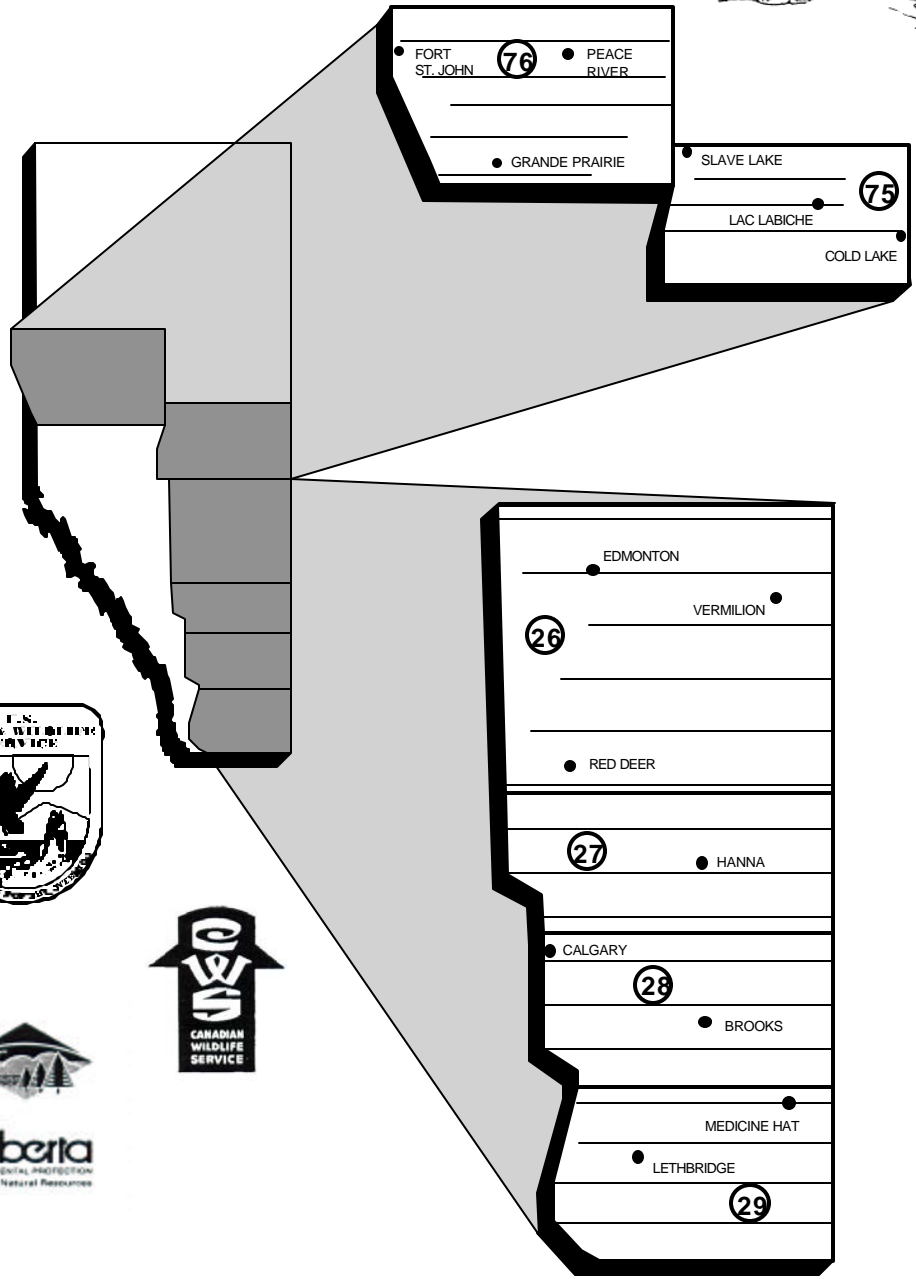


WATERFOWL BREEDING POPULATION SURVEY

SOUTHERN AND CENTRAL ALBERTA

MAY 2004



Alberta
ENVIRONMENTAL PROTECTION
Natural Resources

TITLE Waterfowl Breeding Population and Habitat Survey for Southern and Central Alberta

STRATA SURVEYED 26, 27, 28, 29, 75, 76

DATES May 6-23, 2004

DATA SUPPLIED BY United States Fish and Wildlife Service (USFWS)
Canadian Wildlife Service (CWS)
Alberta Environmental Protection/Wildlife
Management Division (AEP)
Ducks Unlimited, Canada (DUC)

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ABSTRACT

The 2004 breeding population estimate for strata 26-29 (Southern Alberta) is 2,503,800 total ducks (Table 1), a decrease of -7.2% from 2003, a decrease of -22.2% from the recent ten-year

mean (1994-2003) and a decrease of -42.6% from the long-term mean (1955-2003). In Southern Alberta, total dabbling ducks (Table 1) decreased -6.6% from 2003, decreased -21.5% from the 1994-2003 ten-year mean and remained -44.7% below the 1955-2003 long-term mean. Mallards (Table 1) decreased -4.3% from 2003, Blue-winged Teal increased +11.6% from 2003 and Pintails decreased -36% from 2003. Total diving ducks (Table 1) decreased -10% from 2003, decreased -24.9% from the 1994-2003 ten-year mean and decreased -30.9% from the 1955-2003 long-term mean. Total pond counts (Table 2) decreased -42.5% in Southern Alberta from last year, decreased -27.4% from the ten-year and -29.7% from the long term means.

The 2004 breeding population estimate for strata 75-76 (Central Alberta) is 1,753,000 total ducks (Table 4) an increase of +38% from last year and an increase of +19.4% from the long-term (15 year) mean. Total dabbling ducks increased +84.0% from last year and increased +14.7% from the 15-year mean. Mallards increased +37.5% from 2003, and decreased -10.8% from the 15-year mean. Blue-winged Teal increased +290.7% from last year and increased +114% from the 15-year mean. Pintails increased +20.1% from 2003 and increased +17.9% from the 15-year mean. Total diving ducks decreased -3.5% from last year and increased +26.75% from the 15-year mean. Total ponds (Table 5) in Stratum 75 and 76 decreased -2.9% from last year and increased +3.7% from the 15-year mean.

Over a decade of drought is continuing in Southern and Central Alberta this year. Precipitation since November 2003 was well below normal (64% to 79% of normal) in the prairies and (52% to 84% of normal) in the southern Aspen Parklands of southern Alberta, with habitat in the poor category for most of the area. The high mountain snow pack provided below normal run-off this spring and early summer. Conditions also declined in the west and central Peace Parklands of Stratum 76 and northern Aspen Parklands of Stratum 75 with habitat in the poor to mostly fair category. Precipitation since November 2003 was below normal (64% to 92% of normal).

METHODS

The procedures followed in conducting the survey are contained in the Standard Operating Procedures for Aerial Waterfowl Breeding Ground Population and Habitat Surveys, Section III, revised April 1987. The analytical and procedural changes, described in the 1991 and 1992 reports, continued this year. As a result, measures of precision are now available with the population estimates. This year and the last nine years reports reflects a major change made to the historical (1955-1995) database of breeding waterfowl and habitat estimates. Nonparametric regression methods were used to predict population values for years in which no survey was conducted in a stratum. An internal report (Office of Migratory Bird Management, Laurel, MD) describes how and for which cases prediction was done.

Air-ground segment data in Central Alberta's strata 75 and 76 (12- air/ground segments = 13% of the survey area) are not sufficient to compute accurate visibility correction factors (VCF's) for all duck species. Stratum 26 more closely resembles the habitat of 75 and 76 than the other Southern Alberta strata (27-29). It was decided to combine air-ground data from strata 26, 75

and 76, when calculating VCF's for strata 75 and 76. Acceptable standard errors and variances were obtained when this was done. Southern Alberta VCF's are still calculated with data from strata 26-29 only (37- air/ground segments = 25% of the survey area).

In 1996, Canada goose breeding population estimates were corrected for visibility bias based on data collected by air and ground survey crews in this reporting region. For validity of comparisons to means for previous years, historical Canada goose population indices were also adjusted for visibility bias using data collected by all air and ground survey crews throughout the Canadian and U.S. prairie regions in 1996. Therefore, estimates and means reported here cannot be directly compared with those in reports written before 1996 for this region.

Air data were compiled using a notebook computer. All areas in the current survey design (Tables 3 and 6) were flown. The survey was conducted using the same aerial crew and aircraft, a Cessna 206, for strata 26-29, 75 and 76. This was the 16th year of flying aerial waterfowl surveys for the pilot/observer and the 1st year for the aerial observer. All air and ground crew members participated in pre-survey training.

The Alberta ground crew did reconnaissance of the survey area and concluded that most species observed appeared paired by May 1. Most deciduous tree species were leafed out and the season timing appeared normal in southern areas. The survey was initiated on May 6 for Southern Alberta and completed on May 18. The Central Alberta survey commenced on May 18 and concluded on May 23. A total of 59 flight hours was required to complete the survey.

WEATHER AND HABITAT CONDITIONS

Environment Canada, Climate Research Branch reports that the entire province recorded below normal winter precipitation except Peace River and Cold Lake (Bonnyville area). In the Fall, 2003, generally, precipitation recorded in both northwestern and central Alberta varied from near normal to much below normal. In southern Alberta, fall precipitation was recorded as near normal to above normal. Winter was generally colder than normal (averages were -2°C colder than normal).

Spring saw near normal precipitation in the Peace Parklands of north Central Alberta by Grande Prairie. Southern Alberta had generally much below normal precipitation except Red Deer (Aspen Parklands). We found that area to be in fair condition. Spring was warmer than normal (averages were +2°C to +4°C above normal).

The Prairie and Aspen Parklands of Stratum 26 to 29 and 75 were generally in poor condition with a few areas of fair along the Milk River Ridge in Stratum 29. There were actually ponds to count around the Suffield area of Stratum 28 (first time in 5 years I have seen this). There is usually an area of good habitat in a 50 mile ring around Edmonton. This year it was barely rated as fair. Pond counts are half that of last year. Stratum 75 is generally in poor condition. St 76 is generally in fair to mostly poor condition. Pond counts are similar to last year.

BREEDING POPULATION INDICES

A listing of all birds and the respective comparisons can be found in Tables 1 and 4, the Trend Graphs and Appendices 1 and 2.

SOUTHERN ALBERTA

The 2004 breeding population estimate for strata 26-29 (Southern Alberta) is 2,503,800 total ducks (Table 1), a decrease of -7.2% from 2003, a decrease of -22.2% from the recent ten-year mean (1994-2003) and a decrease of -42.6% from the long-term mean (1955-2003). In Southern Alberta, total dabbling ducks (Table 1) decreased -6.6% from 2003, decreased -21.5% from the 1994-2003 ten-year mean and remained -44.7% below the 1955-2003 long-term mean. Mallards (Table 1) decreased -4.3% from 2003, Blue-winged Teal increased +11.6% from 2003 and Pintails decreased -36% from 2003. Total diving ducks (Table 1) decreased -10% from 2003, decreased -24.9% from the 1994-2003 ten-year mean and decreased -30.9% from the 1955-2003 long-term mean. Total pond counts (Table 2) decreased -42.5% in Southern Alberta from last year, decreased -27.4% from the ten-year and -29.7% from the long term means. Canada geese numbers changed +11%, +21% and +209.6 %, and Coots changed +8.1%, +17.4% and +3.9 % from the above respective means.

CENTRAL ALBERTA

The 2004 breeding population estimate for strata 75-76 (Central Alberta) is 1,753,000 total ducks (Table 4) an increase of +38% from last year and an increase of +19.4% from the long-term(15 year) mean. Total dabbling ducks increased +84.0 % from last year and increased +14.7% from the 15-year mean. Mallards increased +37.5% from 2003, and decreased -10.8% from the 15-year mean. Blue-winged Teal increased +290.7% from last year and increased +114% from the 15-year mean. Pintails increased +20.1% from 2003 and increased +17.9% from the 15-year mean. Total diving ducks decreased -3.5% from last year and increased +26.75 from the 15-year mean. Total ponds (Table 5) in Stratum 75 and 76 decreased -2.9% from last year and increased +3.7% from the 15-year mean. Canada geese numbers changed +33.3%, and +87.3% , and Coots changed +298.3%, and +52.5 % from the above respective means.

CONCLUSIONS

- 1) Residual nesting cover from last years brief relief from the drought was evident in southern portions of Stratum 29. Total pond counts are 42% below last years numbers. Ducks appeared to be crowded in the remaining wetlands. Total duck numbers are down 7.2% from last year. Production this year should be poor in the Prairies and Aspen Parklands.
- 2) The late spring snow and rain did not seem to discourage early nesting attempts.
- 3) Habitat conditions declined while duck numbers increased in Central Alberta.

Sincere appreciation is extended to all who participated in this survey. Thank you to the Winnipeg Climate Center and Alberta Agriculture for precipitation data and soil moisture maps.

Submitted by: Elizabeth Buelna Huggins-Flyway Biologist

Date: July 1, 2004

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

Species/Ponds	Stratum				2004 Total	2003 Total	10-Year Mean	Long-Term Mean	% Change From		
	26	27	28	29					2003	10-Year Mean	Long-Term Mean
Ducks											
Dabblers											
Mallard	316.3	67.6	114.6	101.6	600.1	627.1	828.4	1117.6	-4.3%	-27.6%	-46.3%
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	-100.0%
Gadwall	120.1	33.7	67.6	68.5	289.9	240.9	346.9	308.5	20.3%	-16.4%	-6.0%
Am. wigeon	64.0	17.6	22.9	12.2	116.6	131.6	170.6	303.6	-11.4%	-31.6%	-61.6%
Am. green-winged teal	65.2	8.0	11.1	14.1	98.4	131.8	209.7	196.5	-25.3%	-53.1%	-49.9%
Blue-winged teal	194.0	31.2	78.7	56.3	360.2	322.6	418.8	612.8	11.6%	-14.0%	-41.2%
N. shoveler	167.2	42.2	117.5	57.7	384.6	448.4	361.4	355.7	-14.2%	6.4%	8.1%
N. pintail	29.5	18.8	59.6	53.4	161.3	251.9	224.9	741.7	-36.0%	-28.3%	-78.2%
Subtotal	956.3	219.1	471.9	363.8	2011.2	2154.3	2560.7	3636.3	-6.6%	-21.5%	-44.7%
Divers											
Redhead	38.3	11.1	19.4	10.2	78.9	96.9	111.6	117.6	-18.6%	-29.3%	-32.9%
Canvasback	38.5	2.7	5.4	3.6	50.2	69.7	57.4	64.3	-28.0%	-12.6%	-22.0%
Scaups	52.1	19.7	25.4	27.0	124.1	172.1	264.0	362.5	-27.9%	-53.0%	-65.8%
Ring-necked duck	17.4	2.9	2.9	20.9	44.1	31.1	20.8	17.3	41.8%	111.9%	154.4%
Goldeneyes	14.5	0.6	0.8	10.3	26.3	34.2	20.0	14.5	-23.3%	31.4%	80.7%
Bufflehead	58.4	3.0	6.1	3.2	70.6	82.9	71.0	48.2	-14.8%	-0.5%	46.4%
Ruddy Duck	71.9	0.4	13.1	8.1	93.5	54.9	104.8	81.1	70.4%	-10.8%	15.3%
Subtotal	291.2	40.3	73.0	83.1	487.6	541.7	649.4	705.7	-10.0%	-24.9%	-30.9%
Miscellaneous											
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	-100.0%
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	--
Scoters	0.8	0.0	0.0	0.0	0.8	0.0	2.0	13.1	--	-61.3%	-94.0%
Mergansers	2.7	0.3	0.0	1.2	4.2	2.6	7.3	6.8	64.5%	-42.5%	-37.6%
Subtotal	3.5	0.3	0.0	1.2	5.0	2.6	9.4	19.9	95.2%	-46.5%	-74.9%
Total Ducks	1251.0	259.7	544.9	448.1	2503.8	2698.6	3219.4	4361.9	-7.2%	-22.2%	-42.6%
Canada Goose	128.9	18.0	34.3	33.4	214.6	193.3	177.4	69.3	11.0%	21.0%	209.6%
Am. coot	80.2	29.0	56.9	74.1	240.2	222.3	290.6	231.2	8.1%	-17.4%	3.9%
Ponds	271.0	61.8	97.6	80.3	510.7	888.4	703.3	726.3	-42.5%	-27.4%	-29.7%

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 Alberta.

Year	Stratum				Total
	26	27	28	29	
1961	358.2	105.8	82.0	49.8	595.7
1962	395.5	84.9	73.2	52.5	606.2
1963	543.0	127.9	49.1	57.6	777.6
1964	366.7	97.1	62.1	118.6	644.5
1965	601.7	197.5	95.5	104.2	998.8
1966	490.2	162.6	134.9	76.2	863.9
1967	377.5	155.9	215.8	169.9	919.1
1968	266.1	43.6	47.3	80.9	438.0
1969	483.2	156.4	125.3	94.5	859.5
1970	531.2	187.1	86.5	77.8	882.7
1971	585.4	196.6	121.4	78.0	981.4
1972	517.1	92.7	60.1	61.2	731.1
1973	683.9	136.4	121.3	83.6	1025.2
1974	947.3	259.1	124.1	64.1	1394.6
1975	428.2	205.8	178.3	145.6	957.9
1976	459.6	144.2	104.1	123.7	831.6
1977	433.8	53.0	45.4	55.8	588.0
1978	295.8	89.8	88.6	145.6	619.9
1979	617.2	124.9	100.7	153.7	996.4
1980	281.2	68.1	59.1	52.1	460.6
1981	365.2	80.5	58.9	64.7	569.3
1982	374.6	86.4	66.8	103.3	631.1
1983	318.7	56.0	58.0	64.3	497.1
1984	386.4	69.8	42.9	38.8	537.9
1985	493.5	170.2	89.3	75.3	828.3
1986	514.5	70.7	46.4	96.0	727.5
1987	325.0	151.5	58.1	72.1	606.8
1988	229.3	61.6	52.7	74.3	417.9
1989	274.0	111.2	57.8	105.9	548.9
1990	467.9	116.4	66.2	121.7	772.1
1991	445.7	83.1	73.5	93.4	695.7
1992	328.1	78.3	48.0	48.8	503.2
1993	344.0	139.1	90.7	115.9	689.8
1994	406.1	122.5	69.8	122.0	720.4
1995	417.9	93.2	58.8	118.8	688.7
1996	522.1	138.4	130.5	112.9	903.9
1997	653.6	199.0	143.2	104.6	1100.4
1998	358.1	78.7	66.3	56.2	559.3
1999	469.5	104.6	67.2	74.7	716.0
2000	345.9	89.3	63.1	54.8	553.1
2001	226.4	67.6	56.6	75.1	425.7
2002	249.4	80.1	59.9	87.5	476.9
2003	384.1	167.2	159.5	177.7	888.4
2004	271.0	61.8	97.6	80.3	510.7
10-year Mean	403.3	114.1	87.5	98.4	703.3
Long-term Mean	431.7	118.7	85.1	90.8	726.3
Percent Change:					
From 2003	-29.40%	-63.00%	-38.80%	-54.80%	-42.50%
From 10-year Mean	-32.80%	-45.80%	11.60%	-18.40%	-27.40%
From Long-term Mean	-37.20%	-47.90%	14.80%	-11.60%	-29.70%

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

Species/Ponds	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Ducks										
Dabblers										
Mallard	1907.0	1757.6	1986.7	2072.2	1753.0	1502.4	1330.9	983.1	1227.9	1119.4
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	200.3	269.9	187.1	219.6	275.7	369.2	279.6	207.8	198.8	256.6
Am. wigeon	582.3	535.6	535.8	548.9	616.0	539.9	502.3	380.1	315.2	346.3
Am. green-winged teal	351.3	182.2	186.2	205.1	324.4	262.3	320.6	63.4	72.8	114.6
Blue-winged teal	1550.2	903.8	908.6	1078.5	903.6	877.8	897.1	346.7	426.8	634.6
N. shoveler	397.2	405.0	349.8	442.3	321.1	431.9	303.5	196.8	378.0	342.0
N. pintail	1591.5	1521.5	1250.6	1223.9	832.6	1087.5	513.3	328.6	811.9	417.6
Subtotal	6579.8	5575.5	5404.8	5790.4	5026.5	5071.0	4147.3	2506.6	3431.5	3231.1
Divers										
Redhead	140.5	145.7	105.9	127.2	113.2	71.3	78.1	44.3	79.6	88.6
Canvasback	96.2	98.7	100.6	168.7	78.1	58.3	63.9	54.6	77.6	83.8
Scaups	427.2	483.2	515.1	490.6	400.2	325.8	393.6	231.9	358.5	400.5
Ring-necked duck	1.4	8.8	1.5	4.5	9.4	2.9	10.1	2.1	1.7	3.4
Goldeneyes	16.0	21.1	15.5	9.1	8.7	11.4	11.2	7.9	2.4	5.9
Bufflehead	26.1	36.6	33.8	39.5	44.6	32.9	53.2	22.1	26.5	24.4
Ruddy Duck	76.2	78.3	43.4	51.6	79.2	97.9	49.8	21.9	37.4	93.0
Subtotal	783.7	872.4	815.8	891.1	733.5	600.4	660.0	384.9	583.8	699.5
Miscellaneous										
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	0.0	28.0	21.6	20.6	26.9	18.9	25.6	25.2	16.4	17.1
Mergansers	0.0	0.0	0.0	5.9	4.0	1.2	0.4	0.0	0.0	1.6
Subtotal	0.0	28.0	21.6	26.5	30.9	20.1	26.0	25.2	16.4	18.7
Total Ducks	7363.6	6475.9	6242.1	6708.1	5790.9	5691.5	4833.3	2916.7	4031.7	3949.3
Canada Goose	0.0	0.7	17.2	35.4	31.2	50.6	37.9	24.7	34.1	38.0
Am. coot	141.3	108.0	56.6	98.1	169.8	120.1	92.9	19.7	82.2	40.0
Ponds							595.7	606.2	777.6	644.5
Species/Ponds	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Ducks										
Dabblers										
Mallard	893.9	1546.7	1502.4	912.0	1121.4	1594.6	1871.3	1825.3	1729.5	1576.2
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	200.3	479.6	415.8	491.6	339.0	343.3	362.8	444.9	281.0	495.6
Am. wigeon	320.9	385.5	485.3	467.5	403.8	434.3	502.0	448.4	394.1	514.5
Am. green-winged teal	117.2	176.1	175.0	121.5	204.5	203.6	263.3	288.1	311.9	404.8
Blue-winged teal	494.1	533.2	712.9	325.3	363.2	440.9	714.3	494.9	459.2	1209.7
N. shoveler	276.2	470.8	538.5	394.6	433.3	329.1	423.6	435.7	466.1	588.0
N. pintail	777.1	1265.2	1559.5	501.6	1584.5	1366.4	1763.1	1716.4	1025.1	2123.1
Subtotal	3079.8	4857.2	5389.4	3214.1	4449.8	4712.1	5900.4	5653.8	4666.9	6911.9
Divers										
Redhead	93.3	190.1	194.4	85.0	117.8	74.7	68.7	118.1	89.1	155.3
Canvasback	100.5	68.5	97.9	57.9	26.7	49.4	39.0	65.5	54.0	100.2
Scaups	306.5	238.7	346.8	234.0	350.9	367.9	299.5	426.8	588.9	368.6
Ring-necked duck	11.0	4.3	34.8	11.0	8.7	14.2	36.2	30.6	2.0	15.1
Goldeneyes	1.5	4.9	0.0	5.6	8.9	3.6	20.4	15.6	19.7	17.7
Bufflehead	71.1	33.4	48.6	32.4	44.1	40.4	33.8	53.3	30.6	26.0
Ruddy Duck	93.4	83.0	111.9	96.7	47.9	66.9	56.7	102.0	38.2	93.3
Subtotal	677.3	623.0	834.4	522.7	605.0	617.1	554.4	811.9	822.5	776.3
Miscellaneous										
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	16.9	20.0	23.6	17.5	21.6	23.2	12.1	13.2	16.0	8.0
Mergansers	9.3	7.7	1.8	1.1	1.7	9.4	4.1	4.2	2.1	0.0
Subtotal	26.1	27.7	25.4	18.6	23.3	32.7	16.1	17.4	18.1	8.0
Total Ducks	3783.3	5507.9	6249.2	3755.4	5078.0	5361.9	6470.9	6483.0	5507.5	7696.2
Canada Goose	24.0	19.0	34.6	15.0	23.5	28.4	50.0	30.5	35.7	29.2
Am. coot	65.1	48.1	202.5	98.8	144.8	169.8	99.7	122.6	145.4	267.0
Ponds	998.8	863.9	919.1	438.0	859.5	882.7	981.4	731.1	1025.2	1394.6

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

Species/Ponds	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Ducks										
Dabblers										
Mallard	1398.3	1453.6	853.3	823.5	983.1	975.2	947.1	765.8	845.6	713.0
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Gadwall	303.7	308.7	392.2	279.7	346.4	319.6	309.4	215.5	142.3	204.4
Am. wigeon	384.3	344.5	194.9	303.5	402.5	403.9	179.8	200.0	170.9	158.4
Am. green-winged teal	230.8	345.6	151.9	222.3	256.8	224.0	180.1	127.5	136.2	117.7
Blue-winged teal	1108.2	820.3	751.0	393.2	592.9	834.6	1148.1	498.1	419.1	429.2
N. shoveler	550.3	325.0	220.8	259.0	391.4	388.8	503.9	320.4	200.3	187.3
N. pintail	1553.1	956.5	345.8	1087.6	1456.4	842.3	657.3	576.8	380.8	299.8
Subtotal	5528.7	4554.3	2909.8	3368.7	4429.5	3988.3	3926.1	2704.1	2295.1	2109.9
Divers										
Redhead	181.7	173.4	202.1	133.8	100.7	268.4	111.1	57.8	60.4	98.3
Canvasback	78.9	52.1	64.6	51.2	53.5	62.1	49.4	73.8	49.7	26.6
Scaups	382.7	625.9	477.7	463.0	687.5	473.0	469.3	522.1	491.9	367.5
Ring-necked duck	26.0	13.5	23.9	50.9	21.3	8.9	29.5	23.7	12.7	33.6
Goldeneyes	15.5	28.3	3.9	33.2	7.6	29.6	4.6	6.8	6.8	1.7
Bufflehead	56.1	47.3	35.2	60.6	67.2	32.3	55.5	42.2	57.4	25.8
Ruddy Duck	184.7	33.6	101.5	75.5	42.0	33.9	63.0	116.0	72.9	62.3
Subtotal	925.7	974.1	908.9	868.3	979.7	908.2	782.5	842.4	751.8	615.8
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	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	7.3	24.1	13.5	26.0	36.2	20.4	7.7	11.8	6.4	17.3
Mergansers	16.4	0.0	4.8	16.1	5.7	18.0	13.6	15.5	15.3	4.9
Subtotal	23.8	24.1	18.3	42.1	41.9	38.3	21.3	27.9	21.7	22.2
Total Ducks	6478.2	5552.5	3837.0	4279.1	5451.1	4934.9	4729.8	3574.4	3068.6	2748.0
Canada Goose	30.2	19.8	23.8	30.2	35.5	21.1	45.6	40.3	41.7	46.8
Am. coot	483.3	83.5	285.4	168.4	418.0	501.1	405.0	371.7	253.2	542.7
Ponds	957.9	831.6	588.0	619.9	996.4	460.6	569.3	631.1	497.1	537.9
Ducks										
Dabblers										
Mallard	803.0	698.8	753.9	627.4	585.9	778.7	769.2	733.5	753.8	848.8
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	164.9	226.4	127.1	256.4	250.2	414.4	292.7	358.0	414.3	511.7
Am. wigeon	177.3	90.2	110.4	85.5	95.9	123.2	117.9	170.3	198.5	193.2
Am. green-winged teal	106.7	78.7	120.3	162.0	106.0	132.5	131.1	174.4	175.9	152.6
Blue-winged teal	295.3	361.9	596.6	552.9	418.2	521.2	580.2	716.1	526.6	466.6
N. shoveler	321.2	220.7	330.7	165.6	227.9	322.5	294.5	241.4	421.1	421.4
N. pintail	593.4	242.6	447.4	171.4	313.6	317.7	116.3	103.9	372.5	383.4
Subtotal	2461.7	1919.3	2486.4	2021.3	1997.7	2610.3	2301.9	2497.7	2862.8	2977.7
Divers										
Redhead	133.9	123.3	143.5	85.7	96.6	162.8	110.8	112.0	110.3	110.3
Canvasback	56.6	59.2	53.5	54.8	36.7	78.1	58.4	32.8	45.9	64.0
Scaups	363.2	322.7	256.2	345.2	158.0	307.3	299.8	288.0	268.4	265.0
Ring-necked duck	18.7	11.7	18.6	35.3	46.5	12.4	14.9	15.4	9.6	12.6
Goldeneyes	16.2	29.9	24.2	31.6	16.1	19.3	10.6	10.1	9.5	15.1
Bufflehead	17.0	33.8	22.7	50.8	32.5	36.5	80.0	67.6	79.6	43.1
Ruddy Duck	43.8	32.9	35.8	77.9	65.6	129.9	193.8	85.2	57.1	65.5
Subtotal	649.4	613.5	554.4	681.3	451.9	746.4	768.3	611.1	580.3	575.5
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.4	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	18.6	17.2	1.1	7.2	5.6	9.9	15.5	4.4	0.8	5.2
Mergansers	8.9	8.6	10.1	21.6	8.6	5.0	15.2	8.7	6.3	6.9
Subtotal	27.5	25.8	11.1	28.8	14.2	14.9	31.1	13.1	7.1	12.1
Total Ducks	3138.6	2558.7	3052.0	2731.3	2463.9	3371.6	3101.3	3121.9	3450.1	3565.3
Canada Goose	49.6	79.6	59.0	95.5	79.3	113.8	66.8	100.1	85.1	129.0
Am. coot	327.3	282.2	137.9	166.1	349.5	485.7	279.7	307.4	282.1	234.7
Ponds	828.3	727.5	606.8	417.9	548.9	772.1	695.7	503.2	689.8	720.4

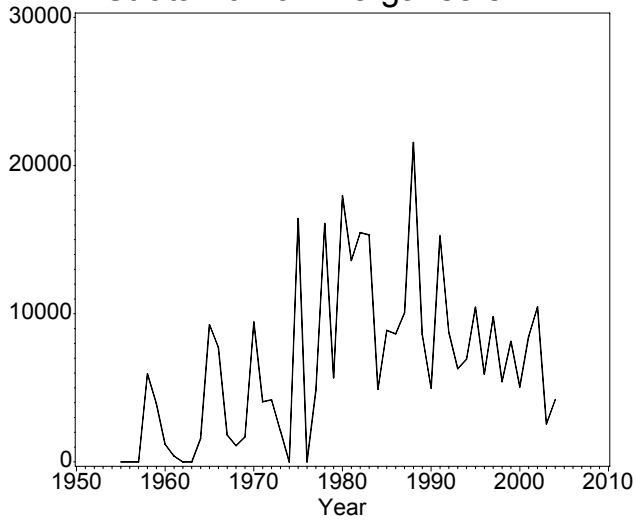
Appendix 1 (continued). Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Southern Alberta.

Species/Ponds	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Ducks										
Dabblers										
Mallard	778.5	793.8	883.6	950.1	1031.8	833.2	743.8	793.3	627.1	600.1
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	410.6	404.2	308.3	360.2	332.5	310.9	256.8	333.4	240.9	289.9
Am. wigeon	179.8	191.1	190.5	150.3	179.6	225.2	186.8	77.5	131.6	116.6
Am. green-winged teal	245.3	314.5	324.4	92.2	190.5	308.1	190.5	147	131.8	98.4
Blue-winged teal	430.8	505.9	358.5	521.9	391.5	577.8	367.8	244.2	322.6	360.2
N. shoveler	267.6	373.8	443.2	329.4	408.2	380.4	267.8	274	448.4	384.6
N. pintail	198.2	333.5	472.8	166.3	115.0	188.8	66.1	73	251.9	161.3
Subtotal	2510.7	2916.8	2981.3	2570.5	2649.2	2824.4	2079.5	1942.3	2154.3	2011.2
Divers										
Redhead	95.2	102.7	188.9	67.6	180.7	106.8	54.0	112.5	96.9	78.9
Canvasback	60.5	67.0	68.5	68.6	56.1	73.2	31.9	14.5	69.7	50.2
Scaups	366.5	376.4	347.7	243.1	228.2	292.3	201.9	146.5	172.1	124.1
Ring-necked duck	9.0	10.1	37.4	11.9	52.0	16.2	20.2	7.5	31.1	44.1
Goldeneyes	31.4	6.1	6.9	44.7	5.8	26.5	22.6	6.6	34.2	26.3
Bufflehead	68.3	103.5	91.3	73.9	69.5	70.9	59.2	47.2	82.9	70.6
Ruddy Duck	128.5	302.2	87.1	123.6	73.4	74.3	51.6	86.5	54.9	93.5
Subtotal	759.4	967.8	827.9	633.3	665.8	660.3	441.3	421.3	541.7	487.6
Miscellaneous										
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	10.9	0.3	1.3	0.0	0.3	0.0	1.8	0.5	0.0	0.8
Mergansers	10.4	5.9	9.8	5.4	8.1	5.1	8.5	10.5	2.6	4.2
Subtotal	21.3	6.2	11.1	5.4	8.4	5.1	10.3	11	2.6	5.0
Total Ducks	3291.4	3890.9	3820.2	3209.2	3323.4	3489.7	2531.1	2374.5	2698.6	2503.8
Canada Goose	158.0	160.2	109.8	191.6	151.8	269.5	213.5	196.9	193.3	214.6
Am. coot	232.9	234.4	377.5	260.0	342.3	418.8	207.4	376.1	222.3	240.2
Ponds	688.7	903.9	1100.4	559.3	716.0	553.1	425.7	476.9	888.4	510.7

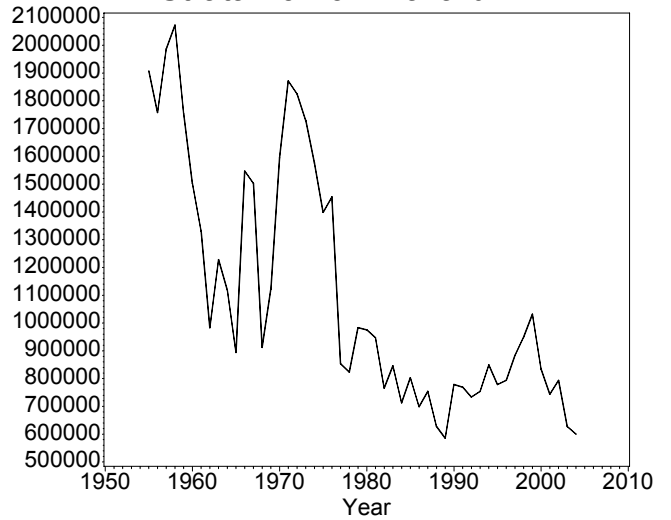
Table 3. Survey design for Southern Alberta, May 2004.

	STRATUM				
	26	27	28	29	Total
<u>Survey design</u>					
Square miles in stratum	26,448	11,724	12,890	13,235	64,297
Square miles in sample-waterfowl	544.5	288.0	310.5	171.0	1,314
Square miles in sample-ponds	272.3	144.0	155.25	85.5	657
Lineal miles in sample	2,178	1,152	1,242	684	5,256
Number of transects in sample	11	6	7	4	28
Number of segments in sample	121	64	69	38	292
Expansion factor	48.5730	40.7083	41.5137	77.3977	---
<u>Current year coverage</u>					
Square miles in sample-waterfowl	256.5	144.0	130.5	171.0	697.5
Square miles in sample-ponds	126.0	72.0	65.25	85.5	348.75
Lineal miles in sample	1,008	576	522	684	2,790
Number of transects in sample	6	3	3	4	16
Number of segments in sample	57	32	29	38	155
Expansion factor	103.11	81.4167	98.7739	77.3977	—

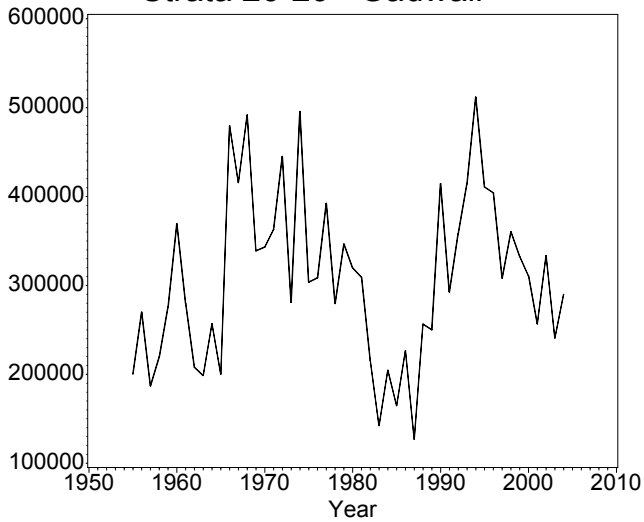
Strata 26-29 Mergansers



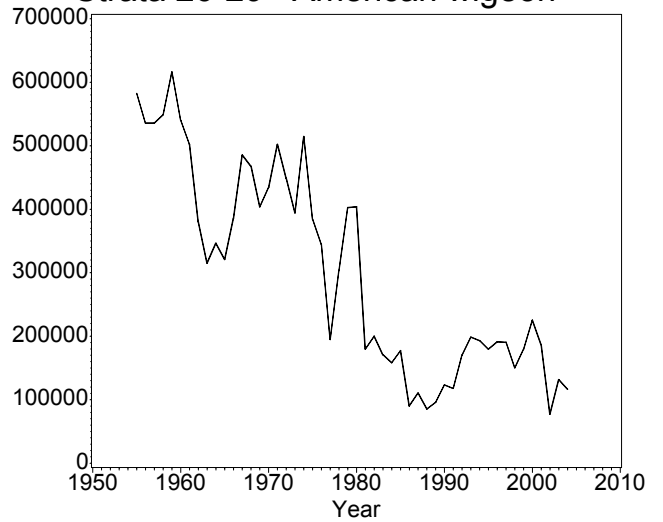
Strata 26-29 Mallard



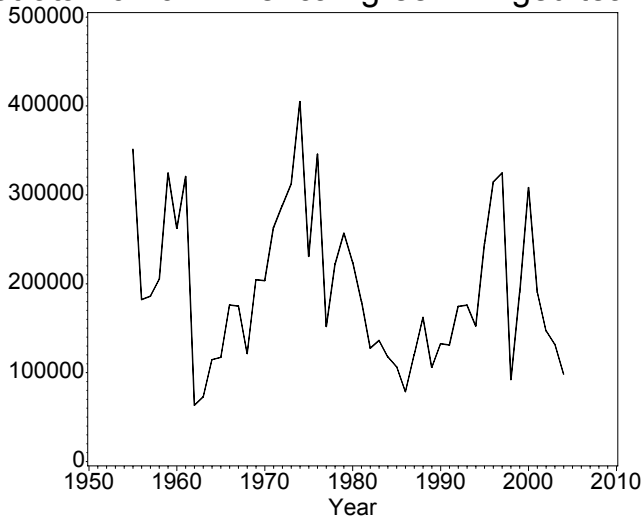
Strata 26-29 Gadwall



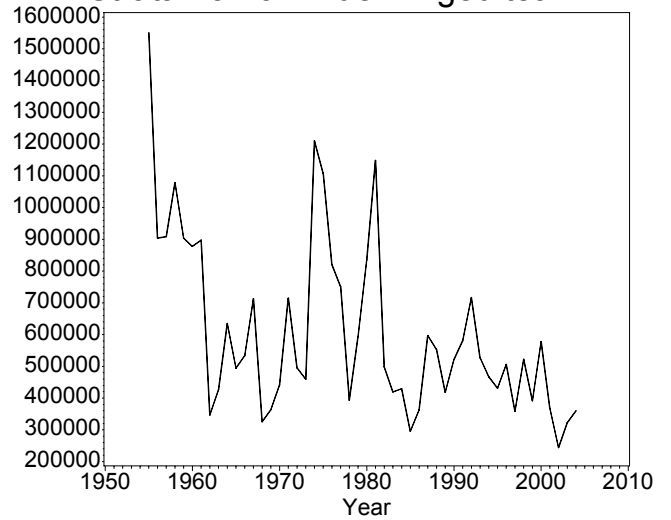
Strata 26-29 American wigeon



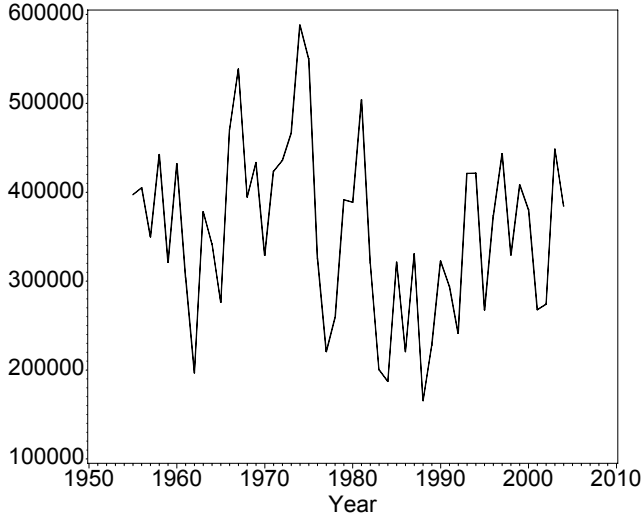
Strata 26-29 American green-winged teal



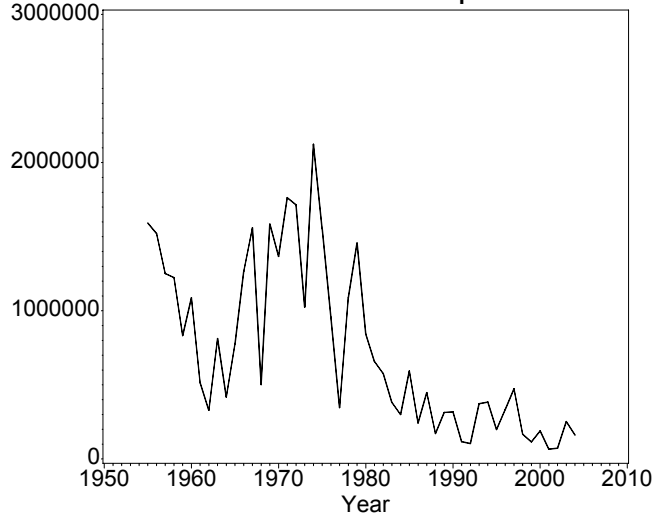
Strata 26-29 Blue-winged teal



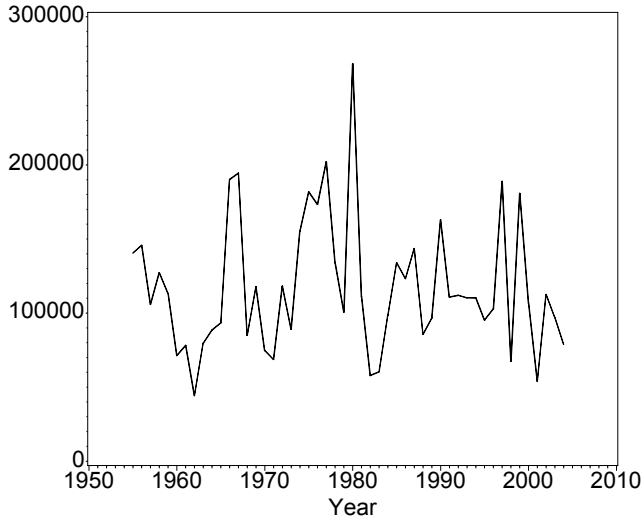
Strata 26-29 Northern shoveler



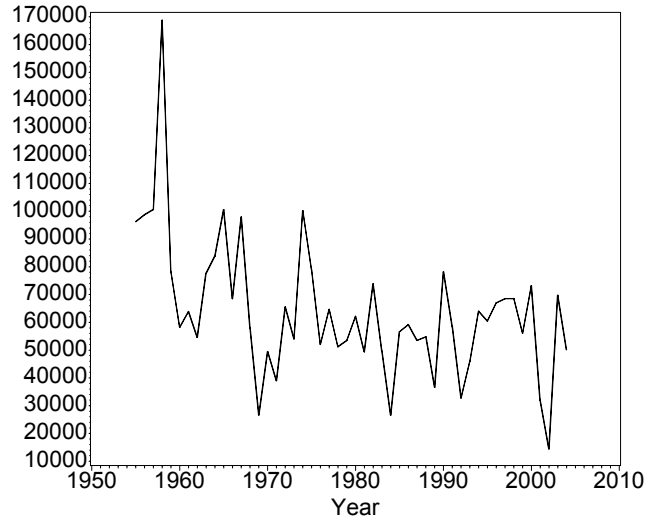
Strata 26-29 Northern pintail



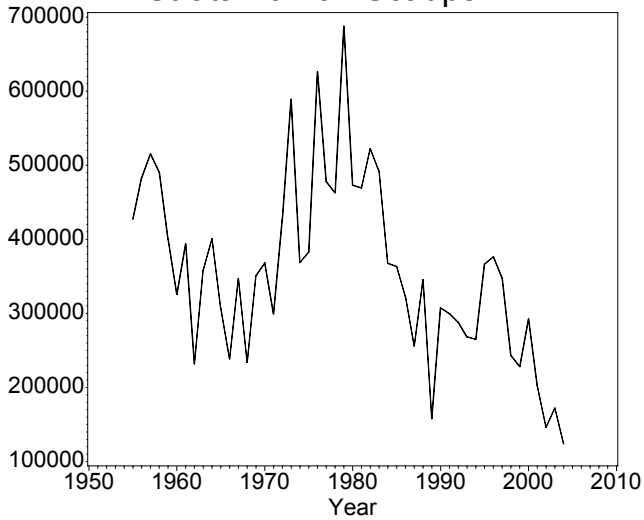
Strata 26-29 Redhead



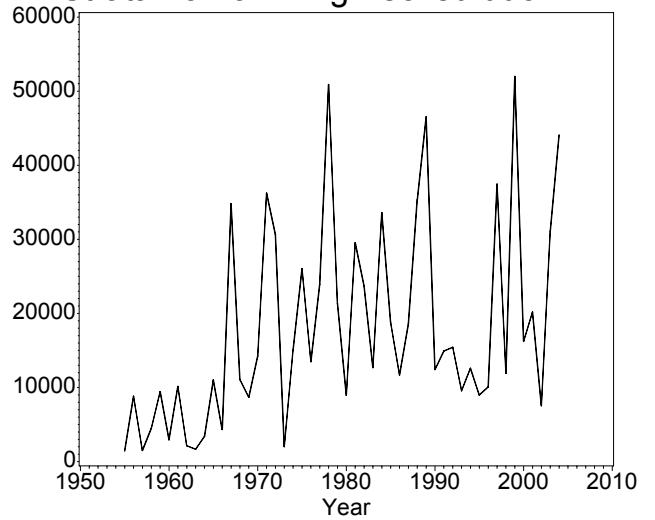
Strata 26-29 Canvasback



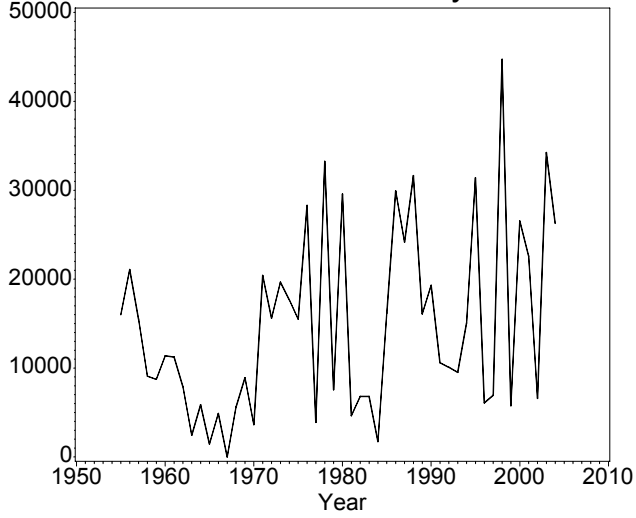
Strata 26-29 Scaups



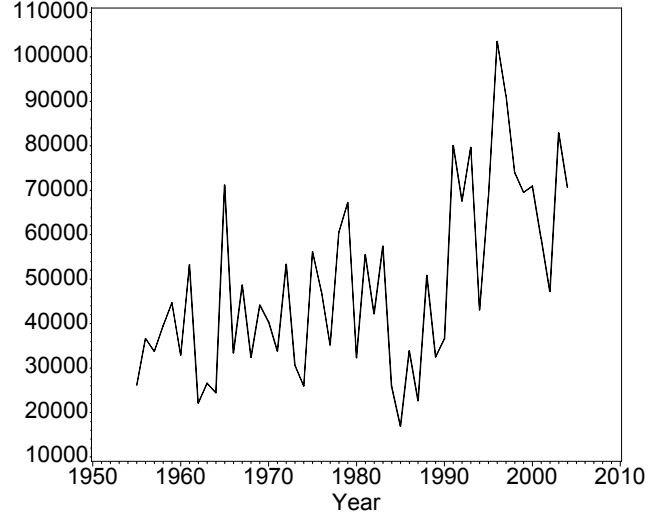
Strata 26-29 Ring-necked duck



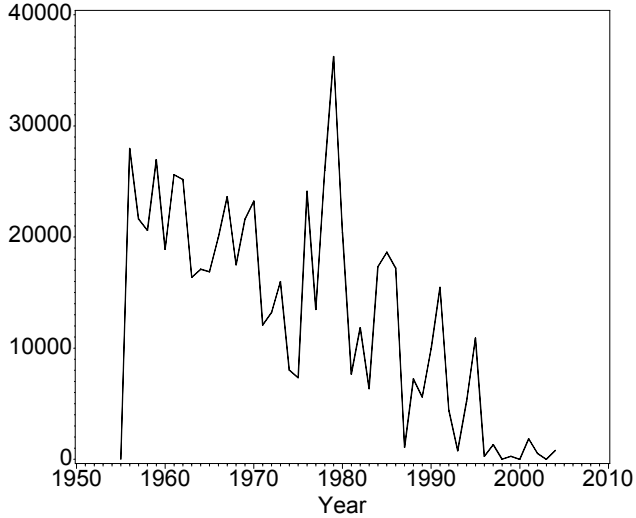
Strata 26-29 Goldeneyes



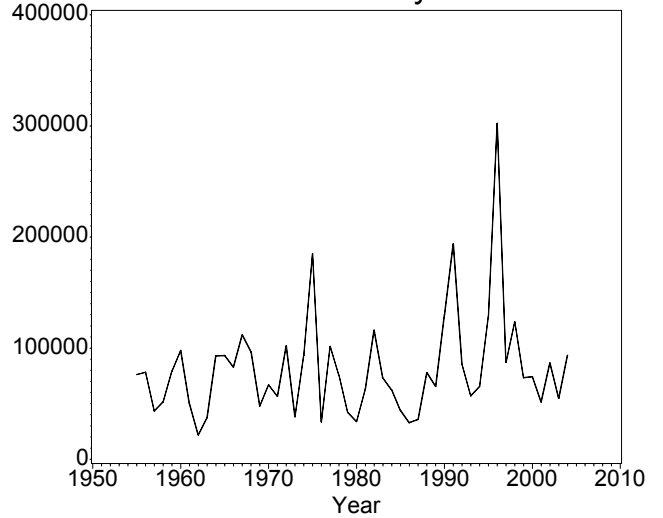
Strata 26-29 Bufflehead



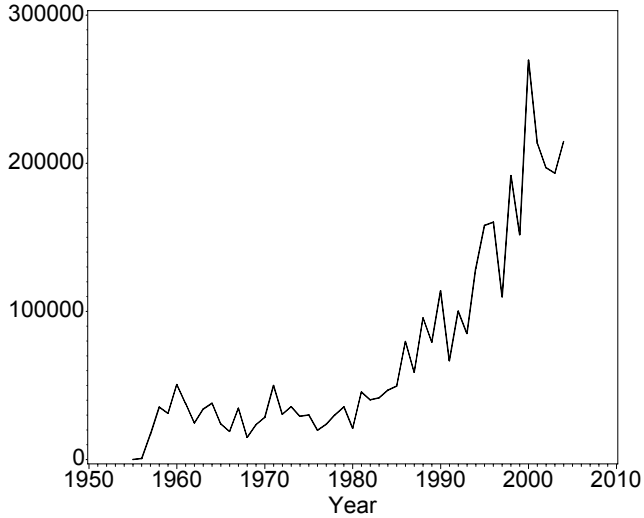
Strata 26-29 Scoters



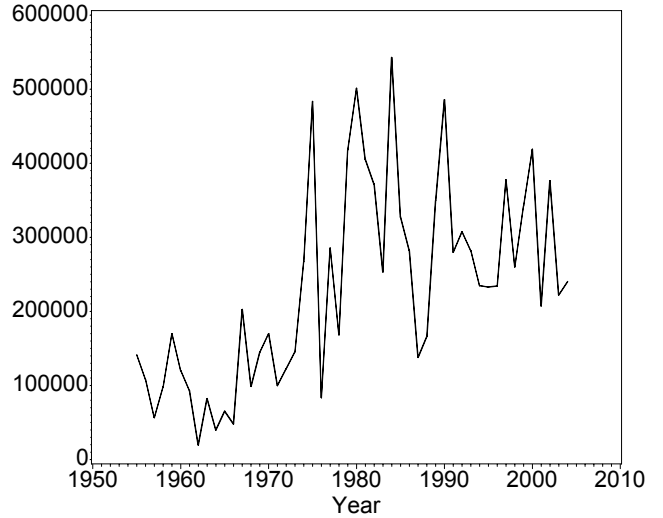
Strata 26-29 Ruddy Duck



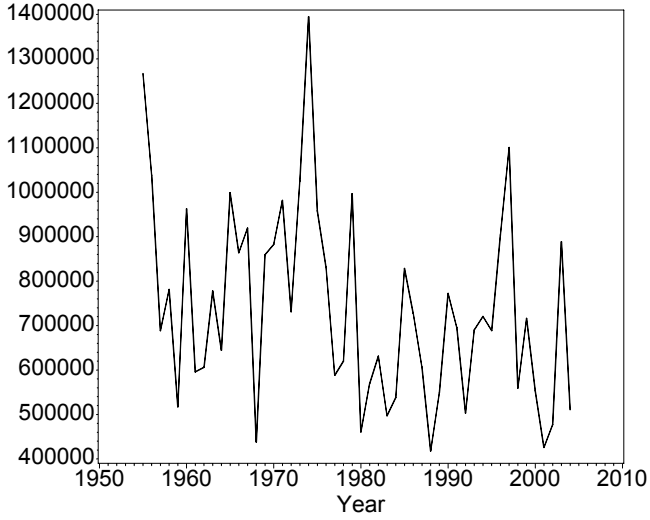
Strata 26-29 Canada Goose



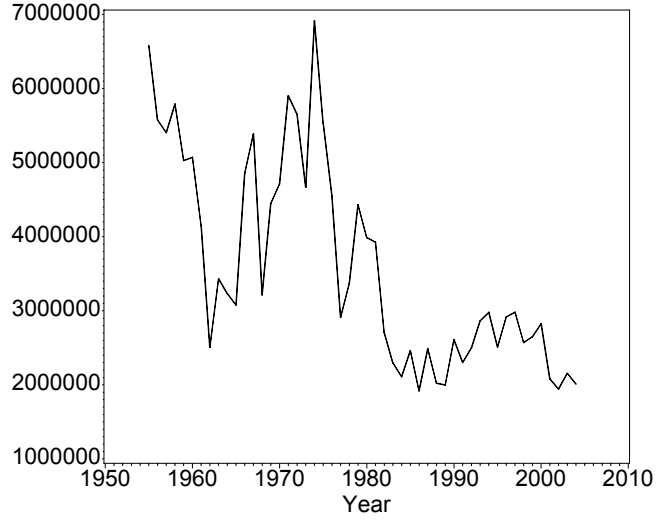
Strata 26-29 American coot



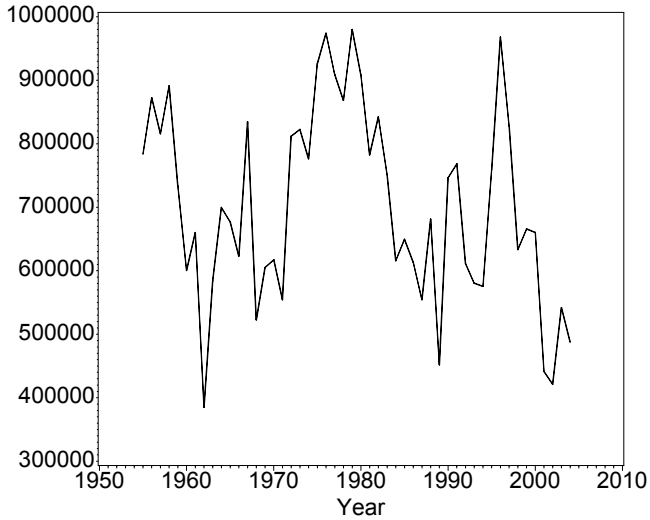
Strata 26-29 Ponds



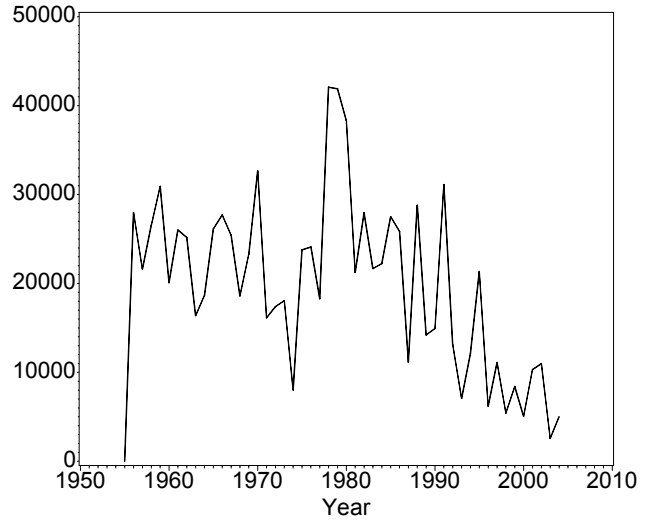
Strata 26-29 Dabblers



Strata 26-29 Divers



Strata 26-29 Miscellaneous



Strata 26-29 Total Ducks

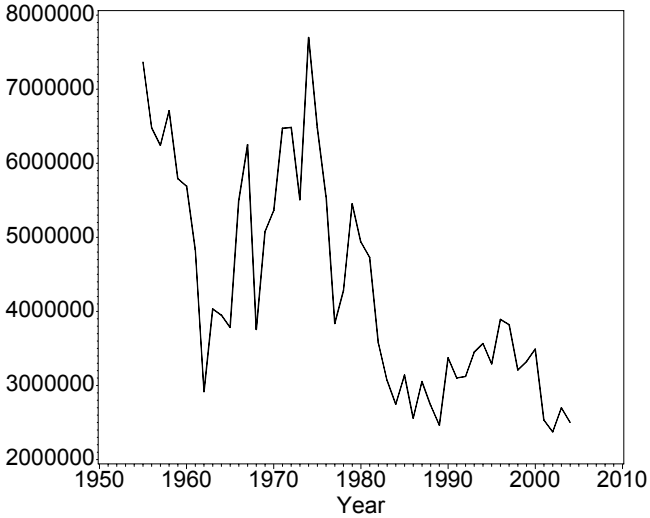


Table 4. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparison against the previous year and the previous long-term mean for Central Alberta.

Species/Ponds	Stratum		2004 Total	2003 Total	Long-Term Mean	% Change From	
	75	76				2003	Long-Term Mean
Ducks							
Dabblers							
Mallard	178.6	199.4	378.0	275.0	423.6	37.5%	-10.8%
Am. black duck	0.0	0.0	0.0	0.0	0.0	--	--
Gadwall	52.0	59.3	111.3	56.8	62.0	95.8%	79.6%
Am. wigeon	21.3	26.4	47.7	37.8	82.0	26.2%	-41.9%
Am. green-winged teal	62.6	33.2	95.7	40.0	114.1	139.4%	-16.1%
Blue-winged teal	123.8	168.8	292.5	74.9	136.7	290.7%	114.0%
N. shoveler	54.4	58.8	113.2	73.7	87.4	53.5%	29.5%
N. pintail	5.8	16.2	22.0	18.3	18.6	20.1%	17.9%
Subtotal	498.4	562.0	1060.5	576.5	924.4	84.0%	14.7%
Divers							
Redhead	36.0	21.2	57.2	19.4	31.1	194.9%	83.9%
Canvasback	18.6	6.2	24.8	43.8	34.4	-43.3%	-27.9%
Scaups	129.1	72.6	201.7	138.3	153.2	45.9%	31.7%
Ring-necked duck	16.1	22.0	38.1	36.7	36.4	3.7%	4.6%
Goldeneyes	34.2	14.1	48.3	161.4	49.5	-70.1%	-2.5%
Bufflehead	100.6	114.8	215.3	171.1	164.1	25.9%	31.2%
Ruddy Duck	51.2	29.6	80.8	119.4	57.2	-32.4%	41.2%
Subtotal	385.8	280.6	666.3	690.2	526.1	-3.5%	26.7%
Miscellaneous							
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	--	--
Eiders	0.0	0.0	0.0	0.0	0.0	--	--
Scoters	2.5	18.3	20.8	1.6	7.8	1224.4%	165.3%
Mergansers	4.1	1.4	5.4	2.3	10.0	136.2%	-45.5%
Subtotal	6.5	19.7	26.2	3.9	17.8	577.0%	47.1%
Total Ducks	890.7	862.3	1753.0	1270.5	1468.3	38.0%	19.4%
Canada Goose	46.8	45.3	92.0	69.0	49.1	33.3%	87.3%
Am. coot	147.9	80.4	228.3	57.3	149.7	298.3%	52.5%
Ponds	172.7	329.3	502.1	517.0	484.4	-2.9%	3.7%

Table 5. Long-term trend in adjusted May pond estimates (thousands) by stratum with comparisons against the previous year and the previous long-term mean for Central Alberta.

Year	Stratum		
	75	76	Total
1989	160.4	251.5	411.9
1990	174.4	315.5	489.9
1991	166.1	252.1	418.2
1992	137.2	282.0	419.2
1993	156.2	245.3	401.5
1994	147.2	238.2	385.4
1995	175.1	330.9	505.9
1996	239.3	329.6	569.0
1997	394.1	405.4	799.5
1998	170.5	225.5	395.9
1999	209.0	337.2	546.2
2000	129.0	298.2	427.2
2001	139.6	266.4	406.0
2002	184.8	387.8	572.5
2003	181.0	336.0	517.0
2004	172.7	329.3	502.1
1989-2003 Mean	184.3	300.1	484.4
Percent Change:			
From 2003	-4.60%	-2.00%	-2.90%
From 1989-2003 Mean	-6.30%	9.70%	3.70%

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

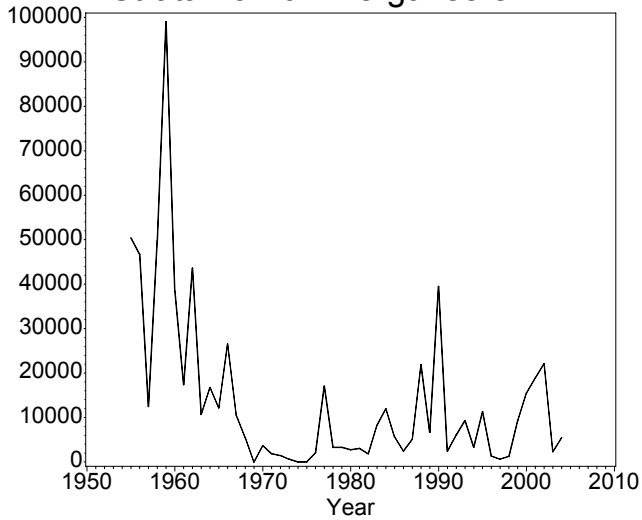
Species/Ponds	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Ducks										
Dabblers										
Mallard	380.2	380.0	369.4	380.9	346.4	384.4	434.0	381.6	431.9	382.8
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	59.3	62.6	32.1	41.3	31.7	41.1	29.4	64.6	68.3	99.2
Am. wigeon	62.0	84.2	101.6	82.4	97.7	97.2	139.0	115.6	110.8	57.6
Am. green-winged teal	50.6	41.1	57.5	62.7	82.4	121.9	144.0	146.1	167.9	41.4
Blue-winged teal	161.3	160.2	127.2	158.2	55.6	95.1	76.1	163.6	117.0	183.4
N. shoveler	87.4	101.4	60.7	100.6	46.8	65.0	62.6	76.1	113.5	87.4
N. pintail	35.2	23.5	7.2	8.4	2.9	12.5	13.8	18.1	74.4	13.3
Subtotal	835.9	852.9	755.8	834.5	663.4	817.3	899.0	965.8	1083.8	865.0
Divers										
Redhead	21.7	26.3	15.0	72.8	31.7	23.1	9.6	18.4	35.7	50.2
Canvasback	28.9	37.6	5.6	13.7	59.0	42.8	10.6	90.4	26.7	61.3
Scaups	128.0	194.9	124.6	153.4	136.9	131.9	126.3	182.5	159.2	81.1
Ring-necked duck	24.7	20.2	18.0	15.5	25.1	88.2	86.2	44.2	26.1	32.2
Goldeneyes	28.5	50.6	39.4	25.2	39.4	55.7	71.0	16.4	73.5	47.0
Bufflehead	87.0	135.2	156.1	220.3	116.7	90.8	136.8	232.2	231.8	202.5
Ruddy Duck	64.7	44.2	5.7	62.8	60.7	4.9	27.5	57.6	7.5	194.8
Subtotal	383.6	509.1	364.4	563.8	469.6	437.4	468.1	641.7	560.6	669.1
Miscellaneous										
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	9.0	11.4	12.6	10.7	3.4	10.1	11.8	0.5	11.5	4.3
Mergansers	6.6	39.5	2.4	6.0	9.3	3.3	11.3	1.3	0.6	1.3
Subtotal	15.6	50.8	15.0	16.8	12.7	13.4	23.1	1.9	12.1	5.5
Total Ducks	1235.1	1412.8	1135.1	1415.1	1145.7	1268.1	1390.2	1609.4	1656.5	1539.7
Canada Goose	12.5	19.0	15.4	19.8	18.9	20.7	43.3	48.2	29.1	71.1
Am. coot	26.4	158.7	21.6	64.0	62.6	39.7	31.9	37.7	243.3	375.3
Ponds	411.9	489.9	418.2	419.2	401.5	385.4	505.9	569.0	799.5	395.9

Species/Ponds	1999	2000	2001	2002	2003	2004
Ducks						
Dabblers						
Mallard	640.5	516.8	503.3	546.5	275.0	378.0
Am. black duck	0.0	0.0	0.0	0	0.0	0.0
Gadwall	68.6	56.9	86.6	131.2	56.8	111.3
Am. wigeon	93.0	44.3	61.5	45.4	37.8	47.7
Am. green-winged teal	174.0	327.3	70.7	184.1	40.0	95.7
Blue-winged teal	150.1	246.8	76.1	204.8	74.9	292.5
N. shoveler	78.4	99.1	101.0	157.6	73.7	113.2
N. pintail	19.8	10.8	5.9	15.5	18.3	22.0
Subtotal	1224.5	1301.9	905.1	1285.1	576.5	1060.5
Divers						
Redhead	82.9	18.0	20.1	21.9	19.4	57.2
Canvasback	34.5	10.6	24.9	26.1	43.8	24.8
Scaups	207.0	181.0	208.7	144.2	138.3	201.7
Ring-necked duck	61.8	28.5	32.0	6.7	36.7	38.1
Goldeneyes	9.9	35.1	58.7	31.3	161.4	48.3
Bufflehead	190.3	133.9	163.9	193.4	171.1	215.3
Ruddy Duck	27.3	67.8	31.0	82.3	119.4	80.8
Subtotal	613.7	474.9	539.2	505.8	690.2	666.3
Miscellaneous						
Long-tailed Duck	0.0	0.0	0.0	0	0.0	0.0
Eiders	0.0	0.0	0.0	0	0.0	0.0
Scoters	2.9	8.8	16.2	2.8	1.6	20.8
Mergansers	9.3	15.5	18.9	22.1	2.3	5.4
Subtotal	12.2	24.3	35.1	24.9	3.9	26.2
Total Ducks	1850.4	1801.1	1479.4	1815.8	1270.5	1753.0
Canada Goose	93.8	114.5	76.7	85	69.0	92.0
Am. coot	142.4	548.6	48.9	386.8	57.3	228.3
Ponds	546.2	427.2	406.0	572.5	517.0	502.1

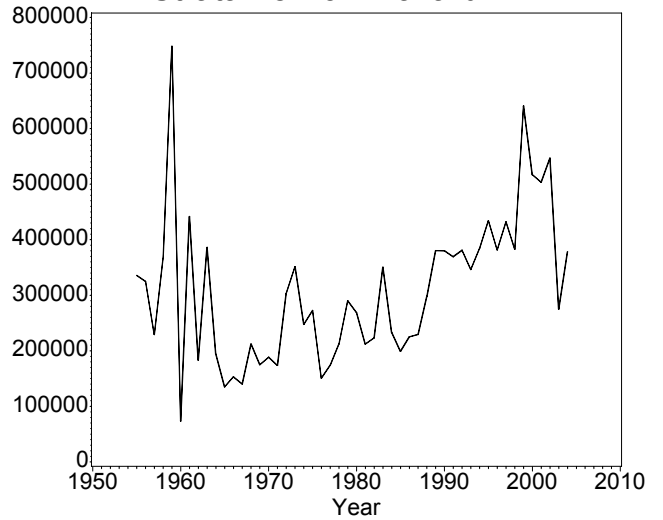
Table 6. Survey design for Central Alberta, May 2004

	<u>STRATUM</u>		
	<u>75</u>	<u>76</u>	<u>Total</u>
<u>Survey design</u>			
Square miles in stratum	19,387	26,483	45,870
Square miles in sample-waterfowl	166.5	220.5	387
Square miles in sample-ponds	83.25	110.25	193.5
Lineal miles in sample	666	882	1,548
Number of transects in sample	4	5	9
Number of segments in sample	37	49	86
Expansion factor	116.4384	120.1043	--
<u>Current year coverage</u>			
Square miles in sample-waterfowl	180.0	220.5	400.5
Square miles in sample-ponds	90.0	110.25	200.25
Lineal miles in sample	720	882	1602
Number of transects in sample	4	5	9
Number of segments in sample	40	49	89
Expansion factor	107.7056	120.1043	

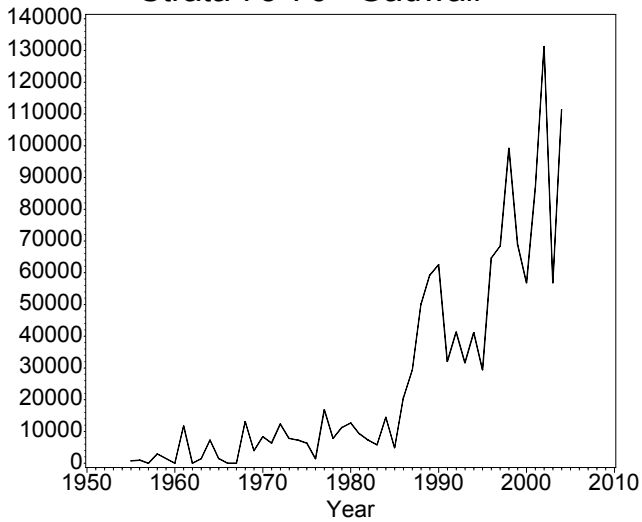
Strata 75-76 Mergansers



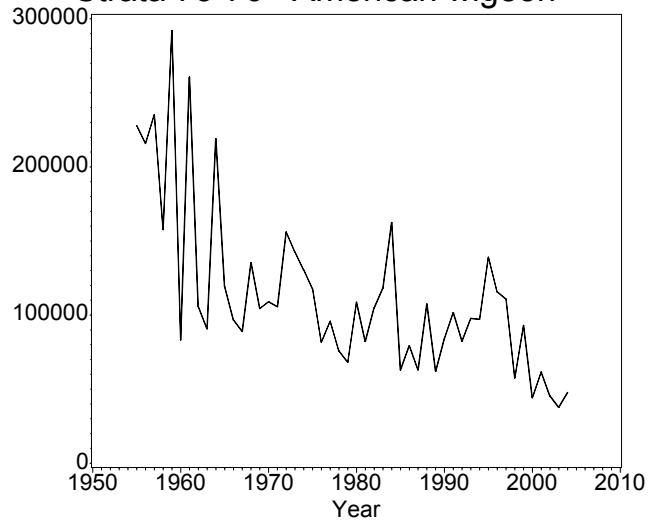
Strata 75-76 Mallard



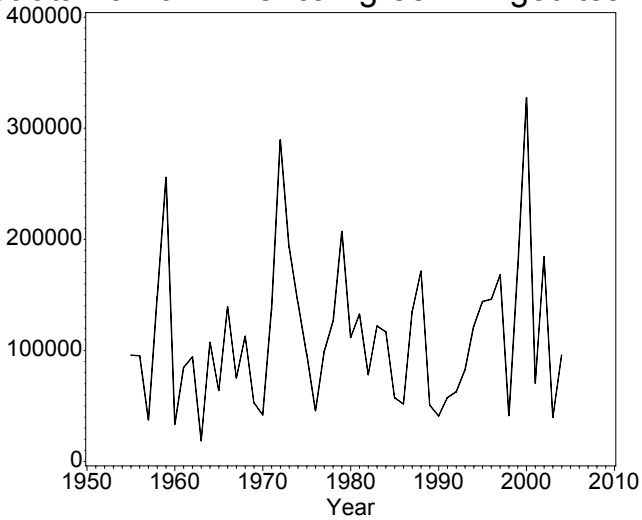
Strata 75-76 Gadwall



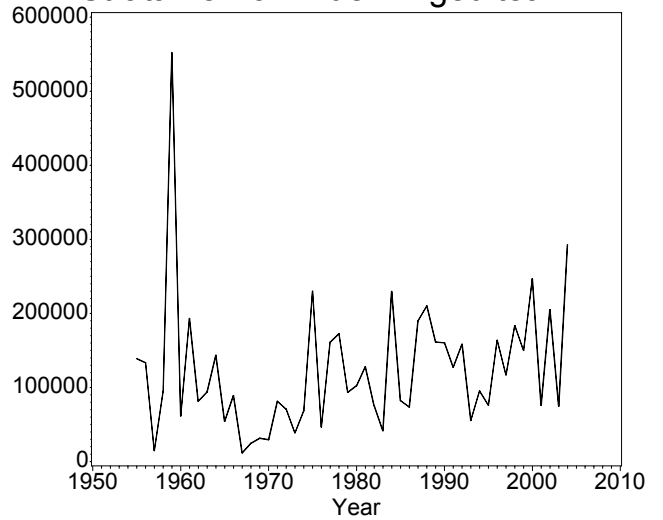
Strata 75-76 American wigeon



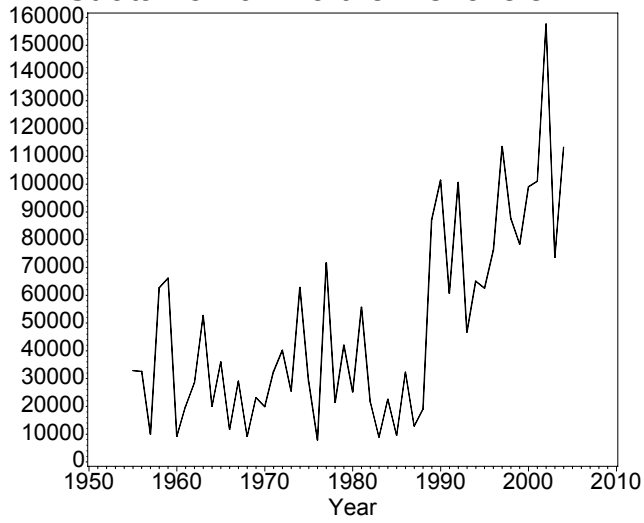
Strata 75-76 American green-winged teal



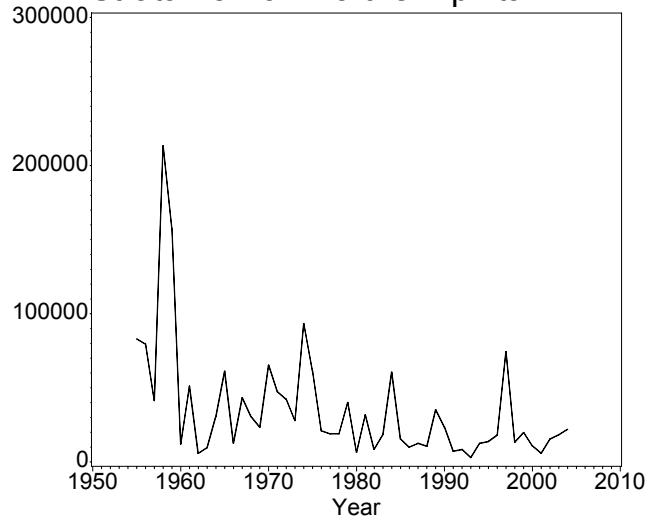
Strata 75-76 Blue-winged teal



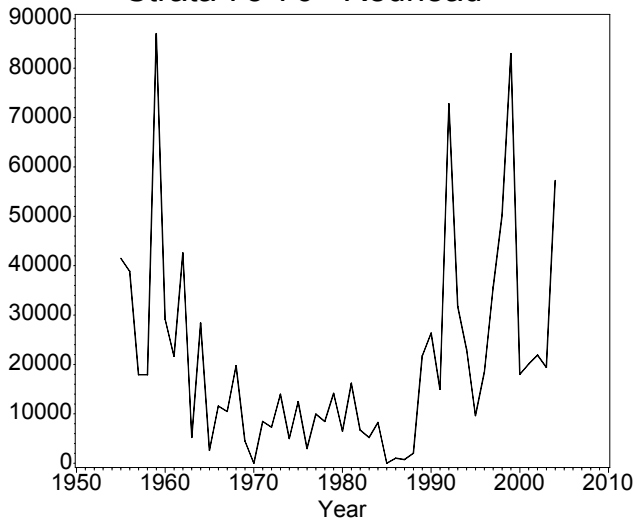
Strata 75-76 Northern shoveler



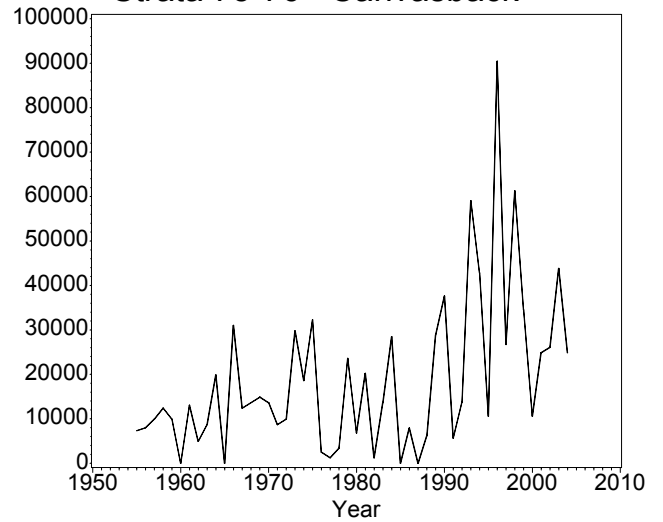
Strata 75-76 Northern pintail



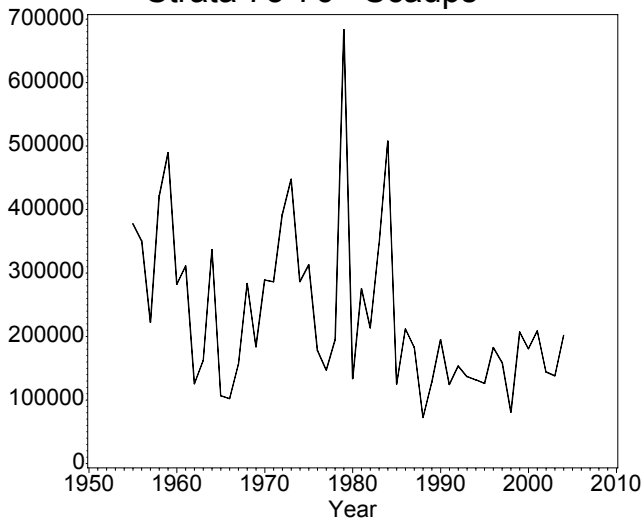
Strata 75-76 Redhead



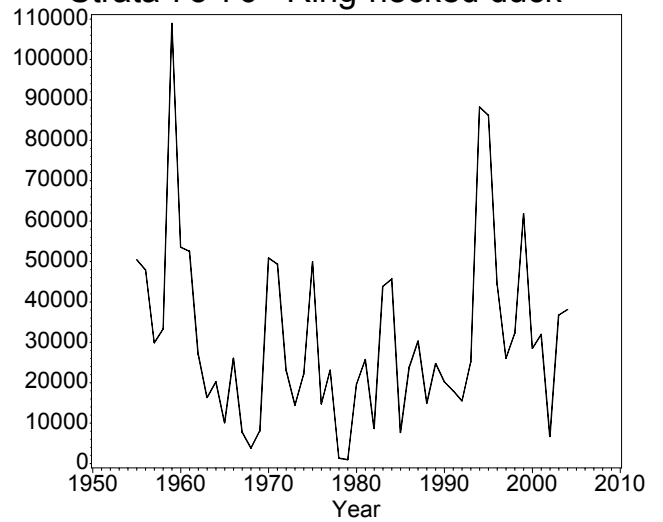
Strata 75-76 Canvasback



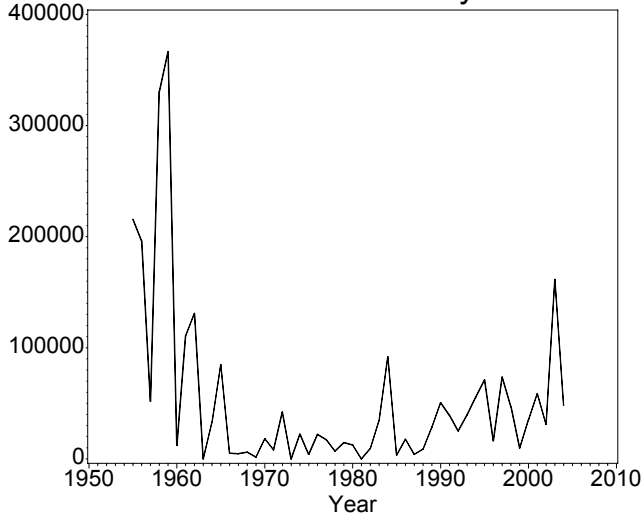
Strata 75-76 Scaups



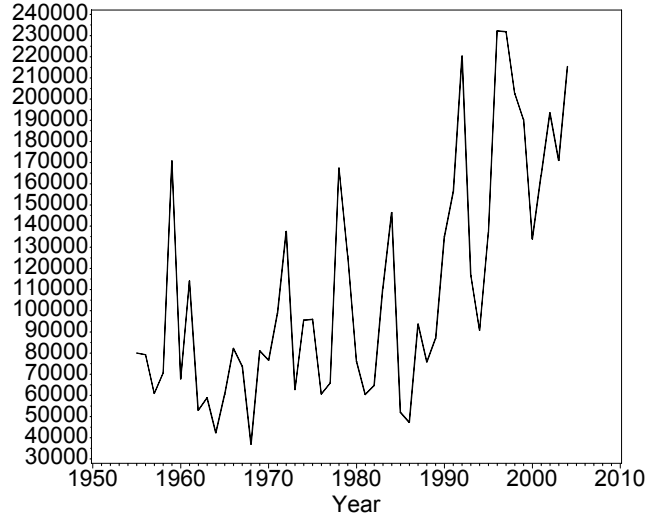
Strata 75-76 Ring-necked duck



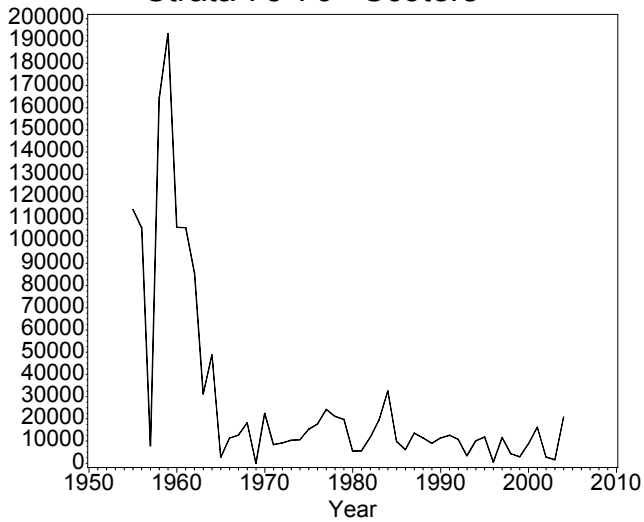
Strata 75-76 Goldeneyes



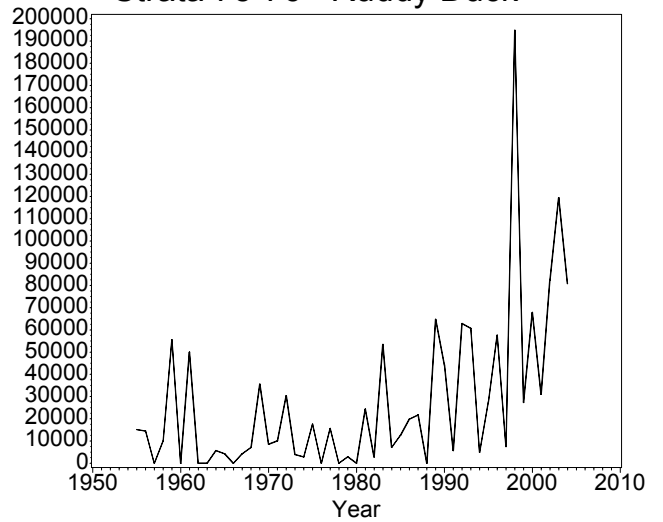
Strata 75-76 Bufflehead



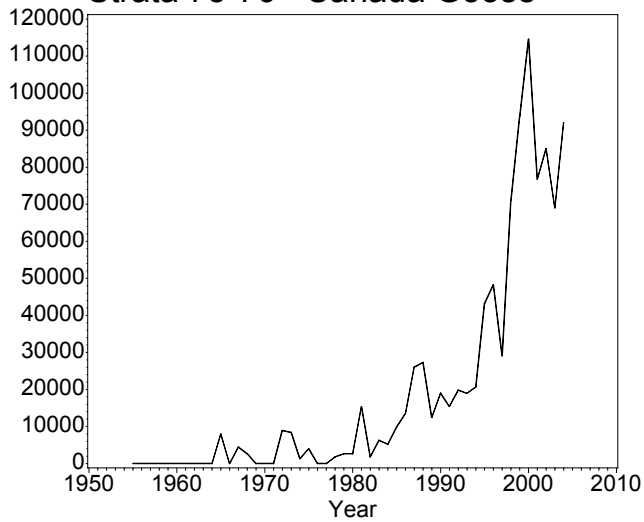
Strata 75-76 Scoters



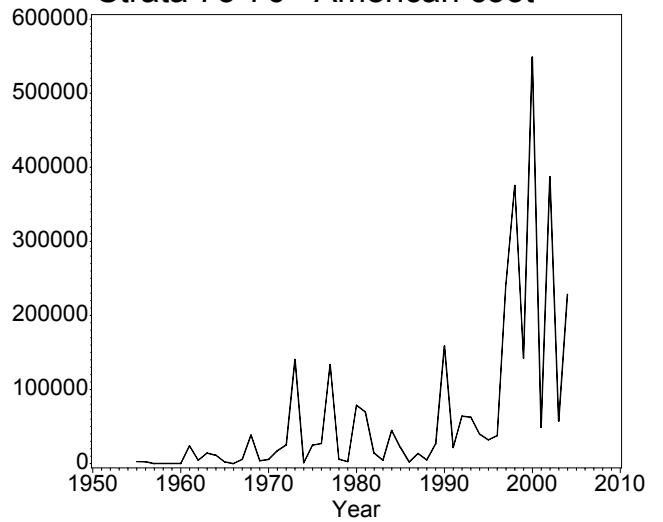
Strata 75-76 Ruddy Duck



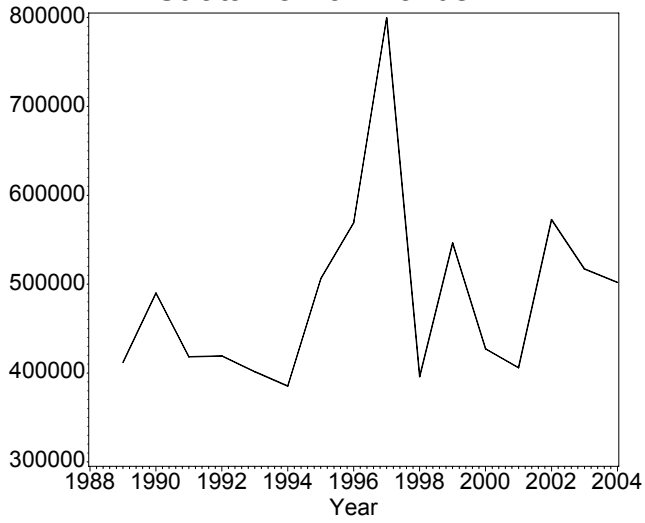
Strata 75-76 Canada Goose



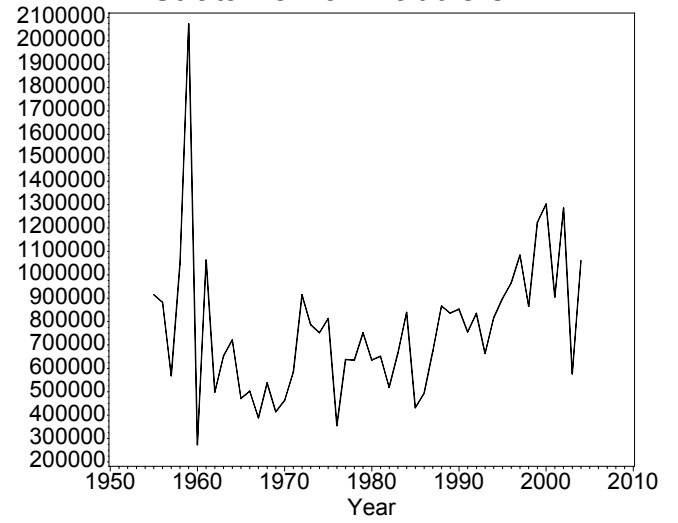
Strata 75-76 American coot



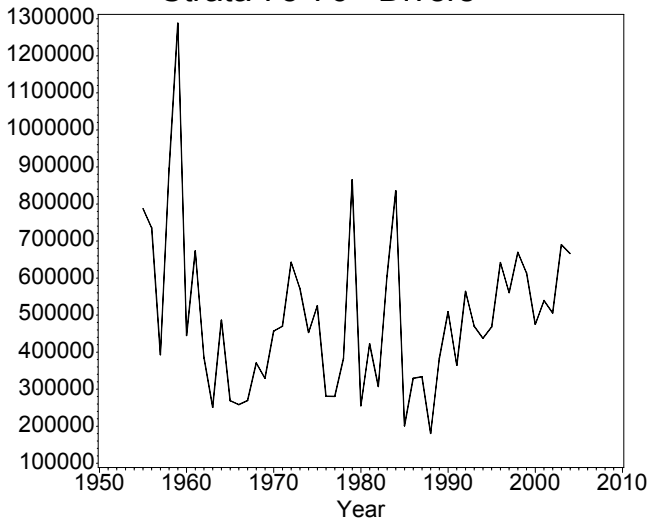
Strata 75-76 Ponds



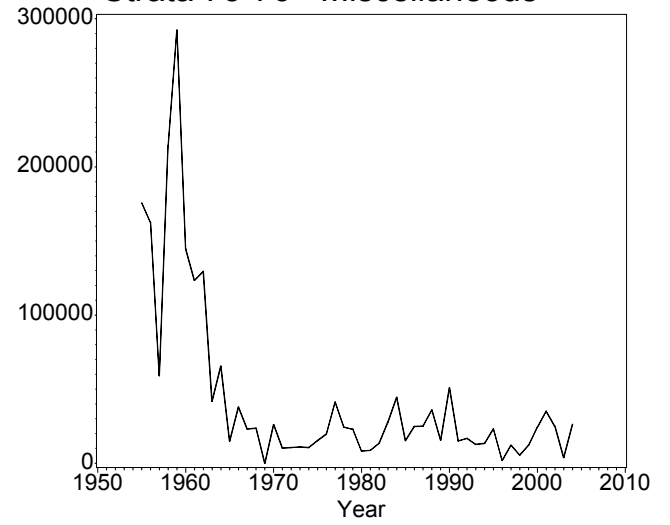
Strata 75-76 Dabblers



Strata 75-76 Divers



Strata 75-76 Miscellaneous



Strata 75-76 Total Ducks

