FARMLAND WILDLIFE POPULATIONS

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2005 Minnesota August Roadside Survey

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ABSTRACT

Population indices for ring-necked pheasants increased in 2005. Gray partridge, cottontail rabbit, white-tailed jackrabbit, and dove indices were similar to 2004, whereas counts of white tailed deer decreased slightly. The winter of 2004-05 was average to mild throughout Minnesota's agricultural zone, and spring weather was variable with cold weather in May and wet weather in June (the nesting period for pheasants in Minnesota). Wet spring weather appears to have impacted gray partridge nesting success more than pheasants. Overwinter survival of farmland wildlife in 2005 was probably above average, and reproductive success was moderate.

The pheasant index (birds/100 mi) increased 75% from last year, 68% from the 10-year mean, and was similar to the long-term average. The pheasant index remained 62% below the benchmark years of 1955-64 (soil-bank years with marginal cropland in long-term set-aside, a diversified agricultural landscape, more small grains and tame hay, and less pesticide use). Pheasant hen indices and average brood size increased from 2004, which reflects improved overwinter survival and reproductive success from last year. Overall, the size of the fall population will be close to 2003 levels. The best opportunity for harvesting pheasants appears to be in the Southwest and South Central regions, although good opportunities will likely also be available in the West Central and Central regions.

The gray partridge index was similar to last year, 32% below the 10-year mean, and 47% below the long-term average. Counts were variable in most regions, but a significant increase was observed in the Southwest. Similar to pheasants, mean brood size and broods/adult increased in 2005. Gray partridge counts were highest in the Southwest region.

The cottontail rabbit index was similar to last year, and the 10-year and long-term averages. Counts of cottontail rabbits were highest in the Southwest, East Central, South Central, and Southeast regions. The jackrabbit index also held steady in 2005. The statewide index was similar to last year and the 10-year average, but remained 82% below the long-term average. The range-wide jackrabbit population peaked in the late 1950's and declined to its lowest level in 1993, from which populations have not recovered. Counts of white-tailed jackrabbits were highest in the Northwest and West Central regions.

The number of mourning doves observed in 2005 was similar to last year and the 10-year average, but remained 23% below the long-term average. Counts decreased in 5 of 7 regions, but only the Central and East Central regions exhibited a statistically significant decrease in 2005.

INTRODUCTION

This report is a summary of the 2005 Minnesota August roadside survey. The annual survey is conducted during the first 2 weeks in August by Minnesota Department of Natural Resource (MNDNR) enforcement and wildlife personnel throughout the farmland region of Minnesota (Figure 1). The August roadside survey consists of 171 25-mile routes (1-4 routes/county); 152 routes are located in the ring-necked pheasant range. The 2 Sherburne County routes were dropped in 2005 for safety reasons; routes were almost 100% paved and had heavy traffic. A new route was added in northwest Sherburne County where more suitable road conditions were present.

Observers drove each route in the early morning at 15-20 miles/hr and recorded the number of pheasants, gray (Hungarian) partridge, cottontail rabbits, white-tailed jackrabbits, and other wildlife they saw. Counts conducted on cool, clear, calm mornings with heavy dew yield the most consistent results because wildlife, especially pheasants, gray partridge, and rabbits, move to warm, dry areas (e.g., gravel roads) during early-morning hours. The data provide an **index of relative abundance** and are used to monitor annual changes and long-term trends in regional and range-wide populations. Results were reported by agricultural region and range-wide; however, population indices for species with low detection rates are imprecise and should be interpreted cautiously.

2004-2005 WEATHER SUMMARY

In Minnesota, the winter (Dec-Mar) of 2004-05 saw average precipitation with temperatures slightly above average (MCWG, http://climate.umn.edu/cawap/monsum/monsum.asp). Snow depth through most of December was <1 inch throughout the majority of Minnesota's pheasant range (MCWG, http://climate.umn.edu/doc/snowmap.htm). Storm events from mid-January to mid-February resulted in snow depths ≥6 inches over the northern pheasant range, but much of southern Minnesota experienced snow depths ≥6 inches for only short intervals. A late winter storm in mid-March resulted in snow depths topping 18 inches in south central and southeastern Minnesota, but again warm temperatures following the storm event left snow cover nonexistent by the end of the month. The winter of 2004-05 can be considered mild over most of the pheasant range (the fourth consecutive mild winter). Spring weather was a mixed bag. Precipitation was average statewide in April, and temperatures were above average, setting the stage for conditions conducive to good wildlife production. However, average temperatures in May were 2-4 degrees cooler than historical averages across Minnesota. June, although rainy, had above average temperatures (3-5° F above normal), and July was warmer and drier than average in the southern two-thirds of the state. Overwinter survival of farmland wildlife was probably above average; early reproductive success was likely moderated by cooler than average conditions in May and rainy weather in June, but later nesting and brood-rearing conditions were very good.

HABITAT CONDITIONS

Habitat conditions in the pheasant range continue to maintain their highest levels since the mid-1990s. Over 1 million acres of habitat are currently enrolled in farm programs (e.g., CRP, CREP, RIM, WRP), and another close to 600,000 acres of habitat are protected as Wildlife Management Areas (WMA) and Waterfowl Protection Areas. Within the pheasant range, protected grasslands account for about 6.0% of the landscape (range: 2.9-10.3%; Table 1). Farm programs make up the largest portion of protected grasslands in the state. Updates to rental rates for new CRP contracts announced this spring will continue to make farm programs attractive and economically feasible for Minnesota farmers. Sign-up for the Minnesota CREP II began June 2005 targeting enrollment of up to 120,000 new acres of environmentally sensitive acreage in the Red River Watershed in northwestern Minnesota, the Lower Mississippi Watershed in southeastern Minnesota and the Missouri/Des Moines River Watershed in southwestern Minnesota. Although progress continues on the new CRP and CREP II, the expiration of a large proportion of existing CRP contracts in 2007 is still a major concern for future wildlife populations. The MNDNR continues to expand the habitat base through accelerated WMA acquisition.

SURVEY CONDITIONS

Cooperators completed 169 routes in 2005; one route each in Scott and Carver Counties were not conducted this year due to unfavorable conditions. Weather conditions during the survey ranged from excellent (calm, heavy dew, clear sky) to poor (wind speeds ≥10 mph, light dew, and heavy overcast). Medium-to-heavy dew conditions were present at the start of 91% of the survey routes, which was worse than 2004 (97%), but equal to the 10-year average (91%). Clear skies (<30% cloud cover) were present at the start of 84% of routes, with wind speeds <4 mph recorded for 71% of routes. Surveys were extended to August 20th to accommodate poor weather conditions for some areas during August 1-15.

RING-NECKED PHEASANT

The average number of pheasants observed per 100 miles increased 75% (95% CI: 53-97%) from 2004 and 68% from the 10-year average (Table 2; Figure 1; Figure 2A). The pheasant index was similar to the long-term average (Table 2), but remained below the benchmark years of 1955-64 by 62%. Total pheasants observed per 100 miles ranged from 34.4 in the Southeast to 225.8 in the Southwest (Table 3, Figure 1; Figure 5). Increases from last year were significant in all regions except the East Central and the Southeast (Table 3; Figure 1; Figure 5).

A 34% increase (95% CI: 15-54%) in the range-wide hen index (hens/100 mi) was observed from last year (Table 2), and ranged from 4.6 hens/100 miles in the Southeast to 33.7 hens/100 miles in the Southwest. In contrast, the cock index was similar to last year (Table 2). The 2005 hen:cock ratio was 2.0, compared to 1.3 in 2004 and 1.7 in 2003. Given the average fall population in 2004 and likely above-average overwinter survival, the spring breeding population should have been higher than average. Data from spring pheasant surveys, conducted as part of a CRP/pheasant winter-cover research project, indicated unusually high breeding pheasant populations in Southwest Minnesota, but lower populations in the West Central and South Central regions (Kurt Haroldson, MNDNR, unpublished data). These surveys were conducted on 36 study areas located in Lincoln, Lyon, Cottonwood, and Jackson Counties in the Southwest; Pope County in the West Central; and LeSueur, and Rice Counties in the South Central region during April 20 – May 26. Nearly 300 pheasants/100 miles were counted on Southwest study areas with very good habitat.

The number of pheasant broods observed per 100 miles increased 70% from last year, 72% compared to the 10-year average, and 21% from the long-term average (Table 2). The brood index continues to remain below the benchmark years (1955-64). The region with the smallest number of broods sighted was the Southeast (4.8 broods/100 mi), with the highest index in the Southwest region (33.5 broods/100 mi). Average brood size in 2005 was back to 2003 levels (5.0 ± 0.1 [SE] chicks/brood). Mean brood size in 2005 increased from 2004 (4.2 ± 0.1 chicks/brood), but was similar to the 10-year mean (5.1 chicks/brood), and below the long-term average (5.6 chicks/brood; Table 2). The median hatch date for pheasants was June 8 (n = 593), one day later than last year and 2 days later than the 10-year average (Table 2). The distribution of estimated hatch dates for observed broods was unimodal and approximately normally distributed, which suggests that many early nesting attempts were successful (vs. wide-spread nest failure, which often leads to an extensive renesting effort and a bimodal peak in hatch dates). Average age of broods observed was 8.3 weeks (range: 1-16 wks).

An increase in the range-wide pheasant index was expected given the mild winter and moderate weather during reproductive season. However, the magnitude of the increase was surprising. Although cool, wet spring weather is typically associated with reduced recruitment, the cool May was apparently moderated by below-normal precipitation, and the wet June was apparently moderated by above-normal temperatures. The combination of relatively high hen numbers and average reproductive success led to an increase in the pheasant index for 2005. Overall, the size of the fall population will be close to 2003 levels. The best opportunity for harvesting pheasants appears to be in the Southwest and South Central regions, although good opportunities will likely also be available in the West Central and Central regions.

GRAY PARTRIDGE

Rangewide, the gray partridge index (7.7 partridge/100 miles) was similar to last year. However, the 2005 index was 32% below the 10-year average and 47% below the long-term average (Table 2, Figure 2B). Within regions, the partridge index ranged from 0.0/100 miles in the East Central and Northwest to 42.5/100 miles in the Southwest (Table 3, Figure 6). The only significant regional change occurred in the Southwest, where the partridge index increased 126% from last year (Table 3).

The number of adults observed per 100 miles was also similar to last year, but 21% below the 10-year mean and 35% below the long-term average (Table 2). The proportion of adult partridge observed with broods (32%) increased from 2004 (24%), but was similar to the 10-year average (34%) and long-term average (33%). Average brood size in 2005 (7.0 chicks/brood) was larger than in 2004 (5.7 chicks/brood), but smaller than the 10-year average (8.0 chicks/brood) and the long-term average (9.0

chicks/brood). Total broods observed per 100 miles was similar to 2004 and the 10-year average, but 38% below the long-term average (Table 2). The median hatch date was June 10 (n = 32), which was 13 days earlier compared to 2004 and 9 days earlier than the 10-year average.

Gray partridge in their native range (southeastern Europe and northern Asia) are associated with arid climates and only produce well in the Midwest during dry or drought years. Consequently, gray partridge are more strongly affected by weather conditions during nesting and brood rearing than are pheasants. Wet weather in June appears to have impacted gray partridge more strongly than Minnesota's pheasant population. The Southwest region offers the best opportunity for harvesting gray partridge in 2005.

COTTONTAIL RABBIT and WHITE-TAILED JACKRABBIT

The eastern cottontail rabbit index (6.9 rabbits/100 mi) was similar to last year, and the 10-year and long-term averages (Table 2, Figure 3A). There continues to be high variability in counts and percent change by region (Table 3). The cottontail rabbit index ranged from 0.8 rabbits/100 mi in the Northwest to 12.6 rabbits/100 mi in the Southwest (Figure 7). The best opportunities for harvesting cottontail rabbits are in the Southwest, East Central, South Central, and Southeast regions.

The index of white-tailed jackrabbits held steady in 2005. The statewide index (0.5 rabbits/100 mi) was similar to the 10-year average (0.5), but remained 82% (95% CI: 66-98%) below the long-term average (2.0; Table 2, Figure 3B). The range-wide jackrabbit population peaked in the late 1950's and declined to its lowest level (0.2 rabbits/100 mi) in 1993, from which populations have not recovered (Figure 3B). The long-term decline in jackrabbits probably reflects the loss of their preferred habitats (i.e., small grains, pasture, and hayfields). The greatest potential for white-tailed jackrabbit hunting is likely in the Northwest and West Central regions (Table 3, Figure 8). Indices of relative abundance and annual percent change should be interpreted cautiously because estimates are based on low numbers of sightings.

WHITE-TAILED DEER

The index of white-tailed deer (14.4 deer/100 mi) decreased 22% from last year, was comparable to the 10-year average and was 58% above the long-term average (1974-04; Table 2, Figure 4A). The South Central and East Central regions saw the only significant decreases from 2004, although counts within regions were highly variable. The farmland deer population index shows an increasing long-term trend since 1979 (Figure 4A). Modeling projections based on independent data also indicate an increasing trend for deer populations in the farmland zone.

MOURNING DOVE

The number of mourning doves observed per 100 miles in 2005 was similar to last year and the 10-year average, but remained 23% below the long-term average (Table 2, Figure 4B). The mourning dove index ranged from 57.7 doves/100 mi in the Northwest region to 322.9 doves/100 mi in the Southwest. Significant decreases in dove counts were detected only in the Central and East Central regions (Table 3). The number of mourning doves <u>heard</u> along U.S. Fish and Wildlife Service call-count survey (CCS) routes (n = 7) in Minnesota were also similar to last year. Trend analyses indicated the number of mourning doves <u>heard</u> along the CCS routes declined 4.8% per year (90% CI: -9.2 to –0.3%) during 1996-2005 and 1.7% per year (90% CI: -3.1 to -0.2%) during 1966-2005 (Dolton and Rau 2005). In fall 2004, Minnesota held its first modern dove hunting season.

OTHER SPECIES

Notable incidental sightings: 1 bald eagle (Wabasha County), 2 black bear (Marshall and Polk Counties), 1 Cooper's hawk (Steele County), 7 coyote (Rice, Swift, Waseca, and Winona Counties), 1 moose (Wilkin County), 1 moose cow with 2 calves (Marshall County), 5 mink (Martin County), 1 peregrine falcon (Wabasha County), 3 prairie chickens (Ottertail and Norman Counties), 2 red fox (Roseau and Stevens Counties), 265 sandhill cranes (14 counties), 10 sharptail grouse (Kittson, Marshall, and Pennington Counties), 2 short-eared owls (Roseau County), 12 skunk (7 counties), 11 trumpeter swan (Brown and Isanti Counties), and 144 wild turkeys and 42 turkey poults (19 counties).

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LITERATURE CITED

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Table 1. Abundance (total acres) and density (acres/mi^2) of undisturbed grassland habitat within pheasant range, 2005[a].

	Cropland Retirement									Density
AGREG	CRP	CREP	RIM	RIM-WRP	WRP	USFWS[c]	MNDNR[d]	Total	%	(ac/mi^2)
WC[b]	362,510	37,379	17,075	822	14,015	168,404	99,175	699,380	10.3	65.9
SW	123,567	22,040	12,203	579	766	14,332	50,814	224,302	5.9	37.9
C	135,122	14,490	17,097	714	2,815	82,176	44,142	296,557	4.9	31.4
SC	90,345	26,557	11,767	3,730	8,075	7,111	29,079	176,663	4.4	28.0
SE	89,301	0	5,554	554	481	18,438	45,127	159,454	4.3	27.5
EC	5,182	0	1,265	0	4	4,548	83,042	94,041	2.9	18.8
Total	806,028	100,465	64,961	6,398	26,156	295,010	351,378	1,650,396	6.0	38.3

[a] Unpublished data, Tabor Hoek, BWSR, 22 August 2005.

[b] Does not include Norman County.

[c] Includes Waterfowl Production Areas (WPA), USFWS easements, and USFWS refuges.

[d] MNDNR Wildlife Management Areas (WMA).

Table 2. Statewide trends (% change) in number of wildlife observed per 100 miles driven, Minnesota August roadside survey, 1955-2005.

Species / Subgroup	Change from 2004[a]					Change from 10-year average[b]				Change from long-term average[c]			
	n	2004	2005	%	95% CI	*n*	1995-04	%	95% CI	*n*	LTA	%	95% CI
Ring-necked pheasant													
Total pheasants	148	58.3	101.9	75	±22	146	61.3	68	±23	140	105.7	-1	±16
Cocks		8.5	7.3	-14	±15		5.6	34	±20		12.1	-39	±12
Hens		10.9	14.6	34	±19		8.7	70	±25		15.3	-1	±16
Broods		9.4	15.9	70	±20		9.4	72	±23		13.6	21	±18
Chicks per brood		4.2	5.0	21			5.1	-1			5.6	-11	
Broods per 100 hens		86.5	109.0	26			109.6	-1			101.4	8	
Median hatch date		Jun 07	Jun 08				Jun 06						
Gray partridge													
Total partridge	167	5.4	7.7	42	±69	165	11.4	-32	±29	140	17.3	-47	±21
Adults		2.3	2.4	3	±39		3.0	-21	±21		4.4	-35	±18
Broods		0.5	0.8	40	±74		1.1	-27	±33		1.5	-38	±26
Chicks per brood		5.7	7.0	22			8.0	-12			9.0	-22	
Broods per 100 adults		23.7	32.0	35			34.2	-6			33	-4	
Median hatch date		Jun 23	Jun 10				Jun 19						
Eastern cottontail	167	6.6	6.9	6	±26	165	5.9	19	±21	140	6.9	16	±21
White-tailed jackrabbit	167	0.3	0.5	54	±92	165	0.5	6	±56	140	2.0	-82	±16
White-tailed deer	167	18.6	14.4	-22	±15	165	12.8	13.3	±23	145	6.1	58	±33
Mourning dove	167	208.7	194.9	-7	±16	165	212.2	-8	±13	140	279.1	-23	±13

[a] Includes Northwest region, except for pheasants. Estimates based on routes (*n*) surveyed in both years.

[b] Includes Northwest region, except for pheasants. Estimates based on routes (*n*) surveyed at least 9 of 10 years.

[c] LTA = 1955-2004, except for deer = 1974-2004. Does not include Northwest region (8 counties in Northwest were added to survey in 1982). Estimates for all species except deer based on routes (*n*) surveyed ≥40 years; estimates for deer based on routes surveyed ≥25 years.

Table 3. Regional trends (% change) in number of wildlife observed per 100 miles driven, Minnesota August roadside survey, 1955-2005.

Region / Species	Change from 2004[a]					Change from 10-year average[b]				Change from long-term average[c]			
	n	2004	2005	%	95% CI	*n*	1995-04	%	95% CI	*n*	LTA	%	95% CI
Northwest[d]													
Gray partridge	19	0.2	0.0	-100	±210	19	0.0	-100	±210	19	4.5	-100	±72
Eastern cottontail		2.9	0.8	-71	±140		0.9	-4	±121		0.9	-9	±132
White-tailed jackrabbit		0.2	1.1	402	±654		0.5	118	±265		0.7	42	±171
White-tailed deer		53.1	52.8	0	±32		33.4	58	±61		24.6	115	±91
Mourning dove		60.5	57.7	-5	±56		84.0	-31	±35		133.6	-57	±28
West Central													
Ring-necked pheasant	37	45.1	94.4	109	±64	35	40.3	147	±69	33	114.1	-7	±32
Gray partridge		1.3	0.6	-50	±148		3.0	-81	±64		11.4	-94	±25
Eastern cottontail		3.2	4.2	30	±62		2.7	53	±74		4.5	-3	±50
White-tailed jackrabbit		0.5	1.0	80	±152		0.7	38	±110		2.8	-70	±25
White-tailed deer		14.4	9.8	-32	±40		12.4	-20	±28		7.9	29	±45
Mourning dove		259.8	211.4	-19	±24		317.8	-32	±14		412.9	-47	±12
Central													
Ring-necked pheasant	27	42.9	86.1	101	±54	27	49.3	74	±54	24	76.9	12	±47
Gray partridge		1.5	4.1	180	±387		5.1	-19	±115		10.8	-57	±67
Eastern cottontail		7.0	5.8	-17	±58		5.5	6	±57		6.4	1	±55
White-tailed jackrabbit		0.0	0.1				0.3	-46	±136		1.4	-88	±36
White-tailed deer		6.7	6.4	-4	±61		5.9	7	±52		3.7	73	±88
Mourning dove		209.1	145.9	-30	±29		186.0	-22	±21		243.9	-39	±16
East Central													
Ring-necked pheasant	14	40.9	54.3	33	±59	14	48.0	13	±74	14	89.0	-39	±33
Gray partridge		0.0	0.0				0.1	-100	±147		0.2	-100	±133
Eastern cottontail		8.0	9.4	18	±54		9.1	4	±51		8.4	12	±46
White-tailed jackrabbit		0.0	0.0				0.0				0.3	-100	±59
White-tailed deer		21.7	12.0	-45	±33		14.0	-14	±47		7.1	69	±114
Mourning dove		102.3	66.2	-35	±29		90.1	-27	±34		129.4	-49	±33

Table 3. Continued.

Region / Species	Change from 2004					Change from 10-year average				Change from long-term average			
	n	2004	2005	%	95% CI	*n*	1995-04	%	95% CI	*n*	LTA	%	95% CI
Southwest													
Ring-necked pheasant	19	122.9	225.8	84	±40	19	98.0	130	±57	19	112.2	101	±56
Gray partridge		18.8	42.5	126	±122		36.1	18	±63		45.0	-5	±50
Eastern cottontail		8.8	12.6	43	±71		7.8	61	±80		8.3	52	±70
White-tailed jackrabbit		0.4	0.6	49	±240		0.7	-9	±111		4.3	-85	±32
White-tailed deer		17.4	13.7	-22	±53		10.6	29	±67		7.0	95	±107
Mourning dove		276.7	322.9	17	±74		275.5	17	±56		310.0	4	±51
South Central													
Ring-necked pheasant	32	73.9	111.3	51	±41	32	84.7	31	±33	31	139.6	-21	±24
Gray partridge		12.9	9.1	-29	±100		23.8	-62	±38		20.7	-55	±34
Eastern cottontail		11.3	9.2	-18	±51		8.5	8	±28		7.6	24	±33
White-tailed jackrabbit		0.5	0.1	-75	±113		0.5	-74	±66		2.0	-94	±29
White-tailed deer		8.4	3.1	-63	±43		5.2	-40	±35		3.2	2	±56
Mourning dove		247.6	284.3	15	±32		223.4	27	±39		253.6	12	±43
Southeast													
Ring-necked pheasant	19	27.6	34.4	25	±64	19	50.8	-32	±35	19	78.1	-56	±35
Gray partridge		2.5	2.9	17	±230		10.2	-71	±53		15.2	-81	±35
Eastern cottontail		5.1	8.6	70	±136		8.4	3	±64		8.2	5	±70
White-tailed jackrabbit		0.2	0.2	0	±305		0.2	0	±244		0.7	-70	±61
White-tailed deer		25.5	18.3	-28	±40		17.0	8	±73		9.3	95	±106
Mourning dove		201.9	185.4	-8	±42		190.9	-3	±38		212.2	-13	±29

[a] Based on routes (*n*) surveyed in both years.

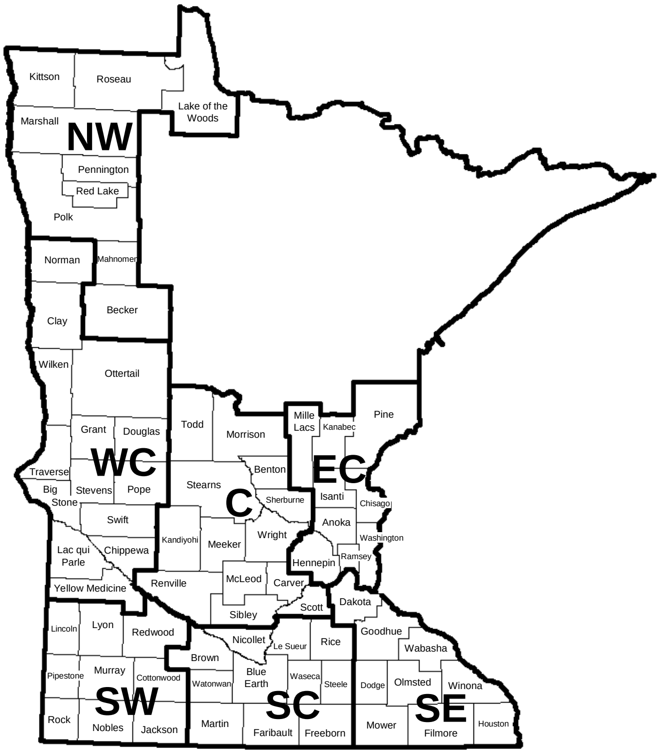
[b] Based on routes (*n*) surveyed at least 9 of 10 years.

[c] LTA = 1955-2004, except for Northwest region (1982-2004) and white-tailed deer (1974-2004). Estimates based on routes (*n*) surveyed ≥40 years (1955-2004), except for Northwest (≥20 years) and white-tailed deer (≥25 years).

[d] Eight Northwestern counties (19 routes) were added to August roadside survey in 1982.

August Roadside Survey

(pheasants/100 miles)



RANGEWIDE

2005	101
2004	57
1995-2004	60
1955-1964	288
LTA (1955-2004)	103
% change from:	
2004	77
1995-2004	69
1955-1964	-65
LTA	-2

WEST CENTRAL

2005	94
2004	45
1995-2004	39
1955-1964	346
LTA (1955-2004)	105
% change from:	
2004	109
1995-2004	142
1955-1964	-73
LTA	-10

CENTRAL

2005	86
2004	39
1995-2004	45
1955-1964	190
LTA (1955-2004)	74
% change from:	
2004	118
1995-2004	89
1955-1964	-55
LTA	16

EAST CENTRAL

2005	54
2004	41
1995-2004	47
1955-1964	184
LTA (1955-2004)	89
% change from:	
2004	33
1995-2004	15
1955-1964	-70
LTA	-39

SOUTHWEST

2005	226
2004	123
1995-2004	98
1955-1964	356
LTA (1955-2004)	112
% change from:	
2004	84
1995-2004	130
1955-1964	-37
LTA	101

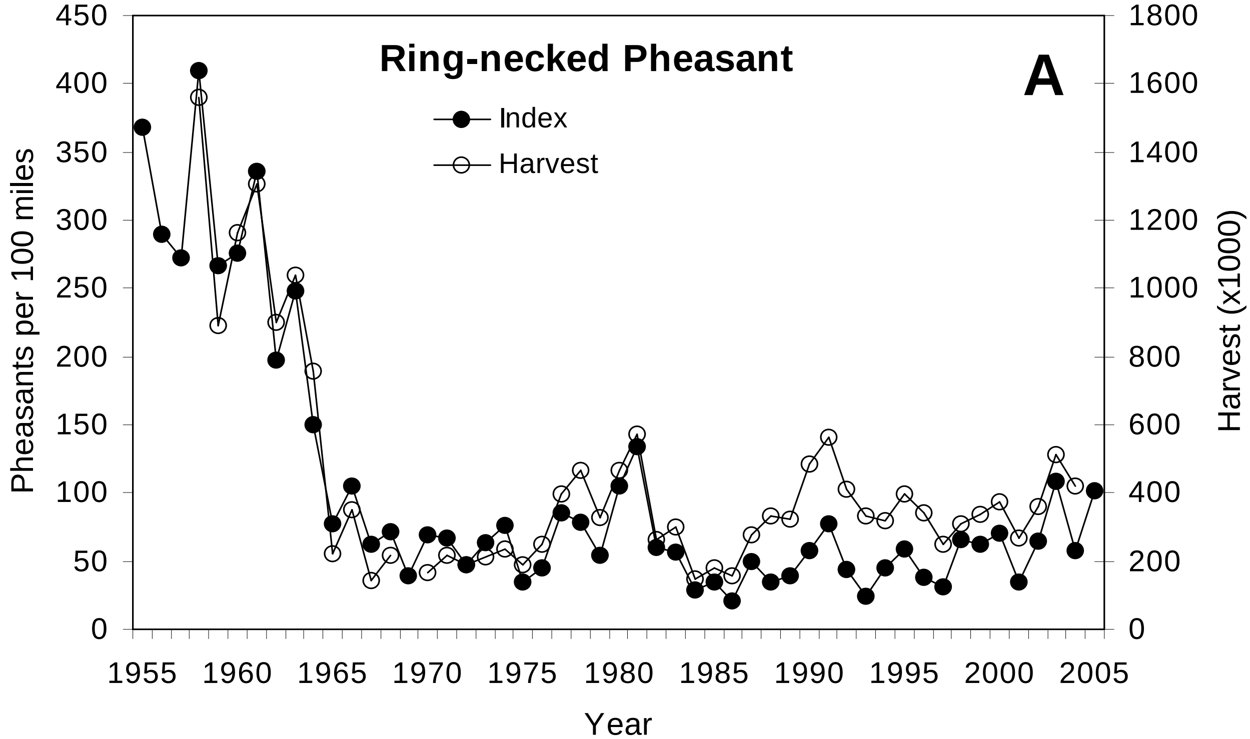
SOUTH CENTRAL

2005	111
2004	74
1995-2004	85
1955-1964	409
LTA (1955-2004)	140
% change from:	
2004	51
1995-2004	31
1955-1964	-73
LTA	-20

SOUTHEAST

2005	33
2004	29
1995-2004	52
1955-1964	129
LTA (1955-2004)	82
% change from:	
2004	13
1995-2004	-37
1955-1964	-75
LTA	-60

Figure 1. Survey regions for Minnesota's August Roadside Survey. Ring-necked pheasants seen per 100 miles of August Roadside Survey and percent change from 2004, 10-yr mean (1995-2004), benchmark (1955-1964), and long-term average (1955-2004). Benchmark reflects soil-bank years with marginal cropland in long-term set-aside, a diversified agricultural landscape, more small grains and tame hay, and less pesticide use. **Note:** estimates are based on **all routes completed** and, thus, may differ from values in Table 2 and 3 (full report), which were based on routes directly comparable among years (i.e., unaltered routes with few or no missing survey years).



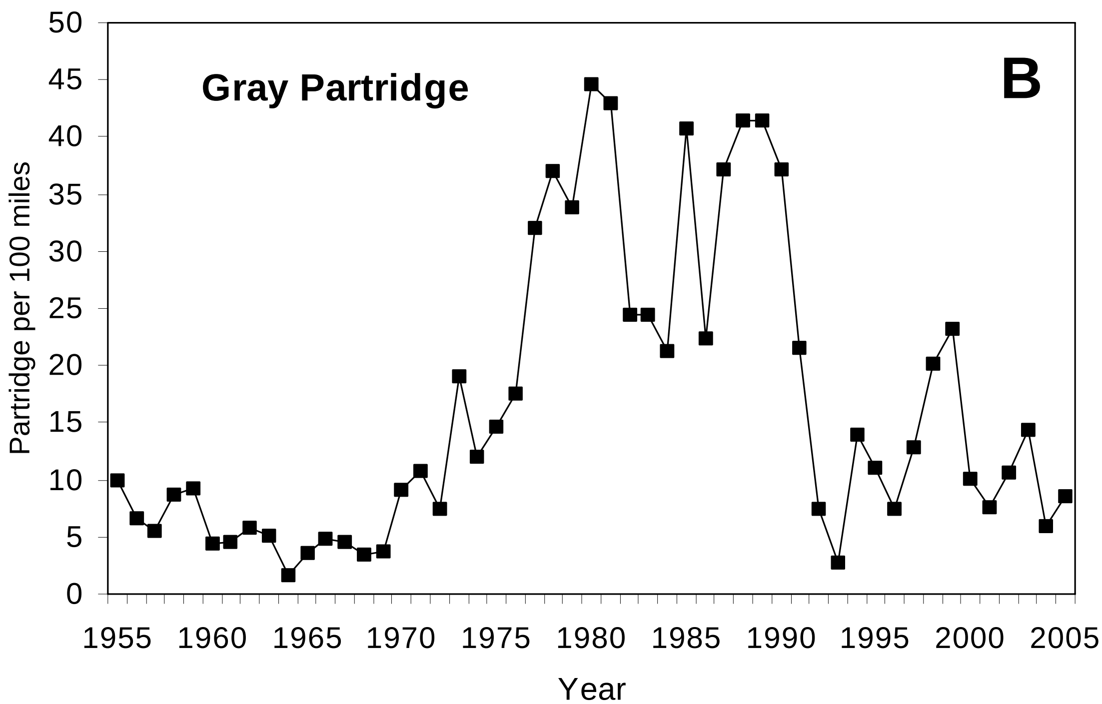


Figure 2. Statewide index of ring-necked pheasants (**A**) and gray partridge (**B**) seen per 100 miles driven. Does not include the Northwest region. Based on all survey routes completed.

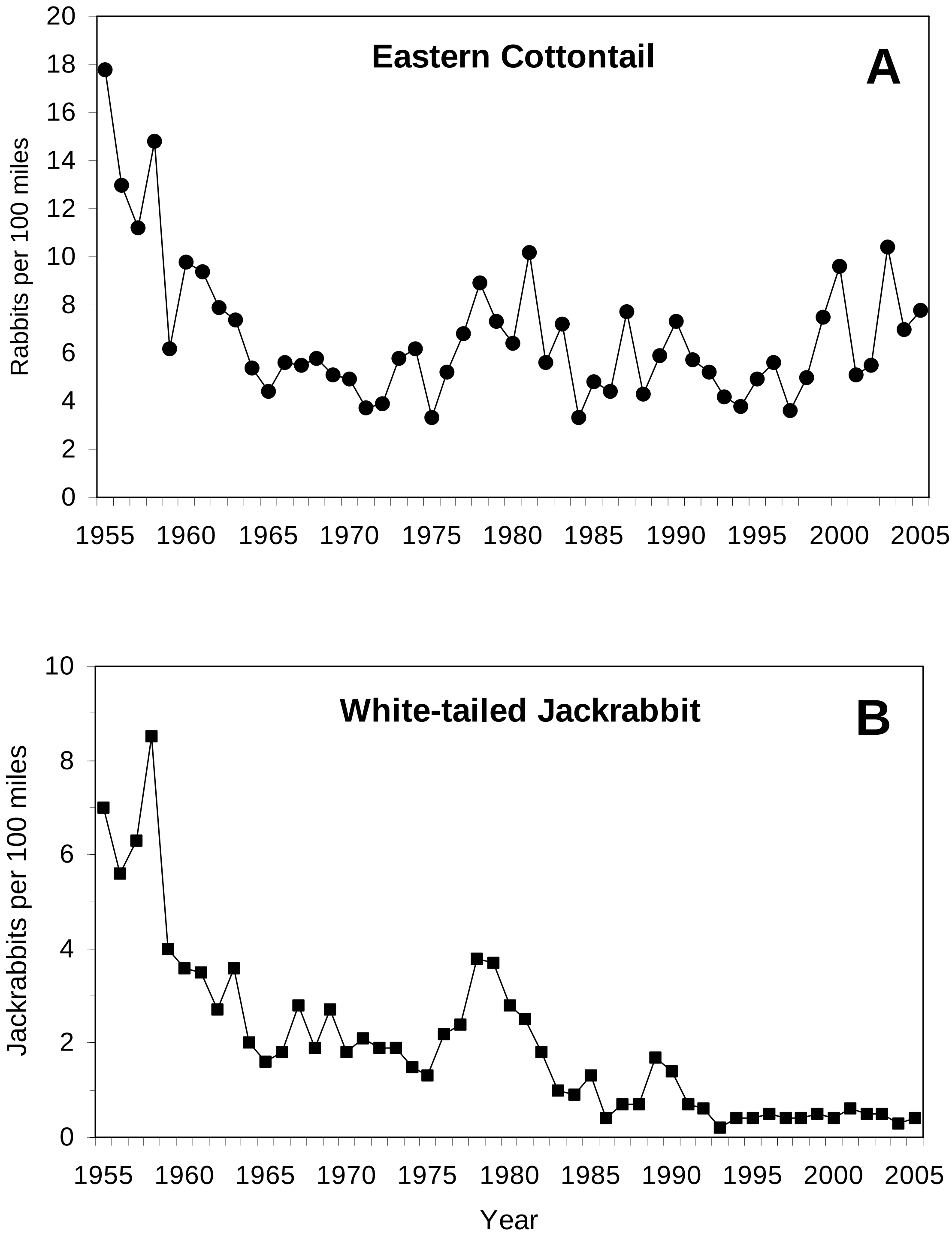
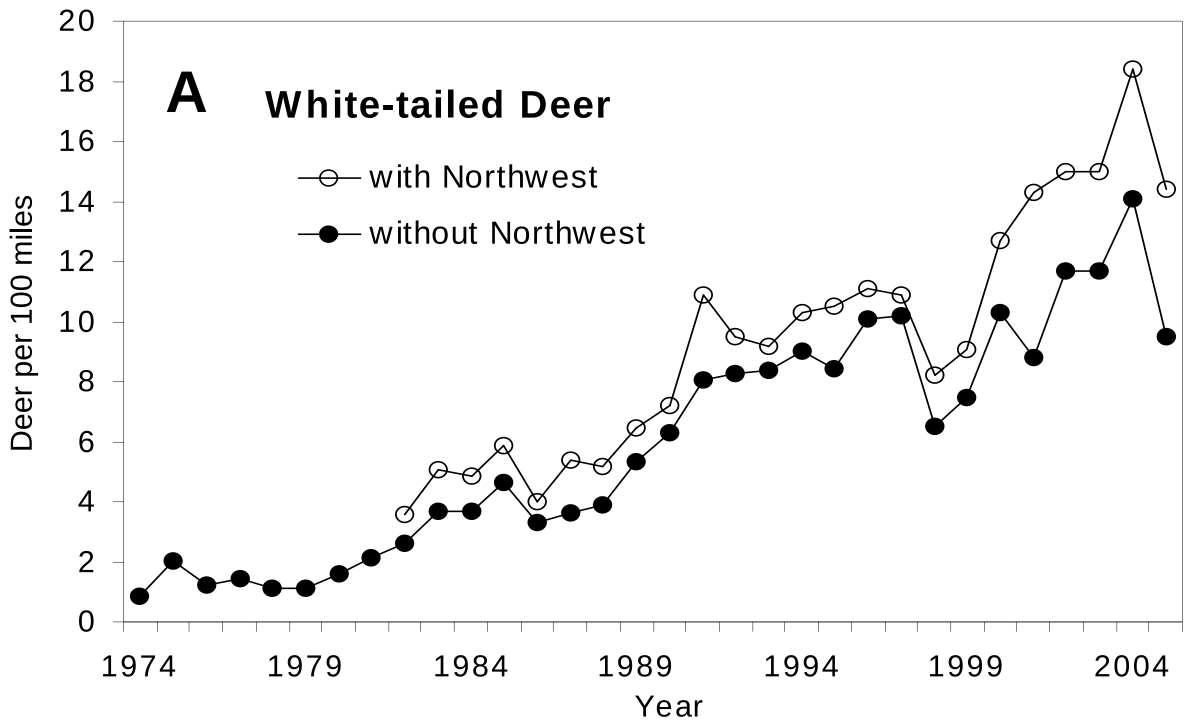


Figure 3. Statewide index of eastern cottontail (**A**) and white-tailed jackrabbits (**B**) seen per 100 miles driven. Does not include the Northwest region. Based on all survey routes completed.



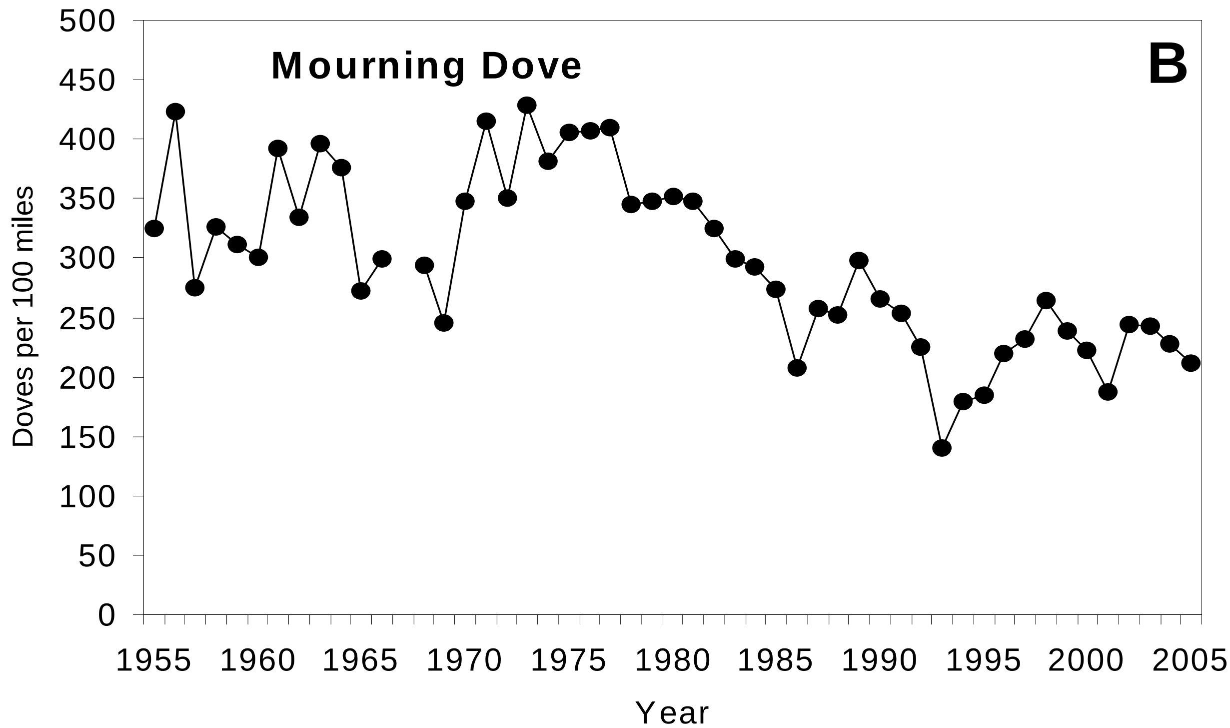
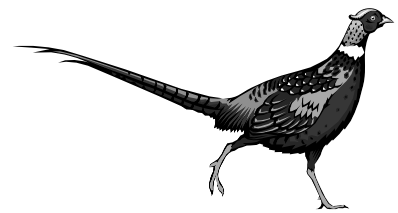


Figure 4. Statewide index of white-tailed deer (**A**) and mourning doves (**B**) seen per 100 miles driven. Doves were not counted in 1967 and the dove index does not include the Northwest region. Based on all survey routes completed.



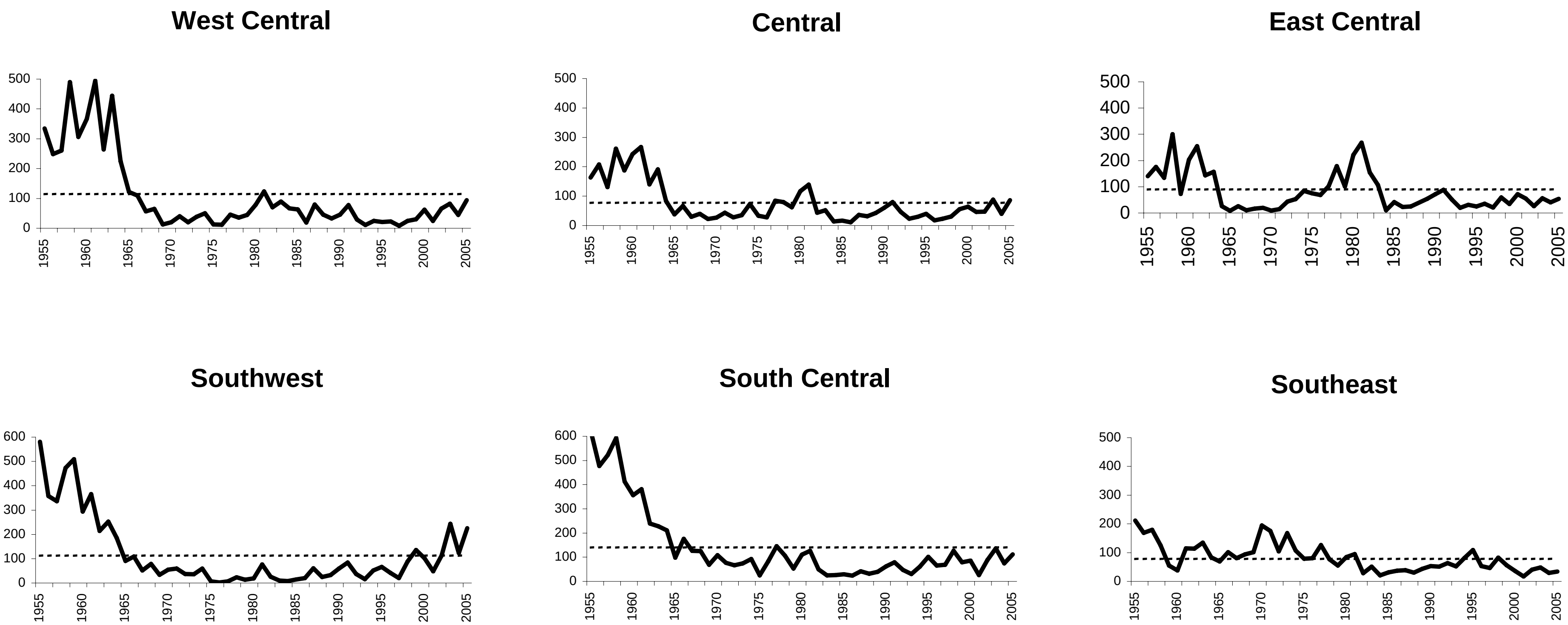


Figure 5. Regional index (——) and long-term average (······) of **ring-necked pheasants seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis is not the same scale among survey regions.

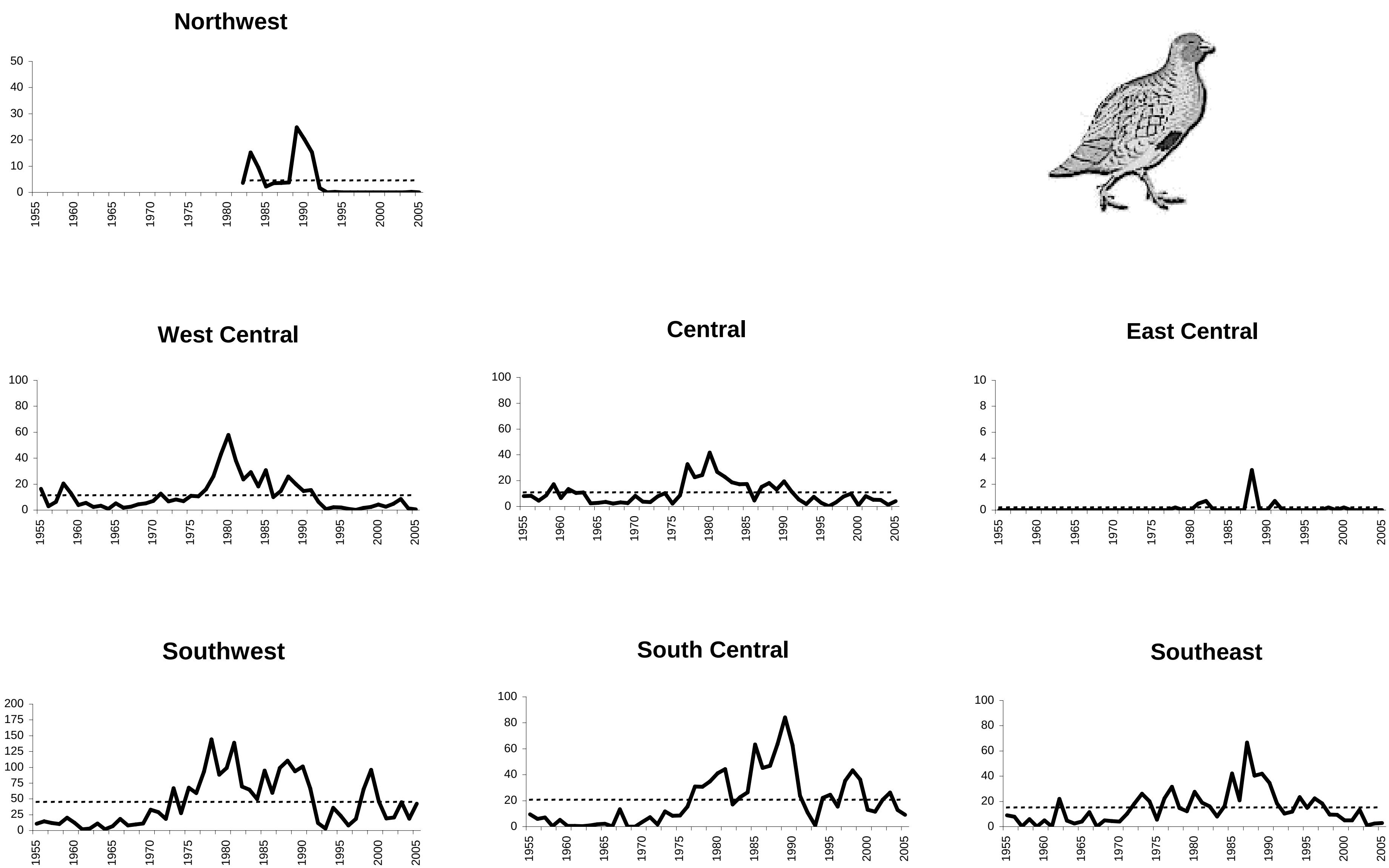


Figure 6. Regional index (——) and long-term average (……) of **gray partridge seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis is not the same among survey regions.

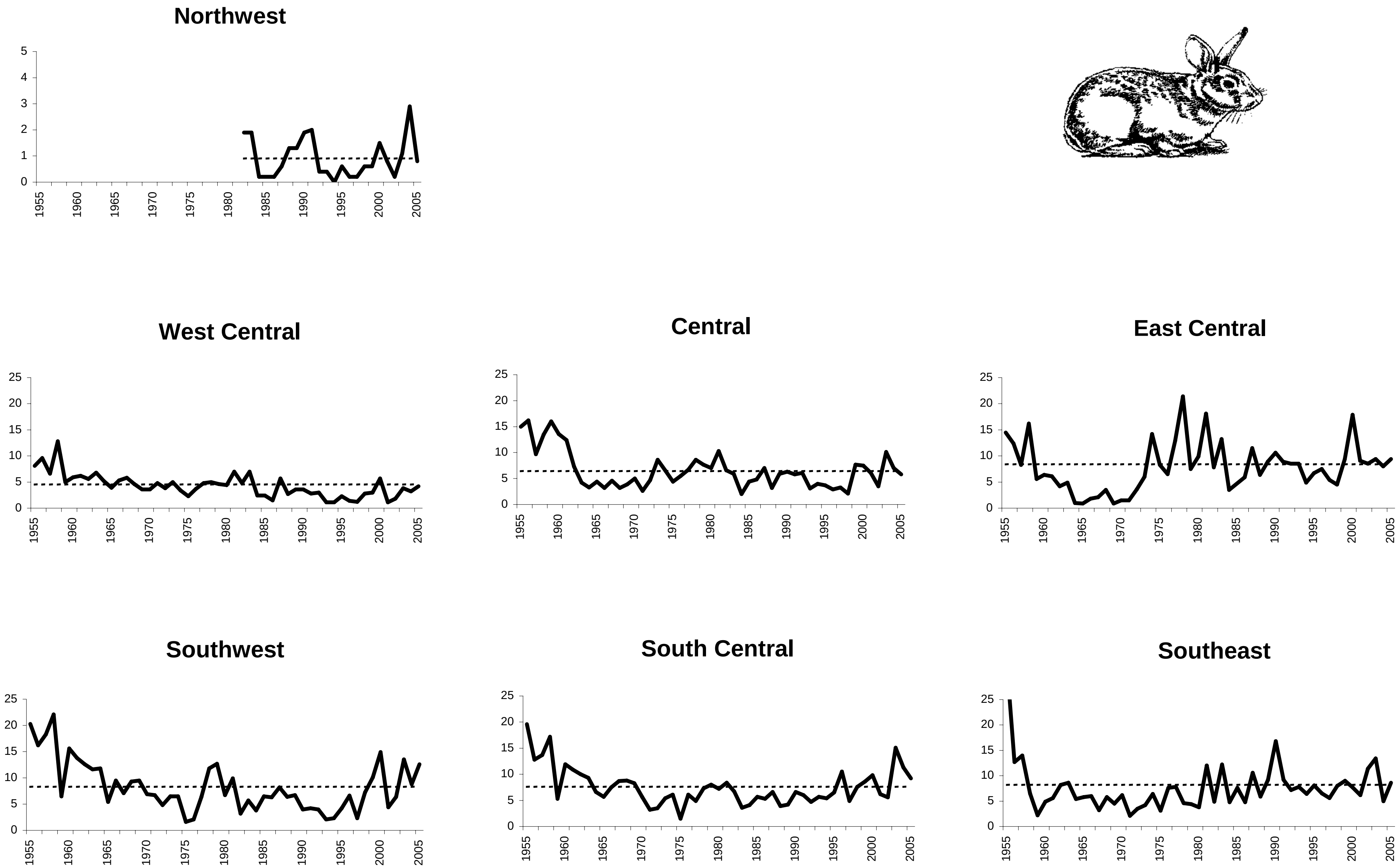
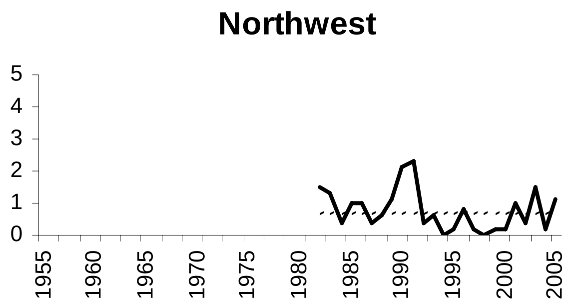
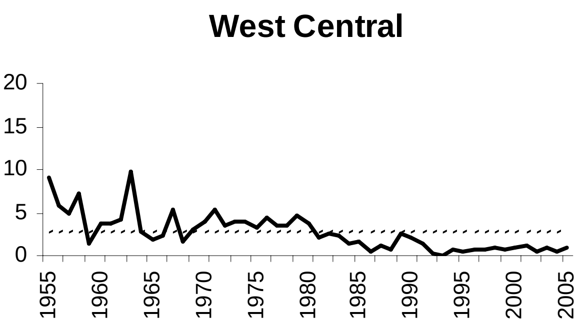
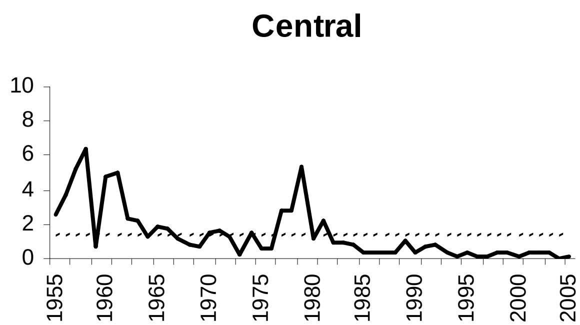
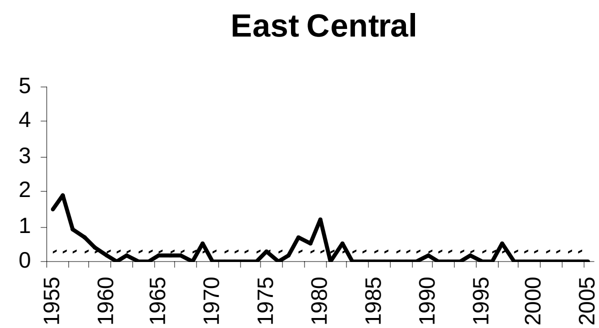


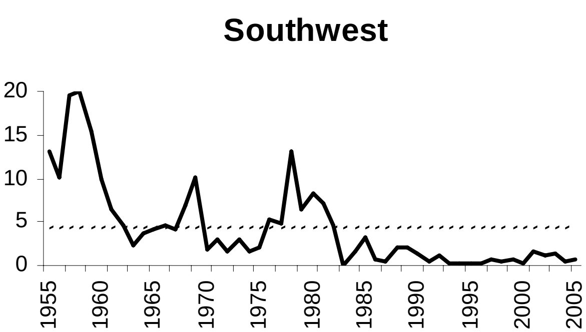
Figure 7. Regional index (———) and long-term average (······) of **cottontail rabbits seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis is not the same among survey regions.

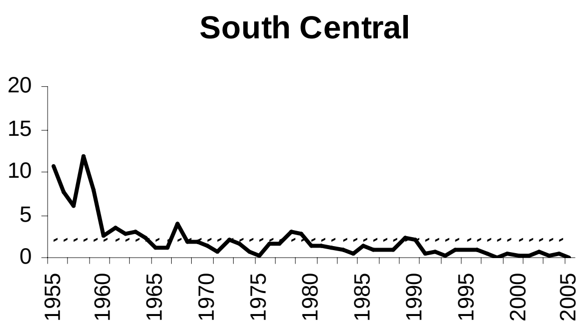












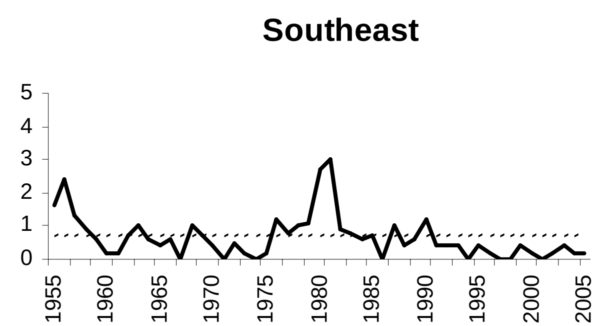


Figure 8. Regional index (____) and long-term average (......) of **white-tailed jackrabbits seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis is not the same among survey regions.

Population Trends of White-tailed Deer in Minnesota's Farmland/Transition Zone – 2005

Marrett Grund, Farmland Wildlife Populations and Research Group

INTRODUCTION

White-tailed deer (*Odocoileus virginianus*) represent one of the most important big game mammals in Minnesota. Although viewed as being important by both hunters and non-hunters, deer also pose socioeconomic and ecological challenges for wildlife managers, such as deer-vehicle accidents, crop depredation, and forest regeneration issues. Thus, monitoring the status of deer populations is critical so that appropriate harvest levels can be determined based on established deer management goals.

The intent of this document is to: 1) identify where the farmland population model is applied to model deer population dynamics in Minnesota, 2) describe the structure of and data inputs for the farmland population model, 3) discuss general trends of deer density and current abundance, and 4) describe trends of harvest patterns in the farmland/transition zone.

METHODS

Minnesota Farmland/Transition Zone

There are 4 deer management units (DMUs) in Minnesota's farmland/transition zone (Figure 1) and DMUs are further partitioned into deer management sub-units (DMSUs; Figure 2). The primary purpose of DMUs and DMSUs is to pool data in homogeneous landscape types. Permit areas (PAs) delineated within DMUs serve as the basis for population modeling and managing antlerless harvests (Figure 3). There are 87 PAs in Minnesota's farmland zone. However, the 2 PAs encompassing the Twin Cities metro region are not modeled.

Population Modeling

The population model used to analyze past trends and test harvest strategies in the farmland/transition zone can best be described as an accounting procedure that subtracts losses, adds gains, and keeps a running total of the number of animals alive in various sex-age classes during successive periods of the annual cycle. The deer population is partitioned into 4 sex-age classes (fawns, adults, males, and females). The 12-month year is divided into 4 periods representing important biological events in the deer's life (hunting season, winter, reproduction, and summer). The primary purposes of the farmland model are to: 1) organize and synthesize existing data on farmland deer populations, 2) advance our understanding of each deer population through population analysis, 3) provide population estimates and simulated vital rates for farmland deer populations, and 4) assist our management efforts through simulations, projections, and predictions of various management prescriptions.

The 3 most important parameters within the model reflect the aforementioned biological events, which include reproduction, harvest, and non-hunting mortality. Fetal rates are typically estimated at the DMU level via fetus surveys conducted each spring. Fetal rates are then used to estimate population reproductive rates for each deer herd within a particular DMU. The deer population increases in size after reproduction is simulated. Non-hunting mortality rates occurring during summer months (prior to the hunting season) are derived from field studies conducted in Minnesota and other agricultural regions. Although summer mortality rates are low, they do represent a reduction in the annual deer population. In farmland deer herds, virtually all mortality occurring during the 12-month year can be attributed to hunter harvests. Annual harvests are simulated in the model by subtracting the numerical harvest (adjusted for crippling and non-registered deer) from the pre-hunt population for each respective sex-age class. In heavily hunted deer populations, like those in the farmland/transition region, the numerical harvest data "drive" the population model by substantially reducing the size of the deer herd. Winter mortality rates are estimated from field studies conducted in Minnesota and other farmland regions, similar to summer mortality rates. After winter mortality rates are simulated, the population is at its lowest point during the 12-month period and the annual cycle begins again with reproduction.

RESULTS AND DISCUSSION

Population Trends and Densities

Deer densities continued to increase throughout most of the farmland/transition zone. Deer densities were highest in the Big Woods DMU, lowest in the Prairie DMU, and at intermediate levels in northwestern Minnesota (Agassiz & Red River DMUs). Detailed long-term trends in deer densities can be reviewed in Table 1.

In northwestern Minnesota, simulated deer densities indicated a slight downward trend over the last couple of years (Figure 4). Efforts to reduce deer in this area may be having an impact. However, most managers and constituent groups indicated there were still too many deer in northwestern Minnesota.

In the Big Woods DMU, which incorporates the transition zone, deer densities continued to increase (Figure 4). Rate of increase was most rapid in the Southeast and Metro DMSUs, despite efforts to reduce deer populations in these areas (Fig 5).

In the Prairie DMU, deer densities have increased slowly over the last couple of years (Figure 4). Rate of increase was fastest in the North and Southwest DMSUs (Figure 6). This trend reflected objectives and management strategies of most wildlife managers in southwestern Minnesota who wished to either maintain or slightly increase deer herds in their respective work areas.

Harvest Trends

In northwestern Minnesota, registered harvest densities have steadily increased over the past 5-6 years (Figure 7). Harvest densities were higher and have increased at a faster rate in the Agassiz DMU than in the Red River DMU.

In the Big Woods DMU, harvest densities varied across DMSUs and across years (Figure 8). Trends in harvest densities have been most stable in the Metro and most variable in the Southeast DMSU. Harvest densities have generally increased in the Central and North DMSUs over the past 4-6 years.

In the Prairie DMU, harvest densities have declined in the River DMSU but have been relatively stable in North and Southwest DMSUs (Figure 9). Harvest densities have fluctuated in the Southeast DMSU but are comparable to harvest densities a decade ago.

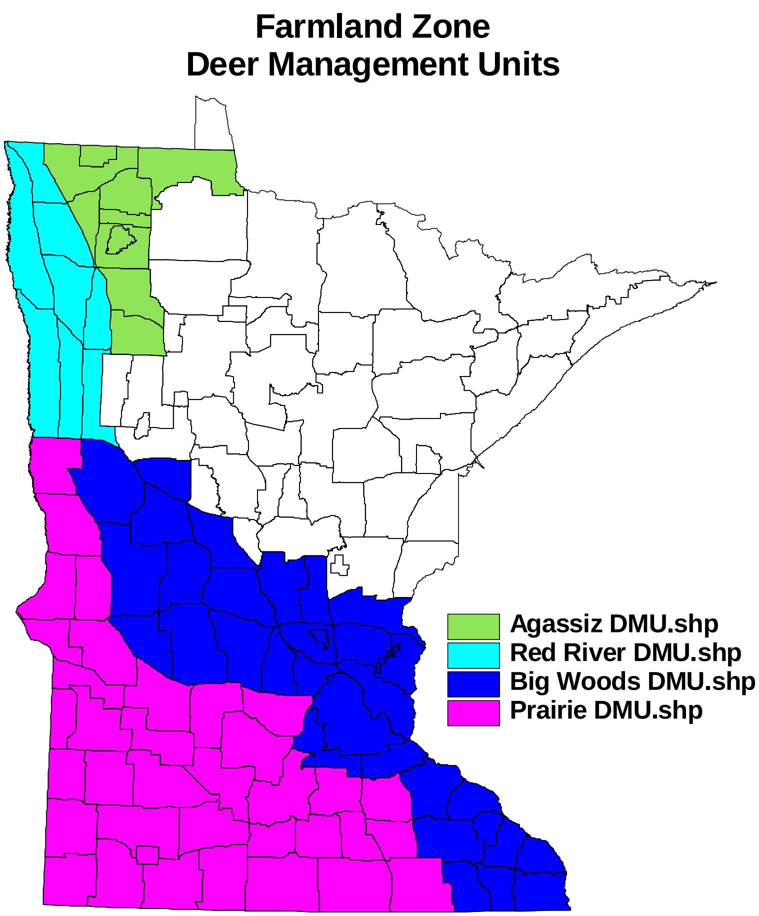


Figure 1. Deer management units in the farmland zone of Minnesota, 2004.

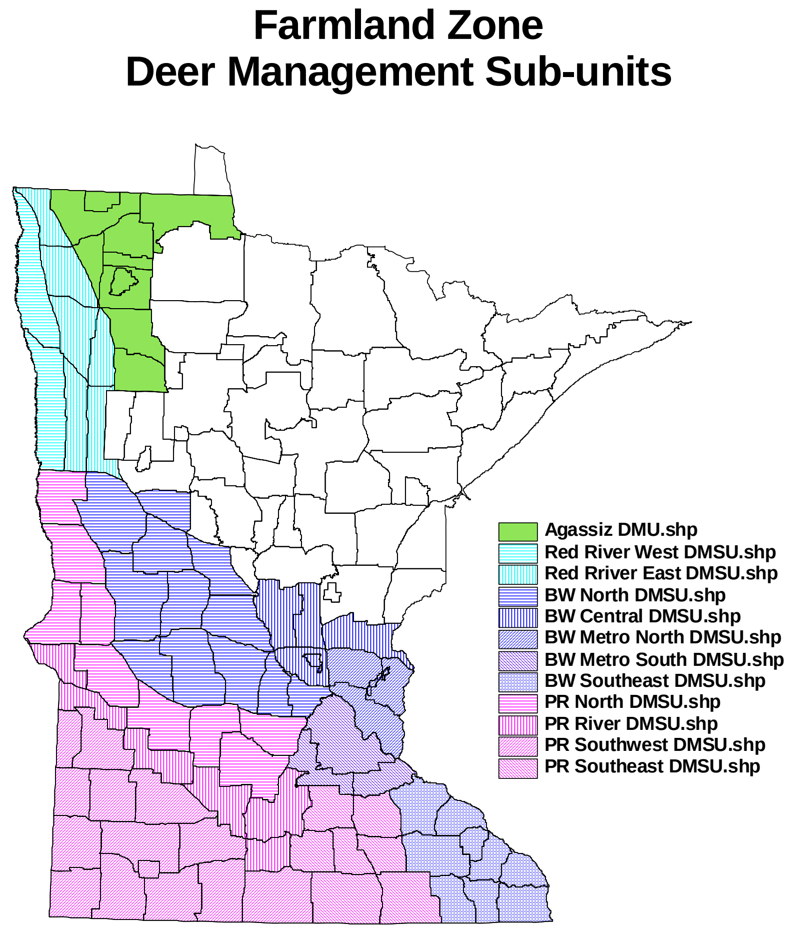


Figure 2. Deer management sub-units in the farmland zone of Minnesota, 2004.

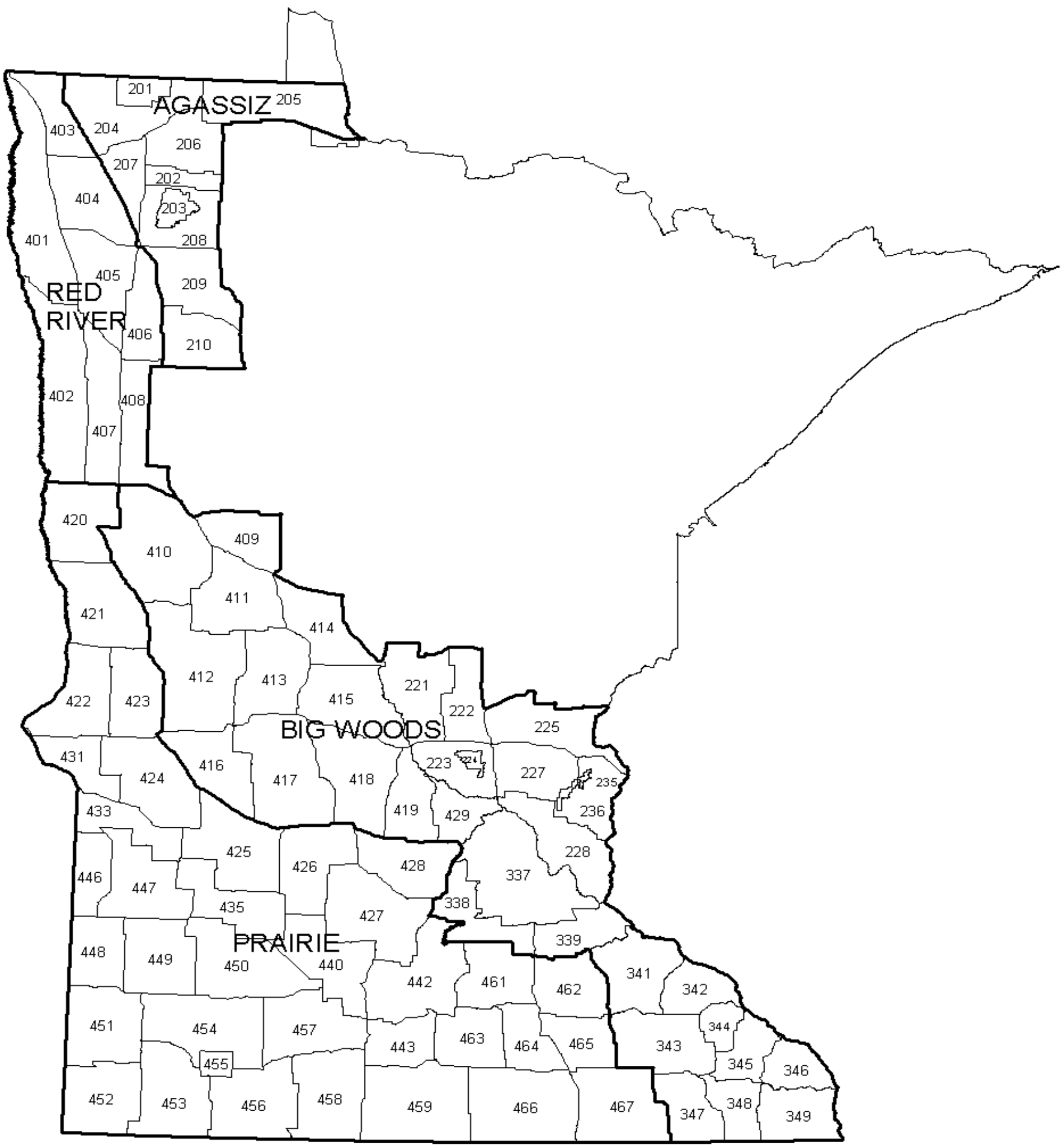


Figure 3. Deer permit areas in Minnesota's the farmland zone, 2004.

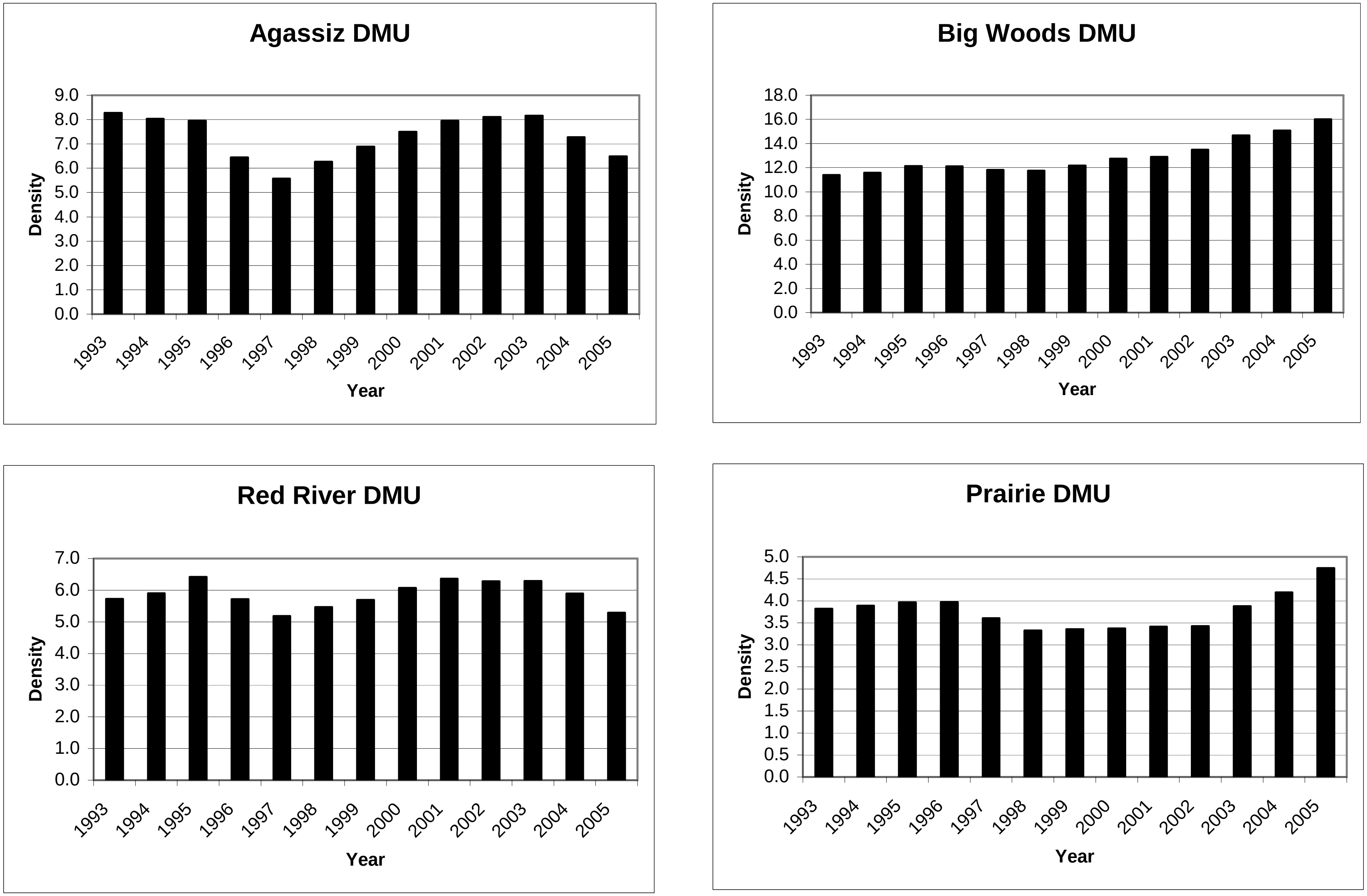


Figure 4. Modeled deer densities for each deer management unit in the farmland zone of Minnesota, 1993-2005.

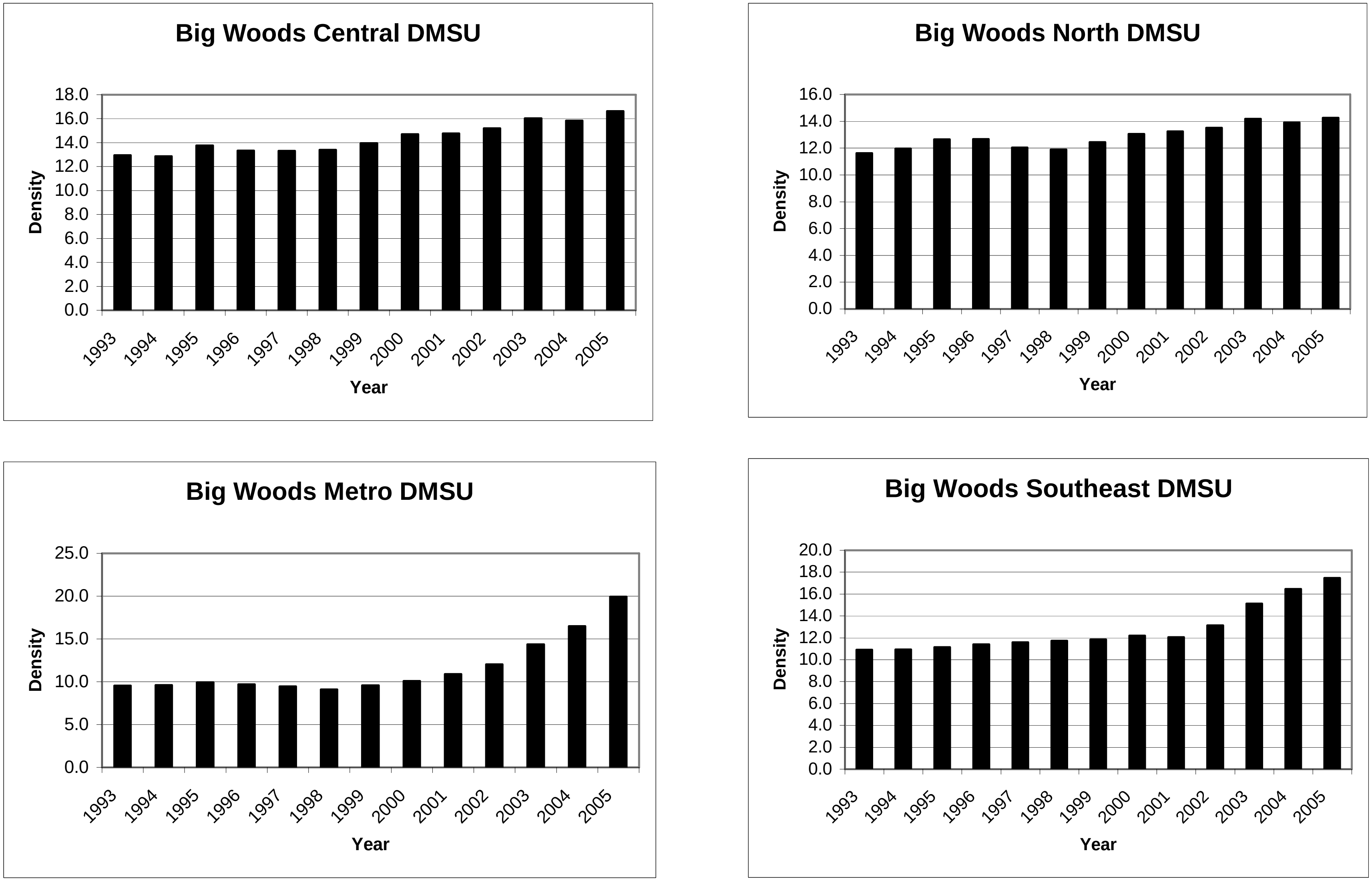
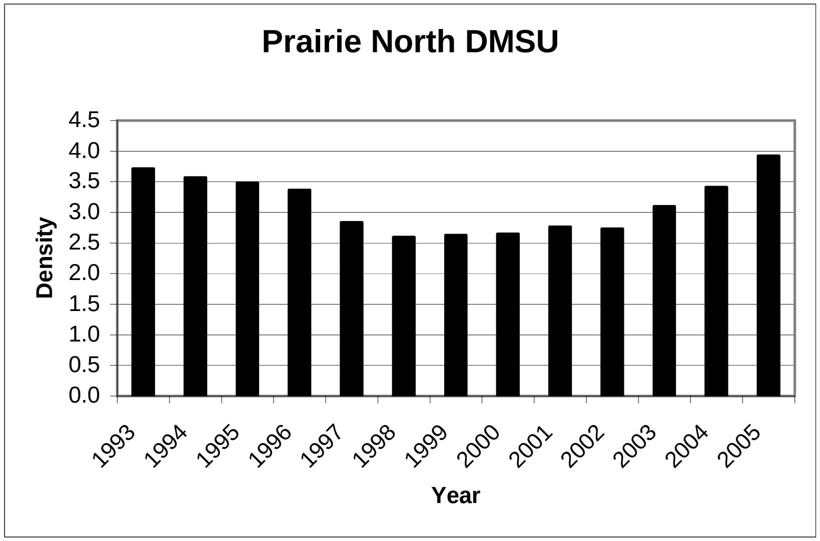
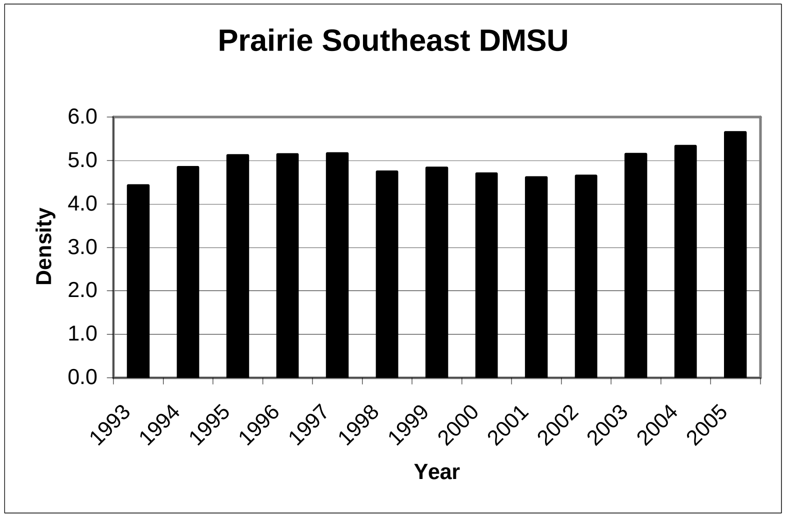
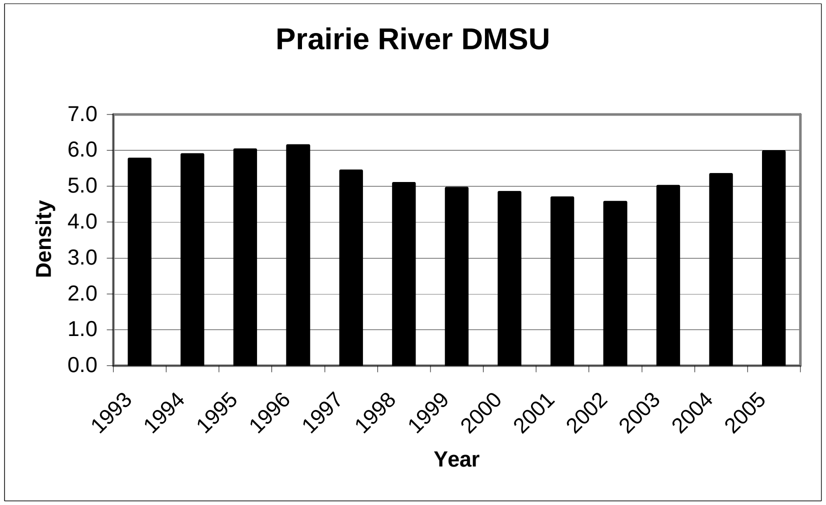


Figure 5. Modeled deer densities for Big Woods deer management sub-units of Minnesota, 1993-2005.







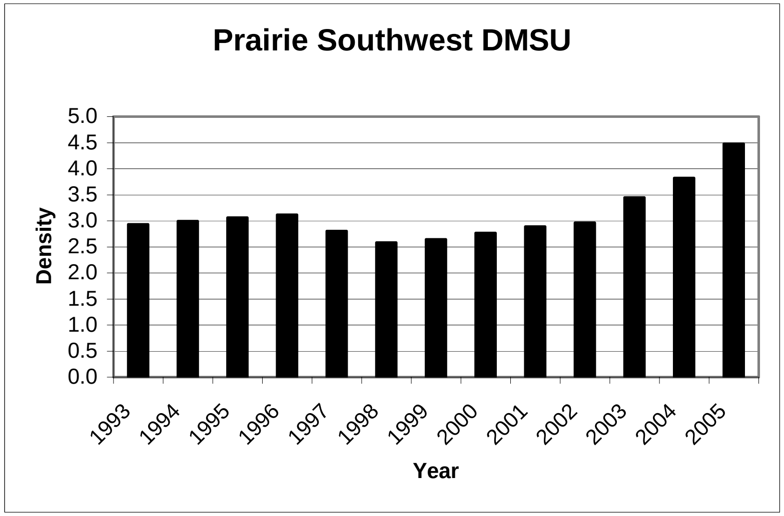


Figure 6. Modeled deer densities for Prairie deer management sub-units of Minnesota, 1993-2005.

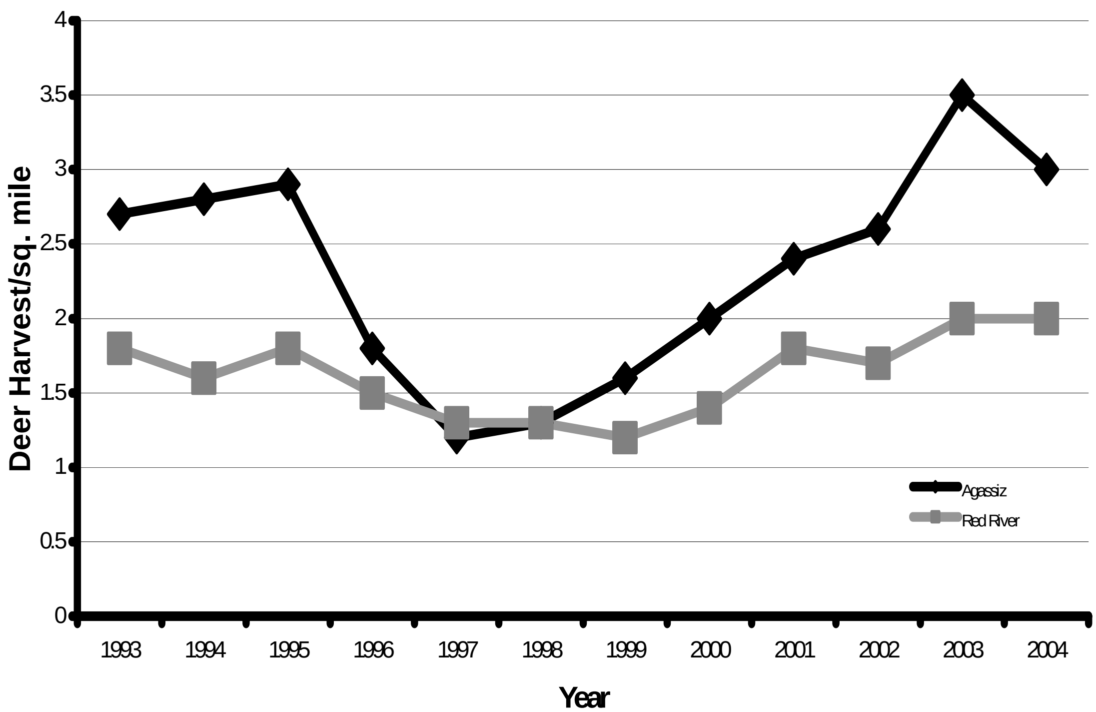


Figure 7. Deer harvest densities in the Agassiz and Red River deer management units of Minnesota, 1993-2004.

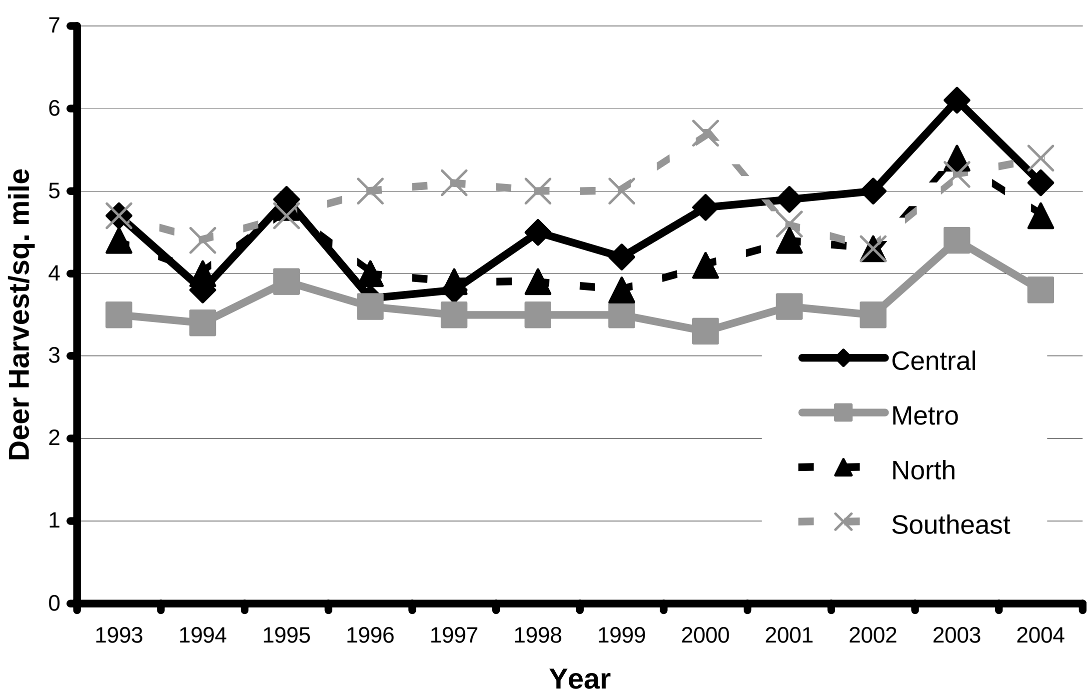


Figure 8. Deer harvest densities in Big Woods deer management sub-units of Minnesota, 1993-2004.

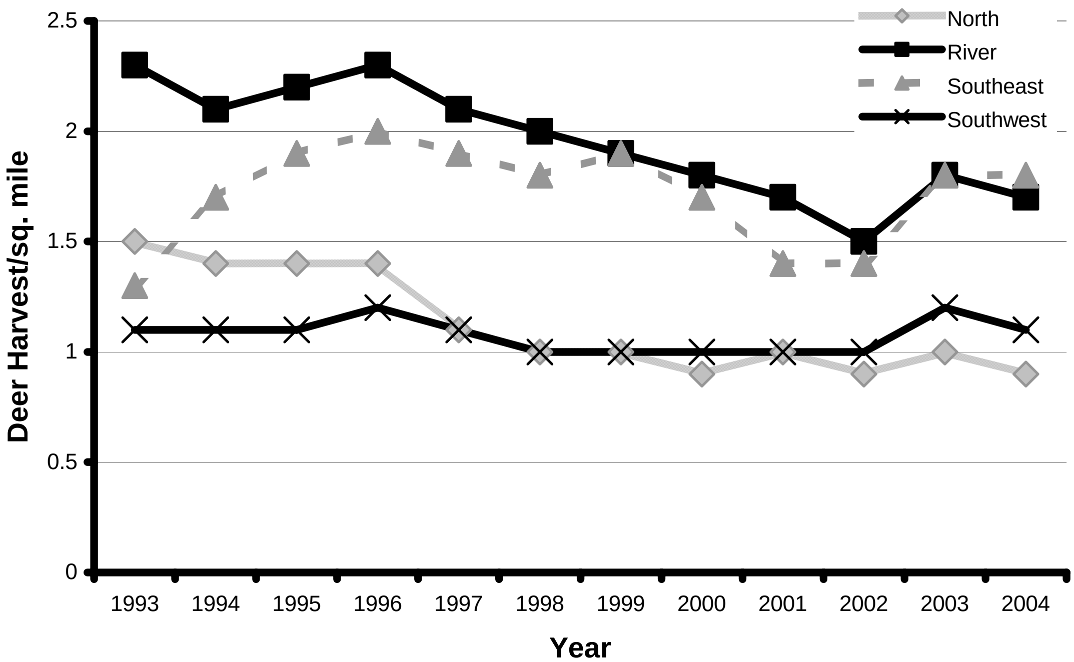


Figure 9. Deer harvest densities in Prairie deer management sub-units of Minnesota, 1993-2004.

Table 1. Pre-fawning deer density estimates[a] (deer/mi^2) by deer management unit (DMU), sub-unit (DMSU), and permit area (PA) in Minnesota's Farmland/Transition Zone, 1993-2005.

DMU	DMSU	PA	Area mi^2	Pre-fawning density 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
RED RIVER	*West*	401	1039	2.1	2.2	2.5	2.3	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.4	2.4
		402	1021	3.3	3.4	3.8	3.5	2.9	3.0	3.2	3.3	3.4	3.0	2.8	2.3	1.7
		Total	2060	2.7	2.8	3.1	2.9	2.4	2.5	2.6	2.7	2.8	2.6	2.6	2.3	2.1
	East	403	396	6.2	6.3	6.9	5.9	5.7	6.2	6.6	7.1	7.5	7.9	8.1	7.8	7.2
		404	631	7.0	7.1	7.8	7.0	6.5	7.1	7.5	7.9	8.3	8.4	8.8	8.7	8.1
		405	654	6.5	6.6	7.1	6.3	5.9	6.4	6.9	7.4	7.8	7.6	7.7	7.2	6.6
		406	413	10.5	11.3	12.7	11.4	9.9	10.3	10.5	11.0	11.0	10.0	9.5	8.0	6.2
		407	618	8.5	8.5	9.1	8.1	7.5	7.7	8.0	8.8	9.2	9.4	9.1	8.6	7.5
		408	494	8.0	8.1	8.4	7.3	6.9	7.2	7.3	7.9	8.4	8.8	9.0	8.7	8.4
		Total	3206	7.7	7.9	8.5	7.5	7.0	7.4	7.7	8.3	8.6	8.6	8.7	8.2	7.4
Red River Total			5266	5.7	5.9	6.4	5.7	5.2	5.5	5.7	6.1	6.4	6.3	6.3	5.9	5.3
AGASSIZ		201	155	6.1	5.0	3.7	2.4	1.9	2.5	3.1	3.7	4.5	4.8	4.8	5.3	5.4
		202	156	11.4	10.4	9.8	7.4	6.2	7.6	8.7	9.9	11.0	10.9	10.7	9.3	8.5
		203	108	11.4	9.2	6.9	3.0	1.9	2.3	2.9	3.6	4.5	5.5	6.7	6.6	7.1
		204	718	7.3	7.3	7.3	6.0	4.7	5.2	5.6	5.9	6.0	5.7	5.8	5.2	4.9
		205	642	11.7	12.0	11.8	9.4	7.3	8.7	9.6	10.7	11.3	11.9	11.8	9.3	6.9
		206	471	8.7	8.2	8.3	6.8	5.7	6.4	7.2	8.1	8.8	8.8	8.3	6.9	5.4
		207	300	8.8	8.0	7.6	6.2	5.7	6.4	7.0	7.7	8.2	8.4	8.8	7.8	6.9
		208	448	4.2	3.9	3.5	2.6	2.4	2.9	3.4	3.9	4.2	4.3	4.6	4.3	4.2
		209	576	6.0	6.0	6.3	5.4	5.1	5.7	6.0	6.4	6.7	6.8	7.0	6.8	6.5
		210	485	11.3	11.5	12.0	10.7	9.6	9.8	10.5	10.9	11.2	11.4	11.5	11.1	10.7
Agassiz Total			4059	8.3	8.0	7.9	6.4	5.6	6.3	6.9	7.5	7.9	8.1	8.2	7.3	6.5
BIG WOODS	*North*	409	417	22.8	25.2	28.2	30.0	28.6	27.9	29.8	32.9	32.2	32.4	33.2	32.2	31.2

DMU	DMSU	PA	Area mi[2]	Pre-fawning density 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
		410	924	13.0	13.2	13.8	13.5	12.9	13.1	14.5	15.7	16.4	17.1	18.2	18.7	20.0
		411	642	18.5	19.2	20.8	20.8	20.3	21.1	22.7	24.7	26.1	27.2	29.2	30.5	33.2
		412	989	10.5	10.3	10.5	10.0	9.2	9.0	9.5	9.6	9.4	9.5	10.1	10.2	10.5
		413	644	12.8	13.3	14.1	14.0	13.2	13.4	13.5	14.1	14.4	14.1	13.1	11.2	9.5
		414	557	14.8	15.5	17.0	17.0	17.3	17.5	18.1	18.7	18.9	19.4	20.4	19.0	18.4
		415	702	8.4	8.8	9.4	9.3	8.9	8.8	9.1	9.4	9.4	9.6	9.9	9.0	8.2
		416	544	9.2	9.6	9.7	9.7	9.1	8.8	8.5	8.1	8.0	7.6	7.9	7.4	7.4
		417	939	9.1	9.0	9.3	9.6	8.7	8.0	7.9	7.8	7.7	8.0	8.6	8.4	9.4
		418	760	7.7	7.6	7.9	7.8	7.2	7.0	7.3	7.1	7.1	7.3	8.0	7.7	7.9
		419	393	9.0	9.4	9.6	9.6	8.9	7.7	7.8	8.5	8.8	9.2	10.3	10.9	12.1
		429	288	5.3	5.5	5.3	5.4	5.1	4.8	5.1	5.6	5.9	6.3	7.0	7.2	8.1
		Total	7799	11.6	12.0	12.7	12.7	12.0	11.9	12.4	13.1	13.3	13.5	14.2	13.9	14.3
	Central	221	642	8.7	8.7	9.4	9.4	9.4	9.8	10.5	11.5	11.3	11.9	12.5	12.4	12.6
		222	412	12.8	12.4	13.4	12.9	12.7	13.2	13.8	14.4	14.2	14.6	14.9	13.9	14.2
		223	376	12.3	12.7	13.4	12.9	12.7	12.5	12.5	13.3	13.4	13.8	14.8	14.8	16.0
		224	48	13.5	14.2	15.4	15.2	16.2	17.5	18.4	20.2	22.3	24.5	27.4	28.4	30.9
		225	619	17.8	17.4	18.7	17.8	17.9	17.6	18.2	18.7	18.9	19.1	20.3	20.3	21.7
		Total	2097	13.0	12.9	13.8	13.3	13.3	13.4	14.0	14.7	14.8	15.2	16.0	15.8	16.6
	Metro[b]	227	472	15.4	15.5	16.4	12.9	12.9	12.8	13.4	13.7	14.5	15.3	17.7	19.6	22.8
		235	33	12.8	12.9	13.0	12.0	12.6	13.3	16.9	20.0	24.4	31.4	42.8	53.5	70.5
		236	374	15.0	15.3	16.0	16.4	16.2	15.6	16.5	17.3	18.5	20.4	23.4	26.0	30.6
		338	452	4.6	4.4	4.4	4.4	4.1	3.8	3.9	4.4	4.9	5.7	7.4	9.0	11.4
		339	395	5.4	5.6	5.5	5.5	5.0	4.5	4.7	5.0	5.5	6.3	8.0	9.8	12.6
		Total	1726	9.6	9.7	10.0	9.8	9.5	9.2	9.7	10.2	11.0	12.1	14.5	16.6	20.1
	Southeast	341	611	7.7	8.0	8.4	8.7	8.8	8.8	8.8	8.9	8.7	9.7	11.1	9.2	9.3
		342	352	10.4	10.5	10.6	9.9	10.1	11.0	11.2	11.5	11.4	12.6	15.0	17.2	10.0
		343	663	7.1	7.4	7.6	8.0	8.3	8.0	8.4	9.0	9.3	10.8	13.1	15.7	18.9
		344	189	18.1	17.5	17.3	16.9	15.6	14.6	13.9	14.2	14.5	16.6	20.1	23.5	28.4

DMU	DMSU	PA	Area mi^2	Pre-fawning density 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
		345	326	11.3	10.8	10.8	10.4	10.6	10.8	10.8	10.5	9.6	9.8	10.8	12.1	13.9
		346	319	17.3	16.6	16.7	17.3	18.0	17.7	18.0	18.8	18.9	20.1	22.8	24.9	26.9
		347	434	9.1	9.3	9.2	9.5	9.6	9.2	9.2	9.3	9.1	10.1	11.0	11.8	12.5
		348	332	15.6	15.7	16.1	16.7	17.0	17.1	16.5	16.2	15.1	15.0	16.1	16.5	16.5
		349	492	11.5	11.8	12.3	13.0	13.7	14.8	15.7	16.7	16.7	18.3	21.4	24.3	27.7
		Total	3718	10.9	10.9	11.1	11.3	11.6	11.7	11.8	12.1	12.0	13.1	15.1	16.4	17.4
Big Wood Total			15340	11.4	11.6	12.1	12.1	11.8	11.7	12.2	12.7	12.9	13.5	14.7	15.1	16.0
PRAIRIE	*North*	420	651	4.2	3.9	3.8	3.7	3.2	3.0	3.4	3.7	3.8	3.6	3.9	3.8	3.5
		421	749	3.5	3.4	3.3	3.1	2.7	2.5	2.7	2.8	3.1	3.0	3.6	4.1	4.8
		422	634	2.9	2.6	2.5	2.4	2.0	2.2	2.2	2.2	2.2	2.2	2.5	2.7	3.3
		423	531	4.3	4.1	4.1	4.1	3.7	3.4	3.3	3.2	3.4	3.1	3.5	3.7	4.4
		424	766	6.0	6.0	6.0	6.5	5.2	4.3	4.0	3.6	3.4	3.2	3.4	3.9	4.4
		425	779	2.4	2.3	2.2	1.9	1.3	1.0	0.9	0.9	1.0	1.0	1.2	1.5	1.8
		426	614	4.0	3.9	3.7	3.2	2.9	2.7	2.8	2.9	3.2	3.3	3.8	4.1	4.8
		427	837	2.4	2.3	2.2	1.8	1.5	1.3	1.4	1.5	1.6	1.8	2.1	2.4	3.0
		428	550	4.2	4.0	4.1	4.0	3.6	3.4	3.6	3.6	3.9	4.1	4.8	5.5	6.3
		Total	6111	3.7	3.6	3.5	3.4	2.8	2.6	2.6	2.6	2.8	2.7	3.1	3.4	3.9
	River	431	360	6.8	6.9	6.8	7.6	6.7	5.9	5.5	4.7	4.2	3.9	3.9	3.8	4.1
		433	397	9.5	9.9	10.3	10.4	9.3	8.8	8.3	8.2	7.9	7.7	8.9	9.1	10.1
		435	575	5.9	5.7	5.8	6.0	5.2	4.9	4.7	4.6	4.5	4.4	4.9	5.4	6.4
		440	662	4.3	4.4	4.5	4.5	4.1	3.9	3.9	3.8	3.7	3.5	3.8	4.0	4.1
		442	806	4.5	4.5	4.7	4.5	3.9	3.8	4.0	4.2	4.3	4.3	4.9	5.5	6.3
		443	386	6.0	6.4	6.7	6.7	6.0	5.5	5.2	4.9	4.6	4.5	4.7	4.8	5.3
		Total	3186	5.8	5.9	6.0	6.1	5.4	5.1	4.9	4.8	4.7	4.6	5.0	5.3	6.0
	Southwest	446	345	5.8	6.0	6.5	6.8	6.5	6.1	6.1	5.9	5.7	5.4	5.4	5.3	5.4
		447	675	2.7	2.6	2.7	2.6	2.2	2.1	2.0	2.1	2.0	2.0	2.4	2.6	3.1
		448	447	3.7	3.5	3.1	3.0	2.5	2.2	2.2	2.8	3.6	3.8	4.4	5.0	5.9

DMU	DMSU	PA	Area mi²	Pre-fawning density 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
		449	625	3.9	3.8	3.7	3.4	2.8	2.5	2.4	2.9	3.8	4.1	5.0	5.8	6.9
		450	816	1.9	2.0	2.0	1.8	1.5	1.4	1.5	1.4	1.4	1.3	1.6	1.7	2.0
		451	687	2.7	2.7	2.7	3.1	2.7	2.5	2.5	2.5	2.6	2.8	3.3	3.8	4.8
		452	637	2.6	2.7	3.0	3.3	3.2	3.2	3.3	3.5	3.5	3.6	4.1	4.5	5.2
		453	729	1.9	2.0	2.0	2.0	1.7	1.6	1.8	2.0	2.2	2.4	3.1	3.6	4.8
		454	840	3.5	3.5	3.6	3.6	3.2	3.0	3.1	3.3	3.4	3.4	3.9	4.4	5.0
		455	95	4.6	4.8	4.6	4.8	4.4	4.4	4.4	4.1	3.9	3.9	4.4	4.4	4.7
		456	712	3.2	3.3	3.5	3.6	3.3	3.2	3.3	3.3	3.5	3.7	4.4	5.2	6.0
		457	666	2.6	2.6	2.5	2.7	2.4	2.3	2.5	2.6	2.7	2.6	2.9	3.1	3.4
		458	715	2.5	2.8	2.8	2.9	2.6	2.4	2.3	2.4	2.4	2.4	2.7	2.9	3.3
		459	974	2.8	3.1	3.3	3.4	3.2	2.7	2.7	2.8	2.7	2.8	3.2	3.5	4.2
		Total	8963	2.9	3.0	3.1	3.1	2.8	2.6	2.6	2.8	2.9	3.0	3.4	3.8	4.5
	Southeast	461	481	7.5	8.1	8.6	8.8	8.8	8.0	7.8	7.5	7.2	7.1	7.6	7.4	7.0
		462	506	7.0	7.7	8.3	8.4	8.4	8.1	8.3	7.8	7.5	7.2	7.8	8.0	8.3
		463	453	3.4	3.5	3.6	3.4	3.3	3.0	3.1	3.2	3.3	3.3	3.5	3.8	4.3
		464	377	4.2	4.5	4.8	4.6	4.2	3.8	3.7	3.8	4.0	4.3	5.1	5.7	6.5
		465	385	4.3	4.7	5.1	4.9	4.9	4.3	4.5	4.1	4.1	4.2	4.7	4.8	5.1
		466	931	3.3	3.7	3.9	4.1	4.1	3.7	3.9	3.8	3.6	3.7	4.3	4.7	5.3
		467	774	2.9	3.4	3.5	3.5	3.6	3.4	3.5	3.7	3.7	3.7	4.2	4.1	4.2
		Total	3907	4.4	4.8	5.1	5.1	5.2	4.7	4.8	4.7	4.6	4.7	5.2	5.3	5.7
Prairie Total			22167	3.8	3.9	4.0	4.0	3.6	3.3	3.4	3.4	3.4	3.4	3.9	4.2	4.7
Farmland Zone Total			46832	6.9	7.0	7.3	7.1	6.6	6.6	6.8	7.1	7.2	7.4	8.1	8.2	8.6

[a]Density estimates are subject to change as new data are incorporated or the model is revised.
[b]Excluding permit areas 228 & 337, which were not modeled.

Fetus Survey Data Results of White-tailed Deer in the Farmland/Transition Zone of Minnesota – 2005

Marrett Grund and Bob Osborn, Farmland Populations & Research Group

INTRODUCTION

Fetus surveys are used to gather information on productivity (number of fetuses per doe) of juvenile (≤12 months of age) and adult (>12 months of age) female white-tailed deer (*Odocoileus virginianus*) in the farmland/transition zone of Minnesota (Figure 1). These data, along with other biological information, are incorporated into the farmland deer population model. The farmland deer population model is used to predict changes in population size and determine deer management strategies for 85 permit areas.

A simple and effective method for estimating productivity rates is through direct examination of the reproductive tracts of female deer killed by motor vehicles. The objectives of the this survey are to estimate 1) pregnancy rates of juvenile and adult white-tailed deer in the farmland/transition zone of Minnesota and 2) fetal rates of adult and juvenile white-tailed deer in the farmland/transition zone of Minnesota.

METHODS

Reproductive data required for the farmland deer population model include age of the female (juvenile or adult), pregnancy status, number of fetuses present, and gender of the fetuses. These data are collected annually from road-killed females from 1 February to 31 May. Personnel participating in the survey include all wildlife staff in the farmland/transition zone. Area Wildlife Managers are encouraged to contact local Department of Transportation staff and law enforcement officials to facilitate locating dead deer in a timely fashion. Where possible, the use of volunteers is also encouraged.

Equipment for data collection included a sharp knife or scalpel, vinyl gloves, and self-addressed, postage-paid postcards. When examining each deer, staff located and opened the uterus to check for fetuses. Staff recorded pregnancy/lactation status, age class of the female, number and gender of all fetuses present, and the location of the road-killed animal (Figure 2). Notes on body condition or any other unusual observations were also recorded.

RESULTS & DISCUSSION

A total of 262 deer were examined in 2005. Fifteen (6%) of these deer came from the Northwest Deer Management Unit (DMU; Table 1), 192 (73%) from the Big Woods DMU (Table 2), and 55 (21%) from the Prairie DMU (Table 3).

Pregnancy rates for fawns ranged from 13% in the Prairie DMU to 33% in the Northwest DMU. Throughout the farmland/transition zone, 44% of fawns were pregnant. Pregnancy rates for adults ranged from 89% in the Northwest DMU to 91% in the Big Woods DMU and averaged 90% across the farmland/transition zone.

Fetal rates for fawns ranged from 0.1 fetuses/fawn in the Prairie DMU to 0.4 fetuses/fawn in the Big Woods DMU, and averaged 0.3 fetuses/fawn across the farmland/transition zone. Fetal rates for adults ranged from 1.7 fetuses/adult in the Big Woods and Prairie DMUs, and 1.9 fetuses/adult in the Northwest DMU. Fetal rates averaged 1.7 fetuses/adult throughout the farmland/transition zone.

Table 1. Reproductive performance of white-tailed deer in Minnesota for the Northwest[a] Deer Management Unit, 1980 – 2005.

	Fawns			Adults		
Year	N	Percent Pregnant	Fetuses per doe	N	Percent Pregnant	Fetuses per doe
1980	8	50	0.6	12	92	1.7
1981	4	0	0.0	11	100	1.7
1982	6	67	0.7	18	94	1.8
1983	15	27	0.3	26	85	1.6
1984	10	40	0.6	23	87	1.7
1985	6	17	0.2	11	91	1.7
1986	3	0	0.0	6	83	1.3
1987	3	0	0.0	5	100	1.6
1988	3	33	0.3	4	50	0.8
1989	14	21	0.3	27	93	1.7
1990	18	22	0.2	29	93	1.7
1991	11	9	0.1	15	87	1.6
1992	13	8	0.1	24	96	1.6
1993	7	0	0.0	11	100	1.6
1994	7	14	0.1	13	92	1.4
1995	4	25	0.3	6	100	2.0
1996	5	0	0.0	21	81	1.3
1997	4	0	0.0	12	100	1.5
1998	3	0	0.0	7	86	1.6
1999	5	0	0.0	14	100	1.6
2000	7	14	0.1	11	100	2.0
2001	4	0	0.0	8	100	1.8
2002	7	14	0.1	13	100	1.8
2003	0	0	0.0	3	100	1.7
2004	2	50	0.5	2	100	2.0
2005	6	33	0.3	9	89	1.9
Mean (1980's)		26	0.3		88	1.6
Mean (1990's)		8	0.1		94	1.6
Mean (2000's)		19	0.2		98	1.9

[a]Red River (East and West) and Agassiz Deer Management Units were combined into the Northwest Deer Management Unit due to small sample sizes.

Table 2. Reproductive performance of white-tailed deer in Minnesota for the Big Woods Deer Management Unit[a], 1978 – 2005.

	Fawns			Adults		
Year	N	Percent Pregnant	Fetuses per doe	N	Percent Pregnant	Fetuses per doe
1978	74	47	0.5	113	96	1.8
1979	87	30	0.3	119	92	1.7
1980	87	61	0.7	107	97	1.8
1981	78	58	0.6	132	92	1.7
1982	95	43	0.5	197	95	1.8
1983	83	55	0.7	167	95	1.8
1984	77	22	0.3	123	95	1.8
1985	60	50	0.6	105	96	1.8
1986	79	37	0.4	116	88	1.6
1987	45	44	0.5	146	94	1.8
1988	14	64	0.8	31	97	1.8
1989	51	31	0.3	85	96	1.8
1990	96	32	0.3	125	95	1.8
1991	50	20	0.2	71	96	1.8
1992	67	24	0.3	100	95	1.8
1993	47	38	0.4	95	93	1.7
1994	46	15	0.2	99	94	1.7
1995	21	19	0.2	54	91	1.8
1996	59	15	0.2	112	96	1.8
1997	40	33	0.4	96	88	1.6
1998	53	23	0.3	109	91	1.7
1999	49	37	0.4	95	91	1.6
2000	62	23	0.3	76	91	1.6
2001	36	14	0.1	65	94	1.7
2002	70	23	0.3	97	95	1.8
2003	66	20	0.2	90	95	1.6
2004	65	20	0.2	60	88	1.6
2005	93	29	0.4	99	91	1.7
Mean (1980's)		47	0.5		95	1.8
Mean (1990's)		26	0.3		93	1.7
Mean (2000's)		22	0.2		92	1.7

[a]The majority of samples (approximately 85%) from this Deer Management Unit were obtained from the Big Woods Metro sub-unit. Consequently, the data reported in this table may not reflect reproductive performances throughout the remainder of the Big Woods Management Unit.

Table 3. Reproductive performance of white-tailed deer in Minnesota for the Prairie Deer Management Unit, 1980 – 2005.

	Fawns			Adults		
Year	N	Percent Pregnant	Fetuses per doe	N	Percent Pregnant	Fetuses per doe
1978	25	44	0.6	69	100	1.9
1979	83	34	0.4	92	90	1.8
1980	51	63	0.7	55	91	1.7
1981	57	44	0.5	65	92	1.8
1982	50	46	0.6	85	94	1.9
1983	42	62	0.9	51	96	1.9
1984	30	23	0.3	69	84	1.6
1985	21	38	0.4	49	94	1.9
1986	25	64	0.8	56	93	1.7
1987	27	52	0.6	47	94	0.9
1988	20	40	0.5	16	100	1.9
1989	37	38	0.4	54	89	1.7
1990	43	42	0.4	62	97	1.8
1991	30	20	0.2	67	94	1.8
1992	37	19	0.2	51	94	1.9
1993	39	38	0.4	75	93	1.8
1994	32	16	0.2	46	98	1.9
1995	39	21	0.3	50	92	1.7
1996	28	14	0.1	30	90	1.6
1997	26	4	0.0	49	92	1.7
1998	18	17	0.2	38	97	1.7
1999	26	19	0.2	47	96	1.7
2000	13	23	0.4	23	87	1.6
2001	18	6	0.1	39	87	1.5
2002	19	32	0.4	26	92	1.7
2003	18	22	0.2	123	93	1.7
2004	10	10	0.1	9	89	1.7
2005	16	13	0.1	39	90	1.7
Mean (1980's)		47	0.5		93	1.7
Mean (1990's)		21	0.2		94	1.8
Mean (2000's)		18	0.2		90	1.7

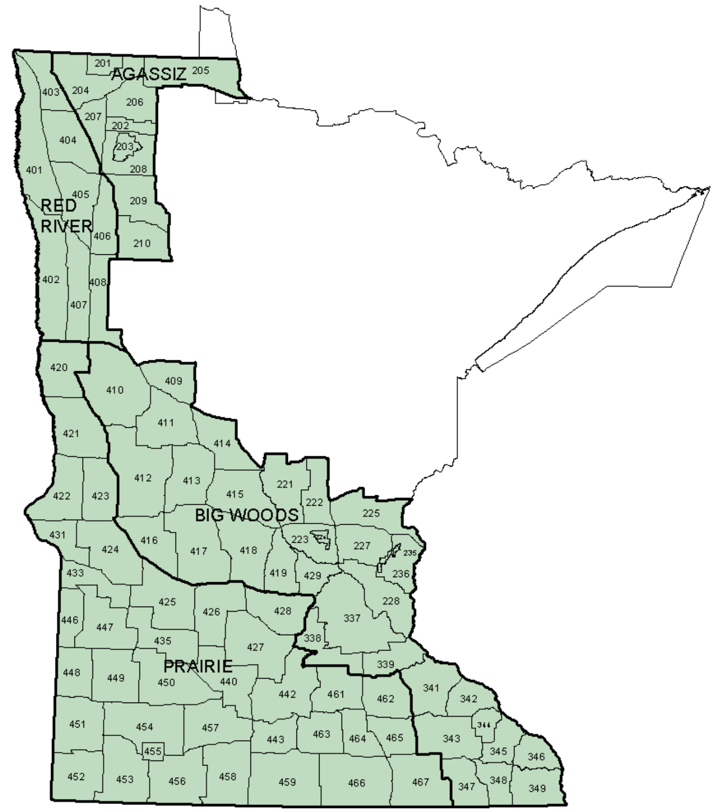


Figure 1. Permit areas within the Farmland Zone of Minnesota.

FETUS SURVEY REPORT FORM

Name ________________________________ Date ______________

Sex: _____ Age: Juv. (<12 months) _____ Adult (>12 months) _____

Pregnant: Yes _____ No _____ (Lactating _____)

Number of fetuses ____________ Sex of Fetuses _______________

County ______________________ Highway ____________________

Permit area __________ Twp ______ Rng ______ Sec ______

Miles _____ direction _____ from ______________________________

Comments ____

Figure 2. Postcard for reporting fetus survey data.