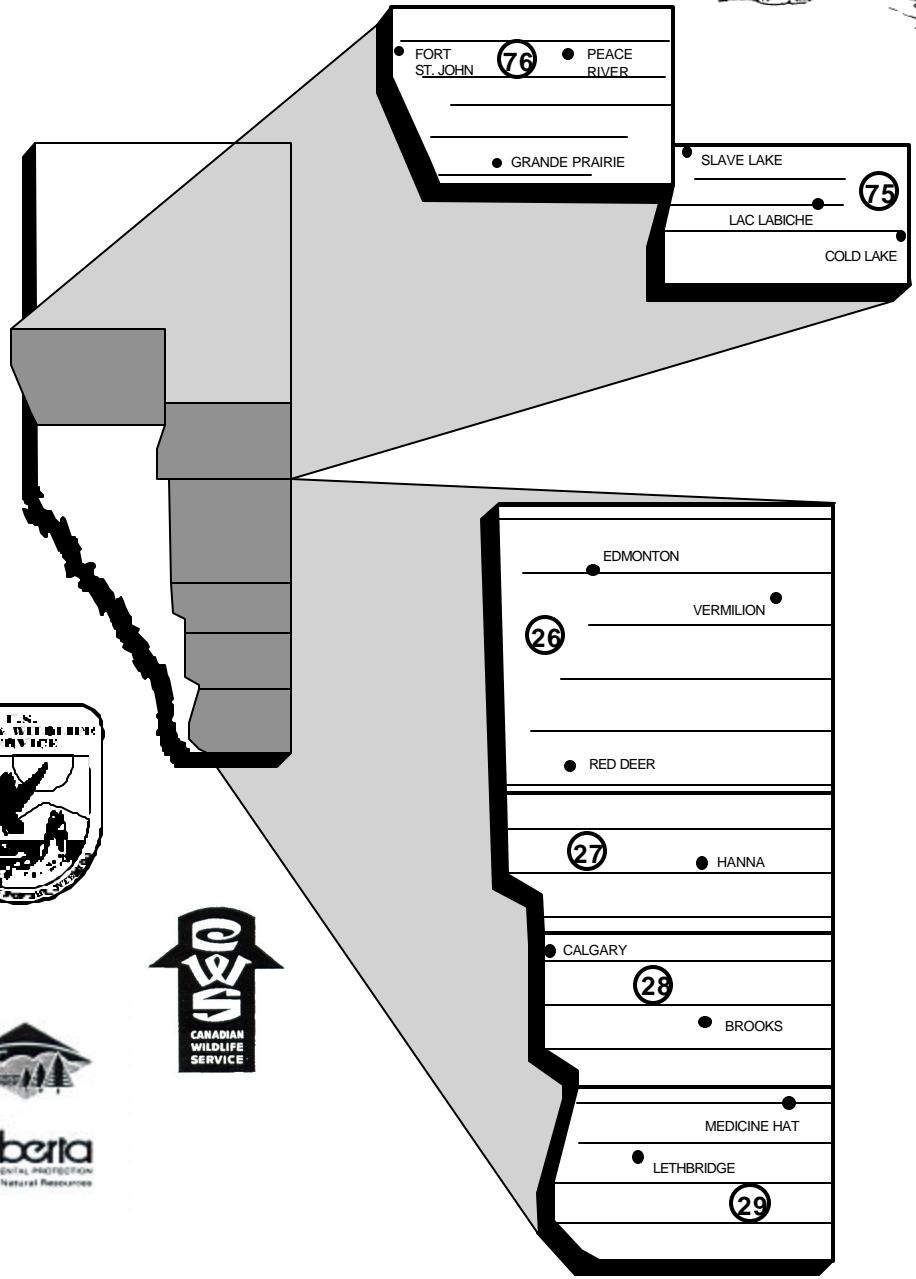
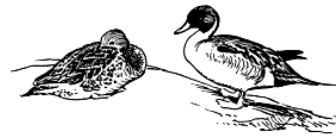


WATERFOWL BREEDING POPULATION SURVEY

SOUTHERN AND CENTRAL ALBERTA

MAY 2001



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

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

DATES May 3-22, 2001

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 2001 breeding population estimate for strata 26-29 (Southern Alberta) is 2,531,100 total ducks (Table 1), a decrease of -27.50% from 2000, a decrease of -26.1% from the recent ten-year mean (1991-2000) and a decrease of -43.5% from the long-term mean (1955-2000). In Southern Alberta, total dabbling ducks (Table 1) decreased -26.4% from 2000, -23.2% from the 1991-

2000 ten-year mean and remained -44.4% below the 1955-2000 long-term mean. Mallards (Table 1) decreased -10.7% from 2000, Blue-winged Teal decreased -36.4% from 2000 and Pintails decreased -65% from 2000. Total diving ducks (Table 1) decreased -33.2% from 2000, decreased -37.4% from the 1991-2000 ten-year mean and decreased -38.8% from the 1955-2000 long-term mean. Total pond counts (Table 2) decreased -23% in Southern Alberta from last year, -40.3% from the ten-year and -42.2% from the long term means.

The 2001 breeding population estimate for strata 75-76 (Central Alberta) is 1,479,400 total ducks (Table 4). In Central Alberta, total ducks (Table 4) decreased -17.9% from last year and increased +1.7% from the long-term (12 year) mean. Total dabbling ducks decreased -30.5% from last year and decreased -2.1% from the 12-year mean. Mallards decreased -2.6% from 2000, and increased +20% from the 12-year mean. Blue-winged Teal decreased -69.2% from last year and decreased -46.1% from the 12-year mean. Pintails decreased -45.2% from 2000 and decreased -70.4% from the 12-year mean. Total diving ducks increased +13.5% from last year and increased +5.1% from the 12-year mean. Total ponds (Table 5) in Stratum 75 and 76 decreased -5% from last year and decreased -15.6% from the 12-year mean.

The fall, winter and spring in Southern and Central Alberta saw below normal precipitation in the majority of the province. Winter temperatures were normal to slightly above normal for all areas. The mountain snow pack was 35-50% of normal in Southern and Central Alberta. By June 1, a much below normal spring runoff in the prairies was complete and most of the snowpack had been depleted. As of May 1, 22% of the agriculture land in Alberta was in the very low spring soil moisture category and 68% of the land was in the low category. Precipitation in May was generally below-average in most areas of the province. Current predictions from Environment Canada are for below-normal precipitation for the June to August period in southern Alberta.

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 four 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, and 75. This was the 14th year of flying aerial waterfowl surveys for the aerial crew. An experienced aerial observer, CWS Biologist Dave Duncan was the aerial observer for strata 76. 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. Most deciduous tree species were leafed out and the season timing appeared normal in southern areas. The survey was initiated on May 3 for Southern Alberta and completed on May 15. The Central Alberta survey commenced on May 14 and concluded on May 22. A total of 65 flight hours was required to complete the survey. Aerial Canvasback telemetry was conducted in conjunction with the waterfowl survey when logistics allowed. Data was forwarded to USGS, Dixon, CA.

WEATHER AND HABITAT CONDITIONS

Environment Canada, Climate Research Branch reports average to slightly above average temperatures for the November 2000 to April 2001 period. Spring in Southern and Central Alberta saw below normal precipitation in all areas. Temperatures were average and precipitation in May was generally below-average in most areas of the province.

The Milk River country along the Montana border was in poor condition. Most of the Prairie Grassland portions of strata 27, 28 and 29 were in fair to poor condition. Dug out levels (some of the only remaining water) were in the dry, to 1/4 full level in the southern portions of the Prairie grasslands

The Aspen Parklands of Stratum 26 were mostly in fair condition with areas of good condition in a 20 mile radius around Edmonton and Red Deer. Dugout levels were in the 1/2 full level.

The Ag Forest Transition and Parklands of stratum 75 and 76 were generally in poor condition. The more permanent type wetlands available in these areas were in poor condition compared to 1999, but in slightly better condition than 2000. Scars from the 1998 fires are still visible (250,000+ hectares of tundra and forest burned in the Slave Lake and Swan Hills portions of Stratum 75) plus new fires in this area were adding to the destruction of the parklands.

BREEDING POPULATION INDICES

When comparing birds to the current ten-year mean (1991-2000), it is important to remember the 1980's were characterized by decreasing waterfowl populations and habitat conditions. 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 2001 breeding population estimate for strata 26-29 (Southern Alberta) is 2,531,100 total ducks (Table 1), a decrease of -27.50% from 2000, a decrease of -26.1% from the recent ten-year mean (1991-2000) and a decrease of -43.5% from the long-term mean (1955-2000). In Southern Alberta, total dabbling ducks (Table 1) decreased -26.4% from 2000, -23.2% from the 1991-2000 ten-year mean and remained -44.4% below the 1955-2000 long-term mean. Mallards (Table 1) decreased -10.7% from 2000, decreased -11.2% from the 10-year mean and decreased -35% from the long term means. Blue-winged Teal decreased -36.4% from 2000, decreased -27.5% from the 10-year mean, and decreased -41.8% from the long-term means. Pintails decreased -65% from 2000, decreased -73% from the 10-year mean and decreased -91% from the long-term mean. Total diving ducks (Table 1) decreased -33.2 % from 2000, decreased -37.4% from the 1991-2000 ten-year mean and decreased -38.8% from the 1955-2000 long-term mean. Total pond counts (Table 2) decreased -23% in Southern Alberta from last year, -40.3% from the ten- year and -42.2% from the long term means. Canada geese numbers changed -20.8%, +50.1% and +251.6%, and Coots changed -50.5%, -30.2 and -9.3% from the above respective means.

Overall mallard breeding population estimates for(Prairie Canada and north central U.S.) regions in the traditional survey areas decreased -17% from last year and were up +5% from the long-term averages.. Survey timing appeared good for Blue-winged Teal this year. Overall Blue-winged teal breeding population estimates for(Prairie Canada and north central U.S.) regions in the traditional survey areas declined -23% from last year and were up +29% from the long-term averages. Overall Pintail breeding population estimates for(Prairie Canada and north central U.S.) regions in the traditional survey areas increased +13% from last year and were down -23% from the long-term averages. Total duck breeding population estimates for regions in the traditional survey areas decreased -14% from last year and were up +9 from the long -term averages.

CENTRAL ALBERTA

The 2001 breeding population estimate for strata 75-76 (Central Alberta) is 1,479,400 total ducks (Table 4). In Central Alberta, total ducks(Table 4) decreased -17.9% from last year and increased +1.7% from the long-term(12 year) mean. Total dabbling ducks decreased -30.5% from last year and decreased -2.1% from the 12-year mean. Mallards decreased -2.6% from 2000, and increased +20% from the 12-year mean. Blue-winged Teal decreased -69.2% from last year and decreased -46.1% from the 12-year mean. Pintails decreased -45.2% from 2000 and decreased -70.4% from the 12-year mean. Total diving ducks increased +13.5% from last

year and increased +5.1% from the 12-year mean. Total ponds (Table 5) in Stratum 75 and 76 decreased -5% from last year and decreased -15.6% from the 12-year mean.

CONCLUSIONS

1) Poor habitat conditions and drought seem to be the continued trend again in Alberta this year. Ducks appeared crowded in the few remaining wetlands. This intense competition for nesting territories will likely have a negative effect on nesting success.

2) In 84 years of record, 2001 has been estimated at the 6th driest on record. Long term average pond counts were down -42% in Southern and -16% in Central Alberta. Soil moisture conditions were very low through out the province.

3) Waterfowl numbers declined in the Aspen Parklands of Stratum 26, which is normally the bright spot for waterfowl numbers and abundance of wetlands and nesting habitat.

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-Flyway Biologist

Date: June 27, 2001

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				2001 Total	2000 Total	10-Year Mean	Long-Term Mean	% Change From		
	26	27	28	29					2000	10-Year Mean	Long-Term Mean
Ducks											
Dabblers											
Mallard	461.1	100.0	111.1	71.6	743.8	833.2	837.6	1143.4	-10.7%	-11.2%	-35.0%
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	-100.0%
Gadwall	199.4	23.1	25.2	9.0	256.8	310.9	370.3	310.5	-17.4%	-30.7%	-17.3%
Am. wigeon	72.9	28.3	47.6	38.0	186.8	225.2	179.6	314.8	-17.0%	4.0%	-40.7%
Am. green-winged teal	117.3	30.9	38.6	3.7	190.5	308.1	210.9	199.1	-38.2%	-9.7%	-4.3%
Blue-winged teal	290.2	40.1	23.9	13.6	367.8	577.8	507.6	632.4	-36.4%	-27.5%	-41.8%
N. shoveler	179.3	27.3	25.0	36.2	267.8	380.4	358.1	357.4	-29.6%	-25.2%	-25.1%
N. pintail	32.0	12.3	10.2	11.6	66.1	188.8	245.1	781.6	-65.0%	-73.0%	-91.5%
Subtotal	1352.2	262.0	281.6	183.6	2079.5	2824.4	2709.3	3739.2	-26.4%	-23.2%	-44.4%
Divers											
Redhead	31.3	2.3	7.0	13.4	54.0	106.8	118.5	119.6	-49.5%	-54.5%	-54.9%
Canvasback	24.5	1.8	3.5	2.1	31.9	73.2	59.5	66.0	-56.4%	-46.4%	-51.7%
Scaups	148.3	29.7	18.2	5.8	201.9	292.3	297.5	374.9	-30.9%	-32.1%	-46.1%
Ring-necked duck	12.2	3.3	3.6	1.1	20.2	16.2	18.9	17.2	24.3%	6.6%	17.4%
Goldeneyes	21.3	0.0	0.7	0.6	22.6	26.5	16.7	14.1	-14.9%	35.5%	60.1%
Bufflehead	55.5	1.6	1.2	0.9	59.2	70.9	74.8	47.3	-16.6%	-20.9%	25.2%
Ruddy Duck	31.0	3.3	5.3	12.0	51.6	74.3	119.1	82.2	-30.5%	-56.7%	-37.2%
Subtotal	324.1	41.9	39.5	35.9	441.3	660.3	705.0	721.2	-33.2%	-37.4%	-38.8%
Miscellaneous											
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	-100.0%	-100.0%
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	--
Scoters	1.8	0.0	0.0	0.0	1.8	0.0	3.9	13.9	--	-52.5%	-86.9%
Mergansers	7.8	0.0	0.6	0.0	8.5	5.1	8.2	6.7	67.4%	3.3%	25.9%
Subtotal	9.7	0.0	0.6	0.0	10.3	5.1	12.1	20.7	103.6%	-14.8%	-50.2%
Total Ducks	1685.9	303.9	321.8	219.5	2531.1	3489.7	3426.4	4481.1	-27.5%	-26.1%	-43.5%
Canada Goose	122.8	27.8	32.4	30.4	213.5	269.5	142.2	60.7	-20.8%	50.1%	251.6%
Am. coot	97.2	37.4	30.4	42.3	207.4	418.8	297.0	228.8	-50.5%	-30.2%	-9.3%
Ponds	226.4	67.6	56.6	75.1	425.7	553.1	713.1	736.0	-23.0%	-40.3%	-42.2%

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
10-year Mean	429.1	112.6	81.1	90.2	713.1
Long-term Mean	442.6	119.8	84.6	89.1	736.0
Percent Change:					
From 2000	-34.5%	-24.4%	-10.3%	37.0%	-23.0%
From 10-year Mean	-47.2%	-40.0%	-30.2%	-16.7%	-40.3%
From Long-term Mean	-48.8%	-43.6%	-33.1%	-15.7%	-42.2%

Table 3. Survey design for Southern Alberta, May 2001.

	STRATUM				Total
	26	27	28	29	
<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	—

Table 6. Survey design for Central Alberta, May 2001

	STRATUM		Total
	75	76	
<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	

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										
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	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										
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	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										
Oldsquaw	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
Species/Ponds	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
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										
Oldsquaw	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
Ducks							
Dabblers							
Mallard	778.5	793.8	883.6	950.1	1031.8	833.2	743.8
Am. black duck	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
Am. wigeon	179.8	191.1	190.5	150.3	179.6	225.2	186.8
Am. green-winged teal	245.3	314.5	324.4	92.2	190.5	308.1	190.5
Blue-winged teal	430.8	505.9	358.5	521.9	391.5	577.8	367.8
N. shoveler	267.6	373.8	443.2	329.4	408.2	380.4	267.8
N. pintail	198.2	333.5	472.8	166.3	115.0	188.8	66.1
Subtotal	2510.7	2916.8	2981.3	2570.5	2649.2	2824.4	2079.5
Divers							
Redhead	95.2	102.7	188.9	67.6	180.7	106.8	54.0
Canvasback	60.5	67.0	68.5	68.6	56.1	73.2	31.9
Scaups	366.5	376.4	347.7	243.1	228.2	292.3	201.9
Ring-necked duck	9.0	10.1	37.4	11.9	52.0	16.2	20.2
Goldeneyes	31.4	6.1	6.9	44.7	5.8	26.5	22.6
Bufflehead	68.3	103.5	91.3	73.9	69.5	70.9	59.2
Ruddy Duck	128.5	302.2	87.1	123.6	73.4	74.3	51.6
Subtotal	759.4	967.8	827.9	633.3	665.8	660.3	441.3
Miscellaneous							
Oldsquaw	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
Scoters	10.9	0.3	1.3	0.0	0.3	0.0	1.8
Mergansers	10.4	5.9	9.8	5.4	8.1	5.1	8.5
Subtotal	21.3	6.2	11.1	5.4	8.4	5.1	10.3
Total Ducks	3291.4	3890.9	3820.2	3209.2	3323.4	3489.7	2531.1
Canada Goose	158.0	160.2	109.8	191.6	151.8	269.5	213.5
Am. coot	232.9	234.4	377.5	260.0	342.3	418.8	207.4
Ponds	688.7	903.9	1100.4	559.3	716.0	553.1	425.7

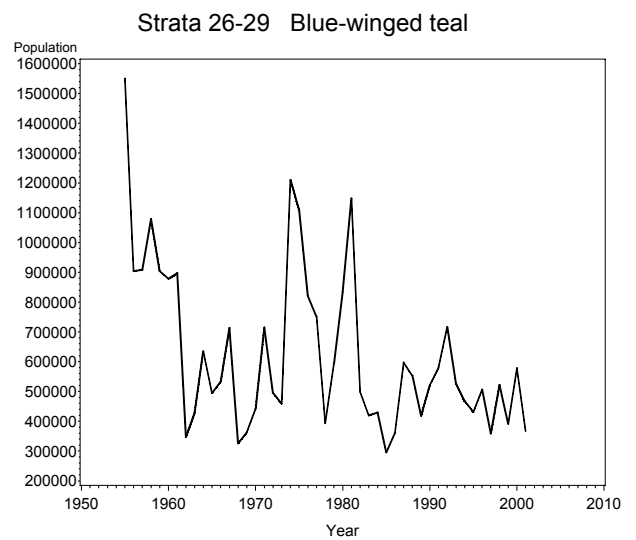
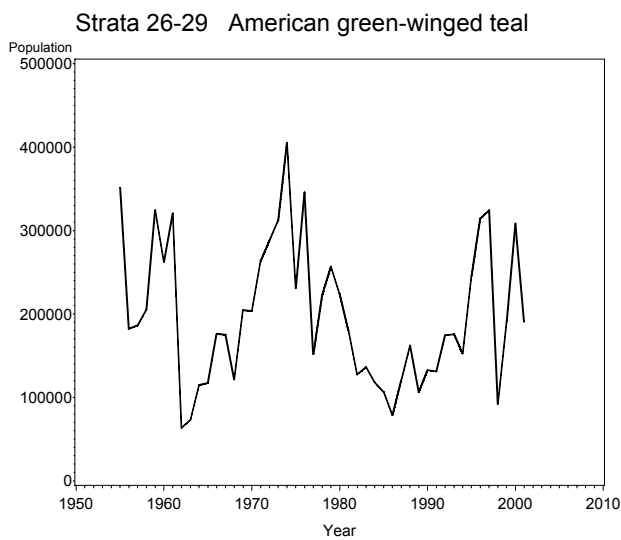
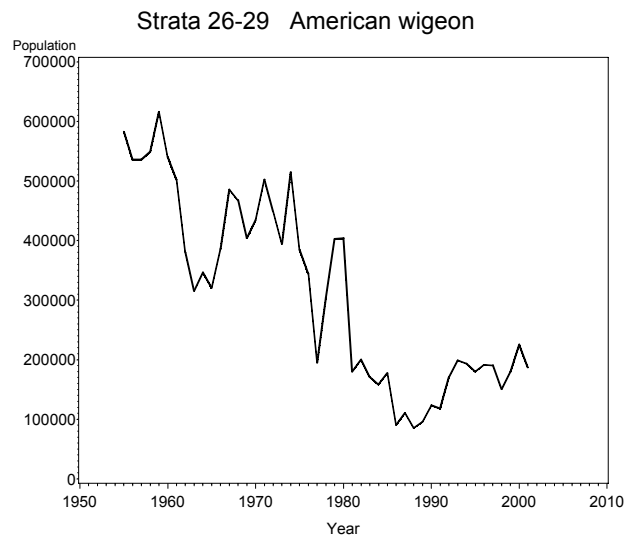
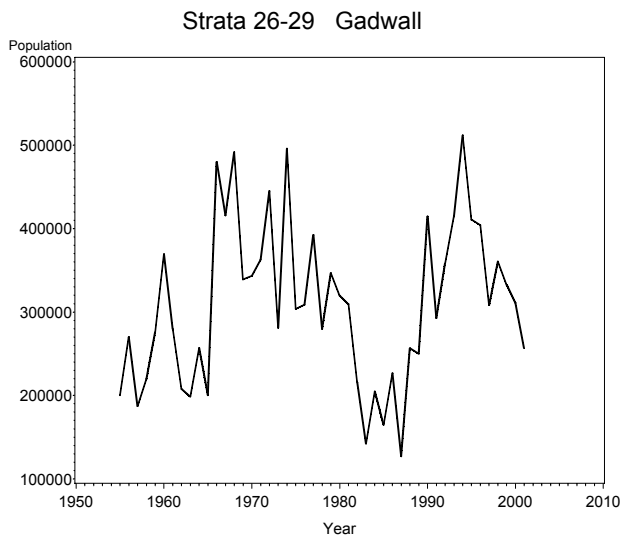
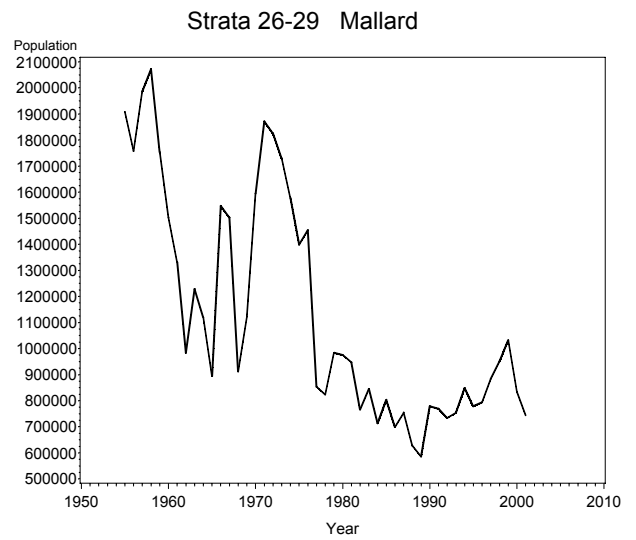
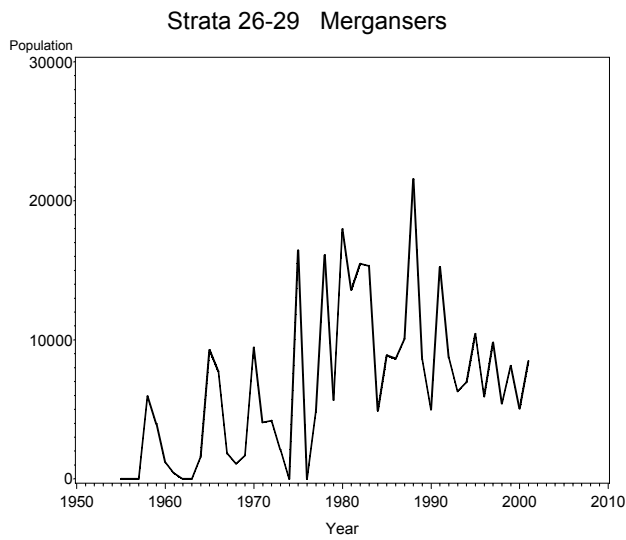


Figure 1. Population indices for the individual waterfowl species and ponds on an annual basis.

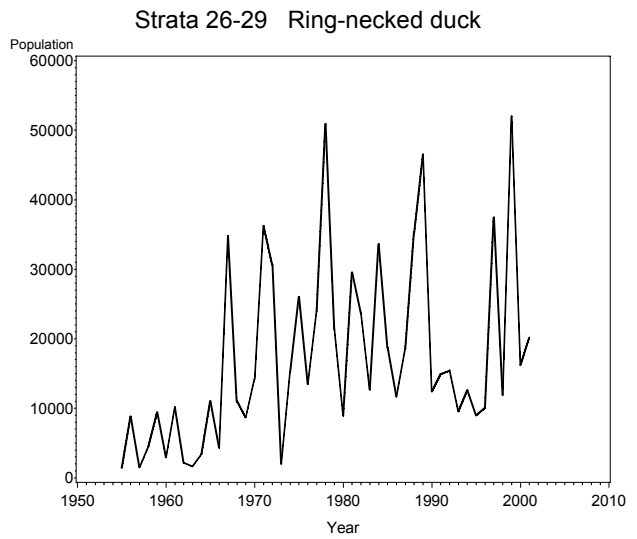
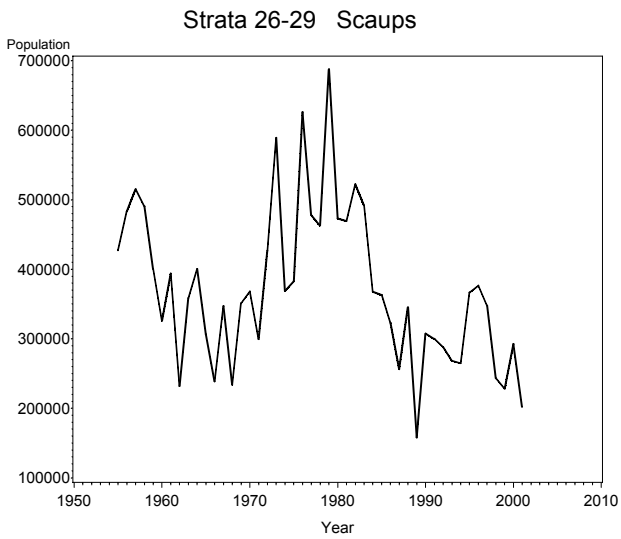
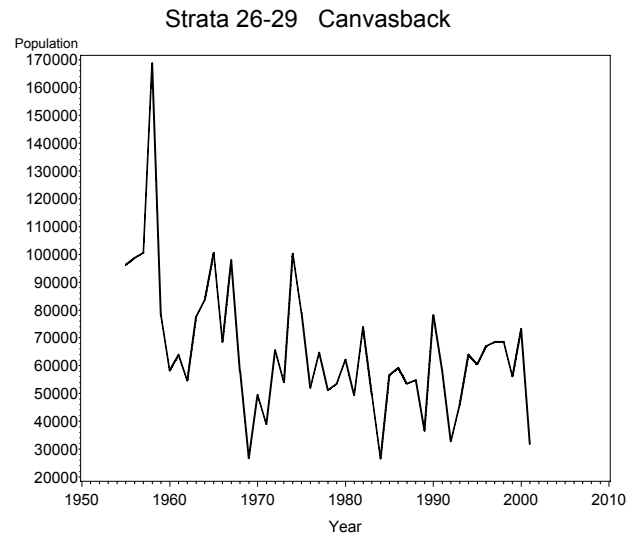
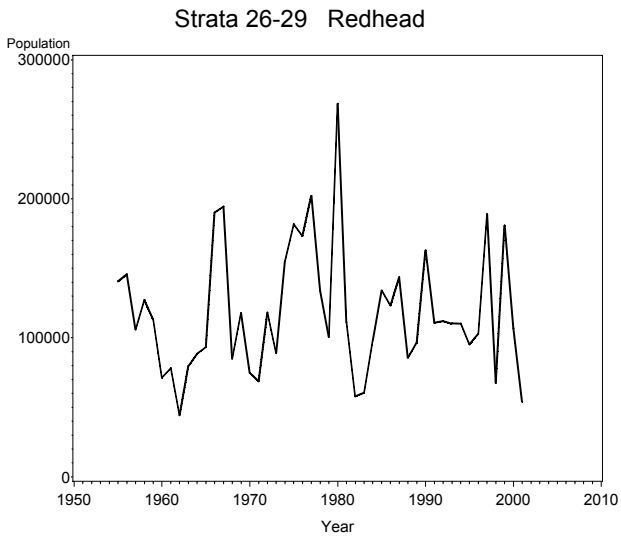
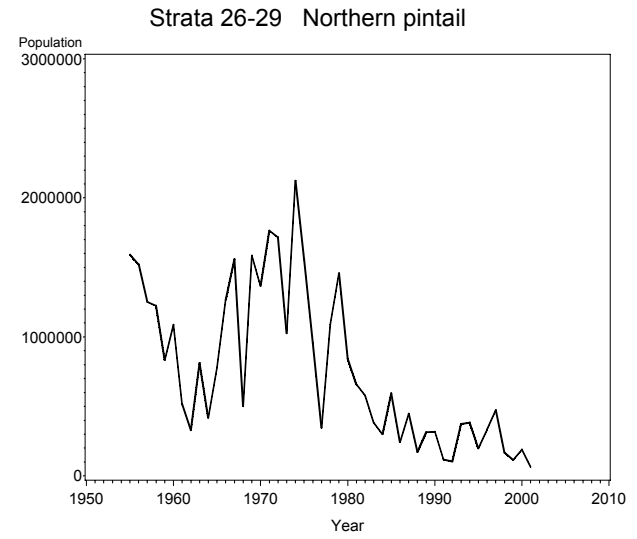
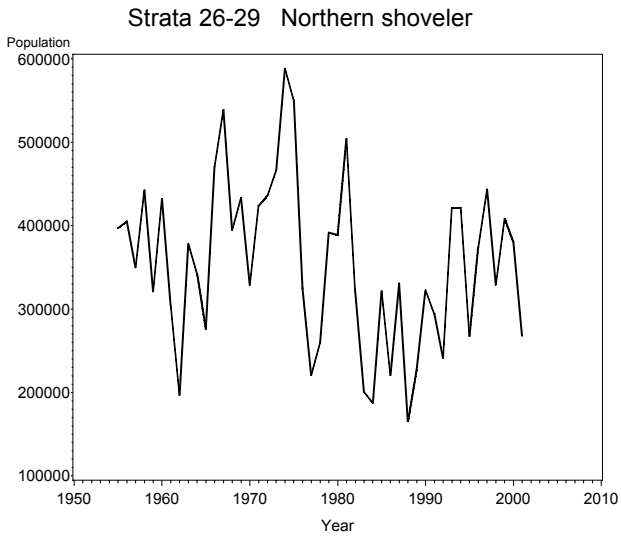


Figure 1 continued.

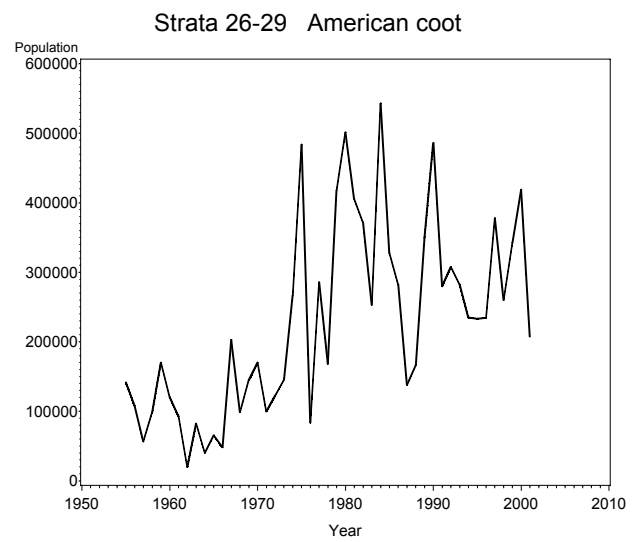
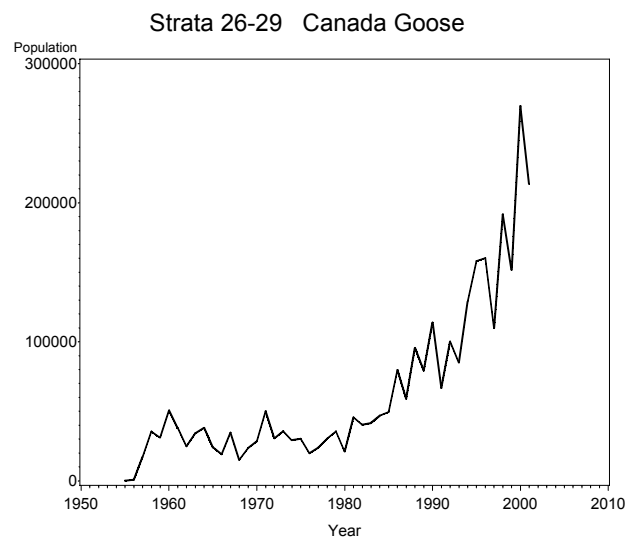
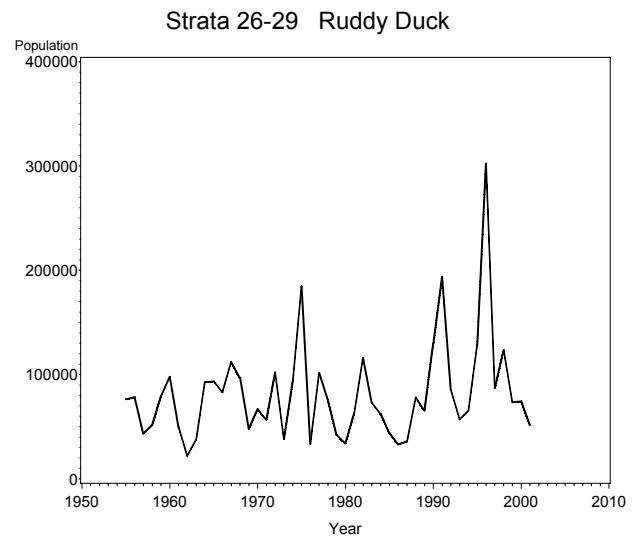
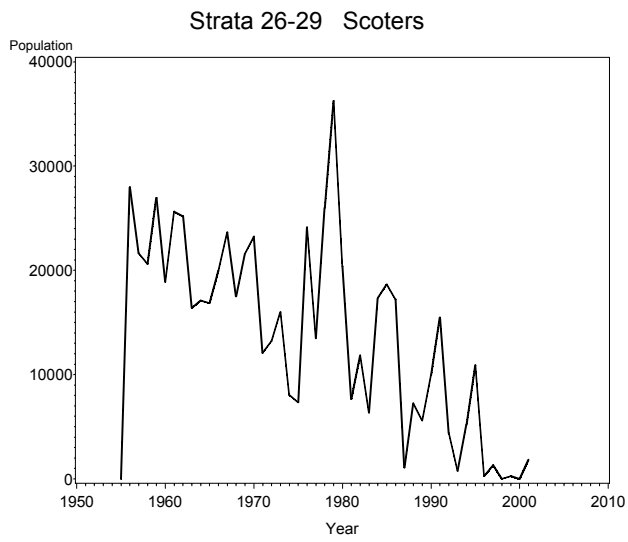
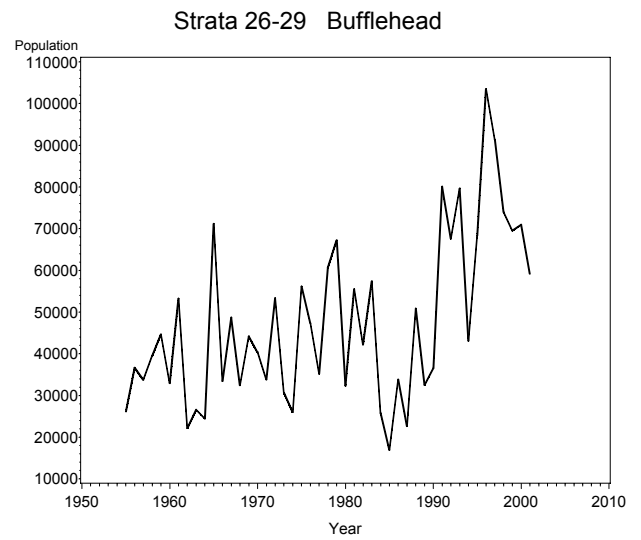
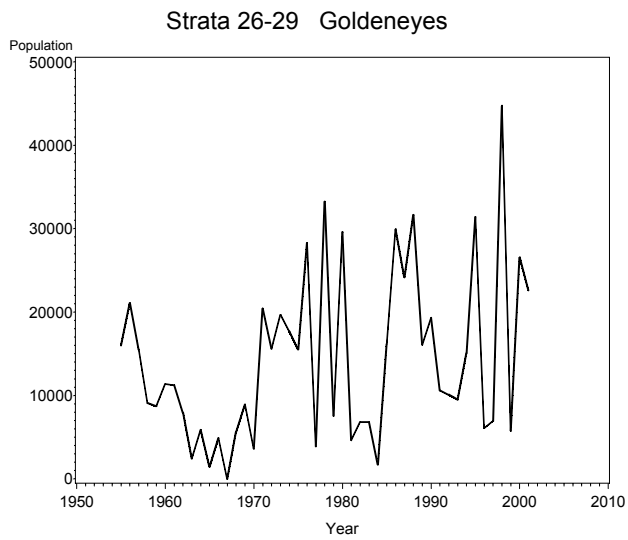


Figure 1 continued.

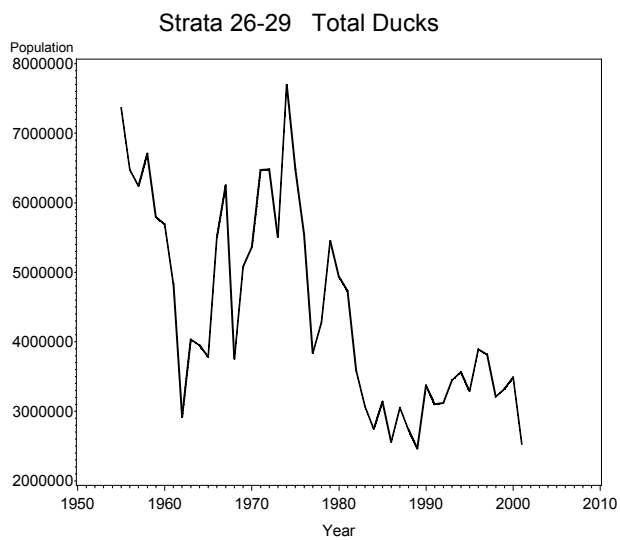
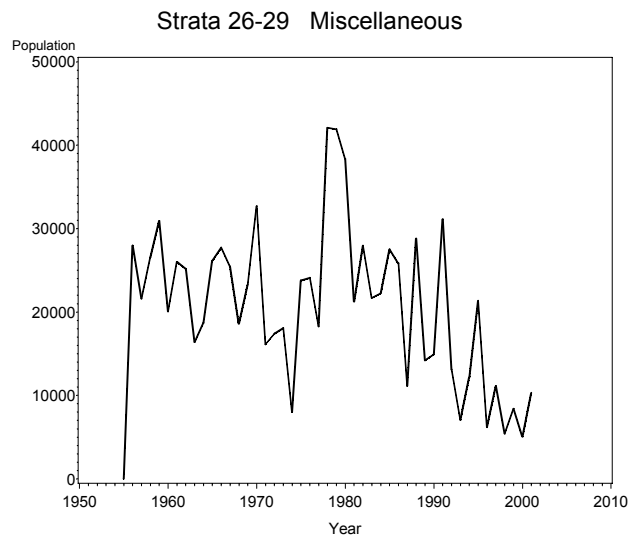
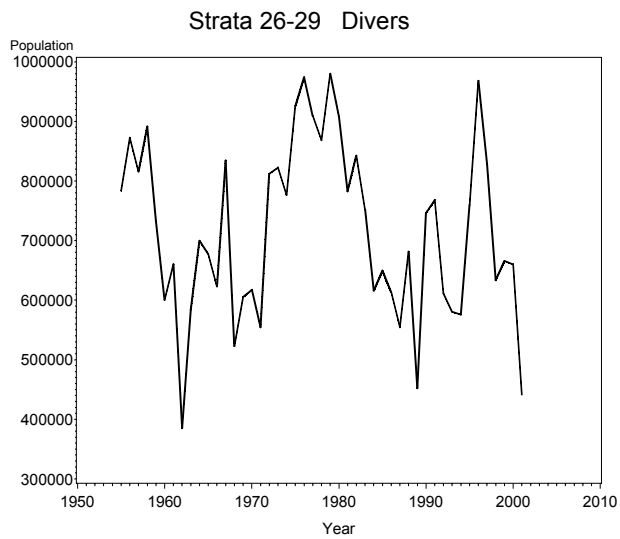
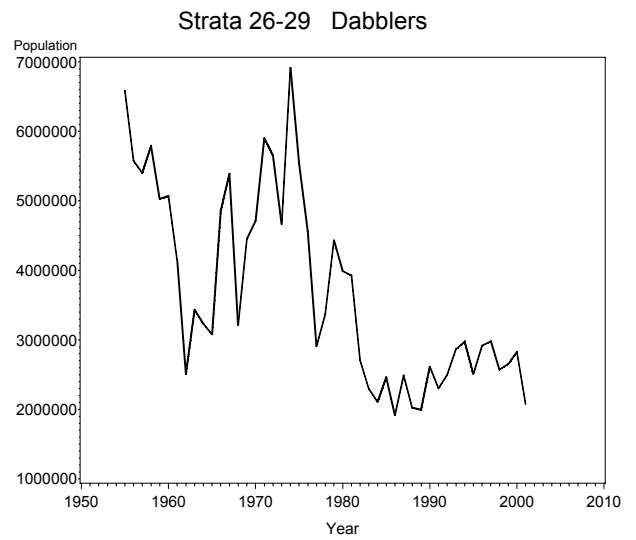
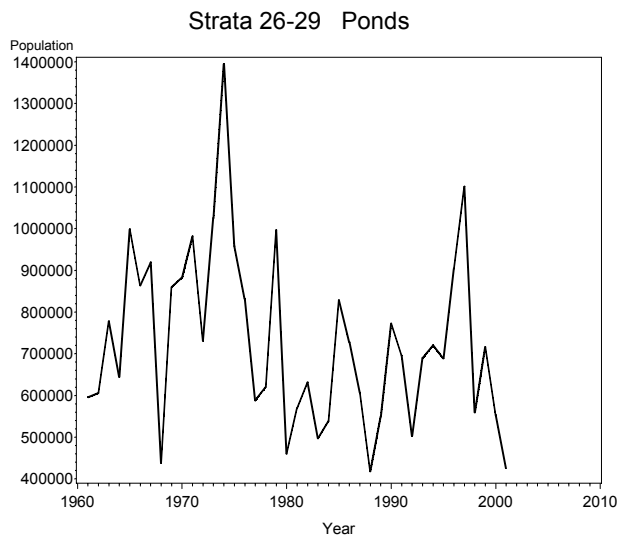


Figure 1 continued.

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		2001 Total	2000 Total	Long-Term Mean	% Change From	
	75	76				2000	Long-Term Mean
Ducks							
Dabblers							
Mallard	224.6	278.8	503.3	516.8	419.1	-2.6%	20.1%
Am. black duck	0.0	0.0	0.0	0.0	0.0	--	--
Gadwall	55.2	31.4	86.6	56.9	54.6	52.3%	58.6%
Am. wigeon	39.7	21.8	61.5	44.3	90.4	39.0%	-32.0%
Am. green-winged teal	36.6	34.0	70.7	327.3	118.1	-78.4%	-40.2%
Blue-winged teal	55.5	20.6	76.1	246.8	141.2	-69.2%	-46.1%
N. shoveler	23.6	77.4	101.0	99.1	81.6	2.0%	23.8%
N. pintail	3.3	2.6	5.9	10.8	20.0	-45.2%	-70.4%
Subtotal	438.5	466.7	905.1	1301.9	925.0	-30.5%	-2.1%
Divers							
Redhead	5.6	14.5	20.1	18.0	33.8	11.6%	-40.6%
Canvasback	21.7	3.2	24.9	10.6	35.1	135.1%	-29.3%
Scaups	147.0	61.7	208.7	181.0	150.6	15.3%	38.6%
Ring-necked duck	23.8	8.1	32.0	28.5	39.2	12.1%	-18.6%
Goldeneyes	43.9	14.7	58.7	35.1	41.0	67.0%	43.2%
Bufflehead	92.3	71.6	163.9	133.9	161.1	22.4%	1.7%
Ruddy Duck	18.4	12.6	31.0	67.8	52.1	-54.2%	-40.5%
Subtotal	352.7	186.5	539.2	474.9	513.0	13.5%	5.1%
Miscellaneous							
Oldsquaw	0.0	0.0	0.0	0.0	0.0	--	--
Eiders	0.0	0.0	0.0	0.0	0.0	--	--
Scoters	14.5	1.7	16.2	8.8	8.1	84.4%	100.4%
Mergansers	18.2	0.7	18.9	15.5	8.9	21.7%	112.8%
Subtotal	32.7	2.4	35.1	24.3	16.9	44.3%	106.9%
Total Ducks	823.9	655.6	1479.4	1801.1	1454.9	-17.9%	1.7%
Canada Goose	43.8	32.9	76.7	114.5	42.2	-33.0%	81.9%
Am. coot	27.9	21.0	48.9	548.6	146.0	-91.1%	-66.5%
Ponds	139.6	266.4	406.0	427.2	480.8	-5.0%	-15.6%

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 (2001)		
	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
1989-2000 Mean	188.2	292.6	480.8
Percent Change:			
From 2000	8.2%	-10.6%	-5.0%
From 1989-2000 Mean	-25.8%	-8.9%	-15.6%

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										
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	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
Ducks			
Dabblers			
Mallard	640.5	516.8	503.3
Am. black duck	0.0	0.0	0.0
Gadwall	68.6	56.9	86.6
Am. wigeon	93.0	44.3	61.5
Am. green-winged teal	174.0	327.3	70.7
Blue-winged teal	150.1	246.8	76.1
N. shoveler	78.4	99.1	101.0
N. pintail	19.8	10.8	5.9
Subtotal	1224.5	1301.9	905.1
Divers			
Redhead	82.9	18.0	20.1
Canvasback	34.5	10.6	24.9
Scaups	207.0	181.0	208.7
Ring-necked duck	61.8	28.5	32.0
Goldeneyes	9.9	35.1	58.7
Bufflehead	190.3	133.9	163.9
Ruddy Duck	27.3	67.8	31.0
Subtotal	613.7	474.9	539.2
Miscellaneous			
Oldsquaw	0.0	0.0	0.0
Eiders	0.0	0.0	0.0
Scoters	2.9	8.8	16.2
Mergansers	9.3	15.5	18.9
Subtotal	12.2	24.3	35.1
Total Ducks	1850.4	1801.1	1479.4
Canada Goose	93.8	114.5	76.7
Am. coot	142.4	548.6	48.9
Ponds	546.2	427.2	406.0

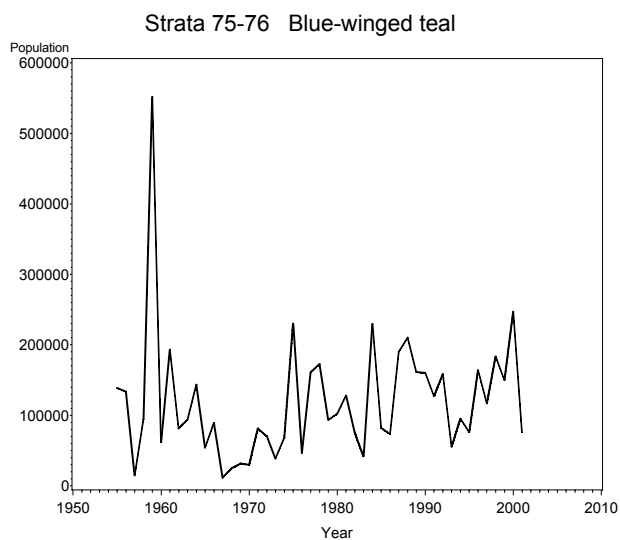
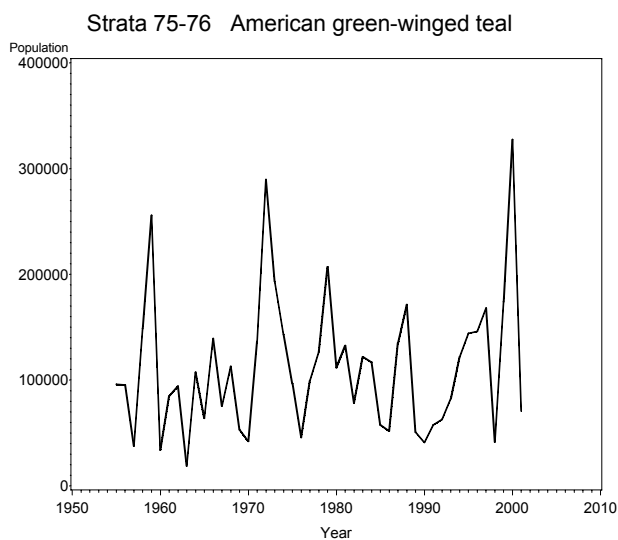
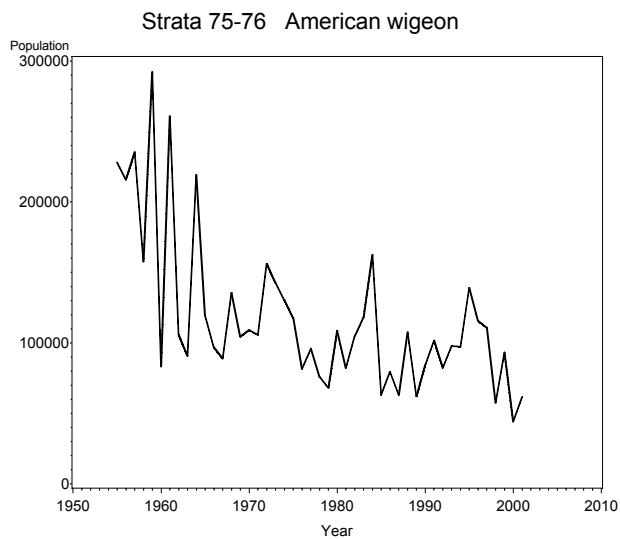
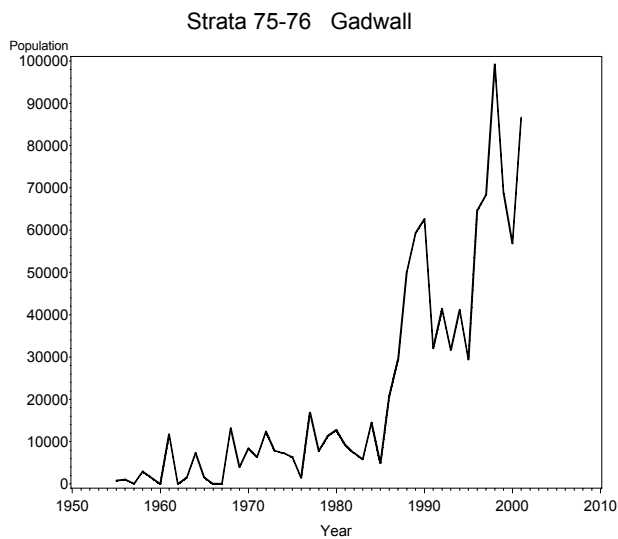
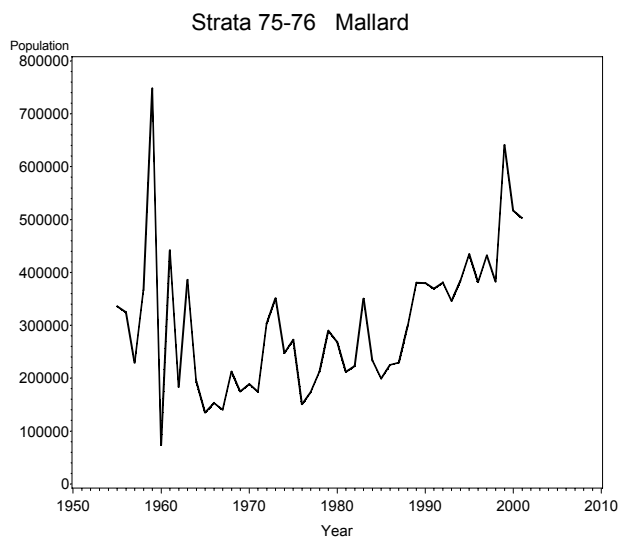
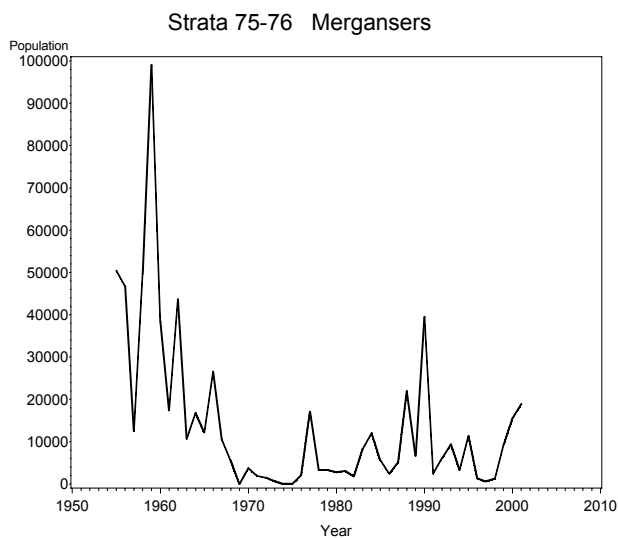


Figure 2. Population indices for the individual waterfowl species and ponds on an annual basis.

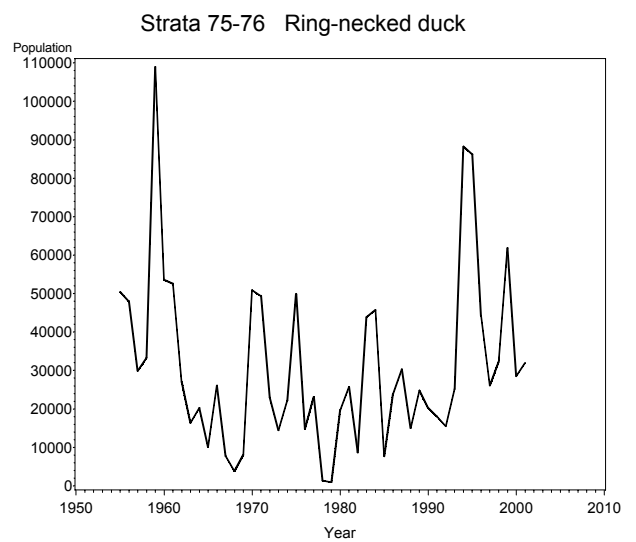
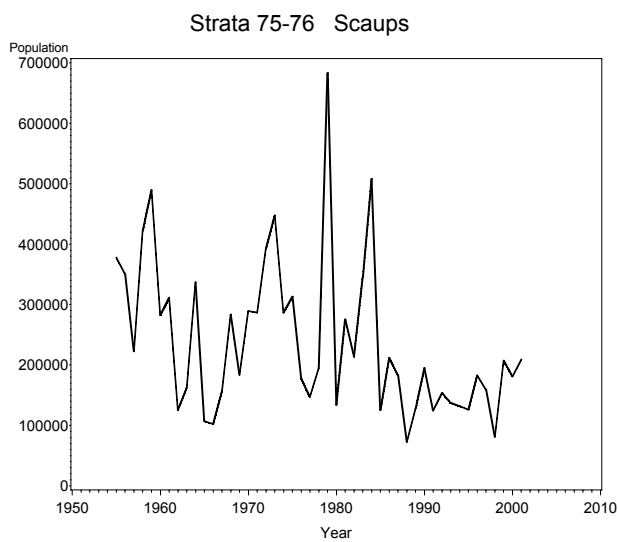
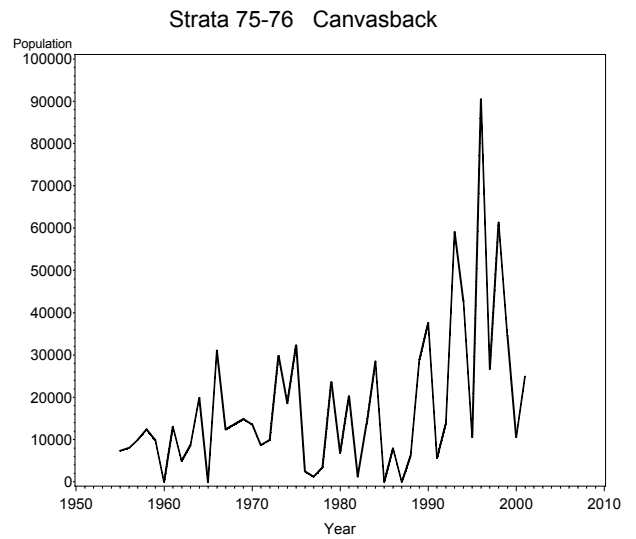
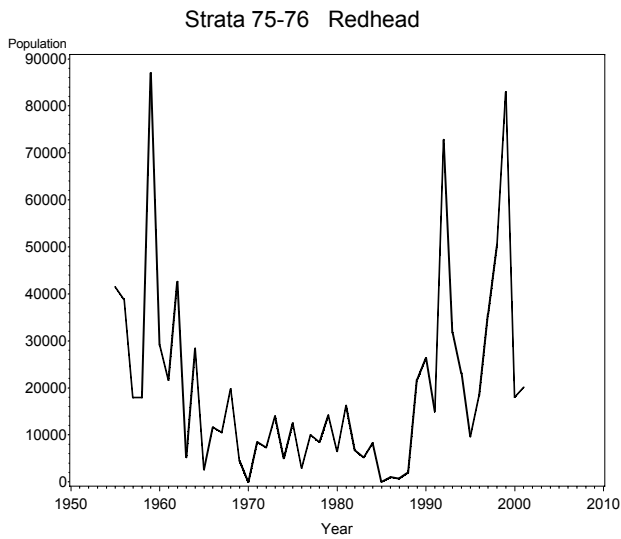
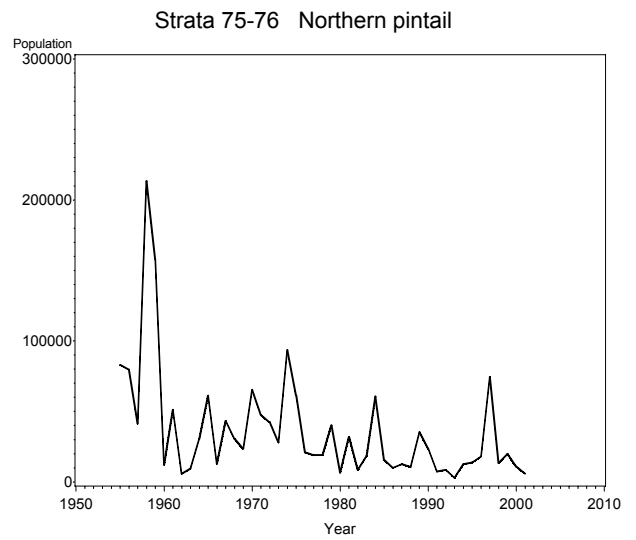
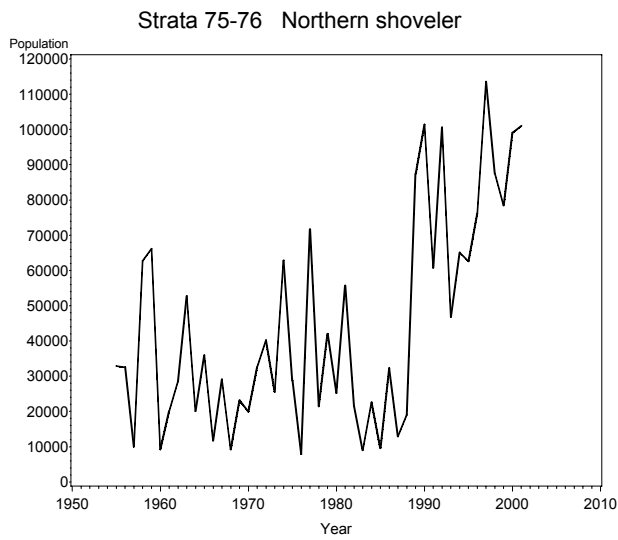


Figure 2 continued.

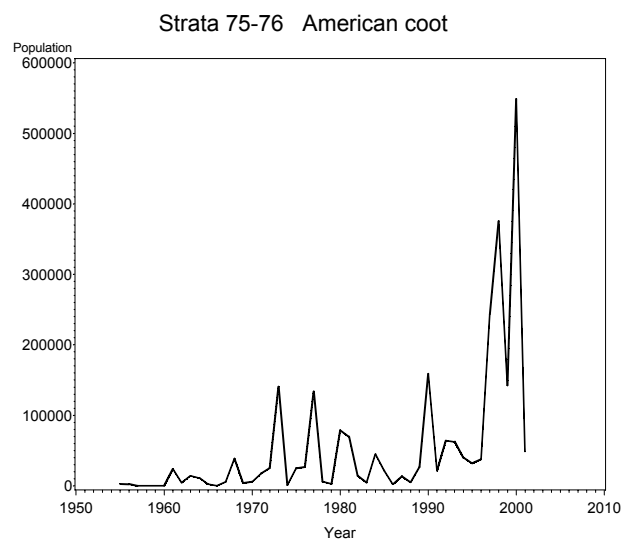
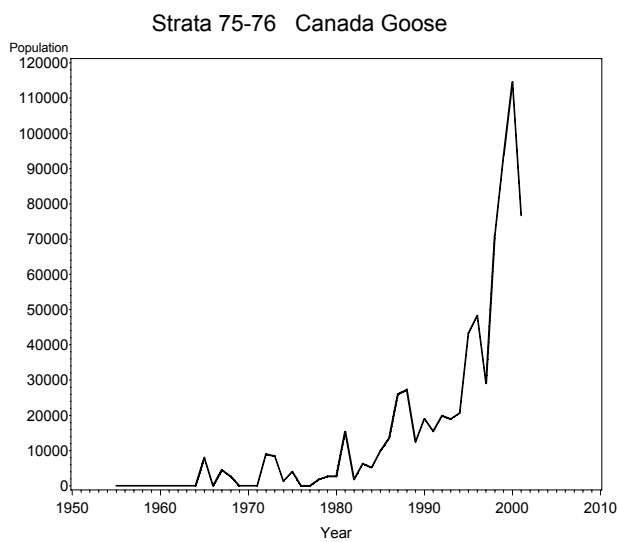
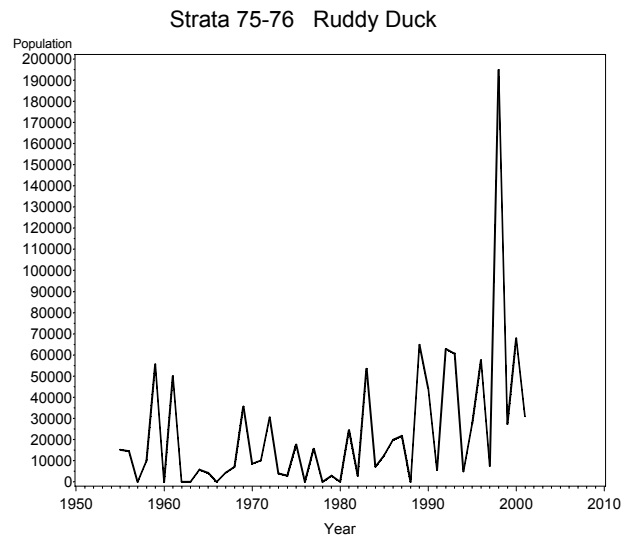
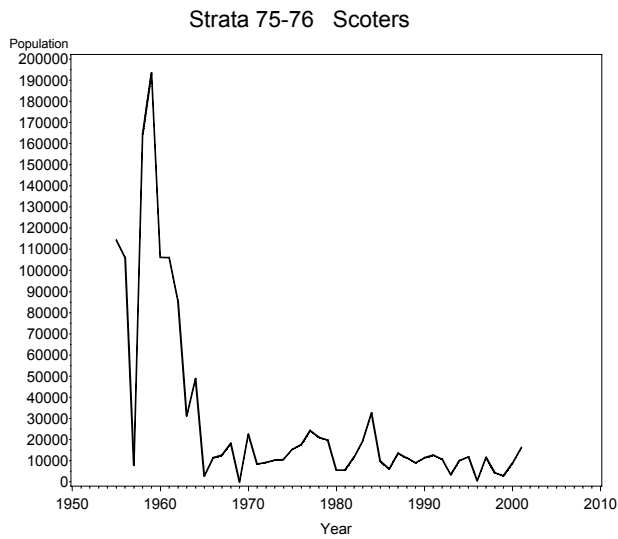
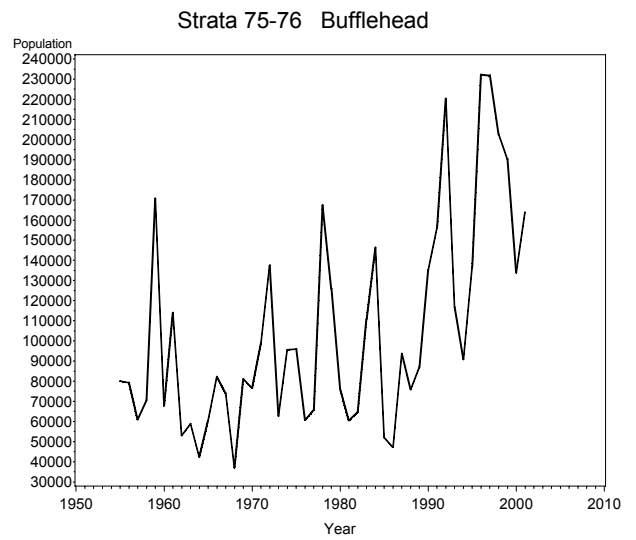
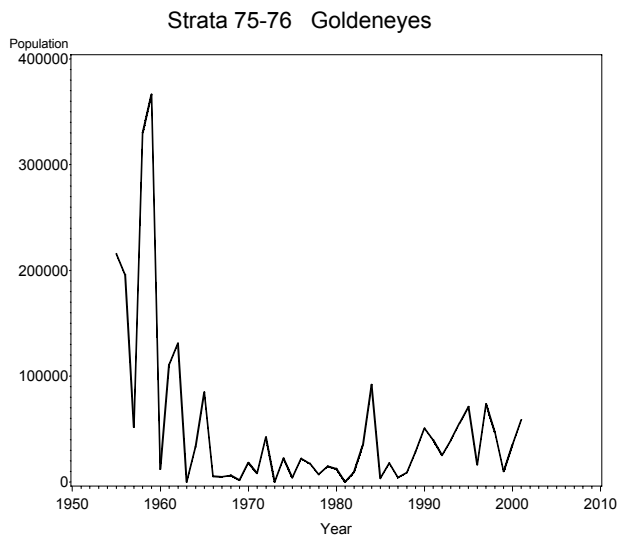


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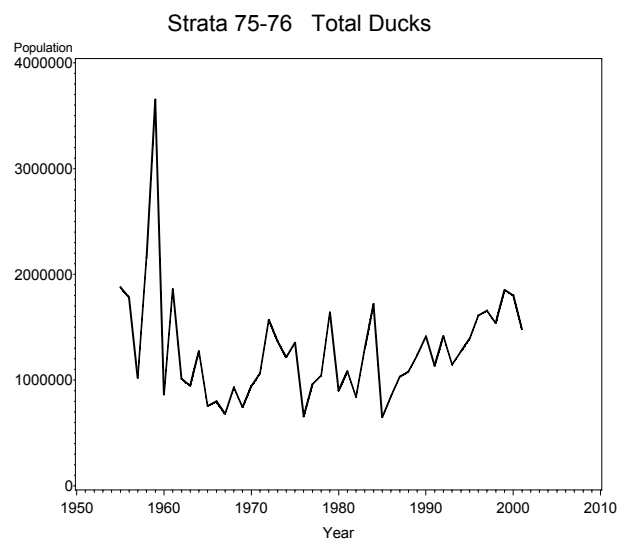
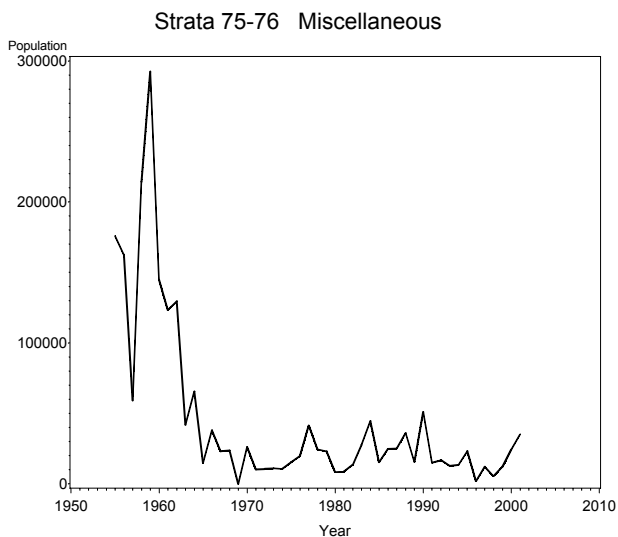
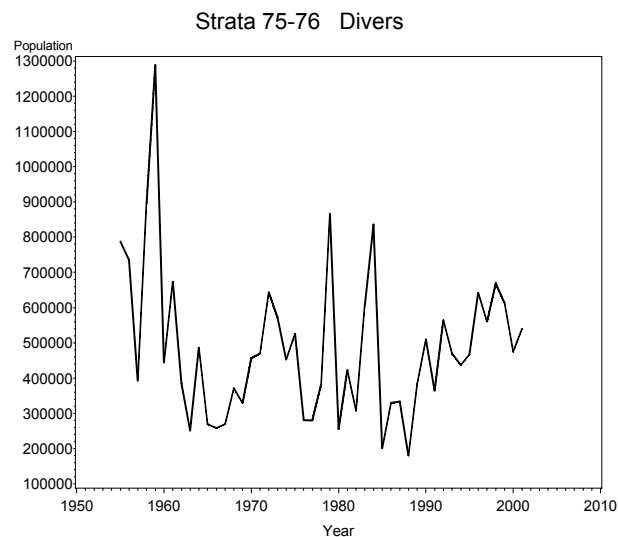
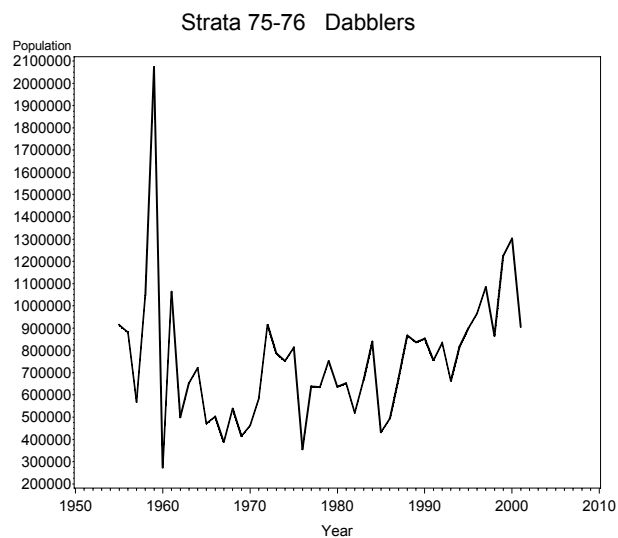
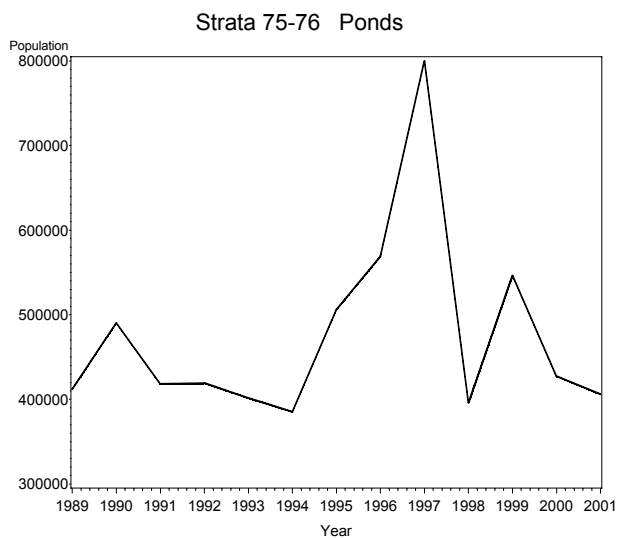


Figure 2 continued.