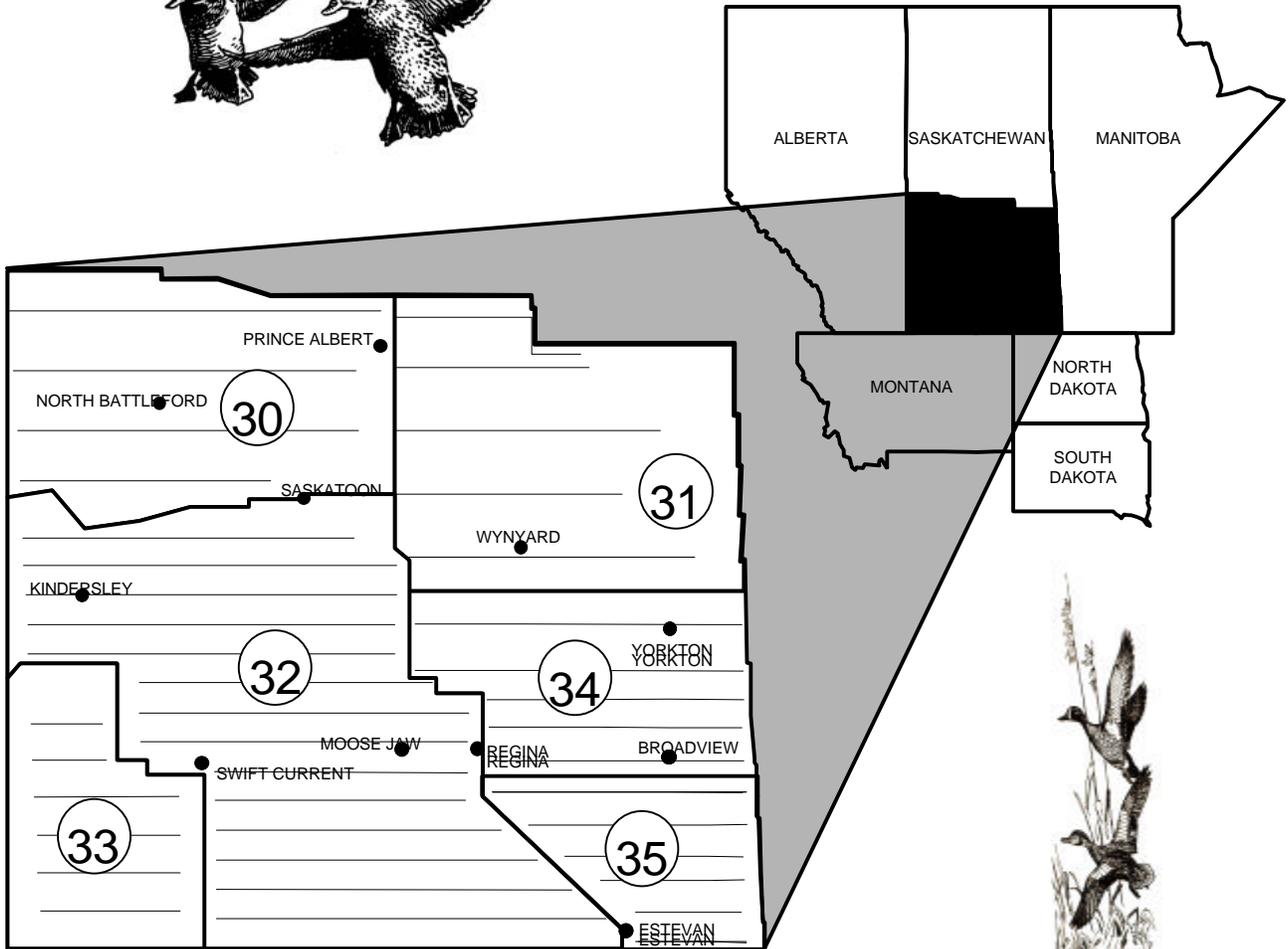
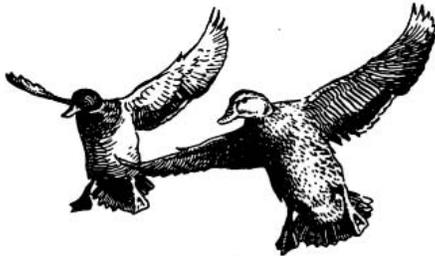


WATERFOWL BREEDING POPULATION SURVEY

SOUTHERN SASKATCHEWAN

2005



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

AND

ENVIRONMENT CANADA
CANADIAN WILDLIFE SERVICE



TITLE: Waterfowl Breeding Population Survey for Southern Saskatchewan
STRATA SURVEYED: 30, 31, 32, 33, 34, and 35
DATES: May 5 – May 31, 2005
DATA SUPPLIED BY: United States Fish and Wildlife Service (USFWS)
Canadian Wildlife Service (CWS)

Strata 30, 31, 32, and 33

Aerial Crew

Pilot/Observer Philip Thorpe, Flyway Biologist, USFWS
Observer Thomas Lewis, Wildlife Biologist, USFWS

Ground Crew

Crew Leaders: Dan Nieman, Wildlife Biologist, CWS
Jack Smith, Wildlife Technician, CWS
Keith Warner, Wildlife Technician, CWS

Assistants:

Kevin Dufour, Wildlife Biologist, CWS
Chris Downie, Student Technician, CWS
Phyllis Nieman, Volunteer, CWS
Nathan Weibe, Student Technician, CWS
Chad Wilkinson, Student Technician, CWS
Amanda Williams, Contractor, Ducks Unlimited Canada

Strata 34 and 35

Aerial Crew

Pilot/Observer: Rod King, Flyway Biologist, USFWS
Observer: Scott Frazer, Wildlife Biologist, USFWS

Ground Crew

Crew Leaders: Dale Caswell, Wildlife Biologist, CWS
Jim Leafloor, Wildlife Biologist, CWS
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Assistants:

Jason Caswell, Student Technician, CWS
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Laura Beaudoin, Student Technician, CWS
Shona Lawson, Wildlife Technician, DUC

ABSTRACT: The 2005 Waterfowl Breeding Population and Habitat Survey of Southern Saskatchewan was conducted 5-31 May and was consistent in design and coverage to previous year's surveys. Wetland and upland habitat conditions were variable across Southern Saskatchewan during the 2005 survey. Dry wetlands and poor upland cover were observed in the south and west, while the northern grasslands and Parklands had flooded wetlands and excellent upland conditions for nesting and brood rearing waterfowl. The May pond estimate was 65.3% higher than the 2004 estimate, 22.2% higher than the 10-year mean, and 23.7% higher than the long-term mean. The total duck population estimate (7,970,800) was 37.7%, 2.8%, and 8.5% higher than the 2004 estimate, the 10-year mean, and the long-term mean, respectively. Percent changes for selected species compared to 2004, the 10-year mean, and the long-term mean are as follows: mallards, 7.4%, -14.5%, -16.8%; blue-winged teal, 38.3%, 3.4%, 31.9%; northern pintail, 81.0%, 27.9%, -30.0%; canvasbacks, 34.3%, -26.1%, -11.1%; scaup (greater and lesser), 106.3%, 17.8%, -8.6%. Good production is expected from the majority of the survey area, except in the southwest portions of stratum 32 and 33, where poor to fair production is expected due to poor wetland habitat conditions. Excellent production is expected from most of the Parklands due to wetlands that were in good condition prior to waterfowl arrival and uplands that had good nesting cover.

METHODS: The procedures used in conducting the 2005 survey are described in the Standard Operating Procedures for Aerial Waterfowl Breeding Population and Habitat Surveys in North America, Section III (A), (revised 1987). No changes were made this year in survey methodology or aerial coverage (Table 1).

A survey program (written by John I. Hodges, USFWS-Alaska) provided the basis for recording observations and transcribing data into electronic format. This software integrates point locations {from the aircraft Global Positioning System unit (GPS)} with each bird or pond observation (See Thorpe 2000 for a more detailed description of the survey program).

Air-ground comparison transects (34 in strata 30-33; 16 in strata 34-35) were used to provide visibility correction factors for waterfowl, American coots, and pond numbers. The following 10 air-grounds were not completed by the ground crew because of a lack of funding: East End, Cabri Lake, Elfros, Environ, Grand Coulee, Gravelbourg, Hendon, Kincaid, Neidpath, and Waldheim. In addition, Lawson, Midnight Lake, and Peterson air-grounds were shortened from 18 miles to 10 miles, 17 miles to 11 miles, and 18 miles to 12 miles, respectively. All air-grounds were completed in strata 34 and 35.

The aircrew in strata 30-33 remained the same as 2004; however, a new observer was used in strata 34-35. In addition, 2 new ground crew members were added in strata 34-35, but crew leaders remained the same in all strata. All new personnel were provided initial training in duck identification, pond classification, and survey procedures and all were closely monitored for accuracy in identification and compliance with established procedures throughout the survey.

The survey was initiated 5 May and was completed 31 May. Two Cessna 206s (1 on amphibian floats in strata 34-35) were used as survey aircraft in all strata. Approximately 88 and 21 hours of flight time were required to complete the survey within strata 30-33 and strata 34-35, respectively. Weather and ground crew related delays amounted to 9 days and 3 days in strata 30-33 and strata 34-35, respectively.

WEATHER AND HABITAT CONDITIONS: During the 2005 survey, Southern Saskatchewan generally had good wetland and upland habitat conditions for waterfowl.

Although temporary wetlands were in short supply across the grasslands, the parklands had an abundance of temporary wetlands.

The grasslands strata of 32 and 33 received average to below-average precipitation during the winter. Spring precipitation varied across the grasslands during April and May and much of the area received average precipitation; the exceptions were in the southwest and northwest, which received above-average rainfall. Upland habitat conditions throughout the grasslands appeared to be in better shape compared to conditions observed in 2004.

The northwest Parklands (stratum 30) received above-average precipitation during the winter and spring and both upland nesting cover and wetlands were in good to excellent condition. The northeast Parklands (stratum 31) received below average to average precipitation during the winter and average to above-average precipitation during the spring. Most of the upland and wetland habitat within this stratum was in good to excellent condition for duck nesting and brood rearing. Many of the wetlands had flooded beyond their normal basins and into the surrounding uplands. The flooding may benefit some species by forcing them out of the wetland margins (narrow habitat vulnerable to predation) and into larger tracts of nesting cover. There was also an increase in flooded emergent vegetation and woodland, which will benefit overwater and cavity nesting species.

Temperatures in the survey area were 1-5° C above average during fall 2004. Winter temperatures varied, but were generally above average across the Province; the southwest had temperatures that were 4-5° C above average during December and February. Southern Saskatchewan temperatures during January were 1-3° C below average. Spring temperatures across the survey area were also variable. March and April temperatures were 1-3° C above average while May temperatures were 1-2° C below average.

Spring runoff was below average in the southwest and west, above average in the northwest and southeast, and average in the northeast. However, conditions changed by the first week in June when heavy rains occurred in Alberta and Saskatchewan. The status of both the North and South Saskatchewan Rivers changed within a 2-week period from below-average flows to record-high flows for June. This shouldn't have had a major impact on ducks and the additional rains should recharge wetlands throughout the Province. Typically, the runoff that affects ducks is spring runoff due to snow melt into isolated wetland depressions. This runoff was variable as noted above.

Planting of spring crops was 95% complete as of 13 June (Saskatchewan Agriculture, Food, and Rural Revitalization 2005a). Throughout June, precipitation caused field flooding and delayed spraying for pests and weeds in many areas of the Province. Haying began in the Province the week of 26 June, but was only 1% complete and has been delayed because of the cool weather and frosts that occurred in May (Saskatchewan Agriculture, Food, and Rural Revitalization 2005b). The delay should be beneficial to early nesting species. Pasture conditions were reported good to excellent by 98% of Saskatchewan Crop Report survey respondents (Saskatchewan Agriculture, Food, and Rural Revitalization 2005b).

The May pond estimate (2,414,900) was 65.3% higher than the 2004 estimate (1,461,300), 22.2% higher than the 10-year mean, and 23.7% higher than the long-term mean (Table 2, Fig. 1). The 2005 May pond estimate was the 14th highest (wettest) on record and the improved conditions were evident in all strata except stratum 33.

BREEDING POPULATION ESTIMATES: The 2005 total duck population estimate for Southern Saskatchewan was 37.7% higher than the 2004 estimate, 2.8% higher than the 10-year mean, and 8.5% higher than the long-term mean (Table 3).

The 2005 total dabbling duck population estimate increased 36.8% from 2004 and was similar to the 10-year and long-term mean. (Table 3). Except for gadwall, all dabbling duck estimates were equal to or higher than their 2004 estimates and their 10-year means. The gadwall estimate, although down slightly from 2004, was the 8th highest estimate on record (Appendix 1). The northern pintail estimate was 81.0% higher than 2004, but remains 30.0% lower than the long-term mean. A few species were close to their highest estimates on record; the northern shoveler estimate was the 3rd highest on record and the American green-winged teal estimate was the 9th highest on record.

The total diving duck population estimate was 44.3% higher than the 2004 estimate (Table 3). Redhead, canvasback, and scaup estimates were all higher than their 2004 estimates, but redhead and canvasback estimates remained below their 10-year means (Table 3). The 2005 scaup estimate was 17.8% above the 10-year mean, but remained below the long-term mean.

The American coot estimate was 50.4% higher than the 2004 estimate and well-above the long-term mean for the species (Table 3). The Canada goose estimate was well-above the long-term mean and their population estimates continue to indicate a strong upward trend in Southern Saskatchewan (Fig. 1).

CONCLUSIONS:

Naturally, weather conditions during the hatching and brood-rearing period are fundamental to brood survival and recruitment predictions. Similar to last year, the weather during the latter part of May and most of June (1-21) was characterized by above-average precipitation and below-average temperatures (1-2° C in May, 0.5-1.8° C in June); conditions that generally increase mortality of young (class 1a) ducklings. The cool, wet weather likely had a negative affect on recruitment from Southern Saskatchewan in 2004 and, if weather conditions persist, have the potential to reduce recruitment (especially of early nesting species) from Southern Saskatchewan again in 2005. A pilot ground-based production survey coordinated by the CWS during the summer months will help us better determine waterfowl production in 2005.

The following predictions are based on conditions that were seen during the May survey and formulated using waterfowl numbers, wetland densities, water levels, and upland habitat conditions. Because the grasslands are dynamic in nature, habitat conditions can change rapidly. Some areas have received above-average rainfall since the survey was completed and nesting and brood habitat has improved; however, many of the ducks that nest in the grasslands arrived prior to these improved conditions. Nesting and brood rearing habitat has to be available to arriving ducks in April and early May so birds have time to make breeding decisions (remain or overfly), once birds overfly an area because of poor quality habitat, they rarely return in the same year. Because of this, waterfowl production in the grasslands is expected to be poor in the western and southern grasslands, fair in the southwest and central survey areas, and good along the Missouri Coteau into the Alan Hills and west to the Alberta border. The wetlands in the extreme northwestern grasslands were full and upland habitat conditions appeared favorable during the survey. Ducks were present in high numbers and I would expect excellent production from this area.

The pond estimate in stratum 30, located in the northwest Parklands, was 177.8% higher than the 2004 estimate and ranked as the 5th wettest year on record (Table 2). The increase in pond numbers may finally represent an end to the long-term drought that has existed in this stratum since the late 1990s. Wetlands were full to flooding, sheetwater was still present in mid-to late May and duck estimates in the stratum were 184.3% higher than 2004. We expect good to excellent production and recruitment from this stratum.

Pond numbers also increased (89.9%) in the northeast Parklands (stratum 31) and the pond estimate has not been this high since 1996. Many basins were overflowing into adjacent basins and both flooding and sheetwater were present during the survey. Upland conditions appeared good for nesting and production and recruitment is also expected to be good to excellent from this stratum.

Potential for production and recruitment was good to excellent in strata 34 and 35 this year. Stratum 34 had the highest wetland estimate since 1999, while the estimate for stratum 35 ranked slightly above the 10-year average.

Overall, upland and wetland conditions across Southern Saskatchewan have improved since the 2004 survey and much of the survey area had good to excellent conditions for duck production. Although, the cool, wet weather could increase duckling mortality and reduce recruitment, the continued moisture will help recharge wetlands that still show impacts from the recent drought. If the weather pattern continues across the Province, habitat conditions for the 2006 breeding season in Southern Saskatchewan will be better than in 2005.

ACKNOWLEDGMENTS

We would be unable to complete the survey without the hard work and cooperation of the Canadian Wildlife Service ground crew - thanks. Tim Moser provided helpful comments that improved this report.

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Submitted by: Philip Thorpe

Date: July 7, 2005

Table 1. Survey design and May 2005 coverage for Southern Saskatchewan.

	Stratum						Total
	30	31	32	33	34	35	
Survey design:							
Square miles in stratum	18,570	21,086	37,911	11,345	13,164	9,044	111,120
Square miles in sample- waterfowl	153.0	144.0	571.5	90.0	175.5	126.0	1,260.0
Square miles in sample- ponds	76.50	72.00	285.75	45.00	87.75	63.00	630.00
Linear miles in sample	612	576	2,286	360	702	504	5,040
Number of transects in sample	4	5	14	6	5	6	40
Number of segments in sample	34	32	127	20	39	28	280
Expansion factor	121.373	146.431	66.336	126.056	75.009	71.778	
May 2005 coverage:							
Square miles in sample- waterfowl	153.0	144.0	571.5	90.0	175.5	126.0	1260.0
Square miles in sample- ponds	76.50	72.00	285.75	45.00	87.75	63.00	630.00
Linear miles in sample	612	576	2,286	360	702	504	5,040
Number of transects in sample	4	5	14	6	5	6	40
Number of segments in sample	34	32	127	20	39	28	280
Expansion factor	121.373	146.431	66.336	126.056	75.009	71.778	

Table 2. Long-term trend in adjusted May pond estimates (thousands) by stratum with comparisons to the previous year, the previous 10-year mean, and the long-term mean for Southern Saskatchewan (1961-2005).

Year	Stratum						Total
	30	31	32	33	34	35	
1961	142.2	219.4	252.2	80.3	58.9	41.8	794.9
1962	160.3	383.4	311.1	45.2	269.4	59.9	1229.3
1963	145.0	198.5	268.9	43.3	239.1	129.7	1024.5
1964	196.9	357.3	322.6	64.7	481.8	394.0	1817.2
1965	327.9	439.9	610.1	112.2	435.1	332.2	2257.4
1966	350.8	587.3	595.1	133.0	569.7	388.5	2624.3
1967	282.3	642.1	688.8	194.9	545.1	299.0	2652.2
1968	231.4	329.6	404.2	65.1	123.6	58.5	1212.5
1969	386.7	469.7	781.8	140.0	267.1	179.6	2225.0
1970	278.1	603.7	733.4	102.6	721.3	518.1	2957.1
1971	294.3	407.0	495.3	120.4	608.7	391.7	2317.4
1972	349.1	646.2	357.2	63.1	546.0	302.8	2264.4
1973	266.8	466.6	326.8	85.7	227.6	117.0	1490.4
1974	427.6	836.7	755.0	122.9	943.1	460.9	3546.3
1975	395.3	806.1	785.7	192.7	763.9	480.9	3424.7
1976	201.9	399.0	553.4	96.8	656.6	670.8	2578.5
1977	176.1	254.7	265.7	44.5	338.7	170.3	1250.0
1978	274.1	393.6	566.4	161.6	545.5	280.7	2221.8
1979	433.4	697.5	660.4	130.2	667.8	480.9	3070.1
1980	265.4	311.3	358.2	48.1	273.3	137.2	1393.6
1981	145.9	160.5	126.2	28.4	97.3	52.6	611.0
1982	283.6	629.7	704.5	119.0	247.5	210.4	2194.7
1983	384.9	715.4	711.9	96.0	464.6	323.3	2696.2
1984	283.1	548.3	266.9	35.2	260.3	131.9	1525.8
1985	622.3	737.1	722.9	108.0	560.4	207.8	2958.5
1986	343.8	402.5	615.2	112.8	529.1	346.3	2349.6
1987	223.8	260.9	347.5	150.9	251.5	184.3	1418.9
1988	217.6	378.7	149.1	37.1	213.8	63.4	1059.8
1989	208.1	220.6	222.9	71.1	63.9	73.1	859.7
1990	213.0	284.9	277.1	56.8	453.6	97.4	1382.8
1991	194.8	213.2	437.3	157.1	257.8	144.8	1405.1
1992	247.9	376.4	349.8	34.5	378.3	229.1	1615.9
1993	167.7	189.6	337.3	94.0	203.0	96.3	1087.9
1994	407.3	564.7	742.9	178.0	472.3	288.0	2653.1
1995	344.9	680.9	343.5	52.7	561.0	331.4	2314.4
1996	408.3	666.9	1041.4	197.6	573.0	381.6	3268.9
1997	461.6	497.4	972.1	163.4	578.1	319.5	2992.0
1998	146.5	284.6	345.0	49.3	403.0	241.8	1470.2
1999	313.1	344.4	807.0	93.5	614.9	362.3	2535.3
2000	214.4	272.9	322.5	36.6	348.1	209.2	1403.7
2001	139.7	202.4	378.9	42.0	480.1	292.8	1535.7
2002	72.9	127.4	193.8	68.5	157.3	15.1	634.9
2003	136.8	275.5	851.1	258.7	333.6	287.2	2143
2004	148.2	277.8	372.2	156.8	281.6	224.8	1461.3
2005	411.5	527.6	550.9	115.7	528.0	281.2	2414.9
10-year Mean	238.6	363.0	562.7	111.9	433.1	266.6	1976.0
Long-term Mean	270.8	426.4	493.9	101.0	410.6	250.2	1953.0
Percent Change:							
From 2004	177.8%	89.9%	48.0%	-26.2%	87.5%	25.1%	65.3%
From 10-year Mean	72.5%	45.3%	-2.1%	3.4%	21.9%	5.5%	22.2%
From Long-term Mean	52.0%	23.7%	11.5%	14.5%	28.6%	12.4%	23.7%

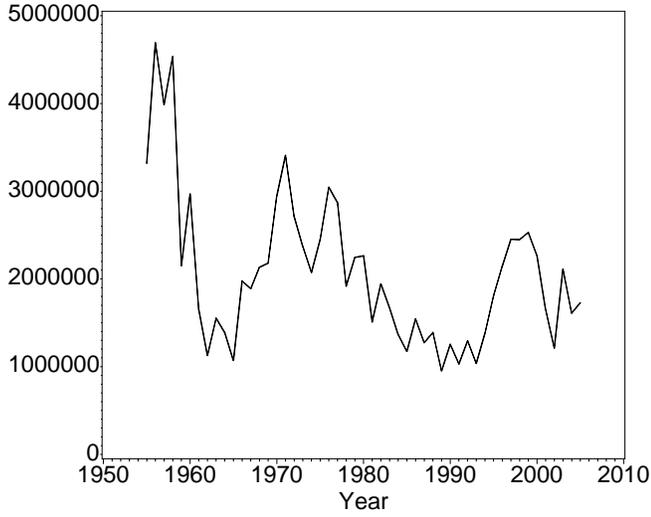
Table 3. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparisons to the previous year, the previous 10-year mean, and the long-term mean for Southern Saskatchewan, May 2005.

Species/Ponds	Stratum						% Change From						
	30	31	32	33	34	35	2005 Total	2004 Total	10-Year mean	Long- term mean	2004	10-Year mean	Long- term mean
Dabbling ducks													
Mallard	339.7	328.9	524.7	121.1	228.7	185.8	1728.9	1609.5	2022.8	2078.9	7.4%	-14.5%	-16.8%
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2	--	-100.0%	-100.0%
Gadwall	84.9	95.2	338.7	66.0	64.9	73.3	723.0	751.8	859.3	552.6	-3.8%	-15.9%	30.8%
Am. wigeon	68.5	59.7	112.6	15.1	20.8	17.4	294.2	128.1	269.8	427.8	129.8%	9.0%	-31.2%
Am. green-winged teal	117.7	117.3	66.2	3.5	23.4	30.9	359.0	124.3	267.6	226.9	188.7%	34.1%	58.2%
Blue-winged teal	287.2	291.7	558.1	47.2	181.1	231.7	1597.0	1154.7	1543.9	1210.3	38.3%	3.4%	31.9%
N. shoveler	314.2	160.1	530.1	91.3	129.9	87.9	1313.6	783.6	985.9	634.3	67.6%	33.2%	107.1%
N. pintail	116.3	67.1	413.6	64.1	82.2	114.2	857.5	473.7	670.5	1225.4	81.0%	27.9%	-30.0%
Subtotal	1328.5	1120.1	2544.1	408.4	730.9	741.3	6873.2	5025.7	6620.4	6356.4	36.8%	3.8%	8.1%
Diving ducks													
Redhead	28.5	49.6	60.5	7.9	52.0	27.2	225.6	131.2	254.9	189.4	72.0%	-11.5%	19.1%
Canvasback	50.6	20.9	25.8	3.5	38.8	22.8	162.4	120.9	219.9	182.8	34.3%	-26.1%	-11.1%
Scaup	124.1	62.7	133.1	19.6	29.9	11.9	381.3	184.8	323.7	417.1	106.3%	17.8%	-8.6%
Ring-necked duck	0.9	1.7	1.5	0.0	0.4	2.4	6.9	19.6	44.2	27.4	-64.7%	-84.3%	-74.7%
Goldeneyes	39.0	39.3	4.9	0.0	1.8	3.5	88.5	16.0	38.1	22.3	452.6%	132.0%	296.6%
Bufflehead	40.3	28.1	2.5	0.0	10.4	10.5	91.8	55.2	77.0	35.2	66.2%	19.2%	161.0%
Ruddy Duck	34.9	25.7	41.9	1.0	26.9	6.5	136.9	229.9	166.2	105.1	-40.4%	-17.6%	30.2%
Subtotal	318.4	228.1	270.1	32.0	160.1	84.7	1093.4	757.7	1124.0	979.3	44.3%	-2.7%	11.7%
Miscellaneous													
Long-tailed duck	0.0	0.0	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	0.0	0.0	--	--	--
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.2	--	-100.0%	-100.0%
Mergansers	0.5	0.6	1.3	0.0	1.2	0.6	4.1	3.1	6.6	4.8	34.5%	-37.5%	-13.6%
Subtotal	0.5	0.6	1.3	0.0	1.2	0.6	4.1	3.1	7.0	8.0	34.5%	-40.6%	-48.3%
Total ducks	1647.4	1348.8	2815.4	440.4	892.2	826.5	7970.8	5786.4	7751.4	7343.8	37.7%	2.8%	8.5%
Canada goose	60.9	69.1	79.9	14.9	34.5	24.3	283.6	267.2	283.0	102.5	6.1%	0.2%	176.8%
Am. coot	183.8	206.0	219.7	17.2	123.5	56.7	806.9	536.3	757.7	447.4	50.4%	6.5%	80.3%
Ponds	411.5	527.6	550.9	115.7	528.0	281.2	2414.9	1461.3	1976.0	1953.0	65.3%	22.2%	23.7%

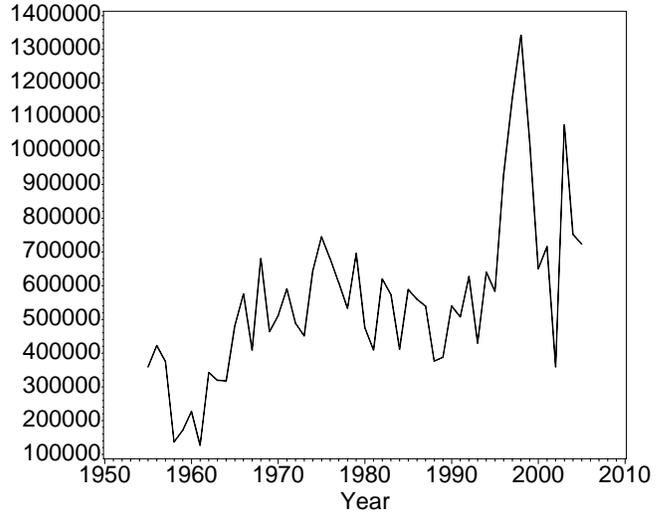
Waterfowl Breeding Population Survey

Southern Saskatchewan

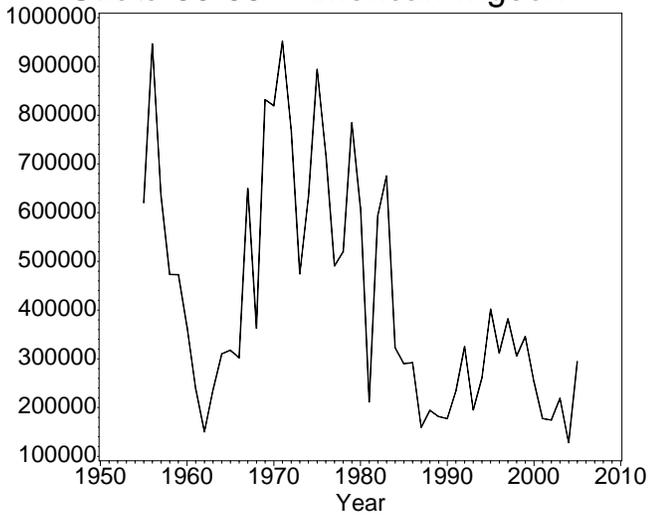
Strata 30-35 Mallard



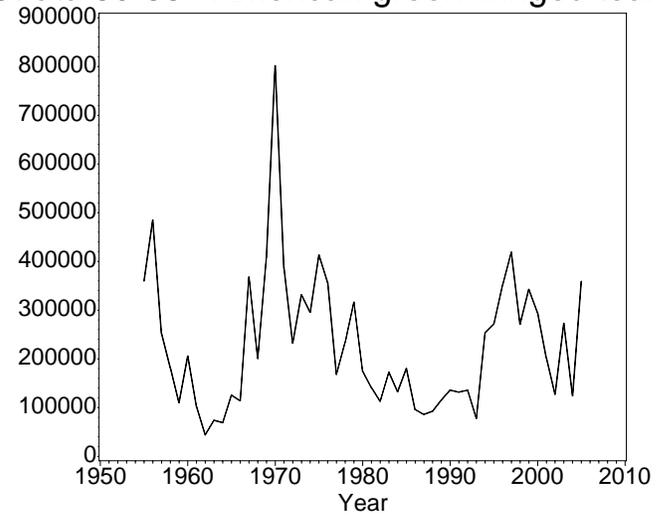
Strata 30-35 Gadwall



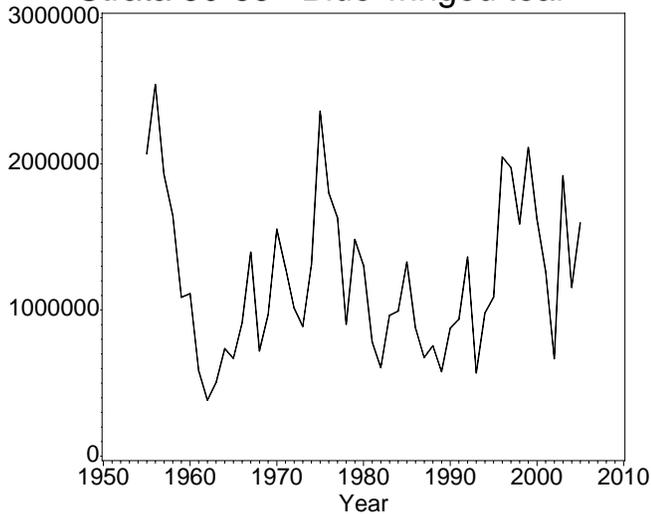
Strata 30-35 American wigeon



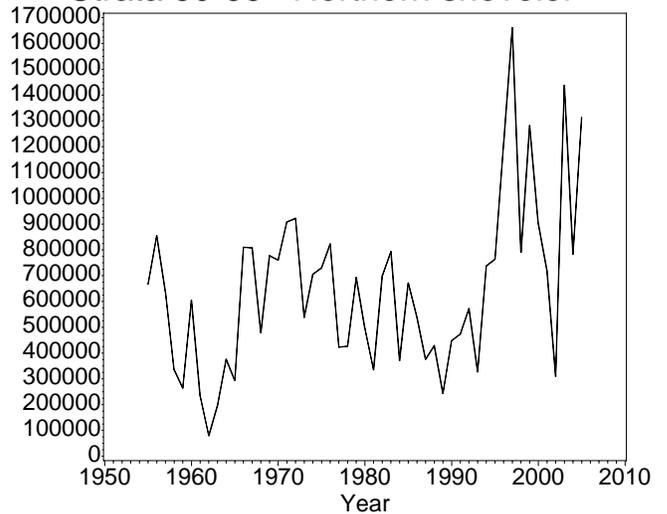
Strata 30-35 American green-winged teal



Strata 30-35 Blue-winged teal



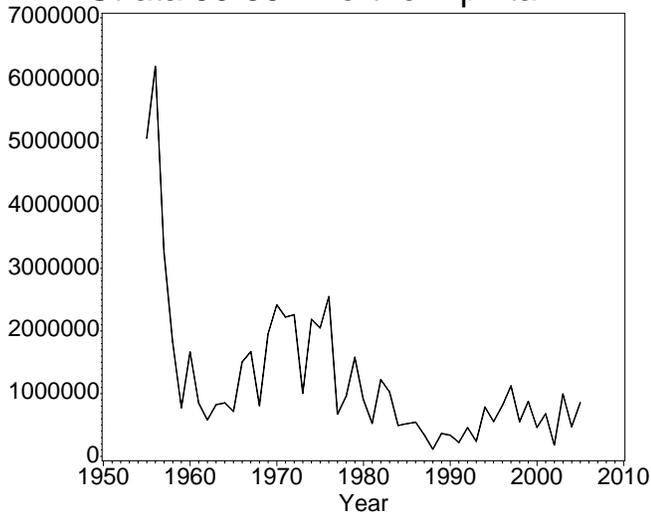
Strata 30-35 Northern shoveler



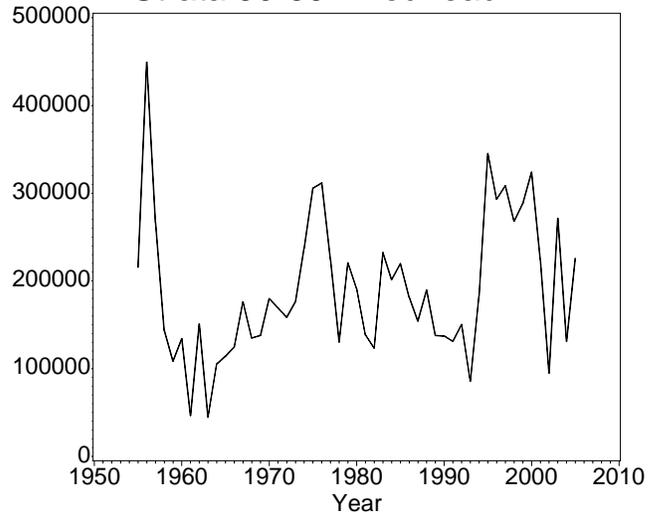
Waterfowl Breeding Population Survey

Southern Saskatchewan

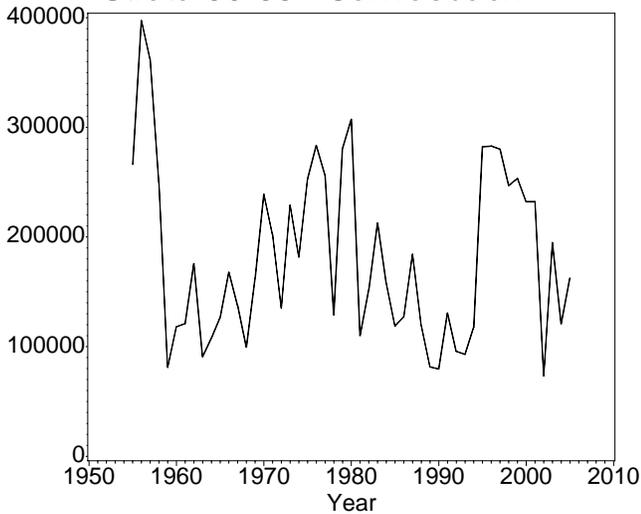
Strata 30-35 Northern pintail



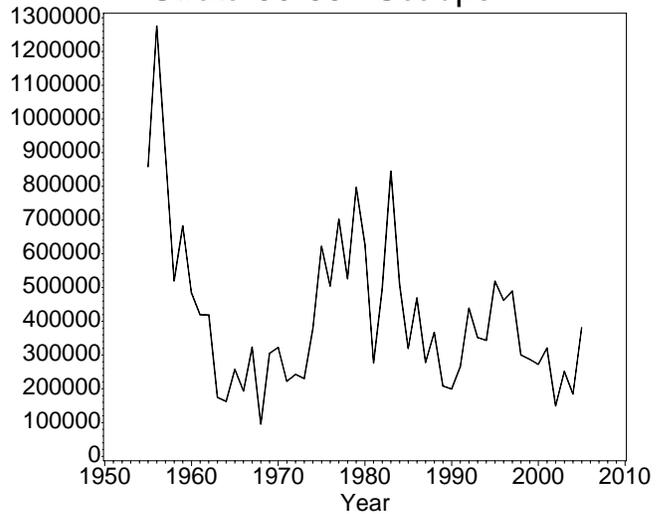
Strata 30-35 Redhead



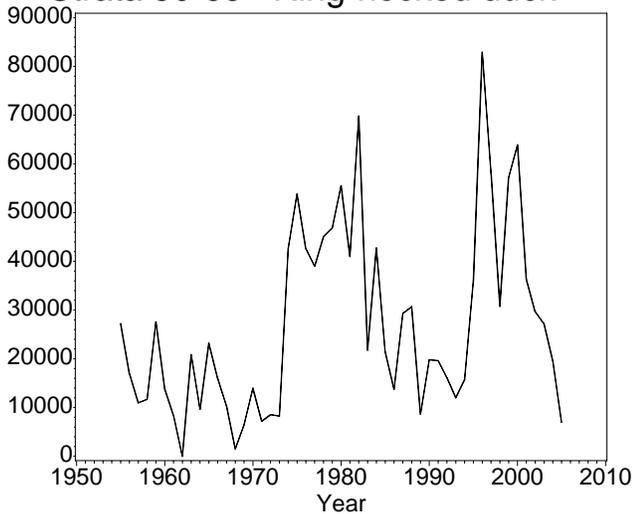
Strata 30-35 Canvasback



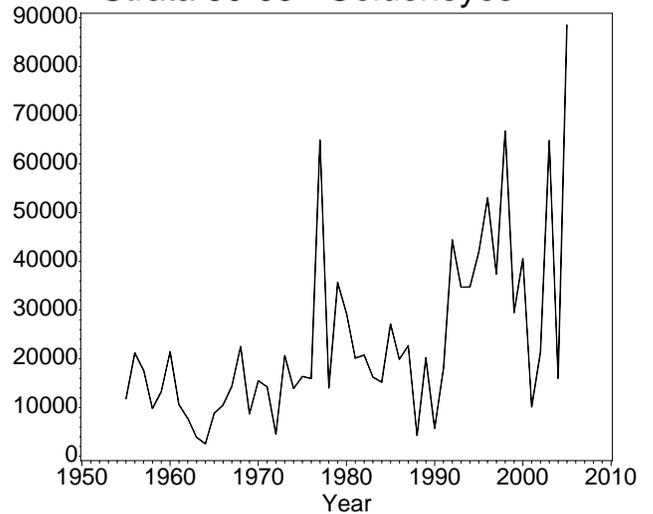
Strata 30-35 Scaups



Strata 30-35 Ring-necked duck



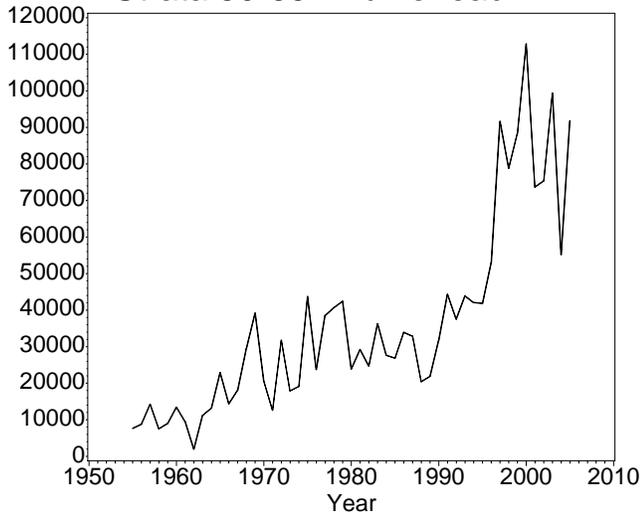
Strata 30-35 Goldeneyes



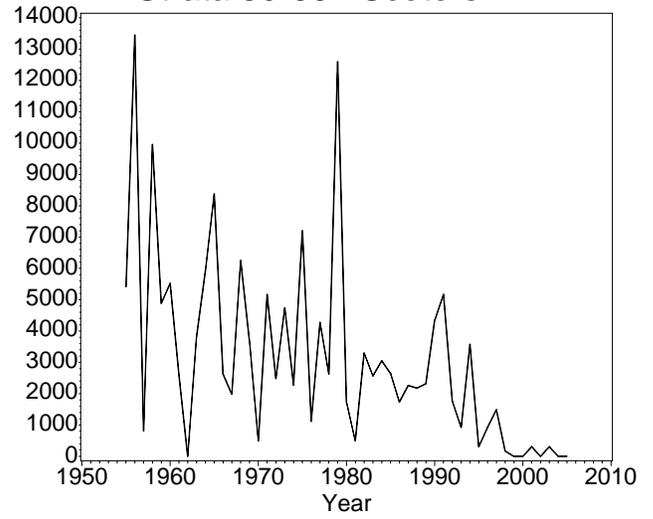
Waterfowl Breeding Population Survey

Southern Saskatchewan

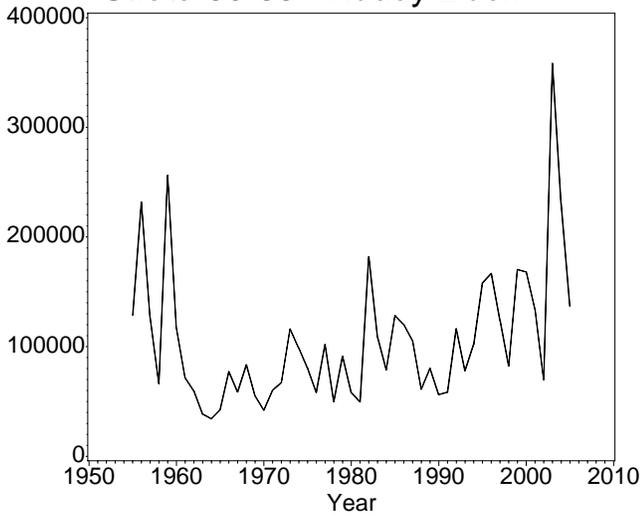
Strata 30-35 Bufflehead



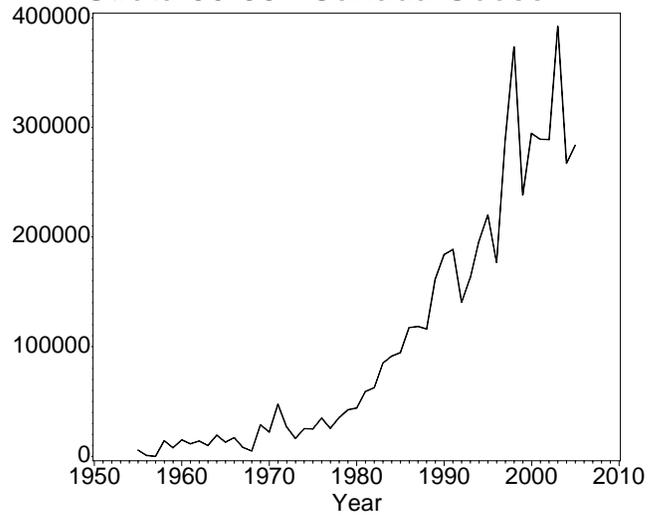
Strata 30-35 Scoters



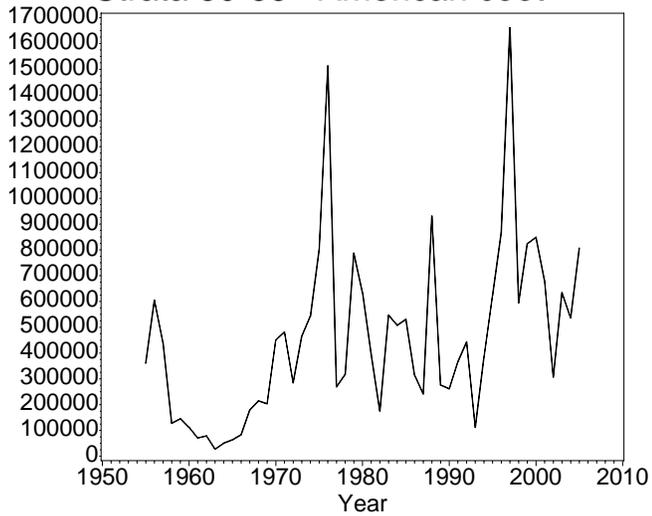
Strata 30-35 Ruddy Duck



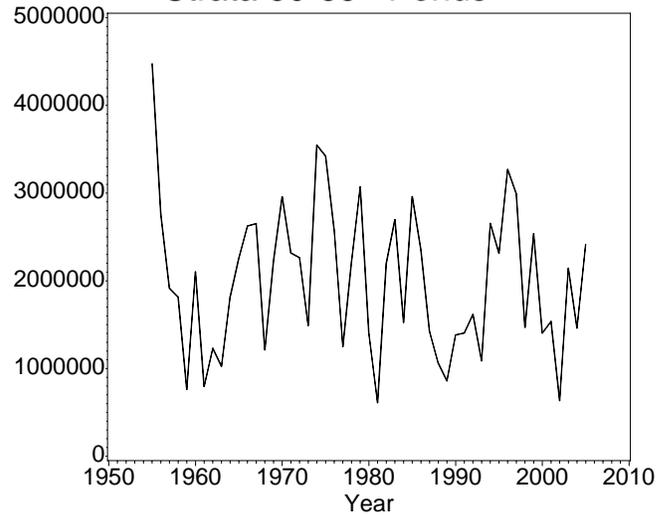
Strata 30-35 Canada Goose



Strata 30-35 American coot



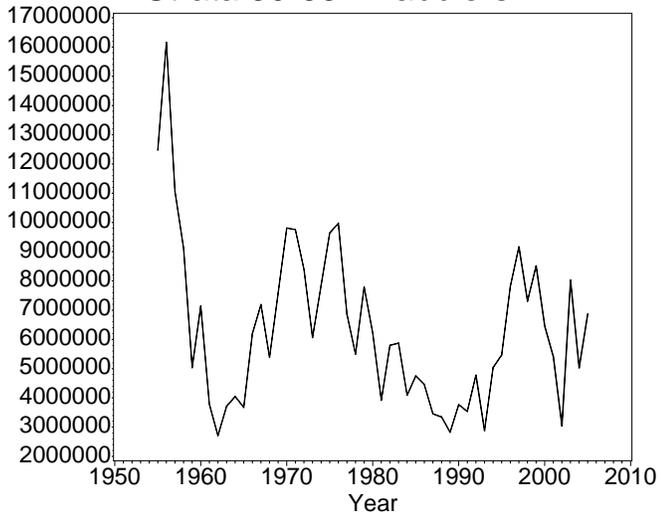
Strata 30-35 Ponds



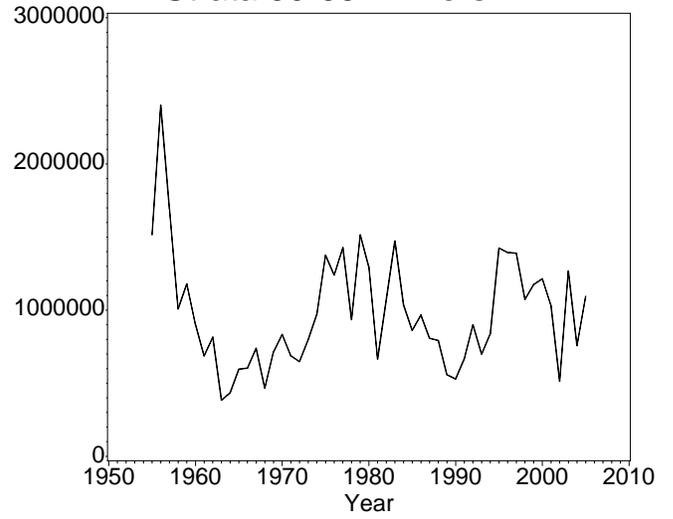
Waterfowl Breeding Population Survey

Southern Saskatchewan

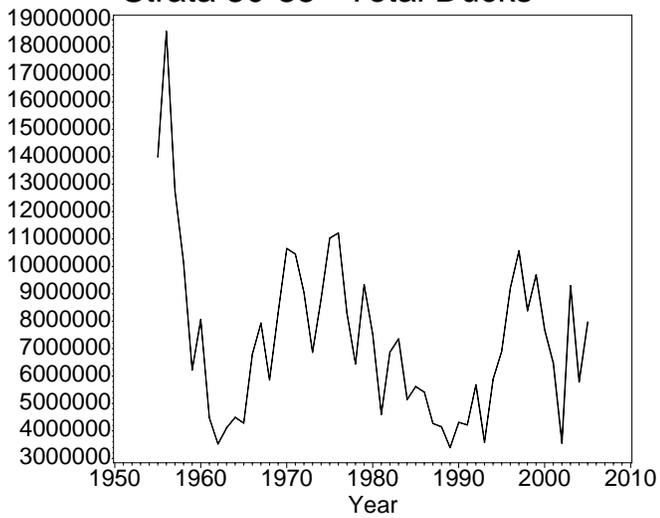
Strata 30-35 Dabblers



Strata 30-35 Divers



Strata 30-35 Total Ducks



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

Species/Ponds	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Dabbling ducks										
Mallard	3317.2	4691.4	3987.9	4534.0	2152.2	2967.5	1649.7	1125.9	1551.4	1387.3
Am. black duck	0.3	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	359.0	422.1	375.7	136.7	171.4	227.0	126.8	342.7	319.4	317.6
Am. wigeon	620.4	946.2	634.0	473.1	472.6	365.2	238.0	150.2	237.3	310.1
Am. green-winged teal	359.6	484.3	252.0	182.3	110.0	205.5	101.7	44.2	73.8	69.1
Blue-winged teal	2068.5	2542.7	1924.3	1650.7	1087.0	1112.8	583.0	383.8	504.9	735.8
N. shoveler	667.1	854.4	637.9	335.4	264.5	604.3	233.9	79.8	196.9	375.3
N. pintail	5076.5	6222.2	3245.9	1813.0	775.0	1665.5	846.7	581.1	823.9	853.4
Subtotal	12468.6	16163.3	11058.3	9125.2	5032.7	7147.9	3779.8	2707.7	3707.6	4048.5
Diving ducks										
Redhead	215.4	449.1	266.8	143.5	108.6	134.2	46.6	150.7	44.6	105.3
Canvasback	266.2	397.4	362.0	249.7	81.2	118.1	121.0	175.7	90.9	107.7
Scaup	858.3	1274.7	898.1	520.0	683.1	484.5	419.5	418.8	174.4	162.9
Ring-necked duck	27.2	16.9	10.9	11.7	27.6	13.8	8.4	0.0	20.8	9.6
Goldeneyes	11.8	21.2	17.7	9.8	13.3	21.4	10.6	7.8	3.9	2.6
Bufflehead	7.6	8.8	14.2	7.5	9.0	13.4	9.5	2.0	11.2	13.2
Ruddy Duck	128.7	231.8	126.1	66.2	256.1	116.8	71.4	59.6	38.5	34.3
Subtotal	1515.3	2399.9	1695.9	1008.4	1178.8	902.1	686.9	814.5	384.4	435.5
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	5.4	13.4	0.8	10.0	4.9	5.5	2.6	0.0	3.8	5.9
Mergansers	0.5	0.0	0.0	0.0	0.4	11.4	2.6	0.0	9.4	2.4
Subtotal	5.9	13.4	0.8	10.0	5.3	16.9	5.2	0.0	13.2	8.3
Total ducks	13989.9	18576.6	12755.0	10143.5	6216.9	8066.8	4471.9	3522.2	4105.2	4492.3
Canada goose	5.6	0.8	0.0	14.2	7.8	15.0	11.4	13.9	9.9	19.2
Am. coot	360.7	604.7	438.8	127.5	145.3	112.0	70.5	79.0	27.4	50.5
Ponds							794.9	1229.3	1024.5	1817.2

Species/Ponds	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Dabbling ducks										
Mallard	1069.9	1975.6	1888.4	2132.2	2180.0	2945.5	3407.2	2711.5	2369.1	2073.8
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Gadwall	481.2	575.4	409.2	679.9	463.5	511.5	590.2	488.8	451.5	644.7
Am. wigeon	317.7	302.1	649.1	362.8	831.7	819.3	951.4	772.3	474.4	633.2
Am. green-winged teal	125.3	114.2	367.7	200.7	408.8	801.4	386.9	232.2	331.2	295.4
Blue-winged teal	669.1	909.7	1395.7	720.2	966.6	1552.6	1291.4	1012.9	887.9	1312.2
N. shoveler	293.6	809.9	807.7	479.4	777.4	760.7	907.7	921.9	538.4	705.2
N. pintail	716.6	1504.8	1671.1	809.2	1956.2	2417.2	2222.0	2261.6	1006.3	2186.0
Subtotal	3673.4	6191.7	7188.9	5384.3	7584.0	9808.1	9757.0	8401.2	6058.7	7850.5
Diving ducks										
Redhead	114.1	124.6	176.0	134.9	137.8	179.6	169.3	158.6	176.3	237.6
Canvasback	126.5	167.8	137.5	99.5	162.4	238.9	202.1	135.3	228.9	181.8
Scaup	257.3	193.5	323.4	95.6	305.0	322.8	222.4	242.6	230.4	377.9
Ring-necked duck	23.2	16.0	10.4	1.5	6.5	13.9	7.2	8.5	8.2	42.6
Goldeneyes	8.8	10.5	14.3	22.5	8.7	15.5	14.3	4.6	20.6	13.9
Bufflehead	22.9	14.4	18.1	29.5	39.2	20.5	12.6	31.7	17.9	19.1
Ruddy Duck	42.6	77.1	58.7	83.3	55.0	42.1	60.2	67.2	116.0	98.5
Subtotal	595.4	603.9	738.3	466.9	714.6	833.4	688.0	648.4	798.3	971.4
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	8.4	2.6	2.0	6.2	3.7	0.5	5.2	2.5	4.7	2.3
Mergansers	5.2	0.0	0.0	1.0	1.4	8.8	1.3	0.0	2.2	0.5
Subtotal	13.6	2.6	2.0	7.2	5.1	9.3	6.4	2.5	6.9	2.7
Total ducks	4282.4	6798.2	7929.2	5858.5	8303.7	10650.8	10451.5	9052.1	6864.0	8824.6
Canada goose	12.8	16.9	8.0	4.9	28.6	22.1	47.3	26.7	16.4	25.2
Am. coot	63.6	83.4	179.0	214.3	203.8	450.3	481.5	284.9	465.9	544.3
Ponds	2257.4	2624.3	2652.2	1212.5	2225.0	2957.1	2317.4	2264.4	1490.4	3546.3

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

Species/Ponds	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Dabbling ducks										
Mallard	2449.2	3044.7	2869.3	1917.6	2244.2	2263.0	1509.8	1941.1	1670.1	1364.7
Am. black duck	0.4	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Gadwall	744.6	679.4	607.5	532.9	695.5	474.6	409.5	619.7	573.3	411.8
Am. wigeon	893.7	720.1	490.7	519.9	784.1	610.4	211.7	594.3	675.0	322.3
Am. green-winged teal	412.8	356.5	168.1	233.9	316.0	174.3	140.9	112.9	172.4	132.7
Blue-winged teal	2360.2	1799.6	1631.3	902.4	1482.8	1307.2	781.5	605.9	963.2	993.6
N. shoveler	730.3	822.9	422.7	426.7	692.4	494.7	335.3	699.0	792.8	370.9
N. pintail	2050.3	2549.6	672.5	961.8	1579.9	897.6	526.2	1222.0	1029.4	492.1
Subtotal	9641.5	9972.8	6862.2	5495.0	7795.1	6221.8	3914.8	5795.0	5876.3	4088.1
Diving ducks										
Redhead	305.7	311.7	224.3	130.3	220.5	190.9	138.4	123.4	232.2	201.6
Canvasback	252.9	283.3	256.5	129.0	280.9	307.2	110.1	151.9	212.7	157.7
Scaup	622.2	504.6	702.2	526.2	796.5	629.0	277.1	496.6	844.8	510.2
Ring-necked duck	53.8	42.6	39.0	45.1	46.8	55.5	41.0	69.8	21.8	42.7
Goldeneyes	16.4	15.9	64.8	14.0	35.7	29.4	20.1	20.8	16.2	15.2
Bufflehead	43.7	23.8	38.5	40.7	42.4	23.9	29.2	24.7	36.2	27.6
Ruddy Duck	80.3	58.4	101.8	50.0	91.1	57.9	49.7	181.9	108.5	78.9
Subtotal	1374.9	1240.3	1427.2	935.2	1514.0	1293.8	665.7	1069.1	1472.5	1033.8
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	7.2	1.1	4.3	2.6	12.6	1.7	0.5	3.3	2.6	3.0
Mergansers	7.5	5.3	3.4	6.5	13.0	6.8	14.6	3.4	5.9	17.7
Subtotal	14.7	6.4	7.6	9.1	25.6	8.6	15.0	6.7	8.5	20.8
Total ducks	11031.1	11219.5	8297.0	6439.4	9334.7	7524.2	4595.6	6870.8	7357.3	5142.7
Canada goose	25.0	34.8	25.6	35.3	42.4	44.0	59.0	62.5	85.0	91.3
Am. coot	799.8	1513.0	269.4	317.8	787.2	634.2	395.1	175.4	546.7	507.4
Ponds	3424.7	2578.5	1250.0	2221.8	3070.1	1393.6	611.0	2194.7	2696.2	1525.8

Species/Ponds	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Dabbling ducks										
Mallard	1173.3	1542.6	1273.3	1389.2	951.7	1253.7	1031.1	1293.4	1036.4	1380.3
Am. black duck	0.0	0.0	0.9	0.0	0.0	0.0	0.5	0.3	0.0	0.0
Gadwall	588.4	559.9	539.1	376.2	387.9	539.5	507.7	626.9	429.6	639.8
Am. wigeon	290.1	292.3	159.4	194.1	181.4	177.3	234.3	324.9	195.2	261.0
Am. green-winged teal	179.9	95.9	85.8	92.7	115.5	135.7	131.8	135.6	77.8	253.2
Blue-winged teal	1327.3	876.5	674.8	755.3	578.4	875.5	936.7	1362.4	570.1	980.2
N. shoveler	671.0	538.8	375.8	428.3	243.8	447.8	473.4	571.9	327.4	737.5
N. pintail	520.6	545.9	343.8	113.8	363.7	336.7	221.0	456.9	240.4	785.2
Subtotal	4750.7	4451.8	3453.1	3349.6	2822.5	3766.1	3536.4	4772.4	2876.8	5037.1
Diving ducks										
Redhead	219.6	181.6	154.3	189.3	137.8	137.2	131.1	150.3	85.7	183.5
Canvasback	118.8	127.2	184.2	119.0	81.5	79.7	130.5	95.7	93.0	117.7
Scaup	319.8	468.9	278.2	366.9	208.1	199.3	265.4	438.6	352.1	343.9
Ring-necked duck	21.4	13.7	29.3	30.7	8.6	19.8	19.6	16.1	12.0	15.7
Goldeneyes	27.1	19.9	22.7	4.3	20.2	5.7	18.0	44.4	34.7	34.8
Bufflehead	26.9	33.9	32.9	20.4	21.9	31.7	44.3	37.6	43.9	42.1
Ruddy Duck	128.3	120.2	105.6	61.2	80.1	56.2	58.5	116.1	78.1	102.2
Subtotal	861.8	965.5	807.1	791.9	558.2	529.7	667.4	898.7	699.5	839.8
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	2.6	1.7	2.3	2.2	2.3	4.3	5.2	1.8	0.9	3.6
Mergansers	1.9	0.0	6.9	5.8	3.7	7.9	6.5	3.8	3.5	2.3
Subtotal	4.5	1.7	9.1	8.0	6.0	12.3	11.6	5.6	4.8	6.5
Total ducks	5617.0	5419.1	4269.3	4149.5	3386.6	4308.1	4215.4	5676.7	3581.0	5883.3
Canada goose	94.7	117.3	118.4	116.2	162.2	184.0	188.7	140.5	163.1	196.6
Am. coot	530.6	315.0	241.7	930.7	276.2	261.5	366.6	442.6	111.8	383.3
Ponds	2958.5	2349.6	1418.9	1059.8	859.7	1382.8	1405.1	1615.9	1087.9	2653.1

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

Species/Ponds	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Dabbling ducks										
Mallard	1808.5	2142.7	2450.8	2448.7	2528.6	2266.7	1649.7	1212.5	2110.7	1609.5
Am. black duck	0.4	0.0	0.0	3.3	0.4	0.4	0.0	0.0	0.8	0.0
Gadwall	583.6	930.1	1155.3	1342.0	1028.7	650.0	715.4	359.7	1076.6	751.8
Am. wigeon	401.8	311.8	381.9	305.5	345.5	253.1	177.3	174.5	218.9	128.1
Am. green-winged teal	271.3	351.2	418.5	271.2	342.2	294.8	202.3	127.3	272.6	124.3
Blue-winged teal	1088.4	2046.6	1974.4	1589.0	2110.9	1622.4	1267.5	667.1	1918.3	1154.7
N. shoveler	763.9	1212.8	1660.7	790.5	1281.3	899.8	718.1	310.2	1437.7	783.6
N. pintail	554.2	807.4	1123.9	551.8	875.2	463.6	680.0	181.8	993.4	473.7
Subtotal	5472.2	7802.8	9165.4	7302.2	8512.9	6450.9	5410.3	3033.2	8028.8	5025.7
Diving ducks										
Redhead	345.1	293.2	308.5	268.1	288.3	323.8	224.3	94.9	271.3	131.2
Canvasback	282.3	283.0	280.1	246.9	253.4	232.2	232.2	73.3	194.8	120.9
Scaup	518.6	462.5	489.5	300.2	287.4	272.8	320.6	149.7	251.4	184.8
Ring-necked duck	36.0	82.9	58.1	30.8	57.2	63.9	36.3	29.7	27.2	19.6
Goldeneyes	41.9	53.0	37.4	66.7	29.5	40.5	10.2	21.4	64.8	16.0
Bufflehead	41.9	53.0	91.6	78.8	88.4	112.8	73.7	75.4	99.4	55.2
Ruddy Duck	158.1	166.7	124.1	82.3	170.3	168.2	134.3	70.0	358.2	229.9
Subtotal	1423.9	1394.2	1389.2	1073.7	1174.5	1214.2	1031.5	514.2	1267.0	757.7
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	0.3	0.9	1.5	0.2	0.0	0.0	0.3	0.0	0.3	0.0
Mergansers	7.5	4.0	6.5	6.8	2.6	9.2	21.2	3.0	2.4	3.1
Subtotal	7.9	4.9	7.9	6.9	2.6	9.2	21.5	3.0	2.7	3.1
Total ducks	6903.9	9201.9	10562.5	8382.9	9690.0	7674.2	6463.3	3550.3	9298.6	5786.4
Canada goose	220.0	176.8	289.6	373.3	238.4	294.4	289.1	288.9	391.9	267.2
Am. coot	625.2	868.1	1661.1	594.3	823.7	848.5	679.2	306.8	633.9	536.3
Ponds	2314.4	3268.9	2992.0	1470.2	2535.3	1403.7	1535.7	634.9	2143.0	1461.3

Species/Ponds	2005
Dabbling ducks	
Mallard	1728.9
Am. black duck	0.0
Gadwall	723.0
Am. wigeon	294.2
Am. green-winged teal	359.0
Blue-winged teal	1597.0
N. shoveler	1313.6
N. pintail	857.5
Subtotal	6873.2
Diving ducks	
Redhead	225.6
Canvasback	162.4
Scaup	381.3
Ring-necked duck	6.9
Goldeneyes	88.5
Bufflehead	91.8
Ruddy Duck	136.9
Subtotal	1093.4
Miscellaneous	
Long-tailed duck	0.0
Eiders	0.0
Scoters	0.0
Mergansers	4.1
Subtotal	4.1
Total Ducks	7970.8
Canada Goose	283.6
Am. coot	806.9
Ponds	2414.9