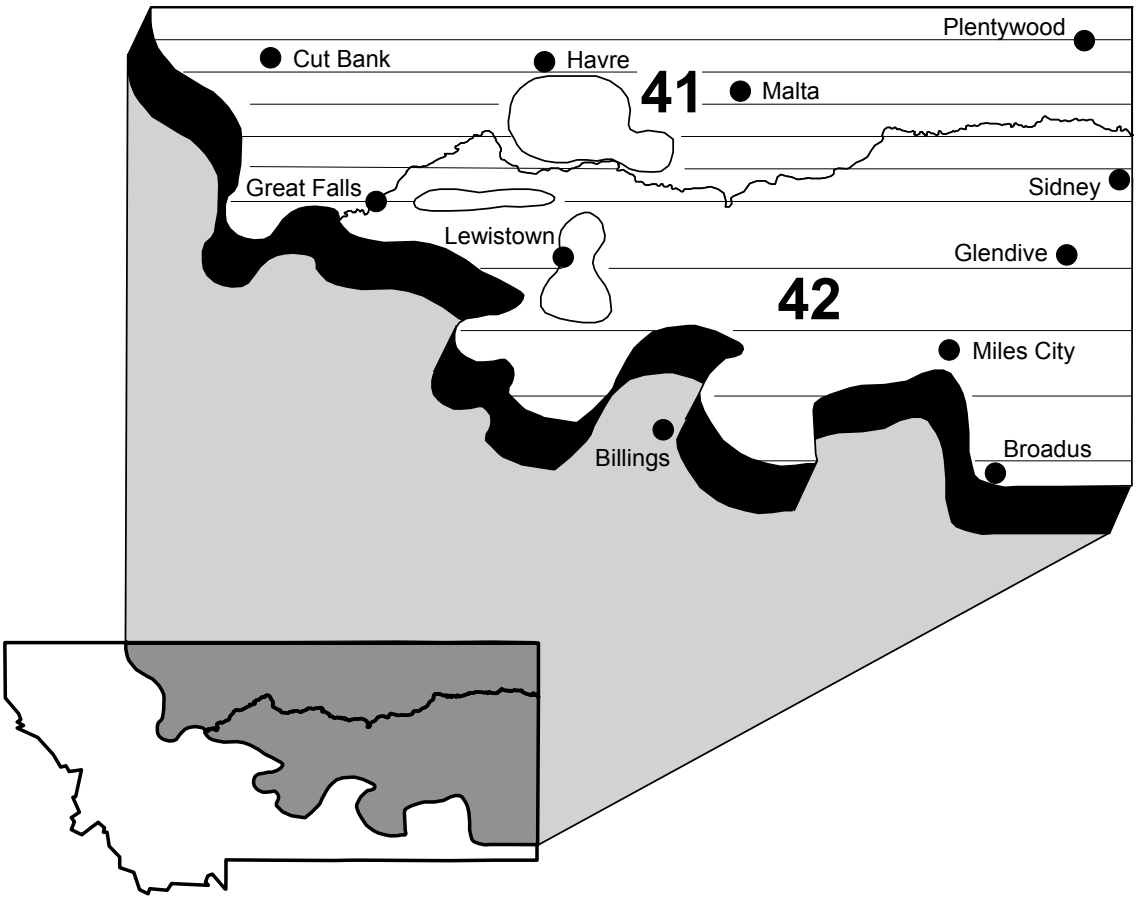
Waterfowl Breeding Population Survey
for

MONTANA



2007

Title: **Waterfowl Breeding Population Survey for Montana**

Strata Surveyed: 41 and 42

Dates: May 1 – 19 2007

Data Supplied by: U.S. Fish and Wildlife Service (USFWS)
Division of Migratory Bird Management(WPS)

Aerial Crew:

Pilot/Observer: Ray Bentley
Flyway Biologist, USFWS/DMBM
Corvallis, OR

Observer: Peter Fasbender
Endangered Species Grants Coordinator, USFWS-ES
Fort Snelling, MN

Ground Crew:

Leader: Pam Garrettson
Wildlife Biologist, USFWS-PHAS
Laurel , MD

Assistants: Kathy Fleming
Landscape Ecologist, USFWS-PHAB
Laurel, MD

Emily Silverman
Statistician, USFWS-PHAB
Laurel, MD

Abstract:
The 2007 waterfowl breeding population survey for Montana was completed on May 19 with all transects and segments covered as outlined in the survey design. The central portions of both strata have benefited from two years of increased winter/spring precipitation with an easing of an existing soil moisture deficit, increased pond numbers, generally robust residual and seasonal upland vegetation, and large areas of favorable habitat. The central regions of stratum 41 and 42 contained relatively good habitat conditions while the western Front Range region as well as the eastern border with the Dakotas appeared only fair to marginal. Recorded pond numbers increased 57% from 2006 and were 80% over the long term mean. Waterfowl numbers remain somewhat static in overall numbers with Mallards showing an 8% decline from 2006 and 11% increase from the long term mean. Northern pintail and scaup, both showed continued declines remained 49% and 67% below long term means respectively. Canada goose population estimates exhibited a 38% increase from 2006, a value 73% above the long term mean. The somewhat marginal habitat conditions observed in the western and eastern portions of stratum 41 and 42 were offset by relatively favorable conditions encountered in the central regions with overall production expected to be comparable to long term means and a slight improvement over 2006 and the recent past.

Methods:

Procedures followed in conducting this survey are described in the Standard Operating Procedures for Aerial Breeding Ground Surveys in North America, Section III, revised 2003. The survey design for Montana included 14 air/ground comparison segments comprising 5.7% of the total 193 segments flown. All segments specified in the survey design were counted (Table 3).

Air crew members met in Pierre SD on April 29 followed by ground crew members on April 30. Initial ground reconnaissance for waterfowl breeding status was conducted on April 30 north of Pierre and continued through May 1 west of Pierre. Aerial observer orientation and training also began on April 30 and continued through May 1 and included wetland classification assessment, waterfowl species identification and social grouping determination, recording system orientation, and aircraft safety procedures. Aerial surveys were initiated on May 2 and continued through May 19. Flights were canceled on May 3, 6, and 14 due to adverse weather conditions. Data files and habitat summaries for stratum 43 and 44 (Western Dakotas) were submitted to John Solberg, Central Flyway Biologist/Pilot, for inclusion in the overall Dakotas report.

A single engine Cessna 182R (N702) was used to conduct the survey over approximately 73 flight hours. Survey personnel included Ray Bentley as pilot/observer, Peter Fasbender as observer, Pam Garrettson as ground crew leader, Kathy Fleming and Emily Silverman as ground crew assistants. 2007 represented Ray's 7th season flying Montana surveys and Pete's first season as observer. Pam Garrettson had served as ground crew leader in the Eastern Dakotas with 2007 representing her third season in Montana.

As in other years, aerial crews utilized on-board laptop computers for data recording. Geo-referencing was accomplished in 2007 using an on-board wireless GPS receiver independent of the aircraft navigational GPS system. Data files were generated after daily transcription followed by compilation and summaries using software developed by Jack Hodges (Ret) USFWS/DMBM, Juneau, AK. Processed data files were submitted to Mark Otto, FWS Population and Habitat Assessment Branch (PHAB) in Laurel MD for application of visibility correction factors and generation of population abundance estimates.

Weather and Habitat Conditions:

Weather conditions during the survey consisted of above normal temperatures often exceeding 75F and no precipitation. Winter of 2006-2007 in eastern Montana was considered to be relatively mild with near normal levels of precipitation overall. A late March storm system added 4-8 inches of snow to much of the region maintaining PDI and SPI indices at or near 100% of normal. However an unseasonably warm and dry April and early May served to degrade portions of the region in habitat quality with evidence of seasonal wetland desiccation occurring. As was observed during the 2006 surveys, areas of eastern Montana that are historically considered to be relatively moist, containing conditions more favorable to waterfowl nesting, were dry in 2007 compared to portions of the region normally observed to be dry which were much improved over the recent past. An example was the far western survey segments boarding the Front Range. Receiving much of its moisture from runoff this region often contains favorable habitat in the form of fragmented streams and beaver ponds, however by mid May, much of the area was considered only fair to marginal. Other areas benefited from spring precipitation with robust upland growth, exhibited good carry over vegetation, and adequate emergent and riparian vegetation. CRP lands were also observed to be in fair condition offering good nest cover in areas were native prairie continued to be only marginal.

As is normal for the entire region the quality of habitat at any given location is largely dependent on the path of precipitation producing storms. With the general weather system movement from

southwest to northeast these isolated cells produce a diverse and somewhat random mosaic of habitat qualities often with a relatively sharp gradient between poor and favorable areas. The high line region bordering Alberta and Saskatchewan was rated as fair and poor with many dry basins and fragmented streams. In this area CRP acreage served to mitigate the lack of both upland growth and residual nesting cover. However, to the south, the habitat improved with the region east and south of Malta appearing good with most basins full, streams flowing, and seasonal type III wetlands relatively abundant. Further south near Lewistown conditions were favorable to the east and less favorable to the west and south again demonstrating a complex spatial array of favorable vs. unfavorable habitat polygons. Personal communications with Jim Hansen, Montana Fish, Wildlife and Parks, support the aerial observations and indicate that precipitation occurring after the region was surveyed did contribute to maintenance of early May conditions with some degree of improvement noted. Overall, conditions appear similar to 2006 with some improvement in the central portion of both stratum 41 and 42 yet continued drought conditions occurring in the west, east, and northern segments. Late May and June precipitation in both marginal and favorable regions could improve habitat quality for late nesting species, re-nesters, and brood survival.

Stratum 41 (North of the Missouri River)
This region showed pond (class III wetlands and larger) estimates at 223,500, a 51% increase from 2006 and over 70% above the long term mean (Table 2). Regional PDI and SPI indices concur with our observations of an area containing more water bodies than is usually found. The central portion of the stratum contributed to the increase in observed pond numbers as winter and spring precipitation filled many basins for the first time in several years. In contrast the Front Range region, experiencing a relatively dry cycle and containing many stream systems of high complexity further increased recorded pond numbers with the addition of fragmented stream channels. As is historically the case, an anomaly occurs where full flow streams as would occur during a wet cycle are recorded as fewer water bodies than fragmented stream channels as occurs under a dry cycle. A similar phenomenon is likely occurring along the far north border with Canada as topography in this region again results in much of the recorded “ponds” actually occurring as stream channels. Upland cover throughout most of the stratum has responded to the relatively good precipitation and observations of emergent habitat in standing water show adequate development. The observed increase in wetland density, particularly in the central region, combined with good residual and upland spring growth should mitigate the portions of the strata showing more marginal conditions with an overall average production potential.

Stratum 42 (South of the Missouri River)
The area south of the Missouri River showed much improvement over recent and long term observations. Recorded pond estimates of 251,200 reflect a 64% increase over 2006 and nearly 90% over 10 year and long term means. Again it is felt that much of the calculated increase is a partial result of the many cases of stream fragmentation occurring in the western and far eastern portions of the strata. This combined with the much improved habitat in the central region and a lowering of the relatively long term soil moisture deficit of the recent 6 years. While no precipitation occurred during the survey the expected precipitation that normally occurs in June will serve to further maintain the current habitat status. Across the strata upland vegetation development was good, emergent growth appeared robust and the frequently observed cases of waterfowl crowding as occurs during dry cycles were slight. As in stratum 41, it is expected that the central regions exhibiting relatively good waterfowl production habitat will offset the western and eastern areas yielding an average production year.

Breeding Population Estimates

Initial ground observations and pre-survey aerial observations indicated that survey timing was appropriate with all key species present and breeding behavior apparent. Instances of waterfowl crowding as is often observed during years of drought were much less prevalent than in the recent past..

Population estimates for dabbler species totaled 924,700 (Table 1) and represent a value similar to 2006 (- 4.7%) and is 8.5% over the long term mean. Mallards showed a slight reduction from 2006 at 319,700 (- 8.3%) but 2007 estimates were 11% over long term mean values. Increases were noted for gadwall, American widgeon, and green-winged teal from 2006 and long term mean observations. Northern pintail however showed a 58% decline from 2006, and nearly a 50% decline from the long term mean.

Estimates for diving species declined 9% from 2006 at 42,500 representing a 29% decline from the long term mean. Only canvasback and ring-necked duck displayed increases from 2006 and from historic data bases with scaup and redhead showing declines for 10-year, long term, and short term endpoints. It should be noted that diving species are poorly represented in this region with relatively few individuals being encountered. These low numbers combined with relatively high variability often produce high percentage changes from mean values. Such is the case with bufflehead, ruddy duck, and canvasback, all infrequently encountered and showing large departures from historic values.

Canada goose estimates showed a 38% increase from 2006 at 97,300. This value remains 24% above the 10-year mean and 73% above the long term mean.

American coot numbers continue to fluctuate widely with an over 400% increase from 2006 but about equal (1.7%) to the long term mean.

As in previous surveys waterfowl population estimates were greater in stratum 41 than in 42. This difference is consistent for all species except canvasback (a low sample size species) and Canada goose. The largest variation in estimates for the two strata occurs with American widgeon with 76% of encounters occurring in stratum 41.

Graphs #1 through #26 provide visual depiction trends in waterfowl population estimates over long term.

Conclusions:

The 2007 surveys show an improvement in waterfowl habitat quality and quantity from the recent past.. During 2001-2004, the region was under the influence of moderate to severe drought with 2005 showing signs of early improvement with increase precipitation. By 2006 waterfowl population estimates and observations of wetland densities reflected an overall improvement in habitat conditions, but the region was still in a soil moisture deficit which tended to depress a full recovery. Winter and spring precipitation while at or near normal levels and enabling robust upland vegetation, often failed to charge wetlands. In 2007, the continuation to normal to above normal precipitation has manifested increases in pond densities, yet waterfowl numbers remain relatively static. One factor to note in stratum 41 and 42 is the large percentage of “pond” habitat that consists of artificial impoundments. These tend to be deeper and more consistent in the frequency of full basin condition than the classic seasonal and semi- permanent wetland. Artificial impoundments provide more stable overall waterfowl habitat though likely not as

productive as natural wetland systems, and thus a rather tempered response of waterfowl numbers to increased precipitation. In areas of stratum 41 and 42 dominated by artificial impoundments the presents of suitable upland nest cover continues to be critical particularly in the form of CRP lands as much of the native short grass prairie in the area adjacent to artificial impoundments incurs heavy grazing. The recorded increases in pond numbers reflect a real observation of more ponds on the landscape combined with the anomalies associated with partially dry stream channels containing a fragmented series of pools and thus inflating pond numbers after data expansion. The population estimates of all ducks species combined seems to be similar to 2006 with diver species showing slight declines. Of note, northern pintail and scaup continue to show declines in this region while mallard numbers appear relatively stable. Continued June precipitation should maintain brood habitat and benefit late nesting efforts and will be critical for establishment of next year's residual vegetation. The areas of favorable habitat occurring in the centers of both strata should help offset more marginal conditions found towards the west and eastern borders with overall subsequent production predicted to be average for eastern Montana.

Table 1. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparison against the previous year, the previous 10-year mean, and the long-term mean for Montana.

	Stratum (2007)						% Change From		
Species/Ponds	41	42	2007 Total	2006 Total	10-Year Mean	Long-Term Mean	2006	10-Year Mean	Long-Term Mean
Ducks									
Dabblers									
Mallard	188.3	131.5	319.7	348.5	330.7	287.3	-8.3%	-3.3%	11.3%
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	--	--	--
Gadwall	107.6	57.9	165.5	111.2	176.0	115.1	48.8%	-5.9%	43.8%
Am. wigeon	73.2	22.9	96.1	70.4	59.4	79.0	36.5%	61.8%	21.6%
Am. green-winged teal	16.9	11.8	28.7	16.9	33.2	23.5	69.3%	-13.5%	21.9%
Blue-winged teal	63.6	78.2	141.7	151.9	141.4	102.9	-6.7%	0.2%	37.7%
N. shoveler	63.5	33.2	96.7	90.3	121.5	93.4	7.1%	-20.4%	3.6%
N. pintail	48.3	27.9	76.2	181.3	103.7	151.0	-57.9%	-26.4%	-49.5%
Subtotal	561.4	363.3	924.7	970.5	965.8	852.2	-4.7%	-4.3%	8.5%
Divers									
Redhead	1.4	1.6	3.0	8.5	6.8	6.2	-65.2%	-56.3%	-52.2%
Canvasback	5.6	9.8	15.4	10.5	6.5	5.7	47.4%	137.3%	169.2%
Scaups	9.7	1.8	11.4	12.9	22.4	34.8	-11.5%	-49.1%	-67.2%
Ring-necked duck	6.6	3.2	9.7	8.4	2.2	2.4	16.3%	341.2%	298.2%
Goldeneyes	0.0	0.0	0.0	0.0	0.6	0.7	--	-100.0%	-100.0%
Bufflehead	0.0	0.6	0.6	1.7	1.4	1.4	-67.8%	-59.4%	-60.5%
Ruddy Duck	2.4	0.0	2.4	4.8	10.4	8.3	-49.4%	-76.5%	-70.6%
Subtotal	25.7	16.9	42.5	46.8	50.2	59.7	-9.1%	-15.3%	-28.7%
Miscellaneous									
Long-tailed duck	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	--	--	--
Scoters	0.0	0.0	0.0	0.0	0.1	0.0	--	-100.0%	-100.0%
Mergansers	0.3	0.0	0.3	1.5	4.4	2.5	-83.1%	-94.2%	-89.7%
Subtotal	0.3	0.0	0.3	1.5	4.6	2.5	-83.1%	-94.4%	-89.9%
Total Ducks	587.3	380.2	967.5	1018.9	1020.6	914.4	-5.0%	-5.2%	5.8%
Canada Goose	40.3	57.0	97.3	70.3	78.6	56.2	38.4%	23.8%	73.0%
Am. coot	14.3	46.1	60.4	11.9	47.3	59.4	408.9%	27.9%	1.7%
Ponds	223.5	251.2	474.7	301.4	273.1	263.3	57.5%	73.8%	80.3%

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 Montana.

	Stratum (2007)		
Year	41	42	Total
1974	142.4	66.9	209.2
1975	150.6	128.8	279.4
1976	109.3	126.3	235.5
1977	70.4	88.2	158.6
1978	145.7	156.2	301.9
1979	135.0	106.2	241.2
1980	77.9	74.4	152.3
1981	103.3	73.0	176.3
1982	147.1	126.5	273.5
1983	85.2	88.7	173.9
1984	88.6	117.5	206.2
1985	127.3	160.0	287.3
1986	190.4	206.3	396.7
1987	102.2	127.1	229.3
1988	78.3	92.0	170.3
1989	160.5	177.3	337.8
1990	121.7	124.3	246.0
1991	111.6	130.1	241.6
1992	95.6	140.0	235.5
1993	94.3	100.5	194.8
1994	227.4	251.1	478.5
1995	164.1	184.7	348.8
1996	209.4	174.7	384.1
1997	154.3	160.2	314.5
1998	149.4	176.0	325.4
1999	227.6	149.8	377.3
2000	74.6	88.0	162.6
2001	74.2	79.7	154.0
2002	71.3	93.4	164.7
2003	136.4	124.4	260.8
2004	161.5	135.8	297.3
2005	187.9	185.1	373.0
2006	148.1	153.3	301.4
2007	223.5	251.2	474.7
10-year Mean	138.5	134.6	273.1
Long-term Mean	131.0	132.3	263.3
Percent Change:			
From 2006	50.9%	63.9%	57.5%
From 10-year Mean	61.3%	86.7%	73.8%
From Long-term Mean	70.6%	89.9%	80.3%

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

Species/Ponds	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Ducks										
Dabblers										
Mallard	363.3	489.4	320.9	198.5	291.3	311.5	273.9	374.2	261.3	198.2
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	147.9	130.5	100.0	93.7	94.3	53.3	49.1	15.5	11.8	69.6
Am. wigeon	36.8	43.2	63.6	68.6	85.8	92.6	58.3	129.8	99.2	76.8
Am. green-winged teal	22.5	18.4	29.9	20.5	8.6	28.2	11.5	31.7	51.5	21.9
Blue-winged teal	137.5	133.3	82.9	53.2	149.9	99.3	87.1	17.0	8.5	77.7
N. shoveler	65.7	83.1	98.6	78.0	109.6	64.9	65.5	61.1	47.2	58.1
N. pintail	287.4	262.9	277.3	72.2	156.4	191.2	124.3	240.6	167.7	116.8
Subtotal	1061.2	1160.7	973.1	584.9	895.9	840.9	669.7	870.0	647.3	619.2
Divers										
Redhead	2.6	4.2	12.4	1.4	2.6	2.0	2.4	0.0	2.4	1.0
Canvasback	3.1	0.5	1.6	3.5	5.5	3.6	5.6	6.7	9.6	1.3
Scaups	27.8	44.7	43.0	27.0	50.0	33.2	15.6	39.5	49.2	35.8
Ring-necked duck	3.3	0.9	7.4	2.9	0.2	0.0	0.0	0.0	0.0	2.1
Goldeneyes	0.0	1.3	0.0	0.0	0.6	0.0	0.0	8.8	2.4	0.0
Bufflehead	1.3	1.3	0.4	2.1	1.4	0.4	0.0	1.7	0.6	1.7
Ruddy Duck	0.0	2.7	1.7	1.5	22.3	0.6	1.3	5.7	3.1	1.8
Subtotal	38.1	55.7	66.4	38.3	82.7	39.9	25.0	62.4	67.4	43.8
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	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	1.4	0.0	7.7	0.7	0.0	0.0	0.0	0.7	0.8	3.5
Subtotal	1.4	0.0	7.8	0.7	0.0	0.0	0.0	0.7	0.8	3.5
Total Ducks	1100.7	1216.4	1047.3	623.9	978.6	880.8	694.6	933.1	715.5	666.6
Canada Goose	19.0	0.0	44.9	42.2	42.2	50.4	61.2	31.6	14.0	22.1
Am. coot	13.9	19.4	23.4	58.1	31.0	22.3	9.6	17.5	38.0	22.2
Ponds										209.2

Species/Ponds	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Ducks										
Dabblers										
Mallard	478.4	168.0	171.0	282.5	258.3	256.2	245.8	323.5	230.1	189.8
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	72.9	55.3	19.7	174.8	78.6	83.5	119.9	95.1	71.0	38.3
Am. wigeon	110.6	99.7	77.1	157.0	87.9	148.9	65.2	89.4	77.9	73.0
Am. green-winged teal	53.1	13.6	3.9	18.2	40.1	9.9	9.1	13.4	18.9	10.6
Blue-winged teal	98.3	207.1	93.8	93.9	117.5	103.4	81.8	211.0	79.9	52.1
N. shoveler	100.2	102.2	31.1	179.2	189.6	52.2	121.8	160.7	61.8	65.0
N. pintail	259.2	226.0	118.5	348.9	324.8	146.6	157.3	306.9	88.3	99.8
Subtotal	1172.8	871.9	514.9	1254.7	1096.7	800.7	801.0	1200.0	627.9	528.6
Divers										
Redhead	0.7	2.7	3.2	7.0	14.7	4.4	25.0	15.0	10.5	19.2
Canvasback	2.1	16.2	3.2	6.4	10.4	4.8	5.4	12.5	5.0	3.5
Scaups	26.4	29.9	34.4	72.1	88.6	36.8	35.8	61.0	47.1	53.3
Ring-necked duck	0.0	1.4	0.2	0.8	0.0	0.9	0.9	2.4	16.3	3.0
Goldeneyes	0.0	0.0	0.6	0.0	1.1	1.6	0.0	0.0	0.0	0.6
Bufflehead	0.4	0.6	0.0	1.3	3.6	1.0	2.4	5.6	0.4	1.8
Ruddy Duck	2.6	1.9	1.2	14.1	12.4	0.7	17.1	17.8	9.1	11.8
Subtotal	32.2	52.7	42.8	101.7	130.8	50.1	86.6	114.2	88.3	93.1
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Mergansers	1.4	0.8	2.7	1.9	4.1	0.0	8.5	1.8	0.0	1.4
Subtotal	1.4	0.8	2.7	1.9	4.1	0.0	8.5	1.8	0.2	1.4
Total Ducks	1206.4	925.4	560.3	1358.3	1231.5	850.8	896.0	1316.0	716.5	623.1
Canada Goose	23.1	27.0	26.3	27.9	41.6	36.6	31.3	37.1	34.6	51.1
Am. coot	13.8	59.5	16.4	83.1	319.4	104.2	197.7	53.3	42.9	103.5
Ponds	279.4	235.5	158.6	301.9	241.2	152.3	176.3	273.5	173.9	206.2

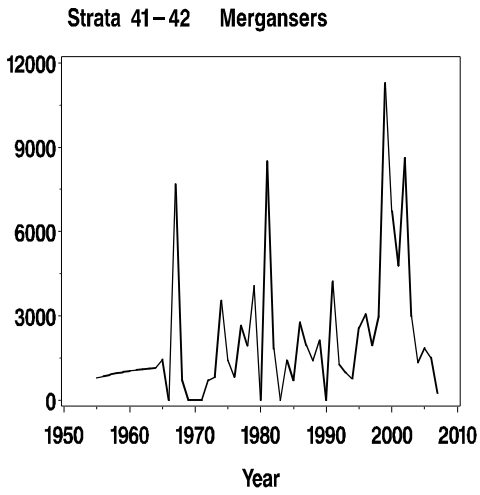
Appendix 1 (continued). Long-term trend in adjusted waterfowl breeding population estimates (thousands).

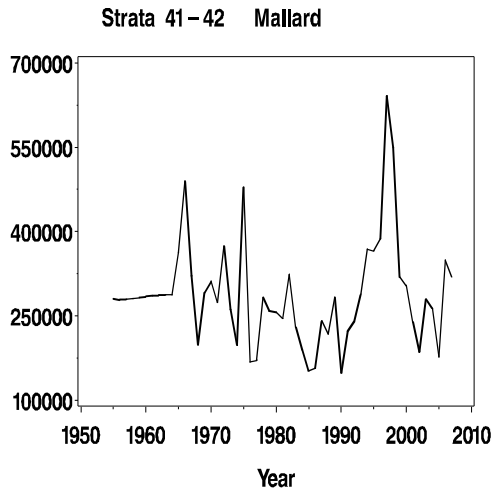
Species/Ponds	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Ducks										
Dabblers										
Mallard	152.0	156.9	240.9	218.0	282.8	148.4	222.7	239.9	288.6	368.7
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	40.8	33.8	32.6	30.7	128.5	56.7	96.9	154.4	181.5	182.9
Am. wigeon	58.7	52.0	64.9	44.0	58.8	126.2	70.3	88.2	65.5	137.7
Am. green-winged teal	6.4	6.2	6.0	12.0	17.0	15.7	12.4	16.3	8.4	34.0
Blue-winged teal	38.6	21.6	40.2	83.5	65.9	76.3	77.7	89.0	60.3	186.4
N. shoveler	34.1	69.3	73.2	33.7	58.6	86.3	51.5	27.1	92.7	194.3
N. pintail	56.5	95.9	146.0	61.6	58.0	131.2	43.1	75.5	130.4	244.5
Subtotal	387.0	435.6	603.8	483.6	669.6	640.6	574.7	690.4	827.4	1348.5
Divers										
Redhead	2.7	3.6	3.4	2.7	7.0	7.8	6.4	5.5	5.3	3.4
Canvasback	2.1	2.8	1.0	2.1	5.1	10.8	1.0	5.6	9.3	12.5
Scaups	20.0	33.4	44.7	55.9	46.9	33.1	25.2	14.0	28.3	28.6
Ring-necked duck	4.3	7.1	0.4	1.2	3.8	0.4	0.5	3.9	4.0	5.0
Goldeneyes	1.3	2.5	0.0	0.0	1.1	0.6	0.7	0.0	1.5	0.0
Bufflehead	1.0	0.4	0.0	4.1	1.7	6.0	2.2	1.3	0.4	0.3
Ruddy Duck	8.0	4.6	0.6	25.1	5.8	9.2	38.0	9.2	1.8	4.7
Subtotal	39.3	54.5	50.2	91.2	71.4	67.9	73.9	39.6	50.6	54.5
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	0.7	2.8	1.9	1.4	2.1	0.0	4.2	1.3	1.0	0.8
Subtotal	0.7	2.8	1.9	1.4	2.1	0.0	4.2	1.3	1.0	0.8
Total Ducks	427.1	492.9	656.0	576.2	743.1	708.6	652.8	731.3	879.0	1403.7
Canada Goose	49.4	32.9	39.4	67.1	79.3	97.7	70.8	90.5	103.3	76.3
Am. coot	145.2	32.1	27.2	95.5	65.9	153.4	52.9	15.3	58.3	56.8
Ponds	287.3	396.7	229.3	170.3	337.8	246.0	241.6	235.5	194.8	478.5

Species/Ponds	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Ducks										
Dabblers										
Mallard	366.0	386.9	641.2	549.5	319.0	304.1	239.1	185.8	279.7	262.8
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	359.3	201.7	513.5	232.7	205.3	125.9	179.0	87.3	109.1	101.3
Am. wigeon	116.9	100.2	122.4	92.9	63.1	57.6	41.6	28.6	30.7	42.8
Am. green-winged teal	30.3	56.1	58.1	13.3	27.2	16.5	18.1	40.6	50.2	56.4
Blue-winged teal	94.4	89.3	138.1	225.5	241.5	50.0	72.8	73.3	171.2	145.9
N. shoveler	81.4	109.3	209.1	90.5	235.6	60.3	86.1	76.2	158.5	125.6
N. pintail	154.5	135.6	209.3	110.9	131.8	58.7	79.0	47.0	95.0	77.9
Subtotal	1202.8	1079.1	1891.7	1315.4	1223.5	673.1	715.7	538.7	894.3	812.7
Divers										
Redhead	3.4	8.1	4.3	6.1	6.3	1.8	4.8	9.5	14.2	11.2
Canvasback	8.0	4.6	9.6	6.1	4.9	3.5	4.5	1.2	10.9	10.4
Scaups	21.4	35.9	32.7	14.1	28.0	30.7	31.5	20.6	24.6	16.3
Ring-necked duck	7.0	0.4	0.0	2.1	2.4	0.0	2.9	1.1	0.4	3.0
Goldeneyes	0.4	0.0	0.9	0.7	1.4	0.5	0.0	1.6	0.0	0.5
Bufflehead	0.5	0.0	2.2	1.5	1.1	1.7	0.6	0.5	0.7	0.6
Ruddy Duck	7.0	1.2	8.9	11.8	8.3	2.4	24.9	14.9	17.1	10.2
Subtotal	47.7	50.1	58.6	42.4	52.5	40.6	69.3	49.5	67.8	52.2
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Mergansers	2.6	3.1	1.9	3.0	11.3	6.7	4.8	8.6	3.0	1.3
Subtotal	2.6	3.4	2.4	3.0	11.8	6.7	4.8	8.6	3.5	1.3
Total Ducks	1253.1	1132.6	1952.7	1360.8	1287.9	720.4	789.8	596.8	965.6	866.3
Canada Goose	98.6	106.6	78.5	84.9	84.2	94.9	88.2	82.8	56.9	70.9
Am. coot	33.2	38.8	80.1	12.8	174.7	69.1	21.6	36.3	17.7	43.4
Ponds	348.8	384.1	314.5	325.4	377.3	162.6	154.0	164.7	260.8	297.3

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

Species/Ponds	2005	2006	2007
Ducks			
Dabblers			
Mallard	177.5	348.5	319.7
Am. black duck	0.0	0.0	0.0
Gadwall	94.3	111.2	165.5
Am. wigeon	43.6	70.4	96.1
Am. green-winged teal	34.5	16.9	28.7
Blue-winged teal	144.1	151.9	141.7
N. shoveler	82.7	90.3	96.7
N. pintail	45.6	181.3	76.2
Subtotal	622.4	970.5	924.7
Divers			
Redhead	1.2	8.5	3.0
Canvasback	3.4	10.5	15.4
Scaups	12.8	12.9	11.4
Ring-necked duck	1.8	8.4	9.7
Goldeneyes	0.0	0.0	0.0
Bufflehead	3.0	1.7	0.6
Ruddy Duck	0.3	4.8	2.4
Subtotal	22.6	46.8	42.5
Miscellaneous			
Long-tailed duck	0.0	0.0	0.0
Eiders	0.0	0.0	0.0
Scoters	0.0	0.0	0.0
Mergansers	1.9	1.5	0.3
Subtotal	1.9	1.5	0.3
Total Ducks	646.8	1018.9	967.5
Canada Goose	73.9	70.3	97.3
Am. coot	5.1	11.9	60.4
Ponds	373.0	301.4	474.7


Strata 41 – 42 Mergansers
12000
9000
6000
3000
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Mallard
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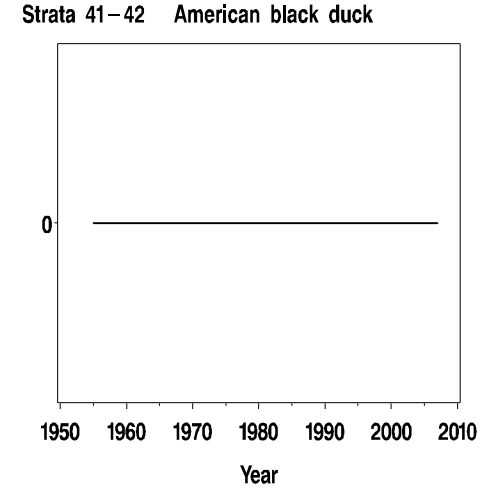
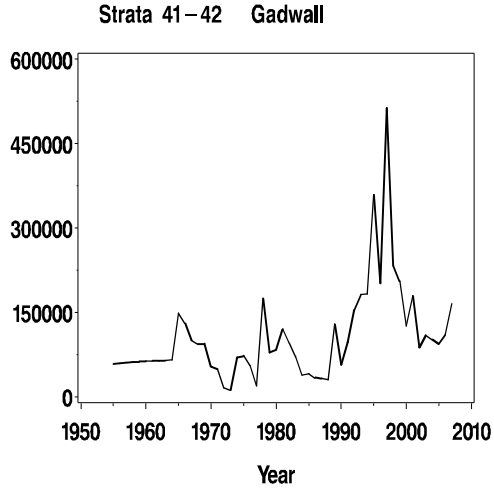
550000
400000
250000
100000
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 American black duck
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Gadwall
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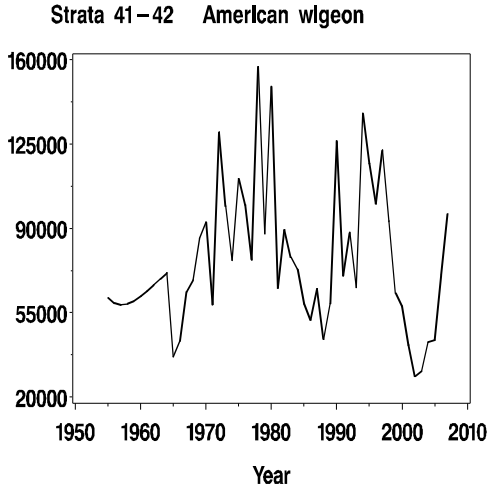
450000
300000
150000
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 American wigeon
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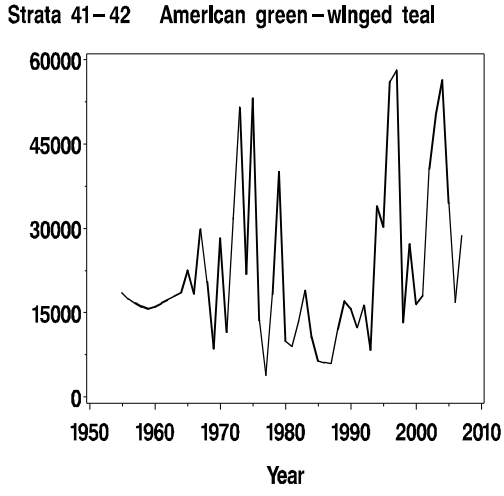
125000
90000
55000
20000
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 American green – winged teal
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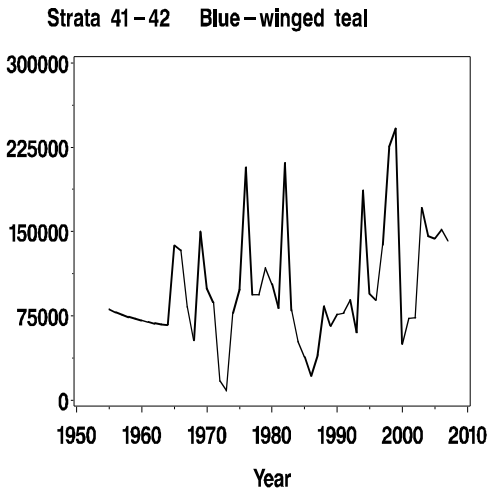
45000
30000
15000
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Blue – winged teal
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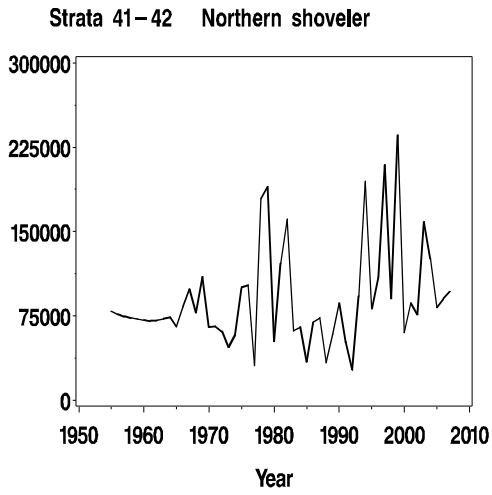
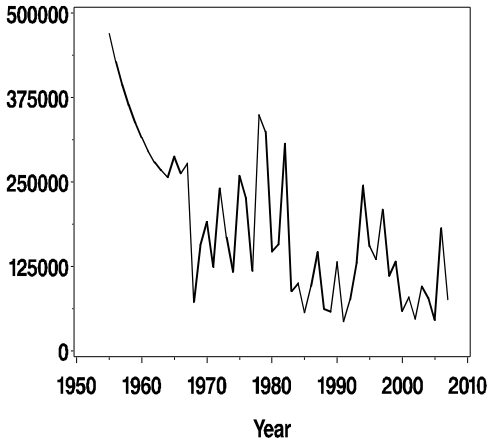
225000
150000
75000
0
1950
1960
1970
1980
1990
2000
2010
Year


Strata 41 – 42 Northern shoveler
300000
225000
150000
75000
0
1950
1960
1970
1980
1990
2000
2010
Year


Strata 41 – 42 Northern pintail
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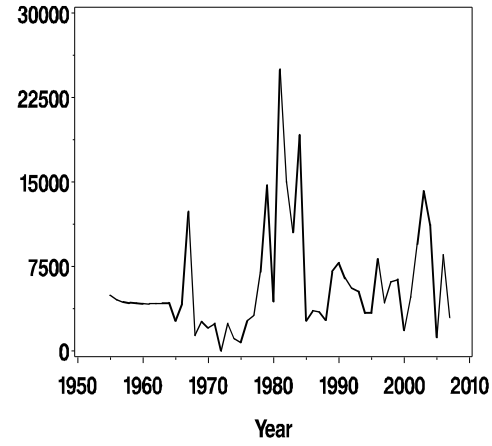
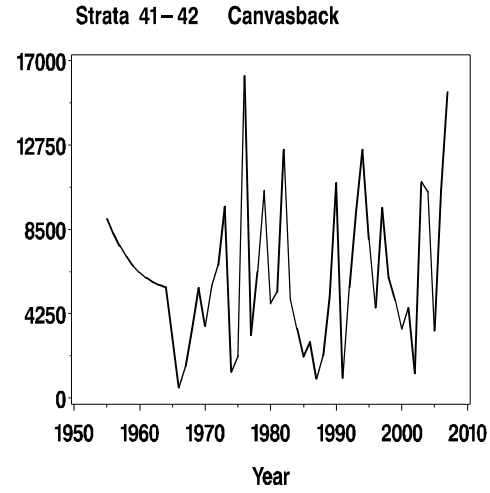
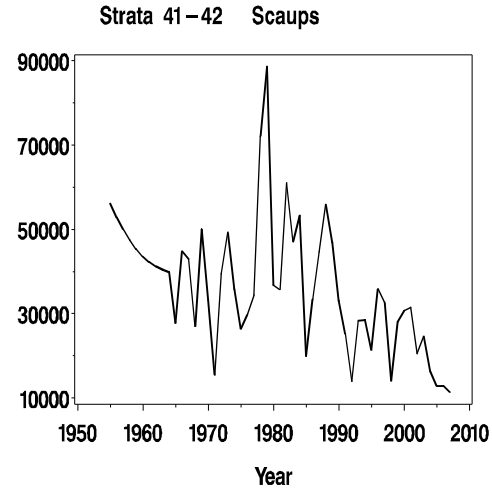
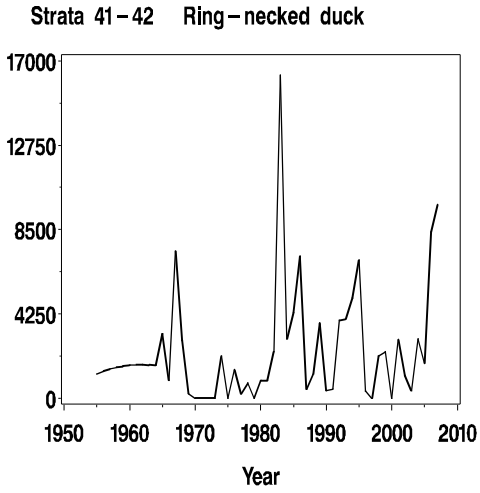
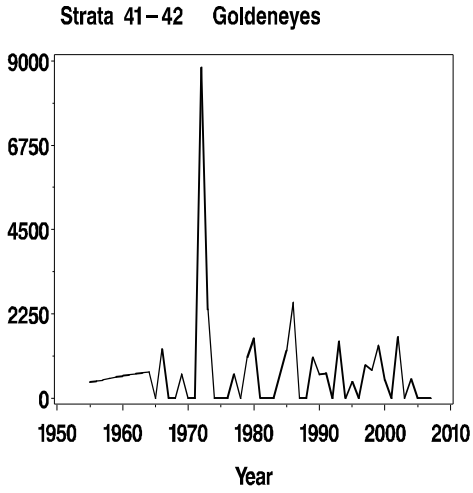
375000
250000
125000
0
1950
1960
1970
1980
1990
2000
2010
Year

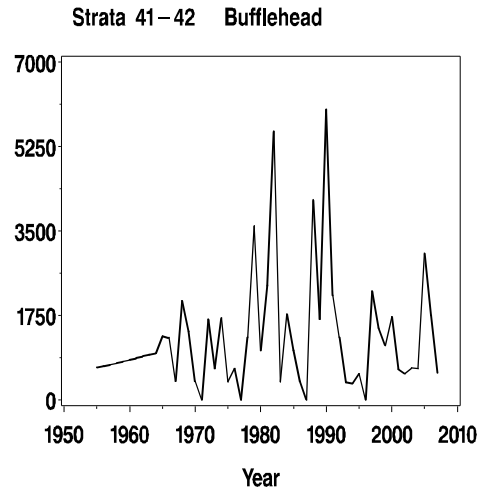

Strata 41 – 42 Redhead
30000
22500
15000
7500
0
1950
1960
1970
1980
1990
2000
2010
Year

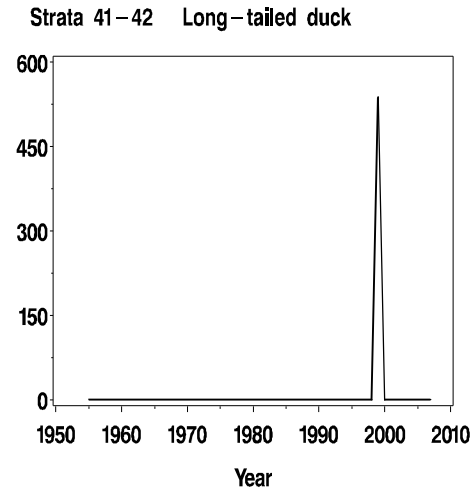

Strata 41 – 42 Canvasback
17000
12750
8500
4250
0
1950
1960
1970
1980
1990
2000
2010
Year

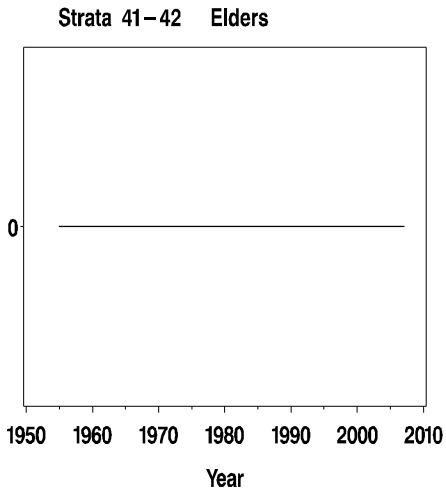

Strata 41 – 42 Scaups
90000
70000
50000
30000
10000
1950
1960
1970
1980
1990
2000
2010
Year

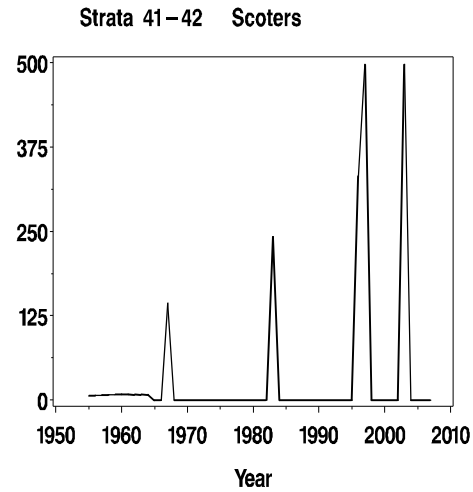

Strata 41 – 42 Ring – necked duck
17000
12750
8500
4250
0
1950 1960 1970 1980 1990 2000 2010
Year

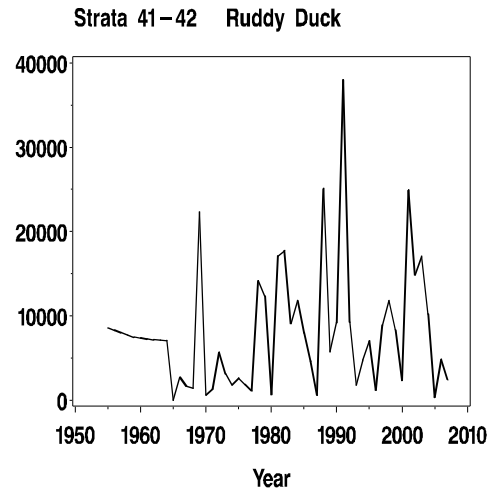

Strata 41 – 42 Goldeneyes
9000
6750
4500
2250
0
1950 1960 1970 1980 1990 2000 2010
Year

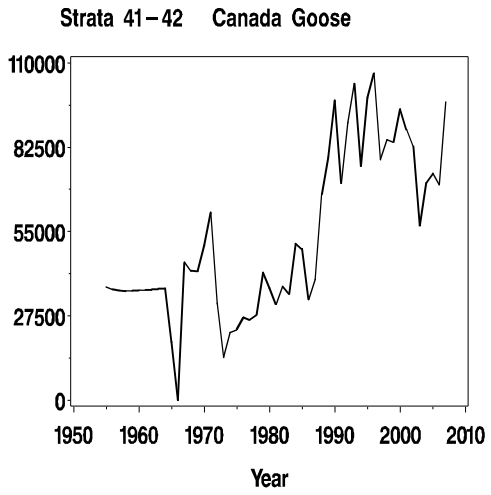

Strata 41 – 42 Bufflehead
7000
5250
3500
1750
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Long – tailed duck
600
450
300
150
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Elders
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Scoters
500
375
250
125
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Ruddy Duck
40000
30000
20000
10000
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Canada Goose
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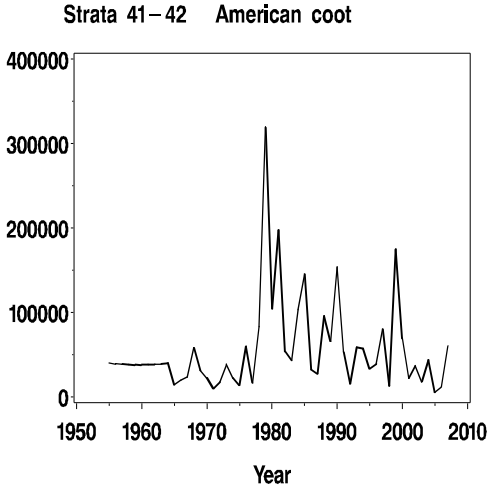
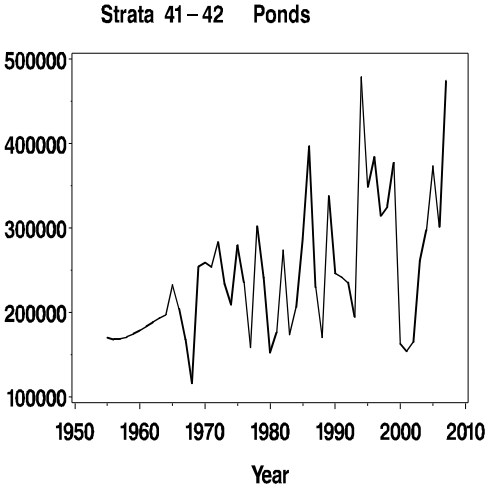
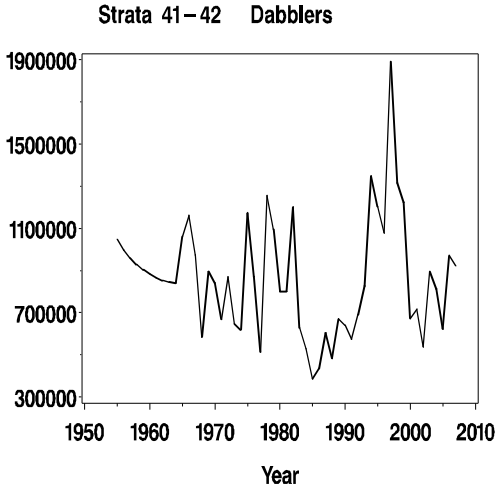
82500
55000
27500
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 American coot
400000
300000
200000
100000
0
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Ponds
500000
400000
300000
200000
100000
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Dabblers
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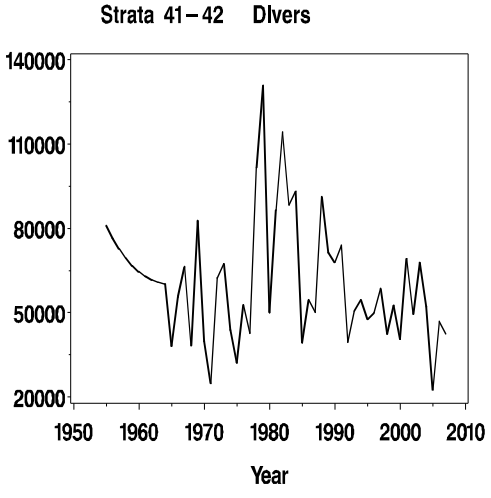
1500000
1100000
700000
300000
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Divers
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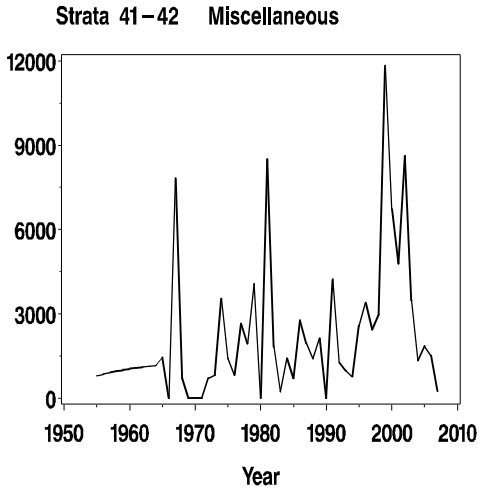
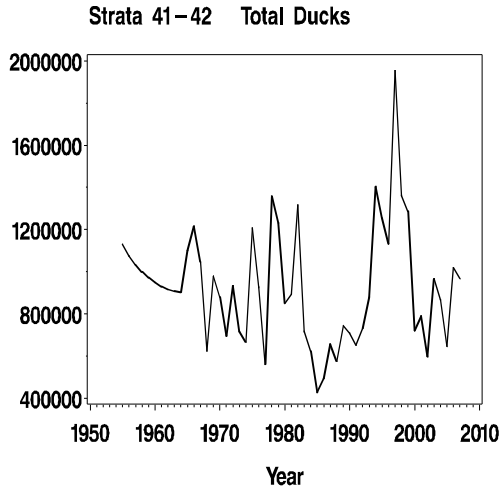
110000
80000
50000
20000
1950 1960 1970 1980 1990 2000 2010
Year


Strata 41 – 42 Miscellaneous
12000
9000
6000
3000
0
1950
1960
1970
1980
1990
2000
2010
Year


Strata 41 – 42 Total Ducks
2000000
1600000
1200000
800000
400000
1950
1960
1970
1980
1990
2000
2010
Year