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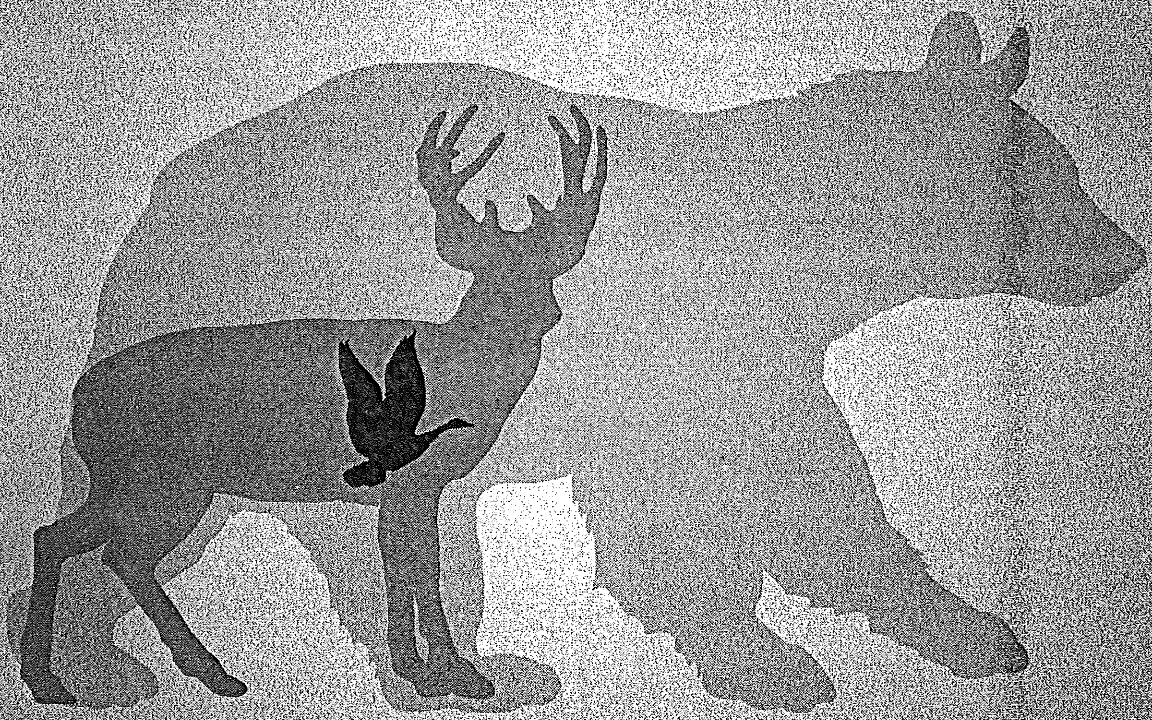

Status of Wildlife Populations

Fall 2010

Minnesota Department of Natural Resources
Division of Fish and Wildlife
St. Paul, Minnesota

STATUS OF WILDLIFE POPULATIONS, FALL 2010

(Including 2000-2010 Hunting and Trapping Harvest Statistics)

Minnesota
DEPARTMENT OF NATURAL RESOURCES

edited by
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Note: Data in this report may change as a result of future verification and more comprehensive analysis.

Status of Wildlife Populations, Fall 2010

(Including 2000-2010 Hunting and Trapping Harvest Statistics)

This is the 34th year that the DNR has compiled this booklet; it is primarily an administrative document intended for DNR personnel. Since 1984 we have also generated a companion volume, *Summaries of Wildlife Research Findings*, containing annual summaries of activities and findings from ongoing research projects in the Wildlife Policy and Research Unit. This publication will be posted on the DNR website and available in other formats upon request. In the on-line format links are available to the U.S. Fish and Wildlife Service Division of Migratory Bird Management to access their reports for Waterfowl Population Status; Migratory Bird Harvest Information Preliminary Estimates; American Woodcock Population Status; and Mourning Dove Population Status.

Most of the fieldwork associated with collection of census and survey data for farmland, wetland, and forest wildlife is performed by wildlife biologists and managers (conservation officers also participate in August roadside counts). The Farmland, Wetland, and Forest Wildlife Population and Research groups coordinate these activities, analyze and interpret data, and prepare recommendations for harvest regulations and season setting.

Most of the hunting and trapping harvest estimates are calculated and summarized by St. Paul central office personnel.

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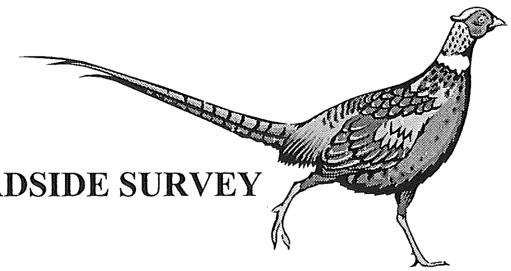


2010 MINNESOTA AUGUST ROADSIDE SURVEY

Kurt J. Haroldson and Molly A. Tranel
Farmland Wildlife Populations & Research Group

ABSTRACT

This report is a summary of the 2010 Minnesota August roadside survey. Population indices for ring-necked pheasants, gray partridge, cottontail rabbits, and white-tailed jackrabbits were similar to 2009 but below the 10-year and long-term averages. Population indices for white-tailed deer and mourning doves were similar to 2009 and the 10-year average. Sandhill crane indices were also unchanged from 2009. Conservation Reserve Program (CRP) enrollment in Minnesota declined by 54,000 acres from 2009, including 21,000 acres from the pheasant range, but increases in enrollment of other farm programs and acquisition of public lands exceeded CRP losses, yielding a net gain of about 4,000 acres of protected habitat. The winter of 2009-10 was the most severe since 2000-01 for much of the farmland region. Weather during March-May was warm and dry (except for the Northwest), but June turned wetter than normal. Thus, conditions for overwinter survival of farmland wildlife in 2010 were below average, whereas reproductive conditions were excellent early but then declined in June.

The 2010 pheasant index (62.8 birds/100 mi) was similar to 2009 but remained 22% below the 10-year average, 38% below the long-term average, and 79% 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). The 2010 hen pheasant index was similar to last year range-wide but was 28% below the 10-year average. The number of broods observed was similar to last year but 20% below the 10-year average, which reflected fewer hens available for nesting. Overall, the size of the fall population will be close to that of last year, when approximately 400,000 roosters were harvested. The best opportunity for harvesting pheasants appears to be in the Southwest region, although good opportunities will likely also be available in the Central and West Central regions.

The gray partridge index was similar to last year, but 55% below the 10-year mean and 76% below the long-term average. Observed regional changes were not significant, but were based on small samples. Gray partridge counts were highest in the Southwest and Southeast regions.

The cottontail rabbit index was similar to last year, but 31% below the 10-year average and 24% below the long-term average. Counts of cottontail rabbits were highest in the East Central, Southeast, and Central regions. The jackrabbit index did not change significantly in 2010, but was 96% below the long-term average. The range-wide jackrabbit population peaked in the late 1950's and declined to low levels in the 1980s, from which populations have not recovered. Counts of white-tailed jackrabbits were highest in the Southwest region.

The number of mourning doves observed in 2010 was similar to last year and the 10-year average but below the long-term average. In contrast, the white-tailed deer index was similar to last year and the 10-year average, but significantly higher than the long-term average. Sandhill crane indices were unchanged from 2009.

INTRODUCTION

This report is a summary of the 2010 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.

Observers drove each route in the early morning at 15-20 miles/hour 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 (Figure 1) and range-wide; however, population indices for species with low detection rates are imprecise and should be interpreted cautiously.

ACKNOWLEDGMENTS

We thank all cooperators for their efforts in completing routes in 2010; without their help the survey would not be possible. Tonya Klinkner provided assistance with data entry. John Giudice reviewed an early draft of this report. Tabor Hoek of the Minnesota Board of Water & Soil Resources (BWSR) provided enrollment data on cropland-retirement programs in Minnesota.

WEATHER SUMMARY

After a series of mild to moderate winters, the winter of 2009-10 was the most severe since 2000-01 for much of the farmland region of Minnesota. Snow cover exceeded 6 inches throughout most of the farmland zone from mid-December through early March, and snow depths exceeded 30 inches in parts of southwest and south central Minnesota for up to 7 weeks (Minnesota Climatology Working Group [MCWG], http://climate.umn.edu/doc/snowmap.htm). However, March was warmer (range +5°F to +10°F, MCWG, http://climate.umn.edu/cawap/monsum/monsum.asp) and drier than average and snow cover was virtually gone throughout the entire farmland region by mid-March. Warm, dry conditions continued through April and May in all farmland regions except the Northwest, offering an excellent start to the spring nesting period. June, however, was wetter and slightly cooler than average. Thus, conditions for over-winter survival of farmland wildlife were below average throughout most of the farmland region (especially parts of the Southwest and South Central agricultural regions), whereas reproductive conditions were excellent early but then declined in June, the critical peak of hatch for pheasants in Minnesota when chicks are most vulnerable to weather.

HABITAT CONDITIONS

Conservation Reserve Program (CRP) enrollment continued a declining trend with losses from 2009 of 21,000 acres in Minnesota's pheasant range, 36,000 acres in the prairie-chicken range, and 54,000 acres statewide. However, gains in Reinvest in Minnesota (RIM), RIM-Wetlands Reserve Program (RIM-WRP), and Conservation Reserve Enhancement Program (CREP) enrollments and acquisitions of Wildlife Management Areas (WMA) and Waterfowl Production Areas (WPA) in the pheasant range exceeded CRP losses, yielding a net gain of about 4,000 acres of protected habitat since 2009. Habitat enrolled in farm programs (e.g., CRP, CREP, RIM, WRP) declined from a 2007 peak of 1.1 million acres to 963,000 acres in the pheasant range, whereas habitat protected as WMAs and WPAs increased to 712,000 acres. Within the pheasant range, protected grasslands account for about 6.1% of the landscape (range: 3.0-10.2%; Table 1).

Farm programs make up the largest portion of protected grasslands in the state. The expiration of a large proportion of existing CRP contracts is still a major concern for future wildlife populations, with nearly 500,000 acres in Minnesota scheduled to expire in the next 3 years. However, the first general CRP signup since 2006 was just completed and interest is high in Minnesota's State Acres For wildlife Enhancement (SAFE) initiative under the CRP (http://www.fsa.usda.gov/Internet/FSA_File/mn_cp38e_factfheet_20080403.pdf). The future of farmland retirement programs remains under threat due to continued high land-rental rates and competing economic opportunities (e.g., ethanol production).

The MNDNR continues to expand the habitat base through accelerated WMA acquisition with 1,900 acres of new WMAs in the pheasant range in the last year. New funding from the Lessard-Sams Outdoor Heritage account is expected to further accelerate acquisition of WMAs and WPAs. In addition, the Working Lands Initiative (http://www.dnr.state.mn.us/workinglands/index.html) will attempt to protect and expand large wetland-grassland complexes in 12 counties in western Minnesota.

SURVEY CONDITIONS

Cooperators completed 168 of the 171 routes in 2010. Weather conditions during the survey ranged from excellent (calm, heavy dew, clear sky) to medium (light dew and overcast skies). Medium-to-heavy dew conditions were present at the start of 95% of the survey routes, which was similar to 2009 (94%) but better than the 10-year average (92%). Clear skies (<30% cloud cover) were present at the start of 90% of routes, with wind speeds <7 mph recorded for 96% of routes. The survey period was extended to July 29th - August 19th to allow most routes to be completed.

RING-NECKED PHEASANT

The average number of pheasants observed (62.8/100 mi) was similar to 2009 (95% CI on percent change: -12 to 24%; Table 2) but remained 22% below the 10-year average (95% CI: -36 to -9%; Table 2; Figure 2A), 38% below the long-term average (95% CI: -50 to -26%; Table 2), and 79% below the benchmark years of 1955-64 (95% CI: -90 to -67%). Total pheasants observed per 100 miles ranged from 8.2 in the Southeast to 104.2 in the Southwest (Table 3, Figure 5). Changes from last year were not significant in any region (Table 3).

The range-wide hen index (8.9 hens/100 mi) was similar to last year (95% CI: -24 to 10%), but 28% below the 10-year average (95% CI: -42 to -14%; Table 2). The hen index varied from 0.8 hens/100 miles in the Southeast to 12.8 hens/100 miles in the Southwest, and was lower than last year only for the Southwest region (95% CI: -65 to -4%). The cock index (8.0 cocks/100 mi) was also similar (95% CI: -17 to 25%) to 2009 and the 10-year average (95% CI: -16 to 11%; Table 2). The 2010 hen:cock ratio was 1.12, which was below average (1.51) for the CRP years (1987-2010). A low sex ratio may reflect a delayed nesting effort, but evidence of this is relatively weak for 2010.

The number of pheasant broods observed (10.1/100 mi) was similar (95% CI: -7 to 29%) to last year, but 20% (95% CI: -33 to -7%) below the 10-year average, and 24% (95% CI: -38 to -10%) below the long-term average (Table 2). The brood index remains far below the benchmark years of 1955-64 (34.8 broods/100 mi). Regional brood indices ranged from 1.8 broods/100 miles in the Southeast to 17.5 broods/100 miles in the Southwest. Average brood size in 2010 (4.5 ± 0.2 [SE] chicks/brood) was similar to last year (4.6 ± 0.1 [SE] chicks/brood), but below the 10-year mean (4.8 chicks/brood) and the long-term average (5.5 chicks/brood; Table 2). The median hatch date for pheasants was June 9 ($n = 376$), the same as 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 (versus wide-spread nest failure, which often leads to an extensive renesting effort and a wide or bimodal peak in hatch dates). However, successful late-season nests will likely be underrepresented in roadside data. Median age of broods observed was 8 weeks (range: 1-16 weeks).

A severe winter throughout the pheasant range (the first since 2001) was expected to result in reduced hen counts, but this was observed only in the Southwest region. In addition, wet weather during June (the normal peak of pheasant hatch) probably held brood survival below average, similar to 2009 which also had cool, wet weather during June. Thus, we expected a decline in the range-wide pheasant index due to weather and were pleasantly surprised to detect no change from 2009. Overall, the size of the fall population will be close to last year, when 400,000 roosters were harvested (Figure 2A). The best opportunity for harvesting pheasants appears to be in the Southwest region, although good opportunities will likely also be available in the Central and West Central regions.

GRAY PARTRIDGE

Range-wide, the gray partridge index (3.4 partridge/100 miles) was similar to last year but 55% below the 10-year average (95% CI: -87 to -23%) and 76% below the long-term average (95% CI: -94 to -58%, Table 2, Figure 2B). Within regions, the partridge index ranged from 0.0/100 miles in the Northwest, Central, and East Central regions to 8.2/100 miles in the Southwest (Table 3, Figure 6). There were no significant regional changes from last year (Table 3). Observations of gray partridge were too few for analysis by age class.

Conversion of diversified agricultural practices to more intense land-use with fewer haylands, pastures, small grain fields, and hedgerows have reduced the amount of suitable habitat for the gray partridge in Minnesota. Gray partridge in their native range (southeastern Europe and northern Asia) are associated with arid climates and their reproductive success is limited in the Midwest except during successive dry or drought years. Consequently, gray partridge are more strongly affected by weather conditions during nesting and brood rearing than are pheasants. The Southwest, Southeast, and South Central regions offer the best opportunity for harvesting gray partridge in 2010.

COTTONTAIL RABBIT and WHITE-TAILED JACKRABBIT

The eastern cottontail rabbit index (4.6 rabbits/100 mi) was similar to last year (95% CI: -8 to 56%), but 31% below the 10-year average (95% CI: -47 to -15%) and 24% below the long-term average (95% CI: -41 to -7%, Table 2, Figure 3A). The cottontail rabbit index ranged from 0.2 rabbits/100 miles in the Northwest to 12.0 rabbits/100 miles in the East Central region (Table 3, Figure 7). Changes from 2009 were significant only in the East Central region, where the counts increased by 200% (95% CI: 42 to 357%; Table 3). The best opportunities for harvesting cottontail rabbits are in the East Central, Southeast, and Central regions.

The index of white-tailed jackrabbits did not change significantly from 2009, but was 76% below the 10-year average (95% CI: -108 to -44%) and 96% below the long-term average (95% CI: -109 to -83%, Table 2, Figure 3B). The range-wide jackrabbit population peaked in the late 1950's and declined to low levels in 1980s (Figure 3B). The 2010 index is the lowest ever recorded in Minnesota, with only 4 observations in 4,200 miles of survey. The long-term decline in jackrabbits reflects the loss of their preferred habitats (i.e., pasture, hayfields, and small grains). The greatest potential for white-tailed jackrabbit hunting is likely in the Southwest region (Table 3, Figure 8). However, indices of relative abundance and annual percent change should be interpreted cautiously because estimates are based on a small number of sightings.

WHITE-TAILED DEER

The index for white-tailed deer (15.4 deer/100 mi) was similar to last year (95% CI: -31 to 3%) and the 10-year average (95% CI: -12 to 22%), but 69% above the long-term average (95% CI: 35 to 103%, Table 2, Figure 4A). Among regions, deer indices were not significantly different from 2009 (Table 3).

MOURNING DOVE

The number of mourning doves observed (211.0 doves/100 mi) in 2010 was similar to last year and the 10-year average, but was below the long-term average (95% CI: -29 to -3%; Table 2, Figure 4B). The mourning dove index ranged from 74.5 doves/100 miles in the Northwest region to 330.2 doves/100 miles in the West Central Region (Table 3). The number of mourning doves <u>heard</u> along U.S. Fish and Wildlife Service call-count survey (CCS) routes (n = 14) in Minnesota was similar to last year. Trend analyses indicated the number of mourning doves <u>heard</u> along the CCS routes declined 1.1% per year (90% CI: -2.7 to 1.1%) during 2001-2010 and declined 1.3% per year (90% CI: -2.0 to -0.5%) during 1966-2010 (Sanders and Parker 2010).

SANDHILL CRANE

For only the second consecutive year, observers were asked to report the number of adult and juvenile sandhill cranes observed on the August Roadside Survey. Range-wide, the 2010 index averaged 10.1 cranes/100 miles of survey, including 2.0 juveniles/100 miles (Table 2). Compared to 2009, we detected no change in the total number of cranes observed (95% CI: -32 to 76%) or the number of juvenile cranes observed (95% CI: -1 to 135%; Table 2). Among regions, crane indices ranged from 0.0/100 miles in the West Central, Southwest, and Southeast regions to 44.3 cranes/100 miles in the Northwest region (Table 3). Juvenile cranes were observed in the Central (3.7/100 mi), East Central (8.6/100 mi), South Central (0.1/100 mi), and Northwest (5.6/100 mi) regions.

OTHER SPECIES

Notable incidental sightings: bald eagle (Jackson County), northern harrier (Renville County), merlin (Washington County), great blue heron (Waseca County), belted kingfishers (LeSuer and Watonwan Counties), magpies (Pennington County), yellow-billed cuckoo (Rice County), red-headed woodpeckers (Stearns and Watonwan Counties), upland sandpipers (Stevens County), prairie chickens (Red Lake County), sharp-tailed grouse (Marshall County), wild turkeys (Chippewa, Chisago, Dodge, Grant, Kandiyohi, Kittson, Le Sueur, Lincoln, McCleod, Marshall, Mille Lacs, Morrison, Mower, Murray, Olmsted, Rice, Sherburne, Stearns, Steele, Todd, Traverse, Washington, Wilkin, and Winona Counties), black bear (Marshall County), coyotes (Big Stone, Clay, Grant, Otter Tail, and Roseau Counties), fisher (Douglas County), and red fox (Steele County).

LITERATURE CITED

SANDERS, T.A., and K. PARKER. 2010. Mourning dove population status, 2010. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C.

[MCWG] Minnesota Climatology Working Group. 2010. MCWG Home Page http://climate.umn.edu/. Accessed on August 10, 2010.

Table 1. Abundance (total acres) and density (acres/mi^2) of undisturbed grassland habitat within Minnesota's pheasant range, 2010[a].

	Cropland Retirement									Density
AGREG	CRP	CREP	RIM	RIM-WRP	WRP	USFWS[c]	MNDNR[d]	Total	%	ac/mi^2
WC[b]	320,837	39,203	20,938	5,041	18,453	178,952	107,832	691,255	10.2	65.1
SW	102,996	25,286	14,393	713	766	19,400	55,850	219,404	5.8	37.1
C	134,953	15,320	21,696	1,422	3,100	86,047	46,242	308,781	5.1	32.7
SC	89,262	28,181	13,038	5,184	8,791	8,495	31,643	184,594	4.6	29.2
SE	74,207	2,718	9,132	556	771	36,224	52,259	175,867	4.7	30.4
EC	4,133	0	2,368	0	4	4,720	84,743	95,968	3.0	19.1
Total	726,388	110,707	81,564	12,916	31,886	333,839	378,569	1,675,868	6.1	38.9

[a] Unpublished data, Tabor Hoek, BWSR, 12 August 2010.

[b] Does not include Norman County.

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

[d] MNDNR Wildlife Management Areas (WMA).

Table 2. Range-wide trends (% change) in number of wildlife observed per 100 miles driven, Minnesota August roadside survey, 1955-2010.

Species Subgroup	Change from 2009[a]					Change from 10-year average[b]				Change from long-term average[c]			
	n	2009	2010	%	95% CI	*n*	2000-09	%	95% CI	*n*	LTA	%	95% CI
Ring-necked pheasant													
Total pheasants	149	59.3	62.8	6	±18	147	81.8	-22	±13	148	101.7	-38	±12
Cocks	149	7.7	8.0	4	±21		8.3	-3	±14		11.5	-30	±13
Hens	149	9.6	8.9	-7	±17		12.5	-28	±14		14.8	-39	±13
Broods	149	9.1	10.1	11	±18		12.8	-20	±13		13.3	-24	±14
Chicks per brood	376	4.6	4.5	-1			4.8	-5			5.5	-18	
Broods per 100 hens	376	94.5	112.9	20			103.0	10			101.2	12	
Median hatch date	376	Jun 12	Jun 9				Jun 09						
Gray partridge													
Total partridge	167	2.8	3.4	23	±97	166	7.6	-55	±32	148	16.1	-76	±18
Eastern cottontail	167	3.7	4.6	24	±32	166	6.6	-31	±16	148	6.8	-24	±17
White-tailed jackrabbit	167	0.3	0.1	-64	±69	166	0.4	-76	±32	148	1.8	-96	±13
White-tailed deer	167	17.9	15.4	-14	±17	166	14.9	5	±17	167	9.2	69	±34
Mourning dove	167	246.5	211.0	-14	±17	166	221.0	-5	±14	148	273.2	-16	±13
Sandhill Crane													
Total cranes	167	8.2	10.1	22	±54								
Juveniles	167	1.2	2.0	67	±68								

[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 = 1955-2009, except for deer = 1974-2009. Estimates for all species except deer based on routes (*n*) surveyed ≥40 years; estimates for deer based on routes surveyed ≥25 years. Thus, Northwest region (8 counties in Northwest were added to survey in 1982) included only for deer.

Table 3. Regional trends (% change) in number of wildlife observed per 100 miles driven, Minnesota August roadside survey, 1955-2010.

Region	Change from 2009[a]					Change from 10-year average[b]				Change from long-term average[c]			
Species	*n*	2009	2010	%	95% CI	*n*	2000-09	%	95% CI	*n*	LTA	%	95% CI
Northwest[d]													
Gray partridge	18	0.2	0.0	-100	±211	19	0.4	-100	±104	19	3.8	-100	±68
Eastern cottontail		0.2	0.2	0			1.0	-79	±70		0.9	-76	±56
White-tailed jackrabbit		0.2	0.2	0	±307		0.6	-62	±97		0.7	-69	±82
White-tailed deer		48.2	46.5	-4	±38		47.0	-4	±37		28.9	57	±81
Mourning dove		63.4	74.5	17	±69		84.9	-16	±29		125.6	-43	±27
Sandhill Crane		36.7	44.3	21	±74								
West Central													
Ring-necked pheasant	35	68.9	70.4	2	±42	34	83.1	-13	±34	35	104.0	-32	±22
Gray partridge		1.0	2.3	122	±486		2.8	-16	±191		10.2	-78	±54
Eastern cottontail		2.9	0.9	-68	±79		3.6	-77	±34		4.3	-79	±27
White-tailed jackrabbit		0.1	0.1	0			0.6	-80	±69		2.3	-95	±22
White-tailed deer		17.6	16.8	-5	±35		12.4	39	±39		8.7	93	±59
Mourning dove		321.4	330.2	3	±43		262.9	28	±43		374.9	-12	±30
Sandhill Crane		0.0	0.0										
Central													
Ring-necked pheasant	30	59.2	76.4	29	±47	29	69.0	14	±34	29	76.1	3	±36
Gray partridge		0.8	0.0	-100	±205		3.6	-100	±71		10.1	-100	±44
Eastern cottontail		3.2	6.1	92	±93		6.6	-4	±46		6.5	-2	±52
White-tailed jackrabbit		0.3	0.0	-100	±142		0.2	-100	±69		1.3	-100	±22
White-tailed deer		8.7	9.0	4	±47		6.9	35	±54		4.2	124	±95
Mourning dove		255.3	183.2	-28	±28		195.1	-4	±23		236.4	-21	±27
Sandhill Crane		7.1	10.8	53	±102								
East Central													
Ring-necked pheasant	13	43.7	49.8	14	±62	13	59.9	-17	±42	13	85.2	-42	±25
Gray partridge		0.0	0.0				0.0	-100	±218		0.2	-100	±133
Eastern cottontail		4.0	12.0	200	±158		11.1	8	±64		8.5	40	±71
White-tailed jackrabbit		0.0	0.0				0.0				0.3	-100	±60
White-tailed deer		17.8	10.4	-42	±47		16.8	-38	±55		8.0	30	±101
Mourning dove		114.1	97.8	-14	±27		96.9	1	±37		127.3	-23	±33
Sandhill Crane		38.1	40.9	7	±128								

Table 3. Continued.

Region / Species	Change from 2009					Change from 10-year average				Change from long-term average			
	n	2009	2010	%	95% CI	*n*	2000-09	%	95% CI	*n*	LTA	%	95% CI
Southwest													
Ring-necked pheasant	19	115.8	104.2	-10	±30	19	159.5	-35	±30	19	119.8	-13	±31
Gray partridge		8.2	8.2	0	±156		27.0	-70	±31		43.0	-81	±24
Eastern cottontail		6.3	3.4	-47	±63		8.7	-62	±25		8.3	-59	±30
White-tailed jackrabbit		1.3	0.4	-67	±109		1.0	-59	±62		4.0	-90	±21
White-tailed deer		19.1	20.0	4	±46		13.4	49	±50		7.9	153	±98
Mourning dove		327.8	238.7	-27	±23		343.6	-31	±21		316.4	-25	±24
Sandhill Crane		0.0	0.0										
South Central													
Ring-necked pheasant	32	52.5	56.5	8	±35	32	88.1	-36	±21	32	134.8	-58	±21
Gray partridge		7.5	5.7	-24	±122		13.1	-56	±50		19.5	-71	±27
Eastern cottontail		4.9	5.4	10	±51		9.4	-43	±28		7.7	-31	±29
White-tailed jackrabbit		0.0	0.0	0.0			0.2	-100	±65		1.8	-100	±25
White-tailed deer		6.3	3.4	-46	±51		5.6	-40	±43		3.4	0	±58
Mourning dove		330.3	294.4	-11	±41		269.1	9	±31		258.4	14	±34
Sandhill Crane		0.3	1.0	298	±471								
Southeast													
Ring-necked pheasant	20	9.6	8.2	-15	±73	20	28.6	-71	±25	20	75.7	-89	±29
Gray partridge		0.0	7.2				5.9	23	±190		14.3	-49.7	±68
Eastern cottontail		4.6	7.8	70	±74		7.7	1	±41		7.8	0	±47
White-tailed jackrabbit		0.2	0.0	-100	±209		0.2	-100	±96		0.6	-100	±43
White-tailed deer		22.4	13.0	-42	±64		15.6	-17	±49		10.0	31	±62
Mourning dove		141.8	81.3	-43	±28		203.4	-60	±25		226.2	-64	±21
Sandhill Crane		0.0	0.0										

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

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

[c] LTA = 1955-2009, except for Northwest region (1982-2009) and white-tailed deer (1974-2009). Estimates based on routes (*n*) surveyed ≥40 years (1955-2009), except for Northwest (≥20 years) and white-tailed deer (≥25 years).

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

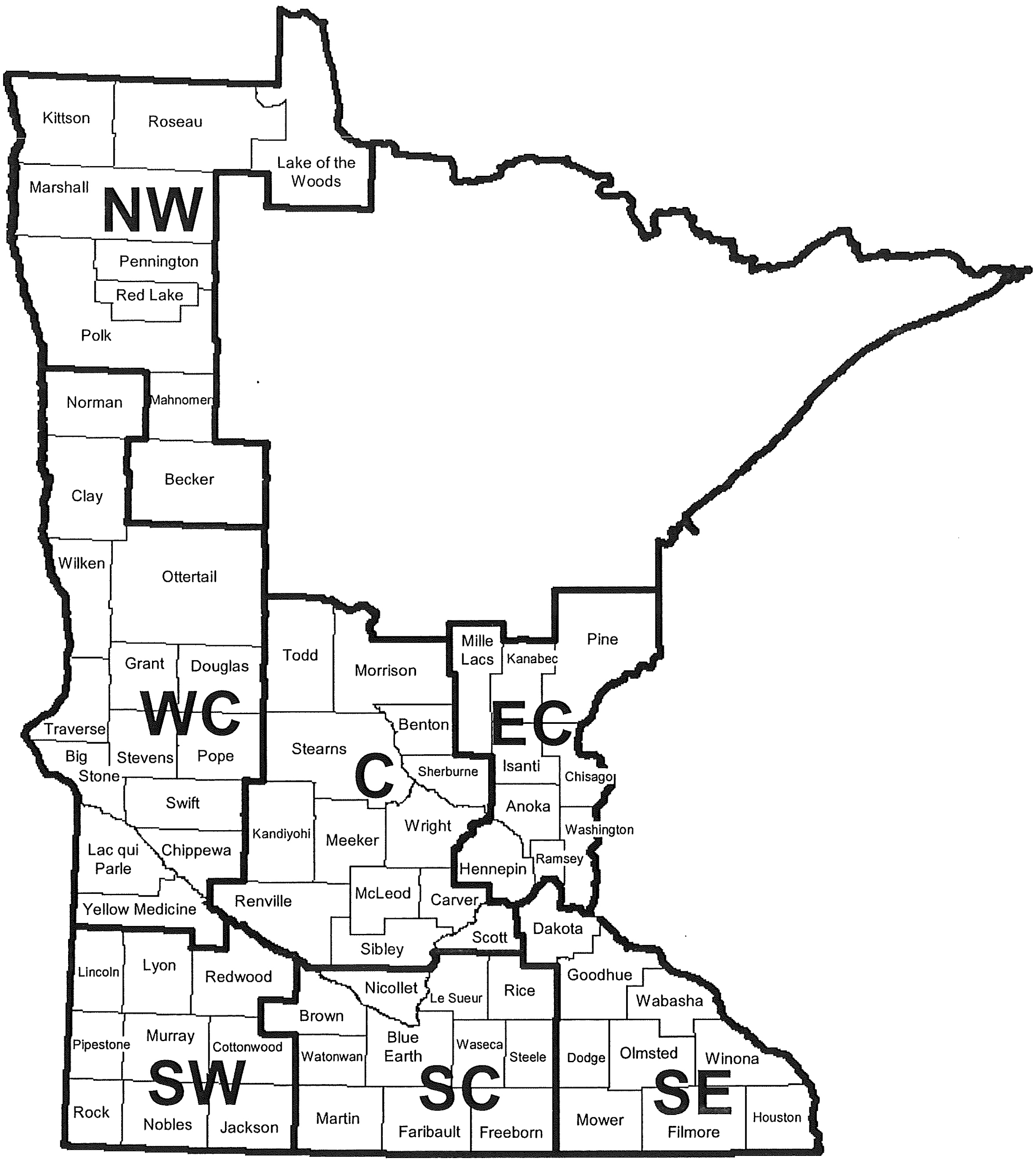


Figure 1. Survey regions for Minnesota's August roadside survey, 2010.

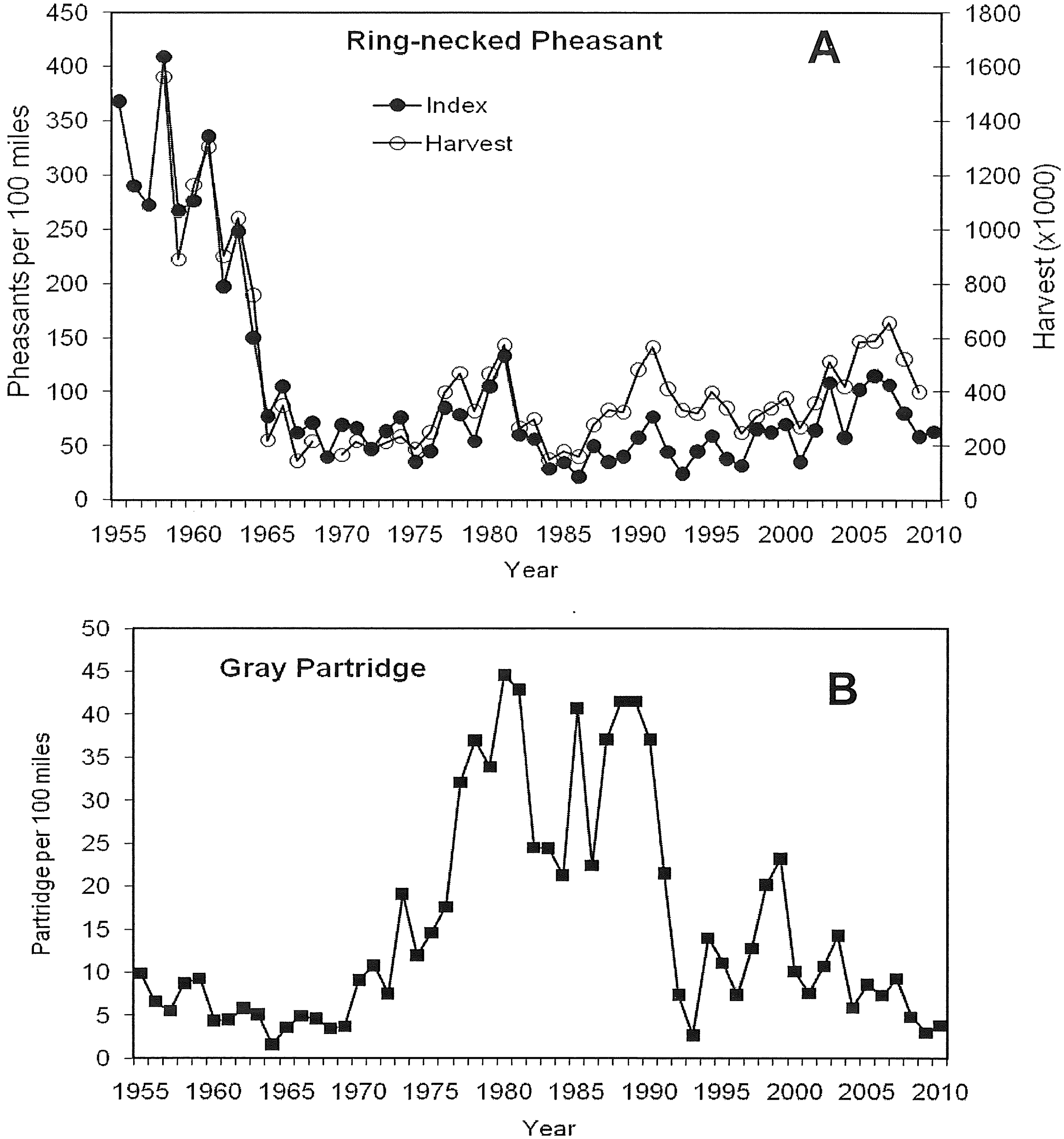
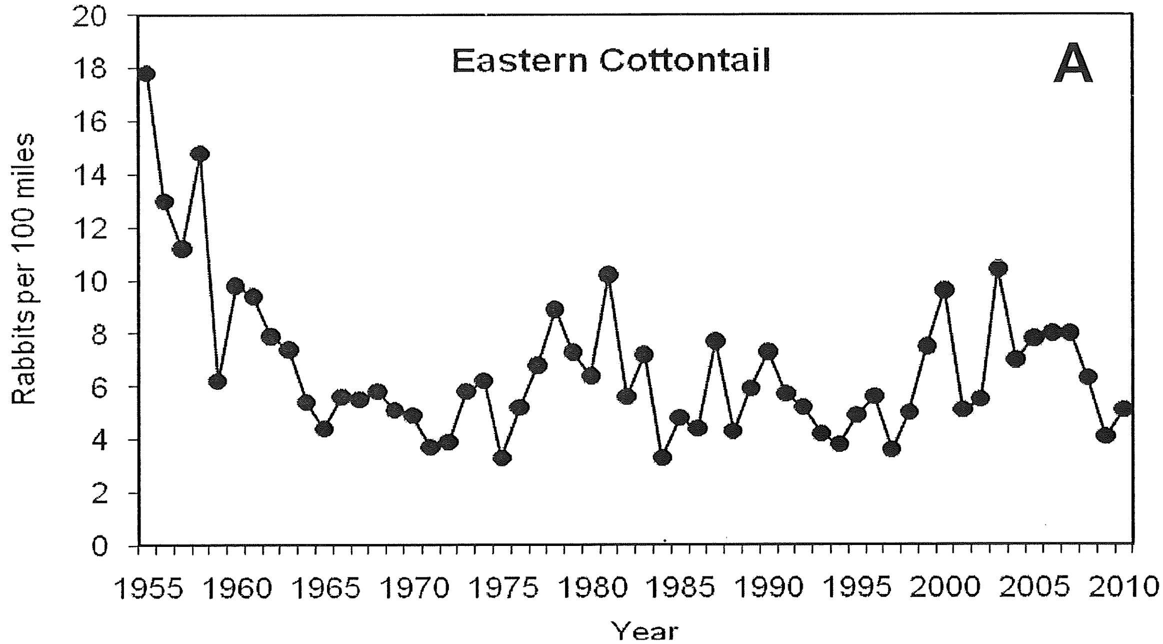


Figure 2. Range-wide index of ring-necked pheasants (**A**) and gray partridge (**B**) seen per 100 miles driven in Minnesota, 2010. Does not include the Northwest region. Based on all survey routes completed.



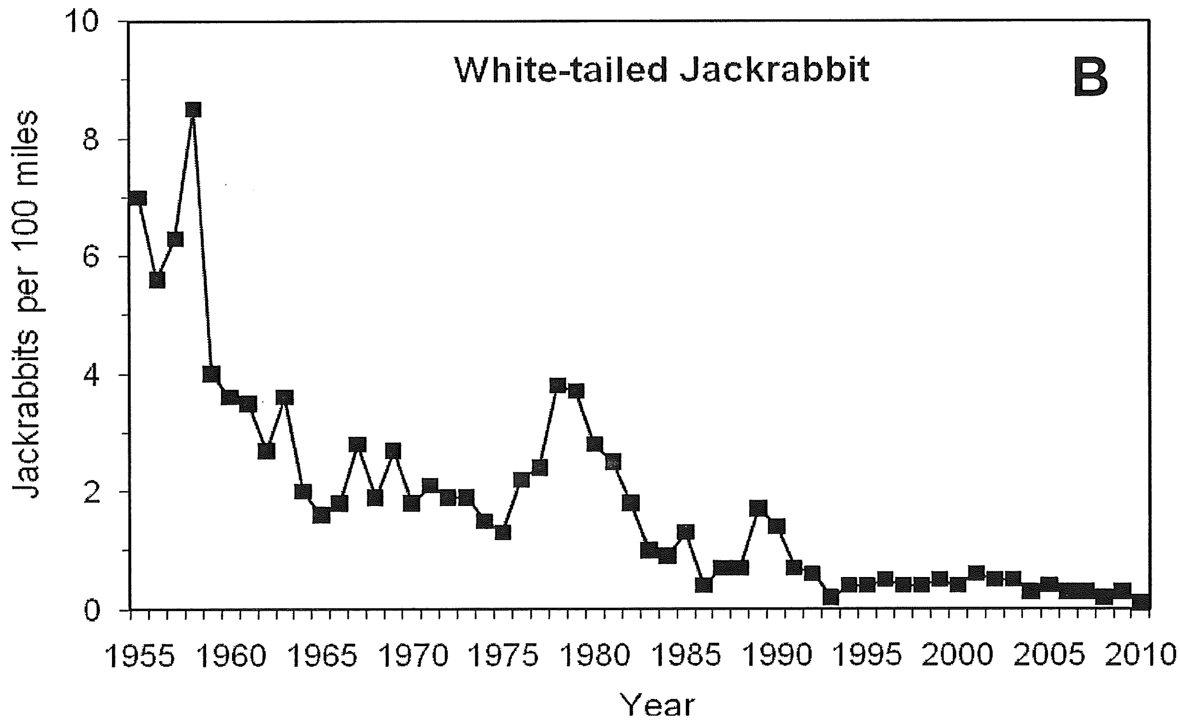
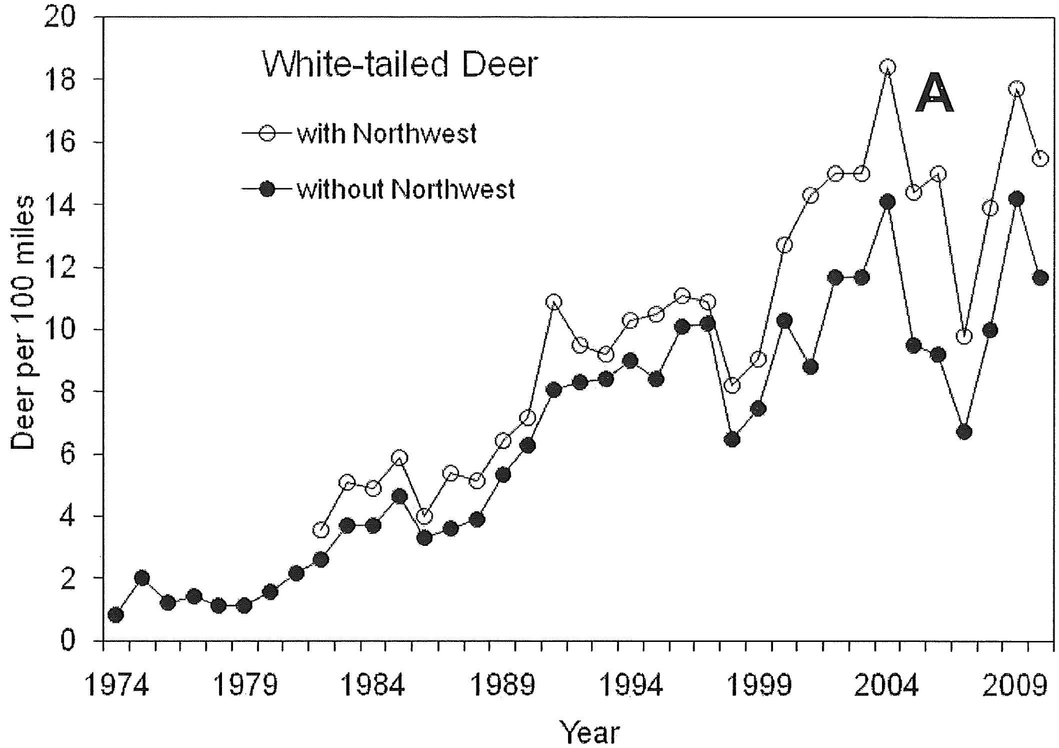


Figure 3. Range-wide index of eastern cottontail (**A**) and white-tailed jackrabbits (**B**) seen per 100 miles driven in Minnesota, 2010. Does not include the Northwest region. Based on all survey routes completed.



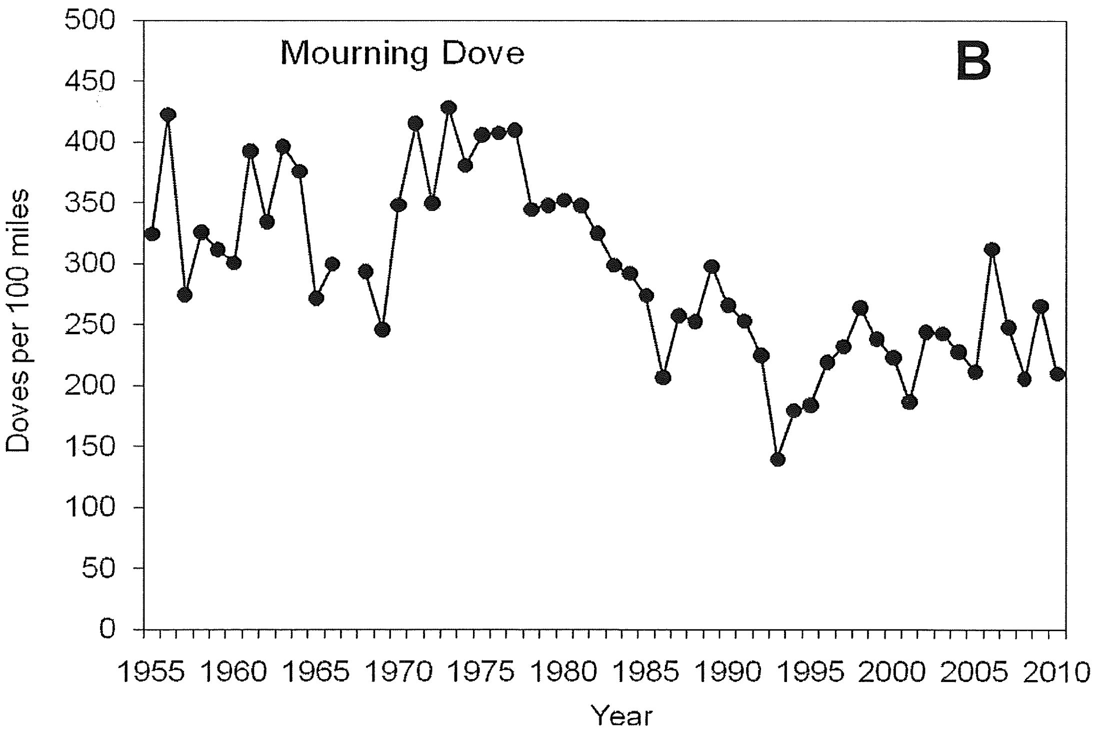
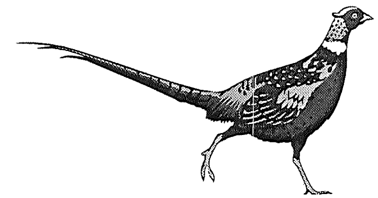


Figure 4. Range-wide index of white-tailed deer (**A**) and mourning doves (**B**) seen per 100 miles driven in Minnesota, 2010. Doves were not counted in 1967 and the dove index does not include the Northwest region. Based on all survey routes completed.



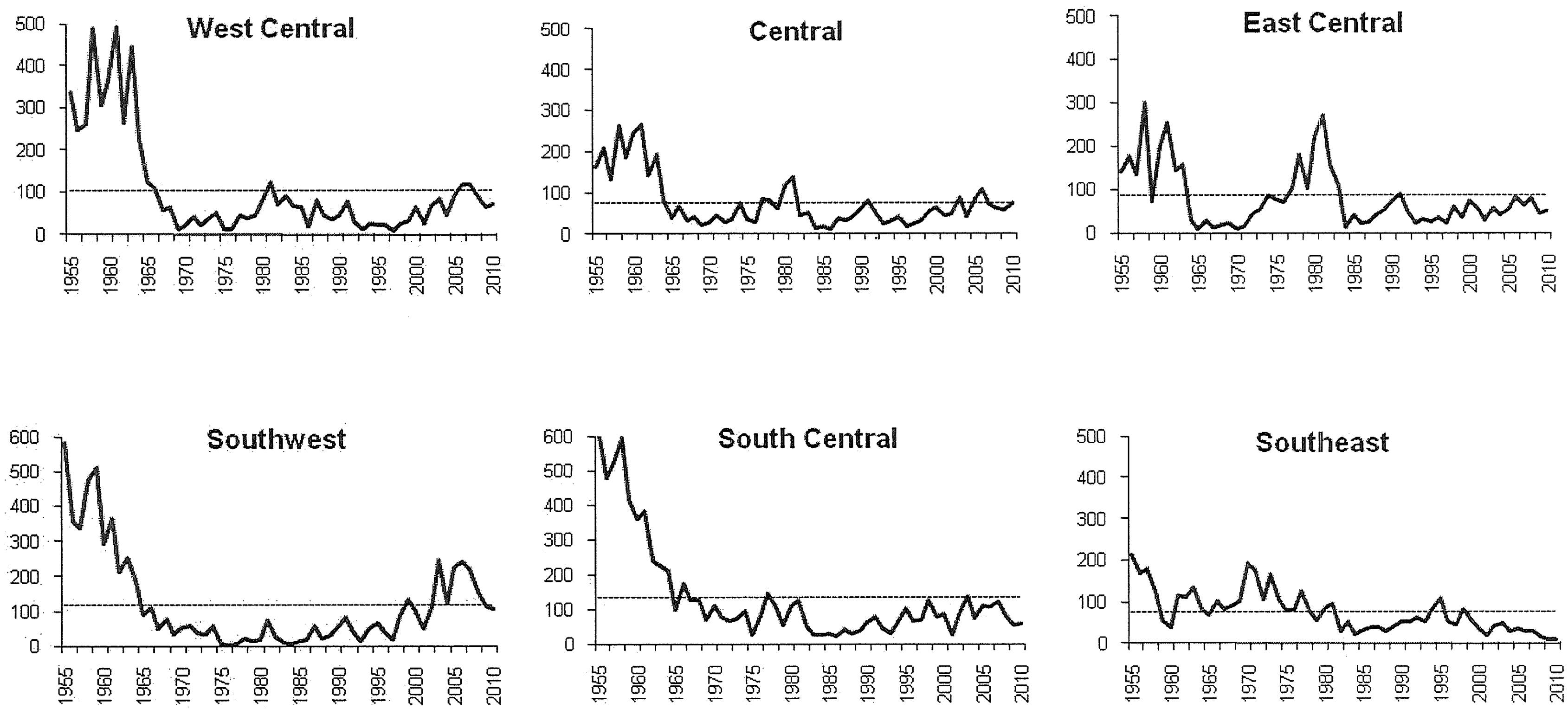
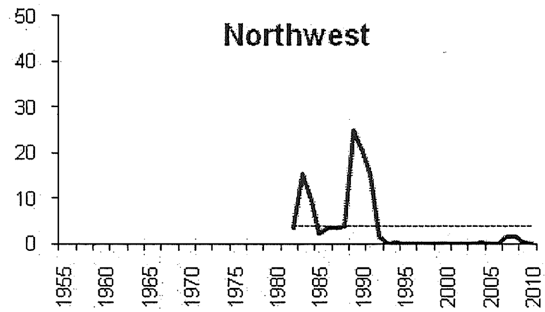
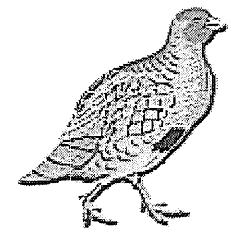


Figure 5. Regional index (——) and long-term average (......) of **ring-necked pheasants seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis differs among survey regions.





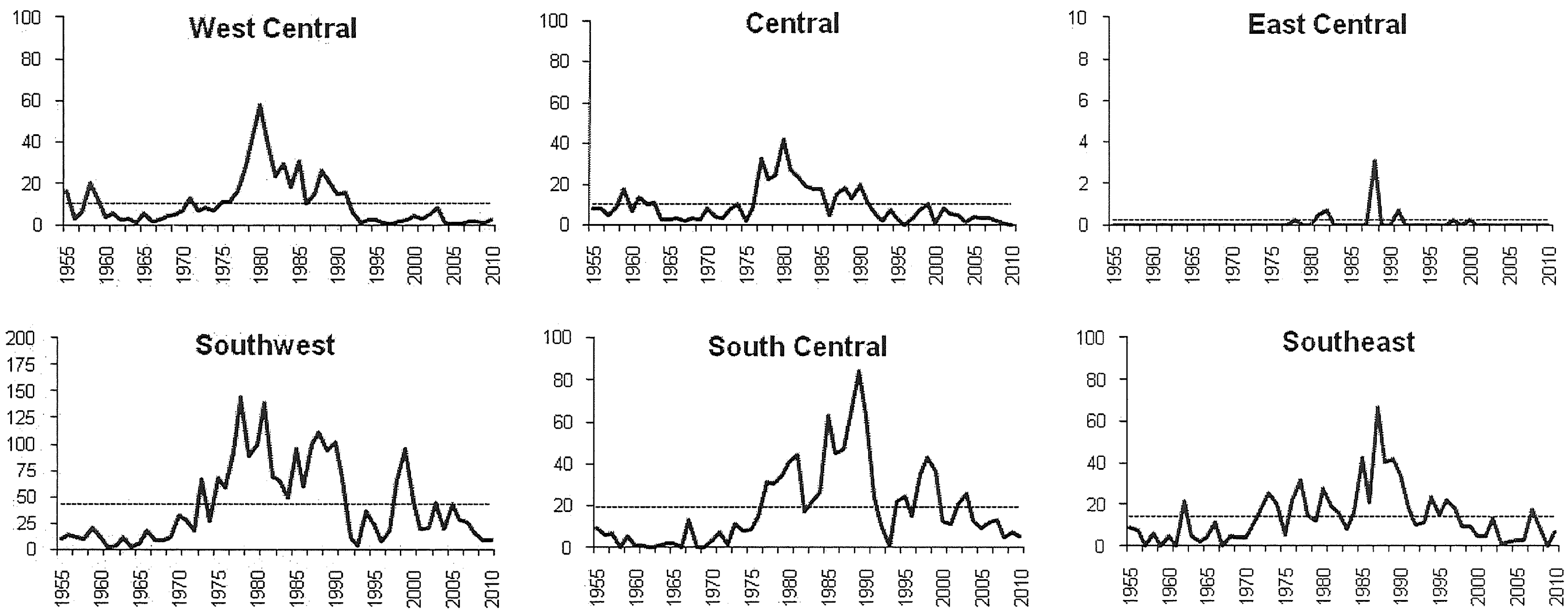


Figure 6. Regional index (——) and long-term average (......) of **gray partridge seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis differs among survey regions.

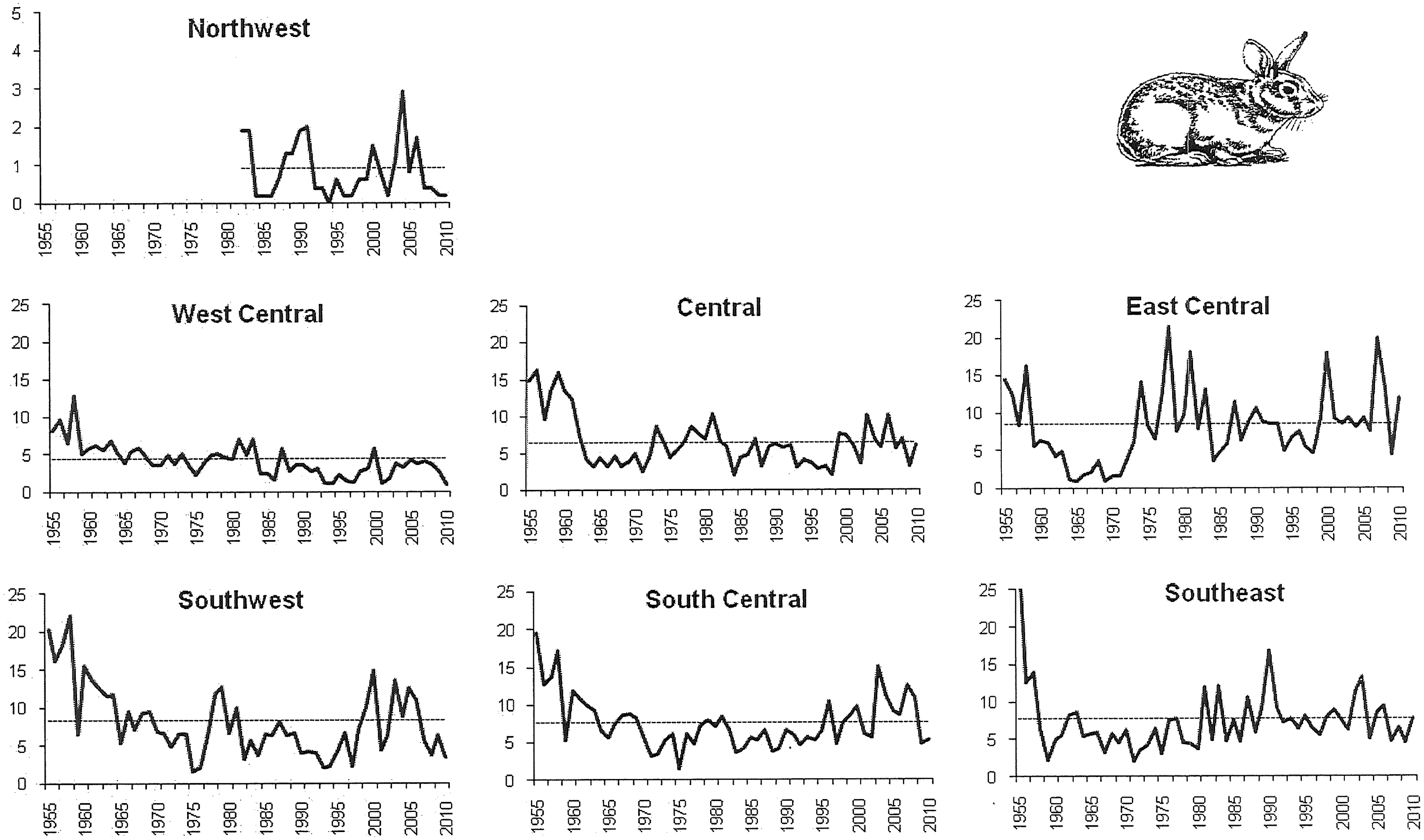


Figure 7. Regional index (——) and long-term average (……) of **cottontail rabbits seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis differs among survey regions.

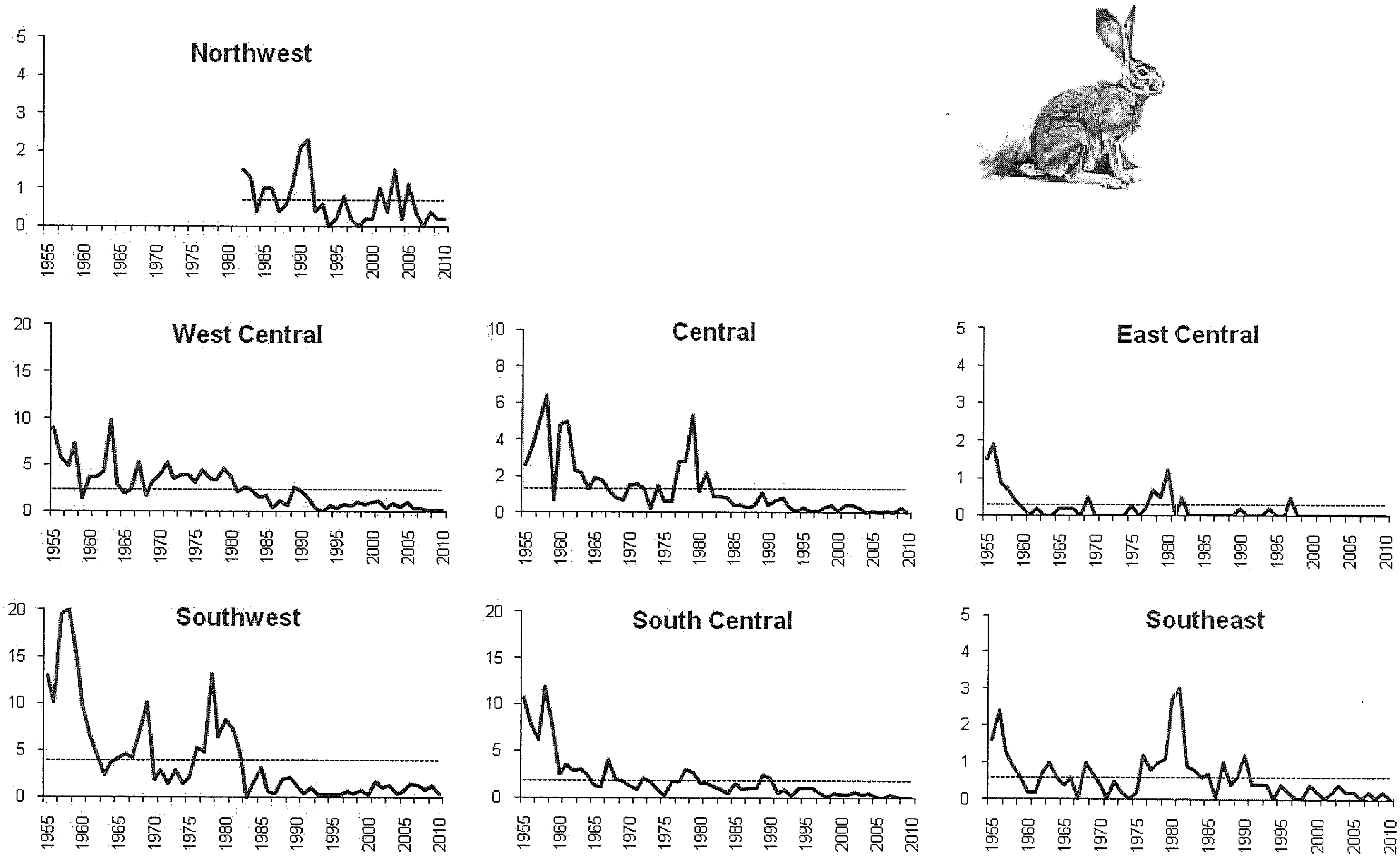


Figure 8. Regional index (——) and long-term average (.......) of **white-tailed jackrabbits seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis differs among survey regions.

MONITORING POPULATION TRENDS OF WHITE-TAILED DEER IN MINNESOTA'S FARMLAND/TRANSITION ZONE – 2010

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 serious socioeconomic and ecological challenges for wildlife managers, such as deer-vehicle collisions, crop depredation, and forest regeneration issues. Thus, monitoring the status of deer populations is critical to determine appropriate harvest levels based on established management goals.

This document 1) identifies where the farmland population model was applied to model deer population dynamics in Minnesota, 2) describes the structure of and data inputs for the farmland population model, and 3) discusses general trends of deer density and current abundance.

METHODS

Minnesota Farmland/Transition Zone

The farmland/transition zone encompasses >46,000 square miles and 87 permit areas (PAs). I arbitrarily pooled PAs into 11 geographic units to describe general population trends and management issues at a broader scale (Figure 1). Several management strategies were available in 2010 including: 1) youth-only lottery with varying number of permits, 2) lottery with varying number of antlerless permits, 3) managed, and 4) intensive (Figure 2). The strategy employed during a given year depended upon where the population density was in relation to the population density goal (Figures 3 and 4).

We began using a youth-only antlerless permit system for the first time in 2009 (herein referred to as "bucks-only), which was the most conservative management strategy available to Minnesota wildlife managers. The Twin Cities metro region (PA 601) was not modeled due to limited hunting opportunities, and PAs 224, 235 and 238 were not modeled due to demographic stochastic error associated with their small population sizes (Grund and Woolf 2004).

Population Modeling

The population model used to analyze past population trends and test harvest strategies can be best 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 were to 1) organize and synthesize data on farmland deer populations, 2) advance the understanding of farmland deer populations through population analysis, 3) provide population estimates and simulate vital rates for farmland deer populations, and 4) assist with management efforts through simulations, projections, and predictions of different management prescriptions.

The 3 most important parameters within the model reflect the aforementioned biological events, which include reproduction, harvest, and non-hunting mortality. Fertility rates were typically estimated at the regional level via fetal surveys conducted each spring (for details, see Dunbar 2005). Embryo rates were then used to estimate population reproductive rates for each deer herd within a particular region. The deer population increased in size after reproduction was simulated. Non-hunting mortality rates occurring during summer months (prior to the hunting season) were estimated from field studies conducted in Minnesota and other agricultural regions. Although summer mortality rates were low, they did represent a reduction in the annual deer population. In farmland deer herds, virtually all mortality occurring during the year can be attributed to hunter harvests. Annual harvests were 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 (Grund and Woolf 2004). Winter mortality rates were estimated from field studies conducted in Minnesota and other farmland regions, similar to summer mortality. After winter mortality rates were simulated, the population was at its lowest point during the 12-month period and the annual cycle began again with reproduction.

RESULTS

Population Trends and Densities

Northwest Management Units

Karlstad Unit – Populations were generally stable (Table 1) and deer densities were at or near the deer density goals established in 2005 in each of these units. However, deer populations immediately to the west of PA 101 were managed more aggressively and population reductions were expected. These populations were not managed according to the population goals due to concerns about potential transmission of Bovine Tuberculosis into adjacent permit areas. Deer densities averaged 6 deer per square mile (SD = 2 deer per square mile).

Crookston/TRF Unit – Deer densities have declined throughout all of these units due to the use of early antlerless seasons in 5 consecutive years (Table 1). Consequently, these PAs were designated as managed or intensive and early antlerless seasons were not used during the 2010 hunting season. These more conservative management strategies will reduce the antlerless harvest by >40% and will allow the populations to stabilize or increase toward goal densities. Similar to the Karlstad unit, deer densities averaged 5 deer per square mile (SD = 2 deer per square mile).

Mahnomen Unit – With the exception of PA 262, all populations were at or near goal densities (Table 1). The antlerless harvest should be reduced by >40% in the Mahnomen Unit during the 2010 hunting season because early antlerless seasons were used in most of these PAs during 2009 whereas most of them were designated as managed during the 2010 hunting season (Figure 2). The deer density averaged 6 deer per square mile (SD = 4 deer per square mile) and managers expressed few management concerns in this region.

Central Management Units

Morris Unit – All populations were at goal densities with the exception of PA 276, which the population model indicated was above goal in 2010 (Figure 4). Population densities varied considerably in this region and averaged 4 deer per square mile (SD = 3 deer per square mile).

Osakis Unit – All populations were at or near goal densities in 2010 (Figure 4). Permit areas 239 and 213 were designated as managed rather than lottery during the 2010 season, which will increase the antlerless harvest 30-40% and allow populations stabilize at the established goal densities. Population densities averaged 13 deer per square mile (SD = 3 deer per square mile) and managers expressed few management concerns in this region.

Cambridge Unit – Deer densities were generally stable throughout this unit (Table 1). However, all PA populations remained well above goal in 2010 with the exception of the deer herd in PA 223 (Figure 4). This unit was an active participant in the ADM study and 3 of the PAs were managed with early antlerless seasons for 5 consecutive years. Aerial surveys conducted in 2010 confirmed deer densities did not decline as a result of the early antlerless seasons, however. Population densities averaged 13 deer per square mile (SD = 3 deer per square mile).

Hutchinson Unit – About half of these PAs were at goal in this unit, the other half were below goal (Figure 4). Populations have increased throughout this unit as a result of designating the PAs as bucks-only or using very conservative lottery quotas over the past 2-3 years (Table 1). Densities varied considerably in this unit and averaged 6 deer per square mile (SD = 4 deer per square mile).

<u>Southern Management Units</u>

Minnesota River Unit – All permit areas were at goal in this unit (Figure 4) and more aggressive management were used in 2010 to stabilize deer numbers (Figure 3). Deer densities averaged 6 deer per square mile (SD = 2 deer per square mile).

Slayton Unit – Deer densities remain below goal in about 75% of the PAs in this unit. However, deer densities were increasing and all should be at or near goal densities by 2012. As a result of increasing deer densities, the number of PAs designated as bucks-only decreased from 6 to 4 from 2009 to 2010, respectively. No PAs should be designated as bucks-only in 2011. Deer densities averaged 3 deer per square mile (SD = 1 deer per square mile) in spring 2010.

Waseca Unit – Population densities have generally been stable over the past few years and were at or near density goals (Table 1, Figure 4). There was relatively little variability in deer densities across the unit and deer densities averaged 5 deer per square mile (SD = 1 deer per square mile).

Rochester Unit – Most deer densities were at or near goal with the exception of PA 346 and 349 where early antlerless seasons have been used the past 3 years. Although deer densities have begun to decline in those 2 PAs, early antlerless seasons will be used again in 2010 to further move the populations toward goal. Deer densities were much lower in the northern portion of the unit and deer densities averaged 13 deer per square mile (SD = 6 deer per square mile) throughout this entire unit.

LITERATURE CITED

DUNBAR, E. J. 2005. Fetus survey data result of white-tailed deer in the farmland/transition zone of Minnesota—2005 *in* Dexter, M. H., editor, Status of wildlife populations, fall 2005. Unpublished report, Division of Fish and Wildlife, Minnesota Department of Natural Resources, St. Paul, Minnesota, USA. 270pp.

GRUND, M. D., and A. WOOLF. 2004. Development and evaluation of an accounting model for estimating deer population sizes. Ecological Modeling 180:345-357.

Figure 1. Deer management units in the farmland zone of Minnesota, 2010.

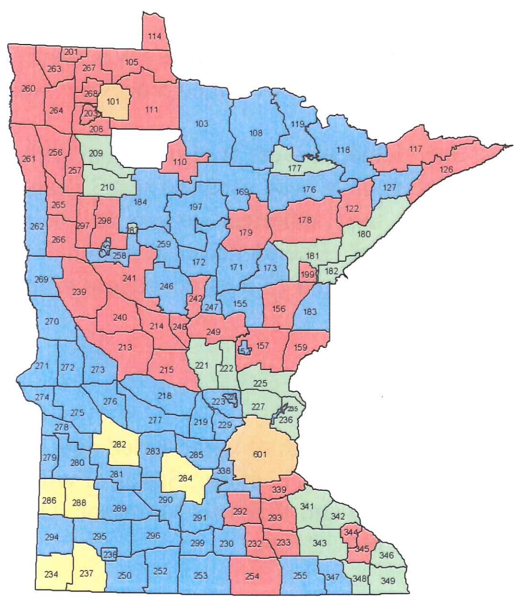


Figure 2. Deer management strategies used in permit areas throughout Minnesota, 2010. Permit areas are numbered and management strategies are color-coded. Permit areas are designated as: 1) bucks-only if colored yellow, 2) lottery if colored blue, 3) managed if colored red, and 4) intensive if colored green.

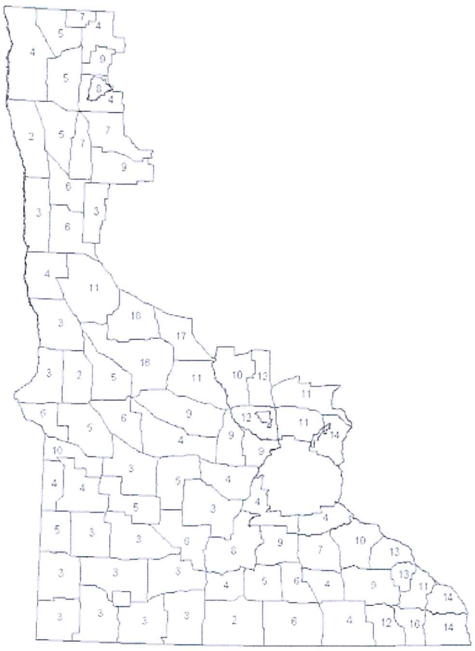


Figure 3. Population density goals in deer permit areas in Minnesota, 2010.

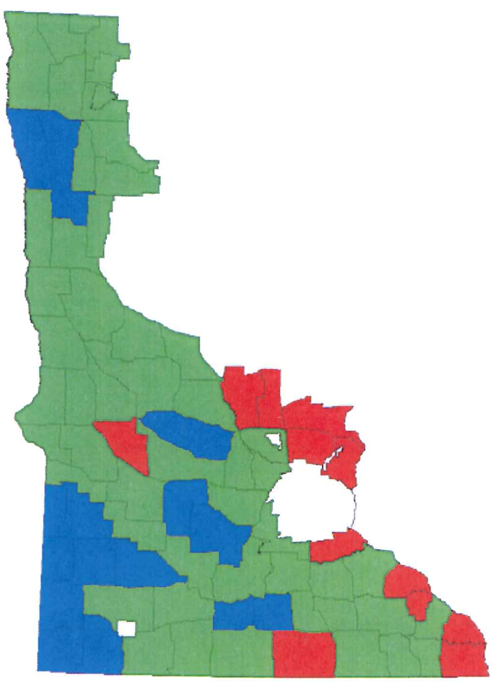


Figure 4. Population density relative to goal density in Minnesota, 2010. Permit areas colored in blue were below goal, permit areas colored in green were at goal, and permit areas colored in red were above goal.

Table 1. Pre-fawn deer density (deer/mi^2) as simulated from population modeling in each permit area of Minnesota's Farmland/Transition Zone, 1998-2010.

Region / Permit Area	Area (mi^2)	Pre-fawning Density 1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Karlstad														
201	161	2	3	4	4	5	5	4	5	5	5	5	5	6
260	1249										4	4	4	4
263	512										5	5	5	5
203	118	3	4	5	5	6	8	7	7	7	7	6	7	7
208	379	3	3	4	4	4	5	4	4	4	4	4	4	4
267	472										5	4	5	4
268	229										9	10	10	10
264	669										7	7	7	6
Total	3789	3	3	4	4	5	6	5	4	4	6	6	6	6
Crookston														
261	795										2	2	1	1
256	653	6	6	6	7	8	8	8	7	7	6	4	4	3
257	413	8	8	8	8	8	7	8	9	8	8	7	7	6
209	639	6	6	6	7	7	7	8	9	9	8	8	8	7
210	615	10	11	11	11	12	11	12	13	12	12	11	10	10
Total	3115	8	8	8	8	9	8	8	8	8	7	7	6	5
Mahnomen														
262	677										2	2	2	2
265	494										8	7	6	4
266	617										5	6	7	7
297	438									4	3	3	2	3
Total	2226										6	6	6	6

Table 1. (continued)

Morris														
269	650	3	3	3	4	4	4	4	4	3	2	3	3	3
270	748	3	3	3	3	3	4	4	2	1	1	1	2	2
271	632	2	2	2	2	2	3	3	4	2	1	1	2	3
272	531	3	3	3	3	4	4	2	2	2	2	2	2	2
273	572									4	4	5	5	5
274	360	6	6	5	4	4	4	4	4	4	4	4	5	6
275	764	4	4	4	3	3	3	3	4	4	3	3	4	5
276	543	9	9	8	8	8	8	7	7	6	5	5	6	7
282	779	1	1	1	1	1	1	1	2	1	2	2	3	4
Total	5579	4	4	4	4	4	4	4	4	3	3	3	4	4
Osakis														
239	922	13	15	16	16	15	14	13	12	12	11	10	11	12
240	642	21	23	25	26	27	26	21	20	19	18	18	17	17
213	1057									14	13	13	15	17
214	557	17	18	18	19	19	19	20	19	18	19	18	17	16
215	701	9	9	9	9	10	10	9	8	9	9	9	10	10
Total	3879	15	16	17	18	18	17	16	15	15	14	13	13	13
Cambridge														
221	642	10	11	12	11	12	13	13	12	13	13	12	12	12
222	413	13	14	14	14	15	15	14	14	15	16	15	15	15
223	377	9	8	11	10	9	11	9	8	11	11	10	11	12
225	618	14	15	18	19	16	16	15	13	13	15	15	15	14
227	471	13	13	13	12	11	11	10	9	13	14	13	14	15
229	287	5	5	6	6	6	7	7	6	7	7	6	7	8
236	372	16	17	17	16	17	17	18	18	18	19	18	19	20
Total	3180	11	12	13	13	12	13	12	11	13	13	12	12	13

Table 1. (continued)

Hutchinson														
218	884									8	7	7	7	7
277	813									3	3	3	4	4
219	392	8	8	9	7	7	8	7	7	7	7	7	8	8
229	287	5	5	6	6	6	7	7	6	7	7	6	7	8
285	550	3	4	4	4	4	5	6	4	3	3	3	3	4
283	614	3	3	3	3	4	4	3	3	3	4	2	3	3
284	838	1	1	2	2	2	2	2	3	2	2	2	2	3
Total	4378	4	4	5	4	5	5	5	5	5	5	5	6	6
Minnesota River														
278	401	9	8	8	8	8	9	10	8	8	8	8	9	11
281	575	5	5	5	4	4	5	5	6	4	4	4	5	6
290	662	4	4	4	4	4	4	4	4	4	4	5	6	7
291	802	4	4	4	4	4	5	5	5	4	5	5	5	7
Total	2440	6	5	5	5	5	6	6	6	5	5	6	6	7
Slayton														
237	729	2	2	2	3	3	4	3	2	2	2	2	2	2
279	344	6	7	7	6	6	6	5	5	4	3	3	3	3
280	675	2	2	2	2	2	2	2	3	2	3	2	2	3
286	446	2	2	3	4	4	4	4	4	4	4	3	3	4
288	625	3	2	3	4	4	4	4	4	3	2	2	2	2
289	816	1	2	1	1	1	2	2	1	2	2	2	2	2
294	686	3	3	3	3	3	3	4	2	2	2	2	2	2
295	840	3	3	3	3	3	4	4	4	3	2	2	3	3
296	666	2	3	3	3	3	3	3	3	2	2	2	3	3
234	636	3	3	4	4	4	4	5	4	3	2	2	2	2
250	712	3	3	3	4	4	4	5	4	4	2	2	3	3
Total	5734	3	3	3	3	3	4	4	4	3	3	3	3	3

Table 1. (continued)

Waseca														
292	480	8	8	8	7	7	8	7	7	8	8	8	7	7
293	511	8	8	8	8	8	7	7	8	8	7	7	7	7
299	386	6	5	5	5	5	5	5	5	3	3	2	2	3
230	452	3	3	3	3	3	4	4	4	4	4	4	3	4
232	377	4	4	4	4	4	4	4	4	5	5	5	5	6
233	385	4	4	4	4	4	5	5	4	4	4	4	4	4
252	715	2	2	2	2	2	2	3	2	2	2	2	2	3
253	974	3	3	3	3	3	3	4	3	2	2	2	2	2
254	930	4	4	4	4	4	4	4	5	4	5	5	6	8
255	774	3	4	4	4	4	4	4	4	4	4	3	4	4
Total	5269	5	5	5	5	5	5	5	5	5	5	5	5	5
Rochester														
338	454	4	4	4	4	5	5	4	4	4	4	4	5	5
339	394	5	5	4	5	5	4	4	5	5	4	5	5	6
341	611	9	9	9	9	10	10	9	10	9	10	10	10	10
342	350	11	11	12	11	13	15	17	13	13	13	14	15	16
343	662	8	8	9	9	11	13	11	13	10	10	11	10	9
344	189	15	14	14	14	15	15	13	12	11	11	12	15	18
345	326	11	11	11	10	10	11	12	11	12	11	12	12	12
346	319	18	18	19	19	19	20	20	21	22	23	22	22	21
347	434	9	9	9	9	10	11	12	13	13	12	11	10	11
348	332	17	17	16	15	15	16	17	18	20	19	19	16	16
349	492	15	16	17	17	18	21	20	21	22	22	20	19	16
Total	4563	11	11	11	11	12	13	13	13	13	13	13	13	12

WILDLIFE DAMAGE COMPLAINTS

NOTE: Wildlife damage complaint information is collected statewide from wildlife managers. The data is compiled and summarized by the Wildlife Damage Extension Specialist at the Brainerd area office.

WILDLIFE DAMAGE COMPLAINTS

Nick Reindl, Wildlife Damage Program Coordinator
Kathleen Koelbl-Crews, Wildlife Damage Extension Specialist
Steve Benson, Wildlife GIS Coordinator

Wildlife damage complaint information is collected statewide from wildlife managers. The 2009 information was compiled by MIS – GIS and summarized by the Wildlife Damage Program Coordinator, 1601 Minnesota Drive, Brainerd, MN 56401.

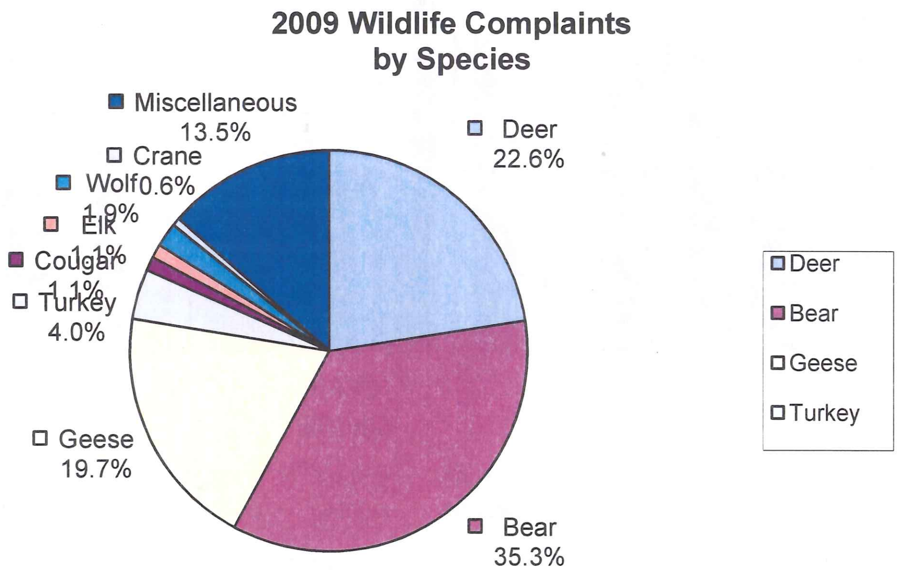


Figure 1. Wildlife complaints by species for the year 2009, in Minnesota.

Wildlife managers recorded a total of 620 wildlife complaints in 2009, up 6 % when compared to the 2008 total of 583 complaints. Three species; black bear, white-tailed deer, and Canada geese account for 481, (78%) of the complaints received (Figure1). Five other species of special interest for wildlife damage; cougar, elk, turkey, sandhill crane, and wolf comprise an additional 55, (9 %) of the recorded complaints. Twenty-five species are represented in 84 (14%) of the miscellaneous complaints received, thirty of those were for beaver.

During calendar year 2009 materials and assistance were provided for permanent, woven wire, deer exclusion fences to 19 specialty crop producers. Crops protected included mixed vegetable (5), apple orchard (7), Christmas trees (1), vineyards (2), nursery (3) and hay yard (1). In addition, materials were provided to upgrade one energized fence for a strawberry producer and materials were provided for semi-portable energized deer fences to three producers to protect strawberry and mixed vegetable crops.

The number of deer shooting permits (69) was down 51% in 2009 compared to 2008 when 140 were issued. Landowner permits outside the tuberculosis (TB) zone were down 29% while the number of permits within the TB zone was down 94% to just 3 permits issued. (Figure 9).

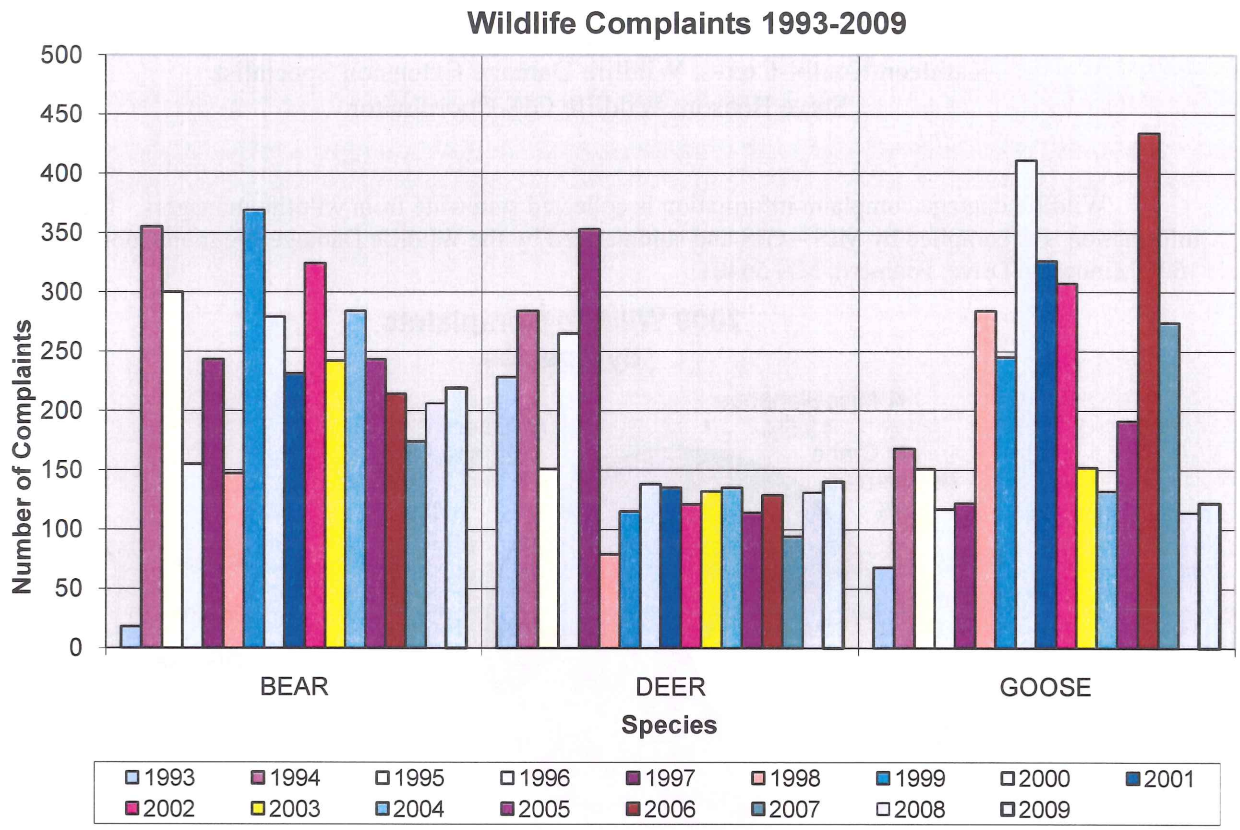


Figure 2. Number of wildlife complaints recorded for bear, deer and geese from 1993-2009, in Minnesota.

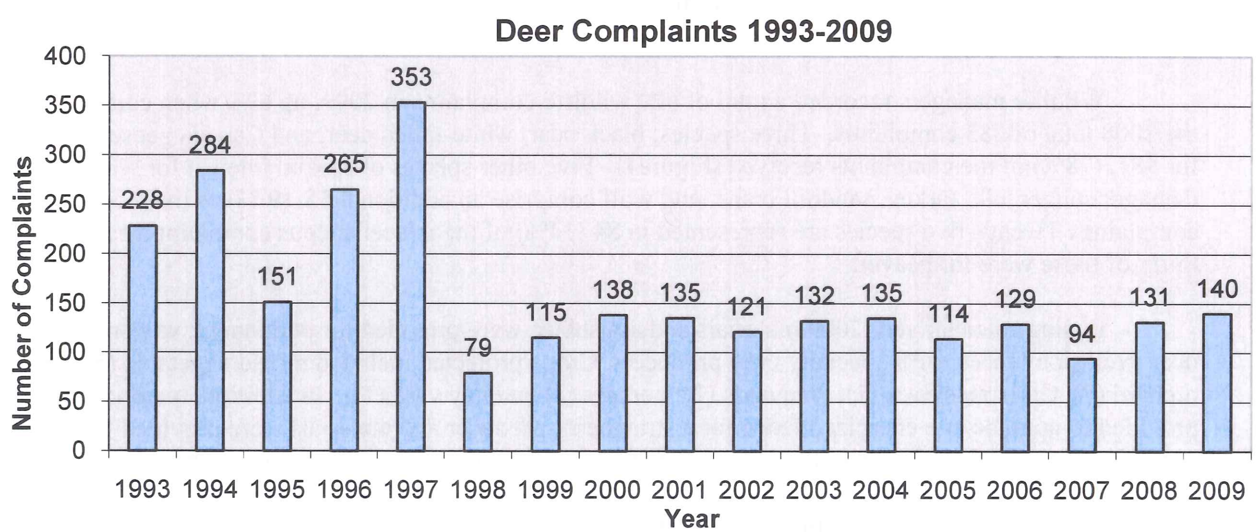


Figure 3. Number of deer complaints from 1993-2009, in Minnesota.

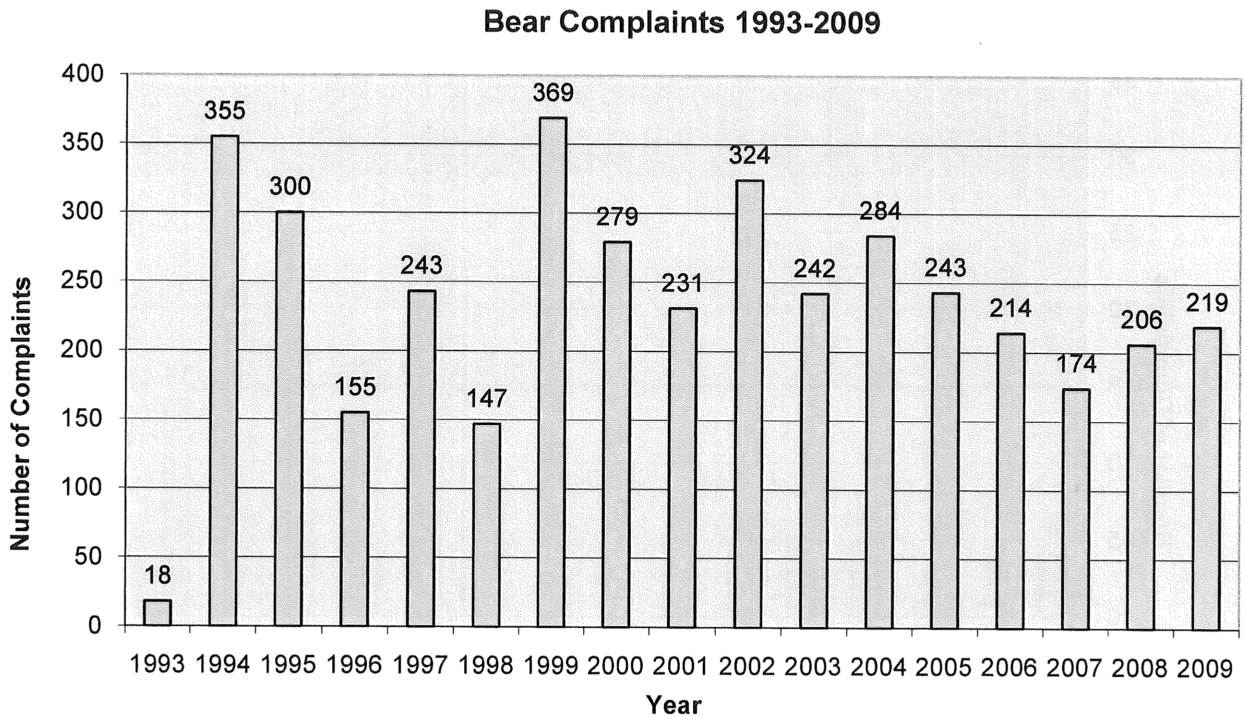


Figure 4. Number of bear complaints from 1993-2009 in Minnesota.

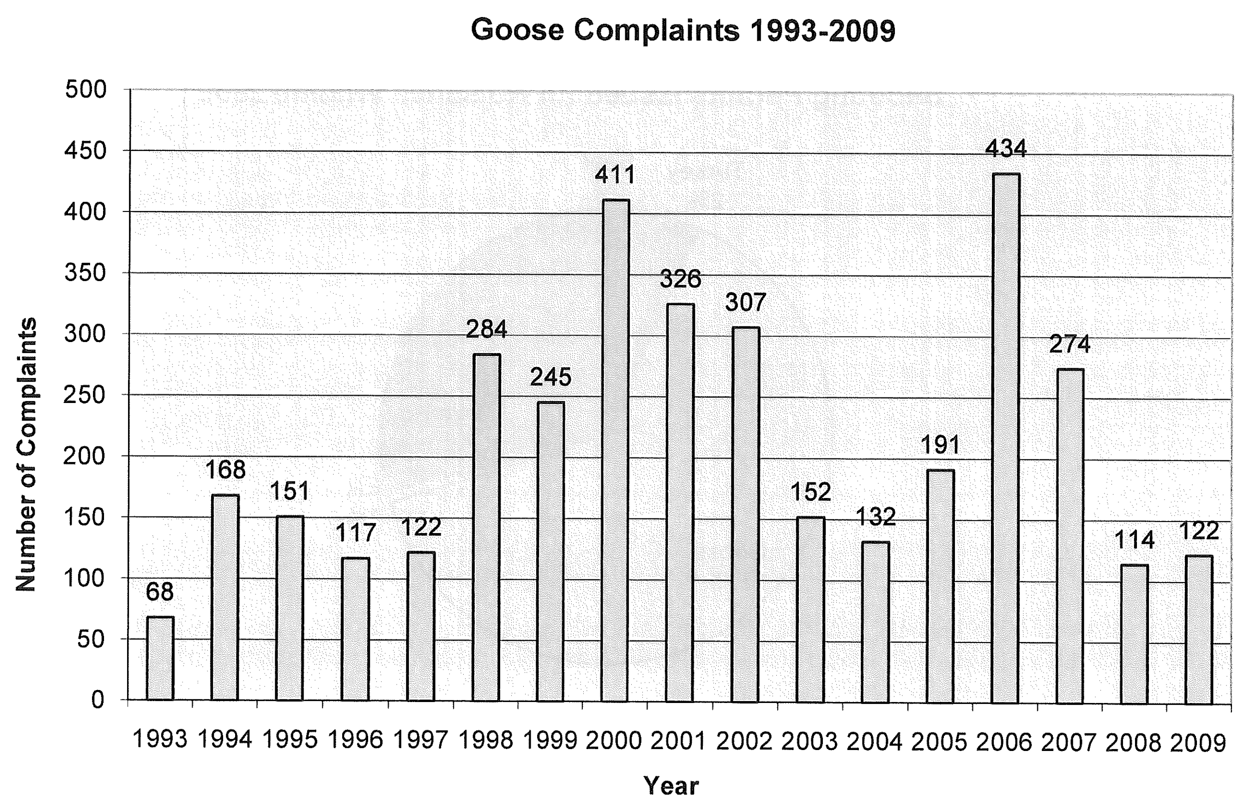


Figure 5. Number of goose complaints from 1993-2009, in Minnesota.

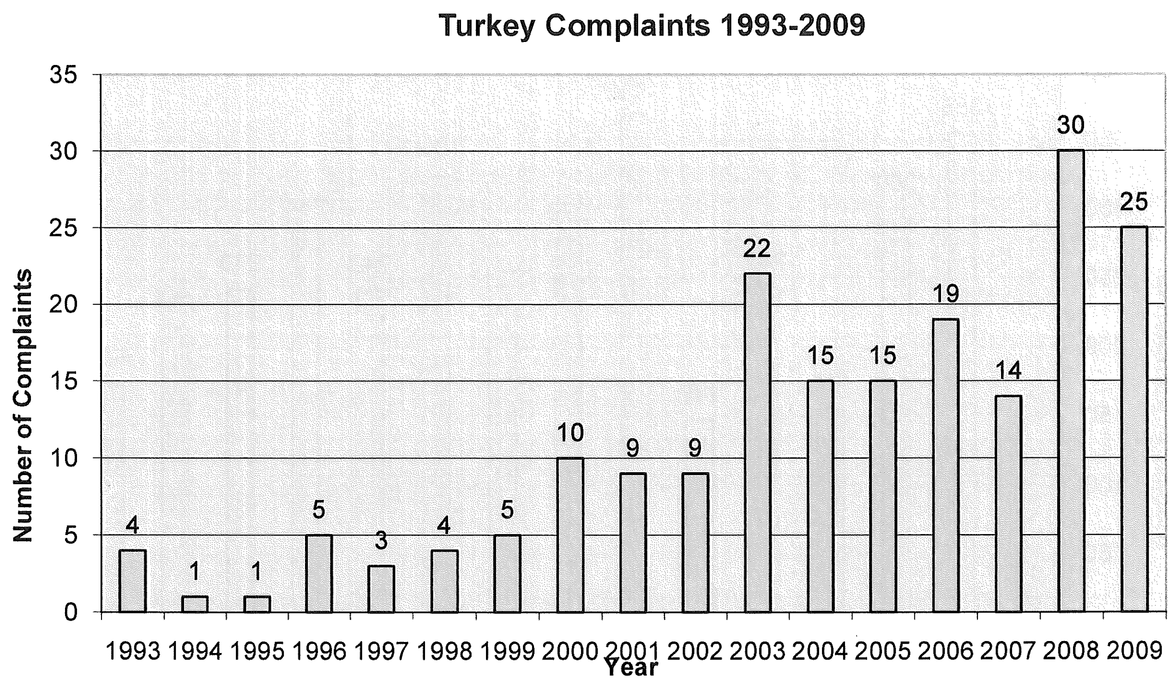


Figure 6. Number of turkey complaints from 1993-2009, in Minnesota.

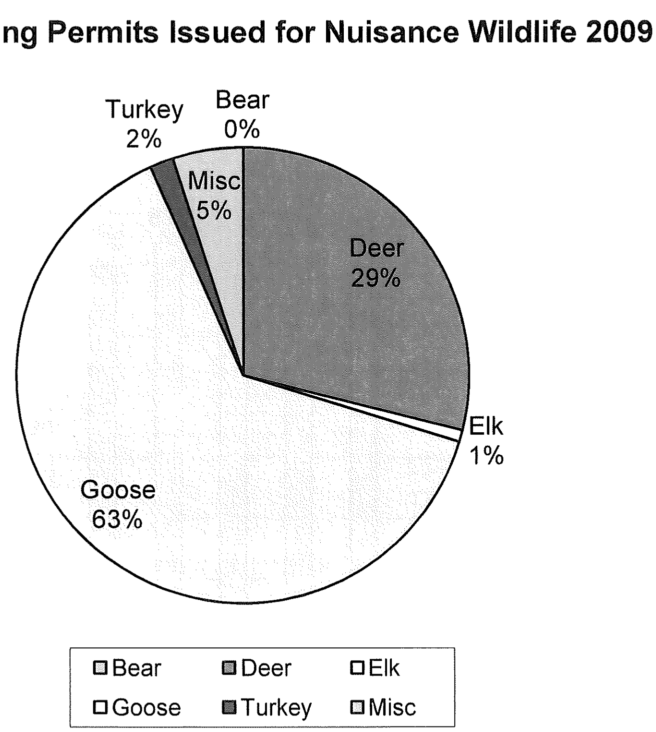


Figure 7. Shooting permits issued for nuisance wildlife control in Minnesota for 2009.

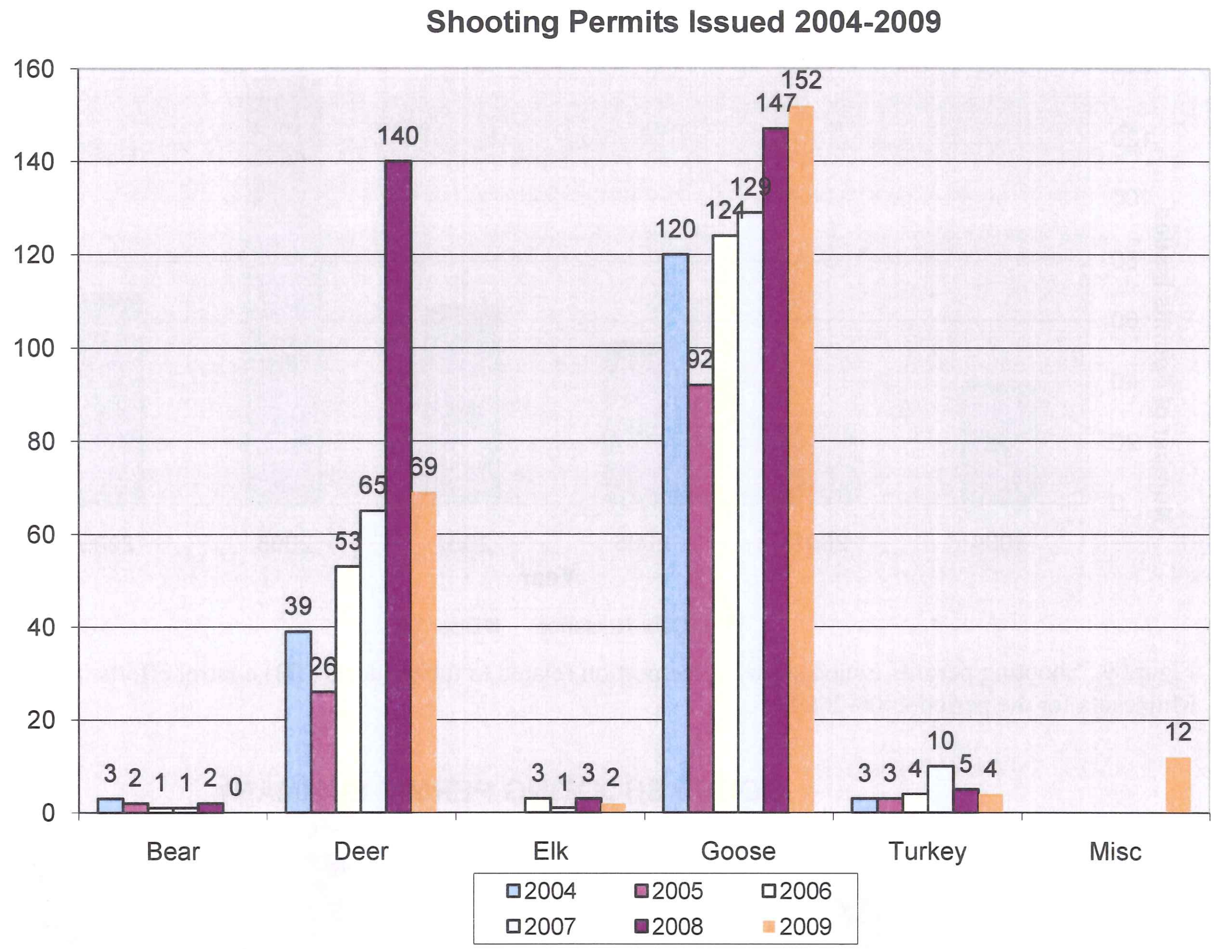


Figure 8. Shooting permits issued for nuisance wildlife control in Minnesota for 2004-2009.

The twelve miscellaneous permits issued in 2009 represent multi-species permits that were issued primarily to airport authorities for the control of birds posing a hazard to air traffic. These have not been reflected in past summaries.

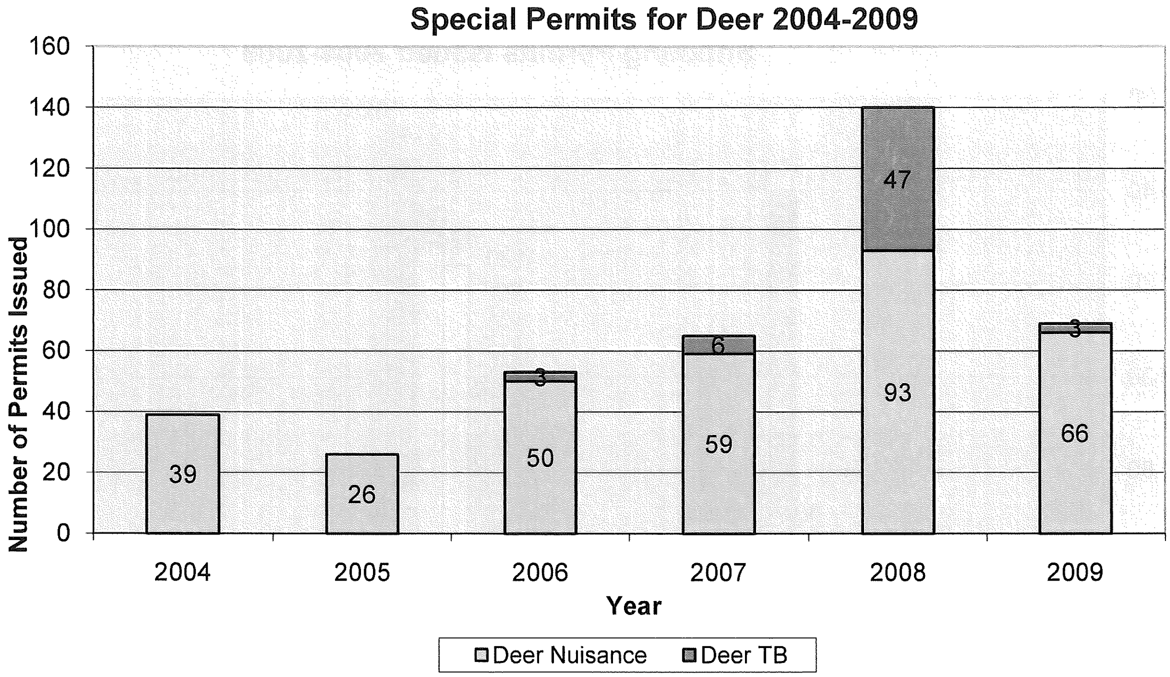


Figure 9. Shooting permits issued showing the portion related to tuberculosis (TB) control efforts in Minnesota for the period 2006-2009.

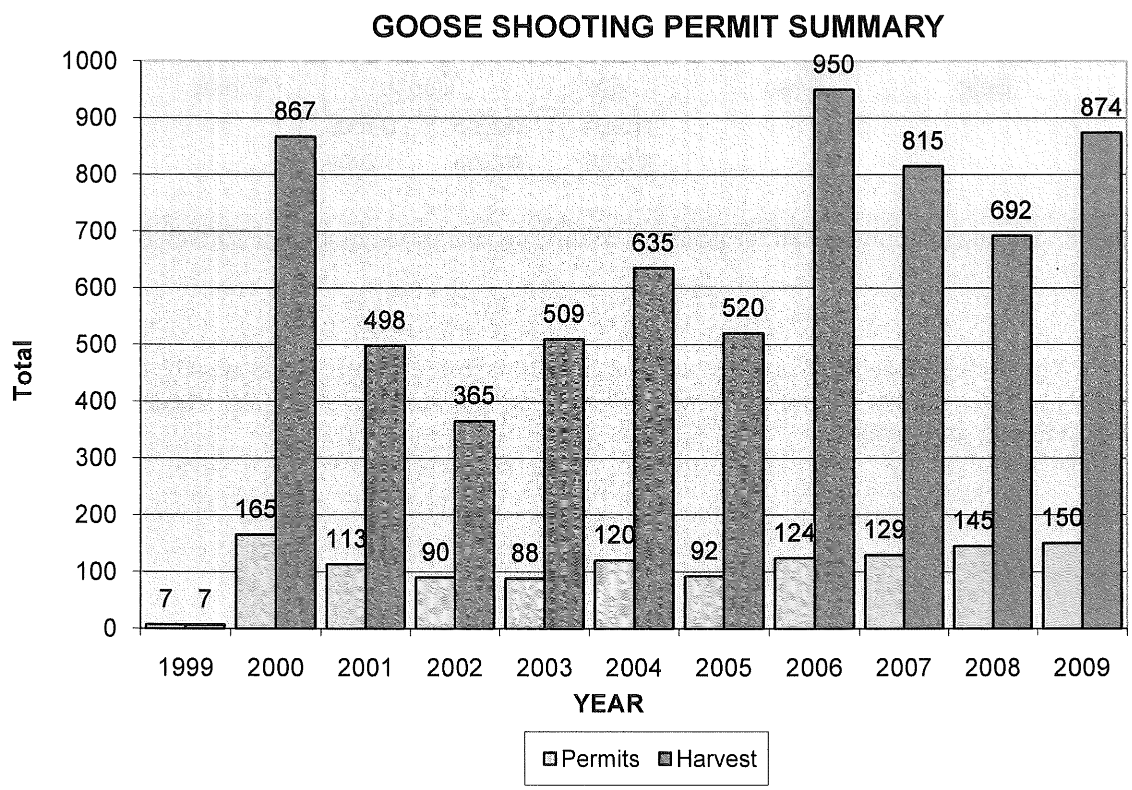


Figure 10. Comparison of nuisance goose shooting permits and harvest in Minnesota 1999-2009.

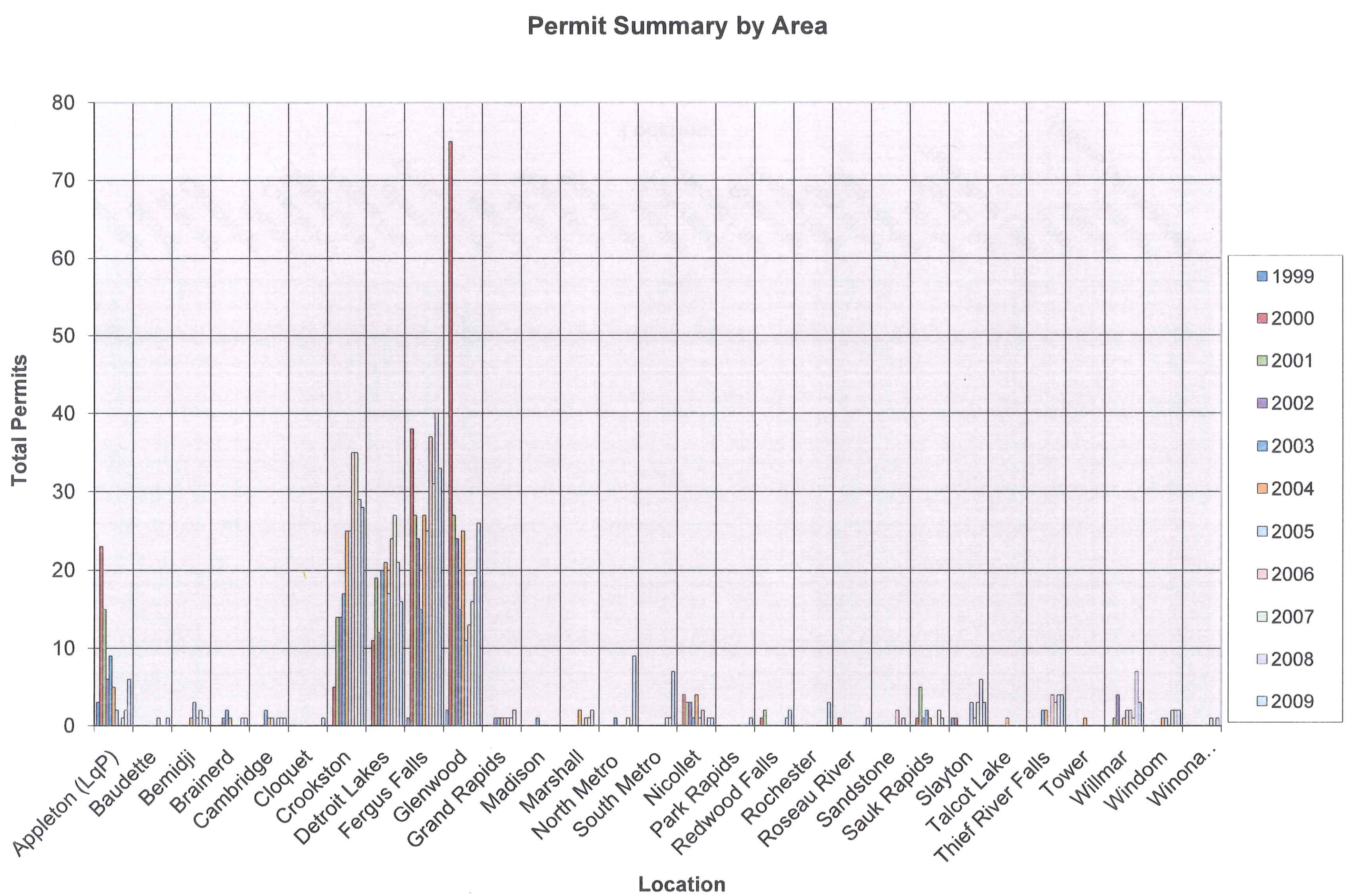


Figure 11. Nuisance goose permits issued by area wildlife offices in Minnesota 1999-2009.

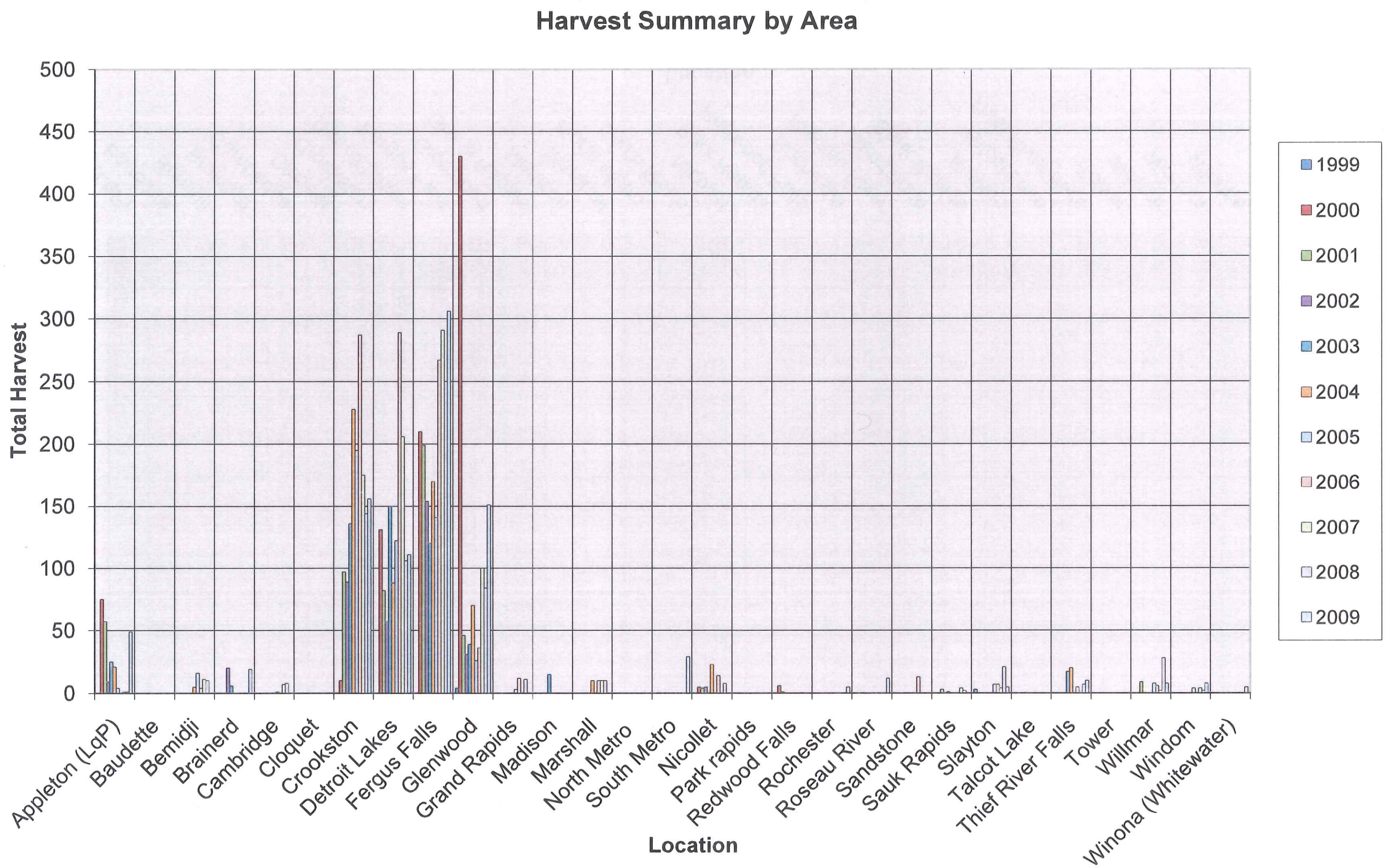


Figure 12. Nuisance goose harvest by area wildlife office in Minnesota 1999-2009.

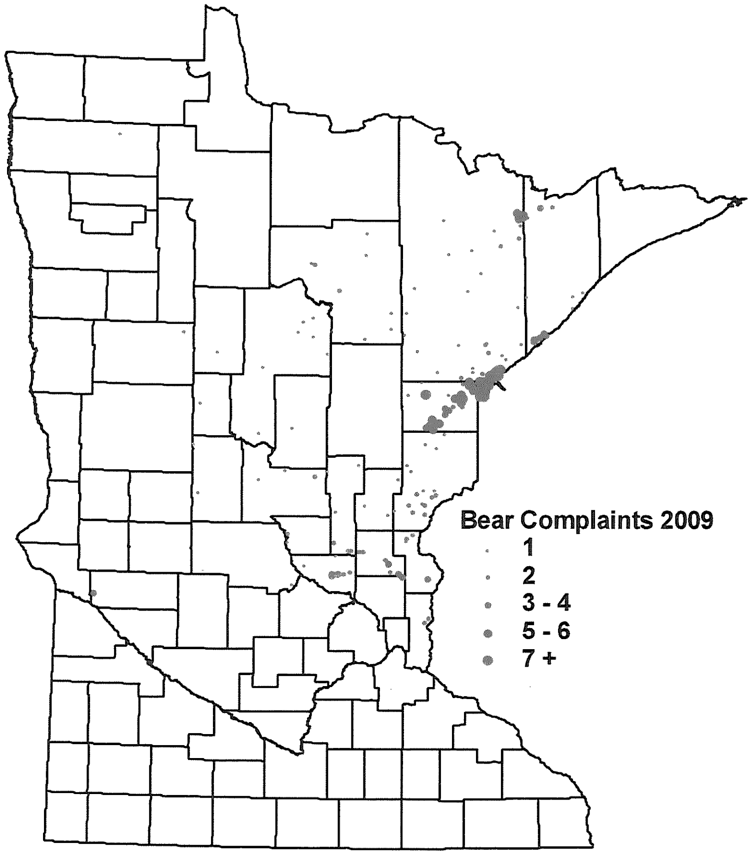


Figure 13. Location of bear damage complaints in 2009 (n=218). Note: number of points mapped differs from the total number of complaints received due to insufficient location information provided in the complaint reports to accurately map.

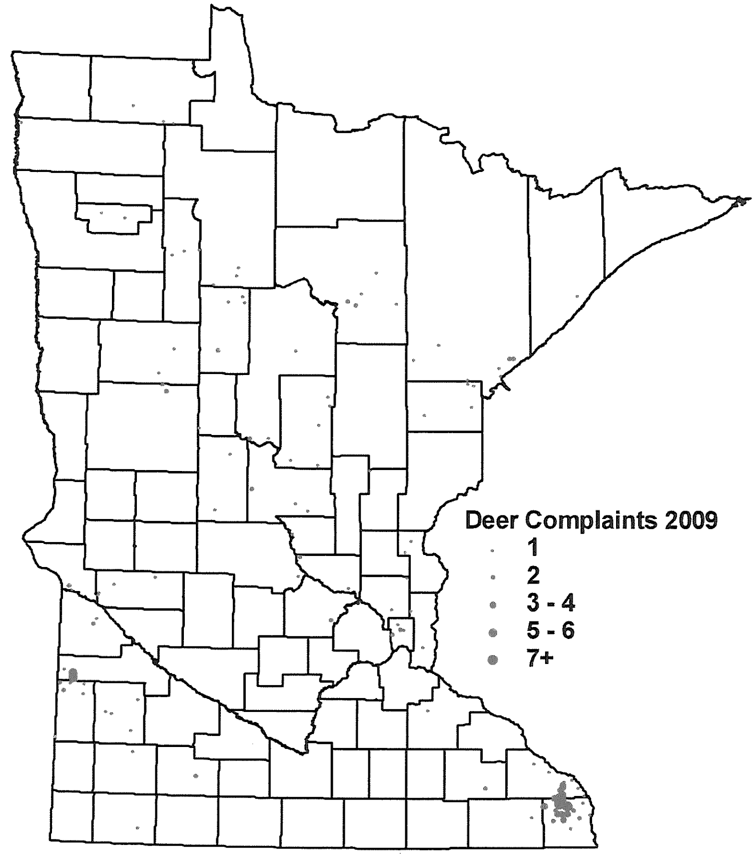


Figure 14. Location of deer damage complaints in 2009 (n=140). Note: number of points mapped differs from the total number of complaints received due to insufficient location information provided in the complaint reports to accurately map.

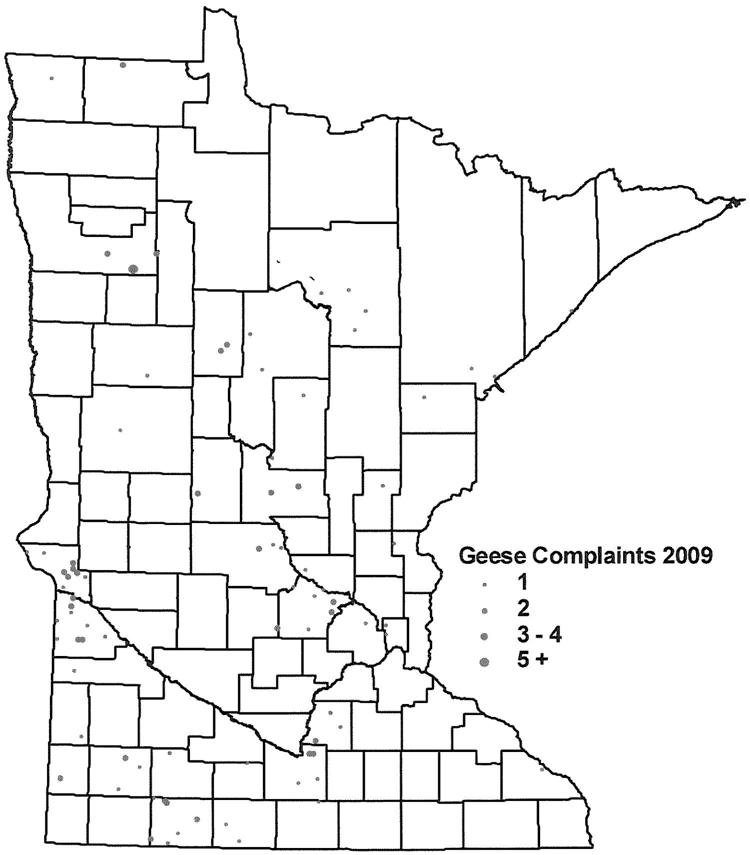


Figure 15. Location of goose damage complaints in 2009 (n=122). Note: number of points mapped differs from the total number of complaints received due to insufficient location information provided in the complaint reports to accurately map.

CARNIVORE SCENT STATION SURVEY

AND

WINTER TRACK INDICES

NOTE: This survey is organized and coordinated by the Forest Wildlife Populations and Research Group, 1201 E. Hwy 2, Grand Rapids, MN 55744. Results are presented at this location in the book because of the statewide nature of the data.

CARNIVORE SCENT STATION SURVEY SUMMARY, 2009

John Erb, Minnesota Department of Natural Resources, Forest Wildlife Research Group

INTRODUCTION

Monitoring the distribution and abundance of carnivores can be important for documenting the effects of harvest, habitat change, and environmental variability on these populations. However, many carnivores are highly secretive, difficult to repeatedly capture, and naturally occur at low to moderate densities, making it difficult to estimate abundance over large areas using traditional methods (e.g., mark-recapture, distance sampling, etc.). Hence, indices of relative abundance are often used to monitor such populations over time (Sargeant et al. 1998, 2003, Hochachka et al. 2000, Wilson and Delahay 2001, Conn et al. 2004).

In the early 1970's, the U.S. Fish and Wildlife Service initiated a carnivore survey designed primarily to monitor trends in coyote populations in the western U.S. (Linhart and Knowlton 1975). In 1975, the Minnesota DNR began to utilize similar survey methodology to monitor population trends for numerous terrestrial carnivores within the state. This year marks the 34th anniversary of the carnivore scent station survey.

METHODS

Scent station survey routes are composed of tracking stations (0.9 m diameter circle) of sifted soil with a fatty-acid scent tab placed in the middle. Scent stations are spaced at 0.5 km intervals on alternating sides of a road or trail. During the initial years (1975-82), survey routes were 23.7 km long, with 50 stations per route. Stations were checked for presence/absence of tracks on 4 consecutive nights (old tracks removed each night), and the mean number of station visits per night was the basis for subsequent analysis. Starting in 1983, following suggestions by Roughton and Sweeny (1982), design changes were made whereby routes were shortened to 4.3 km, 10 stations/route (still with 0.5 km spacing between stations), and routes were surveyed only once on the day following route placement. The shorter routes and fewer checks allowed for an increase in the number and geographic distribution of survey routes. In either case, the design can be considered two-stage cluster sampling.

Survey routes were selected non-randomly, but with the intent of maintaining a minimum 5 km separation between routes, and encompassing the variety of habitat conditions within the work area of each survey participant. Most survey routes are placed on secondary (unpaved) roads/trails, and are completed from September through October. Survey results are currently stratified based on 3 'habitat zones' within the state (forest, farmland, and transition).

Track presence/absence is recorded at each station, and track indices are computed as the percentage of scent stations visited by each species. Confidence intervals (95%) are computed using bootstrap methods (percentile method; Thompson et al. 1998). For each of 1000 replicates, survey routes are randomly re-sampled according to observed zone-specific route sample sizes, and station visitation rates are computed for each replicate sample of routes. Replicates are ranked according to the magnitude of the calculated index, and the 25th and 975th values constitute the lower and upper bounds of the confidence interval.

RESULTS AND DISCUSSION

A total of 282 routes were completed this year (Figure 1). There were 2,666 operable scent stations examined on the 282 4.3 km routes. Route density varied from 1 route per 564 km^2 in the Forest zone to 1 route per 1,238 km^2 in the Farmland zone (Figure 1).

Statewide, route visitation rates (% of routes with detection) were highest for red fox (42%), followed by skunk (38%), raccoon (34%), domestic cat (32%), coyote (22%), and dog (18%). Regionally, route visitation rates were as follows: red fox – Farmland (FA) 29%, Transition (TR) 31%, Forest (FO) 52%; coyote – FA 29%, TR 30%, FO 14%; skunk – FA 56%, TR 39%, FO 31%; raccoon – FA 69%, TR 36%, FO 19%; domestic cat – FA 55%, TR 45%, FO 16%; and dog – FA 36%, TR 25%, FO 8%.

Figures 2-5 show <u>station</u> visitation indices (% of stations visited) from the survey's inception through the current year. Although the survey is largely intended to document long-term trends in populations, confidence intervals improve interpretation of the significance of annual changes. Based on the presence/absence of confidence interval overlap, there were no statistically significant changes from last year. However, there was a 'notable' decline in the farmland coyote index (Figure 2), as well as a notable increase if the forest zone red fox index (Figure 4). Bobcat indices reached their highest level, though confidence intervals are large (Figure 5).

Red fox indices remain highest in the zone with the lowest coyote index (i.e., Forest zone), an area where coyotes are likely limited by wolves. Point estimates for the red fox index in the Farmland and Transition zones remain well below their long-term average (Figures 2 and 3), likely a combined result of increasing coyote numbers and habitat alteration. Wolf indices have not changed appreciably in the last 5 years.

ACKNOWLEDGEMENTS

I wish to thank all of the cooperators who participated in the 2009 survey: DNR Division of Wildlife staff; Superior National Forest Aurora District; Agassiz, Rydell, Sherberne, and Tamarac National Wildlife Refuges; USFWS Detroit Lakes and Morris Wetland Management Districts; 1854 Treaty Authority, White Earth and Red Lake Tribal Resource Departments; Vermillion Community College; Cass County Land Department; Marshall County Central High School; and Richard Nelles and Tom Stuber.

LITERATURE CITED

CONN, P. B., L. L. BAILEY, and J. R. SAUER. 2004. Indexes as surrogates to abundance for low-abundance species. Pages 59-76 *in* W. L. Thompson, editor. Sampling rare or elusive species: Concepts, designs, and techniques for estimating population parameters. Island Press, Washington, D.C., USA.

HOCHACHKA, W. M., K. MARTIN, F. DOYLE, and C. J. KREBS. 2000. Monitoring vertebrate populations using observational data. Canadian Journal of Zoology 78:521-529.

LINHART, S. B., and F. F. KNOWLTON. 1975. Determining the relative abundance of coyotes by scent station lines. Wildlife Society Bulletin 3: 119-124.

ROUGHTON, R. D., and M. D. SWEENY. 1982. Refinements in scent-station methodology for assessing trends in carnivore populations. Journal of Wildlife Management 46: 217-229.

SARGEANT, G. A., D. H. JOHNSON, and W. E. BERG. 1998. Interpreting carnivore scent station surveys. Journal of Wildlife Management 62: 1235-1245.

SARGEANT, G. A., D. H. JOHNSON, and W. E. BERG. 2003. Sampling designs for carnivore scent-station surveys. Journal of Wildlife Management 67: 289-298.

THOMPSON, W. L., G. C. WHITE, and C. GOWAN. 1998. Monitoring vertebrate populations. Academic Press, San Diego, California.

WILSON, G. J., and R. J. DELEHAY. 2001. A review of methods to estimate the abundance of terrestrial carnivores using field signs and observation. Wildlife Research 28:151-164.

2009 Scent Station Specifics

Zone	Routes Completed	Route Density	Station Nights
Farmland	55	1/1,238 km^2	530
Transition	80	1/822 km^2	733
Forest	147	1/564 km^2	1,403
Totals	282	1/769 km^2	2,666

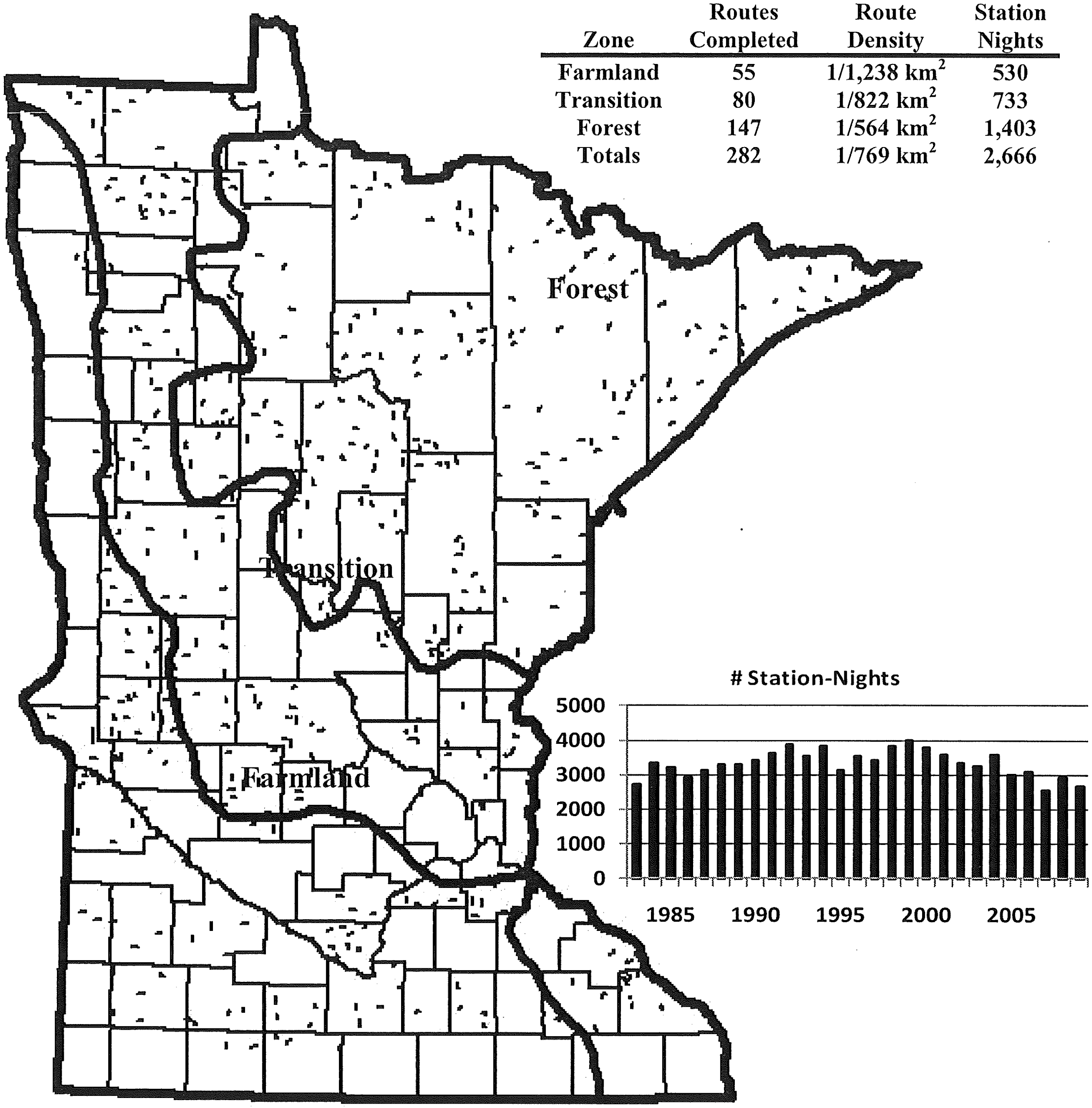


Figure 1. Locations of scent station routes. Insets show 2009 route specifics and the number of station-nights per year since 1983.

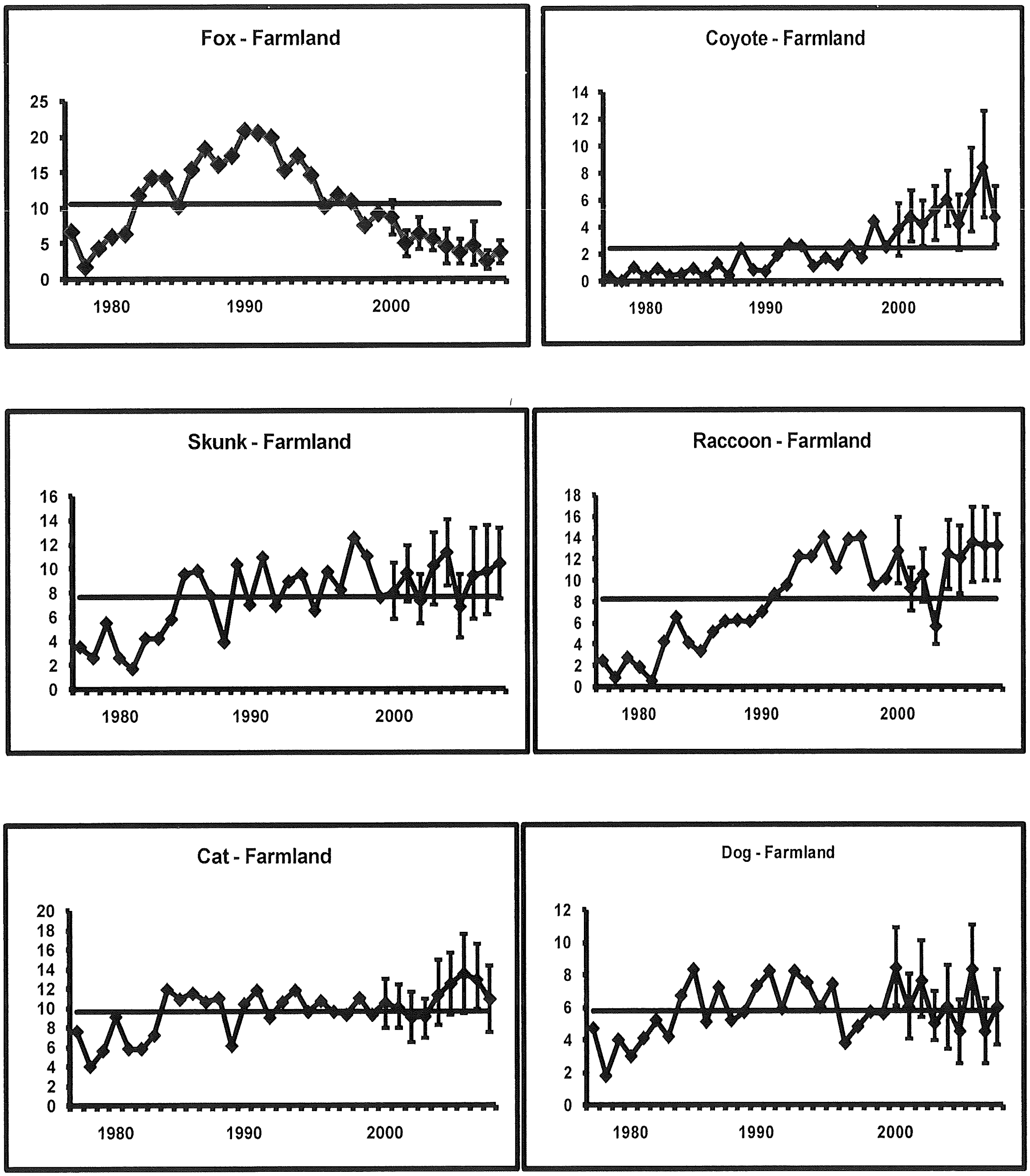


Figure 2. Percentage of scent stations visited by selected species in the Farmland Zone of Minnesota, 1977-2009. Horizontal line represents long-term mean.

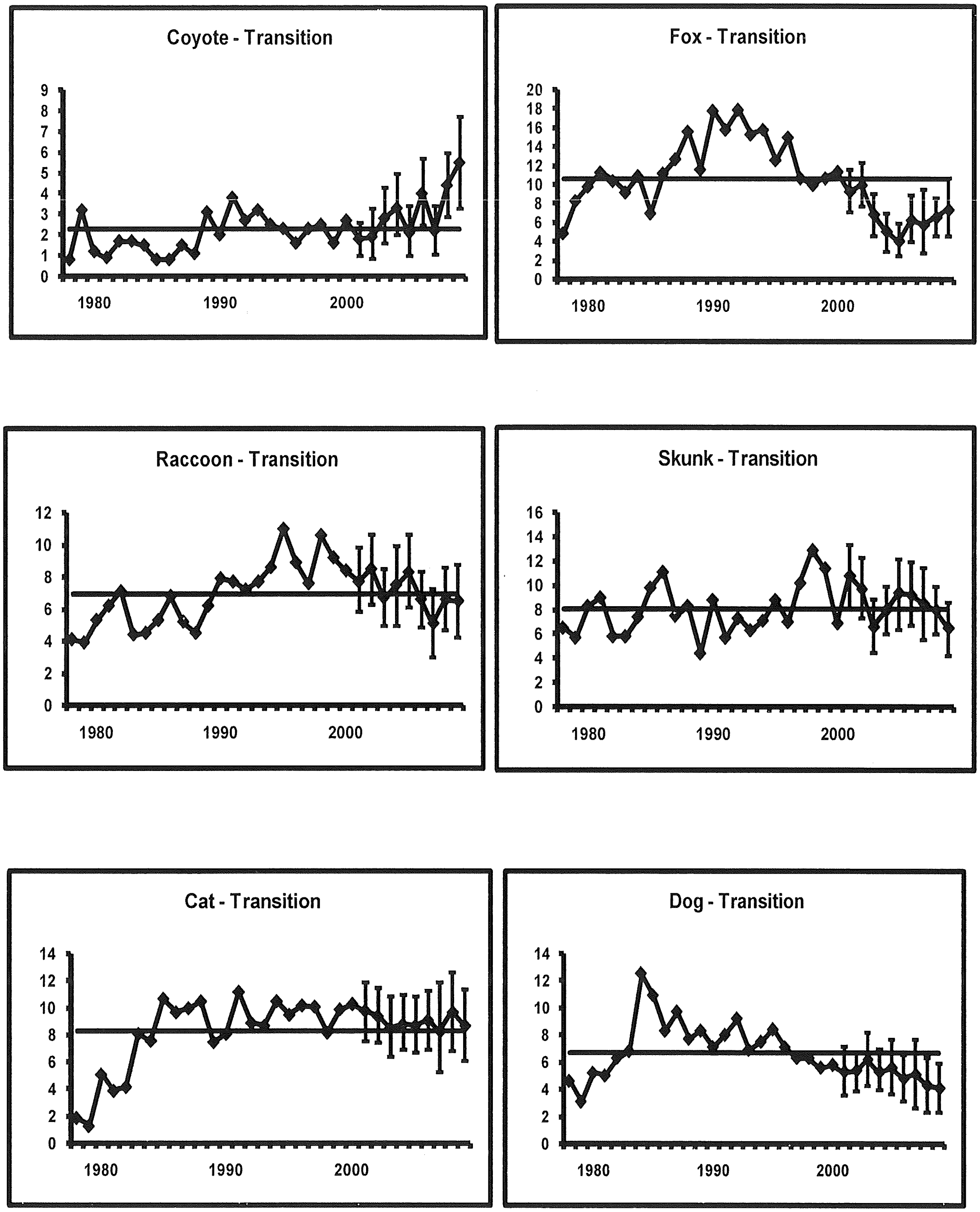


Figure 3. Percentage of scent stations visited by selected species in the Transition Zone of Minnesota, 1978-2009. Horizontal line represents long-term mean.

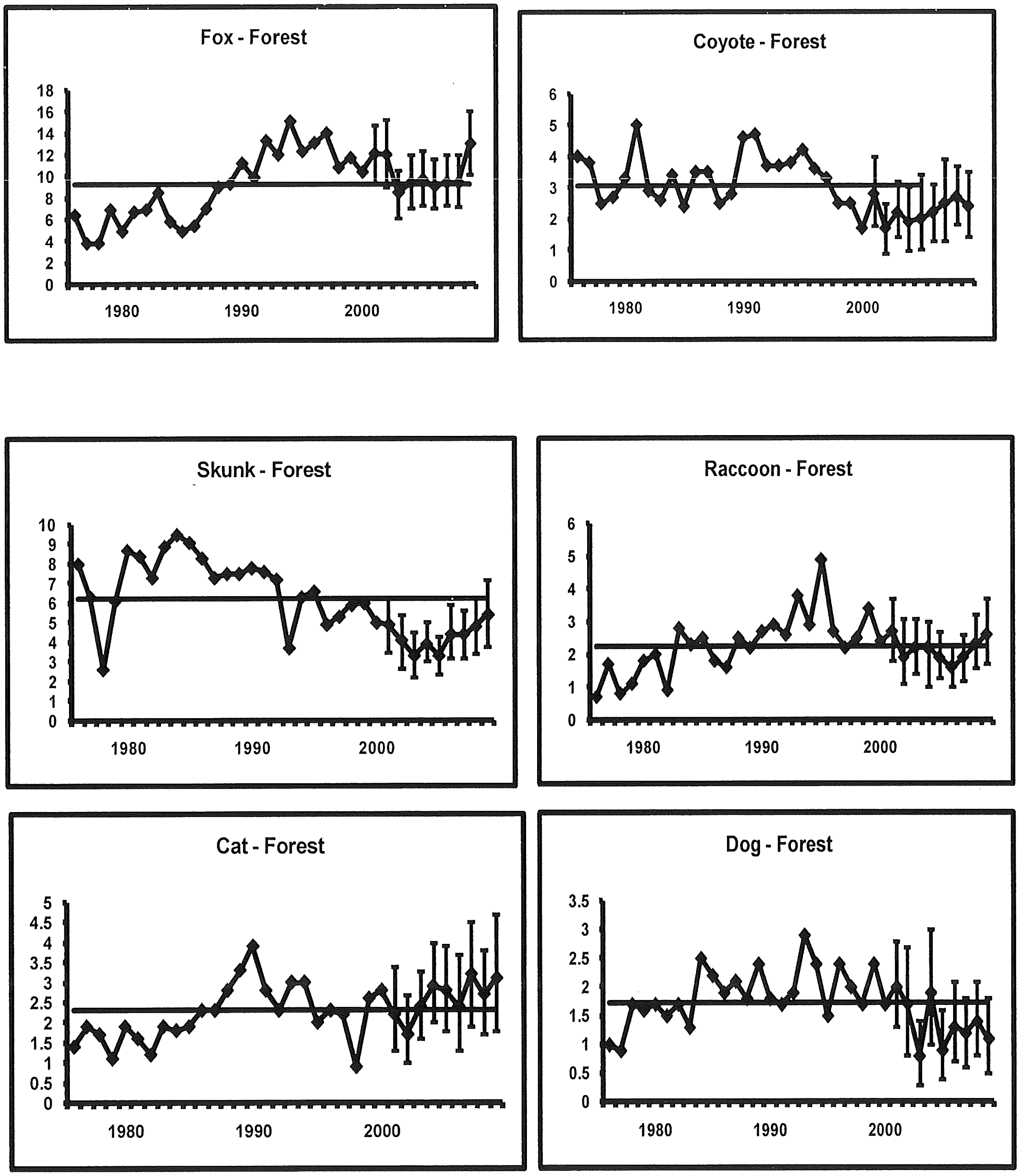


Figure 4. Percentage of scent stations visited by selected species in the Forest Zone of Minnesota, 1976-2009. Horizontal line represents long-term mean.

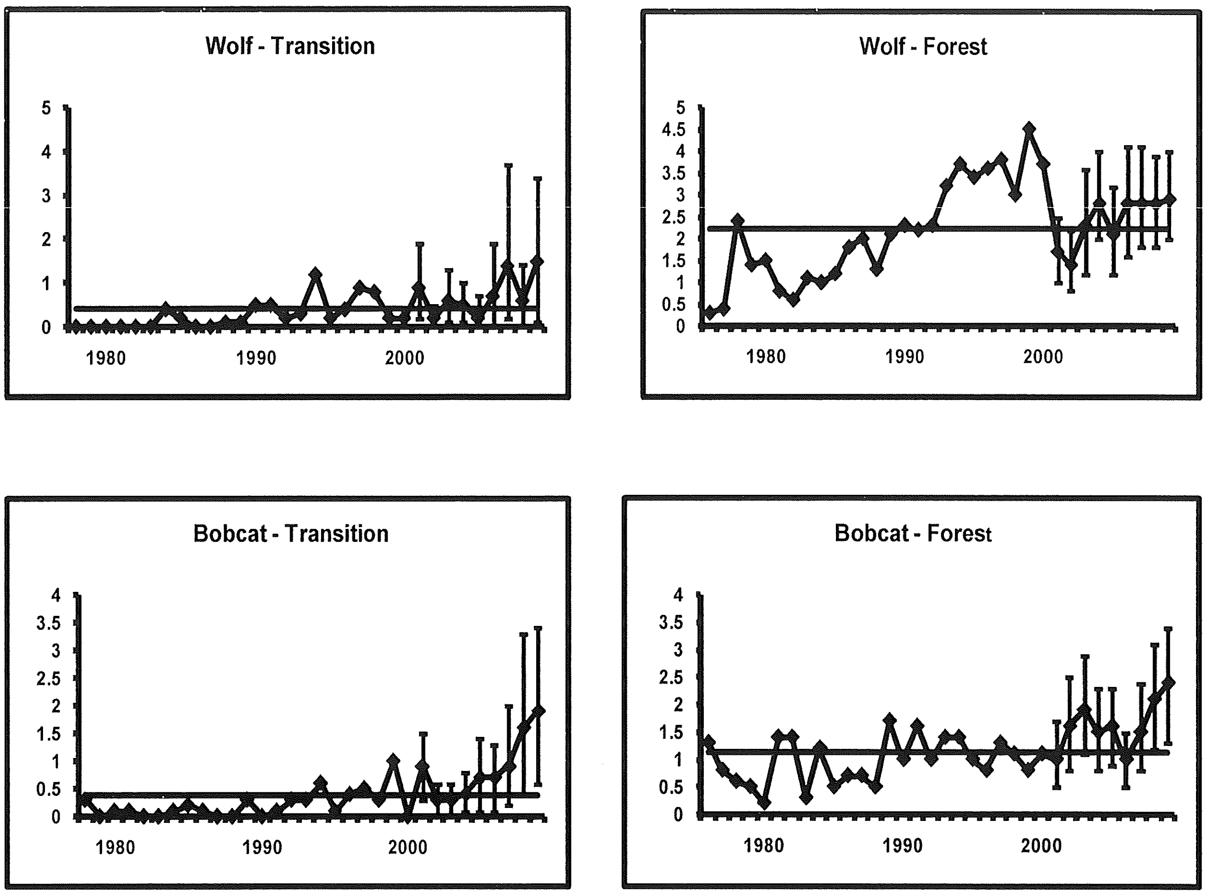


Figure 5. Percentage of scent stations visited by wolves and bobcat in the Forest and Transition Zones of Minnesota, 1976-2009. Horizontal lines represents long-term mean.

FURBEARER WINTER TRACK SURVEY SUMMARY, 2009

John Erb, Forest Wildlife Populations and Research Group, DNR

INTRODUCTION

Monitoring the distribution and abundance of carnivores can be important for documenting the effects of harvest, habitat change, and environmental variability on these populations. However, many carnivores are highly secretive, difficult to repeatedly capture, and naturally occur at low to moderate densities, making it difficult to estimate abundance over large areas using traditional methods (e.g., mark-recapture, distance sampling, etc.). Hence, indices of relative abundance are often used to monitor such populations over time (Hochachka et al. 2000, Wilson and Delahay 2001, Conn et al. 2004).

In winter, tracks of carnivores are readily observable following snowfall. Starting in 1991, Minnesota initiated a carnivore snow track survey in the northern portion of the State. The survey's primary objective is to use a harvest-independent method to monitor distribution and population trends of fisher (*Martes pennanti*) and marten (*Martes americana*), two species for which no other survey data was available. Because sign of other carnivores is readily detectable in snow, participants also record tracks for other selected species. After 3 years of evaluating survey logistics, the survey became operational in 1994.

METHODS

Presently, 58 track survey routes are distributed across the northern portion of the state (Figure 1). Each route is 10 miles long and follows secondary roads or trails. Route locations were subjectively determined based on availability of suitable roads/trails, but were chosen, where possible, to represent the varying forest habitat conditions in northern Minnesota. For data recording, each 10-mile route is divided into 20 0.5-mile segments.

Each route is surveyed once following a fresh snow typically from December through mid-February, and track counts are recorded for each 0.5-mile segment. When it is obvious the same animal crossed the road multiple times <u>within</u> a 0.5-mile segment, the animal is only recorded once. If it is obvious that an animal ran along the road and entered multiple 0.5 mile segments (which often occurs with canids), it's tracks are recorded in all segments, but circled to denote it was the same animal. While such duplicate tracks are not included in calculation of track indices (see below), recording data in this manner allows for future analysis of animal activity in relation to survey 'plot' size and habitat. Snowshoe hare (*Lepus americanus*) are recorded only as present or absent in the first 0.1 miles of each 0.5-mile segment. While most routes are surveyed 1 day after the conclusion of a snowfall (ending by 6:00 pm), thereby allowing 1 night for track 'registry', a few routes are usually completed 2 nights following snowfall. In such cases, track counts on those routes are divided by the number of days post-snowfall.

Currently, 3 summary statistics (2 graphs) are presented for each species. First, I compute the percentage of 0.5-mile segments with species presence after removing any duplicates (e.g., if the same fox clearly traverses 2 adjacent 0.5-mile segments along the road, and it was the only 'new' red fox (*Vulpes vulpes*) in the second segment, only 1 of the 2 segments is considered independently occupied). In addition to this metric, but on the same graph, the average number of tracks per 10-mile route is presented after removing any obvious duplicate tracks across segments. For wolves (*Canis lupus*) traveling through adjacent segments, the maximum number of pack members recorded in any 1 of those segments is used as the track total for that particular group, though this is likely an underestimate of true pack size. Because individuals from many of the species surveyed tend to be solitary, these 2 indices will often yield mathematically equivalent results (i.e., on average, one tends to differ from the other by a constant factor). In the case of wolf packs, and to a lesser extent red fox and coyotes (*Canis latrans*) which may start traveling as breeding pairs in winter, the approximate equivalence of these 2 indices will still be true if average (detected) group sizes are similar across years. However, the solitary tendencies in some species are not absolute, potential abundance (in relation to survey plot size) varies across species, and for wolves, pack size may vary annually. For these reasons, as well as to provide an intuitive count metric, both indices are currently presented. Because snowshoe hares are tallied only as present/absent, the 2 indices will by definition be equivalent. Hare survey data is also obtained via counts of animals observed on grouse drumming count surveys conducted in spring. Data for both the spring and winter indices are presented for comparison.

In the second graph for each species, I illustrate the percentage of routes where each species was detected (hereafter, the 'distribution index'). This measure is computed to help assess whether any notable changes in the above track indices are a result of larger-scale changes in distribution (more/less routes with presence) and/or finer-scale changes in density along routes.

Using bootstrap methods, I compute confidence intervals (90%) for the percent of segments with species presence and the percent of routes with species presence. For each of 1000 replicates, survey routes are randomly re-sampled according to the observed route sample size. Replicates are ranked according to the magnitude of the calculated index, and the 50th and 950th values constitute the lower and upper bounds of the confidence interval.

RESULTS

Forty-five of the 58 routes were completed this year (Figure 2). Survey routes took an average of 2.1 hours to complete. Total snow depths averaged 10" for completed routes, just slightly above the long-term average (Figure 3). Mean overnight low temperature the night preceding the surveys was -4°F, the second coldest since surveys began (Figure 3). Survey routes were completed between December 10th and February 25th this winter, with a mean survey date of January 7th (Figure 3).

Though not a statistically significant change, fisher track indices (% of segments with detection) once again dropped to a new low (Figure 4). Fishers were detected on 5% of the route segments, and on 56% of the routes (Figure 4). Conversely, though still a non-significant change, marten track indices rebounded slightly. Their track index, however, remains well below the long-term average (Figure 4). Marten were detected on 5% of the route segments, and 40% of the survey routes.

Compared to last year, little change was observed in bobcat (*Lynx rufus*), wolf, red fox, and weasel (*Mustela* spp.) indices (Figure 4). Red fox and weasel remain below their long-term average, bobcats remain above their long-term average, with wolf indices near their long-term average. Wolves were detected on 71% of survey routes, while bobcats were detected on 41% of survey routes. The coyote index increased significantly this year, though only to a level approximating their long-term average. Both the spring and winter hare indices have remained stable in recent years, with no clear indication that the historic pattern of 10-year cycles is continuing in current times (Figure 4).

DISCUSSION

Reliable interpretation of changes in track survey results is dependent on the assumption that the probability of detecting animals remains relatively constant across years (Gibbs 2000) Because this remains an untested assumption, caution is warranted when interpreting changes, particularly annual changes of low to moderate magnitude, or short-term trends. Of particular note this year, the mean survey date was somewhat later than the long-term average, with average temperatures (on nights preceding each survey event) the second coldest since the survey began.

Based on confidence intervals, the only statistically significant change from last year was an increase in the coyote index, though only to a level approximating its long-term average. In addition, several multi-year patterns continue, with fisher, marten, fox, and weasel indices below their long-term average, and bobcat indices above their long-term average. Confidence interval data for previous years will continue to be incorporated over the next couple years.

I continue to review the adequacy of survey route sample size and distribution and hope that additional routes can be added in future years. We have also initiated fisher and marten research that, among other things, should provide some evaluation of track survey assumptions and possible approaches for estimating, and hence correcting for, any differences in the probability of detecting animals across years (e.g., MacKenzie et al. 2004). In particular, I hope to initiate repeat surveys on a subset of survey routes each winter, thereby allowing for estimation of year-specific detection rates.

ACKNOWLEDGEMENTS

I wish to thank all those who participated in this year's survey, including DNR field staff, USFS staff (Ely and Cook Districts), and staff from the Fond-du-Lac, Leech Lake, and Red Lake Bands, and the 1854 Treaty Authority.

LITERATURE CITED

CONN, P. B., L. L. BAILEY, and J. R. SAUER. 2004. Indexes as surrogates to abundance for low-abundance species. Pages 59-76 *in* W. L. Thompson, editor. Sampling rare or elusive species: Concepts, designs, and techniques for estimating population parameters. Island Press, Washington, D.C., USA.

GIBBS, J. P. 2000. Monitoring populations. Pages 213-252 *in* L. Boitani and T. K. Fuller, editors. Research Techniques in Animal Ecology. Columbia University Press, New York, USA.

HOCHACHKA, W. M., K. MARTIN, F. DOYLE, and C. J. KREBS. 2000. Monitoring vertebrate populations using observational data. Canadian Journal of Zoology 78:521-529.

MACKENZIE, D. I., J. A. ROYLE, J. A. BROWN, and J. D. NICHOLS. 2004. Occupancy estimation and modeling for rare and elusive populations. Pages 149-172 *in* W. L. Thompson, editor. Sampling rare or elusive species: Concepts, designs, and techniques for estimating population parameters. Island Press, Washington, D.C., USA.

WILSON, G. J., and R. J. DELAHAY. 2001. A review of methods to estimate the abundance of terrestrial carnivores using field signs and observation. Wildlife Research 28:151-164.

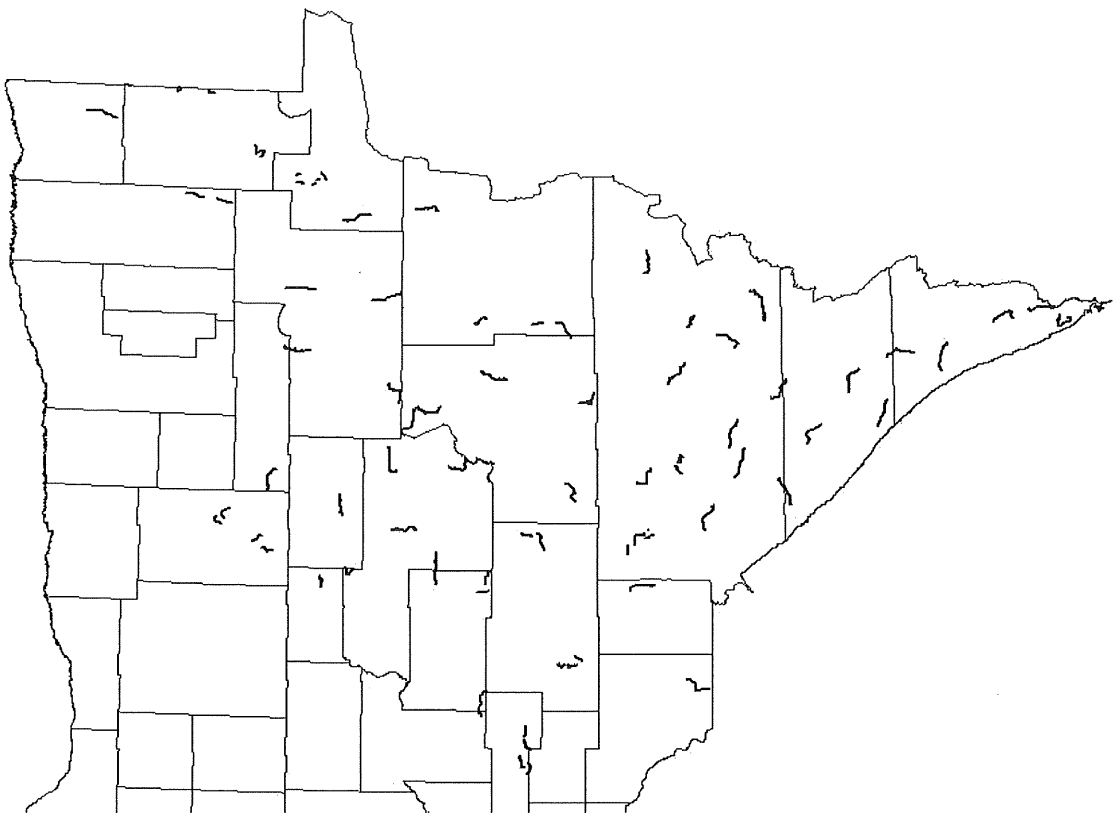


Figure 1. Locations of established furbearer winter track survey routes.

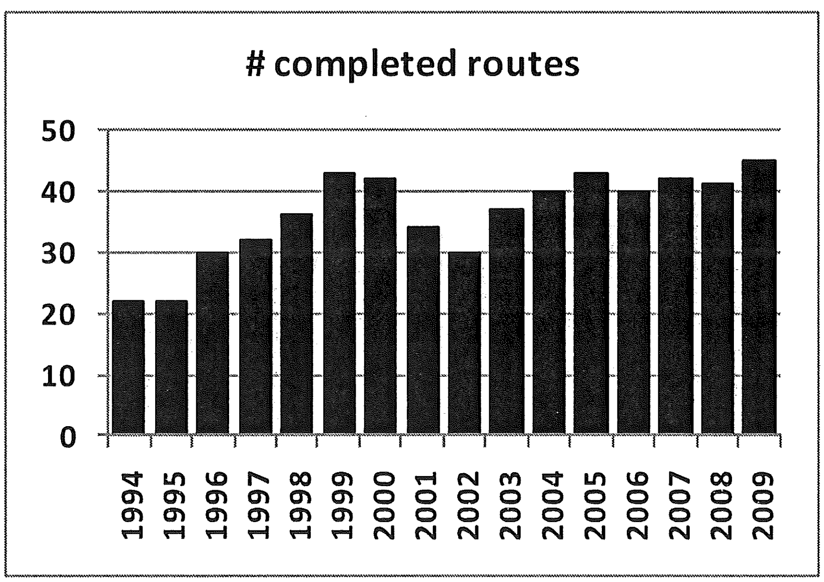
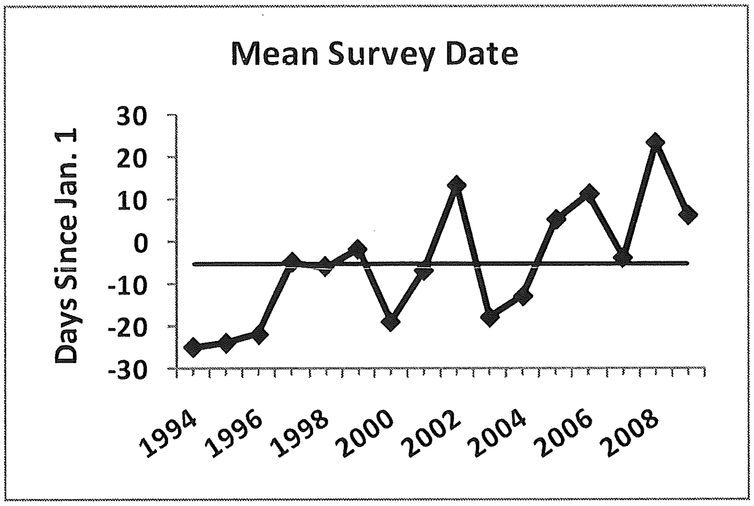
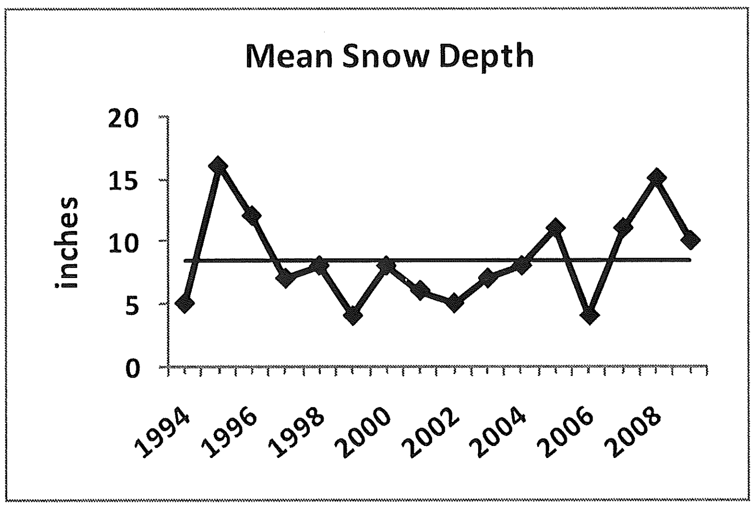


Figure 2. Number of winter track routes surveyed, 1994-2009.





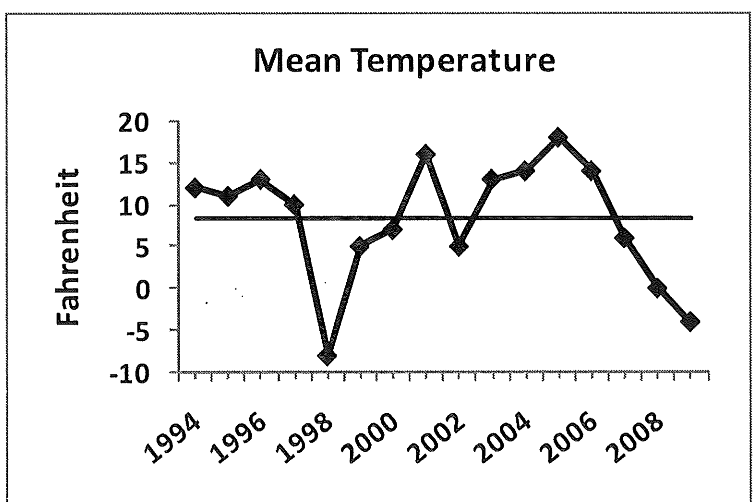


Figure 3. Average winter track survey date, snow depth, and temperature, 1994-2009. Horizontal line represents long-term mean.

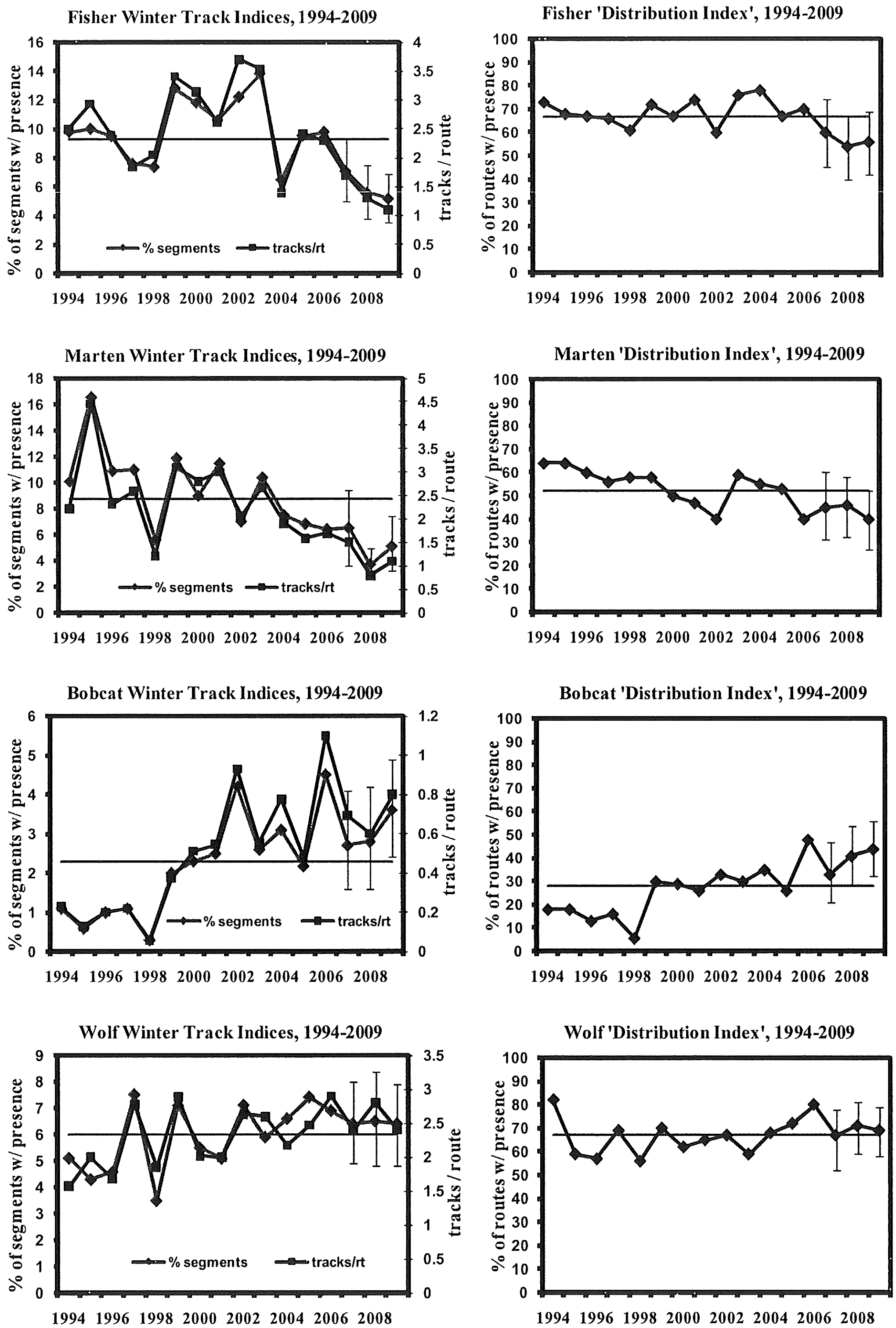


Figure 4. Winter track indices for selected species in Minnesota. Horizontal lines represent long-term average for percentage of segments and routes with presence.

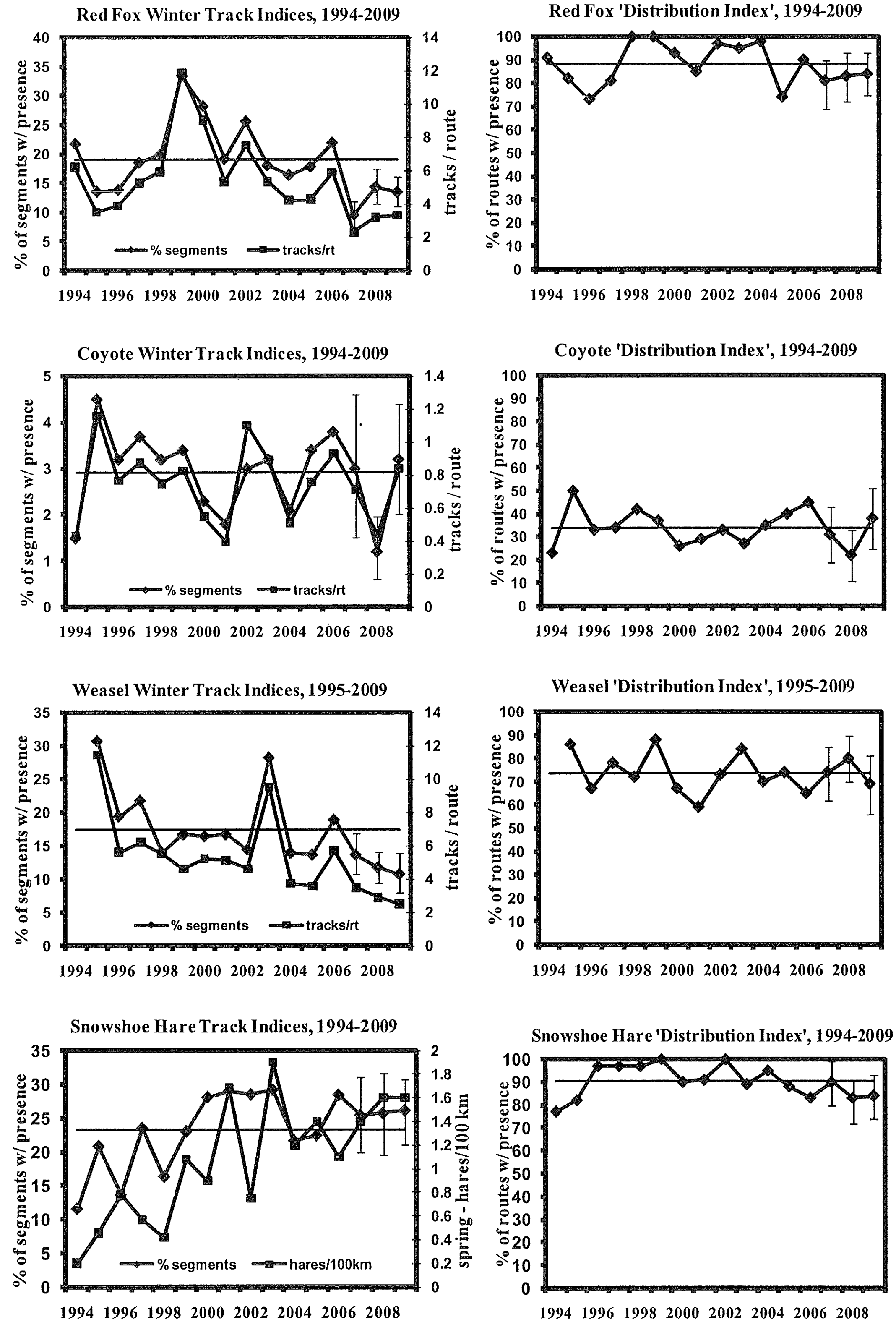


Figure 4 (continued). Winter track indices for selected species in Minnesota.

FOREST WILDLIFE POPULATIONS

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GROUSE SURVEYS IN MINNESOTA DURING SPRING 2010

Michael A. Larson, Forest Wildlife Populations and Research Group

SUMMARY OF FINDINGS

Surveys for ruffed grouse (*Bonasa umbellus*) and sharp-tailed grouse (*Tympanuchus phasianellus*) were conducted during April and May 2010. Mean counts of ruffed grouse drums throughout the forested regions of Minnesota were 1.5 (95% confidence interval = 1.3–1.7) drums/stop (dps). That was 27% lower than the mean of 2.0 (1.8–2.3) dps observed during 2009, which was likely the peak in abundance during the population cycle of ruffed grouse in Minnesota.

During the spring 2010 survey 2,096 sharp-tailed grouse were observed at 195 dancing grounds. The mean number of sharp-tailed grouse per dancing ground was 8.9 (7.5–10.5) in the East Central survey region, 11.8 (10.4–13.1) in the Northwest region, and 10.7 (9.8–11.8) statewide. Index values (i.e., grouse/lek) declined slightly from 2009 in the Northwest region and remained approximately the same in the East Central region. The statewide index value was similar to those from 2003–2007 and the long-term average since 1980.

INTRODUCTION

Index Surveys

The purpose of surveys of grouse populations in Minnesota is to monitor changes in the densities of grouse over time. Estimates of density, however, are difficult and expensive to obtain. Simple counts of animals, on the other hand, are convenient and, assuming that changes in density are the major source of variation in counts among years, they can provide a reasonable index to long-term trends in populations. Other factors, such as weather and habitat conditions, observer ability, and grouse behavior, vary over time and also affect simple counts of animals. These other factors make it difficult to make inferences about potential changes in wildlife populations over short periods of time (e.g., a few annual surveys) or from small changes in index values. Over longer periods of time or when changes in index values are large, assumptions upon which grouse surveys in Minnesota depend are more likely to be valid, thereby making inferences about grouse populations more valid. For example, index values from the ruffed grouse drumming count survey have documented what is believed to be true periodic fluctuations in ruffed grouse densities (i.e., the 10-year cycle).

Ruffed Grouse

The ruffed grouse (*Bonasa umbellus*) is Minnesota's most popular game bird. It occurs throughout the forested regions of the state. Annual harvest varies from approximately 150,000 to 1.4 million birds and averages >500,000 birds. Information derived from spring drumming counts and hunter harvest statistics indicates that ruffed grouse populations fluctuate cyclically at intervals of approximately 10 years.

During spring there is a peak in the drumming behavior of male ruffed grouse. Ruffed grouse drum to communicate to other grouse the location of their territory. The purpose is to attract females for breeding and deter encroachment by competing males. Drumming makes male ruffed grouse much easier to detect, so counts of drumming males is a convenient basis for surveys to monitor changes in the densities of ruffed grouse. Ruffed grouse were first surveyed in Minnesota during the mid-1930s. Spring drumming counts have been conducted annually since the establishment of the first survey routes in 1949.

Sharp-tailed Grouse

Sharp-tailed grouse (*Tympanuchus phasianellus*) in Minnesota occur in brushlands, which often form transition zones between forests and grasslands. Sharp-tailed grouse are considered a valuable indicator of the availability and quality of brushlands for wildlife. Although sharp-tailed grouse habitat was more widely distributed in Minnesota during the early- and mid-1900s, the range of sharp-tailed grouse is now limited to areas in the Northwest (NW) and East Central (EC) portions of the state (Figure 1). Since 1990 annual harvest of sharp-tailed grouse by hunters has varied from 8,000 to 30,000 birds, and the number of hunters has varied from 6,000 to 13,000.

During spring male sharp-tailed grouse gather at dancing grounds, or leks, in grassy areas and fields where they defend small territories and make displays to attract females for breeding. Surveys of sharp-tailed grouse populations are based on counts of grouse at dancing grounds. The first surveys of sharp-tailed grouse in Minnesota were conducted between the early 1940s and 1960. The current sharp-tailed grouse survey was initiated in 1976.

METHODS

Ruffed Grouse

Roadside routes consisting of 10 semipermanent stops approximately 1.6 km (1 mile) apart have been established. Routes were originally located along roads with little automobile traffic that were also near apparent ruffed grouse habitat. Therefore, route locations were not selected according to a statistically valid spatial sampling design, which means that data collected along routes is not necessarily representative of the larger areas (e.g., counties, regions) in which routes occur. Approximately 50 routes were established by the mid-1950s, and approximately 70 more were established during the late-1970s and early-1980s.

Observers from the Department of Natural Resources (DNR) Area Wildlife Offices and a variety of other organizations drove along each survey route once just after sunrise during April or May. Observers were not trained but often were experienced with the survey. At each designated stop along the route the observer listened for 4 minutes and recorded the number of ruffed grouse drums (not necessarily the number of individual grouse) he or she heard. Attempts were made to conduct surveys on days near the peak of drumming activity that had little wind and no precipitation.

The survey index value was the number of drums heard during each stop along a route. The mean number of drums/stop (dps) was calculated for each of 4 survey regions and for the entire state (Figure 2). As an intermediate step to summarizing survey results by region, I calculated the mean number of dps for each route. Mean index values for survey regions were calculated as the mean of route-level means for all routes occurring within the region. Some routes crossed regional boundaries, so data from those routes were included in the means for both regions. The number of routes within regions was not proportional to any meaningful characteristic of the regions or ECS section upon which they were based. Therefore, mean index values for the Northeast region and the state were calculated as the weighted mean of index values for the 4 and 7 ECS sections, respectively, they included. The weight for each section mean was the geographic area of the section (i.e., AAP = 11,761 km^2, MOP = 21,468 km^2, NSU = 24,160 km^2, DLP = 33,955 km^2, WSU = 14,158 km^2, MIM = 20,886 km^2, and PP = 5,212 km^2). Only approximately half of the Minnesota and Northeast Iowa Morainal (MIM) and Paleozoic Plateau (PP) sections were within the ruffed grouse range, so the area used to weight drum index means for those sections was reduced accordingly using subsection boundaries.

Stops along survey routes are a small sample of all possible stops within the range of ruffed grouse in Minnesota. Survey index values based on the sample of stops are not the same as they would be if drum counts were conducted at a different sample of stops or at all possible stops. To account for the uncertainty in index values because they are based on a sample, I calculated 95% confidence intervals (CI) for each mean. A 95% confidence interval is a numerical range in which 95% of similarly estimated intervals (i.e., from different hypothetical samples) would contain the true, unknown mean. I used 10,000 bootstrap samples of route-level means to estimate percentile CIs for mean index values for survey regions and the whole state. Limits of each CI were defined as the 2.5^{th} and 97.5^{th} percentiles of the bootstrap frequency distribution. I calculated mean index values and CIs for 1982–2008. Data from earlier years were not analyzed because they were not available in a digital form.

Sharp-tailed Grouse

Over time, DNR Wildlife Managers have recorded the locations of sharp-tailed grouse dancing grounds in their work areas. As new dancing grounds were located, they were added to the survey list. Known, accessible dancing grounds were surveyed by Wildlife Area staff and their volunteers between sunrise and 2.5 hours after sunrise during April and early-May to count sharp-tailed grouse. When possible, surveys were conducted when the sky was clear and the wind was <16 km/hr (10 mph). Attempts were made to conduct surveys on >1 day to account for variation in the attendance of male grouse at the dancing ground. Survey data consist of the maximum of daily counts of sharp-tailed grouse at each dancing ground.

The dancing grounds included in the survey were not selected according to a statistically valid spatial sampling design. Therefore, data collected during the survey were not necessarily representative of the larger areas (e.g., counties, regions) in which the dancing grounds occur. It was believed, however, that most dancing grounds within each work area were included in the sample, thereby minimizing the limitations caused by the sampling design.

I calculated the mean number of sharp-tailed grouse per dancing ground (i.e., index value), averaged across dancing grounds within the NW and EC regions and statewide for spring 2009. The number of grouse included those recorded as males and those recorded as being of unknown sex, and only leks with ≥2 grouse were included when calculating mean index values. It was not valid to compare the full survey data and results from different years because survey effort and success in detecting and observing sharp-tailed grouse was different between years and the survey samples were not necessarily representative of other dancing grounds. To estimate differences in sharp-tailed grouse index values between 2 consecutive years, therefore, I analyzed separately sets of data that included counts of birds only from dancing grounds that were surveyed during both years. Although the dancing grounds in the separate data sets were considered comparable, the counts of birds at the dancing grounds still were not. Many factors can affect the number of birds counted, so inferences based upon comparisons of survey data between years are tenuous.

To account for the uncertainty in index values because they are based on a sample of dancing grounds rather than all dancing grounds, I calculated 95% confidence intervals (CI) for each mean. I used 10,000 bootstrap samples of dancing ground counts to estimate percentile confidence intervals for mean index values for the NW and EC regions and the whole state.

The current delineation between the NW and EC survey regions was based on ECS section boundaries (Figure 1), with the NW region consisting of the Lake Agassiz & Aspen Parklands, Northern Minnesota & Ontario Peatlands, and Red River Valley sections and the EC region consisting of selected subsections of the Northern Minnesota Drift & Lake Plains, Western Superior Uplands, and Southern Superior Uplands sections. The 2005 Grouse Survey Report detailed the transition from the former to the current delineation of regions.

RESULTS & DISCUSSION

Ruffed Grouse

Observers from 15 cooperating organizations surveyed 125 routes between 2 April and 18 May 2010. Most routes (90%) were run between 16 April and 6 May. The median date this year (23 April) was 8 days earlier than during 2009 and 6 days earlier than the 2000–2009 average (29 April), which was consistent with much spring phenology occurring relatively early during 2010. Observers reported survey conditions as Excellent, Good, and Fair on 63%, 33%, and 4% of 123 routes, respectively. The distribution of survey conditions has been consistent for at least the last 4 years. Survey cooperators included the DNR Divisions of Fish & Wildlife and Forestry; Chippewa and Superior National Forests (USDA Forest Service); Fond du Lac, Grand Portage, Leech Lake, Red Lake, and White Earth

Reservations; 1854 Treaty Authority; Agassiz and Tamarac National Wildlife Refuges (U.S. Fish & Wildlife Service); Vermilion Community College; Cass and Beltrami counties; and UPM Blandin Paper Mill.

Mean counts of ruffed grouse drums throughout the forested regions of Minnesota were 1.5 (95% confidence interval = 1.3–1.7) drums/stop (dps) during 2010. Drum counts by survey region during 2010 were 1.6 (1.4–1.9) dps in the Northeast (n = 104 routes), 1.8 (1.1–2.6) dps in the Northwest (n = 7), 1.0 (0.5–1.6) dps in the Central Hardwoods (n = 14), and 0.3 (0.1–0.8) dps in the Southeast (n = 8) (Figures 3 and 4). Median index values for bootstrap samples were similar to observed means (i.e., within 0.02 dps), so no bias-correction was necessary.

Declines in counts from 2009 to 2010 in the Northeast (31%) and statewide (27%) were statistically significant. Counts declined in the 3 peripheral regions also (4–29%), but the wide confidence intervals precluded definitive inferences about the 1-year change in counts. It appears that the peak in abundance during the population cycle of ruffed grouse in Minnesota occurred during 2009.

Sharp-tailed Grouse

A total of 2,096 sharp-tailed grouse was observed at 195 dancing grounds with ≥2 male grouse (or grouse of unknown sex) during spring 2010. Leks with ≥2 grouse were visited a mean of 1.7 times. There were 626 grouse on 70 leks in the EC survey region and 1,470 grouse on 125 leks in the NW region. The index value (i.e., grouse/lek) for the NW region declined slightly from 2009, and the index value for the EC region remained approximately the same (Tables 1 and 2). The statewide value of 10.7 (9.8–11.8) was similar to values from 2003–2007 and the long-term average since 1980 (Figure 5). The peak in population index values for sharp-tailed grouse that occurred in 2009 coincided with the peak in the abundance of ruffed grouse in Minnesota. The spring index values for both species have followed an approximately 10-year cyclical pattern.

Table 1. Number of sharp-tailed grouse observed per active lek (≥2 males) during spring in Minnesota.

	Statewide			Northwest[a]			East Central[a]		
Year	Mean	95% CI[b]	n[c]	Mean	95% CI[b]	n[c]	Mean	95%CI[b]	n[c]
2004	11.2	10.1–12.3	183	12.7	11.3–14.2	116	8.5	7.2– 9.9	67
2005	11.3	10.2–12.5	161	13.1	11.5–14.7	95	8.8	7.3–10.2	66
2006	9.2	8.3–10.1	161	9.8	8.7–11.1	97	8.2	6.9– 9.7	64
2007	11.6	10.5–12.8	188	12.7	11.3–14.1	128	9.4	8.0–11.0	60
2008	12.4	11.2–13.7	192	13.6	12.0–15.3	122	10.4	8.7–12.3	70
2009	13.6	12.2–15.1	199	15.2	13.4–17.0	137	10.0	8.5–11.7	62
2010	10.7	9.8–11.8	195	11.8	10.4–13.1	125	8.9	7.5–10.5	70

[a] Survey regions; see Figure 1.
[b] 95% CI = 95% confidence interval for the mean. It is an estimate of the uncertainty in the value of the mean.
[c] n = number of leks in the sample.

Table 2. Difference in the number of sharp-tailed grouse per lek on dancing grounds that were observed during consecutive spring surveys in Minnesota.

	Statewide			Northwest[a]			East Central[a]		
Comparison[b]	Mean	95% CI[c]	n[d]	Mean	95% CI[c]	n[d]	Mean	95%CI[c]	n[d]
2004 - 2005	-1.3	-2.2– -0.3	186	-2.1	-3.5– -0.8	112	0.0	-1.0– 1.1	74
2005 - 2006	-2.5	-3.7– -1.3	126	-3.6	-5.3– -1.9	70	-1.1	-2.6– 0.6	56
2006 - 2007	2.6	1.5– 3.8	152	3.3	1.7– 5.1	99	1.2	0.1– 2.3	53
2007 - 2008	0.4	-0.8– 1.5	166	0.0	-1.6– 1.6	115	1.2	0.1– 2.5	51
2008 - 2009	0.9	-0.4– 2.3	181	1.8	-0.1– 3.8	120	-0.8	-2.1– 0.6	61
2009 - 2010	-0.6	-1.8– 0.6	179	-0.8	-2.6– 1.0	118	-0.1	-1.2– 1.0	61

[a] Survey regions; see Figure 1.
[b] Consecutive years for which comparable leks were compared.
[c] 95% CI = 95% confidence interval for the mean. It is an estimate of the uncertainty in the value of the mean.
[d] n = number of dancing grounds in the sample.

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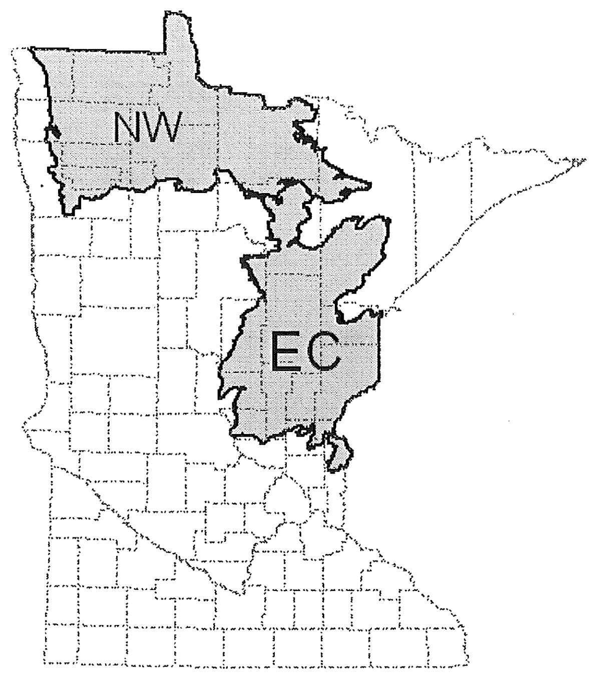


Figure 1. Northwest (NW) and East Central (EC) survey regions for **sharp-tailed grouse** relative to county boundaries in Minnesota. The regions were based largely on boundaries of ECS Subsections.

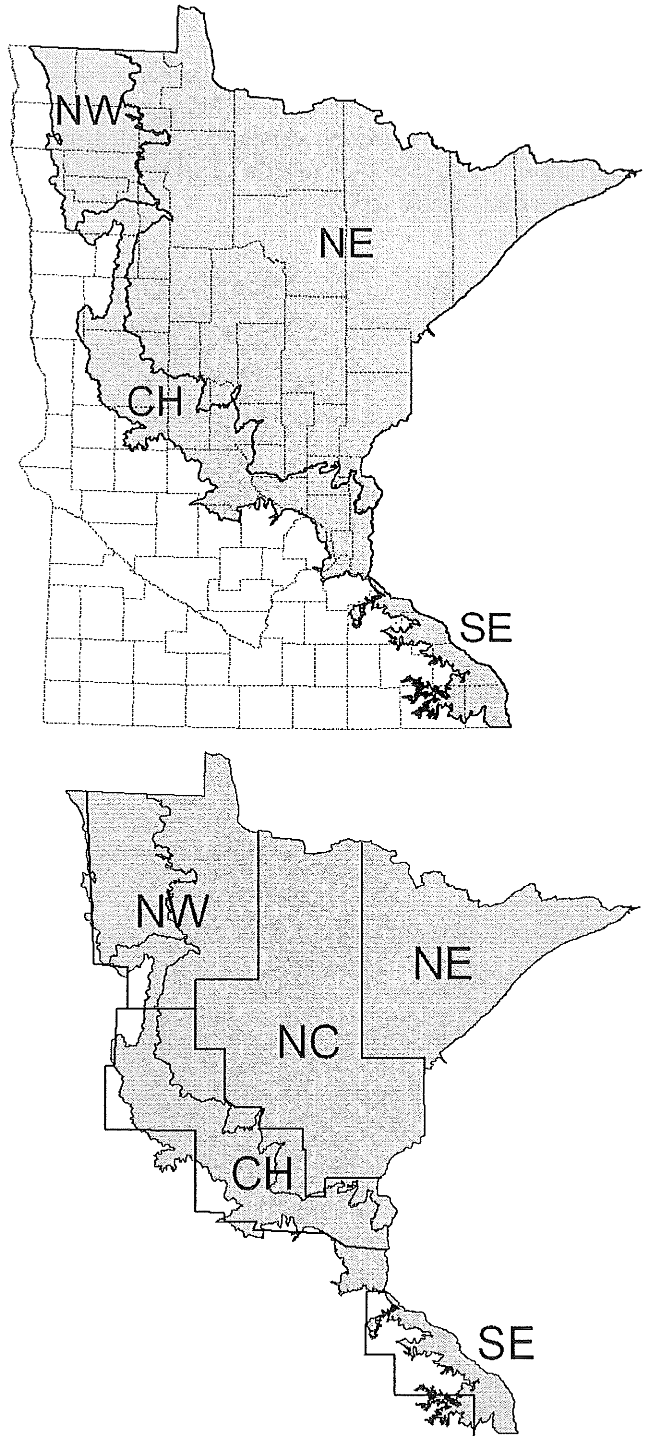
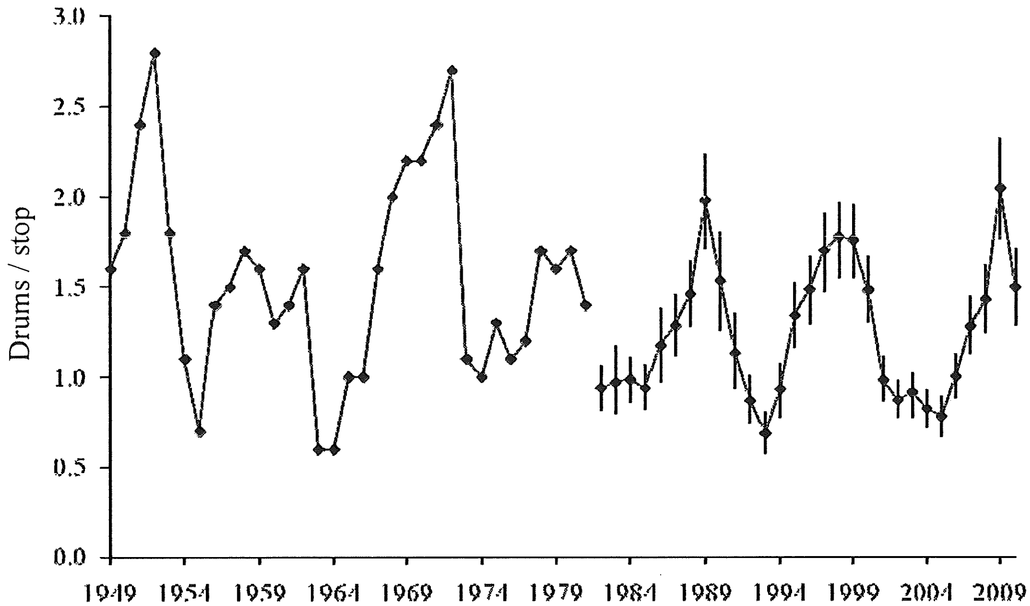


Figure 2. **Ruffed grouse** survey regions (shaded, curved boundaries) are based on the Ecological Classification System. Top panel: regions are labeled and overlaid on counties (dashed lines). Bottom panel: former survey zones (straight boundaries) are labeled and overlaid on regions.



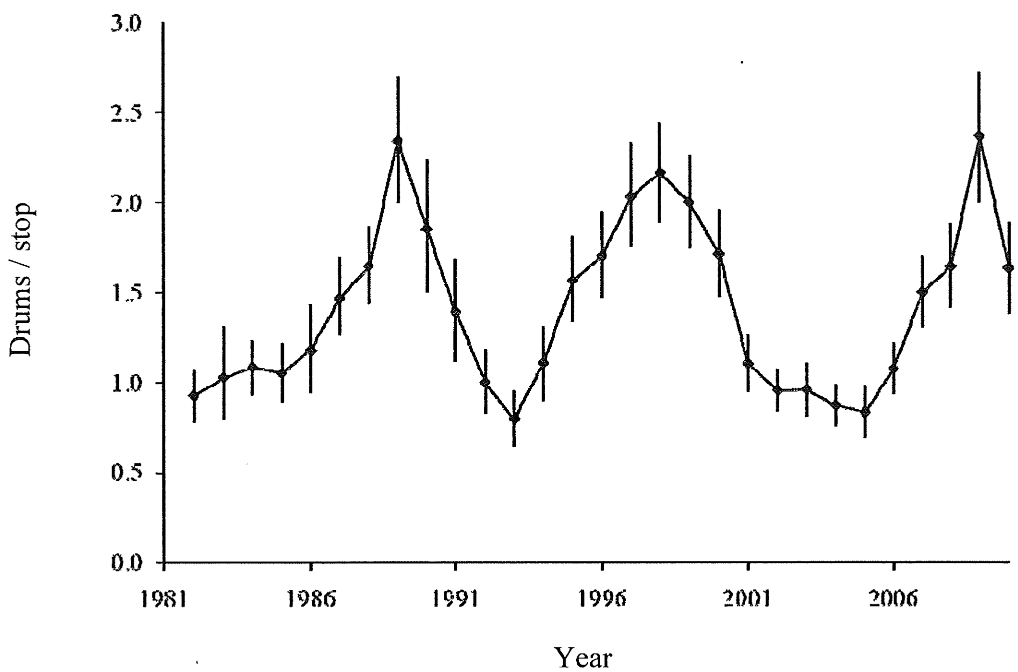
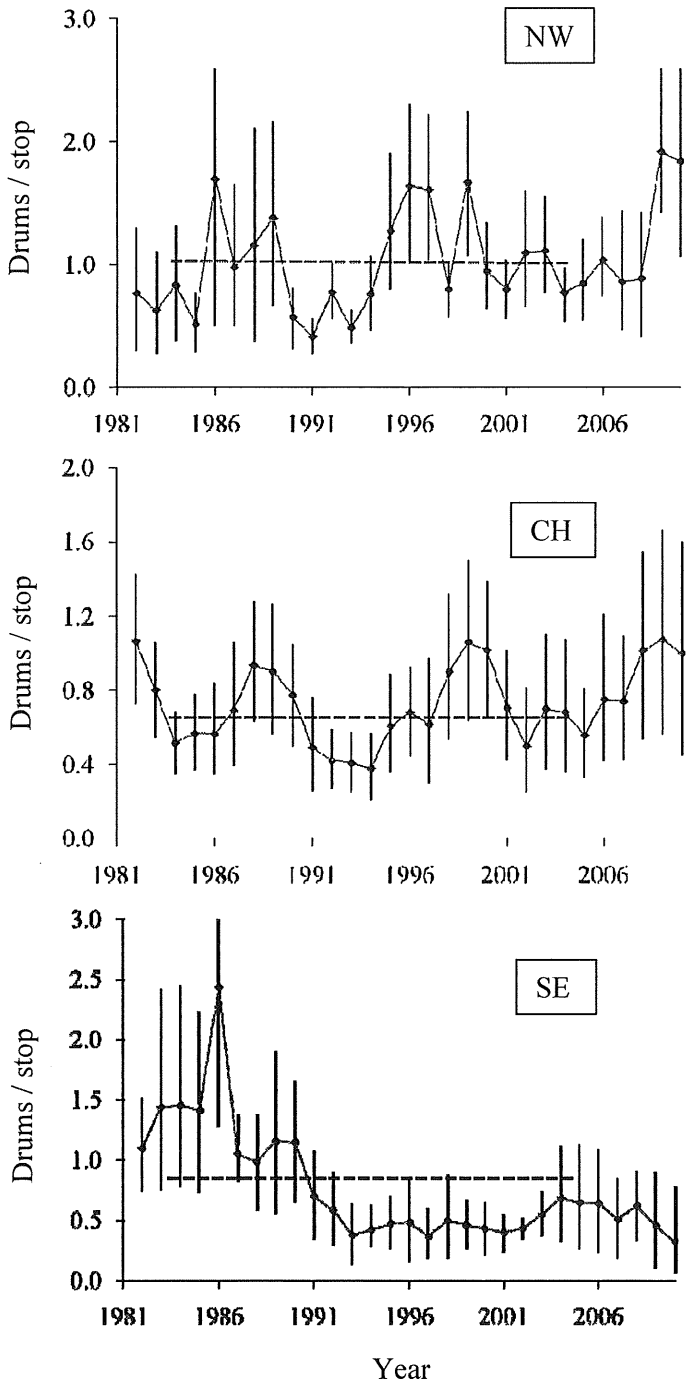


Figure 3. Ruffed grouse drum count index values in **Minnesota** (top) and just the **Northeast** region (bottom). Vertical error bars represent 95% confidence intervals based on bootstrap samples. Statewide means before 1982 were not re-analyzed with the current methods, so confidence intervals were not available. The difference in index values between 1981 and 1982 reflected a real decrease in drums counted, not an artifact of the change in analysis methods.



. Ruffed grouse drum count index values in the **Northwest** (NW), **Central Hardwoods** (CH), and **Southeast** (SE) survey regions of Minnesota. Dashed horizontal lines indicate the mean from 1984 to 2004. Vertical error bars represent 95% confidence intervals based on bootstrap samples. The highest error bar in the bottom panel was truncated.

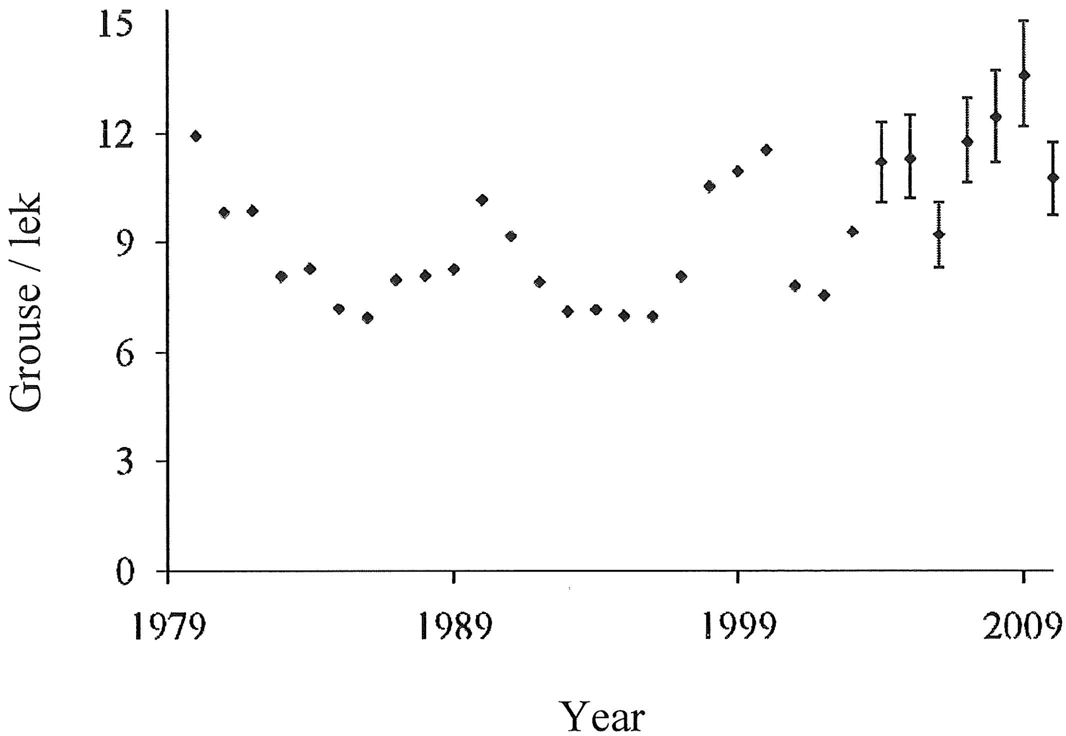


Figure 5. Mean number of **sharp-tailed grouse** observed in Minnesota during spring surveys of dancing grounds, 1980–2010. Vertical error bars, which were calculated only for recent years, represent 95% confidence intervals based on bootstrap samples. No line connects the annual means because they are not based on comparable samples of leks.

PRAIRIE-CHICKEN SURVEY IN MINNESOTA DURING 2010

Michael A. Larson, Forest Wildlife Populations and Research Group

SUMMARY OF FINDINGS

Surveys for greater prairie-chickens (*Tympanuchus cupido pinnatus*) were conducted during April and May of 2010. We located 152 booming grounds where males gather for breeding displays, and we counted 1,499 male prairie-chickens, including birds of unknown sex. Within the 17 41-km^2 survey blocks we observed 0.13 (95% confidence interval = 0.09–0.16) booming grounds/km^2 and 9.6 (8.4–10.8) males/booming ground. The density of booming grounds was greater than the average of 0.08 (0.06–0.09) booming grounds/km^2 observed during the 10 years before recent hunting seasons (i.e., 1993–2002), whereas the density of males at booming grounds was less than the average of 11.5 (10.1–12.9) males/booming ground observed during 1993–2002.

INTRODUCTION

Index Surveys

The purpose of surveys of grouse populations in Minnesota is to monitor changes in the densities of grouse over time. Estimates of density, however, are difficult and expensive to obtain. Simple counts of animals, on the other hand, are convenient and, assuming that changes in density are the major source of variation in counts among years, they can provide a reasonable index to long-term trends in populations. Other factors, such as weather and habitat conditions, observer ability, and grouse behavior, vary over time and also affect simple counts of animals. These other factors make it difficult to make inferences about potential changes in wildlife populations over short periods of time (e.g., a few annual surveys) or from small changes in index values. Over longer periods of time or when changes in index values are large, assumptions upon which grouse surveys in Minnesota depend are more likely to be valid, thereby making inferences about grouse populations more valid. For example, index values from the ruffed grouse drumming count survey have documented what is believed to be true periodic fluctuations in ruffed grouse densities (i.e., the 10-year cycle).

Greater Prairie-Chickens

During the early 1800s greater prairie-chickens (*Tympanuchus cupido pinnatus*) were present along the southern edge of Minnesota. Their range expanded and contracted dramatically during the next 150 years. Currently, most prairie-chickens in Minnesota occur along the beach ridges of glacial Lake Agassiz in the west (Figure 1). The population of prairie-chickens was expanded southward to the upper Minnesota River valley by a series of relocations during 1998–2006. Hunters in Minnesota have harvested approximately 120 prairie-chickens annually since 2003 when a limited-entry hunting season was opened for the first time since 1942.

During spring male prairie-chickens gather at communal display areas, or leks. The display areas of prairie-chickens are called booming grounds because males make a low-frequency, booming vocalization during their displays. From 1974 to 2003 the Minnesota Prairie Chicken Society coordinated annual counts of prairie-chickens at booming grounds. During 2004 the Minnesota Department of Natural Resources (DNR) began coordinating the annual prairie-chicken surveys, and a standardized survey design was adopted.

METHODS

During the few hours near sunrise from late-March until mid-May cooperating biologists and numerous volunteers counted prairie-chickens at booming grounds in western Minnesota. They attempted to locate and observe multiple times all booming grounds within 17 designated survey blocks (Figure 2). Each block was a square comprising 4 sections of the Public Land Survey (approximately 4,144 ha) and was selected non-randomly based upon the spatial distribution of booming grounds and the presence of relatively abundant grassland habitat. I separated the survey blocks into 2 groups—core and periphery—based upon densities of prairie-chickens, with a threshold of approximately 1.0 male/km^2 during 2010, and geographic location relative to other survey blocks (Figure 2).

Observations of booming grounds outside the survey blocks were also recorded. They contribute to the known minimum abundance of prairie-chickens and may be of historical significance. These observations, however, were only incidental to the formal survey. Bird counts from areas outside the survey blocks cannot be used to make inferences about the relative abundance of prairie-chickens among different geographic areas (e.g., counties, permit areas) or points in time (e.g., years) because the amount of effort expended to obtain the observations was not standardized or recorded.

Observers counted prairie-chickens at booming grounds from a distance using binoculars. If vegetation or topography obscured the view of a booming ground, the observer attempted to flush the birds to obtain an accurate count. Observed prairie-chickens were classified as male, female, or unknown sex. Male prairie-chickens were usually obvious due to their display behavior. Birds were classified as unknown sex when none of the birds at a booming ground was observed displaying or when the birds had to be flushed to be counted. Most birds classified as unknown likely were males because most birds at booming grounds are males. Although most male prairie-chickens attend booming grounds most mornings, female attendance at booming grounds is much more limited and sporadic. Females are also more difficult to detect because they do not vocalize or display like males. Counts of males and unknowns, rather than females, therefore, were used to make comparisons between core and peripheral ranges and between years.

I summarized counts of booming grounds and prairie-chickens by hunting permit areas and spring survey blocks. I calculated confidence intervals for the mean of estimated densities using the standard deviation of density estimates among survey blocks. I compared densities from the current year to estimates from the 10 years before recent hunting seasons (i.e., 1993–2002). Such comparisons should be made cautiously because prior to 2004 there was less emphasis on standardization of effort and timing of surveys. Survey protocols were similar in the past, however, and the current survey blocks were located in areas surveyed regularly since the mid-1970s. Also, sex-specific counts were not recorded prior to 2000 and they likely included females, so counts from those years were reduced by the proportion of females observed in 2004 to make them more comparable to current counts of males and birds of unknown sex.

RESULTS & DISCUSSION

Observers from at least 4 cooperating organizations and many unaffiliated volunteers counted prairie-chickens during April and May 2010. Cooperators included the DNR Division of Fish and Wildlife, the Fergus Falls and Detroit Lakes Wetland Management Districts (U.S. Fish & Wildlife Service), The Nature Conservancy, and the University of Minnesota-Crookston. Observers located 152 booming grounds and counted 1,499 male prairie-chickens during 2010 (Table 1). Within hunting permit areas we observed 0.02 booming grounds/km^2 and 10.4 males/booming ground during 2010. Minimum counts in Table 1 and the densities calculated from them are not comparable among permit areas or years because they included surveys that were conducted outside of the survey blocks and did not follow a predetermined spatial sampling design.

Each booming ground was observed on a median of 2 (mean = 2.0) different days, and 43% of booming grounds were observed only once during 2010. Attendance of males at booming grounds varies among days and by time of day. Single counts of males at a booming ground, therefore, may be an unreliable indication of true abundance. Similar counts on multiple days, on the other hand, demonstrate that the counts may be a good indicator of true abundance. Even multiple counts, however, cannot overcome the problems associated with the failure to estimate the probability of detecting booming grounds and individual birds at booming grounds. Without estimates of detection probability, the prairie-chicken survey is an index to, not an estimate of, prairie-chicken abundance within the survey blocks. The credibility of the index for monitoring changes in abundance among years is dependent upon the untested assumption that a linear relationship exists between counts of male prairie-chickens and true abundance. In other words, we assume that (the expected value of) the probability of detection does not change among years.

Within survey blocks we counted 852 males, including birds of unknown sex, on 89 booming grounds during 2010 (Table 2). Booming grounds were defined as having ≥2 males, so observations of single males were excluded from summaries by survey block. In the 10 core survey blocks we observed 0.16 (0.12–0.21) booming grounds/km^2 and 9.5 (8.2–10.9) males/booming ground (Table 2, Figure 2). In the 7 peripheral survey blocks we observed 0.07 (0.04–0.10) booming grounds/km^2 and 9.8 (7.1–12.4) males/booming ground. The density of booming grounds observed among all survey blocks during 2010 was greater than the average of 0.08 (0.06–0.09) booming grounds/km^2 observed during the 10 years before recent hunting seasons (i.e., 1993–2002), whereas the density of males at booming grounds observed among all survey blocks during 2010 was less than the average of 11.5 (10.1–12.9) males/booming ground observed during 1993–2002 (Table 2, Figure 3).

Table 1. Minimum abundance of prairie-chickens within and outside of hunting permit areas in western Minnesota during spring 2010. Counts of booming grounds and birds are not comparable among permit areas or years.

Permit Area	Area (km^2)	Booming grounds	Males	Unk.[a]
801A	603	0	0	0
802A	826	7	51	0
803A	668	0	0	0
804A	435	0	0	0
805A	267	9	62	0
806A	749	9	68	18
807A	440	29	350	29
808A	417	24	298	0
809A	743	20	217	0
810A	505	13	152	0
811A	704	10	58	30
PA subtotal[b]	6,356	121	1,256	77
Outside PAs[c]	NA[d]	31	243	75
Grand total	NA	152	1,499	152

[a] Unk. = prairie-chickens of unknown sex. It is likely that most were males.
[b] Sum among the 11 permit areas (PA).
[c] Counts from outside the permit areas (PA).
[d] NA = not applicable. The size of the area outside permit areas was not defined.

Table 2. Counts of prairie-chickens within survey blocks in Minnesota.

			2010		Change from 2009[a]	
Range[b]	Survey Block	Area (km^2)	Booming grounds	Males[c]	Booming grounds	Males[c]
Core	Polk 1	41.2	7	51	0	-12
	Polk 2	42.0	9	62	0	-39
	Norman 1	42.0	3	28	1	7
	Norman 2	42.2	7	57	1	-15
	Norman 3	41.0	13	105	2	-15
	Clay 1	46.0	10	115	0	25
	Clay 2	41.0	2	39	0	11
	Clay 3	42.0	7	73	-1	-16
	Clay 4	39.0	5	58	-1	-5
	Wilkin 1	40.0	5	59	-3	-31
	Core subtotal	415.0	68	647	-1	-90
Periphery	Mahnomen	41.7	4	46	1	12
	Becker 1	41.4	6	43	4	30
	Becker 2	41.7	3	32	0	-12
	Wilkin 2	41.7	2	11	-1	-6
	Wilkin 3	42.0	3	44	-1	-22
	Otter Tail 1	41.0	2	16	1	9
	Otter Tail 2	40.7	1	13	-2	-23
	Periphery subtotal	290.6	21	205	2	-12
Grand total		705.5	89	852	1	-102

[a] The 2009 count was subtracted from the 2010 count, so a negative value indicates a decline.
[b] Survey blocks were classified as either in the core or periphery of the prairie-chicken range in Minnesota based upon bird densities and geographic location.
[c] Includes birds recorded as being of unknown sex but excludes lone males not observed at a booming ground.

ACKNOWLEDGEMENTS

I sincerely appreciate the efforts of all the DNR staff and volunteer cooperators who conducted and helped coordinate the prairie-chicken survey. I thank Laura Gilbert for helping with data entry and Wes Bailey and Mark Lenarz for reviewing a draft of this report.

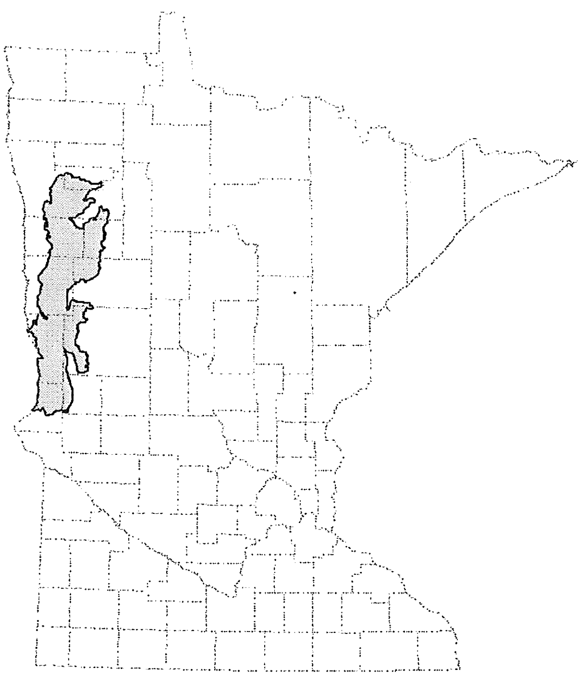


Figure 1. Primary range of greater prairie-chickens (shaded area) relative to county boundaries in Minnesota. This range boundary was based on ECS Land Type Associations and does not include all areas that are known to be occupied by prairie-chickens.

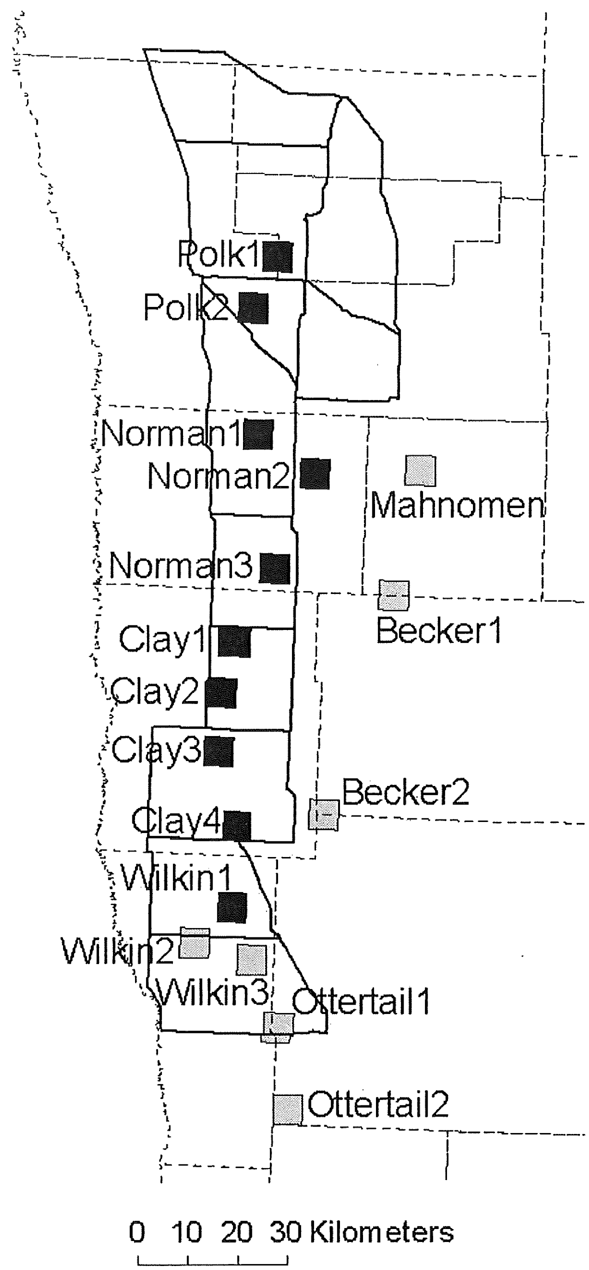


Figure 2. Survey blocks (41 km^2, labeled squares) and hunting permit area boundaries (solid lines) for prairie-chickens in western Minnesota. Survey blocks were designated as being in either the core (black) or periphery (gray) of the range. Blocks were named after the counties (dashed lines) in which they were primarily located. Permit areas were labeled sequentially from 801A in the north to 811A in the south.

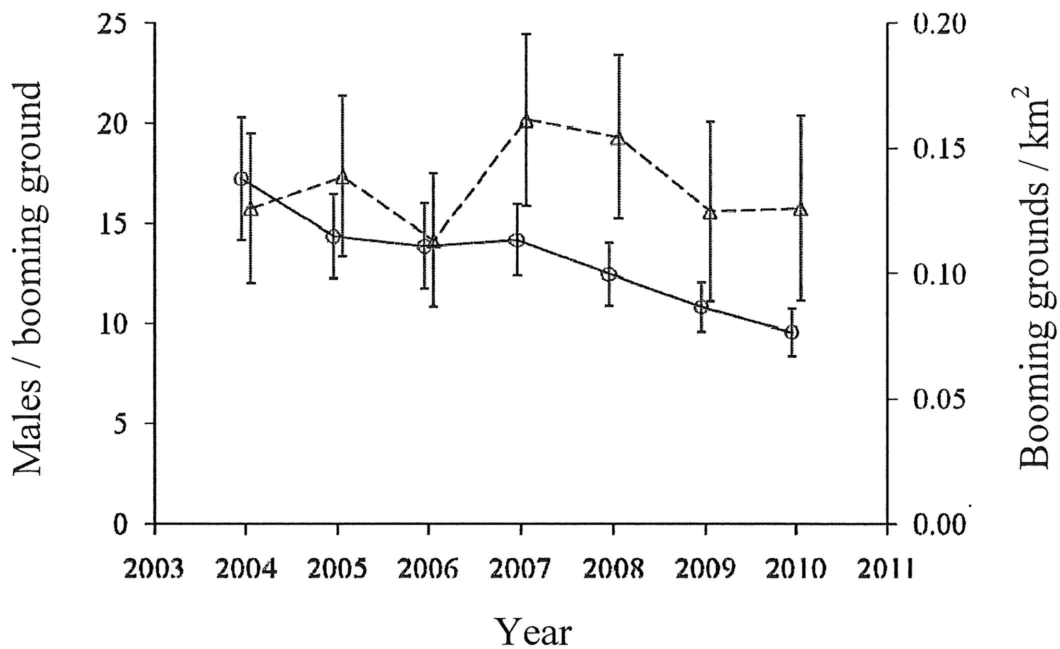


Figure 3. Number of prairie-chicken males/booming ground (circles connected by solid line) and booming grounds/km^2 (triangles connected by dashed line) observed in 17 41-km^2 survey blocks in western Minnesota. Vertical error bars represent 95% confidence intervals. The average densities during the 10 years preceding recent hunting seasons (i.e., 1993–2002) were 11.5 (10.1–12.9) males/booming ground 0.08 (0.06–0.09) booming grounds/km^2.

Drawing by Gilbert Proulx

REGISTERED FURBEARER POPULATION MODELING 2010 REPORT

John Erb, Forest Wildlife Populations and Research Group

INTRODUCTION

For populations of secretive carnivores, obtaining field-based estimates of population size remains a challenging task (Hochachka et al. 2000; Wilson and Delehay 2001; Conn et al. 2004). This is particularly true when one is interested in annual estimates, multiple species, and/or large areas. Nevertheless, population estimates are desirable to assist in making management or harvest decisions. Population modeling is a valuable tool for synthesizing our knowledge of population demography, predicting outcomes of management decisions, and approximating population size.

In the late 1970s, Minnesota developed population models for 4 species of carnivores (fisher, marten, bobcat, and otter) to help 'estimate' population size and track population changes. All are deterministic accounting models that do not currently incorporate density-dependence. However, juvenile survival adjustments are made for bobcats and fisher during cyclic lows in hare abundance and following severe winters, particularly those where northern deer populations decline. For juvenile marten, survival is adjusted downward during apparent lows in small mammal abundance. Modeling projections are interpreted in conjunction with harvest data and results from any annual field-based track surveys.

METHODS

Primary model inputs include the estimated 1977 'starting' population size, estimates of age-specific survival and reproduction, and sex- and age-specific harvest data. Reproductive inputs are based largely on carcass data collected in the early 1980s, and for bobcats, additional data collected in 1992 and from 2003-present. Initial survival inputs were based on a review of published estimates in the literature, but are periodically adjusted as noted above. In some cases, parameter adjustments for previous years are delayed until additional data on prey abundance trends is available. Hence, population estimates reported in previous reports may not always match those reported in current reports. Obtaining updated Minnesota-specific survival and reproductive estimates is the goal of ongoing research.

Harvest data is obtained through mandatory furbearer registration. A detailed summary of 2009 harvest information is available in a separate report. Bobcat and marten age data is obtained via x-ray examination of pulp cavity width or microscopic counts of cementum annuli from teeth of harvested animals. While the population models only utilize data for the 3 age-classes (juvenile, yearling, adult), marten and bobcat cementum annuli counts have periodically been collected for all non-juveniles to facilitate interpretation of reproductive data (bobcats) and to obtain current information on year-class distribution for both species. However, in recent years, all marten teeth and male bobcats were classified only into age-classes (juvenile, yearling, adult), while all female bobcat teeth were sectioned to determine specific year-classes. Current harvest age proportions for fisher and otter are approximated using averages computed from carcass collections obtained during 1980-86 (otter) and 1977-1994 (fisher).

For comparison to model projections, field-based track survey indices are presented in this report as running 3-year (t-1, t, t+1) averages of the observed track index, with the most recent year's average computed as (2/3*current index + 1/3*previous index). More detailed descriptions of scent post and winter track survey methods and results are available in separate reports.

RESULTS AND DISCUSSION

Bobcat. The 2009 registered DNR trapping and hunting harvest was 884, a slight increase from last year, and nearly matching the record harvest observed in 2006 (890; Table 1). Total modeled harvest, which includes reported tribal take, was 942. The juvenile to adult female ratio in the harvest (0.9; Table 1) was slightly below both the long-term average (1.5) and the recent 10-year average (1.1). A total of 844 bobcat carcasses were examined (Table 1), with a mean age of 2.5 for females. Approximately 6% of the harvested female bobcats were ≥ 6.5 years old (Figure 1).

Based on examination of reproductive tracts, 25% of yearling females produced a litter in 2009, slightly below the 7-year average of 27% (Figure 2). Average litter size for pregnant yearlings was 2.5, above the 7-year average of 2.2. Pregnancy rate for 2+ year olds was 75%, below last year (80%), but similar to the previous 7-year mean (74%). Mean litter size for pregnant adults was 2.7 (7-year mean = 2.8). For both yearlings and adults, pregnancy rates appear to fluctuate much more than average litter size.

As a result of a recent but continuing discordance between population modeling projections and field evidence (i.e., track surveys, harvests, field observations), numerous inputs to the bobcat population model were modified this year. Because we currently collect empirical data on reproductive parameters, the model was recalibrated primarily via adjustment of post-2001 survival parameters. While the magnitude of parameter changes was based on professional judgment, the preponderance of evidence clearly suggests the population model was underestimating the size of the bobcat population. The changes made to the input parameters resulted in a 65% increase in the projected 2009 spring population. Based on projections from the recalibrated model, 22% of the 2009 fall population was harvested. Population modeling predicts a 3% decline in the bobcat population (Figure 3), with an estimated 2010 spring population size of ~ 3,000 (Figure 3). Harvests and both track indices remain at or near record levels (Figure 3).

Fisher. For the past 3 years, the fisher harvest season has been 1 week shorter than 'normal' (i.e., shortened from 16 days to 9 days). Fisher harvest this year under the DNR framework declined 30% to 1,259 (Table 2). Modeled harvest, which includes reported tribal take, was 1,323. Carcass collections ended in 1994, so no current age or reproductive data are available. The fisher winter track survey index continued to decline, once again reaching a new low since the survey began (Figure 4).

With the availability of both reproductive and survival data collected as part of an ongoing fisher research project, as well as some discordance between recent model projections and field sign, numerous model parameters were adjusted in accordance with preliminary research findings. The changes made to the input parameters resulted in a 27% decrease in the projected 2009 spring population. Based on projections from the recalibrated model, 17% of the fall fisher population was harvested. Modeling projects negligible population change from last year (Figure 3), with an estimated 2010 spring population size of ~ 6,100 fishers.

Marten. As with fisher, the marten harvest season the last 3 years has been 1 week shorter than 'normal' (i.e., shortened from 16 days to 9 days). Harvest this year under the DNR framework was 2,073, up 14% from last year (Table 3). Modeled harvest, which includes reported tribal take, was 2,250. Age-class information was obtained from a sample of 70% of the carcasses collected this year. Juveniles comprised 55% of the total harvest, above the recent 10-year average (48%), though similar to the longer-term average of 56% (Table 3; Figure 5). The juvenile:adult female ratio (4.9) in the harvest was above last year (2.1), but below the long-term average (Table 3).

With the availability of reproductive, survival, and sex ratio data collected as part of an ongoing marten research project, numerous model parameters were adjusted in accordance with preliminary research findings. The changes made to the input parameters resulted in a 13% decrease in the projected 2009 spring population, as well as a shift toward a more balanced adult sex ratio (previously very female biased). Based on projections from the recalibrated model, 18% of the fall marten population was harvested. Modeling projects a 2% population increase from last year (Figure 3), with an estimated 2010 spring population size of ~ 9,500 martens.

Otter. In the north otter-trapping zone, harvest under the DNR framework declined 21% to 1,484 (Table 4), likely a result of reduced fur prices and trapper effort. Modeled harvest, including reported tribal take, was 1,578 (Table 4). An estimated 12% of the fall population was harvested. Carcass collections ended in 1986, so no age or reproductive data are available. After several years of decline, modeling suggests the population has increased the past 3 years, with a projected 7% increase this year (Figure 7). No independent otter survey data are currently available for comparison in the northern zone. The current estimated spring population in the north zone is ~ 11,700.

A new otter-trapping zone was also established in southeast Minnesota starting in 2007. The otter harvest in the southeast zone has increased slightly in each of the 3 years, from 44 the first year to 60 this year. While we have established protocol for an otter occupancy survey in this region to assist with population monitoring, weather conditions or scheduling conflicts have not allowed us to consistently fly repeat surveys (or any surveys in some years) that would allow for detection-corrected comparisons of occupancy rate across years. Acknowledging this limitation, approximately 40% more otter sign was recorded during this past winter's aerial survey compared to a similar survey flown in 2006 (i.e., the year prior to the first harvest season). The preponderance of evidence suggests that since the harvest season was established 3 years ago, the otter population has likely continued to increase. Efforts to develop a population model specific to the southeast zone are continuing, though initial projections are not yet available.

LITERATURE CITED

CONN, P. B., L. L. BAILEY, and J. R. SAUER. 2004. Indexes as surrogates to abundance for low-abundance species. Pages 59-76 *in* W. L. Thompson, editor. Sampling rare or elusive species: Concepts, designs, and techniques for estimating population parameters. Island Press, Washington, D.C., USA.

HOCHACHKA, W. M., K. MARTIN, F. DOYLE, and C. J. KREBS. 2000. Monitoring vertebrate populations using observational data. Canadian Journal of Zoology 78:521-529.

WILSON, G. J., and R. J. DELEHAY. 2001. A review of methods to estimate the abundance of terrestrial carnivores using field signs and observation. Wildlife Research 28:151-164.

Table 1. Bobcat harvest data, 1980 to 2009.

Year	DNR Harvest	Modeled Harvest[1]	% Autumn Pop. Taken[2]	Carcasses Examined	% juveniles	% yearlings	% adults	Juv: Ad. Female ratio	% male juveniles	% male yearlings	% male adults	Overall % males	Mean Pelt Price[3]
1980	210	210	10	48	31	33	36	1.9	80	69	56	66	$79
1981	260	260	13	230	37	23	40	2.1	59	63	55	58	$73
1982	274	320	15	261	35	15	50	1.3	47	49	47	48	$66
1983	208	212	10	205	37	26	37	1.5	54	53	30	45	$61
1984	280	288	15	288	37	13	50	1.4	52	66	44	51	$76
1985	119	121	6	99	33	19	48	1.2	41	41	43	42	$70
1986	160	160	8	132	26	17	57	0.9	53	32	51	51	$120
1987	214	229	12	163	33	16	51	1.4	44	52	48	48	$101
1988	140	143	7	114	40	18	42	1.7	58	62	46	54	$68
1989	129	129	6	119	39	17	44	2	49	53	56	53	$48
1990	84	87	4	62	20	34	46	0.8	58	80	44	59	$43
1991	106	110	5	93	35	33	32	3.6	59	55	70	61	$37
1992	167	167	7	151	28	22	50	1.2	55	45	53	53	$28
1993	201	210	8	161	32	20	48	1.4	51	45	52	50	$43
1994	238	270	11	187	26	16	58	0.8	64	43	45	50	$36
1995	134	152	6	96	31	15	54	2.7	57	71	79	71	$32
1996	223	250	10	164	35	20	45	1.5	51	30	49	46	$33
1997	364	401	17	270	35	16	49	1.2	60	37	43	48	$30
1998	103	107	5	77	29	26	45	1.6	59	60	60	60	$28
1999	206	228	8	163	18	24	58	0.8	55	59	62	60	$24
2000	231	250	8	183	31	26	43	1.5	54	59	50	53	$33
2001	259	278	9	213	30	21	49	1.3	52	51	53	52	$46
2002	544	621	17	475	27	25	48	1	66	49	46	52	$72
2003	483	518	15	425	25	13	62	0.9	61	46	53	54	$96
2004	631	709	17	524	28	34	38	1.6	51	40	54	49	$99
2005	590	638	15	485	25	13	62	0.8	51	48	46	48	$96
2006	890	983	22	813	26	17	57	1.1	61	50	58	57	$101
2007	702	758	19	633	34	14	52	1.2	55	60	47	52	$93
2008	853	928	21	714	26	25	49	1.1	56	52	51	52	$75
2009	884	942	22	844	23	22	55	0.9	57	46	54	53	$43

[1] Includes DNR and Tribal harvests

[2] Estimated from population model; includes estimated non-reported harvest of 10%.

[3] Average pelt price based on a survey of in-state fur buyers only.

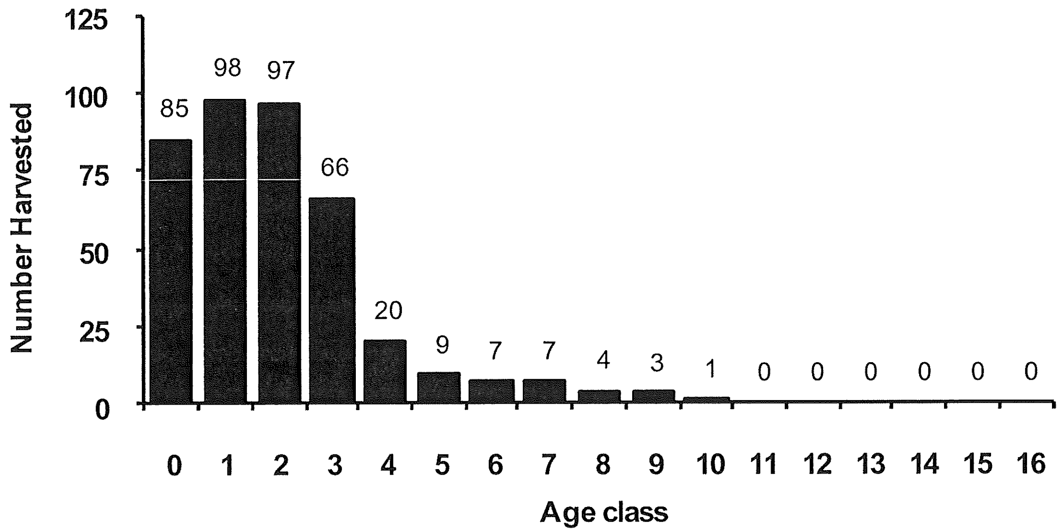


Figure 1. Age structure of female bobcats in the 2009-10 harvest.

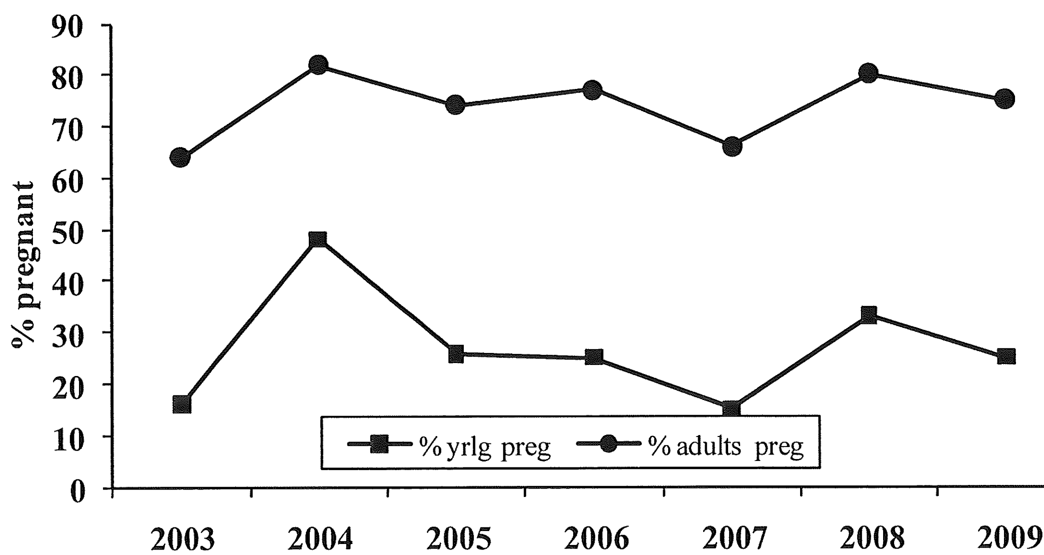


Figure 2. Pregnancy rates for yearling and adult bobcats in Minnesota, 2003-2009.

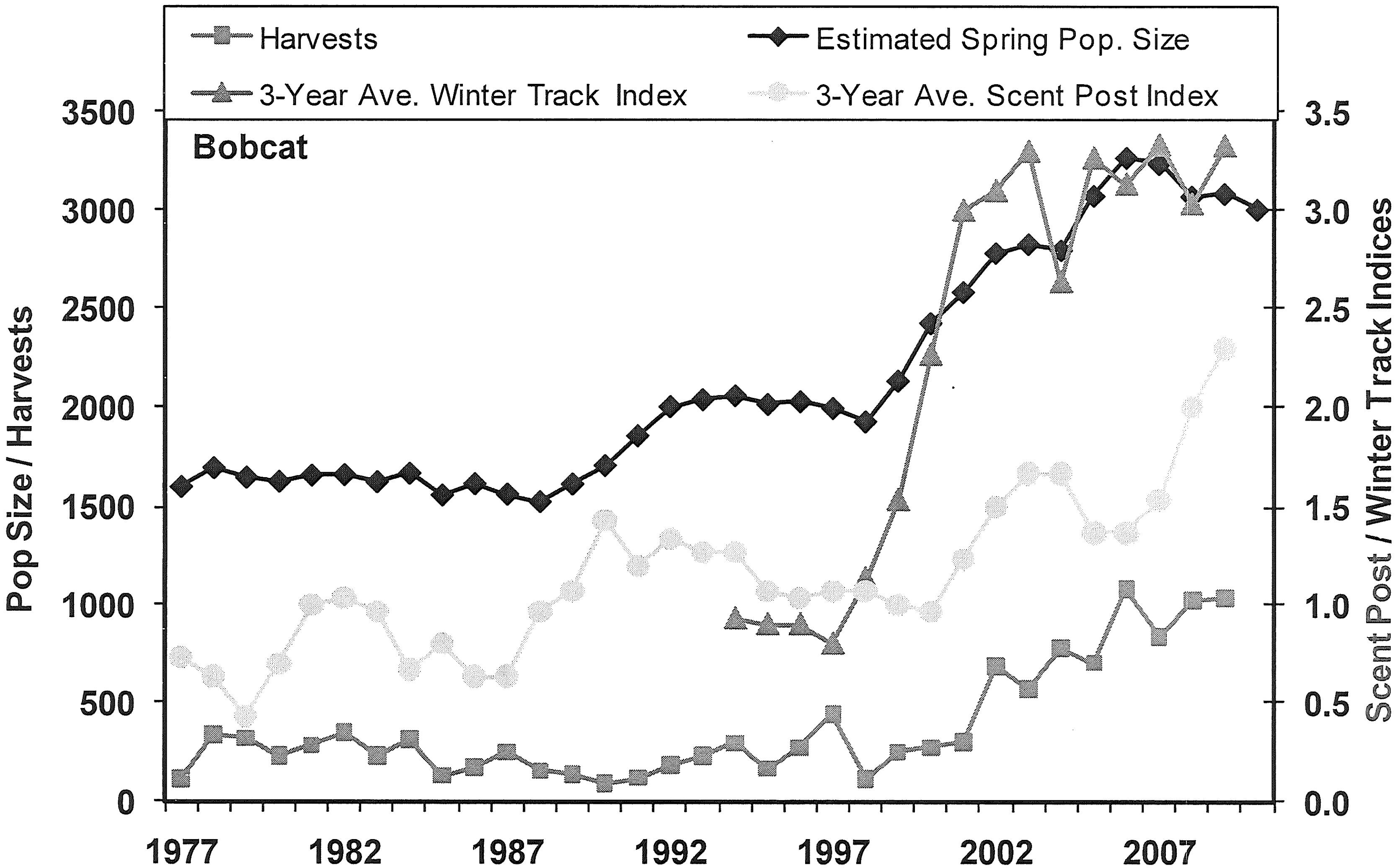


Figure 3. Bobcat populations, harvests, and survey indices, 1977-2010. Harvests include an estimate of non-reported take.

Table 2. Fisher harvest data, 1980 to 2009. Carcass collections ended in 1994.

Year	DNR harvest	Modeled Harvest[2]	% Autumn Pop. Harvested[3]	Carcasses examined	% juveniles	% yearlings	% adults	Juv: Ad. Female ratio	% male juveniles	% male yearlings	% male adults	% males overall	Pelt price Males[4]	Pelt price Females[4]
1980	CLOSED													
1981	862	1022	16	843	66	24	10	10.5	48	43	37	47	$94	$110
1982	912	1073	16	1073	66	19	15	9.4	46	41	52	46	$70	$99
1983	631	735	11	662	69	18	13	8.8	45	40	40	44	$71	$121
1984	1285	1332	18	1270	63	20	17	7.2	52	45	45	49	$70	$122
1985	678	735	10	712	63	20	18	5.4	46	40	34	43	$74	$130
1986	1068	1186	16	1186	59	24	18	5.3	48	50	37	46	$84	$162
1987	1642	1749	23	1534	63	15	22	4.7	46	40	37	43	$84	$170
1988	1025	1050	15	805	70	15	15	6.8	48	45	33	45	$54	$100
1989	1243	1243	17	1024	64	19	17	5.8	47	47	36	45	$26	$53
1990	746	756	10	592	65	14	21	4.5	44	55	30	43	$35	$46
1991	528	528	6	410	66	21	13	7.8	50	52	35	48	$21	$48
1992	778	782	8	629	58	21	21	4.9	42	55	45	46	$16	$29
1993	1159	1192	11	937	59	22	19	5.3	47	37	42	44	$14	$28
1994	1771	1932	16	1360	56	18	26	4	47	54	44	48	$19	$30
1995	942	1060	9	-	-	-	-	-	-	-	-	45	$16	$25
1996	1773	2000	15	-	-	-	-	-	-	-	-	45	$25	$34
1997	2761	2974	22	-	-	-	-	-	-	-	-	45	$31	$34
1998	2695	2987	23	-	-	-	-	-	-	-	-	45	$19	$22
1999	1725	1880	16	-	-	-	-	-	-	-	-	45	$19	$20
2000	1674	1900	15	-	-	-	-	-	-	-	-	45	$20	$19
2001	2145	2362	19	-	-	-	-	-	-	-	-	54	$23	$23
2002	2660	3028	24	-	-	-	-	-	-	-	-	54	$27	$25
2003	2521	2728	22	-	-	-	-	-	-	-	-	55	$27	$26
2004	2552	2753	23	-	-	-	-	-	-	-	-	52	$30	$27
2005	2388	2454	22	-	-	-	-	-	-	-	-	52	$36	$31
2006	3250	3500	33	-	-	-	-	-	-	-	-	51	$76	$68
2007	1682	1811	21	-	-	-	-	-	-	-	-	51	$63	$48
2008	1712	1828	22	-	-	-	-	-	-	-	-	52	$22	$37
2009	1259	1323	17	-	-	-	-	-	-	-	-	53	$34	$35

1 Combined limit since 1999 of any combination of marten and fisher totaling the specified limit, except in 1999 where fisher portion of limit could only be 2.

2 Includes DNR and Tribal harvests

3 Estimated from population model, includes estimated non-reported harvest of 22% 1977-1992, and 10% from 1993-present.

4 Average pelt price based on a survey of in-state fur buyers only.

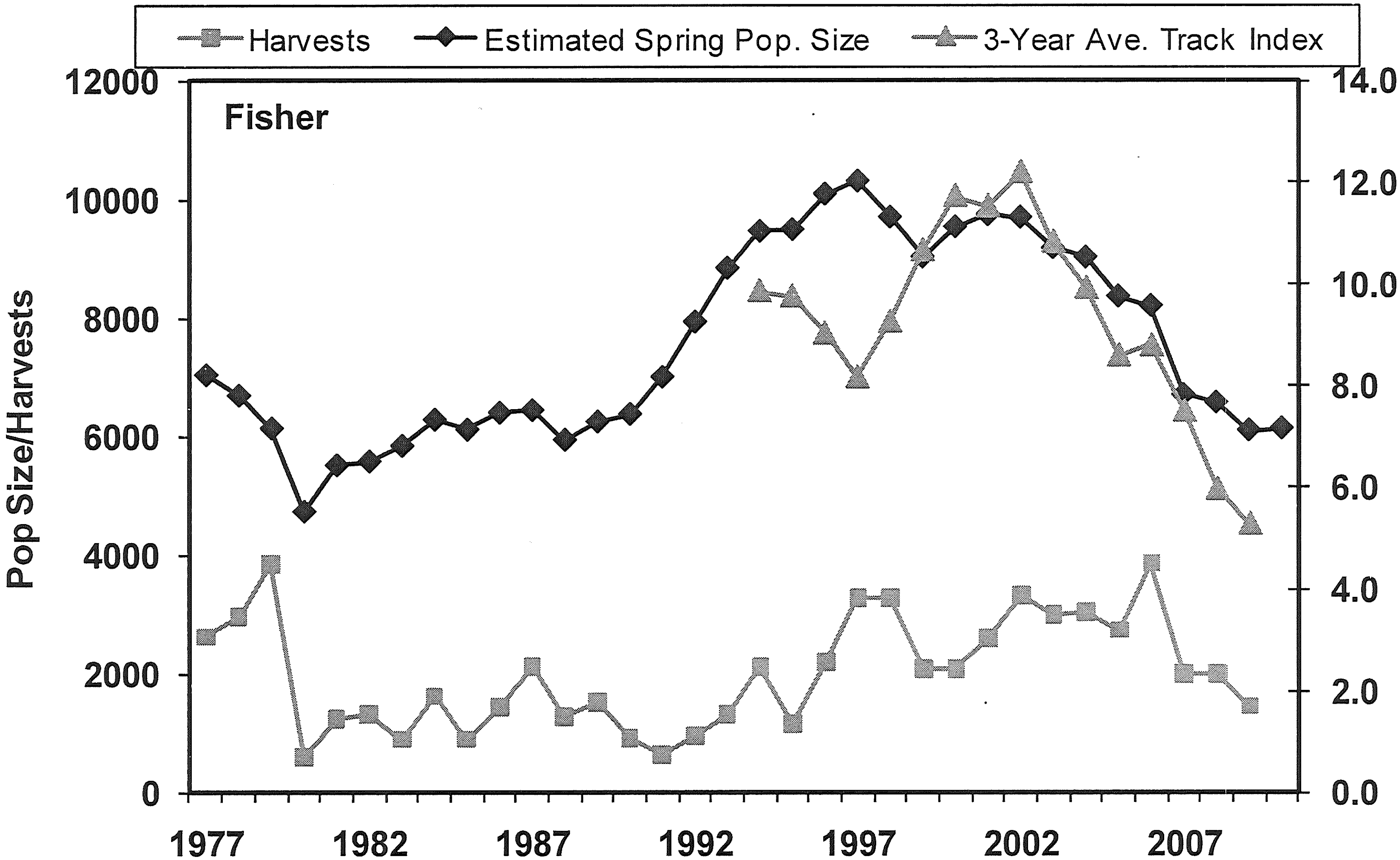


Figure 4. Fisher populations, harvests, and survey indices, 1977-2010. Harvests include an estimate of non-reported take.

Table 3. Marten harvest data, 1985 to 2009.

Year	DNR harvest	Modeled Harvest[2]	% Autumn Pop. Harvested[3]	Carcasses examined	% juveniles	% yearlings	% adults	Juv: Ad. Female ratio	% male juveniles	% male yearlings	% male adults	% males overall	Pelt price Males[4]	Pelt price Females[4]
1985	430	430	5	507	73	18	9	17.2	69	68	82	70	$30	$28
1986	798	798	8	884	64	21	15	12.3	65	71	81	69	$36	$27
1987	1363	1363	13	1754	66	18	16	11.2	65	67	75	67	$43	$39
1988	2072	2072	16	1977	66	11	23	8.6	58	50	66	59	$50	$43
1989	2119	2119	16	1014	68	12	20	9.7	57	63	65	59	$48	$47
1990	1349	1447	12	1375	48	18	34	3.6	59	54	61	59	$44	$41
1991	686	1000	9	716	74	9	17	16.1	69	71	72	70	$40	$27
1992	1602	1802	12	1661	65	18	17	15.1	63	70	75	66	$28	$25
1993	1438	1828	12	1396	57	20	23	7.5	61	71	67	64	$36	$30
1994	1527	1846	12	1452	58	15	27	6.4	62	76	67	66	$34	$28
1995	1500	1774	11	1393	60	18	22	8.2	63	68	66	65	$28	$21
1996	1625	2000	13	1372	48	22	30	4.8	62	69	67	65	$34	$29
1997	2261	2762	16	2238	61	13	26	6.2	60	60	63	61	$28	$22
1998	2299	2795	17	1577	57	18	25	6.6	62	66	65	63	$20	$16
1999	2423	3000	16	2013	67	12	21	9.8	65	66	67	66	$25	$21
2000	1629	2050	11	1598	56	25	19	8.9	62	69	66	64	$28	$21
2001	1940	2250	11	1895	62	15	23	11	66	73	75	69	$24	$23
2002	2839	3192	16	2451	39	30	31	3.1	57	63	61	60	$28	$27
2003	3214	3548	18	2391	48	17	35	4	57	65	66	62	$30	$27
2004	3241	3592	20	2776	26	28	46	1.3	52	64	57	58	$31	$27
2005	2653	2873	18	1992	53	16	31	4.9	64	63	65	64	$37	$32
2006	3788	4120	26	1914	64	17	20	9.2	66	67	65	66	$74	$66
2007	2221	2481	18	1355	30	29	41	1.5	56	64	50	56	$59	$50
2008	1823	1953	15	1095	40	21	39	2.1	58	60	53	56	$31	$28
2009	2073	2250	16	1252	55	16	29	4.9	65	46	61	61	$27	$30

[1] Combined limit since 1999 of any combination of fisher and marten totaling the specified limit, except in 1999 where fisher portion of limit could only be 2.

[2] Includes DNR and Tribal harvests

[3] Estimated from population model; includes estimated non-reported harvest of 40% in 1985-1987 and 1991, 20% in 1988-1990 and 1992-1998, and 10% from 1999-present.

[4] Starting in 2005, the number of carcasses examined represents a random sample of ~ 70% of the carcasses collected in each year.

[5] Average pelt price based on a survey of in-state fur buyers only

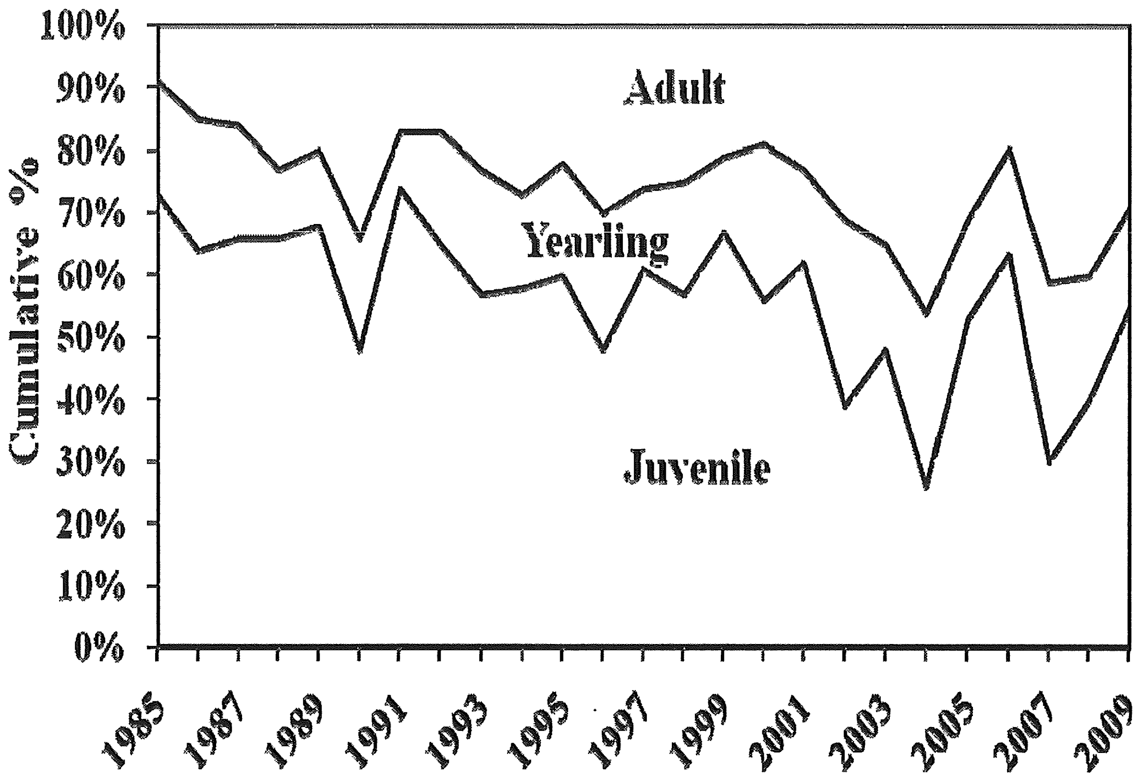


Figure 5. Marten harvest age-class proportions, 1985-2009.

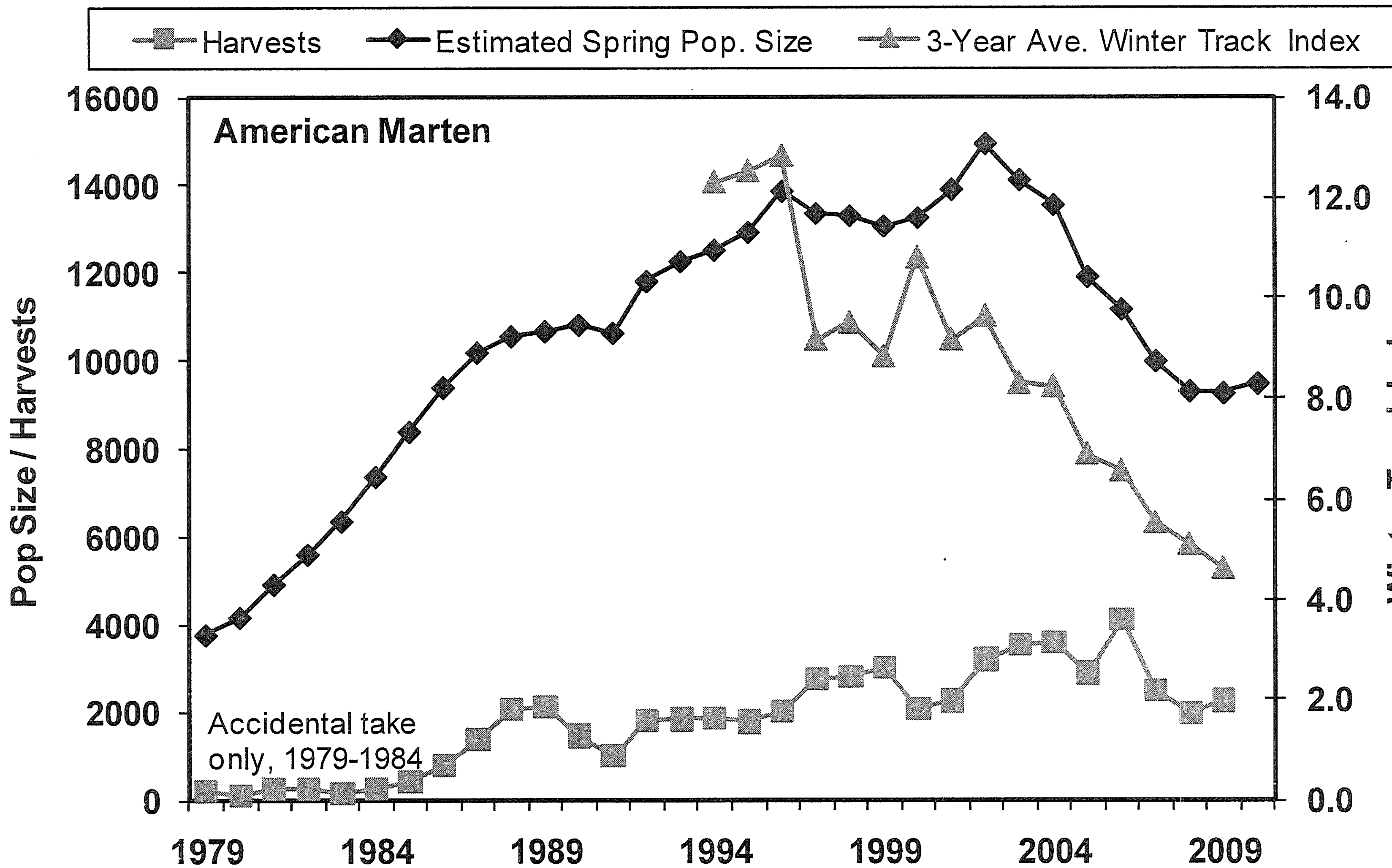


Figure 6. American marten populations, harvests, and survey indices, 1979-2010. Harvests include an estimate of non-reported take.

Table 4. Otter harvest data[1], 1980 to 2009. Carcasses were only collected from 1980-86.

Year	DNR harvest	Modeled Harvest[2]	% Autumn Pop. Harvested[3]	Carcasses examined	% juveniles	% yearlings	% adults	Juv:ad. females	% male juveniles	% male yearlings	% male adults	% males overall	Pelt price Otter[4]	Pelt price Beaver[4]
1980	1111	1111	16	88	55	15	30	3.4	40	62	56	48	$33	$18
1981	485	762	11	471	55	20	25	4.3	56	53	48	52	$30	$14
1982	385	625	9	389	51	26	23	6	57	65	65	60	$26	$11
1983	408	614	8	433	42	31	27	3.7	56	57	57	56	$25	$12
1984	513	561	7	549	48	23	29	3.2	47	50	49	49	$22	$12
1985	559	572	7	572	43	23	34	2.2	53	50	43	51	$21	$15
1986	777	777	8	745	45	23	32	2.7	45	48	46	47	$24	$20
1987	1386	1484	15	-	-	-	-	-	-	-	-	52	$23	$17
1988	922	922	9	-	-	-	-	-	-	-	-	52	$22	$14
1989	1294	1294	12	-	-	-	-	-	-	-	-	52	$22	$12
1990	888	903	8	-	-	-	-	-	-	-	-	52	$24	$9
1991	855	925	8	-	-	-	-	-	-	-	-	51	$25	$9
1992	1368	1368	10	-	-	-	-	-	-	-	-	52	$30	$7
1993	1459	1646	10	-	-	-	-	-	-	-	-	52	$43	$10
1994	2445	2708	19	-	-	-	-	-	-	-	-	52	$48	$14
1995	1435	1466	12	-	-	-	-	-	-	-	-	52	$39	$12
1996	2219	2500	18	-	-	-	-	-	-	-	-	52	$39	$19
1997	2145	2313	17	-	-	-	-	-	-	-	-	52	$40	$17
1998	1946	2139	16	-	-	-	-	-	-	-	-	52	$34	$13
1999	1635	1717	13	-	-	-	-	-	-	-	-	52	$41	$11
2000	1578	1750	13	-	-	-	-	-	-	-	-	52	$51	$14
2001	2323	2531	18	-	-	-	-	-	-	-	-	57	$46	$13
2002	2145	2390	16	-	-	-	-	-	-	-	-	59	$61	$10
2003	2766	2966	20	-	-	-	-	-	-	-	-	57	$85	$12
2004	3450	3700	25	-	-	-	-	-	-	-	-	56	$87	$14
2005	2846	2884	22	-	-	-	-	-	-	-	-	58	$89	$15
2006	2720	2872	22	-	-	-	-	-	-	-	-	56	$43	$17
2007	1803	1911	15	-	-	-	-	-	-	-	-	55	$29	$16
2008	1884	1983	15	-	-	-	-	-	-	-	-	59	$24	$12
2009	1484	1578	12	-	-	-	-	-	-	-	-		$36	$13

[1] Excludes harvest in new trapping zone in SE MN that opened in 2007.

[2] Includes DNR and Tribal harvests

[3] Estimated from population model. Incl. estimated non-reported harvest of 30% to 1991, 22% from 1992-2001, and 10% from 2002-present.

[4] Weighted average of spring (beaver only) and fall prices based on a survey of in-state fur buyers.

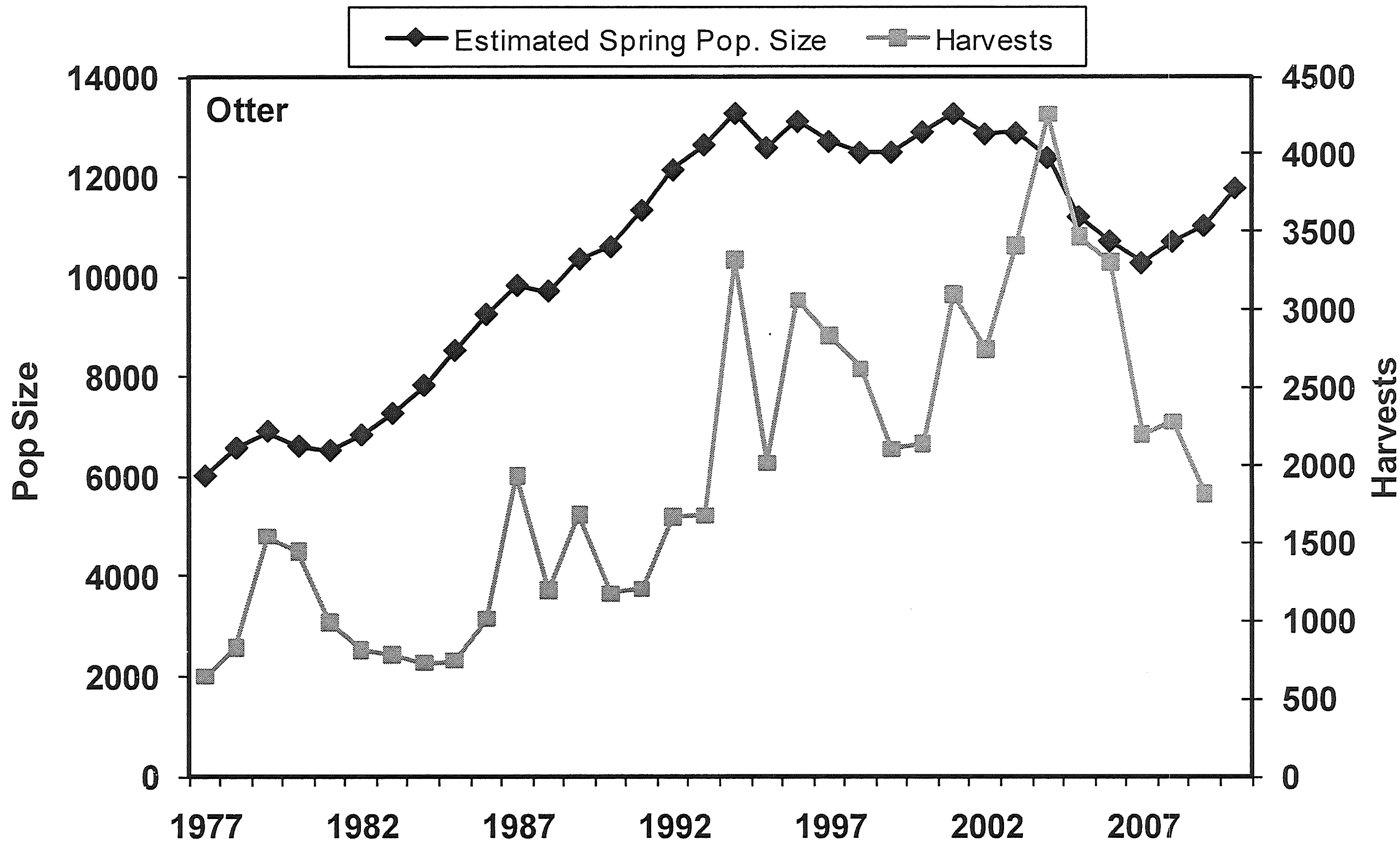


Figure 7. Otter populations and harvests, 1977-2010. Harvests include an estimate of non-reported take.

POPULATION TRENDS OF WHITE-TAILED DEER IN THE FOREST ZONE – 2010

Mark S. Lenarz, Forest Wildlife Populations and Research Group

INTRODUCTION

Deer hunters are required by regulation to register each deer they harvest within 24 hours of the close of the deer-hunting season. Data collected as part of this registration process provide important information on the sex and age of deer killed, population trends, and the effectiveness of current management regulations. The following report presents a brief analysis of the 2009 harvest registration data in the forest zone (Figure 1). This is followed by a discussion of deer population trends and projections in the forest zone based on simulation modeling.

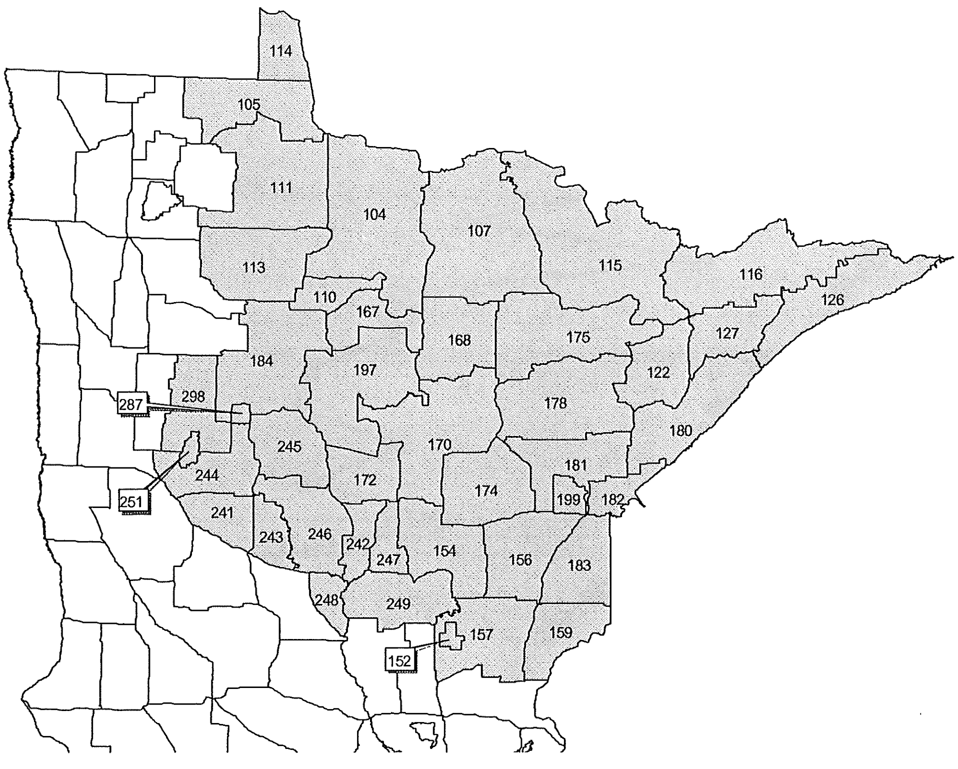


Figure 1. Permit areas in the forested zone, 2009.

HARVEST

In 2009, hunters registered 194,186 deer, down 12% from 2008. Of that number, 48% or 94,089 deer were harvested in the forested zone (Figure 1, Table 1). The 2009 forest zone harvest decreased 19% from the 2008 harvest. The following discussion applies to the subset of deer harvested in the forested zone.

The buck harvest decreased in 25 of the 42 permit areas yet this represented a decline of only 3% from the 2008 buck harvest (Table 2). Last year, the 2008 buck harvest was down 15% from the preceding year. The minor change in the 2009 buck harvest likely reflects the fact that deer populations in most permit areas were near goal. There were fewer opportunities to harvest antlerless deer in 2009 and hunters likely hunted longer to harvest a buck.

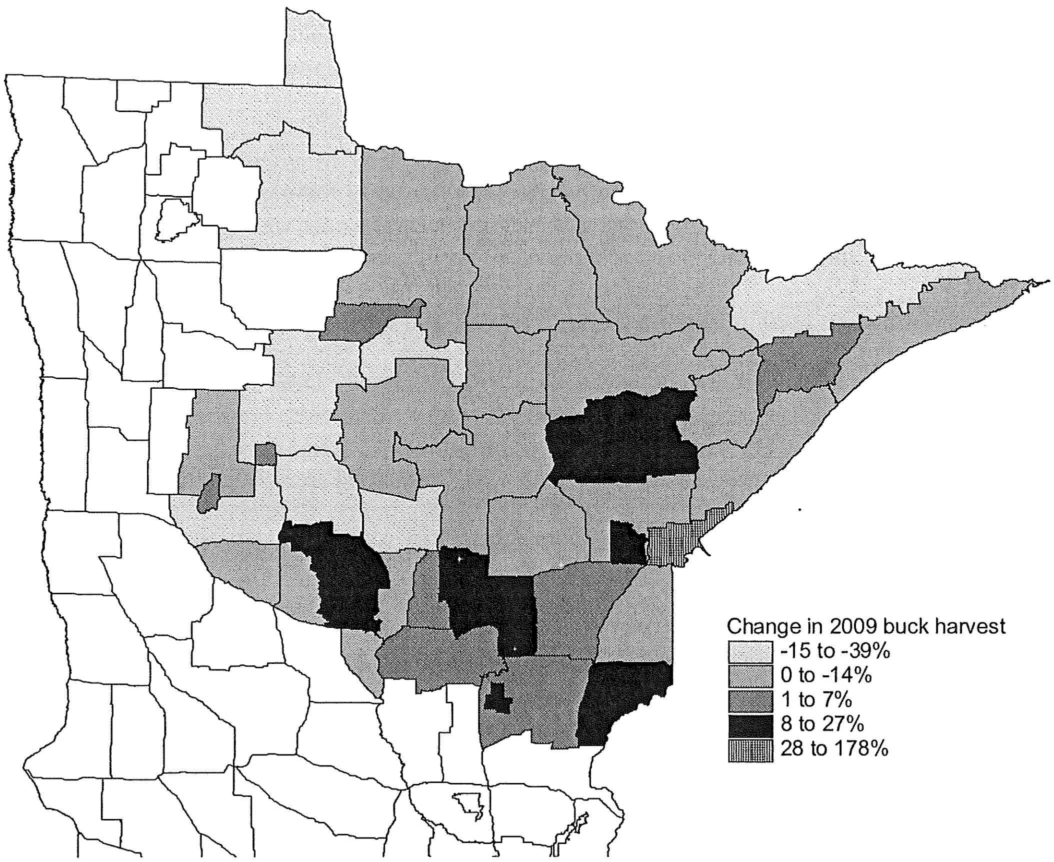


Figure 2. Change in buck harvest in forest zone permit areas between 2008 and 2009.

The antlerless harvest decreased in 33 of the 42 permit areas (Table 3) and the total antlerless harvest decreased by 29%. The greatest decreases occurred in 11 permit areas that shifted from managed or intensive into the lottery category ($\bar{x}$ = -63%, n = 11, range -36 to -81%; Table 4). Under the lottery category, only hunters with an either-sex permit (based on a lottery) are allowed to kill an antlerless deer. In permit areas that remained within their respective category (i.e. stayed lottery, managed, etc), the antlerless harvest increased ($\bar{x}$ = 21%, n = 17, range -7 to 270%; Table 4).

The proportion of bucks in the forest zone harvest (total forest bucks/total forest harvest) increased 8% from last year to 49%. This increase reflected the decreased 2009 antlerless harvest. Forest-wide, the proportion of bucks by permit area ranged from 28 to 83%.

The archery harvest in the forest zone declined 35% in 2009. Change in the archery harvest was correlated with change in the total forest deer harvest (r^2 = 0.795, P < 0.001) which suggests that the decline was in part, the result of reduced deer numbers. State wide archery license sales increased <1% from 2008.

The muzzleloader harvest declined 20% in the forest zone in 2009. Unlike archery, the change in muzzleloader harvest was not related to change in the total forest harvest. Muzzleloader license sales declined by 2%.

POPULATION TRENDS AND MODEL PROJECTIONS

Based on the winter severity index (WSI), the winter of 2009-10 was generally mild with only 2 stations in the "moderate" range (Figure 3). Maximum WSI occurred at Isabella with a reading of 114 and International Falls recorded a reading of 105.

In an attempt to make permit areas more homogeneous in regards to ownership and habitat, we altered the boundaries of 21 permit areas (Figure 6). The numbering of some of these permit areas was changed to prevent confusion with the earlier numbering system (Figure 6). Because we aggregated some permit areas and split others, the forested zone now includes 43 permit areas, up from the 42 in 2009.

Simulation modeling was used in 37 permit areas (Figure 1 and Table 5) to approximate deer density, identify trends, and project the effect of the 2009-hunting season. To better summarize the results for this report, permit areas were pooled into one of 5 regions (Figs. 4 and 5). Deer density varied according to region with the lowest densities occurring in the Northeast and Northwest. Highest densities occurred in the West Central and South. The same basic trend occurred in all 5 areas; deer density was at the lowest level in 1997 following the severe winters of the mid-1990's and then steadily increased to peak density in 2003 in response to low (or no) antlerless permits and mild winters. Between 2003 and 2009, there was a steady decline in deer numbers in the South, Central, and West Central in response to the high antlerless harvest. In the past year, deer numbers continued to drop slightly (1%) in the West Central region but increased from 1 to 10% in the remaining regions.

Based on density targets set during the 2005 and 2006 goal setting processes, the 2010 pre-fawn deer density was above goal over much of the forest zone (Figure 6). For purposes here, if deer density was within 1 deer/mi^2 of the goal, the permit area is listed as being at goal. Deer density in permit areas ranged from 5 deer/mi^2 below goal to almost 10 deer/mi^2 above goal.

After discussion at several levels within the Division of Fish and Wildlife, the final designation of permit areas for the 2010 hunting season call for 20 permit areas to be listed as Lottery, 18 permit areas as Managed, 5 permit areas as Intensive, and 2 of the latter will also have an early antlerless season (Figure 7).

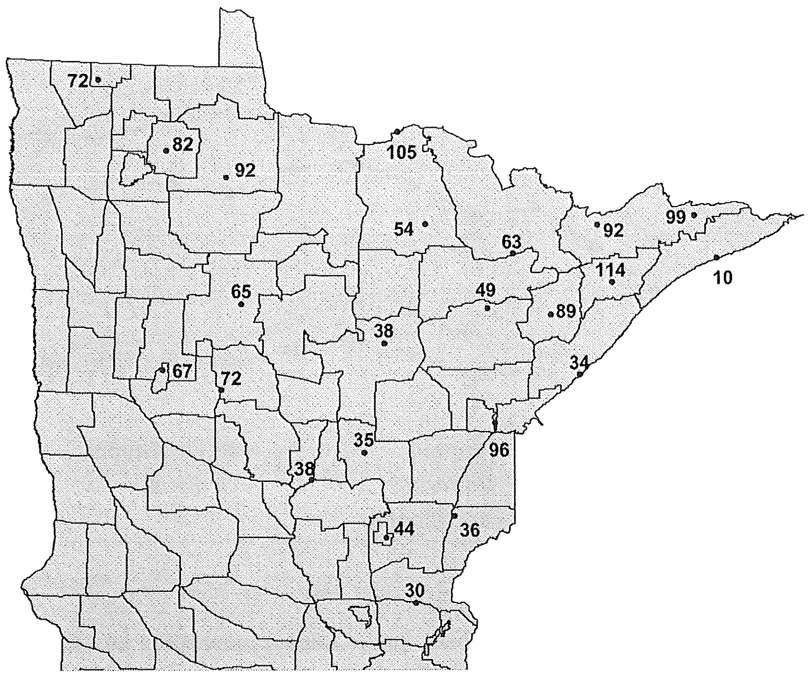


Figure 3. Final WSI values for the forested zone of Minnesota, winter of 2008-2009.

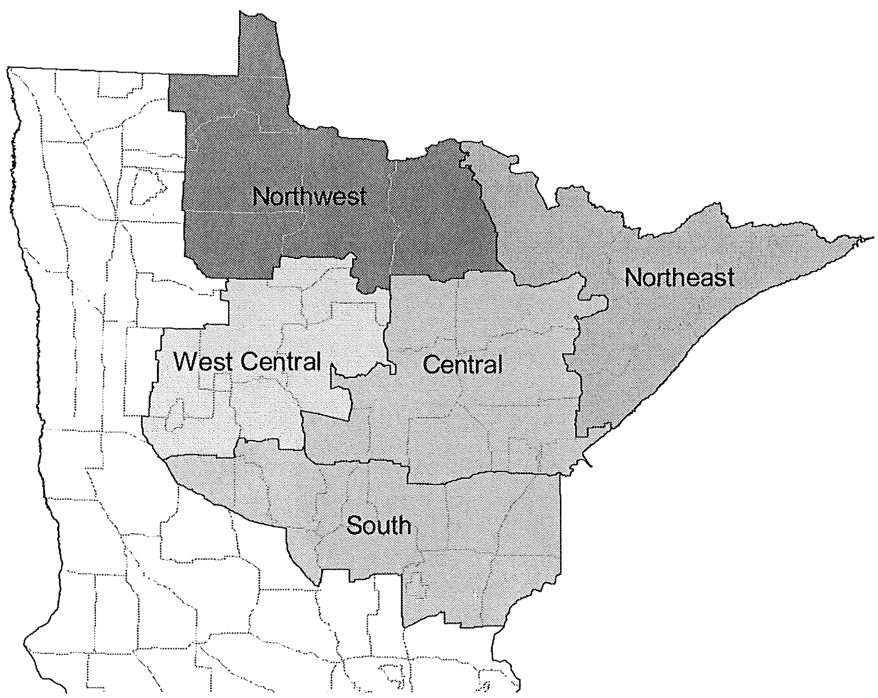


Figure 4. Permit areas grouped for summary discussion.

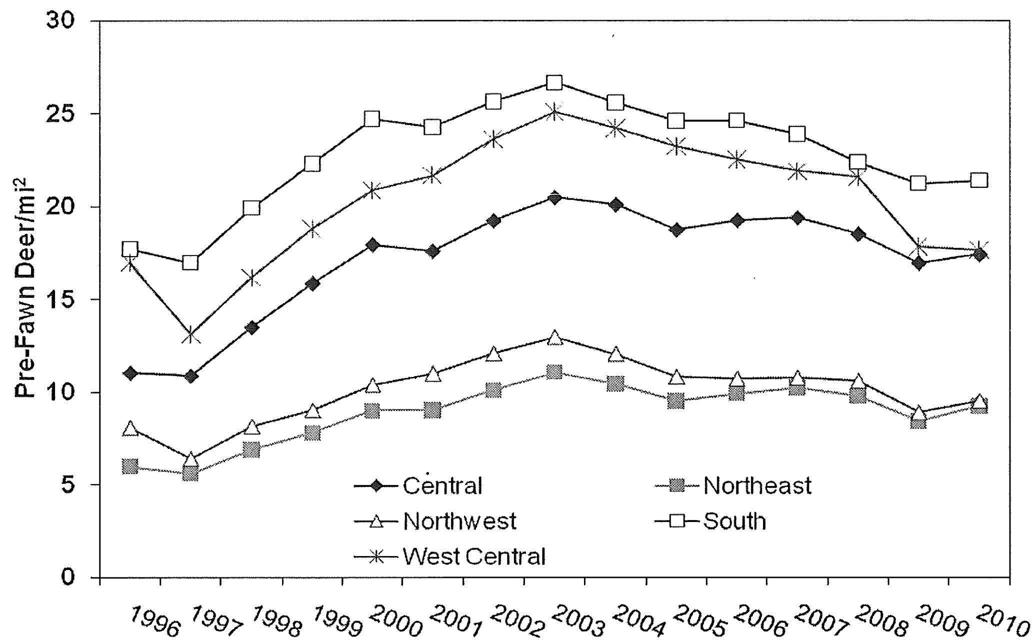


Figure 5. Population trends of deer in forest zone. Trend lines represent the groups of permit areas as illustrated in figure 4. Density represents pre-fawn density.

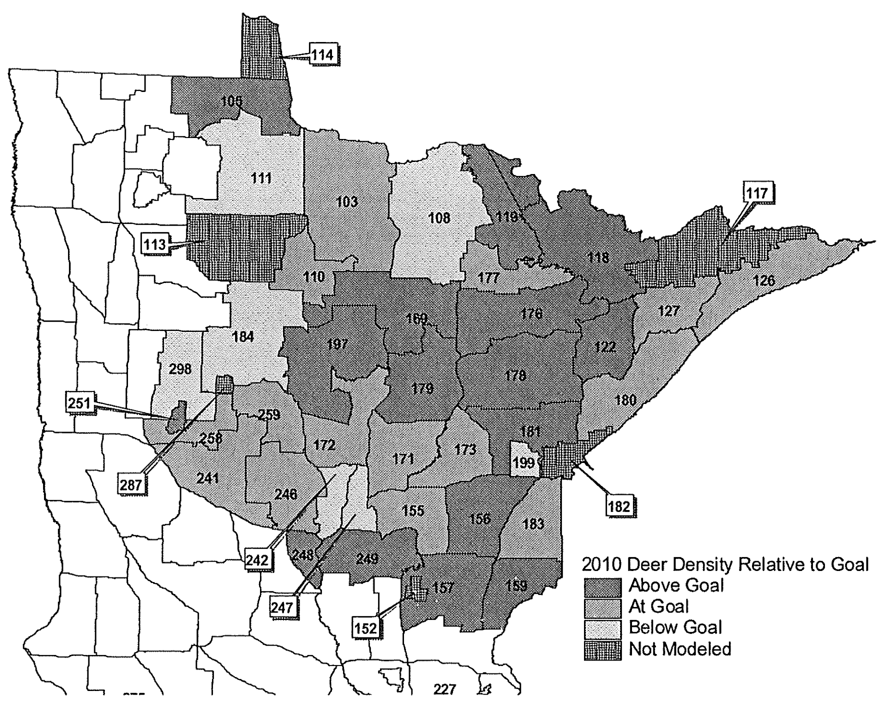


Figure 6. Deer density expressed relative to pre-fawn population goals. Note revised permit area boundaries (and numbers) effective for the 2010 hunting season.

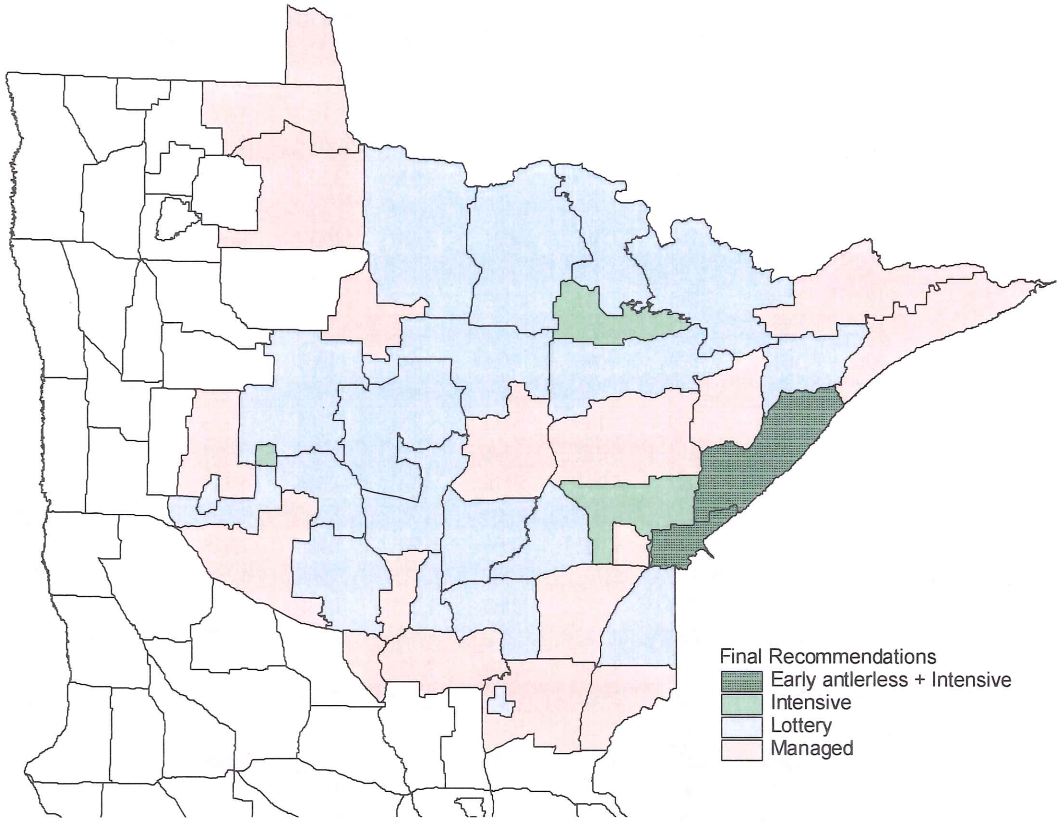


Figure 7. Final designation of permit areas in the Forest Zone for the 2010 hunting season.

Table 1. Total registered deer harvest for Deer Permit Areas in Minnesota's Forested Zone.

Permit Area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change
104	1,372	1,837	1,939	2,253	3,421	2,902	2,483	2,632	2,557	2,100	1,316	-37%
105	1,389	1,821	1,962	2,385	3,740	3,106	3,557	3,210	3,344	2,391	2,006	-16%
107	1,994	2,846	3,547	3,499	5,206	4,027	3,936	3,825	3,874	3,148	1,731	-45%
110	1,511	1,376	1,371	1,553	2,180	2,122	1,945	1,910	1,935	1,865	1,438	-23%
111	1,169	1,644	2,223	2,264	3,064	2,621	2,687	2,812	1,608	1,558	1,364	-12%
114	40	55	72	80	96	110	123	174	127	120	96	-20%
115	2,334	3,174	3,586	3,815	5,431	4,333	4,378	4,480	4,250	3,438	2,214	-36%
116	138	150	156	157	265	298	261	270	350	394	170	-57%
122	296	556	617	574	696	716	657	1067	1118	1,014	753	-26%
126	306	445	470	597	702	841	904	977	1150	990	861	-13%
127	176	81	95	99	146	177	151	188	215	181	132	-27%
152	225	283	264	217	235	246	271	330	377	292	375	28%
154	2,978	4,418	4,169	5,032	5,717	5,176	4,583	4,546	4,526	2,578	2,767	7%
156	2,643	3,795	3,055	3,258	4,966	4,594	4,517	4,767	5,164	4,486	4,241	-5%
157	5,385	6,990	7,194	7,728	9,001	7,606	6,901	7,989	7,828	6,276	5,491	-13%
159	4,371	5,311	4,459	4,153	5,207	3,887	3,968	3,905	4,165	3,205	3,030	-5%
167	1,452	1,601	1,967	2,488	1,572	1,463	1,257	1,738	1,977	1,812	1,334	-26%
168	2,410	2,686	2,376	3024	3,218	3,978	2,534	3,627	3,357	2,941	2,695	-8%
170	2,880	4,938	4,829	4,716	8,460	7,154	7,221	6,951	8,346	7,412	5627	-24%
172	2,961	4,253	4,621	4,910	7,004	5,489	5,227	5,345	4,877	3,966	3459	-13%
174	1,927	2,438	2,140	2,678	3,825	3,347	3,095	3,180	3,245	2,856	1965	-31%
175	2,326	3,035	3,338	3233	5,071	4,254	3,103	4,559	4,419	4,318	2410	-44%
178	2,351	3,050	3,347	3,666	5,523	5,297	5,373	5,476	6,562	5,884	5045	-14%
180	946	1,540	1,703	1,867	3,123	2,355	2,837	3,553	3,755	3,366	2600	-23%
181	1,780	2,362	2,457	2,419	3,599	3,544	3,755	4,475	5,005	4,527	3526	-22%
182	614	827	862	869	1,309	1,206	1,256	1,460	1,599	1,621	2335	44%
183	2,147	2,748	2,743	2,771	3,960	3,533	3,449	4,006	3,747	3,060	2194	-28%
184	5,970	7,283	7,762	8,811	14,023	12,307	11,482	10,261	11,005	9,335	6645	-29%
197	933	1,372	1,167	1,413	1,652	1,723	1,594	2,471	2,248	2,051	1858	-9%
199	130	169	166	164	140	172	188	167	206	218	239	10%
241	2651	4284	3927	3857	4549	4449	4,288	4,369	4,787	4,261	4,332	2%
242	1,552	1,820	2,072	2,426	2,767	2,244	2,116	2,170	2,259	2,215	1,598	-28%
243	1,907	2,634	2,864	3,238	4,131	3,684	3,165	3,429	3,458	2,342	2,975	27%
244	2,956	3,771	4,841	5,805	7,452	6,702	6,162	6,192	7,102	5,499	2,686	-51%
245	3,524	4,695	5,053	5,626	8,231	6,377	5,737	6,115	5,393	4,853	2,786	-43%
246	4,075	5,599	6,090	5,149	7,530	6,782	5,835	6,389	5,339	2,847	3,323	17%
247	1,631	1,923	2,115	2101	2,744	2,582	2,115	2,393	2,064	1,230	1,277	4%
248	850	1,039	881	1,352	1,897	1,864	1,670	1,280	1,387	952	917	-4%
249	2,217	2,826	3,148	3,238	4,223	3,800	3,211	3,667	3,305	2,063	2,193	6%
251	246	326	254	298	470	387	325	301	253	145	199	37%
287	368	376	460	470	529	425	280	305	306	250	301	20%
298	704	803	826	932	1988	1733	1664	1727	1610	1,522	1,585	4%
Forested Zone	77,834	103,180	107,189	115,185	159,063	139,613	130,261	138,688	140,199	115,582	94,089	-19%

Table 2. Registered buck harvest for Deer Permit Areas in Minnesota's Forested Zone.

Permit Area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change
104	1,137	1,240	1,266	1,332	1,589	1,586	1,250	1,176	1,279	1,070	943	-12%
105	846	945	813	1,138	1,488	1,326	1,364	1,122	1,206	964	807	-16%
107	1,706	1,948	2,174	2,119	2,523	2,277	1,861	1,725	1,921	1,576	1,431	-9%
110	685	732	674	699	852	813	694	658	784	653	662	1%
111	1,088	1,168	1,395	1,463	1,467	1,408	1,316	1,149	830	741	607	-18%
114	40	43	56	63	55	55	72	95	83	69	54	-22%
115	1,898	2,038	2,145	2,376	2,915	2,679	2,262	2,242	2,228	1,764	1,633	-7%
116	138	150	156	157	238	251	230	186	261	219	132	-40%
122	293	417	452	449	501	567	534	565	658	587	553	-6%
126	306	390	417	495	585	591	595	606	686	518	495	-4%
127	176	80	82	86	126	149	127	147	148	104	106	2%
152	173	191	182	130	106	152	141	158	149	126	160	27%
154	2,018	2,305	2,142	2,169	2,071	2,049	1,789	1,677	1,911	1,468	1,699	16%
156	1,836	2,084	1,690	1,653	2,001	2,003	1,811	1,881	2,068	1,831	1,938	6%
157	3,009	3,327	3,144	3,048	3,207	3,030	2,745	2,916	2,832	2,334	2,466	6%
159	2,121	2,431	1,947	1,667	1,995	1,518	1,528	1,548	1,674	1,229	1,366	11%
167	906	1,036	968	1,211	821	819	709	692	821	706	585	-17%
168	1,579	1,653	1,454	1,675	1,698	1,889	1,435	1,439	1,525	1,233	1,142	-7%
170	1,621	3,106	2,786	2,611	3,435	3,233	2,987	2,920	3,285	2,698	2,414	-11%
172	1,821	2,292	2,259	2,200	2,359	2,147	1,853	1,799	1,866	1,429	1,203	-16%
174	1,234	1,448	1,257	1,363	1,542	1,597	1,367	1,313	1,400	1,247	1,245	0%
175	1,923	2,108	2,074	2,115	2,480	2,320	2,074	2,192	2,223	1,872	1,734	-7%
178	1,946	2,059	2,013	2,218	2,651	2,767	2,704	2,503	2,966	2,310	2,574	11%
180	941	1,215	1,358	1,398	1,831	1,833	1,692	1,829	1,878	1,579	1,538	-3%
181	1,351	1,596	1,562	1,590	1,943	1,940	1,779	1,998	2,240	1,823	1,806	-1%
182	484	577	564	568	685	684	361	357	372	315	878	179%
183	1,633	1,919	1,650	1,575	1,661	1,654	1,514	1,634	1,745	1,430	1,409	-1%
184	3,813	4,124	3,925	4,310	4,774	4,848	4,161	3,554	3,553	3,433	2,852	-17%
197	923	1,142	953	998	1,040	1,143	999	1,090	1,108	999	882	-12%
199	91	137	123	132	104	130	151	119	150	119	145	22%
241	1030	1382	1396	1477	1559	1621	1,460	1,506	1,498	1,370	1,462	7%
242	812	988	885	824	912	740	721	692	688	656	607	-7%
243	1,081	1,192	1,169	1,247	1,343	1,217	1,066	1,142	1,066	957	927	-3%
244	1,848	2,014	2,048	2,300	2,540	2,390	2,170	2,155	2,080	1,893	1542	-19%
245	2,216	2,350	2,179	2,430	2,743	2,449	2,036	2,229	1,932	1,887	1517	-20%
246	2,355	2,784	2,479	2,384	2,599	2,527	2,082	2,178	1,935	1,595	1753	10%
247	970	1,181	1,056	948	1,047	955	861	848	802	651	692	6%
248	641	778	622	720	714	739	656	638	487	410	406	-1%
249	1,310	1,590	1,479	1,429	1,479	1,327	1,261	1,285	1,246	1,134	1149	1%
251	129	134	152	132	176	183	128	145	91	59	63	7%
287	167	189	201	184	207	182	106	104	92	81	85	5%
298	601	648	685	654	952	894	810	799	753	762	699	-8%
Forested Zone	50,896	59,131	56,033	57,736	65,014	62,682	55,462	55,011	56,520	47,901	46,361	-3%

Table 3. Registered antlerless deer harvest for Deer Permit Areas in Minnesota's Forested Zone.

Permit Area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change
104	235	597	673	921	1,832	1,316	1,233	1,456	1,278	1,030	373	-64%
105	543	876	1,149	1,247	2,252	1,780	2,193	2,088	2,138	1,427	1,199	-16%
107	288	898	1,373	1,380	2,683	1,750	2,075	2,100	1,953	1,572	300	-81%
110	826	644	697	854	1,328	1,309	1,251	1,252	1,151	1,212	776	-36%
111	81	476	828	801	1,597	1,213	1,371	1,663	778	817	757	-7%
114	0	12	16	17	41	55	51	79	44	51	42	-18%
115	436	1,136	1,441	1,439	2,516	1,654	2,116	2,238	2,022	1,674	581	-65%
116	0	0	0	0	27	47	31	84	89	175	38	-78%
122	3	139	165	125	195	149	123	502	460	427	200	-53%
126	0	55	53	102	117	250	309	371	464	472	366	-22%
127	0	1	13	13	20	28	24	41	67	77	26	-66%
152	52	92	82	87	129	94	130	172	228	166	215	30%
154	960	2,113	2,027	2,863	3,646	3,127	2,794	2,869	2,615	1,110	1,068	-4%
156	807	1,711	1,365	1,605	2,965	2,591	2,706	2,886	3,096	2,655	2,303	-13%
157	2,376	3,663	4,050	4,680	5,794	4,576	4,156	5,073	4,996	3,942	3,025	-23%
159	2,250	2,880	2,512	2,486	3,212	2,369	2,440	2,357	2,491	1,976	1,664	-16%
167	546	565	999	1,277	751	644	548	1,046	1,156	1,106	749	-32%
168	831	1,033	922	1,349	1,520	2,089	1,099	2,188	1,832	1,708	1,553	-9%
170	1,259	1,832	2,043	2,105	5,025	3,921	4,234	4,031	5,061	4,714	3,213	-32%
172	1,140	1,961	2,362	2,710	4,645	3,342	3,374	3,546	3,011	2,537	2,256	-11%
174	693	990	883	1,315	2,283	1,750	1,728	1,867	1,845	1,609	720	-55%
175	403	927	1,264	1,118	2,591	1,934	1,029	2,367	2,196	2,446	676	-72%
178	405	991	1,334	1,448	2,872	2,530	2,669	2,973	3,596	3,574	2,471	-31%
180	5	325	345	469	1,292	522	1,145	1,724	1,877	1,787	1,062	-41%
181	429	766	895	829	1,656	1,604	1,976	2,477	2,765	2,704	1,720	-36%
182	130	250	298	301	624	521	339	303	388	394	1,457	270%
183	513	829	1,093	1,197	2,299	1,879	1,935	2,372	2,002	1,630	785	-52%
184	2,157	3,159	3,837	4,501	9,249	7,459	7,321	6,707	7,452	5,902	3,793	-36%
197	10	230	214	415	612	580	595	1,381	1,140	1,052	976	-7%
199	39	32	43	32	36	42	37	48	56	99	94	-5%
241	1,621	2,902	2,531	2,380	2,990	2,828	2,828	2,863	3,289	2,891	2,870	-1%
242	740	832	1,187	1,602	1,855	1,504	1,395	1,478	1,571	1,559	991	-36%
243	826	1,442	1,695	1,991	2,788	2,467	2,099	2,287	2,392	1,385	2,048	48%
244	1,108	1,757	2,793	3,505	4,912	4,312	3,992	4,037	5,022	3,606	1,144	-68%
245	1,308	2,345	2,874	3,196	5,488	3,928	3,701	3,886	3,461	2,966	1,269	-57%
246	1,720	2,815	3,611	2,765	4,931	4,255	3,753	4,211	3,404	1,252	1,570	25%
247	661	742	1,059	1,153	1,697	1,627	1,254	1,545	1,262	579	585	1%
248	209	261	259	632	1,183	1,125	1,014	642	900	542	511	-6%
249	907	1,236	1,669	1,809	2,744	2,473	1,950	2,382	2,059	929	1,044	12%
251	117	192	102	166	294	204	197	156	162	86	136	58%
287	201	187	259	286	322	243	174	201	214	169	216	28%
298	103	155	141	278	1,036	839	854	928	857	760	886	17%
Forested Zone	26,938	44,049	51,156	57,449	94,049	76,931	74,243	82,877	82,840	66,769	47,728	-29%

Table 4. Change in anterless harvest in response to change in harvest strategy between 2008 and 2009 seasons for Deer Permit Areas in Minnesota's forest zone.

Permit Area	L-L	M-L	M-M	M-I	I-L	I-M	I-I	EA-EA	EA-M	EA-I
104		-64%								
105								-16%		
107		-81%								
110									-36%	
111								-7%		
114			-18%							
115		-65%								
116		-78%								
122					-53%					
126						-22%				
127					-66%					
152			30%							
154	-4%									
156						-13%				
157									-23%	
159									-16%	
167						-32%				
168			-9%							
170						-32%				
172			-11%							
174		-55%								
175		-72%								
178									-31%	
180									-41%	
181									-36%	
182								270%		
183		-36%								
184						-36%				
197			-7%							
199			-5%							
241										-1%
242						-36%				
243				48%						
244					-68%					
245		-57%								
246	25%									
247	1%									
248			-6%							
249	12%									
251			58%							
287							28%			
298			17%							
Mean	9%	-64%	5%	48%	-62%	-29%	28%	82%	-31%	-1%
n	4	8	9	1	3	6	1	3	6	1

L = Lottery, M = Managed, I = Intensive, EA = Intensive+Early Antlerless

Table 5. Pre-Fawn deer density (deer/sq.mi.) as simulated from modeling in each permit area in Minnesota's forested zone.

Permit Area	Area (sq. mi.)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Change
103	1,818	7	7	8	9	8	7	7	7	7	6	7	8%
105	766	24	26	29	31	31	28	27	27	27	23	24	4%
108	1,643	12	12	13	14	13	11	11	12	11	9	10	11%
110	522	18	18	19	20	20	19	19	19	18	16	16	-1%
111	1,437	6	7	7	8	7	6	6	6	6	5	5	4%
118	1,202	9	9	10	11	10	8	9	9	9	7	8	20%
119	799	13	13	14	15	14	12	12	13	12	10	11	12%
122	600	5	5	6	6	6	7	7	7	7	7	7	6%
126	941	4	4	5	5	6	6	6	6	5	5	5	2%
127	587	2	2	2	2	2	2	2	2	2	2	2	6%
155	597	18	18	18	18	17	16	16	15	14	15	17	9%
156	826	18	18	20	22	22	22	23	22	21	20	20	-2%
157	889	23	23	24	24	23	22	23	21	20	18	18	-2%
159	568	24	21	22	22	21	21	21	21	20	20	20	1%
169	1,122	16	15	16	15	15	14	15	14	14	13	13	2%
171	686	17	17	18	19	18	17	17	17	15	15	15	3%
172	695	21	21	22	24	23	21	21	20	18	17	16	-2%
173	592	14	14	15	16	15	14	14	14	13	13	14	6%
176	1,099	14	13	14	15	15	13	14	14	14	12	13	10%
177	504	17	17	18	20	18	16	16	17	17	13	14	10%
178	1,278	18	19	21	23	24	22	23	24	24	21	22	4%
179	867	22	21	23	25	24	23	23	24	22	21	21	1%
180	982	13	14	15	17	17	16	16	16	16	15	16	7%
181	856	23	23	25	28	28	26	27	27	26	25	25	0%
183	663	25	25	27	28	28	25	25	25	24	23	24	4%
184	1,232	23	24	27	29	28	26	25	24	22	18	18	-4%
197	965	14	14	15	16	16	16	16	16	15	14	13	-4%
241	998	34	35	37	39	38	37	36	36	34	30	29	-3%
242	215	34	33	35	35	33	32	32	31	28	23	20	-12%
246	836	27	26	27	28	26	25	24	23	21	22	23	5%
247	230	32	31	32	33	31	29	29	27	25	23	22	-2%
248	212	24	23	25	27	27	26	27	26	24	22	22	-3%
249	502	18	17	18	19	18	17	17	16	15	16	18	10%
251	55	17	16	17	18	16	14	13	12	12	12	13	5%
258	328	32	35	38	40	39	37	36	35	32	27	28	5%
259	428	32	33	36	37	34	32	31	30	38	24	25	6%
298	619	17	18	19	21	20	19	19	19	19	17	16	-2%
Forest Zone	29,159	16.7	16.8	18.2	19.3	18.5	17.4	17.5	17.3	16.6	14.8	15.3	-11%

2010 AERIAL MOOSE SURVEY

Mark S. Lenarz, Forest Wildlife Populations and Research Group

INTRODUCTION

Each year, we conduct an aerial survey in northeastern Minnesota in an effort to monitor moose (*Alces alces*) numbers and identify fluctuations in the status of Minnesota's largest deer species. The primary objectives of this annual survey are to estimate moose numbers and determine the calf:cow and bull:cow ratios. We use these data in a simulation model to identify population trends and the harvestable surplus.

METHODS

We estimated moose numbers and age/sex ratios by flying transects within a stratified random sample of survey plots (Figure 1). Survey plots were last stratified in 2009. As in previous years, all survey plots were rectangular (5 x 2.67 mi.) and all transects were oriented east to west. DNR Enforcement pilots flew the Bell Jet Ranger helicopters used to conduct the survey. We sexed moose using the presence of antlers, size and shape of the bell, nose color and/or presence of a vulval patch (Mitchell 1970), and identified calves on the basis of size and behavior. We recorded UTM coordinates and the percent visual obstruction (VOC) for all moose observed within the plots. We defined visual obstruction as the proportion of vegetation within a circle (10m radius or roughly 4 moose lengths) that would prevent you from seeing a moose when circling that spot from an oblique angle. If we observed more than one moose at a location, visual obstruction was based on the first moose sighted.

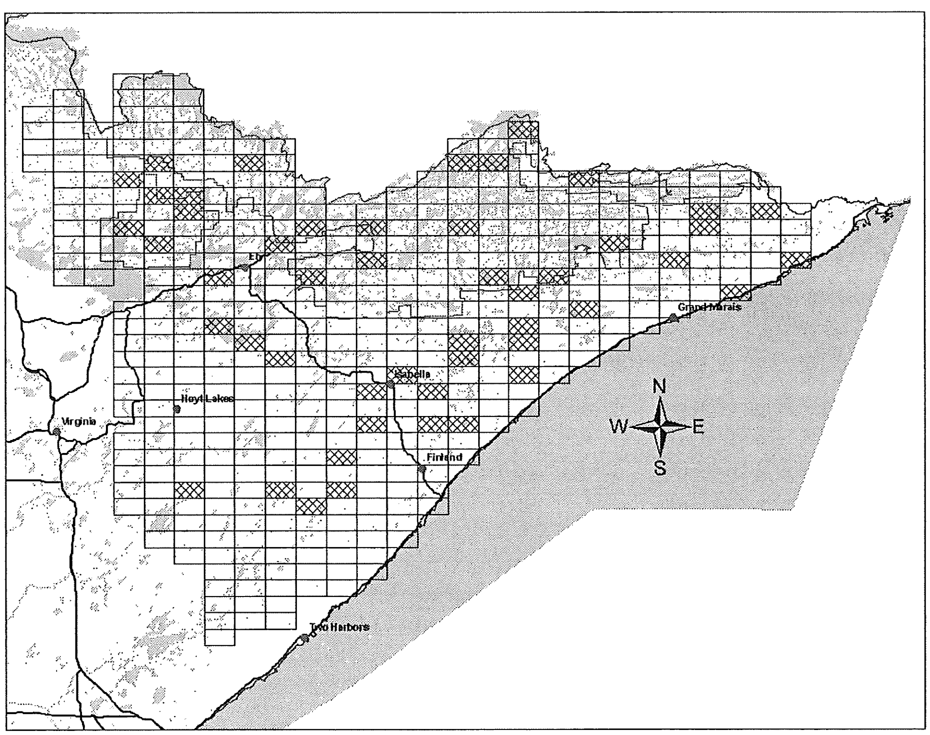


Figure 1. Northeast moose survey area and sample plots (cross hatching) flown in the 2010 aerial moose survey.

We accounted for visibility bias by using a sightability model (Ackerman 1988, Anderson and Lindzey 1996, Otten et al. 1993, Quayle et al. 2001, Samuel et al. 1987). We developed this model between 2004 and 2007 using moose that were radiocollared as part of research on the population dynamics of the northeastern moose population. Logistic regression indicated that visual obstruction was the most important covariate in determining whether radiocollared moose were observed. We used uncorrected estimates (no visibility bias correction) of bulls, cows, and calves to calculate the bull:cow and calf:cow ratios.

RESULTS

We initiated the survey on 4 January and completed it on 12 January. Observers rated survey conditions as "good" (middle rank) on 39 plots and "excellent" on 1 plot. Snow conditions for the survey were <8" on 1 plot, between 8" and 16" on 36 plots, and >16" on 3 plots. During the survey flights, observers located 379 moose on the 40 plots (533 mi^2) including 140 bulls, 179 cows, 48 calves, and 12 unidentified moose. After adjusting for sampling and sightability, we estimated that the moose population in northeastern Minnesota contained 5,528±1,318 animals (Table 1). Estimates of the calf:cow and bull:cow ratio were 0.28 and 0.83, respectively (Table 1).

DISCUSSION

We have used the sightability model approach for 7 years to account for sightability bias in our estimates of moose numbers in northeastern Minnesota. In 2004, 3 observers equated VOC to crown closure on some observations and this resulted in significantly higher estimates of VOC (Kruskal Wallis AOV, $F=16.7$, $P<0.001$). As a result, the 2004 population estimate was biased high (Table 1). Pairwise comparison of the remaining years indicated that mean VOC did not differ among years 2005 -2010 and as a result, population estimates were more comparable. Because of this bias, the population estimate for 2004 was not included in subsequent analyses. Survey estimates prior to 2004 were based on fixed-wing aircraft surveys and are not comparable to estimates based on post 2003 helicopter surveys.

Table 1. Estimated moose numbers, calves:cow, percent calves, percent cows with twins, and bulls:cow from aerial surveys in northeastern Minnesota.

Survey	Estimate	Calves:Cow	% Calves	% Cows w/ twins	Bulls:Cow
1998	3,464 ±36%	0.71	25	0	0.98
1999	3,915 ±35%	0.57	18	9	1.30
2000	3,733 ±25%	0.70	20	7	1.34
2001	3,879 ±28%	0.61	19	5	1.05
2002	5,214 ±23%	0.93	25	20	1.22
2003	4,161 ±37%	0.70	14	11	2.01
2004	13,093±40%	0.42	15	4	1.24
2005	7,923±30%	0.52	19	9	1.04
2006	8,501±28%	0.34	13	5	1.09
2007	6,659±27%	0.29	13	3	0.89
2008	7,637±28%	0.36	16	2	0.77
2009	7,593±23%	0.32	14	2	0.94
2010	5,528±24%	0.28	13	3	0.83

The 2010 population estimate was substantially lower than those from previous years but the overlap in confidence intervals (Table 1, Figure 2) indicates no statistical difference between the 2009 and 2010 point estimates. At current levels of precision (±24%) the point estimate would have had to decline to at least 4,750 for it to be significantly lower than the 2009 estimate. Survey estimates were relatively imprecise and even with unlimited resources it would be difficult to measurably improve the precision.

The negative slope of the trend line (Figure 2) also was not significant ($P = 0.126$). The lack of a significant downward trend among survey estimates was likely an artifact of the small sample size (n=6). Several data sets suggest that the northeastern Minnesota moose population is declining. Simulation modeling that integrated survival and reproductive rates measured between 2002 and 2008 indicated that the population was declining by approximately 15% per year over the long term (Lenarz et al. In press). This inference is reinforced by 2 measures of recruitment measured during the survey. Estimates of calf:cow ratio and the % calves in the moose population were not affected by the switch from fixed-wing aircraft to helicopters and we can compare the trend in these statistics over a longer time period. Over the past 13 years, the cow:calf ratio has exhibited a significant decline (Figure 3; $P = 0.001$). During the same time period, the % calves has also declined (Figure 3; $P = 0.006$). In addition, the proportion of cows accompanied by twins has steadily declined since 2002 (Table 1; $P = 0.010$). Independent of the aerial survey, hunter success rates have steadily declined since 2001, for both either sex hunting ($P = 0.001$) and for bulls-only hunting ($P < 0.001$).

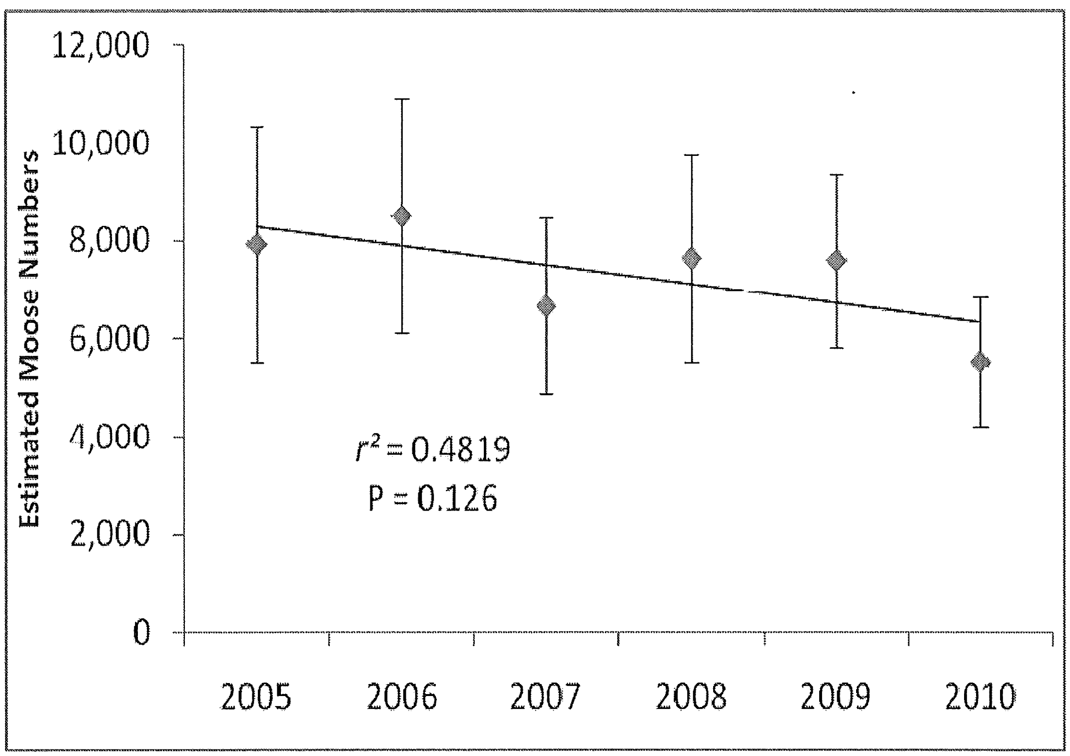


Figure 2. Point estimates, 90% confidence intervals, and trend line of estimated moose numbers in northeastern Minnesota, 2005-2010.

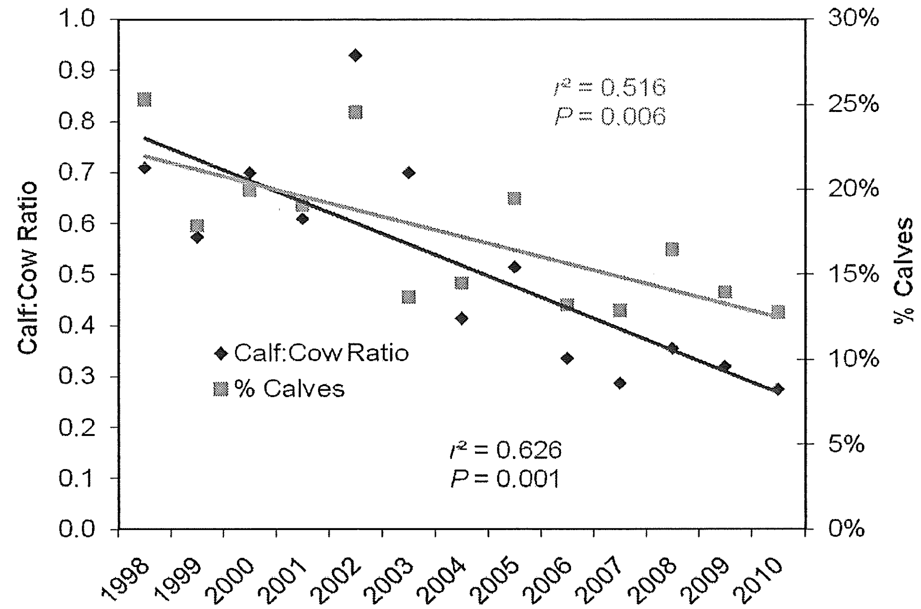


Figure 3. Estimated calf:cow ratio and % calves from aerial moose surveys in northeastern Minnesota. The % calves is less biased than the calf:cow ratio because it is not dependent on adult cow moose being correctly classified. The calf:cow ratio is not adjusted for sightability and can be compared with estimates prior to adoption of the sightability model.

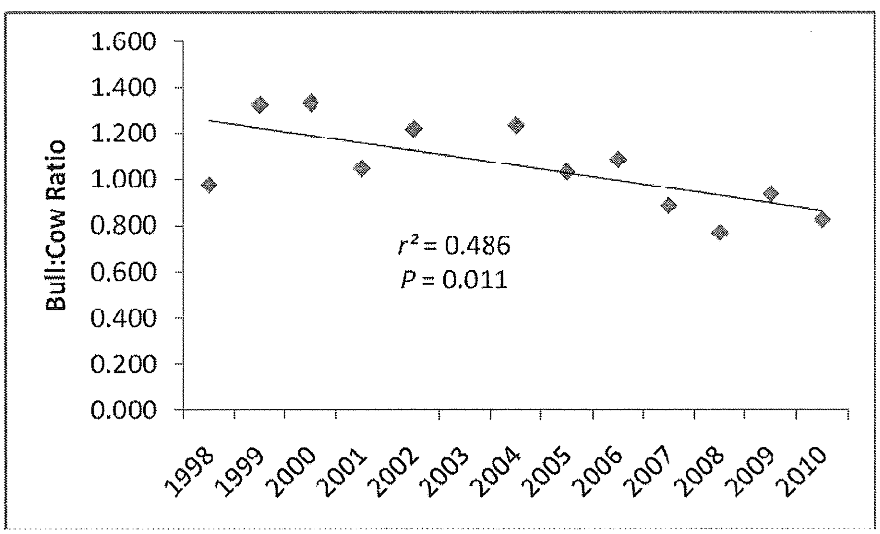


Figure 4. Estimated bull:cow ratio from aerial moose surveys in northeastern Minnesota. The bull:cow ratio is not adjusted for sightability and can be compared with estimates prior to adoption of the sightability model.

The estimated bull:cow ratio (Table 1; Figure 4) continued to decline. When the 2003 estimate (2.01) was excluded from analysis (this estimate was biologically impossible considering estimates in 2002 and 2004) there was a negative trend in this statistic ($r^2 = 0.486$, $P = 0.011$). This trend implies that bull moose have a higher mortality than cow moose. Survival estimates from radiocollared moose between 2002 and 2008 indicated no difference in survival between sexes (Lenarz et al. 2009). Harvest of moose by State hunters has been restricted to bull moose since 2007. It is unlikely that harvest is the cause of the decline in the bull:cow ratio because a low number of bull moose are harvested each year (e.g. 137 in 2009) and the bull:cow ratio has been declining since at least 1999.

ACKNOWLEDGMENTS

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LITERATURE CITED

ACKERMAN, B. R. 1988. Visibility bias of mule deer aerial census procedures in southeast Idaho. Ph D. Dissertation. University of Idaho, Moscow.

ANDERSON, C. R., and F. G. LINDZEY. 1996. Moose sightability model developed for helicopter surveys. Wildlife Society Bulletin. 24:247-259.

LENARZ, M. S., J. FIEBERG, M. W. SCHRAGE, and A. J. EDWARDS. In Press. Living on the edge: viability of moose in northeastern Minnesota. Journal of Wildlife Management.

LENARZ, M. S., M. E. NELSON, M. W. SCHRAGE, and A. J. EDWARDS. 2009. Temperature mediated moose survival in northeastern Minnesota. Journal of Wildlife Management. 73:503-510.

MITCHELL, H.B. 1970. Rapid aerial sexing of antlerless moose in British Columbia. Journal Wildlife Management. 34: 645-646.

OTTEN, R.M., J.B. HAUFLER, S.R. WINTERSTIEN, and L.C. BENDER. 1993. An aerial census procedure for elk in Michigan. Wildlife Society Bulletin. 21:73-80.

QUAYLE, J.F., A.G. MACHUTCHON, and D. N. JURY. 2001. Modeling moose sightability in south-central British Columbia. Alces 37:43-54.

SAMUEL, M.D., E.O. GARTON, M.W. SCHLEGEL, and R.G. CARSON. 1987. Visibility bias during aerial surveys of elk in northcentral Idaho. Journal Wildlife Management. 51:622-630.

WETLAND WILDLIFE POPULATIONS

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2010 WATERFOWL BREEDING POPULATION SURVEY MINNESOTA

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ABSTRACT: The number of breeding waterfowl in a portion of Minnesota has been estimated each year since 1968 as a part of the overall inventory of North American breeding waterfowl. The survey consists of aerial observations in addition to more intensive ground counts on selected routes to determine the proportion of birds counted by the aerial crew. Procedures used are similar to those used elsewhere across the waterfowl breeding grounds. The 2010 aerial survey portion was flown from 4-16 May. Ice-out dates were 2-3 weeks earlier than normal spring temperatures during March-May were one of the warmest on record across the state. Overall, spring wetland habitat conditions were near average across the state. Wetland conditions were fairly dry across much of the survey area in late April and early May but improved considerably with rain events in mid-May. Wetland numbers decreased 15% compared to 2009 but were similar to both the 10-year (+4%) and long-term (+8%) averages. The estimated numbers of temporary (Type 1) wetlands decreased 31% from 2009 and were 61% below the long-term average. The estimated mallard breeding population was 242,000, which was unchanged from last year's estimate of 236,000 mallards ($P = 0.91$). Mallard numbers were 15% below the 10-year average but 8% above the long-term average of 224,000 breeding mallards. The estimated blue-winged teal breeding population was 132,000, which was unchanged from last year's estimate of 135,000 (P=094) but below both the 10-year (-36%) and long-term (-40%) averages. The combined population index of other ducks, excluding scaup, was 157,000, which was lower than last year's estimate of 170,000 and remained 34% below the 10-year average and 12% below the long-term average of 179,000 other ducks. Population estimates of wood duck (64,000), northern shoveler (30,000), ring-necked duck (24,000), and gadwall (10,000) accounted for most (82%) of the total population of other ducks. The estimate of total duck abundance (531,000), which excludes scaup, was similar to last year's estimate (541,000) and was 27% below the 10-year average, 15% below the long-term average (624,000) and the 4th lowest estimate since 1985. The estimated number of Canada geese (corrected for visibility) was 147,000 and 11% lower than 2009. Based on the social status of mallards and blue-winged teal observed (number of pairs, lone males, and flocked birds), the survey timing was consistent with recent years. Low numbers of late migrating species (scaup, ring-necked ducks, coots) were recorded, suggesting most migrants had already moved through the state before the survey was initiated.

METHODS: The aerial survey is based on a sampling design that includes three survey strata (Table 1, Figure 1). The strata cover 39% of the state area and are defined by density of lake basins (>10 acres) exclusive of the infertile northeastern lake region. The strata include the following:

Stratum I: high density, 21 or more lake basins per township.

Stratum II: moderate density, 11 to 20 lake basins per township.

Stratum III: low density, 2 to 10 lake basins per township.

Areas with less than two basins per township are not surveyed. Strata boundaries were based upon "An Inventory of Minnesota Lakes" (Minnesota Conserv. Dept.

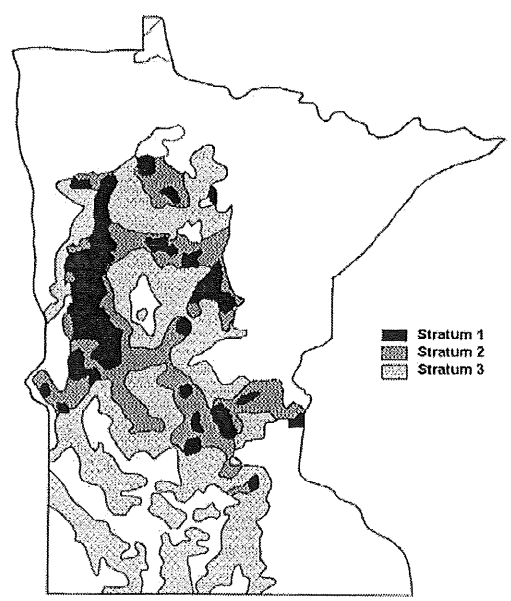

Figure. 1. Location of waterfowl breeding population survey strata in Minnesota.

1968:12). Standard procedures for the survey follow those outlined in "Standard Operating Procedures for Aerial Waterfowl Breeding Ground Populations and Habitat Surveys in North America" (USFWS/CWS 1987). Changes in survey methodology were described in the 1989 Minnesota Waterfowl Breeding Population Survey report. Pond and waterfowl data for 1968-74 were calculated from Jessen (1969-72) and Maxson and Pace (1989).

All aerial transects in Strata I-III (Table 1) were flown using a Cessna 185 (N605NR). Wetlands were counted on the observer's side of the plane (0.125 mile wide transect) only; a correction factor obtained in 1989 was used to adjust previous data (1968-88) that was obtained when the observer counted wetlands on both sides of the plane (0.25 mile wide transect). Data were recorded on digital voice recorders for both the pilot and observer and transcribed from the digital WAV files.

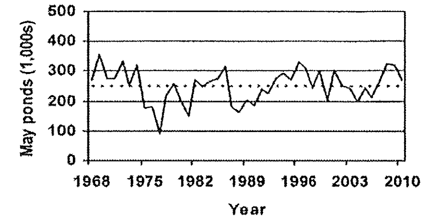

Fig. 2. Number of May ponds (Types II-V) and long-term average (dashed line) in Minnesota, 1968-20010.

Visibility correction factors (VCFs) were derived from intensive ground surveys on 14 selected routes flown by the aerial crew. Many of these routes use a county road as the mid-point of the transect boundary which aids in navigation and helps ensure the aerial and ground crews survey the same area. Ground routes each originally included approximately 100 wetland areas; however, drainage has reduced the number of wetlands on most of the routes. All observations from both ground crews and aerial crews were used to calculate the VCFs.

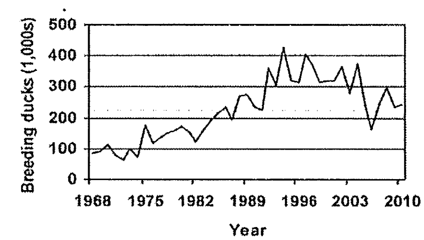

Fig. 3. Mallard population estimates (adjusted for visibility bias) and long-term average (dashed line) in Minnesota, 1968-2010.

The SAS computer program was modified in 1992 to obtain standard errors for mallard and blue-winged teal breeding population estimates. These calculations were based upon SAS computer code written by Graham Smith, USFWS-Office of Migratory Bird Management. We compared estimates for 2009 and 2010 using two-tailed Z-tests.

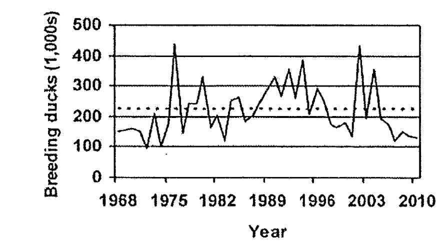

Fig. 4. Blue-winged teal population estimates (adjusted for visibility bias) and long-term average (dashed line) in Minnesota, 1968-2010.

SURVEY CHRONOLOGY: The 2010 aerial survey began on 4 May in southern Minnesota and concluded in northern Minnesota on 16 May. The survey was completed in 9 days of flight time. Transects were flown May 4, 6, 8-10, 12, and 14-16; flights began no earlier than 7 AM and were completed by 12:00 PM each day.

WEATHER AND HABITAT CONDITIONS: Ice out on most lakes across the state was 2-3 weeks earlier than average. Temperatures in April averaged 7.4˚F above normal statewide; regional temperatures ranged from 5.9˚F above average in northeast Minnesota to 8.7˚F above average in northwest Minnesota. April precipitation was 0.7 inches below normal statewide and ranged from 0.06 inches below normal in northwest Minnesota to 1.4 inches below normal in south central Minnesota. This was the first April since modern records began in 1891 that no measurable snow was recorded in the state and was the 2nd warmest April on record. May temperatures averaged 0.3°F above normal statewide. May precipitation was 0.1 inches below normal statewide and ranged from 0.8 inches below normal in south central Minnesota to 1.8 inches above normal in northwest Minnesota (http://climate.umn.edu). Additional temperature and precipitation data are provided in Appendix A.

In early May 2010, statewide topsoil moisture indices were rated as 33 % short or very short, 65 % adequate, and 2% surplus moisture. By late May, statewide indices were rated as 6% short or very short, 87% adequate and 7% surplus moisture. For comparison, in early May 2009 statewide topsoil moisture indices were rated as 11% short or very short, 66% adequate, and 23% surplus moisture.

Planting dates for row crops were earlier in 2010 than recent years. By 2 May, 87% of the corn acres had been planted statewide compared to 56% in 2009 and 41% for the previous 5-year average. By 1 June, 48% of alfalfa hay had been cut compared to 15% in 2009 and a 5-year average of 15% (Minnesota Agricultural Statistics Service Weekly Crop Weather Reports, (http://www.nass.usda.gov/mn/).

Wetland numbers (Types II – V) declined 15% from 2009 but were similar to both the 10-year average (+4%) and long-term averages (+8%) (Table 2; Figure 2). The numbers of temporary (Type I) wetlands decreased 31% from 2009 and were 61% below the long-term average.

Leaf-out dates were 2-3 weeks earlier than normal, which greatly decreased visibility from the air. The emergence of wetland vegetation was also much earlier than average, which also decreased visibility.

WATERFOWL POPULATIONS: the number of ducks, Canada geese, and coots, by stratum, are shown in Tables 3-5; total numbers are presented in Table 6. These estimates are expanded for area but not corrected for visibility bias.

The 2010 breeding population estimate of mallards was 241,884 (SE = 33,940), which was unchanged from 2009 (Z = 0.11, P = 0.91) (Table 7, Figure 3). Mallard numbers were 15% below the 10-year average and 8% above the long-term average of 224,000. In 2010, 5% of the total mallards were in flocks, which was identical to last year. Pairs comprised 12% of the mallards observed, compared to 15% in 2009. This suggests that survey timing was similar to recent years based on the social status observed.

The estimated blue-winged teal population was 132,261 (SE = 27,430), which was unchanged from 2009 (Z = 0.71, P = 0.94). Blue-winged teal numbers remained 36% below the 10-year average and 40% below the long-term average (Table 7, Figure 4). Pairs comprised 56% of the blue-winged teal observed. Lone males comprised 23% of the blue-winged teal and flocks comprised 21% of the blue-winged teal observed. The social structure observed was similar to the most recent 5 year average.

Other duck numbers (excluding scaup) were 157,000, which was 8% lower than last year's estimate of 170,000 and 34% below the 10-year average and 12% below the long-term average (Table 7, Figure 5).

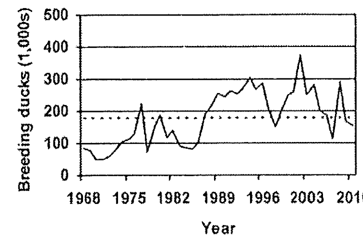

Fig. 5. Other duck (excluding scaup) populations (adjusted for visibility bias) and long-term average (dashed line) in Minnesota, 1968-2010.

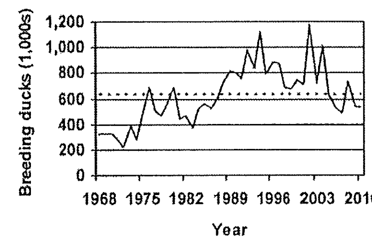

Fig. 6. Total duck (excluding scaup) population estimate and long-term average (dashed line) in Minnesota, 1968-2010.

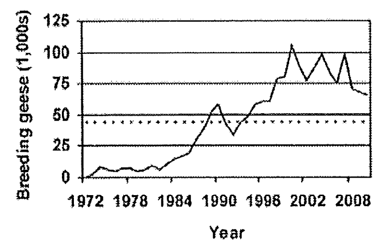

Fig. 7. Canada goose population estimates (not adjusted for visibility bias) and long-term average in Minnesota, 1972-2010.

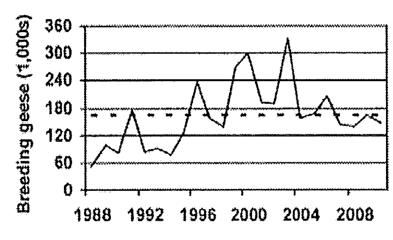

Fig. 8. Canada goose population estimates (adjusted for visibility bias) and long-term average in Minnesota, 1988-2010.

Population estimates of wood duck (64,000), northern shovelers (30,000), ring-necked duck (24,000), and gadwall (10,000) accounted for over 80% of the total population of other ducks. Scaup numbers were 72% lower than last year and 86% below the long-term average. Scaup are rare nesting ducks in Minnesota and late spring migrants and low scaup counts indicate most migrant scaup had moved through the state prior to the survey this year.

The total duck population index, excluding scaup, was 531,000, which was similar to last year's index of 541,000 ducks but below the 10-year (-27%) and long-term (-15%) averages (Table 7, Figure 6).

Visibility Correction Factors (VCFs) for mallards, blue-winged teal, and other ducks were similar to 2009 (Table 7). The mallard VCF (2.99) was 37% above the long-term average. The blue-winged teal VCF (4.04) was similar to the long-term average (3.90). The VCF for other ducks (2.84) was 10% lower than the long-term average (3.17).

Canada goose numbers (uncorrected for visibility) decreased 2% compared to 2009 but remained 51% above the long-term average (Table 7, Figure 7). The VCF for Canada geese was 2.22 and similar to the long-term average of 2.37. The population estimate of Canada geese (adjusted for visibility) was 147,000, which was 10% below the long-term average of 163,000 geese (Table 7, Figure 8).

The estimated coot population, uncorrected for visibility, was 700 in 2010 compared to 9,200 in 2009, indicating most migrant coots had already moved through the state.

SUMMARY: Overall wetland conditions were near average. Mallard abundance in 2010 (242,000) was similar to 2009 (236,000). Mallard numbers were 8% above the long-term average (224,000) but 15% below the 10-year average (284,000). Blue-winged teal abundance (132,000) was similar to 2009 (135,000) but 36% below the 10-year average (207,000) and 40% below the long-term average (221,000). The combined population index of other ducks (157,000) was 8% lower than 2009 and 12% below the long-term average. Total duck abundance (531,000), excluding scaup, was similar to 2009 (541,000) and was 27% below the 10-year average and 15% below the long-term average. Canada goose numbers, adjusted for visibility bias, decreased 11% from 2009.

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LITERATURE CITED:

JESSEN, R. J. 1969. Waterfowl breeding ground survey, 1968. Minn. Game Research Proj. Q. Prog. Rep. 29(32):173-180.

JESSEN, R. J. 1971. Waterfowl breeding ground survey, 1969. Minn. Game Research Proj. Q. Prog. Rep. 31(2):100-106.

JESSEN, R. J. 1971. Waterfowl breeding ground survey, 1970. Minn. Game Research Proj. Q. Prog. Rep. 31(2):107-113.

JESSEN, R. J. 1971. Waterfowl breeding ground survey, 1971. Minn. Game Research Proj. Q. Prog. Rep. 31(2):114-120.

JESSEN, R. J. 1972. Waterfowl breeding ground survey, 1972. Minn. Game Research Proj. Q. Prog. Rep. 32(2):89-95.

MINNESOTA CONSERVATION DEPARTMENT. 1968. An inventory of Minnesota Lakes. Waters Section, Division of Waters, Soils, and Minerals, Bull. No. 25. 498pp.

MAXSON, S. J., and R. M. PACE. 1989. Summary and evaluation of Minnesota's waterfowl breeding population survey, 1972-1986. Minnesota Wildl. Rep. 7. 92pp.

USFWS/CWS. 1987. Standard operating procedures for aerial waterfowl breeding ground population and habitat surveys in North America. U.S. Fish and Wildlife Service and Canadian Wildlife Service.

Table 1. Survey design for Minnesota, May 2010.[1]

	Stratum 1	2	3	Total
Survey design				
Square miles in stratum	5,075	7,970	17,671	30,716
Square miles in sample - waterfowl	182.75	136.375	203.125	522.25
Square miles in sample - ponds	91.375	68.1875	101.5625	261.125
Linear miles in sample	731.0	545.5	812.5	2,089.0
Number of transects in sample	39	36	40	115
Minimum transect length (miles)	5	6	7	5
Maximum transect length (miles)	36	35	39	39
Expansion Factor - waterfowl	27.770	58.442	86.996	
Expansion Factor - ponds	55.540	116.884	173.991	
Current year coverage				
Square miles in sample - waterfowl	182.75	136.375	203.125	522.25
Square miles in sample - ponds	91.375	68.1875	101.5625	261.125
Linear miles in sample	731.0	545.5	812.5	2,089.0
Number of transects in sample	39	36	40	115
Minimum transect length (miles)	5	6	7	5
Maximum transect length (miles)	36	35	39	39
Expansion Factor - waterfowl	27.770	58.442	86.996	
Expansion Factor - ponds	55.540	116.884	173.991	

[1] Also, 8 additional air-ground transects (total linear miles = 202.5, range - 10-60 miles) were flown to use in calculating the VCF.

Table 2. Estimated number of May ponds (Type I and Types II-V). 1968-2010.

	Year	Type I	Number of ponds [1]
	1968		272,000
	1969		358,000
	1970		276,000
	1971		277,000
	1972		333,000
	1973		251,000
	1974		322,000
	1975		175,000
	1976		182,000
	1977		91,000
	1978		215,000
	1979		259,000
	1980		198,000
	1981		150,000
	1982		269,000
	1983		249,000
	1984		264,000
	1985		274,000
	1986		317,000
	1987		178,000
	1988		160,000
	1989		203,000
	1990		184,000
	1991	82,862	237,000
	1992	10,019	225,000
	1993	199,870	274,000
	1994	123,958	294,000
	1995	140,432	272,000
	1996	147,859	330,000
	1997	30,751	310,000
	1998	20,560	243,000
	1999	152,747	301,000
	2000	5,090	204,000
	2001	66,444	303,000
	2002	30,602	254,000
	2003	34,005	244,000
	2004	9,494	198,000
	2005	30,764	241,000
	2006	56,798	211,000
	2007	32,415	262,000
	2008	69,734	325,000
	2009	39,078	318,000
	2010	26,880	270,000
Averages:	10-year	47,925	260,000
	Long-term	67,552	250,000
% change from:	2009	-31%	-15%
	10-year	-44%	4%
	Long-term	-61%	8%

[1] Type II-V, correction factor from 1989 (123,000/203,000=0.606) used to adjust 1968-88 pond numbers.

Table 3. Minnesota waterfowl breeding populations by species for Stratum I (high wetland density), expanded for area but not visibility, 1992-2010.

Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	Year: 2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Dabblers:																			
Mallard	28,770	23,327	22,160	20,494	25,104	26,992	33,157	26,576	26,604	28,742	29,297	25,937	29,381	19,050	16,829	16,357	25,104	19,467	18,439
Black Duck	0	0	56	0	0	0	0	0	0	0	0	0	0	56	0	0	0	0	0
Gadwall	2,777	778	444	1,055	1,083	611	1,111	1,777	833	1,333	944	1,250	2,111	1,166	1,444	889	1,166	1,055	1,000
American Wigeon	56	0	0	194	0	0	56	56	56	111	0	56	555	167	0	56	111	56	56
Green-winged Teal	0	111	278	0	278	56	333	0	278	56	278	222	444	56	56	167	278	167	56
Blue-winged Teal	15,274	10,358	9,164	7,609	6,720	6,387	8,220	6,998	11,247	7,387	14,218	9,664	23,771	9,303	5,665	5,332	9,942	5,998	7,304
Northern Shoveler	1,000	111	278	111	1,277	1,500	500	555	1,055	305	1,277	278	1,166	333	167	56	1,000	666	1,027
Northern Pintail	222	611	167	167	167	111	111	167	167	389	56	111	56	0	56	0	56	56	0
Wood Duck	10,941	11,636	7,359	6,831	6,498	9,497	12,302	5,582	10,219	6,720	2,888	4,499	8,081	5,498	3,555	2,666	6,665	4,277	3,999
Dabbler Subtotal	59,040	46,932	39,906	36,461	41,127	45,154	55,790	41,711	50,459	45,043	48,958	42,017	65,565	35,629	27,772	25,523	44,322	31,742	31,881
Divers:																			
Redhead	3,499	1,416	1,972	639	722	778	944	500	583	1,444	750	333	805	666	666	916	1,389	472	944
Canvasback	2,111	2,777	3,166	3,860	1,166	1,333	1,777	2,971	1,222	2,027	1,833	1,333	666	972	833	1,000	2,277	1,333	1,222
Scaup	23,854	6,748	19,661	7,192	13,829	3,416	9,247	1,750	7,415	5,832	2,444	2,055	5,971	4,110	111	555	6,276	8,553	2,777
Ring-necked Duck	4,721	2,222	3,582	1,583	3,166	2,694	2,749	2,360	4,776	2,444	2,777	1,361	5,165	1,722	2,055	1,555	21,494	6,859	3,138
Goldeneye	222	111	222	111	167	0	111	56	56	333	111	0	222	222	56	222	278	278	222
Bufflehead	722	0	444	56	278	0	56	111	56	111	222	111	389	167	222	56	1,611	833	389
Ruddy Duck	500	1,250	639	167	139	528	11,052	972	0	83	1,305	417	305	1,222	305	0	1,027	861	28
Hooded Merganser	444	222	111	278	611	555	389	722	500	722	555	333	278	333	555	111	666	944	555
Large Merganser	111	0	56	0	0	56	0	0	0	111	0	972	0	111	0	278	333	333	333
Diver Subtotal	36,184	14,746	29,853	13,886	20,078	9,360	26,325	9,442	14,608	13,107	9,997	6,915	13,801	9,525	4,803	4,693	35,351	20,466	9,608
Total Ducks	95,224	61,678	69,759	50,347	61,205	54,514	82,115	51,153	65,067	58,150	58,955	48,932	79,366	45,154	32,575	30,216	79,673	52,208	41,489
Other:																			
Coot	11,386	1,166	528	611	3,055	5,054	555	83	3,999	1,722	2,888	2,666	21,411	2,444	639	139	16,829	2,166	139
Canada Goose	10,914	13,135	12,802	14,413	12,774	10,330	16,967	19,495	22,160	24,882	24,104	22,160	23,160	22,938	21,633	29,797	18,717	16,523	16,440

Table 4. Minnesota waterfowl breeding populations by species for Stratum II (medium wetland density), expanded for area but not visibility, 1992-2010.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Dabblers:																			
Mallard	45,585	37,111	42,896	42,896	48,507	54,643	53,942	52,247	49,559	44,650	43,773	34,715	44,474	26,883	25,130	24,779	27,935	23,494	21,507
Black Duck	0	0	0	0	0	0	0	0	0	117	0	0	0	0	0	0	0	0	0
Gadwall	2,045	1,286	1,403	1,052	935	468	584	1,519	3,039	1,636	701	584	3,565	584	1,052	234	3,039	1,169	1,286
American Wigeon	351	0	117	0	468	351	818	0	468	0	0	0	2,513	117	0	0	351	0	351
Green-winged Teal	0	351	117	0	935	234	351	117	117	117	468	234	234	0	117	0	0	234	117
Blue-winged Teal	26,766	18,818	19,227	10,636	13,851	13,792	13,208	10,578	19,637	9,701	21,390	15,955	30,624	11,513	9,000	8,416	12,740	11,104	8,474
Northern Shoveler	1,636	1,286	935	818	1,636	2,571	701	2,104	4,675	1,052	2,221	1,403	1,753	234	584	351	468	701	2,513
Northern Pintail	234	351	468	234	117	234	468	117	117	117	0	117	0	0	0	234	0	0	0
Wood Duck	11,221	9,468	9,409	6,662	8,708	11,338	10,520	19,753	13,792	7,831	5,143	4,558	8,766	3,273	1,753	2,221	6,546	5,260	6,312
Dabbler subtotal	87,838	68,671	74,572	62,298	75,157	83,631	80,592	86,435	91,404	65,221	73,696	57,566	91,929	42,604	37,636	36,235	51,079	41,962	40,560
Divers:																			
Redhead	3,097	2,279	3,799	1,403	1,110	1,987	935	1,636	2,805	2,455	234	584	1,110	292	175	935	935	584	760
Canvasback	0	584	1,052	0	234	701	117	117	935	0	468	1,052	234	0	0	1,169	468	234	117
Scaup	22,208	877	14,085	7,831	21,916	18,935	4,032	3,331	6,779	3,039	5,961	2,279	7,188	2,981	468	643	3,097	2,104	0
Ring-necked Duck	2,922	3,156	3,331	1,403	7,714	3,565	2,279	2,221	5,610	3,799	6,370	2,455	5,377	1,929	3,331	1,578	13,149	9,117	2,396
Goldeneye	351	584	701	701	1,753	818	234	935	584	468	234	234	351	117	117	0	351	584	468
Bufflehead	526	117	234	0	117	117	0	0	0	0	1,169	117	468	351	117	117	1,403	818	643
Ruddy Duck	1,227	3,390	409	117	58	117	0	468	0	0	1,870	2,688	0	351	58	0	0	175	409
Hooded Merganser	351	584	468	117	234	468	117	701	935	1,403	701	701	234	234	351	234	584	701	117
Large Merganser	117	0	0	0	0	0	0	0	117	117	0	0	234	351	0	0	351	0	0
Diver subtotal	30,799	11,571	24,079	11,572	33,136	26,708	7,714	9,409	17,765	11,281	17,007	10,110	15,196	6,606	4,617	4,676	20,338	14,317	4,910
Total Ducks	118,637	80,242	98,651	73,870	108,293	110,339	88,306	95,844	109,169	76,502	90,703	67,676	107,125	49,210	42,253	40,911	71,417	56,279	45,470
Other:																			
Coot	11,162	5,201	1,461	526	7,013	5,026	643	234	1,110	468	4,909	1,519	8,007	584	292	409	23,961	0	117
Canada Goose	7,305	9,409	12,565	12,682	13,559	16,364	19,812	18,585	25,831	24,604	20,688	22,091	28,461	20,688	26,825	25,890	19,753	22,675	18,935

Table 5. Minnesota waterfowl breeding populations by species for Stratum III (low wetland density), expanded for area but not visibility, 1992-2010.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Dabblers:																			
Mallard	69,771	63,333	73,425	79,166	79,862	78,993	101,873	90,390	81,690	72,642	72,121	55,156	84,561	36,539	30,884	35,843	50,371	35,408	40,976
Black Duck	0	0	0	0	0	0	0	0	0	0	0	0	174	0	0	174	174	0	0
Gadwall	2,436	1,218	2,610	3,306	3,306	2,436	3,045	2,436	2,610	10,701	3,306	1,566	6,960	2,001	5,568	4,176	870	1,392	1,392
American Wigeon	522	348	1,218	0	1,044	348	696	0	522	174	1,218	174	1,566	1,044	174	348	348	174	348
Green-winged Teal	0	348	174	0	957	348	174	0	1,218	1,392	522	174	0	174	522	0	0	0	0
Blue-winged Teal	51,067	35,494	41,932	29,492	36,625	25,316	26,360	18,530	29,405	20,618	56,374	21,140	39,758	27,578	23,663	15,659	18,095	20,183	16,964
Northern Shoveler	11,048	1,914	2,784	5,307	12,701	11,049	4,176	4,002	20,444	10,701	6,264	870	3,828	348	522	870	4,002	2,088	6,873
Northern Pintail	870	1,218	696	174	870	522	870	870	696	522	0	174	348	174	174	348	174	0	174
Wood Duck	24,185	25,229	23,228	16,355	27,926	14,268	23,837	20,531	25,055	17,225	13,572	12,702	20,705	7,482	7,308	5,394	14,442	10,266	12,354
Dabbler subtotal	159,899	129,102	146,067	133,800	163,291	133,280	161,031	136,759	161,640	133,975	153,377	91,956	157,900	75,340	68,815	62,812	88,476	69,511	79,081
Divers:																			
Redhead	6,438	1,827	2,958	7,134	1,044	1,044	2,001	3,480	2,523	3,654	1,305	174	1,740	1,479	0	522	783	870	174
Canvasback	0	348	696	174	1,392	0	3,306	174	3,915	522	696	1,131	2,784	0	0	348	1,566	1,218	348
Scaup	20,009	4,176	23,924	13,397	29,840	8,787	15,137	8,961	18,182	6,873	4,611	783	17,747	5,307	1,392	696	5,481	1,914	522
Ring-necked Duck	3,654	2,871	5,568	1,044	12,875	3,654	2,958	1,479	8,178	8,526	7,395	1,479	5,133	10,179	6,699	1,392	8,526	6,525	3,045
Goldeneye	1,044	696	783	1,479	1,914	522	696	696	1,044	1,566	3,132	1,305	696	1,044	1,044	870	348	522	174
Bufflehead	696	348	696	0	1,044	174	348	0	0	0	1,218	783	2,088	0	174	696	1,218	870	174
Ruddy Duck	6,786	1,218	2,175	2,349	1,740	348	0	174	0	696	18,878	87	2,262	870	696	261	87	348	0
Hooded Merganser	348	348	696	1,044	1,566	696	696	1,218	957	174	2,175	174	1,740	1,218	870	174	696	348	1,218
Large Merganser	348	0	174	174	0	0	0	0	0	0	522	0	0	261	957	348	348	348	348
Diver subtotal	39,323	11,832	37,670	26,795	51,415	15,225	25,142	16,182	34,799	22,011	39,932	5,916	34,190	20,358	11,832	5,307	19,053	12,963	6,003
Total Ducks	199,222	140,934	183,737	160,595	214,706	148,505	186,173	152,941	196,439	155,986	193,309	97,872	192,090	95,698	80,647	68,119	107,529	82,474	85,084
Other:																			
Coot	62,463	12,179	12,788	3,828	182,953	24,620	5,133	14,702	67,684	3,132	14,007	7,134	77,427	8,613	14,702	5,742	15,137	7,047	435
Canada Goose	15,746	21,314	23,228	30,971	34,537	33,755	42,368	41,933	57,940	39,932	33,407	43,412	46,717	39,758	27,230	42,629	31,841	28,274	30,710

Table 6. Minnesota waterfowl breeding populations by species for Stratum I - III combined, expanded for area coverage but not visibility, 1992-2010.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Dabblers:																			
Mallard	144,126	123,771	138,481	142,556	153,473	160,628	188,972	169,213	157,853	146,034	145,191	115,974	158,416	82,472	72,843	76,979	103,411	78,368	80,922
Black Duck	0	0	56	0	0	0	0	0	0	117	0	0	174	56	0	174	174	0	0
Gadwall	7,258	3,282	4,457	5,413	5,324	3,515	4,740	5,733	6,482	13,670	4,951	3,400	12,635	3,752	8,064	5,298	5,075	3,616	3,677
American Wigeon	929	348	1,335	194	1,512	699	1,570	56	1,045	285	1,218	230	4,634	1,327	174	404	810	230	754
Green-winged Teal	0	810	569	0	2,170	638	858	117	1,613	1,564	1,267	630	678	230	694	167	278	400	172
Blue-winged Teal	93,107	64,670	70,323	47,737	57,196	45,495	47,788	36,106	60,288	37,706	91,982	46,759	94,152	48,394	38,328	29,407	40,777	37,286	32,742
Northern Shoveler	13,684	3,311	3,997	6,236	15,614	15,120	5,377	6,661	26,175	12,058	9,762	2,550	6,747	915	1,273	1,276	5,469	3,456	10,413
Northern Pintail	1,326	2,180	1,331	575	1,154	867	1,449	1,153	979	1,028	56	402	404	174	230	582	230	56	174
Wood Duck	46,347	46,333	39,996	29,848	43,132	35,103	46,659	45,866	49,067	31,777	21,603	21,759	37,553	16,253	12,616	10,281	27,652	19,802	22,664
Dabbler subtotal	306,777	244,705	260,545	232,559	279,575	262,065	297,413	264,905	303,502	244,239	276,030	191,704	315,393	153,573	134,222	124,568	183,876	143,214	151,518
Divers:																			
Redhead	13,034	5,522	8,729	9,176	2,876	3,809	3,880	5,616	5,911	7,552	2,289	1,092	3,656	2,438	842	2,373	3,107	1,926	1,878
Canvasback	2,111	3,709	4,914	4,034	2,792	2,034	5,200	3,262	6,072	2,549	2,996	3,516	3,684	972	833	2,517	4,311	2,785	1,687
Scaup	66,071	11,801	57,670	28,420	65,585	31,138	28,416	14,041	32,376	15,743	13,016	5,117	30,906	12,397	1,971	1,894	14,854	12,571	3,299
Ring-necked Duck	11,297	8,249	12,481	4,030	23,755	9,913	7,986	6,060	18,565	14,768	16,542	5,294	15,675	13,829	12,085	4,525	43,169	22,501	8,579
Goldeneye	1,617	1,391	1,706	2,291	3,834	1,340	1,041	1,687	1,684	2,367	3,477	1,539	1,269	1,383	1,216	1,092	976	1,384	864
Bufflehead	1,944	465	1,374	56	1,439	291	404	111	56	111	2,609	1,011	2,944	517	513	868	4,231	2,521	1,206
Ruddy Duck	8,513	5,858	3,223	2,633	1,937	993	11,052	1,613	0	779	22,054	3,192	2,567	2,443	1,060	261	1,114	1,384	437
Hooded Merganser	1,143	1,154	1,275	1,439	2,411	1,719	1,202	2,641	2,392	2,299	3,432	1,209	2,251	1,785	1,776	519	1,947	1,993	1,890
Large Merganser	576	0	230	174	0	56	0	0	117	228	522	972	234	723	957	626	1,032	681	681
Diver subtotal	106,306	38,149	91,602	52,253	104,629	51,293	59,181	35,031	67,173	46,396	66,937	22,942	63,186	36,487	21,253	14,675	74,741	47,746	20,521
Total Ducks	413,083	282,854	352,147	284,812	384,204	313,358	356,594	299,936	370,675	290,635	342,967	214,646	378,579	190,060	155,475	139,243	258,617	190,960	172,039
Other:																			
Coot	85,011	18,546	14,777	4,965	193,021	34,700	6,331	15,020	72,793	5,321	21,804	11,319	106,845	11,641	15,633	6,290	55,927	9,213	691
Canada Goose	33,965	43,858	48,595	58,066	60,870	60,449	79,147	80,012	105,932	89,418	78,200	87,663	98,339	83,384	75,688	98,316	70,311	67,473	66,085

Table 7. Estimated waterfowl populations during the Minnesota Waterfowl breeding population survey, 1968-2010.

	Mallard				Blue-winged teal				Other ducks (exc. scaup)		
Year	Unad. PI	VCF	PI	SE	Unad. PI	VCF	PI	SE	Unad. PI	VCF	PI
1968	41,030	2.04	83,701		61,943	2.44	151,141		41,419	2.08	86,152
1969	53,167	1.67	88,789		45,180	3.45	155,871		34,605	2.27	78,553
1970	67,463	1.69	113,945		31,682	5.06	160,343		30,822	1.62	49,932
1971	47,702	1.65	78,470		42,445	3.49	148,218		29,520	1.71	50,450
1972	49,137	1.27	62,158		49,386	1.96	96,895		34,405	1.69	58,127
1973	56,607	1.76	99,832		53,095	3.92	208,292		33,155	2.45	81,362
1974	44,866	1.62	72,826		39,402	2.59	102,169		38,266	2.79	106,609
1975	55,093	3.19	175,774		45,948	3.95	181,375		34,585	3.31	114,459
1976	69,844	1.69	117,806		89,370	4.87	435,607		39,022	3.35	130,669
1977	60,617	2.21	134,164		37,391	3.86	144,187		18,633	11.95	222,748
1978	56,152	2.61	146,781		28,491	8.53	242,923		22,034	3.30	72,798
1979	61,743	2.57	158,704	28,668	46,708	5.21	243,167	62,226	39,749	3.79	150,545
1980	83,775	2.05	171,957	22,312	50,966	6.49	330,616	40,571	47,322	3.97	188,020
1981	79,562	1.95	154,844	16,402	64,546	2.59	167,258	23,835	30,947	3.80	117,667
1982	51,655	2.33	120,527	17,078	42,772	4.75	203,167	34,503	32,726	4.32	141,501
1983	73,424	2.12	155,762	15,419	42,728	2.81	119,980	20,809	32,240	2.84	91,400
1984	94,514	1.99	188,149	24,065	89,896	2.82	253,821	33,286	40,326	2.18	87,709
1985	96,045	2.26	216,908	32,935	90,453	2.91	263,607	33,369	35,018	2.35	82,383
1986	108,328	2.16	233,598	30,384	68,235	2.69	183,338	28,204	38,900	2.67	103,851
1987	165,881	1.16	192,289	23,500	102,480	1.99	203,718	32,289	76,746	2.51	192,947
1988	155,543	1.75	271,718	38,675	101,183	2.38	240,532	39,512	81,514	2.61	212,988
1989	124,362	2.19	272,968	26,508	90,300	3.16	285,760	39,834	88,109	2.89	254,887
1990	140,879	1.65	232,059	26,316	107,177	3.09	330,659	44,455	124,531	1.97	245,152
1991	128,315	1.75	224,953	28,832	91,496	2.90	265,138	42,057	93,784	2.81	263,619
1992	144,126	2.50	360,870	43,621	93,107	3.83	356,679	53,619	109,779	2.33	255,774
1993	123,771	2.47	305,838	31,103	64,670	4.02	260,070	36,307	82,612	3.28	271,263
1994	138,482	3.08	426,455	66,240	70,324	5.48	385,256	82,580	85,671	3.55	303,847
1995	142,557	2.24	319,433	48,124	47,737	4.40	210,043	40,531	66,096	4.05	267,668
1996	153,473	2.05	314,816	53,461	57,196	5.05	288,913	64,064	107,950	2.64	285,328
1997	160,629	2.54	407,413	65,771	45,496	5.57	253,408	67,526	76,095	2.72	207,316
1998	188,972	1.95	368,450	61,513	47,788	3.66	174,848	33,855	91,478	1.64	149,786
1999	169,213	1.87	316,394	51,651	36,106	4.53	163,499	36,124	80,459	2.49	200,570
2000	157,853	2.02	318,134	36,857	60,288	2.97	179,055	32,189	120,158	2.09	250,590
2001	146,034	2.20	320,560	39,541	37,706	3.60	135,742	19,631	91,152	2.85	260,051
2002	145,191	2.53	366,625	46,264	91,982	4.67	429,934	87,312	92,778	4.04	374,978
2003	115,974	2.42	280,517	34,556	46,759	4.13	193,269	36,176	46,796	5.30	248,019
2004	158,416	2.37	375,313	57,591	94,152	3.75	353,209	56,539	95,105	2.94	279,802
2005	82,472	2.89	238,500	28,595	48,394	4.01	194,125	37,358	46,797	4.26	199,355
2006	72,843	2.21	160,715	24,230	38,328	4.53	173,674	60,353	42,333	4.41	186,719
2007	76,979	3.15	242,481	30,020	29,407	4.20	123,588	20,055	30,963	3.73	115,390
2008	103,411	2.88	297,565	27,787	40,777	3.74	152,359	24,157	99,575	2.91	289,629
2009	78,368	3.02	236,436	36,539	37,286	3.63	135,262	32,155	62,725	2.70	169,568
2010	80,922	2.99	241,884	33,940	32,742	4.04	132,261	27,430	55,076	2.84	156,599
Averages:											
10-year (2000-2009)	113,754	2.57	283,685	36,198	52,508	3.92	207,022	40,593	72,838	3.52	237,410
Long-term (1968-2009)	102,964	2.18	224,409	35,953	59,542	3.90	220,969	41,790	60,640	3.17	178,576
% change from: 2009	3%	-1%	2%	-7%	-12%	11%	-2%	-15%	-12%	5%	-8%
10-year average	-29%	16%	-15%	-6%	-38%	3%	-36%	-32%	-24%	-19%	-34%
Long-term average	-21%	37%	8%	-6%	-45%	4%	-40%	-34%	-9%	-10%	-12%

[1] Unad. PI - unadjusted population index, VCF - Visibility Correction Factor, PI - adjusted population index, SE - standard error.

Table 7. Continued.

	Scaup			Total ducks (ex. scaup)		Total Ducks		Canada geese		
Year	Unad. PI	VCF	PI	Unad. PI	PI	Unad. PI	PI	Unad. PI	VCF	PI
1968	22,834	2.08	47,495	144,392	320,994	167,226	368,488			
1969	9,719	2.27	22,062	132,952	323,213	142,671	345,275			
1970	12,105	1.62	19,610	129,967	324,219	142,072	343,829			
1971	5,713	1.71	9,764	119,667	277,137	125,380	286,901			
1972	12,062	1.69	20,379	132,928	217,181	144,990	237,560	366		
1973	10,633	2.45	26,093	142,857	389,486	153,490	415,580	1,965		
1974	18,378	2.79	51,201	122,534	281,605	140,912	332,806	8,835		
1975	9,563	3.31	31,649	135,626	471,608	145,189	503,257	5,997		
1976	22,494	3.35	75,323	198,236	684,082	220,730	759,405	5,409		
1977	2,971	11.95	35,517	116,641	501,099	119,612	536,616	7,279		
1978	14,774	3.35	48,812	106,677	462,502	121,451	511,314	7,865		
1979	92,134	3.79	348,948	148,200	552,416	240,334	901,364	4,843		
1980	12,602	3.97	50,070	182,063	690,593	194,665	740,663	6,307		
1981	19,844	3.88	75,451	175,055	439,769	194,899	515,220	10,156		
1982	21,556	4.32	93,204	127,153	465,195	148,709	558,399	6,600		
1983	9,551	2.84	27,077	148,392	367,142	157,943	394,219	11,081		
1984	15,683	2.18	34,111	224,736	529,679	240,419	563,790	14,051		
1985	7,409	2.35	17,430	221,516	562,898	228,925	580,328	16,658		
1986	6,247	2.67	16,678	215,463	520,787	221,710	537,465	19,599		
1987	10,306	2.51	25,910	345,107	588,954	355,413	614,864	29,960		
1988	10,545	2.61	27,553	338,240	725,238	348,785	752,791	39,057	1.36	53,004
1989	71,898	2.89	207,991	302,771	813,615	374,669	1,021,606	51,946	1.88	97,898
1990	40,075	1.97	78,892	372,587	807,870	412,662	886,761	58,425	1.37	80,147
1991	40,727	2.81	114,480	313,595	753,710	354,322	868,191	42,231	4.18	176,465
1992	66,071	2.33	153,939	347,012	973,323	413,083	1,127,262	33,965	2.43	82,486
1993	11,801	3.28	38,750	271,053	837,172	282,854	875,921	43,858	2.08	91,369
1994	57,670	3.55	204,536	294,477	1,115,558	352,147	1,320,095	48,595	1.68	77,878
1995	28,421	4.05	115,096	256,390	797,144	284,811	912,241	58,065	2.08	120,775
1996	65,585	2.64	173,351	318,619	889,057	384,204	1,062,408	60,870	3.92	238,708
1997	31,138	2.72	84,834	282,220	868,137	313,358	952,971	60,449	2.59	156,817
1998	28,416	1.64	46,528	328,238	693,084	356,654	739,612	79,147	1.75	138,507
1999	14,041	2.49	35,002	285,778	680,463	299,819	715,465	80,012	3.35	268,168
2000	32,376	2.10	67,520	338,299	747,779	370,675	815,299	105,932	2.84	301,298
2001	15,743	2.85	44,914	274,892	716,353	290,653	761,267	89,418	2.17	193,887
2002	13,016	4.04	52,606	327,951	1,171,537	340,967	1,224,143	78,200	2.42	189,353
2003	5,117	5.30	27,120	209,529	721,805	214,646	748,925	87,663	3.78	331,094
2004	30,906	2.94	90,926	347,673	1,008,324	378,579	1,099,250	98,339	1.58	155,859
2005	12,397	4.26	52,811	177,663	631,980	190,060	684,791	83,384	2.02	168,469
2006	1,971	4.41	8,692	153,504	521,109	155,475	529,801	75,688	2.73	206,757
2007	1,894	3.73	7,058	137,349	488,517	139,243	495,575	98,316	1.47	144,289
2008	14,854	2.91	43,205	243,763	739,553	258,617	782,758	70,311	1.99	139,708
2009	12,571	2.70	33,979	178,379	541,266	190,950	575,245	67,473	2.44	164,405
2010	3,299	2.84	9,380	168,740	530,744	172,039	540,124	66,085	2.22	146,960
Averages:										
10-year (2000-2009)	14,085	3.52	42,883	238,900	728,822	252,987	771,705	85,472	2.34	199,512
Long-term (1968-2009)	22,472	3.17	66,347	223,099	624,123	245,571	690,470	43,903	2.37	162,606
% change from: 2009	-74%	5%	-72%	-5%	-2%	-10%	-6%	-2%	-9%	-11%
10-year average	-77%	-19%	-78%	-29%	-27%	-32%	-30%	-23%	-5%	-26%
Long-term average	-85%	-11%	-86%	-24%	-15%	-30%	-22%	51%	-6%	-10%

[1] Unad. PI - unadjusted population index, VCF - Visibility Correction Factor, PI - adjusted population index, SE - standard error.

Appendix A. Temperature and precipitation at selected cities in, or adjacent to, Minnesota May Waterfowl Survey Strata, 12 April – 17 May 2010 (Source: Minnesota Climatological Working Group, http://climate.umn.edu/cawap/nwssum/nwssum.asp).

		Temperature (F) for week ending:										Total weekly precipitation (inches)					Precipitation departure from normal
		19-April		26-April		3-May		10-May		17-May							
Region	City	Avg[1]	Depart[2]	Avg[1]	Depart[2]	Avg[1]	Depart[2]	Avg[1]	Depart[2]	Avg[1]	Depart[2]	19-April	26-April	3-May	10-May	17-May	1 Apr17 May 17
NW	Crookston	49.0	7.4	56.2	10.8	52.5	3.5	43.2	-9.2	52.6	-2.9	0.39	0.00	0.89	1.31	0.41	0.63
NC	Grand Rapids	51.4	10.5	50.0	5.7	49.0	1.5	43.8	-6.8	49.9	-3.5	0.05	0.34	0.82	1.05	0.79	-0.05
	Itasca	47.6	10.0	49.6	8.4	49.2	4.3	41.2	-7.2	49.0	-2.5	0.48	0.37	1.15	1.05	0.75	1.02
WC	Alexandria	54.0	11.6	52.8	6.9	50.2	0.9	44.5	-8.0	49.9	-5.5	0.62	0.12	0.34	0.47	1.46	-0.14
	Fergus Falls	Missing															
	Montevideo	55.7	11.5	53.0	5.4	53.2	2.2	46.8	-7.4	48.0	-9.2	0.00	0.55	0.39	0.54	1.10	-1.12
	Morris	53.6	9.6	53.8	6.3	51.3	0.4	44.6	-9.5	48.8	-8.2	1.09	0.27	0.44	0.26	1.38	0.15
C	Becker	54.8	10.4	52.4	4.7	54.0	3.3	48.0	-5.6	49.2	-7.0	1.01	0.55	0.23	0.71	1.68	0.11
	Hutchinson	56.4	11.4	55.4	6.9	54.0	2.2	49.4	-5.6	49.7	-8.2	3.92	0.22	0.21	1.10	1.47	3.41
	St. Cloud	53.8	10.3	51.2	4.4	52.2	2.2	45.8	-7.2	51.1	-4.6	0.90	0.29	0.22	0.48	1.48	-0.05
	Staples	53.1	11.2	51.6	6.3	50.5	2.0	43.5	-8.0	48.9	-5.3	0.25	0.00	0.57	0.80	1.51	-0.21
	Willmar	55.4	11.4	54.2	6.6	53.3	2.3	46.7	-7.5	49.5	-7.6	3.05	0.11	0.33	0.39	1.58	1.96
EC	Aitkin	52.2	11.3	49.2	5.1	48.8	1.6	43.6	-6.5	47.8	-5.0	0.15	0.32	1.05	1.26	1.83	1.19
	Cambridge	Missing															
	Msp Airport	57.1	10.6	55.2	5.5	56.6	3.9	48.4	-7.3	53.2	-5.2	1.36	0.54	0.07	0.64	1.31	0.54
SW	Pipestone	54.4	10.0	54.0	6.3	51.5	0.7	45.9	-8.0	48.6	-8.1	0.31	1.04	0.41	0.40	2.55	0.97
	Redwood Falls	57.7	11.0	55.5	5.5	55.3	2.0	48.2	-8.2	52.8	-6.5	0.46	0.71	0.48	0.46	1.53	-0.12
	Worthington	54.8	11.5	54.6	8.0	51.6	1.7	47.7	-5.4	47.8	-8.4	0.97	0.30	0.77	0.28	1.37	0.16
SC	Faribault	54.9	10.9	53.8	6.6	54.8	4.4	49.8	-3.6	50.0	-6.3	0.44	0.26	0.17	0.87	1.32	-1.21
	Waseca	57.4	12.7	55.7	7.7	54.6	3.3	48.4	-6.0	49.5	-7.9	0.87	0.54	0.14	0.75	1.25	-1.33
	Winnebago	57.0	11.2	56.4	7.4	53.9	1.8	51.7	-3.3	49.9	-7.8	0.62	0.53	0.45	0.69	0.97	-1.39
Statewide		53.1	10.3	51.8	5.6	51.7	2.3	45.8	-6.6	49.4	-5.9	0.50	0.33	0.61	0.70	1.26	

[1] Average temperature (°F) for the week ending on the date shown.
[2] Departure from normal temperature.

Waterfowl information is taken from the U.S. Fish and Wildlife Service report Waterfowl Population Status, 2010 by Kathy Fleming, Timothy Moser, Walt Rhodes, and Nathan Zimpfer. The entire report is available on the Division of Migratory Bird Management home page (http://www.fws.gov/migratorybirds/reports/reports.html .

Table 1. Canada goose population indices (in thousands) of the eastern prairie flock, 1971-2010 (from: U.S. Fish and Wildlife Service. 2010. Waterfowl population status, 2010. U.S. Department of the Interior, Washington, D.C. U.S.A.).

Year	Population[a]
1971-72	125,000
1972-73	138,000
1973-74	120,000
1974-75	144,000
1975-76	216,000
1976-77	164,000
1977-78	180,000
1978-79	99,000
1979-80	n.a.
1980-81	125,000
1981-82	132,000
1982-83	155,000
1983-84	136,000
1984-85	158,000
1985-86	195,000
1986-87	203,000
1987-88	209,000
1988-89	210,000
1989-90	232,000
1990-91	212,000
1991-92	202,000
1992-93	157,000
1993-94	211,000
1994-95	205,000
1995-96	190,000
1996-97	199,000
1997-98	126,000
1998-99	207,000
1999-00	275,000
2000-01	215,000
2001-02	216,000
2002-03	229,000
2003-04	291,000
2004-05	255,000
2005-06	185,000
2006-07	218,000

Year	Population[a,b]
2007-08	256,600
2008-09	279,900
2009-10	251,300

[a] Surveys conducted in Spring.

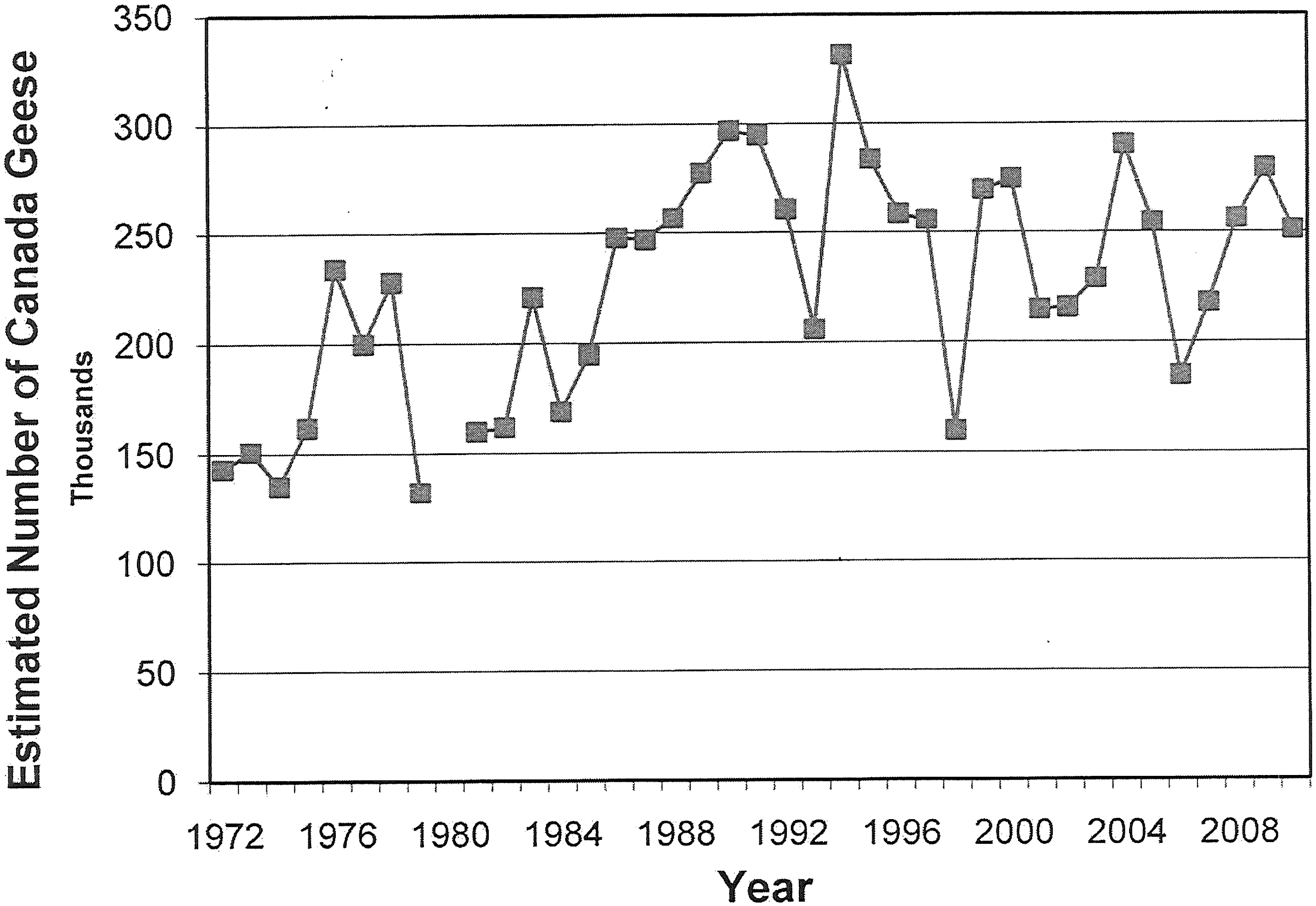


Figure 1. Breeding ground survey estimates of the Eastern Prairie Population of Canada geese, 1972-2010. (from: U.S. Fish and Wildlife Service. 2010. Waterfowl population status, 2010. U.S. Department of the Interior, Washington, D.C. U.S.A.). Surveys conducted in spring. Indirect or preliminary estimates. Data not available for 1980.

Table 2. Estimated number of May ponds (adjusted for visibility) in Prairie Canada (portions of Alberta, Saskatchewan and Manitoba) 1965-2010 and north-central U.S. (North Dakota, South Dakota and Montana) 1974-2010. (from: U.S. Fish and Wildlife Service. 2010. Waterfowl population status, 2010. U.S. Department of the Interior, Washington, D.C. U.S.A.)

	Ponds (thousands)	
Year	Prairie Canada	North Central U.S.[a]
1965	4,379	--
1966	4,555	--
1967	4,691	--
1968	1,986	--
1969	3,548	--
1970	4,875	--
1971	4,053	--
1972	4,009	--
1973	2,950	--
1974	6,390	1,841
1975	5,320	1,911
1976	4,599	1,392
1977	2,278	771
1978	3,622	1,590
1979	4,859	1,522
1980	2,141	761
1981	1,443	683
1982	3,185	1,458
1983	3,906	1,259
1984	2,473	1,766
1985	4,283	1,327
1986	4,025	1,735
1987	2,524	1,348
1988	2,110	791
1989	1,693	1,290
1990	2,817	691
1991	2,494	706
1992	2,784	825
1993	2,261	1,351
1994	3,769	2,216
1995	3,893	2,443
1996	5,003	2,480
1997	5,061	2,397
1998	2,522	2,065
1999	3,862	2,842
2000	2,422	1,524
2001	2,747	1,893
2002	1,439	1,281
2003	3,522	1,668
2004	2,513	1,407
2005	3,921	1,461
2006	4,450	1,644
2007	5,040	1,963
2008	3,055	1,377
2009	3,568	2,866
2010	3729	2,936
Average	3,439	1,608
% Change in 2010 from:		
2009	+ 5	+ 2
Long term Average	+ 8	+ 83

[a] No comparable survey data available for the north-central U.S. during 1965-73.

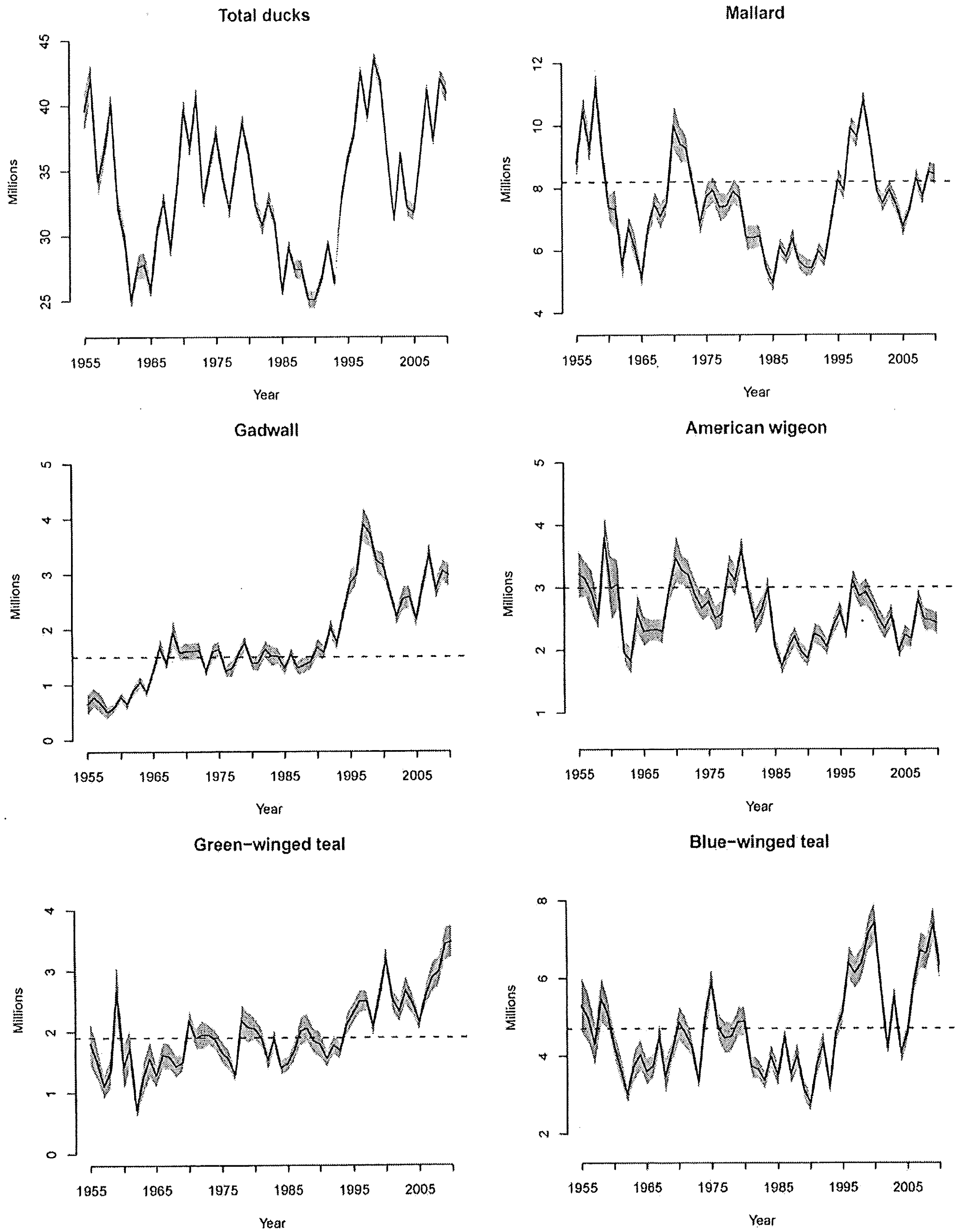


Figure 2. Estimates of North American breeding populations, 95% confidence intervals, and North American Waterfowl Management Plan population goal (dashed line) for selected species and number of water areas in May in Prairie Canada and Northcentral U.S. (from: U.S. Fish and Wildlife Service. 2010. Waterfowl population status, 2010. U.S. Department of the Interior, Washington, D.C. U.S.A.)

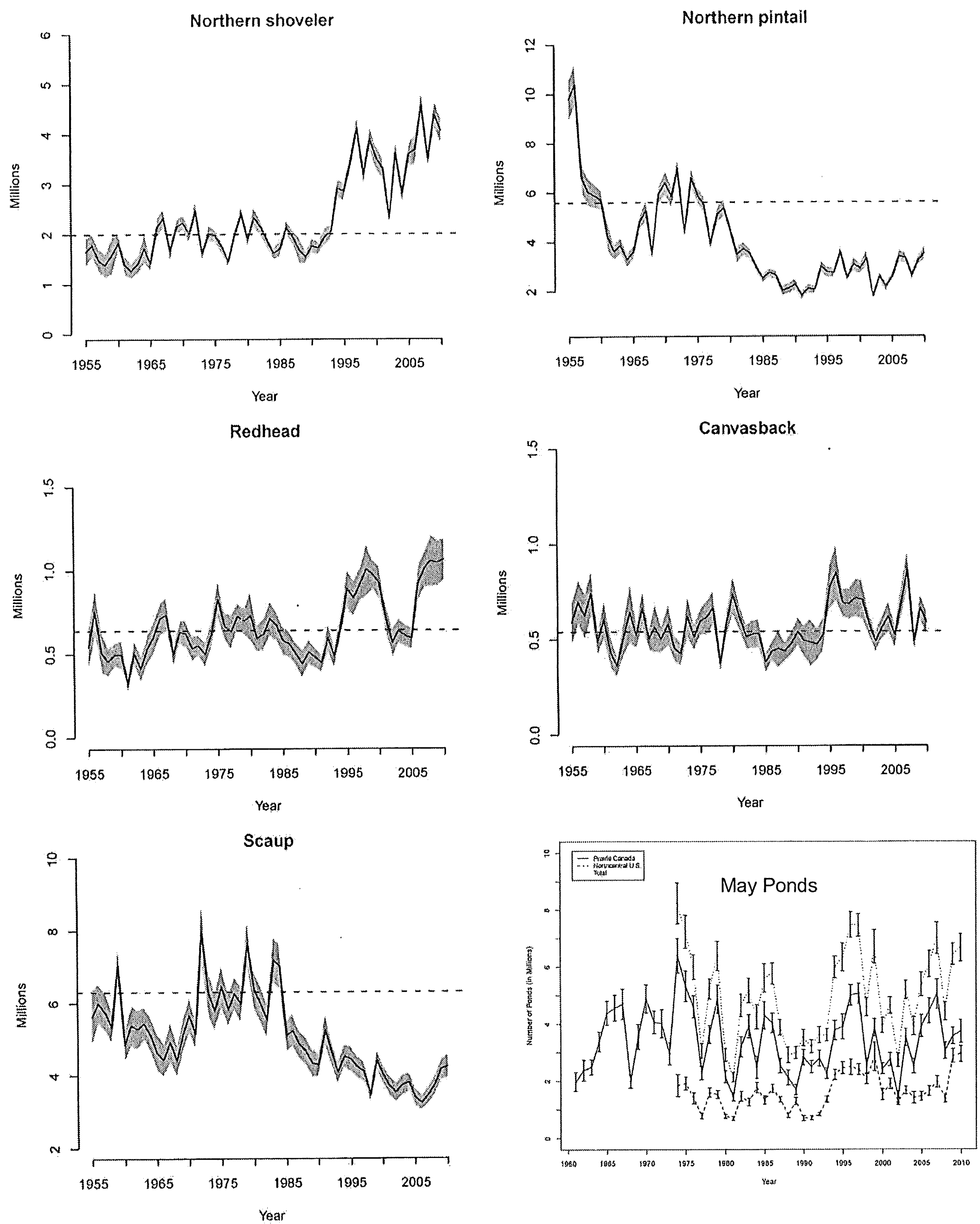


Figure 2. (continued).

2010 MINNESOTA SPRING CANADA GOOSE SURVEY

David Rave, Wetland Wildlife Populations and Research Group

INTRODUCTION

This report presents results from the tenth year of a spring helicopter survey of resident Canada geese in Minnesota. The survey was developed to comply with a Mississippi Flyway Council request to produce a statewide population estimate of resident giant Canada geese having 95% confidence intervals (C.I.'s) that are within $\pm$ 25% of the estimate.

METHODS

The original survey was initiated in 2001 using a double sampling design where an annual stratified sample was randomly selected from 900 plots in each ecoregion (Maxson 2002). I eliminated the double sampling design in 2008 by stratifying all potential plots in each ecoregion, and randomly sampling from the entire sampling frame (i.e., it is now a simple stratified sampling design with new sample plots drawn each year). Stratification criteria and survey protocols were the same as in previous years; thus, results should be comparable among years.

As in the original stratification, the state was divided into three ecoregions (Prairie Parkland, Eastern Broadleaf Forest/Tallgrass Aspen Parklands, Laurentian Mixed Forest) hereafter referred to as Prairie, Transition, and Forest. The 7- county Metro area was excluded from the Transition ecoregion. Similarly, Lake and Cook Counties plus the Boundary Waters Canoe Area and the Northwest Angle were excluded from the Forest ecoregion. Four Statewide ArcView shapefiles were then unioned together: National Wetlands Inventory circular 39, DNR 1:24k lakes, Public Land Survey Quarter section Boundaries, and ECS provinces, to assign each quarter section plot to the appropriate strata.

Four new fields were then computed: total acres of Type 3, 4, and 5 wetlands per quarter section (Circ39_acr) , total acres of 1:24k lakes per quarter section (Lakes_acr), total acres of type 3 wetlands per quarter section (Sum_type3_acr) and total acres of river per quarter section (Sum_Riv_acr). A summary table was created with text fields for each of the 8 strata (habitat-quality class x ecoregion). Using the query builder in ArcMap, quarter sections in each ecoregion were assigned to habitat-quality classes for resident geese: 1) not nesting habitat – expect no geese, 2) limited nesting habitat – habitat capable of supporting 1 or 2 pairs of geese, 3) prime nesting habitat – habitat capable of supporting 3 or more pairs.

Habitat-classification criteria for each ecoregion was:

Prairie

No geese =	Type 3-4-5 <0.5 acres and rivers <10 acres or plot is all water. (n = 61,597 plots).
1-2 pairs =	Type 3-4-5 $\geq$ 0.5 acres but Type 3 <15 acres or Type 3-4-5 <0.5 acres and rivers >10 acres. (n = 30,874 plots).
3+ pairs =	Type 3 >15 acres, but plot is not all water. (n = 9,537 plots).

Transition

No geese =	Type 3-4-5 <1 acre and rivers <8 acres or plot is all water. (n = 39,484 plots).
1-2 pairs =	Type 3-4-5 = 1-25 acres or Type 3-4-5 >25 acres, but Type 3 <15 acres or Type 3-4-5 <1 acre and rivers >8 acres. (n = 31,091 plots).
3+ pairs =	Type 3-4-5 >25 acres, but Type 3 >15 acres and plot is not all water. (n = 7,988 plots).

Forest

No geese =	Type 3-4-5 <2 acres and rivers <2 acres or plot all water. (n = 75,835 plots).
1-2 pairs =	Type 3-4-5 $\geq$2 acres, but not all water or Type 3-4-5 <2 acres and rivers >2 acres. (n = 51,155 plots).
3+ pairs =	None.

Plots in the "no geese class" are not flown and there are no plots in the "3+ pairs" class in the Forest ecoregion. Each year 30 plots are randomly selected in each of the 5 remaining strata using ArcView's AlaskaPak extension, and these 150 plots are surveyed at low level using a helicopter. Ideally, the survey should be conducted during mid-incubation.

Because of a very early spring, and early statewide lake ice-out dates, the survey was started about 4 days earlier in 2010 than in most previous years (Table 2). Pilot John Heineman and I flew the survey on five days between 15 and 20 April, 2010. Canada geese seen within plot boundaries were recorded as singles, pairs, and groups. We also recorded whether singles and pairs were observed with a nest. The number of singles and pairs was doubled when the total number of geese per plot was calculated (unless 2 singles were observed to associate as a pair after being flushed).

RESULTS AND DISCUSSION

The total Canada goose population estimate in the surveyed area for 2010 was 293,234 (±70,760). Adding 17,500 for the Twin Cities metro area (Cooper 2004) yields a statewide estimate of 310,734 (Table 1). Relative error (95% CI half-width) was 24.1% of the estimate, close to the goal of 25.0%. The survey tallied 42.5% singles, 48.2% pairs, and 9.3% groups (Table 2). Typically, many of the pairs seen on this survey are not associated with nests and are likely nonbreeders. An index to nesting effort (i.e., Productive Geese) was obtained by combining singles and pairs associated with nests. In 2010, 46.6% of the geese seen were classified as Productive Geese (Table 2).

The 2010 Canada goose breeding population estimate for the surveyed area was similar to the 2009 estimate, although goose numbers appeared to be slightly lower in the Prairie region and slightly higher in the Forest and Transition regions (Table 1). A time-series plot suggested the goose population in the survey area has been reasonably stable over the last 9 years (Figure 1).

Weather conditions in 2010 were characterized by earlier spring temperatures statewide, and dry, warm weather throughout most of the incubation period and during the survey period. The early spring and the number of productive geese observed this year indicates that 2010 will likely be a very good year for Canada goose production. Weather conditions throughout May and June will influence goose productivity. Regardless, the 2010 Canada goose population estimate remained above the state Canada goose population goal of 250,000 geese.

Wetland and habitat quality were variable in the state this year. Wetland conditions were drier than average in about the southern half of the state, while wetland levels appeared to be average to well above average in the northern half of the state. Due to the large percentage of productive geese in the population, and good wetland conditions in much of the state, I expect above average Canada goose production throughout the state in 2010.

ACKNOWLEDGEMENTS

Frank Martin (Univ. of MN) and Steve Maxson were instrumental in the original design of this survey. Steve also was the principal observer during the first 6 years of the survey. Tim Loesch, Christopher Pouliot, and Shelly Sentyrz set up the original 2,700 ¼-section plots using ArcView and were very helpful in getting the survey up and running in 2001. Shelly Sentyrz was also instrumental in helping to restratify plots statewide for the 2008 survey. Chris Scharenbroich provided GPS coordinates of plots to the pilot, and printed out maps of the 150 plots flown this year. John Heineman piloted the helicopter and served as the second observer. John Giudice provided statistical assistance.

LITERATURE CITED

COOPER, J. 2004. Canada goose program report 2004. Unpublished report. 20 pp.

MAXSON, S.J. 2002. 2002 Minnesota Spring Canada Goose Survey. Unpublished Report.

Table 1. Spring Canada goose population estimates in Minnesota, 2001-2010.

Year	Prairie	Transition	Forest	Subtotal	95% CI	Metro	**TOTAL**
2001	77,360	95,470	92,390	265,220	±69,500	20,000	**285,220**
2002	135,850	144,900	33,940	314,690	±134,286	20,000	**334,690**
2003	106,520	121,290	56,420	284,230	±78,428	20,000	**304,230**
2004	128,501	130,609	95,636	354,747	±107,303	20,000	**374,747**
2005	113,939	149,286	57,529	320,754	±90,541	17,500	**338,254**
2006	126,042	164,085	67,994	358,071	±108,436	17,500	**375,571**
2007	137,151	99,274	25,509	261,933	±80,167	17,500	**279,433**
2008*	113,483	127,490	30,400	271,372	±69,055	17,500	**288,872**
2009	129,115	114,737	23,644	267,496	±70,607	17,500	**284,996**
2010	83,911	151,902	57,421	293,234	±70,760	17,500	**310,734**

*Prior to 2008, double-sampling for stratification was used to estimate stratum weights. The entire frame was re-stratified in 2008 (double-sampling was eliminated) and Lake of the Woods and the NW Angle were removed from the frame. The sampling frame was adjusted slightly in 2009 because of some processing errors in 2008. The population estimates for 2008 are based on the updated (2009) sampling frame.

Table 2. Percent of Canada Geese seen as singles, pairs, groups, and productive geese on the Minnesota Spring Canada Goose Survey, 2001-2010.

Year	Singles[1]	Pairs[1]	Groups	Productive Geese[2]	Dates of Survey
2001	27.0	63.9	9.1	36.4	4/14 to 5/02/2001
2002	30.7	52.0	17.2	41.5	4/26 to 5/11/2002
2003	27.9	58.2	13.9	29.3	4/22 to 5/01/2003
2004	26.5	57.5	16.0	35.5	4/22 to 5/04/2004
2005	33.0	50.2	16.8	40.7	4/20 to 5/03/2005
2006	43.5	45.9	10.6	50.3	4/24 to 5/05/2006
2007	31.0	51.5	17.5	36.2	4/23 to 4/28/2007
2008	38.4	55.4	6.2	42.6	4/23 to 5/05/2008
2009	41.8	50.7	7.5	45.2	4/21 to 5/01/2009
2010	42.5	48.2	9.3	46.6	4/15 to 4/20/2010

[1]Singles and pairs were doubled before calculating proportions.
[2]Productive geese equals Singles + Pairs with nests.

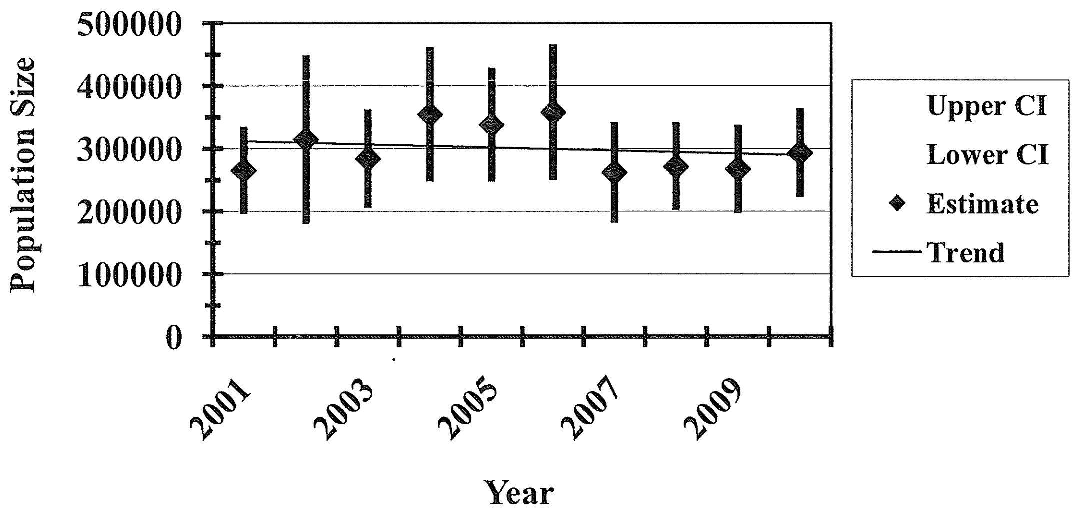


Figure 1. Spring Canada goose population estimates (±95% CI) in Minnesota, 2001-2010. (Does not include Metro area.)

Mourning dove information is taken from the U.S. Fish and Wildlife Service report by Sanders T. A. and K. Parker. 2010. Mourning dove population status, 2010. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C. 28 pp. The entire report is available on the Division of Migratory Bird Management web site

(http://www.fws.gov/migratorybirds/NewReportsPublications/PopulationStatus.html).

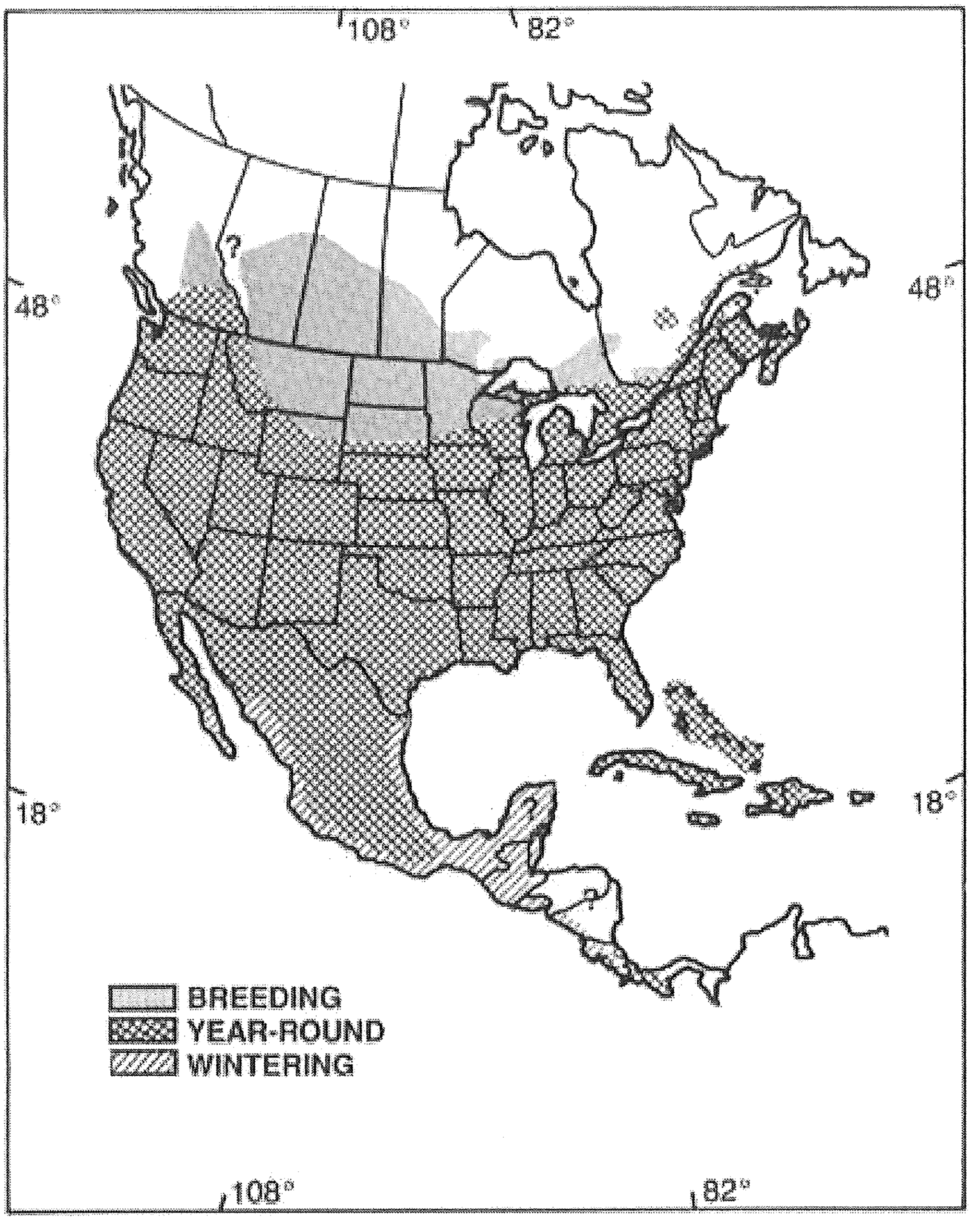


Figure 1. Breeding and wintering ranges of the mourning dove (adapted from Mirarchi and Baskett 1994). (From: Sanders T. A. and K. Parker. 2010. Mourning dove population status, 2010. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C. 28 pp.)

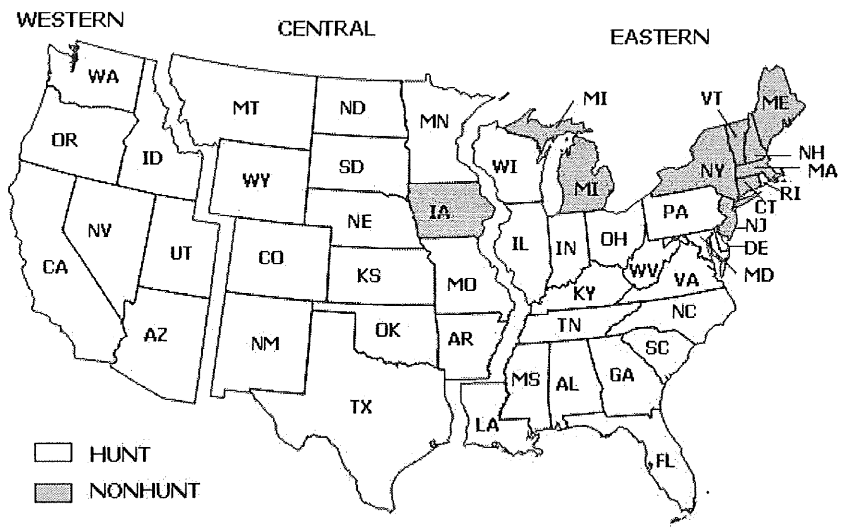


Figure 2. Mourning dove management units with 2009 hunting and non-hunting states. (From: Sanders T. A. and K. Parker. 2010. Mourning dove population status, 2010. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C. 28 pp.)

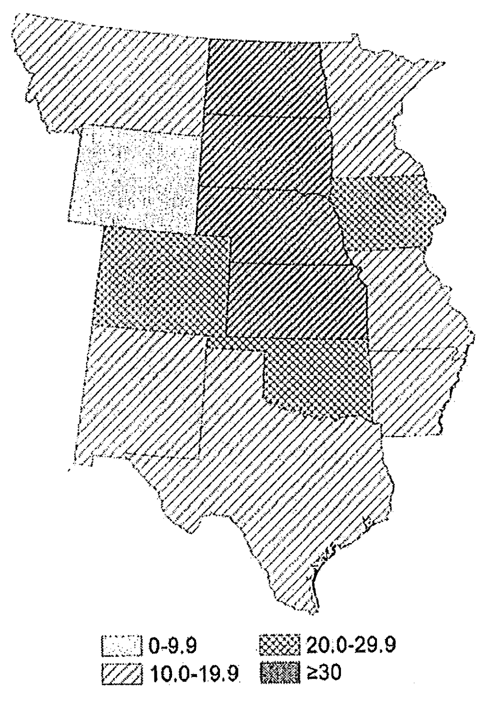


Figure 3. Mourning dove abundance in the Central Management Unit, based on the mean of the 2 CCS-heard index values from the last 2 years (2009-10). (From: Sanders T. A. and K. Parker. 2010. Mourning dove population status, 2010. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C. 28 pp.)

Table 1. Preliminary estimates and 95% confidence intervals (CI, expressed as the interval half width in percent) of mourning dove harvest and hunter activity for the Central management unit during the 2007, 2008 and 2009 seasons [a]. (From: Sanders T. A. and K. Parker. 2010. Mourning dove population status, 2010. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C. 28 pp.)

Management unit / State	Hunters			Hunter Days Afield			Total Harvest		
	2007[1]	2008[1]	2009	2007	2008	2009	2007	2008	2009
CENTRAL	485,700 [2]	443,900	393,400 †[3]	1,803,900 ± 9	1,496,900 ± 9	1,312,700	9,180,200 ± 9	7,520,000 ± 10	7,474,600 ± 12
AR	37,000 ± 16	23,300 ± 18	22,400 ±19	115,900 ± 23	76,600 ± 33	53,800 ± 26	791,700 ± 24	422,000 ± 23	353,500 ± 21
CO	21,800 ±11	23,200 ± 12	20,300 ± 13	57,800 ± 14	60,400 ± 18	45400 ± 18	315,000 ± 14	288,400 ± 19	242,400 ± 17
KS	36,300 ±8	26,800 ± 11	29,400 ± 10	119,100 ± 11	78,500 ± 15	97,000 ± 14	725,100 ± 13	443,700 ± 15	572,600 ± 16
MN	7,700 ± 35	11,300 ± 28	6,800 ± 36	27,600 ± 49	34,900 ± 42	24,100 ± 64	67,400 ± 52	83,500 ± 48	61,500 ± 67
MO	42,600 ± 8	34,300 ± 9	21,500 ± 16	124,400 ± 13	93,400 ± 14	58,700 ± 21	603,300 ± 15	467,800 ± 16	294,700 ± 26
MT	1,700 ± 31	2,100 ± 45	2,500 ± 32	4,000 ± 34	3,700 ± 44	6,400 ± 46	20,900 ± 43	18,400 ± 51	12,700 ± 32
NE	17,000 ± 12	13,600 ± 33	16,000 ± 12	55,300 ± 16	48,800 ± 52	51,800 ± 15	319,600 ± 18	238,600 ± 49	277,600 ± 17
NM	8,600 ± 18	6,300 ± 18	7,800 ±16	40,100 ± 33	26,200 ± 29	35,700 ± 26	198,700 ± 25	138,100 ± 30	170,200 ± 26
ND	3,200 ± 27	2,700 ± 30	2,800 ± 28	9,900 ± 26	9,200 ± 44	10,800 ± 50	48,700 ± 27	26,400 ± 31	40,000 ± 31
OK	24,600 ± 14	19,300 ± 17	18,600 ± 12	73,100 ± 19	57,800 ± 17	55,500 ± 15	480,000 ± 24	361,200 ± 18	378,400 ± 17
SD	6,000 ± 20	7,300 ± 18	6,500 ± 19	18,200 ± 25	27,500 ±34	21,700 ± 23	104,000 ± 30	152,100 ± 30	105,400 ± 24
TX	275,200 ± 10	271,300 ± 10	236,600 ± 10	1,149,600 ± 13	974,100 ± 13	846,200 ± 12	5,463,300 ± 14	4,849,600 ± 14	4,945,100 ± 18
WY	4,000 ± 20	2,500 ± 25	2,300 ± 27	8,800 ± 24	5,900 ± 33	5,800 ± 31	42,600 ± 27	30,100 ± 36	20,600 ± 31

[1] This represents the 95% confidence interval expressed as a percent of the point estimate.
[2] Hunter number estimates at the Management Unit and national levels may be biased high, because the HIP sample frames are state specific; therefore hunters are counted more than once if they hunt in >1 state. Variance is inestimable.
[3] No estimate available.

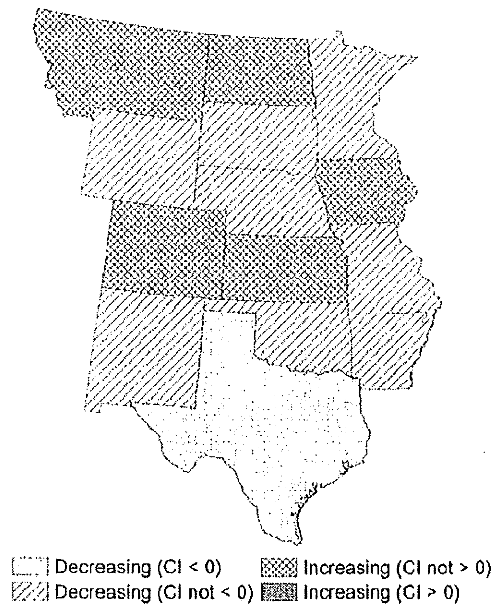


Figure 4. Trend in mourning dove abundance by state in the Central Management Unit over the last 10 years (2001-2010) based on CCS-heard data. Credible intervals (CI, 95%) that exclude zero provide evidence for an increasing or decreasing trend (From: Sanders T. A. and K. Parker. 2010. Mourning dove population status, 2010. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C. 28 pp.)

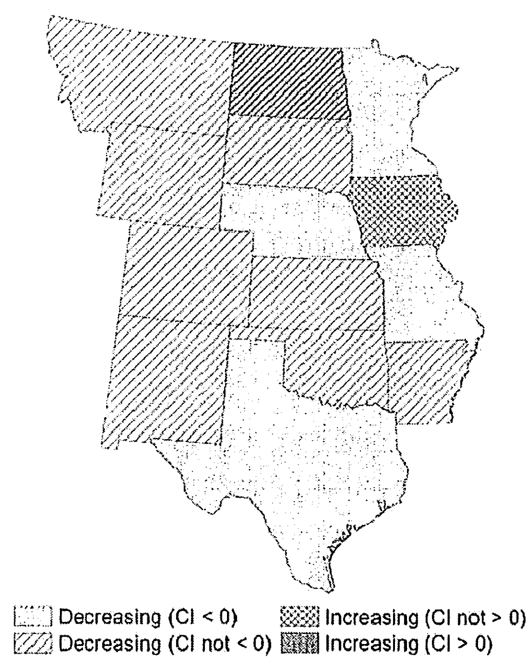


Figure 5. Trend in mourning dove abundance by state in the Central Management Unit over the last 45 years (1966-2010) based on CCS-heard data. Credible intervals (CI, 95%) that exclude zero provide evidence for an increasing or decreasing trend. (From: Sanders T. A. and K. Parker. 2010. Mourning dove population status, 2010. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C. 28 pp.)

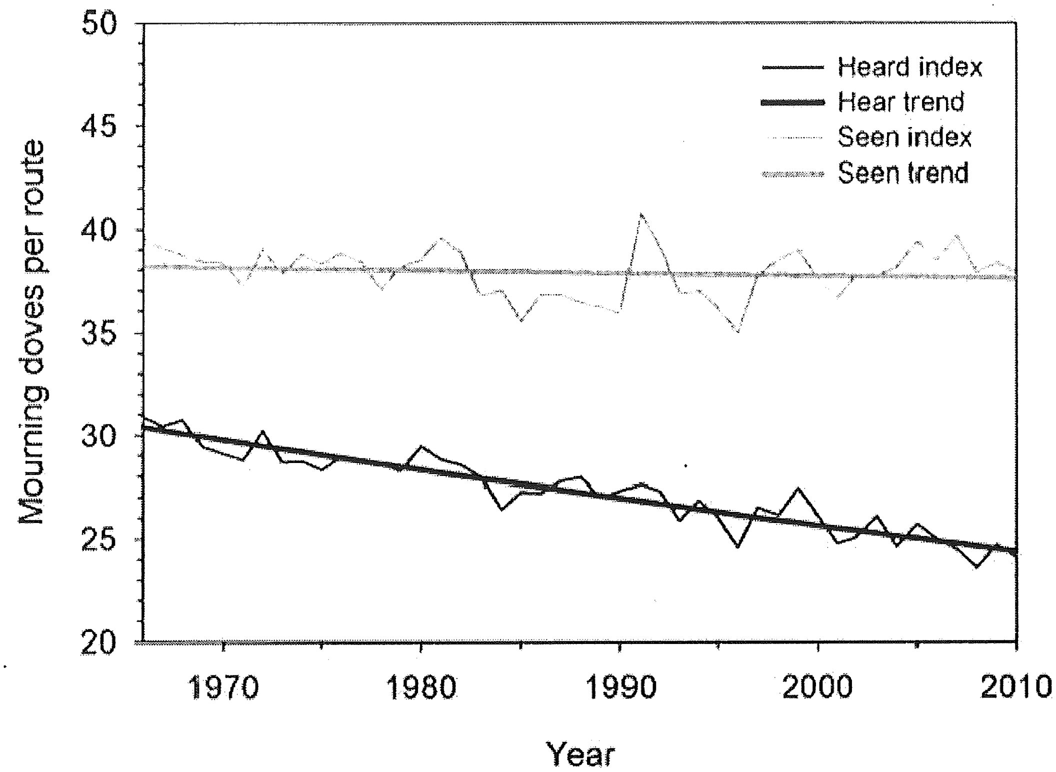


Figure 6. Mourning dove abundance indices and predicted trends in the Central Management Unit based on CCS data, 1966-2010. Trend lines are exponentiated predicted values from fitting a regression line through the log transformed annual indices. (From: Sanders T. A. and K. Parker. 2010. Mourning dove population status, 2010. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C. 28 pp.)

American Woodcock information is taken from the U.S. Fish and Wildlife Service report American Woodcock Population Status, 2010. Cooper, T.R. and K. Parker. Us. Fish and Wildlife Service, Laurel, MD. 16 pp. The entire report is available on the Division of Migratory Bird Management home page (http://www.fws.gov/migratorybirds/NewReportsPublications/PopulationStatus.html).

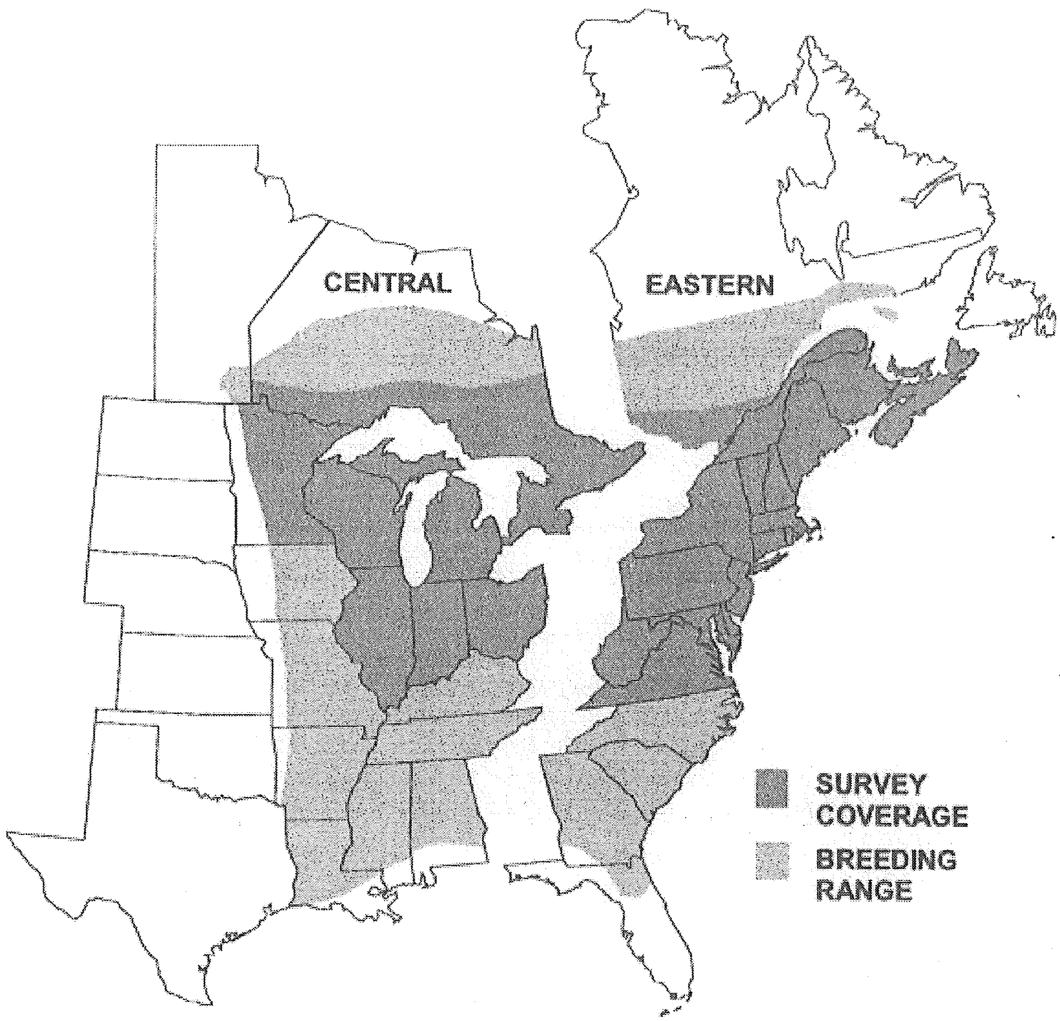


Figure 1. Woodcock management regions, breeding range, singing-ground survey coverage, (from: Cooper, T.R. and K. Parker. 2010. American woodcock population status, 2010. U.S. Fish and Wildlife Service, Laurel, MD. 16pp.)

Table 24. Short term (2009 – 10), 10 –year (2000-2010), and long-term (1968-2010) trends (% change per year [a]) in the number of American woodcock heard during the Singing-ground Survey as determined by using the hierarchical log-linear modeling technique (Sauer et al. 2008) (from: Cooper, T.R. and K. Parker. 2010. American woodcock population status, 2010. U.S. Fish and Wildlife Service, Laurel, MD. 16pp.).

Management Unit/State	Number of Routes[b]	n[c]	(2009-10) % Change	(2000-10) % Change	(1968-10) % Change
CENTRAL	453	639	4.39	-1.19	- 0.97
IL	46	26	33.33	1.43	1.23
IN	11	40	4.52	- 2.69	- 3.92
MB[d]	17	23	- 1.81	- 1.24	- 1.65
MI	112	148	2.80	- 1.30	- 1.12
MN	74	103	21.00	0.69	0.46
OH	27	57	- 2.49	- 0.86	- 1.80
ON	89	139	- 4.24	- 2.97	- 1.05
WI	77	103	- 0.30	- 0.58	- 0.67

[a] Median of route trends estimated used hierarchical modeling. To estimate the total percent change over several years, use: 100(% change/100+1)y)-100 where y is the number of years. Note: extrapolating the estimated trend statistic (% change per year) over time (e.g., 30 years) may exaggerate the total change over the period.

[b] Total number of routes surveyed in 2010 for which data were received by 2 June, 2010.

[c] Number of routes with >2 years of data and at least 1 observed woodcock between 1968 and 2010.

[d] Manitoba began participating in the Singing-ground survey in 1990.

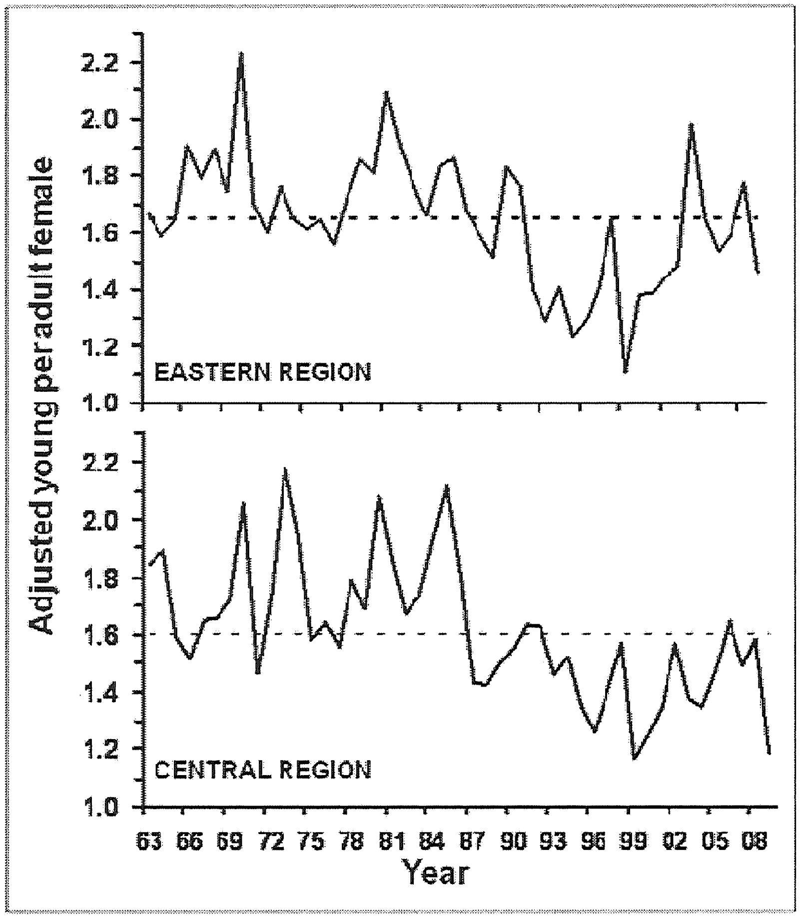


Figure 2. Weighted annual indices of American woodcock recruitment, 1963-2009. Dashed line is the 1963-2008 average. (from: Cooper, T.R. and K. Parker. 2010. American woodcock population status, 2010. U.S. Fish and Wildlife Service, Laurel, MD. 16pp.).

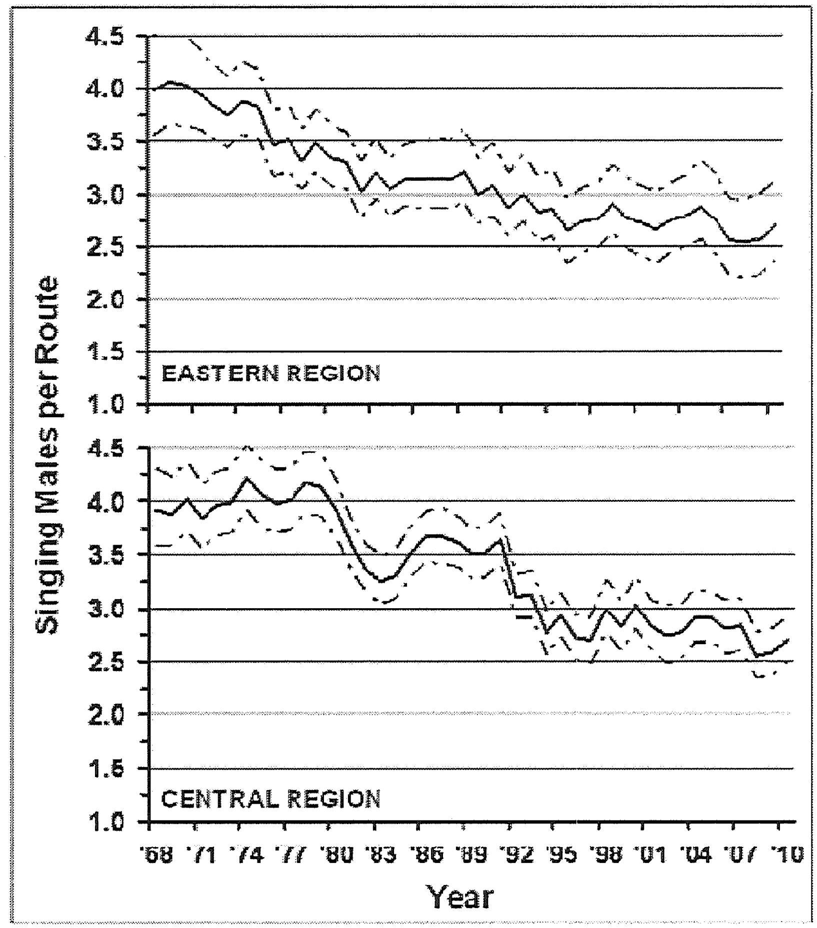


Figure 3. Annual indices of the number of woodcock heard on the Singing-ground Survey, 1968-2010. The dashed lines represent the 95th percentile credible interval. (from: Cooper, T.R. and K. Parker. 2010. American woodcock population status, 2010. U.S. Fish and Wildlife Service, Laurel, MD. 16pp.).

Table 25. Preliminary estimates of woodcock hunter numbers, days afield, and harvest for selected states, from the 2006-07, 2007-08, 2008-09, and 2009-10. Harvest Information Program surveys. Note: for 2009-10 all estimates rounded to the nearest 100 for harvest, hunters, and days afield. (from: Cooper, T.R. and K. Parker. 2010. American woodcock population status, 2010. U.S. Fish and Wildlife Service, Laurel, MD. 16pp.).

Management Unit / State	Active woodcock hunters				Days afield				Harvest			
	2006-07	2007-08	2008-09	2009-10 ([a])	2006-07	2007-08	2008-09	2009-10 ([a])	2006-07	2007-08	2008-09	2009-10([a])
Central Region	n.a.[b]	n.a.[b]	n.a.[b]	n.a.[b]	344,262 ± 12%	358,480 ± 14%	369,800 ± 16%	322,300 ± 14	232,557 ± 17%	214,162 ± 16%	174,300 ± 16%	175,100 ± 17
IL	1,973 ± 87%	3,111 ± 73%	2,100 ± 90%	1,800 ± 98	8,944 ± 115%	7,644 ± 72%	6,100 ± 103%	6,200 ± 91	2,171 ± 160%	3,819 ± 149%	4,300 ± 100%	5,300 ± 142
IN	1,000 ± 58%	1,788 ± 71	900 ± 69%	1,100 ± 63	4,377 ± 75%	3,342 ± 58%	2,400 ± 63%	4,000 ± 80	2,403 ± 69%	1,203 ± 53%	800 ± 31%	1,700 ±79
MI	30,017 ± 14%	28,412 ± 13%	34,600 ± 13%	26,400 ± 15	155,333 ± 17%	138,881 ±15%	156,000 ± 17%	146,200 ± 21	116,216 ± 27%	86,825 ± 17%	78,900 ± 17%	80,900 ± 22
MN	14,934 ± 24%	15,295 ± 29%	8,700 ± 37%	9,700 ± 37	60,160 ± 31%	62,810 ± 36%	37,900 ± 43%	38,300 ± 44	38,738 ± 41%	34,400 ± 38%	19,900 ± 67%	16,00 ± 48
OH	2,249 ± 68%	2,611 ± 73%	2,900 ± 69%	1,600 ± 82	9,764 ± 67%	9,259 ± 72%	10,300 ± 70%	7,200 ± 94	4,060 ± 51%	2,598 ± 68%	2,300 ± 68%	1,200 ± 63
WI	19,390 ± 22%	17,258 ± 23%	14,200 ± 24%	19,400 ± 22	72,365 ± 25%	79,139 ± 31%	65,400 ± 35%	77,100 ±24	42,958 ± 25%	48,027 ± 31%	36,000 ± 27%	29,200 ± 24

[a] 95% Confidence Intervals are expressed as a % of the point estimate.

[b]. Regional estimates of hunter numbers cannot be obtained due to the occurrence of individual hunters being registered in the Harvest Information Program in more than one state.

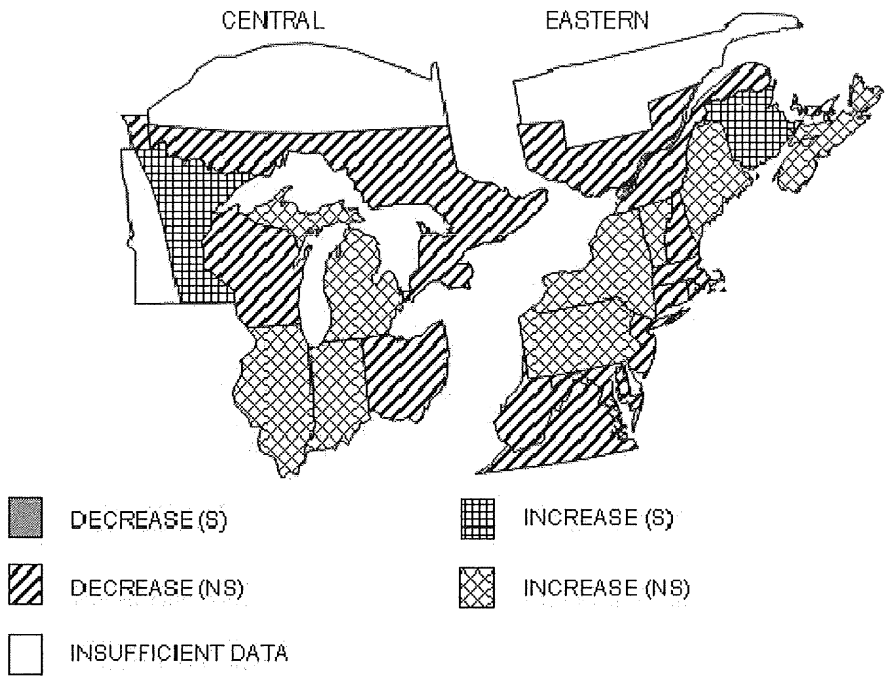


Figure 4. Short-term trends in number of American woodcock heard on the Singing-ground Survey; 2009-10, as determined by the hierarchical modeling method. A significant trend (S) does not include zero in the 95% credible interval, while a non-significant (NS) trend does include zero. (from: Cooper, T.R. and K. Parker. 2010. American woodcock population status, 2010. U.S. Fish and Wildlife Service, Laurel, MD. 16pp.).

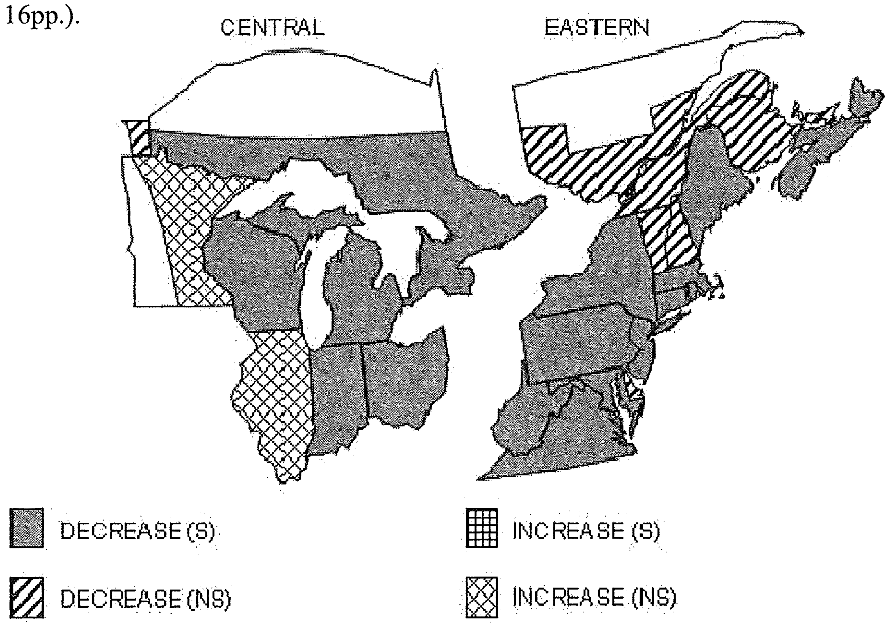


Figure 5. Long-term trends in number of American woodcock heard on the Singing-ground Survey; 1968-2010, as determined by the hierarchical modeling method. A significant trend (S) does not include zero in the 95% credible interval, while a non-significant (NS) trend does include zero. (from: Cooper, T.R. and K. Parker. 2010. American woodcock population status, 2010. U.S. Fish and Wildlife Service, Laurel, MD. 16pp.).

2010 RING-NECKED DUCK BREEDING PAIR SURVEY

Christine M. Herwig, Wetland Wildlife Populations and Research Group

SUMMARY OF FINDINGS

A pilot study was conducted in 2004 – 2006 to develop a survey for Minnesota's ring-necked duck (*Aythya collaris*) resident breeding population because little was known about the distribution and abundance of breeding ring-neck ducks in the state. We employed the survey design and methods developed during the pilot study (Zicus et al. 2008) to estimate the breeding population in 2007. In 2008 – 2010, we surveyed only 3 of 6 geographic strata and 2 of 4 habitat classes due to budget limitations. We surveyed 173 plots, similar to the surveys in 2008 – 2010, but we also sampled 49 plots that had been surveyed in 2009 to look at inter-annual variation. Helicopter-based counts in 2010 entailed 9 survey-crew days from 7 – 16 June totaling ~45 hrs of flight time. In 2010, based on data from 222 plots surveyed, the resident breeding population for the 3 geographic strata was estimated to be 5,300 indicated breeding pairs (IBP) and 12,000 birds. These estimates are much lower than previous estimates from 2006 – 2009, which ranged from 9,440 – 10,947 IBP and 18,533 – 22,987 birds.

INTRODUCTION

Growing concern among biologists about the status of ring-necked ducks in Minnesota prompted the initiation of a pilot study to develop a breeding pair survey (Zicus et al. 2008). At the time, little was known about the breeding distribution and abundance of resident ring-necked ducks in Minnesota. Concerns were raised, in part, due to counts from 10 wetlands in the Bemidji area, which have shown a ~70% decline in ring-necked duck breeding pairs since 1969 (Zicus et al. 2004). Counts from this geographically limited survey suggest that the Minnesota population may be declining despite continental increases (U.S. Fish and Wildlife Service 2008). Additionally, the species was identified as a forest indicator because of its unique habitat associations (Minnesota Department of Natural Resources 2006). The importance of this species to Minnesota is also reflected in the number of ring-necked ducks harvested annually, often the 3rd most common duck taken by hunters (U.S. Fish and Wildlife Service, unpublished reports). The primary objectives of this survey have been to estimate breeding pair numbers and monitor population trends in northern Minnesota.

METHODS

Number of breeding pairs and population size within a stratified random sample of survey plots have been estimated using 2 stratification variables: (1) Ecological Classification System (ECS) section; and (2) presumed nesting-cover availability (i.e., a surrogate for predicted breeding ring-necked duck density, Zicus et al. 2008). The pilot study and the first year of the operational survey (2007) were restricted to an area believed to be primary breeding range of ring-necked ducks for logistical efficiency (Zicus et al. 2008) and included 6 ECS sections (Figure 1). In 2008 – 2010, 3 of the ECS sections were dropped from the survey (Figure 1). Public Land Survey (PLS) sections (~2.6-km^2 plots, range = 1.2 – 3.0 km^2) were used as primary sampling units. The PLS sections at the periphery of the survey area that were <121 ha in size were removed from the sampling frame to reduce the probability of selecting these small plots. We used the same habitat class definitions that were used for stratification in 2006 (Table 1; Zicus et al. 2008).

To evaluate scaling back the survey to every other year, a sample of the plots surveyed in 2009 was resurveyed in 2010 to examine annual variation within a plot. Plots sampled in 2009 (N=174) were first treated as a separate stratum, then ordered by stratum (i.e., 3 ECS sections x 2 habitat classes), total number of ring-neck ducks observed in 2009, and total acres of nesting habitat. Once ordered, a random systematic sample of was drawn from each combination of ECS and habitat class. The end result was 50 plots to be surveyed in 2010 drawn from across a range of total number of ducks observed and potential nesting habitat.

To select plots for the 2010 survey, the sampling frame consisted of 6 strata (i.e., 3 ECS sections x 2 habitat classes, Figure 1A), and we proportionally allocated 175 plots to the 6 strata with a restriction that a minimum of 10 plots occur in each stratum. The 174 plots surveyed in 2009 were not included as possible plots when the sample was allocated. As in 2008 and 2009, we did not survey plots in habitat class 3 and 4 plots. Data collected for the resampled plots were included in the 2010 survey estimates.

For each plot, location, date, and time were recorded as were all ring-necked ducks observed on study plots and their sex and social status (Zicus et al. 2008). We considered pairs, lone males, and males in flocks of 2 – 5 to indicate breeding pairs (IBP; J. Lawrence, MNDNR, personal communication). The resident breeding population in the survey area was considered to be twice the IBP plus the number of lone females, flocked females, mixed sex groups, and single-sex groups >5 birds. We used the R library survey (Lumley 2009, R Development Core Team 2009) to estimate IBP and resident breeding population totals for habitat class 1 and 2 plots in each ECS section, the 2009 plots surveyed again in 2010, and the entire survey area, which included 7 strata (3 ECS sections x 2 habitat classes and the resampled plots).

RESULTS

In 2010, plots were well distributed throughout the study area (Figure 1B). Most plots (102) were located in the Northern Minnesota Drift and Lake Plains section, while the fewest plots (20) were located in the Lake Agassiz, Aspen Parklands section (Table 2). The sampling rate was higher in the Lake Agassiz, Aspen Parklands section than the other 2 ECS sections (5.9% versus 1.4% and 1.5%; Table 2). We were unable to survey 1 of the plots in the Northern Minnesota Drift and Lake Plains section and 2 plots in the Minnesota and Northeast Iowa Morainal section due to mechanical problems with the helicopter and time restrictions. Additionally, a substitute plot was selected to replace 1 plot that fell within National Guard's Camp Ripley in Little Falls, Minnesota due to access limitations.

The survey was conducted 7 – 16 June and entailed 9 survey-crew days totaling ~45 hrs of flight time. A total of 230 ring-necked ducks were observed in 56 (25%) of 222 plots (Table 3). By habitat type, birds were detected on 38 (33%) of habitat class 1 plots and 18 (16%) of habitat class 2 plots. Overall, counts on occupied plots ranged from 1 to 18 birds (median = 2 birds/plot). Numbers of IBP on occupied plots ranged from 0 to 12 (median = 2 IBP/plot). Numbers of birds on occupied plots ranged from 1 to 25 ducks (median = 3.5 breeding birds/plot). Of the birds observed, 49% were classified as pairs, 20% lone males, 20% flocked males, and <1% mixed groups, lone females, and flocked females. Of IBP, 38% were classified as pairs, 31% lone males, and 31% flocked males. These IBP ratios suggest that survey timing may have been later phenologically in 2010 than in previous years (Figure 2).

Estimated IBP in the survey area was 5,338 pairs (SE = 1,082; Table 4, Figure 3A). The estimated resident breeding population of ring-necked ducks in the survey area was 11,843 birds (SE = 2,525; Table 4, Figure 3B). Because of sampling frame changes in 2008 – 2010, estimates from 2006 and 2007 were re-calculated with a 3 ECS sampling frame. Data from 2004 and 2005 were not re-calculated, because habitat classifications also changed since those surveys were conducted. Estimates (IBP and breeding population) from 2010 appear to be much lower than previous estimates from 2006 – 2009, which ranged from 9,440 – 10,947 IBP and 18,533 – 22,987 birds. The resident breeding population ranged from a high of 3,376 pairs and 7,781 breeding birds in the Northern Minnesota Drift and Lake Plains section to a low of 790 pairs and 1,714 breeding birds and in the Lake Agassiz, Aspen Parklands section (Table 5).

When the plots sampled in both 2009 and 2010 were examined, 68 ducks in 2009 and 65 ducks in 2010 were observed in 14 (29%) of 49 plots in both 2009 and 2010. Although overall counts and plot occupancy were similar between years, when examined on a plot-by-plot basis, there was no relationship (Figure 5). Comparing habitat types, birds were detected on 10 (40%) of habitat class 1 plots and 4 (17%) of habitat class 2 plots in 2009. In 2010, birds were detected on 8 (32%) of habitat class 1 plots and 6

(25%) of habitat class 2 plots. Number of birds, IBP and resident breeding population on occupied plots were similar between years (Table 6). In 2009, of the birds observed, 26% were classified as pairs, 31% flocked males, 20% lone males, 19% mixed groups, 4% lone females, and no flocked females. In 2010, 51% were classified as pairs, 26% lone males, 21% flocked males, 2% lone females, and no mixed groups or flocked females. The IBP ratios for the 49 resampled plots (Figure 6) were opposite for the broader survey, which had higher IBP ratios in 2009 than 2010 (Figure 2). Comparing these IBP ratios suggest that survey timing for these resampled plots may have been later in the breeding cycle in 2009 than 2010.

DISCUSSION

The resident breeding population appeared to be relatively stable since 2006, remaining between 18,000 and 23,000 breeding birds based on the estimates for the 3 ECS. In 2010, there appeared to be a notable drop in the estimates of IBP and breeding birds. While this decline could be real, other possible explanations include survey timing and sampling variability. Many additional years are needed, however, to detect population trends.

Resampled plots provided useful information for examining annual variation within plots. Contrary to expectations, we did not find any relationship between ring-necked duck counts on plots sampled in adjacent years. Based on social status of the IBP, it appears that the survey was conducted at a slightly different stage of nesting in 2009 than 2010, but this difference in timing likely does not account for all of the variability observed. Regardless, there was more sampling variability within plots among years than expected. Although there is some interest in scaling back the survey to every other year, more study is needed to better understand sampling variation and its affect on the detection of population trends.

ACKNOWLEDGMENTS

We thank pilots John Heineman and Mike Trenholm for help with survey planning and for flying the survey. Frank Swendsen has served as observer for a portion of the plots. John Giudice conducted the statistical analyses and provides assistance interpreting the data. David Rave not only provided help with the methodology but continues to help with any questions I have about the survey. Shelly Sentyrz and Chris Scharenbroich created the navigation maps used during the survey. We also acknowledge the Red Lake band of the Ojibwe, National Guard personnel at Camp Ripley, and managers at Agassiz, Tamarac, and Sherburne National Wildlife Refuges for allowing plots under their purview to be surveyed. Brian Hargrave and Nancy Dietz provided the initial Minnesota Gap Analysis Program (MNGAP) data, and Dan Hertel supplied the Habitat and Population Evaluation Team (HAPET) data used to define the primary breeding range.

LITERATURE CITED

GIUDICE, J. H., J. R. FIEBERG, M. C. ZICUS, D. P. RAVE, and R. G. WRIGHT. 2010. Cost and precision functions for aerial quadrat surveys: A case study of ring-necked ducks in Minnesota. Journal of Wildlife Management 74(2):342 – 349.

LUMLEY, T. 2009. Survey analysis in R. <http://faculty.washington.edu/tlumley/survey/>. Accessed 13 April 2010.

MINNESOTA DEPARTMENT OF NATURAL RESOURCES. 2006. *A vision for wildlife and its use – goals and outcomes 2006 – 2012.* Minnesota Department of Natural Resources, St. Paul.

R DEVELOPMENT CORE TEAM. 2009. R: a language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. http://www.R-project.org.

RAVE, D. P., M. C. ZICUS, J. R. FIEBERG, J. H. GIUDICE, and R. G. WRIGHT. 2008. Minnesota's ring-necked duck breeding pair survey. Pages 469 – 482 in M. W. DonCarlos, R. O. Kimmel, J. S. Lawrence, and M. S. Lenarz, editors. Summaries of wildlife research findings 2007. Minnesota Department of Natural Resources, St. Paul.

SMITH, G. W. 1995. A critical review of the aerial and ground surveys of breeding waterfowl in North America. National Biological Service, Biological Science Report 5, Washington, D.C.

U. S. FISH AND WILDLIFE SERVICE. 2008. Waterfowl breeding population and habitat survey. U. S. Fish and Wildlife Service Division of Migratory Bird Management, Laurel, Maryland. http://mbdcapps.fws.gov/.

ZICUS, M. C., R. T. EBERHARDT, J. DIMATTEO, and L. L. JOHNSON. 2004. Bemidji area ring-necked duck survey. Pages 169 – 183 *in* M. W. DonCarlos, R. O. Kimmel, J. S. Lawrence, and M. S. Lenarz, editors. Summaries of wildlife research findings 2003. Minnesota Department of Natural Resources, St. Paul.

ZICUS, M. C., D. P. RAVE, J. R. FIEBERG, J. H. GIUDICE, and R. G. WRIGHT. 2008. Distribution and abundance of Minnesota breeding ring-necked ducks Aythya collaris. Wildfowl 58:31 – 45.

Table 1. Habitat classes assigned to Public Land Survey section plots in the Minnesota ring-necked duck breeding pair survey area, June 2004 – 2010.

Habitat class	Definition[a] 2004	Definition[a] 2005 - 2010[b]	Percent of survey area 2004	2005	2006- 2007	2008-2010
1	Plots with ≥ the median amount of MNGAP class 14 and/or 15 cover within 250 m of and adjacent to MNGAP class 12 cover (i.e., high pair potential).	Plots with ≥ the median amount of MNGAP class 10, 14, and/or 15 cover within 250 m of and adjacent to MNGAP class 12 and/or 13 cover (i.e., high pair potential).	15.3	24.5	21.5	70.7
2	Plots with < the median amount of MNGAP class 14 and/or 15 cover within 250 m of and adjacent to MNGAP class 12 cover (i.e., moderate pair potential).	Plots with < the median amount of MNGAP class 10, 14, and/or 15 cover within 250 m of and adjacent to class 12 and/or 13 cover (i.e., moderate pair potential).	15.3	24.5	21.5	29.3
3	Plots with no MNGAP class 14 and/or 15 cover that include MNGAP class 12 cover that is within 250 m of a shoreline (i.e., low pair potential).	Plots with no MNGAP class 10, 14, and/or 15 cover that include class 12 and/or 13 cover that is within 100 m of a shoreline (i.e., low pair potential).	25.2	7.7	13.5	0.0
4	Plots with no MNGAP class 14 and/or 15 cover and no MNGAP class 12 cover within 250 m of a shoreline (i.e., no pair potential).	Plots with no MNGAP class 10, 14, and/or 15 cover and no class 12 and/or 13 cover within 100 m of a shoreline (i.e., no pair potential).	44.2	43.3	43.5	0.0

[a]Plots are Public Land Survey sections. MNGAP = Minnesota GAP level 4 land cover data. Class 10 = lowlands with <10% tree crown cover and >33% cover of low-growing deciduous woody plants such as alders and willows. Class 12 = lakes, streams, and open-water wetlands. Class 13 = water bodies whose surface is covered by floating vegetation. Class 14 = wetlands with <10% tree crown cover that is dominated by emergent herbaceous vegetation such as fine-leaf sedges. Class 15 = wetlands with <10% tree crown cover that is dominated by emergent herbaceous vegetation such as broad-leaf sedges and/or cattails.

[b]Habitat class definitions in 2005 – 2010 were the same, but MNGAP class 10, 14, and 15 cover associated with lakes having a General or Recreational Development classification under the Minnesota Shoreland Zoning ordinance was not considered nesting cover in 2006 – 2010.

Table 2. Sampling rates in the habitat class 1 and 2 strata by Ecological Classification System (ECS) section for Minnesota's ring-necked duck breeding-pair survey, June 2004 – 2010.

ECS section	No. of plots[a]				No. of plots surveyed (Sampling rate [%])					
	2004	2005	2006-2007	2008-2010	2004	2005	2006-2007	2008	2009	2010
W & S Superior Uplands[b]	1,638	2,461	2,218	-	18 (1.1)	22 (0.9)	20 (0.9)	-	-	-
Northern Superior Uplands	1,810	4,648	4,209	-	13 (0.7)	36 (0.8)	33 (0.8)	-	-	-
N Minnesota & Ontario Peatlands	1,817	2,737	2,389	-	26 (1.4)	35 (1.3)	30 (1.3)	-	-	-
N Minnesota Drift & Lake Plains	5,048	8,383	7,145	7,145	78 (1.5)	94 (1.1)	77 (1.1)	108 (1.5)	104 (1.5)	126 (1.8)
Minnesota & NE Iowa Morainal	3,510	4,033	3,561	3,561	50 (1.4)	35 (0.9)	32 (0.9)	53 (1.5)	51 (1.4)	66 (1.9)
Lake Agassiz, Aspen Parklands	316	363	340	340	15 (4.7)	8 (2.2)	8 (2.4)	13 (3.8)	20 (5.9)	30 (8.8)

[a]Number of Public Land Survey sections in the ECS section(s).

[b]Western and Southern Superior Uplands sections combined due to the small area of the Southern Superior Uplands occurring in the survey area.

Table 3. Survey results for habitat class 1 and 2 strata in the Minnesota ring-necked duck breeding pair survey area, June 2004 – 2010.

Year	No. of plots surveyed	No. plots with birds (%)	Birds[a]			IBP[b]			Resident breeding birds[c]		
			Total	Per plot	Per occupied plot	Total	Per plot	Per occupied plot	Total	Per plot	Per occupied plot
2004	200	50 (25)	278	1.39	5.56	160	0.81	3.20	353	1.77	7.06
2005	230	37 (16)	147	0.64	3.97	92	0.43	2.49	218	0.95	5.89
2006	200	50 (25)	279	1.40	5.58	167	0.85	3.34	375	1.88	7.50
2007	200	52 (26)	152	0.76	2.92	137	0.72	2.63	296	1.48	5.69
2008	174	58 (33)	296	1.70	5.10	173	0.99	2.98	364	2.09	6.28
2009	174	57 (33)	273	1.57	4.79	173	0.99	3.04	362	2.08	6.35
2010	222	56 (22)	230	1.04	4.11	147	0.66	2.63	321	1.45	5.73

[a]Total number of ring-necked ducks counted during the survey.

[b]The number of indicated breeding pairs (IBP) is the sum of the pairs, lone males, and males in flocks of 2 – 5 birds.

[c]The total resident breeding population in the survey area was considered to be twice the IBP plus the number of lone females, flocked females, mixed sex groups, and single-sex groups >5 birds.

Table 4. Estimated indicated breeding pairs (IBP) and resident breeding population size in the habitat class 1 and 2 strata in the Minnesota ring-necked duck breeding pair survey area, June 2004 – 2010.

	IBP (CV[%])		Resident breeding population (CV[%])	
Year	6 ECS[a]	3 ECS[b]	6 ECS[a]	3 ECS[b]
2004	9,443 (17.8[c])	-	20,321 (18.1[c])	-
2005	7,496 (20.0[c])	-	17,279 (21.5[c])	-
2006	14,770 (17.6[c])	9,851 (23.8)	32,621 (17.4[c])	21,849 (23.1)
2007	12,787 (17.7)	8,705 (19.9)	26,026 (17.5)	17,863 (19.5)
2008	-	9,439 (16.8)	-	19,488 (16.6)
2009	-	10,947 (14.3)	-	22,987 (15.0)
2010	-	5,338 (20.3)	-	11,843 (21.3)

[a]Population estimates were based on a stratified random sample of habitat class 1 and 2 Public Land Survey (PLS) sections in 12 strata (2 habitat classes and 6 Ecological Classification System [ECS] sections).

[b]Population estimates were based on a stratified random sample of habitat class 1 and 2 Public Land Survey (PLS) sections in 6 strata (2 habitat classes and 3 Ecological Classification System [ECS] sections). Population estimates were not adjusted for 2004 and 2005, because the habitat classifications have also changed since those surveys were conducted.

[c]Variance estimate is biased low because no birds were observed in one or more strata. As a result, the confidence interval is too narrow and the CV is optimistic.

Table 5. Estimated indicated breeding pairs (IBP) and resident breeding population by Ecological Classification System (ECS) section in the habitat class 1 and 2 strata in the Minnesota ring-necked duck breeding pair survey area, June 2005 – 2010.

	IBP (CV [%])					
ECS section	2005	2006	2007	2008	2009	2010
W & S Superior Uplands[b]	444 (99.5[c])	669 (59.1)	671 (99.6)	-	-	-
Northern Superior Uplands	1,169 (46.8)	2,679 (33.7)	2,694 (46.5)	-	-	-
N Minnesota & Ontario Peatlands	239 (54.1[c])	1,572 (34.7)	717 (46.5)	-	-	-
N Minnesota Drift & Lake Plains	3,490 (33.0)	6,334 (31.5)	5,686 (26.0)	4,948 (24.6)	7,064 (17.1)	3,376 (27.1)
Minnesota & NE Iowa Morainal	918 (43.6)	2,102 (53.9)	2,118 (38.8)	3,689 (26.0)	3,449 (28.4)	1,025 (52.0)
Lake Agassiz, Aspen Parklands	1,235 (40.1[c])	1,414 (35.2)	902 (40.9)	803 (38.4)	436 (35.5)	790 (29.1)

[a]Western and Southern Superior Uplands sections combined due to the small area of the Southern Superior Uplands occurring in the survey area.

Table 5. Continued.

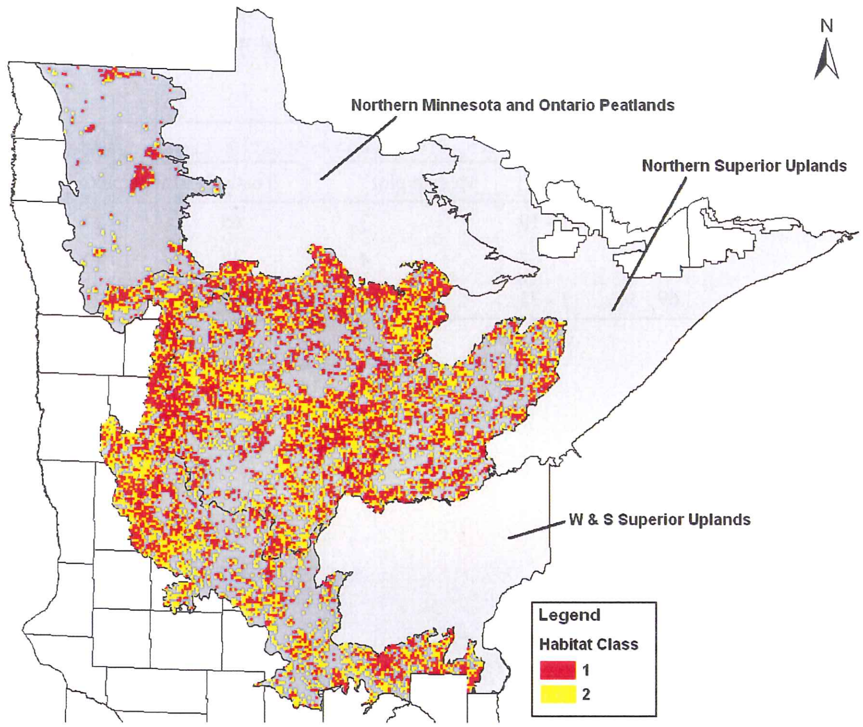
	Resident breeding population (CV [%])					
ECS section	2005	2006	2007	2008	2009	2010
W & S Superior Uplands[b]	889 (99.5[c])	1,338 (59.1)	1,342 (99.6)	-	-	-
Northern Superior Uplands	2,339 (46.8)	5,357 (33.7)	5,388 (46.5)	-	-	-
N Minnesota & Ontario Peatlands	477 (54.1[c])	4,076 (42.3)	1,434 (46.5)	-	-	-
N Minnesota Drift & Lake Plains	6,981 (33.0)	14,816 (29.6)	11,651 (25.4)	10,264 (24.3)	14,948 (18.2)	7,781 (28.7)
Minnesota & NE Iowa Morainal	4,122 (56.4)	4,204 (53.9)	4,236 (38.8)	7,377 (26.0)	7,170 (29.2)	2,048 (52.0)
Lake Agassiz, Aspen Parklands	2,471 (40.1[c])	2,829 (35.2)	1,976 (42.3)	1,846 (41.4)	871 (35.4)	1,714 (29.7)

[a]Western and Southern Superior Uplands sections combined due to the small area of the Southern Superior Uplands occurring in the survey area.

Table 6. Total number of ring-necked ducks, indicated breeding pairs (IBP), and resident breeding birds for 49 plots sampled in 2009 and 2010. The range and median per plot are also provided.

	2009			2010		
	Total	Range/plot	Median/plot	Total	Range/plot	Median/plot
No. birds	68	1 - 19	3	65	1 - 17	4
IBP	42	1 - 7	4	42	1 - 12	2
Resident breeding birds	69	1 - 23	2	85	2 - 24	4.5

A



B

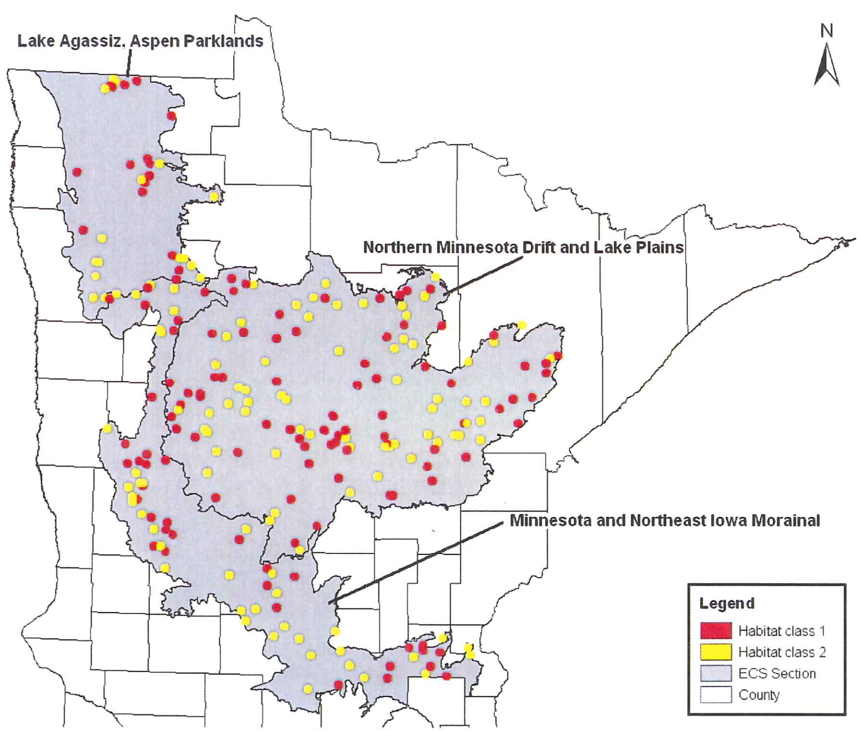


Figure 1. In the 3 Ecological Classification Section (ECS) sampling frame (A) all Public Land Survey (PLS) plots, (B) 2010 survey plots (enlarged for visibility), and (C) plots from 2009 resampled in 2010 indicated by habitat class for Minnesota's ring-necked duck breeding pair survey.

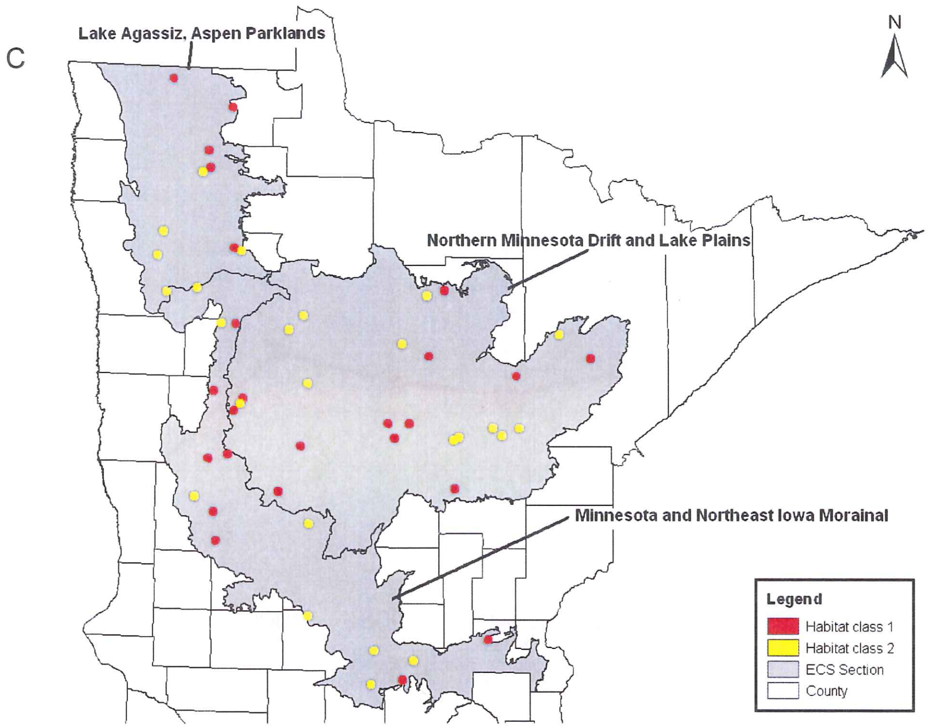


Figure1.Continued

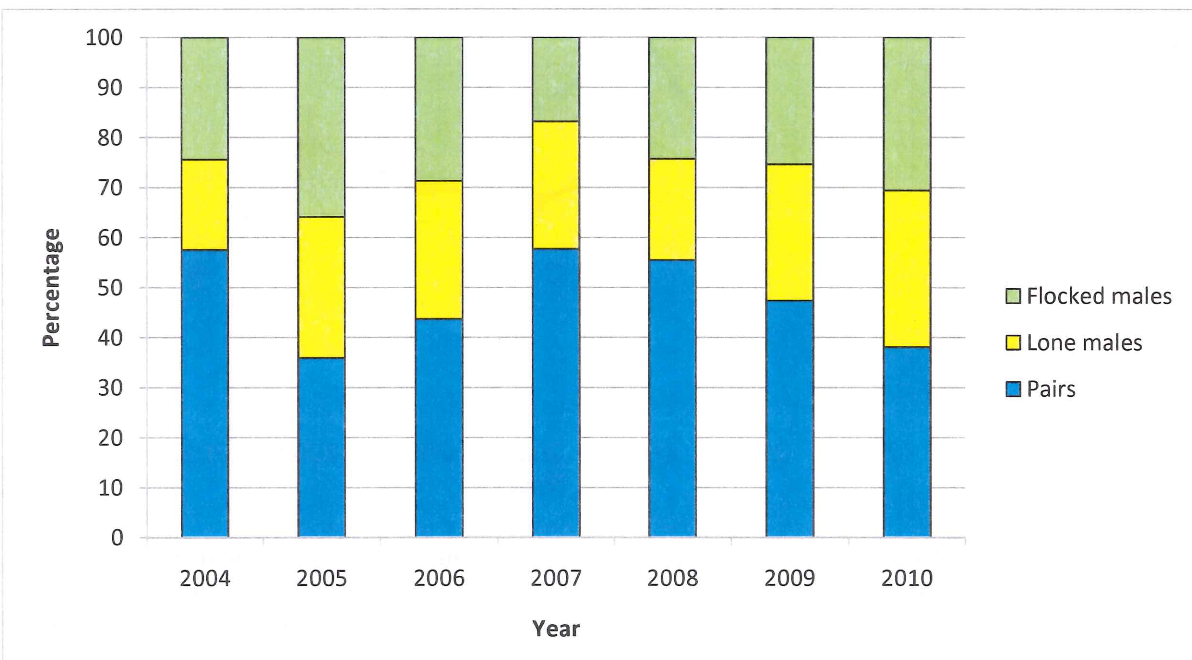
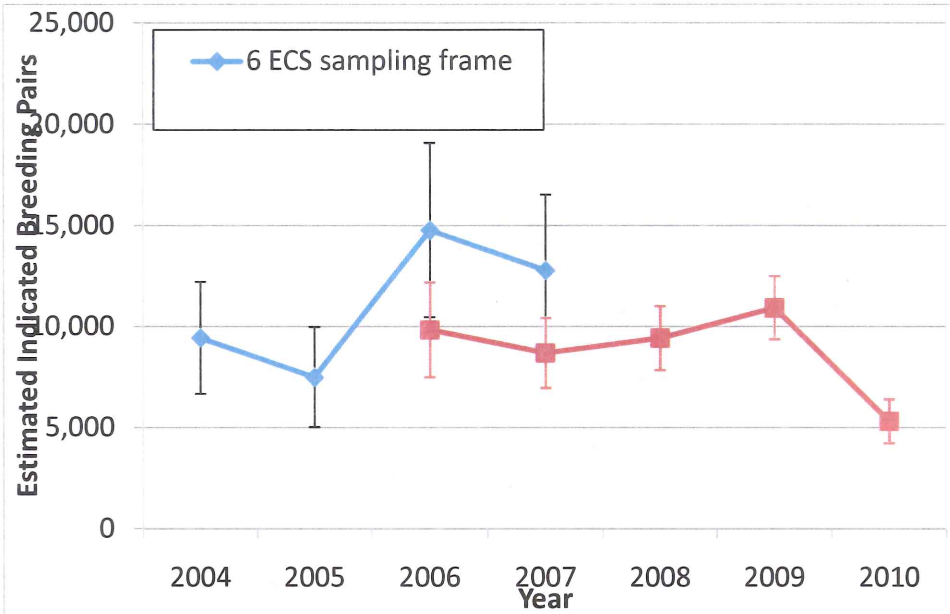


Figure 2. Social status of the indicated breeding pairs observed in the Minnesota ring-necked duck breeding pair survey area, June 2004 – 2009. Surveys were conducted 6 – 17 June 2004, 12 – 24 June 2005, 6 – 16 June 2006, 5 – 13 June 2006, 9 – 17 June 2008, 5 – 12 June 2009, and 7 – 16 June 2010.

A



B

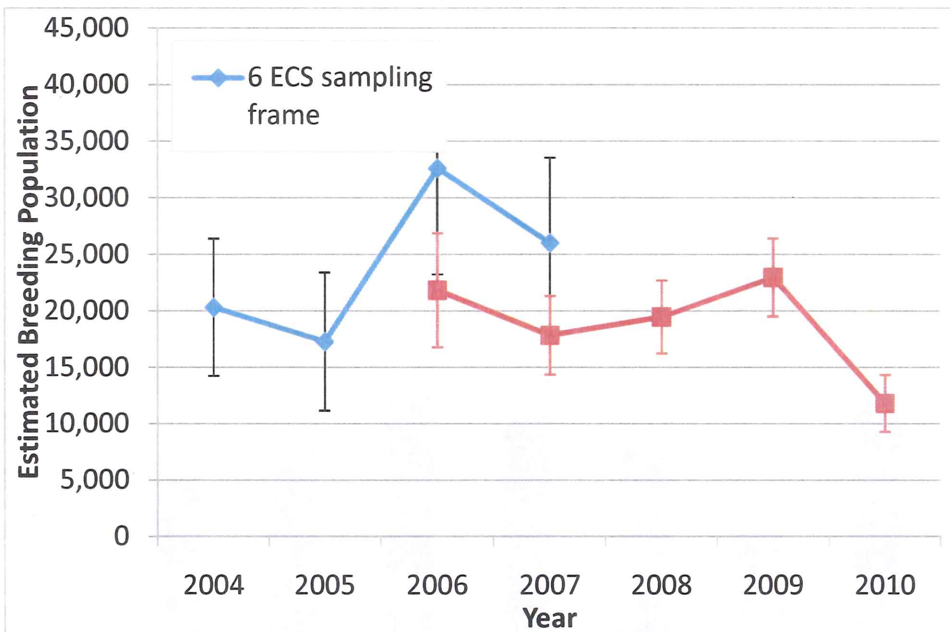


Figure 3. For the habitat class 1 and 2 strata (A) estimated indicated breeding pairs with SE bars and (B) estimated ring-necked duck resident breeding population with SE bars in the Minnesota ring-necked duck breeding pair survey area, June 2004 – 2010. Estimates were based on a stratified random sample of Public Land Survey (PLS) sections in habitat classes 1 and 2 for 6 Ecological Classification System (ECS) sections in 2004 – 2007 and for 3 ECS sections in 2008 – 2010. Estimates from 2006 and 2007 were recalculated using the same sampling frame as 2008 – 2010 (3 ECS instead of 6 ECS) for comparison; population estimates were not adjusted for 2004 and 2005, because the habitat classifications have also changed since those surveys were conducted.

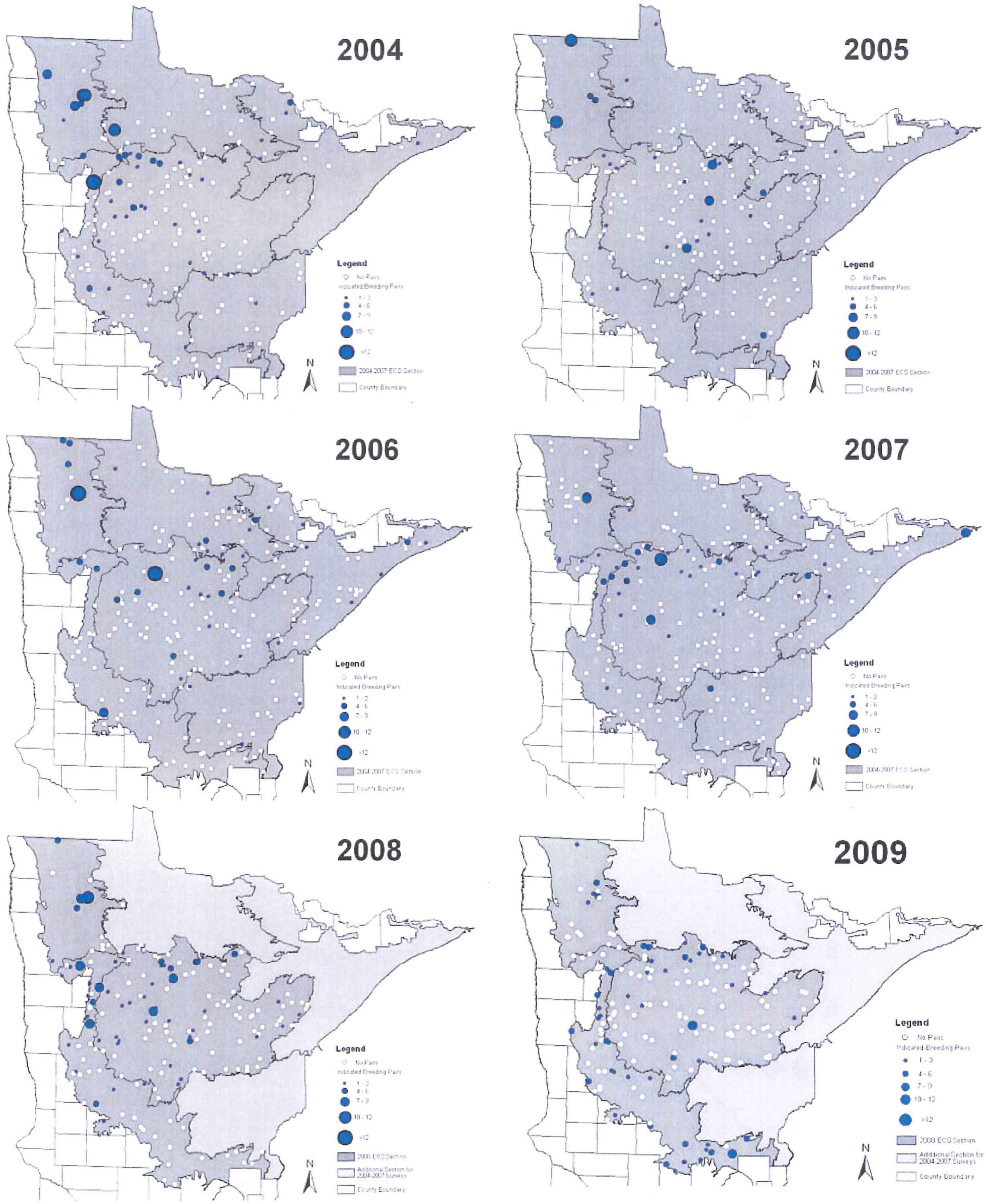


Figure 4. Plot locations and numbers of indicated breeding pairs (IBP) observed on survey plots in the Minnesota ring-necked duck breeding pair survey area in June 2009 (bottom right). White circles indicate plots where no indicated pairs were seen. Maximum number of indicated breeding pairs per plot was 11 pairs in 2010 (13 in 2004; 11 in 2005; 16 in 2006; 11 in 2007; 10 in 2008; 8 in 2009). The Ecological Classification System (ECS) sections are also shown.

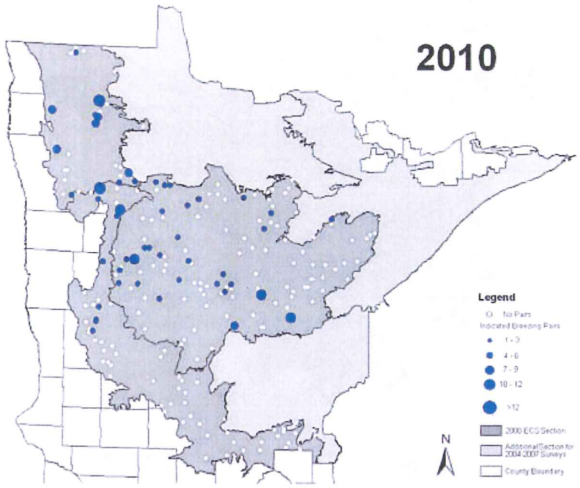


Figure 4. Continued.

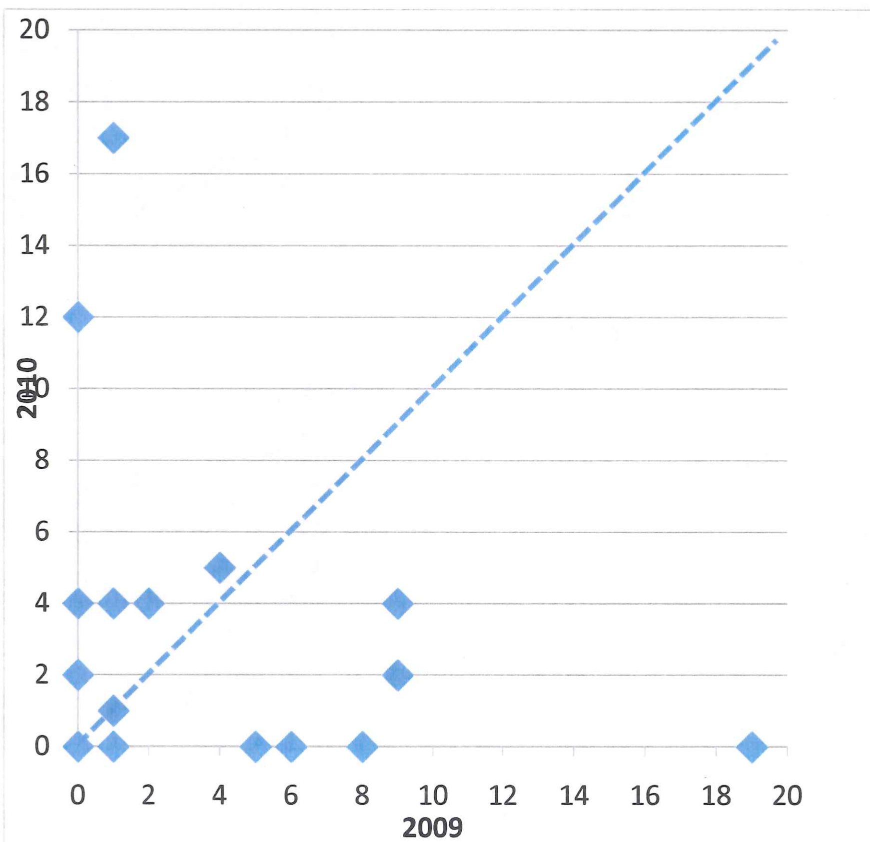


Figure 5. Scatterplot showing total counts of ring-necked ducks on plots sampled in both 2009 and 2010. Data did not show parity, as points did not fall along 1:1 dashed reference line.

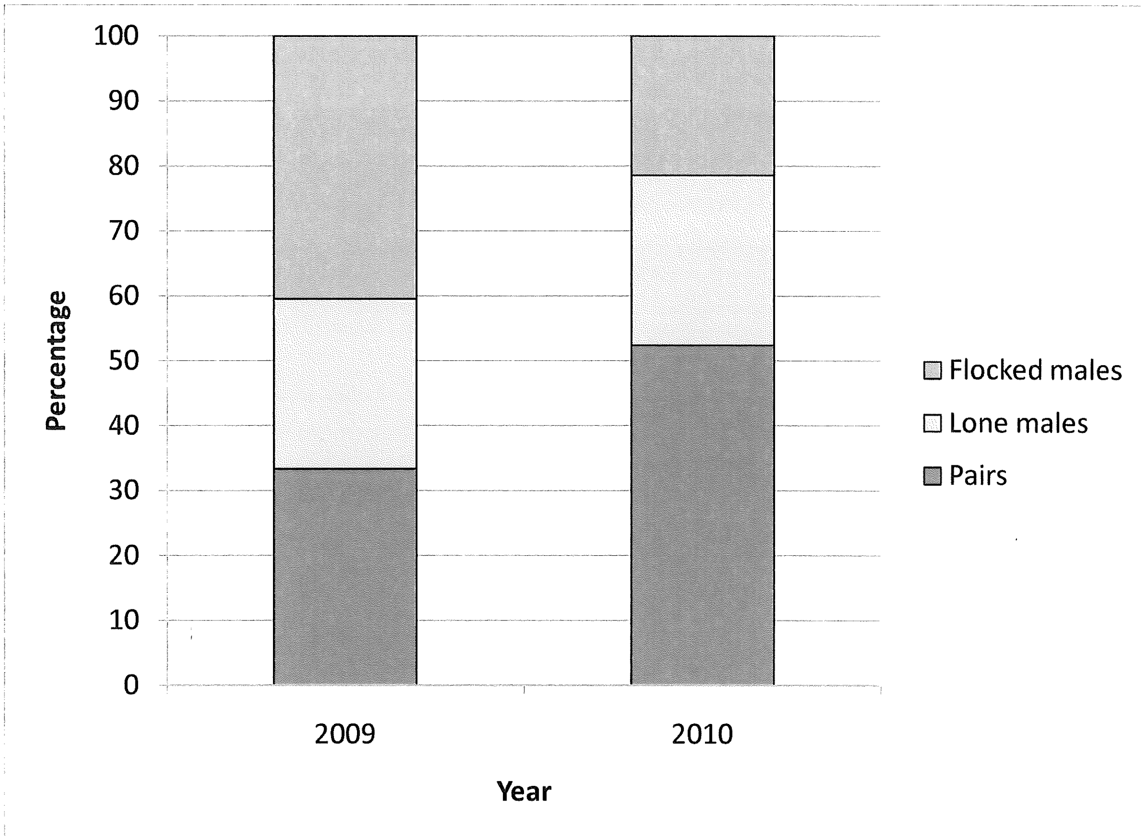


Figure 6. Social status of the indicated breeding pairs observed in 49 plots surveyed in 2009 and resampled in 2010.

HUNTING HARVEST STATISTICS

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2009 SMALL GAME HUNTER MAIL SURVEY

Margaret Dexter, Wildlife Research Unit

INTRODUCTION

The Minnesota Department of Natural Resources, Division of Fish and Wildlife, Wildlife Research unit annually conducts a survey of small game hunters. Annual harvest estimates from survey data provide guidance for future hunting regulations and season structure.

METHODS

The Wildlife Research unit requested a random sample be drawn from the Electronic License System database in late February, 2010 to ensure that each license holder had an equal chance of being in the survey sample. The sample consisted of 5,999 (approximately 2%) Small Game License holders, drawn proportionately from each of the nine Small Game license types available: Resident Senior Citizen, Resident Youth Small Game, Resident (Adult) Small Game, Resident Individual sports, Resident Combination Sports, Resident Lifetime Small Game, Resident Lifetime sports, Nonresident Youth, and Nonresident (Adult) Small Game.

Hunters that returned the survey questionnaire within three weeks were marked returned and eliminated from follow-up mailings. Follow-up mailings were sent to non-respondents at three week intervals. There were three follow-up mailings to non-respondents.

Completed and returned questionnaires were checked for completeness, consistency, and biological practicability. Cards were marked with numeric county codes corresponding to the hunter's written information. Data from each usable card was converted to an electronic database. Data were checked for errors, duplicate responses, and /or missing data. The following is a list of assumptions made in data coding:

1) If an individual checked the box indicating (s)he did not hunt, but harvest information was provided, it was assumed that the individual did hunt.
2) If a range was given for "number of days hunted" or "number of animals harvested", the median of the range, rounded to the nearest even integer was recorded.
3) If a hunter indicated spending time hunting for a species, but left "number bagged" blank, the # bagged was entered as missing data.
4) If a small game hunter indicated bagging a species, but left "number of days hunted" blank, then "number of days hunted" was recorded as missing data.
5) If more than one county was indicated for "county hunted in most", the first county listed was recorded. However, if the several counties listed were indicated to apply to all species hunted, then counties were recorded in sequential order in relation to species hunted.
6) If "county hunted in most" was left unanswered or not legible, the county was recorded as missing data.

Data from all usable cards were tabulated and statistically analyzed by the St. Paul staff, using SAS statistical analysis software programs.

RESULTS

Estimated number of hunters increased slightly for crow, spruce grouse and red fox (Table 3). Number of hunters declined for duck, Canada goose, mourning dove, pheasant, sharp-tailed grouse, cottontails, and snowshoe hare (Table 3). There was very little change in estimated take per hunter (Table 4) or mean harvest and hunter success rates (Table 5). Total estimated harvests (Table 6) increased for crow, woodcock, ruffed grouse, spruce grouse, fox squirrel, and red fox. Estimated harvests declined for ducks, geese, coot, snipe, mourning dove, pheasant, sharp-tailed grouse, gray partridge, gray squirrel, cottontail, jack rabbit, snowshoe hare and raccoon. Estimated harvest for gray fox and coyote stayed the same as for the previous year. Note that all estimates were based on a survey of approximately 2% of all small game license holders. Data in this report may change as a result of future verification and more comprehensive analysis.

Attached are survey results. All estimates were statewide unless otherwise indicated. Tables 1-7 are historic tables of small game harvest for the previous 10 years and tables 8-12 are for the 2009-10 hunting season.

Table 1. Small game hunter response to mail surveys, 1979 - 80 through 2009 - 10.

Year	Number mailed	Number not delivered	Delivered questionnaires completed and returned	
			Number	Percent
1979 - 80	5,696	443	4,504	85.7
1980 - 81	6,434	385	4,963	82.0
1981 - 82	6,656	399	5,419	86.6
1982 - 83	5,963	266	4,792	84.1
1983 - 84	4,551	269	3,325	77.7
1984 - 85	4,096	127	3,280	82.6
1985 - 86	3,370	157	2,574	80.1
1986 - 87	4,668	208	3,623	81.2
1987 - 88	5,513	248	4,191	79.6
1988 - 89	15,388	857	11,431	78.7
1989 - 90[a]	10,893	735	7,790	76.7
1990 - 91[a]	5,000	394	3,467	75.3
1991 - 92[a]	5,050	387	3,541	75.9
1992 - 93[a]	5,000	288	3,625	76.9
1993 - 94[a]	5,011	282	3,320	70.2
1994 - 95[a]	5,000	387	3,353	72.7
1995 - 96[a]	5,000	321	3,293	70.4
1996 - 97[a]	5,000	170	3,334	69.0
1997 - 98[a]	5,000	198	3,234	67.3
1998 - 99[a]	5,000	200	3,153	65.7
1999 - 00[a]	5,001	180	3,349	69.5
2000 - 01[a]	5,000	184	3,001	62.3
2001 - 02 [a]	6,000	225	3,667	64.0
2002 - 03 [a]	6,000	363	3,862	68.5
2003 - 04[a]	6,400	381	3,972	66.0
2004 - 05[a]	6,000	356	3,823	68.0
2005 – 06[a]	6,280	142	3,946	64.3
2006 – 07[a]	6,000	151	3,810	65.1
2007 – 08[a]	6,000	113	3,736	65.5
2008 – 09[a]	5,996	183	3,551	61.1
2009 - 10[a]	5,999	88	3,828	63.8

[a] Includes resident and non-resident licenses, and excludes duplicate licenses.

Table 2. Use of small game hunter licenses, 1999-00 through 2009-2010.

		Returns from mail survey	Projections from license sales
1999-00	Hunted	2,689 (80.7%)	264,237
	Did not hunt	644 (19.3%)	63,194
		3,333 (100.0%)	327,431
2000-01	Hunted	2,254 (78.7%)	252,518
	Did not hunt	610 (21.3%)	68,344
		2,864 (100.0%)	320,862
2001-02	Hunted	2,849 (77.7%)	231,589
	Did not hunt	610 (21.3%)	66,466
		3,665 (100.0%)	298,055
2002-03	Hunted	2,962 (76.7%)	221,455
	Did not hunt	900 (23.3%)	67,274
		3,862 (100.0%)	288,729
2003-04	Hunted	3,085 (78.2%)	232,206
	Did not hunt	862 (21.8%)	64,733
		3,947 (100.0%)	296,939
2004-05	Hunted	2,934 (77.6%)	223,275
	Did not hunt	847 (22.4%)	64,450
		3,781 (100.0%)	287,725
2005-06	Hunted	3,035 (77.1%)	216,000
	Did not hunt	900 (22.9%)	64,156
		3,935 (100.0%)	280,156
2006-07	Hunted	2,994 (79.0%)	233,759
	Did not hunt	795 (21.0%)	62,139
		3,789 (100.0%)	295,898
2007-08	Hunted	2,894 (77.9%)	232,505
	Did not hunt	822 (22.1%)	65,961
		3,716 (100.0%)	298,467
2008-09	Hunted	2,678 (75.4%)	218,753
	Did not hunt	873 (24.6%)	71,311
		3,551 (100.0%)	290,064
2009-10	Hunted	2,850 (75.0%)	212,126
	Did not hunt	952 (25.0%)	70,857
		3,802 (100.0%)	282,983

Includes resident and non-resident information. Excludes duplicates.

0001

2009 Small Game Hunter Report

1. Did you hunt small game, listed below, in Minnesota this year (March 2009 - Feb 2010)? ☐ No ☐ Yes (Please check box)
2. Indicate the **total number of days** spent hunting small game of all species listed below, in Minnesota. ________
3. For the species you hunted indicate your harvest, number of days hunted, and county in which you hunted most for each species, even if **None** were bagged. Report only game **you personally** bagged and retrieved in Minnesota. **Do not** include birds taken on shooting preserves or game farms.

		Number You bagged	Days Hunted	County
Ducks (all species)	01			
Coots (mud hens)	50			
Canada geese	40			
Other geese	41			
Snipe (jacksnipe)	51			
Rails and gallinules	52			
Crows	53			
Woodcock	60			
Mourning Dove	65			
Pheasants	70			
Ruffed grouse (Forest partridge)	71			
Spruce grouse	72			
Sharp-tailed grouse	73			
Hungarian (Gray) partridge	74			
Fox squirrel	89			
Gray squirrel	90			
Cottontail rabbit	91			
Jackrabbit	92			
Snowshoe hare	93			
Badger	35			
Coyote (brush wolf)	97			
Gray fox	96			
Raccoon	94			
Red fox	95			

Dear Small Game Hunter:

You have been selected at random from among Minnesota's small game hunting license buyers to assist us in evaluating the 2009-2010 small game hunting season **(March 2009-February 2010).** We need information to estimate the season's harvest and to help set future small game seasons. Answer only for your Minnesota 2009 hunting experience.

YOUR RESPONSE IS NEEDED
EVEN IF YOU DID NOT HUNT OR HARVEST SMALL GAME

Please fill out the attached questionnaire and mail as soon as possible.
A reminder will be sent to individuals not returning the questionnaire within three weeks. No envelope or stamp is necessary; just tear along the perforation and drop into a mailbox.

THANK YOU FOR YOUR COOPERATION

Dave Schad, Director
Division of Fish and Wildlife
Department of Natural Resources

Minnesota Department of Natural Resources
Division of Fish and Wildlife
Wildlife Research Unit
500 Lafayette Road, Box 20
St. Paul, MN 55155

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Figure 1. Sample of Small Game Hunter survey card

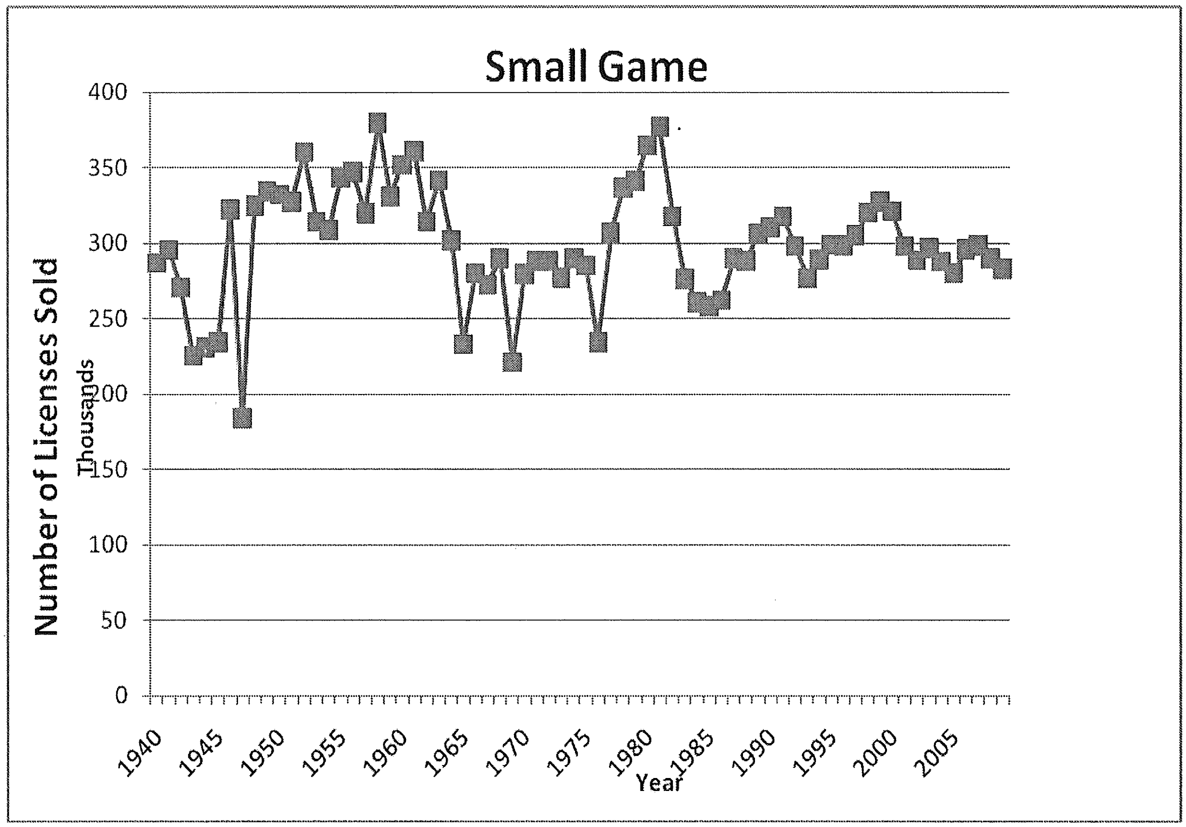


Figure 2. Number of Minnesota small game licenses sold, 1940–2009

Table 3. Estimated number of hunters (thousands) for various species, 1995-96 through 2009-10.

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Ducks	119	114	122	117	122	109	109	112	101	105	92	87	87	81	78
Canada goose	73	75	79	77	80	77	76	79	75	75	69	66	63	59	56
Other geese	10	6	5	6	5	7	7	6	7	5	5	5	4	4	3
American coot	9	6	7	5	6	4	4	4	4	5	4	5	3	4	4
Common snipe	2	2	2	2	2	2	1	2	1	2	1	2	2	2	1
Rails / gallinules	1	<1	<1	<1	<1	<1	<1	1	<1	<1	0	1	<1	<1	<1
Crow [*]	15	13	11	11	14	14	11	13	12	12	12	11	9	10	11
American woodcock	21	18	17	19	19	16	11	12	13	12	11	14	11	12	12
Mourning dove [γ]										16	11	13	13	12	10
Ring-necked pheasant	96	88	80	88	93	100	85	91	105	104	111	119	118	107	100
Ruffed grouse	116	118	127	142	139	121	101	91	94	79	76	92	91	87	87
Spruce grouse	14	11	11	11	11	9	9	7	9	7	7	10	11	8	10
Sharp-tailed grouse	8	7	8	8	8	10	8	6	7	6	5	7	7	7	6
Gray partridge	12	11	8	10	10	8	7	7	8	5	6	6	7	4	4
Gray squirrel	35	33	27	30	31	27	26	25	29	23	25	25	26	22	22
Fox squirrel	23	20	16	18	20	17	15	15	20	15	15	16	15	13	13
Eastern cottontail	23	19	14	19	18	20	17	16	21	19	20	20	20	18	16
White-tailed jackrabbit	5	4	3	3	3	2	3	2	3	3	2	3	3	2	2
Snowshoe hare	5	4	4	7	7	5	6	6	6	4	3	6	4	5	3
Raccoon (Sept - Feb)	10	10	9	9	6	6	6	6	6	6	5	9	10	7	7
Raccoon[‡] (March -Aug)	5	4	3	4	3	5	4	4	5	3	3				
Red fox (Sept -Feb)	15	11	9	9	8	10	6	7	7	6	6	6	6	6	8
Red fox[‡] (March -Aug)	4	3	2	3	2	2	3	2	2	1	1				
Gray fox	3	n.a.	2	2	2	1	1	1	2	2	1	2	2	2	2
Coyote	15	13	10	11	11	16	11	12	15	16	19	17	16	19	19
Badger	<1	1	1	<1	<1	1	<1	1	<1	1	1	1	<1	<1	<1

[*] Crow season added in 1989. [‡] Raccoon and red fox season continuous May 1994 thru March 15, 2006. [γ] Mourning dove season added 2004.

Table 4. Estimated take per hunter, for respondents reporting that they hunted a particular species, 1995-96 through 2009-10.

	Estimated take per hunter														
	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Ducks	9.7	9.6	9.9	9.5	8.4	8.9	9.1	9.2	9.0	6.9	7.3	8.4	8.1	8.1	7.4
Canada geese	2.5	3.2	2.9	2.8	3.5	3.9	4.0	3.3	3.9	3.8	4.1	4.9	3.9	4.9	4.1
Other geese	0.9	1.4	2.3	1.0	1.2	2.2	1.2	1.9	1.7	1.5	1.9	1.5	2.1	3.2	1.9
American coot	3.1	3.8	4.1	4.7	4.0	2.7	4.5	4.6	2.8	4.0	3.9	5.6	4.6	5.7	3.6
Common snipe	1.6	2.8	2.6	2.9	1.6	1.3	1.3	1.5	1.8	1.1	4.4	1.9	2.0	1.2	1.1
Rails/gallinules	2.3	1.0	0.7	0.5	0.2	3.7	0.6	2.6	0.5	0.3	0	2.4	5.3	0.4	0.8
Crow *	8.5	7.3	6.6	9.3	4.4	6.9	7.7	5.6	6.7	5.8	7.8	6.4	6.4	5.2	5.3
American woodcock	3.9	3.2	3.4	3.3	2.8	2.8	2.3	2.4	2.4	3.5	2.5	3.2	2.6	2.4	3.0
Mourning dove[γ]										6.2	7	6.7	7.7	11.4	10.5
Ring-necked pheasant	4.2	3.9	3.1	3.5	3.7	3.7	3.2	3.9	4.9	4.0	5.3	4.9	5.5	4.9	4.0
Ruffed grouse	3.9	4.5	5.2	6.7	4.9	5.1	3.3	2.8	3.8	2.5	2.9	4.5	3.2	3.7	4.1
Spruce grouse	1.8	1.4	2.3	2.4	1.8	2.5	1.1	1.6	2.1	1.3	1.4	2.7	1.7	2.0	1.9
Sharp-tailed grouse	1.3	1.2	1.7	2.6	1.6	1.6	1.2	1.3	1.7	1.7	1.3	1.8	2.0	2.1	1.7
Gray partridge	2.2	2.2	1.9	2.5	1.9	2.1	1.5	1.7	2.8	2.4	2.6	1.9	1.6	2.2	1.9
Gray squirrel	4.9	4.9	4.9	5.0	4.3	5.3	5.6	5.2	6.0	5.7	5.0	5.5	5.2	5.4	4.9
Fox squirrel	4.6	3.8	4.4	3.3	3.5	3.9	4.1	4.5	4.2	4.1	4.1	4.2	3.2	3.9	4.1
Eastern cottontail	4.3	3.4	4.5	4.6	3.2	3.9	3.6	3.3	4.3	4.6	4.5	3.9	4.0	4.5	3.5
White-tailed jackrabbit	1.5	2.6	1.6	2.5	1.9	2.8	2.6	1.6	2.4	2.3	2.7	1.6	3.3	2.6	1.5
Snowshoe hare	2.0	2.3	2.0	3.5	3.1	5.2	3.3	1.9	2.2	1.8	3.1	3.0	1.4	2.5	1.5
Raccoon (Sept - Feb)	14.7	21.3	13.8	16.6	10.9	7.6	9.4	10.0	8.5	9.0	6.0	7.2	4.9	9.7	9.1
Raccoon[‡] (March -Aug)	11.3	24.4	5.1	5.8	6.4	7.8	4.4	5.4	4.7	6.1	2.7				
Red fox (Sept -Feb)	3.1	3.0	1.4	1.3	1.2	1.9	1.2	1.5	1.8	1.1	1.7	1.3	1.1	0.8	1.3
Red fox[‡] (March -Aug)	1.5	1.3	0.8	1.2	0.6	0.9	1.5	1.7	0.6	0.6	0.9				
Gray fox	1.0	n.a.	1.3	0.9	0.9	0.7	0.4	0.4	0.4	1.1	0.9	1.8	0.3	1.3	1.0
Coyote	1.8	2.3	1.6	1.3	1.3	1.8	1.1	1.2	1.3	1.1	2.1	1.2	2.1	2.4	2.4
Badger	1.4	2.1	0.9	4.3	1.1	0.8	0.6	1.7	0.7	1.0	1.2	1.3	0.3	1.0	2.0

[*]Crow season added in 1989. [‡] Raccoon and red fox season continuous May 1994 thru March 15, 2006. [γ] Mourning dove season added 2004.

Table 5. Mean harvest for successful hunters and hunter success rates (%), 1999-00 through 2009-10.

	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Ducks	9.7 (86.2)	10.2 (84.9)	10.6 (85.6)	10.6 (86.7)	10.4 (86.7)	8.6 (81.1)	8.9 (82.5)	9.9 (84.4)	9.5 (85.4)	9.8 (82.8)	9.2(80.5)
Canada geese	4.7 (74.7)	5.3 (74.2)	5.3 (76.3)	4.6 (72.0)	5.1 (76.0)	5.2 (72.8)	5.5 (73.7)	6.3 (78.4)	5.5 (71.4)	6.4 (76.6)	5.6 (72.8)
Other geese	2.8 (38.2)	4.0 (54.1)	2.8 (43.8)	4.4 (42.5)	2.7 (65.3)	3.3 (45.7)	4.5 (43.1)	2.7 (55.2)	4.2 (50.0)	6.3 (50.0)	3.5 (54.5)
American coot	5.5 (73.0)	4.2 (64.7)	7.5 (60.4)	6.4 (71.2)	3.7 (76.9)	5.5 (73.1)	5.1 (75.9)	7.2 (77.6)	6.3 (74.4)	6.9 (82.4)	5.5 (65.5)
Common snipe	2.3 (66.7)	1.5 (85.0)	2.4 (52.9)	2.6 (60.0)	2.3 (78.9)	1.6 (68.0)	4.7 (94.1)	2.6 (75.0)	2.9 (70.8)	1.7 (72.7)	1.82 (61.1)
Rails / gallinules	1.0 (20.0)	3.7 (100.0)	1.5 (40.0)	3.8 (66.7)	1.0 (50.0)	1.0 (33.3)	0.0 (0.0) *	4.3 (57.1)	6.4 (83.3)	1.0 (40.0)	1.3 (60.0)
Crow	5.2 (85.5)	8.2 (84.0)	8.6 (89.4)	6.3 (89.0)	7.9 (85.3)	6.4 (90.8)	9.1 (85.6)	7.2 (89.1)	7.3 (87.7)	5.9 (87.8)	5.9 (89.5)
American woodcock	3.8 (74.6)	3.6 (80.3)	3.4 (68.3)	3.6 (65.6)	3.3 (71.8)	5.3 (64.6)	3.6 (70.3)	3.9 (82.7)	3.7 (68.9)	3.3 (73.8)	4.1 (72.3)
Mourning dove[γ]						7.9 (78.9)	8.7 (80.1)	8.2 (81.2)	9.8 (78.7)	13.2 (86.6)	11.4 (92.2)
Ring-necked pheasant	5.2 (69.8)	5.2 (71.9)	4.7 (66.4)	5.5 (71.7)	6.3 (77.2)	5.7 (70.0)	7.0 (75.9)	6.6 (75.3)	7.1 (78.1)	6.4 (76.7)	5.8 (68.7)
Ruffed grouse	6.3 (78.9)	6.4 (80.7)	4.8 (68.5)	4.3 (63.8)	5.1 (73.5)	3.9 (63.3)	4.4 (67.5)	5.9 (77.4)	4.7 (69.4)	5.0 (73.7)	5.5 (74.5)
Spruce grouse	2.9 (62.7)	4.1 (60.7)	2.3 (47.2)	3.4 (48.0)	3.3 (62.9)	2.3 (54.2)	2.4 (60.6)	3.8 (70.6)	3.1 (53.8)	3.0 (67.6)	3.1 (63.6)
Sharp-tailed grouse	3.4 (48.2)	3.1 (52.9)	2.4 (49.5)	3.5 (38.8)	3.3 (52.2)	3.1 (54.3)	2.4 (55.1)	3.3 (56.0)	4.4 (45.9)	3.2 (64.2)	3.0 (57.3)
Gray partridge	3.1 (62.4)	3.7 (58.6)	2.5 (58.3)	2.8 (59.1)	4.1 (68.9)	3.6 (65.7)	5.0 (52.3)	2.8 (68.8)	3.0 (55.4)	3.4 (64.8)	3.3 (57.9)
Gray squirrel	5.1 (84.7)	6.7 (84.9)	6.6 (84.4)	6.1 (86.2)	7.0 (85.3)	6.9 (82.5)	5.8 (86.1)	6.4 (87.1)	5.9 (87.6)	6.2 (87.6)	5.8 (85.6)
Fox squirrel	4.5 (79.0)	4.8 (80.5)	5.3 (77.7)	5.9 (76.4)	5.1 (82.6)	4.8 (85.1)	5.0 (82.5)	5.0 (84.5)	3.9 (82.6)	4.6 (83.3)	4.8 (84.7)
Eastern cottontail	4.0 (80.0)	4.8 (82.5)	4.7 (77.7)	4.7 (70.5)	5.2 (84.2)	5.8 (79.6)	5.4 (83.4)	4.6 (84.8)	4.8 (84.0)	5.3 (85.2)	4.3 (82.6)
White-tailed jackrabbit	2.6 (72.7)	4.1 (68.2)	5.2 (50.0)	2.7 (60.6)	3.3 (72.5)	3.0 (75.0)	3.2 (82.8)	2.5 (63.6)	4.5 (72.2)	3.8 (70.0)	2.1 (70.8)
Snowshoe hare	3.9 (79.4)	6.3 (82.6)	4.4 (75.0)	2.9 (67.1)	3.5 (60.8)	3.0 (61.4)	4.6 (68.1)	3.8 (80.3)	2.2 (62.3)	3.5 (71.4)	2.6 (59.6)
Raccoon (Sept -Feb)	11.4 (95.1)	8.0 (94.8)	10.0 (93.6)	11.6 (86.3)	9.6 (88.5)	9.9 (91.6)	6.5 (92.6)	7.7 (93.8)	5.4 (89.9)	10.6 (91.2)	9.6 (94.9)
Raccoon[‡] (March -Aug)	6.6 (96.2)	8.2 (95.1)	4.9 (90.2)	5.9 (91.7)	5.6 (85.2)	6.7 (90.9)	3.1 (86.8)				
Red fox (Sept -Feb)	2.4 (51.9)	3.4 (56.7)	2.7 (44.9)	3.1 (49.0)	3.5 (51.0)	2.8 (38.2)	3.7 (46.4)	2.1 (60.0)	2.3 (45.8)	1.5 (49.3)	2.4 (54.3)
Red fox[‡] (March -Aug)	1.3 (47.4)	1.9 (47.1)	2.8 (54.5)	3.6 (46.7)	1.1 (51.7)	1.4 (44.4)	1.6 (55.6)				
Gray fox	2.3 (40.0)	2.0 (33.3)	1.4 (26.3)	1.8 (23.5)	1.3 (30.0)	2.6 (40.9)	1.9 (50.0)	2.7 (65.4)	1.0 (29.2)	3.3 (39.1)	2.5 (41.7)
Coyote	2.5 (49.1)	3.4 (53.9)	2.4 (47.3)	3.2 (36.6)	2.7 (48.8)	2.5 (45.3)	4.11 (50.4)	2.4 (50.5)	4.4 (49.0)	4.4 (53.8)	4.6 (51.7)
Badger	1.3 (87.5)	1.0 (83.3)	1.0 (60.0)	2.8 (60.0)	1.0 (66.7)	1.2 (85.7)	1.2 (100.0)	1.6 (81.8)	1.0 (33.3)	1.2 (83.3)	2.5 (80.0)

[‡] Raccoon and red fox season continuous May 1994 thru March 15, 2006. [γ] Mourning dove season added 2004. * No hunters surveyed reported Rails/Gallinules in bag.

Table 6. Statewide (resident and non-resident) small game hunting license sales and estimated hunter harvest, 1997-98 through 2009-10.

	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Small game license sales[a]	305,186	320,308	327,431	320,862	298,055	288,729	296,939	287,725	280,156	295,898	298,467	290,064	282,983
Federal duck stamp sales	138,331	134,098	134,138	135,884	140,980[e]	144,851[e]							
State duck stamp sales	126,009	126,488	128,245	121,709	118,590	119,677	118,757	114,003	102,143	101,792	100,134	95,675	89,942
Pheasant stamp sales	85,093	99,664	106,945	114,440	97,665	102,097	121,456	114,653	117,301	129,546	129,315	123,270	110,456
Estimated harvest[b] (thousands)													
Ducks[c]	1,206	1,119	1,021	969	990	1,024	914	727	677	731	708	658	576
Canada geese[c]	230	218	285	301	308	257	290	284	282	324	244	288	229
Other geese[c]	11	6	6	15	8	11	13	8	9	7	8	14	6
American coot [c]	29	25	25	10	17	20	11	20	16	25	16	24	15
Common snipe	4	5	3	3	2	3	3	2	5	4	4	2	1
Rails / gallinules	<1	<1	<1	1	<1	2	<1	<1	0	1	3	<1	<1
Crow	74	106	60	96	88	72	82	72	93	69	54	52	56
American woodcock	58	63	54	45	27	28	30	41	28	43	28	29	35
Mourning dove[f]								97	78	86	101	133	110
Ring-necked pheasant	248	309	339	375	267	358	511	420	586	588	655	522	400
Ruffed grouse	654	946	685	619	332	249	351	194	224	417	294	318	358
Spruce grouse	25	27	19	23	9	12	18	9	10	27	18	17	19
Sharp-tailed grouse	13	22	14	16	10	9	12	10	6	12	14	14	10
Gray partridge	16	24	19	17	10	11	22	13	16	11	11	10	8
Gray squirrel	131	149	132	140	146	134	175	133	122	141	133	122	110
Fox squirrel	68	57	71	65	63	67	85	62	62	66	48	51	54
Eastern cottontail	65	89	59	78	63	52	93	87	90	78	79	80	58
White-tailed jack rabbit	4	7	6	7	8	4	7	7	5	4	9	6	3
Snowshoe hare	8	25	21	27	22	11	12	8	10	17	6	11	5
Raccoon (Sept -Feb)	124	143	65	49	59	60	50	57	29	63	47	72	67
Raccoon[d] (Mar –Aug)	17	2	16	36	18	19	22	20	7				
Red fox (Sept –Feb)	13	13	10	19	7	11	13	6	10	8	6	4	10
Red fox [d] (Mar –Aug)	2	3	1	2	4	4	1	1	1				
Gray fox	3	1	2	1	1	1	1	2	1	4	1	2	2
Coyote	16	14	13	29	12	14	20	18	39	21	34	46	46
Badger	1	1	1	1	<1	1	<1	<1	1	1	<1	<1	1

Harvest estimates in this table, and the number of hunters and mean take per hunter in Table 5, are calculated from different questions on the survey form. The sample used in calculations differs from one estimator to the next. This is because some respondents give specific answers to one question but not to a related one. A formula is used to calculate the total estimated take for each species that appear in this table. In most years the formula produces results rather close to those obtained by multiplying the average take per hunter times the number of hunters. However, in other years (e.g., 1985) results of the two methods are quite divergent, perhaps as a result of an unusual sample. This is being investigated further, and as a result, numbers may change somewhat in future reports. The most current report of survey findings will have the best data available at that time.

[a] Duplicate licenses not included.
[b] Estimates based upon response of hunters to questionnaires.
[c] U.S. Fish and Wildlife Service HIP harvest estimates for 2008 are:
Ducks . . . . 584,000 Canada geese . . . . 222,900 Other geese 0
[d] Raccoon and red fox seasons were year round from May,1994 through March 16, 2006.
[e] Federal duck stamps sold have not been audited for non-hunting stamp purchasers. [f] Mourning dove season added 2004.

Table 7. Mail survey results of nonresident small game hunters, 1996-97 through 2008-09.

	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Nonresident licenses issued[a]	6,361	7,155	7,572	7001	5,843	5,852	6,291	6,385	5,897	7,356	7,858	7,114	6,934
Questionnaires:													
Number mailed	269	200	199	98	124	130	123	182	210	185	185	226	196
Number not delivered	18	17	16	6	9	9	17	13	10	11	11	15	10
Number (percent) returned	183 (73)	117 (64)	136 (74)	56 (61)	77 (67)	75 (66)	68 (64)	114 (67)	134 (67)	115 (62)	101 (58)	89 (42)	105 (54)
Estimated nonresidents and (percent) of all nonresidents hunting:													
Ducks	2,331 (37)	2,874 (40)	2,505 (33)	2,375 (34)	2,727 (47)	2,263 (39)	2,498 (40)	2,394 (37)	2,040 (35)	2,344 (32)	2,256 (29)	2,293 (32)	1,849 (27)
Canada goose	1,113 (17)	1,468 (20)	1,225 (16)	1,500 (21)	1,169 (20)	1,092 (19)	1,388 (24)	1,368 (21)	1,818 (31)	2,083 (28)	934 (12)	1,587(22)	726 (10)
Ruffed grouse	2,157 (34)	3,608 (50)	3,508 (46)	3,000 (43)	1,169 (20)	2,029 (35)	2,313 (40)	1,824 (29)	1,774 (30)	1,953 (26)	1,867 (24)	1,940 (27)	1,915 (28)
Ring-necked pheasant	731 (11)	612 (8)	947 (13)	625 (9)	935 (16)	1,404 (24)	2,128 (36)	2,679 (42)	2,572 (44)	3,776 (51)	2,645 (34)	3,116 (44)	1,519 (22)
Raccoon	.35 (1)	0 (0)[c]	56 (1)	250 (4)	0 (0)	0 (0)	0 (0)	0 (0)	44 (0.7)	0 (0)	78 (1.0)	0 (0)	0 (0)
Estimated nonresident take:													
Ducks	15,967	26,663	26,391	18,253	42,225	17,556	17,855	19,269	12,149	12,173	22,718	15,463	11,755
Canada goose	4,905	4,587	6,960	5,001	13,400	5,852	5,736	6,214	3,946	3,580	3,501	5,762	3,698
Ruffed grouse	16,072	27,886	23,384	24,003	6,622	9,207	9,437	7,924	6,429	11,522	7,236	6,938	8,651
Ring-necked pheasant	2,505	1,712	4,844	4,001	3,740	7,647	9,344	11,174	13,656	16,079	17,661	10,642	6,274
Raccoon[b]	70	0	724	3,375	0	0	0	0	887	0	3,268	0	0

[a] Excludes duplicate licenses and nonresident shooting preserve licenses.
[b] In 2001, 2002, 2003, 2004, 2006, 2008, and 2009 no non-residents reported hunting/harvesting raccoons.

Raccoon take per hunter			
Year	Resident	Non-resident	Number of Non-resident raccoon licenses
2000	8	13	51
2001[b]	10	0	48
2002[b]	11	0	46
2003[b]	10	0	44
2004[b]	8	0	46
2005	6	20	44
2006[b]	8	0	53
2007	5	42	45
2008[b]	10	0	40
2009[b]	10	0	33

Table 8. Number of days spent hunting small game statewide by species, 2009 – 10.

SPECIES HUNTED	SUM OF DAYS HUNTED	SAMPLE SIZE	MEAN DAYS HUNTED W/ ZEROES	95% CONF INT	N REPORTING DAYS HUNTED	MEAN DAYS HUNTED W/O ZEROES	95% CONF INT	ESTIMATED HUNTERS	ESTIMATED HUNTER-DAYS	95% CONF INT
DUCK (ALL SPECIES)	7485	3802	1.97	0.16	1032	7.25	0.47	77,705	557,109	45,756
CANADA GOOSE	5580	3802	1.47	0.15	728	7.66	0.60	55,599	415,320	42,066
OTHER GEESE	300	3802	0.08	0.04	40	7.50	3.15	3,275	22,329	11,461
COOT	355	3802	0.09	0.04	50	7.10	2.76	4,094	26,423	12,433
SNIPE	130	3802	0.03	0.03	15	8.67	6.42	1,340	9,676	7,942
RAILS & GALLINULES	71	3802	0.02	0.02	5	14.20	22.44	372	5,285	6,971
CROW	617	3802	0.16	0.06	133	4.64	1.51	10,643	45,923	16,615
WOODCOCK	915	3802	0.24	0.05	151	6.06	0.93	11,834	68,103	14,761
MOURNING DOVE	631	3802	0.17	0.04	138	4.57	0.88	10,495	46,965	11,743
PHEASANT	9150	3802	2.41	0.19	1314	6.96	0.46	99,811	681,035	53,296
RUFFED GROUSE	7481	3802	1.97	0.16	1152	6.49	0.44	87,530	556,811	46,294
SPRUCE GROUSE	775	3802	0.20	0.06	122	6.35	1.32	9,825	57,683	15,546
SHARP-TAILED GROUSE	449	3802	0.12	0.05	72	6.24	2.01	5,582	33,419	13,046
GRAY PARTRIDGE	447	3802	0.12	0.05	54	8.28	3.01	4,243	33,270	14,765
FOX SQUIRREL	1084	3802	0.29	0.08	172	6.30	1.45	13,174	80,682	21,822
GRAY SQUIRREL	1568	3802	0.41	0.08	284	5.52	0.82	22,255	116,706	21,475
COTTONTAIL RABBIT	1180	3802	0.31	0.12	208	5.67	2.03	16,300	87,827	33,254
JACKRABBIT	40	3802	0.01	0.01	21	1.90	0.83	1,786	2,977	1,724
SNOWSHOE HARE	159	3802	0.04	0.02	43	3.70	1.28	3,498	11,834	5,317
BADGER	7	3802	0.00	0.00	4	1.75	1.52	372	521	561
RACCOON(SEPT-FEB)	771	3802	0.20	0.09	86	8.97	3.75	7,294	57,386	26,546
RED FOX(SEPT-FEB)	904	3802	0.24	0.10	91	9.93	3.46	7,815	67,285	26,833
GRAY FOX	405	3802	0.11	0.09	20	20.25	15.55	1,786	30,144	24,731
COYOTE	2153	3802	0.57	0.14	244	8.82	1.88	19,426	160,248	38,912

Table 9. Statewide estimates of number of hunters and mean harvest for all hunters reporting hunting for that species, 2009 – 10.

SPECIES HUNTED	BAGGED SUM	SAMPLE SIZE	N HUNTING	ESTIMATED HUNTERS	MEAN BAGGED W/ ZEROES	95% CONF INT
DUCK (ALL SPECIES)	7749	3802	1044	77,705	7.42	0.22
CANADA GOOSE	3074	3802	747	55,599	4.12	0.11
OTHER GEESE	84	3802	44	3,275	1.91	0.01
COOT	199	3802	55	4,094	3.62	0.03
SNIPE	20	3802	18	1,340	1.11	0.00
RAILS & GALLINULES	4	3802	5	372	0.80	0.00
CROW	757	3802	143	10,643	5.29	0.05
WOODCOCK	476	3802	159	11,834	2.99	0.05
MOURNING DOVE	1477	3802	141	10,495	10.48	0.10
PHEASANT	5375	3802	1341	99,811	4.01	0.13
RUFFED GROUSE	4810	3802	1176	87,530	4.09	0.12
SPRUCE GROUSE	257	3802	132	9,825	1.95	0.02
SHARP-TAILED GROUSE	128	3802	75	5,582	1.71	0.01
GRAY PARTRIDGE	108	3802	57	4,243	1.89	0.01
FOX SQUIRREL	725	3802	177	13,174	4.10	0.05
GRAY SQUIRREL	1475	3802	299	22,255	4.93	0.06
COTTONTAIL RABBIT	776	3802	219	16,300	3.54	0.04
JACKRABBIT	35	3802	24	1,786	1.46	0.01
SNOWSHOE HARE	72	3802	47	3,498	1.53	0.01
BADGER	10	3802	5	372	2.00	0.00
RACCOON(SEPT-FEB)	896	3802	98	7,294	9.14	0.11
RED FOX(SEPT-FEB)	138	3802	105	7,815	1.31	0.01
GRAY FOX	25	3802	24	1,786	1.04	0.01
COYOTE	620	3802	261	19,426	2.38	0.05

Table 10. Estimated harvest and mean harvest per successful hunter 2009-10

SPECIES HUNTED	N BAGGING	MEAN BAGGED W/O ZEROES	95% CONF INT	ESTIMATED BAGGERS	HARVEST ESTIMATE	95% CONF INT	HUNTER SUCCESS RATE (%)
DUCK (ALL SPECIES)	840	9.23	0.85	62,521	576,758	62,631	80.5
CANADA GOOSE	544	5.65	0.59	40,490	228,798	29,573	72.8
OTHER GEESE	24	3.50	1.80	1,786	6,252	3,867	54.5
COOT	36	5.53	2.43	2,679	14,812	7,975	65.5
SNIPE	11	1.82	0.78	819	1,489	1,024	61.1
RAILS & GALLINULES	3	1.33	1.43	223	298	355	60.0
CROW	128	5.91	1.09	9,527	56,344	13,992	89.5
WOODCOCK	115	4.14	1.53	8,559	35,429	14,452	72.3
MOURNING DOVE	130	11.36	2.11	9,676	109,933	27,382	92.2
PHEASANT	921	5.84	0.42	68,550	400,061	36,455	68.7
RUFFED GROUSE	876	5.49	0.43	65,201	358,008	34,886	74.5
SPRUCE GROUSE	84	3.06	0.78	6,252	19,129	6,293	63.6
SHARP-TAILED GROUSE	43	2.98	0.69	3,200	9,527	3,549	57.3
GRAY PARTRIDGE	33	3.27	1.16	2,456	8,038	3,886	57.9
FOX SQUIRREL	150	4.83	1.00	11,165	53,962	13,873	84.7
GRAY SQUIRREL	256	5.76	0.67	19,054	109,784	18,048	85.6
COTTONTAIL RABBIT	181	4.29	0.65	13,472	57,758	11,929	82.6
JACKRABBIT	17	2.06	0.97	1,265	2,605	1,644	70.8
SNOWSHOE HARE	28	2.57	0.59	2,084	5,359	2,303	59.6
BADGER	4	2.50	3.79	298	744	939	80.0
RACCOON(SEPT-FEB)	93	9.63	4.10	6,922	66,689	31,026	94.9
RED FOX(SEPT-FEB)	57	2.42	0.55	4,243	10,271	3,493	54.3
GRAY FOX	10	2.50	1.94	744	1,861	1,645	41.7
COYOTE	135	4.59	1.28	10,048	46,147	14,799	51.7

The following information has been excerpted from: U.S. Fish and Wildlife Service. Migratory bird hunting activity and harvest during the 2008 and 2009 hunting seasons: preliminary estimates. U.S. Department of the Interior, Washington, D.C. U.S.A. The entire report is available on-line at http://www.fws.gov/migratorybirds/reports/reports.html

Table 1. Species composition of the Minnesota waterfowl harvest, 2008 and 2009. (from: Raftovich, R.V., K.A. Wilkins, K.D. Richkus, S.S. Williams, and H.L. Spriggs. 2010. Migratory Bird Hunting activity and harvest during the 2008 and 2009 hunting seasons: Preliminary estimates. U.S. Fish and Wildlife Service, Laurel, Maryland. USA July 2010. 63 pp).**Note:** All hunter activity and harvest estimates are preliminary, pending final counts of the number of migratory bird hunters in each state and complete audits of all survey response data.

	Minnesota Harvest					Mississippi Flyway Harvest		
Species	2008	% of Harvest	2009	% of Harvest	Percent change in Harvest 08-09	2008	2009	Percent change Harvest 08-09
Mallard	188,974	32.36	101,280	25.82	- 87	2,282,091	2,076,235	- 10
Domestic mallard	0	0.00	0	0.00	0	3,311	1,990	- 66
American black duck	1,120	0.19	0	0.00	0	29,641	30,373	+ 2
Black x mallard	560	0.10	641	0.16	+ 13	5,850	6,104	+ 4
Gadwall	19,877	3.40	23,931	6.10	+ 17	906,308	713,277	- 27
American wigeon	13,718	2.35	10,470	2.67	- 31	160,218	96,709	- 66
Green-winged teal	61,592	10.55	49,999	12.74	- 23	852,849	755,233	- 13
Blue-winged /cinnamon teal	60,752	10.40	34,828	8.87	- 74	517,937	732,594	+ 29
Northern shoveler	10,079	1.73	16,666	4.25	+ 40	252,481	283,039	+ 11
Northern pintail	7,279	1.25	3,632	0.93	- 100	158,218	106,727	- 48
Wood duck	78,949	13.52	53,204	13.56	- 48	662,706	647,412	- 2
Redhead	10,079	1.73	8,974	2.29	- 12	43,108	59,860	+ 28
Canvasback	280	0.05	3,846	0.98	+ 93	1,234	27,831	+ 96
Greater scaup	840	0.14	1,496	0.38	+ 44	24,649	24,567	0
Lesser scaup	10,639	1.82	10,043	2.56	- 6	97,340	111,522	+ 13
Ring-necked duck	80,629	13.81	45,726	13.65	- 76	251,356	186,243	- 35
Goldeneye	11,198	1.92	7,051	1.79	- 59	29,540	30,017	+ 2
Bufflehead	17,358	2.97	12,607	3.21	- 38	101,118	91,175	- 11
Ruddy duck	280	0.05	214	0.05	- 31	10,970	12,243	+ 10
Scoters	0	0.00	0	0.00	0	1,585	3,599	+ 56
Hooded merganser	8,679	1.49	7,478	1.91	- 16	38,201	41,645	+ 8
Other mergansers	1,120	0.19	214	0.05	- 423	8,139	7,534	- 8
Total Duck Harvest (retrieved kill)	584,000 ± 14%		392,300 ±14%		- 49	6,522,900 ± 6%	6,121,500 ± 6%	- 7

[a] Sum of all species does not equal total because of rounding error.

Table 2. Top 10 states in number of **adult duck hunters**, 2009, and number of hunter-days and retrieved duck kill, in each (from: Raftovich, R.V., K.A. Wilkins, K.D. Richkus, S.S. Williams, and H.L. Spriggs. 2010. Migratory Bird Hunting activity and harvest during the 2008 and 2009 hunting seasons: Preliminary estimates. U.S. Fish and Wildlife Service, Laurel, Maryland. USA July 2010. 63 pp). **Note:** All hunter activity and harvest estimates are preliminary, pending final counts of the number of migratory bird hunters in each state and complete audits of all survey response data.

State	Number of active duck hunters	Duck hunter days afield	Total duck harvest	Seasonal duck harvest per hunter
Louisiana	80,100 ± 6%	691,400 ± 10%	1,848,400 ± 12%	23.1 ±13%
Texas	67,400 ± 20%	410,200 ± 28%	979,800± 20%	14.5 ± 28%
Minnesota	61,100 ± 10%	335,800 ± 14%	392,300 ± 14%	6.4 ± 17%
Arkansas	55,000 ± 9%	435,600 ± 12%	1,103,900 ± 18%	20.1 ± 20%
Wisconsin	51,500 ± 11%	330,800 ± 11%	322,600 ± 11%	6.3 ± 15%
California	51,300 ± 11%	511,300 ± 16%	1,441,200 ± 20%	28.1 ± 23%
Michigan	41,100 ± 10%	251,100 ± 12%	308,900 ±13%	7.5 ± 16%
Missouri	35,200 ± 13%	234,600 ± 21%	398,700 ± 25%	11.3 ± 28%
Illinois	35,100 ± 10%	317,200 ± 14%	425,200 ± 18%	12.1 ± 21%
North Dakota	30,600 ± 7%	165,900 ± 15%	473,000 ± 19%	15.5 ± 21%
Mississippi Flyway		3,455,500 ± 5%	6,121,500 ± 6%	
United States		6,771,900 ± 4%	13,139,800 ± 4%	

Table 3. Top 10 states in number of **adult goose hunters**, 2009, and number of hunter-days and retrieved goose kill, in each (from: Raftovich, R.V., K.A. Wilkins, K.D. Richkus, S.S. Williams, and H.L. Spriggs. 2010. Migratory Bird Hunting activity and harvest during the 2008 and 2009 hunting seasons: Preliminary estimates. U.S. Fish and Wildlife Service, Laurel, Maryland. USA July 2010. 63 pp). **Note:** All hunter activity and harvest estimates are preliminary, pending final counts of the number of migratory bird hunters in each state and complete audits of all survey response data.

State	Number of active goose hunters	Goose hunter days afield	Total goose harvest	Seasonal goose harvest per hunter
Minnesota	49,100 ± 11%	252,000 ± 16%	147,700 ± 19%	3.0 ± 22%
Wisconsin	43,400 ± 11%	279,200 ± 17%	97,300 ± 20%	2.2 ± 23%
Texas	36,700 ± 23%	108,900 ± 26%	196,500 ± 35%	5.4 ± 42%
Michigan	35,400 ± 10%	214,700 ± 14%	162,300 ± 15%	4.6 ± 18%
California	33,400 ± 12%	251,100 ± 15%	150,300 ± 18%	4.5 ± 20%
Pennsylvania	30,500 ± 12%	167,500 ± 16%	169,100 ± 18%	5.5 ± 22%
Illinois	29,100 ± 11%	223,400 ± 14%	167,700 ± 16%	5.8 ± 20%
Maryland	24,200 ± 9%	136,800 ± 13%	169,700 ± 13%	7.0 ± 16%
Ohio	20,900 ± 19%	138,900 ± 21%	82,600 ± 18%	4.0 ± 26%
North Dakota	20,700 ± 8%	98,200 ± 15%	136,700 ± 37%	6.6 ± 38%
Mississippi Flyway		1,773,900 ± 6%	1,163,400 ± 8%	
United States [b]		3,789,800 ± 4%	3,327,000 ± 5%	

[b]. Goose hunter statistics do not include brant hunter statistics for coastal states with brant seasons: Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Rhode Island, Virginia, California, Oregon, Washington, and Alaska.

HUNTER ACTIVITY AND GOOSE HARVEST DURING THE SEPTEMBER 2009 CANADA GOOSE HUNT IN MINNESOTA

David P. Rave, Wetland Wildlife Populations and Research
Margaret H. Dexter, Wildlife Policy and Research Unit
John Giudice, Biometrics Unit

The September Canada goose season in Minnesota was 5-22 September 2009 (18 days). Beginning in 2007 and continuing through 2009, a 7-day (16 - 22 Sep) experimental season addition was added in the Northwest Goose Zone (Figure 1). The U.S. Fish and Wildlife Service had approved the 7-day season extension in other goose zones in Minnesota after a 3-year experimental season from 1999-2001 (Maxson et al. 2003).

During the September season the daily bag limit was 5 Canada geese per day statewide. Shooting hours were 1/2 hour before sunrise to sunset. Taking of Canada geese was prohibited on or within 100 yards of all surface waters in the Northwest Goose Zone, in the Carlos Avery Wildlife Management Area and in the Swan Lake Area. Within the Twin Cities Metro Zone, and goose refuges open to goose hunting, hunting was not permitted from public road right-of-ways. Goose hunters were required to obtain a $4.00 permit to participate in the September season.

This report documents results of the 2009 September goose hunter mail questionnaire survey (Appendix A).

METHODS

Permittees were randomly selected to receive a post-season hunter survey. Questionnaires were sent to 3,103 permit holders following the season. Questionnaires were individually numbered, and up to 3 questionnaires were mailed to individuals who had not responded. Completed questionnaires were double key-punched to reduce errors.

The questionnaire asked hunters which zone they hunted, number of days they hunted, and, for the season as a whole, number of geese taken and number of geese knocked down and not retrieved. Hunters were asked to indicate the number of days during the September season that they hunted over water, and not over water. Finally, the questionnaire asked whether hunters hunted in the Northwest Zone during the final week of the season (16 – 22 Sep), and how many days and how many geese they shot and retrieved during that week.

Statistical Analysis Systems (SAS Institute Inc. 1999-2001, Version 8.2) computer programs were written to summarize responses to the questionnaire survey.

RESULTS AND DISCUSSION

The DNR License Bureau reported that 35,418 Special Canada Goose Season permits were sold prior to 23 September, 2009. Response rate to the survey was 57.8%. Among those respondents, 71.1% indicated that they hunted during the September season. Following the usual pattern, the majority of the hunters indicated they hunted in the Remainder zone, followed by the West, Twin Cities Metro, Northwest, and

Southeast goose zones (Table 1). The Remainder and West zones are the largest zones (Figure 1). Active hunters were afield an average of 3.0 to 3.7 days and retrieved 2.0 to 4.4 geese, depending upon their hunt zone (Table 1). Overall, the success rate for active hunters was 64.4%.

The survey estimates that 88,381 Canada geese were harvested during the 2008 September season with approximately 62% of the harvest in the Remainder Zone and 13% in the West Zone (Table 1). This harvest pattern has remained rather consistent during the 2000-2009 September seasons (Table 2). Prior to the implementation of the Harvest Information Program, the U.S. Fish and Wildlife Service adjusted their mail survey statistics by a memory and prestige response bias factor of 0.848 for geese bagged in the Mississippi Flyway (Voelzer et al. 1982:56). Multiplying September Canada goose harvest by the adjustment factor would indicate a 2009 retrieved harvest of 74,947.

We asked hunters how many days they hunted overwater and how many days they hunted away from water. A total of 36 % of hunters statewide hunted over water, and 28% of all days spent hunting during the September season were overwater (Table 3). We did not ask how many birds were shot overwater.

Of those hunters who indicated that they hunted in the Northwest Zone, 54% reported hunting during the final week of the season, Sep 16 – 22, 2009. This equates to 543 hunters, 1295 hunter days, and a retrieved harvest of 1,692 geese during the experimental season (Sep 16 – 22) in the Northwest zone.

LITERATURE CITED

MAXSON, S. J., J. S. LAWRENCE, and M. H. DEXTER. 2003. Final report on Minnesota's 1999-2002 experimental September Canada goose season extension. Minnesota Dept. of Natural Resources Unpubl. Report. 18 pp.

VOELZER, J. F., E. Q. LAUXEN, S. L. RHOADES, and K. D. NORMAN, editors. 1982. Waterfowl status report 1979. U.S.D.I. Fish Wildl. Ser. Spec. Sci. Rep. - Wildl. No. 246. 96pp.

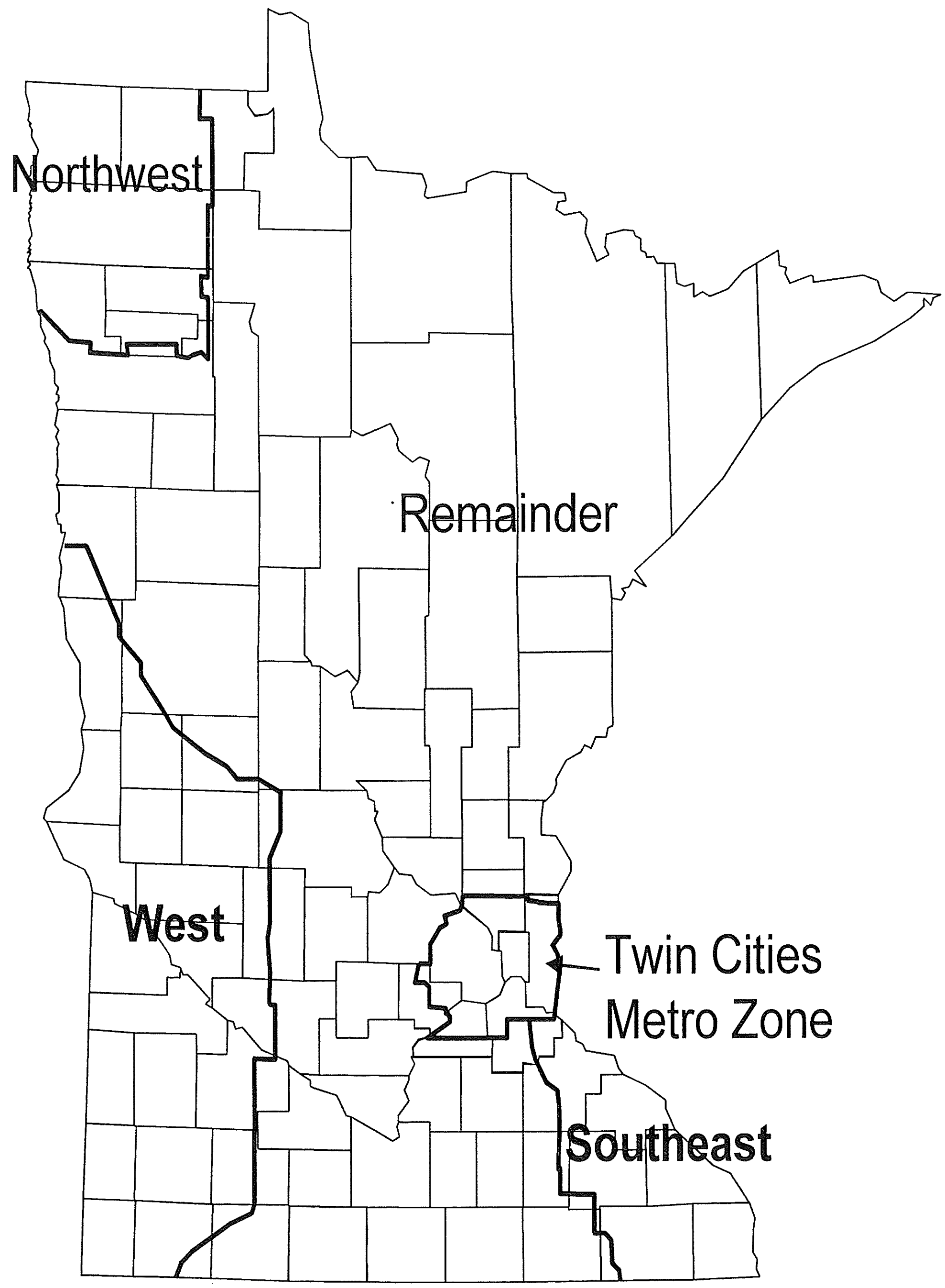


Figure 1. September season Goose Zones in Minnesota.

Table 1. Permit sales, hunter activity, and harvest[a] by zone during the September Canada Goose season (5-22 September) in Minnesota, 2009.

Parameter	Northwest	West	Southeast	Twin Cities Metro	Remainder	Total
ALL ZONES						
Total permits sold						35,418
Questionnaires delivered						3,103
Useable questionnaires returned						1,700
% responding						57.8
Active hunters						1,209
% active hunters						71.1
BY ZONE						
% Distribution of hunters by primary hunt zone	4.0	20.3	3.3	16.7	60.2	100
%successful	70.8	55.7	67.5	66.3	65.7	64.4
Days/active hunter	3.7	3.1	3.0	3.7	3.6	3.7
Geese/active hunter	4.4	2.0	2.4	3.0	3.2	3.1
Unretrieved harvest/active	0.65	0.27	0.45	0.37	0.41	0.41
% unretrieved harvest	12.7	11.9	15.7	10.9	11.4	11.6
EXPANDED:						
Active hunters	1,001	5,126	834	4,209	15,168	25,189
Hunter days	3,692	15,879	2,461	15,649	54,630	92,298
Retrieved harvest	4,442	10,294	2,023	12,794	48,609	**78,151**
Est. unretrieved harvest	647	1,397	376	1,563	6251	10,230
Total harvest	5,089	11,690	2,398	14,357	54,859	88,381

[a]Harvest estimates not adjusted for memory/exaggeration bias.

Table 2. Retrieved harvest estimates by zone during the September Canada Goose season in Minnesota, 2000 – 2009.

Year	Northwest	West	Southeast	Twin Cities Metro	Remainder	Total Geese Harvested	Number of Hunters	Geese/ Day/ Hunter	Total Geese/ Hunter
2000	2,750	18,909	1,183	15,594	51,685	**90,121**	33,202	0.63	2.71
2001	2,047	27,663	538	8,164	62,608	**101,021**	28,265	0.82	3.57
2002	1,568	22,075	848	8,504	50,769	**83,764**	26,089	0.68	3.20
2003	2,805	17,779	2,357	9,890	48,157	**80,988**	30,415	0.74	2.66
2004	4,326	16,843	1,197	11,090	56,480	**89,936**	29,657	0.80	3.03
2005	4,888	15,304	1,717	11,139	61,218	**94,266**	27,865	0.89	3.38
2006	6,826	17,987	1,461	11,844	53,321	**91,439**	28,405	0.86	3.22
2007	7,948	14,952	1,469	11,702	58,243	**94,314**	25,379	0.91	3.72
2008	5,530	16,168	2,580	13,656	62,827	**100,748**	27,392	0.98	3.73
2009	4,442	10,294	2,023	12,794	48,609	**78,151**	25,189	0.85	3.10

Table 3. Percent of Hunters that Reported Hunting $\geq$1 Day Overwater, and percent of total days hunted overwater, during the September Canada Goose season in Minnesota, 2009.

Zone	% of Hunters that Hunted Overwater	% of Days Spent Hunting Overwater
North West	4.7	2.8
South East	56.4	47.0
Twin Cities Metro	39.3	31.7
West	39.7	28.3
Remainder	35.9	27.3
All	36.2	27.9

Appendix A. Questions asked on the 2009 September Special Canada Goose Season Hunter Survey.

2009 September Special Canada Goose Season Hunter Survey

You are being asked to provide information to help us evaluate the harvest of Canada geese in Minnesota during September 5-22, 2009. Your cooperation is important. Please return this survey card even if you did not hunt Canada geese. THANK YOU! Dave Schad, Director, Division of Fish and Wildlife, MN DNR.

1. Did you hunt during the September 5-22, 2009 Special Canada Goose season?

    __ Yes __ No (Please check one.)

    If NO, please check no and return the survey. Thank you. If YES, please continue.

2. For each zone you hunted in (please see attached map), please indicate the number of days you hunted and the total number of geese you **personally** shot and retrieved (do not include information from other members in your party).

Goose Zone/Season **(see map for goose-zone boundaries)**	**Number of days hunted**	**Total geese personally shot and retrieved**	**Total geese personally knocked down but not retrieved**
Northwest *If you hunted the Northwest Zone, please see question 4.*			
Southeast			
Twin Cities Metro			
West (includes West Central Zone)			
Anywhere in the Remainder of State			

3. Please indicate the number of days during the 2009 Special Canada Goose season that you hunted geese:
    a) Overwater, (e.g. with decoys floating in or along the shore of a wetland or pass shooting next to a wetland) __________ days hunted

    b) Not overwater (e.g. field shooting) __________ days hunted

4. If you indicated that you hunted in the **Northwest Goose Zone** in question 2:
    a) Did you hunt Canada geese in the **Northwest Goose Zone** during the **last week** of the season (**Wednesday, September 16, 2009 through Tuesday, September 22, 2009**)?

        __ Yes __ No

    b) How many days did you hunt and how many geese did you personally shoot and retrieve in the **Northwest Goose Zone** during the final week of the season (**Wednesday, September 16, 2009 through Tuesday, September 22, 2009**)?

        __________ days hunted

        __________ geese harvested

If you have general comments you may write them here (continue on back if necessary). If you have questions and desire a specific response, please contact your local DNR Wildlife Office or the DNR Information Center (Minnesota DNR, 500 Lafayette Road, St. Paul, MN 55155-4020, 1-888-646-6367). Thank you.

2010 LIGHT GOOSE CONSERVATION ORDER HARVEST IN MINNESOTA

David Rave and Margaret Dexter, Wildlife Populations and Research Unit

INTRODUCTION

This report documents results of the 2010 Light Goose Conservation Order hunter mail questionnaire survey.

METHODS

Minnesota held a light goose Conservation Order harvest from 1 March - 30 April 2010. Participants were required to obtain a $3.50 permit. No other license, stamp or permit was required. Shooting hours were 1/2 hour before sunrise to 1/2 hour after sunset. There were no daily or possession limits. Use of electronic calls and unplugged shotguns was allowed.

All permit holders were sent a questionnaire after the season. Survey questions are listed in Table 1. Second and third mailings were sent to non-respondents after one month had elapsed.

RESULTS AND DISCUSSION

A total of 952 permits was issued and 671 responses (72 %) to the questionnaire were obtained (Table 2). In calculating harvest estimates, we assumed that the 281 non-respondents participated in the conservation action and took light geese in the same manner as respondents (i.e., tallies were expanded by 1.42). Anecdotal reports suggest fewer light geese were present in Minnesota for fewer days during spring 2010 than spring 2009, which resulted in fewer hunters and less geese harvested in 2010 than 2009. Harvest was again concentrated in the southwest portion of the state with some also being taken in west-central Minnesota. Three-hundred eighty nine people attempted to take light geese during the 61-day conservation order period. Active participants pursued light geese for 1,475 days and 559 light geese were shot and retrieved. This was an average retrieved take of 1.4 geese per active participant. Another 70 light geese were reported wounded and not retrieved.

Unplugged shotguns were used by 175 (44.9%) individuals to take 348 (62.2%) geese, of which 131 (23.4%) were taken with the 4th, 5th, or 6th shell. Electronic calls were used by 191 (25.9%) participants to take 192 (34.3%) light geese. During the 1/2 hour after sunset period, 87 (15.6%) geese were harvested by 154 (39.7%) active hunters.

ACKNOWLEDGMENTS

J. Giudice, MNDNR Biometrics Unit analyzed all data for this report.

Table 1. Questions asked on Light Goose Conservation Order hunter mail questionnaire.

1. Did you hunt light geese in Minnesota during March 1 – April 30, 2010?
2. How many days did you hunt light geese in Minnesota during March 1 – April 30, 2010?
3. In what County did you hunt light geese most often during March 1 – April 30, 2010?
4. How many light geese did you personally shoot and retrieve in Minnesota?
5. How many light geese did you personally shoot, but were UNABLE to retrieve?
6. Did you hunt light geese in Minnesota with a gun(s) that was holding more than 3 shells?
7. If yes, how many light geese did you shoot with a gun holding more than 3 shells?
8. How many light geese did you shoot and retrieve with the 4^{th}, 5^{th}, or 6^{th} shell?
9. Did you hunt light geese in Minnesota with the aid of an electronic caller?
10. If yes, how many light geese did you shoot and retrieve with the aid of an electronic caller?
11. Did you hunt light geese in Minnesota during the ½ hour after sunset period?
12. If yes, how many light geese did you shoot and retrieve during the ½ hour after sunset period?

Table 2. Summary of Light Goose Conservation Order harvest in Minnesota, 2001 - 2010

	Year									
Statistic	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total permits sold	1,128	1,997	1,438	1,424	1,383	1,363	1,292	1,406	1,670	952
Useable returns	769	1,375	1,071	1,095	998	955	921	910	1,057	671
Response rate (%)	68.0	69.0	74.0	77.0	72.0	70.0	71.0	65.0	63.0	72.3
Active hunters (%)	34.8	60.5	38.5	48.5	44.7	37.3	39.8	54.9	66.0	40.8
Estimated total hunters	393	1,209	553	690	618	516	514	773	1,103	389
Estimated hunter days	2,112	5,517	2,600	3,372	2,643	2,665	2,302	3,404	4,647	1,475
Mean days/hunter	5.4	4.6	4.7	4.9	4.3	5.2	4.5	4.4	4.2	3.8
Estimated harvest (shot & retrieved)	316	3,516	2,005	2,735	1,395	1,360	1,786	2,409	4,366	559
Mean harvest/hunter	0.8	2.9	3.6	4.0	2.3	2.6	3.5	3.1	4.0	1.4
Estimated crippling losses	19	637	253	315	150	163	172	302	640	70
Percent of hunters using unplugged guns	49.2	46.4	50.6	48.2	44.0	42.3	43.6	46.7	46.8	44.9
Est. number hunters using uplugged guns	193	560	280	333	272	215	224	361	516	175
Est. number geese shot with unplugged guns	129	2,137	996	1,385	777	689	1,032	1,275	2,413	348
Est. harvest with shell 4-5-6	68	615	401	491	269	287	277	339	822	131
Percent of hunters using electronic calls	14.3	11.8	15.7	19.3	17.8	14.4	17.1	19.1	23.5	25.9
Est. number hunters using e-calls	56	142	87	133	110	73	88	148	260	101
Est. harvest while using e-calls	103	512	474	326	268	280	329	566	1,171	192
Percent of hunters hunting 1/2-hr after sunset	35.9	45.5	41.2	38.4	42.7	43.9	38.3	42.3	43.1	39.7
Est. number hunting after 1/2-hr sunset	141	550	228	265	264	223	197	326	475	154
Est. harvest 1/2-hr after sunset	43	841	267	311	242	246	209	511	713	87

FALL WILD TURKEY HARVEST REPORT, 2009

Eric Dunton, Farmland Wildlife Populations and Research Group

Minnesota's fall turkey hunting season is managed with a quota system similar to the spring turkey hunting season. Permits are allocated across 67 permit areas (PAs; Figure 1) during 2, 5-day time periods in PAs 156 - 467 and 1, 30-day time period in PA 601.

Three types of permits were available to hunters: (1) general lottery permits in which applicants or parties of up to 4 hunters applied for specific PA and time period, (2) landowner permits in which up to 20% of permits for each PA and time period were reserved for landowners or tenants who lived on 40 acres or more of land within the PA, and (3) surplus permits were offered in under-subscribed permit areas and time periods to hunters who applied in the lottery, but were unsuccessful. General lottery and landowner permits were made available based on a system of preference, which was determined by the number of years applicants submitted a valid, but unsuccessful application since last receiving a permit. If available, surplus permits could be purchased on a first-come, first-served basis. Permit holders were allowed to harvest 1 turkey of either sex during the fall season.

Fall turkey hunting opportunity was increased significantly since 2007 with the addition of 4,840 available permits (108% increase) and 35 new permit areas. In 2009, over 5,000 permits were issued, and hunters registered 1,163 turkeys, similar to the 2008 season (Table 1; Figure 2). Hunter success averaged 23% but varied among PAs from 0% in PAs 156, 183, 235, 450, 457, and 458 to 46% in PAs 244 and 454 (Table 2). The majority of permits issued were general lottery (94%), followed by landowner permits (4%), and surplus (2%; Tables 3 – 4).

In response to wild turkey range expansion, the number of PAs open to fall turkey hunting was increased by 35 since 2007. For the second year a 30-day season was held in PA 601 to increase hunter participation and turkey harvest in response to an increasing number of urban/nuisance complaints in the metropolitan area. The addition of 800 permits in PA 601 plus 35 new PAs accounted for 38% of the registered harvest since 2007. Expanded permit allocation in traditional PAs accounted for the remainder of the increase in the number of hunters and registered harvest. Hunter success has remained stable (range 22-24%) since 2004 (Table 1).

Table 1. Permits available and issued, applicants, registered harvest, and hunter success rates for fall wild turkey hunting seasons 1990 – 2009, Minnesota.

Year	Permits available	Applicants	Permits issued	Registered harvest	Hunter success (%)[a]
1990	1000	4522	951	326	34
1991	2200	2990	2020	552	27
1992	2200	2782	2028	588	29
1993	2400	3186	2094	605	29
1994	2500	3124	2106	601	29
1995	2500	3685	2125	648	30
1996	2500	4453	2289	685	30
1997	2580	4574	2378	698	29
1998	2710	4526	2483	828	33
1999	2890	5354	2644	865	33
2000	3090	5263	2484	735	30
2001	2870	4501	2262	629	28
2002	3790	5180	2945	594	20
2003	3870	5264	2977	889	30
2004	4380	5878	3277	758	23
2005	4410	4542	2978	681	23
2006	4290	4167	2802	618	22
2007	4490	4464	2837	695	24
2008	7560	5834	4981	1187	24
2009	9330	7738	5019	1163	23

[a] Success rates not adjusted for non-participation.

Table 2. Permits available and issued, registered harvest, success, and historic success rates by permit area for the 2009 fall wild turkey season, Minnesota.

	Permits		2009		Historic mean[b]	
Permit area	Available	Issued	Registered harvest	Success (%)[a]	Success (%)	*n*
156	20	14	0	0	0	1
157	100	74	14	19	21	2
159	20	11	1	9	9	1
183	10	9	0	0	0	1
213	100	74	13	18	22	2
214	200	114	42	37	34	2
215	300	187	45	24	27	2
218	200	133	33	25	25	1
219	100	68	6	9	9	1
221	200	86	19	22	21	2
222	200	75	19	25	28	2
223	200	128	26	20	19	2
225	200	99	15	15	15	1
227	300	119	31	26	25	3
229	50	24	3	13	22	2
235	20	11	0	0	0	1
236	300	167	41	25	26	7
239	300	170	56	33	26	2
240	200	120	33	28	29	2
241	20	15	6	40	40	1
243	20	13	4	31	31	1
244	40	28	13	46	46	1
248	100	60	11	18	24	2
249	100	50	8	16	19	2
262	40	7	5	71	43	2
338	200	154	43	28	24	7
339	200	111	22	20	20	7
341	500	267	72	27	26	7
342	350	157	41	26	23	7
343	300	224	51	23	27	7
344	200	116	18	16	20	7
345	200	56	8	14	18	7
346	300	149	33	22	24	7
347	200	98	19	19	25	7

Table 2. Continued

	Permits		2009		Historic mean[b]	
Permit area	Available	Issued	Registered harvest	Success (%)[a]	Success (%)	*n*
348	250	144	31	22	25	7
349	450	124	26	21	22	7
412	40	19	8	42	38	2
416	20	14	4	29	29	1
417	30	23	5	22	22	1
420	40	9	4	44	36	4
422	50	29	15	52	45	4
425	40	33	6	18	24	4
427	20	6	1	17	17	1
428	30	25	4	16	24	2
431	20	9	4	44	23	4
433	20	18	3	17	22	4
440	20	16	5	31	39	2
442	250	188	59	31	27	7
443	100	59	8	14	17	7
446	20	11	2	18	32	4
447	20	14	3	21	12	4
448	30	19	3	16	23	7
449	30	15	3	20	29	6
450	20	9	0	0	9	4
451	20	5	1	20	20	1
454	20	13	6	46	46	1
457	20	7	0	0	0	1
458	20	1	0	0	0	1
459	20	12	1	8	3	2
461	250	194	34	18	29	7
462	240	169	31	18	25	7
463	30	23	10	43	32	2
464	80	39	5	13	24	7
465	80	23	10	43	24	7
466	160	90	25	28	28	7
467	100	76	12	16	20	7
601[c]	1000	395	83	21	22	7
Total	9330	5019	1163	23	24	

[a] Success rates not adjusted for non-participation.
[b] Mean success rate (%) over all fall turkey seasons (*n*) between 2003 – 2009 or since a permit area opened for fall turkey hunting.
[c] Permit Area 601consisted of 1, 30-day season.

Table 3. Permits available and issued by type, registered harvest, and success by permit area during Time Period A for the 2009 fall wild turkey season, Minnesota.

Permit area	Permits Available	Permits issued by type: General	Landowner	Surplus	Total	Registered harvest	Success (%)[a]
156	10	5	1	0	6	0	0
157	50	30	5	0	35	8	23
159	10	8	0	0	8	0	0
183	5	3	0	0	3	0	0
213	50	30	9	0	39	5	13
214	100	68	7	0	75	21	28
215	150	118	4	1	123	26	21
218	100	71	7	0	78	18	23
219	50	36	2	0	38	3	8
221	100	52	4	3	59	13	22
222	100	50	0	2	52	12	23
223	100	62	4	0	66	13	20
225	100	67	2	0	69	12	17
227	150	72	1	1	74	16	22
229	25	14	0	0	14	2	14
235	10	10	0	0	10	0	0
236	150	114	1	0	115	26	23
239	150	100	6	0	106	34	32
240	100	70	3	0	73	17	23
241	10	5	2	0	7	2	29
243	10	6	2	0	8	3	38
244	20	13	1	0	14	8	57
248	50	27	10	0	37	6	16
249	50	28	5	0	33	5	15
262	20	2	0	0	2	2	100
338	100	75	7	0	82	19	23
339	100	56	3	2	61	12	20
341	250	149	6	4	159	33	21
342	175	84	2	0	86	28	33
343	150	117	5	0	122	25	20
344	100	49	0	4	53	12	23
345	100	25	2	1	28	4	14
346	150	96	8	1	105	23	22
347	100	48	5	0	53	11	21

Table 3. Continued

Permit area	Permits available	Permits issued by type				Registered harvest	Success (%)[a]
		General	Landowner	Surplus	Total		
348	125	73	3	1	77	18	23
349	225	84	1	0	85	17	20
412	20	9	3	0	12	4	33
416	10	5	2	0	7	2	29
417	15	11	0	0	11	3	27
420	20	4	2	0	6	4	67
422	25	20	1	0	21	12	57
425	20	14	2	0	16	3	19
427	10	3	0	0	3	1	33
428	15	12	1	0	13	2	15
431	10	5	1	0	6	1	17
433	10	8	1	0	9	1	11
440	10	5	1	0	6	3	50
442	125	96	5	0	101	33	33
443	50	35	0	1	36	7	19
446	10	5	0	0	5	1	20
447	10	9	0	0	9	1	11
448	15	13	0	0	13	1	8
449	15	8	0	0	8	2	25
450	10	4	1	0	5	0	0
451	10	5	0	0	5	1	20
454	10	9	0	0	9	4	44
457	10	4	2	0	6	0	0
458	10	0	0	0	0	0	0
459	10	10	0	0	10	1	10
461	125	101	4	0	105	17	16
462	120	100	5	0	105	16	15
463	15	13	0	0	13	8	62
464	40	24	0	0	24	1	4
465	40	11	0	0	11	6	55
466	80	49	2	2	53	14	26
467	50	43	1	0	44	9	20
Total	4165	2552	152	23	2727	612	22

[a] Success rates not adjusted for non-participation

Table 4. Permits available and issued by type, registered harvest, and success by permit area during Time Period B for the 2009 fall wild turkey season, Minnesota.

Permit area	Permits available	Permits issued by type: General	Landowner	Surplus	Total	Registered harvest	Success (%)[a]
156	10	6	2	0	8	0	0
157	50	38	1	0	39	6	15
159	10	3	0	0	3	1	33
183	5	5	1	0	6	0	0
213	50	32	3	0	35	8	23
214	100	34	3	2	39	21	54
215	150	61	2	1	64	19	30
218	100	48	7	0	55	15	27
219	50	30	0	0	30	3	10
221	100	25	1	1	27	6	22
222	100	23	0	0	23	7	30
223	100	58	0	4	62	13	21
225	100	29	1	0	30	3	10
227	150	41	2	2	45	15	33
229	25	10	0	0	10	1	10
235	10	1	0	0	1	0	0
236	150	47	1	4	52	15	29
239	150	56	3	5	64	22	34
240	100	38	2	7	47	16	34
241	10	7	1	0	8	4	50
243	10	5	0	0	5	1	20
244	20	14	0	0	14	5	36
248	50	21	0	2	23	5	22
249	50	17	0	0	17	3	18
262	20	5	0	0	5	3	60
338	100	69	2	1	72	24	33
339	100	46	0	4	50	10	20
341	250	106	1	1	108	39	36
342	175	70	0	1	71	13	18
343	150	96	4	2	102	26	25
344	100	58	2	3	63	6	10
345	100	24	1	3	28	4	14
346	150	42	0	2	44	10	23
347	100	44	1	0	45	8	18

Table 4. Continued

Permit area	Permits available	Permits issued by type: General	Landowner	Surplus	Total	Registered harvest	Success (%)[a]
348	125	65	2	0	67	13	19
349	225	39	0	0	39	9	23
412	20	7	0	0	7	4	57
416	10	7	0	0	7	2	29
417	15	10	2	0	12	2	17
420	20	3	0	0	3	0	0
422	25	8	0	0	8	3	38
425	20	17	0	0	17	3	18
427	10	3	0	0	3	0	0
428	15	11	1	0	12	2	17
431	10	3	0	0	3	3	100
433	10	9	0	0	9	2	22
440	10	7	3	0	10	2	20
442	125	82	5	0	87	26	30
443	50	23	0	0	23	1	4
446	10	4	2	0	6	1	17
447	10	5	0	0	5	2	40
448	15	6	0	0	6	2	33
449	15	7	0	0	7	1	14
450	10	4	0	0	4	0	0
451	10	0	0	0	0	0	0
454	10	4	0	0	4	2	50
457	10	1	0	0	1	0	0
458	10	1	0	0	1	0	0
459	10	2	0	0	2	0	0
461	125	86	3	0	89	17	19
462	120	62	2	0	64	15	23
463	15	10	0	0	10	2	20
464	40	15	0	0	15	4	27
465	40	9	0	3	12	4	33
466	80	33	1	3	37	11	30
467	50	28	3	1	32	3	9
Total	4165	1780	65	52	1897	468	25

[a] Success rates not adjusted for non-participation

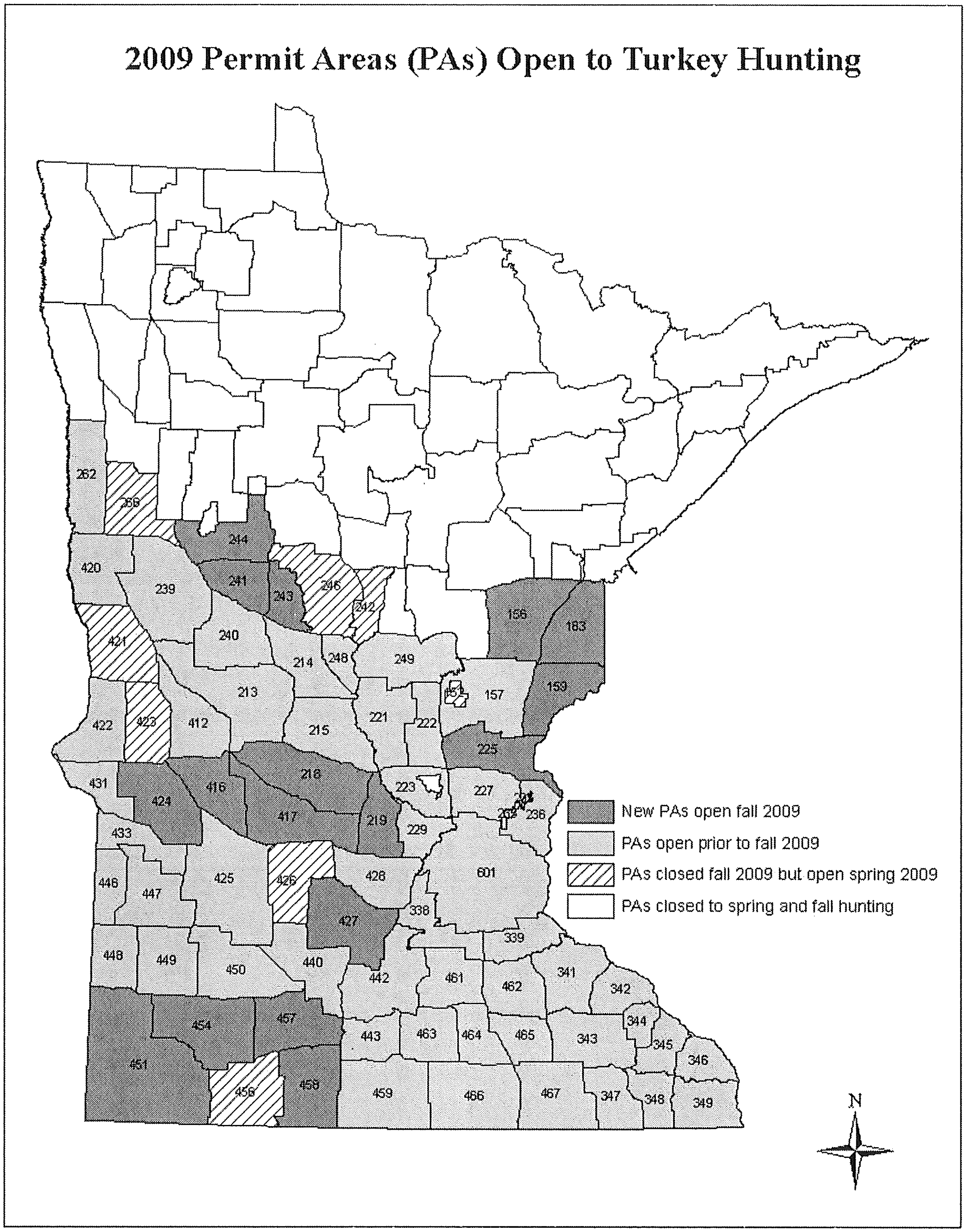


Figure 1. Permit Areas (PAs) open to hunting for the 2009 fall turkey hunting season, Minnesota.

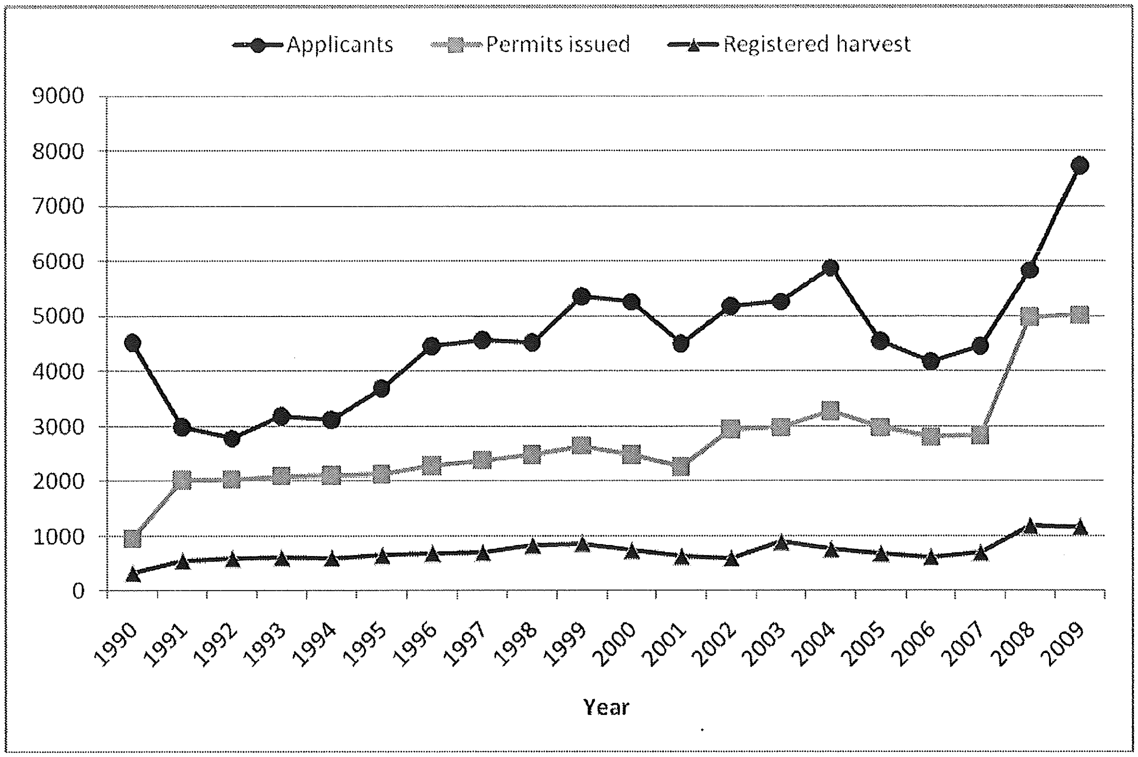


Figure 2. Applicants, permits issued, and registered harvest for fall wild turkey seasons 1990 – 2009, Minnesota.

SPRING 2010 WILD TURKEY HARVEST REPORT

Eric Dunton, Farmland Wildlife Populations and Research Group

In Minnesota, the spring wild turkey hunting season is designed to regulate harvest and distribute hunting pressure by allocating permits across 77 permit areas (PAs, Figure 1) and 8 time periods using a quota system. Hunters interested in pursuing wild turkeys were required to apply for a permit through a drawing based on a system of preference. Preference is determined by the number of years a valid but unsuccessful application has been submitted since last receiving a permit. Hunters may apply individually or in a group of up to 4 hunters. Successful applicants are notified through mail, and unsuccessful applicants are awarded a preference point. The goal of this system is to provide quality turkey hunting opportunities where turkey populations can sustain harvest.

For the 2010 spring hunting season there were 4 notable regulation changes: (1) all youth age 17 and younger by April 14, 2010 could purchase a youth permit over the counter to hunt any single time period and permit area of their choice; (2) hunters had the option to register their turkey over the phone, using the internet, or at a registration station; (3) the second choice option was eliminated from the application; and (4) the number of permits available for the last 2 time periods (G and H) was increased by 110% from 10,582 (2009) to 22,250 (2010). All surplus licenses remaining after the drawing were offered over the counter in mid-March on a first-come, first-served basis.

Eight types of hunting licenses were available to resident turkey hunters: (1) general lottery permit in which an applicant or a group of up to 4 hunters applied for a specific PA and time period; (2) landowner permit in which up to 20% of permits for each PA and time period were reserved for landowners or tenants who lived on 40 acres or more of land within the PA; (3) youth permit; (4) archery permit which could be purchased for the last 2 time periods of any PA with 50 or more permits per period; (5) youth archery; (6) surplus permits; (7) youth surplus; and (8) military permit.

During 2010 we received 51,312 applications for 55,982 permits (Table 1, Figure 2). More than 46,500 general lottery, landowner, youth, and surplus permits were issued to hunters, and more than 2,900 additional permits were issued to archers (Table 1). Hunters registered almost 13,500 turkeys, an increase of 10% from 2009 and the highest turkey harvest on record (Table 1, Figure 2). Hunter success averaged 29% (Table 1), which is below the 5-year average of 32%. Hunter success by PA ranged from 13% (PA 459) to 40% (PA 422; Table 2). Hunter success varied by license type from 7% (archery) to 31% (youth), 36% (general lottery and landowner), and 42% (surplus). Similar to the 10-year average, hunter success rates were highest during the first 2 time periods (Table 3). The majority of general lottery (71%), landowner (92%), and youth (79%) permits were issued during time periods A – D, while the majority of surplus permits (98%) were issued during time periods E – H (Table 4). The 8,490 permits issued to resident and non-resident youth hunters (general lottery, surplus, archery, and mentored) in 2010 was a 69% increase over the 5,024 youth permits issued in 2009. Approximately 10% (1,398) of harvested turkeys were registered using the phone registration system, 12% (1,662) through the internet, and 77% (10,407) at a registration station.

Among turkey management units (TMU), success rates in 2010 were relatively uniform (range 26-32%) except in TMUs A and B, which were slightly lower (23%, Table 5). A plot of success rates in TMUs A and B suggests that populations appear to be fluctuating around a stable mean or declining slowly (Figure 3). Success rates during 2010 declined from the average in all TMUs (Table 5, Figure 3). Although the uniform decline in success rates in 2010 may be an artifact of the unusually large increase in permits issued in 2010 (Figure 2), the trend in hunter success should be carefully monitored into the future.

Overall weather conditions for the 2010 spring turkey hunting season were favorable across much of the turkey range in Minnesota. April and May were relatively dry across much of Minnesota, except for the Red River Valley where major flooding occurred in late March and continued through April (Minnesota Climatology Working Group 2010). April temperatures were above average and May temperatures were near historic averages (Minnesota Climatology Working Group 2010). Although favorable weather generally contributes to increased harvest, the continued increase in harvest can be partially attributed to the increase in the number of permits available (i.e., 32% overall increase in the number of permits available with the majority of increase in time Periods G and H and a 10% increase in registered harvest) from 2009, 1 new PA open to hunting (PA 247), and youth hunters being able to purchase permits over the counter. Increased permits and permit areas resulted in more opportunities for hunters to harvest turkeys.

LITERATURE CITED

DUNTON, E., AND J. SNYDERS. 2009. Fall wild turkey population survey, 2008. Minnesota Department of Natural Resources, St. Paul, MN, Agency Report.

MINNESOTA CLIMATOLOGY WORKING GROUP. 2010. Climate journal. http://climate.umn.edu/ Accessed 8 July 2010.

Table 1. Spring applicants, permits available and issued, and registered harvest from 1978 – 2010 for all spring wild turkey hunting seasons, Minnesota.

Year	Applicants	Permits Available	Permits Issued	Permits Issued (%)	Registered harvest	Success (%)[a]
1978	10,740	420	411	97.9	94	22.9
1979	11,116	840	827	98.5	116	14.0
1980	9,613	1,200	1,191	99.3	98	8.2
1981	8,398	1,500	1,437	95.8	113	7.9
1982	7,223	2,000	1,992	99.6	106	5.3
1983	8,153	2,100	2,079	99.0	116	5.6
1984	7,123	3,000	2,837	94.6	178	6.3
1985	5,662	2,750	2,449	89.1	323	13.2
1986	5,715	2,500	2,251	90.0	333	14.8
1987	6,361	2,700	2,520	93.3	520	20.6
1988	8,402	3,000	2,994	99.8	674	22.5
1989	13,007	4,000	3,821	95.5	930	24.3
1990	14,326	6,600	6,126	92.8	1,709	27.9
1991	15,918	9,170	8,607	93.9	1,724	20.0
1992	16,401	9,310	9,051	97.2	1,691	18.7
1993	17,800	9,625	9,265	96.3	2,082	22.5
1994	19,853	9,940	9,479	95.4	1,975	20.8
1995	21,345	9,975	9,550	95.7	2,339	24.5
1996	23,757	12,131	10,983	90.5	2,841	25.9
1997	25,958	12,530	11,610	92.7	3,302	28.4
1998	29,727	14,035	13,229	94.3	4,361	33.0
1999	39,957	18,360	16,387	89.3	5,132	31.3
2000	42,022	20,160	18,661	92.6	6,154	33.0
2001	41,048	22,936	21,404	93.3	6,383	29.8
2002	42,415	24,136	22,607	93.7	6,516	28.8
2003	44,415	25,016	22,770	91.0	7,666	33.7
2004	48,059	27,600	25,261	91.5	8,434	33.4
2005	49,181	31,748	27,638	87.1	7,800	28.2
2006	45,704	32,624	27,876	85.4	8,241	29.6
2007[b]	52,566	33,976	28,320	83.4	9,412	33.2
2008[b]	51,000	37,992	31,942	84.1	10,994	34.4
2009[b]	57,692	42,328	36,193	85.5	12,210	33.7
2010[b]	51,312	55,982	46,548[c]	83.0	13,467	29.0

[a] Success rates not adjusted for non-participation

[b] Youth hunt data included

[c] 2,910 permits were issued to archery hunters and are not included in this figure.

Table 2. Permits available and issued, registered harvest, success, and historic success rates by permit area for the 2010 spring wild turkey season, Minnesota.

	Permits		2010		Historic mean[d]	
Permit area	Available	Issued[a]	Registered harvest[b]	Success (%)[c]	Success (%)	*n*
152	80	46	16	35	31	2
156	150	176	57	32	47	2
157	650	738	247	33	46	6
159	240	259	63	24	36	6
183	80	83	12	14	29	2
213	1000	1045	313	30	46	3
214	1000	784	259	33	38	6
215	1180	1224	365	30	43	11
218	1120	1262	442	35	50	3
219	590	670	194	29	31	11
221	700	678	222	33	51	5
222	630	532	148	28	44	5
223	1000	1076	314	29	36	11
225	1440	1216	309	25	27	11
227	1400	1252	333	27	34	11
229	470	396	90	23	25	10
235	240	220	46	21	34	11
236	1560	1277	398	31	39	11
239	1310	1294	363	28	43	8
240	1160	957	320	33	40	5
241	360	294	84	29	42	2
242	80	38	12	32	38	1
243	240	226	72	32	40	2
244	500	496	146	29	34	8
246	300	353	111	31	59	1
247[e]	80	74	25	34	0	0
248	580	385	110	29	43	6
249	560	543	160	29	32	7
262	180	80	24	30	44	2
266	180	57	14	25	64	1
338	1100	1017	298	29	33	9
339	1070	913	269	29	35	9
341	2210	2105	646	31	34	9
342	2150	1396	375	27	27	9
343	2000	1875	646	34	41	9
344	1250	1001	229	23	27	11

Table 2. Continued

Permit area	Permits		2010		Historic mean[d]	
	Available	Issued[a]	Registered harvest[b]	Success (%)[c]	Success (%)	*n*
345	1500	915	206	23	22	9
346	2600	1565	413	26	25	11
347	1500	1114	278	25	27	9
348	1650	1231	273	22	25	9
349	3600	2372	513	22	24	11
412	560	486	137	28	42	3
416	240	248	72	29	39	10
417	630	701	222	32	43	3
420	180	74	18	24	37	6
421	112	29	6	21	35	2
422	380	167	66	40	46	11
423	80	13	2	15	21	2
424	140	62	15	24	32	5
425	590	684	202	30	39	6
426	80	39	12	31	24	9
427	180	146	45	31	34	9
428	540	377	124	33	43	9
431	180	112	37	33	41	11
433	240	204	43	21	51	6
440	750	643	209	33	32	11
442	1590	1554	504	32	35	11
443	910	592	156	26	32	11
446	140	109	31	28	39	5
447	140	78	17	22	27	5
448	180	128	35	27	52	6
449	180	183	65	36	47	6
450	180	101	32	32	29	11
451	240	124	25	20	47	7
454	80	87	29	33	34	5
456	80	28	5	18	11	5
457	180	98	27	28	35	11
458	140	49	16	33	30	5
459	300	220	28	13	25	11
461	1280	1159	380	33	34	11
462	1350	1011	367	36	37	9

Table 2. Continued

	Permits		2010		Historic mean[d]	
Permit area	Available	Issued[a]	Registered harvest[b]	Success (%)[c]	Success (%)	*n*
463	350	301	67	22	30	11
464	470	349	92	26	29	9
465	470	279	83	30	28	9
466	910	594	150	25	32	8
467	690	555	135	24	35	8
601	1550	1632	557	34	39	10

[a] 2,910 permits were issued to archery hunters and 97 permits were issued for the Camp Ripley disabled veterans hunt and are not included in these figures

[b] 41 turkeys were registered from the Camp Ripley disabled veterans hunt and are not included in these figures

[c] Success rates not adjusted for non-participants

[d] Mean success rate (%) over all spring turkey seasons (*n*) between 1999 – 2009 or since a permit area boundary change occurred.

[e] New permits area for the 2010 spring season

Table 3. Permits available and issued, registered harvest, and success (2010 and mean) by time period for the 2010 spring wild turkey season, Minnesota.

	Permits		2010		
Time period[a]	Available	Issued	Registered harvest	Success (%)[b]	2000 – 2009 Mean success (%)
A	5622	7910	3180	40	43
B	5622	5298	1903	36	39
C	5622	6942	2107	30	31
D	5622	6282	1711	27	29
E	5622	5353	1484	28	33
F	5622	4327	898	21	29
G	11125	7085	1502	21	25
H	11125	3254	634	19	24
Youth hunt[c]					
Z		12	7	58	
Camp Ripley[d]					
802A		6	5	83	
801B		33	11	33	
802B		3	1	33	
801C		43	24	56	

[a] A = April 14 – 18, B = April 19 – 23, C = April 24 – 28, D = April 29 – May 3, E = May 4 – 8, F = May 9 – 13, G = May 14 – 20, and H = May 21 – 27

[b] Success rates not adjusted for non-participants

[c] In 2010 mentored youth hunts are coded to time period A due to regulation change which allowed youth hunters to purchase permits over the counter

[d] Disabled veterans hunt

Table 4. Permits available and issued by license type (resident and non-resident) and time period for the spring 2010 wild turkey season, Minnesota.

		Permits issued			
Time period	Permits available	General lottery	Landowner	Surplus	Youth[b]
A	5622	4315	690	35	2870
B	5622	4430	376	88	404
C	5622	4525	378	44	1995
D	5622	4609	194	60	1419
E	5622	2674	53	2225	401
F	5622	1422	23	2611	271
G	11125	2557	46	3731	751
H	11125	767	17	2103	367
Total[a]	55982	25299	1777	10897	8478

[a] Total excludes 97 permits issued for the Camp Ripley disabled veterans hunt

[b] Total excludes 12 permits issued for a mentored youth hunt in PA 343 (Time Period Z)

Table 5. Permits available and issued, registered harvest, success (2010 and mean), and mean finite rate of population change (Dunton and Snyders 2009) by Turkey Management Unit (TMU) for the 2010 spring wild turkey season, Minnesota.

	Permits		2010		Mean success[e]		Mean finite rate of change[f]	
TMU[a,b]	Available	Issued[d]	Registered harvest[d]	Success (%)	%	n	λ	99% CI[g]
A	9350	6083	1405	23	24	9	0.99 *	(0.94, 1.04)
B	1250	1001	229	23	27	11	0.98	(0.89, 1.07)
C	7860	6490	1945	30	32	9	0.99	(0.91, 1.09)
D	5850	5398	1632	30	36	9	1.06 *	(1.04, 1.07)
E	2640	2518	704	28	33	2	1.15 *	(1.09, 1.20)
F	6590	5161	1543	30	35	8	1.03	(0.96, 1.12)
G	1840	1205	310	26	33	5	1.07 *	(1.02, 1.11)
H	4260	3789	1151	30	34	6	1.03	(0.95, 1.13)
I	800	562	181	32	37	9	1.08	(0.99, 1.19)
J	3050	2941	881	30	40	1	1.11	(0.96, 1.30)
K	3990	4253	1313	31	43	3	1.09	(0.99, 1.20)
L	3110	3073	885	29	43	3	1.15	(0.91, 1.45)
M	892	345	107	31	36	2	1.18	(1.01, 1.37)
N	4140	3495	1102	32	39	1	1.18	(0.93, 1.51)
O	360	137	38	28	48	1	1.17	(0.70, 1.97)
P[c]	-	-	-	-	-	-	1.12	-

[a] TMU A = permits areas (345, 346, 348, 349), TMU B = permit area (344), TMU C = permit areas (341, 342, 343, 347), TMU D = permit areas (227, 235. 236, 338, 601), TMU E = permit areas (152, 156, 157, 159, 183, 225), TMU F = permit areas (339, 461, 462, 464, 465, 466, 467), TMU G = permit areas (446, 447, 448, 449, 450, 451, 454, 456, 457, 458, 459), TMU H = permit areas (431, 433, 435, 440, 442, 443), TMU I = permit areas (425, 426, 427, 428), TMU J = permit areas (154, 221, 222, 223, 224, 242, 247, 249), TMU K = permit areas (215, 218, 219, 229, 417), TMU L = permit areas (213, 239, 412, 416), TMU M = permit areas (420, 421, 422, 423, 424), TMU N = permit areas (214, 240, 241, 243, 244, 245, 246, 248), TMU O = permit areas (201, 208, 209, 210, 251, 256, 257, 260, 261, 262, 263, 264, 265, 266, 267, 268, 298), TMU P = permit areas (170, 172, 174, 181, 182, 184, 197, 199, 287).

[b] Not all permit areas in a TMU are open to spring hunting

[c] TMU P currently does not have any permit areas open for spring hunting

[d] Total excludes 97 permits issued and 41 turkeys registered from the Camp Ripley disabled veterans hunt

[e] Mean success rate based on consecutive number of years hunting in permit area since a boundary change occurred or area was opened to hunting. Mean success rate based on areas open to hunting, which may not represent all permit areas within a TMU.

[f] Mean finite rate of change based on fall wild turkey population survey data (1999-2008 [n = 4 surveys]), TMU P based on 2 surveys.

[g] 85% family of confidence intervals (type I error rate controlled at $\alpha = 0.15$).

*Desired level of precision achieved

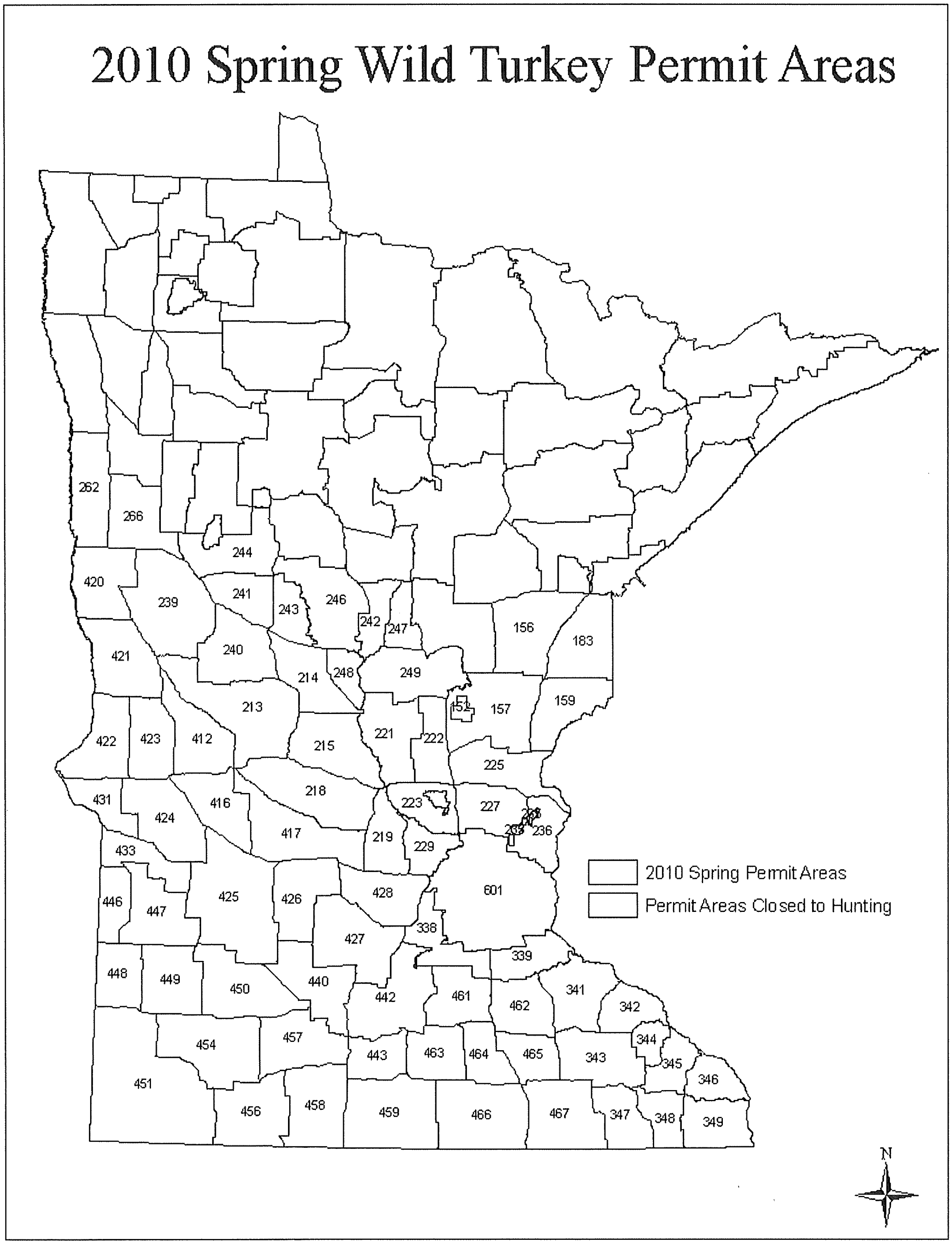


Figure 1. Permit areas open for hunting during the 2010 spring turkey hunting season, Minnesota.

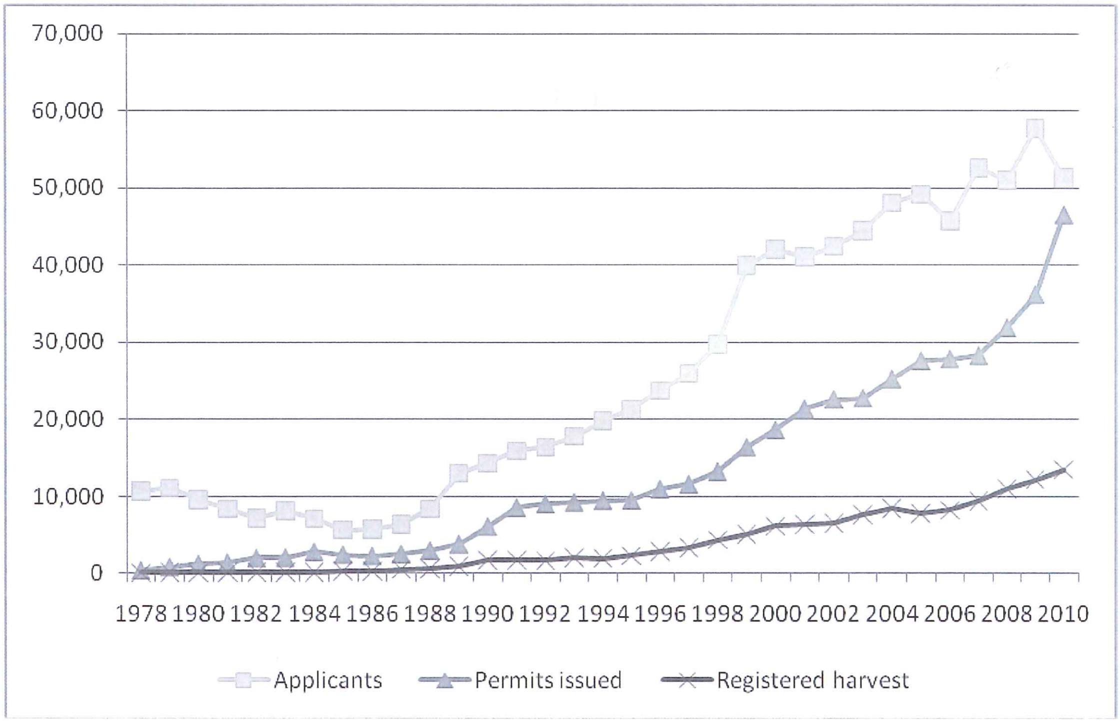


Figure 2. Applicants, permits issued, and registered harvest for the spring wild turkey seasons 1978-2010, Minnesota.

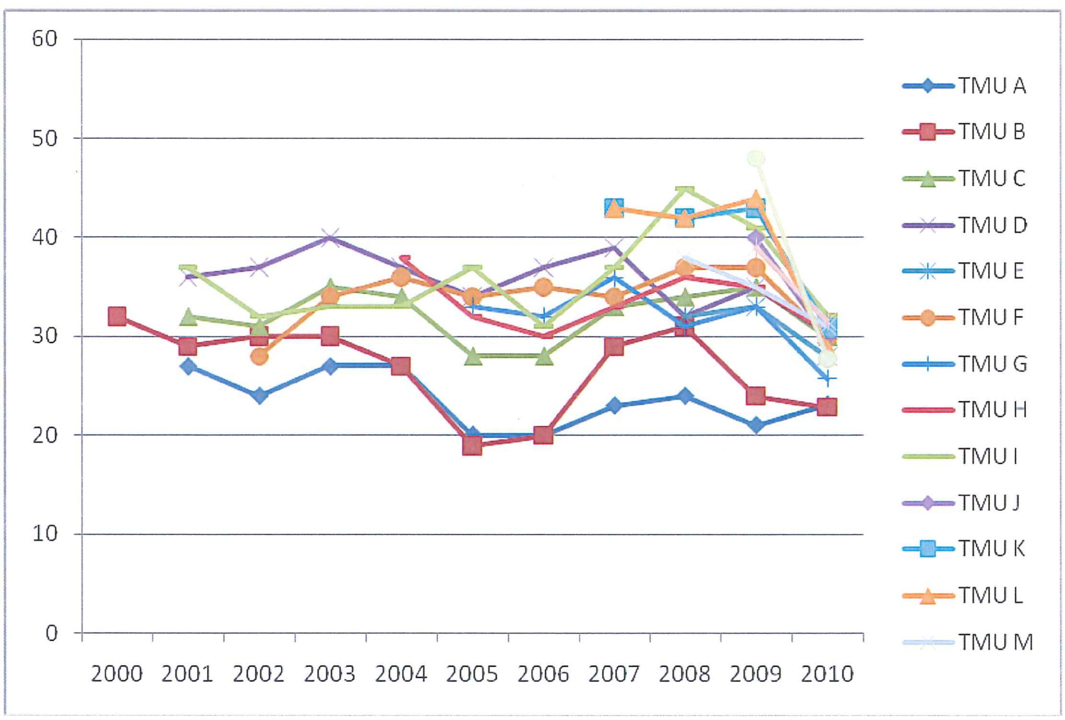


Figure 3. Mean success rate (%) for turkey management units (TMUs) based on cumulative permit area success rates since a boundary change occurred or permit areas opened for hunting, Minnesota.

Appendix A. Permits available, applicants, and permits issued by license type and permit area for time periods A – F for the 2010 spring wild turkey season, Minnesota.

		Permits issued			
Permit area	Available	General Lottery	Landowner	Surplus	Youth
152	30	18	0	6	3
156	90	63	12	0	40
157	450	292	27	71	140
159	120	93	11	6	28
183	30	25	3	0	6
213	600	402	63	68	194
214	600	359	25	146	98
215	780	528	34	143	232
218	720	503	52	103	278
219	390	275	18	58	149
221	450	285	24	98	131
222	330	229	21	45	99
223	600	427	25	95	225
225	990	586	66	206	177
227	900	593	25	187	242
229	270	163	11	68	77
235	120	98	0	13	43
236	960	616	23	192	243
239	810	532	60	114	176
240	660	431	45	116	147
241	180	112	8	39	52
242	30	7	0	14	9
243	120	67	13	22	33
244	300	209	23	34	81
246	150	96	18	30	68
247	30	14	2	6	14
248	330	194	21	51	68
249	360	223	20	67	86
262	90	25	1	26	18
266	90	22	0	24	6
338	600	384	46	122	203
339	570	391	28	96	155
341	1410	1009	69	175	314
342	1350	855	56	169	165
343	1200	852	82	169	359
344	750	567	32	72	125

Appendix A. Continued

Permit area	Permits available	Permits issued: General lottery	Landowner	Surplus	Youth
345	900	552	37	105	112
346	1800	1071	76	113	182
347	900	610	34	95	161
348	1050	695	44	134	131
349	2400	1533	87	218	242
412	360	244	17	62	56
416	120	88	13	14	40
417	330	244	27	25	100
420	90	26	1	30	3
421	42	13	0	13	2
422	180	105	1	21	17
423	30	6	0	6	0
424	60	34	2	12	7
425	390	285	36	45	99
426	30	16	3	10	1
427	90	68	10	7	24
428	240	158	18	35	62
431	90	60	6	13	12
433	120	82	8	19	32
440	450	302	29	72	111
442	990	656	89	158	262
443	510	332	16	71	92
446	60	45	8	4	10
447	60	33	3	11	6
448	90	53	10	17	13
449	90	69	9	5	36
450	90	44	5	17	18
451	120	55	1	31	16
454	30	22	2	3	9
456	30	15	1	5	4
457	90	51	5	15	12
458	60	20	0	20	2
459	150	96	7	23	33
461	780	529	45	144	197
462	750	501	33	119	160

Appendix A. Continued

Permit area	Available	Permits issued: General lottery	Landowner	Surplus	Youth
463	210	138	15	34	42
464	270	171	1	57	63
465	270	168	2	44	27
466	510	305	14	97	78
467	390	243	21	79	102
601	1050	692	14	209	300
Total[a]	33732	21975	1714	5063	7360

[a] Total excludes 97 permits issued for the Camp Ripley disabled veterans hunt

Appendix B. Permits available, applicants, and permits issued by license type and permit area for time periods G - H for the 2010 spring wild turkey season, Minnesota.

		Permits issued			
Permit area	Permits available	General lottery	Landowner	Surplus	Youth
152	50	0	0	18	1
156	60	28	2	20	11
157	200	67	2	118	21
159	120	61	1	53	6
183	50	33	1	12	3
213	400	105	3	176	34
214	400	52	5	81	18
215	400	69	1	187	30
218	400	107	2	181	36
219	200	44	0	104	22
221	250	48	1	75	16
222	300	51	2	68	17
223	400	64	0	212	28
225	450	42	1	118	20
227	500	54	1	125	25
229	200	13	1	52	11
235	120	11	0	46	9
236	600	65	0	110	28
239	500	110	1	257	44
240	500	66	0	128	24
241	180	28	1	47	7
242	50	4	0	4	0
243	120	30	1	51	9
244	200	34	0	103	12
246	150	64	2	64	11
247	50	22	0	16	0
248	250	20	1	28	2
249	200	38	0	98	11
262	90	2	0	5	3
266	90	3	0	1	1
338	500	90	3	144	25
339	500	71	0	144	28
341	800	175	3	316	44
342	800	36	0	86	29
343	800	139	2	232	40
344	500	65	2	122	16

Appendix B. Continued

Permit area	Permits available	Permits issued			
		General lottery	Landowner	Surplus	Youth
345	600	25	0	69	15
346	800	40	1	66	16
347	600	59	1	116	38
348	600	81	0	115	31
349	1200	154	0	113	25
412	200	41	1	56	9
416	120	29	0	60	4
417	300	106	2	169	28
420	90	8	0	5	1
421	70	1	0	0	0
422	200	12	0	9	2
423	50	1	0	0	0
424	80	0	0	7	0
425	200	92	1	91	35
426	50	3	1	4	1
427	90	14	0	19	4
428	300	26	0	70	8
431	90	12	0	6	3
433	120	20	1	34	8
440	300	46	0	72	11
442	600	135	6	208	40
443	400	30	0	41	10
446	80	17	0	18	7
447	80	8	0	15	2
448	90	10	1	21	3
449	90	17	2	42	3
450	90	6	0	7	4
451	120	11	0	9	1
454	50	16	1	26	8
456	50	2	0	1	0
457	90	9	0	5	1
458	80	2	0	2	3
459	150	28	0	27	6
461	500	67	1	153	23
462	600	75	2	100	21

Appendix B. Continued

Permit area	Permits available	Permits issued			
		General lottery	Landowner	Surplus	Youth
463	140	14	0	49	9
464	200	14	0	32	11
465	200	8	0	23	7
466	400	22	0	60	18
467	300	42	3	54	11
601	500	110	0	258	49
Total[a]	22250	3324	63	5834	1118

[a] Total excludes 97 permits issued for the Camp Ripley disabled veterans hunt

Appendix C. Permits available and issued, registered harvest by hunting license type and permit area for the 2010 spring wild turkey season, Minnesota.

	Permits		Registered harvest by hunting license type									
Permit Area	Available	Issued	601[a]	602[b]	606[c]	607[d]	608[e]	610[f]	611[g]	613[h]	614[i]	615[j]
152	80	46	3	0	0	0	0	8	0	5	0	0
156	150	176	20	0	0	0	0	28	1	8	0	0
157	650	738	49	1	0	4	0	153	1	38	0	1
159	240	259	8	0	0	2	0	46	0	7	0	0
183	80	83	2	0	0	0	0	10	0	0	0	0
213	1000	1045	75	0	0	6	0	196	3	33	0	0
214	1000	784	39	0	1	1	0	161	1	55	0	1
215	·1180	1224	74	0	1	9	0	198	1	82	0	0
218	1120	1262	86	0	0	13	0	263	0	80	0	0
219	590	670	52	0	0	3	0	110	0	29	0	0
221	700	678	38	0	0	4	0	142	1	37	0	0
222	630	532	17	0	0	5	0	97	4	25	0	0
223	1000	1076	74	0	0	15	0	167	0	57	0	1
225	1440	1216	41	0	0	7	0	204	0	56	0	1
227	1400	1252	61	0	0	8	0	209	2	53	0	0
229	470	396	21	0	0	1	0	55	0	13	0	0
235	240	220	11	0	0	2	0	25	1	7	0	0
236	1560	1277	77	2	1	13	0	242	2	60	1	0
239	1310	1294	58	0	0	4	0	232	2	67	0	0
240	1160	957	54	2	0	3	0	192	4	65	0	0
241	360	294	20	0	0	0	0	47	0	17	0	0
242	80	38	1	0	0	0	0	7	0	4	0	0
243	240	226	11	0	0	0	0	40	0	21	0	0
244	500	496	20	1	0	3	0	101	1	20	0	0
246	300	353	29	0	0	1	0	60	0	21	0	0
247	80	74	3	0	0	0	0	16	0	6	0	0
248	580	385	19	0	0	0	0	76	0	15	0	0
249	560	543	26	0	0	1	0	97	0	36	0	0
262	180	80	8	0	0	0	0	9	0	7	0	0
266	180	57	4	0	0	0	0	7	0	3	0	0
338	1100	1017	72	1	0	2	0	183	1	39	0	0
339	1070	913	45	0	0	3	0	168	2	51	0	0
341	2210	2105	99	0	1	5	1	425	11	104	0	0
342	2150	1396	45	1	0	3	0	284	5	36	1	0
343	2000	1875	135	1	0	15	0	398	6	87	2	2
344	1250	1001	27	0	1	1	0	171	5	23	1	0

Appendix C. Continued

	Permits		Registered harvest by hunting license type									
Permit area	Available	Issued	601[a]	602[b]	606[c]	607[d]	608[e]	610[f]	611[g]	613[h]	614[i]	615[j]
345	1500	915	24	0	0	1	0	153	3	25	0	0
346	2600	1565	39	0	0	0	0	332	7	34	1	0
347	1500	1114	38	0	0	1	0	198	5	36	0	0
348	1650	1231	27	0	0	1	0	197	11	36	0	1
349	3600	2372	44	1	1	0	0	401	23	43	0	0
412	560	486	15	0	0	1	0	92	0	29	0	0
416	240	248	12	0	0	0	0	44	0	16	0	0
417	630	701	37	0	0	4	0	134	0	46	1	0
420	180	74	2	0	0	0	0	11	0	5	0	0
421	112	29	0	0	0	0	0	3	0	3	0	0
422	380	167	6	0	0	0	0	45	1	13	0	1
423	80	13	0	0	0	0	0	2	0	0	0	0
424	140	62	1	0	0	0	0	9	0	5	0	0
425	590	684	31	0	0	5	0	142	1	22	0	1
426	80	39	0	0	0	0	0	9	0	3	0	0
427	180	146	12	0	0	0	0	29	0	4	0	0
428	540	377	20	0	0	3	0	75	0	26	0	0
431	180	112	5	0	0	0	0	28	0	3	1	0
433	240	204	8	0	0	0	0	31	0	4	0	0
440	750	643	49	0	0	1	0	132	0	26	0	1
442	1590	1554	89	0	0	6	0	314	3	92	0	0
443	910	592	13	0	0	1	0	124	1	17	0	0
446	140	109	1	0	0	0	0	21	1	8	0	0
447	140	78	1	0	0	0	0	13	0	3	0	0
448	180	128	4	0	0	0	0	25	0	6	0	0
449	180	183	14	0	0	0	0	36	0	14	1	0
450	180	101	9	0	0	0	0	17	0	6	0	0
451	240	124	1	0	0	0	0	14	0	9	0	1
454	80	87	6	0	0	0	0	14	0	9	0	0
456	80	28	0	0	0	0	0	4	0	1	0	0
457	180	98	4	0	0	0	0	18	0	5	0	0
458	140	49	0	0	0	0	0	9	0	6	1	0
459	300	220	5	0	0	0	0	18	1	4	0	0
461	1280	1159	63	0	0	6	0	241	3	65	2	0
462	1350	1011	54	0	0	7	0	252	3	50	1	0

Appendix C. Continued

Permit area	Permits		Registered harvest by hunting license type									
	Available	Issued	601[a]	602[b]	606[c]	607[d]	608[e]	610[f]	611[g]	613[h]	614[i]	615[j]
463	350	301	8	0	0	1	0	48	0	9	1	0
464	470	349	24	0	0	1	0	52	0	15	0	0
465	470	279	10	0	0	1	0	55	2	15	0	0
466	910	594	22	0	0	1	0	99	0	26	2	0
467	690	555	28	1	0	3	0	77	0	26	0	0
601	1550	1632	135	2	2	27	0	279	4	107	1	0
Total[k]	55,982	46,451[l]	2285	13	8	205	1	8624	123	2139	17	11

[a] Resident youth
[b] Non-resident youth
[c] Resident youth archery
[d] Resident archery
[e] Non-resident archery
[f] Resident license (includes general lottery and landowner)
[g] Non-resident license (includes general lottery)
[h] Resident surplus
[i] Non-resident surplus
[j] Military
[k] Total registered harvest excludes 41 turkeys registered by license types (603 resident youth surplus, 599 non-resident youth archery, 604 non-resident youth spring surplus),
[l] Total excludes 97 permits issued for the Camp Ripley disabled veterans hunt

Appendix D. Gender and age structure of registered wild turkeys by permit area for the 2010 spring wild turkey season, Minnesota.
Note: Gender and age is hunter reported and is subject to error.

		Male			
Permit area	Female (bearded)	Adult	Juvenile	Juvenile (%)	Total registered harvest
152	0	14	2	13	16
156	0	40	17	30	57
157	0	208	39	16	247
159	2	56	5	8	63
183	0	12	0	0	12
213	0	255	58	19	313
214	0	206	53	20	259
215	3	303	59	16	365
218	2	349	91	21	442
219	1	152	41	21	194
221	0	181	41	18	222
222	0	128	20	14	148
223	0	266	48	15	314
225	0	245	64	21	309
227	4	259	70	21	333
229	0	63	27	30	90
235	2	35	9	20	46
236	2	320	76	19	398
239	0	295	68	19	363
240	0	253	67	21	320
241	0	66	18	21	84
242	0	10	2	17	12
243	0	62	10	14	72
244	1	118	27	18	146
246	1	88	22	20	111
247	0	21	4	16	25
248	1	92	17	15	110
249	0	130	30	19	160
262	1	14	9	38	24
266	1	11	2	14	14
338	3	225	70	23	298
339	1	212	56	21	269
341	2	500	144	22	646
342	2	297	76	20	375
343	4	523	119	18	646
344	0	155	74	32	229

Appendix D. Continued

Permit area	Female (bearded)	Male		Juvenile (%)	Total registered harvest
		Adult	Juvenile		
345	0	171	35	17	206
346	5	319	89	22	413
347	2	228	48	17	278
348	1	215	57	21	273
349	4	360	149	29	513
412	0	118	19	14	137
416	0	64	8	11	72
417	0	177	45	20	222
420	0	18	0	0	18
421	0	4	2	33	6
422	1	51	14	21	66
423	0	1	1	50	2
424	0	14	1	7	15
425	1	154	47	23	202
426	0	12	0	0	12
427	1	39	5	11	45
428	0	89	35	28	124
431	0	32	5	14	37
433	0	37	6	14	43
440	0	156	53	25	209
442	5	373	126	25	504
443	0	113	43	28	156
446	0	23	8	26	31
447	1	13	3	18	17
448	0	33	2	6	35
449	1	59	5	8	65
450	0	20	12	38	32
451	0	22	3	12	25
454	0	27	2	7	29
456	1	3	1	20	5
457	0	22	5	19	27
458	0	14	2	13	16
459	0	25	3	11	28
461	2	324	54	14	380
462	3	275	89	24	367

Appendix D. Continued

Permit area	Female (bearded)	Male		Juvenile (%)	Total registered harvest
		Adult	Juvenile		
463	0	50	17	25	67
464	1	67	24	26	92
465	0	69	14	17	83
466	1	113	36	24	150
467	2	114	19	14	135
601	3	452	102	18	557
801[a]	0	33	2	6	35
802[a]	0	5	1	17	6
Total	68	10672	2727	20	13467

[a] Camp Ripley disabled veterans hunt

Appendix E. Registered harvest, general lottery applicants, permits available (total, landowner, general lottery), and the chance of being drawn in the general lottery by permit area and time period for the 2010 spring wild turkey season, Minnesota.

				Permits available			
Permit area	Time period	Registered harvest	Applicants	Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
152	A	0	12	5	0	5	42
	B	2	12	5	0	5	42
	C	4	12	5	0	5	42
	D	3	12	5	0	5	42
	E	2	4	5	0	5	125
	F	2	0	5	0	5	100
	G	2	1	25	0	5	100
	H	1	2	25	0	5	100
156	A	10	38	15	3	9	24
	B	7	26	15	2	11	42
	C	13	38	15	0	14	37
	D	8	38	15	3	8	21
	E	3	22	15	3	9	41
	F	0	12	15	1	13	100
	G	7	30	30	2	24	80
	H	9	10	30	0	30	100
157	A	57	224	75	7	60	27
	B	27	122	75	7	59	48
	C	41	196	75	11	50	26
	D	33	183	75	1	72	39
	E	28	54	75	1	73	100
	F	29	24	75	0	75	100
	G	21	51	100	1	98	100
	H	11	29	100	1	98	100
159	A	18	115	20	4	12	10
	B	9	47	20	5	10	21
	C	4	73	20	2	16	22
	D	6	41	20	0	20	49
	E	3	22	20	0	20	91
	F	5	14	20	0	20	100
	G	13	53	60	0	58	100
	H	5	11	60	1	58	100
183	A	3	14	5	1	3	21
	B	2	9	5	0	4	44
	C	1	19	5	1	3	16
	D	2	32	5	0	5	16
	E	2	19	5	1	3	16
	F	0	9	5	0	5	56
	G	2	22	25	0	25	100
	H	0	15	25	1	23	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
213	A	78	281	100	15	85	30
	B	46	209	100	19	81	39
	C	51	314	100	16	84	27
	D	40	264	100	7	93	35
	E	25	79	100	5	95	100
	F	23	47	100	1	99	100
	G	24	86	200	3	197	100
	H	26	31	200	0	200	100
214	A	54	176	100	10	90	51
	B	38	130	100	4	96	74
	C	42	163	100	10	90	55
	D	36	145	100	0	100	69
	E	33	33	100	1	99	100
	F	14	22	100	0	100	100
	G	30	45	200	2	198	100
	H	12	15	200	3	197	100
215	A	78	343	130	10	120	35
	B	41	176	130	8	122	69
	C	58	367	130	11	119	32
	D	49	253	130	3	127	50
	E	41	79	130	1	129	100
	F	36	38	130	1	129	100
	G	41	60	200	1	199	100
	H	21	22	200	0	200	100
218	A	98	322	120	19	101	31
	B	48	200	120	10	110	55
	C	65	364	120	13	107	29
	D	49	232	120	9	111	48
	E	45	88	120	1	119	100
	F	41	55	120	0	120	100
	G	60	82	200	2	198	100
	H	36	40	200	0	200	100
219	A	54	196	65	5	60	31
	B	28	123	65	6	59	48
	C	22	198	65	3	62	31
	D	24	142	65	2	63	44
	E	18	52	65	2	63	100
	F	13	17	65	0	65	100
	G	25	43	100	0	100	100
	H	10	12	100	0	100	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
221	A	51	148	75	8	67	45
	B	33	106	75	9	66	62
	C	26	171	75	4	71	42
	D	30	105	75	2	73	70
	E	29	23	75	1	74	100
	F	22	27	75	0	75	100
	G	22	47	125	1	124	100
	H	9	13	125	0	125	100
222	A	29	116	55	10	45	39
	B	26	78	55	3	52	67
	C	21	154	55	1	54	35
	D	19	85	55	4	51	60
	E	14	37	55	2	53	100
	F	6	24	55	1	54	100
	G	28	46	150	2	148	100
	H	5	13	150	0	150	100
223	A	77	339	100	10	90	27
	B	41	199	100	5	95	48
	C	48	309	100	4	96	31
	D	33	172	100	1	99	58
	E	31	74	100	5	95	100
	F	23	38	100	0	100	100
	G	48	59	200	0	200	100
	H	13	14	200	0	200	100
225	A	75	332	165	33	132	40
	B	52	187	165	10	155	83
	C	49	317	165	14	151	48
	D	40	191	165	5	160	84
	E	40	60	165	2	163	100
	F	21	27	165	2	163	100
	G	22	47	225	1	224	100
	H	10	11	225	0	225	100
227	A	81	335	150	2	148	44
	B	53	202	150	12	138	68
	C	49	250	150	8	142	57
	D	50	178	150	2	148	83
	E	37	68	150	1	149	100
	F	20	33	150	0	150	100
	G	30	54	250	1	249	100
	H	13	13	250	0	250	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
229	A	26	86	45	4	41	48
	B	12	56	45	3	42	75
	C	15	81	45	1	44	54
	D	13	60	45	3	42	70
	E	9	12	45	0	45	100
	F	2	10	45	0	45	100
	G	9	13	100	1	99	100
	H	4	5	100	0	100	100
235	A	15	77	20	0	20	26
	B	7	51	20	0	20	39
	C	4	50	20	0	20	40
	D	6	33	20	0	20	61
	E	1	10	20	0	20	100
	F	2	17	20	0	20	100
	G	6	4	60	0	60	100
	H	5	11	60	0	60	100
236	A	109	369	160	8	152	41
	B	52	230	160	4	156	68
	C	56	318	160	7	153	48
	D	47	229	160	4	156	68
	E	54	87	160	0	160	100
	F	24	32	160	0	160	100
	G	44	54	300	0	300	100
	H	12	22	300	0	300	100
239	A	72	328	135	15	120	37
	B	54	221	135	17	118	53
	C	60	366	135	16	119	33
	D	34	280	135	11	124	44
	E	41	89	135	1	134	100
	F	32	66	135	0	135	100
	G	49	94	250	1	249	100
	H	21	33	250	0	250	100
240	A	76	232	110	19	91	39
	B	38	130	110	13	97	75
	C	44	211	110	10	100	47
	D	37	190	110	3	107	56
	E	42	54	110	0	110	100
	F	36	48	110	0	110	100
	G	35	59	250	0	250	100
	H	12	20	250	0	250	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
241	A	24	68	30	0	30	44
	B	11	35	30	1	29	83
	C	13	67	30	4	26	39
	D	10	37	30	3	27	73
	E	10	12	30	0	30	100
	F	6	11	30	0	30	100
	G	8	27	90	1	89	100
	H	2	6	90	0	90	100
242	A	3	4	5	0	5	100
	B	0	1	5	0	5	100
	C	1	14	5	0	5	36
	D	0	10	5	0	5	50
	E	0	0	5	0	5	100
	F	2	0	5	0	5	100
	G	6	6	25	0	25	100
	H	0	0	25	0	25	100
243	A	12	44	20	3	17	39
	B	8	16	20	2	18	100
	C	9	53	20	4	16	30
	D	10	31	20	3	17	55
	E	5	12	20	0	20	100
	F	5	4	20	1	19	100
	G	14	26	60	1	59	100
	H	9	15	60	0	60	100
244	A	35	128	50	8	42	33
	B	15	89	50	2	48	54
	C	33	159	50	7	43	27
	D	15	113	50	5	45	40
	E	15	53	50	1	49	92
	F	14	32	50	0	50	100
	G	10	33	100	0	100	100
	H	9	10	100	0	100	100
246	A	14	69	25	3	22	32
	B	10	56	25	4	21	38
	C	22	90	25	3	22	24
	D	14	78	25	4	21	27
	E	9	29	25	0	25	86
	F	11	6	25	4	21	100
	G	19	63	75	2	73	100
	H	12	21	75	0	75	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
247	A	2	20	5	0	5	25
	B	4	6	5	1	4	67
	C	3	14	5	0	5	36
	D	2	10	5	1	4	40
	E	1	1	5	0	5	100
	F	1	3	5	0	5	100
	G	9	20	25	0	25	100
	H	3	5	25	0	25	100
248	A	28	93	55	8	47	51
	B	20	57	55	5	50	88
	C	19	83	55	3	52	63
	D	14	55	55	0	55	100
	E	8	16	55	4	51	100
	F	5	7	55	1	54	100
	G	14	24	125	0	125	100
	H	2	3	125	1	124	100
249	A	37	118	60	7	53	45
	B	23	113	60	9	51	45
	C	30	141	60	2	58	41
	D	15	108	60	2	58	54
	E	14	30	60	0	60	100
	F	11	24	60	0	60	100
	G	24	25	100	0	100	100
	H	6	18	100	0	100	100
262	A	5	6	15	1	14	100
	B	4	3	15	0	15	100
	C	7	15	15	0	15	100
	D	1	9	15	0	15	100
	E	2	0	15	0	15	100
	F	0	0	15	0	15	100
	G	5	3	45	0	45	100
	H	0	1	45	0	45	100
266	A	4	6	15	0	15	100
	B	2	3	15	0	15	100
	C	1	8	15	0	15	100
	D	3	4	15	0	15	100
	E	1	2	15	0	15	100
	F	0	1	15	0	15	100
	G	3	5	45	0	45	100
	H	0	0	45	0	45	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available			Chance of general lottery applicant being drawn (%)[b]
				Total	Landowner[a]	General lottery	
338	A	86	258	100	17	83	32
	B	39	181	100	11	89	49
	C	48	259	100	10	90	35
	D	40	156	100	5	95	61
	E	28	60	100	1	99	100
	F	16	26	100	2	98	100
	G	32	91	250	1	249	100
	H	9	19	250	2	248	100
339	A	65	202	95	12	83	41
	B	36	140	95	4	91	65
	C	36	168	95	7	88	52
	D	33	149	95	3	92	62
	E	32	60	95	1	94	100
	F	14	32	95	1	94	100
	G	42	79	250	0	250	100
	H	11	14	250	0	250	100
341	A	126	557	235	24	211	38
	B	97	344	235	20	215	63
	C	105	618	235	14	221	36
	D	80	381	235	7	228	60
	E	79	186	235	3	232	100
	F	47	102	235	1	234	100
	G	79	145	400	2	398	100
	H	33	64	400	1	399	100
342	A	110	388	225	32	193	50
	B	76	269	225	7	218	81
	C	52	425	225	13	212	50
	D	50	255	225	4	221	87
	E	50	106	225	0	225	100
	F	23	69	225	0	225	100
	G	11	49	400	0	400	100
	H	3	6	400	0	400	100
343	A	130	431	200	28	172	40
	B	83	307	200	15	185	60
	C	113	496	200	26	174	35
	D	90	320	200	11	189	59
	E	63	138	200	1	199	100
	F	49	93	200	1	199	100
	G	79	141	400	1	399	100
	H	32	36	400	1	399	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
344	A	64	392	125	18	107	27
	B	38	239	125	8	117	49
	C	40	303	125	4	121	40
	D	27	165	125	2	123	75
	E	25	108	125	0	125	100
	F	16	70	125	0	125	100
	G	15	62	250	2	248	100
	H	4	19	250	0	250	100
345	A	57	255	150	26	124	49
	B	41	160	150	9	141	88
	C	33	202	150	1	149	74
	D	27	161	150	1	149	93
	E	33	59	150	0	150	100
	F	2	11	150	0	150	100
	G	13	33	300	0	300	100
	H	0	10	300	0	300	100
346	A	133	403	300	44	256	64
	B	83	277	300	9	291	100
	C	69	395	300	10	290	73
	D	50	279	300	10	290	100
	E	42	124	300	2	298	100
	F	12	45	300	1	299	100
	G	20	46	400	1	399	100
	H	4	5	400	0	400	100
347	A	73	289	150	13	137	47
	B	36	202	150	5	145	72
	C	48	289	150	10	140	48
	D	42	176	150	6	144	82
	E	38	88	150	0	150	100
	F	10	27	150	0	150	100
	G	19	64	300	1	299	100
	H	12	9	300	0	300	100
348	A	64	370	175	23	152	41
	B	44	252	175	4	171	68
	C	35	355	175	8	167	47
	D	35	291	175	8	167	57
	E	50	100	175	1	174	100
	F	19	51	175	0	175	100
	G	20	84	300	0	300	100
	H	6	16	300	0	300	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Permits available: Landowner[a]	Permits available: General lottery	Chance of general lottery applicant being drawn (%)[b]
349	A	147	747	400	51	349	47
	B	101	402	400	13	387	96
	C	79	597	400	14	386	65
	D	65	444	400	7	393	89
	E	59	226	400	2	398	100
	F	17	87	400	0	400	100
	G	30	165	600	0	600	100
	H	15	34	600	0	600	100
412	A	20	118	60	5	55	47
	B	15	62	60	4	56	90
	C	24	114	60	3	57	50
	D	22	98	60	4	56	57
	E	16	30	60	1	59	100
	F	12	26	60	0	60	100
	G	21	42	100	1	99	100
	H	7	10	100	0	100	100
416	A	13	64	20	4	16	25
	B	7	48	20	3	17	35
	C	11	58	20	4	16	28
	D	9	52	20	0	20	38
	E	7	12	20	2	18	100
	F	6	12	20	0	20	100
	G	15	17	60	0	60	100
	H	4	15	60	0	60	100
417	A	42	175	55	11	44	25
	B	19	116	55	4	51	44
	C	25	217	55	5	50	23
	D	28	123	55	4	51	41
	E	19	63	55	2	53	84
	F	14	33	55	1	54	100
	G	41	83	150	1	149	100
	H	34	34	150	1	149	100
420	A	5	8	15	0	15	100
	B	2	2	15	0	15	100
	C	7	18	15	1	14	78
	D	1	8	15	0	15	100
	E	0	0	15	0	15	100
	F	0	0	15	0	15	100
	G	3	8	45	0	45	100
	H	0	1	45	0	45	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
421	A	1	6	7	0	7	100
	B	1	3	7	0	7	100
	C	2	4	7	0	7	100
	D	1	3	7	0	7	100
	E	0	1	7	0	7	100
	F	0	0	7	0	7	100
	G	1	2	35	0	35	100
	H	0	0	35	0	35	100
422	A	13	43	30	1	29	67
	B	11	26	30	0	30	100
	C	9	28	30	0	30	100
	D	14	28	30	0	30	100
	E	4	6	30	0	30	100
	F	5	1	30	0	30	100
	G	10	14	100	0	100	100
	H	0	1	100	0	100	100
423	A	1	5	5	0	5	100
	B	1	1	5	0	5	100
	C	0	3	5	0	5	100
	D	0	0	5	0	5	100
	E	0	0	5	0	5	100
	F	0	0	5	0	5	100
	G	0	1	25	0	25	100
	H	0	0	25	0	25	100
424	A	4	21	10	2	8	38
	B	3	8	10	0	10	100
	C	1	12	10	0	10	83
	D	3	13	10	0	10	77
	E	4	0	10	0	10	100
	F	0	0	10	0	10	100
	G	0	0	40	0	40	100
	H	0	0	40	0	40	100
425	A	41	177	65	14	51	29
	B	25	89	65	8	57	64
	C	38	162	65	9	56	35
	D	26	149	65	5	60	40
	E	20	52	65	0	65	100
	F	12	32	65	0	65	100
	G	21	65	100	1	99	100
	H	19	43	100	0	100	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
426	A	1	12	5	1	4	33
	B	2	11	5	1	4	36
	C	3	11	5	1	4	36
	D	1	1	5	0	5	100
	E	0	1	5	0	5	100
	F	1	1	5	0	5	100
	G	3	3	25	1	24	100
	H	1	2	25	0	25	100
427	A	13	13	15	4	11	85
	B	4	26	15	2	13	50
	C	7	24	15	3	12	50
	D	6	17	15	1	14	82
	E	7	14	15	0	15	100
	F	2	9	15	0	15	100
	G	4	15	45	0	45	100
	H	2	1	45	0	45	100
428	A	30	88	40	7	33	38
	B	15	83	40	2	38	46
	C	22	89	40	4	36	40
	D	14	63	40	4	36	57
	E	13	27	40	1	39	100
	F	9	16	40	0	40	100
	G	17	27	150	0	150	100
	H	4	11	150	0	150	100
431	A	5	20	15	4	11	55
	B	6	20	15	2	13	65
	C	5	18	15	0	15	83
	D	5	18	15	0	15	83
	E	5	7	15	0	15	100
	F	4	9	15	0	15	100
	G	2	9	45	0	45	100
	H	5	6	45	0	45	100
433	A	11	42	20	4	16	38
	B	7	31	20	1	19	61
	C	3	39	20	3	17	44
	D	10	26	20	0	20	77
	E	3	15	20	0	20	100
	F	2	6	20	0	20	100
	G	6	18	60	1	59	100
	H	1	3	60	0	60	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Permits available: Landowner[a]	Permits available: General lottery	Chance of general lottery applicant being drawn (%)[b]
440	A	60	193	75	14	61	32
	B	22	101	75	7	68	67
	C	38	130	75	4	71	55
	D	28	110	75	3	72	65
	E	21	50	75	0	75	100
	F	16	24	75	1	74	100
	G	16	39	150	0	150	100
	H	8	15	150	0	150	100
442	A	125	434	165	31	134	31
	B	62	287	165	19	146	51
	C	68	483	165	27	138	29
	D	62	277	165	11	154	56
	E	55	113	165	0	165	100
	F	40	58	165	1	164	100
	G	73	120	300	3	297	100
	H	19	32	300	3	297	100
443	A	45	117	85	7	78	67
	B	28	94	85	1	84	89
	C	20	153	85	3	82	54
	D	22	97	85	1	84	87
	E	25	40	85	2	83	100
	F	5	14	85	2	83	100
	G	9	25	200	0	200	100
	H	2	14	200	0	200	100
446	A	5	8	10	3	7	88
	B	4	8	10	3	7	88
	C	2	17	10	0	10	59
	D	4	12	10	2	8	67
	E	3	8	10	0	10	100
	F	2	10	10	0	10	100
	G	9	15	40	0	40	100
	H	2	3	40	0	40	100
447	A	3	14	10	1	9	64
	B	5	9	10	1	9	100
	C	0	23	10	0	10	43
	D	3	15	10	1	9	60
	E	0	2	10	0	10	100
	F	0	0	10	0	10	100
	G	4	7	40	0	40	100
	H	2	6	40	0	40	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
448	A	3	24	15	4	11	46
	B	6	26	15	3	12	46
	C	10	27	15	2	13	48
	D	6	13	15	1	14	100
	E	4	6	15	0	15	100
	F	1	5	15	0	15	100
	G	3	12	45	0	45	100
	H	2	4	45	1	44	100
449	A	14	42	15	3	12	29
	B	5	34	15	3	12	35
	C	5	33	15	2	13	39
	D	9	41	15	1	14	34
	E	3	10	15	0	15	100
	F	4	15	15	0	15	100
	G	21	17	45	2	43	100
	H	4	5	45	0	45	100
450	A	6	30	15	3	12	40
	B	6	9	15	1	14	100
	C	8	20	15	1	14	70
	D	6	9	15	0	15	100
	E	1	6	15	0	15	100
	F	3	1	15	0	15	100
	G	2	4	45	0	45	100
	H	0	2	45	0	45	100
451	A	3	21	20	1	19	90
	B	3	9	20	0	20	100
	C	9	15	20	0	20	100
	D	4	7	20	0	20	100
	E	1	5	20	0	20	100
	F	1	5	20	0	20	100
	G	2	8	60	0	60	100
	H	2	3	60	0	60	100
454	A	2	23	5	1	4	17
	B	3	8	5	0	5	63
	C	2	15	5	1	4	27
	D	7	22	5	0	5	23
	E	2	2	5	0	5	100
	F	1	6	5	0	5	83
	G	6	15	25	1	24	100
	H	6	3	25	0	25	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
456	A	0	4	5	0	5	100
	B	0	4	5	0	5	100
	C	1	2	5	1	4	100
	D	3	7	5	0	5	71
	E	0	1	5	0	5	100
	F	0	0	5	0	5	100
	G	1	2	25	0	25	100
	H	0	0	25	0	25	100
457	A	6	14	15	2	13	93
	B	6	10	15	2	13	100
	C	1	32	15	1	14	44
	D	6	17	15	0	15	88
	E	5	4	15	0	15	100
	F	0	0	15	0	15	100
	G	2	7	45	0	45	100
	H	1	2	45	0	45	100
458	A	5	16	10	0	10	63
	B	3	3	10	0	10	100
	C	4	2	10	0	10	100
	D	2	6	10	0	10	100
	E	1	3	10	0	10	100
	F	0	0	10	0	10	100
	G	1	2	40	0	40	100
	H	0	0	40	0	40	100
459	A	6	64	25	2	23	36
	B	2	30	25	1	24	80
	C	6	47	25	3	22	47
	D	7	41	25	1	24	59
	E	1	22	25	0	25	100
	F	4	5	25	0	25	100
	G	2	25	75	0	75	100
	H	0	10	75	0	75	100
461	A	83	315	130	22	108	34
	B	64	175	130	9	121	69
	C	63	286	130	10	120	42
	D	41	154	130	3	127	82
	E	44	80	130	1	129	100
	F	29	35	130	0	130	100
	G	40	62	250	1	249	100
	H	16	20	250	0	250	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Permits available: Landowner[a]	Permits available: General lottery	Chance of general lottery applicant being drawn (%)[b]
462	A	84	263	125	7	118	45
	B	46	129	125	16	109	84
	C	53	244	125	6	119	49
	D	51	207	125	3	122	59
	E	47	69	125	1	124	100
	F	19	20	125	0	125	100
	G	48	71	300	2	298	100
	H	19	23	300	0	300	100
463	A	20	89	35	8	27	30
	B	8	50	35	3	32	64
	C	8	64	35	4	31	48
	D	5	42	35	0	35	83
	E	9	20	35	0	35	100
	F	3	16	35	0	35	100
	G	11	10	70	0	70	100
	H	3	9	70	0	70	100
464	A	16	100	45	1	44	44
	B	14	55	45	0	45	82
	C	16	86	45	0	45	52
	D	19	55	45	0	45	82
	E	10	13	45	0	45	100
	F	6	6	45	0	45	100
	G	6	15	100	0	100	100
	H	5	4	100	0	100	100
465	A	17	62	45	1	44	71
	B	16	45	45	1	44	98
	C	15	74	45	0	45	61
	D	13	51	45	0	45	88
	E	13	13	45	0	45	100
	F	2	2	45	0	45	100
	G	5	13	100	0	100	100
	H	2	1	100	0	100	100
466	A	43	167	85	7	78	47
	B	22	122	85	4	81	66
	C	26	173	85	3	82	47
	D	18	87	85	0	85	98
	E	12	22	85	0	85	100
	F	9	9	85	0	85	100
	G	15	30	200	0	200	100
	H	5	7	200	0	200	100

Appendix E. Continued

Permit area	Time period	Registered harvest	Applicants	Permits available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
467	A	31	133	65	9	56	42
	B	14	72	65	4	61	85
	C	27	132	65	2	63	48
	D	15	89	65	6	59	66
	E	12	28	65	0	65	100
	F	7	20	65	0	65	100
	G	18	35	150	2	148	100
	H	11	14	150	1	149	100
601	A	123	418	175	5	170	41
	B	59	299	175	5	170	57
	C	99	343	175	3	172	50
	D	58	245	175	1	174	71
	E	55	95	175	0	175	100
	F	48	48	175	0	175	100
	G	74	111	250	0	250	100
	H	41	45	250	0	250	100

[a] Landowners were allotted up to 20% of the total permits available for each permit area and time period. Unused landowner permits were made available in the general lottery.
[b] Chance of general lottery applicant being drawn assumes no hunter preference

PRAIRIE-CHICKEN HARVEST IN MINNESOTA DURING 2009

Michael A. Larson, Forest Wildlife Populations and Research Group

INTRODUCTION

Hunting seasons for prairie-chickens (*Tympanuchus cupido pinnatus*) in Minnesota were closed from 1943 through 2002. During October 2003 a limited-entry, 5-day hunting season for prairie-chickens was held within 7 contiguous permit areas in western Minnesota. Opportunities to purchase a hunting permit were awarded through a lottery system, and each licensed hunter could harvest a maximum of 2 prairie-chickens. The same format was implemented for prairie-chicken hunting seasons during 2004 and 2005. The number of permit areas was increased to 11 in 2006 and have remained the same since then (Figure 1). Permit areas 804A–811A (i.e., those south of U.S. Highway 2) are in an area that is closed to the hunting of sharp-tailed grouse (*Tympanuchus phasianellus*). Licensed prairie-chicken hunters in those permit areas, however, are allowed to take up to a regular bag limit of sharp-tailed grouse while hunting prairie-chickens. The objective of this report is to document results of the 2009 prairie-chicken hunting season.

METHODS

The Electronic Licensing System (ELS) automatically recorded all lottery applications, lottery results, and purchases of permits. Prairie-chicken hunters are not required to register their harvested birds in the ELS, so I sent a postcard survey by mail to all people who were successful in the lottery. Approximately 3 weeks later I sent the postcard survey a second time to people who had not responded to the first mailing. The survey consisted of the following 5 questions: did you hunt, how many days did you hunt, how many prairie-chickens did you bag, how many sharp-tailed grouse did you bag while hunting for prairie-chickens, and how satisfied were you with the hunt?

To summarize hunting results for this report I used only responses from lottery winners who purchased a hunting permit. I checked to ensure that responses from people who replied to the first mailing were similar to responses from people who replied to the second mailing. Then, to estimate the numbers of hunters and birds harvested, I assumed that nonrespondents would have had the same average response as all those who responded to either mailing of the survey.

RESULTS & DISCUSSION

One hundred eighty-six prairie-chicken hunting permits were available during 2009. There were 179 lottery winners, and 14 of them were landowners (Table 1). There were fewer applicants than available permits in 2 of the permit areas. One hundred forty-six lottery winners purchased a permit. Two lottery winners who did not purchase a permit reported hunting, so I considered there to be 148 permit purchasers in 2009. One hundred eight permit purchasers (73%) responded to the first mailing of the survey, and 21 (14%) responded to the second mailing, so the response rate of purchasers was 87% (i.e., 129 of 148).

Seven purchasers who responded to the survey reported that they did not hunt (5%), and 122 respondents reported hunting, so there were an estimated 141 hunters (Table 2). Hunters hunted an average of 2.1 days during the October 17th–21st season. Hunters reported harvesting 102 prairie-chickens, and the estimated total harvest was 120 prairie-chickens (Table 2). I estimated that 76 hunters bagged at least 1 prairie-chicken (54%). The average rating for hunter satisfaction on a 1–5 scale was 3.4 (median = 4), and 75% of the 122 respondents to this question reported a satisfaction level of 3 or greater.

The hunter success rate and harvest and during 2009 were very similar to the averages for the previous 3 years when similar numbers of permits were offered (Table 3). The number of applicants has been similar during the last 5 years; hunter success rates and total harvest have been more variable. Hunter satisfaction is highly correlated with hunter success ($r = 0.74$, $n = 6$, Table 3).

Prairie-chicken hunters reported bagging 15 sharp-tailed grouse while hunting prairie-chickens, and the estimated harvest was 16 sharp-tailed grouse. These sharp-tailed grouse were harvested from permit areas 801A–807A, and half of them were harvested from permit area 805A (Figure 1).

ACKNOWLEDGEMENTS

I appreciate the help of Laura Gilbert in preparing and mailing the survey and in data entry, and comments from Mark Lenarz and Wes Bailey helped me improve the clarity of the report.

Table 1. Results of the lottery for prairie-chicken hunting permits in Minnesota during 2009.

Permit area	Permits available	No. of applicants	Lottery winners Number[a]	Lottery winners Proportion
801A	10	3	3	1.00
802A	10	7	7	1.00
803A	10	13	10	0.77
804A	17	40	17	0.43
805A	20	84	22	0.26
806A	17	72	18	0.25
807A	25	63	25	0.40
808A	20	29	20	0.69
809A	20	65	20	0.31
810A	27	101	27	0.27
811A	10	35	10	0.29
All	186	512	179	0.35

[a] Extra permits may be awarded in a permit area when the last applicant selected in the lottery applied as a member of a hunting party.

Table 2. Hunter harvest of prairie-chickens in Minnesota during 2009.

Permit	No. of hunters[a]		Birds harvested		Birds per	Success
area	Self-reported	Estimated	Self-reported	Estimated	harvester[b]	rate[c]
801A	2	2	0	0		0.00
802A	6	6	8	8	2.0	0.67
803A	7	8	2	2	1.0	0.25
804A	13	15	13	15	1.7	0.60
805A	15	17	18	20	1.7	0.71
806A	13	15	8	10	1.4	0.47
807A	18	20	20	23	1.5	0.75
808A	11	14	14	19	1.7	0.79
809A	16	16	7	8	1.3	0.38
810A	15	20	11	14	1.6	0.45
811A	6	8	1	1	1.0	0.13
All	122	141	102	120	1.6	0.54

[a] Number of permit purchasers who actually went hunting.
[b] Estimated number of prairie-chickens harvested per successful hunter.
[c] Proportion of estimated hunters who harvested ≥1 prairie-chicken.

Table 3. Annual summary of prairie-chicken hunting results in Minnesota during 2003–2009.

Year	Permits available	Applicants	Birds harvested	Success rate[a]	Hunter satisfaction[b]
2003	100	853	115	0.68	4.4
2004	101	759	51	0.37	3.6
2005	110	500	90	0.58	4.0
2006	182	512	92	0.40	3.6
2007	187	519	122	0.53	
2008	186	535	141	0.62	3.9
2009	186	512	120	0.54	3.4

[a] Proportion of hunters who harvested ≥1 prairie-chicken.
[b] Average on a 1–5 scale.

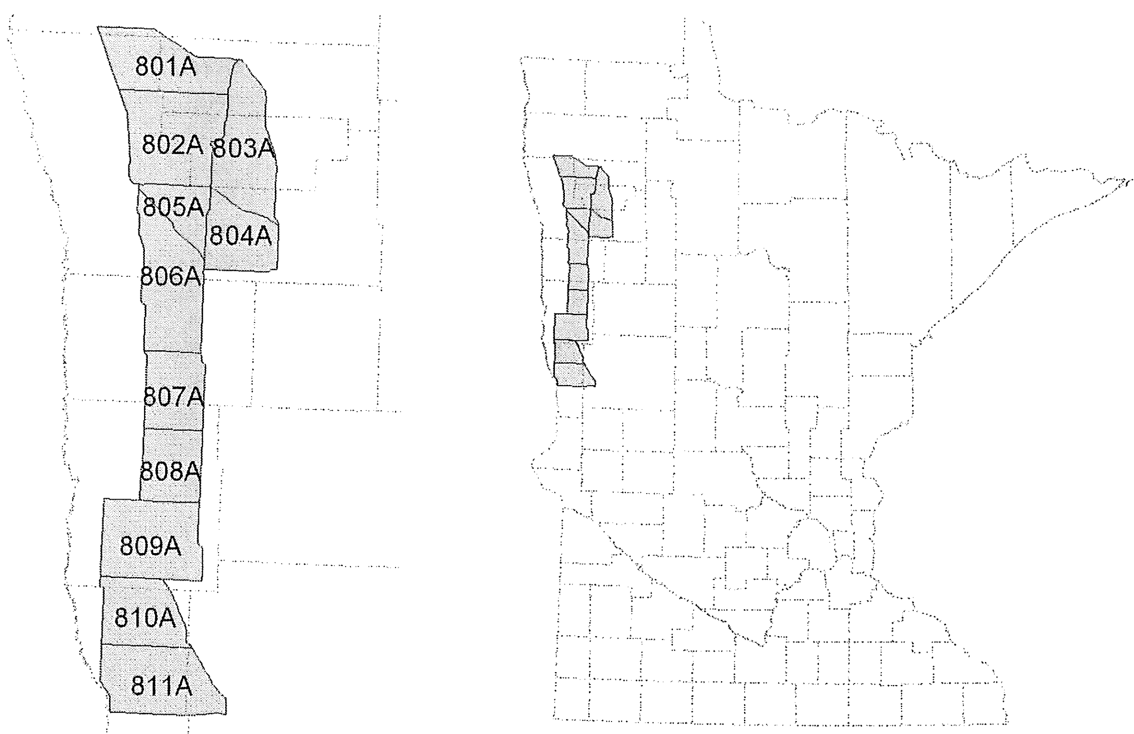


Figure 1. Map of permit areas for prairie-chicken hunting in Minnesota (left) and their location relative to counties within the state (right).

2009 MINNESOTA BEAR HARVEST REPORT

David Garshelis, Karen Noyce, Forest Wildlife and Populations Research Group

INTRODUCTION

The Minnesota bear range is divided into 11 bear management units (BMUs, Figure 1). Each has a separate quota on hunting licenses. Outside the primary bear range, where bear depredation to crops is a primary concern, license sales are unlimited (no-quota area). Hunters in this area can harvest two bears, and beginning in 2005 hunters could purchase both a quota and no-quota license. In all areas the season runs from September 1 through mid-October. About 80% of hunters use bait. This report summarizes status and trends in harvests and population size and structure.

METHODS

Successful hunters must register their bears at designated registration stations. Stations are not staffed by DNR personnel. Harvest data are a simple tally of these registrations, which for the most part are done electronically. Hunters also are required to submit a tooth from harvested bears (compliance ≈ 70%), which is used to estimate age. Some years, including this year, they were also requested to submit a section of rib bone. Hunters receive a postage-paid tooth envelope when they register their bear, and extract and submit the tooth and rib samples themselves. Teeth samples are used to estimate harvest age structure. Rib samples are used to check for tetracycline, the biomarker that is used to obtain statewide mark–recapture population estimates. The most recent tetracycline-marking was done in the summer of 2008, and samples were collected that year to derive a preliminary population estimate. Tetracycline persists in bones for several years, so the collection this year helps to refine the 2008 estimate.

RESULTS

The number of permits available to hunters steadily increased through the 1980–1990s, peaking at 20,840 in 1999 (Table 1). Since then the number of permits has been incrementally reduced to a low of 10,000 in 2009 (approximately 1994 level). Permits were reduced in 8 of 11 BMUs to reduce harvest pressure and over-crowding (Table 2). Due to this reduction, only 1 BMU (BCAWA) was undersubscribed (Table 3). Surplus licenses were offered only to applicants who chose this BMU as a second choice, but none of them elected to purchase a license.

The estimated number of hunters in the field in 2009 (9,300) also was the lowest since 1994 (Table 1). Total harvest (2,801) was higher than expected because the success rate (30%) was atypically high, compared to the past 6 years (Table 1). The high success rate appears largely attributable to the reduced number of hunters (Figure 2).

Harvest increased from 2008 to 2009 in every BMU except 22 and 45 (Table 4). The downward trend in BMU 45 may suggest a population decline. Other BMUs had harvests near the 5-year mean, or slightly below, simply reflecting the reduced number of hunters in most areas. BMU 11 (northwest no quota; Figure 1) continues to show a strong harvest, reflecting an increased density of bears.

Hunting success was above the 5-year mean for all BMUs except one, and was especially high in BMUs 22, 24 and 31 (Table 5). Only BMU 45 had a lower than expected success rate. Chronology of the harvest was typical, with 74% of bears harvested in the first week (Table 6).

Two key factors, fall food abundance and hunter numbers, explain most of the year-to-year variation in the number of bears killed each year (Figure 3). A regression analysis based on these 2 variables predicted a higher harvest than actually occurred during 2002–2008, but the prediction was accurate for 2009, probably because of reduced hunter numbers (Figure 2, 3). Productivity of oak, dogwood and hazel, the 3 key fall foods for bears, was average or above average (especially east-central) in 2009.

Tetracycline baits set in the summer of 2008 resulted in the biomarking of ~470 bears. From harvests in 2008 and 2009, 3,182 rib and teeth samples were examined, of which 90 were marked (2.8% in pooled sample). A range of population estimates can be obtained, depending on which recovery sample (2008, 2009, or a combination of the 2) is used. Presently, the "best" estimate is ~20,000 ± 5,500, which is ~5,000 bears less than the 2002 estimate (Figure 4).

DISCUSSION

Harvests of bears remained consistently high during 2003–2007 (Table 1), masking an apparent decline in the population. These high harvests (>3000 bears) were due to consistently high hunting success. A reduction in permits, and thus number of hunters, should reduce the harvest in the next few years, and enable the population to grow. The population is being managed at a level that provides good hunting opportunities but also socially tolerable nuisance activity. There is no target population number, but rather a range that meets these criteria. In fact, the target population is likely to fluctuate. With a smaller population size during the 1980s, nuisance activity was often intolerable (during poor food years, at least). Since 2002, nuisance complaints have been consistently low, reflecting consistently good natural food supplies as well as a change in behavior of people (better at removing attractants, such as garbage and birdseed, and also less apt to complain about bears). Thus, it is possible that the population could grow to a higher level (e.g., 25,000) and still be publicly acceptable.

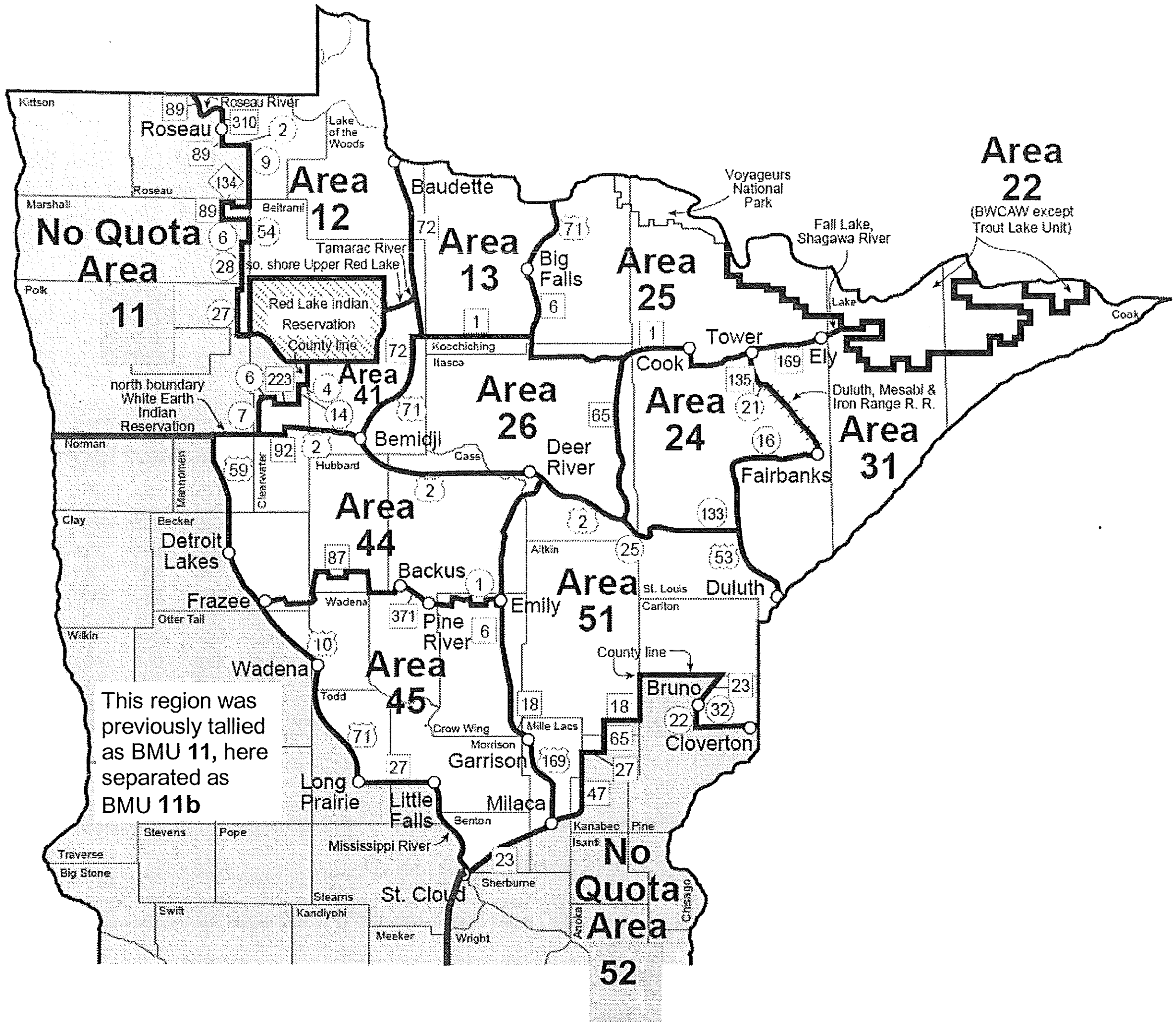


Figure 1. Bear management units (BMUs) within quota (white) and no-quota (gray) zones. Hunters in the quota zone are restricted to a single BMU, whereas no-quota hunters can hunt anywhere within that zone.

Table 1. Bear permits, licenses, hunters, harvests, and success rates, 1990–2009.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Permit applications	24861	25890	26428	27365	30127	29922	30405	27353	30245	29384	29275	26824	21886	16431	16466	16153	15725	16345	17362[a]	17571[a]
Permits available	6370	7140	7920	8630	9400	11950	12030	11370	18210	20840	20710	20710	20610	20110	16450	15950	14850	13200	11850	10000
Licenses purchased (total)	7094	7757	8485	9224	9826	12448	12414	11440	16737	18355	19304	16510	14639	14409	13669	13199	13164	11936	10404	9892
Quota area [b]	5568	6257	6845	7528	8125	10304	10592	9655	14941	16563	17021	13632	12350	9833	10063	9340	9169	8905	7842	7342
Quota surplus/military [b]												235	209	2554	1356	1591	1561	526	233	77[c]
No-quota area [b]	1526	1500	1640	1696	1701	2144	1822	1785	1796	1792	2283	2643	2080	2022	2238	2268	2434	2505	2329	2473
% Licenses bought [d]																				
Of permits available [d]	87.4	87.6	86.4	87.2	86.4	86.2	88.0	84.9	82.0	79.5	82.2	67.0	60.9	61.6	69.4	68.5	72.3	71.4	67.7	73.4
Of permits issued [d]									84.4	87.2	83.9	69.8	66.3	65.7	68.3	67.1	68.9	70.0	67.2	73.8
Estimated no. hunters [e]	6600	7200	7900	8600	9100	11600	11500	10300	14500	15900	16800	15500	13700	13500	12800	12400	12400	11200	9800	9300
Harvest	2381	2143	3175	3003	2329	4956	1874	3212	4110	3620	3898	4936	1915	3598	3391	3340	3290	3172	2135	2801
Harvest sex ratio (%M) [f]	52	59	50	56	62	47	62	55	55	53	58	56	61	58	57	59	58	57	62	59
Success rate (%) [g]																				
Total harvest/hunters	36	30	40	35	26	43	16	31	28	23	23	29	14	26	26	26	26	28	21	30
Quota harvest/licenses	35	30	41	34	26	42	15	29	25	20	20	28	14	25	26	25	25	28	21	30

[a] Includes area 99, a designation to increase preference but not to obtain a license (2008: $n = 528$, 2009 $n = 835$).

[b] Quota area established in 1982. No-quota area established in 1987. Surplus licenses from undersubscribed quota areas sold beginning in 2000; originally open only to unsuccessful permit applicants, but beginning in 2003, open to all. In 2009, surplus permits available only to 2nd-choice applicants, but none purchased (see Table 3). Total licenses = quota + quota surplus + no-quota + military (no permit needed).

[c] Free licenses for 10 and 11 year-olds were available beginning 2009 ($n = 45$), and included here with military licenses.

[d] Quota licenses bought (including surplus)/permits available, or licenses bought (prior to surplus)/permits issued (permits issued more relevant for years when some areas were undersubscribed; see Table 3). Beginning in 2008, some permits were issued for area 99; these are no-hunt permits, just to increase preference, and are not included in this calculation.

[e] Number of licensed hunters x percent of license-holders hunting. Percent hunting is based on data from bear hunter surveys conducted during 1981–91, 1998 (86.8%), and 2001(93.9%).

[f] Sex ratio as reported by hunters; hunters classify about 10% of female bears as males, so the actual harvest has a lower %M than shown here. In good food years, the harvest is more male-biased.

[g] Success rates in 2001–2009 were calculated as number of successful hunters/total hunters, rather than bears killed/total hunters, because hunters could take 2 bears. In 2009, 52 hunters took more than 1 bear (46 took 2 bears on NQ license, 1 hunter took 1 quota and 1 NQ bear, and 5 hunters took 2 quota bears [illegally]): thus, the 2801 bears were taken by 2749 different hunters, so success = 2749/9300 = 30%.

Table 2. Number of bear hunting permits available per year, 2005–2009 (aligned with permit applications in Table 3 below; highlighted values show drop from previous year).

BMU	2009	2008	2007	2006	2005
12	450	450	500	550	550
13	600	650	700	800	900
22	150	150	150	150	150
24	650	750	900	1000	1200
25	1250	1550	1700	1900	1900
26	1000	1150	1250	1500	1500
31	1300	1700	1900	2100	2100
41	400	400	400	450	450
44	1100	1350	1500	1700	1700
45	600	1000	1200	1200	1500
51	2500	2700	3000	3500	4000
Total	10000	11850	13200	14850	15950

Table 3. Number of bear hunting license applicants, and number and percent of available surplus licenses bought, 2005–2009[a]. Shaded values indicate undersubscribed areas.

BMU	2009		2008		2007		2006		2005	
	Apps	Surplus bought	Apps	Surplus bought	Apps	Surplus bought	Apps	Surplus bought	Apps	Surplus bought
12	876		857		811		1005		864	
13	700		709		745		680	120 100%	714	186 100%
22	91	0[b]	85	50 77%	87	51 81%	92	58 100%	65	46 54%
24	843		825		742	159 100%	624	367 98%	749	270 60%
25	1694		1793	4[c]	1799		1789	112 100%	1923	
26	1874		1999	2[c]	2028		1915		1997	
31	2423		2388	3[c]	2383		2290		2097	4 100%
41	685		656		577		683		653	
44	2787		2821		2669		2838		2884	
45	941		873	128 100%	936	266 100%	840	360 100%	927	346 60%
51	3822		3828		3568		2969	531 100%	3276	726 100%
Total	16736[d]		16834[d]	178 92%	16345	476 98%	15725	1548 ~100%	16149	1578 78%

[a] Surplus licenses available beginning in 2001. This was discontinued in 2009 and replaced by 2nd choice lottery applicants.
[b] No 2nd choice applicants bought a license for BMU 22, so it remained undersubscribed.
[c] Courtesy licenses issued by Commissioner, not actual surplus.
[d] Beginning in 2008, applicants could apply for area 99 in order to receive preference, but not buy a license; these are not included in this total.

Figure 2. Relationship between hunting success (note inverted scale) and hunter numbers. Red horizontal lines show mean hunting success for periods with <9000 hunters vs >12,000 hunters. Other variation in hunting success is mainly attributable to food conditions.

Table 4. Minnesota bear harvest tally[a] for 2009 by Bear Management Unit (BMU) and sex compared to harvests during 2004-2008 and record high harvests.

BMU	2009											
	M	(%M)	F	U	**Total**	**2008**	**2007**	**2006**	**2005**	**2004**	**5 year mean**	**Record high harvest** (yr)
Quota												
12	81	(58)	59	0	140	101	124	70	165	165	125	263 (01)
13	101	(68)	48	0	149	129	163	151	205	197	169	258 (95)
22	3	(43)	4	0	7	7	15	15	8	10	11	41 (89)
24	77	(51)	74	0	151	100[b]	134	194	144	212	157	288 (95)
25	187	(54)	157	0	344	298[b]	369	421	404	546	408	584 (01)
26	114	(50)	112	2	228	137[b]	315	314	285	320	274	513 (95)
31	256	(67)	128	0	384	248[b]	398	482	445	484	411	697 (01)
41	55	(53)	49	0	104	77	104	40	104	83	82	201 (01)
44	142	(56)	113	0	255	196	333	192	273	283	255	643 (95)
45	20	(48)	22	0	42[c]	72	113	118	107	118	106	178 (01)
51	258	(62)	158	0	416	344	557	721	505	544	534	895 (01)
Total	1294	(58)	924	2	2220	1709	2625	2718	2759[d]	2962	2555	4288 (01)
No Quota[e]												
11	183	(58)	131	1	315	172	324[f]	114	334	175	224	351[d] (05)
11b[g]	8	(89)	1	0	9	3	4	6	1	2	3	
52	156	(61)	101	0	257	251	219	400	223	252	269	400 (06)
Total	347	(60)	233	1	581	426	547	520	581[d]	429	501	678 (95)
State	1641	(59)	1157	3	**2801**	2135	3172	3290[d]	3340[d]	3391	3066	4956 (95)

[a] Hunters receive tooth envelopes and registration stations. The following table shows the number of tooth envelopes that had no corresponding registration slip or e-registration. These were added to the harvest tally.

Year	Quota area	No-quota area
2004	96	39
2005	179	31
2006	63	15
2007	27	9
2008	23	4
2009	19	14

[b] Lowest harvest since 1996.

[c] Second lowest harvest in this BMU, since it was established in 1994.

[d] The estimated registered harvest, including those in which registration data were lost and no tooth envelope was received. Value does not match column total because BMU data were uncorrected for lost registration data.

[e] Some hunters with no-quota licenses hunted in the quota area, and their kills were assigned to the BMU where they apparently hunted (*n* = 28 in 2006, 27 in 2007, 14 in 2008, 3 in 2009). Some quota area hunters also apparently hunted in the wrong BMU, based on the block where they said they killed a bear, but these were recorded in the BMU where they were assigned, not the BMU of the indicated harvest block, presuming most were misreported kill locations.

[f] Second highest harvest for this area. Third highest was 321 bears in 2001.

[g] Subset of BMU 11 south of the main harvest area (Fig 2).

Table 5. Bear hunting success (%) by BMU, measured as the registered harvest (excluding second bear) divided by the number of licenses sold[a], 2004–2009.

BMU	Mean success 2004-2008	2009		2008		2007		2006		2005[b]		2004	
		% Success	% 2 bears[c]	% Success	% 2 bears[c]	% Success	% 2 bears[c]	% Success	% 2 bears[c]	% Success	% 2 bears[c]	% Success	% 2 bears[c]
Quota	25												
12	32	39		32		36		19		41		33	
13	30	32		28		31		24		32		33	
22	11	16[d]		8		14		14		10		11	
24	22	31[d]		20		20		25		20		27	
25	32	36		28[e]		31		30		30		38	
26	30	31		17[e]		36		30		34		31	
31	29	38[d]		21[e]		28		33		31		33	
41	26	34		27		35		13		31		23	
44	22	30		21		30		16		24		20	
45	13	11[e]		11[e]		14		14		13		12	
51	22	23		19		27		28		18		19	
No Quota	20												
Statewide	24												

[a] Harvest/licenses instead of harvest/hunters because BMU-year-specific estimates for the rate of hunting by licensed hunters are unreliable. Statewide estimates of harvest/hunters are presented in Table 1.

[b] For 2005, estimated registered harvest was used instead of known registered harvest due to a large loss of registration data.

[c] Percent of successful hunters that shot 2 bears; 2nd bear is not included in the calculation of hunting success. The taking of 2 bears was legal only in the no-quota area since 2002. A few hunters also apparently shot 2 bears in the quota area (and submitted 2 sets of teeth), but these are not shown here because the numbers are very low (see Table 1, footnote g).

[d] Highest success since 1997 (BMU 22, 31 & statewide) or 1995 (BMU 24).

[e] Lowest success since 2002.

[f] Of the no-quota hunters, 34 took 2 bears in BMU 11 versus only 11 in BMU 52.

Table 6. Cumulative bear harvest (% of total harvest) by date, 1990–2009.

Year	Day of week for opener	Aug 22/23 – Aug 31	Sep 1 – Sep 7	Sep 1 – Sep 14	Sep 1 – Sep 30
1990	Sat		69	82	96
1991	Sun		64	76	93
1992	Tue		72	86	96
1993	Wed		67	80	94
1994	Thu		67	78	92
1995	Fri		72	87	97
1996	Sun		56 [a]	70	87
1997	Mon		76	88	97
1998	Tue		76	87	96
1999	Wed		69	81	95
2000	Wed	57	72	82	96
2001	Wed	67	82	88	98
2002	Sun		57 [a]	69	90
2003	Mon		72	84	96
2004	Wed		68	82	95
2005	Thu		72	81	94
2006	Fri		69	83	96
2007	Sat		69	82	96
2008	Mon		58 [a]	71	92
2009	Tue		74	86	96

[a] The low proportion of total harvest taken during the opening week (<60%) reflects a high abundance of natural foods.

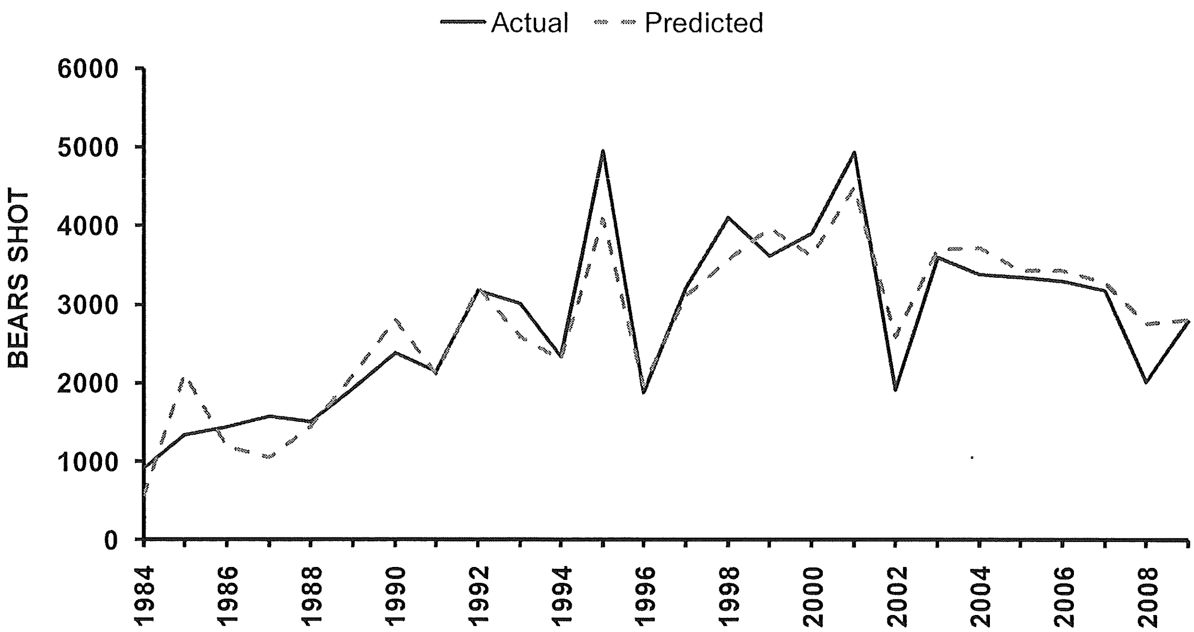


Figure 3. Number of bears harvested vs. number predicted, based on fall food abundance and hunter numbers. Prediction for 2009 based on regression from 1984–2008 (top graph; $R^2 = 0.86$) or 2000–2008 (bottom graph; $R^2 = 0.97$).

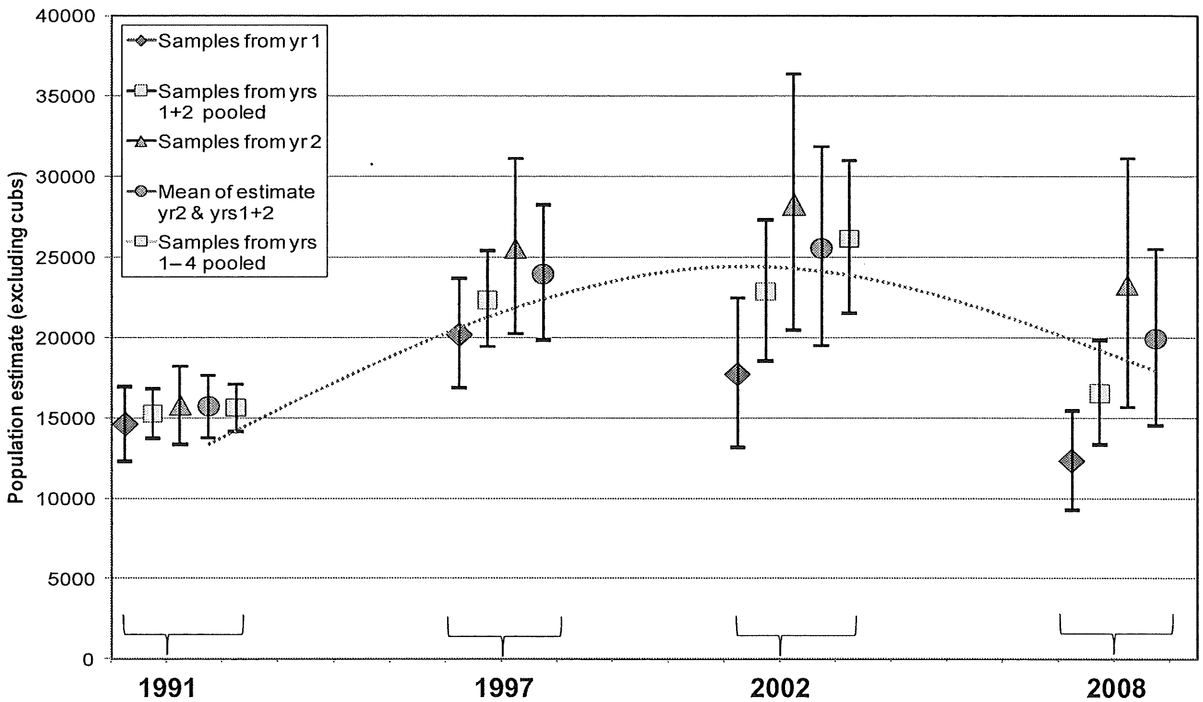


Figure 4. Statewide population estimates derived from tetracycline marking in 1991, 1997, 2002, and 2008. Each cluster of estimates pertains to the year of marking, with each point (and associated 95% CI) representing a different recapture sample (yr 1 = year of marking, yr 2 = year after marking). Simulation modeling suggested that samples pooled from multiple years (yellow squares) are likely to be most accurate, but in the absence of many years of sampling, the mean of the estimate derived from yr 2 samples and the estimate derived from yr 1+2 samples may be most reliable; thus, a red trend line is drawn through those points.

2009 MINNESOTA DEER HARVEST REPORT

Lou Cornicelli, Big Game / Season Program Consultant, Division of Fish and Wildlife

INTRODUCTION

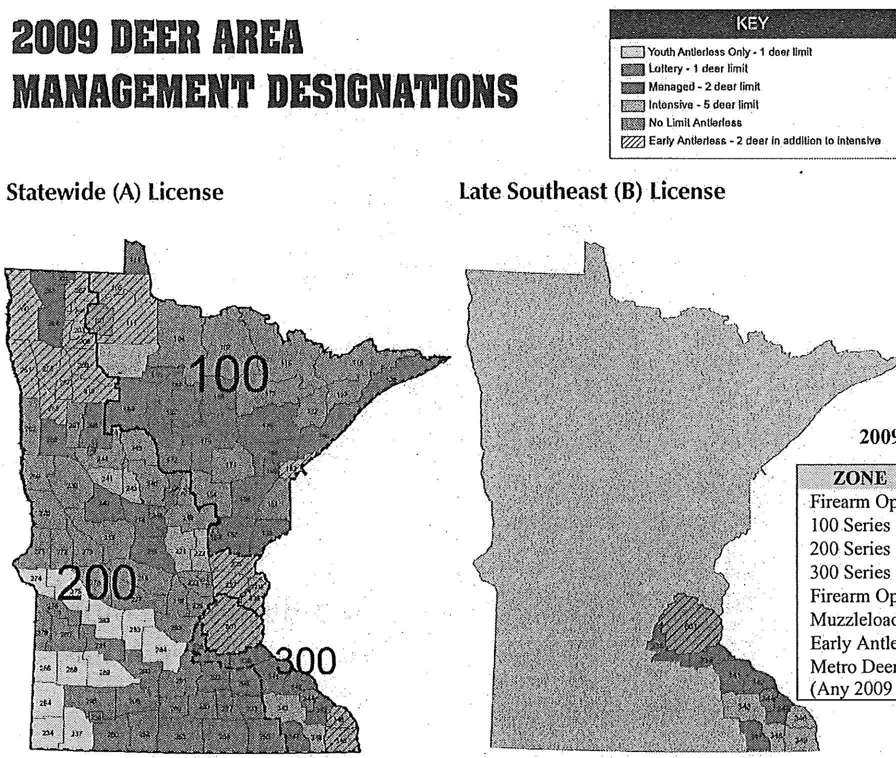
The white-tailed deer may be considered Minnesota's most popular wildlife species. Each year 500,000 hunters harvest over 190,000. In 2009, hunters registered 194,186 deer

METHODS

Every deer taken by hunting in Minnesota must be registered within 24 hours of the close of the season under which the deer was taken. Deer may be registered at any of the 825 to nearly 900 "Big Game Registration" stations available throughout the state. Implementation of electronic licensing (ELS) has improved the efficiency and accuracy of deer harvest estimates and provides a more timely release of harvest information. Registered deer are recorded as adult buck, fawn buck, adult doe, or fawn doe. Additional information gathered at time of registration includes date of kill, deer permit area, and season.

RESULTS

Outcome of the 2009 deer harvest are presented in the following tables.



2009 Minnesota Firearms Deer Seasons

ZONE	DATES
Firearm Option Statewide (A)*	
100 Series	Nov. 7-22
200 Series	Nov. 7-15
300 Series	Nov. 7-15
Firearm Option Late Southeast (B)**	Nov. 21-29
Muzzleloader****	Nov. 28-Dec. 13
Early Antlerless Season***	Oct. 10-11
Metro Deer Management Area (601)*** (Any 2009 firearms or muzzleloader.)	Nov. 7-29

Figure 1. 2009 Firearms and Archery Deer Seasons.

2009 Minnesota Archery Deer Season Dates: September 19-December 31.
Antlerless deer and legal bucks may be taken by archery, except only legal bucks may be taken in permit areas that have no either-sex permits or have youth-only either-sex permits.

Table 1. Statewide Firearms, Archery, and Muzzleloader Harvest, License Sales, and Success Rates, 1999-2009.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
REGULAR FIREARMS											
Resident License Sales	395,745	400,814	401,005	367,964	344,875	309,698	291,298	299,774	285,286	376,006	377,077
Non-Resident License Sales	9,970	10,595	10,972	10,835	11,334	12,036	12,523	12,520	12,520	11,883	11,759
Bonus Permit Sales	23,785	34,802	59,013	105,699	194,201	183,186	184,566	167,343	145,522	190,156	140,920
Multi-Zone Buck License Sales	43,903	42,669	41,921	35,658	32,929	32,359	28,233	15,984	15,051	N/A	N/A
Youth License Sales	2,038	3,215	4,011	2,884	34,463	51,347	50,501	49,599	49,242	50,397	56,678
All Season Deer License Sales		2,384	3,986	22,125	30,998	46,008	59,090	75,511	76,385	N/A	N/A
Total License Sales	475,441	495,289	519,601	545,165	648,800	634,634	626,211	620,731	584,006	628,442	586,434
Registered Buck Harvest[1]	92,584	102,961	98,894	101,333	110,440	116,612	95,594	95,695	97,528	85,646	83,820
Antlerless Permits Offered	177,380	232,595	286,540	365,667	31,625	30,760	28,830	18,925	18,830	32,325	60,100
Antlerless Permits Issued	135,852	180,490	196,603	192,907	25,386	24,111	25,656	18,925	18,830	32,325	60,100
Antlerless Permits App.	214,597	237,571	225,341	202,086	30,253	28,454	31,403	31,403	31,403	31,403	90,882
Registered AL Harvest[1]	71,681	88,492	98,169	102,280	147,420	123,278	119,363	135,981	118,860	98,147	78,525
Registered Total Harvest[1]	164,265	191,453	197,063	203,613	257,860	239,890	214,957	231,676	216,388	183,793	162,345
Registered % Successful[2]	34.8	38.6	37.9	37.3489	39.7	37.8	34.3	37.3	37.1	35.1	32.1
Gun	451,656	459,677	461,895	439,466	454,599	451,448	441,645	453,388	438,484	438,286	445,514
ARCHERY											
Resident License Sales	66,226	68,947	69,608	57,532	59,339	50,601	50,293	49,595	52,780	87,872	88,707
Non-Resident License Sales	1,073	1,271	1,288	1,275	1,428	1,144	1,207	1,286	1,509	1,509	1,610
Youth Archery Sales	N/A	N/A	N/A	N/A	3,748	7,261	7,489	7,688	7,663	9,005	9,157
Mgmt Permit License Sales	16,945	20,393	22,141	18,126	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total License Sales	84,244	90,611	93,037	76,933	60,767	59,006	58,989	58,569	61,952	99,033	99,474
Total Harvest - Archery Lic/Bonus	13,376	15,776	15,884	14,744	19,335	17,237	18,975	17,076	17,261	22,632	20,629
Total Harvest - All-Season license					2,356	3,489	4,563	8,284	6,900	N/A	N/A
Total Archery Harvest	13,376	15,776	15,884	14,744	21,691	20,726	23,538	25,360	24,161	22,632	20,629
Registered % Successful[2]	15.8	17.4107	17.1	19.2	22.3	29.2	24.6	24.8	24.3	18.5	17.5
MUZZLELOADER											
Total Muzzleloader License Sales	--	11,972	13,043	11,764	9,142	10,512	9,226	10,781	9,867	64,673	63,282
Estimated All-Season Hunters	--	--	--	--	12,020	14,168	23,293	23,293	26,813	N/A	N/A
Total Muzzleloader Harvest	2,928	4,548	4,494	3,505	9,466	9,289	15,421	13,507	12,138	9,572	7,929
Registered % Successful[2]		37.9886	34.5	29.8	44.7	37.6	47.4	39.6	28.2	13.4	11.3
TOTAL Registered Harvest	180,569	211,777	217,452	222,050	290,525	260,604	255,736	270,778	260,434	221,837	194,186

[1]Does not include free landowner licenses

[2]Based on total license sales - does not include all-season deer

Table 2. Deer Harvest by License Type and Zone, 2009.

Firearms/Zone	Hunters	Harvest			Overall Success
		Bucks	Antlerless	Total	
1	172,988	34,015	30,570	64,585	33.4%
2	221,221	41,374	37,150	78,524	31.8%
3A	22,873	5,729	4,602	10,331	38.7%
3B	17,405	1,890	4,945	6,835	32.9%
Early Season	11,559	0	2,891	2,891	21.4%
Free Landowner[1]	3,631	0	1,036	1,036	28.5%
Muzzleloader[2]	63,282	2,844	5,085	7,929	11.3%
Archery[3]	99,474	7,650	12,979	20,629	17.5%
TOTAL[4]	**489,096**	**94,367**	**99,819**	**194,186**	33.8%

[1] Includes deer taken during regular firearms, muzzleloader, and archery seasons.

[2] Total number of people who bought only a muzzleloader license was 10,262.

[3] Includes Camp Ripley. Total number of people who bought only an archery license was 28,293.

[4] Due to the fact that a hunter can buy multiple licenses, hunter numbers are an estimate.

Table 3. Firearms Harvest and Harvest per Square Mile by Permit Area, 2009. Includes all firearm licenses but does not include early antlerless harvest.

Permit Area	Zone	Adult Male	Fawn Male	Adult Female	Fawn Female	Total	Area Size (sq.mi.)	Bucks/ Sq. Mile	Antlerless/ Sq. Mile	Total/ Sq. Mile
101	1A	342	75	232	73	722	496	0.69	0.77	1.46
104	1A	929	66	264	28	1,287	2,078	0.45	0.17	0.62
105	1A	786	171	586	136	1,679	740	1.06	1.21	2.27
107	1A	1405	45	207	24	1,681	1,896	0.74	0.15	0.89
110	1A	647	139	469	115	1,370	300	2.16	2.41	4.57
111	1A	601	110	401	83	1,195	1,437	0.42	0.41	0.83
114	1A	48	5	29	1	83	123	0.39	0.28	0.67
115	1A	1590	81	408	44	2,123	1,867	0.85	0.29	1.14
116	1A	119	2	29	0	150	1,164	0.10	0.03	0.13
122	1A	547	26	137	24	734	619	0.88	0.30	1.19
126	1A	471	41	239	34	785	943	0.50	0.33	0.83
127	1A	104	0	21	2	127	561	0.19	0.04	0.23
152	1A	154	37	128	29	348	61	2.52	3.18	5.70
154	1A	1615	212	667	117	2,611	760	2.13	1.31	3.44
156	1A	1859	474	1300	307	3,940	825	2.25	2.52	4.78
157	1A	2317	640	1653	420	5,030	889	2.61	3.05	5.66
159	1A	1298	286	968	218	2,770	568	2.29	2.59	4.88
167	1A	574	122	498	93	1,287	432	1.33	1.65	2.98
168	1A	1099	271	934	202	2,506	723	1.52	1.95	3.47
170	1A	2285	609	1787	445	5,126	1,311	1.74	2.17	3.91
172	1A	1147	407	1340	301	3,195	451	2.54	4.54	7.09
174	1A	1211	141	469	65	1,886	835	1.45	0.81	2.26
175	1A	1692	96	478	65	2,331	1,249	1.35	0.51	1.87
178	1A	2476	440	1499	302	4,717	1,259	1.97	1.78	3.75
180	1A	1452	159	668	122	2,401	983	1.48	0.97	2.44
181	1A	1688	307	1011	211	3,217	709	2.38	2.16	4.54
182	1A	540	126	350	93	1,109	269	2.01	2.12	4.13
183	1A	1356	151	487	92	2,086	663	2.04	1.10	3.15
184	1A	2696	716	2191	559	6,162	1,231	2.19	2.82	5.01
197	1A	851	170	604	128	1,753	975	0.87	0.93	1.80
199	1A	134	13	59	9	215	148	0.91	0.55	1.45
201	2A	90	18	47	22	177	161	0.56	0.54	1.10
203	2A	97	16	54	13	180	118	0.82	0.70	1.53
208	2A	233	40	174	37	484	379	0.62	0.66	1.28
209	2A	574	123	415	131	1,243	639	0.90	1.05	1.94
210	2A	996	231	743	225	2,195	615	1.62	1.95	3.57
213	2A	1518	247	712	187	2,664	1,057	1.44	1.08	2.52
214	2A	1342	461	1008	339	3,150	557	2.41	3.25	5.66
215	2A	952	365	702	264	2,283	701	1.36	1.90	3.25
218	2A	783	153	412	114	1,462	884	0.89	0.77	1.65
219	2A	526	97	251	66	940	392	1.34	1.06	2.40
221	2A	960	347	701	278	2,286	642	1.50	2.07	3.56
222	2A	886	276	606	185	1,953	413	2.15	2.59	4.73
223	2A	479	77	180	49	785	377	1.27	0.81	2.08
224	2A	87	14	54	13	168	47	1.86	1.73	3.60
225	2A	1333	389	830	251	2,803	618	2.16	2.38	4.53
227	2A	835	241	521	150	1,747	471	1.77	1.94	3.71

Table 3. (Continued)

Permit Area	Zone	Adult Male	Fawn Male	Adult Female	Fawn Female	Total	Area Size (sq.mi.)	Bucks/ Sq. Mile	Antlerless/ Sq. Mile	Total/ Sq. Mile
229	2A	224	43	82	18	367	287	0.78	0.50	1.28
230	2A	218	28	90	25	361	452	0.48	0.32	0.80
232	2A	219	17	80	9	325	377	0.58	0.28	0.86
233	2A	172	14	55	11	252	385	0.45	0.21	0.66
234	2A	142	2	5	0	149	636	0.22	0.01	0.23
235	2A	43	4	11	2	60	32	1.34	0.53	1.87
236	2A	714	164	410	80	1,368	372	1.92	1.76	3.68
237	2A	163	2	11	1	177	728	0.22	0.02	0.24
238	2A	65	1	11	1	78	95	0.68	0.14	0.82
239	2A	1289	264	724	192	2,469	922	1.40	1.28	2.68
240	2A	1767	506	1287	379	3,939	642	2.75	3.39	6.14
241	2A	1353	537	1310	460	3,660	417	3.25	5.54	8.78
242	2A	515	125	475	113	1,228	215	2.40	3.32	5.72
243	2A	870	345	868	295	2,378	314	2.77	4.81	7.58
244	2A	1453	257	639	167	2,516	583	2.49	1.82	4.31
245	2A	1412	244	759	157	2,572	583	2.42	1.99	4.41
246	2A	1682	294	993	204	3,173	772	2.18	1.93	4.11
247	2A	620	103	348	69	1,140	229	2.71	2.27	4.97
248	2A	363	80	238	80	761	212	1.71	1.88	3.59
249	2A	1078	237	579	146	2,040	502	2.15	1.92	4.07
250	2A	320	4	38	3	365	711	0.45	0.06	0.51
251	2A	60	29	70	28	187	55	1.09	2.30	3.39
252	2A	270	12	48	3	333	715	0.38	0.09	0.47
253	2A	356	20	88	10	474	974	0.37	0.12	0.49
254	2A	435	41	136	22	634	930	0.47	0.21	0.68
255	2A	332	35	101	15	483	774	0.43	0.20	0.62
256	2A	430	111	393	100	1,034	653	0.66	0.92	1.58
257	2A	365	106	342	87	900	412	0.89	1.30	2.18
260	2A	542	96	505	93	1,236	1,249	0.43	0.56	0.99
261	2A	144	28	132	18	322	795	0.18	0.22	0.41
262	2A	150	12	42	14	218	677	0.22	0.10	0.32
263	2A	401	60	250	57	768	512	0.78	0.72	1.50
264	2A	671	142	466	112	1,391	669	1.00	1.08	2.08
265	2A	468	144	411	107	1,130	494	0.95	1.34	2.29
266	2A	403	81	301	79	864	617	0.65	0.75	1.40
267	2A	195	37	147	52	431	472	0.41	0.50	0.91
268	2A	264	66	204	46	580	229	1.15	1.38	2.53
269	2A	202	16	50	12	280	650	0.31	0.12	0.43
270	2A	148	5	21	11	185	748	0.20	0.05	0.25
271	2A	173	10	31	4	218	632	0.27	0.07	0.34
272	2A	179	9	18	6	212	531	0.34	0.06	0.40
273	2A	325	41	139	35	540	572	0.57	0.38	0.94
274	2A	135	0	6	0	141	355	0.38	0.02	0.40
275	2A	240	1	2	0	243	764	0.31	0.00	0.32
276	2A	394	27	88	12	521	543	0.73	0.23	0.96
277	2A	1122	101	325	53	1,601	813	1.38	0.59	1.97
278	2A	403	27	77	23	530	401	1.01	0.32	1.32

Table 3. (Continued)

Permit Area	Zone	Adult Male	Fawn Male	Adult Female	Fawn Female	Total	Area Size (sq.mi.)	Bucks/ Sq. Mile	Antlerless/ Sq. Mile	Total/ Sq. Mile
279	2A	187	9	56	3	255	344	0.54	0.20	0.74
280	2A	174	9	41	11	235	675	0.26	0.09	0.35
281	2A	425	16	96	15	552	575	0.74	0.22	0.96
282	2A	97	0	5	0	102	779	0.12	0.01	0.13
283	2A	200	6	4	1	211	614	0.33	0.02	0.34
284	2A	263	3	12	3	281	838	0.31	0.02	0.34
285	2A	350	28	121	19	518	550	0.64	0.31	0.94
286	2A	231	2	11	1	245	446	0.52	0.03	0.55
287	2A	83	41	137	37	298	46	1.81	4.68	6.49
288	2A	373	4	17	4	398	625	0.60	0.04	0.64
289	2A	150	0	8	2	160	816	0.18	0.01	0.20
290	2A	293	16	86	6	401	662	0.44	0.16	0.61
291	2A	574	57	155	23	809	802	0.72	0.29	1.01
292	2A	395	90	209	50	744	480	0.82	0.73	1.55
293	2A	393	88	245	53	779	511	0.77	0.75	1.52
294	2A	211	1	10	1	223	686	0.31	0.02	0.33
295	2A	396	18	58	5	477	840	0.47	0.10	0.57
296	2A	257	15	53	8	333	666	0.39	0.11	0.50
297	2A	189	8	35	6	238	438	0.43	0.11	0.54
298	2A	676	162	517	134	1,489	618	1.09	1.32	2.41
299	2A	253	17	90	14	374	386	0.66	0.31	0.97
338	3A	237	49	128	29	443	454	0.52	0.45	0.98
338	3B	57	17	82	24	180	454	0.13	0.27	0.40
339	3A	230	41	117	29	417	394	0.58	0.47	1.06
339	3B	39	37	99	21	196	394	0.10	0.40	0.50
341	3A	659	113	313	83	1,168	611	1.08	0.83	1.91
341	3B	255	155	360	114	884	611	0.42	1.03	1.45
342	3A	519	72	289	60	940	350	1.48	1.20	2.68
342	3B	223	115	319	93	750	350	0.64	1.50	2.14
343	3A	608	129	386	76	1,199	662	0.92	0.89	1.81
343	3B	193	101	318	74	686	662	0.29	0.74	1.04
344	3A	437	24	84	9	554	189	2.31	0.62	2.92
344	3B	90	54	146	41	331	189	0.47	1.27	1.75
345	3A	379	85	186	43	693	326	1.16	0.96	2.13
345	3B	150	70	242	50	512	326	0.46	1.11	1.57
346	3A	751	126	407	85	1,369	319	2.36	1.94	4.30
346	3B	232	139	420	102	893	319	0.73	2.07	2.80
347	3A	420	65	171	45	701	434	0.97	0.65	1.62
347	3B	127	53	183	35	398	434	0.29	0.63	0.92
348	3A	542	89	369	87	1,087	332	1.63	1.64	3.28
348	3B	146	77	273	76	572	332	0.44	1.28	1.72
349	3A	953	124	583	107	1,767	492	1.94	1.65	3.59
349	3B	361	179	685	175	1,400	492	0.73	2.11	2.85

Table 3. (Continued)

Permit Area	Zone	Adult Male	Fawn Male	Adult Female	Fawn Female	Total	Area Size (sq.mi.)	Bucks/ Sq. Mile	Antlerless/ Sq. Mile	Total/ Sq. Mile
601	Metro	629	125	428	85	1,267	1,633	0.39	0.39	0.78
901	Park	3	1	3	0	7				
902	Park	50	35	95	35	215				
903	Park	1	0	7	1	9				
904	Park	7	1	2	0	10				
905	Park	3	1	3	1	8				
906	Park	8	2	9	4	23				
907	Park	0	0	4	1	5				
908	Park	2	0	2	0	4				
909	Park	0	3	0	1	4				
910	Park	0	6	6	1	13				
912	Park	25	25	41	23	114				
913	Park	1	2	6	1	10				
914	Park	13	5	3	2	23				
915	Park	3	2	8	6	19				
916	Park	31	26	32	15	104				
918	Park	2	2	6	1	11				
920	Park	0	3	8	0	11				
921	Park	3	5	5	6	19				
922	Park	4	1	9	4	18				
923	Park	0	3	3	1	7				
925	Park	9	8	20	4	41				
926	Park	2	1	3	2	8				
927	Park	6	6	25	12	49				
928	Park	0	1	1	0	2				
929	Park	1	4	15	5	25				
930	Park	8	1	4	0	13				
931	Park	13	9	21	6	49				
932	Park	5	2	5	3	15				
TOTAL		83,820	16,545	49,829	12,151	162,345				

Table 4. Firearm Bonus Permit Harvest by Permit Area, 2009
Managed Permit Areas.

Permit Area	Zone	Fawn Male	Adult Female	Fawn Female	Total
110	1A	68	239	68	375
114	1A	2	17	1	20
126	1A	21	146	17	184
152	1A	17	66	16	99
156	1A	248	687	172	1,107
157	1A	321	853	228	1,402
159	1A	145	476	121	742
167	1A	54	243	50	347
168	1A	118	457	99	674
170	1A	324	940	251	1,515
172	1A	209	680	163	1,052
178	1A	229	814	164	1,207
180	1A	77	390	77	544
181	1A	190	585	131	906
184	1A	420	1297	351	2,068
197	1A	78	320	69	467
199	1A	4	35	3	42
201	2A	10	25	12	47
214	2A	216	515	190	921
215	2A	137	313	110	560
240	2A	254	699	214	1,167

Permit Area	Zone	Fawn Male	Adult Female	Fawn Female	Total
242	2A	73	235	60	368
248	2A	36	116	46	198
251	2A	16	38	16	70
263	2A	28	142	39	209
264	2A	78	257	60	395
266	2A	41	166	39	246
292	2A	37	80	24	141
293	2A	53	115	32	200
298	2A	84	281	79	444
338	3A	28	67	13	108
339	3A	23	66	17	106
341	3A	59	209	61	329
342	3A	41	196	42	279
345	3A	45	117	26	188
347	3A	41	121	35	197
338	3B	9	33	11	53
339	3B	22	46	12	80
341	3B	67	161	58	286
342	3B	54	151	50	255
345	3B	26	92	20	138
347	3B	29	98	17	144
TOTAL		**4,032**	**12,584**	**3,264**	**19,880**

Table 4. Firearm Bonus Permit Harvest by Permit Area, 2009.

Intensive Permit Areas

Permit Area	Zone	Fawn Male	Adult Female	Fawn Female	Total
101	1A	10	21	7	38
105	1A	112	424	90	626
111	1A	65	241	42	348
182	1A	84	244	72	400
203	2A	12	40	8	60
208	2A	28	103	27	158
209	2A	94	289	99	482
210	2A	164	506	165	835
221	2A	217	423	189	829
222	2A	171	366	119	656
225	2A	245	487	157	889
227	2A	151	327	97	575
236	2A	105	250	62	417
241	2A	380	921	327	1,628
243	2A	208	541	190	939
256	2A	71	286	75	432
257	2A	73	219	61	353
260	2A	64	341	74	479
261	2A	19	91	15	125
265	2A	98	295	77	470
267	2A	25	114	34	173
268	2A	36	146	34	216
287	2A	30	88	29	147
343	3A	87	275	58	420
346	3A	88	307	67	462
348	3A	57	266	67	390
349	3A	91	460	88	639
343	3B	62	188	51	301
346	3B	73	239	67	379
348	3B	42	130	48	220
349	3B	105	415	102	622
601	Metro	87	292	66	445
Total		**3,154**	**9,335**	**2,664**	**15,153**

Table 5. Early Antlerless Season Harvest by Permit Area, 2009.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
101	6	26	2	34
105	30	137	34	201
111	15	84	22	121
182	20	80	26	126
208	11	20	9	40
209	33	151	28	212
210	62	184	53	299
225	79	181	72	332
227	18	86	20	124
236	15	77	14	106
256	14	90	20	124
257	18	78	35	131
260	25	112	21	158
261	5	19	6	30
265	43	96	39	178
267	3	25	5	33
268	3	36	7	46
346	53	153	54	260
349	35	175	70	280
601	14	33	8	55
Total	**502**	**1,843**	**545**	**2,890**

Table 6. Summary of Firearms Special Hunts, 2009. Includes regular, youth, and bonus permits.

			Harvest				
Area	Dates	Permits Issued	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
900 - Schoolcraft State Park[1]	11/7-11/22	Unl.	0	0	0	0	0
901 - Rice Lake Nat. Wildlife Refuge	11/14-11/22	40*	3	1	3	0	7
902 - St. Croix State Park[1]	11/14-11/17	550**	50	35	95	35	215
903 - Savanna Portage State Park[1]	11/14-11/18	40***	1	0	7	1	9
904 - Gooseberry Falls State Park[1]	11/7-11/22	30*	7	1	2	0	10
905 - Split Rock Lighthouse State Park[1]	11/7-11/22	30*	3	1	3	1	8
906 - Tettegouche State Park[1]	11/7-11/22	125*	8	2	9	4	23
907 - Scenic State Park[1]	11/7-11/22	30*	0	0	4	1	5
908 - Hayes Lake State Park[1]	11/7-11/22	50*	2	0	2	0	4
909 - Lake Bemidji State Park[1]	11/7-11/10	35#	0	3	0	1	4
910 - Zippel Bay State Park[1]	11/7-11/22	55#	0	6	6	1	13
911 - Judge CR Magney SP*	11/7-11/22	Unl.	0	0	0	0	0
912 - Wild River State Park[1]	11/7-11/10	150**	25	25	41	23	114
913 - Lake Carlos State Park[1]	11/7-11/10	20#	1	2	6	1	10
914 - William O'Brien State Park[1]	11/7-11/8	65*	13	5	3	2	23
915 - Lake Bronson State Park[1]	11/7-11/15	30**	3	2	8	6	19
916 - Maplewood State Park[1]	11/7-11/10	100*	31	26	32	15	104
917 - Rydell NWR	11/7-11/15	10	0	0	0	0	0
918 - Lake Alexander SNA[1]	11/7-11/15	40*	2	2	6	1	11
919 - Buffalo River State Park[1]	11/7-11/8	16#	0	0	0	0	0
920 - Glacial Lakes State Park	11/12-11/15	30#	0	3	8	0	11
921 - Lake Louise State Park[1]	11/14-11/15	25**	3	5	5	6	19
922 - Beaver Creek Valley State Park[1]	11/7-11/8	20**	4	1	9	4	18
923 - Zumbro Falls SNA[1]	11/7-11/15	12#	0	3	3	1	7
924 - Forestville/Mystery Cave SP[1]	11/7-11/9	110**	0	0	0	0	0
925 - Frontenac State Park[1]	11/21-11/22	50**	9	8	20	4	41
926 - Great River Bluffs SP[1]	11/21-11/22	50**	2	1	4	2	9
927 - Whitewater State Park[1]	11/21-11/23	50**	7	6	27	12	52
928 - Zumbro Falls SNA[1]	11/21-11/29	12#	0	1	1	0	2
929 - Whitewater Refuge	11/21-11/29	60#	1	4	15	5	25
930 - Vermillion Highlands WMA[1]	11/7-11/20	50**	8	1	4	0	13
931 - Carver Park Reserve[1]	11/21-11/22	105*	13	9	21	6	49
932 -Lake Rebecca Park Reserve[1]	11/28-11/29	80*	5	2	5	3	15
TOTAL			201	155	349	135	840

1 Bonus permits available *Either sex ** Earn-A-Buck

***Antler Point Restriction #Antlerless Only

Table 7. Free Landowner Firearms Harvest by Permit Area, 2009.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
101	1	2	0	3
105	0	5	1	6
110	3	2	4	9
111	2	2	1	5
156	3	5	2	10
157	5	29	2	36
159	1	4	2	7
167	2	1	0	3
168	2	6	0	8
170	0	7	1	8
172	3	4	1	8
178	2	3	4	9
180	0	3	2	5
181	1	6	0	7
184	8	38	10	56
197	0	1	2	3
199	0	0	1	1
201	0	1	0	1
203	0	1	0	1
208	0	1	1	2
209	2	7	2	11
210	6	14	4	24
214	35	49	17	101
215	17	21	6	44
221	11	19	6	36
222	2	4	2	8
225	4	11	4	19
227	2	1	1	4
236	0	7	1	8

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
240	14	34	15	63
241	9	26	4	39
242	0	2	0	2
243	9	15	3	27
248	1	7	0	8
256	3	10	1	14
257	3	11	2	16
260	0	9	0	9
261	1	1	0	2
263	0	1	3	4
264	4	22	2	28
265	1	10	1	12
266	4	8	2	14
267	0	4	1	5
268	4	3	2	9
292	2	6	1	9
293	0	2	1	3
298	3	8	3	14
338	1	1	1	3
339	0	2	0	2
341	5	17	6	28
342	6	16	8	30
343	2	15	1	18
345	6	24	0	30
346	8	19	3	30
347	0	9	3	12
348	5	15	4	24
349	13	40	7	60
TOTAL	216	591	151	958

Table 8. Archery Harvest by Permit Area, 2009.
Includes Regular, Youth, All-Season, and Bonus Permits.

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
101	3	2	8	1	14
104	7	1	10	0	18
105	12	7	50	3	72
107	17	1	21	0	39
110	12	8	24	4	48
111	5	3	10	1	19
114	6	0	6	0	12
115	21	3	18	1	43
116	5	0	6	0	11
122	6	1	6	2	15
126	15	4	21	2	42
127	0	0	1	0	1
152	4	3	10	2	19
154	78	5	47	12	142
156	57	20	122	22	221
157	136	34	164	20	354
159	55	21	108	13	197
167	5	2	16	1	24
168	26	9	64	8	107
170	103	32	204	23	362
172	45	21	110	14	190
174	24	7	23	7	61
175	22	1	28	2	53
178	74	20	111	8	213
180	69	11	63	5	148
181	99	22	104	9	234
182	237	151	563	106	1,057
183	44	3	33	8	88
184	112	38	176	25	351
197	22	5	36	4	67
199	10	2	6	0	18
201	0	0	1	0	1
203	1	0	1	1	3
208	3	2	9	3	17
209	22	8	39	6	75
210	27	18	78	4	127
213	214	15	67	12	308
214	60	21	108	19	208
215	135	35	157	25	352
218	135	12	62	8	217
219	90	12	48	9	159
221	72	56	185	34	347
222	63	48	174	31	316
223	120	17	50	6	193
224	16	1	4	1	22
225	117	76	259	29	481
227	193	85	294	65	637
229	70	7	25	3	105
230	32	2	18	1	53
232	35	3	17	0	55
233	49	5	33	3	90
234	28	0	0	0	28
235	8	2	7	4	21
236	198	64	317	55	634
237	25	1	2	1	29
238	5	2	4	0	11
239	60	8	50	5	123
240	83	28	166	17	294
241	81	54	304	33	472
242	80	28	149	31	288
243	45	28	195	28	296
244	53	15	50	2	120
245	74	14	47	5	140
246	49	6	42	5	102
247	57	8	40	3	108
248	35	10	57	8	110
249	58	13	37	5	113
250	52	3	22	0	77
251	2	1	2	0	5
252	40	3	33	5	81
253	57	4	21	3	85
254	76	9	43	4	132
255	80	7	45	6	138
256	13	4	28	4	49
257	15	3	36	6	60
260	21	2	60	2	85
261	11	3	30	2	46
262	18	2	14	3	37
263	6	0	9	2	17
264	17	5	11	5	38
265	16	9	47	8	80
266	19	7	31	4	61
267	3	2	16	4	25
268	8	2	12	1	23
269	22	2	8	1	33
270	20	0	9	2	31
271	22	0	8	0	30
272	13	1	6	0	20
273	36	2	17	0	55
274	18	4	22	3	47
275	21	0	3	0	24
276	24	2	11	0	37
277	155	10	107	17	289
278	58	6	26	1	91
279	15	3	8	2	28
280	25	1	15	2	43
281	45	6	30	2	83
282	10	2	0	0	12
283	35	0	0	0	35
284	48	1	1	0	50
285	80	9	55	4	148
286	25	0	0	0	25
287	2	0	2	0	4
288	64	0	0	0	64

Table 8. (Continued)

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
289	18	1	1	0	20
290	35	2	16	2	55
291	116	13	92	8	229
292	75	15	82	14	186
293	76	12	65	13	166
294	30	0	1	0	31
295	69	8	40	4	121
296	33	2	21	4	60
297	4	0	2	0	6
298	13	4	21	1	39
299	43	8	42	8	101
338	77	13	60	11	161

*Camp Ripley First Hunt
**Camp Ripley Second Hunt

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
339	56	12	64	11	143
341	171	27	192	38	428
342	117	21	108	18	264
343	268	97	554	84	1,003
344	72	12	19	5	108
345	69	17	82	14	182
346	149	41	233	41	464
347	86	16	101	11	214
348	101	33	178	29	341
349	179	37	293	39	548
601	701	263	1045	191	2,200
970	45	25	89	11	170
971	131	27	116	32	306
Total	**7,650**	**1,962**	**9,570**	**1,447**	**20,629**

Table 9. Archery Harvest using Bonus Permits by Permit Area, 2009.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
101	0	2	0	2
105	3	43	2	48
110	6	20	4	30
111	2	9	1	12
114	0	6	0	6
126	2	14	2	18
152	2	8	2	12
156	11	87	15	113
157	19	121	15	155
159	13	85	10	108
167	2	10	1	13
168	4	44	5	53
170	22	134	17	173
172	15	77	10	102
178	16	63	5	84
180	7	44	4	55
181	13	78	7	98
182	135	503	101	739
184	30	136	16	182
197	4	29	3	36
199	0	3	0	3
201	0	1	0	1
203	0	1	1	2
208	2	6	3	11
209	5	30	5	40
210	13	68	4	85
214	19	89	13	121
215	19	116	13	148
221	50	162	32	244
222	41	137	28	206
225	64	225	27	316
227	71	247	59	377
236	52	280	49	381
240	23	132	11	166
241	47	280	31	358
242	23	122	23	168
243	26	170	23	219
248	9	40	4	53
251	1	2	0	3
256	4	24	4	32
257	3	32	6	41
260	1	50	2	53
261	3	25	2	30
263	0	9	1	10
264	5	11	3	19
265	8	44	8	60
266	6	26	3	35
267	2	15	4	21
268	2	8	1	11
287	0	2	0	2
292	13	64	9	86
293	11	52	12	75
298	3	17	1	21
338	10	43	8	61
339	8	52	9	69
341	18	168	32	218
342	14	93	13	120
343	80	505	78	663
345	13	62	9	84
346	37	211	39	287
347	11	85	9	105
348	31	164	28	223
349	29	271	39	339
601	227	944	175	1,346
TOTAL	**1,310**	**6,601**	**1,041**	**8,952**

Table 10. Summary of Archery Special Hunts, 2009 Includes Regular, Youth, and Bonus Permits.

Area	Dates	Permits Issued	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
970 - Camp Ripley	10/15-10/16	2,500	45	89	25	11	170
971 - Camp Ripley	10/30-10/31	2,500	131	116	27	32	306
972 - Crow-Hassan Park Reserve	11/13-11/15	130	0	0	0	0	0
973 - Murphy-Hanrahan Park Reserve	11/13-11/15	180	0	0	0	0	0
974 - Cleary Lake Regional Park	11/13-11/15	55	0	0	0	0	0
975 - Vermillion Highlands WMA	9/19-11/1	60	1	0	0	0	1
976 - City of New Ulm	10/10-12/31	50	0	1	0	0	1
977 - City of Red Wing	9/19-12/31	Unl.	0	2	0	1	3
978 - City of Sandstone	9/19-12/31	Unl.	0	0	0	0	0
979 - City of St. Cloud	9/19-12/31	50	0	0	0	0	0
980 - City of Taylors Falls	9/19-12/31	Unl.	0	0	0	0	0
981 - City of Mankato	10/24-12/31	40	0	0	0	0	0
982 - City of Granite Falls	9/19-12/31	10	0	0	0	0	0
983 - City of Ortonville	9/19-12/31	30	0	0	0	0	0
984 - City of Canby	9/19-12/31	20	0	2	1	0	3
985 - City of Bemidji	9/19-11/15	40	3	6	0	0	9
Total			**180**	**216**	**53**	**44**	**493**

*Total permits for this hunt was 50 and hunters could use either firearms or archery equipment.
**Total number of hunters. Permits were unlimited.

Table 11. Free Landowner Archery Harvest by Permit Area, 2009.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
110	0	1	0	1
156	1	1	0	2
178	0	1	0	1
184	0	1	0	1
214	0	2	0	2
215	1	0	1	2
221	1	0	1	2
227	0	1	0	1
240	0	1	0	1
248	0	1	0	1
298	0	1	0	1
342	1	2	0	3
343	3	10	0	13
346	0	1	0	1
347	1	0	0	1
348	0	2	0	2
349	1	3	0	4
TOTAL	8	29	2	39

Table 12. Muzzleloader Harvest by Permit Area, 2009.
Includes Regular, Muzzleloader, Youth, All-Season, and Bonus permits.

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
101	6	0	3	3	12
104	8	2	1	1	12
105	10	5	23	4	42
107	12	1	1	1	15
110	4	1	15	1	21
111	2	5	12	2	21
115	24	3	21	2	50
116	8	0	1	0	9
122	0	2	3	0	5
126	9	2	23	0	34
127	2	0	1	0	3
152	2	0	4	2	8
154	8	3	5	2	18
156	22	11	48	2	83
157	13	9	70	11	103
159	13	9	36	5	63
167	6	1	17	0	24
168	17	4	52	9	82
170	28	13	83	19	143
172	11	10	47	7	75
174	10	1	8	0	19
175	20	0	5	1	26
178	25	16	68	7	116
180	18	1	29	3	51
181	20	6	41	7	74
182	11	2	30	4	47
183	9	0	9	2	20
184	52	18	69	18	157
197	9	4	16	9	38
199	1	0	5	0	6
201	1	0	1	0	2
203	1	0	0	0	1
208	6	6	15	5	32
209	13	9	29	9	60
210	31	8	43	6	88
213	60	11	32	9	112
214	25	16	52	16	109
215	44	30	95	27	196
218	39	8	18	5	70
219	40	7	20	6	73
221	23	27	87	17	154
222	31	19	68	10	128
223	25	7	5	4	41
224	1	0	0	0	1
225	33	25	93	20	171
227	35	22	93	21	171
229	15	3	12	3	33
230	15	2	10	3	30
232	17	3	14	1	35
233	22	2	15	2	41
234	26	0	1	0	27
235	2	0	1	0	3
236	27	17	67	14	125
237	55	1	1	0	57
238	6	0	3	0	9
239	33	6	20	5	64
240	38	20	88	24	170
241	32	33	107	32	204
242	12	16	44	10	82
243	12	16	82	13	123
244	36	2	13	2	53
245	31	6	31	6	74
246	23	3	17	6	49
247	12	5	7	1	25
248	8	7	25	6	46
249	13	11	12	4	40
250	39	1	12	0	52
251	1	1	2	3	7
252	36	1	9	2	48
253	30	1	13	1	45
254	36	3	33	8	80
255	52	8	12	1	73
256	19	7	30	4	60
257	12	3	32	8	55
260	46	14	55	10	125
261	17	1	29	2	49
262	11	3	6	0	20
263	12	1	7	2	22
264	26	7	28	5	66
265	19	11	52	11	93
266	25	9	48	14	96
267	9	0	10	2	21
268	8	1	8	2	19
269	38	0	3	0	41
270	11	1	3	0	15
271	17	0	0	0	17
272	16	1	4	0	21
273	23	2	6	0	31
274	13	0	0	0	13
275	21	0	0	0	21

Table 12. (Continued).

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
276	25	1	6	1	33
277	70	6	29	5	110
278	49	3	11	2	65
279	20	3	6	0	29
280	20	1	4	0	25
281	31	0	18	3	52
282	15	0	0	0	15
283	23	0	0	0	23
284	28	0	1	0	29
285	21	2	10	0	33
286	35	0	0	0	35
288	63	0	1	0	64
289	21	0	0	1	22
290	24	1	10	0	35
291	47	3	23	3	76
292	24	14	63	11	112
293	38	22	72	14	146

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
294	55	1	1	1	58
295	67	2	5	0	74
296	27	3	4	0	34
297	4	1	2	0	7
298	12	5	30	12	59
299	18	5	9	1	33
338	11	5	32	5	53
339	19	3	19	4	45
341	37	26	81	8	152
342	21	17	62	20	120
343	56	33	159	40	288
344	17	3	17	5	42
345	30	9	36	8	83
346	37	22	95	22	176
347	20	11	49	5	85
348	33	27	118	21	199
349	51	29	165	19	264
601	15	17	47	8	87
Total	**2,844**	**828**	**3,554**	**703**	**7,929**

Table 13. Muzzleloader Harvest using Bonus Permits by Permit Area, 2009.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total	Permit Area	Fawn Male	Adult Female	Fawn Female	Total
101	0	1	2	3	240	8	54	16	78
105	5	16	4	25	241	22	83	21	126
110	1	6	1	8	242	12	19	5	36
111	4	8	1	13	243	13	55	10	78
126	2	11	0	13	248	2	15	3	20
152	0	3	1	4	251	1	1	1	3
156	8	19	2	29	256	6	21	3	30
157	3	33	5	41	257	2	25	5	32
159	6	14	3	23	260	9	43	8	60
167	1	8	0	9	261	0	22	2	24
168	2	19	3	24	263	0	3	2	5
170	4	38	9	51	264	4	12	1	17
172	5	26	4	35	265	9	37	8	54
178	7	27	3	37	266	5	32	10	47
180	0	15	1	16	267	0	5	1	6
181	3	20	4	27	268	0	3	1	4
182	1	18	2	21	292	13	31	5	49
184	9	44	8	61	293	13	45	7	65
197	2	5	3	10	298	3	13	7	23
199	0	3	0	3	338	4	21	0	25
208	4	14	4	22	339	2	9	2	13
209	5	16	6	27	341	12	46	2	60
210	6	31	5	42	342	12	32	11	55
214	10	26	9	45	343	23	113	33	169
215	19	49	18	86	345	4	24	3	31
221	15	55	12	82	346	14	79	16	109
222	5	38	6	49	347	7	34	4	45
225	16	57	10	83	348	23	97	16	136
227	12	54	13	79	349	22	123	16	161
236	6	38	10	54	601	14	27	6	47
					Total	**420**	**1,836**	**374**	**2,630**

Table 14. Summary of Muzzleloader Special Hunts, 2009.
Includes Regular, Youth, All-Season, and Bonus Permits.

Area	Dates	Permits Issued	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
935 - Jay Cooke SP[1]	12/5-12/9	120*	8	5	13	12	38
936 - Crow Wing SP[1]	12/4-12/6	45*	4	7	10	3	24
937 - Soudan SP[1]	11/28-12/13	20*	2	1	4	0	7
938 - City of Tower[1]	11/28-12/13	30*	3	1	8	0	12
939 - Lake Shetek SP[1]	12/5-12/6	15**	0	4	7	1	12
940 - Lake Maria SP[1]	12/5-12/7	25***	1	0	4	1	6
941 - Nerstrand Big Woods SP[1]	11/28-11/29	50*	9	4	8	4	25
942 - Myre-Big Island SP	11/28-11/30	40**	0	6	14	2	22
943 - Sibley SP	12/5-12/6	50**	1	4	8	4	17
944 - Vermilion Highlands WMA[1]	11/28-12/13	25*	1	1	2	0	4
TOTAL			29	33	78	27	167

[1] Bonus permits available *Either Sex **Antlerless Only ***Earn-A-Buck

Table 15. Free Landowner Muzzleloader Harvest by Permit Area, 2009.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
110	0	1	0	1
157	0	1	0	1
170	0	1	0	1
181	0	1	0	1
184	0	1	0	1
214	1	0	0	1
215	0	0	1	1
221	1	1	0	2
222	1	1	0	2
225	0	1	1	2
240	1	3	0	4
241	0	2	0	2
256	0	1	0	1
260	1	0	0	1
264	1	0	0	1
265	0	1	0	1
266	1	0	0	1
268	0	1	1	2
292	0	0	1	1
293	1	0	0	1
338	0	1	0	1
341	0	4	0	4
343	0	1	0	1
346	1	1	0	2
347	0	1	0	1
349	1	1	0	2
Total	**10**	**25**	**4**	**39**

Table 16. Summary of Youth Firearm Hunts and NW Youth Season, 2009.

Area	Dates	Permits Issued	Harvest Adult Male	Adult Female	Fawn Male	Fawn Female	Total
950 - Camp Ripley Archery	10/09-10/11	150	1	7	2	2	12
951 - Arden Hills A	10/09-10/11	30	Incomplete Data				2
952 - Arden Hills B	10/15-10/16	30	Incomplete Data				6
953 - Whiewater Game Refuge	10/15-10/18	75	Incomplete Data				3
954 - Lake Bemidji SP	10/17-10/18	25	Incomplete Data				3
955 - Lake Alexander SNA	10/9-10/11	20	0	1	0	0	1
956 - St. Croix SP	10/24-10/25	75	4	4	2	4	14
957 - Rydell NWR	10/17-10/18	20	Incomplete Data				6
958 - Savanna Portage SP	10/24-10/25	20	Incomplete Data				10
959 - Buffalo River SP	10/24-10/25	10	Incomplete Data				2
960 - Tettegouche SP	10/17-10/18	10	0	0	0	0	0
961 - Itasca SP	10/17-10/18	50	Incomplete Data				8
962 - Greenleaf State Rec. Area	10/15-10/18	3	0	0	0	0	0

Northwest Youth Season - October 17 - 18, unlimited permits

Permit Area	Adult Female	Fawn Male	Fawn Female	Total
101	11	1	1	13
105	8	3	2	13
168	0	0	1	1
201	2	0	0	2
203	1	0	0	1
208	6	2	5	13
209	1	1	0	2
244	0	0	0	0
257	4	1	1	6
260	6	2	3	11
263	4	1	0	5
264	5	2	1	8
267	5	0	1	6
268	4	1	0	5
Total	57	14	15	86

Table 17. Total Deer Harvest by Permit Area, 2009.
Includes all license types, permits, and special hunts.

Permit Area	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
101	356	309	90	84	839
104	944	275	69	29	1,317
105	808	804	216	179	2,007
107	1434	229	47	25	1,735
110	663	508	148	120	1,439
111	608	507	133	108	1,356
114	54	35	5	1	95
115	1635	447	87	47	2,216
116	132	36	2	0	170
122	553	146	29	26	754
126	495	283	47	36	861
127	106	23	0	2	131
152	160	142	40	33	375
154	1701	719	220	131	2,771
156	1938	1470	505	331	4,244
157	2466	1887	683	451	5,487
159	1366	1112	316	236	3,030
167	585	531	125	94	1,335
168	1142	1050	284	220	2,696
170	2416	2074	654	487	5,631
172	1203	1497	438	322	3,460
174	1245	500	149	72	1,966
175	1734	511	97	68	2,410
178	2575	1678	476	317	5,046
180	1539	760	171	130	2,600
181	1807	1156	335	227	3,525
182	788	1023	299	229	2,339
183	1409	529	154	102	2,194
184	2857	2430	772	602	6,661
197	882	656	179	141	1,858
199	145	70	15	9	239
201	91	51	18	22	182
203	99	56	16	14	185
208	242	224	61	59	586
209	609	635	174	174	1,592
210	1054	1048	319	288	2,709
213	1792	811	273	208	3,084
214	1427	1168	498	374	3,467
215	1131	954	430	316	2,831
218	957	492	173	127	1,749
219	656	319	116	81	1,172
221	1055	973	430	329	2,787
222	980	848	343	226	2,397
223	624	235	101	59	1,019
224	104	58	15	14	191
225	1483	1363	569	372	3,787
227	1063	994	366	256	2,679
229	309	119	53	24	505
230	265	118	32	29	444

Permit Area	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
232	271	111	23	10	415
233	243	103	21	16	383
234	196	6	2	0	204
235	53	19	6	6	84
236	939	871	260	163	2,233
237	243	14	4	3	264
238	76	18	3	1	98
239	1382	794	278	202	2,656
240	1888	1541	554	420	4,403
241	1466	1721	624	525	4,336
242	607	668	169	154	1,598
243	927	1145	389	336	2,797
244	1543	702	274	171	2,690
245	1517	837	264	168	2,786
246	1754	1052	303	215	3,324
247	689	395	116	73	1,273
248	406	320	97	94	917
249	1149	628	261	155	2,193
250	411	72	8	3	494
251	63	74	31	31	199
252	346	90	16	10	462
253	443	122	25	14	604
254	547	212	53	34	846
255	464	158	50	22	694
256	462	541	136	128	1,267
257	392	492	131	137	1,152
260	610	738	139	129	1,616
261	172	210	37	28	447
262	179	62	17	17	275
263	419	270	62	61	812
264	714	510	156	123	1,503
265	503	606	207	165	1,481
266	447	380	97	97	1,021
267	207	203	42	64	516
268	280	264	73	56	673
269	262	61	18	13	354
270	179	33	6	13	231
271	212	39	10	4	265
272	208	28	11	6	253
273	384	162	45	35	626
274	166	28	4	3	201
275	282	5	1	0	288
276	443	105	30	13	591
277	1347	461	117	75	2,000
278	512	124	38	28	702
279	222	70	15	5	312
280	219	60	11	13	303
281	501	144	22	20	687
282	122	5	2	0	129

Table 17. (Continued).

Permit Area	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
283	258	4	6	1	269
284	339	14	4	3	360
285	451	186	39	23	699
286	291	11	2	1	305
287	85	139	41	37	302
288	500	18	4	4	526
289	189	9	1	3	202
290	352	112	19	8	491
291	737	270	73	34	1,114
292	494	354	119	75	1,042
293	507	382	122	80	1,091
294	296	12	2	2	312
295	532	103	28	9	672
296	317	78	20	12	427
297	197	39	9	6	251
298	701	568	171	147	1,587
299	314	141	30	23	508
338	382	302	84	69	837
339	344	299	93	65	801
341	1122	946	321	243	2,632
342	880	778	225	191	2,074
343	1125	1417	360	274	3,176
344	616	266	93	60	1,035
345	628	546	181	115	1,470
346	1169	1308	381	304	3,162
347	653	504	145	96	1,398
348	822	938	226	213	2,199
349	1544	1901	404	410	4,259
601	1346	1553	419	292	3,610
901	3	3	1	0	7
902	50	95	35	35	215
903	1	7	0	1	9
904	7	2	1	0	10
905	3	3	1	1	8
906	8	9	2	4	23
907	0	4	0	1	5
908	2	2	0	0	4
909	0	0	3	1	4
910	0	6	6	1	13
912	25	41	25	23	114
913	1	6	2	1	10
914	13	3	5	2	23
915	3	8	2	6	19

Permit Area	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
916	31	32	26	15	104
918	2	6	2	1	11
920	0	8	3	0	11
921	3	5	5	6	19
922	4	9	1	4	18
923	0	3	3	1	7
925	9	20	8	4	41
926	2	4	1	2	9
927	7	27	6	12	52
928	0	1	1	0	2
929	1	15	4	5	25
928	0	6	1	1	8
930	8	4	1	0	13
931	13	21	9	6	49
932	5	5	2	3	15
935	8	13	5	12	38
936	4	10	7	3	24
937	2	4	1	0	7
938	3	8	1	0	12
939	0	7	4	1	12
940	1	4	0	1	6
941	9	8	4	4	25
942	0	14	6	2	22
943	1	8	4	4	17
944	1	2	1	0	4
950	2	7	2	1	12
953	1	4	2	0	7
954	1	1	1	0	3
955	0	1	0	0	1
956	5	4	1	3	13
958	3	2	3	2	10
959	0	2	1	2	5
961	0	3	1	1	5
970	45	89	25	11	170
971	131	116	27	32	306
975	1	0	0	0	1
976	0	1	0	0	1
977	0	2	0	1	3
984	0	2	1	0	3
985	3	6	0	0	9
TOTAL	**94,367**	**65,008**	**19,905**	**14,906**	**194,186**

Table 18. Estimated firearm hunter numbers, density, and harvest by Permit Area, 2009.

Permit Area	Firearm Hunters	Area Size (sq mi)	Hunters/ mile^2	Harvest/ mile^2
101	1,628	496	3.3	1.5
104	4,360	2,078	2.1	0.6
105	3,786	740	5.1	2.3
107	6,787	1,896	3.6	0.9
110	2,617	300	8.7	4.6
111	3,120	1,437	2.2	0.8
114	170	123	1.4	0.7
115	8,146	1,867	4.4	1.1
116	781	1,164	0.7	0.1
122	2,186	619	3.5	1.2
126	1,977	943	2.1	0.8
127	538	561	1.0	0.2
152	1,204	61	19.7	5.7
154	8,779	760	11.6	3.4
156	9,074	825	11.0	4.8
157	12,396	889	13.9	5.7
159	6,955	568	12.2	4.9
167	3,551	432	8.2	3.0
168	7,509	723	10.4	3.5
170	12,977	1,311	9.9	3.9
172	9,072	451	20.1	7.1
174	6,205	835	7.4	2.3
175	8,137	1,249	6.5	1.9
178	10,007	1,259	7.9	3.7
180	5,913	983	6.0	2.4
181	6,572	709	9.3	4.5
182	2,236	269	8.3	4.1
183	7,197	663	10.9	3.1
184	13,449	1,231	10.9	5.0
197	5,097	975	5.2	1.8
199	562	148	3.8	1.5
201	374	161	2.3	1.1
203	319	118	2.7	1.5
208	1,198	379	3.2	1.3
209	2,452	639	3.8	1.9
210	4,321	615	7.0	3.6
213	8,909	1,057	8.4	2.5
214	6,568	557	11.8	5.7
215	6,222	701	8.9	3.3
218	4,887	884	5.5	1.7
219	2,967	392	7.6	2.4
221	4,776	642	7.4	3.6
222	4,464	413	10.8	4.7

Permit Area	Firearm Hunters	Area Size (sq mi)	Hunters/ mile^2	Harvest/ mile^2
223	2,777	377	7.4	2.1
224	659	47	14.1	3.6
225	6,646	618	10.7	4.5
227	4,402	471	9.3	3.7
229	1,497	287	5.2	1.3
230	1,356	452	3.0	0.8
232	1,174	377	3.1	0.9
233	990	385	2.6	0.7
234	602	636	0.9	0.2
233	990	385	2.6	0.7
234	602	636	0.9	0.2
235	342	32	10.7	1.9
236	3,228	372	8.7	3.7
237	681	728	0.9	0.2
238	252	95	2.7	0.8
239	7,606	922	8.2	2.7
240	7,300	642	11.4	6.1
241	5,319	417	12.8	8.8
242	2,715	215	12.6	5.7
243	4,578	314	14.6	7.6
244	7,417	583	12.7	4.3
245	8,784	583	15.1	4.4
246	9,514	772	12.3	4.1
247	3,511	229	15.3	5.0
248	1,895	212	8.9	3.6
249	5,740	502	11.4	4.1
250	1,378	711	1.9	0.5
251	557	55	10.1	3.4
252	1,156	715	1.6	0.5
253	1,880	974	1.9	0.5
254	2,403	930	2.6	0.7
255	1,622	774	2.1	0.6
256	2,361	653	3.6	1.6
257	1,881	412	4.6	2.2
260	2,460	1,249	2.0	1.0
261	877	795	1.1	0.4
262	902	677	1.3	0.3
263	1,627	512	3.2	1.5
264	3,212	669	4.8	2.1
265	2,083	494	4.2	2.3
266	2,020	617	3.3	1.4
267	1,071	472	2.3	0.9
268	1,144	229	5.0	2.5

Table 18. (Continued).

Permit Area	Firearm Hunters	Area Size (sq mi)	Hunters/ mile^2	Harvest/ mile^2
269	1,230	650	1.9	0.4
270	869	748	1.2	0.2
271	847	632	1.3	0.3
272	882	531	1.7	0.4
273	2,489	572	4.4	0.9
274	678	355	1.9	0.4
275	1,365	764	1.8	0.3
276	2,761	543	5.1	1.0
277	5,643	813	6.9	2.0
278	2,032	401	5.1	1.3
279	1,091	344	3.2	0.7
280	1,266	675	1.9	0.3
281	2,246	575	3.9	1.0
282	618	779	0.8	0.1
283	974	614	1.6	0.3
284	1,166	838	1.4	0.3
285	2,222	550	4.0	0.9
286	942	446	2.1	0.5
287	660	46	14.4	6.5
288	1,538	625	2.5	0.6
289	657	816	0.8	0.2
290	2,240	662	3.4	0.6
291	3,536	802	4.4	1.0
292	2,682	480	5.6	1.5
293	2,420	511	4.7	1.5
294	778	686	1.1	0.3
295	2,042	840	2.4	0.6
296	1,493	666	2.2	0.5
297	975	438	2.2	0.5
298	3,794	618	6.1	2.4
299	1,376	386	3.6	1.0
338	1,914	454	4.2	1.4
339	1,787	394	4.5	1.6
341	4,959	611	8.1	3.4
342	3,707	350	10.6	4.8
343	4,456	662	6.7	2.8
344	2,833	189	15.0	4.7
345	2,829	326	8.7	3.7
346	4,248	319	13.3	7.1
347	3,047	434	7.0	2.5
348	3,986	332	12.0	5.0
349	6,512	492	13.2	6.4
601	2,633	1,633	1.6	0.8
Total	**434,487**	**78,929**	**5.5**	**2.0**

Table 19. Deer harvest per square mile by season, 2009.

Permit Area	Area Size (sq mi)	Archery Harvest/mi^2	Firearm Harvest/mi^2	Muzz. Harvest/mi^2	EA Harvest/mi^2	Total Harvest/mi^2
101	496	0.03	1.5	0.02	0.07	1.6
104	2,078	0.01	0.6	0.01		0.6
105	740	0.10	2.3	0.06	0.27	2.7
107	1,896	0.02	0.9	0.01		0.9
110	300	0.16	4.6	0.07		4.8
111	1,437	0.01	0.8	0.01	0.08	0.9
114	123	0.10	0.7	0.00		0.8
115	1,867	0.02	1.1	0.03		1.2
116	1,164	0.01	0.1	0.01		0.1
122	619	0.02	1.2	0.01		1.2
126	943	0.04	0.8	0.04		0.9
127	561	0.00	0.2	0.01		0.2
152	61	0.31	5.7	0.13		6.1
154	760	0.19	3.4	0.02		3.6
156	825	0.27	4.8	0.10		5.1
157	889	0.40	5.7	0.12		6.2
159	568	0.35	4.9	0.11		5.3
167	432	0.06	3.0	0.06		3.1
168	723	0.15	3.5	0.11		3.7
170	1,311	0.28	3.9	0.11		4.3
172	451	0.42	7.1	0.17		7.7
174	835	0.07	2.3	0.02		2.4
175	1,249	0.04	1.9	0.02		1.9
178	1,259	0.17	3.7	0.09		4.0
180	983	0.15	2.4	0.05		2.6
181	709	0.33	4.5	0.10		5.0
182	269	3.93	4.1	0.17	0.47	8.7
183	663	0.13	3.1	0.03		3.3
184	1,231	0.28	5.0	0.13		5.4
197	975	0.07	1.8	0.04		1.9
199	148	0.12	1.5	0.04		1.6
201	161	0.01	1.1	0.01		1.1
203	118	0.03	1.5	0.01		1.6
208	379	0.04	1.3	0.08	0.11	1.5
209	639	0.12	1.9	0.09	0.33	2.5
210	615	0.21	3.6	0.14	0.49	4.4
213	1,057	0.29	2.5	0.11		2.9
214	557	0.37	5.7	0.20		6.2
215	701	0.50	3.3	0.28		4.0
218	884	0.25	1.7	0.08		2.0
219	392	0.41	2.4	0.19		3.0
221	642	0.54	3.6	0.24		4.3
222	413	0.77	4.7	0.31		5.8
223	377	0.51	2.1	0.11		2.7
224	47	0.47	3.6	0.02		4.1

Table 19. (Continued).

Permit Area	Area Size (sq mi)	Archery Harvest/mi^2	Firearm Harvest/mi^2	Muzz. Harvest/mi^2	EA Harvest/mi^2	Total Harvest/mi^2
225	618	0.78	4.5	0.28	0.54	6.1
227	471	1.35	3.7	0.36	0.26	5.7
229	287	0.37	1.3	0.11		1.8
230	452	0.12	0.8	0.07		1.0
232	377	0.15	0.9	0.09		1.1
233	385	0.23	0.7	0.11		1.0
234	636	0.04	0.2	0.04		0.3
235	32	0.65	1.9	0.09		2.6
236	372	1.70	3.7	0.34	0.28	6.0
237	728	0.04	0.2	0.08		0.4
238	95	0.12	0.8	0.09		1.0
239	922	0.13	2.7	0.07		2.9
240	642	0.46	6.1	0.26		6.9
241	417	1.13	8.8	0.49		10.4
242	215	1.34	5.7	0.38		7.4
243	314	0.94	7.6	0.39		8.9
244	583	0.21	4.3	0.09		4.6
245	583	0.24	4.4	0.13		4.8
246	772	0.13	4.1	0.06		4.3
247	229	0.47	5.0	0.11		5.6
248	212	0.52	3.6	0.22		4.3
249	502	0.23	4.1	0.08		4.4
250	711	0.11	0.5	0.07		0.7
251	55	0.09	3.4	0.13		3.6
252	715	0.11	0.5	0.07		0.6
253	974	0.09	0.5	0.05		0.6
254	930	0.14	0.7	0.09		0.9
255	774	0.18	0.6	0.09		0.9
256	653	0.08	1.6	0.09	0.19	1.9
257	412	0.15	2.2	0.13	0.32	2.8
260	1,249	0.07	1.0	0.10	0.13	1.3
261	795	0.06	0.4	0.06	0.04	0.6
262	677	0.05	0.3	0.03		0.4
263	512	0.03	1.5	0.04		1.6
264	669	0.06	2.1	0.10		2.2
265	494	0.16	2.3	0.19	0.36	3.0
266	617	0.10	1.4	0.16		1.7
267	472	0.05	0.9	0.04	0.07	1.1
268	229	0.10	2.5	0.08	0.20	2.9
269	650	0.05	0.4	0.06		0.5
270	748	0.04	0.2	0.02		0.3
271	632	0.05	0.3	0.03		0.4
272	531	0.04	0.4	0.04		0.5
273	572	0.10	0.9	0.05		1.1
274	355	0.13	0.4	0.04		0.6

Table 19. (Continued).

Permit Area	Area Size (sq mi)	Archery Harvest/mi^2	Firearm Harvest/mi^2	Muzz. Harvest/mi^2	EA Harvest/mi^2	Total Harvest/mi^2
275	764	0.03	0.3	0.03		0.4
276	543	0.07	1.0	0.06		1.1
277	813	0.36	2.0	0.14		2.5
278	401	0.23	1.3	0.16		1.7
279	344	0.08	0.7	0.08		0.9
280	675	0.06	0.3	0.04		0.4
281	575	0.14	1.0	0.09		1.2
282	779	0.02	0.1	0.02		0.2
283	614	0.06	0.3	0.04		0.4
284	838	0.06	0.3	0.03		0.4
285	550	0.27	0.9	0.06		1.3
286	446	0.06	0.5	0.08		0.7
287	46	0.09	6.5	0.00		6.6
288	625	0.10	0.6	0.10		0.8
289	816	0.02	0.2	0.03		0.2
290	662	0.08	0.6	0.05		0.7
291	802	0.29	1.0	0.09		1.4
292	480	0.39	1.5	0.23		2.2
293	511	0.32	1.5	0.29		2.1
294	686	0.05	0.3	0.08		0.5
295	840	0.14	0.6	0.09		0.8
296	666	0.09	0.5	0.05		0.6
297	438	0.01	0.5	0.02		0.6
298	618	0.06	2.4	0.10		2.6
299	386	0.26	1.0	0.09		1.3
338	454	0.35	1.4	0.12		1.8
339	394	0.36	1.6	0.11		2.0
341	611	0.70	3.4	0.25		4.3
342	350	0.75	4.8	0.34		5.9
343	662	1.51	2.8	0.43		4.8
344	189	0.57	4.7	0.22		5.5
345	326	0.56	3.7	0.25		4.5
346	319	1.46	7.1	0.55	0.82	9.9
347	434	0.49	2.5	0.20		3.2
348	332	1.03	5.0	0.60		6.6
349	492	1.11	6.4	0.54	0.57	8.7
601	1,633	1.35	0.8	0.05	0.03	2.2
Total	**78,929**	**0.26**	**2.0**	**0.10**	**0.04**	**2.4**

Table 20. 2009 Antlerless Lottery Distribution Report.

Permit Area Number	Preference Level	Applications Total	Applications Rejected	Unsuccessful	Winners	Permits Available	% Under-Subscribed
104	1	2,052	118	692	1,360	1,500	0.0%
	2	121	0	0	121		
	3	17	0	0	17		
	4	2	0	0	2		
		2,192	**118**	**692**	**1,500**		
107	1	3,079	197	2,717	362	500	0.0%
	2	106	1	0	106		
	3	29	0	0	29		
	4	3	0	0	3		
		3,217	**198**	**2,717**	**500**		
115	1	3,707	245	1,886	1,821	2,000	0.0%
	2	166	5	0	166		
	3	9	0	0	9		
	4	4	0	0	4		
		3,886	**250**	**1,886**	**2,000**		
116	1	268	9	192	76	100	0.0%
	2	23	0	0	23		
	3	0	0	0	0		
	4	1	0	0	1		
		292	**9**	**192**	**100**		
122	1	620	53	0	620	1,000	10.0%
	2	264	1	0	264		
	3	13	0	0	13		
	4	3	0	0	3		
	9	1	0	0	1		
		901	**54**	**0**	**900**		
127	1	139	9	6	133	150	0.0%
	2	15	0	0	15		
	3	2	0	0	2		
		156	**9**	**6**	**150**		
154	1	4,211	211	2,652	1,559	2,250	0.0%
	2	670	70	0	670		
	3	20	0	0	20		
	5	1	0	0	1		
		4,902	**281**	**2,652**	**2,250**		
174	1	2,781	227	1,019	1,762	2,000	0.0%
	2	211	3	0	211		
	3	21	1	0	21		
	4	6	0	0	6		
		3,019	**231**	**1,019**	**2,000**		
175	1	3,753	240	1,969	1,784	2,000	0.0%
	2	175	5	0	175		
	3	5	0	0	5		
	4	36	1	0	36		
		3,969	**246**	**1,969**	**2,000**		
183	1	3,082	237	783	2,299	2,500	0.0%
	2	173	0	0	173		
	3	26	0	0	26		
	4	2	1	0	2		
		3,283	**238**	**783**	**2,500**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications		Unsuccessful	Winners	Permits Available	% Under-Subscribed
		Total	Rejected				
213	1	4,977	419	662	4,315	4,500	0.0%
	2	159	7	0	159		
	3	26	0	0	26		
	4	1	0	0	1		
		5,163	**426**	**662**	**4,500**		
218	1	2,590	142	428	2,162	2,500	0.0%
	2	308	51	0	308		
	3	27	25	0	27		
	4	3	1	0	3		
		2,928	**219**	**428**	**2,500**		
219	1	1350	63	0	1,350	1,500	4.3%
	2	86	26	0	86		
	3	13	11	0	13		
		1,449	**100**	**0**	**1,436**		
223	1	1,176	97	0	1,176	1,500	17.6%
	2	50	1	0	50		
	3	8	0	0	8		
	4	2	0	0	2		
		1,234	**98**	**0**	**1,236**		
224	1	269	22	0	269	350	20.3%
	2	8	1	0	8		
	3	2	0	0	2		
		277	**23**	**0**	**279**		
229	1	546	71	0	546	1,200	50.8%
	2	38	2	0	38		
	3	6	1	0	6		
		584	**74**	**0**	**590**		
230	1	694	34	288	406	500	0.0%
	2	87	14	0	87		
	3	5	5	0	5		
	4	2	1	0	2		
	5	1	2	0	0		
		789	**56**	**288**	**500**		
232	1	565	26	0	565	700	15.9%
	2	23	10	0	23		
	3	1	0	0	1		
		589	**36**	**0**	**589**		
233	1	383	18	0	383	750	46.1%
	2	19	3	0	19		
	3	2	0	0	2		
		404	**21**	**0**	**404**		
234	1	59	60	21	38	50	0.0%
	2	8	4	0	8		
	3	4	1	0	4		
		71	**65**	**21**	**50**		
235	1	89	6	74	15	25	0.0%
	2	10	0	0	10		
		99	**6**	**74**	**25**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications Total	Applications Rejected	Unsuccessful	Winners	Permits Available	% Under-Subscribed
237	1	52	48	13	39	50	0.0%
	2	6	28	0	6		
	3	1	5	0	1		
	4	1	0	0	1		
	5	2	0	0	2		
	6	1	1	0	1		
		63	**82**	**13**	**50**		
238	1	71	9	71	0	25	0.0%
	2	45	2	22	23		
	3	2	0	0	2		
		118	**11**	**93**	**25**		
239	1	3,802	314	0	3,802	7,000	42.8%
	2	176	6	0	176		
	3	24	1	0	24		
	4	1	0	0	1		
		4,003	**321**	**0**	**4,003**		
244	1	3,942	322	1,088	2,854	3,000	0.0%
	2	128	1	0	128		
	3	14	0	0	14		
	4	4	0	0	4		
		4,088	**323**	**1,088**	**3,000**		
245	1	4,765	338	949	3,816	4,000	0.0%
	2	156	4	0	156		
	3	24	1	0	24		
	4	4	0	0	4		
		4,949	**343**	**949**	**4,000**		
246	1	4,437	322	1,629	2,808	4,000	0.0%
	2	1,179	1	0	1,179		
	3	10	0	0	10		
	4	3	0	0	3		
		5,629	**323**	**1,629**	**4,000**		
247	1	1,807	79	76	1,731	1,800	0.0%
	2	65	0	0	65		
	3	3	0	0	3		
	4	1	0	0	1		
		1,876	**79**	**76**	**1,800**		
249	1	2,996	142	0	2,996	3,500	9.0%
	2	181	55	0	181		
	3	5	0	0	5		
	4	4	0	0	4		
		3,186	**197**	**0**	**3,186**		
250	1	579	43	579	0	100	0.0%
	2	119	11	30	89		
	3	11	6	0	11		
		709	**60**	**609**	**100**		
252	1	289	36	289	0	100	0.0%
	2	234	7	197	37		
	3	62	5	0	62		
	4	1	4	0	1		
	5	0	1	0	0		
		586	**53**	**486**	**100**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications Total	Applications Rejected	Unsuccessful	Winners	Permits Available	% Under-Subscribed
253	1	520	59	511	9	300	-0.7%
	2	376	14	132	244		
	3	42	6	0	42		
	4	5	1	0	5		
	5	2	2	0	2		
		945	**82**	**643**	**302**		
254	1	1,016	49	0	1,016	1,200	11.5%
	2	44	18	0	44		
	3	2	0	0	2		
		1,062	**67**	**0**	**1,062**		
255	1	674	142	0	674	700	0.6%
	2	16	55	0	16		
	3	5	0	0	5		
	5	1	0	0	1		
		696	**197**	**0**	**696**		
262	1	251	16	219	32	150	0.0%
	2	115	6	0	115		
	3	3	2	0	3		
		369	**24**	**219**	**150**		
269	1	407	33	367	40	250	0.0%
	2	204	12	0	204		
	3	6	3	0	6		
		617	**48**	**367**	**250**		
270	1	133	49	133	0	25	0.0%
	2	116	18	112	4		
	3	22	0	1	21		
	4	0	1	0	0		
		271	**68**	**246**	**25**		
271	1	118	16	118	0	50	0.0%
	2	97	3	97	0		
	3	96	4	49	47		
	4	3	0	0	3		
		314	**23**	**264**	**50**		
272	1	161	20	161	0	50	0.0%
	2	125	4	125	0		
	3	95	2	48	47		
	4	3	0	0	3		
		384	**26**	**334**	**50**		
273	1	1,265	50	45	1,220	1,300	0.0%
	2	57	13	0	57		
	3	23	11	0	23		
		1,345	**74**	**45**	**1,300**		
274	1	52	23	43	9	25	0.0%
	2	12	19	0	12		
	3	3	16	0	3		
	4	1	6	0	1		
		68	**64**	**43**	**25**		
275	1	110	22	110	0	25	0.0%
	2	22	4	7	15		
	3	6	5	1	5		
	4	5	1	0	5		
	5	0	0	0	0		
		143	**32**	**118**	**25**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications Total	Applications Rejected	Unsuccessful	Winners	Permits Available	% Under-Subscribed
276	1	639	67	639	0	300	0.0%
	2	630	17	570	60		
	3	236	5	0	236		
	4	4	1	0	4		
		1,509	**90**	**1,209**	**300**		
277	1	1,425	144	1,425	0	950	0.0%
	2	1,272	33	774	498		
	3	440	23	0	440		
	4	11	8	0	11		
	5	1	1	0	1		
	6	0	1	0	0		
		3,149	**210**	**2,199**	**950**		
278	1	514	71	514	0	250	0.0%
	2	499	16	476	23		
	3	267	8	48	219		
	4	5	3	0	5		
	5	1	1	0	1		
	6	1	0	0	1		
	7	1	0	0	1		
		1,288	**99**	**1,038**	**250**		
279	1	251	42	251	0	150	0.0%
	2	267	40	227	40		
	3	108	6	0	108		
	4	2	4	0	2		
	5	0	1	0	0		
		628	**93**	**478**	**150**		
280	1	228	43	228	0	75	0.0%
	2	199	11	197	2		
	3	181	3	112	69		
	4	4	3	0	4		
	5	0	1	0	0		
		612	**61**	**537**	**75**		
281	1	359	79	359	0	300	0.0%
	2	305	18	279	26		
	3	370	13	118	252		
	4	16	2	0	16		
	5	4	1	0	4		
	6	2	0	0	2		
		1,056	**113**	**756**	**300**		
282	1	30	22	21	9	25	0.0%
	2	11	26	0	11		
	3	5	15	0	5		
		46	**63**	**21**	**25**		
283	1	87	35	75	12	25	0.0%
	2	7	24	0	7		
	3	3	41	0	3		
	4	1	2	0	1		
	5	2	0	0	2		
		100	**102**	**75**	**25**		
284	1	91	37	80	11	25	0.0%
	2	10	38	0	10		
	3	4	29	0	4		
	4	0	25	0	0		
	5	0	10	0	0		
	6	0	1	0	0		
		105	**140**	**80**	**25**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications		Unsuccessful	Winners	Permits Available	% Under-Subscribed
		Total	Rejected				
285	1	687	56	673	14	500	0.0%
	2	480	15	24	456		
	3	15	6	0	15		
	4	10	4	0	10		
	5	5	1	0	5		
		1,197	**82**	**697**	**500**		
286	1	80	44	45	35	50	0.0%
	2	9	27	0	9		
	3	5	1	0	5		
	4	0	0	0	0		
	5	1	0	0	1		
		95	**72**	**45**	**50**		
288	1	94	43	82	12	50	0.0%
	2	26	49	0	26		
	3	5	48	0	5		
	4	2	2	0	2		
	5	4	0	0	4		
	6	1	0	0	1		
		132	**142**	**82**	**50**		
289	1	61	31	46	15	25	0.0%
	2	7	31	0	7		
	3	2	15	0	2		
	4	0	8	0	0		
	5	1	1	0	1		
		71	**86**	**46**	**25**		
290	1	490	5	490	0	300	0.0%
	2	482	2	472	10		
	3	359	0	84	275		
	4	8	0	0	8		
	5	3	0	0	3		
	6	4	0	0	4		
		1,346	**7**	**1,046**	**300**		
291	1	1,012	89	1,012	0	650	0.0%
	2	832	25	428	404		
	3	224	11	0	224		
	4	16	6	0	16		
	5	4	0	0	4		
	6	2	2	0	2		
		2,090	**133**	**1,440**	**650**		
294	1	59	52	22	37	50	0.0%
	2	10	30	0	10		
	3	3	12	0	3		
		72	**94**	**22**	**50**		
295	1	476	66	476	0	100	0.0%
	2	468	14	466	2		
	3	107	10	13	94		
	4	3	3	0	3		
	5	2	3	0			
	6	1	0	0	1		
		1,057	**96**	**955**	**100**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications		Unsuccessful	Winners	Permits Available	% Under-Subscribed
		Total	Rejected				
296	1	301	55	301	0	100	0.0%
	2	308	18	308	0		
	3	171	2	84	87		
	4	7	2	0	7		
	5	3	0	0	3		
	6	2	2	0	2		
	7	1	0	0	1		
		793	**79**	**693**	**100**		
297	1	283	23	153	130	150	0.0%
	2	18	0	0	18		
	3	2	0	0	2		
		303	**23**	**153**	**150**		
299	1	360	32	359	1	250	0.0%
	2	345	6	148	197		
	3	48	0	0	48		
	4	3	1	0	3		
	5	0	1	0	0		
	6	1	0	0	1		
		757	**40**	**507**	**250**		
344A	1	278	15	77	201	300	0.0%
	2	94	4	0	94		
	3	3	1	0	3		
	4	1	1	0	1		
	5	1	1	0	1		
		377	**22**	**77**	**300**		
344A	1	289	23	289	0	200	0.0%
	2	191	9	60	131		
	3	68	0	0	68		
	4	0	1	0	0		
	5	1	1	0	1		
		549	**34**	**349**	**200**		
344B	1	375	27	0	375	750	8.9%
	2	292	7	0	292		
	3	14	9	0	14		
	4	1	1	0	1		
	5	1	0	0	1		
		683	**44**	**0**	**683**		
TOTAL		**90,882**	**7,377**	**33,230**	**57,631**	**60,800**	

Table 21. 2009 Special Permit Areas for Firearms Hunters.

Special Hunt	Preference Level	Applications Total	Applications Rejected	Unsuccessful	Winners	Permits Available	Bonus Permits
901 - Rice Lake Nat. Wildlife Refuge	1	79	0	55	24	40	No
	2	16	0	0	16		
		79	**0**	**55**	**24**		
902 - St. Croix State Park	1	669	1	277	392	550	Yes
	2	153	0	0	153		
	3	5	0	0	5		
		827	**1**	**277**	**550**		
903 - Savanna Portage State Park	1	53	0	33	20	40	Yes
	2	21	0	0	21		
	3	1	0	0	1		
		75	**0**	**33**	**42**		
904 - Gooseberry Falls State Park	1	39	0	0	39	40	Yes
		39	**0**	**0**	**39**		
905 - Split Rock Lighthouse State Park	1	21	0	0	21	30	Yes
		21	**0**	**0**	**21**		
906 - Tettegouche State Park	1	76	0	0	76	125	Yes
	2	3	0	0	3		
		79	**0**	**0**	**79**		
907 - Scenic State Park	1	27	0	0	27	30	Yes
	2	2	0	0	2		
		29	**0**	**0**	**29**		
908 - Hayes Lake State Park	1	9	0	0	9	30	Yes
		9	**0**	**0**	**9**		
909 - Lake Bemidji State Park	1	33	0	0	33	35	Yes
	2	2	0	0	2		
		35	**0**	**0**	**35**		
910 - Zippel Bay State Park	1	52	0	2	50	55	Yes
	2	5	0	0	5		
		57	**0**	**2**	**55**		
911 - Judge CR Magney SP						N/A	Yes
912 - Wild River State Park	1	259	0	208	51	150	Yes
	2	95	0	0	95		
	3	5	0	0	5		
		359	**0**	**208**	**151**		
913 - Lake Carlos State Park	1	24	0	9	15	20	Yes
	2	5	0	0	5		
		29	**0**	**9**	**20**		
914 - William O'Brien State Park	1	120	0	69	51	70	Yes
	2	19	0	0	19		
		139	**0**	**69**	**70**		
915 - Lake Bronson State Park	1	49	0	20	29	30	Yes
	2	2	0	0	2		
		51	**0**	**20**	**31**		
916 - Maplewood State Park	1	219	0	219	0	100	Yes
	2	150	0	150	0		
	3	113	0	22	91		
	4	9	0	0	9		
		491	**0**	**391**	**100**		
917 - Rydell NWR	1	5	0	0	5	10	Yes
		5	**0**	**0**	**5**		
918 - Lake Alexander SNA	1	56	0	20	36	40	Yes
	2	4	0	0	4		
		60	**0**	**20**	**40**		

Table 21. Continued.

Special Hunt	Preference Level	Applications Total	Applications Rejected	Unsuccessful	Winners	Permits Available	Bonus Permits
919 - Buffalo River State Park	1	14	0	1	13	16	Yes
	2	3	0	0	3		
		17	**0**	**1**	**16**		
920 - Glacial Lakes State Park	1	21	0	0	21	30	Yes
	2	5	0	0	5		
		26	**0**	**0**	**26**		
921 - Lake Louise State Park	1	35	0	35	0	25	Yes
	2	25	0	0	25		
		60	**0**	**35**	**25**		
922 - Beaver Creek Valley State Park	1	35	0	32	3	20	Yes
	2	18	0	0	18		
		53	**0**	**32**	**21**		
923 - Zumbro Falls SNA	1	10	0	0	10	12	Yes
		10	**0**	**0**	**10**		
924 - Forestville/Mystery Cave SP	1	134	0	55	79	110	Yes
	2	31	0	0	31		
		165	**0**	**55**	**110**		
925 - Frontenac State Park	1	55	0	41	14	50	Yes
	2	34	0	0	34		
	3	3	0	0	3		
		92	**0**	**41**	**51**		
926 - Great River Bluffs SP	1	18	0	0	18	100	Yes
	2	4	0	0	4		
		22	**0**	**0**	**22**		
927 - Whitewater State Park	1	84	0	84	0	50	Yes
	2	53	0	5	48		
	3	2	0	0	2		
		139	**0**	**89**	**50**		
928 - Zumbro Falls SNA	1	9	0	0	9	12	Yes
	2	2	0	0	2		
		11	**0**	**0**	**11**		
929 - Whitewater Refuge	1	40	0	0	40	60	No
	2	6	0	0	6		
		46	**0**	**0**	**46**		
930 - Vermillion Highlands WMA	1	60	0	44	16	25	Yes
	2	7	0	0	7		
	3	1	0	0	1		
	9	1	0	0	1		
		69	**0**	**44**	**25**		
931 - Carver Park Reserve	1	171	0	149	22	105	Yes
	2	70	0	0	70		
	3	2	0	0	2		
		243	**0**	**149**	**94**		
932 - Lake Rebecca Park Reserve	1	131	0	75	56	80	Yes
	2	21	0	0	21		
	3	2	0	0	2		
		154	**0**	**75**	**79**		
		3,491	**1**	**1,605**	**1,886**	**2,090**	

Table 22. 2009 Special Permit Areas for Muzzleloader Hunters.

Permit Area Number	Preference Level	Applications Total	Applications Rejected	Unsuccessful	Winners	Permits Available	Bonus Permits
935 - Jay Cooke SP	1	160	0	160	0	120	Yes (4)
	2	129	0	20	109		
	3	9	0	0	9		
	4	2	0	0	2		
		300	**0**	**180**	**120**		
936 - Crow Wing SP	1	83	0	83	0	45	Yes (4)
	2	55	0	49	6		
	3	39	0	0	39		
		177	**0**	**132**	**45**		
937 - Soudan Mine SP	1	9	0	0	9	20	Yes (1)
	2	2	0	0	2		
		11	**0**	**0**	**11**		
938 - City of Tower	1	9	0	0	9	40	No
	2	2	0	0	2		
		11	**0**	**0**	**11**		
939 - Lake Shetek SP	1	27	0	27	0	15	Yes (4)
	2	24	0	22	2		
	3	13	0	0	13		
		64	**0**	**49**	**15**		
940 - Lake Maria SP	1	86	0	86	0	25	Yes (4)
	2	24	0	2	22		
	3	4	0	0	4		
	4	1	0	0	1		
		115	**0**	**88**	**27**		
941 - Nerstrand Woods SP	1	102	0	102	0	50	Yes (1)
	2	72	0	50	22		
	3	28	0	0	28		
	4	1	0	0	1		
		203	**0**	**152**	**51**		
942 - Myre-Big Island SP	1	54	0	30	24	40	Yes (1)
	2	16	0	0	16		
	3	1	0	0	1		
		71	**0**	**30**	**41**		
943 - Sibley SP	1	53	0	53	0	50	Yes (1)
	2	47	0	0	47		
	3	2	0	0	2		
	4	1	0	0	1		
		103	**0**	**53**	**50**		
944 - Vermillian Highlands WMA	1	29	0	13	16	25	Yes (1)
	2	9	0	0	9		
	3	1	0	0	1		
		39	**0**	**13**	**26**		
TOTAL		**1,094**	**0**	**697**	**397**	**430**	
GRAND TOTAL		**95,467**	**7,378**	**35,532**	**59,914**	**63,320**	

2010 WINTER ELK SURVEY REPORT

Joel Huener, Thief Lake WMA

INTRODUCTION

Minnesota has two populations of elk. The first herd lives in the area north of Grygla on a combination of public and private lands, and can trace its origins back to re-introduction efforts in the area in 1935 (Figure 1). The second herd lives along the Manitoba/Kittson County border, and is comprised primarily of animals that have moved in from Canada.

The Minnesota Legislature provided for the opportunity for sport hunting of elk in 1987 to help alleviate depredation concerns in the Grygla herd range, and to provide for the unique recreational opportunity this affords. Hunting this population is permitted whenever the pre-calving population exceeds 20 animals. The winter aerial survey is the basis for population estimates used to set hunting permit quotas.

The Kittson County herd is comprised of three sub-populations – the Caribou-Vita herd which moves back and forth between Caribou WMA in Minnesota, and Vita, Manitoba; the Water Tower herd, which lives largely within Minnesota along the Manitoba border, and the Lancaster herd, which lives east of Lancaster, Minnesota. Elk of the Lancaster herd are year-round residents of Minnesota in an area comprised almost entirely of private land, and have been responsible for most of the depredation claims in that area. There is evidence that escaped captive elk may have been the nucleus for this herd. The recently revised elk plan calls for the elimination of this particular sub-herd of elk to eliminate captive genetics from Minnesota's elk herd.

METHODS

Population estimates for these two herds are based on helicopter surveys done between December and March, when snow conditions and the lack of leaf cover permits good visibility of elk. Surveys are undertaken with DNR – Wildlife personnel from the Thief River Falls office with DNR aircraft and pilots. Areas are covered using transects at 1/5 mile intervals in the Grygla herd range, and 1/3 mile intervals in the Kittson County herd range. Transects are programmed into GPS based systems on the aircraft.

Further information on herd composition is derived from ground surveys driven during early morning hours in the respective elk ranges. Because the Caribou-Vita herd winters on both sides of the border, coordination between the Province of Manitoba and Minnesota DNR is necessary, and has not been possible in all years.

When the pre-calving population in the Grygla herd is above 30, a recommendation for hunting seasons and permit numbers is forwarded to the Region and St. Paul based on herd composition. Elk hunting in Minnesota is a once-in-a-lifetime opportunity, and hunters may apply for permits singly or in parties of two (receiving one permit between them). Successful applicants must attend a mandatory orientation at Thief Lake WMA, and animals taken must be registered either at Thief Lake headquarters or at the Karlstad Wildlife office, where biological samples are taken.

RESULTS

The pre-calving population for the Grygla elk herd in 2010 was 40 animals (see Figure 2). A breakdown of the sightings in the elk survey in the Grygla range showed 11 bulls, 24 cows, and 5 calves. Survey conditions were optimal during the survey, with 16" of snow, partly cloudy skies, and cold temperatures from +5 to-10 F. One group of 5 bull elk was sighted during the aerial bovine Tuberculosis deer survey in the area north of the survey area. Some additional areas may need to be added to the survey area to cover all the areas used by the elk. Additional contact with landowners/observers is intended for next year's survey to ensure that all the elk are sighted.

The notable reduction in total herd numbers was intended to move the population toward the goal stated in the elk plan. A total of 14 elk tags were available in the Grygla zone during the 2009 hunting seasons, and 14 elk were taken by the end of the alternate season in January.

An effort was made this year to coordinate the aerial survey in Kittson County with a concurrent survey in the neighboring portions of the Province of Manitoba. By the time that arrangements were made, an early thaw resulted in rapidly deteriorating snow conditions, with the result that the aerial survey was not done in the Kittson County elk range this winter.

Concurrent seasons were held in the range of the Water Tower herd and Lancaster herd in Kittson County this year, again in an effort to move populations toward goal levels. During those hunts, a total of 9 animals were removed from the Lancaster herd, and 5 were removed from the Water Tower herd.

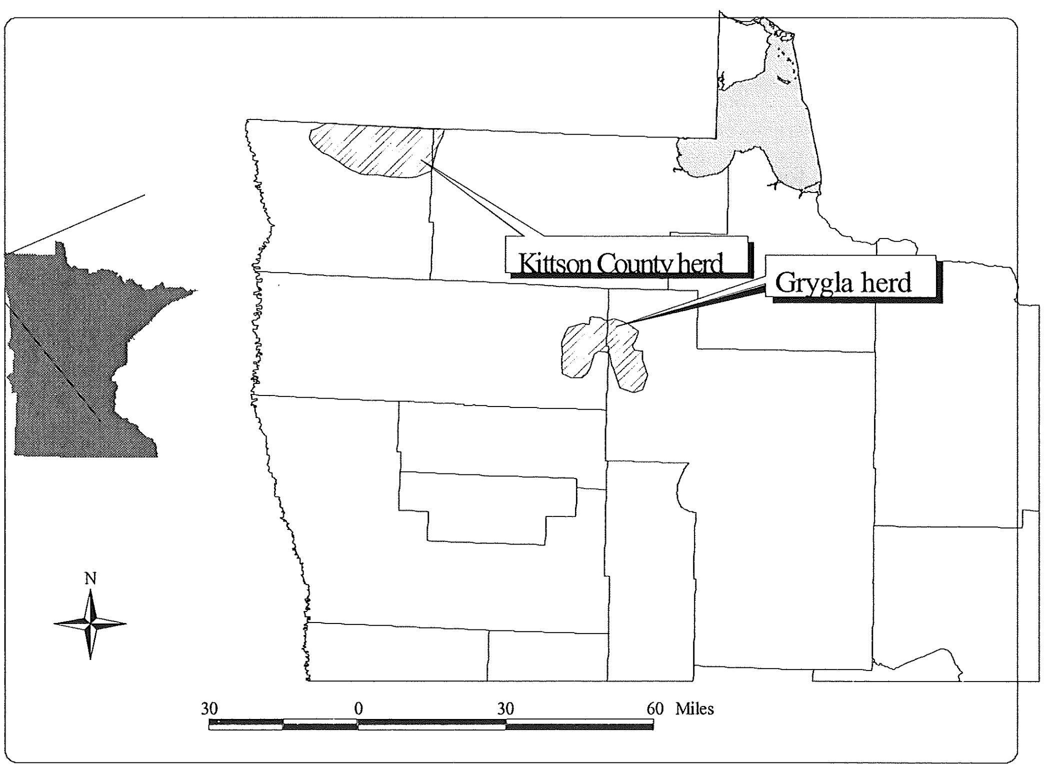


Figure 1. Current elk range in Minnesota, 2010.

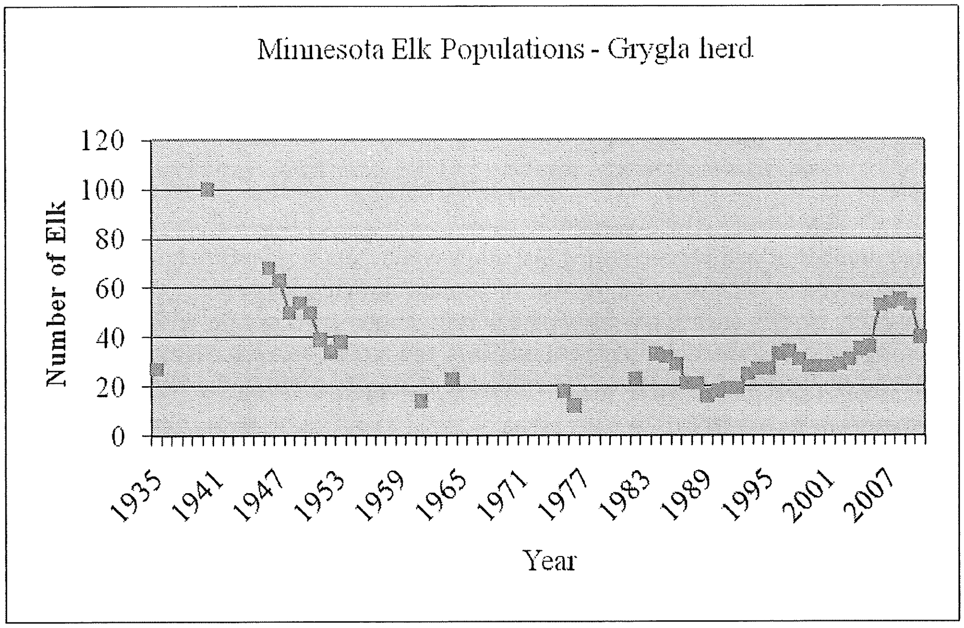


Figure 2. Pre-calving elk numbers in the Grygla herd, 2010.

2009 MINNESOTA MOOSE HARVEST

Mark S. Lenarz, Forest Wildlife Populations and Research Group

INTRODUCTION

Each year, a limited number of permits are issued that allow Minnesota residents to hunt moose. The following report is intended to document the number of hunters applying for permits, the number of permits issued, a hunting party's chance of receiving a permit, hunter success rate, and a breakdown of the harvest by hunting zone. Information on permit numbers and moose harvested by members of the 1854 Treaty Authority or Fond du Lac band of Lake Superior Chippewa within the 1854 Ceded Territory is also provided.

METHODS

All successful State hunters are required to register their moose at one of 9 registration stations and provide information on the location where they killed their moose, date of kill, and sex of moose harvested.

RESULTS

In 2009, State hunters harvested 103 moose in northeastern Minnesota. No season was held in northwestern Minnesota. Of the 2,746 parties that applied for this year's moose hunt, 225 (8%) were drawn, and 223 purchased licenses (Table 1). Hunters were restricted to harvesting bulls in this year's hunt. Table 1 also lists the number of permits offered by hunting zone, chance of being selected for a permit, and hunter success. The 1854 Treaty Authority issued 55 permits and band members killed 16 moose (14 bulls and 2 cows). The Fond du Lac band issued 68 permits and the preliminary harvest (as of 11/6/2009) was 26 moose (20 bulls and 6 cows). The Fond du Lac season closes 12/31/2009.

DISCUSSION

The success rate of State hunters in 2009 was 46%, an increase of 1% over 2008 (Tables 1 and 2). This was the third year of hunting was for bulls only. The success rate for members of the 1854 Treaty Authority was 29%. The preliminary success rate for the Fond du Lac band was 38%, as of 11/6/2009.

Table 1. Moose harvested, licenses offered and sold, application rate, and party success, in 2009 moose hunt in northeastern Minnesota.

Zone	Bulls	Cows	Total	Licenses Offered	Licenses Sold*	Party Applications*	Chances for Permit	% Success
20	3	0	3	12	12	92	13%	25%
21	5	0	5	6	6	111	5%	83%
22	2	0	2	5	5	37	14%	40%
23	1	0	1	2	2	22	9%	50%
24	5	0	5	9	9	169	5%	56%
25	4	0	4	14	14	309	5%	29%
26	3	0	3	4	4	25	16%	75%
27	3	0	3	5	4	34	15%	75%
28	4	0	4	9	9	51	18%	44%
29	3	0	3	8	8	120	7%	38%
30	3	0	3	7	7	133	5%	43%
31	9	0	9	18	18	354	5%	50%
32	1	0	1	4	4	20	20%	25%
33	2	0	2	7	7	109	6%	29%
34	1	0	1	2	2	33	6%	50%
36	2	0	2	10	10	36	28%	20%
37	1	0	1	3	3	22	14%	33%
60	2	0	2	4	4	28	14%	50%
61	4	0	4	10	10	79	13%	40%
62	10	0	10	19	19	177	11%	53%
63	2	0	2	4	4	25	16%	50%
64	3	0	3	8	7	39	21%	43%
70	4	0	4	7	7	119	6%	57%
72	6	0	6	12	12	176	7%	50%
73	1	0	1	6	6	85	7%	17%
74	4	0	4	4	4	34	12%	100%
76	5	0	5	6	6	65	9%	83%
77	5	0	5	10	10	107	9%	50%
79	2	0	2	5	5	45	11%	40%
80	3	0	3	5	5	90	6%	60%
Total	103	0	103	225	223	2746	8%	46%

*Number of 2, 3, or 4 person parties - rejected applications

Table 2. Applicants, permit numbers, moose harvested, and success rates of state moose hunters since 1993.

	Northwest				Northeast				
Year	Party Applicants	Permits	Moose Harvested	Party Success	Party Applicants	Permits	Licenses Purchased	Moose Harvested	Party Success
1993	6,558	446	422	95%	2,934	315	315	264	84%
1994	8,208	262	244	93%	3,022	189	189	155	82%
1995	7,622	191	171	90%	3,181	188	188	156	83%
1996	2,476	39	38	97%	3,830	207	207	156	75%
1997		No Season			3,958	198	198	152	77%
1998		No Season			4,157	182	182	125	69%
1999		No Season			3,919	189	189	136	72%
2000		No Season					No Season		
2001		No Season			3,164	182	176	125	71%
2002		No Season			2,580	208	202	141	70%
2003		No Season			2,328	224	217	144	66%
2004		No Season			3,062	246	240	151	63%
2005		No Season			3,060	284	276	164	59%
2006		No Season			2,952	279	269	161	60%
2007		No Season			2,566	233	229	115	50%
2008		No Season			2,706	247	245	110	45%
2009		No Season			2,746	225	223	103	46%

Note: Harvest was restricted to antlered bulls beginning in 2007.

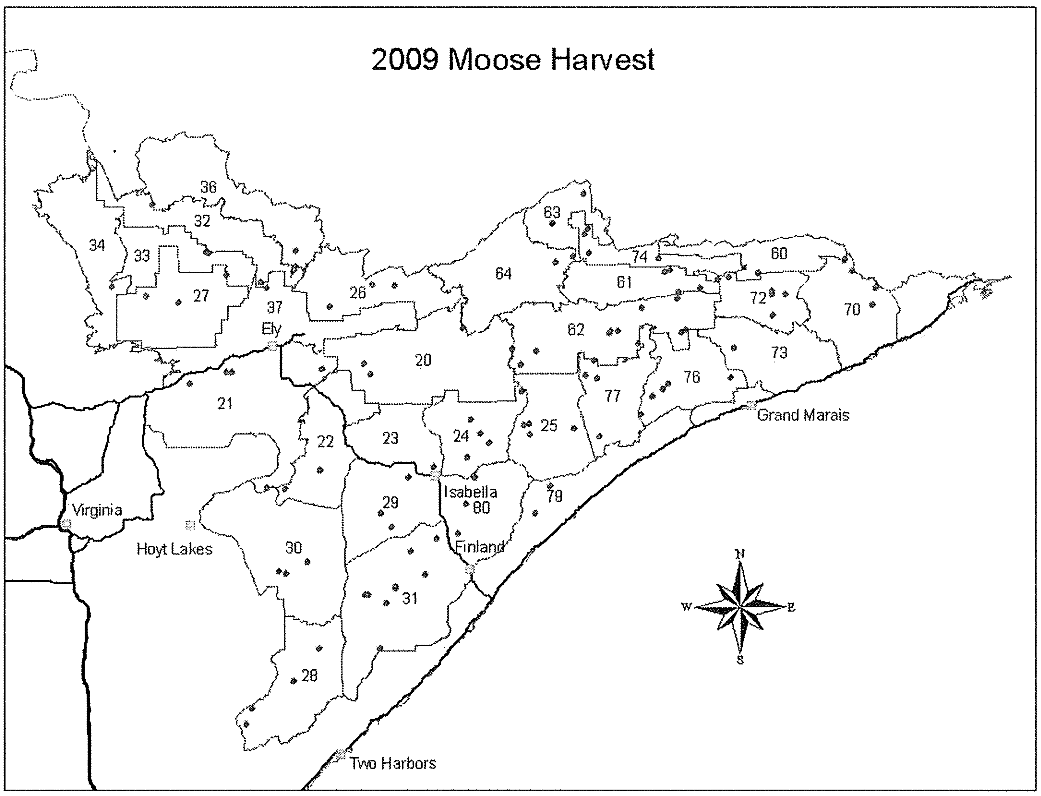


Figure 1. Moose harvest and hunting zones in northeastern Minnesota, 2009

TRAPPING HARVEST STATISTICS

Division of Fish and Wildlife
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2009 TRAPPER HARVEST SURVEY

Margaret Dexter, Wildlife Research Unit

INTRODUCTION

The Minnesota Department of Natural Resources, Research Surveys and Statistics unit annually conducts a survey of trapper license holders. Annual harvest estimates from survey data provide the basis for future trapping regulations and season structure.

METHODS

The Research Surveys and Statistics unit requests a list of all active trapper license holders from the Electronic License System database in late February. The sample consisted of all valid Regular, Junior and Non-resident Trapper License holders. For the 2009-10 trapping season there were 4,803 Resident Regular Trappers, 343 Resident Junior Trappers, 799 Resident Senior Trappers, 207 Lifetime Trappers, and 6 Nonresident (MN landowners) Trappers surveyed. Of the 6,158 valid licenses, 6,144 had usable addresses for purposes of the survey.

Trappers that returned the survey questionnaire within three weeks were marked returned and eliminated from follow-up mailings. Follow-up mailings were sent to non-respondents at intervals of three weeks. There were three follow-up mailings to non-respondents.

Completed and returned questionnaires were checked for completeness, consistency, and biological practicability. Cards were marked with numeric county codes corresponding to the trapper's written information. Data from each usable card was converted to an electronic database. Data were checked for errors, duplicate responses, and /or missing data. The following is a list of assumptions made in data coding:

1) If an individual checked the box indicating (s)he did not trap, but harvest information was provided, it was assumed that the individual did trap.
2) If a range was given for "number of days trapped" or "number of animals harvested", the median of the range, rounded to the nearest even integer was recorded.
3) If a trapper indicated spending time trapping for a species, but left "number trapped" blank, the # trapped was entered as missing data.
4) If a trapper indicated taking a species, but left "number of days trapped" blank, then "number of days trapped" was recorded as missing data.
5) If more than one county was indicated for "county trapped in most", the first county listed was recorded. However, if the several counties listed were indicated to apply to all species trapped, then counties were recorded in sequential order in relation to species hunted.
6) If "county trapped in most" was left unanswered or not legible, the county was recorded as missing data.

Data from all usable cards were tabulated and statistically analyzed by the St. Paul staff, using SAS statistical analysis software programs.

RESULTS

Attached are the survey results for Harvest Statewide and by License type, in tabular form (Tables 1 – 5).

Table 1. Trapper response to mail surveys, 1983-84 through 2009-10.

Year	Number mailed	Number not delivered	Delivered questionnaires completed and returned	
			Number	Percent
1983-84	770	10	663	87.2
1984-85	556	9	495	90.5
1985-86	581	13	506	89.1
1986-87	582	8	514	89.5
1987-88	721	11	607	85.5
1988-89	852	25	727	87.9
1989-90	3,302	120	2,804	88.1
1990-91	2,294	102	1,875	85.5
1991-92	2,643	149	2,062	82.7
1992-93	2,080	76	1,681	83.9
1993-94	2,828	100	2,194	80.4
1994-95	2,382	76	1,876	81.5
1995-96	3,244	118	2,467	80.3
1996-97	4,071	132	3,017	76.6
1997-98	3,500	96	2,629	77.2
1998-99	3,900	117	2,878	76.4
1999-00	3,110	74	2,313	76.2
2000-01	5,262	146	3,941	77.0
2001-02	5,482	127	4,132	78.6
2002-03	5,655	210	4,148	76.0
2003-04	5,812	197	4,234	75.4
2004-05	6,267	235	4,547	75.4
2005-06	6,060	88	4,396	73.6
2006-07	8,508	139	5,835	69.9
2007-08	6,342	104	4,326	69.9
2008-09	6,203	86	4,166	68.1
2009-10	6,144	70	4,425	71.7

Table 2. Use of trapper licenses, 1997-98 through 2009-10.

		Return from mail survey	Projections from license sales
1997-98	Trapped	2,310 (88.6%)	6,198
	Did not trap	296 (11.4%)	798
		2606 (100.0%)	6,996[a]
1998-99	Trapped	2,398 (88.6%)	5,541
	Did not trap	480 (16.7%)	1,111
		2,878 (100.0%)	6,652[a]
1999-00	Trapped	1,927 (83.5%)	4,122
	Did not trap	381 (16.5%)	814
		2,308 (100.0%)	4,936[a]
2000-01	Trapped	2,897 (75.9%)	4,051
	Did not trap	920 (24.1%)	1,286
		3,817 (100.0%)	5,337[a]
2001-02	Trapped	3,332 (81.5%)	4,510
	Did not trap	754 (18.5%)	1,024
		4,086 (100.0%)	5,534[a]
2002-03	Trapped	3,344 (80.6%)	4,615
	Did not trap	804 (19.4%)	1,111
		4,148 (100.0%)	5,726[a]
2003-04	Trapped	3,412 (81.1%)	4,737
	Did not trap	793 (18.9%)	1,104
		4,205 (100.0%)	5,841[a]
2004-05	Trapped	3,697 (81.9%)	5,136
	Did not trap	815 (18.1%)	1,135
		4,512 (100.0%)	6,271[a]
2005-06	Trapped	3,495 (80.0%)	4,930
	Did not trap	875 (20.0%)	1,233
		4,370 (100.0%)	6,163[a]
2006-07	Trapped	4,782 (81.9%)	7,008
	Did not trap	1,053 (18.1%)	1,549
		5,835 (100.0%)	8,557[a]
2007-08	Trapped	3,322 (77.2%)	5,533
	Did not trap	980 (22.8%)	1,634
		4,302 (100.0%)	7,167[a]
2008-09	Trapped	3,154 (75.7%)	5,319
	Did not trap	1,012 (24.3%)	1,708
		4,166 (100.0%)	7,027[a]
2009-10	Trapped	3,202 (72.7%)	4,467
	Did not trap	1,202 (27.3%)	1,677
		4,404 (100.0%)	6,144[a]

[a] excludes duplicates.

Table 3. Estimated number of trappers of various furbearers, 1996-97 through 2009-10.

	Estimated number of trappers													
	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Muskrat	3677	3901	3121	2137	2052	2419	2137	2117	2269	2351	4228	2371	2393	2088
Mink	3213	3201	2772	1919	1867	2117	1945	1917	2085	1864	3033	2168	2044	1541
Short-tailed weasel	443	580	366	383	318	411	408	473	470	349	864	595	511	417
Long-tailed weasel	385	562	347	330	272	313	312	374	299	211	694	434	345	254
Raccoon (Sept -Feb)	2975	3015	2769	1880	1599	2249	2427	2384	2505	2315	3766	3189	3150	2320
Raccoon (Mar -Aug)[a]	387	452	463	315	343	334	354	338	406	322				
Striped skunk	1149	1131	994	681	563	955	1052	1102	1161	1023	1644	1485	1488	949
Eastern spotted skunk	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Badger	322	301	234	178	135	250	237	292	310	219	347	330	293	206
Opossum	720	623	643	458	484	610	754	934	1037	957	1511	1392	1169	701
Red fox (Sept -Feb)	1772	1751	1186	1033	986	1093	1319	1290	1179	991	1608	1320	1232	1006
Red fox (Mar -Aug)[a]	138	196	137	107	89	91	111	113	110	85				
Gray fox	398	414	386	308	468	277	421	441	451	407	806	654	657	529
Coyote	873	825	576	552	491	606	813	812	826	857	1379	1203	1141	888
Beaver (Oct 09- Feb 10)	2456	2841	2483	1891	1695	2054	1844	1883	2171	1965	2659	2008	1877	1650
Beaver (Mar 09- Apr 09)	1577	2009	1907	1320	1425	1345	1296	1233	1449	1455	1710	1408	1257	1260

[a] Raccoon and red fox season continuous May 1994 thru March 15, 2006.

Table 4. Estimated take per trapper of various furbearers, 1995-96 through 2009-2010.

	Estimated take per successful trapper reporting that species														
	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Muskrat	70	55	58	42	46	42	42	35	33	32	39	58	32	34	47
Mink	11	11	11	13	14	12	14	10	9	10	10	9	9	8	9
Short-tailed weasel	10	9	10	7	5	8	10	7	7	6	6	9	7	7	8
Long-tailed weasel	5	5	5	5	5	5	7	4	5	3	3	5	5	3	3
Raccoon (Sept -Feb)	23	23	24	23	20	20	27	25	22	23	21	21	23	23	19
Raccoon (Mar Aug)[a]	15	13	14	15	14	11	19	12	15	12	11				
Striped skunk	8	10	10	9	8	8	8	8	8	8	7	7	7	7	7
Eastern spotted skunk	5	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Badger	2	2	2	2	2	2	2	2	2	1	2	1	2	1	2
Opossum	9	9	9	11	13	11	8	11	12	14	12	14	12	10	7
Red fox (Sept -Feb)	9	7	7	5	6	6	6	6	5	4	4	4	3	3	3
Red fox (Mar -Aug)[a]	5	4	4	3	4	4	5	5	6	3	3				
Gray fox	2	n.a.	3	3	2	2	2	2	2	2	2	2	2	2	2
Coyote	5	4	3	3	4	4	4	4	5	4	5	4	4	4	4
Beaver (Oct 09-Feb 10)	14	16	16	16	16	15	18	13	12	13	13	13	11	11	11
Beaver (Mar 09 - Apr 09)	29	31	32	29	27	26	31	26	21	26	24	24	19	22	20

[a] Raccoon and red fox season continuous May 1994 thru March 15, 2006.

Table 5. Minnesota trapper license sales and estimated annual harvest, 1996-97 through 2009-2010[a]

	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Trapper license sales [b]	6,675	6,996	6,652	4,936	5,337	5,534	5,725	5,841	6,271	6,163	8,557	7,167	7,027	6,158
Estimated harvest [c]														
Muskrat	201,794	188,189	131,439	97,333	85,555	100,819	75,190	69,131	72,079	91,271	243,360	75,439	80,157	98,524
Mink	34,612	32,449	36,152	26,808	22,590	28,684	19,894	16,716	21,478	18,048	26,084	18,626	16,647	13,207
Short-tailed weasel	4,196	6,401	2,400	1,763	2,586	4,160	2,895	3,519	2,679	2,223	8,145	4155	3,515	3,128
Long-tailed weasel	2,065	3,880	1,863	1,619	1,354	2,243	1,138	1,781	1,007	651	3,494	2013	1,118	838
Raccoon (Oct - Feb)	68,810	71,705	63,680	37,435	32,460	60,292	61,221	53,534	56,848	48,966	78,571	73498	71,893	45,118
Raccoon (Mar -Aug)[f]	4,936	8,986	6,849	4,263	3,702	6,468	4,137	4,933	4,940	3,594				
Striped skunk	11,168	10,027	9,181	5,266	4,580	7,168	7,901	8,474	8,704	6,881	10,773	10811	10,354	6,194
Eastern spotted skunk [g]	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Badger	594	446	400	319	205	407	358	552	455	339	461	499	424	316
Opossum	6,453	5,201	6,916	5,907	5,351	5,127	8,491	11,251	14,313	11,754	20,442	17	11,296	4,963
Red fox (Oct - Feb)	12,477	9,995	6,347	6,508	6,165	6,870	7,851	6,721	4,684	3,528	6,783	4060	3,500	2,984
Red fox (Mar -Aug)[f]	529	680	458	379	357	447	612	635	334	222				
Gray fox	974	1,163	976	743	468	525	892	915	898	797	1,703	1360	1,320	1,084
Coyote	3,148	2,720	1,637	2,372	2,112	2,369	3,641	3,805	3,607	3,915	5,315	5355	4,532	3,797
Beaver (Oct 09- Feb 10)	38,113	47,370	38,720	30,564	24,802	35,963	23,592	22,801	28,716	26,029	33,966	21813	21,075	18,178
Beaver (Mar 09-Apr 09)	48,235	65,472	55,262	36,189	37,455	41,829	33,721	26,363	37,861	35,252	41,652	26286	27,815	25,008
Registered harvest														
Otter	2,219	2,145	1,946	1,635	1,578	2,301	2,145	2,766	3,450	2,846	2,720	1,861	1,938	1,544
Lynx [g]	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Bobcat [e]	223	359	103	206	231	250	544	483	631	590	890	702	853	884
Fisher	1,773	2,761	2,695	1,725	1,674	2,119	2,660	2,517	2,552	2,388	3,251	1,682	1,712	1,259
Marten	1,625	2,261	2,299	2,423	1,629	1,928	2,839	3,214	3,241	2,653	3,788	2,221	1,823	2,073

[a] Includes data for all seasons from October through April of years indicated.

[b] Separate licenses were issued for juveniles (13-17 years old) and adults (18 and older), beginning in 1982. Nonresident (MN Landowner) licenses started in 2004. Senior trapping licenses were first issued in 2007. Lifetime Licenses became available for free when renewing lifetime sports or small game licenses in 2007. As of April 4, 2010 6,158 trapping licenses were sold in 2009 343 (5.6%) were juvenile licenses, 4,803 (78.0%) were Regular adult licenses, 799 (12.9%) were Senior licenses, 207(3.4%) were Lifetime licenses, and 6 (<1%) were Nonresident (MN Landowner) licenses. Duplicate licenses excluded.

[c] Based upon trappers' responses to mail surveys.

[e] Registered harvest for bobcat includes animals taken by hunting. [f] Raccoon and red fox season continuous May 1994 thru March 15, 2006.

[g] Lynx (1984) and Eastern spotted skunk (1996) listed as Special Concern and threatened species (respectively) and are fully protected.

MINNESOTA FUR BUYERS SURVEY FOR THE 2009-2010 HUNTING AND TRAPPING SEASON

Jason Abraham, Wildlife Furbearer Program Coordinator
Margaret Dexter, Wildlife Policy and Research Unit

INTRODUCTION

Fur buyers are individuals licensed by the State of Minnesota to buy and sell raw fur. They are required to keep complete records of all transactions and activities related to buying, selling, and disposing of raw furs. Each year buyers are sent a questionnaire asking them to submit information regarding the "average" price they paid to trappers for various furbearers the previous season.

METHODS

In August 2010, questionnaires were mailed to the 43 licensed fur buyers in Minnesota. The survey asked them to report the number and type of fur purchased from Minnesota trappers and hunters in 2009-10 and the "average price" paid to those hunters and trappers based on all furs purchased. A total of 32 usable surveys were received, for a return rate of 74 percent.
Calculations of average pelt price for each species (Table 1) were weighted according to the number of pelts purchased by each buyer. Average pelt prices for the past 15 years are summarized in Table 2. Total estimated value of the furbearer harvest to trappers and hunters in 2009-10 was $734,582.41, a 20 percent increase from 2008-09.

Table 1. Minnesota fur prices as reported by licensed fur dealers, 2009-10.

Species	Number Buyers	Number Pelts	Minimum Price ($)	Maximum Price ($)	Weighted Mean ($)
Muskrat	19	24,008	1.12	6.00	4.43
Mink Female	19	2,261	2.83	12.00	8.02
Mink male	19	2,993	7.00	13.00	9.37
Raccoon	18	22,173	7.00	13.00	9.18
Red Fox	16	927	6.63	15.00	10.85
Gray Fox	11	240	8.00	15.00	11.55
Coyote	18	2,791	2.00	20.00	8.62
Bobcat	9	246	35.00	125.00	42.77
River Otter	11	327	15.00	62.00	35.65
Beaver 10-2	16	4,419	6.00	16.00	12.49
Beaver 3-4	12	11,194	7.00	16.00	14.47
L.T. Weasel	4	101	1.00	5.00	3.02
S.T. Weasel	8	454	1.50	5.00	3.12
Striped Skunk	11	137	1.00	6.00	3.66
Badger	14	77	1.00	25.00	8.81
Opossum	8	172	0.50	1.50	1.30
Fisher Male	9	262	25.00	38.00	34.45
Fisher Female	9	173	30.00	40.00	34.90
Marten Male	8	249	28.40	35.00	26.76
Marten Female	6	158	25.00	35.00	29.95
Deer Hides	15	15,878	2.00	5.00	4.44
Bear Hides	6	48	25.00	60.00	43.00

Table 2. Average price ($) per pelt paid to hunters and trappers in Minnesota, 1998-99 through 2009-10.

Species	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Muskrat	1.11	1.57	1.83	2.32	2.11	2.05	1.90	2.81	5.79	2.96	1.85	4.43
Mink (female)	6.11	8.22	7.70	6.76	6.52	7.23	10.22	10.23	13.18	9.05	7.45	8.02
Mink (male)	9.83	11.61	11.15	9.34	9.55	11.41	11.34	14.29	18.04	12.32	9.14	9.37
S.T. Weasel	1.72	2.16	2.30	2.41	2.63	2.53	2.52	2.60	3.58	3.18	3.57	3.02
L.T. Weasel	2.05	2.34	1.80	2.98	1.94	3.34	3.05	2.56	4.35	5.00	2.21	3.12
Raccoon	7.25	5.09	8.86	9.53	10.33	11.45	10.49	9.61	11.92	14.32	9.34	9.18
Striped Skunk	4.72	4.40	4.79	3.91	5.81	4.66	3.95	3.77	4.46	5.27	7.12	8.62
Badger	6.30	7.30	10.15	9.39	13.18	14.23	12.94	13.40	15.71	13.92	7.70	8.81
Opossum	0.58	0.96	0.97	1.19	1.22	1.23	1.51	1.40	1.52	1.76	1.21	1.30
Red Fox	8.04	11.82	14.45	17.07	22.08	20.02	17.28	16.96	17.68	14.69	11.79	10.85
Gray Fox	5.63	7.06	7.52	8.36	9.05	13.64	12.58	15.00	22.36	30.09	14.08	11.55
Coyote	5.57	9.42	12.40	13.37	16.12	18.37	15.24	13.57	17.76	13.51	7.12	8.62
Bobcat	27.66	24.23	33.09	46.00	71.54	95.90	98.99	95.74	101.07	93.41	74.74	42.77
Beaver (fall-winter)	11.40	11.51	14.66	12.74	10.05	12.57	13.62	14.48	18.35	14.60	14.63	12.49
Beaver (spring)	14.06	11.02	12.80	12.47	9.99	11.09	13.80	16.49	14.81	17.77	9.36	14.47
Otter	34.03	41.41	50.52	46.19	61.16	85.33	87.23	88.89	42.85	29.49	24.33	35.65
Fisher (male)	18.92	19.45	20.14	23.18	26.70	27.15	30.02	36.03	76.33	63.09	22.27	34.45
Fisher (female)	21.76	19.91	19.01	22.86	25.44	25.71	27.47	31.46	67.82	48.24	37.22	34.90
Marten (male)	19.70	24.89	27.56	24.10	28.00	30.09	30.65	37.47	74.04	58.72	30.61	26.76
Marten (female)	16.12	21.27	21.25	22.52	27.30	26.70	27.42	31.53	66.09	50.05	28.19	29.95
Deer Hides	6.40	6.32	6.46	2.86	3.48	5.41	3.95	4.14	4.51	3.92	3.53	4.44
Bear Hides	36.23	33.87	39.81	36.10	40.56	41.55	46.61	39.30	43.03	36.57	29.81	43.00

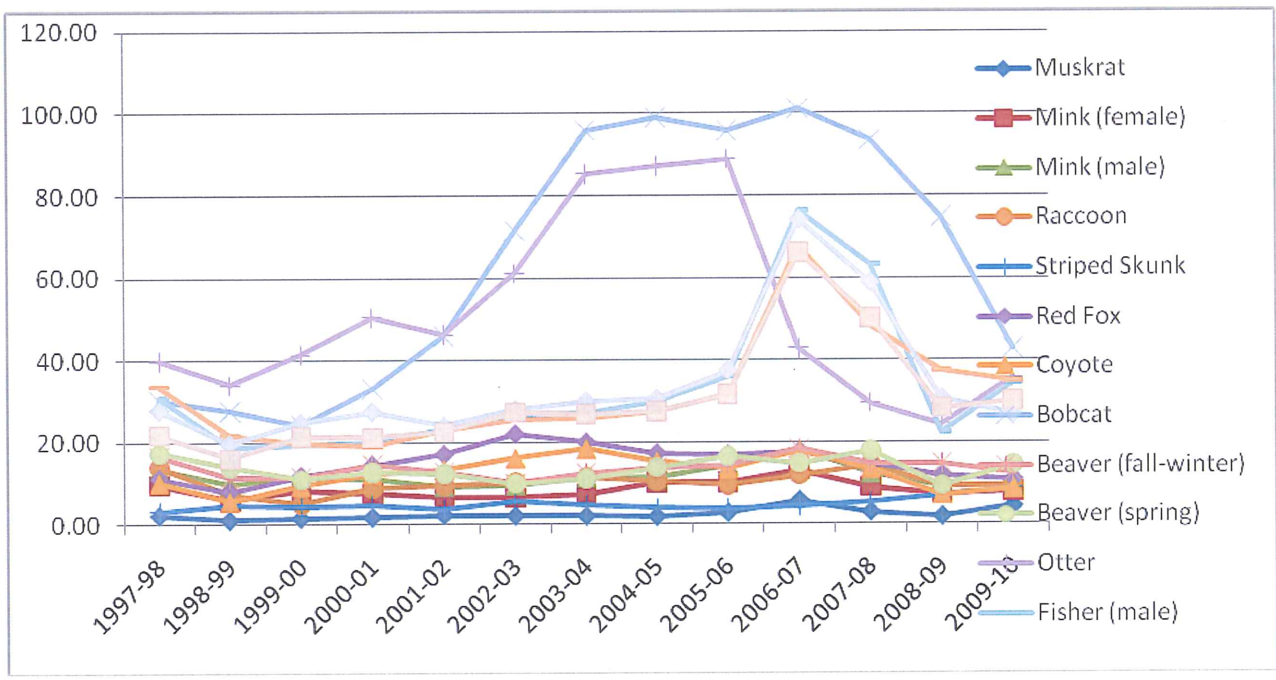

Figure 1. Average price per pelt paid to hunters and trappers for selected species in Minnesota, 1997-98 through 2009-10.

REGISTERED FURBEARER HARVEST STATISTICS

Forest Wildlife Populations and Research Group
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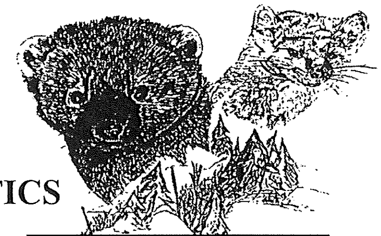

Drawing by Gilbert Proulx

REGISTERED FURBEARER HARVEST STATISTICS
2009-10 Report

John Erb, Forest Wildlife Populations and Research Group

INTRODUCTION

Monitoring harvest is an important component of population management for many wildlife populations. For many species, harvest represents a large proportion of overall mortality. Obtaining harvest information can be useful for documenting changes in the distribution and abundance of animals, as well as the effects of changes in harvest seasons, harvest techniques, and habitat. The level of detail or accuracy necessary in harvest information may vary across species, depending on such factors as density, harvest pressure, habitat sensitivity of the species, and reproductive potential.

In Minnesota, detailed harvest information is collected on 4 carnivores – fisher, marten, bobcat, and river otter. These species have lower reproductive potential, naturally occur at low to moderate densities, have comparatively 'restricted' distributions, and/or may be more subject to effects of habitat change. Hence, detailed harvest information is desirable to help ensure sustainable populations. For approximately the past 30 years, such data has been collected for these species.

METHODS

Fur-harvesters are required to bring pelts from harvested animals (fisher, marten, bobcat, and otter) in to fur registration stations within 48 hours of the close of the season. Upon registration, information is collected on the sex, date, and harvest location (township), and the pelt is tagged to verify it has been registered.

RESULTS

Currently, harvest of fisher, marten, and bobcat is allowed in approximately the northern 60% of the state (Figure 1). The fisher and marten harvest season was shortened the last 3 years from 16 days to 9 days (Table 1). The otter-trapping zone was expanded in 2007 to include more areas in central Minnesota, as well as a portion of southeast Minnesota (Figure 1). All harvest summaries are provided in the following tables.

NOTE: This report does not include tribal harvests, or any confiscations.

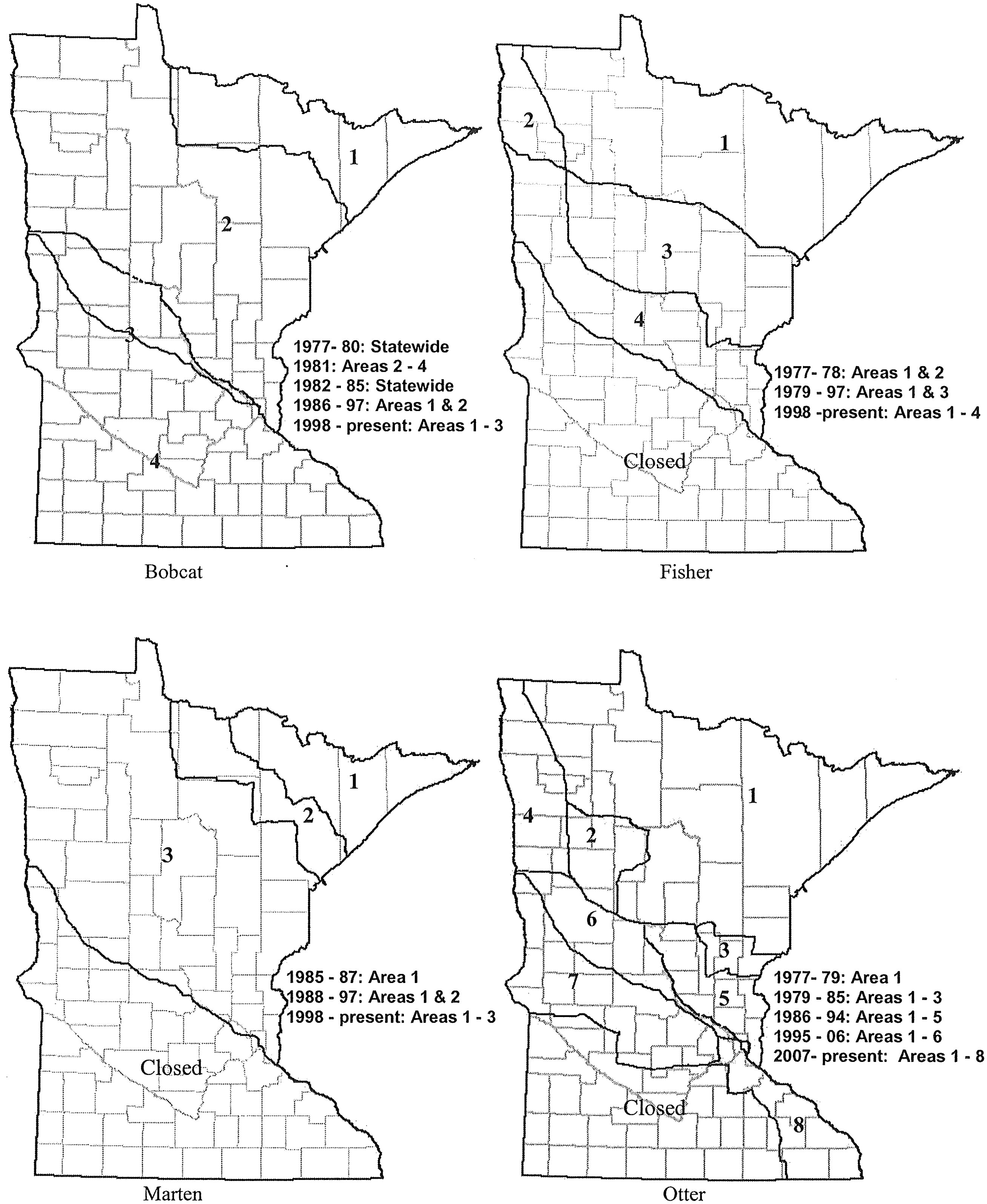

Figure 1. Open trapping areas for fisher, marten, bobcat, and otter, 1977 - present.

Table 1. Registered furbearer seasons and harvests, 1981-2009.

	Bobcat				Fisher				Marten				Otter			
Year	Season	Days	Limit	Harvest	Season	Days	Limit	Harvest	Season	Days	Limit	Harvest	Season[a]	Days	Limit	Harvest
1981-82	12/1-1/23	54	5	259	12/1-12/10	10	1	862	CLOSED				11/14-11/28	15	2	484
1982-83	12/1-1/23	54	5	274	12/1-12/10	10	1	912	CLOSED				11/13-11/27	15	2	385
1983-84	12/1-1/22	53	5	208	12/1-12/11	11	1	631	CLOSED				11/12-11/26	15	2	408
1984-85	12/1-1/20	51	5	280	12/1-12/16	16	1	1289	CLOSED				11/17-12/1	15	2	529
1985-86	11/30-1/19	51	5	119	11/30-12/15	16	1	678	11/30-12/15	16	1	430	11/16-12/15	30	3	559
1986-87	11/29 -1/3	36	5	160	11/29-12/14	16	1	1067	11/29-12/14	16	1	798	11/1-11/30	30	3	777
1987-88	11/28-1/3	37	5	212	11/28-12/13	16	1	1641	11/28-12/13	16	1	1363	10/24-11/29	37	3	1386
1988-89	11/26-1/1	37	5	141	11/26-12/11	16	1	1025	11/26-12/11	16	2	2072	10/29-11/27	30	3	922
1989-90	12/2-1/7	37	5	129	12/2-12/17	16	1	1243	12/2-12/17	16	2	2119	10/28-12/17	51	3	1294
1990-91	12/1-1/6	37	5	84	12/1-12/16	16	1	746	12/1-12/16	16	2	1349	10/27-1/6	71	3	888
1991-92	11/30-1/5	37	5	106	11/30-12/15	16	1	528	11/30-12/15	16	1	686	10/26-1/5	71	3	855
1992-93	11/28-1/3	37	5	168	11/28-12/13	16	1	778	11/28-12/13	16	2	1602	10/24-1/3	71	4	1368
1993-94	12/4-1/9	37	5	201	12/4-12/19	16	2	1159	12/4-12/19	16	2	1438	10/23-1/9	78	4	1459
1994-95	12/3-1/8	37	5	238	12/3-12/18	16	2	1772	12/3-12/18	16	2	1527	10/29-1/8	71	4	2445
1995-96	12/2-1/7	37	5	134	12/2-12/17	16	2	942	12/2-12/17	16	2	1500	10/28-1/7	71	4	1435
1996-97	11/30 -1/5	37	5	223	11/30-12/15	16	2	1773	11/30-12/15	16	2	1625	10/26-1/5	71	4	2219
1997-98	11/29-1/4	37	5	359	11/29-12/14	16	2	2761	11/29-12/14	16	2	2261	10/25-1/4	71	4	2145
1998-99	11/28-12/13	16	5	103	11/28-12/13	16	2	2695	11/28-12/13	16	2	2299	10/24-1/3	71	4	1946
1999-00	12/4-1/9	37	5	206	12/4-12/19	16	2	1725	12/4-12/19	16	4	2423	10/23-1/9	78	4	1635
2000-01	12/2-1/7	37	5	231	12/2-12/17	16	4	1674	12/2-12/17	16	4	1629	10/28-1/7	71	4	1578
2001-02	11/24-1/6	44	5	250	11/24-12/9	16	4	2119	11/24-12/9	16	4	1928	10/27-1/6	71	4	2301
2002-03	11/30-1/5	37	5	544	11/30-12/15	16	5	2660	11/30-12/15	16	5	2839	10/26-1/5	71	4	2145
2003-04	11/29-1/4	37	5	483	11/29-12/14	16	5	2521	11/29-12/14	16	5	3214	10/25-1/4	71	4	2766
2004-05	11/27-1/9	44	5	631	11/27-12/12	16	5	2552	11/27-12/12	16	5	3241	10/23-1/9	78	4	3450
2005-06	11/26-1/8	44	5	590	11/26-12/11	16	5	2388	11/26-12/11	16	5	2653	10/29-1/8	71	4	2846
2006-07	11/25-1/7	44	5	890	11/25-12/10	16	5	3251	11/25-12/10	16	5	3788	10/28-1/7	71	4	2720
2007-08	11/24-1/6	44	5	702	11/24-12/2	9	5	1682	11/24-12/2	9	5	2221	10/27-1/6	71	2/4[b]	1861
2008-09	11/29-1/4	37	5	853	11/29-12/7	9	5	1712	11/29-12/7	9	5	1823	10/25-1/4	71	2/4[b]	1938
2009-10	11/28-1/3	37	5	884	11/28-12/6	9	5	1259	11/28-12/6	9	5	2073	10/24-1/3	71	2/4[b]	1544

[a] In some years, otter season opens 1 week earlier in a north zone as compared to a south zone. Otter season dates in this table reflect the start of the north zone.

[b] Starting in 2007, otter limits differ between a newly created southeast zone (limit=2; Area 8, Fig. 1) and the remainder of the open area (limit=4).

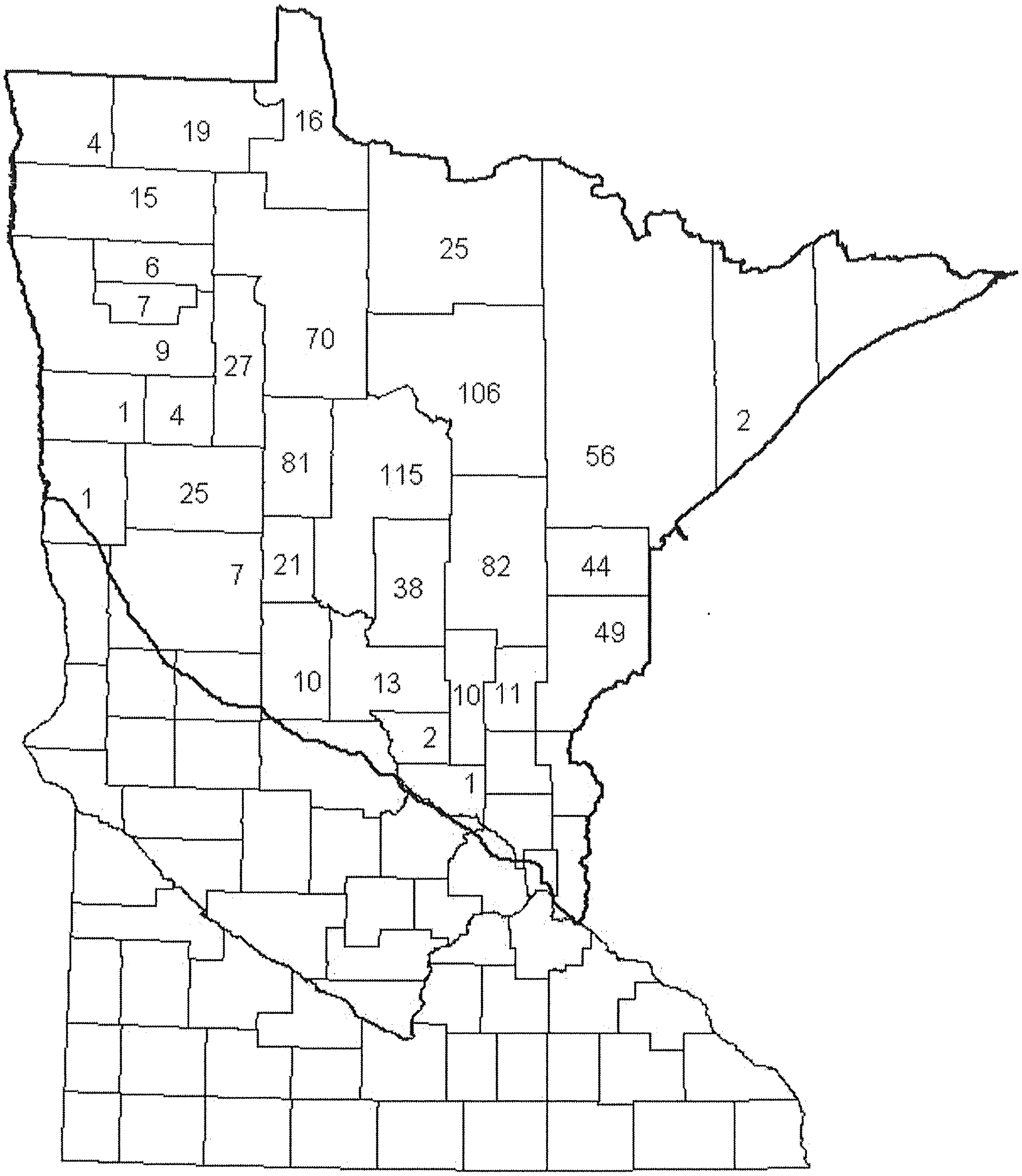

Figure 2. Bobcat harvest by county, 2009-10.

Table 2. Bobcat harvest by county and sex, 2009-10.

County	Sex* Male	Female	Unknown	Total
Aitkin	41	41		82
Becker	15	10		25
Beltrami	35	34	1	70
Benton	1	1		2
Carlton	14	30		44
Cass	50	65		115
Chisago	0	0		0
Clay	1	0		1
Clearwater	12	15		27
Cook	0	0		0
Crow Wing	17	20	1	38
Hubbard	34	47		81
Isanti	0	0		0
Itasca	47	58	1	106
Kanabec	5	6		11
Kittson	1	3		4
Koochiching	11	14		25
Lake	1	1		2
LOW	5	11		16
Mahnomen	1	3		4
Marshall	13	2		15
Mille Lacs	7	3		10
Morrison	7	6		13
Norman	1	0		1
Ottertail	3	4		7
Pennington	4	2		6
Pine	20	29		49
Polk	3	6		9
Red Lake	6	1		7
Roseau	9	10		19
St. Louis	22	34		56
Sherburne	1	0		1
Stearns	0	0		0
Todd	6	4		10
Wadena	9	12		21
Unknown	2	5		7
Total	404	477	3	884

* Trapper/hunter reported sex ratios in this table are **NOT** adjusted according to results from DNR carcass analyses

Table 3. Comparison of bobcat harvest by county, 1999-2009.

County	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Aitkin	25	32	20	35	19	37	32	46	56	64	82
Becker	8	6	28	26	19	28	19	46	24	37	25
Beltrami	13	16	26	63	47	66	34	90	33	49	70
Benton	0	0	0	0	0	0	0	0	1	5	2
Carlton	10	12	14	11	20	27	25	34	25	45	44
Cass	24	11	17	59	48	56	103	137	50	98	115
Chisago	0	0	0	1	0	0	0	0	3	0	0
Clay	0	0	0	0	1	0	0	0	0	0	1
Clearwater	4	0	6	24	19	18	18	42	25	43	27
Cook	0	0	0	1	1	2	3	0	0	1	0
Crow Wing	21	13	4	20	15	19	18	27	21	36	38
Hubbard	7	4	10	31	21	35	22	69	40	49	81
Isanti	2	0	0	0	2	0	1	0	0	0	0
Itasca	23	40	33	74	76	93	68	113	86	72	106
Kanabec	4	11	8	10	9	17	11	14	16	23	11
Kittson	7	6	7	5	8	6	3	5	4	9	4
Kooch	8	11	12	23	25	14	22	16	37	31	25
Lake	0	1	0	0	0	1	2	1	0	1	2
LOW	2	3	0	6	4	6	3	2	9	12	16
Mahnomen	1	1	1	0	3	7	2	7	8	0	4
Marshall	10	2	4	24	14	20	16	19	32	18	15
Mille Lacs	1	2	0	10	4	11	9	8	13	11	10
Morrison	6	8	4	6	14	18	18	17	23	28	13
Norman	0	0	0	0	0	0	0	1	0	0	1
Ottertail	0	0	1	0	0	5	1	7	9	7	7
Pennington	0	1	1	1	0	6	3	2	11	9	6
Pine	15	21	23	49	44	59	47	59	87	101	49
Polk	0	1	0	2	2	4	1	3	0	4	9
Red Lake	0	2	0	1	1	0	6	1	0	0	7
Roseau	7	12	18	22	28	27	28	36	32	18	19
St. Louis	5	9	7	30	25	37	44	45	39	58	56
Sherburne	0	0	0	0	0	0	0	0	0	0	1
Stearns	0	0	0	0	0	0	0	0	1	0	0
Todd	1	0	1	3	6	5	7	12	6	14	10
Wadena	2	0	5	7	8	3	17	16	9	7	21
Unknown	0	4	0	0	0	4	7	15	2	3	7
Total	206	229	250	544	483	631	590	890	702	853	884

Table 4. Bobcat harvest by sex and week, 2009-10 season.

Date	Sex* Male	Female	Unknown	Total	% of Total	Cumulative %
Nov.28 - Dec.4	71	123		194	21.95	21.95
Dec.5 - Dec.11	93	109	2	204	23.08	45.02
Dec.12 - Dec.18	95	80		175	19.80	64.82
Dec.19 - Dec.25	74	96	1	171	19.34	84.16
Dec.26 - Jan.3**	64	62		126	14.25	98.42
Unknown	7	7		14	1.58	100.00
Total	404	477	3	884	100%	

* Trapper/hunter reported sex ratios in this table are **NOT** adjusted according to results from DNR carcass analyses
** 9-day interval

Table 5. Distribution of bobcat harvest* among takers, 1985-2009.

Number (%) of Takers	Number Taken					
	1	2	3	4	5	Total Takers
1985-86	70 (79)	11 (12)	6 (7)	1 (1)	1 (1)	89
1986-87	92 (77)	18 (15)	9 (8)	0 (0)	1 (1)	120
1987-88	104 (72)	23 (16)	10 (7)	6 (4)	2 (1)	145
1988-89	88 (82)	11 (10)	7 (7)	1 (1)	1 (1)	108
1989-90	56 (69)	13 (16)	5 (6)	3 (4)	4 (5)	81
1990-91	47 (77)	9 (15)	1 (2)	4 (7)	0 (0)	61
1991-92	42 (64)	15 (23)	4 (6)	3 (5)	2 (3)	66
1992-93	69 (64)	21 (20)	9 (9)	5 (5)	2 (2)	106
1993-94	90 (70)	17 (13)	13 (10)	7 (5)	2 (2)	201
1994-95	103 (68)	25 (17)	12 (8)	6 (4)	5 (3)	151
1995-96	67 (74)	13 (14)	5 (6)	4 (4)	2 (2)	91
1996-97	115 (73)	28 (18)	85 (5)	2 (1)	4 (3)	157
1997-98	129 (61)	43 (20)	17 (8)	12 (6)	9 (5)	210
1998-99	59 (77)	11 (14)	2 (3)	3 (4)	1 (2)	76
1999-00	113 (76)	21 (14)	10 (6)	4 (3)	1(1)	149
2000-01	99 (69)	23 (16)	7 (5)	5 (4)	9 (6)	143
2001-02	101 (71)	23 (16)	12 (8)	1 (1)	5 (4)	142
2002-03	185 (60)	64 (21)	33 (10)	15 (5)	12 (4)	309
2003-04	171 (64)	40 (15)	25 (10)	20 (7)	11 (4)	267
2004-05	193 (59)	55 (17)	32 (10)	25 (7)	24 (7)	329
2005-06	198 (60)	67 (20)	33 (10)	15 (5)	18 (5)	331
2006-07	265 (57)	90 (19)	44 (9)	25 (5)	42 (9)	466
2007-08	212 (58)	71 (19)	30 (8)	16 (4)	38 (10)	367
2008-09	236 (55)	88 (21)	43 (10)	25 (6)	37 (9)	429
2009-10	223 (53)	80 (19)	40 (9)	30 (7)	51 (12)	424

* Product of categories above may not equal total harvest due to some missing names/license numbers

Table 6. Bobcat harvest by method of take, 1983-2009.

	Total	Trapping					Hunting				
Year	Harvest[a]	Harvest	% of Total	# Takers	Ave. Take	% Males[b]	Harvest	% of Total	# Takers	Ave. Take	% Males[b]
1983-84	208	168	81	118	1.4		40	19	32	1.3	
1984-85	280	252	90	156	1.6		28	10	22	1.3	
1985-86	119	83	70	62	1.3		36	30	27	1.3	
1986-87	160	119	74	89	1.3		41	26	31	1.3	
1987-88	214	177	83	118	1.5		37	17	26	1.4	
1988-89	140	94	67	76	1.2		46	33	32	1.4	
1989-90	129	90	70	49	1.8		39	30	28	1.4	
1990-91	83	61	73	43	1.4		22	27	17	1.3	
1991-92	102	59	58	31	1.9		43	42	33	1.3	
1992-93	168	133	79	85	1.6		35	21	23	1.5	
1993-94	201	147	73	88	1.7		54	27	41	1.3	
1994-95	238	189	79	120	1.6		49	21	31	1.6	
1995-96	134	73	54	53	1.4		61	46	38	1.6	
1996-97	203	133	66	91	1.5		70	34	53	1.3	
1997-98	357	313	88	176	1.8		44	12	34	1.3	
1998-99	103	95	92	67	1.4		8	8	8	1.0	
1999-00	206	155	75	114	1.4		51	25	36	1.4	
2000-01	231	140	61	85	1.6		91	39	58	1.6	
2001-02	250	208	83	116	1.8	41	42	17	27	1.6	68
2002-03	544	500	92	279	1.8	38	44	8	32	1.4	57
2003-04	483	415	86	230	1.8	46	68	14	40	1.7	65
2004-05	631	542	86	279	1.9	43	89	14	53	1.7	60
2005-06	583	435	75	250	1.7	37	148	25	85	1.7	65
2006-07	890	779	88	391	2.0	45	111	12	81	1.4	57
2007-08	702	524	75	266	2.0	40	178	25	110	1.6	48
2008-09	853	689	81	334	2.1	42	164	19	99	1.7	59
2009-10	884	736	83	340	2.2	43	148	17	91	1.6	58

[a] Total harvest reported here may not be equal to total harvest in other tables due to incomplete method-of-take data.

[b] Trapper/hunter reported sex ratios in this table are **NOT** adjusted according to results from DNR carcass analyses

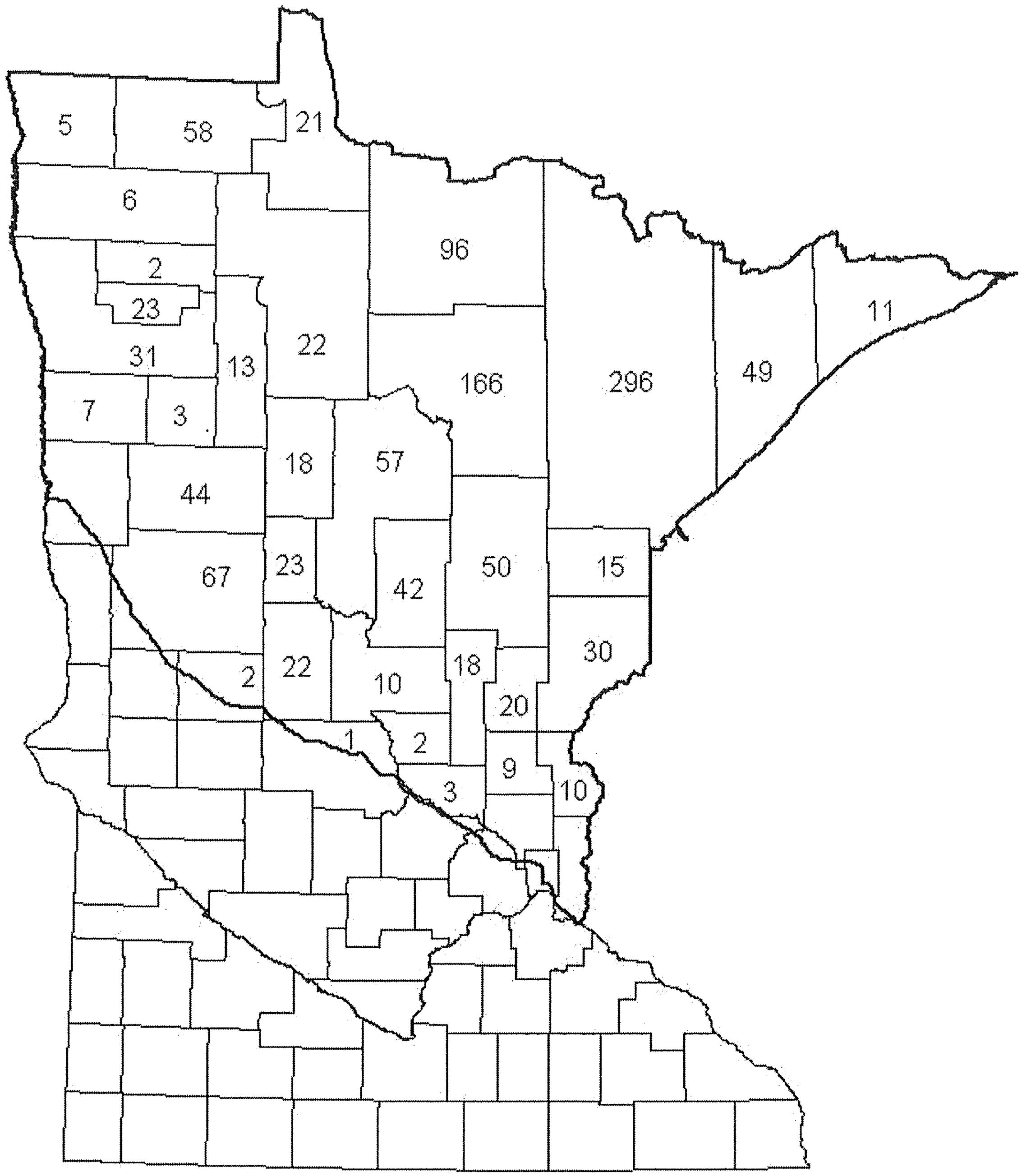

Figure 3. Fisher harvest by county, 2009-10.

Table 7. Fisher harvest by county and sex, 2009-10 season.

County	Sex			Total
	Male	Female	Unknown	
Aitkin	26	24		50
Anoka	0	0		0
Becker	28	16		44
Beltrami	10	12		22
Benton	0	2		2
Carlton	9	6		15
Cass	34	23		57
Chisago	6	4		10
Clay	0	0		0
Clearwater	8	5		13
Cook	5	6		11
Crow Wing	18	24		42
Douglas	1	1		2
Hubbard	10	8		18
Isanti	6	3		9
Itasca	87	79		166
Kanabec	14	6		20
Kittson	4	1		5
Koochiching	45	51		96
Lake	17	30	2	49
LOW	10	11		21
Mahnomen	2	1		3
Marshall	4	2		6
Mille Lacs	11	7		18
Morrison	7	3		10
Norman	3	4		7
Ottertail	34	33		67
Pennington	2	0		2
Pine	17	13		30
Polk	16	15		31
Red Lake	15	8		23
Roseau	30	28		58
St. Louis	155	141		296
Sherburne	2	1		3
Stearns	0	1		1
Todd	13	9		22
Wadena	18	5		23
Washington	0	0		0
Unknown	4	3		7
Total	671	586	2	1,259

Table 8. Comparison of fisher harvest by county, 1998-2009.

County	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Aitkin	105	84	68	103	122	124	96	97	156	67	75	50
Anoka	0	0	0	0	0	1	0	0	0	0	2	0
Becker	15	32	42	46	96	88	92	49	87	57	36	44
Beltrami	105	70	60	73	117	74	71	47	54	40	15	22
Benton	0	0	0	0	0	1	0	1	1	0	3	2
Carlton	25	23	27	37	48	42	40	35	49	13	19	15
Cass	133	123	122	134	225	205	186	149	209	80	77	57
Chisago	1	0	3	2	6	5	6	2	18	7	4	10
Clay	0	0	0	0	0	0	0	0	1	0	3	0
Clearwater	18	13	15	45	45	52	41	35	54	19	37	13
Cook	26	19	19	33	27	28	24	40	35	29	10	11
Crow Wing	75	53	71	82	106	106	113	79	140	81	116	42
Douglas	0	0	1	0	0	3	3	3	6	2	5	2
Hubbard	38	34	34	64	59	62	32	20	51	20	38	18
Isanti	0	0	0	0	0	0	2	3	5	1	5	9
Itasca	441	248	288	298	354	319	323	320	405	195	195	166
Kanabec	3	11	4	4	19	21	13	15	26	11	26	20
Kittson	3	3	3	7	3	11	2	7	2	5	8	5
Koochiching	369	150	159	156	178	171	179	209	221	105	115	96
Lake	84	46	62	54	72	74	87	85	87	49	54	49
LOW	99	83	71	48	115	78	33	63	74	17	42	21
Mahnomen	0	3	0	12	16	14	13	9	27	25	6	3
Marshall	7	10	27	19	18	21	25	18	26	19	26	6
Mille Lacs	3	0	4	3	16	22	14	16	20	15	17	18
Morrison	0	2	0	1	6	3	7	5	23	21	14	10
Norman	0	6	0	0	1	1	11	6	4	9	12	7
Ottertail	1	0	0	1	12	40	52	60	158	110	152	67
Pennington	0	2	4	4	10	18	42	22	22	16	8	2
Pine	55	36	37	29	44	54	56	42	82	39	74	30
Polk	5	6	8	24	46	65	47	38	72	61	49	31
Red Lake	0	2	18	16	15	16	29	34	32	29	23	23
Roseau	171	111	157	180	106	141	114	110	127	84	89	58
St. Louis	880	546	369	608	734	611	740	688	898	407	283	296
Sherburne	0	0	0	0	0	2	0	0	0	0	0	3
Stearns	0	0	0	0	0	0	1	0	0	0	1	1
Todd	0	0	0	2	5	14	18	23	21	13	33	22
Wadena	5	8	0	31	39	32	31	40	44	27	37	23
Washington	0	0	0	0	0	0	0	0	0	1	0	0
Unknown	28	2	1	1	0	2	9	18	14	8	3	7
Total	2,695	1,726	1,674	2,117	2,660	2,521	2,552	2,388	3,251	1,682	1,712	1,259

Table 9. Fisher harvest by date and sex, 2009-10 season.

Date	Sex			Total	% of Known Total	Cumulative %
	Male	Female	Unknown			
Nov. 28	1	2		3	0.24	0.24
Nov. 29	60	52		112	8.90	9.13
Nov. 30	89	75		164	13.03	22.16
Dec. 1	110	88		198	15.73	37.89
Dec. 2	75	88		163	12.95	50.83
Dec. 3	81	61	2	144	11.44	62.27
Dec. 4	74	55		129	10.25	72.52
Dec. 5	86	74		160	12.71	85.23
Dec. 6	73	73		146	11.60	96.82
Unknown	22	18		40	3.18	100%
Total	671	586	2	1,259	100%	

Table 10. Distribution of fisher harvest* among trappers, 1993-2009.

Number (%) of Takers	Number Taken						
	1	2	3	4	5	Total Takers	Ave. Take
1993-94	239 (34)	460 (66)	----	----	----	699	1.7
1994-95	321 (31)	725 (69)	----	----	----	1046	1.7
1995-96	232 (40)	355 (60)	----	----	----	587	1.6
1996-97	321 (31)	726 (69)	----	----	----	1047	1.7
1997-98	351 (23)	1205 (77)	----	----	----	1556	1.8
1998-99	443 (28)	1141 (72)	----	----	----	1584	1.7
1999-00	397 (37)	664 (63)	----	----	----	1061	1.6
2000-01	301(38)	251 (31)	129 (16)	121 (15)	----	802	2.1
2001-02	294 (33)	271 (31)	146 (17)	168 (19)	----	879	2.2
2002-03	336 (35)	234 (25)	138 (15)	117 (12)	123 (13)	948	1.8
2003-04	403 (39)	249 (24)	150 (15)	107 (11)	115 (11)	1024	1.7
2004-05	390 (37)	260 (25)	184 (17)	95 (9)	132 (12)	1061	1.7
2005-06	407 (40)	251 (24)	150 (15)	102 (10)	118 (11)	1028	1.7
2006-07	510 (37)	328 (24)	208 (15)	150 (11)	171 (13)	1367	1.7
2007-08	416 (50)	193 (23)	104 (12)	68 (8)	57 (7)	838	1.7
2008-09	382 (48)	182 (23)	91 (11)	65 (8)	79 (10)	799	1.6
2009-10	372 (55)	156 (23)	69 (10)	42 (6)	38 (6)	677	1.6

* Product of categories above may not equal total harvest due to some missing name/license numbers

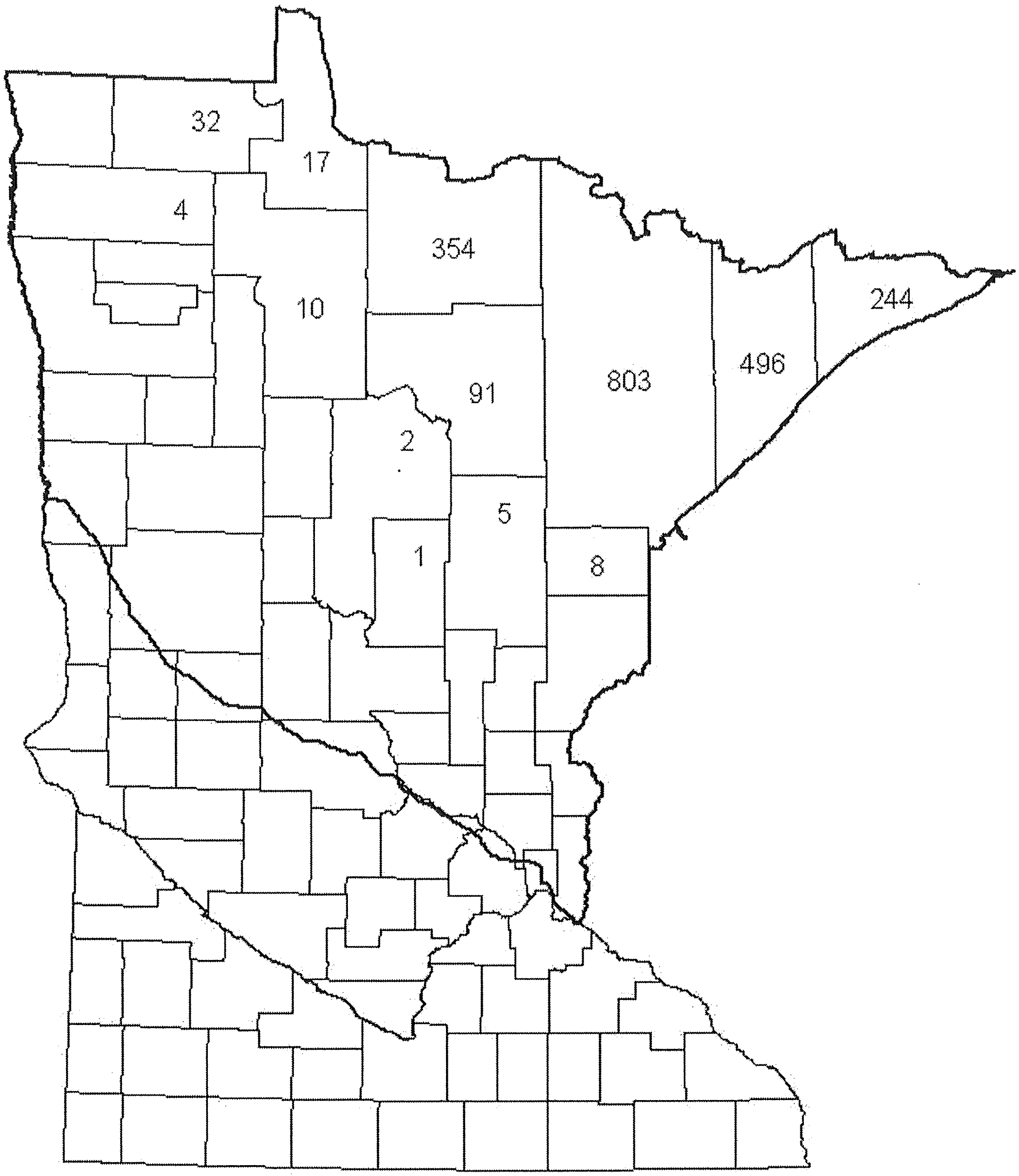

Figure 4. Marten harvest by county, 2009-10.

Table 11. Marten harvest by county and sex, 2009-10 season.

County	Sex			Total
	Male	Female	Unknown	
Aitkin	4	1		5
Beltrami	5	5		10
Carlton	4	4		8
Cass	2	0		2
Clearwater	0	0		0
Cook	170	74		244
Crow Wing	0	1		1
Itasca	62	29		91
Kanabec	0	0		0
Koochiching	217	136	1	354
Lake	311	182	3	496
Lake of the Woods	11	6	.	17
Mahnomen	0	0		0
Marshall	2	2		4
Pennington	0	0		0
Pine	0	0		0
Red Lake	0	0		0
Roseau	14	18		32
St. Louis	504	299		803
Unknown	6	0		6
Total	1,312	757	4	2,073

Table 12. Comparison of marten harvest by county in Minnesota, 1998-2009.

County	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Aitkin	1	2	2	3	5	6	6	6	13	4	12	5
Beltrami	12	37	2	24	30	38	65	17	19	8	6	10
Carlton	3	6	5	11	4	11	1	10	6	1	4	8
Cass	1	2	3	1	3	2	3	1	4	0	1	2
Clearwater	0	0	0	0	0	1	1	0	0	0	0	0
Cook	208	240	190	164	228	411	318	369	446	269	151	244
Crow Wing	0	3	0	0	0	0	0	0	0	0	0	1
Itasca	155	114	82	102	147	141	136	98	155	74	72	91
Kanabec	0	0	0	0	0	0	0	0	2	0	0	0
Koochiching	517	492	306	327	525	534	549	418	592	348	300	354
Lake	284	284	323	243	492	541	551	536	892	520	438	496
LOW	26	58	15	13	104	71	122	54	46	31	17	17
Mahnomen	0	0	0	0	0	0	2	0	0	0	0	0
Marshall	0	1	1	1	1	1	5	3	0	1	0	4
Pennington	0	0	2	0	0	0	0	0	0	1	0	0
Pine	0	0	0	0	0	1	2	1	1	1	0	0
Red Lake	0	0	3	0	0	0	0	0	0	0	0	0
Roseau	41	51	98	48	116	104	127	51	31	69	46	32
St. Louis	1,020	1,131	596	991	1,184	1,352	1,346	1,065	1,579	885	769	803
Unknown	31	2	1	0	0	0	7	24	2	9	7	6
Total	2,299	2,423	1,629	1,928	2,839	3,214	3,241	2,653	3,788	2,221	1,823	2,073

Table 13. Marten harvest by date and sex, 2009-10 season.

Date	Sex			Total	% of Known Total	Cumulative %
	Male	Female	Unknown			
Nov. 28	0	0		0	0.00	0.00
Nov. 29	171	91		262	12.64	12.64
Nov. 30	200	107	3	310	14.95	27.59
Dec. 1	203	128		331	15.97	43.56
Dec. 2	218	115		333	16.06	59.62
Dec. 3	153	69	1	223	10.76	70.38
Dec. 4	125	68		193	9.31	79.69
Dec. 5	121	101		222	10.71	90.40
Dec. 6	91	59		150	7.24	97.64
Unknown	30	19		49	2.36	100%
Total	1,312	757	4	2,073	100%	

Table 14. Distribution of marten harvest* among trappers, 1993-2009.

Number (%) of Takers	Number Taken					Total Takers	Ave. Take
	1	2	3	4	5		
1993-94	76 (10)	681 (90)	----	----	----	757	1.9
1994-95	165 (20)	681 (80)	----	----	----	846	1.8
1995-96	78 (10)	711 (90)	----	----	----	789	1.9
1996-97	157 (18)	734 (82)	----	----	----	891	1.8
1997-98	161 (13)	1050 (87)	----	----	----	1211	1.9
1998-99	187 (15)	1056 (85)	----	----	----	1243	1.8
1999-00	164 (17)	318 (34)	213 (23)	246 (26)	----	941	2.6
2000-01	188 (28)	190 (28)	123 (18)	173 (26)	----	674	2.4
2001-02	147 (23)	175 (27)	138 (21)	187 (29)	----	647	2.6
2002-03	149 (21)	138 (19)	147 (21)	123 (17)	160 (22)	717	1.9
2003-04	126 (15)	135 (16)	159 (19)	170 (20)	265 (31)	855	1.8
2004-05	165 (17)	153 (16)	171 (18)	164 (18)	282 (30)	935	1.8
2005-06	191 (22)	158 (18)	139 (16)	156 (18)	215 (25)	859	1.8
2006-07	206 (18)	201 (17)	226 (19)	203 (17)	335 (29)	1171	1.8
2007-08	176 (23)	160 (21)	147 (19)	141 (18)	142 (19)	766	2.0
2008-09	153 (24)	139 (22)	108 (17)	110 (17)	122 (19)	632	1.9
2009-10	121 (19)	105 (16)	106 (17)	134 (21)	173 (27)	639	1.9

* Product of categories above may not equal total harvest due to some unknown name/license numbers

Table 15. Number of trappers with different fisher/marten combinations, 2009-10. (Combined limit = 5)

Number of Takers		Number of Marten					
		0	1	2	3	4	5
Number of Fisher	0		53	47	37	49	172
	1	202	34	22	29	85	
	2	88	13	15	40		
	3	40	7	21			
	4	28	14				
	5	38			Total takers of at least 1 fisher or marten		1034

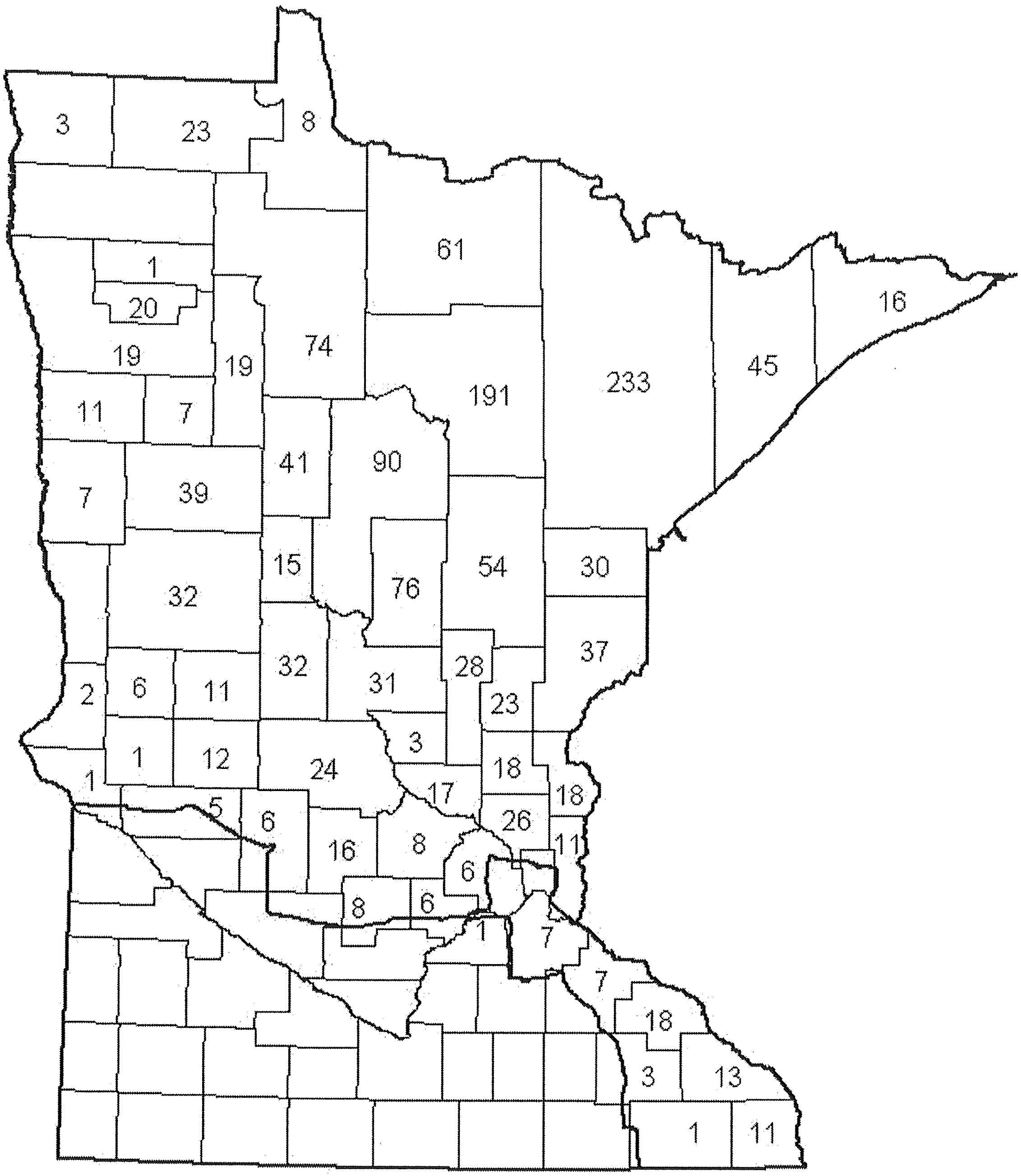

Figure 5. Otter harvest by county, 2009-10.

Table 16. Otter harvest by county and sex, 2009-10 season.

County	Sex			Total
	Male	Female	Unknown	
Aitkin	36	18		54
Anoka	15	11		26
Becker	21	18		39
Beltrami	40	34		74
Benton	1	2		3
Big Stone	1	0		1
Carlton	17	13		30
Carver	3	3		6
Cass	46	44		90
Chisago	11	7		18
Clay	5	2		7
Clearwater	8	11		19
Cook	9	7		16
Crow Wing	49	27		76
Dakota	2	5		7
Douglas	4	7		11
Fillmore	1	0		1
Goodhue	2	5		7
Grant	3	3		6
Hennepin	3	3		6
Houston	8	3		11
Hubbard	23	18		41
Isanti	13	5		18
Itasca	116	75		191
Kanabec	16	7		23
Kandiyohi	3	3		6
Kittson	3	0		3
Koochiching	34	27		61
Lake	23	22		45
Lake of the Woods	8	0		8
McLeod	6	2		8
Mahnomen	4	3		7
Marshall	0	0		0
Meeker	11	5		16
Mille Lacs	13	15		28
Morrison	19	12		31
Norman	10	1		11
Olmsted	1	2		3
Ottertail	18	14		32
Pennington	1	0		1
Pine	20	17		37
Polk	7	12		19
Pope	9	3		12
Red Lake	12	8		20
Roseau	18	5		23
St. Louis	135	98		233
Scott	1	0		1
Sherburne	7	10		17
Stearns	16	8		24
Stevens	0	1		1
Swift	5	0		5
Todd	19	13		32
Traverse	1	1		2
Wabasha	9	9		18
Wadena	8	7		15
Washington	7	4		11
Wilkin	0	0		0
Winona	8	5		13
Wright	5	3		8
Unknown	8	4		12
Total	902	642	0	1,544

Table 17. Comparison of otter harvest by county, 1998-2009.

County	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Aitkin	87	103	82	100	78	87	113	132	124	53	65	54
Anoka	23	25	14	17	17	13	32	22	16	26	18	26
Becker	30	64	45	125	104	105	178	107	117	54	55	39
Beltrami	81	103	74	108	127	173	216	170	154	105	80	74
Benton	6	2	7	10	6	7	19	14	16	9	11	3
Big Stone	0	0	0	0	0	0	0	0	0	0	2	1
Carlton	39	45	29	33	40	38	53	36	39	36	29	30
Carver	0	0	0	0	0	0	0	0	0	2	5	6
Cass	149	109	107	197	189	198	255	231	236	124	160	90
Chisago	20	13	12	26	18	22	20	28	33	16	15	18
Clay	0	7	3	1	7	7	15	18	35	8	14	7
Clearwater	18	29	25	47	61	52	62	48	41	39	35	19
Cook	48	30	26	26	31	41	56	46	39	13	12	16
Crow Wing	81	77	76	96	108	119	141	102	111	63	99	76
Dakota	0	0	0	0	0	0	0	0	0	0	5	7
Douglas	7	1	1	1	0	12	27	16	30	18	28	11
Fillmore	0	0	0	0	0	0	0	0	0	6	1	1
Goodhue	0	0	0	0	0	0	0	0	0	3	3	7
Grant	0	0	0	0	0	0	0	0	0	3	3	6
Hennepin	0	0	0	0	0	0	0	0	0	1	3	6
Houston	0	0	0	0	0	0	0	0	0	9	15	11
Hubbard	28	23	19	61	64	70	91	80	72	59	72	41
Isanti	26	20	28	33	33	27	35	38	30	30	17	18
Itasca	339	220	296	337	310	382	483	362	334	205	201	191
Kanabec	24	29	32	56	40	38	57	79	62	44	29	23
Kandiyohi	0	0	0	0	0	0	0	0	0	2	6	6
Kittson	1	0	0	1	2	3	3	3	5	11	2	3
Koochiching	126	63	107	118	96	164	167	131	118	70	95	61
Lake	77	44	70	57	57	81	88	65	60	35	34	45
LOW	32	36	18	17	21	42	31	34	24	30	17	8
McLeod	0	0	0	0	0	0	0	0	0	6	6	8
Mahnomen	9	10	10	17	7	23	24	29	26	24	7	7
Marshall	5	8	16	13	35	34	29	18	7	6	2	0
Meeker	0	0	0	0	0	0	0	0	0	13	13	16
Mille Lacs	17	15	12	20	22	33	48	51	21	33	26	28
Morrison	18	30	17	45	36	46	64	77	60	45	43	31
Norman	0	2	4	3	4	1	16	17	11	9	17	11
Olmsted	0	0	0	0	0	0	0	0	0	0	2	3
Ottertail	29	20	14	51	32	45	113	85	81	50	82	32
Pennington	2	10	2	6	12	16	18	33	15	9	0	1
Pine	62	21	35	42	61	78	99	51	111	50	74	37

Table 17 (continued). Comparison of otter harvest by county, 1998-2009.

County	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Polk	23	21	34	60	63	72	104	45	47	32	25	19
Pope	0	0	0	0	0	0	0	0	0	11	12	12
Red Lake	7	8	22	18	27	35	58	26	30	19	8	20
Roseau	40	37	40	36	27	72	69	60	53	32	53	23
St. Louis	421	353	255	453	316	483	508	428	344	290	251	233
Scott	0	0	0	0	0	0	0	0	0	3	3	1
Sherburne	13	14	10	11	11	24	25	15	29	26	10	17
Stearns	11	7	5	5	17	13	22	21	33	9	38	24
Stevens	0	0	0	0	0	0	0	0	0	1	3	1
Swift	0	0	0	0	0	0	0	0	0	9	4	5
Todd	23	16	22	24	30	49	53	63	81	35	37	32
Traverse	0	0	0	0	0	0	0	0	0	1	0	2
Wabasha	0	0	0	0	0	0	0	0	0	15	7	18
Wadena	6	13	3	23	23	35	34	38	32	15	19	15
Washington	6	4	4	4	12	10	8	11	16	18	19	11
Wilkin	0	0	0	0	0	0	0	0	0	2	0	0
Winona	0	0	0	0	0	0	0	0	0	11	19	13
Wright	0	0	0	0	1	2	3	2	5	7	9	8
Unknown	12	3	2	3	0	14	13	14	22	6	18	12
Totals	1,946	1,635	1,578	2,301	2,145	2,766	3,450	2,846	2,720	1,861	1,938	1,544

Table 18. Otter harvest by sex and week, 2009-10 season.

Date	Sex			Total	% of	Cumulative
	Male	Female	Unknown	Harvest	Total	%
Oct.24 - Oct.30	82	61		143	9.26	9.26
Oct.31 - Nov.6	196	157		353	22.86	32.12
Nov.7 - Nov.13	130	100		230	14.90	47.02
Nov.14 - Nov.20	111	72		183	11.85	58.87
Nov.21 - Nov.27	90	59		149	9.65	68.52
Nov.28 - Dec.4	137	80		217	14.05	82.58
Dec.5 - Dec.11	64	44		108	6.99	89.57
Dec.12 - Dec.18	30	26		56	3.63	93.20
Dec.19 - Dec.25	37	26		63	4.08	97.28
Dec.26 - Jan.3*	18	14		32	2.07	99.35
Unknown	7	3		10	0.65	100%
Total	902	642	0	1,544	100%	

* 9-day interval.

Table 19. Distribution of otter harvest* among trappers in the northern zone, 1993-2009.

Number (%) of Takers	Number Taken					
	1	2	3	4	Total Takers	Ave. Take
1993-94	193 (33)	115 (19)	100 (17)	184 (31)	592	2.5
1994-95	250 (27)	185 (20)	143 (15)	349 (38)	927	2.6
1995-96	183 (31)	134 (23)	88 (15)	180 (31)	585	2.5
1996-97	257 (29)	205 (23)	140 (16)	283 (32)	885	2.5
1997-98	304 (33)	235 (26)	117 (13)	255 (28)	911	2.4
1998-99	263 (32)	183 (23)	139 (17)	226 (28)	811	2.4
1999-00	222 (33)	124 (19)	99 (15)	217 (33)	662	2.5
2000-01	206 (32)	122 (19)	108 (17)	201 (32)	637	2.5
2001-02	147 (23)	175 (27)	138 (21)	187 (29)	647	2.6
2002-03	253 (33)	147 (19)	122 (16)	241 (32)	763	2.5
2003-04	269 (27)	201 (20)	152 (16)	361 (37)	983	2.6
2004-05	302 (25)	235 (19)	182 (15)	498 (41)	1217	2.7
2005-06	291 (27)	213 (20)	186 (17)	386 (36)	1076	2.6
2006-07	372 (34)	216 (19)	194 (17)	328 (30)	1110	2.4
2007-08	308 (39)	153 (19)	119 (15)	207 (26)	787	2.3
2008-09	293 (37)	157 (20)	121 (15)	216 (27)	787	2.3
2009-10	237 (38)	131 (21)	93 (15)	171 (27)	632	2.3

* Product of categories above may not equal total harvest due to some unknown name/license numbers

Table 20. Distribution of otter harvest* among trappers in the southeast zone, 2007-2009.

Number (%) of Takers	Number Taken			
	1	2	Total Takers	Ave. Take
2007-08	11 (44)	14 (56)	25	1.6
2008-09	21 (62)	13 (38)	34	1.4
2009-10	20 (50)	20 (50)	40	1.5

* Product of categories above may not equal total harvest due to some unknown name/license numbers