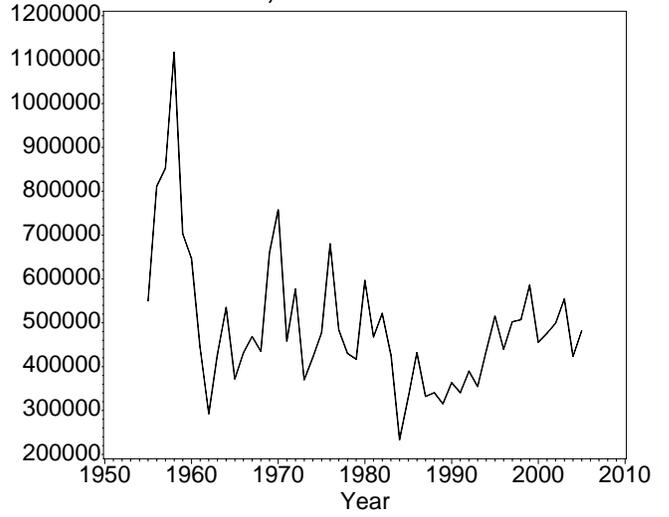
Table 3. Survey design for Southern Manitoba and the Saskatchewan River Delta, May, 2005.

Survey Design	Stratum						Total
	25	36	37	38	39	40	
Sq. Mi. in stratum	7,644	5,500	16,485	5,655	6,552	4,536	46,372
Sq. Mi. in sample	135	58.5	135.0	54.0	121.5	67.5	571.5
Linear Mi. in sample	540	234	540	216	486	270	2,286
No. of transects in sample	5	3	4	3	5	4	24
No. of segments in sample	28	11	30	12	27	15	124
Expansion factor	58.57	111.11	122.111	104.722	53.93	67.20	

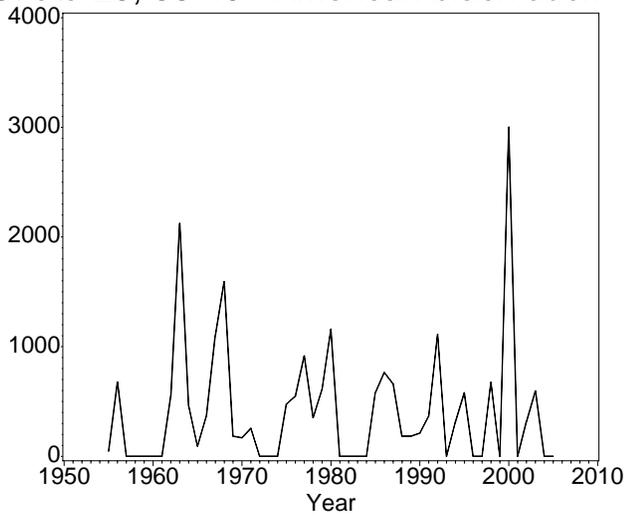
Strata 25, 36-40 Mergansers



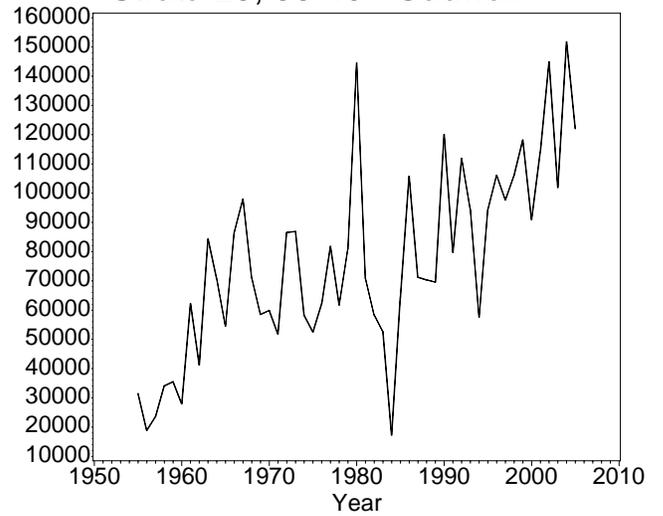
Strata 25, 36-40 Mallard



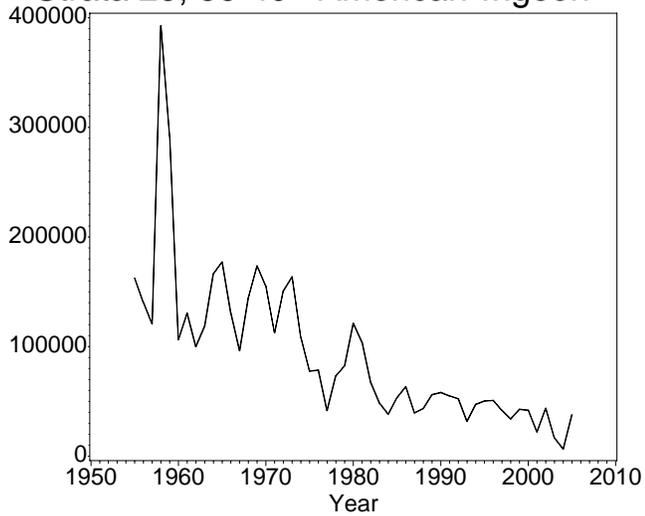
Strata 25, 36-40 American black duck



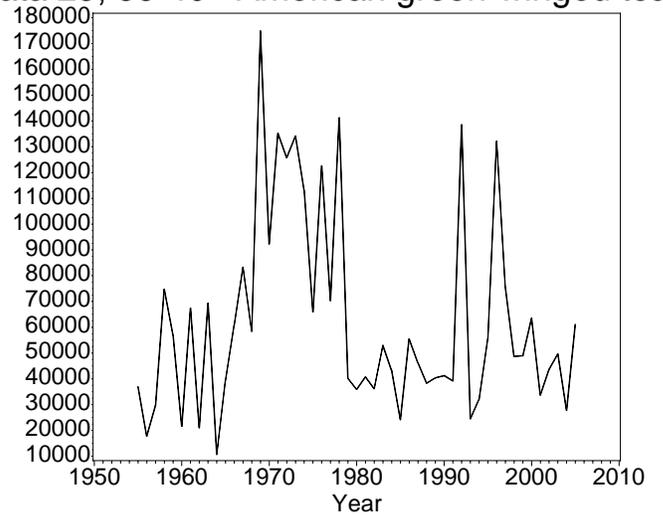
Strata 25, 36-40 Gadwall



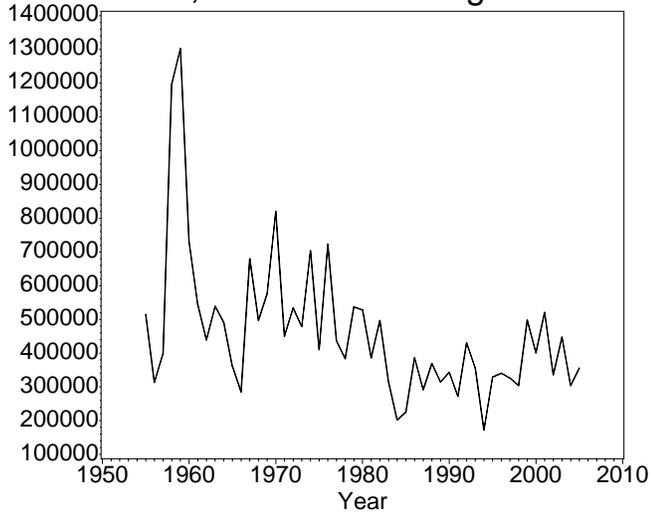
Strata 25, 36-40 American wigeon



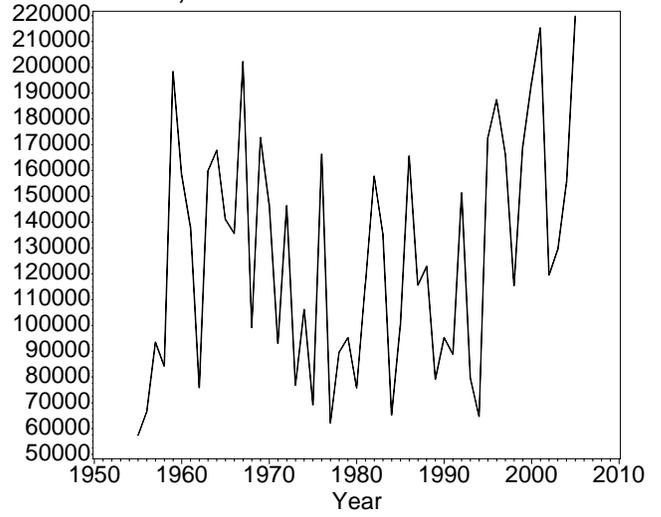
Strata 25, 36-40 American green-winged teal



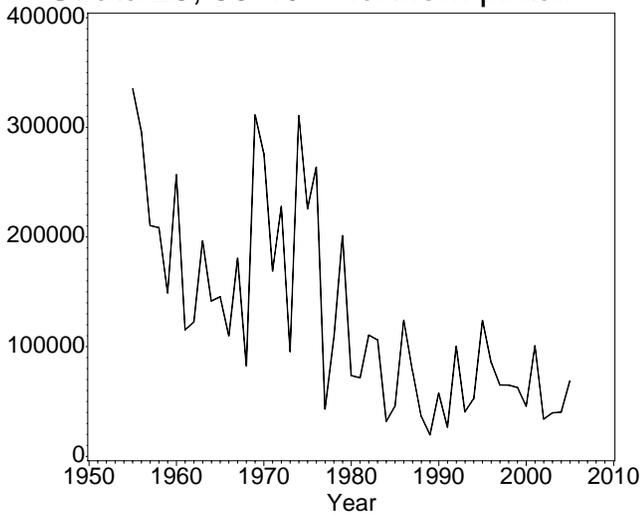
Strata 25, 36-40 Blue-winged teal



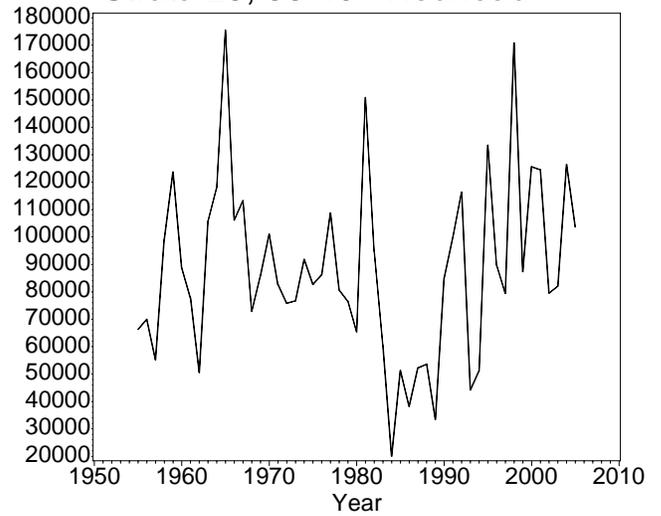
Strata 25, 36-40 Northern shoveler



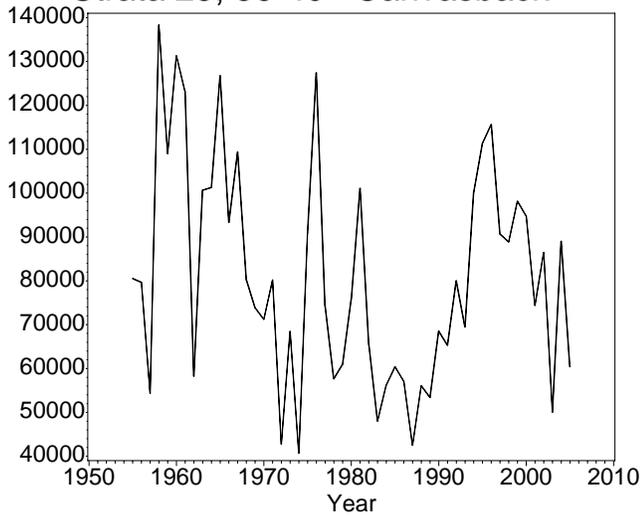
Strata 25, 36-40 Northern pintail



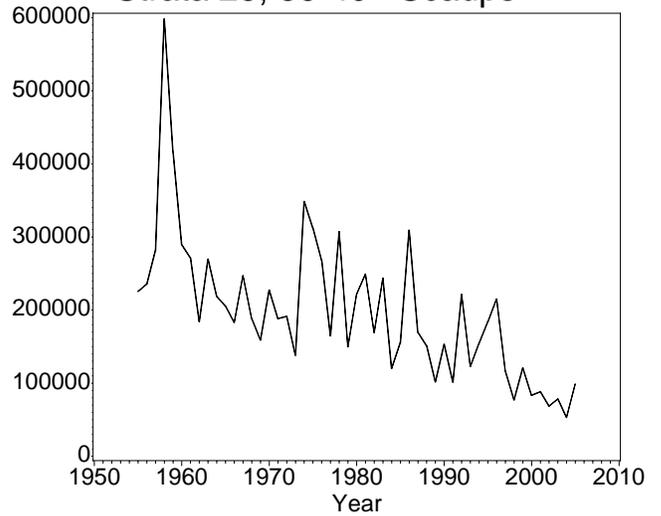
Strata 25, 36-40 Redhead



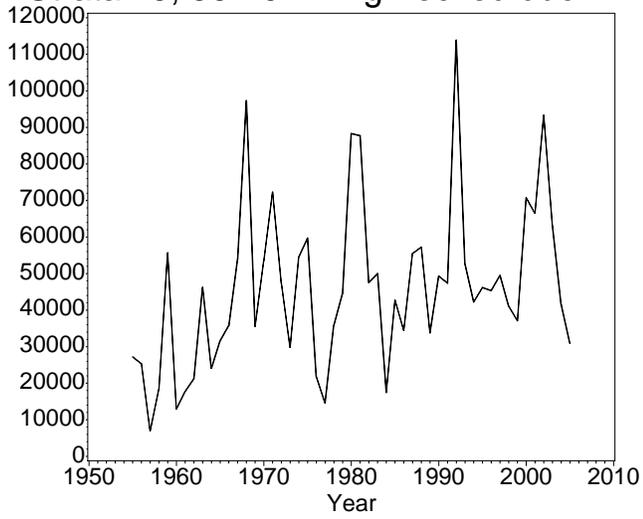
Strata 25, 36-40 Canvasback



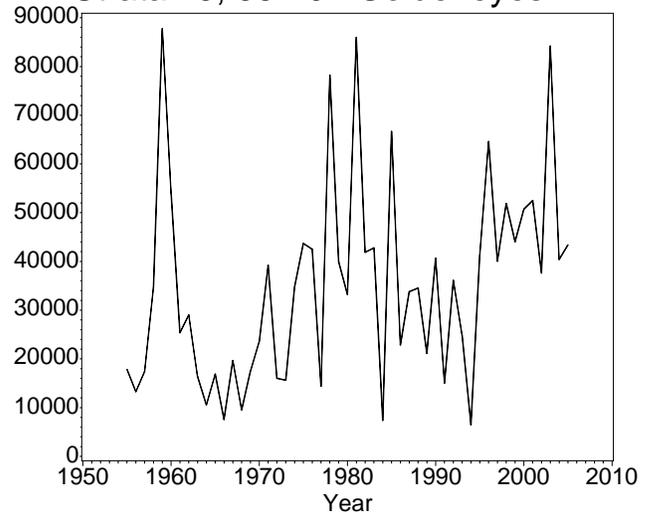
Strata 25, 36-40 Scaups



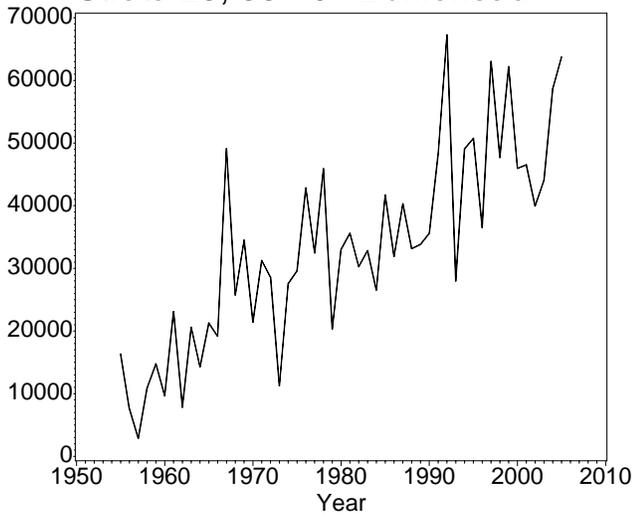
Strata 25, 36-40 Ring-necked duck



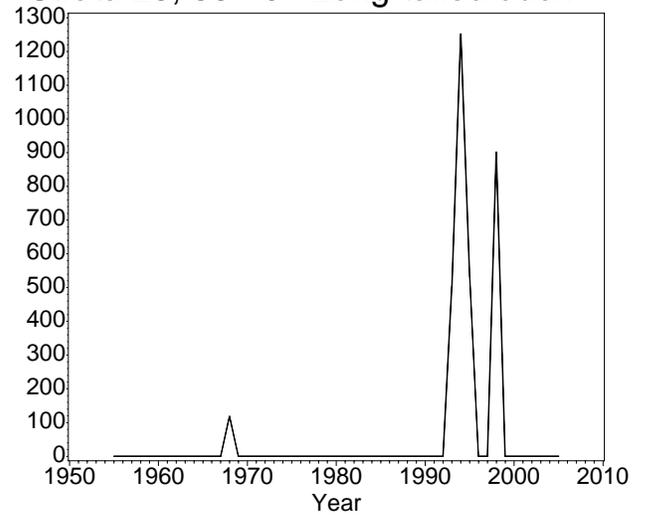
Strata 25, 36-40 Goldeneyes



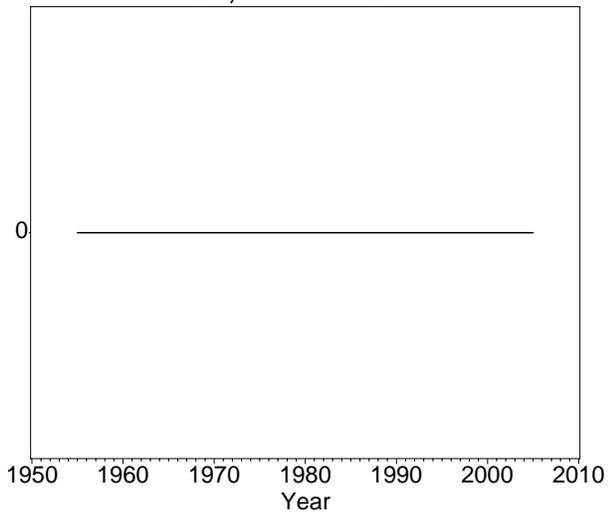
Strata 25, 36-40 Bufflehead



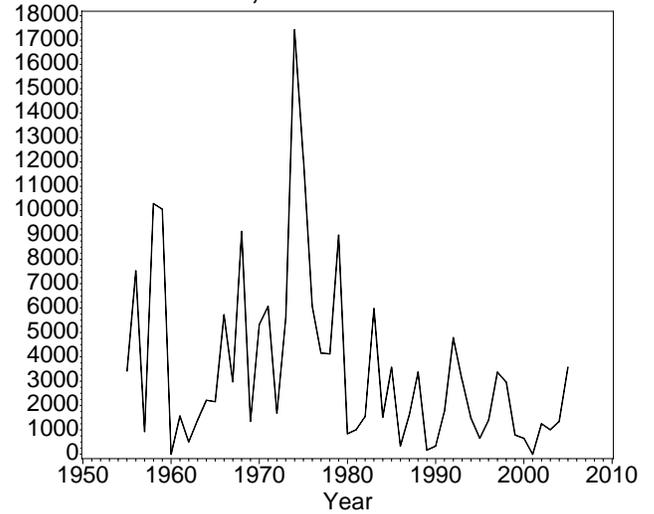
Strata 25, 36-40 Long-tailed duck



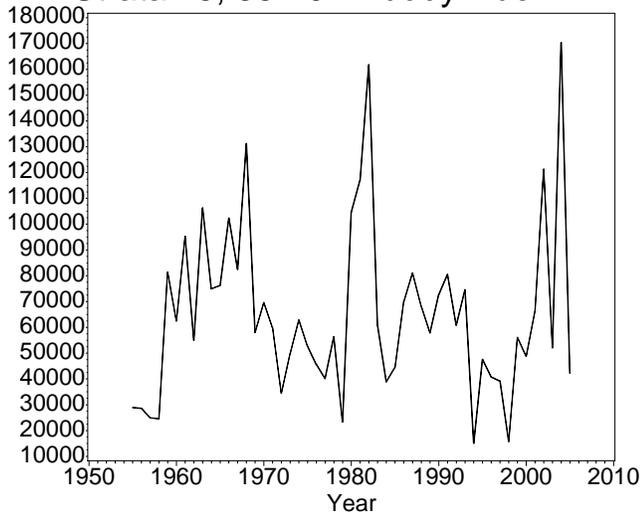
Strata 25, 36-40 Eiders



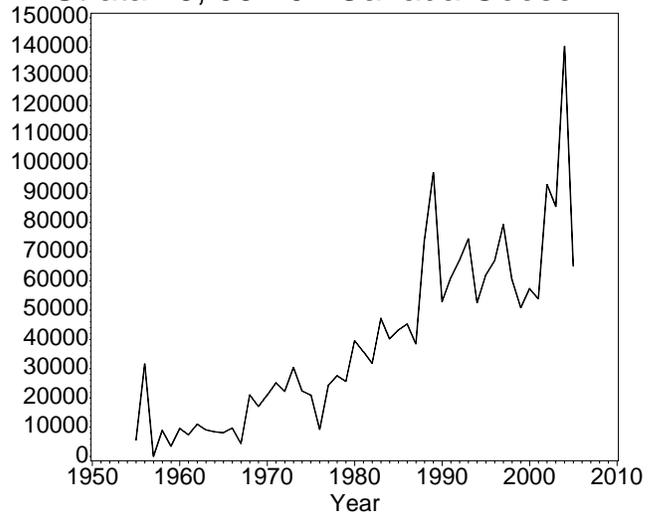
Strata 25, 36-40 Scoters



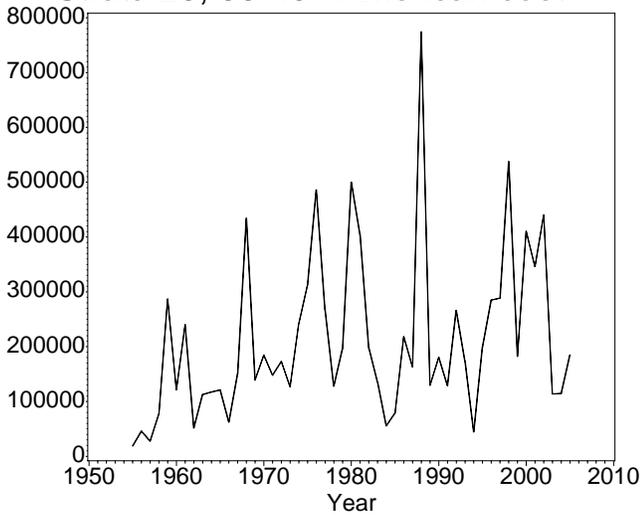
Strata 25, 36-40 Ruddy Duck



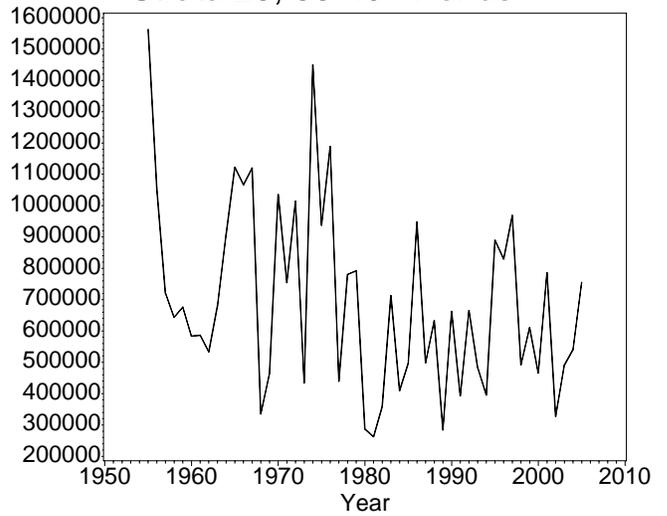
Strata 25, 36-40 Canada Goose



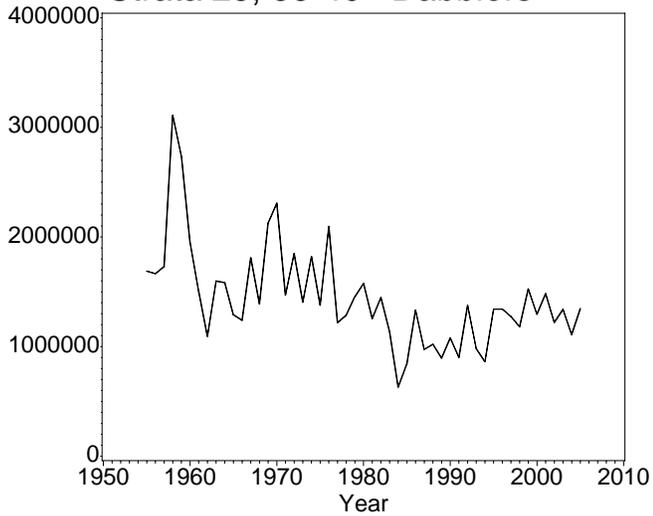
Strata 25, 36-40 American coot



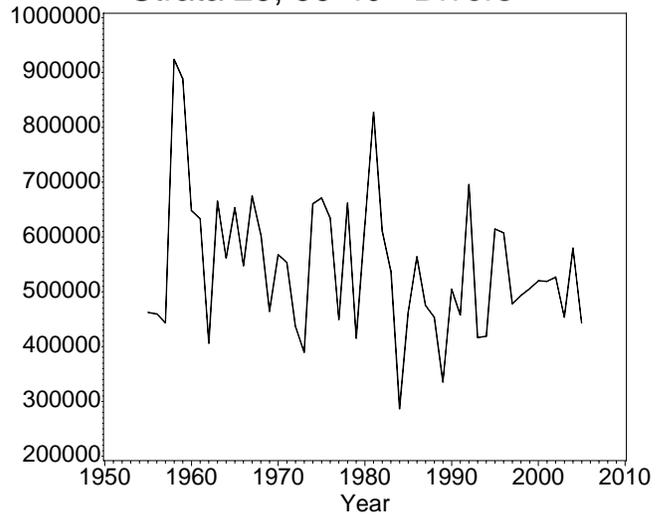
Strata 25, 36-40 Ponds



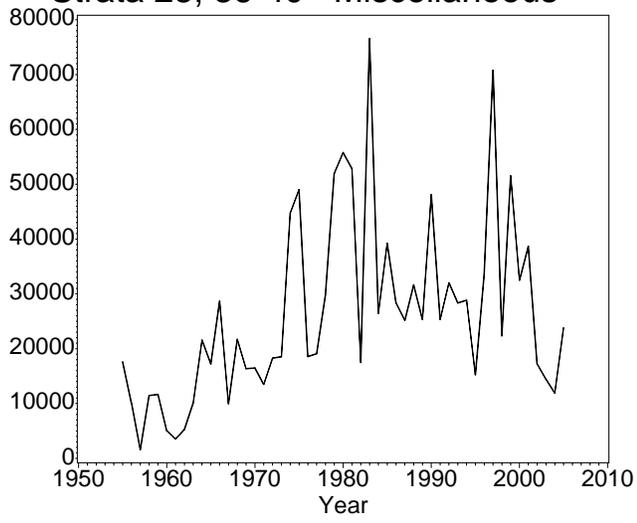
Strata 25, 36-40 Dabblers



Strata 25, 36-40 Divers



Strata 25, 36-40 Miscellaneous



Strata 25, 36-40 Total Ducks

