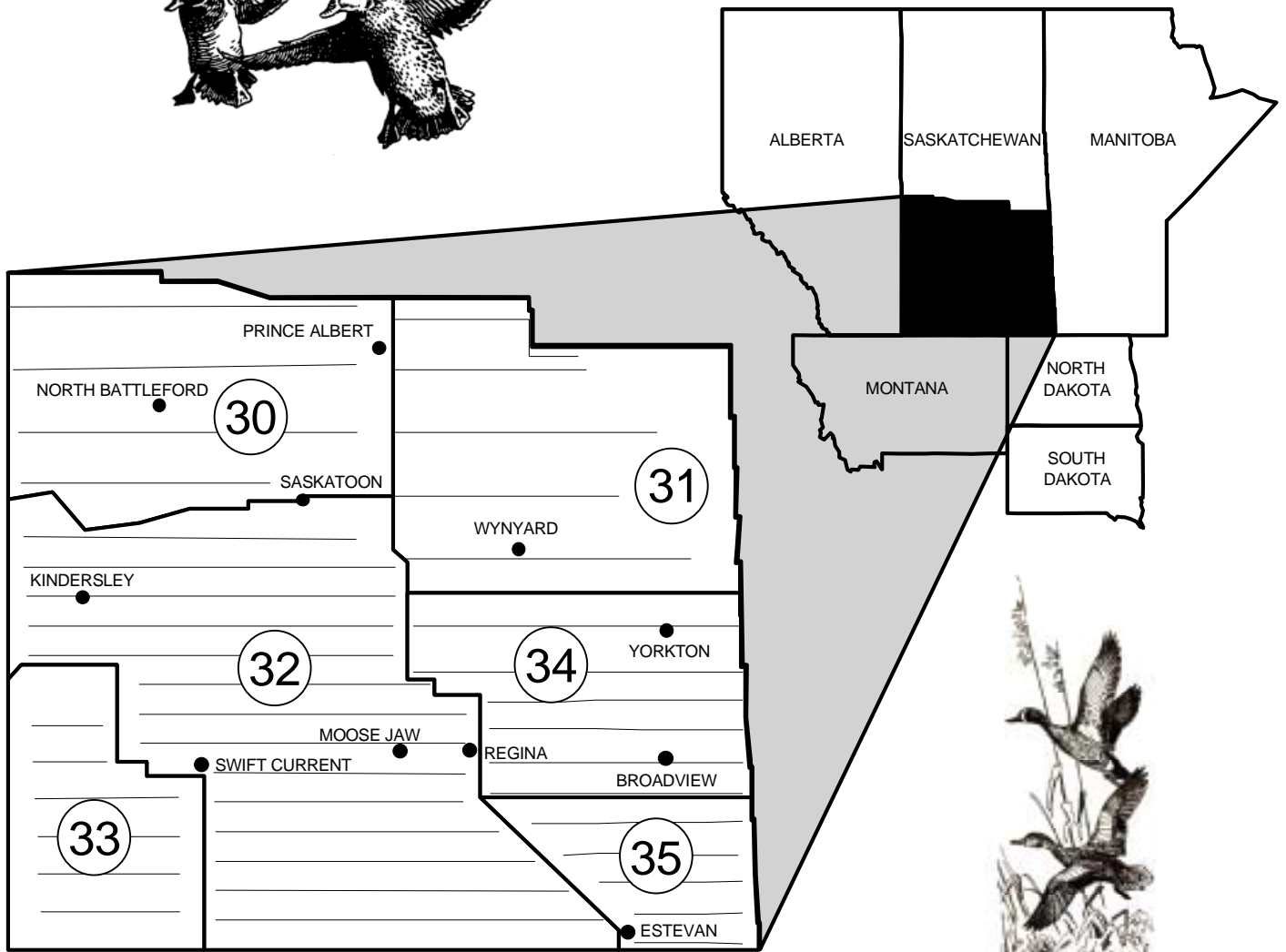
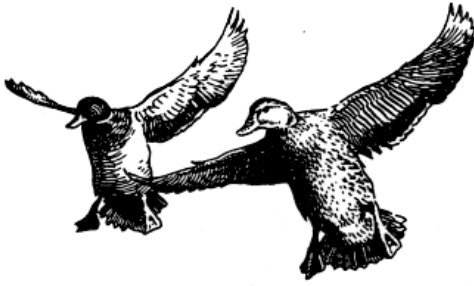


WATERFOWL BREEDING POPULATION SURVEY

SOUTHERN SASKATCHEWAN

2001



U.S. 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 9 – May 26, 2001

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

Pilot/Observer

Karen Bollinger, Flyway Biologist, USFWS

Ground Crew

Crew Leaders:

Dan Nieman, Wildlife Biologist, CWS

Jack Smith, Wildlife Technician, CWS

Keith Warner, Wildlife Technician, CWS

Assistants:

Chris Downie, Student Technician, CWS

Melanie Hosegood, Contractor, Ducks Unlimited Canada

Céleste Lévesque, Volunteer, CWS

Phyllis Nieman, Volunteer, CWS

Chad Park, Student Technician, CWS

Amanda Williams, Student Technician, CWS

Strata 34 and 35

Aerial Crew

Pilot/Observer:

Rod King, Flyway Biologist, USFWS

Observer:

Herb Bell, Wildlife Biologist, USFWS

Ground Crew

Crew Leaders:

Dale Caswell, Wildlife Biologist, CWS

Marc Schuster, Wildlife Technician, CWS

Pat Rakowski, Wildlife Biologist, CWS

Darcy Pisiak, Wildlife Technician, CWS

Martin Van Osh, Wildlife Technician, Ducks Unlimited Canada

Assistants:

Mark Blanchard, Student Technician, CWS

James Galbraith, Student Technician, CWS

Frank Baldwin Jr., Student Technician, CWS

Alain Dupuis, Student Technician, CWS

Bob Carles, General Manager, Sask. Wetland Conservation Corps.

ABSTRACT: The 2001 Waterfowl Breeding Population and Habitat Survey of Southern Saskatchewan was conducted 9 May to 26 May and was consistent in design and coverage to previous years. Below to well-below average winter precipitation and above average winter and spring temperatures negatively impacted wetland and upland conditions across most of the survey area. Although the May pond estimate increased slightly (9%) from the 2000 estimate, it decreased 26% and 23% from the 10-year and the long-term means, respectively. The total duck population estimate (6,463,300) decreased 16%, 10%, and 13% from 2000, the 10-year mean, and the long-term mean, respectively. Percent changes for selected species compared to 2000, the 10-year mean, and the long-term mean are as follows: mallards, -27%, -10%, -22%; northern pintail, 47%, 12%, -47%; blue-winged teal, -22%, -11%, 5%; canvasbacks, 0%, 15%, 25%; scaup (greater and lesser), 18%, -14%, -26%. Only poor to fair nest success is expected across the survey area and recruitment from Southern Saskatchewan is expected to be poor for most of the Province.

METHODS: The procedures used in conducting this year's annual 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 both recording observations and transcribing the data into electronic format. This software integrated point locations {from the aircraft Global Positioning System unit (GPS)} with each bird or pond observation. See previous report (Thorpe 2000) for a more detailed description of the survey program.

Fifty-three (37 in strata 30-33; 16 in strata 34-35) air-ground comparison transects were used to provide visibility correction factors for waterfowl, coot, and pond numbers. The following air-grounds with their associated strata were not completed by the ground crew because of personnel shortages: Environ, 30; Elfros, 31; Hendon, 31; Grand Coulee 32; Gravelbourg, 32; Kincaid, 32; East End, 33. In addition, Lawson (32) and Peterson (31) air-grounds were both shortened from 18 miles to 10 miles.

The aerial survey crew remained the same for strata 34-35, but for the third straight year, a new observer flew in strata 30-33. The primary pilot/observer, Philip Thorpe, was joined this year by Karen S. Bollinger. For the previous 2 years (1999 and 2000), she had been a part of the aerial team surveying the Western Dakotas and Montana. Personnel changes were also made in both ground crews (i.e., two new assistants in each), but key crew leaders remained the same. All new personnel were provided initial training in duck identification, pond classification, and survey procedures. Each was closely monitored for accuracy in identification and compliance with established procedures throughout the survey.

The survey was initiated 9 May and was completed 26 May. A Cessna 206 (Cessna 206 amphibian in strata 34-35) was used as the survey aircraft this year in all strata. Approximately 71 and 23 hours of flight time were required to complete the survey within strata 30-33 and strata 34-35, respectively. One survey day was lost to weather in strata 30-33 and no weather days occurred in strata 34-35.

WEATHER AND HABITAT CONDITIONS: Another below average year for precipitation has resulted in poor to fair upland and wetland habitat conditions across most of the Southern Saskatchewan survey area. Overall, the majority of the survey area during the late summer and fall of 2000 received below average precipitation (60-85% of average), except in the north

central and northeast, which received well-below average precipitation (<40-60% of average) (Agriculture and Agri-food Canada 2001). The exception was an area between Swift Current and Moose Jaw that received well-above average precipitation (150-200% of average). Winter precipitation ranged from average in the southeast, below average in the central and northeast parts of the survey area, and well-below average in the west. Snowfall was below average except in the southeast and east central parts of the Province where it was above average (115-150% of average). Conditions did not improve in April and May and were well-below average in the northwest and northeast and only average in the southeast; extremely dry conditions (<40% of average precipitation) existed over a large part of the west and southwest from Rosetown to Regina south to the U.S. border.

Normal temperatures predominated across Southern Saskatchewan from late summer through October 2000. November and December were characterized by below average temperatures (2-6° C below average) and the late winter and early spring was characterized by average to well-above average temperatures (January 6-10°C above average) (Agriculture and Agri-food Canada 2001). Temperatures during the May survey were average to 1-2 °C above average.

Below average snowfall and dry soil moisture conditions at freeze up resulted in well-below average runoff across most of the survey area, except for the southeast corner of the Province, which reported above average runoff (Sask Water 2001). Noticeably absent from the landscape this year were ephemeral, temporary, and seasonal wetlands that are normally abundant during the spring survey.

As of the 4 June Crop Report (Saskatchewan Agriculture and Food 2001), topsoil moisture, pasture, and hayland conditions were rated as poor to fair across the majority of the survey area; the southeast was again the exception with good conditions reported for topsoil, pasture, and hayland. Seeding progress was ahead of the five-year average (88% seeded) and nearly complete (99% seeded) by the first week in June (Saskatchewan Agriculture and Food 2001).

The May pond estimate (1,535,700) was about the same as the 2000 estimate (1,403,700) but was 26.0% down from the 10-year mean and 23.4% down from the long-term mean (Table 3, Figure 1). Overall, the 2001 May pond estimate was the 18th driest since 1961. The Parkland strata (strata 30 and 31) were most affected by the below average precipitation and both were down about 51% from last year. Stratum 30 pond estimates were the lowest (driest) on record and stratum 31 estimates ranked as the 4th driest on record. Wetlands in the southwest, although slightly improved from last year, still ranked as the 6th driest year on record. Brood habitat during the survey was considered poor across most of the survey area, except for southeast and south central Saskatchewan, which were considered fair to good.

BREEDING POPULATION ESTIMATES: The total duck population estimate for Southern Saskatchewan decreased 15.8% from the 2000 estimate, 9.9% from the 10-year mean, and 13.1% from the long-term mean (Table 2). The total dabbling duck population estimate decreased 16.1% from 2000 and most dabbling species estimates were down this year (Table 2, Figure 1). The 2001 mallard population estimate decreased 27.2% from the 2000 estimate and dropped below the 10-year and long-term means for the first time since 1994 (Figure 1). The blue-winged teal estimate was down 21.9% and 11.2% from the 2000 estimate and the 10-year mean, but remained slightly above the long-term mean (5.0%). The 2001 northern pintail estimate was 46.7% and 11.9% above the 2000 estimate and the 10-year mean, but remained 46.9% below the long-term mean (Table 2). The American wigeon estimate was the lowest since 1990 (Appendix 1) and was 60.6% below the long-term mean (Table 2).

The total diving duck population estimate was down 15.0% compared to the 2000 estimate. Many diving species showed declines compared to last year, although there was no change in the canvasback estimate and the combined scaup (greater and lesser) estimate was up 17.5% this year (Table 2). Scaup continue to be the only true diving duck species that remain below the long-term mean (Table 2).

The American coot estimate was down 19.9% from the 2000 estimate but was still the eighth highest on record and remains 54.6% above the long-term mean (Table 2, Appendix 1). The Canada goose estimate remained about the same as the 2000 estimate and ranked as the fourth highest estimate on record (Appendix 1).

CONCLUSIONS: Another dry year in Southern Saskatchewan has resulted in poor habitat conditions for ducks across the Province. Population estimates for most species of waterfowl (14 of 19) were down this year. Poor to non-existent wetland habitat can probably be attributed to most of the declines for the survey area. Although wetland numbers were up in some strata, parkland strata (30-31) were the driest they have been since the early 1990's. Because these wetlands in the Parklands are generally more permanent and therefore, more resistant to fluctuations in precipitation, this area is important for many waterfowl species when periodic drought cycles dry up the grasslands.

We observed mallards, a common parkland nesting species, in flocks of 3-6 males by the third week of the survey. Generally, this is interpreted to mean that nesting is well underway and that males are preparing to migrate to molting marshes. In a dry year like this one, it may also mean that renesting attempts were already ending by mid to late May.

American wigeon, another species common in the northern forests, also breed successfully on the grasslands and parklands of Saskatchewan. Wigeon estimates were down again this year and population estimates have been in a long-term decline in Southern Saskatchewan since the late 1970's to early 1980's. Early reports from other survey areas have not indicated large influxes of birds that may have come from Saskatchewan.

The decline in some species of diving ducks in the Province may be due to the drought in the Parklands since these species depend on semi-permanent and permanent wetlands. The drought may also explain the decline in some of the sea duck species, such as goldeneyes and buffleheads, all common boreal forest nesters that also breed in the Parklands.

In drought years, many ducks move to areas with better (or more stable) habitat or choose to forego breeding for the year. When the grasslands are dry, northern pintails normally move to the boreal forests and tundra of northern Canada and Alaska. This year, it appears many pintails moved into southeast Saskatchewan to take advantage of the improved wetlands and flooded fields of crop stubble. Many of these pintails may have moved into the area from Montana, Alberta, and western Saskatchewan where extreme drought conditions persist. Numerous flocks and breeding pairs were observed during the beginning of the month; but given the extensive agriculture in the area and the pintail's habit of nesting in crop stubble, it is unlikely that good production and recruitment will come about.

Droughts are a common and important occurrence on the prairies and Southern Saskatchewan appears to be entering a drought cycle that will influence duck populations for the next several years. Waterfowl are highly adapted to these cycles and move in and out of our political boundaries during these cycles. Because of this, it is important when considering current and future increases or decreases in population estimates to use a composite of habitat conditions and

waterfowl estimates from all survey areas to determine if changes in population estimates are local anomalies or regional trends.

LITERATURE CITED

Agriculture and Agri-food Canada. 2001. Drought Watch on the Prairies.
(<http://aceis.agr.ca/pfra/drought.htm>).

Saskatchewan Agriculture and Food. 2001. Crop Report, June 4, 2001. Report Number 10.
(http://www.agr.gov.sk.ca/docs/reports/crop_report/crprpt010604.asp).

Sask Water. 2001. Streamflow Forecast and Water Supply Outlook for Saskatchewan. River Forecast Centre, Basin Operations, Water Resource and Infrastructure Management Division. Moose Jaw, Saskatchewan.

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

Submitted by: Philip Thorpe
Date: July 3, 2001

Table 1. Survey design and May 2001 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 2001 coverage:							
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	

Table 2. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean for Southern Saskatchewan, May 2001.

Species/Ponds	Stratum						% Change From						
	30	31	32	33	34	35	2001 Total	2000 Total	10-Year Mean	Long- Term Mean	2000	10-Year Mean	Long- Term Mean
Ducks													
Dabblers													
Mallard	217.0	235.7	563.8	60.3	334.6	238.1	1649.7	2266.7	1838.7	2116.6	-27.2%	-10.3%	-22.1%
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.2	-100.0%	-100.0%	-100.0%
Gadwall	116.8	58.1	304.4	36.4	107.5	92.2	715.4	650.0	789.4	537.6	10.1%	-9.4%	33.1%
Am. wigeon	27.0	12.3	86.6	10.6	20.7	20.0	177.3	253.1	301.5	449.9	-30.0%	-41.2%	-60.6%
Am. green-winged teal	41.2	42.9	27.6	0.0	45.5	45.0	202.3	294.8	254.8	230.9	-31.4%	-20.6%	-12.4%
Blue-winged teal	105.6	97.5	421.0	41.1	304.8	297.6	1267.5	1622.4	1428.1	1206.7	-21.9%	-11.2%	5.0%
N. shoveler	56.2	40.8	233.1	51.7	143.5	192.8	718.1	899.8	871.9	618.8	-20.2%	-17.6%	16.1%
N. pintail	42.4	51.7	303.4	18.4	78.1	186.0	680.0	463.6	608.0	1281.3	46.7%	11.9%	-46.9%
Subtotal	606.3	539.1	1940.0	218.6	1034.8	1071.6	5410.3	6450.9	6092.9	6441.8	-16.1%	-11.2%	-16.0%
Divers													
Redhead	35.8	21.2	48.8	1.3	76.2	40.9	224.3	323.8	237.8	190.2	-30.7%	-5.7%	17.9%
Canvasback	25.6	41.7	32.4	1.3	92.6	38.5	232.2	232.2	201.5	185.2	0.0%	15.2%	25.4%
Scaup	124.2	38.0	102.7	1.3	37.9	16.6	320.6	272.8	373.1	433.6	17.5%	-14.1%	-26.1%
Ring-necked duck	11.6	6.1	1.2	0.0	9.7	7.7	36.3	63.9	39.2	27.4	-43.2%	-7.4%	32.7%
Goldeneyes	5.3	1.1	0.0	0.0	1.6	2.1	10.2	40.5	40.1	21.8	-74.9%	-74.7%	-53.4%
Bufflehead	31.8	28.6	0.3	0.0	5.6	7.4	73.7	112.8	63.4	31.6	-34.7%	16.1%	132.9%
Ruddy Duck	32.8	5.1	9.7	0.0	64.8	21.9	134.3	168.2	122.5	97.1	-20.2%	9.6%	38.3%
Subtotal	267.2	141.8	195.0	3.9	288.4	135.2	1031.5	1214.2	1077.5	986.9	-15.0%	-4.3%	4.5%
Miscellaneous													
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	--	-100.0%	-100.0%
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	--
Scoters	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	1.4	3.5	--	-78.5%	-91.1%
Mergansers	14.6	3.7	1.3	1.6	0.0	0.0	21.2	9.2	5.3	4.6	130.7%	302.2%	364.2%
Subtotal	14.9	3.7	1.3	1.6	0.0	0.0	21.5	9.2	6.8	8.0	134.0%	216.7%	167.3%
Total Ducks	888.4	684.6	2136.3	224.1	1323.2	1206.8	6463.3	7674.2	7177.2	7436.7	-15.8%	-9.9%	-13.1%
Canada Goose													
Am. coot	61.2	76.8	85.6	11.6	34.1	19.9	289.1	294.4	228.1	84.5	-1.8%	26.7%	242.3%
Am. coot	86.9	6.3	65.0	28.3	290.5	202.2	679.2	848.5	672.5	439.4	-19.9%	1.0%	54.6%
Ponds	139.7	202.4	378.9	42.0	480.1	292.8	1535.7	1403.7	2074.7	2003.9	9.4%	-26.0%	-23.4%

Table 3. 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 Saskatchewan.

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
10-year Mean	290.7	409.1	569.9	105.7	439.0	260.4	2074.7
Long-term Mean	285.5	447.0	498.4	98.0	420.4	254.7	2003.9
Percent Change:							
From 2000	-34.9%	-25.8%	17.5%	14.7%	37.9%	39.9%	9.4%
From 10-year Mean	-51.9%	-50.5%	-33.5%	-60.3%	9.4%	12.4%	-26.0%
From Long-term Mean	-51.1%	-54.7%	-24.0%	-57.2%	14.2%	14.9%	-23.4%

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
Ducks										
Dabblers										
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
Divers										
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										
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	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
Ducks										
Dabblers										
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
Divers										
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										
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	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
Ducks										
Dabblers										
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
Divers										
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										
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	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
Ducks										
Dabblers										
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
Divers										
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										
Oldsquaw	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
Ducks							
Dabblers							
Mallard	1808.5	2142.7	2450.8	2448.7	2528.6	2266.7	1649.7
Am. black duck	0.4	0.0	0.0	3.3	0.4	0.4	0.0
Gadwall	583.6	930.1	1155.3	1342.0	1028.7	650.0	715.4
Am. wigeon	401.8	311.8	381.9	305.5	345.5	253.1	177.3
Am. green-winged teal	271.3	351.2	418.5	271.2	342.2	294.8	202.3
Blue-winged teal	1088.4	2046.6	1974.4	1589.0	2110.9	1622.4	1267.5
N. shoveler	763.9	1212.8	1660.7	790.5	1281.3	899.8	718.1
N. pintail	554.2	807.4	1123.9	551.8	875.2	463.6	680.0
Subtotal	5472.2	7802.8	9165.4	7302.2	8512.9	6450.9	5410.3
Divers							
Redhead	345.1	293.2	308.5	268.1	288.3	323.8	224.3
Canvasback	282.3	283.0	280.1	246.9	253.4	232.2	232.2
Scaup	518.6	462.5	489.5	300.2	287.4	272.8	320.6
Ring-necked duck	36.0	82.9	58.1	30.8	57.2	63.9	36.3
Goldeneyes	41.9	53.0	37.4	66.7	29.5	40.5	10.2
Bufflehead	41.9	53.0	91.6	78.8	88.4	112.8	73.7
Ruddy Duck	158.1	166.7	124.1	82.3	170.3	168.2	134.3
Subtotal	1423.9	1394.2	1389.2	1073.7	1174.5	1214.2	1031.5
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	0.3	0.9	1.5	0.2	0.0	0.0	0.3
Mergansers	7.5	4.0	6.5	6.8	2.6	9.2	21.2
Subtotal	7.9	4.9	7.9	6.9	2.6	9.2	21.5
Total Ducks	6903.9	9201.9	10562.5	8382.9	9690.0	7674.2	6463.3
Canada Goose	220.0	176.8	289.6	373.3	238.4	294.4	289.1
Am. coot	625.2	868.1	1661.1	594.3	823.7	848.5	679.2
Ponds	2314.4	3268.9	2992.0	1470.2	2535.3	1403.7	1535.7

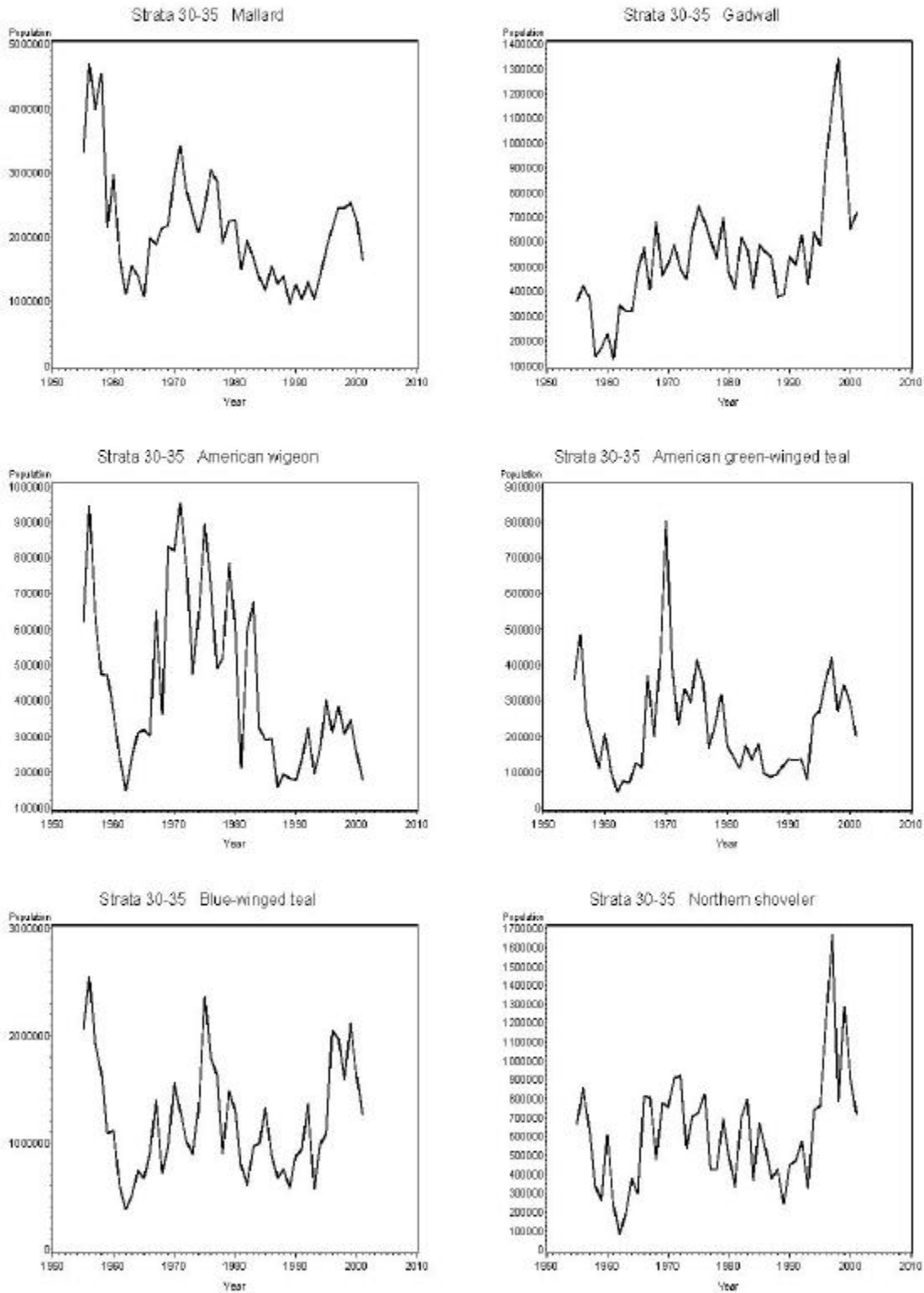


Figure 1. Population indices for individual waterfowl species and ponds for Southern Saskatchewan, May 2001.

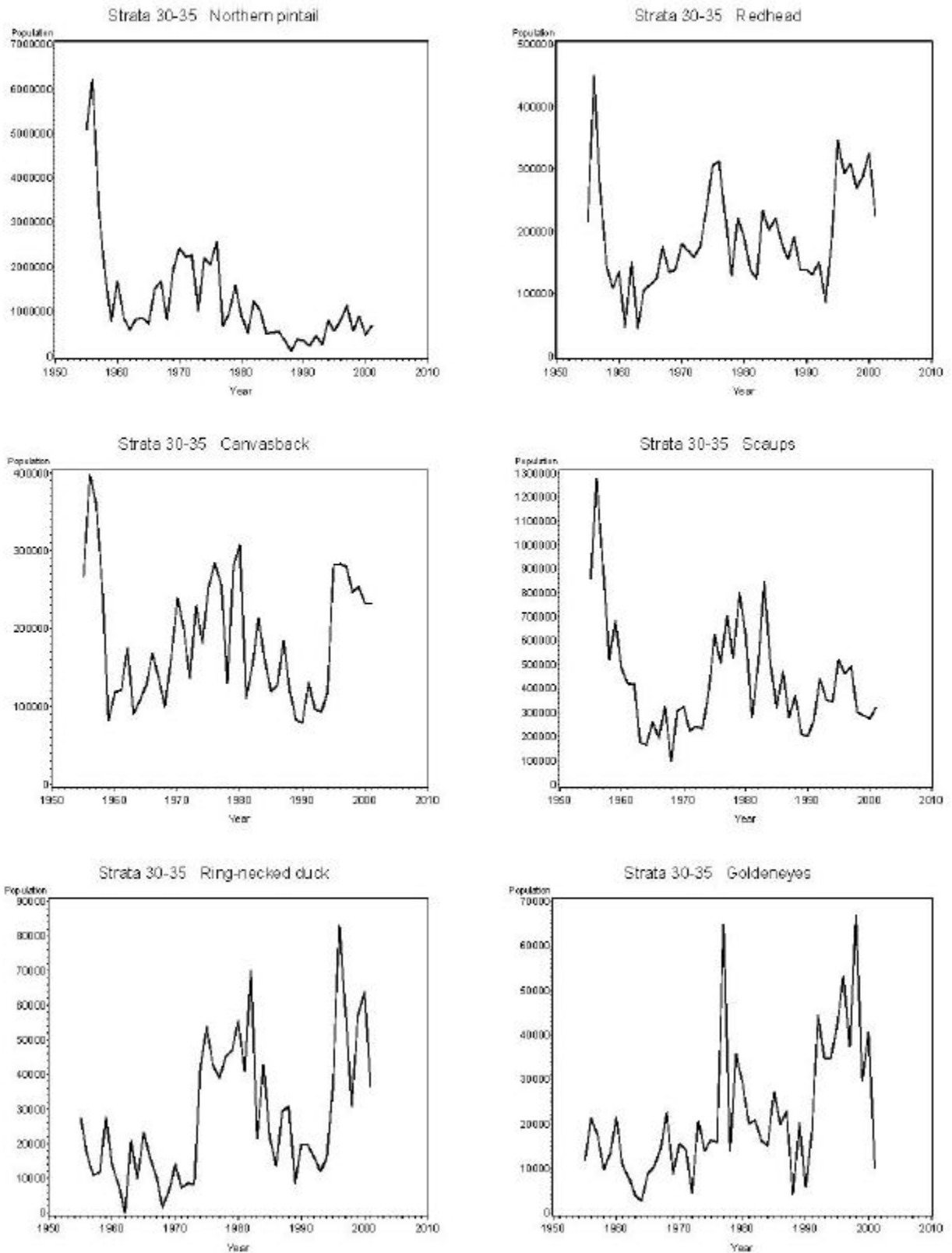


Figure 1. Continued.

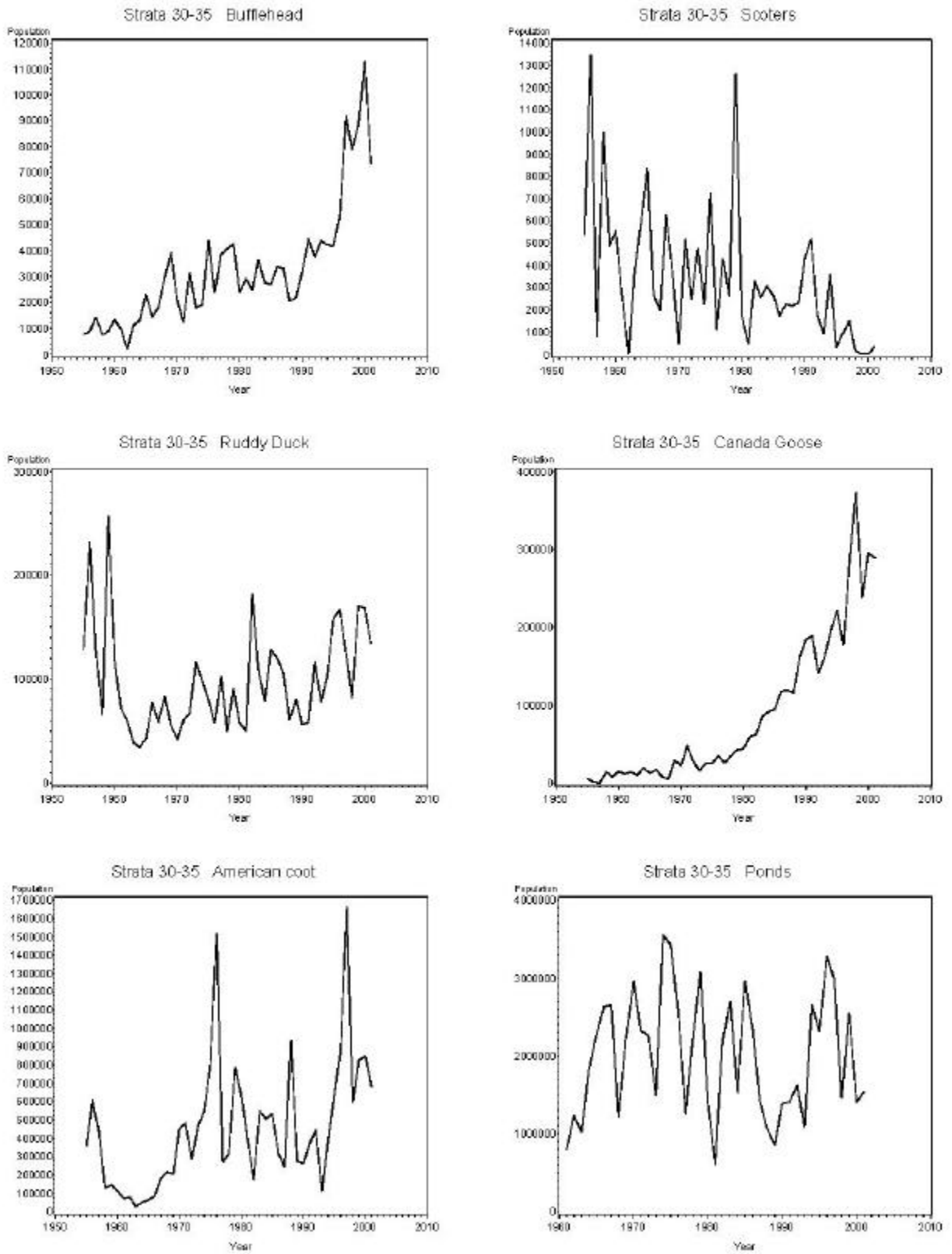


Figure 1. Continued.

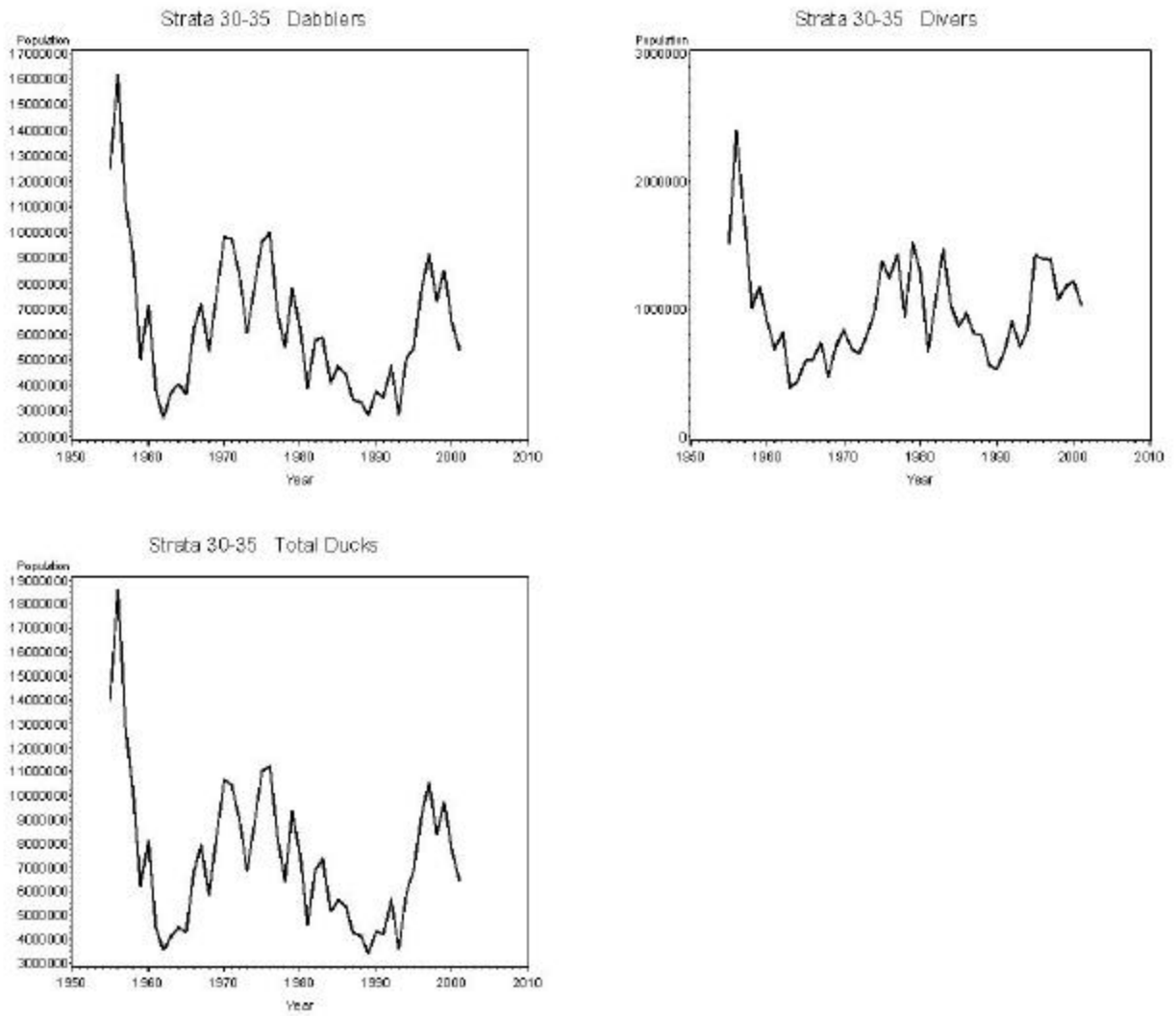


Figure 1. Continued.