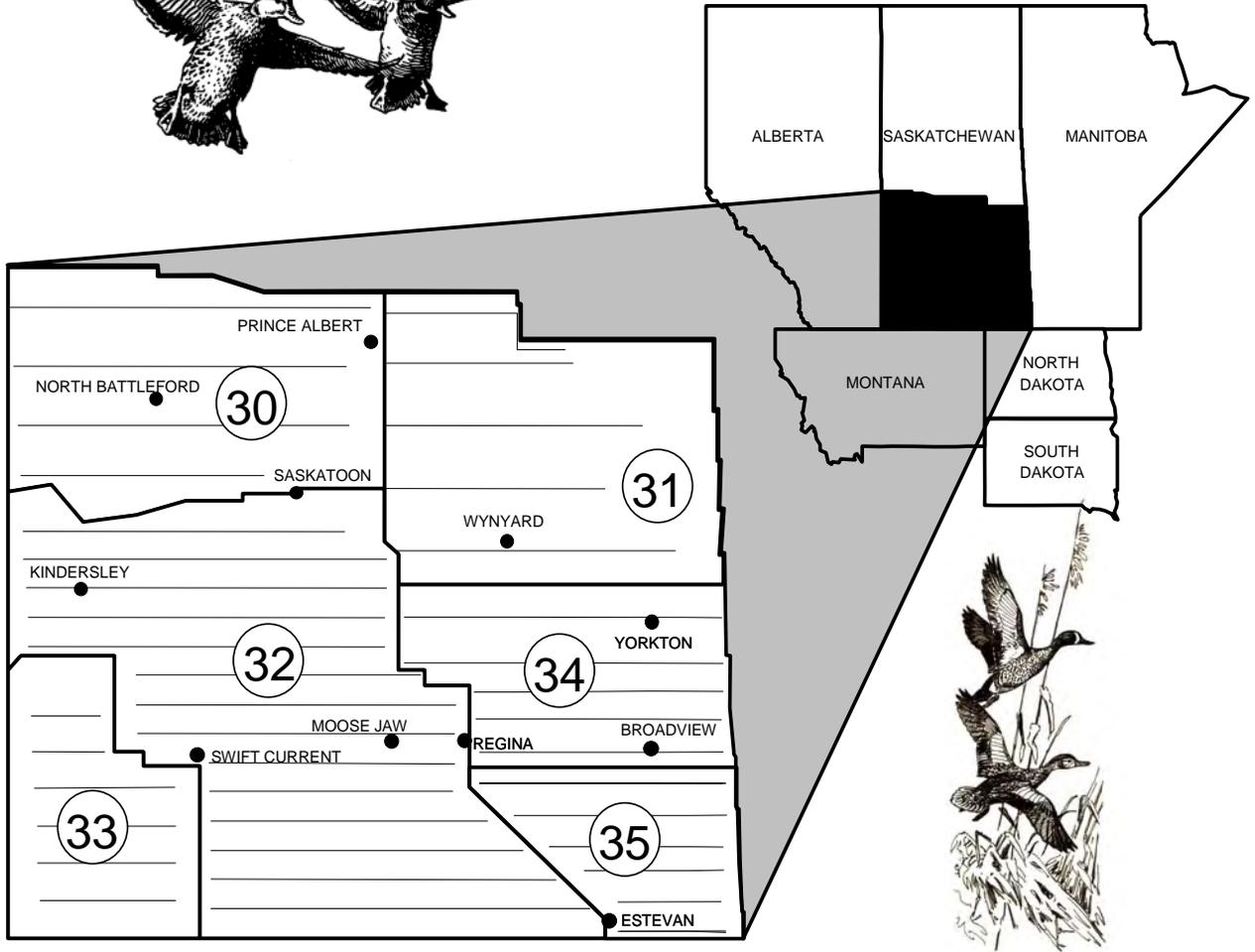


WATERFOWL BREEDING POPULATION AND HABITAT SURVEY OF SOUTHERN SASKATCHEWAN 2008



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

ENVIRONMENT CANADA
CANADIAN WILDLIFE SERVICE



TITLE: Waterfowl Breeding Population Survey for Southern Saskatchewan
STRATA SURVEYED: 30–35
DATES: May 8 – May 28, 2008
DATA SUPPLIED BY: United States Fish and Wildlife Service (USFWS)
Canadian Wildlife Service (CWS)

Strata 30–33

Aerial Crew

Pilot/Observer Philip Thorpe, Flyway Biologist, USFWS
Observer Walt Rhodes, Flyway Biologist, USFWS

Ground Crew

Crew Leaders: Dan Nieman, Wildlife Biologist, CWS
Kevin Dufour, Wildlife Biologist, CWS
Keith Warner, Wildlife Technician, CWS
Amanda Williams, Wildlife Technician, CWS

Assistants: Blake Bartzen, Student Technician, CWS
David Johns, Ducks Unlimited Contractor
Phyllis Nieman, Volunteer, CWS
Logan Sitter, Student Technician, CWS
Dayne Wilkinson, Student Technician, CWS

Strata 34–35

Aerial Crew

Pilot/Observer: Karen Bollinger, Pilot-Biologist, USFWS
Observer: Guthrie Zimmerman, Wildlife Biologist, USFWS

Ground Crew

Crew Leaders: Marc Schuster, Wildlife Technician, CWS
Pat Rakowski, Wildlife Biologist, CWS
Dale Caswell, Wildlife Biologist, CWS
Jason Caswell, Ducks Unlimited Contractor
Garth Ball, Habitat Biologist, Manitoba Conservation

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

ABSTRACT: The 2008 Waterfowl Breeding Population and Habitat Survey of Southern Saskatchewan was conducted 8-28 May and was consistent in design to previous surveys. Wetland and upland habitat conditions were drier across southern Saskatchewan during the 2008 survey. The 2008 May pond estimate was lower than the 2007 estimate (-46.4%), 10-year mean (-16.7%), and long-term mean (-19.6%). The 2008 total duck population estimate was lower than the 2007 estimate (-18.9%), but remained higher than the 10-year mean (+12.0%) and long-term mean (+19.7%). Percent changes for selected species compared to 2007, the 10-year mean, and the long-term mean were: mallard — -11.5%, -2.4%, -7.8%; blue-winged teal — -2.6%, +40.2%, +84.1%; northern pintail — -56.0%, -40.1%, -65.0%; canvasback — -48.7%, -21.8%, -11.1%; and scaup (greater and lesser) — -15.1%, -9.8%, -38.0%. Poor waterfowl recruitment, with isolated areas of fair recruitment, is expected from the grasslands. Fair to good recruitment is forecast for the northeast Parklands. Good to excellent recruitment is expected from the northwest Parklands because of good to excellent wetland and upland habitat conditions across that area.

METHODS: The procedures used during the 2008 survey are described in the Standard Operating Procedures for Aerial Waterfowl Breeding Population and Habitat Surveys in North America, Section III-A, (USFWS and CWS 1987). No changes were made this year in survey methods, however, 3 segments were missed in stratum 32 (Table 1).

A survey computer program written by John I. Hodges, USFWS-Alaska (retired), provided the basis for recording observations and transcribing data into electronic format. This software integrates point locations (from the aircraft Global Positioning System) with each bird or pond observation (Thorpe 2000).

Air-ground comparison segments (n=50) were used to provide visibility correction factors for waterfowl, American coots, and pond numbers. The number of air ground comparison segments was reduced in strata 30-33 in 2000 because of personnel shortages (see Thorpe [2005] for a description of the changes). All air-grounds were completed in 2008.

The aircrew in strata 30-33 had a new observer and a new pilot-observer was used in strata 34-35. Both new crew members were experienced in waterfowl surveys. The ground crew had 2 new crew members in strata 30-33. Crew leaders remained the same in all strata. New personnel were provided training in duck identification, pond classification, and survey procedures before the survey began and were closely monitored for accuracy in identification and compliance with established procedures throughout the survey.

The survey was initiated 8 May and was completed 28 May. Two Cessna 206s (1 on amphibian floats in strata 34-35) were used as survey aircraft in all strata. Approximately 98 hours of flight time were required to complete the survey. Weather delays amounted to 5 days.

WEATHER AND HABITAT CONDITIONS: Habitat conditions for nesting waterfowl have deteriorated in southern Saskatchewan since 2007 because of a drought that appears to be spreading north and west into the northern grasslands and Aspen Parkland Region (Parklands). Dry conditions were present from the U. S. border and covered the grasslands strata of 32, 33, and 35, with only about 10% of the wetland basins containing water on most grassland transects. Fortunately, a late April snow storm provided much needed moisture to Parklands stratum 30 and recharged many of the wetlands just prior to the survey. In the Parklands strata of 31 and 34 wetland conditions have deteriorated since 2007 to the extent that ephemeral and temporary wetlands were predominantly dry.

Fall 2007 precipitation varied from below average in much of the Parklands and western grasslands to above average in the southwestern and central grasslands. Winter precipitation was below to well-below average across the majority of the grasslands and southeastern Parklands and average over the northwestern grasslands and remainder of the Parklands. Spring precipitation was below average over all but the western quarter of the Province. The northeastern Parklands continued to dry out and received less than 40% of the average precipitation for April and May. The southwestern grasslands received needed moisture and had above average precipitation for May because of a stalled weather system over Alberta in late May. Spring runoff in relation to local snow melt into isolated wetlands was delayed until late April and early May in the Parklands because of the below average temperatures across the Province in April (Saskatchewan Watershed Authority 2008). Unlike 2007, no widespread flooding in the Province was observed in 2008. Runoff in the grasslands was non-existent because of below average winter precipitation.

Average temperatures occurred throughout the fall and winter, while below average temperatures characterized the spring in southern Saskatchewan. (Agriculture and Agri-food Canada 2008). August and September 2007 had average temperatures, except for the northern grainbelt in August, which had slightly below average temperatures. All of the grainbelt in October and the western third of the grainbelt in November was 1–2 °C above average while the remainder of the Province in November and December had average temperatures (Agriculture and Agri-food Canada 2008). January was 1–5 °C above average across the Province followed by temperatures 1–5 °C below average in February. During March, temperatures were 1–2 °C below average in the northeast Parklands, but average across the remainder of the Province. April had average temperatures in the southeast Parklands, but the remainder of the Province was 2–5 °C below average (Agriculture and Agri-food Canada 2008). Temperatures during the May survey were average across the western half of the grainbelt and 1–2 °C below average across the eastern half of the grainbelt.

On average across the Saskatchewan grainbelt, planting of spring crops was 97% complete as of 2 June and was above the 5-year average of 86% for the same time period (Saskatchewan Agriculture, Food, and Rural Revitalization 2008). Although seeding of crops was ahead of average, almost 50% of planted crops are rated as below average due to inadequate soil moisture. Only 31% of hay and pasture land was reported to be good to excellent in the Province this year and farmers have reported that some pastures are already going dormant in southern and western regions of the grainbelt (Saskatchewan Agriculture, Food, and Rural Revitalization 2008). Low water levels were reported throughout the southern grainbelt in dugouts used for livestock watering.

The 2008 May pond estimate was lower than the 2007 estimate (-46.4%), 10-year mean (-16.7%), and long-term mean (-19.6%) (Table 2). The change from 2007 is apparent in all strata, especially the grasslands strata of 32, 33, and 35 (Table 2). The pond estimate for stratum 32 was the 5th driest on record and was 58.1% lower than the 2007 estimate (Table 2). Estimates in strata 33 and 35 were also significantly lower than 2007 estimates and those strata ranked 12th and 11th driest, respectively. The pond estimate for stratum 31 was 64.5% lower than the 2007 estimate, but showed little change from the 10-year mean. The 2007 estimate in stratum 31 reflected the extensive flooding across the stratum during that survey and, with below normal winter and spring precipitation this year, the 2007 flooding provided needed carryover water for wetlands. The stratum 30 pond estimate, while lower than the 2007 estimate, remains well-above the 10-year and long-term means (Table 2).

BREEDING POPULATION ESTIMATES: The 2008 total duck population estimate was lower than the 2007 estimate (-18.9%), but remained higher than the 10-year mean (+12.0%) and long-term mean (+19.7%) (Table 3). The 2008 total duck estimate was the 17th highest estimate on record for the 54-year survey (Appendix 1).

The 2008 total dabbling duck population estimate decreased 16.3% from the 2007 estimate but remained above both the 10-year and long-term means (Table 3). The northern pintail estimate was 56.0% lower than the 2007 estimate. This was the largest change for any of the dabbling duck species this year. Given the extremely dry conditions in the grasslands, northern pintails probably spent little time in Saskatchewan before flying north to better habitat in the Canadian boreal forest and Alaska. Mallard, northern shoveler, and gadwall estimates were also lower than 2007 estimates, and this likely can be attributed to the dry conditions in the grasslands as well. Not surprisingly, mallard, northern shoveler, and gadwall estimates were all higher than 2007 estimates in stratum 30, one of the Parkland strata that had good to excellent habitat conditions. However, a redistribution likely occurred to regions outside of the southern Saskatchewan survey area for northern shoveler and gadwall estimates to show a >20% decline compared to 2007.

The 2008 total diving duck population estimate was 32.8% lower than the 2007 estimate but remained above the 10-year and long-term means (Table 3). Among diving ducks, canvasback and ruddy duck (not a true diving duck, but a stiff-tailed duck) estimates had the largest declines compared to 2007 (Table 3). This was especially surprising given that their core habitat (i.e., the Parklands) still had good wetland conditions. Canvasback estimates were down in other survey areas too (e.g., the Dakotas and Manitoba). Interestingly, the redhead estimate showed little change compared to the 2007 estimate. The ruddy duck estimate may be a reflection of the delayed spring. Ruddy ducks are one of the latest migrants and we may have missed some (i.e., not arrived in southern Saskatchewan yet) during the survey. On the contrary, the bufflehead estimate was the highest on record and the species continues to do well in southern Saskatchewan. Some of the highest bufflehead estimates in southern Saskatchewan have occurred during the last 13 years (Appendix 1).

The 2008 Canada goose estimate was the highest on record and was well above the long-term mean. Numerous pairs of Canada geese were seen on survey this year indicating that nesting may have been delayed or forgone this year. The American coot estimate was the second highest on record and was well above both the 10-year and the long-term mean for the species (Table 3). Compared to 2007, the coot estimate was 70% lower in stratum 32 and 64% higher in strata 30 and 31; a good indication of where the water was this year.

CONCLUSIONS: A late spring and a drought in the grasslands this year have impacted some waterfowl species in southern Saskatchewan. Spring phenology was estimated to be 7-10 days behind normal. This was estimated using waterfowl surveys conducted by CWS biologists in late April, waterfowl social behavior, aspen leafout, and timing of flowering shrubs. We delayed the survey by only 3 days because, given the length of the survey, we did not want to miss the timing of early nesting species; thus, the shorter delay compared to the 7-10 day delay in vegetation phenology. Once the survey was initiated, waterfowl social behavior and survey timing appeared normal but vegetation phenology remained behind normal.

Dry conditions in the grasslands will have a big affect on recruitment from southern Saskatchewan this year. Although the southwest grasslands received above average precipitation

during June, this will likely only help the few ducks that were left in the drought stricken area. A habitat appraisal in mid-July will provide information on how much the rain has helped recharge wetlands, but considering the extremely dry conditions in May most of the moisture will likely soak into parched soil. Typically, the habitat picture has to be set by April when waterfowl arrive and set up territories. Precipitation in late May and June only helps waterfowl that have not overflowed the area or late-nesting species. The potential for waterfowl production and recruitment out of most of the grasslands is predicted to be poor. The northern grasslands and the Cypress Hills (stratum 33) had wetland habitat that was considered fair for waterfowl production and recruitment and the mixed grasslands in the Allan Hills, southeast of Saskatoon, still had good habitat for nesting waterfowl. The transition zone between grasslands and Parklands has dried out since 2007 and was rated as fair for production potential. Although the Parklands have dried out since 2007, habitat conditions are still favorable for waterfowl nesting and brood rearing. The excess water on the landscape that was present during the 2007 survey was not present during the 2008 survey but seasonal and semipermanent wetlands remained full. Although stratum 31 and 34 were drier than 2007 and have lost some waterfowl habitat because of the drier conditions, the area still has fair to good potential for waterfowl recruitment. The northwest Parklands (stratum 30) continued to show good to excellent potential for recruitment.

In summary, predominantly poor recruitment is expected out of the grasslands and good recruitment from the Parklands. The northwest Parklands, given better habitat conditions, should have some areas of excellent recruitment.

ACKNOWLEDGMENTS

We would be unable to complete the survey without the hard work and cooperation of the Canadian Wildlife Service ground crew - thanks.

LITERATURE CITED

Agriculture and Agri-food Canada. 2008. Drought Watch on the Prairies.

(http://www.agr.gc.ca/pfra/drought/pr_e.htm).

Saskatchewan Agriculture, Food, and Rural Revitalization. 2008. Crop Report, June 2, 2008. Report Number 9.

(<http://www.agriculture.gov.sk.ca/>).

Saskatchewan Watershed Authority. 2008. Streamflow Forecast and Water Supply Outlook for Saskatchewan, May 1, 2008. River Forecast Centre, Operations, Saskatchewan Watershed Authority. Moose Jaw, Saskatchewan.

(<http://www.swa.ca/WaterManagement/ClimateConditions.asp>)

Thorpe, P. P. 2000. Waterfowl Breeding Population Survey for Southern Saskatchewan. Division of Migratory Bird Management, U. S. Fish and Wildlife Service. Denver, Colorado; unpublished report.

Thorpe, P. P. 2005. Waterfowl Breeding Population Survey for Southern Saskatchewan. Division of Migratory Bird Management, U. S. Fish and Wildlife Service. Denver, Colorado.

<http://www.fws.gov/migratorybirds/reports/wps05/ssask.pdf>

USFWS and CWS. 1987. Standard Operating Procedures for Aerial Waterfowl Breeding Population and Habitat Surveys in North America, revised; unpublished report.

Submitted by: Philip Thorpe and Walt Rhodes

Date: July 10, 2008

Table 1. Survey design and May 2008 coverage for southern Saskatchewan.

	Stratum						Total
	30	31	32	33	34	35	
Survey design:							
Square miles in stratum	18,570.00	21,086.00	37,911.00	11,345.00	13,164.00	9,044.00	111,120.00
Square miles in sample- waterfowl	153.00	144.00	571.50	90.00	175.50	126.00	1,260.00
Square miles in sample- ponds	76.50	72.00	285.75	45.00	87.75	63.00	630.00
Linear miles in sample	612.00	576.00	2,286.00	360.00	702.00	504.00	5,040.00
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	121.37	146.43	66.34	126.06	75.01	71.78	
May 2008 coverage:							
Square miles in sample- waterfowl	153.00	144.00	558.00	90.00	175.50	126.00	1246.50
Square miles in sample- ponds	76.50	72.00	279.00	45.00	87.75	63.00	623.25
Linear miles in sample	612.00	576.00	2,232.00	360.00	702.00	504.00	4,986.00
Number of transects in sample	4	5	14	6	5	6	40
Number of segments in sample	34	32	124	20	39	28	277
Expansion factor	121.37	146.43	67.94	126.06	75.01	71.78	

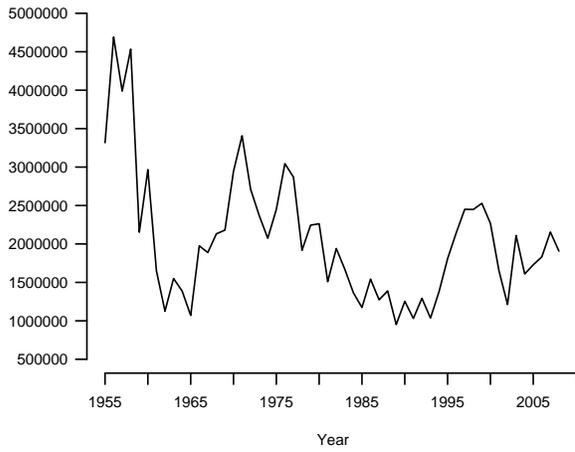
Table 2. Long-term trend in adjusted May pond estimates (thousands) by stratum with comparisons to the previous year, the previous 10-year mean, and the long-term mean for southern Saskatchewan (1961-2008).

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	2143.0
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
2006	456.1	624.2	637.0	87.6	653.9	260.2	2719.0
2007	477.3	1076.7	600.1	144.9	488.1	213.3	3000.3
2008	422.4	382.7	251.4	51.4	381.1	119.3	1608.3
10-year mean	251.7	401.4	505.9	105.4	428.9	238.8	1931.8
Long-term mean	282.1	446.6	500.4	102.0	419.9	250.3	2001.4
Percent change:							
From 2007	-11.5	-64.5	-58.1	-64.5	-21.9	-44.1	-46.4
From 10-year mean	67.9	-4.6	-50.3	-51.2	-11.1	-50.0	-16.7
From long-term mean	49.7	-14.3	-49.8	-49.6	-9.2	-52.3	-19.6

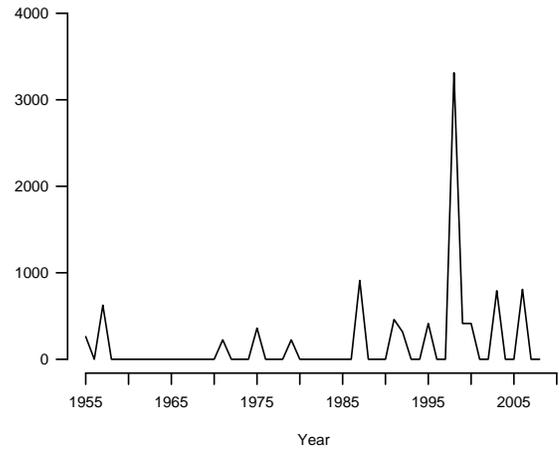
Table 3. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparisons to the previous year, the previous 10-year mean, and the long-term mean for southern Saskatchewan, May 2008.

Species/Ponds	Stratum						2008 Total	2007 Total	10-Year mean	Long-term mean	% Change From		
	30	31	32	33	34	35					2007	10-Year mean	Long-term mean
Dabbling ducks													
Mallard	419.0	441.1	539.6	83.6	290.5	133.4	1907.1	2155.1	1954.2	2069.1	-11.5	-2.4	-7.8
American black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2	--	-100.0	-100.0
Gadwall	280.8	208.8	301.4	50.6	124.1	45.5	1011.2	1317.3	916.7	582.5	-23.2	10.3	73.6
American wigeon	106.5	61.1	148.4	29.9	18.3	7.9	372.0	324.8	250.4	420.6	14.5	48.6	-11.6
Am. green-winged teal	233.5	213.3	58.7	8.6	35.6	11.0	560.6	495.0	288.9	237.8	13.3	94.0	135.8
Blue-winged teal	710.5	494.3	756.2	30.7	250.8	75.3	2317.7	2379.8	1653.5	1258.9	-2.6	40.2	84.1
Northern shoveler	452.3	261.9	302.2	29.5	103.1	34.9	1183.8	1655.9	1080.2	684.8	-28.5	9.6	72.9
Northern pintail	102.1	58.9	159.5	42.2	48.0	12.1	422.8	960.3	706.1	1209.6	-56.0	-40.1	-65.0
Subtotal	2304.6	1739.4	2266.0	275.0	870.2	320.0	7775.2	9288.1	6850.6	6463.5	-16.3	13.5	20.3
Diving ducks													
Redhead	130.4	149.1	37.9	2.9	49.7	13.1	383.0	414.2	267.7	199.0	-7.5	43.1	92.5
Canvasback	57.7	42.2	30.0	0.9	27.1	8.4	166.3	324.3	212.7	187.0	-48.7	-21.8	-11.1
Scaup	102.4	35.7	63.8	9.6	34.3	10.5	256.3	302.1	284.1	413.7	-15.1	-9.8	-38.0
Ring-necked duck	25.1	9.9	0.0	0.0	10.4	4.3	49.8	22.6	35.4	27.6	119.8	40.7	80.6
Goldeneyes	29.5	34.6	1.4	0.0	0.6	0.0	66.2	60.9	46.9	25.2	8.7	41.2	162.7
Bufflehead	46.2	58.8	2.8	0.0	4.4	3.8	116.0	107.6	88.4	38.9	7.9	31.2	198.6
Ruddy Duck	24.4	46.2	35.6	0.0	28.2	2.1	136.5	516.4	203.7	114.7	-73.6	-33.0	19.0
Subtotal	415.7	376.5	171.6	13.4	154.8	42.2	1174.2	1748.1	1138.9	1006.1	-32.8	3.1	16.7
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	0.3	0.1	3.0	-100.0	-100.0	-100.0
Mergansers	2.0	0.8	0.0	0.0	0.8	0.0	3.6	5.3	6.1	4.8	-32.1	-40.9	-24.6
Subtotal	2.0	0.8	0.0	0.0	0.8	0.0	3.6	5.6	6.2	7.8	-35.8	-42.0	-53.9
Total ducks													
	2722.3	2116.7	2437.6	288.4	1025.8	362.2	8953.0	11041.8	7995.7	7477.3	-18.9	12.0	19.7
Canada goose	77.2	118.4	101.7	24.6	63.9	34.1	419.9	380.5	311.1	114.9	10.4	35.0	265.4
American coot	775.4	543.6	138.8	15.1	143.7	24.2	1640.9	1406.3	782.4	486.3	16.7	109.7	237.4
Ponds	422.4	382.7	251.4	51.4	381.1	119.3	1608.3	3000.3	1931.8	2001.4	-46.4	-16.7	-19.6

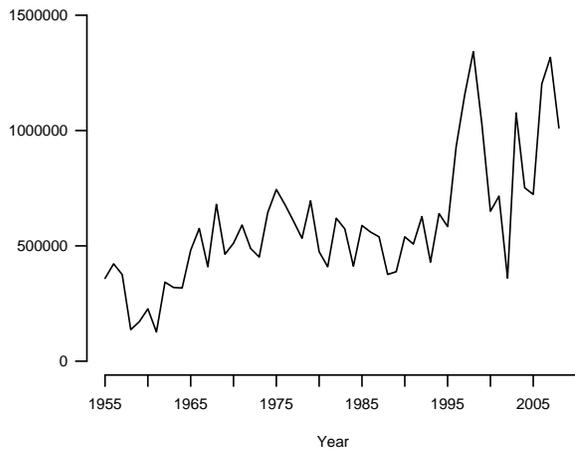
Strata 30-35 Mallard



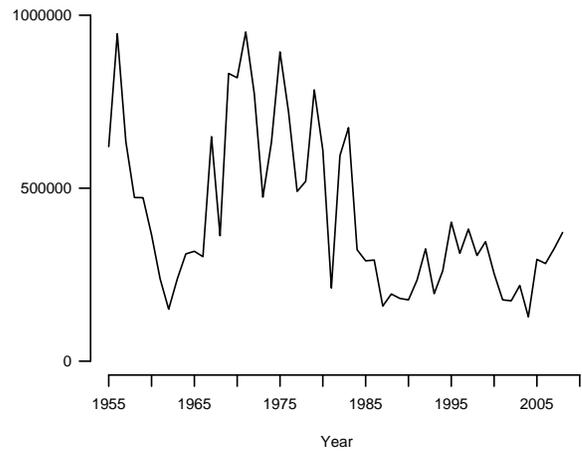
Strata 30-35 American black duck



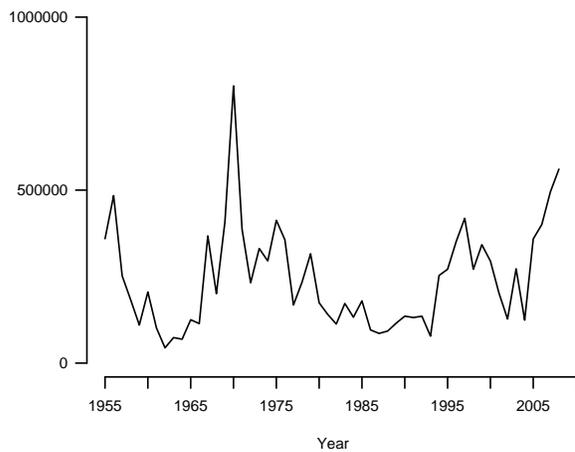
Strata 30-35 Gadwall



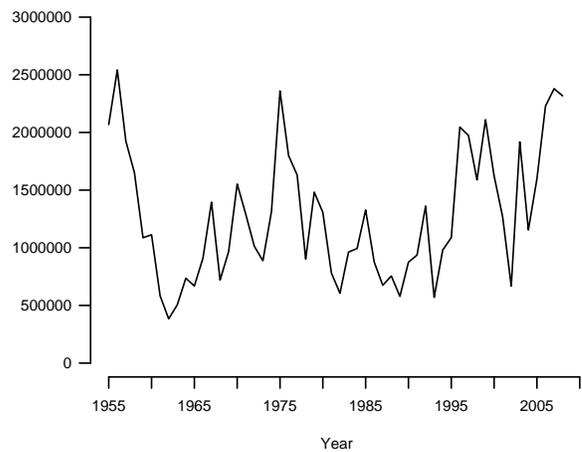
Strata 30-35 American wigeon



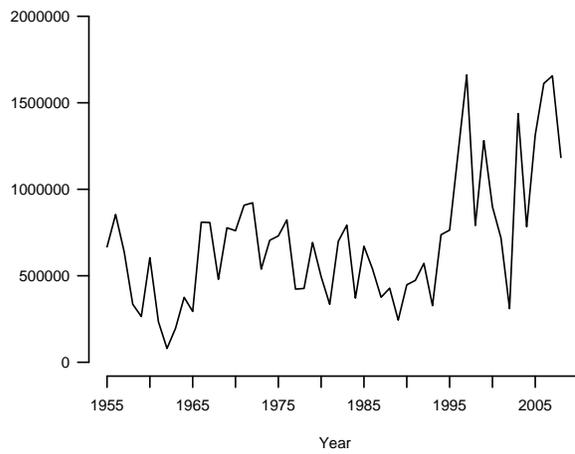
Strata 30-35 American green-winged teal



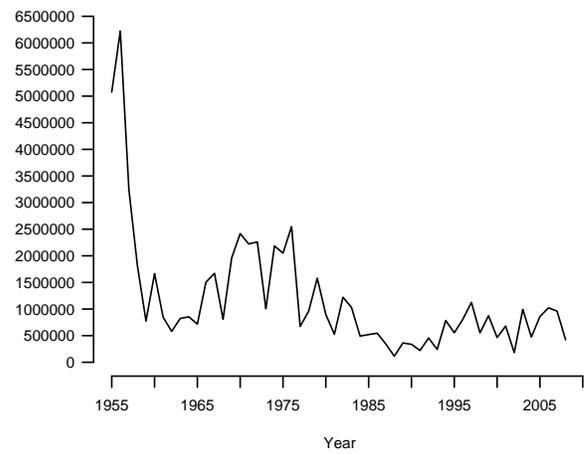
Strata 30-35 Blue-winged teal



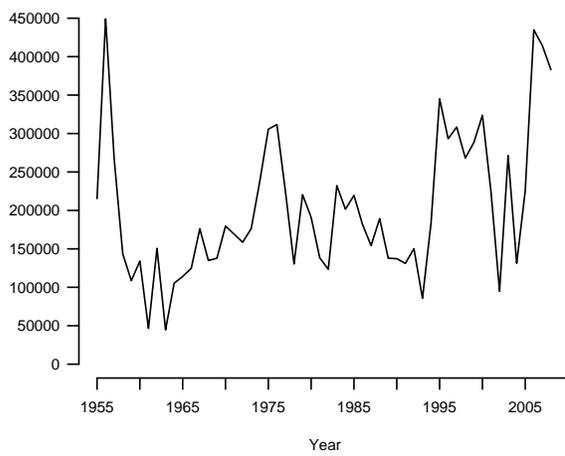
Strata 30-35 Northern shoveler



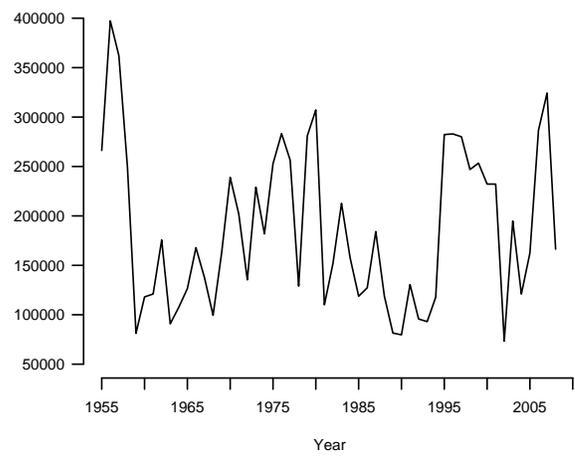
Strata 30-35 Northern pintail



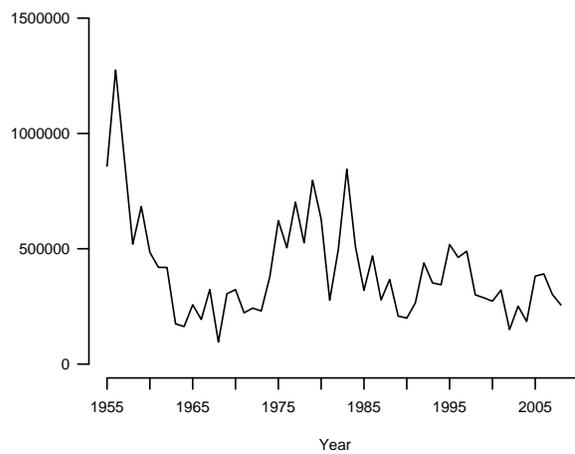
Strata 30-35 Redhead



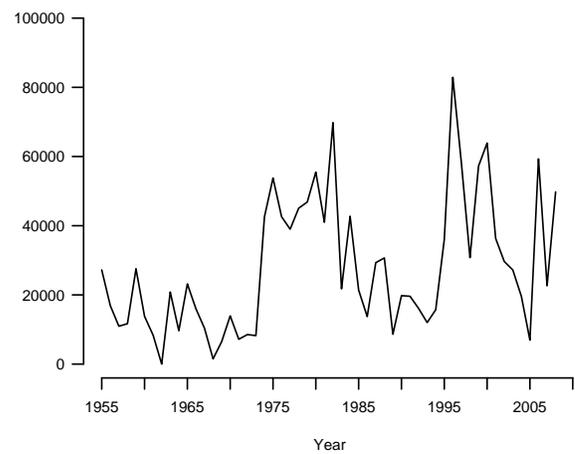
Strata 30-35 Canvasback



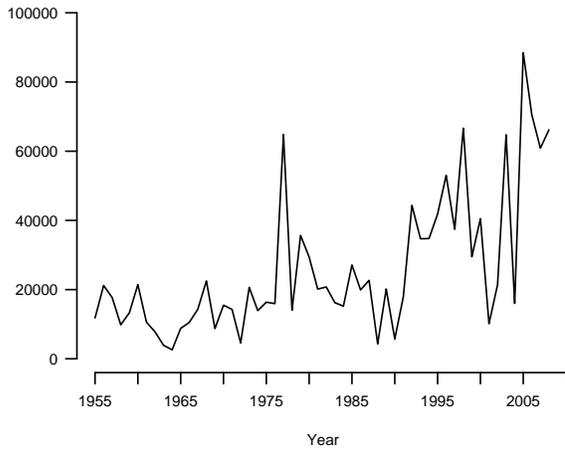
Strata 30-35 Scaups



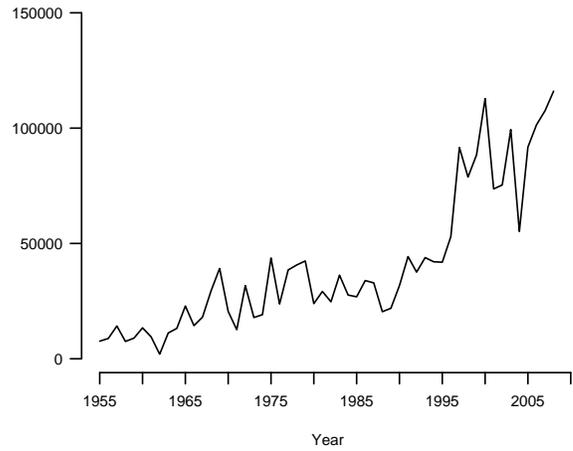
Strata 30-35 Ring-necked duck



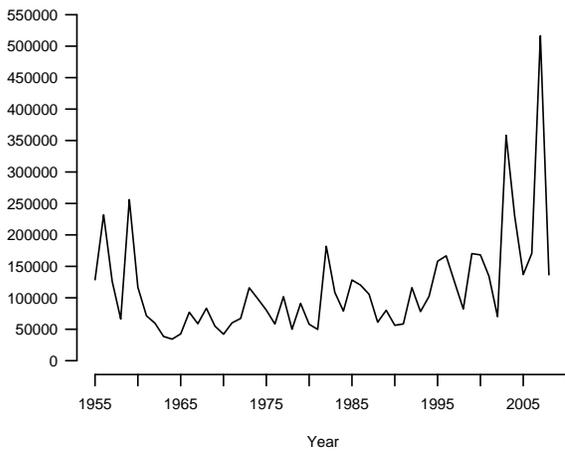
Strata 30-35 Goldeneyes



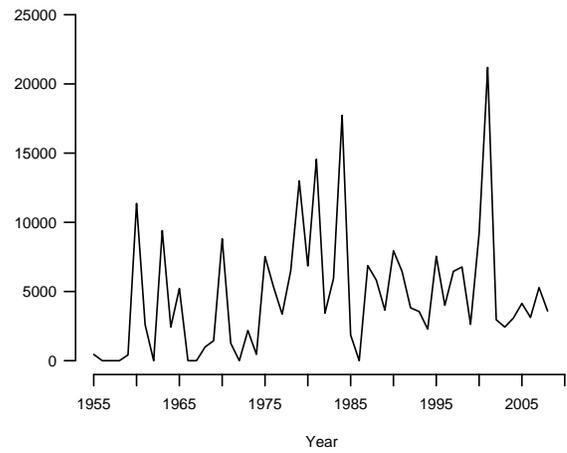
Strata 30-35 Bufflehead



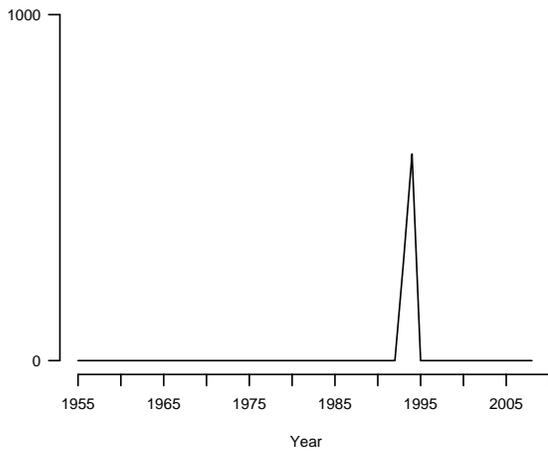
Strata 30-35 Ruddy duck



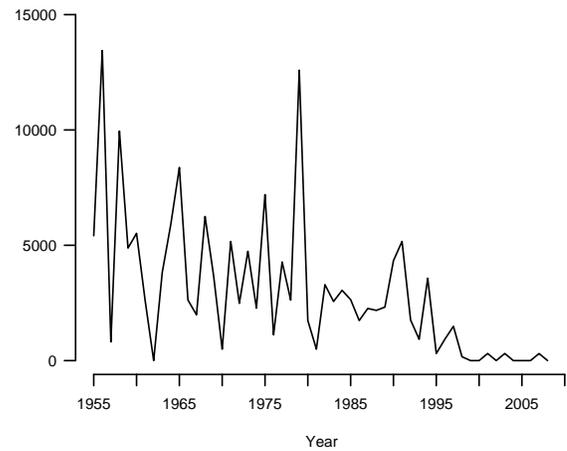
Strata 30-35 Mergansers



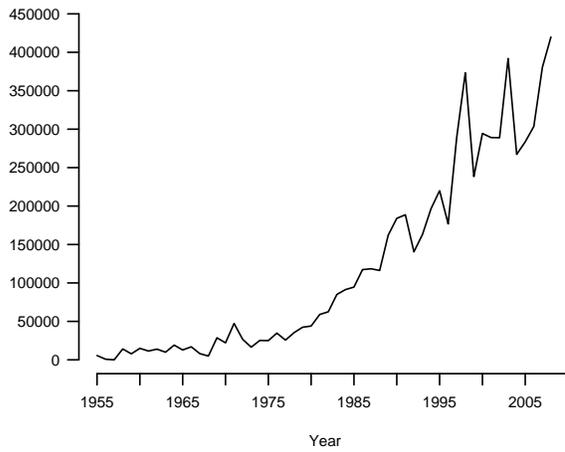
Strata 30-35 Long-tailed duck



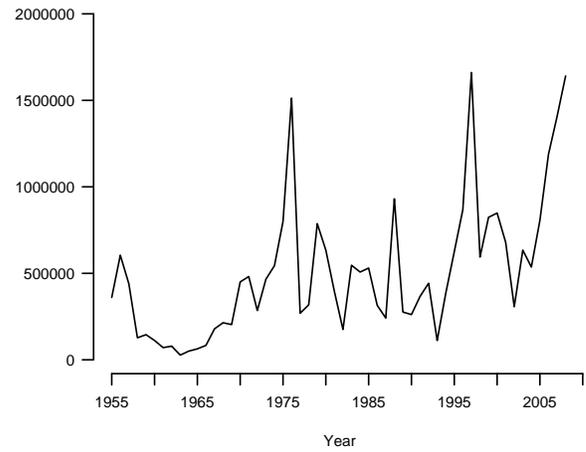
Strata 30-35 Scoters



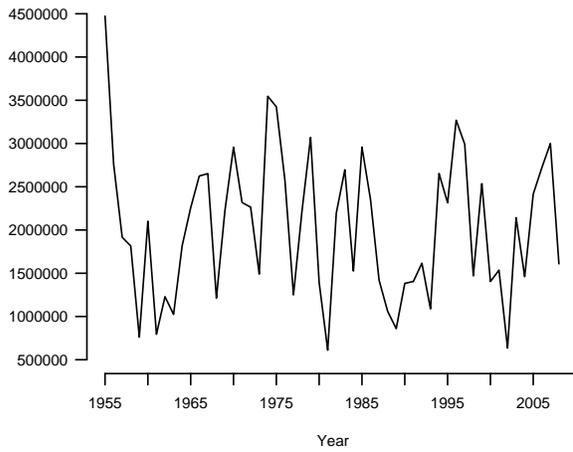
Strata 30-35 Canada goose



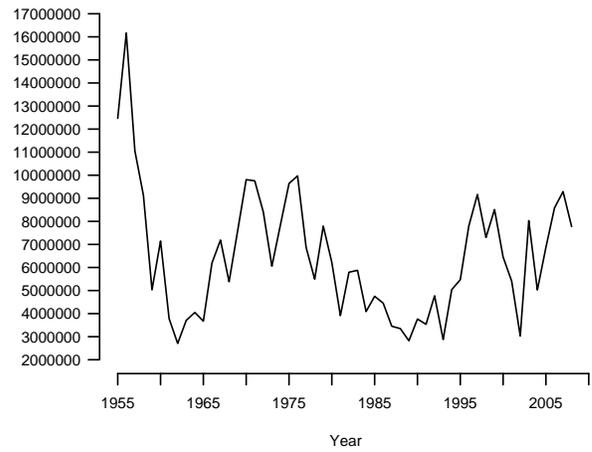
Strata 30-35 American coot



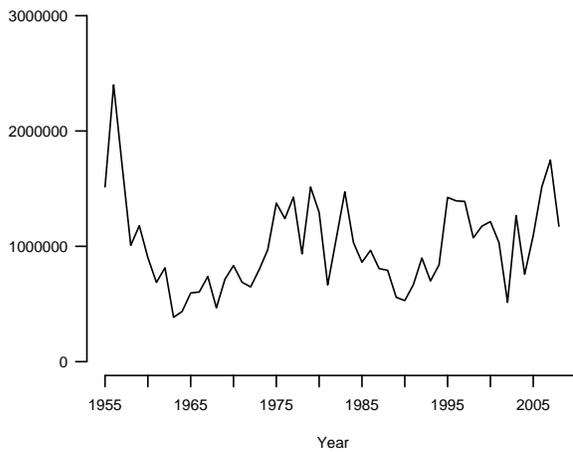
Strata 30-35 Ponds



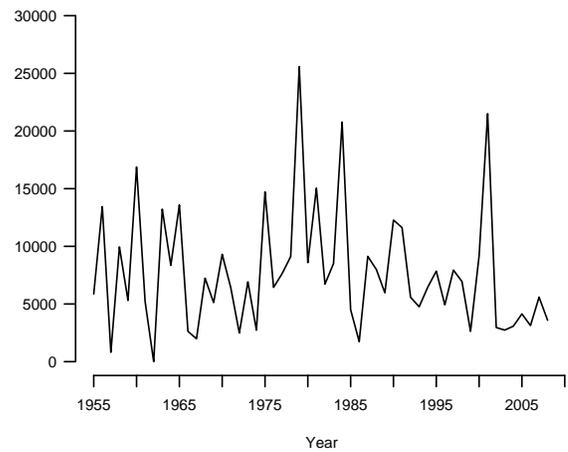
Strata 30-35 Dabblers



Strata 30-35 Divers



Strata 30-35 Miscellaneous



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.

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.

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	2006	2007	2008
Dabbling ducks				
Mallard	1728.9	1831.7	2155.1	1907.1
Am. black duck	0.0	0.8	0.0	0.0
Gadwall	723.0	1202.4	1317.3	1011.2
Am. wigeon	294.2	282.2	324.8	372.0
Am. green-winged teal	359.0	400.6	495.0	560.6
Blue-winged teal	1597.0	2228.1	2379.8	2317.7
N. shoveler	1313.6	1611.6	1655.9	1183.8
N. pintail	857.5	1023.6	960.3	422.8
Subtotal	6873.2	8581.0	9288.1	7775.2
Diving ducks				
Redhead	225.6	435.0	414.2	383.0
Canvasback	162.4	286.7	324.3	166.3
Scaup	381.3	391.0	302.1	256.3
Ring-necked duck	6.9	59.3	22.6	49.8
Goldeneyes	88.5	70.5	60.9	66.2
Bufflehead	91.8	101.4	107.6	116.0
Ruddy Duck	136.9	170.6	516.4	136.5
Subtotal	1093.4	1514.6	1748.1	1174.2
Miscellaneous				
Long-tailed duck	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.3	0.0
Mergansers	4.1	3.1	5.3	3.6
Subtotal	4.1	3.1	5.6	3.6
Total Ducks	7970.8	10098.7	11042.0	8953.0
Canada Goose	283.6	303.5	380.5	419.9
Am. coot	806.9	1188.2	1406.3	1640.9
Ponds	2414.9	2719.0	3000.3	1608.3