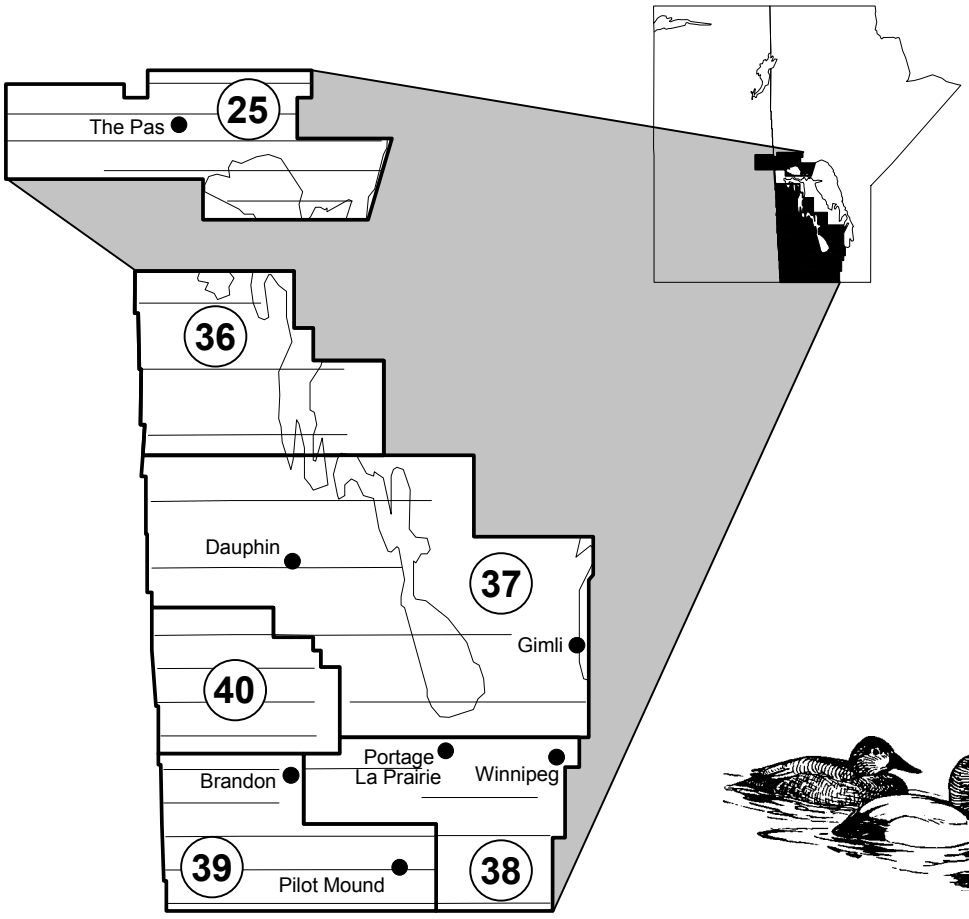
Waterfowl Breeding Population Survey

MAY 2003

Southern Manitoba and Saskatchewan River Delta



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

AND

ENVIRONMENT CANADA
CANADIAN WILDLIFE SERVICE

TITLE: Waterfowl Breeding Population Survey for Southern Manitoba and the Saskatchewan River Delta

STRATA SURVEYED: 25, and 36 through 40

DATES: May 11 - 26, 2003

DATA SUPPLIED BY: United States Fish & Wildlife Service (USFWS)
Canadian Wildlife Service (CWS)
Manitoba Conservation (MC)
Ducks Unlimited, Canada (DUC)

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CWS = Canadian Wildlife Service
DUC = Ducks Unlimited, Canada
MC = Manitoba Conservation

ABSTRACT:

The 2003 survey began on May 11, preceded by an area reconnaissance on May 9. Overall breeding waterfowl numbers were 2.4% higher than in 2002, no significant change from the 10 year mean and - 11% less than the long term mean (Table 1). Dabblers were 9.7% higher than 2002, 7.1 % more than the 10 year mean, yet - 7.8% less than the long term mean. Diving ducks saw negative percentages in all three percent change categories. Waterfowl numbers and habitat conditions varied widely in the survey area. Overall ponds numbers were estimated 50 % higher than 2002. The only stratum (36) to indicate fewer ponds than in 2002, was in the northern portion of the survey area (Table 2).

METHODS:

Methods used in this survey are described in the Standard Operating Procedures (SOP) for Aerial Waterfowl Breeding Ground Population and Habitat Surveys in North America, Section III, revised in 1987. Waterfowl and habitat data were collected using laptop computers and transcribed into a program developed by Jack Hodges MBM-AK.

This is the fourth year that the summary data from Stratum 25 has been included in these survey results. The MBM-PAS calculated all data from previous Stratum 25 summaries and is included in Table 1, Appendix 1, and Figure 1. Pond data is not collected in Stratum 25. As in previous years the Southern Manitoba crew collected data for Stratum 34 and 35 in southeastern Saskatchewan, and forwarded the data to the Southern Saskatchewan crew.

This was the fifth year that King was Pilot/Observer and the first year Burr was Observer for the Southern Manitoba strata. A Cessna 206 amphibious aircraft (N728) was used for the survey. Fourty-five flight hours were needed to survey strata 25 and 36 - 40. During the survey only one day of inclement weather prevented the air crew from flying, but two "wait" days were taken by the air crew while the ground crew finished air/ground segments in the SOP allotted time.

WEATHER AND HABITAT:

In the Prairie Provinces, the winter of 2002-03, was the 15th wettest in 56 years of records. Comparably, 2001-02, was the 50th driest. During this same time period (winter 2002-03) overall temperature was -0.4C below the mean, 31st coolest of 56 years, compared to winter 2001-02 at -4.2C colder and the **coldest** winter on record. However, during late April and into early May areas of southeastern Saskatchewan and southwestern Manitoba received increased precipitation and saw moisture conditions improve rapidly. The border area of central Manitoba and Saskatchewan were also favored with increased precipitation and probably reflect the greatest improvement in wetlands and habitat.

The resultant increased moisture in the survey area occurred in some areas and missed others, such as, eastern and central Manitoba, which still remain dry. Thus, in the areas of significant higher precipitation we found resultant higher water levels than in 2002. Wetlands which had some residual emergent vegetation, and were not previously cultivated through the basin, have water levels extending outside last year's vegetation growth. The down side of the increased water late in spring is that water levels extend into the cultivated, and thus bare dirt area of the basin. This results in very little nesting cover available for dabblers. Due to the timing of the rain, delays in seeding saw many fields cultivated after some duck species had begun nesting. Destruction of nests was suspect when "renewed" courting flights of Blue-winged teal and Mallard were observed during the third week of May.

Overall, habitat appeared to improve over 2002, as was evident in slightly increased numbers of breeding waterfowl. The increased number of ponds and water levels should be a positive factor for brood rearing.

BREEDING POPULATION ESTIMATES:

The 2003 breeding waterfowl population data are listed by strata and species in Table 1. Total duck populations for southern Manitoba were 2.4% higher than 2002, 0.7% above the 10-year mean, but -11 % below the long term mean. A comparison of duck populations for each stratum and each species is, also found in Table 1 and Long-term trend in duck population estimates are found in Appendix 1.

Dabbling duck populations were 9.7 % higher than 2002, 7.1 % higher than the 10-year mean and - 7.8 % lower than the long term mean. Dabbling ducks made up 74.1% of all ducks in the survey area. Of the 1.8 million ducks estimated in the survey area, mallard comprised 30.6% and blue-winged teal 24.8%, respectively of the total. All dabbler species had positive population gains over 2002, except gadwall (-29.6%) and wigeon (-62.1%).

Diving ducks were -13.8% lower than 2002, -11% less than the 10-year mean, and -17.5% lower than the long-term mean. Redhead (+3.2%), scaups (+14%), goldeneyes (+123.8%), and bufflehead (+10.2%) were above 2002 estimates. Canvasback (- 42.1%), ring-necked duck (- 32.4%) and ruddy duck (- 57 %) were under 2002 estimates.

Annual May pond estimates are summarized for 2003 in Table 1, and summarized by year in Table 2. The 2003 pond estimates were 50% higher than 2002, but - 21.4% and -27.7% less than the 10 year mean and long term mean, respectively. Stratum 37 through 40 all indicated increased pond estimates over 2002, while stratum 36 was -31.4% less than 2002 estimates. This estimate of fewer ponds in 2003 may be more of a reflection of the difficult task of estimating actual ponds in 2002 because of missing data, rather than an actual decrease of ponds in 2003.

All segments, as well as all air to ground comparison segments were flown in 2003 and are included in the estimates of ducks and ponds. Table 3. summarizes the survey design of each strata with the expansion for each area.

Figure 1, illustrates the 2003 population trend graphs for all duck species from 1955 through 2003, including Canada geese, coots, and ponds.

CONCLUSIONS AND OBSERVATIONS:

The continued general drought conditions were evident in 2003. Although water conditions improved over 2002, waterfowl did not respond accordingly. If water and habitat continue to improve in 2004 it is likely that waterfowl will make a more positive response. The exceptional increase in the habitat in neighboring Saskatchewan seemed to be where waterfowl numbers responded.

The increase in precipitation late in spring in some areas of the survey area appeared too little, too late. The “late water” seemed to have a negative impact on waterfowl, as it delayed farm field operations to the extent that seeding and other field cultivation activities probably destroyed some early breeding species’ nesting efforts. Although pond number estimates were above 2002 they remain almost 30 % less than the long term average. There will need to be a general increase in precipitation prairie wide before breeding season 2004 to result in major increases in waterfowl populations. One positive aspect from the late rains this spring, which prevented cultivation activities in water basins, is that there should be more residual cover left for next year’s nesting.

ACKNOWLEDGMENTS:

Thanks to Dave and Jim Wall of Maple Leaf Aviation, Brandon, Manitoba, for the care of N728, their friendship and aviation advice, and the Regina Aerocentre for completing our 100 hour inspection on very short notice (due to the OAS last minute change in time available to next 100 hour inspection on N728).

Thanks to the Canadian Wildlife Service for their continued coordination and efforts to complete the ground portion of the survey.

Submitted by: Rodney J. King, Flyway Biologist, DMBM, Mare Island, CA
Date: July 5, 2003

Table 1. 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 Manitoba.

	Stratum										% Change From		
Species/Ponds	25	36	37	38	39	40	2003 Total	2002 Total	10-Year Mean	Long-Term Mean	2002	10-Year Mean	Long-Term Mean
Ducks													
Dabblers													
Mallard	49.2	20.2	146.6	36.5	130.8	170.8	554.2	499.2	477.2	493.2	11.0%	16.1%	12.4%
Am. black duck	0.0	0.0	0.0	0.0	0.6	0.0	0.6	0.3	0.5	0.4	87.1%	21.8%	38.5%
Gadwall	7.9	0.8	7.4	2.7	29.0	54.2	101.9	144.9	102.4	73.8	-29.6%	-0.5%	38.2%
Am. wigeon	0.8	0.0	1.3	0.4	8.4	5.7	16.6	43.7	40.7	98.0	-62.1%	-59.3%	-83.1%
Am. green-winged teal	1.2	0.0	8.8	2.2	29.9	7.6	49.6	43.6	55.8	63.6	13.7%	-11.1%	-22.0%
Blue-winged teal	27.7	10.4	71.1	3.9	127.0	207.3	447.5	335.7	358.2	468.3	33.3%	24.9%	-4.5%
N. shoveler	6.4	2.0	13.8	4.4	44.3	58.5	129.4	119.5	148.5	124.1	8.3%	-12.8%	4.3%
N. pintail	0.4	0.0	2.6	1.5	19.7	15.5	39.6	34.0	67.5	132.0	16.6%	-41.3%	-70.0%
Subtotal	93.5	33.4	251.6	51.6	389.7	519.7	1339.4	1220.9	1250.7	1453.5	9.7%	7.1%	-7.8%
Divers													
Redhead	11.3	0.0	9.7	0.8	32.1	28.3	82.1	79.5	98.6	87.1	3.2%	-16.7%	-5.7%
Canvasback	8.3	1.6	12.4	0.0	10.5	17.3	50.1	86.4	93.0	82.0	-42.1%	-46.1%	-38.9%
Scaups	29.7	1.8	11.1	1.7	26.1	8.0	78.3	68.6	123.1	205.5	14.0%	-36.4%	-61.9%
Ring-necked duck	23.1	0.7	14.9	12.4	4.2	7.7	63.1	93.3	54.4	46.1	-32.4%	15.8%	36.8%
Goldeneyes	28.3	6.7	25.2	0.0	2.8	21.3	84.2	37.6	41.4	33.8	123.8%	103.4%	149.3%
Bufflehead	5.3	3.1	15.9	0.0	4.8	15.1	44.0	40.0	47.0	31.8	10.2%	-6.3%	38.3%
Ruddy Duck	11.6	0.0	5.6	1.2	19.6	14.1	52.1	121.3	52.5	64.0	-57.0%	-0.8%	-18.6%
Subtotal	117.4	13.8	94.7	16.0	100.0	111.8	453.8	526.8	510.0	550.2	-13.8%	-11.0%	-17.5%
Miscellaneous													
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	--	-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	1.0	0.0	0.0	0.0	0.0	0.0	1.0	1.3	1.6	3.6	-19.4%	-35.4%	-72.1%
Mergansers	6.8	3.8	2.0	0.4	0.2	0.3	13.4	16.0	32.0	23.3	-15.9%	-58.1%	-42.4%
Subtotal	7.8	3.8	2.0	0.4	0.2	0.3	14.4	17.2	33.9	27.0	-16.2%	-57.5%	-46.5%
Total Ducks	218.7	51.0	348.2	68.0	489.9	631.7	1807.6	1764.9	1794.6	2030.7	2.4%	0.7%	-11.0%
Canada Goose	10.9	3.0	30.0	3.8	10.1	27.7	85.5	92.9	65.0	35.6	-7.9%	31.5%	140.3%
Am. coot	6.3	0.0	8.4	0.8	52.6	45.7	113.7	439.8	290.7	216.8	-74.2%	-60.9%	-47.6%
Ponds	0.0	44.0	143.1	59.6	140.3	103.9	490.9	327.2	624.8	678.5	50.0%	-21.4%	-27.7%

Table 2. Long-term trend in adjusted May pond estimates (thousands) by stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean for Southern Manitoba. Note that ponds are not counted in stratum 25.

	Stratum						
Year	25	36	37	38	39	40	Total
1961		33.1	289.8	36.3	117.7	109.6	586.6
1962		25.2	313.5	31.9	74.8	88.2	533.6
1963		47.8	247.7	53.2	162.5	168.8	679.9
1964		77.4	289.6	38.6	253.2	250.3	909.1
1965		141.8	443.8	72.6	246.0	218.4	1122.6
1966		115.8	433.2	62.8	242.0	212.4	1066.3
1967		129.0	503.3	70.1	182.7	234.9	1120.0
1968		39.8	153.9	27.4	46.3	67.9	335.3
1969		59.6	153.1	36.8	126.3	87.3	463.1
1970		79.4	368.2	63.1	262.2	262.2	1035.2
1971		69.9	239.9	60.5	200.7	183.5	754.6
1972		103.8	431.5	48.1	180.4	250.0	1013.7
1973		82.6	137.6	33.6	97.7	82.4	433.9
1974		141.7	559.5	67.2	324.6	356.2	1449.1
1975		59.7	264.2	53.3	296.2	264.1	937.6
1976		75.5	444.0	61.7	376.4	231.0	1188.7
1977		35.6	208.2	39.2	67.0	90.0	439.9
1978		129.9	312.5	31.7	114.9	191.3	780.3
1979		67.6	268.5	42.1	202.5	211.7	792.4
1980		32.4	103.2	31.6	58.5	60.9	286.7
1981		30.4	107.8	23.1	47.5	54.0	262.8
1982		27.0	131.1	25.3	88.2	87.4	359.0
1983		89.2	271.7	34.3	163.3	153.9	712.4
1984		69.3	159.1	36.5	86.3	58.2	409.4
1985		45.4	234.6	29.0	83.7	103.6	496.3
1986		94.3	383.8	70.2	197.1	202.2	947.5
1987		42.1	165.2	37.6	119.4	133.8	498.1
1988		108.2	318.5	43.4	48.8	113.6	632.5
1989		36.6	99.1	38.2	63.5	46.8	284.2
1990		80.7	348.5	35.7	52.4	145.2	662.4
1991		28.8	147.1	32.4	70.8	114.0	393.1
1992		61.9	261.9	54.0	150.3	136.6	664.8
1993		48.3	216.8	55.7	63.4	99.2	483.4
1994		45.8	157.9	37.0	89.4	65.6	395.7
1995		79.7	332.1	65.2	239.5	172.9	889.4
1996		76.9	371.2	54.5	177.2	150.1	829.8
1997		99.9	467.5	84.5	157.4	159.2	968.5
1998		43.0	194.9	44.3	124.1	85.7	492.1
1999		36.8	185.6	32.6	204.6	151.1	610.7
2000		45.6	184.0	27.5	91.3	117.3	465.7
2001		31.1	324.7	122.9	144.0	163.1	785.8
2002		64.4	77.8	45.8	52.0	87.2	327.2
2003		44.0	143.1	59.6	140.3	103.9	490.9
10-year Mean		57.1	251.3	57.0	134.3	125.1	624.8
Long-term Mean		67.5	269.2	47.4	146.3	148.1	678.5
Percent Change:							
From 2002		-31.70%	83.80%	30.10%	169.90%	19.20%	50.00%
From 10-year Mean		-23.10%	-43.00%	4.60%	4.50%	-16.90%	-21.40%
From Long-term Mean		-34.80%	-46.80%	25.80%	-4.10%	-29.80%	-27.70%

Table 3.Survey design for Southern Manitoba and the Saskatchewan River Delta, May, 2003.

	Stratum						
Survey Design	25	36	37	38	39	40	Total
Sq. Mi. in the stratum	7,644	5,500	16,485	5,655	6,552	4,536	46,372
Sq. Mi. in sample	135	58.5	135.0	54.0	121.5	67.5	571.5
Linear Mi. in sample	540	234	540	216	486	270	2,286
No. of transects in sample	5	3	4	3	5	4	24
No. of segments in sample	30	13	30	12	27	15	127
Expansion factor	56.622	94.017	122.111	104.722	53.926	67.200	

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

Species/Ponds	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Ducks										
Dabblers										
Mallard	549.9	811.4	852.4	1116.6	702.5	647.2	442.6	292.5	428.6	534.7
Am. black duck	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.5	2.1	0.5
Gadwall	31.4	18.9	23.6	34.1	35.5	28.0	62.2	41.2	84.3	70.7
Am. wigeon	162.3	140.2	120.8	392.7	292.2	106.4	130.4	100.1	118.4	166.3
Am. green-winged teal	36.9	17.8	29.6	74.7	57.1	21.7	67.3	21.0	69.3	10.7
Blue-winged teal	514.8	313.3	399.1	1198.2	1302.2	729.2	543.5	439.2	538.4	490.9
N. shoveler	57.4	66.5	93.4	84.3	198.3	158.0	138.1	75.9	159.9	167.8
N. pintail	335.1	296.2	210.4	208.6	149.0	256.7	115.3	122.5	196.4	141.6
Subtotal	1687.9	1665.1	1729.1	3109.1	2736.7	1947.1	1499.4	1093.0	1597.3	1583.2
Divers										
Redhead	66.3	69.9	55.2	99.1	123.7	88.6	77.7	50.6	105.7	117.9
Canvasback	80.5	79.6	54.4	138.3	109.0	131.3	123.1	58.3	100.6	101.3
Scaups	225.3	235.3	281.6	598.0	416.6	289.1	271.1	184.3	269.5	218.6
Ring-necked duck	27.2	25.3	7.0	18.4	55.7	13.0	17.7	21.2	46.2	24.1
Goldeneyes	17.8	13.3	17.5	34.6	87.7	53.9	25.4	29.0	16.4	10.6
Bufflehead	16.3	7.5	2.9	10.9	14.7	9.6	23.1	7.8	20.6	14.3
Ruddy Duck	28.9	28.6	24.9	24.6	81.3	62.5	95.3	55.0	106.2	74.9
Subtotal	462.3	459.7	443.4	923.9	888.8	648.0	633.4	406.2	665.3	561.7
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	3.4	7.5	0.9	10.3	10.1	0.0	1.6	0.5	1.4	2.2
Mergansers	14.2	2.6	0.6	1.2	1.6	5.0	1.9	4.7	8.7	19.3
Subtotal	17.6	10.1	1.6	11.4	11.7	5.0	3.5	5.3	10.1	21.6
Total Ducks	2167.8	2134.9	2174.1	4044.4	3637.1	2600.2	2136.3	1504.5	2272.7	2166.4
Canada Goose	5.6	31.5	0.0	8.8	3.5	9.5	7.4	11.0	9.0	8.4
Am. coot	18.8	45.7	27.8	77.0	286.6	121.5	239.7	52.0	112.5	117.2
Ponds							586.6	533.6	679.9	909.1

Species/Ponds	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Ducks										
Dabblers										
Mallard	372.0	431.5	468.3	435.1	659.7	757.2	458.3	576.6	370.1	421.0
Am. black duck	0.1	0.4	1.1	1.6	0.2	0.2	0.3	0.0	0.0	0.0
Gadwall	54.5	86.6	98.0	71.0	58.5	59.8	51.8	86.5	86.9	58.1
Am. wigeon	177.0	130.4	96.3	144.5	173.5	155.3	112.6	150.9	163.6	108.3
Am. green-winged teal	39.4	60.9	83.2	58.5	174.8	92.3	135.1	125.7	134.1	112.9
Blue-winged teal	360.5	285.1	679.3	496.9	575.5	819.4	450.0	533.6	478.7	703.6
N. shoveler	141.0	135.7	202.1	99.1	172.7	147.0	93.1	146.3	76.8	106.1
N. pintail	145.5	110.0	180.5	82.5	311.3	276.2	169.0	227.8	95.6	310.5
Subtotal	1290.0	1240.6	1808.8	1389.2	2126.2	2307.4	1470.1	1847.4	1405.8	1820.5
Divers										
Redhead	175.4	106.2	113.2	72.9	85.9	101.0	82.7	75.8	76.7	91.8
Canvasback	126.7	93.3	109.4	80.2	73.8	71.2	80.2	42.8	68.4	40.7
Scaups	205.4	183.1	246.9	188.3	158.9	227.1	188.2	191.3	138.2	348.4
Ring-necked duck	31.6	35.8	53.9	97.3	35.5	53.5	72.3	47.4	29.8	54.6
Goldeneyes	16.9	7.6	19.6	9.5	17.5	23.6	39.2	16.0	15.6	34.7
Bufflehead	21.3	19.2	49.1	25.7	34.5	21.4	31.2	28.6	11.3	27.6
Ruddy Duck	76.2	102.3	82.5	131.2	58.0	69.5	59.8	34.5	49.7	62.8
Subtotal	653.4	547.5	674.6	605.1	464.2	567.4	553.5	436.4	389.7	660.6
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.1	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	2.2	5.7	3.0	9.1	1.3	5.3	6.1	1.7	5.6	17.4
Mergansers	15.0	22.9	7.0	12.4	15.0	11.2	7.4	16.6	13.0	27.3
Subtotal	17.2	28.7	10.0	21.7	16.4	16.5	13.5	18.3	18.5	44.7
Total Ducks	1960.6	1816.7	2493.4	2016.0	2606.7	2891.4	2037.1	2302.0	1814.1	2525.7
Canada Goose	8.1	9.7	4.4	21.0	17.1	21.0	25.1	22.2	30.4	22.3
Am. coot	121.0	62.5	150.3	433.8	139.3	184.2	148.0	172.8	127.3	242.4
Ponds	1122.6	1066.3	1120.0	335.3	463.1	1035.2	754.6	1013.7	433.9	1449.1

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

Species/Ponds	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Ducks										
Dabblers										
Mallard	476.5	679.8	482.8	429.9	417.1	596.2	467.5	521.2	427.7	233.4
Am. black duck	0.5	0.5	0.9	0.4	0.6	1.2	0.0	0.0	0.0	0.0
Gadwall	52.5	62.2	81.8	61.7	81.0	144.5	70.7	58.3	52.6	17.3
Am. wigeon	77.6	78.6	41.7	73.2	82.4	121.1	103.9	67.0	48.4	38.5
Am. green-winged teal	66.0	122.5	70.3	141.2	40.1	35.9	40.7	36.2	52.9	43.2
Blue-winged teal	410.2	722.5	435.8	383.6	536.8	528.0	386.0	496.2	314.3	201.6
N. shoveler	69.3	166.3	62.1	89.6	95.2	75.8	116.1	157.8	135.5	65.3
N. pintail	225.9	263.5	43.1	107.1	201.2	73.6	71.6	110.5	106.2	31.8
Subtotal	1378.5	2095.9	1218.6	1286.6	1454.5	1576.2	1256.6	1447.1	1137.7	631.1
Divers										
Redhead	82.7	86.2	108.8	80.6	76.5	65.4	150.9	94.8	60.5	20.1
Canvasback	90.9	127.4	74.3	57.7	60.9	75.9	101.1	65.5	48.0	56.2
Scaups	312.0	267.9	164.6	307.2	149.8	222.0	249.1	169.3	243.5	120.2
Ring-necked duck	59.7	21.8	14.6	35.8	44.6	88.3	87.8	47.6	50.0	17.5
Goldeneyes	43.7	42.5	14.4	78.2	39.9	33.2	85.9	41.9	42.8	7.4
Bufflehead	29.6	42.8	32.5	45.9	20.3	33.0	35.6	30.3	32.8	26.5
Ruddy Duck	52.6	45.7	40.2	56.3	23.3	104.7	117.0	161.8	60.6	38.9
Subtotal	671.2	634.3	449.4	661.6	415.4	622.6	827.3	611.0	538.2	286.8
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	12.1	6.1	4.2	4.1	9.0	0.8	1.0	1.5	6.0	1.5
Mergansers	36.8	12.5	15.0	25.7	43.0	54.9	51.9	15.9	70.6	24.9
Subtotal	49.0	18.6	19.1	29.8	52.0	55.8	52.9	17.5	76.6	26.4
Total Ducks	2098.7	2748.8	1687.1	1978.1	1921.8	2254.5	2136.8	2075.7	1752.4	944.3
Canada Goose	20.9	9.3	24.3	27.5	25.7	39.5	35.8	31.9	47.1	40.2
Am. coot	312.5	485.5	267.4	128.0	196.3	499.7	404.2	197.7	135.2	55.6
Ponds	937.6	1188.7	439.9	780.3	792.4	286.7	262.8	359.0	712.4	409.4

Species/Ponds	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Ducks										
Dabblers										
Mallard	329.2	431.8	332.0	340.4	315.3	363.1	340.6	389.4	354.7	436.5
Am. black duck	0.6	0.8	0.7	0.2	0.2	0.2	0.4	1.1	0.0	0.3
Gadwall	64.3	105.7	71.2	70.3	69.6	120.1	79.7	111.9	94.4	57.6
Am. wigeon	53.5	63.4	39.5	43.6	56.1	58.1	55.0	52.5	31.9	47.3
Am. green-winged teal	24.2	55.4	46.2	38.3	40.4	41.2	39.3	138.5	24.5	32.1
Blue-winged teal	225.2	386.0	291.5	369.0	314.5	343.1	272.2	430.4	355.6	172.2
N. shoveler	99.9	165.5	115.6	122.8	79.2	95.2	88.9	151.3	79.5	64.8
N. pintail	45.8	124.0	77.9	36.4	19.6	57.4	26.6	100.2	40.5	52.5
Subtotal	842.6	1332.5	974.5	1021.0	894.9	1078.4	902.6	1375.3	981.1	863.3
Divers										
Redhead	51.3	38.3	52.2	53.6	33.5	85.0	99.9	116.3	44.2	51.2
Canvasback	60.4	57.1	42.5	56.0	53.4	68.5	65.3	80.0	69.5	100.2
Scaups	155.6	309.1	169.5	151.1	101.9	152.9	101.4	221.2	123.0	154.7
Ring-necked duck	42.7	34.5	55.5	57.2	33.8	49.3	47.4	113.8	52.6	42.2
Goldeneyes	66.7	22.8	33.8	34.5	21.1	40.6	15.0	36.1	24.8	6.5
Bufflehead	41.7	31.9	40.3	33.1	33.8	35.6	48.2	67.2	28.0	49.1
Ruddy Duck	44.5	69.9	81.0	68.1	57.9	72.7	80.5	60.8	74.6	15.1
Subtotal	462.8	563.7	474.8	453.7	335.4	504.6	457.6	695.5	416.5	419.0
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.3
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	3.6	0.3	1.6	3.4	0.2	0.3	1.8	4.8	3.0	1.5
Mergansers	35.6	28.0	23.6	28.3	25.1	47.8	23.6	27.2	24.8	26.1
Subtotal	39.2	28.3	25.2	31.6	25.3	48.1	25.3	32.0	28.3	28.8
Total Ducks	1344.7	1924.5	1474.5	1506.3	1255.6	1631.2	1385.6	2102.8	1426.0	1311.1
Canada Goose	43.2	45.2	38.5	74.6	97.0	52.9	61.1	67.2	74.4	52.6
Am. coot	78.7	217.9	163.2	773.9	129.8	180.3	129.1	266.0	173.5	44.6
Ponds	496.3	947.5	498.1	632.5	284.2	662.4	393.1	664.8	483.4	395.7

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

Species/Ponds	1995	1996	1997	1998	1999	2000	2001	2002	2003
Ducks									
Dabblers									
Mallard	514.8	439.6	502.2	507.2	585.6	455.7	476.0	499.2	554.2
Am. black duck	0.6	0.0	0.0	0.7	0.0	3.0	0.0	0.3	0.6
Gadwall	94.4	106.1	97.7	106.1	118.1	90.9	114.1	144.9	101.9
Am. wigeon	50.4	50.9	41.8	34.0	42.8	42.0	22.2	43.7	16.6
Am. green-winged teal	55.6	132.0	75.5	48.7	48.9	63.5	33.7	43.6	49.6
Blue-winged teal	328.9	340.4	326.0	303.9	497.6	401.0	520.6	335.7	447.5
N. shoveler	172.8	187.4	166.5	115.4	169.5	194.0	215.2	119.5	129.4
N. pintail	123.8	85.4	65.0	64.9	62.8	45.7	100.7	34.0	39.6
Subtotal	1341.2	1341.7	1274.7	1180.8	1525.3	1295.9	1482.5	1220.9	1339.4
Divers									
Redhead	133.5	89.7	79.4	170.7	87.4	125.6	124.5	79.5	82.1
Canvasback	111.3	115.6	90.7	88.9	98.1	94.8	74.4	86.4	50.1
Scaups	183.9	215.0	116.4	77.2	120.6	83.4	88.3	68.6	78.3
Ring-necked duck	46.2	45.4	49.5	41.1	37.1	70.7	66.5	93.3	63.1
Goldeneyes	41.3	64.6	40.0	51.9	44.0	50.7	52.5	37.6	84.2
Bufflehead	50.7	36.5	63.0	47.7	62.2	46.0	46.5	40.0	44.0
Ruddy Duck	47.5	40.7	39.1	15.7	56.0	48.8	66.2	121.3	52.1
Subtotal	614.4	607.6	478.2	493.1	505.5	519.9	519.0	526.8	453.8
Miscellaneous									
Oldsquaw	0.5	0.0	0.0	0.9	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
Scoters	0.7	1.4	3.4	3.0	0.8	0.7	0.0	1.3	1.0
Mergansers	14.1	32.2	67.4	18.5	50.7	31.8	38.7	16.0	13.4
Subtotal	15.2	33.6	70.8	22.4	51.5	32.5	38.7	17.2	14.4
Total Ducks	1970.9	1982.9	1823.6	1696.3	2082.3	1848.3	2040.2	1764.9	1807.6
Canada Goose	62.1	66.9	79.2	60.3	50.9	57.3	53.9	92.9	85.5
Am. coot	199.7	284.9	288.5	537.4	182.4	410.2	346.1	439.8	113.7
Ponds	889.4	829.8	968.5	492.1	610.7	465.7	785.8	327.2	490.9

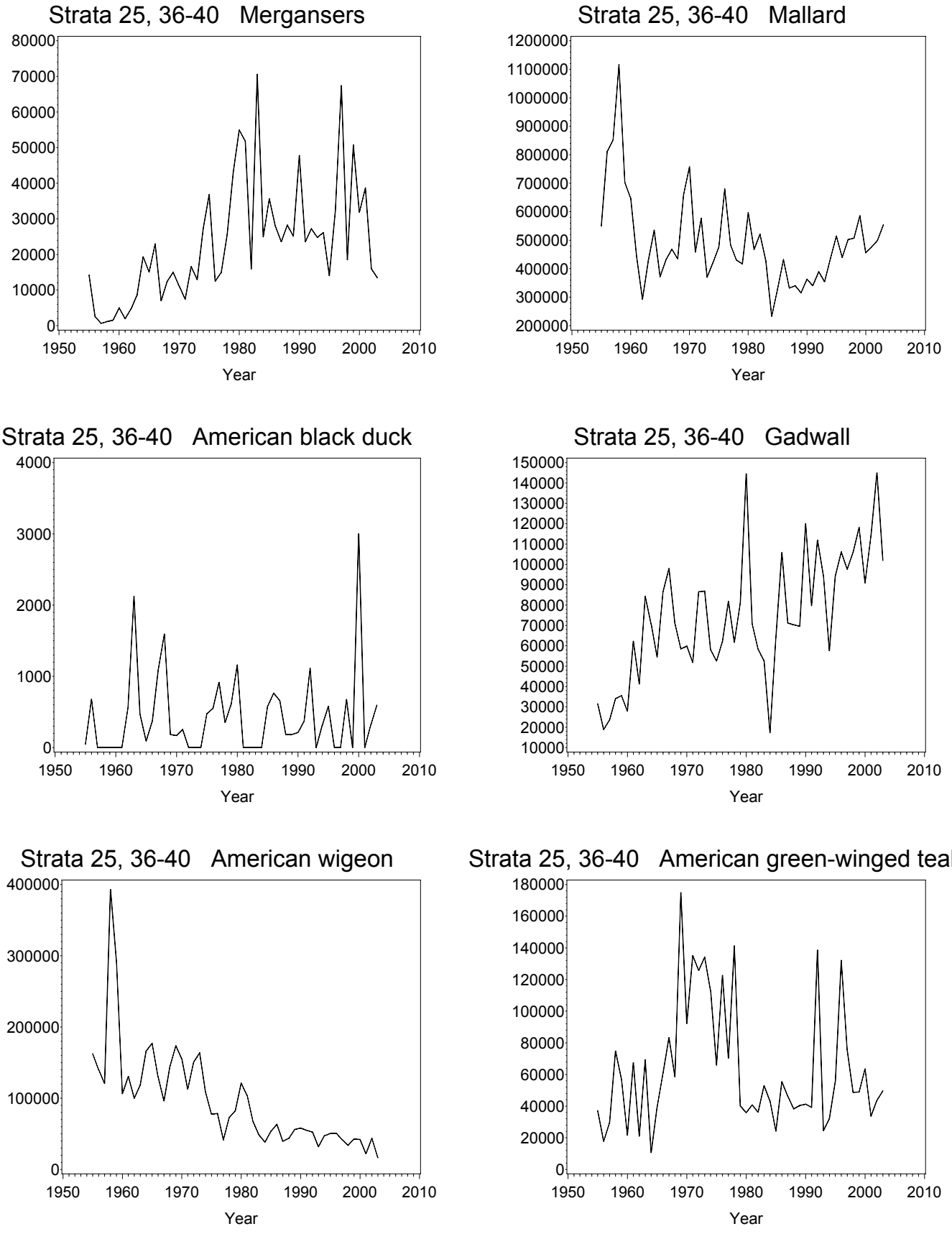
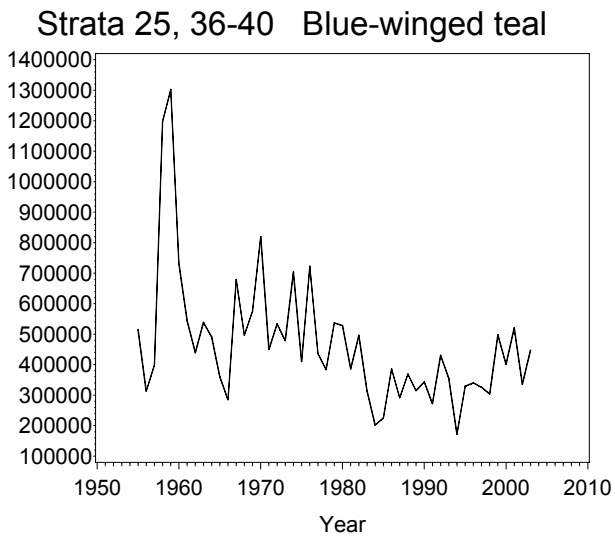
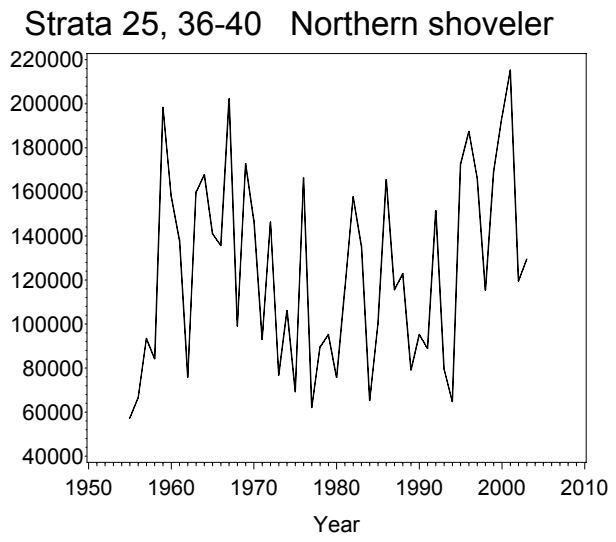
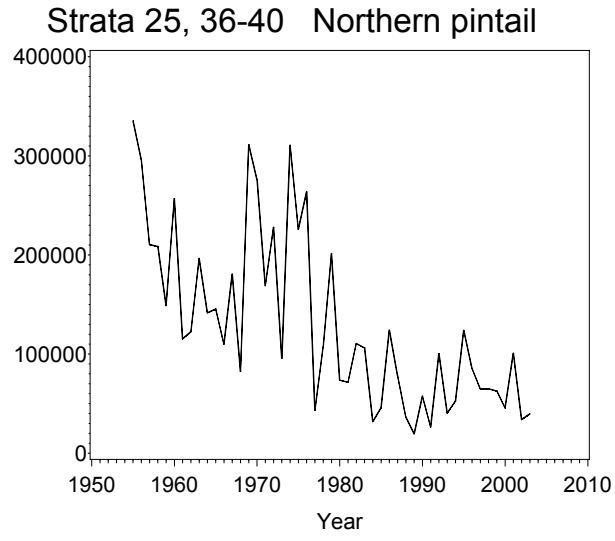
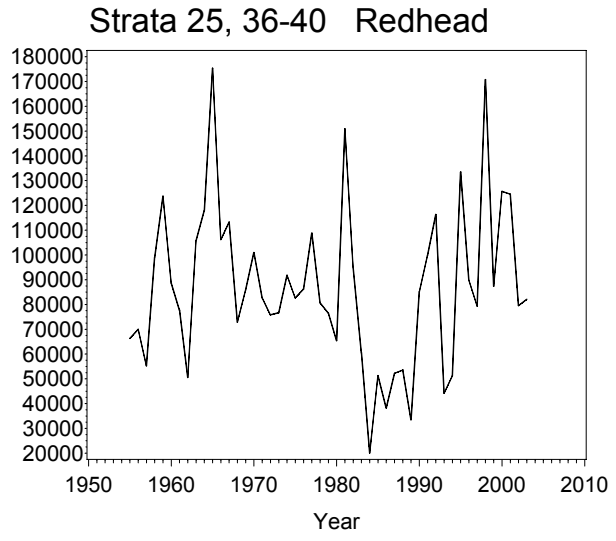


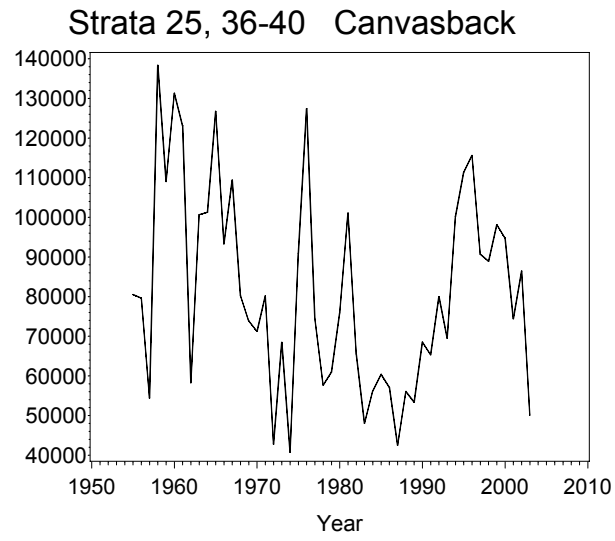
Figure 1. Population estimates for the individual waterfowl species and ponds on an annual basis.











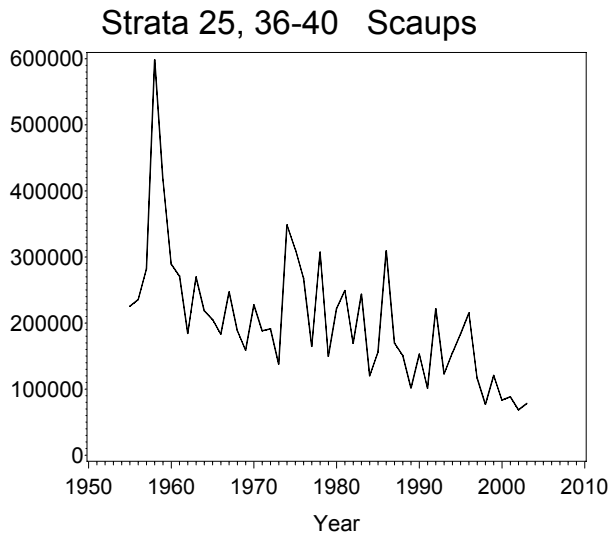
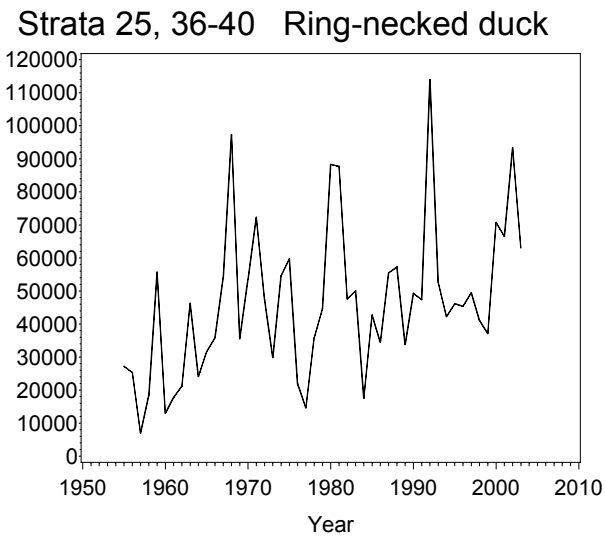
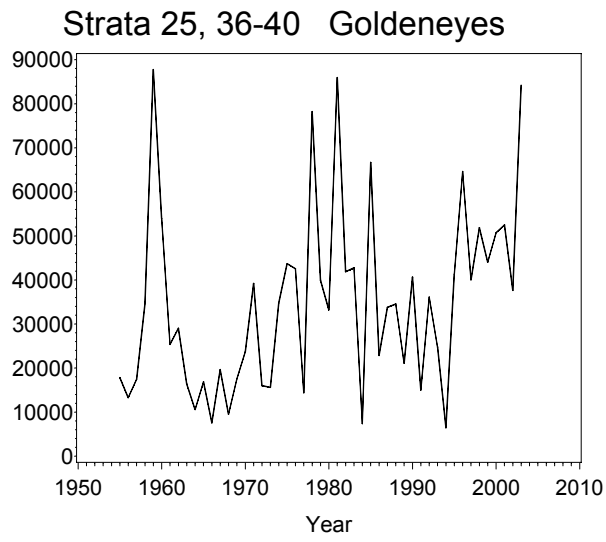
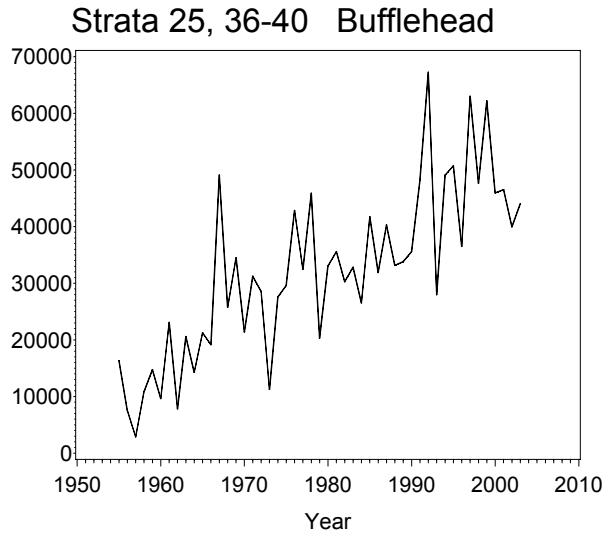
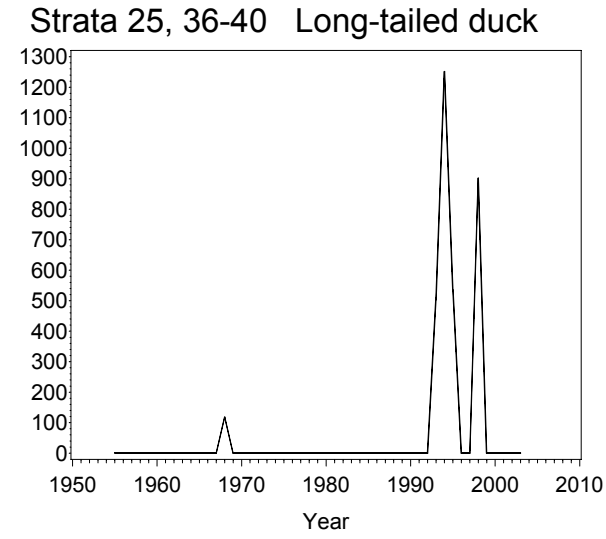


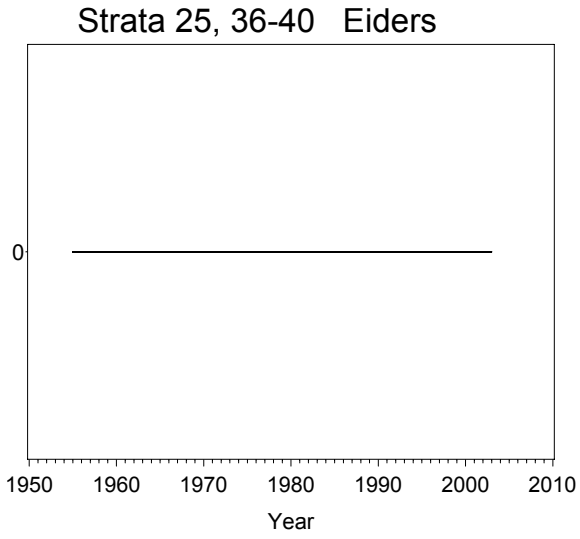
Figure 1 continued.

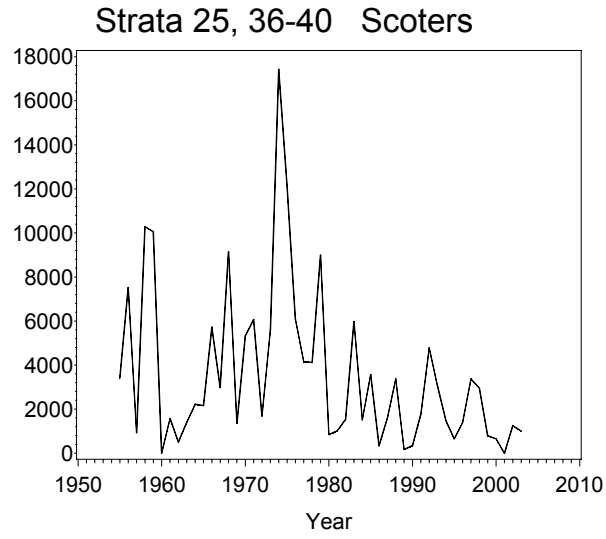












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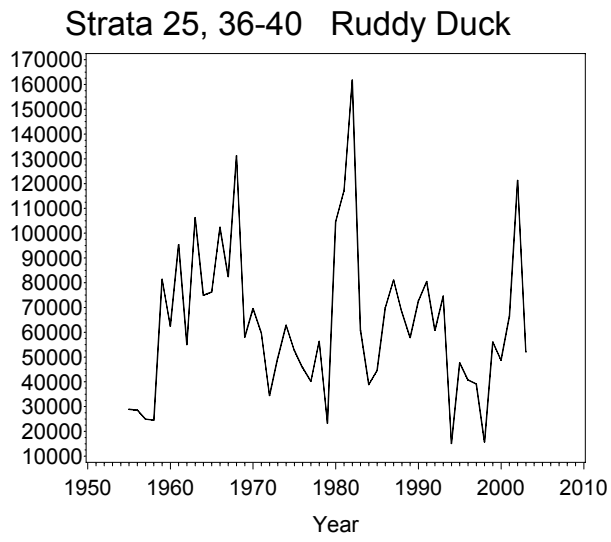

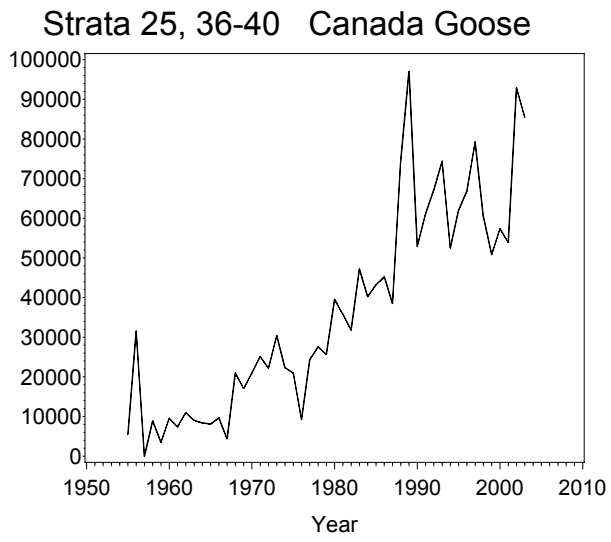

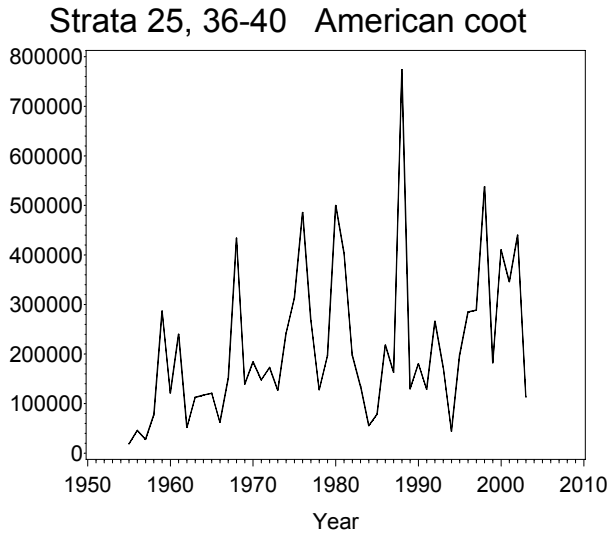

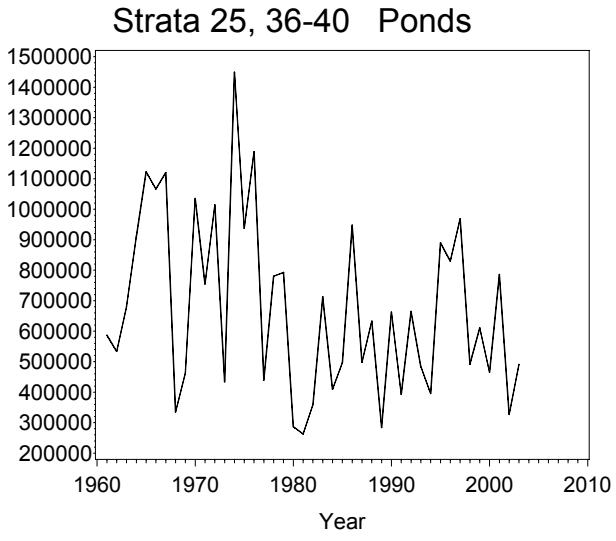

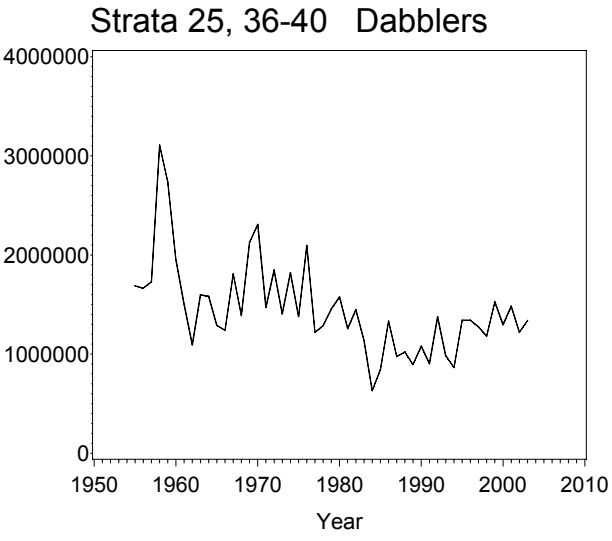

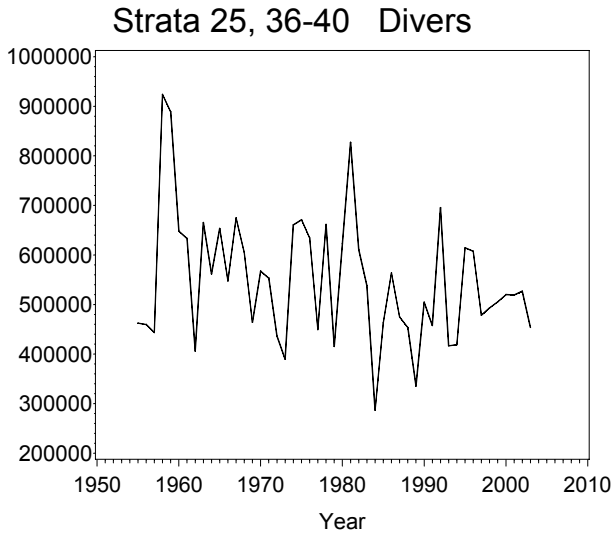

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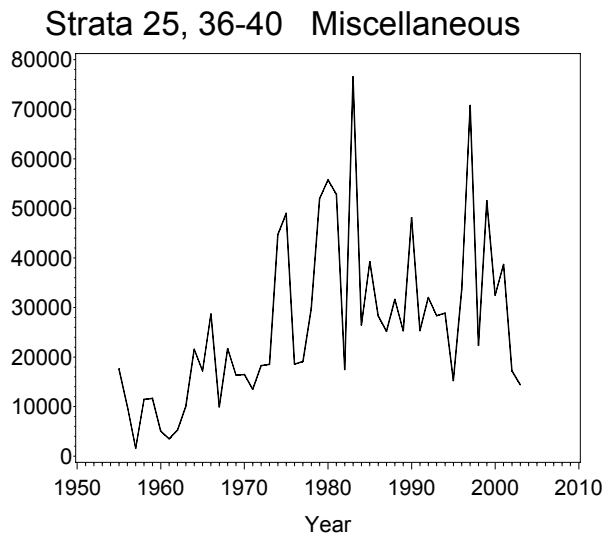

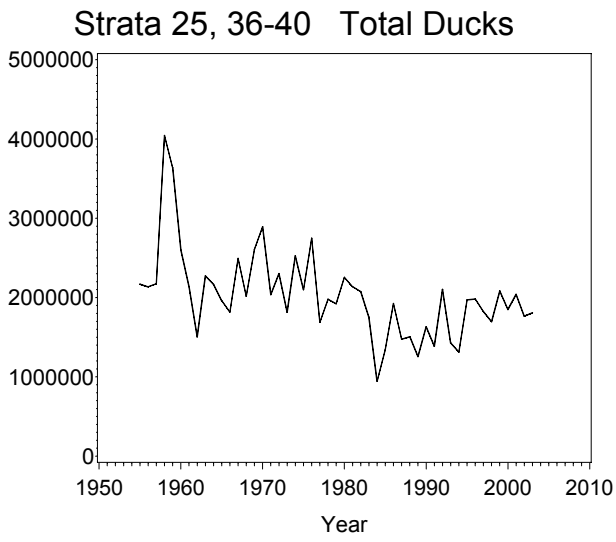

Figure 1 continued.