Status of Wildlife Populations

Fall 2009

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

STATUS OF WILDLIFE POPULATIONS, FALL 2009

(Including 1998-2009 Hunting and Trapping Harvest Statistics)

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 2008

(Including 1998-2008 Hunting and Trapping Harvest Statistics)

This is the 32nd 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 on CD. 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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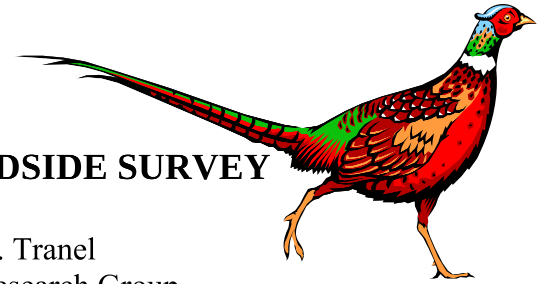

2009 MINNESOTA AUGUST ROADSIDE SURVEY

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

ABSTRACT

This report is a summary of the 2009 Minnesota August roadside survey. Population indices for ring-necked pheasants and cottontail rabbits in 2009 declined from last year. Gray partridge and white-tailed jackrabbit indices were similar to 2008, whereas white-tailed deer and mourning dove indices increased significantly. Conservation Reserve Program (CRP) enrollment in Minnesota declined by 97,000 acres from 2008, including 72,000 acres from the pheasant range. The winter of 2008-09 was moderate to severe throughout much of Minnesota's agricultural zone. Spring weather was cooler and (except for the Northwest) drier than normal. One notable spring weather event was a 3-day period during June 7-9 (the normal peak of pheasant hatch in Minnesota) characterized by rain and high temperatures below 60^{o}F. Conditions for overwinter survival of farmland wildlife in 2009 were probably below average, but reproductive conditions were generally favorable in many areas except for 1 untimely weather event and significant loss of CRP grassland habitat.

The 2009 pheasant index (58.5 birds/100 mi) declined 27% from 2008 and was 27% below the 10-year average, 43% below the long-term average, and 78% 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 2009 hen pheasant index was significantly lower than last year and the 10-year average, which reflected reduced overwinter survival associated with the first moderately severe winter since 2001. The number of broods observed was 25% below last year, which reflected fewer hens available for nesting. Overall, the size of the fall population will be close to that in 2004, when 420,000 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 West Central, Central, and South Central regions.

The gray partridge index was similar to last year, but 71% below the 10-year mean and 81% below the long-term average. Observed regional changes were not significant, but were based on small samples. Although most adults in 2009 were with broods, the number of adults and average brood size declined from last year and the 10-year average. Gray partridge counts were highest in the Southwest and South Central regions.

The cottontail rabbit index declined 42% from last year, 46% from the 10-year average, and 39% from the long-term average. Counts of cottontail rabbits were highest in the Southwest, South Central, Southeast and East Central regions. The jackrabbit index did not change significantly in 2009, but was 86% below the long-term average. The range-wide jackrabbit population peaked in the late 1950's and declined to its lowest level in 1993 (and again in 2008), from which populations have not recovered. Counts of white-tailed jackrabbits were highest in the Southwest region.

The number of mourning doves observed in 2009 increased 26% from last year, but was similar to the 10-year

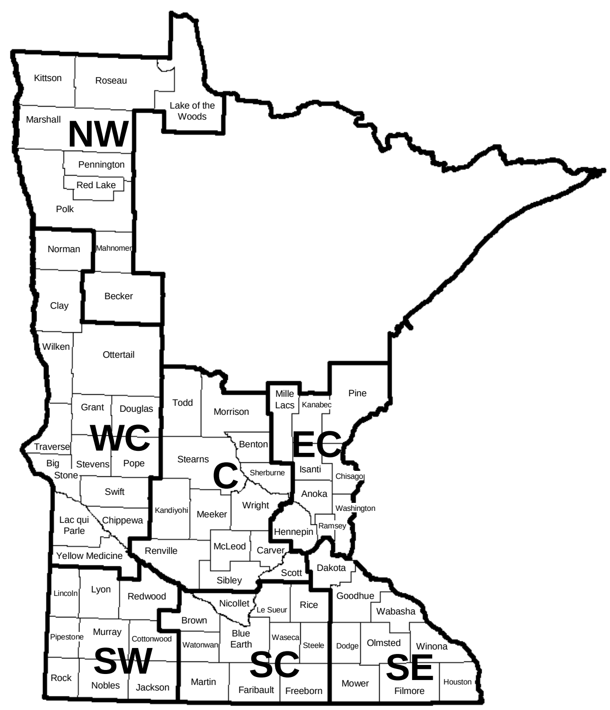

Figure 1. Survey regions for Minnesota's August roadside survey.

and long-term averages. Likewise, the white-tailed deer index increased by 30% from last year, with a significant regional increase in the Southwest.

INTRODUCTION

This report is a summary of the 2009 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 2009; 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

Winter severity, which is determined primarily by duration of snow cover, was moderate to severe throughout most of the farmland region in Minnesota during 2008-09 (the first moderately severe winter since 2001). Most of the farmland zone was snow covered during December – January. An early February thaw opened croplands in the southern agricultural regions and gave food-stressed birds a reprieve (Minnesota Climatology Working Group [MCWG], http://climate.umn.edu/doc/snowmap.htm). However, snow cover persisted through mid-March in the Central and East Central agricultural regions and through early April in the West Central and Northwest agricultural regions. Regional temperatures averaged 2.9ºF below the long-term average for each month, December - March (range +2ºF to -7ºF, MCWG, http://climate.umn.edu/cawap/monsum/monsum.asp). Below normal temperatures continued in all farmland regions from April – July. The spring nesting period was also drier than average in all agricultural regions except the Northwest. One notable spring weather event was a 3-day period during June 7-9 (the normal peak of pheasant hatch in Minnesota) characterized by rain and high temperatures below 60^{o}F. Thus, conditions for over-winter survival of farmland wildlife should have been below average throughout most of the farmland region (especially the Northwest and West Central agricultural regions), but reproductive conditions were generally favorable except for 1 untimely event.

HABITAT CONDITIONS

Conservation Reserve Program (CRP) enrollment in Minnesota’s pheasant range declined by nearly 72,000 acres from 2008, following a 38,000 acre loss the previous year. However, gains in Wetlands Reserve Program (WRP) enrollment and acquisitions of Wildlife Management Areas (WMA) and Waterfowl Production Areas (WPA) in the pheasant range partially offset CRP losses, yielding a net loss of about 64,000 acres of protected habitat since 2008. Habitat enrolled in farm programs (e.g., CRP, Conservation Reserve Enhancement Program, Reinvest In Minnesota, WRP) fell below 1 million acres in the pheasant range for the first time since 2004, whereas habitat protected as WMAs and WPAs grew to 676,000 acres. Within the pheasant range, protected grasslands account for about 5.9% of the landscape (range: 2.9-10.1%; 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 63,000 acres in Minnesota scheduled to expire on September 30, 2009. However, interest is high in Minnesota's new CRP SAFE practice, and conservation interests have requested expansion of this popular program. 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 2,500 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 beginning in 2010. In addition, the Working Lands Initiative will attempt to protect and expand large wetland-grassland complexes in 12 counties in western Minnesota.

SURVEY CONDITIONS

Cooperators completed 170 of the 171 routes in 2009. 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 94% of the survey routes, which was slightly less than for 2008 (98%) but better than the 10-year average (92%). Clear skies (<30% cloud cover) were present at the start of 83% of routes, with wind speeds <7 mph recorded for 96% of routes. The survey period was extended to July 27th - August 17th to allow most routes to be completed.

RING-NECKED PHEASANT

The average number of pheasants observed (58.5/100 mi) decreased 27% from 2008 (95% CI: -41 to -13%; Table 2). The 2009 pheasant index was also 27% below the 10-year average (95% CI: -38 to -16%; Table 2; Figure 2A), 43% below the long-term average (95% CI: -53 to -32%; Table 2), and 78% below the benchmark years of 1955-64 (95% CI: -89 to -66%). Total pheasants observed per 100 miles ranged from 9.6 in the Southeast to 115.8 in the Southwest (Table 3, Figure 5). Declines from last year were significant only for the West Central and South Central regions (Table 3).

The range-wide hen index (9.4 hens/100 mi) declined 34% (95% CI: -51 to -17%) from last year, 22% (95% CI: -35 to -10%) from the 10-year average (Table 2), and varied from 1.4 hens/100 miles in the Southeast to 19.6 hens/100 miles in the Southwest. The cock index (7.6 cocks/100 mi) declined 39% (95% CI: -54 to -23%) from 2008, but was similar to the 10-year average (Table 2). The 2009 hen:cock ratio was 1.24, which was below average (1.53) for the CRP years (1987-2009). A low sex ratio may reflect a delayed nesting effort, but evidence of this is relatively weak for 2009.

The number of pheasant broods observed (9.0/100 mi) declined 25% (95% CI: -40 to -9%) from last year, 28% (95% CI: -38 to -19%) from the 10-year average, and 33% (95% CI: -44 to -21%) from the long-term average (Table 2). The brood index remains far below the benchmark years of 1955-64 (34.7 broods/100 mi). Regional brood indices ranged from 1.6 broods/100 miles in the Southeast to 17.0 broods/100 miles in the Southwest. Average brood size in 2009 (4.6 ± 0.1 [SE] chicks/brood) was similar to last year (4.5 ± 0.1 [SE] chicks/brood), but below the 10-year mean (4.8 chicks/brood) and the long-term average (5.6 chicks/brood; Table 2). The median hatch date for pheasants was June 12 (n = 340), the same as last year and 4 days later than the 10-year average (Table 2). The distribution of estimated hatch dates for observed broods was unimodal and approximately normally distributed, which suggests that many early nesting attempts were successful (vs. wide-spread nest failure, which often leads to an extensive renesting effort and a 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 moderately severe winter throughout the pheasant range (the first since 2001) resulted in reduced hen counts. In addition, habitat loss reduced nesting opportunities and one period of cool and wet weather at the normal peak of pheasant hatch appeared to reduce early brood survival. Thus, a decrease in the range-wide pheasant index was not surprising. Overall, the size of the fall population will be close to that in 2004, when 420,000 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 West Central, Central, and South Central regions.

GRAY PARTRIDGE

Range-wide, the gray partridge index (2.7 partridge/100 miles) was similar to last year but 71% below the 10-year average (95% CI: -101 to -41%) and 81% below the long-term average (95% CI: -99 to -63%, Table 2, Figure 2B). Within regions, the partridge index ranged from 0.0/100 miles in the East Central and Southeast regions to 8.2/100 miles in the Southwest (Table 3, Figure 6). There were no significant regional changes from last year (Table 3).

The number of adults observed per 100 miles declined 56% from last year (95% CI: -103 to -10%), 75% (95% CI: -100 to -49%) from the 10-year mean, and 82% (95% CI: -98 to -66%) from the long-term average (Table 2). The ratio of broods per 100 adult partridge (46%) was 98% above 2008, 46% above the 10-year average, and 40% above the long-term average (Table 2). Average brood size in 2009 (6.7 chicks/brood) was smaller than in 2008 (9.3 chicks/brood), the 10-year average (7.8 chicks/brood), and the long-term average (8.9 chicks/brood). Total broods observed per 100 miles was similar to the 2008 estimate, but 64% below the 10-year average (95% CI: -94 to -34%), and 77% below the long-term average (95% CI: -96 to -59%, Table 2). The median hatch date was June 15, which was 10 days earlier than in 2008 and 8 days earlier than the 10-year average, but estimated from a small sample of observations (n = 12).

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 only produce well in the Midwest during dry or drought years. Consequently, gray partridge are more strongly affected by weather conditions during nesting and brood rearing than are pheasants. The Southwest and South Central regions offer the best opportunity for harvesting gray partridge in 2009.

COTTONTAIL RABBIT and WHITE-TAILED JACKRABBIT

The eastern cottontail rabbit index (3.7 rabbits/100 mi) declined 42% from last year (95% CI: -61 to -23%), 46% from the 10-year average (95% CI: -59 to -33%), and 39% from the long-term average (95% CI: -52 to -27%, Table 2, Figure 3A). The cottontail rabbit index ranged from 0.2 rabbits/100 miles in the Northwest to 6.3 rabbits/100 miles in the Southwest region (Table 3, Figure 7). Declines from 2008 were significant in the Central, East Central, and South Central Regions (Table 3). The best opportunities for harvesting cottontail rabbits are in the Southwest, South Central, Southeast, and East Central regions.

The index of white-tailed jackrabbits did not change significantly from 2008 or the 10-year average but was 86% below the long-term average (95% CI: -102 to -70%, Table 2, Figure 3B). The range-wide jackrabbit population peaked in the late 1950’s and declined to its lowest level (0.2 rabbits/100 mi) in 1993 and again in 2008 (Figure 3B). The long-term decline in jackrabbits probably 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 low numbers of sightings.

WHITE-TAILED DEER

The index for white-tailed deer (17.8/100 mi) increased by 30% (95% CI: 2 to 58%) from last year, and was 31% above the 10-year average (95% CI: 8 to 54%) and 104% above the long-term average (95% CI: 61 to 147%, Table 2, Figure 4A). Among regions, deer indices increased significantly from 2008 only in the Southwest region (Table 3).

MOURNING DOVE

The number of mourning doves observed (244.1/100 mi) in 2009 increased 26% (95% CI: 8 to 44%) from last year and was similar to the 10-year average and the long-term average (Table 2, Figure 4B). The mourning dove index ranged from 63.4 doves/100 miles in the Northwest region to 330.3 doves/100 miles in the South Central Region. The number of mourning doves heard along U.S. Fish and Wildlife Service call-count survey (CCS) routes (n = 9) in Minnesota was similar to last year. Trend analyses indicated the number of mourning doves heard along the CCS routes declined 0.8% per year (90% CI: -64 to 4.7%) during 2000-2009 and 2.0% per year (90% CI: -3.4 to -0.6%) during 1966-2009 (Dolton et al. 2009).

SANDHILL CRANE

For the first time in 2009, observers were asked to report the number of adult and juvenile sandhill cranes observed on the August Roadside Survey. Range-wide, the 2009 index averaged 8.2 cranes/100 miles of survey, including 1.2 juveniles/100 miles (Table 2). Among regions, crane indices ranged from 0.0/100 miles in the West Central, Southwest, and Southeast regions to 36.7 cranes/100 miles in the Northwest region (Table 3). Juvenile cranes were observed in the Central (2.0/100 mi), East Central (5.4/100 mi), and Northwest (3.8/100 mi) regions.

OTHER SPECIES

Notable incidental sightings: 2 bald eagles (Faribault and Norman Counties), 1 barred owl (Pennington County), 1 Coopers hawk (Rice County), 2 northern harriers (Redwood and Steele Counties), 6 great blue herons (Nobles, Pennington, Rock, Waseca, and Watonwan Counties), 1 green heron (Rock County), 1 loggerhead shrike (Brown County), 1 red-headed woodpecker (Redwood County), 2 upland sandpipers (Mower and Traverse Counties), 1 prairie chicken (Red Lake County), 18 sharp-tailed grouse (Lake of the Woods and Marshall Counties), 315 wild turkeys (Benton, Blue Earth, Chisago, Dodge, Douglas, Freeborn, Kandiyohi, Le Sueur, Marshall, Martin, Mille Lacs, Morrison, Mower, Nicollet, Otter Tail, Pennington, Polk, Pope, Renville, Rice, Scott, Stearns, Todd, Traverse, Waseca, Washington, and Winona Counties), 1 moose (Marshall County), 1 wolf (Marshall County), 3 coyotes (Red Lake, Rice, and Winona Counties), and 1 gray fox (Martin County).

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Table 1. Abundance (total acres) and density (acres/mi^2) of undisturbed grassland habitat within pheasant range, 2009[a].

	Cropland Retirement									Density
AGREG	CRP	CREP	RIM	RIM-WRP	WRP	USFWS[c]	MNDNR[d]	Total	%	ac/mi^2
WC[b]	329,754	37,450	17,079	2,592	19,659	173,067	104,534	684,134	10.1	64.4
SW	105,963	24,549	12,214	713	830	17,546	54,338	216,154	5.7	36.6
C	138,057	14,490	17,028	785	3,212	84,626	45,691	303,889	5.0	32.2
SC	90,595	27,610	11,813	4,707	9,367	8,382	30,640	183,113	4.5	29.0
SE	79,026	2,262	5,554	556	620	18,470	51,548	158,036	4.3	27.3
EC	4,367	0	1,265	0	4	2,504	84,314	92,453	2.9	18.4
Total	747,761	106,360	64,953	9,353	33,692	304,596	371,065	1,637,779	5.9	38.0

[a] Unpublished data, Tabor Hoek, BWSR, 5 August 2009.

[b] Does not include Norman County.

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

[d] MNDNR Wildlife Management Areas (WMA).

Table 2. Range-wide trends (% change) in number of wildlife observed per 100 miles driven, Minnesota August roadside survey, 1955-2009.

Species	Change from 2008[a]					Change from 10-year average[b]				Change from long-term average[c]			
Subgroup	*n*	2008	2009	%	95% CI	*n*	1999-08	%	95% CI	*n*	LTA	%	95% CI
Ring-necked pheasant													
Total pheasants	152	80.3	58.5	-27	±14	150	81.0	-27	±11	151	102.4	-43	±10
Cocks	152	12.4	7.6	-39	±15		8.0	-4	±16		11.5	-33	±14
Hens	152	14.3	9.4	-34	±17		12.3	-22	±12		14.8	-36	±12
Broods	152	11.9	9.0	-25	±16		12.7	-28	±10		13.4	-33	±12
Chicks per brood	341	4.5	4.6	3			4.8	-4			5.6	-17	
Broods per 100 hens	341	83.1	94.5	14			103.8	-9			101.4	-7	
Median hatch date	340	Jun 12	Jun 12				Jun 08						
Gray partridge													
Total partridge	170	4.8	2.7	-44	±68	168	9.3	-71	±30	151	16.2	-81	±18
Adults	170	1.5	0.7	-56	±46		2.6	-75	±26		4.1	-82	±16
Broods	170	0.4	0.3	-13	±75		0.9	-64	±30		1.4	-77	±18
Chicks per brood	12	9.3	6.7	-28			7.8	-15			8.9	-25	
Broods per 100 adults	12	23.4	46.4	98			31.8	46			33.1	40	
Median hatch date	12	Jun 25	Jun 15				Jun 23						
Eastern cottontail	170	6.4	3.7	-42	±19	168	6.9	-46	±13	151	6.8	-39	±12
White-tailed jackrabbit	170	0.2	0.3	39	±108	168	0.4	-36	±43	151	1.9	-86	±16
White-tailed deer	170	13.7	17.8	30	±28	168	13.7	31	±23	169	8.8	104	±43
Mourning dove	170	193.4	244.1	26	±18	168	220.3	12	±16	151	275.1	-3	±16
Sandhill Crane													
Total cranes	170		8.2										
Juveniles	170		1.2										

[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 = 1955-2008, except for deer = 1974-2008. 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, 1955-2009.

Region / Species	Change from 2008[a] *n*	2008	2009	%	95% CI	Change from 10-year average[b] *n*	1999-08	%	95% CI	Change from long-term average[c] *n*	LTA	%	95% CI
Northwest[d]													
Gray partridge	18	1.8	0.2	-88	±189	18	0.4	-41	±141	18	3.9	-94	±74
Eastern cottontail		0.4	0.2	-50	±241		1.1	-80	±69		1.0	-77	±56
White-tailed jackrabbit		0.4	0.2	-50	±50		0.5	-57	±88		0.7	-68	±78
White-tailed deer		44.7	48.2	8	±68		44.0	9	±53		28.4	70	±100
Mourning dove		88.4	63.4	-28	±51		88.0	-28	±37		128.1	-51	±27
Sandhill Crane			36.7										
West Central													
Ring-necked pheasant	37	90.4	65.2	-28	±17	36	75.1	-11	±16	37	103.8	-37	±19
Gray partridge		1.6	1.0	-40	±205		2.8	-64	±89		10.5	-91	±27
Eastern cottontail		3.6	2.7	-24	±51		3.5	-20	±43		4.2	-36	±36
White-tailed jackrabbit		0.1	0.1	0	±291		0.6	-83	±62		2.5	-96	±21
White-tailed deer		11.6	17.3	50	±59		11.3	57	±62		8.2	111	±87
Mourning dove		185.0	309.4	67	±52		267.8	18	±34		381.5	-19	±25
Sandhill Crane			0.0										
Central													
Ring-necked pheasant	30	61.2	59.2	-3	±40	29	68.8	-11	±24	29	76.4	-20	±28
Gray partridge		2.3	0.8	-65	±155		4.5	-82	±58		10.3	-92	±45
Eastern cottontail		6.9	3.2	-54	±28		7.1	-53	±25		6.5	-49	±27
White-tailed jackrabbit		0.0	0.3				0.2	32	±175		1.3	-79	±36
White-tailed deer		6.2	8.7	39	±61		6.5	39	±53		4.0	123	±99
Mourning dove		159.8	255.3	60	±43		191.9	37	±37		236.0	11	±35
Sandhill Crane			7.1										
East Central													
Ring-necked pheasant	14	78.3	44.6	-43	±45	14	58.6	-24	±40	14	87.4	-49	±29
Gray partridge		0.0	0.0				0.0	-100	±216		0.2	-100	±133
Eastern cottontail		13.1	4.3	-67	±43		11.6	-63	±24		8.7	-51	±30
White-tailed jackrabbit		0.0	0.0				0.0				0.2	-100	±59
White-tailed deer		18.0	17.4	-3	±62		15.7	11	±42		7.8	125	±86
Mourning dove		87.1	115.7	33	±56		93.3	24	±46		128.0	-10	±44
Sandhill Crane			36.6										

Table 3. Continued.

Region / Species	Change from 2008 *n*	2008	2009	%	95% CI	Change from 10-year average *n*	1999-08	%	95% CI	Change from long-term average *n*	LTA	%	95% CI
Southwest													
Ring-necked pheasant	19	158.5	115.8	-27	±40	19	161.5	-28	±32	19	119.9	-3	±38
Gray partridge		15.8	8.2	-48	±131		35.8	-77	±32		43.7	-81	±23
Eastern cottontail		3.8	6.3	67	±87		9.1	-31	±32		8.3	-24	±28
White-tailed jackrabbit		0.8	1.3	52	±170		1.0	30	±117		4.0	-69	±41
White-tailed deer		11.8	19.1	63	±56		12.0	60	±62		7.6	152	±109
Mourning dove		353.4	327.8	-7	±20		342.7	-4	±20		316.2	4	±27
Sandhill Crane			0.0										
South Central													
Ring-necked pheasant	32	81.1	52.5	-35	±32	32	90.8	-42	±16	32	136.4	-62	±14
Gray partridge		5.0	7.5	50	±208		16.0	-53	±70		19.8	-62	±46
Eastern cottontail		10.9	4.9	-55	±37		9.8	-50	±27		7.8	-37	±31
White-tailed jackrabbit		0.1	0.0	-100	±204		0.3	-100	±57		1.8	-100	±25
White-tailed deer		4.9	6.3	28	±72		5.4	16.1	±46		3.3	91	±75
Mourning dove		266.6	330.3	24	±45		257.3	28	±49		257.0	29	±55
Sandhill Crane			0.3										
Southeast													
Ring-necked pheasant	20	15.7	9.6	-39	±58	20	33.2	-71	±28	20	77.0	-88	±32
Gray partridge		9.8	0.0	-100	±106		6.8	-100	±65		14.6	-100	±32
Eastern cottontail		6.6	4.6	-30	±58		8.2	-44	±42		7.8	-41	±35
White-tailed jackrabbit		0.0	0.2				0.2	11	±240		0.6	-69	±60
White-tailed deer		13.5	22.4	65	±92		14.9	51	±71		9.6	134	±136
Mourning dove		159.0	141.8	-11	±33		208.8	-32	±29		227.9	-38	±25
Sandhill Crane			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 = 1955-2008, except for Northwest region (1982-2008) and white-tailed deer (1974-2008). Estimates based on routes (*n*) surveyed ≥40 years (1955-2008), 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.

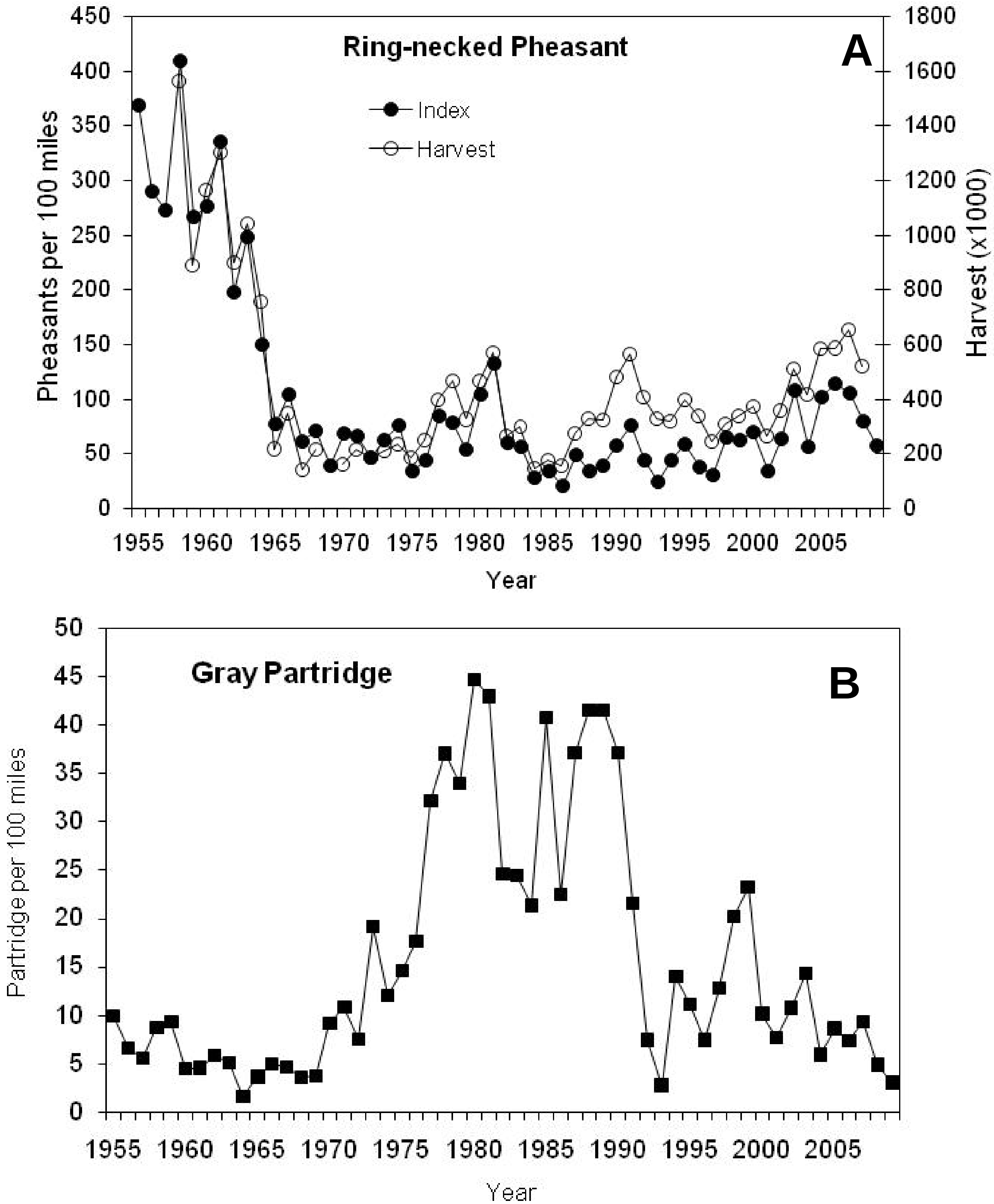

Figure 2. Range-wide index of ring-necked pheasants (**A**) and gray partridge (**B**) seen per 100 miles driven. Does not include the Northwest region. Based on all survey routes completed.

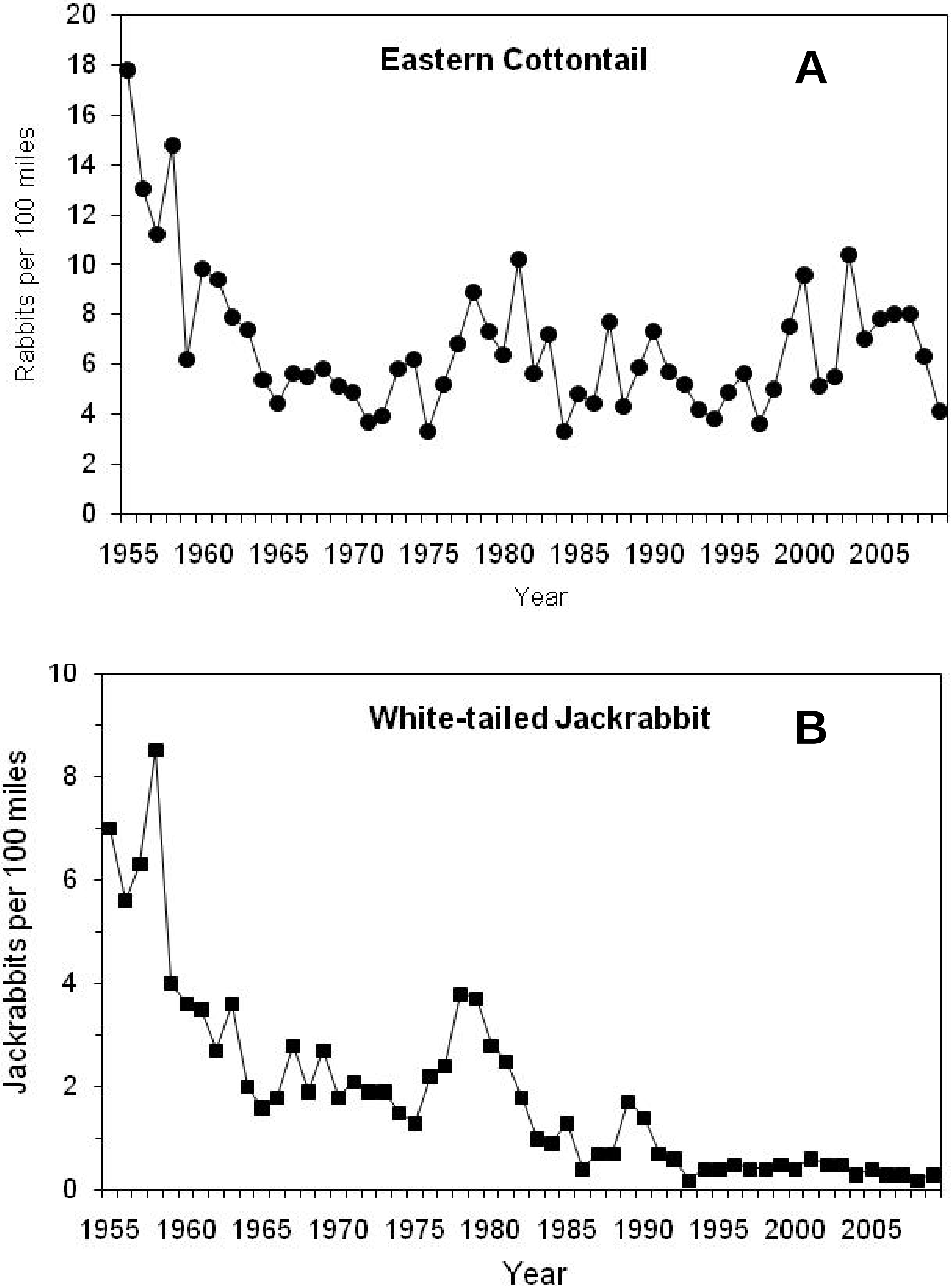

Figure 3. Range-wide index of eastern cottontail (**A**) and white-tailed jackrabbits (**B**) seen per 100 miles driven. Does not include the Northwest region. Based on all survey routes completed.

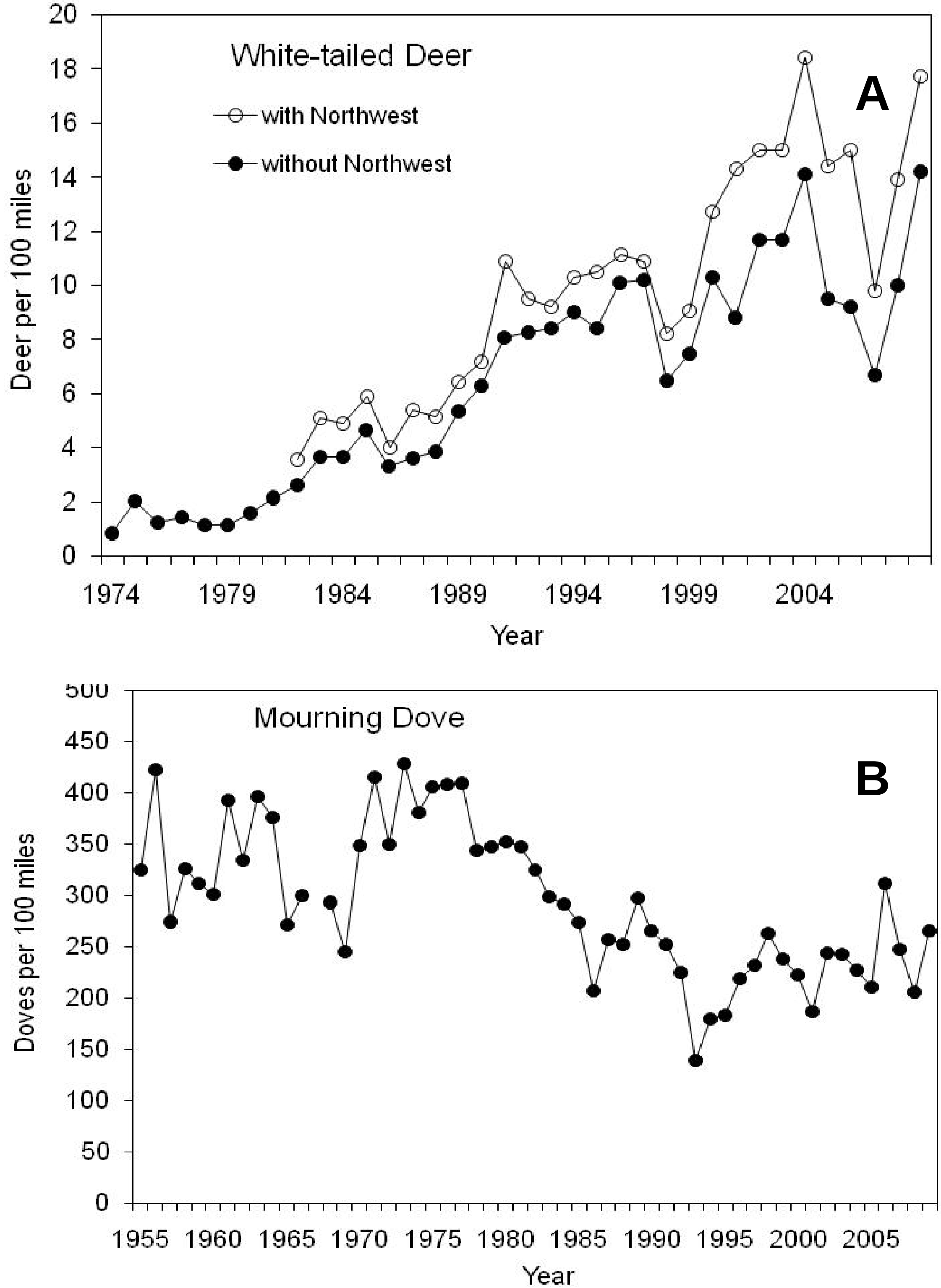

Figure 4. Range-wide index of white-tailed deer (**A**) and mourning doves (**B**) seen per 100 miles driven. Doves were not counted in 1967 and the dove index does not include the Northwest region. Based on all survey routes completed.

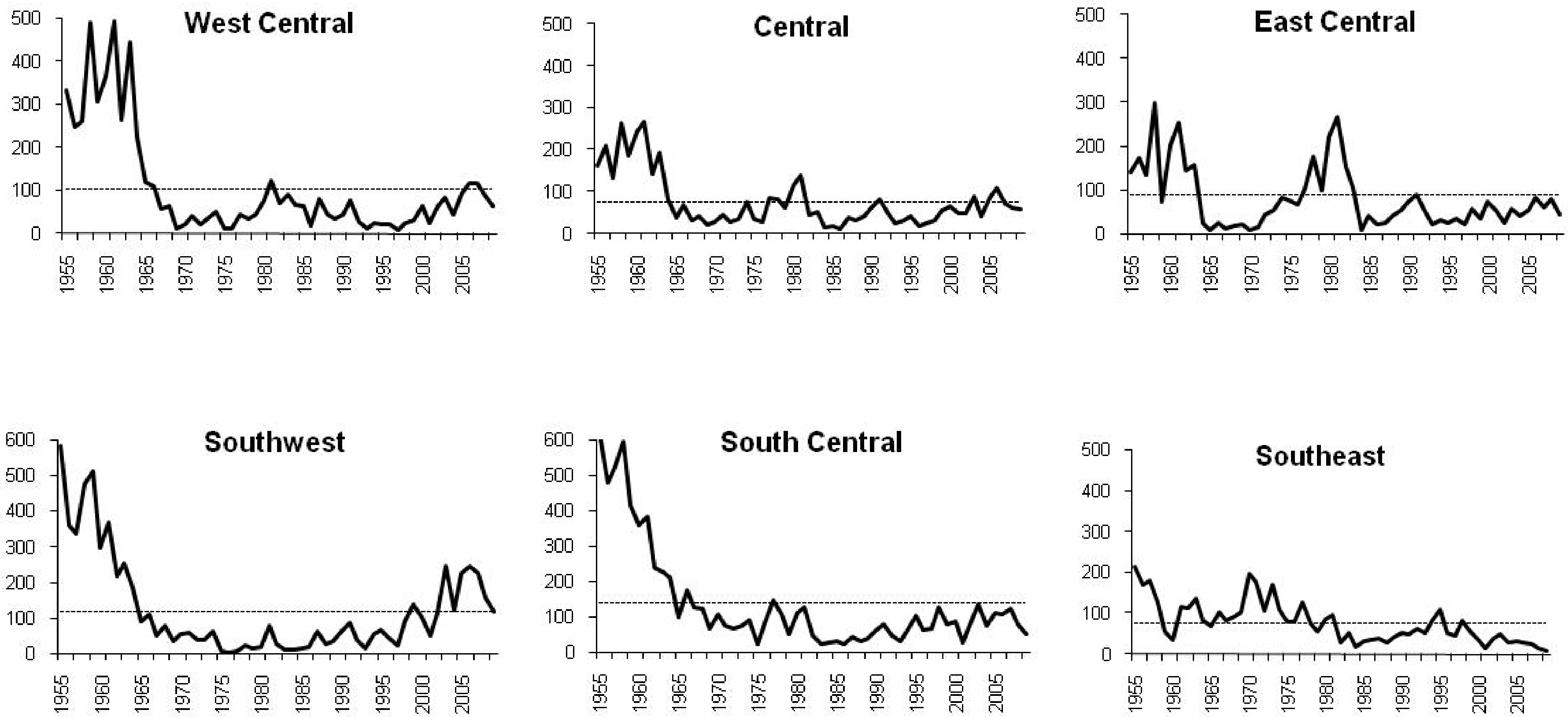

Figure 5. Regional index (——) and long-term average (......) of **ring-necked pheasants seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis is not the same scale among survey regions.

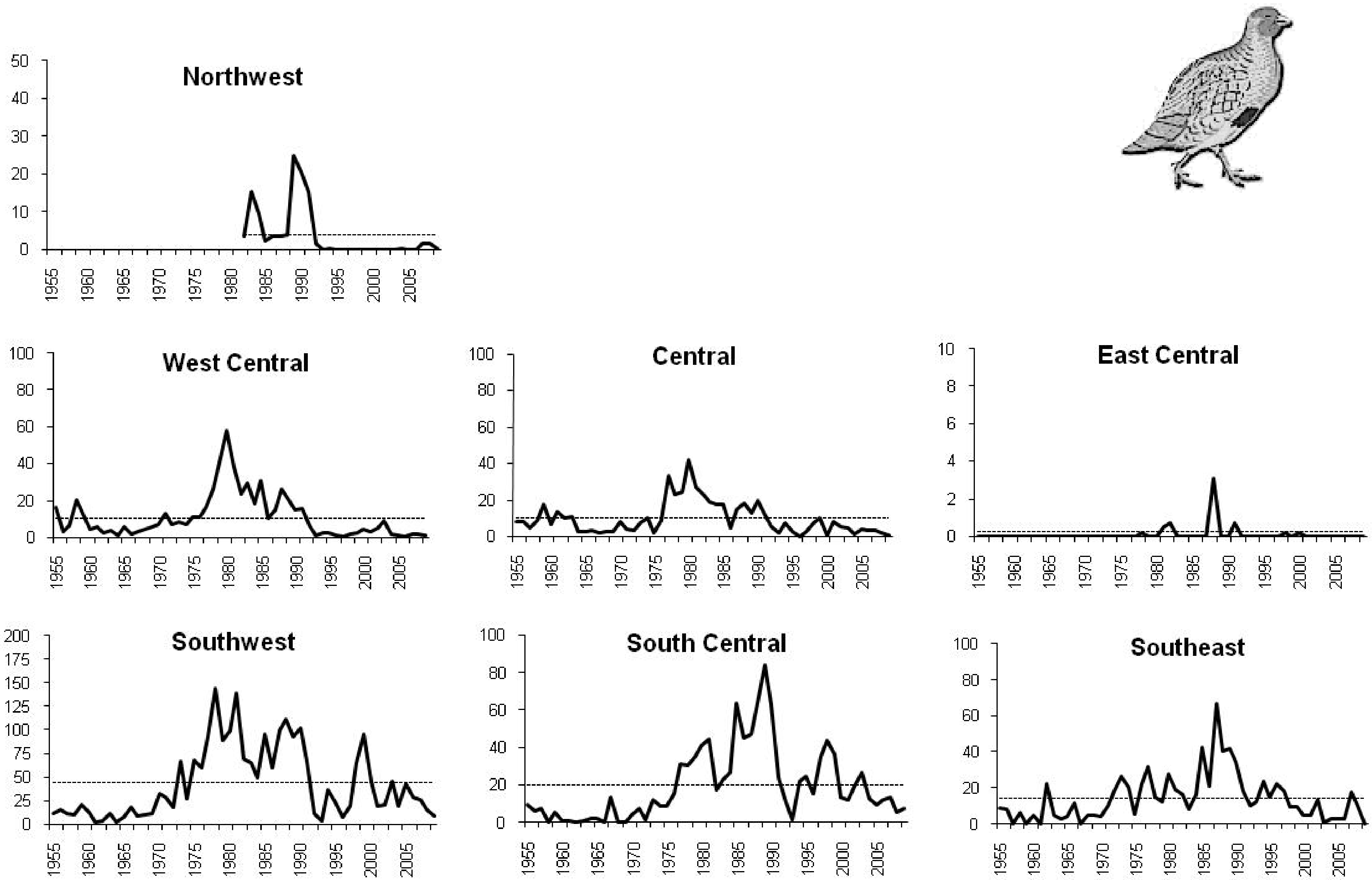

Figure 6. Regional index (——) and long-term average (......) of **gray partridge seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis is not the same scale among survey regions.

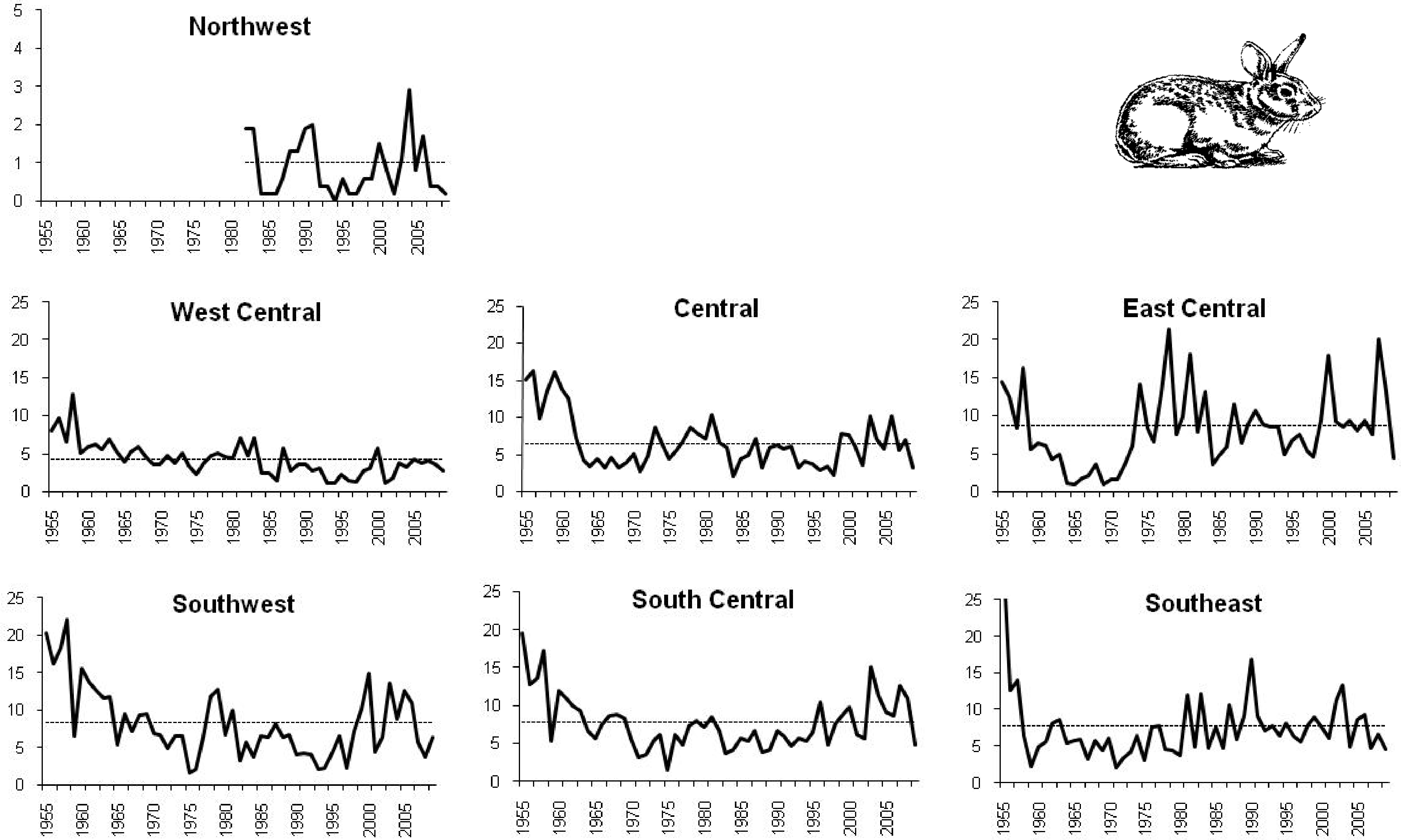

Figure 7. Regional index (——) and long-term average (·······) of **cottontail rabbits seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis is not the same among survey regions.

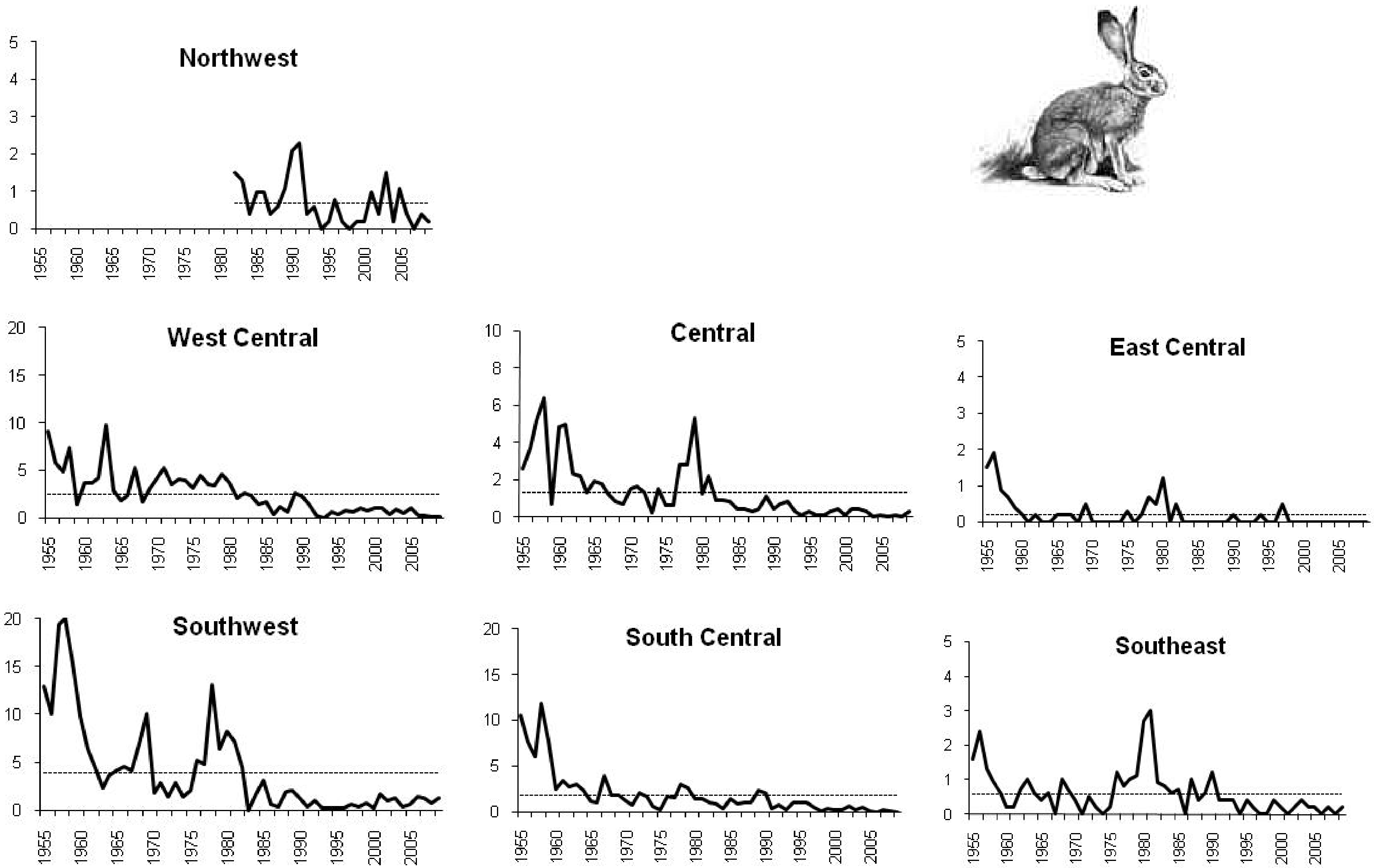

Figure 8. Regional index (____) and long-term average (.......) of **white-tailed jackrabbits seen per 100 miles driven**, Minnesota August roadside survey (1955-present). Based on all survey routes completed. **Note:** scale of vertical axis is not the same among survey regions.

MONITORING POPULATION TRENDS OF WHITE-TAILED DEER IN MINNESOTA'S FARMLAND/TRANSITION ZONE – 2009

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 73 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 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 (Figure 3).

We began using a youth-only antlerless permit system for the first time in 2009, 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 most PA densities were at deer density goals established in 2005. However, some populations were being managed aggressively and additional population reductions were expected 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). A primary concern was over-harvesting deer on the Agassiz National Wildlife Refuge where hunter access was unlimited and the area was designated as intensive.

Crookston/TRF Unit – Populations were generally stable with 2 PA populations showing declines due to the use of early antlerless seasons over the past 4 hunting seasons. However, deer densities remain well above goal and the intent was to further reduce most deer densities. Similar to the Karlstad unit, deer densities averaged 6 deer per square mile (SD = 2 deer per square mile). This area was active in the *Alternative Deer Management* (ADM) *Study* and the study will be completed following the 2009 hunting season. Preliminary findings suggested the primary problem facing managers in this region who desire further population reductions is low hunter participation rates. Managers have suggested adding a late antlerless hunting season to increase hunter effort and remedy the low hunter participation rate issue. Many of these populations will be surveyed using aerial surveys prior to framing management recommendations in 2010.

Mahnomen Unit – With the exception of PA 297, all PA populations were near goal or the densities were moving toward goal densities established in 2006. Permit Area 297 was designated as a lottery PA in 2009 to relieve hunter pressure on antlerless deer. 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 – Some data were showing that populations were moving toward goal, but all populations remained well under goal and conservative management strategies were generally employed during 2009. Managers will consider using youth-only antlerless permits if data are not more conclusive that populations are increasing in 2010. Population densities varied in this region and averaged 4 deer per square mile (SD = 3 deer per square mile).

Osakis Unit – Most populations have increased and were at or near goal densities. Conservative management strategies were used in most PAs of this unit during 2009 due to densities being near goal. 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 or slightly declining. However, all PA populations remained well above goal in 2009. This unit was an active participant in the ADM study and most managers are inclined to designating areas as intensive in 2010 due to the success of the early antlerless season. Population densities averaged 12 deer per square mile (SD = 3 deer per square mile) and many of these deer populations will be surveyed using aerial surveys or distance sampling prior to next spring as part of the ADM study.

Hutchinson Unit – Deer populations were generally well below density goals and the population dynamics have at best been stable over the past 3 years. Therefore, managers used youth-only antlerless permits for the 2009 hunting season in attempt to reduce antlerless harvests and allow populations to move toward goal in some PAs. Densities varied considerably in this unit and averaged 6 deer per square mile (SD = 4 deer per square mile).

Southern Management Units

Minnesota River Unit – Deer densities were at or near goal densities in all PAs and the goal was to stabilize deer numbers in the future. Lottery management strategies have been used in the past to achieve sustainable harvests. Deer densities have not declined along the Minnesota River valley like in the farmland PAs just to the north and south of this unit. Deer densities averaged 6 deer per square mile (SD = 2 deer per square mile).

Slayton Unit – Population densities were well below goal in all PAs in this unit. Deer density goals were established in 2007 with the goal of increasing deer numbers by 25-50%. While several populations have remained stable, most have declined over the past 2 years and no data suggest these deer densities are moving toward goal. Consequently, youth-only antlerless licenses were offered in many PAs and will likely be offered again in 2010 so that progress is made to achieve these established goals. Deer densities averaged 4 deer per square mile (SD = 2 deer per square mile) in spring 2009.

Waseca Unit – Population densities have generally been stable over the past few years and are at or near density goals. 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). Deer will be tested for chronic wasting disease in a small area of the eastern portion of this unit.

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 2 years. Although deer densities have begun to decline in those 2 PAs, early antlerless seasons will be used again in 2009 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. Harvested deer will be tested for chronic wasting disease in this unit during 2009.

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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, 2009.

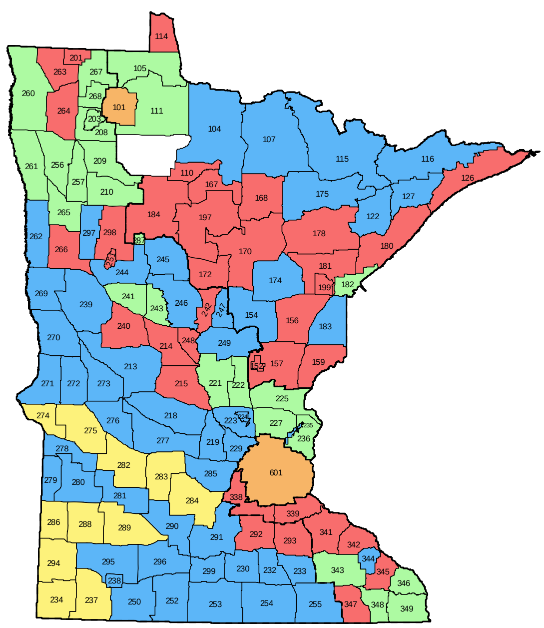

Figure 2. Deer management strategies used in permit areas throughout Minnesota, 2009.

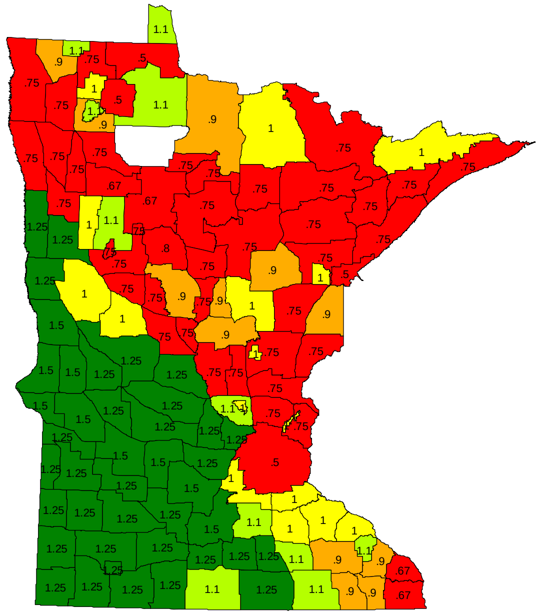

Figure 3. Population density goals in deer permit areas in Minnesota, 2009.

Table 1. Pre-fawn deer density (deer/mi^2) as simulated from population modeling in each permit area of Minnesota's Farmland/Transition Zone, 1997-2009.

Region / Permit Area	Area (mi^2)	Pre-fawning Density 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Karlstad														
201	161	2	2	3	4	4	5	5	4	3	4	3	3	4
260	1249											7	7	7
263	512											5	5	5
203	118	2	3	4	5	5	6	8	7	5	4	5	6	5
208	379	2	3	3	4	4	4	5	4	4	4	4	4	4
267	472											5	4	5
268	229											9	10	11
264	669											7	7	7
Total	3789	2	3	3	4	4	5	6	5	4	4	6	6	6
Crookston														
261	795											3	4	4
256	653	6	6	6	6	7	8	8	8	7	7	7	7	7
257	413	7	8	8	8	8	8	7	6	7	7	7	7	6
209	639	5	6	6	6	7	7	7	7	7	7	7	6	5
210	615	10	10	11	11	11	12	11	11	12	11	11	10	9
Total	3115	7	8	8	8	8	9	8	8	8	8	7	7	6
Mahnomen														
262	677											3	3	4
265	494											10	10	10
266	617										5	6	8	8
297	438										4	3	3	2
Total	2226										5	6	6	6

Region Permit Area	Area (mi^2)	Pre-fawning Density 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Morris														
269	650	3	3	3	3	4	4	4	4	4	3	2	3	3
270	748	3	3	3	3	3	3	4	4	2	1	1	1	1
271	632	2	2	2	2	2	2	3	3	4	2	1	1	2
272	531	4	3	3	3	3	4	4	2	2	2	2	2	2
273	572										7	7	8	9
274	360	7	6	6	5	4	4	4	4	4	4	4	4	5
275	764	5	4	4	4	3	3	3	3	4	4	3	3	4
276	543	9	9	9	8	8	8	8	7	7	7	6	6	7
282	779	1	1	1	1	1	1	1	1	2	1	1	2	2
Total	5579	4	4	4	4	4	4	4	4	4	3	3	3	4
Osakis														
239	922	13	13	15	16	16	15	14	13	12	12	11	10	11
240	642	20	21	23	25	26	27	26	21	21	20	19	18	17
213	1057										14	13	13	14
214	557	17	17	18	18	19	19	19	20	19	18	18	16	14
215	701	9	9	9	9	9	10	10	9	8	9	8	8	9
Total	3879	15	15	16	17	18	18	17	16	15	15	14	13	13
Cambridge														
221	642	10	10	11	12	11	12	13	13	12	13	13	12	11
222	413	13	13	14	14	14	15	15	14	14	14	13	11	10
223	377	10	9	8	11	10	9	11	9	8	11	11	10	11
225	618	14	14	15	18	19	16	16	15	13	13	14	14	13
227	471	13	13	13	13	12	11	11	10	9	13	14	13	13
229	287	5	5	5	6	6	6	7	7	6	7	7	6	7
236	372	16	16	17	17	16	17	17	18	18	18	18	18	17
Total	3180	12	11	12	13	13	12	13	12	11	13	13	12	12

Region		Pre-fawning Density												
Permit Area	Area (mi^2)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hutchinson														
218	884										7	6	6	6
277	813										6	6	7	8
219	392	9	8	8	9	7	7	8	7	7	7	7	7	8
229	287	5	5	5	6	6	6	7	7	6	7	7	6	7
285	550	4	3	4	4	4	4	5	6	4	3	3	3	3
283	614	3	3	3	3	3	4	4	3	3	3	4	4	5
284	838	2	1	1	2	2	2	2	2	3	2	3	2	2
Total	4378	5	4	4	5	4	5	5	5	5	5	5	5	6
Minnesota River														
278	401	9	9	8	8	8	8	9	10	8	8	8	8	9
281	575	5	5	5	5	4	4	5	5	6	4	4	5	6
290	662	4	4	4	4	4	4	4	4	4	4	4	5	5
291	802	4	4	4	4	4	4	5	5	5	4	4	5	5
Total	2440	6	6	5	5	5	5	6	6	6	5	5	6	6
Slayton														
279	344	7	6	7	7	6	6	6	5	5	4	4	5	6
280	675	2	2	2	2	2	2	2	2	3	2	3	3	4
286	446	2	2	2	3	4	4	4	4	4	4	4	4	5
288	625	3	3	2	3	4	4	4	4	4	5	5	6	6
289	816	2	1	2	1	1	1	2	2	1	2	2	2	2
294	686	3	3	3	3	3	3	3	4	3	3	3	3	3
295	840	3	3	3	3	3	3	4	4	5	4	4	4	4
296	666	2	2	3	3	3	3	3	3	3	2	2	2	2
234	636	3	3	3	4	4	4	4	5	4	4	4	4	4
Total	5734	3	3	3	3	3	3	4	4	4	3	3	4	4

Region Permit Area	Area (mi^2)	Pre-fawning Density												
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Waseca														
292	480	9	8	8	8	7	7	8	7	7	8	7	6	5
293	511	9	8	8	8	8	8	7	7	8	8	7	7	7
299	386	6	6	6	6	5	5	5	5	6	5	6	5	6
230	452	3	3	3	3	3	3	4	4	4	4	5	5	4
232	377	4	4	4	4	4	4	4	4	4	5	5	5	5
233	385	5	4	4	4	4	4	5	5	4	4	4	4	4
253	974	3	3	3	3	3	3	3	4	3	3	3	3	4
254	930	4	4	4	4	4	4	4	4	5	4	5	5	6
255	774	4	3	4	4	4	4	4	4	4	4	4	3	4
Total	5269	5	5	5	5	5	5	5	5	5	5	5	5	5
Rochester														
338	454	4	4	4	4	4	5	5	4	4	4	4	4	5
339	394	5	5	5	4	5	5	4	4	5	5	4	5	5
341	611	9	9	9	9	9	10	10	9	10	9	9	9	8
342	350	10	11	11	12	11	13	15	17	13	13	13	14	15
343	662	8	8	8	9	9	11	13	11	13	14	11	11	10
344	189	16	15	14	14	14	15	17	15	15	17	12	14	18
345	326	11	11	11	11	10	10	11	12	11	12	13	13	13
346	319	18	18	18	19	19	19	20	20	21	22	23	22	22
347	434	10	9	9	9	9	10	11	12	13	13	12	11	10
348	332	17	17	17	16	15	15	16	17	17	16	16	18	18
349	492	14	15	16	17	17	18	21	19	20	21	21	20	20
Total	4563	11	11	11	11	11	12	13	13	13	13	13	13	13

FALL WILD TURKEY POPULATION SURVEY, 2008

Eric Dunton and Jennifer Snyders, Farmland Wildlife Populations and Research Group

Changes in distribution and abundance of wild turkeys (*Meleagris gallopavo*) in Minnesota are monitored using a mail survey of white-tailed deer (*Odocoileus virginianus*) hunters in the state's wild turkey range and potential range. The survey is scheduled once every 2 years and consists of asking randomly selected deer hunters where they hunted (permit area [PA]), if they saw wild turkeys while hunting, and the approximate location (miles and direction from nearest town) of turkey sightings. The purpose of the survey is to calculate a wild turkey population index based on the proportion of deer hunters observing wild turkeys (HOWT) in 16 turkey management units (TMU) and their subset PAs, describe relative changes (increase, decrease, none) in the HOWT index compared to previous surveys, describe changes in wild turkey distribution, and estimate the average finite rate of population change over the last 4 surveys.

METHODS

We randomly selected 20,617 permit holders for the regular firearms deer season in 16 TMUs, which included 106 PAs (Figure 1). Prior to 2006, the survey consisted of a stratified sample of antlerless deer hunters, where the PA of each hunter was known prior to drawing the sample. Beginning in 2006, the sampling frame was modified because regulation changes allowed hunters in managed or intensive areas to hunt anywhere within their selected hunting period and zone. But because most hunters pursue deer within relatively small, traditional areas (Welsh and Kimmel 1990), we used PAs listed in the Electronic Licensing System (ELS) as a stratification variable and we selected a random sample of regular firearm deer hunters from each PA.

Turkey PA boundaries were identical to deer permit area boundaries except where several deer PAs were combined into 1 turkey permit area. However, names and boundaries of several permit areas changed since the 2006 survey. The 400 series of deer PAs were changed to a 200 series prior to the 2008 deer season but turkey PAs retained the 400-series names and, therefore, data presented in this report use the 400 series names. Several changes to PA boundaries affected the boundary of TMU O. Turkey PA 425 was combined with PA 435 prior to 2008 and the resulting PA spanned two TMUs (i.e., H and I). We retained the original boundaries of PAs 425 and 435 for this report.

We estimated sample size for each TMU based on a family-wise Type I error rate of 0.15 (per-contrast alpha (α_c) = 0.15/16 TMUs = 0.01), a desired margin of error = 0.07 (half-width of CI for HOWT change), mean HOWT = 0.5, a finite population correction factor, and a response rate of 60%. We used a α_c of 0.01 as a tradeoff between controlling the Type I error rate (probability of rejecting a true null) and having reasonable power to detect a change of $\geq$7% at the TMU scale. Each estimated TMU sample size was then divided among PAs based on the proportion of hunters in each PA (ELS database).

We mailed selected hunters a postcard questionnaire requesting information on PA hunted, number of turkeys observed while hunting, and location of turkey observations (miles and direction from nearest town). We delivered the first mailing on 7 November 2008 and a second mailing on 9 January 2009 to all non-respondents. We did not conduct a third mailing because previous surveys showed that the proportion of useable returns decreased with mailing and by the third mailing >30% of the returns had missing data or were unusable.

We estimated HOWT for each TMU and PA and compared estimates to those of the previous survey (Kimmel and Brinkman 2000, Kruger and Dingman 2003, Isackson et al. 2007). We used log-linear models (Eberhardt and Simmons 1992) to estimate the mean annual rate of change (λ) in HOWT during the past 4 surveys (1999-2008). We constructed an 85% family of confidence intervals (CI) for parameter estimates at the TMU scale. These are equivalent to 99% CIs where the per-family Type I error rate is 0.15 (see above). We constructed standard 95% asymptotic confidence intervals at the PA scale because of the large number of comparisons and small sample sizes. Estimated changes in HOWT (compared to 2006) were considered meaningful if the CI did not include zero, and precision was deemed acceptable if the CI was less than ±7% (desired margin of error). Likewise, we interpreted estimated finite rates of change (λ) as meaningful if the CI did not include 1, and we deemed precision as acceptable if the CI was less than ±0.07.

We generated maps of turkey observations to monitor potential range changes. We excluded questionable observations (where distance between the turkey observation and the center of the hunter-listed PA was >3 times the diameter of the PA) and locations that were outside the state boundary.

RESULTS

The overall response rate was 44.0%, which was lower than the expected response rate (60%) used in sample-size calculations. The response rate decreased from 30.9% in mailing 1 to 19.2% in mailing 2. The percentage of hunters that reported seeing turkeys was independent of mailing (χ^2_2 = 0.586, P = 0.44), which indicated that non-response bias was negligible (at least at the range-wide scale).

Compared to 2006, the HOWT index increased in 6 TMUs (E, F, H, J, L, and N) and was unchanged (CI included zero) in 10 TMUs (Table 1, Figure 1). However, the desired level of precision (±7%) was achieved in only 20% of the TMUs with "no change" (Table 1). Thus, conclusions about "no change" at the TMU scale should be viewed cautiously. Ninety-seven PAs (92%) had comparable data for estimating change in HOWT from the 2006 survey (Table 2). The HOWT index increased in 22 PAs (156, 183, 215, 222, 239, 241, 244, 245, 246, 247, 249, 346, 412, 425, 427, 433, 435, 442, 447, 454, 461, and 462); whereas the remaining 75 CIs included zero (indicating no meaningful change or the change was undetectable due to poor precision). Most estimates at the PA scale were imprecise, e.g., only 3 PAs (170, 172, and 184) achieved the desired level of precision (Table 2). This lack of precision primarily reflected small sample sizes.

Four TMUs (D, E, G, and M) exhibited a positive annual rate of change during 1999-2008 (Figure 2). No negative trends were detected, but 11 TMUs had CI's that included $\lambda = 1$ with levels of precision > 0.07 (Table 1). Thus, estimates of λ were generally imprecise and conclusions about "no change" at the TMU scale should be interpreted cautiously. Eighty-seven PAs had comparable data for estimating λ. Based on the 95% CI of λ, 2% of PAs exhibited a negative rate of change, 31% exhibited positive rates of change, and 67% PAs had CIs that included $\lambda = 1$ (no change; Table 2). However, most estimates of change were imprecise (Table 2). Likewise, only 26% of the PAs with "no change" achieved the desired precision (Table 2). Thus, estimates of "no change" should be viewed cautiously at both the TMU and PA scale.

A comparison of the distribution of turkeys sighted by deer hunters during fall 2006 versus 2008 (Figure 3) suggests that wild turkey range continues to expand in Minnesota.

DISCUSSION

Although we were not able to precisely detect changes in population indices, our data suggest that turkey populations increased since 2006 in TMUs E, F, H, J, L, and N (Figure 1). Population trend data based on the 4 most recent surveys (1999 – 2008) indicate a positive population trend (i.e., the 95% confidence interval [lambda] > 1) in TMUs D, E, G, and M (Figure 2). Turkey populations in the northern portions of TMUs E, J, and N were recently established and are believed to be reproducing and expanding northward. In southeastern Minnesota, population indices and finite rates of change are relatively stable ($\lambda = 1$). Turkey populations in these areas are well established, with population indices probably reflecting random fluctuations around a relatively stable long-term mean.

Population indices from this survey are used to predict future population levels, allocate turkey-hunting permits, and provide information to make management decisions (Kimmel 2000). This report improved measures of uncertainty for population indices and estimated rates of change (previously assumed to be measured without error). These measures of uncertainty can be incorporated into turkey population models to realistically account for precision in management decisions. Estimating HOWT at the PA level is not reliable and increasing sample size to achieve the desired precision is not economically feasible. Options for dealing with uncertainty at the PA scale include managing at a broader scale (e.g., TMU) or using alternative techniques to interpret data (e.g., small-area estimation) at the PA level.

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Table 1. Percent of deer hunters that observed wild turkeys (HOWT) by turkey management unit (TMU) in Minnesota, 2008.

	2008			Absolute change from 2006				Historic mean[b]			Mean finite rate of change			
TMU	*n*	HOWT	SE	*n*	Δ HOWT	SE	99% CI[a]	*n*	HOWT	SE	Interval	*n*	λ	99% CI[a]
A	575	66.8	2.0	1,036	2.7	3.0	(-5.0, 10.4)	13	63.3	2.1	(1999-2008)	4	0.99*	(0.94, 1.04)
B	374	59.8	2.5	729	-1.0	3.6	(-10.3, 8.3)	12	60.9	2.8	(1999-2008)	4	0.98	(0.89, 1.07)
C	691	70.0	1.7	1,219	1.8*	2.7	(-5.2, 8.8)	12	52.2	4.7	(1999-2008)	4	0.99	(0.91, 1.09)
D	573	66.7	2.0	1,041	7.7	3.1	(-0.3, 15.7)	12	20.1	4.0	(1999-2008)	4	1.06*	(1.04, 1.07)
E	646	42.6	2.0	1,235	8.0	2.8	(0.8, 15.2)	12	8.0	1.8	(1999-2008)	4	1.15*	(1.09, 1.20)
F	477	63.7	2.2	960	9.7	3.2	(1.5, 17.9)	12	19.2	4.0	(1999-2008)	4	1.03	(0.96, 1.12)
G	464	38.5	2.3	987	3.2	3.2	(-5.0, 11.4)	12	7.2	1.9	(1999-2008)	4	1.07*	(1.02, 1.11)
H	532	64.0	2.2	1,098	11.3	3.1	(3.3, 19.3)	12	21.5	4.0	(1999-2008)	4	1.03	(0.95, 1.13)
I	418	40.7	2.4	877	6.8	3.3	(-1.7, 15.3)	10	6.6	2.2	(1999-2008)	4	1.08	(0.99, 1.19)
J	621	39.1	2.0	1,155	9.0	2.8	(1.8, 16.2)	9	5.2	2.1	(1999-2008)	4	1.11	(0.96, 1.30)
K	739	56.6	1.9	1,356	5.9	2.8	(-1.3, 13.1)	12	9.7	2.8	(1999-2008)	4	1.09	(0.99, 1.20)
L	515	54.2	2.3	950	11.1	3.3	(2.6, 19.6)	8	4.6	2.4	(1999-2008)	4	1.15	(0.91, 1.45)
M	396	30.7	2.4	861	7.2	3.3	(-1.3, 15.7)	8	5.2	1.4	(1999-2008)	4	1.18	(1.01, 1.37)
N	699	49.0	1.9	1,270	19.0*	2.7	(12.0, 26.0)	8	3.9	1.7	(1999-2008)	4	1.18	(0.93, 1.51)
O	629	17.4	1.9	888	4.2	3.0	(-3.5, 11.9)	8	3.4	0.9	(1999-2008)	4	1.17	(0.70, 1.97)
P	627	5.8	0.9	1,104	1.3*	1.4	(-2.3, 4.9)	1	4.4		(2006-2008)	2	1.12	

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

[b] Mean HOWT index over all available surveys (*n*) prior to 2008.

*Desired level of precision achieved

Table 2. Percent of deer hunters that observed wild turkeys (HOWT) by turkey permit area (PA) in Minnesota, 2008.

	2008			Absolute change from 2006				Historic mean[b]			Mean finite rate of change			
TMU-TPA	*n*	HOWT	SE	*n*	Δ HOWT	SE	95% CL[a]	*n*	HOWT	SE	Interval	*n*	λ	95% CL[a]
A-345	123	66.8	4.2	204	1.8	6.6	(-11.1, 14.7)	12	56.3	3.6	(1999-2008)	4	0.99*	(0.94, 1.03)
A-346	143	70.6	3.8	269	12.8	5.8	(1.4, 24.2)	12	57.2	2.7	(1999-2008)	4	1.00*	(0.94, 1.07)
A-348	140	60.0	4.1	226	-3.4	6.5	(-16.1, 9.3)	12	73.0	2.1	(1999-2008)	4	0.97*	(0.97, 0.98)
A-349	162	68.4	3.6	329	0.3	5.1	(-9.7, 10.3)	13	66.5	1.8	(1999-2008)	4	0.99*	(0.98, 1.00)
B-344	374	59.8	2.5	729	-1.0	3.6	(-8.1, 6.1)	12	60.9	2.8	(1999-2008)	4	0.98*	(0.94, 1.02)
C-341	215	64.1	3.2	401	2.6	4.8	(-6.8, 12.0)	12	48.7	5.5	(1999-2008)	4	0.98	(0.88, 1.10)
C-342	149	68.5	3.8	262	1.0	5.8	(-10.4, 12.4)	12	50.3	5.3	(1999-2008)	4	1.00*	(0.97, 1.03)
C-343	191	74.6	3.1	323	2.0	5.0	(-7.8, 11.8)	12	48.1	6.3	(1999-2008)	4	1.00*	(0.98, 1.02)
C-347	133	72.6	3.9	220	-1.2	6.2	(-13.4, 11.0)	12	63.9	2.1	(1999-2008)	4	1.01*	(0.99, 1.02)
D-227	182	63.8	3.6	356	6.3	5.2	(-3.9, 16.5)	10	15.1	4.1	(1999-2008)	4	1.11*	(1.07, 1.14)
D-235	29	33.5	8.1	49	-8.1	12.8	(-33.2, 17.0)	12	17.2	2.9	(1999-2008)	4	1.03	(0.88, 1.20)
D-236	146	70.0	3.7	261	11.3	5.9	(-0.3, 22.9)	11	22.6	5.6	(1999-2008)	4	1.04*	(1.01, 1.08)
D-338	86	65.3	5.1	151	8.2	7.8	(-7.1, 23.5)	12	27.2	4.7	(1999-2008)	4	1.00*	(0.96, 1.04)
D-601	129	74.4	0.1	211	7.5	5.3	(-2.9, 17.9)	12	16.7	4.0	(1999-2008)	4	1.05	(0.91, 1.22)
E-152	13	45.6	12.4	27	26.3	15.5	(-4.1, 56.7)	3	27.6	7.9	(1999-2008)	4	0.99	(0.74, 1.33)
E-156	143	31.6	3.9	257	10.7	5.4	(0.1, 21.3)	3	10.6	4.5	(1999-2008)	4	1.22*	(1.16, 1.28)
E-157	196	46.9	3.6	377	7.1	5.1	(-2.9, 17.1)	8	3.3	2.1	(1999-2008)	4	1.23	(1.10, 1.37)
E-159	102	39.1	4.8	195	-5.1	7.1	(-19.0, 8.8)	8	4.3	2.1	(1999-2008)	4	1.17	(0.99, 1.38)
E-183	104	38.8	4.8	203	14.3	6.4	(1.8, 26.8)	3	15.1	4.5	(1999-2008)	4	1.13	(0.90, 1.41)
E-225	88	60.5	5.1	170	10.1	7.4	(-4.4, 24.6)	12	10.4	2.1	(1999-2008)	4	1.09	(1.00, 1.20)
F-339	99	55.5	4.9	185	-2.3	7.2	(-16.4, 11.8)	12	32.9	3.7	(1999-2008)	4	1.00	(0.91, 1.08)
F-461	82	72.8	5.0	160	24.1	7.5	(9.4, 38.8)	12	16.9	4.0	(1999-2008)	4	1.06	(0.94, 1.19)
F-462	100	70.4	4.7	186	20.7	7.1	(6.8, 34.6)	12	34.3	4.8	(1999-2008)	4	1.01	(0.91, 1.12)
F-463	46	46.0	7.1	88	0.1	10.2	(-19.9, 20.1)	12	10.6	2.8	(1999-2008)	4	1.04	(0.94, 1.14)

Table 2. Continued.

TMU-TPA	2008			Absolute change from 2006				Historic mean[b]			Mean finite rate of change			
	n	HOWT	SE	*n*	Δ HOWT	SE	95% CL[a]	*n*	HOWT	SE	Interval	*n*	λ	95% CL[a]
F-464	43	61.7	7.1	78	1.0	10.7	(-20.0, 22.0)	12	7.4	2.9	(1999-2008)	4	1.07	(1.00, 1.16)
F-465	34	57.0	8.2	60	11.0	12.1	(-12.7, 34.7)	12	10.8	3.1	(1999-2008)	4	1.03*	(0.97, 1.08)
F-466	20	65.9	10.2	97	15.0	11.8	(-8.1, 38.1)	12	18.8	4.0	(1999-2008)	4	1.03	(0.89, 1.20)
F-467	42	67.8	6.8	94	-3.3	9.3	(-21.5, 14.9)	12	14.8	4.9	(1999-2008)	4	1.04*	(0.98, 1.11)
G-446	28	42.1	8.9	65	0.0	11.8	(-23.1, 23.1)	9	7.7	3.1	(1999-2008)	4	1.02*	(0.97, 1.07)
G-447	32	48.8	8.6	72	21.9	10.9	(0.5, 43.3)	9	4.5	1.9	(1999-2008)	4	1.07	(0.92, 1.25)
G-448	37	51.6	8.4	81	2.5	11.2	(-19.5, 24.5)	7	17.5	5.8	(2002-2008)	3	1.00	(0.90, 1.11)
G-449	40	51.0	7.9	84	-8.8	10.7	(-29.8, 12.2)	8	10.5	4.4	(2002-2008)	3	1.06	(0.58, 1.96)
G-450	27	52.0	9.0	47	16.7	13.7	(-10.2, 43.6)	9	9.3	3.0	(1999-2008)	4	1.02	(0.92, 1.14)
G-451	93	22.8	4.3	174	-6.0	6.8	(-19.3, 7.3)	8	7.4	2.2	(1999-2008)	4	1.01	(0.87, 1.18)
G-454	62	38.0	6.4	139	17.3	8.3	(1.0, 33.6)	8	7.1	2.2	(1999-2008)	4	1.04	(0.88, 1.22)
G-456	41	17.5	5.7	76	-9.3	9.2	(-27.3, 8.7)	11	6.3	1.5	(1999-2008)	4	1.08	(0.89, 1.32)
G-457	35	51.7	8.4	79	11.8	11.0	(-9.8, 33.4)	8	12.7	3.1	(1999-2008)	4	1.15*	(1.12, 1.17)
G-458	22	27.2	9.1	64	-3.8	11.5	(-26.3, 18.7)	8	6.9	1.8	(1999-2008)	4	1.14	(0.96, 1.35)
G-459	38	55.4	7.9	96	6.9	10.1	(-12.9, 26.7)	12	11.7	3.0	(1999-2008)	4	1.05*	(1.01, 1.10)
H-435	156	64.9	3.8	319	12.7	5.6	(1.7, 23.7)	8	19.4	5.0	(1999-2008)	4	1.04*	(0.98, 1.09)
H-431	37	35.9	7.7	77	-19.7	10.8	(-40.9, 1.5)	12	7.2	1.9	(1999-2008)	4	1.08	(0.90, 1.29)
H-433	83	52.3	5.5	161	18.9	7.7	(3.8, 34.0)	8	9.0	2.9	(1999-2008)	4	1.11	(1.01, 1.21)
H-440	103	61.6	4.9	213	8.5	6.8	(-4.8, 21.8)	8	29.0	5.9	(1999-2008)	4	1.02*	(0.99, 1.05)
H-442	136	68.5	4.0	291	16.6	5.6	(5.6, 27.6)	12	31.2	4.3	(1999-2008)	4	1.00	(0.92, 1.10)
H-443	65	67.7	5.7	142	9.3	7.9	(-6.2, 24.8)	10	23.1	5.9	(1999-2008)	4	1.01*	(0.97, 1.06)
I-425	156	64.9	3.8	319	12.7	5.6	(1.7, 23.7)	8	19.4	5.0	(1999-2008)	4	1.04*	(0.98, 1.09)
I-426	103	19.9	4.0	217	-0.6	5.4	(-11.2, 10.0)	9	6.5	2.1	(1999-2008)	4	1.00*	(0.99, 1.01)
I-427	117	46.8	4.6	236	12.6	6.3	(0.3, 24.9)	10	7.1	2.5	(1999-2008)	4	1.07	(0.94, 1.22)
I-428	155	50.7	4.1	323	6.2	5.6	(-4.8,17.2)	10	8.0	3.0	(1999-2008)	4	1.11	(1.00, 1.23)

Table 2. Continued.

TMU-TPA	2008			Absolute change from 2006				Historic mean[b]			Mean finite rate of change			
	n	HOWT	SE	*n*	Δ HOWT	SE	95% CL[a]	*n*	HOWT	SE	Interval	*n*	λ	95% CL[a]
J-154	180	15.7	2.7	324	3.8	3.8	(-3.6, 11.2)	3	5.2	2.3	(1999-2008)	4	1.16	(0.92, 1.46)
J-221	92	59.1	5.0	160	8.0	7.8	(-7.3, 23.3)	9	4.7	2.2	(1999-2008)	4	1.13*	(1.07, 1.19)
J-222	77	59.2	5.5	153	20.2	7.7	(5.1, 35.3)	9	4.4	1.6	(1999-2008)	4	1.22	(1.02, 1.44)
J-223	19	65.3	9.8	65	-10.3	11.6	(-33.0, 12.4)	9	8.1	4.4	(1999-2008)	4	1.06	(0.97, 1.15)
J-224	16	54.6	11.4	28	4.6	11.5	(-17.9, 27.1)	6	41.7	7.4	(1999-2008)	4	1.07	(0.82, 1.39)
J-242	50	18.9	5.8	94	9.7	7.3	(-4.6, 24.0)	2	8.3	0.6	(2002-2008)	3	1.13	(0.43, 2.96)
J-247	72	34.4	5.4	133	16.7	7.3	(2.4, 31.0)	3	7.1	2.7	(1999-2008)	4	1.21	(0.95, 1.54)
J-249	105	53.1	4.8	182	19.5	7.3	(5.2, 33.8)	3	18.3	5.4	(1999-2008)	4	1.17	(1.06, 1.29)
K-215	235	65.7	3.3	425	9.8	4.9	(0.2, 19.4)	9	8.1	4.2	(1999-2008)	4	1.09*	(1.06, 1.12)
K-218	196	57.3	3.6	360	-6.3	5.3	(-16.7, 4.1)	12	8.5	3.1	(1999-2008)	4	1.09	(0.98, 1.20)
K-219	116	53.8	4.6	203	12.6	6.9	(-0.9, 26.1)	12	11.1	1.5	(1999-2008)	4	1.16*	(1.12, 1.21)
K-229	31	50.0	8.8	70	10.9	11.6	(-11.8, 33.6)	6	14.8	4.7	(1999-2008)	4	1.08*	(1.02, 1.14)
K-417	164	45.4	3.9	302	7.5	5.7	(-3.7, 18.7)	8	7.3	3.1	(1999-2008)	4	1.07*	(1.03, 1.11)
L-213	74	49.4	5.7	125	0.5	8.9	(-16.9, 17.9)	8	4.5	1.9	(1999-2008)	4	1.27	(1.02, 1.57)
L-239	212	63.6	3.4	365	11.8	5.3	(1.4, 22.2)	8	4.9	2.6	(1999-2008)	4	1.19*	(1.12, 1.26)
L-412	144	51.1	4.3	281	17.3	5.9	(5.7, 28.9)	8	5.9	2.8	(1999-2008)	4	1.09	(0.93, 1.27)
L-416	83	39.7	5.4	177	-0.1	7.3	(-14.4, 14.2)	8	7.1	3.2	(1999-2008)	4	1.06*	(1.02, 1.10)
M-420	72	37.5	5.6	161	10.6	7.3	(-3.7, 24.9)	8	8.0	2.1	(1999-2008)	4	1.25	(0.95, 1.63)
M-421	50	22.4	6.4	116	-2.9	8.7	(-20.0, 14.2)	8	3.2	0.9	(1999-2008)	4	1.25	(0.87, 1.79)
M-422	64	53.5	6.3	119	4.4	9.0	(-13.2, 22.0)	8	9.0	3.8	(1999-2008)	4	1.10*	(1.06, 1.14)
M-423	82	19.2	4.3	176	6.3	5.6	(-4.7, 17.3)	8	5.0	1.0	(1999-2008)	4	1.13	(0.93, 1.37)
M-424	129	28.0	4.1	292	7.5	5.2	(-2.7, 17.7)	8	5.1	1.4	(1999-2008)	4	1.17*	(1.15, 1.19)
N-214	66	66.4	5.9	129	10.4	8.6	(-6.5, 27.3)	8	5.3	2.5	(1999-2008)	4	1.25	(1.15, 1.37)

Table 2. Continued.

TMU-TPA	2008			Absolute change from 2006				Historic mean[b]			Mean finite rate of change			
	n	HOWT	SE	*n*	Δ HOWT	SE	95% CL[a]	*n*	HOWT	SE	Interval	*n*	λ	95% CL[a]
N-240	71	54.9	5.7	115	8.0	9.3	(-10.2, 26.2)	8	4.9	1.9	(1999-2008)	4	1.15*	(1.11, 1.20)
N-241	52	61.6	6.5	110	25.9	9.1	(8.1, 43.7)	7	3.6	1.4	(2002-2008)	3	1.28	(1.16, 1.41)
N-243	73	46.2	5.8	121	11.7	8.8	(-5.5, 28.9)	3	14.7	6.8	(1999-2008)	4	1.21	(1.07, 1.37)
N-244	126	42.6	4.3	233	13.4	6.2	(1.2, 25.6)	8	3.4	1.7	(1999-2008)	4	1.11*	(1.06, 1.17)
N-245	127	31.1	4.0	218	22.8	4.9	(13.2, 32.4)	3	8.1	0.3	(1999-2008)	4	1.13	(0.82, 1.55)
N-246	145	54.8	4.1	280	33.1	5.4	(22.5, 43.7)	3	10.9	4.2	(1999-2008)	4	1.22	(0.93, 1.62)
N-248	36	52.7	7.9	61	-0.3	12.2	(-24.2, 23.6)	3	31.0	9.4	(1999-2008)	4	1.13	(1.04, 1.22)
O-201	10	31.7	14.3	17	13.4	18.1	(-22.1, 48.9)	2	17.5	0.8	(2002-2008)	3	1.10	(0.52, 2.32)
O-208	22	12.3	6.5	36	-6.9	12.6	(-31.6, 17.8)	3	9.8	2.6	(1999-2008)	4	1.06	(0.86, 1.31)
O-209	4	25.0	2.2	35	8.2	6.7	(-4.9, 21.3)	3	7.6	2.4	(1999-2008)	4	1.16	(0.97, 1.39)
O-210	65	13.4	4.2	131	4.8	5.4	(-5.8, 15.4)	3	4.6	1.6	(1999-2008)	4	1.13	(1.03, 1.25)
O-251	8	27.1	13.3	21	-10.8	18.5	(-47.1, 25.5)	3	16.2	6.1	(1999-2008)	4	1.13	(0.94, 1.35)
O-256	32	20.1	6.7	60	2.0	9.6	(-16.8, 20.8)	1	18.1	.	(2006-2008)	2	1.05	
O-257	21	29.1	9.0	40	18.5	11.7	(-4.4, 41.4)	8	3.5	0.5	(1999-2008)	4	1.14	(0.92, 1.42)
O-260	49	25.8	6.6											
O-261	47	13.5	4.8											
O-262	31	40.4	8.5											
O-263	46	16.1	5.2											
O-264	53	19.4	5.3											
O-265	40	20.2	6.1											
O-266	43	24.4	6.5											
O-267	26	8.2	6.1											
O-268	34	6.5	4.8											

Table 2. Continued.

TMU-TPA	2008			Absolute change from 2006				Historic mean[b]			Mean finite rate of change			
	n	HOWT	SE	*n*	Δ HOWT	SE	95% CL[a]	*n*	HOWT	SE	Interval	*n*	λ	95% CL[a]
O-298	67	26.5	6.1	112	9.9	8.1	(-6.0, 25.8)	3	10.1	3.1	(1999-2008)	4	1.16*	(1.09, 1.23)
P-170	141	7.6	2.2	237	2.4*	3.3	(-4.1, 8.9)	1	5.1		(2006-2008)	2	1.19	
P-172	116	7.2	2.4	207	1.9*	3.3	(-4.6, 8.4)	1	5.2		(2006-2008)	2	1.15	
P-174	78	4.8	2.4	132	-0.9	4.0	(-8.7, 6.9)	1	5.7		(2006-2008)	2	0.93	
P-181	67	8.5	3.3	123	1.4	4.7	(-7.8, 10.6)	1	7.1		(2006-2008)	2	1.08	
P-182	8	23.8	12.4	17	-6.3	17.6	(-40.8, 28.2)	1	30.0		(2006-2008)	2	0.89	
P-184	159	7.5	2.1	264	1.1*	3.1	(-5.0, 7.2)	1	6.4		(2006-2008)	2	1.07	
P-197	48	6.1	3.4	87	0.0	5.9	(-11.6, 11.6)	1	6.1		(2006-2008)	2	1.00	
P-199	6	20.0	1.5	12	-8.0	14.7	(-36.8, 20.8)	1	28.0		(2006-2008)	2	0.85	
P-287	2	32.1	18.5	12	17.5	20.6	(-22.9, 57.9)	1	14.6		(2006-2008)	2	1.46	

[a] Confidence intervals are not adjusted for multiple comparisons, i.e., $\alpha \geq 0.25$.

[b] Mean HOWT index over all available surveys (*n*) prior to 2008.

*Desired level of precision achieved

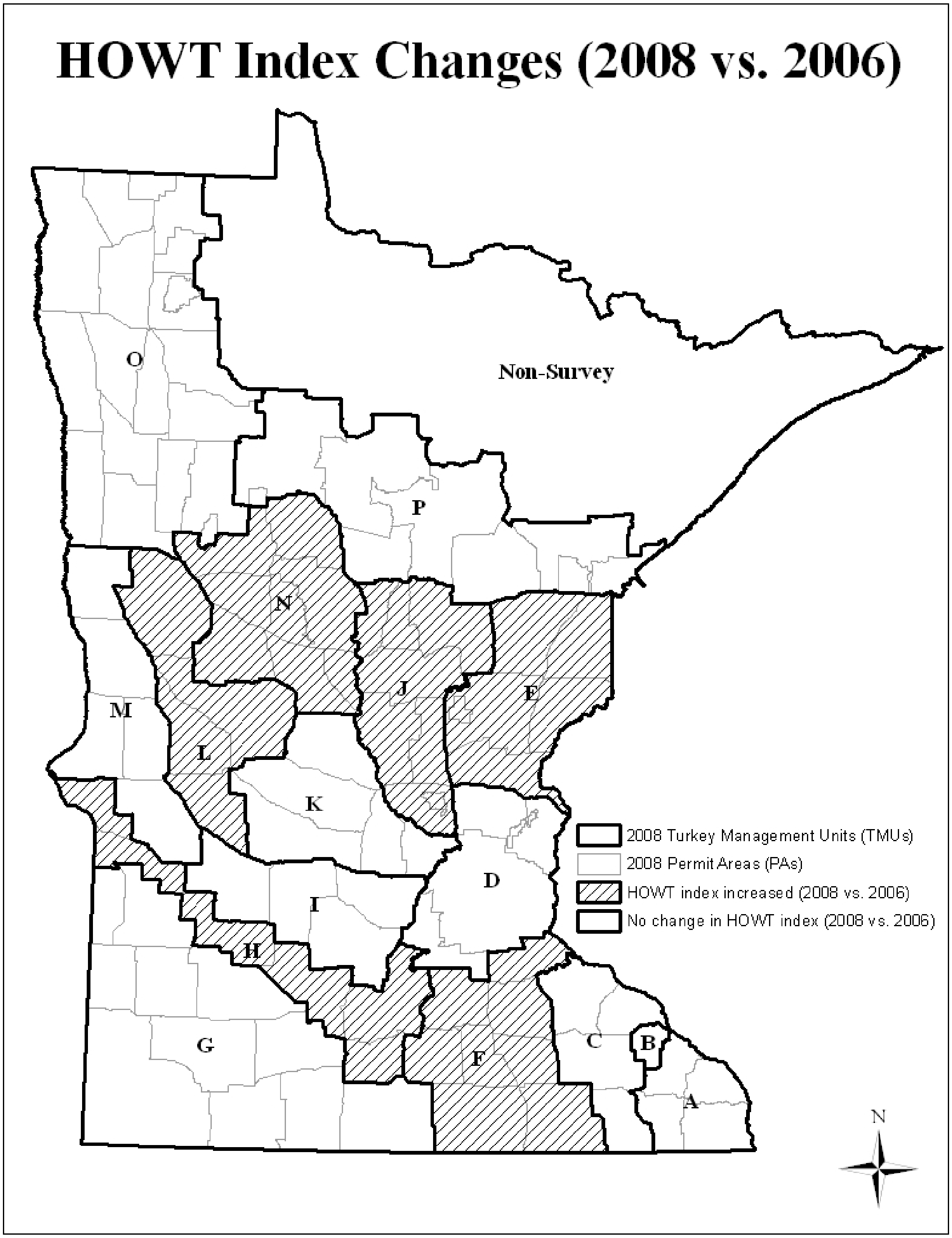


Figure 1. Shaded regions show TMUs where HOWT (population index) increased between the 2006 and 2008 fall wild-turkey population survey. Non-shaded TMUs had no change in HOWT or the desired level of precision was inadequate to detect change.

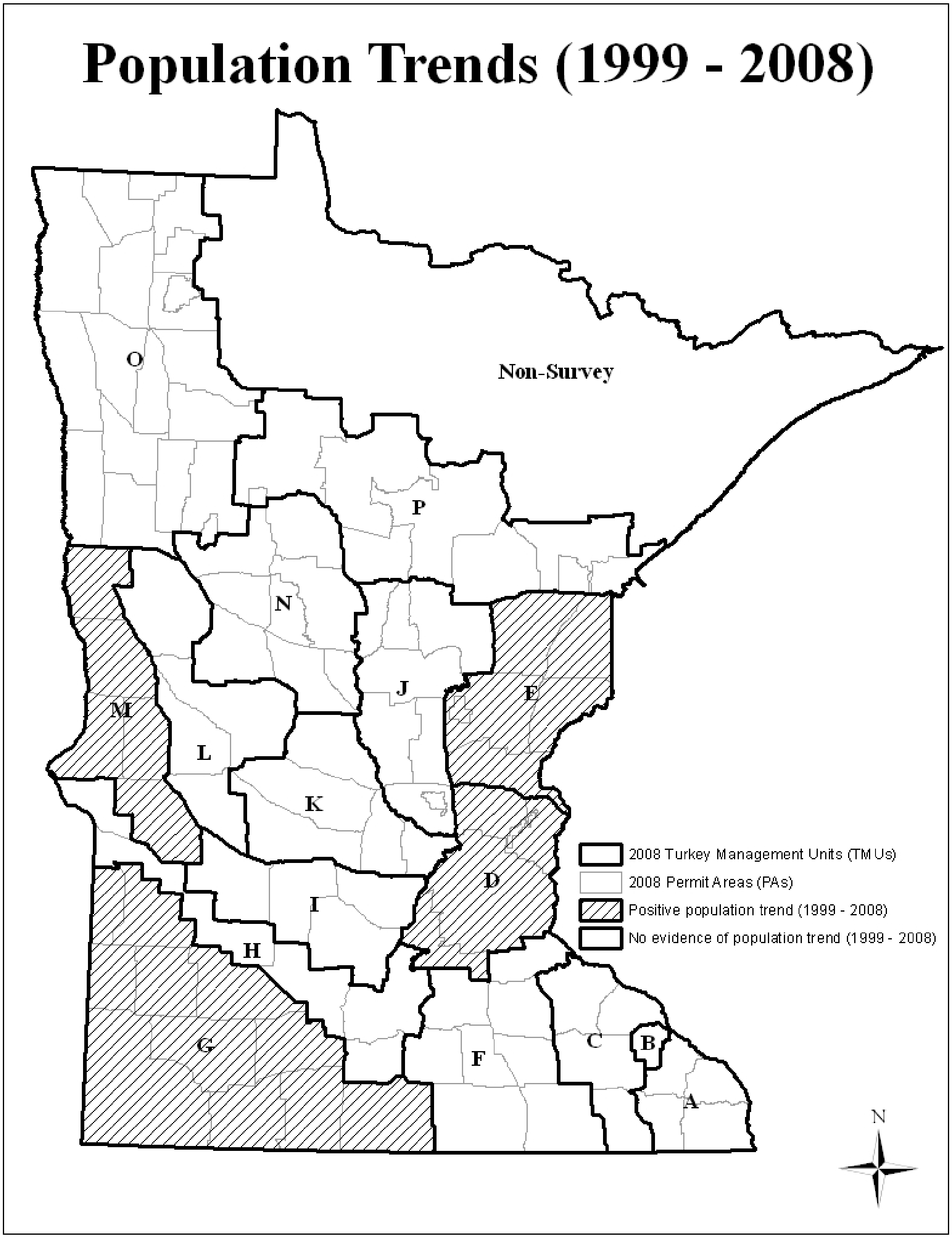


Figure 2. Shaded TMUs had positive population trends during 1999 – 2008 (i.e., the 95% confidence interval [lambda] > 1). Non-shaded TMUs had no evidence of a population trend (linear increase or decrease).

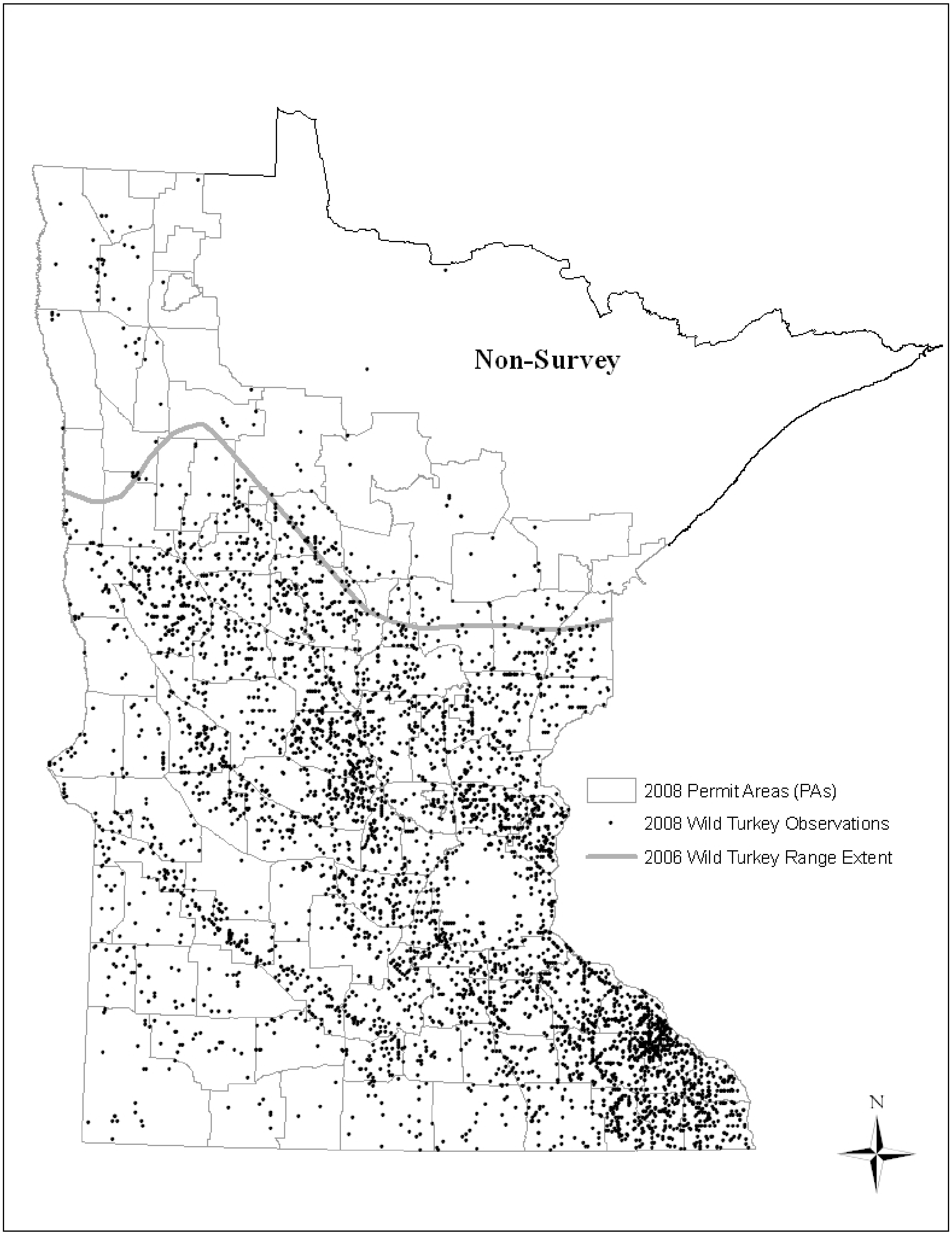


Figure 3. Distribution of wild turkeys based on observations by deer hunters in Minnesota, fall 2008. The solid gray line indicates turkey range extent based on turkey distribution data from the 2006 survey.

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 2008 information was compiled by MIS – GIS and summarized by the Wildlife Damage Program Coordinator, 1601 Minnesota Drive, Brainerd, MN 56401.

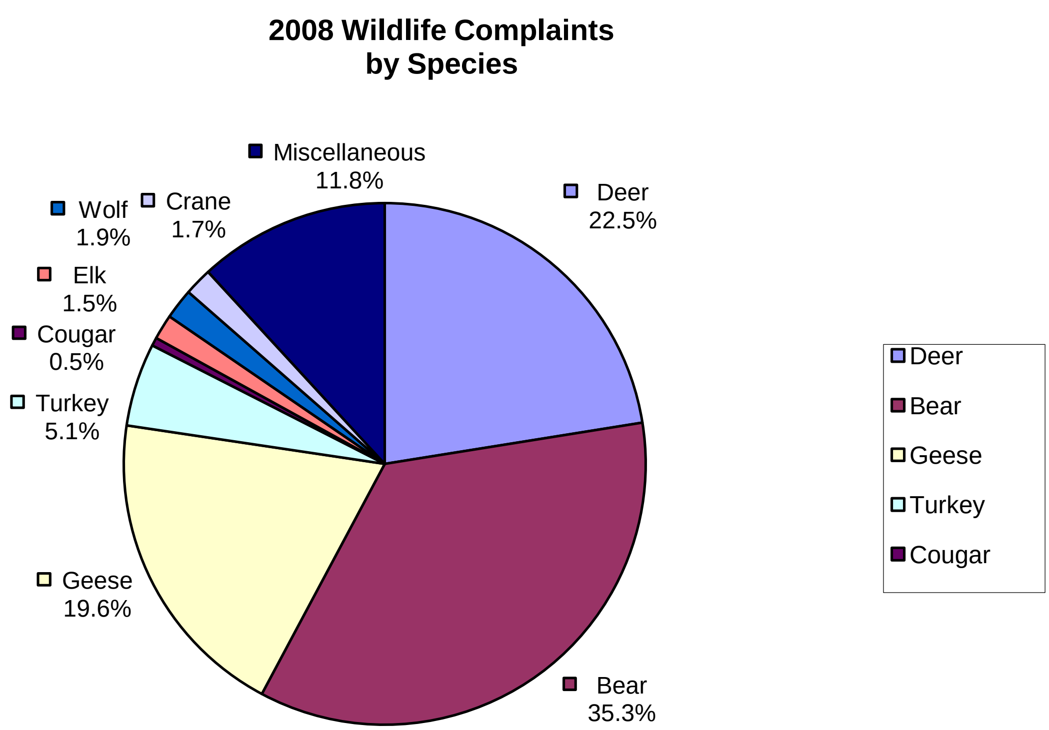


Figure 1. Wildlife complaints by species for the year 2008, in Minnesota.

Wildlife managers recorded a total of 583 wildlife complaints in 2008, down 10% when compared to the 2007 total of 651 complaints. Three species; black bear, white-tailed deer, and Canada geese account for 451, (77%) of the complaints received (Figure1). Five other species of special interest for wildlife damage; cougar, elk, turkey, sandhill crane, and wolf comprise an additional 63, (11 %) of the recorded complaints. Twenty species are represented in 69 (12%) of the miscellaneous complaints received.

During calendar year 2008 materials and assistance were provided for permanent deer exclusion fences to 17 specialty crop growers and one livestock producer for tb management. Crops protected included mixed vegetable (6), apple orchard (1), small berries (2), vineyards (7), tree nursery (1) and hay yard (1). Exclusion techniques included the installation of 10ft. woven-wire (16) and energized (2) deer exclusion fences.

A dramatic increase (115%) in shooting permits for deer between 2007 and 2008 is noted. This is primarily due to the landowner permits issued for deer elimination in the tb zone (Figure 9).

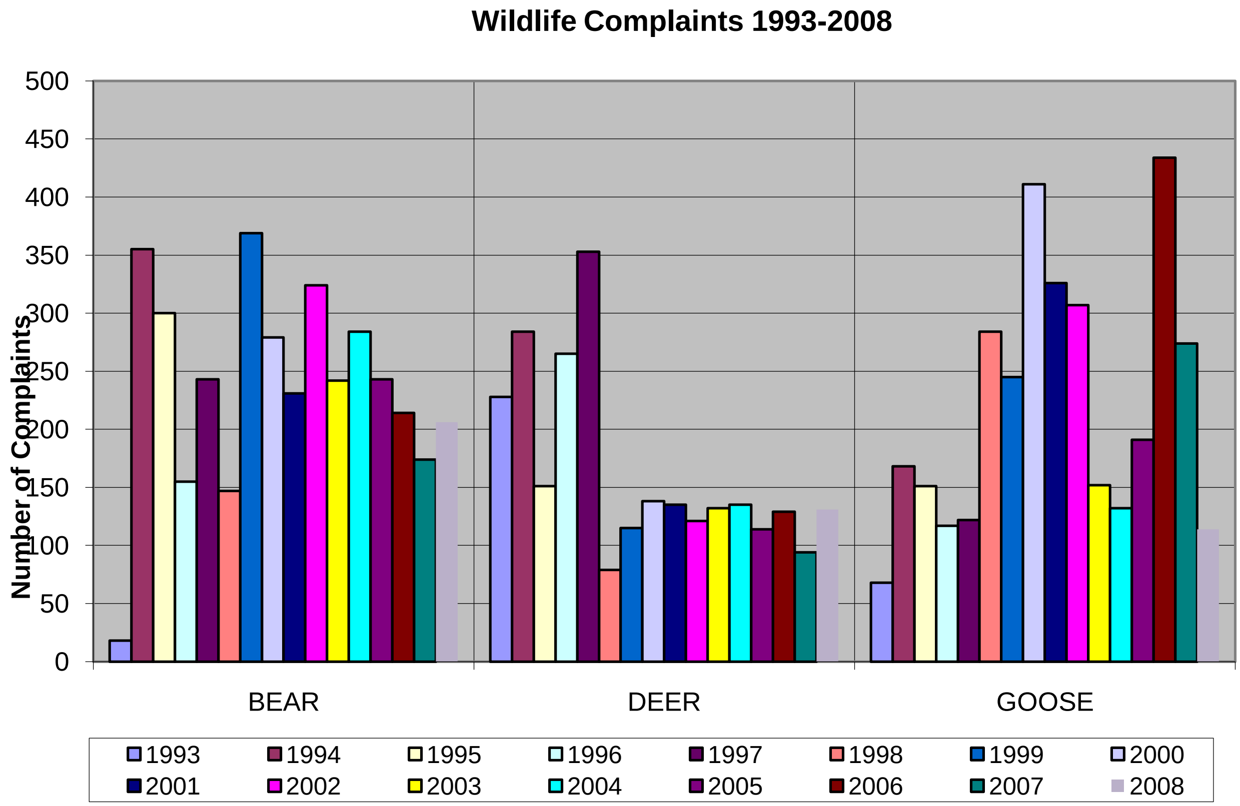


Figure 2. Number of wildlife complaints recorded for bear, deer and geese from 1993-2008, in Minnesota.

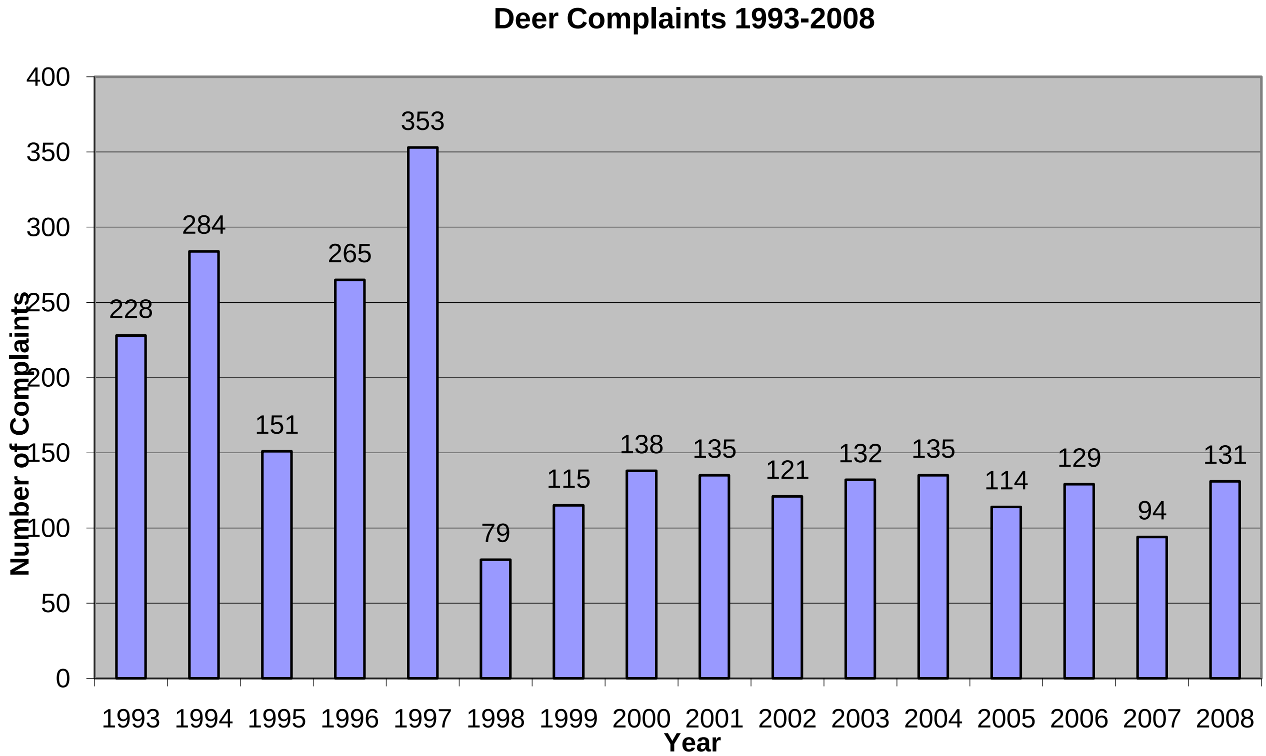


Figure 3. Number of deer complaints from 1993-2008, in Minnesota.

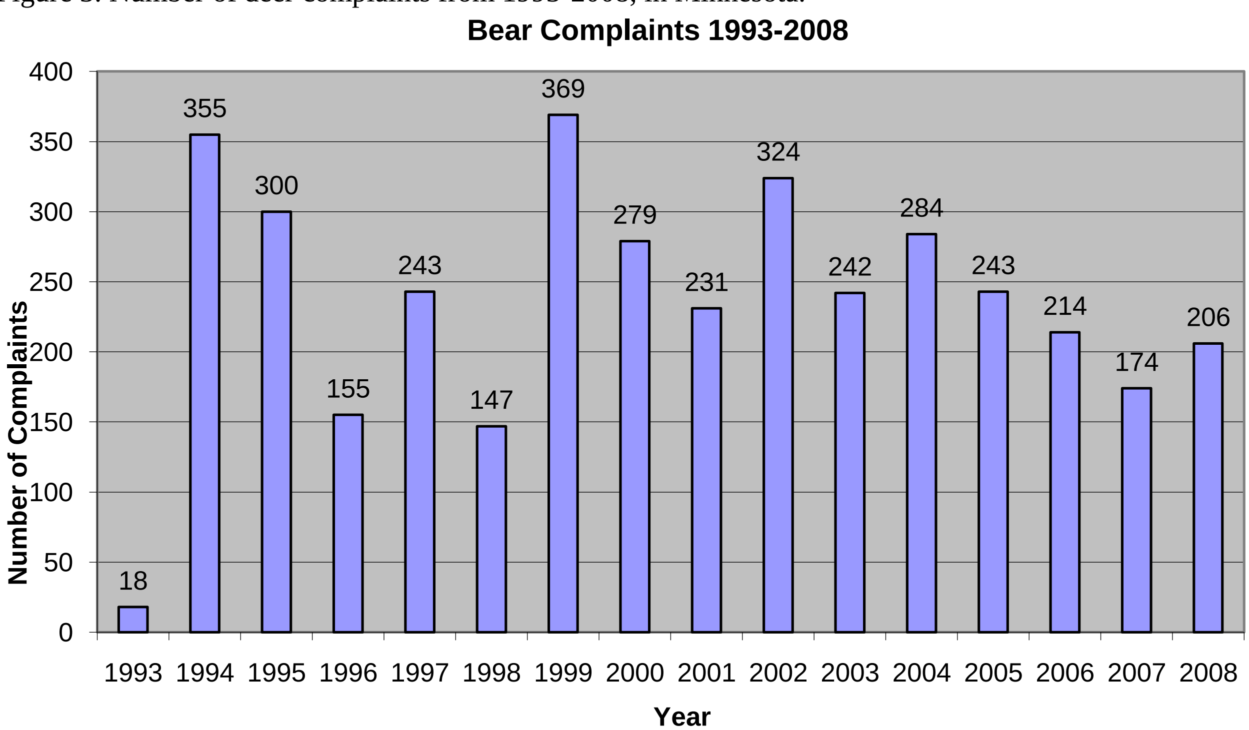


Figure 4. Number of bear complaints from 1993-2008 in Minnesota.

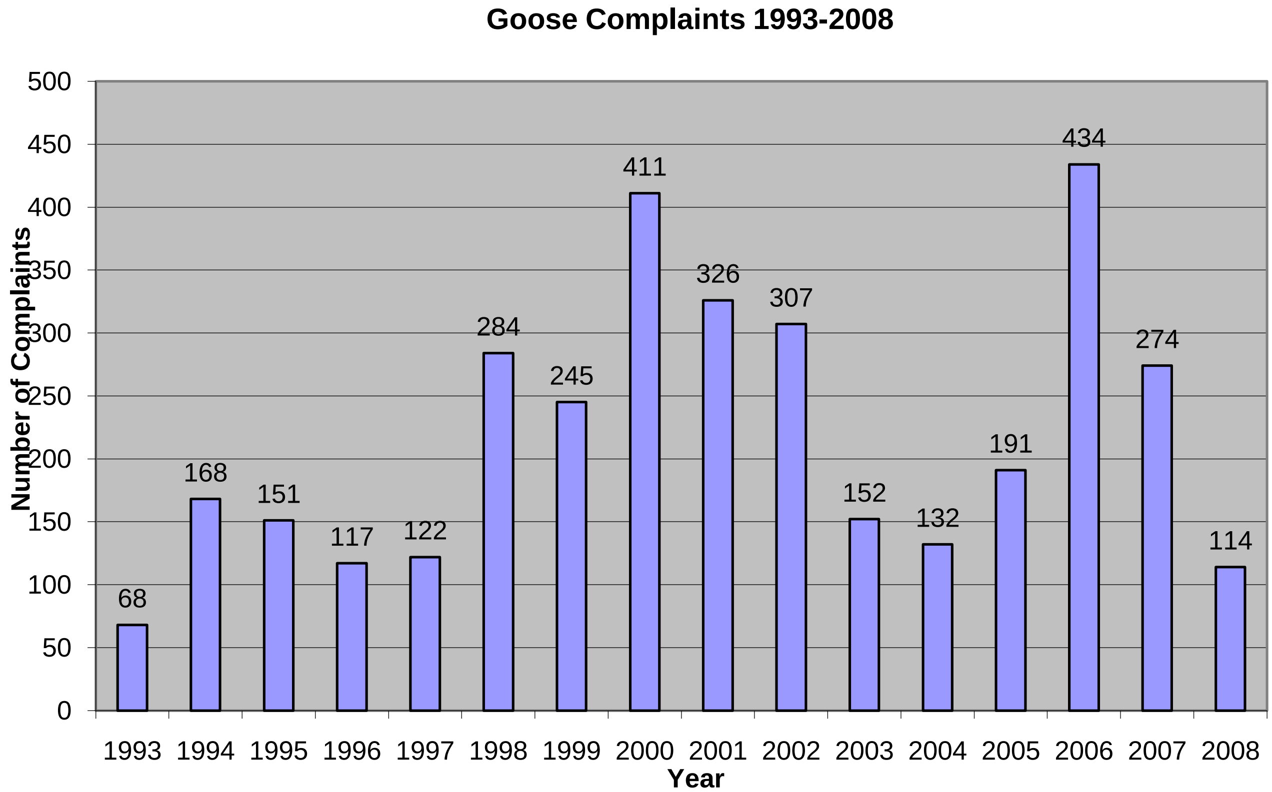


Figure 5. Number of goose complaints from 1993-2008, in Minnesota.

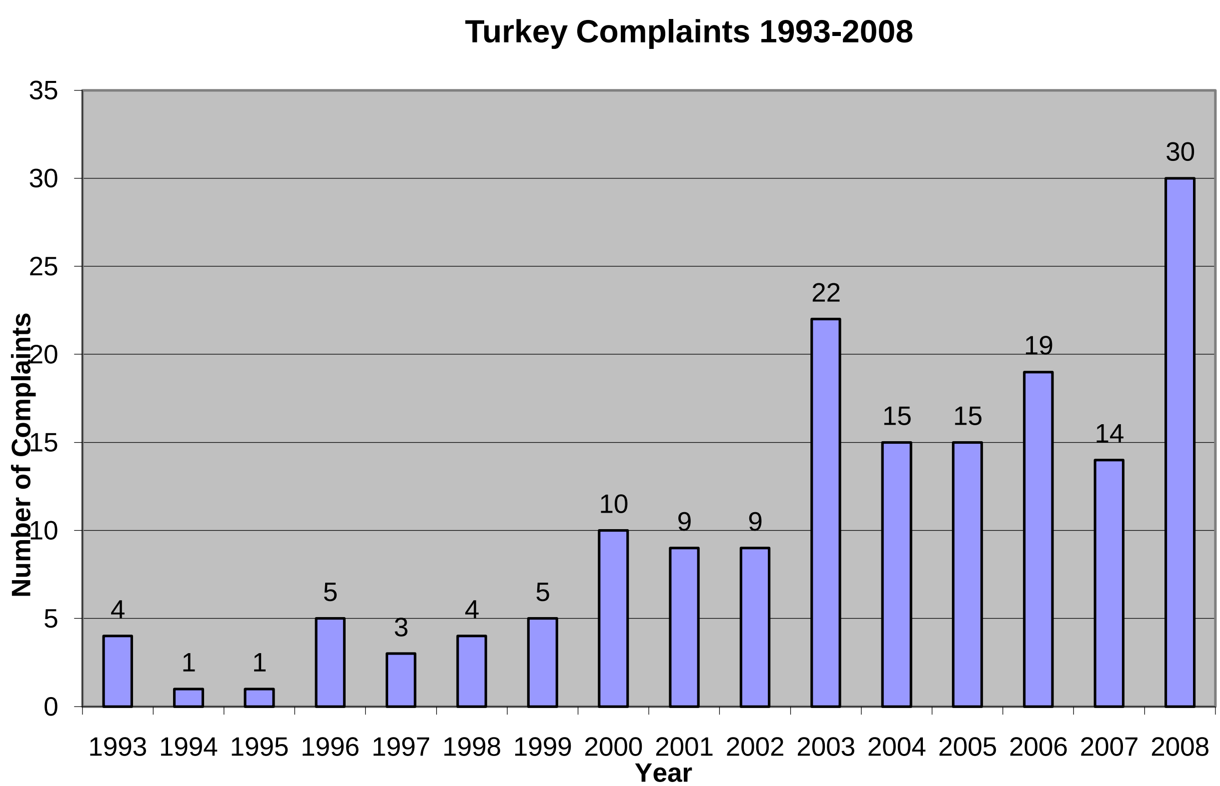


Figure 6. Number of turkey complaints from 1993-2008, in Minnesota.

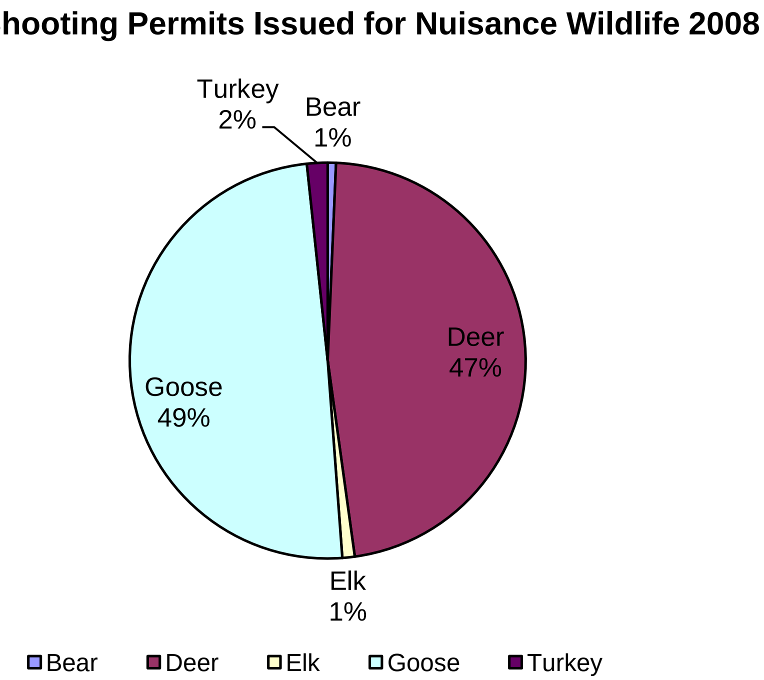


Figure 7. Shooting permits issued for nuisance wildlife control in Minnesota for 2008.

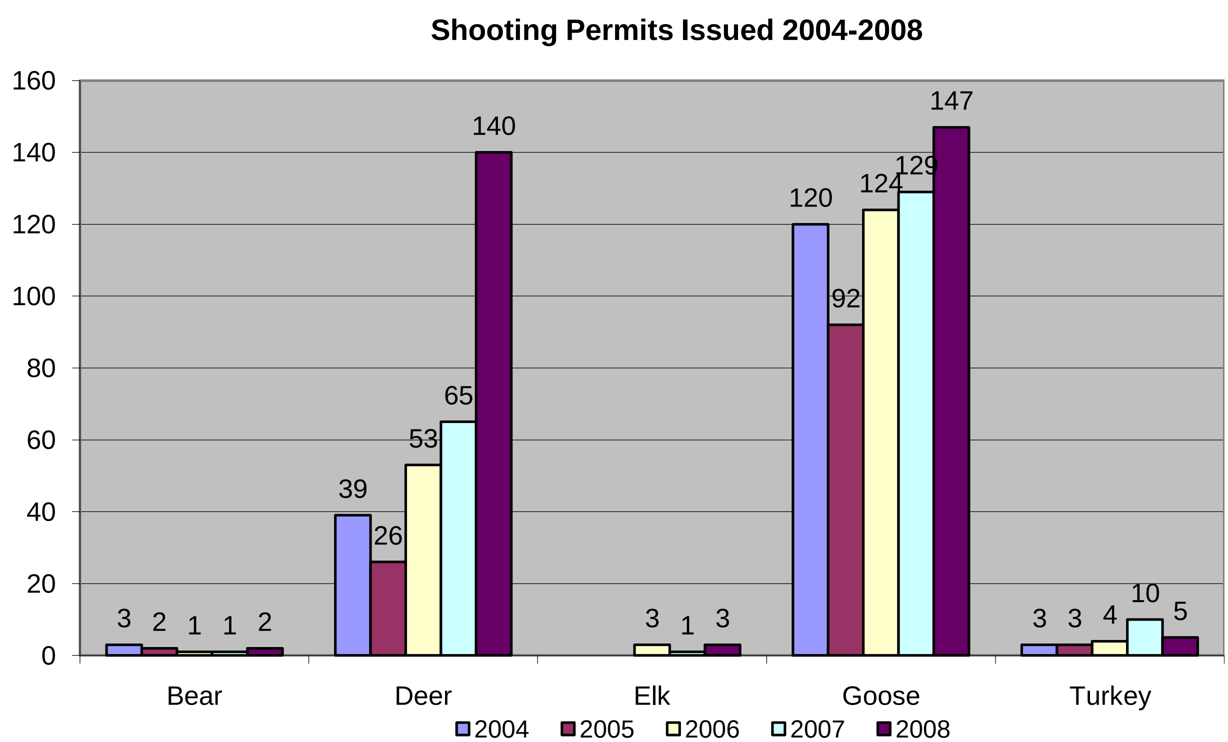


Figure 8. Shooting permits issued for nuisance wildlife control in Minnesota for 2004-2008.

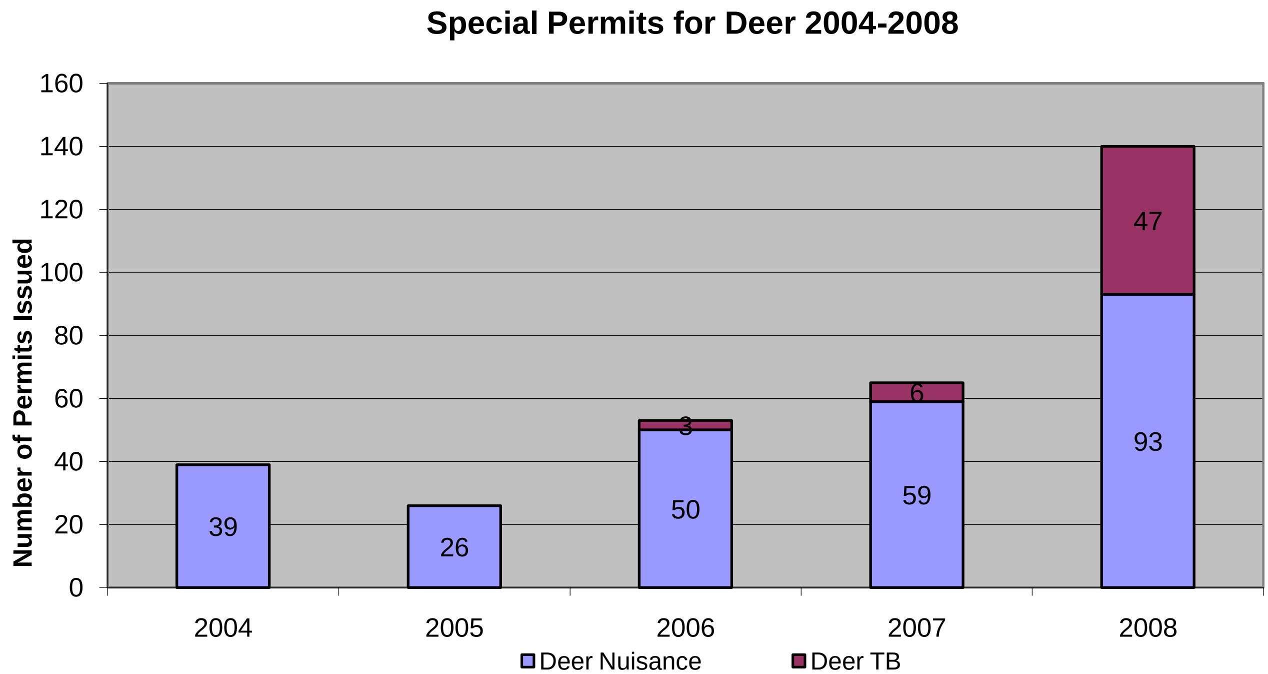


Figure 9. Shooting permits issued showing the portion related to tb control efforts in Minnesota for the period 2006-2008.

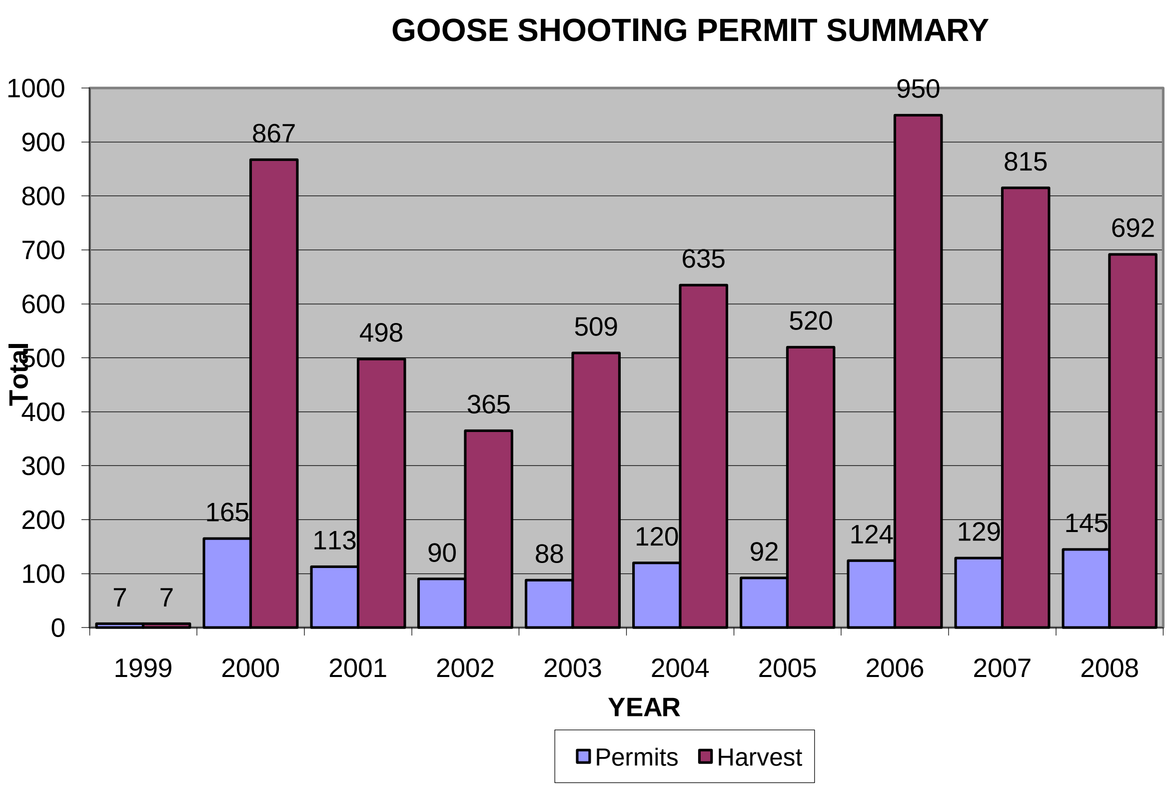


Figure 10. Comparison of nuisance goose shooting permits and harvest in Minnesota 1999-2008.

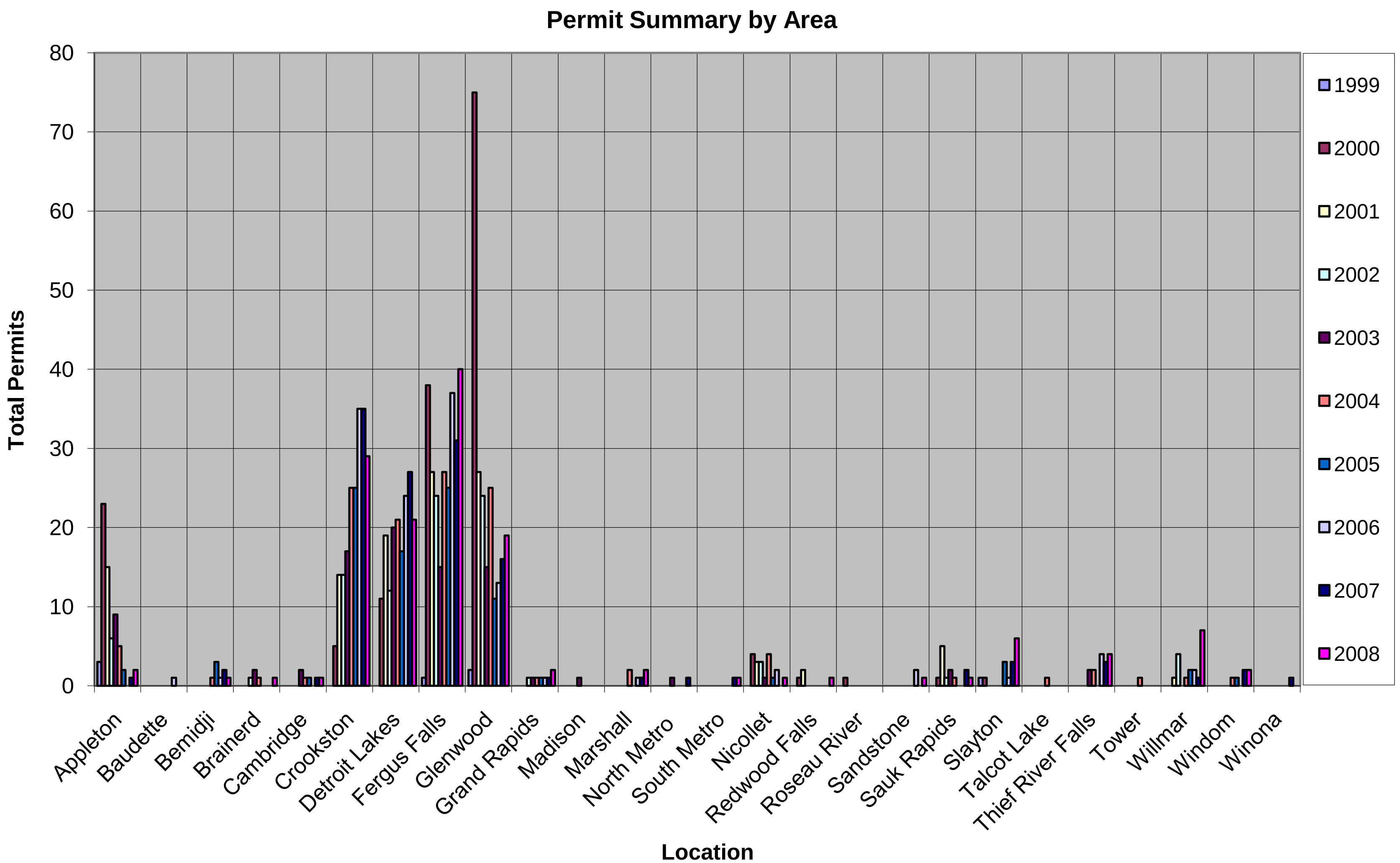


Figure 11. Nuisance goose permits issued by area wildlife offices in Minnesota 1999-2008.

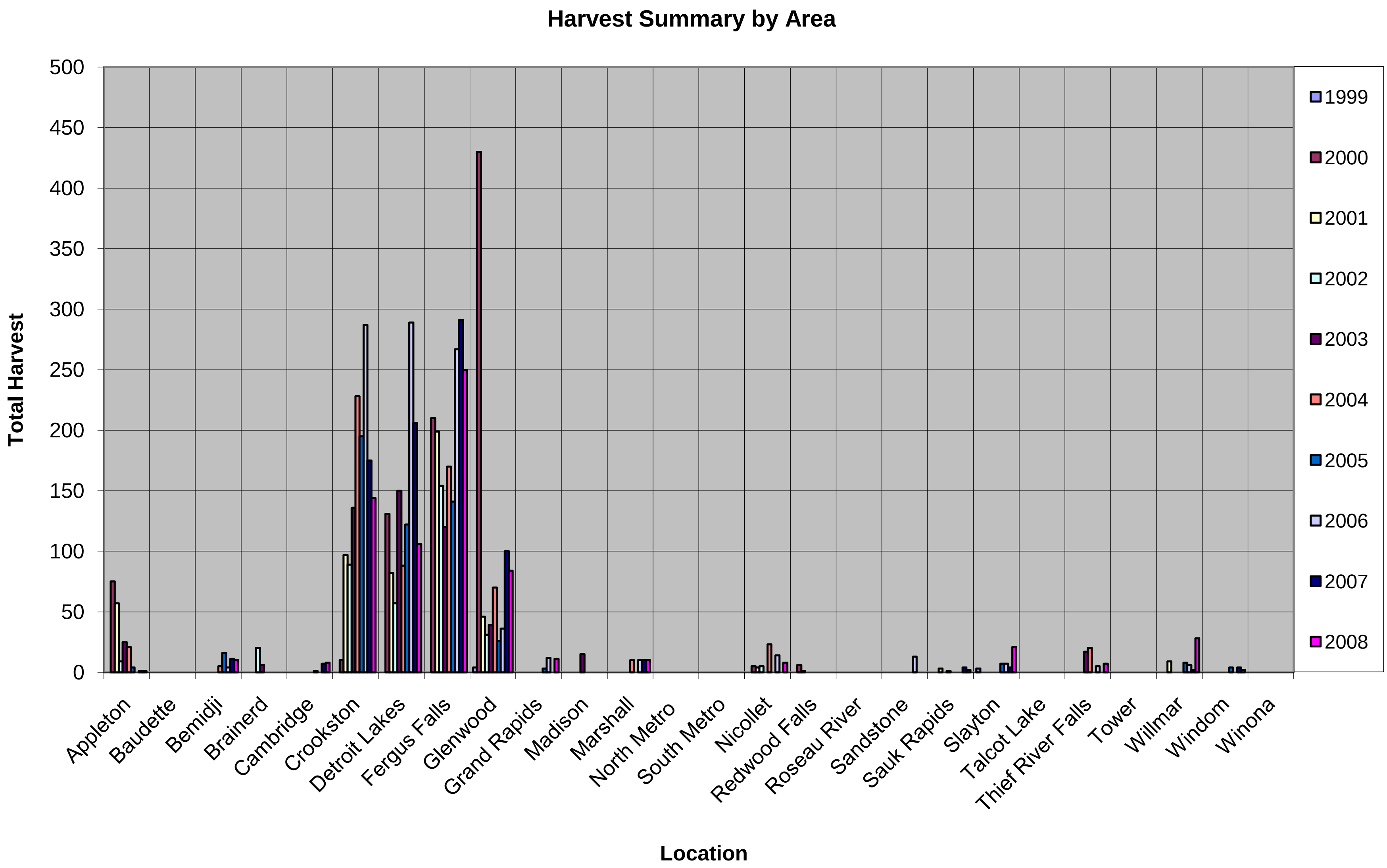
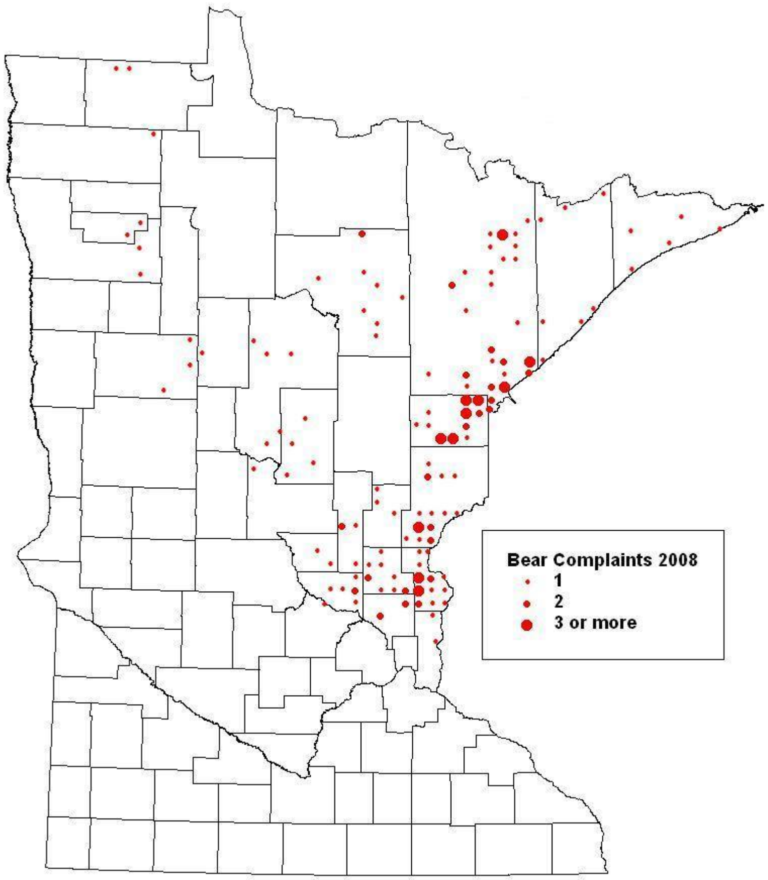


Figure 12. Nuisance goose harvest by area wildlife office in Minnesota 1999-2008.



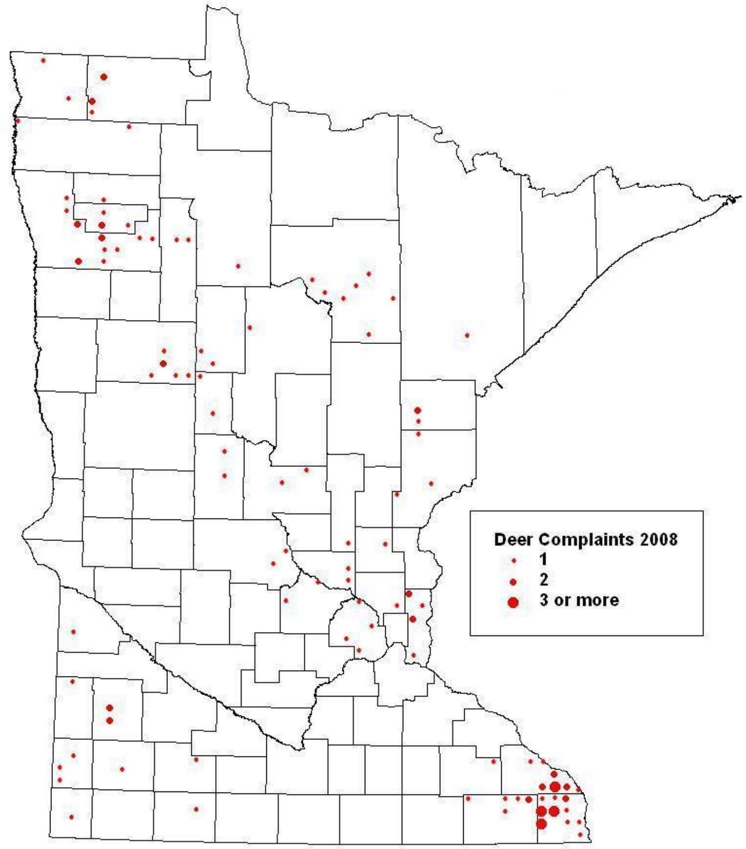


Figure 13. Location of bear damage complaints in 2008 (n=206). Note: number of points mapped differs from the total number of complaints received due to insufficient location information provided in the complaint reports to accurately map.

Figure 14. Location of deer damage complaints in 2008 (n=131). 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.

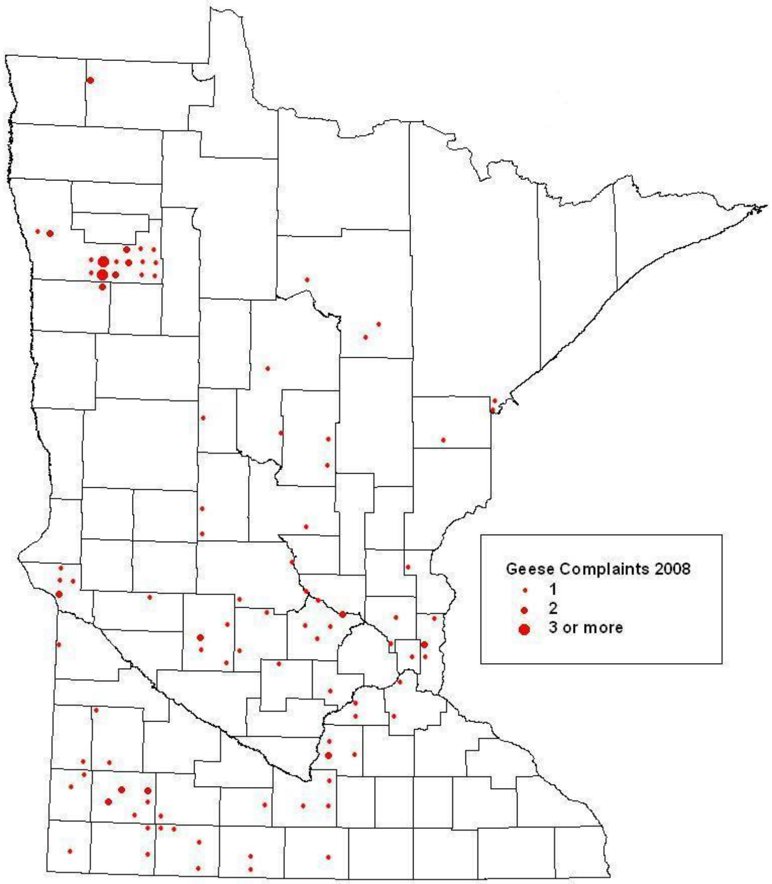


Figure 15. Location of goose damage complaints in 2008 (n=114). Note: number of points mapped differs from the total number of complaints received due to insufficient location information provided in the complaint reports to accurately map.

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.

FURBEARER WINTER TRACK SURVEY SUMMARY, 2008

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*), 2 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), its' 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 <u>routes</u> where each species was detected (hereafter, the 'distribution index'). This measure is computed to help assess whether 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-one of the 58 routes were completed this year (Figure 2). Survey routes took an average of 2 hours to complete. Total snow depths averaged 15" for completed routes (Figure 3), the second deepest since the survey was initiated. Similarly, mean overnight low temperature the night preceding the surveys was 0°F, the second coldest since surveys began (Figure 3). Survey routes were completed between November 25th and February 27th this winter, with a mean survey date of January 24th (Figure 3). This was the latest mean survey date since surveys were initiated.

Fisher and marten track indices (% of segments with detection) both declined to their lowest level since the survey began, although neither was a significant decline from the previous year (Figure 4). Fishers were detected on 54% of the routes, the lowest since the survey was initiated (Figure 4). Marten were detected on 46% of the survey routes, a slight but non-significant increase from last year (Figure 4).

Little change was observed in bobcat (*Lynx rufus*), wolf, and weasel (*Mustela* spp.) indices (Figure 4). Wolves were detected on 71% of survey routes, while bobcats were detected on 41% of survey routes. Red fox track indices rebounded some after a significant decline last year (Figure 4). Nevertheless, fox indices remain low in comparison to previous years. Based on track indices, coyotes, typically the least detected species, declined appreciably from last year. Considering past cyclic tendencies, snowshoe hare indices had been expected to decline in recent years. However, neither the spring nor winter snowshoe hare indices have consistently declined during this time (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, track routes were, on average, surveyed later in winter than ever before. Snow depths were also the second deepest since the survey began, while average temperature was the second coldest. Combined, these conditions could potentially cause a reduction in animal movement, thereby lowering track indices.

Based on confidence intervals, none of the observed changes from last year were statistically significant. However, the decline in coyote and marten indices approached significance, as did the increase in the red fox index. Confidence interval data for all previous years will be available in next year's report.

Two new survey routes were added this year, and I continue to review the adequacy of survey route sample size and distribution. 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).

ACKNOWLEDGEMENTS

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

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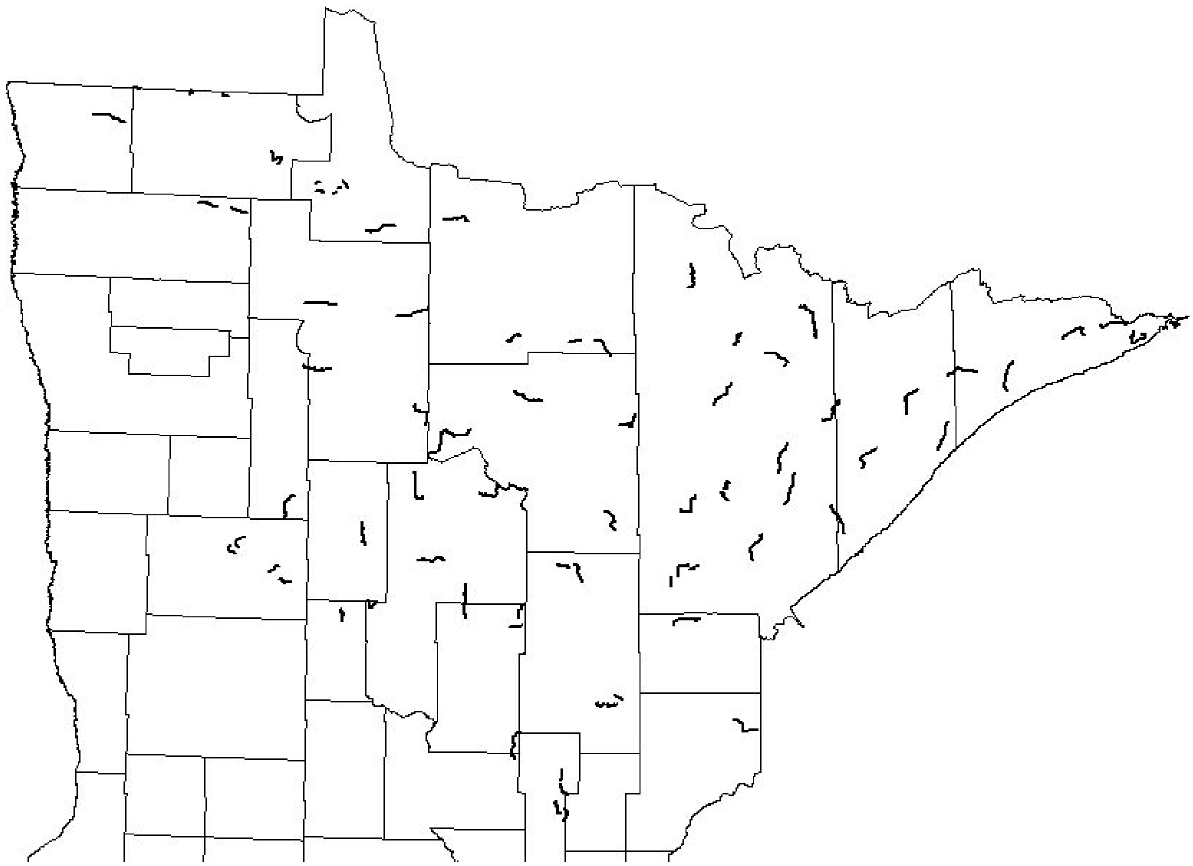

Figure 1. Locations of established furbearer winter track survey routes.

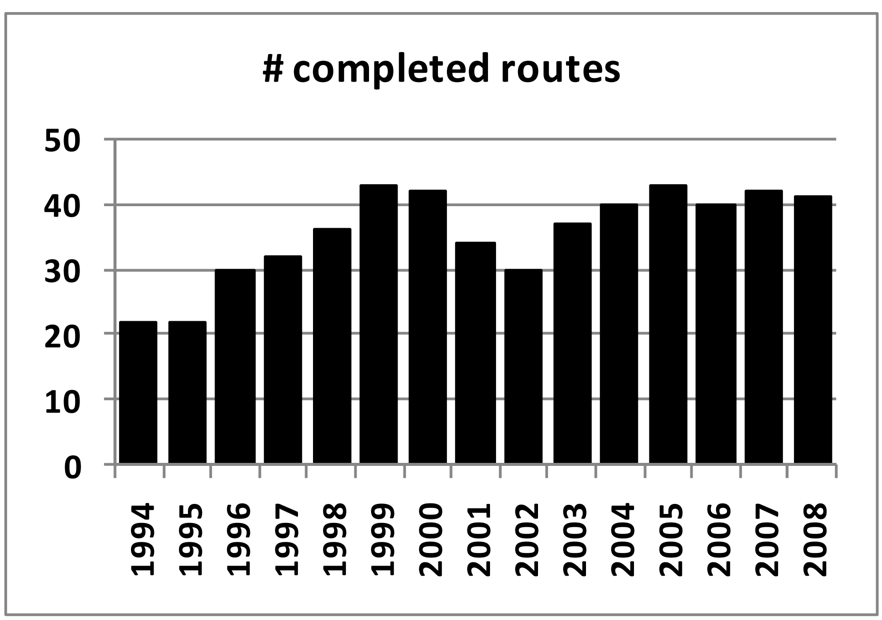

Figure 2. Number of winter track routes surveyed, 1994-2008.

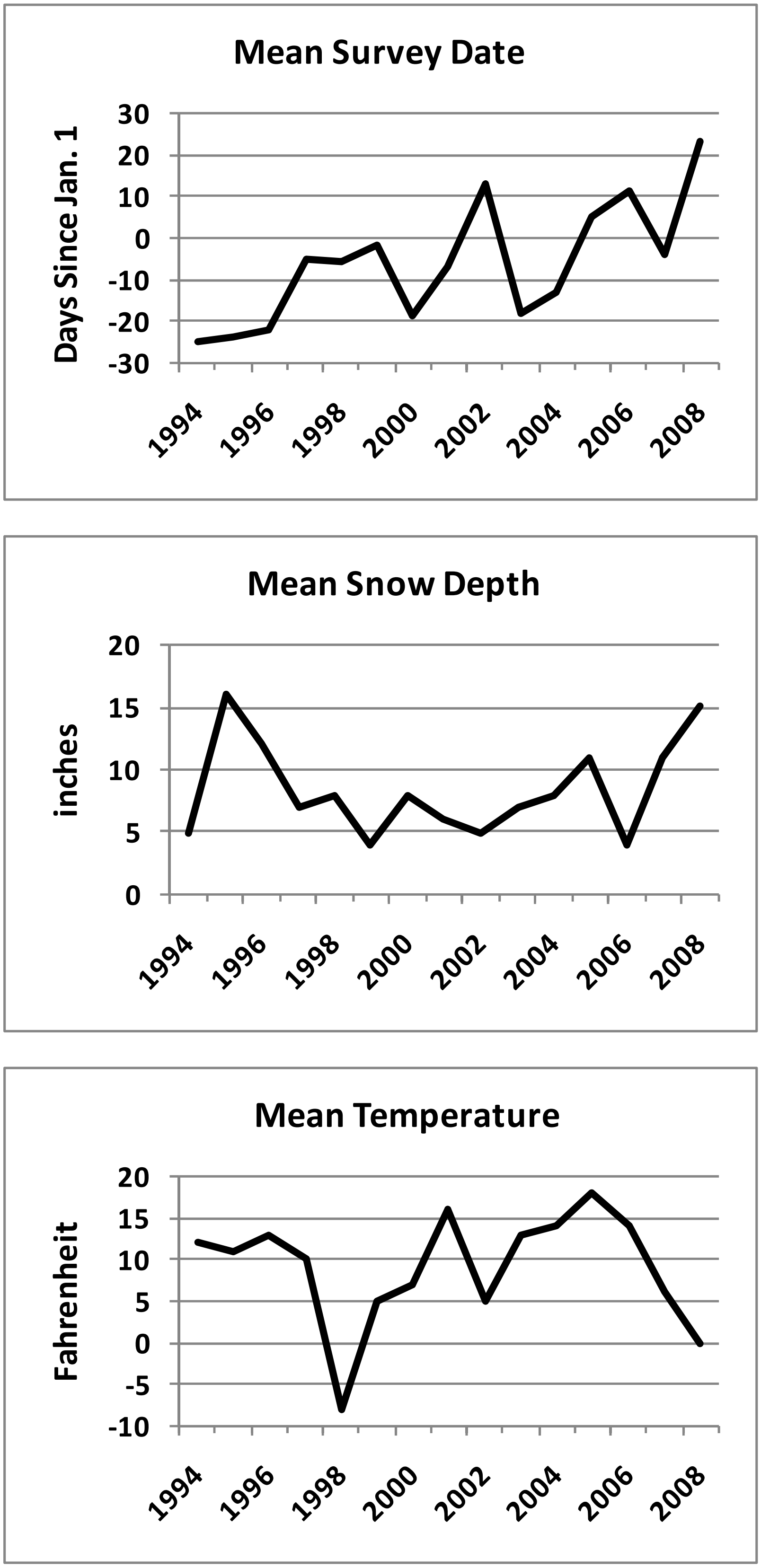

Figure 3. Average winter track survey date, snow depth, and temperature, 1994-2008.

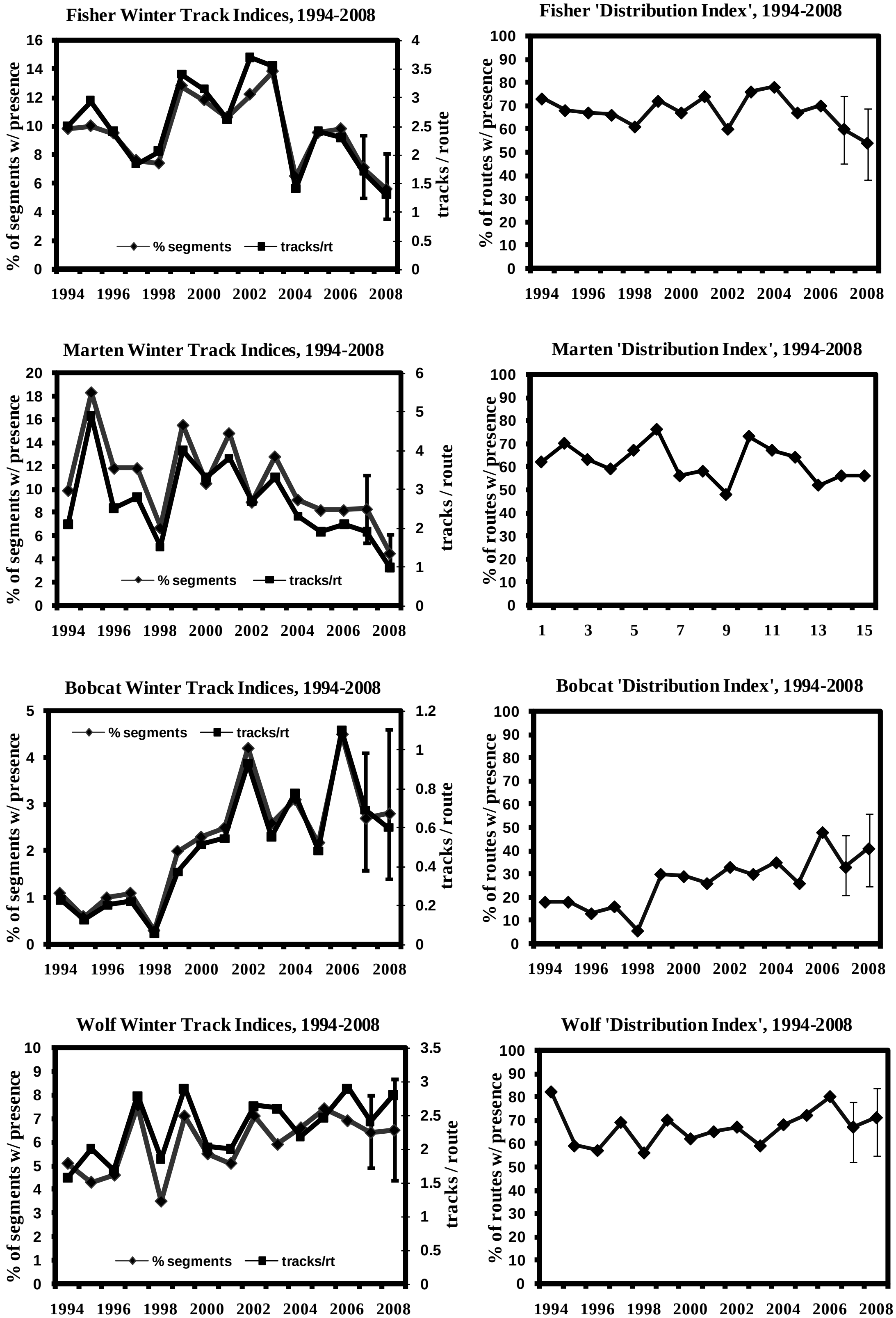

Figure 4. Winter track indices for selected species in Minnesota.

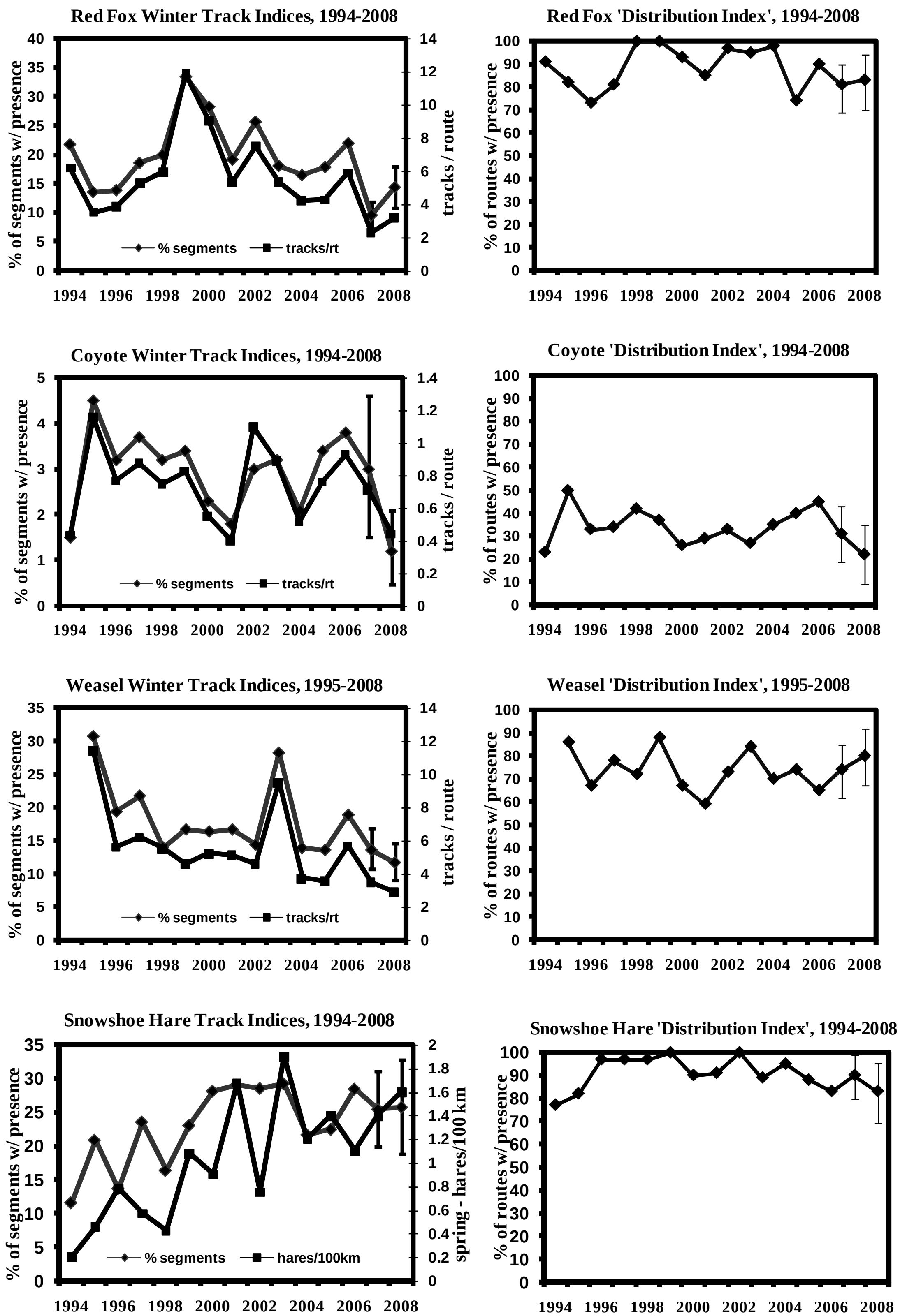

Figure 4 (continued). Winter track indices for selected species in Minnesota.

CARNIVORE SCENT STATION SURVEY SUMMARY, 2008

John Erb, Forest Wildlife Populations and 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 33rd 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. 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 303 routes were completed this year (Figure 1). There were 2,878 operable scent stations examined on the 303 4.3 km routes. Route density varied from 1 route per 528 km^2 in the Forest zone to 1 route per 1,216 km^2 in the Farmland zone (Figure 1).

Statewide, route visitation rates (% of routes with detection) were highest for red fox (39%), followed by skunk (37%), domestic cat (35%), raccoon (34%), coyote (26%), and dog (19%). Regionally, route visitation rates were as follows: red fox – Farmland (FA) 23%, Transition (TR) 40%, Forest (FO) 44%; coyote – FA 41%, TR 29%, FO 19%; skunk – FA 48%, TR 46%, FO 27%; raccoon – FA 64%, TR 39%, FO 20%; domestic cat – FA 70%, TR 44%, FO 17%; and dog – FA 30%, TR 26%, FO 11%. Figures 2-5 show station 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 significant changes from last year.

While multiple factors can influence abundance, fox indices remain lowest in the zone with the highest coyote index (Farmland), while coyote indices are lowest in the zone where wolves are most abundant (Forest). 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, mange, and habitat alteration. The Farmland coyote index continues it's upward trend (Figure 2), while the coyote index in the Forest zone remains below the long-term average (Figure 4). Raccoon indices are highest in the Farmland zone, and above their long-term mean (Figure 2). Recent raccoon indices in both the Transition (Figure 3) and Forest zones (Figure 4) have remained relatively stable near their long-term mean. While not significantly different from recent years, this year's bobcat indices in both the Forest and Transition zones were the highest since the survey was initiated (Figure 5). Wolf indices have not changed appreciably in the last 5 years, and remain slightly above the long-term average (Figure 5).

ACKNOWLEDGEMENTS

I wish to thank all of the cooperators who participated in the 2008 survey: DNR Division of Wildlife staff; Superior National Forest; Agassiz, Rydell, and Sherberne National Wildlife Refuges; USFWS Detroit Lakes Wetland Management District; 1854 Authority, White Earth, Red Lake, and Leech Lake Reservations; Vermillion Community College; Beltrami and Cass County Land Departments; Marshall County Central High School; and Richard Nelles and Tom Stuber.

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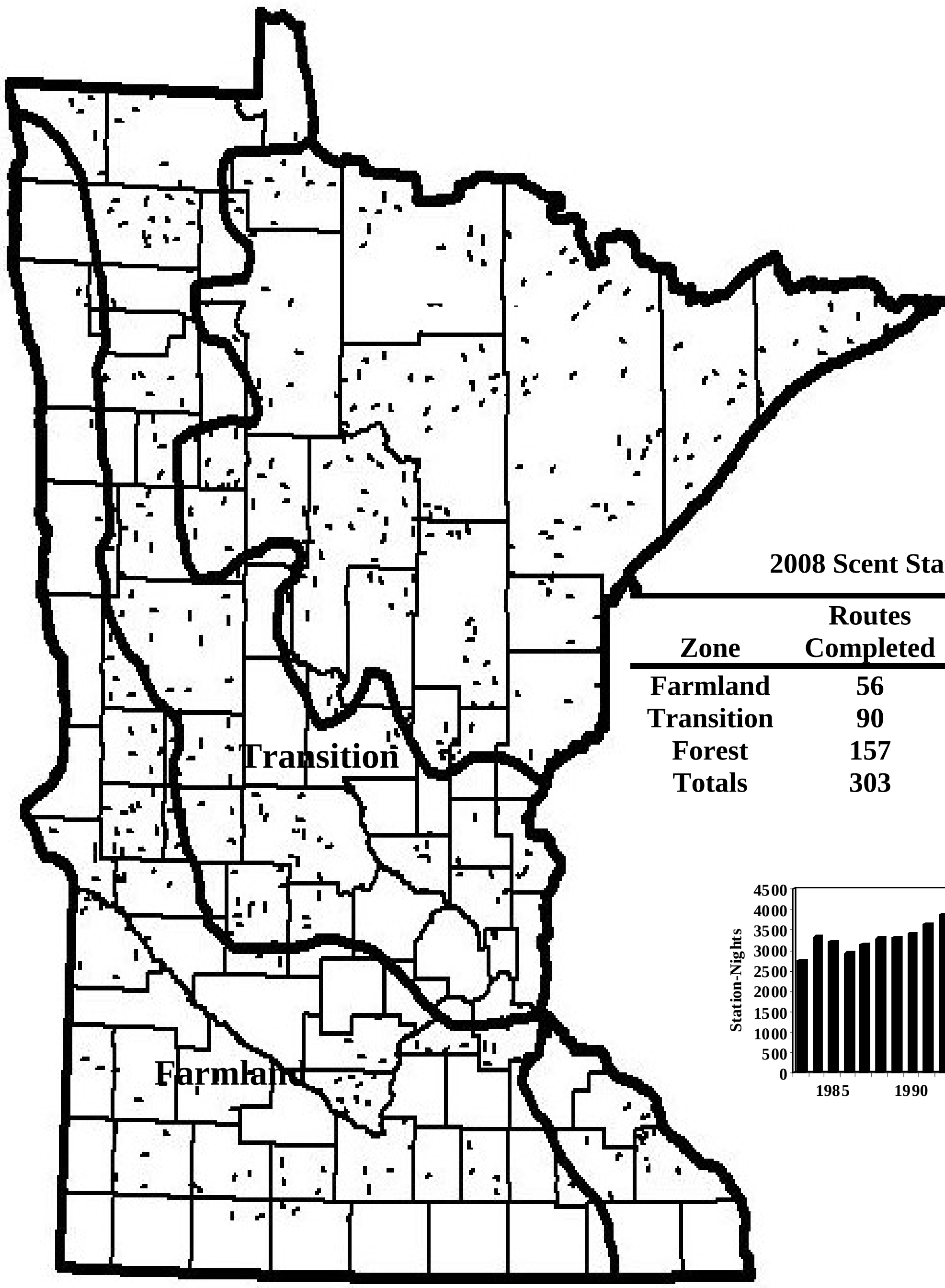

2008 Scent Station Specifics

Zone	Routes Completed	Route Density	Station Nights
Farmland	**56**	**1/1,216 km^2**	**536**
Transition	**90**	**1/730 km^2**	**838**
Forest	**157**	**1/528 km^2**	**1,504**
Totals	**303**	**1/715 km^2**	**2,878**

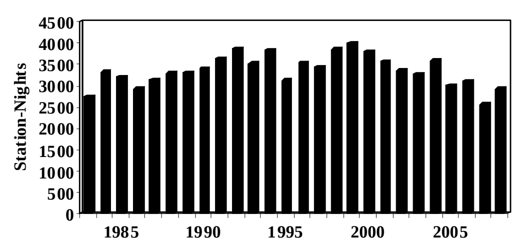

Figure 1. Locations of scent station routes. Insets show 2008 route specifics and the number of station-nights per year since 1983.

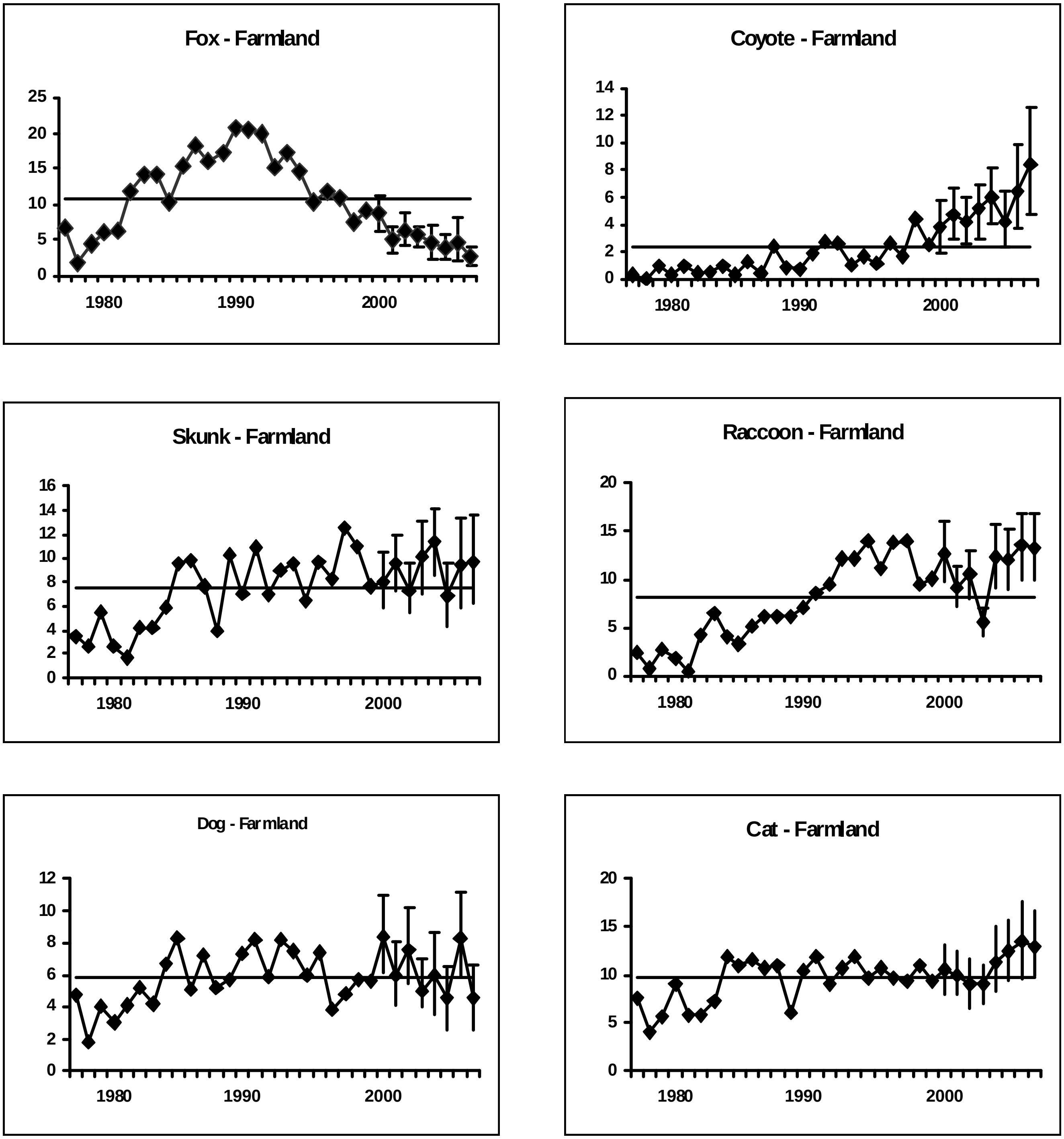

Figure 2. Percentage of scent stations visited by selected species in the Farmland Zone of Minnesota, 1977-2008. Horizontal line represents long-term mean.

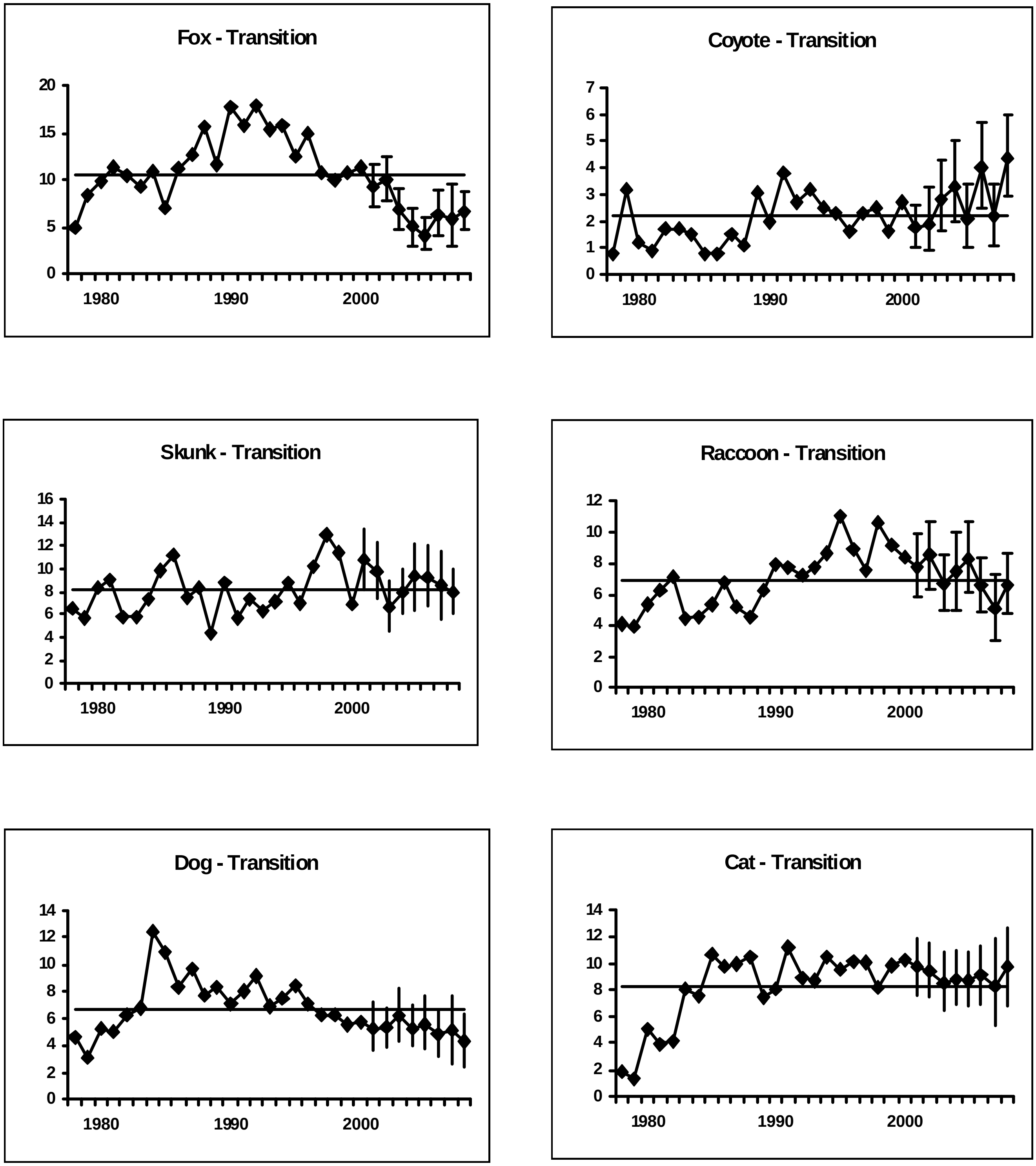

Figure 3. Percentage of scent stations visited by selected species in the Transition Zone of Minnesota, 1978-2008. Horizontal line represents long-term mean.

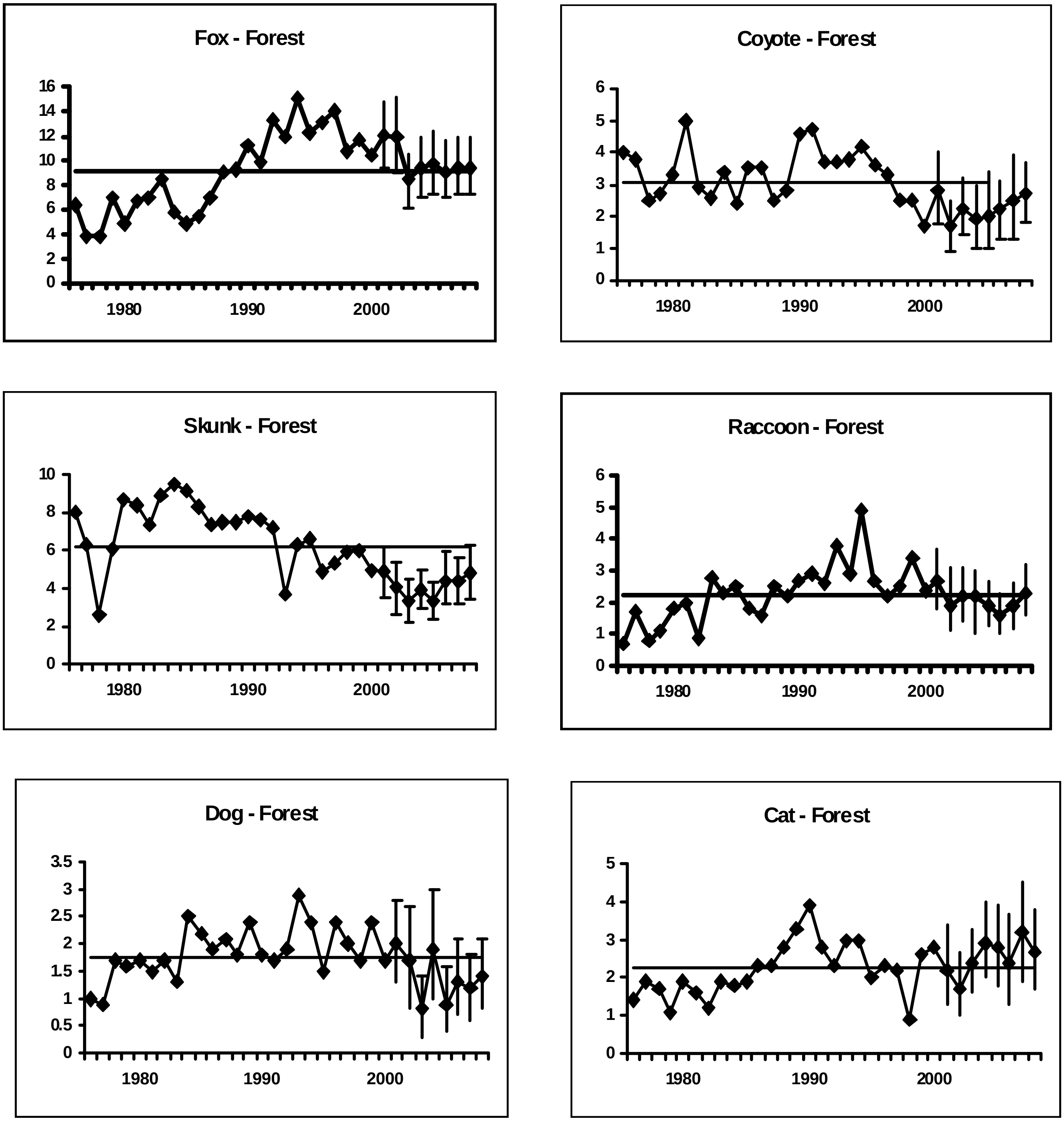

Figure 4. Percentage of scent stations visited by selected species in the Forest Zone of Minnesota, 1976-2008. Horizontal line represents long-term mean.

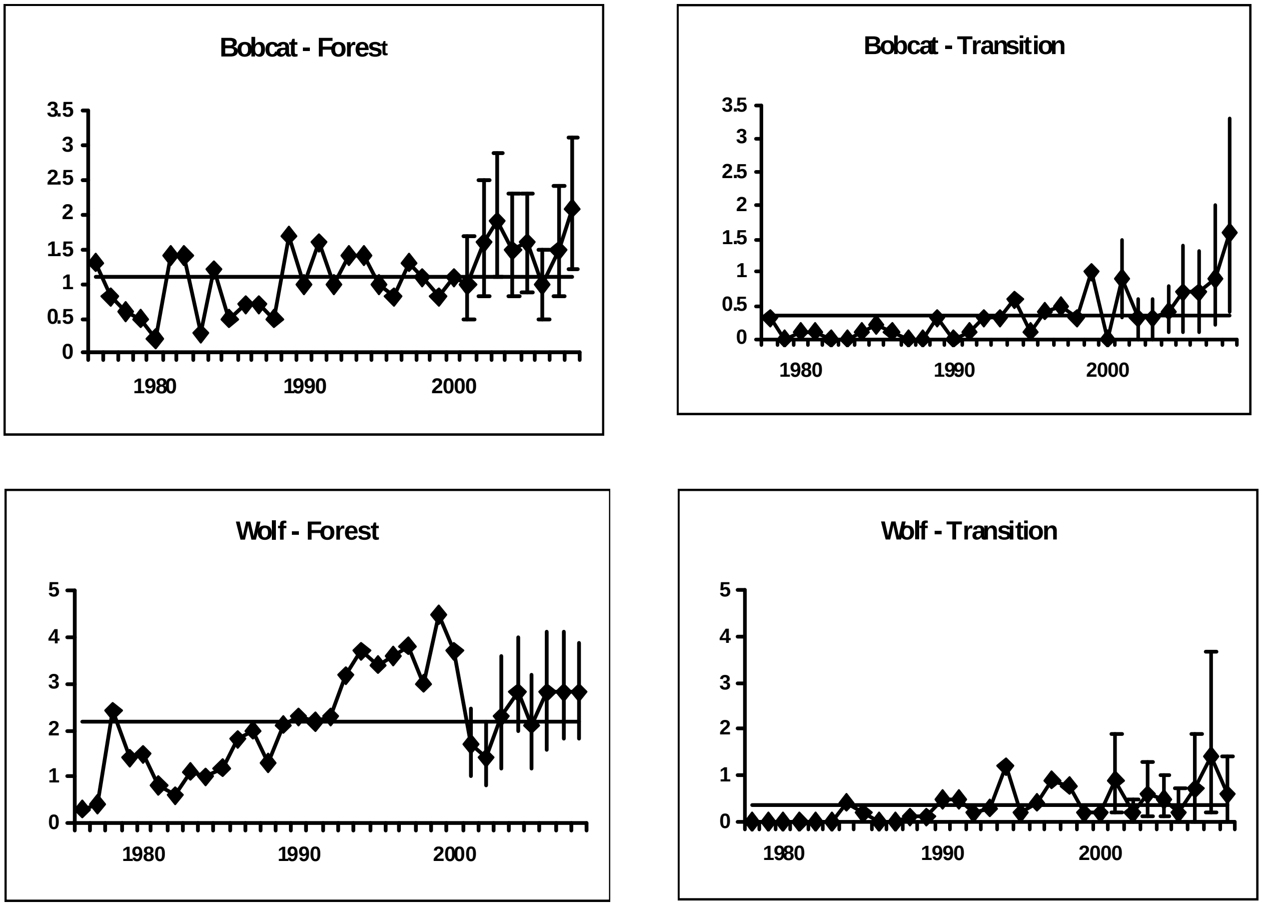

Figure 5. Percentage of scent stations visited by wolves and bobcat in the Forest and Transition Zones of Minnesota, 1976-2008. Horizontal lines represents long-term mean.

FOREST WILDLIFE POPULATIONS

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GROUSE SURVEYS IN MINNESOTA DURING SPRING 2009

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SUMMARY OF FINDINGS

Surveys for ruffed grouse (*Bonasa umbellus*) and sharp-tailed grouse (*Tympanuchus phasianellus*) were conducted during April and May 2009. Mean counts of ruffed grouse drums throughout the forested regions of Minnesota were 2.0 (95% confidence interval = 1.8–2.3) drums/stop (dps). That was 43% higher than the mean of 1.4 (1.2–1.6) dps observed during 2008. It was as high as counts during the last 3 peak years of the long-term population cycle (i.e., 1978, 1989, and 1998).

During the spring 2009 survey 2,699 sharp-tailed grouse were observed at 199 dancing grounds. The mean number of sharp-tailed grouse per dancing ground was 10.0 (8.5–11.7) in the East Central survey region, 15.2 (13.4–17.0) in the Northwest region, and 13.6 (12.2–15.1) statewide. Index values in the Northwest region were 15% (-1–34%) greater during 2009 than during 2008, which were greater than during any other year since 1980. Index values in the East Central region declined slightly from 2008 but remained higher than values observed during 25 of the last 27 years.

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 132 routes between 8 April and 15 May 2009. Most routes (83%) were run between 22 April and 8 May. The median date this year (1 May) was similar to the most recent 10-year average (29 April). Cooperators included the DNR Divisions of Fish & Wildlife and Ecological Services; 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. Observers reported survey conditions as Excellent, Good, and Fair on 57%, 35%, and 8% of 129 routes, respectively. The distribution of survey conditions was within the range of results from the last 3 years.

Mean counts of ruffed grouse drums throughout the forested regions of Minnesota were 2.0 (95% confidence interval = 1.8–2.3) drums/stop (dps) during 2009. Drum counts by survey region during 2009 were 2.4 (2.0–2.7) dps in the Northeast (n = 110 routes), 1.9 (1.4–2.6) dps in the Northwest (n = 8), 1.1 (0.6–1.7) dps in the Central Hardwoods (n = 15), and 0.5 (0.1–0.9) dps in the Southeast (n = 7) (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.

Increases in counts from 2008 to 2009 in the Northeast (44%) and Northwest (117%) regions were statistically significant, as was the statewide increase (43%). Changes in counts in the Central Hardwoods (+5%) and Southeast (-27%) regions were not significant. Drum counts during 2009 throughout most of the range of ruffed grouse in Minnesota were as high as counts during the last 3 peak years of the long-term population cycle (i.e., 1978, 1989, and 1998). It is currently the 4th year of an increasing phase of the cycle, which has lasted as few as 4 years and as many as 8 years during the last 4 cycles.

Sharp-tailed Grouse

A total of 2,699 sharp-tailed grouse was observed at 199 dancing grounds with ≥2 male grouse (or grouse of unknown sex) during spring 2009. Leks with ≥2 grouse were visited a mean of 1.8 times. There were 622 grouse on 62 leks in the EC survey region and 2,077 grouse on 137 leks in the NW region. The index values for the NW region and statewide range continued an increasing trajectory since 2006 (Tables 1 and 2) to values greater than they have been since 1980 (Figure 5). Index values in the EC region declined slightly from 2008 (Tables 1 and 2) but remained higher than values observed during 25 of the last 27 years.

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

[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

[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.

ACKNOWLEDGEMENTS

I sincerely appreciate the efforts of all the DNR staff, partners, and volunteer cooperators who conducted and helped coordinate the grouse surveys. The ruffed grouse survey data for 1982–2004 were entered into a database by Doug Mailhot and another volunteer through a special effort organized by Gary Drotts, John Erb, and Rick Horton. I also thank Laura Gilbert for helping with data entry and archiving and Mark Lenarz for reviewing a draft of this report.

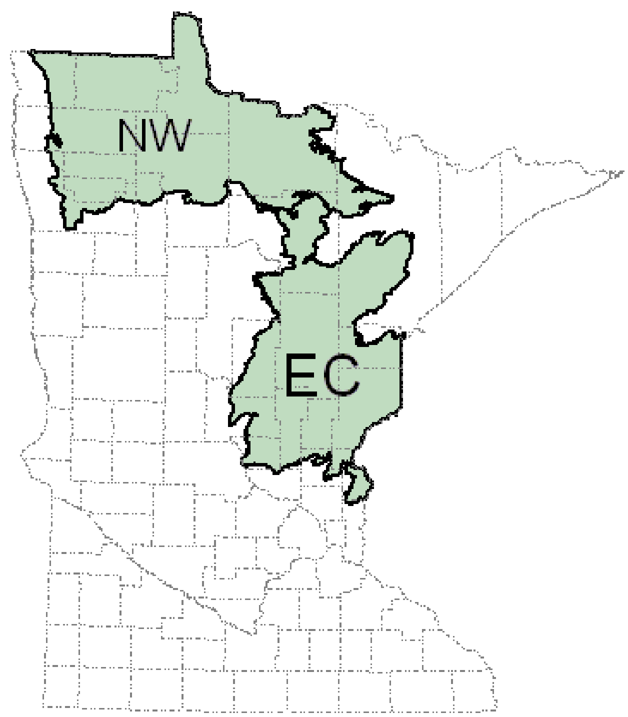

Figure 1. Northwest (NW) and East Central (EC) survey regions for **sharp-tailed grouse** relative to county boundaries in Minnesota. The regions were based largely on boundaries of ECS Subsections.

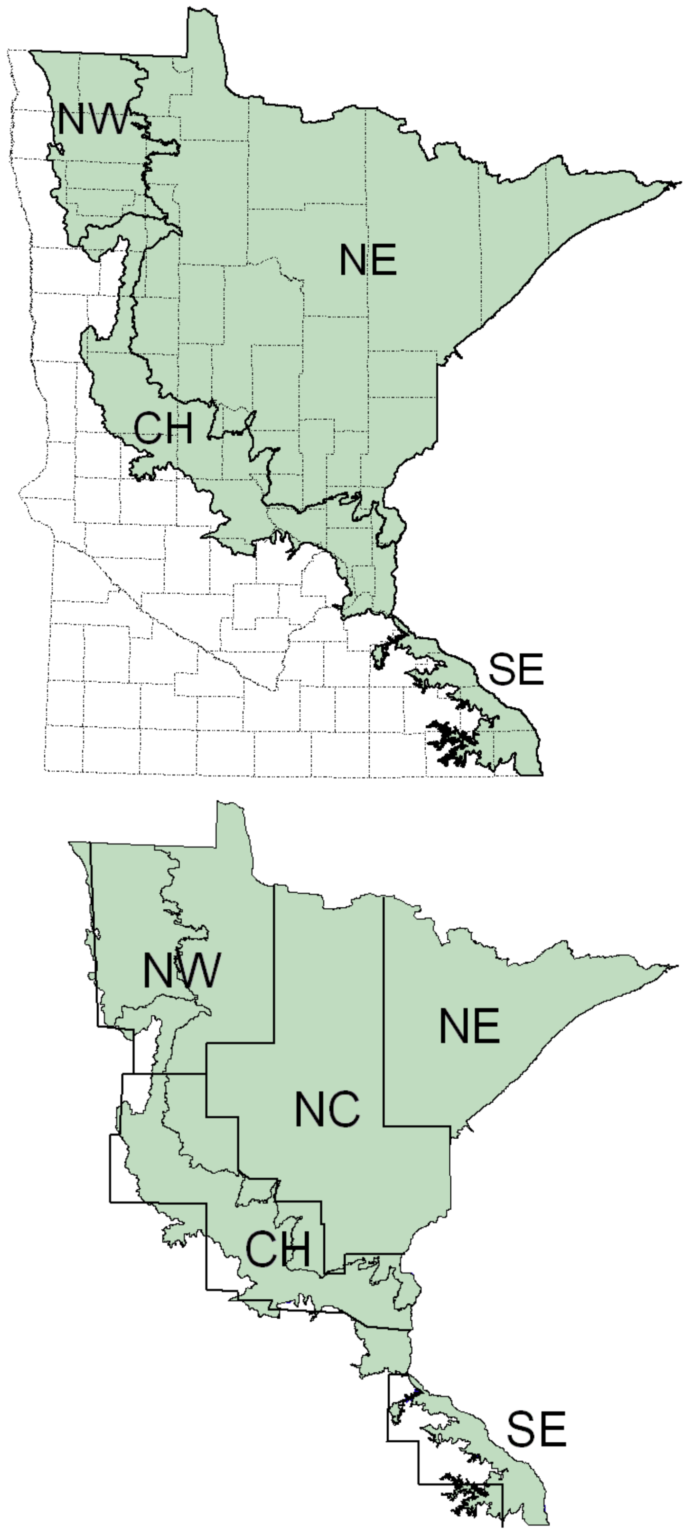

Figure 2. **Ruffed grouse** survey regions (shaded, curved boundaries) are based on the Ecological Classification System. Top panel: regions are labeled and overlaid on counties (dashed lines). Bottom panel: former survey zones (straight boundaries) are labeled and overlaid on regions.

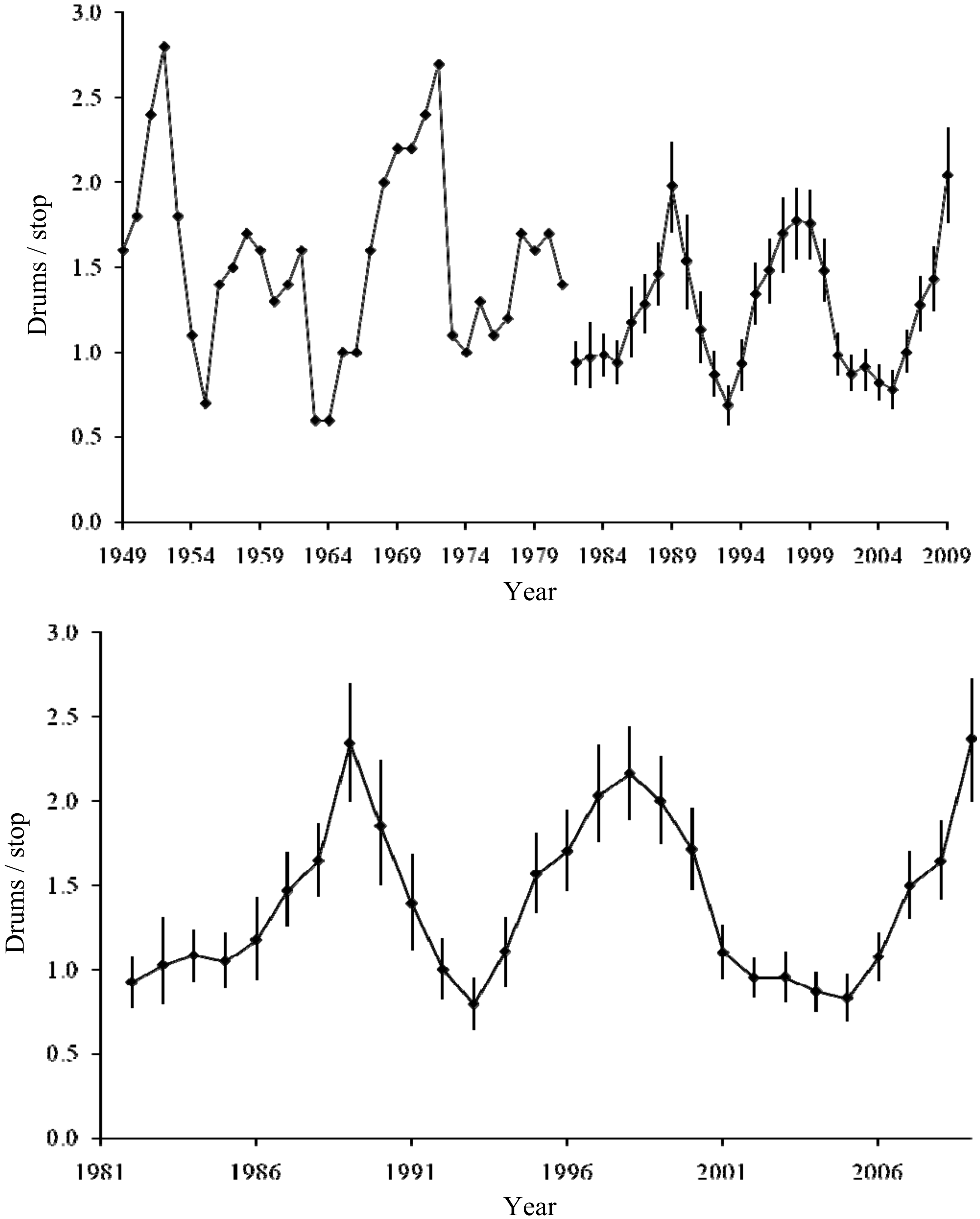

Figure 3. Ruffed grouse drum count index values in **Minnesota** (top) and just the **Northeast** region (bottom). Vertical error bars represent 95% confidence intervals based on bootstrap samples. Statewide means before 1982 were not re-analyzed with the current methods, so confidence intervals were 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.

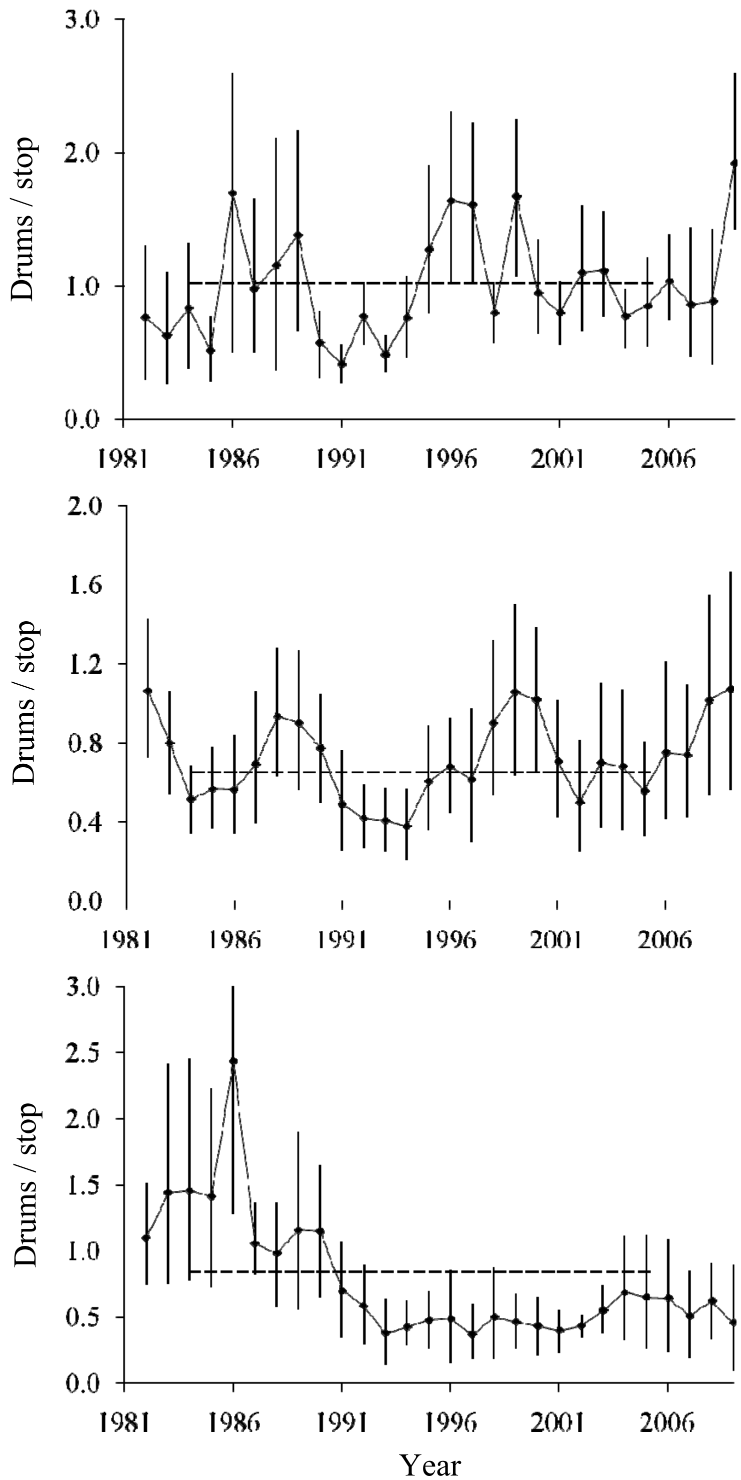

Figure 4. Ruffed grouse drum count index values in the **Northwest** (top), **Central Hardwoods** (middle), and **Southeast** (bottom) survey regions of Minnesota. Dashed horizontal lines indicate the mean from 1984 to 2004. Vertical error bars represent 95% confidence intervals based on bootstrap samples. The highest error bar in the bottom panel was truncated.

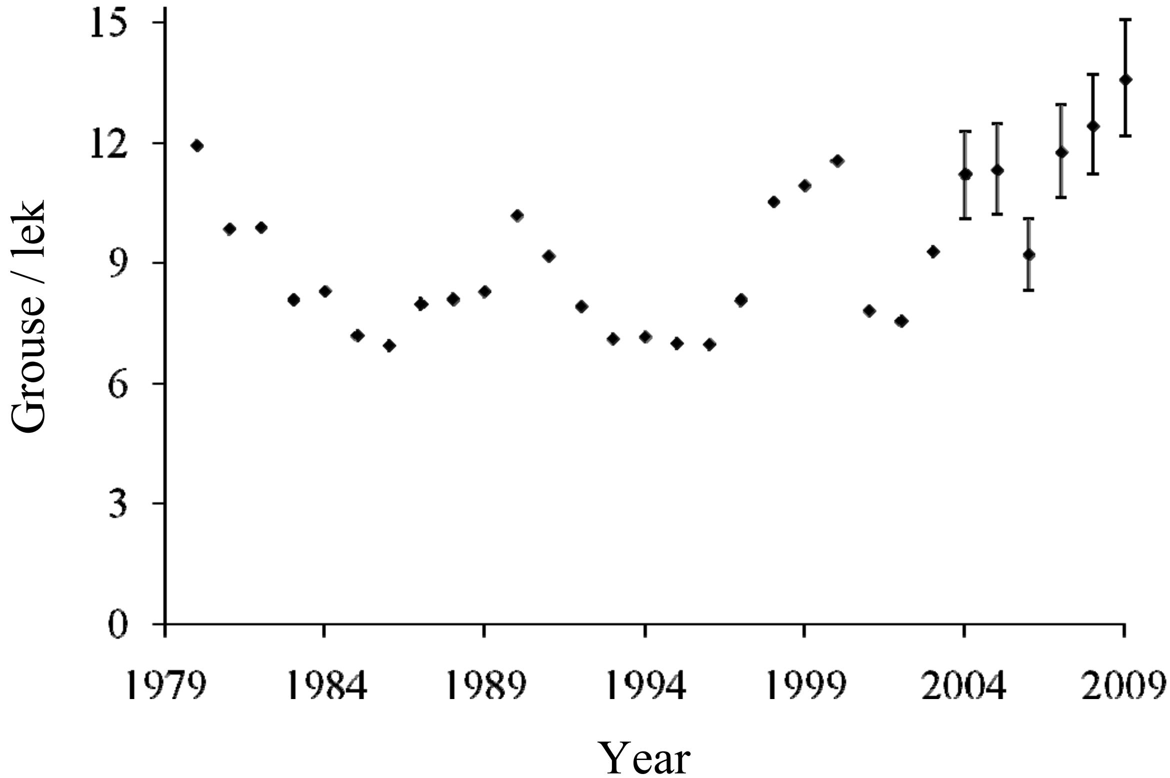

Figure 5. Mean number of **sharp-tailed grouse** observed in Minnesota during spring surveys of dancing grounds, 1980–2009. Vertical error bars, which were calculated only for recent years, represent 95% confidence intervals based on bootstrap samples. No line connects the annual means because they are not based on comparable samples of leks.

PRAIRIE-CHICKEN SURVEY IN MINNESOTA DURING 2008 AND 2009

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 2008 and 2009. During 2009 we counted 1,665 male prairie-chickens (includes birds of unknown sex) and located 151 booming grounds. Within survey blocks we observed 0.32 (0.23–0.42) leks/mi^2 and 10.8 (9.6–12.1) males/lek. Approximately 19% fewer leks and 30% fewer males were counted in survey blocks during spring 2009 than during spring 2008. Averages of annual densities observed during 1993–2002 were 0.2 leks/mi^2 and 11.5 males/lek.

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 100 prairie-chickens annually since 2003 when a limited-entry hunting season was opened for the first time since 1942.

Prairie-chickens, like sharp-tailed grouse, gather at leks during spring. The leks of prairie-chickens are also 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. 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 leks in western Minnesota. They attempted to locate and observe multiple times all prairie-chicken leks within 17 designated survey blocks (Figure 2). Each block was approximately 4 miles × 4 miles square (4,144 ha) and was selected non-randomly based upon the spatial distribution of leks and the presence of relatively abundant grassland habitat. Ten survey blocks were located in what was considered the core of the prairie-chicken range in Minnesota. The other 7 blocks were located in the periphery of the range. The permit areas for the fall hunting season roughly coincide with the core of the range (Figure 2).

Observations of leks 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 leks from a distance using binoculars. If vegetation or topography obscured the view of a lek, 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 lek were 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 leks are males. Although most male prairie-chickens attend leks most mornings, female attendance at leks 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.

RESULTS & DISCUSSION

Observers from at least 3 cooperating organizations and many unaffiliated volunteers counted prairie-chickens during April and May in 2008 and 2009. Cooperators included the DNR Division of Fish and Wildlife, the Fergus Falls and Detroit Lakes Wetland Management Districts (U.S. Fish & Wildlife Service), and The Nature Conservancy. Observers located 236 booming grounds and counted 2,863 male prairie-chickens during 2008 (Table 1). Observers located 151 booming grounds and counted 1,566 male prairie-chickens during 2009 (Table 2). Within hunting permit areas we observed 0.08 leks/mi^2 (0.03 leks/km^2) and 12.8 males/lek during 2008 and 0.05 leks/mi^2 (0.02 leks/km^2) and 10.4 males/lek during 2009. Minimum counts in Tables 2 and 3 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 spatial sampling design.

Each booming ground was observed on a median of 1 (mean = 1.8) and 2 (mean = 2.0) different days during 2008 and 2009, respectively. Fifty-seven percent and 40% of leks were observed only once during 2008 and 2009, respectively. Attendance of males at prairie-chicken leks 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 leks and individual birds at leks. 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.

Table 1. Minimum abundance of prairie-chickens within and outside of hunting permit areas in western Minnesota during spring **2008**. Counts of leks and birds are not comparable among permit areas or years.

Permit Area	Area (sq. mi.)	Leks	Males	Unk.[a]
801A	233	0	0	0
802A	319	18	160	0
803A	258	12	108	0
804A	168	10	149	0
805A	103	26	416	0
806A	289	8	114	0
807A	170	30	361	0
808A	161	30	448	0
809A	287	27	337	0
810A	195	22	285	14
811A	272	15	156	24
PA subtotal[b]	2,454	198	2,534	38
Outside PAs[c]	NA[d]	38	329	96
Grand total	NA	236	2,863	134

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

Table 2. Minimum abundance of prairie-chickens within and outside of hunting permit areas in western Minnesota during spring **2009**. Counts of leks and birds are not comparable among permit areas or years.

Permit Area	Area (sq. mi.)	Leks	Males	Unk.[a]
801A	233	0	0	0
802A	319	8	74	0
803A	258	0	0	0
804A	168	0	0	0
805A	103	10	106	0
806A	289	5	52	0
807A	170	31	370	2
808A	161	23	248	0
809A	287	23	265	0
810A	195	20	179	28
811A	272	11	70	37
PA subtotal[b]	2,454	131	1,364	67
Outside PAs[c]	NA[d]	20	202	32
Grand total	NA	151	1,566	99

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

Within survey blocks we counted 954 males (includes birds of unknown sex) on 88 leks during 2009 (Table 3). That was 30% fewer males and 19% fewer leks than were counted in survey blocks during spring 2008 (Figure 3). Leks were defined as having ≥2 males, so observations of single males were excluded from summaries by survey block. During spring 2009 we observed 0.38 (0.24–0.52) leks/mi^2 and 11.1 (9.6–12.6) males/lek in survey blocks in the core of the range, whereas we observed 0.24 (0.15–0.33) leks/mi^2 and 10.3 (8.2–12.4) males/lek in peripheral blocks (Table 3). The densities of prairie-chickens observed during 2009 were less than the means observed during 2008 but were similar to the means of 0.2 leks/mi^2 and 11.5 males/lek observed in survey blocks from 1993 until 2002.

Table 3. Counts of prairie-chickens within survey blocks in Minnesota.

Range[b]	Survey Block	Area (miles^2)	2009 Leks	2009 Males[c]	Change from 2008[a] Leks	Change from 2008[a] Males[c]
Core	Polk 2	16.2	9	101	1	-19
	Norman 1	16.1	2	21	-1	-28
	Norman 3	16.0	11	120	2	12
	Clay 1	17.6	10	90	-1	-62
	Clay 2	16.0	2	28	0	-36
	Clay 3	16.1	8	89	-2	-26
	Clay 4	14.9	6	63	1	-5
	Wilkin 1	15.4	8	90	0	-21
	Wilkin 3	16.1	4	66	-3	-26
	Otter Tail 1	15.9	1	7	-1	-31
	Core subtotal	160.2	61	675	-4	-242
Periphery	Polk 1	15.9	7	63	-3	-31
	Norman 2	16.3	6	72	-3	-21
	Mahnomen	16.1	3	34	-2	-66
	Becker 1	16.0	2	13	-5	-54
	Becker 2	16.1	3	44	-1	-1
	Wilkin 2	16.1	3	17	0	-2
	Otter Tail 2	15.7	3	36	-3	12
	Periphery subtotal	112.2	27	279	-17	-163
Grand total		272.4	88	954	-21	-405

[a] The 2008 count was subtracted from the 2009 count, so a negative value indicates a decline.
[b] Survey blocks were classified as either mostly within the original (i.e., 2003–2005) hunting permit areas (core) or mostly outside those permit areas (periphery).
[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 Mark Lenarz for reviewing a draft of this report.

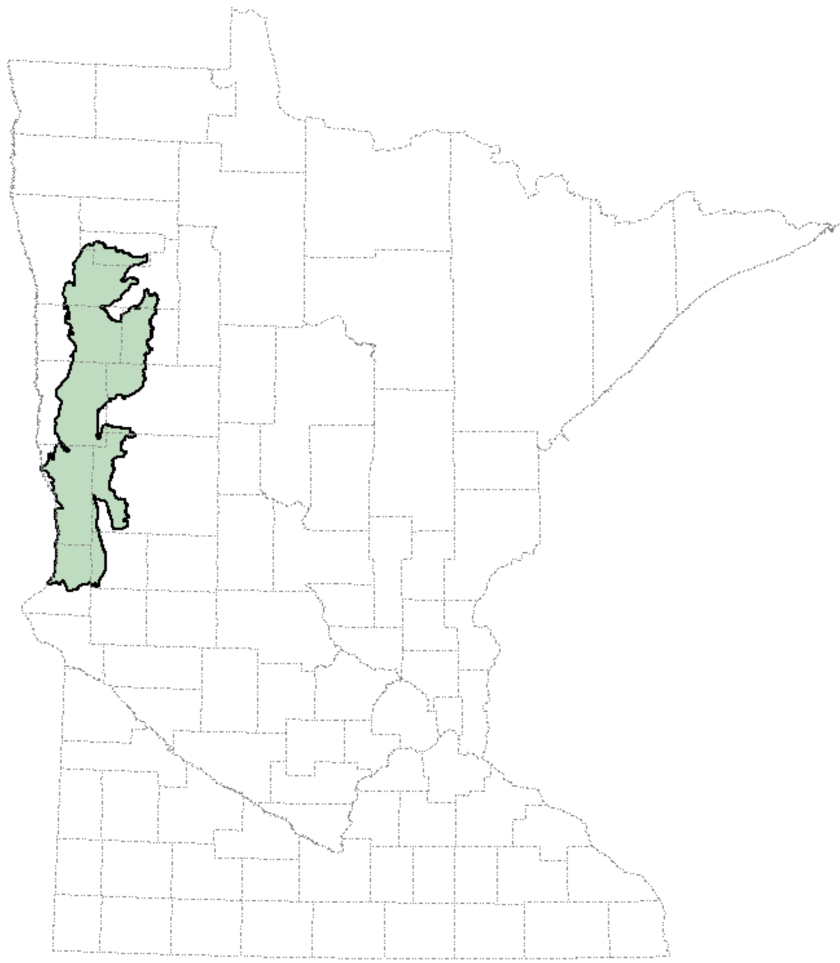

Figure 1. Primary range of greater prairie-chickens (shaded area) relative to county boundaries in Minnesota. The prairie-chicken range was based on ECS Land Type Associations.

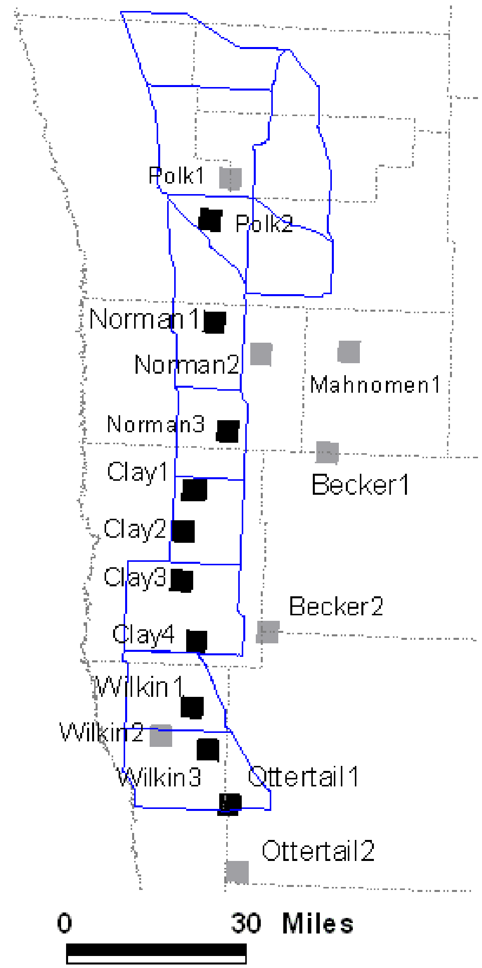

Figure 2. Survey blocks (labeled squares) and hunting permit area boundaries (solid lines) for prairie-chickens in western Minnesota. Survey blocks were designated as being in either the core (black) or periphery (gray) of the range. Blocks were named after the counties (dashed lines) in which they were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

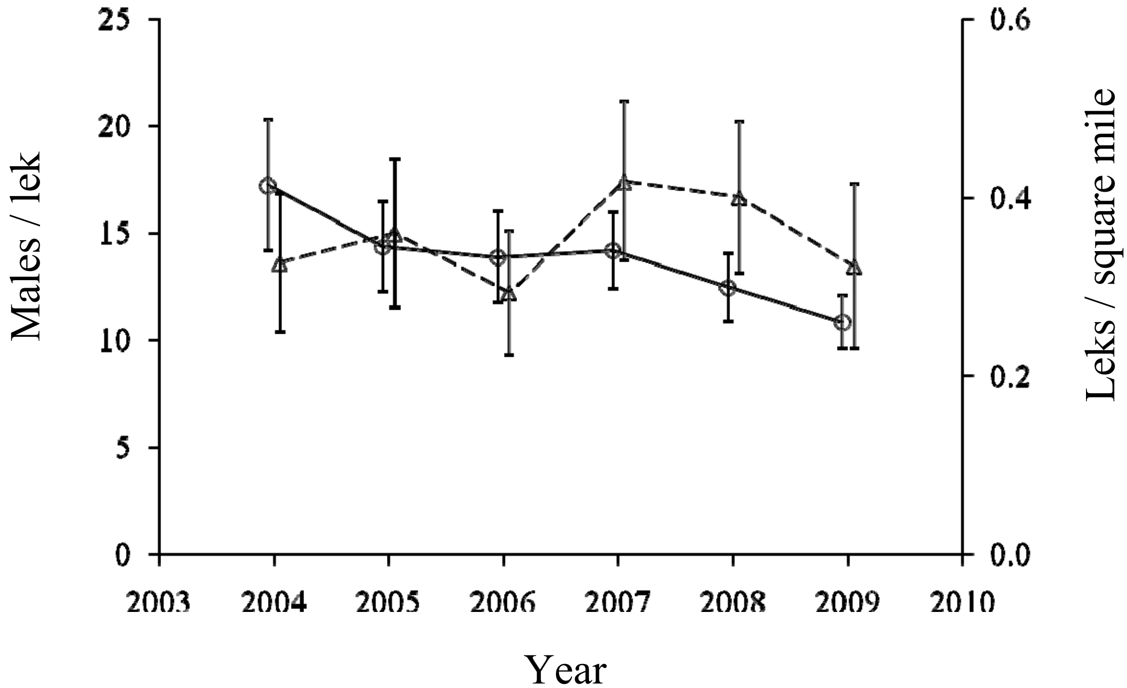

Figure 3. Number of prairie-chicken males/lek (circles) and leks/mi^2 (triangles) observed in western Minnesota. Vertical error bars represent 95% confidence intervals based on n = 17 survey blocks.

REGISTERED FURBEARER POPULATION MODELING
2009 REPORT

John Erb, Forest Wildlife Populations and Research Group
Drawing by Gilbert Proulx

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 annual field-based track surveys, with the exception of otter for which no harvest-independent survey data is currently available for comparison.

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 2008 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 been collected for all non-juveniles in recent years to facilitate interpretation of reproductive data (bobcats) and to obtain current information on year-class distribution for both species. However, this year, 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 2008 registered DNR trapping and hunting harvest was 853, up 22% from last year and near the record harvest observed in 2006 (890; Table 1). Trapping harvest increased 31%, accounting for 81% of the total harvest. Hunting harvest declined 8% to 164. Total modeled harvest, which includes reported tribal take, was 928. Based on population modeling estimates, 30% of the fall population was harvested. The juvenile to adult female ratio in the harvest (1.1; Table 1) was below the long-term average (1.5), but similar to the recent 10-year average (1.2). A total of 714 bobcat carcasses were examined (Table 1), with a mean age of 2.6 for females. Approximately 8% of the harvested female bobcats were 6.5+ years old (Figure 1).

Based on examination of reproductive tracts, 33% of yearling females produced a litter in 2008, above the previous 5-year average of 26% (Figure 2). Average litter size for pregnant yearlings was 2.2, similar to the 5-year average (2.1). Pregnancy rate for 2+ year olds was 80%, also above the previous 5-year mean (73%). Mean litter size for pregnant adults was 2.7 (5-year mean = 2.8). For both yearlings and adults, pregnancy rates appear to fluctuate much more than average litter size.

Population modeling predicts an 18% decline in this spring's bobcat population (Figure 3), with the estimated population size (~ 1,800) now similar to that estimated in the mid-1990's. However, 3-year-averaged scent station indices were at an all-time high last fall, and winter track indices remain comparatively high. Based on these track surveys, as well as additional field sign, I believe the population model is currently underestimating bobcat population size. Given the availability and use of current reproductive data and accurate harvest totals, this implies that non-harvest mortality of bobcats may currently be lower than assumed.

Fisher. For the past 2 years, the fisher harvest season has been 1 week shorter than 'normal' (i.e., shortened from 16 days to 9 days). Harvest this year under the DNR framework was 1,712, similar to last year (Table 2). Modeled harvest, which includes reported tribal take, was 1,828. An estimated 17% of the pre-harvest fisher population was harvested this past winter. Carcass collections ended in 1994, so no current age or reproductive data are available.

Population modeling projects a 5% increase in the spring population, currently estimated at ~8,400. Conversely, and in spite of the reduced harvest the past 2 years, the fisher winter track index has yet to rebound from its recent downward trend (Figure 4). However, as discussed in more detail in a separate track survey report, I believe this year's track survey results may have been biased low, a result of the survey being conducted later than ever before and during one of the most severe winters since the survey began. Hence, it is premature to conclude that the population has not stabilized or slightly increased. Based on multiple sources of information, I believe the fisher population has been declining for several years, but has now stabilized. Nevertheless, if modeling projections further diverge from track survey trends the next couple years, it would suggest that the population model is over-estimating fisher abundance.

Marten. As with fisher, the marten harvest season the last 2 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 1,823, down 18% from last year (Table 3). Modeled harvest, which includes reported tribal take, was 1,953. Age-class information was obtained from a sample of 70% of the carcasses collected this year. Juveniles comprised 40% of the total harvest, below the long-term average of 56% (Table 3; Figure 5). The juvenile:adult female ratio (2.1) in the harvest was also below the long-term average (Table 3).

Based on modeling, 16% of the fall population was harvested. After several years of estimated decline, the population model now projects a stable to slightly increasing population, with an estimated 2009 spring population of ~ 10,600 (Figure 6). Nevertheless, averaged winter track counts continue to suggest a population decline. As noted for fisher, however, I believe this year's track survey results may have been biased low as a result of routes being surveyed later than usual and during a comparatively severe winter. Based on multiple sources of information, I believe the marten population, similar to fisher, has been declining for several years, but has now stabilized. However, if modeling projections further diverge from track survey trends the next couple years, it would suggest that the population model is over-estimating marten abundance.

Otter. In the new north otter-trapping zone (slightly expanded in 2007), harvest under the DNR framework was 1,884, a slight increase from last year (Table 4). Modeled harvest, including reported tribal take, was 1,983 (Table 4). An estimated 16% of the fall population was harvested. Carcass collections ended in 1986, so no age or reproductive data are available. After several years of estimated decline, modeling suggests the population has increased the past 2 years, with an estimated 3% increase this year (Figure 7). No independent otter survey data are currently available for comparison. The current estimated spring population in the north zone is ~ 10,900.

A new otter-trapping zone was also established in southeast Minnesota starting in 2007. A total of ~ 52 otter were harvested this year in the southeast zone, slightly more than during the first year (~ 44). While we have established protocol for an otter survey in this region to assist with population monitoring, weather conditions and scheduling conflicts did not allow us to complete the survey the past 2 winters. I am also currently developing a population model specific to the southeast zone, but initial projections are not yet available.

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Table 1. Bobcat harvest data, 1980 to 2008.

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

[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.

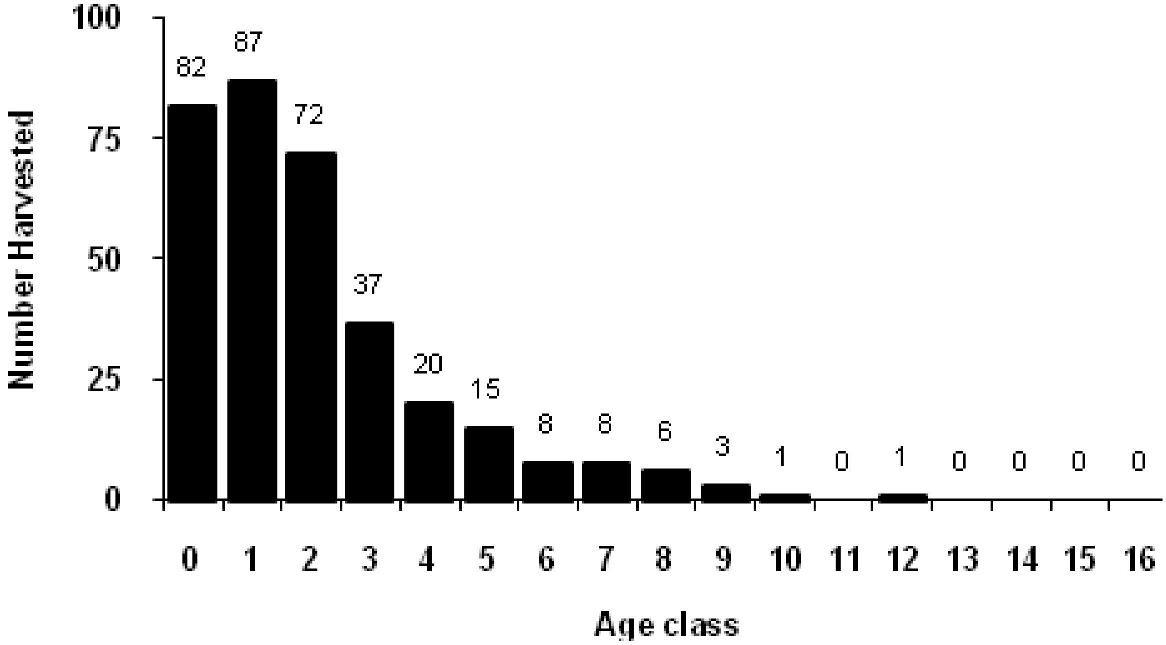

Figure 1. Age structure of female bobcats in the 2008-09 harvest.

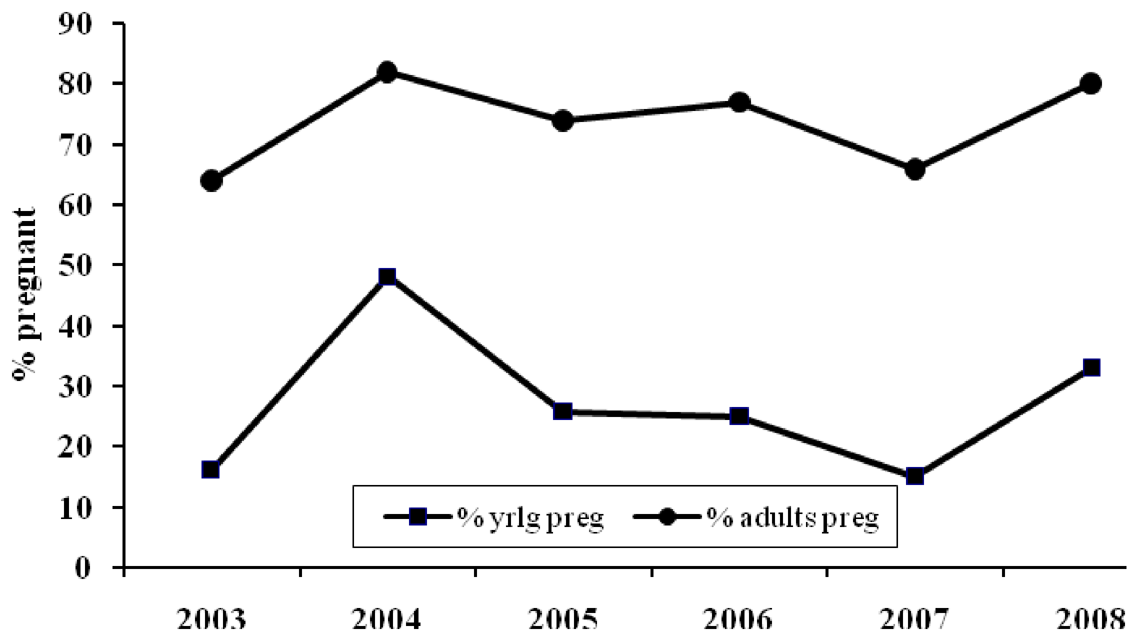

Figure 2. Pregnancy rates for yearling and adult bobcats in Minnesota, 2003-2008.

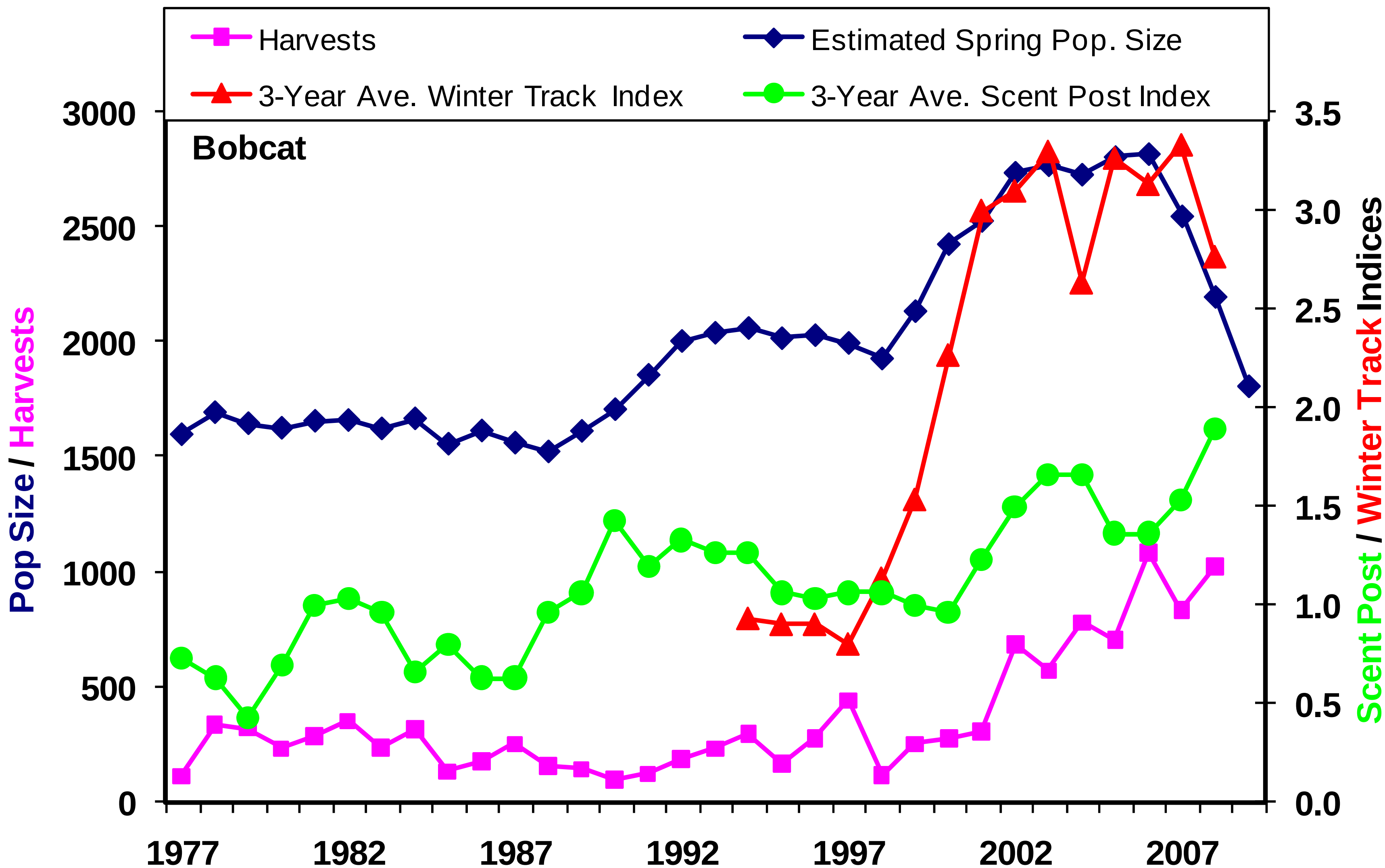

Figure 3. Bobcat populations, harvests, and survey indices, 1977-2008. Harvests include an estimate of non-reported take.

Table 2. Fisher harvest data, 1980 to 2008. Carcass collections ended in 1994.

Year	Season	Limit[1]	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 Males[4]	Pelt price Females[4]
1980	CLOSED															
1981	12/1-12/10	1	862	1022	16	843	66	24	10	10.5	48	43	37	47	$94	$110
1982	12/1-12/10	1	912	1073	16	1073	66	19	15	9.4	46	41	52	46	$70	$99
1983	12/1-12/11	1	631	735	11	662	69	18	13	8.8	45	40	40	44	$71	$121
1984	12/1-12/16	1	1285	1332	19	1270	63	20	17	7.2	52	45	45	49	$70	$122
1985	11/30-12/15	1	678	735	11	712	63	20	18	5.4	46	40	34	43	$74	$130
1986	11/29-12/14	1	1068	1186	17	1186	59	24	18	5.3	48	50	37	46	$84	$162
1987	11/28-12/13	1	1642	1749	24	1534	63	15	22	4.7	46	40	37	43	$84	$170
1988	11/26-12/11	1	1025	1050	15	805	70	15	15	6.8	48	45	33	45	$54	$100
1989	12/2-12/17	1	1243	1243	17	1024	64	19	17	5.8	47	47	36	45	$26	$53
1990	12/1-12/16	1	746	756	10	592	65	14	21	4.5	44	55	30	43	$35	$46
1991	11/30-12/15	1	528	528	7	410	66	21	13	7.8	50	52	35	48	$21	$48
1992	11/28-12/13	1	778	782	9	629	58	21	21	4.9	42	55	45	46	$16	$29
1993	12/4-12/19	2	1159	1192	11	937	59	22	19	5.3	47	37	42	44	$14	$28
1994	12/3-12/18	2	1771	1932	16	1360	56	18	26	4	47	54	44	48	$19	$30
1995	12/2-12/17	2	942	1060	9	-	-	-	-	-	-	-	-	45	$16	$25
1996	11/30-12/15	2	1773	2000	16	-	-	-	-	-	-	-	-	45	$25	$34
1997	11/29-12/14	2	2761	2974	23	-	-	-	-	-	-	-	-	45	$31	$34
1998	11/28-12/13	2	2695	2987	24	-	-	-	-	-	-	-	-	45	$19	$22
1999	12/4-12/19	2	1725	1880	16	-	-	-	-	-	-	-	-	45	$19	$20
2000	12/2-12/17	4	1674	1900	16	-	-	-	-	-	-	-	-	45	$20	$19
2001	11/24-12/9	4	2145	2362	19	-	-	-	-	-	-	-	-	54	$20	$23
2002	11/30-12/15	5	2660	3028	24	-	-	-	-	-	-	-	-	54	$23	$25
2003	11/29-12/14	5	2521	2728	23	-	-	-	-	-	-	-	-	55	$27	$26
2004	11/27-12/12	5	2552	2753	23	-	-	-	-	-	-	-	-	52	$30	$27
2005	11/26-12/11	5	2388	2454	21	-	-	-	-	-	-	-	-	52	$36	$31
2006	11/25-12/10	5	3250	3500	30	-	-	-	-	-	-	-	-	51	$76	$68
2007	11/24-12/2	5	1682	1811	17	-	-	-	-	-	-	-	-	51	$63	$48
2008	11/29-12/7	5	1712	1828	17	-	-	-	-	-	-	-	-	52	$22	$37

[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 11% from 1993-present.

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

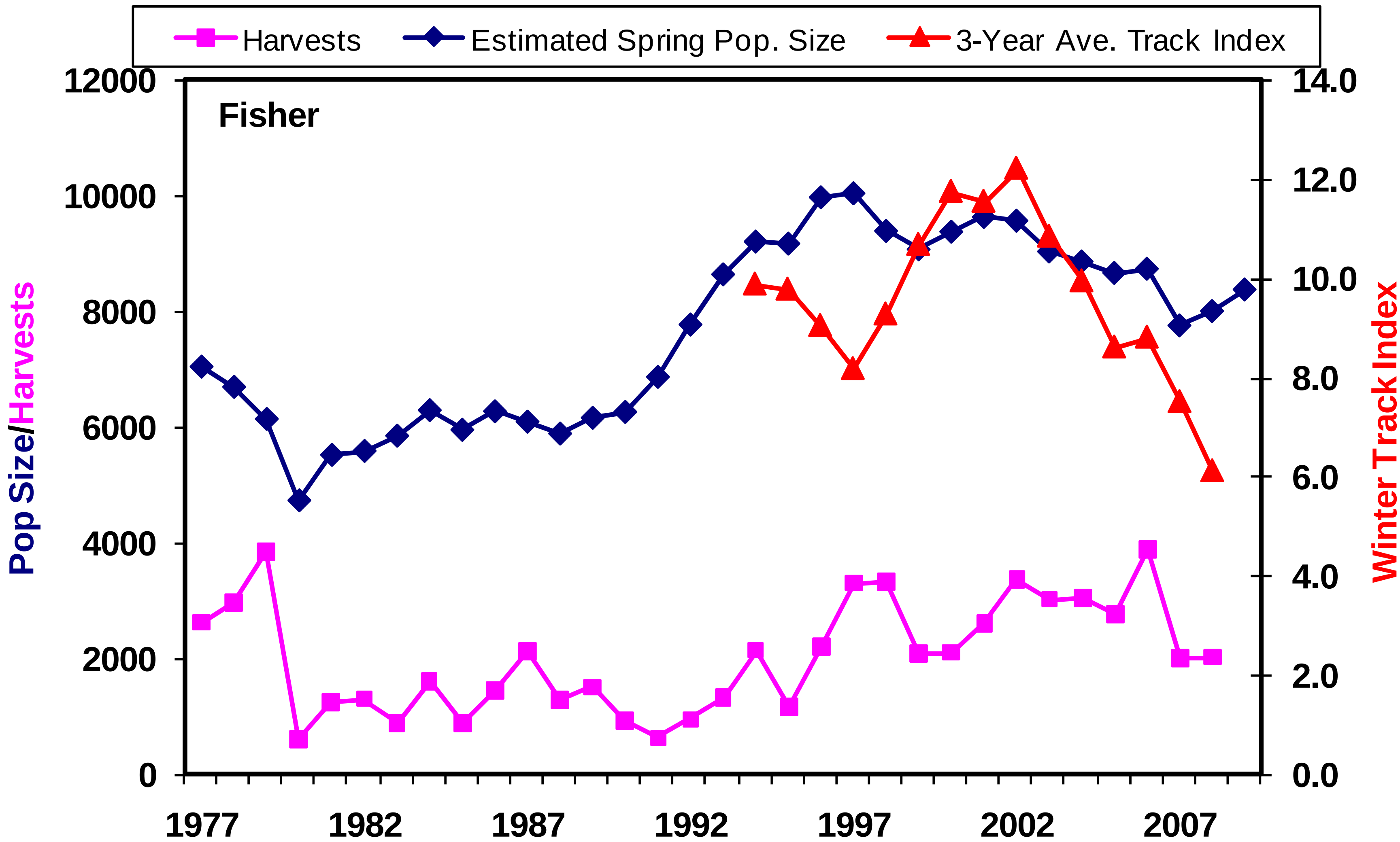

Figure 4. Fisher populations, harvests, and survey indices, 1977-2008. Harvests include an estimate of non-reported take.

Table 3. Marten harvest data, 1985 to 2008.

Year	Season	Limit[1]	DNR harvest	Modeled harvest[2]	% Autumn Pop. Taken[3]	Carcasses examined[4]	% juveniles	% yearlings	% adults	Juv:ad females	% male juveniles	% male yearlings	% male adults	% males overall	Pelt price Males[5]	Pelt price Females[5]
1985	11/30-12/15	1	430	430	6	507	73	18	9	17.2	69	68	82	70	$30	$28
1986	11/29-12/14	1	798	798	10	884	64	21	15	12.3	65	71	81	69	$36	$27
1987	11/28-12/13	1	1363	1363	15	1754	66	18	16	11.2	65	67	75	67	$43	$39
1988	11/26-12/11	2	2072	2072	19	1977	66	11	23	8.6	58	50	66	59	$50	$43
1989	12/2-12/17	2	2119	2119	20	1014	68	12	20	9.7	57	63	65	59	$48	$47
1990	12/1-12/16	2	1349	1447	15	1375	48	18	34	3.6	59	54	61	59	$44	$41
1991	11/30-12/15	1	686	1000	11	716	74	9	17	16.1	69	71	72	70	$40	$27
1992	11/28-12/13	2	1602	1802	15	1661	65	18	17	15.1	63	70	75	66	$28	$25
1993	12/4-12/19	2	1438	1828	15	1396	57	20	23	7.5	61	71	67	64	$36	$30
1994	12/3-12/18	2	1527	1846	15	1452	58	15	27	6.4	62	76	67	66	$34	$28
1995	12/2-12/17	2	1500	1774	13	1393	60	18	22	8.2	63	68	66	65	$28	$21
1996	11/30-12/15	2	1625	2000	16	1372	48	22	30	4.8	62	69	67	65	$34	$29
1997	11/29-12/14	2	2261	2762	20	2238	61	13	26	6.2	60	60	63	61	$28	$22
1998	11/28-12/13	2	2299	2795	20	1577	57	18	25	6.6	62	66	65	63	$20	$16
1999	12/4-12/19	4	2423	3000	20	2013	67	12	21	9.8	65	66	67	66	$25	$21
2000	12/2-12/17	4	1629	2050	14	1598	56	25	19	8.9	62	69	66	64	$28	$21
2001	11/24-12/9	4	1940	2250	14	1895	62	15	23	11	66	73	75	69	$24	$21
2002	11/30-12/15	5	2839	3192	19	2451	39	30	31	3.1	57	63	61	60	$28	$23
2003	11/29-12/14	5	3214	3548	22	2391	48	17	35	4	57	65	66	62	$30	$27
2004	11/27-12/12	5	3241	3592	24	2776	26	28	46	1.3	52	64	57	58	$31	$27
2005	11/26-12/11	5	2653	2873	20	1992	53	16	31	4.9	64	63	65	64	$37	$32
2006	11/25-12/10	5	3788	4120	28	1914	64	17	20	9.2	66	67	65	66	$74	$66
2007	11/24-12/2	5	2221	2481	19	1355	30	29	41	1.5	56	64	50	56	$59	$50
2008	11/29-12/7	5	1823	1953	16	1095	40	21	39	2.1	58	60	53	56	$31	$28

[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 15% 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

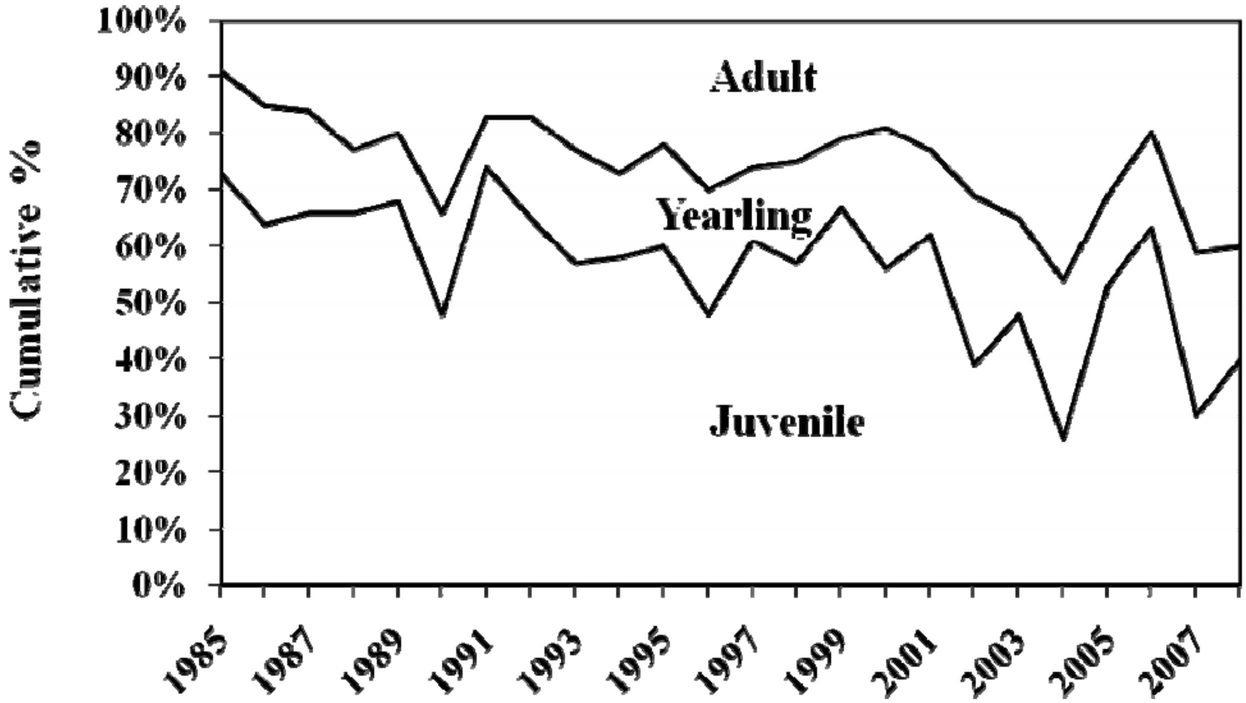

Figure 5. Marten age-class proportions in the harvest, 1985-2008.

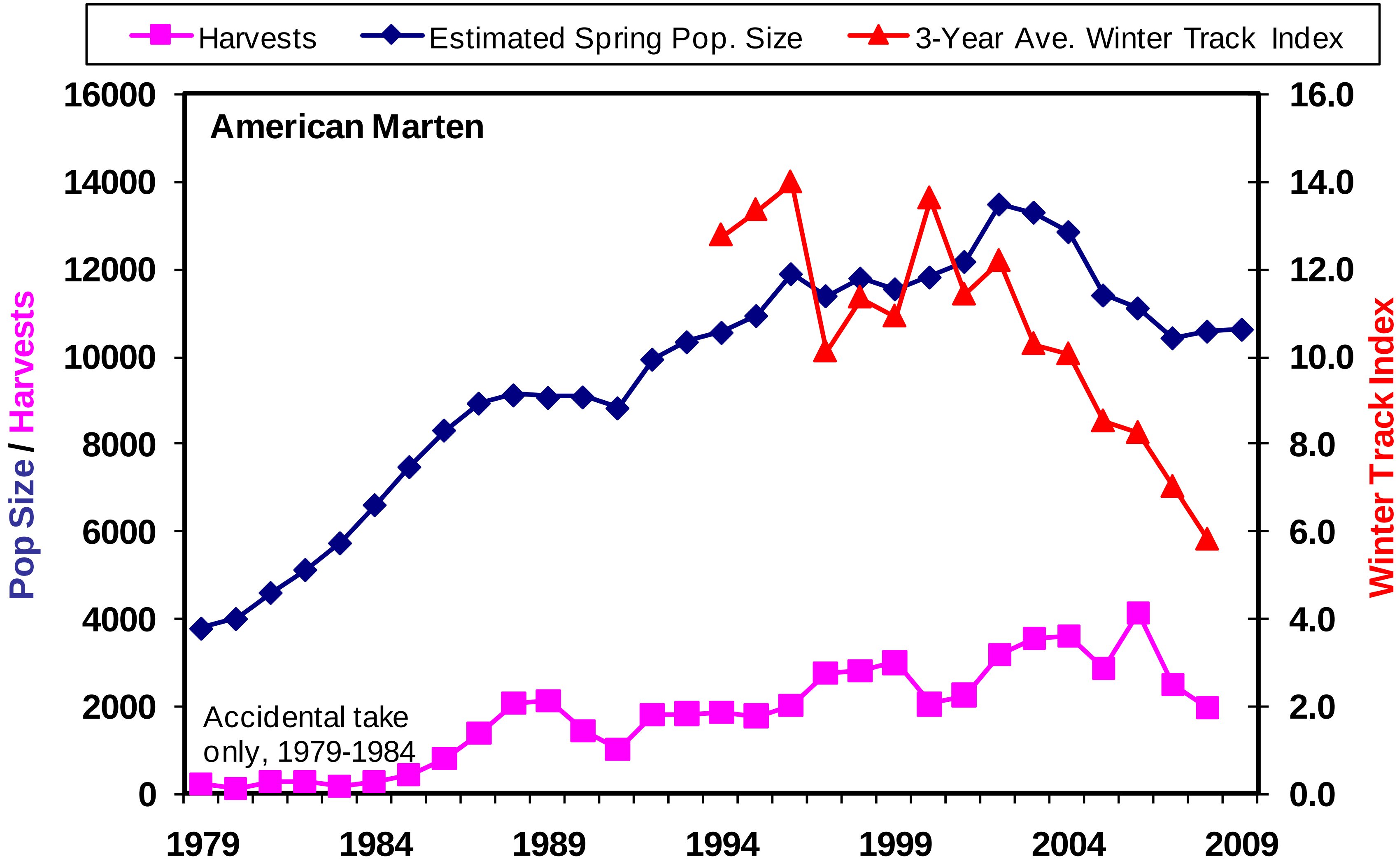

Figure 6. American marten populations, harvests, and survey indices, 1979-2008. Harvests include an estimate of non-reported take.

Table 4. Otter harvest data, 1980 to 2008. Carcasses were only collected from 1980-86.

Year	Season	Limit	DNR harvest	Modeled Harvest[1]	% Autumn Pop. Harvested[2]	Carcasses examined	% juveniles	% yearlings	% adults	Juv:ad. females	% male juveniles	% male yearlings	% male adults	% males overall	Pelt price Otter[3]	Pelt price Beaver[3]
1980	11/15-1/29	2	1111	1111	16	88	55	15	30	3.4	40	62	56	48	$33	$18
1981	11/14-1/28	2	485	762	11	471	55	20	25	4.3	56	53	48	52	$30	$14
1982	11/13-1/27	2	385	625	9	389	51	26	23	6	57	65	65	60	$26	$11
1983	11/12-1/26	2	408	614	8	433	42	31	27	3.7	56	57	57	56	$25	$12
1984	11/17-2/01	2	513	561	7	549	48	23	29	3.2	47	50	49	49	$22	$12
1985	11/16-2/15	3	559	572	7	572	43	23	34	2.2	53	50	43	51	$21	$15
1986	10/24-1/29	3	777	777	8	745	45	23	32	2.7	45	48	46	47	$24	$20
1987	10/27-1/29	3	1386	1484	15	-	-	-	-	-	-	-	-	52	$23	$17
1988	10/29-1/27	3	922	922	9	-	-	-	-	-	-	-	-	52	$22	$14
1989	10/28-2/17	3	1294	1294	12	-	-	-	-	-	-	-	-	52	$22	$12
1990	10/27-1/6	3	888	903	8	-	-	-	-	-	-	-	-	52	$24	$9
1991	10/26-1/5	3	855	925	8	-	-	-	-	-	-	-	-	51	$25	$9
1992	10/24-1/3	4	1368	1368	10	-	-	-	-	-	-	-	-	52	$30	$7
1993	10/23-1/9	4	1459	1646	10	-	-	-	-	-	-	-	-	52	$43	$11
1994	10/29-1/8	4	2445	2708	19	-	-	-	-	-	-	-	-	52	$48	$14
1995	10/28-1/7	4	1435	1466	12	-	-	-	-	-	-	-	-	52	$38	$13
1996	10/26-1/5	4	2219	2500	18	-	-	-	-	-	-	-	-	52	$39	$19
1997	10/25-1/4	4	2145	2313	17	-	-	-	-	-	-	-	-	52	$39	$19
1998	10/24-1/3	4	1946	2139	16	-	-	-	-	-	-	-	-	52	$34	$11
1999	10/23-1/9	4	1635	1717	13	-	-	-	-	-	-	-	-	52	$41	$12
2000	10/28-1/7	4	1578	1750	13	-	-	-	-	-	-	-	-	52	$51	$15
2001	10/27-1/6	4	2323	2531	18	-	-	-	-	-	-	-	-	57	$51	$14
2002	10/26-1/5	4	2145	2390	16	-	-	-	-	-	-	-	-	59	$46	$13
2003	10/25-1/4	4	2766	2966	20	-	-	-	-	-	-	-	-	57	$85	$13
2004	10/23-1/9	4	3450	3700	25	-	-	-	-	-	-	-	-	56	$87	$14
2005	10/29-1/8	4	2846	2884	21	-	-	-	-	-	-	-	-	58	$89	$16
2006	10/28-1/7	4	2720	2872	22	-	-	-	-	-	-	-	-	56	$43	$16
2007	10/27-1/6	4	1847	1955	16	-	-	-	-	-	-	-	-	55	$42	$16
2008	10/25-1/4	4	1884	1983	16	-	-	-	-	-	-	-	-	59		

[1] Includes DNR and Tribal harvests

[2] Estimated from population model. Incl. estimated non-reported harvest of 30% to 1991, 22% from 1992-2001, and 15% from 2002-present.

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

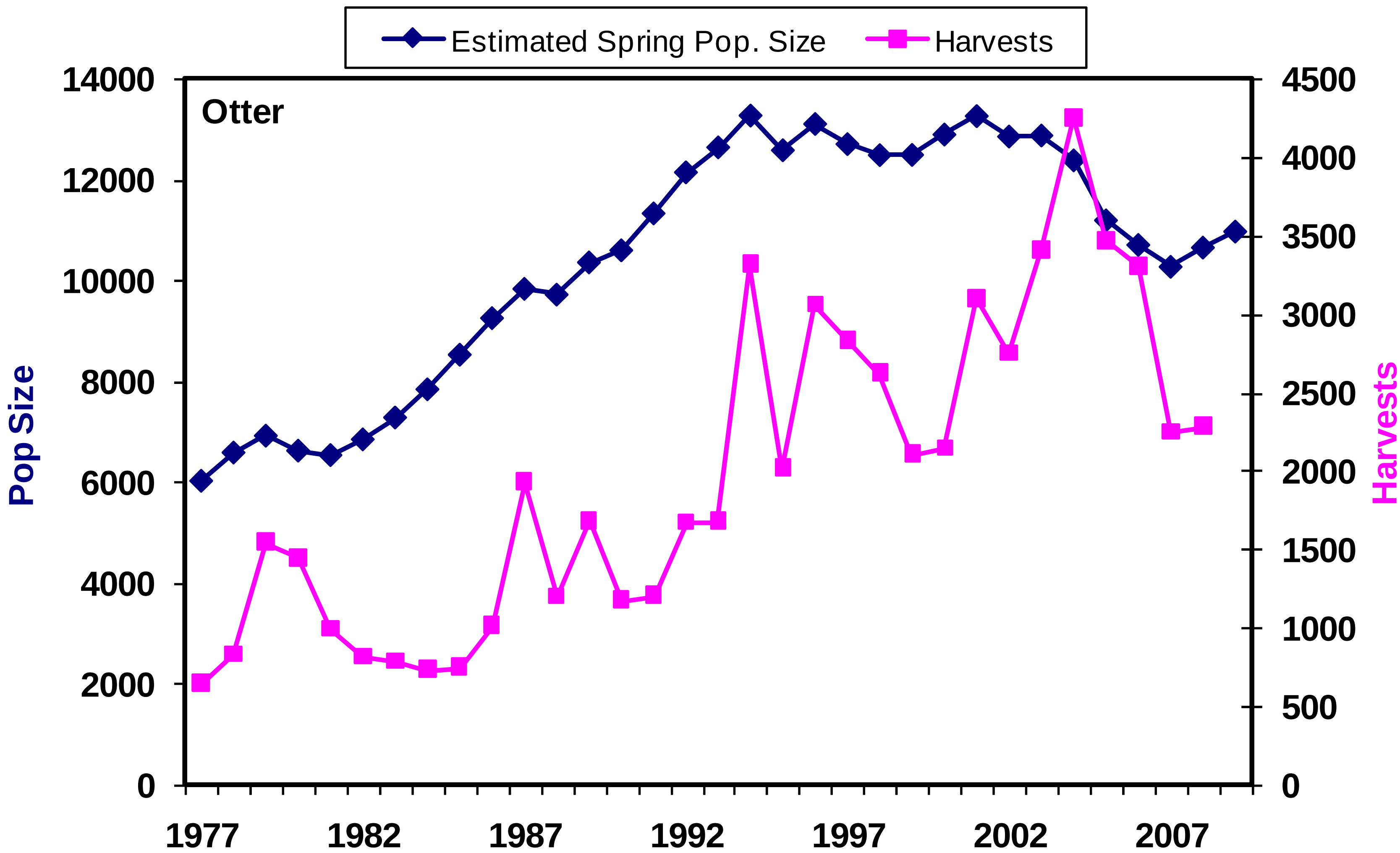

Figure 7. Otter populations and harvests, 1977-2008. Harvests include an estimate of non-reported take.

POPULATION TRENDS OF WHITE-TAILED DEER IN THE FOREST ZONE – 2009

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 2008 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.

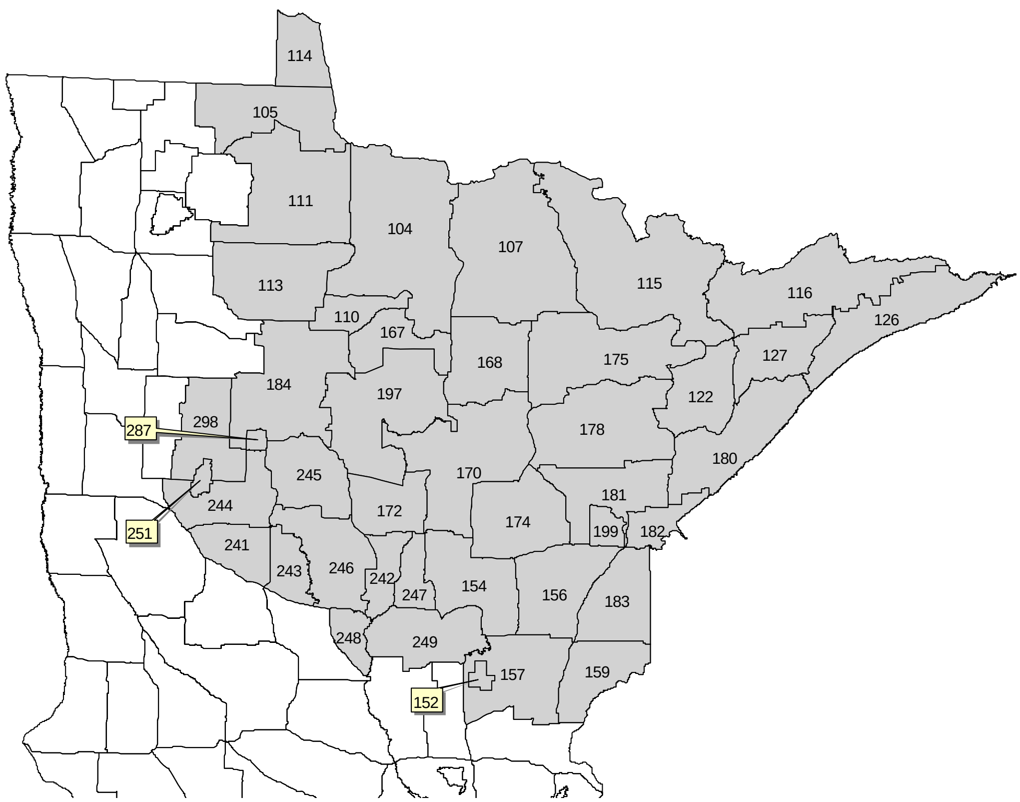

Figure 1. Permit areas in the forested zone, 2008. Permit areas 113, 114, 152, 182, and 287 were not modeled.

HARVEST

In 2008, hunters registered 221,841 deer, the 8th highest harvest ever recorded in Minnesota. Of that number, 44% or 115,582 deer were harvested in the forest zone (Figure 1, Table 1). The 2008 forest zone harvest decreased 18% from the 2007 harvest. The following discussion applies to the subset of deer harvested in the forest zone.

The buck harvest decreased in 41 of the 42 permit areas and only increased 1% in PA298 (Figure 2, Table 2). The total buck harvest declined 15% compared with a 3% decline the previous year (Table 2), an indication that deer density has declined throughout the forest zone.

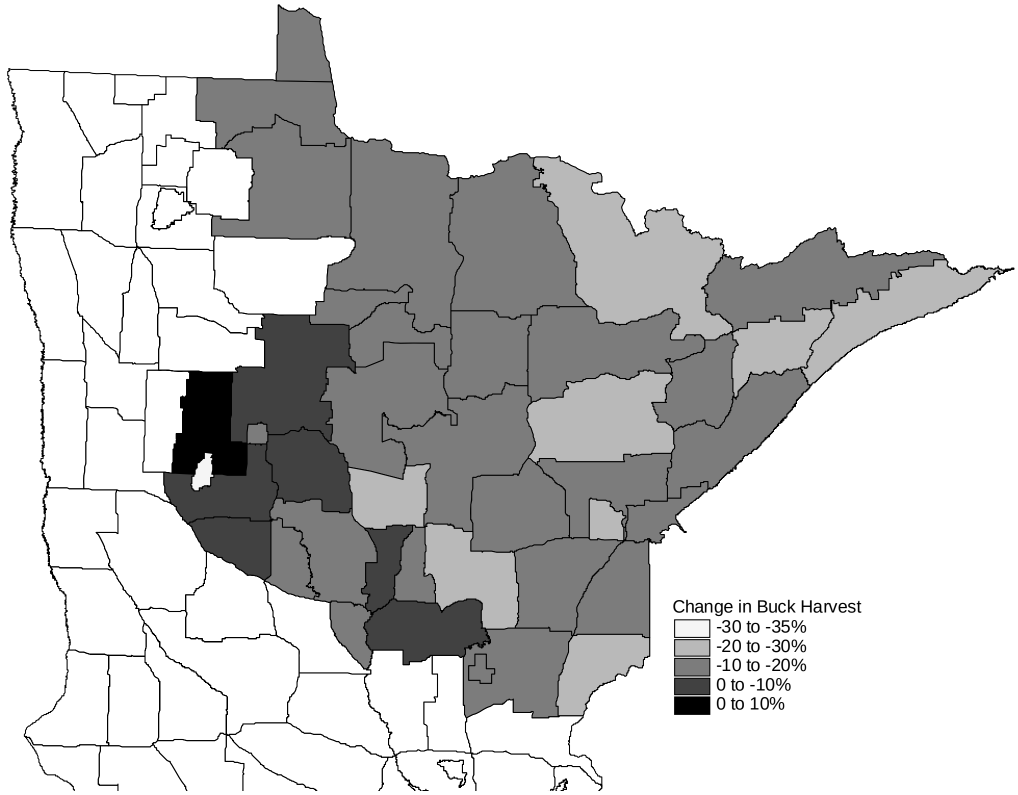

Figure 2. Change in buck harvest in forest zone permit areas between 2007 and 2008.

The antlerless harvest increased in 9 of the 42 permit areas (Table 3) but the total antlerless harvest decreased by 19%. The greatest increases occurred in 2 permit areas that shifted from "lottery" into the "managed" category ($\bar{x}$=87%, n = 2, range 77-97%), which allowed all hunters the option of harvesting 2 antlerless deer (Table 4). The remaining increases in antlerless harvest occurred in permit areas that offered more liberal opportunities to harvest antlerless deer (e.g. "managed" to "intensive"). Decreased antlerless harvest occurred in almost all categories (Table 4).

The proportion of bucks in the forest zone harvest increased 2% from last year to 42%. This increase reflects the decreased 2008 antlerless harvest. Forest-wide, the proportion of bucks in the harvest ranged from 30 to 58%.

The archery harvest in the forest zone declined 13% in 2008. Change in the archery harvest by permit area was correlated with change in the total firearms harvest (r^2 = 0.45, P < 0.001) which suggests that the decline was in part, the result of reduced deer numbers. Between 2002 and 2006, the archery harvest increased over 200%, presumably because of increased sales of the All Season License. The elimination of this license in 2008 also may have contributed to the decline.

The muzzleloader harvest declined 36% in the forest zone in 2008. Change in the muzzleloader harvest by permit area was correlated with change in the total firearms harvest (r^2 = 0.35, P < 0.001) which suggest that the decline is related to decreased deer numbers. The elimination of the All Season License also may have contributed to the decline.

POPULATION TRENDS AND MODEL PROJECTIONS

Based on the winter severity index (WSI), the winter of 2008-09 ranged from "mild" to "severe" (Figure 3). Across much of the northern Minnesota the WSI exceeded 150 and 2 locations exceeded 180. Deep snow between late December and early-April combined with colder than normal temperatures resulted in the higher than normal WSI indices. In the west central portion of the forest zone, the WSI exceeded 100, the threshold for a moderate winter.

Simulation modeling was used in 38 permit areas (Figure 1 and Table 4) 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 lumped in to 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. Since 2003, there has been a steady decline in deer numbers in both the South, Central, and West Central in response to the high antlerless harvest. Deer numbers in both the NW and NE forest dropped 16% and 19%, respectively in the past year, primarily in response to winter severity.

Base on density targets set during the 2005 and 2006 goal setting processes, the 2009 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. Permit areas ranged from 5 deer/mi^2 below goal to as much as 10 deer/mi^2 above goal.

Final classifications of permit areas for the 2009 season are currently being discussed with wildlife managers throughout the forest zone. Tentative recommendations (Figure 7) call for 15 permit areas to be listed as Lottery, 19 permit areas as Managed, 5 permit areas as Intensive, and 3 permit areas as Intensive with an early antlerless harvest. Final decisions on the status of permit areas will be available in early June.

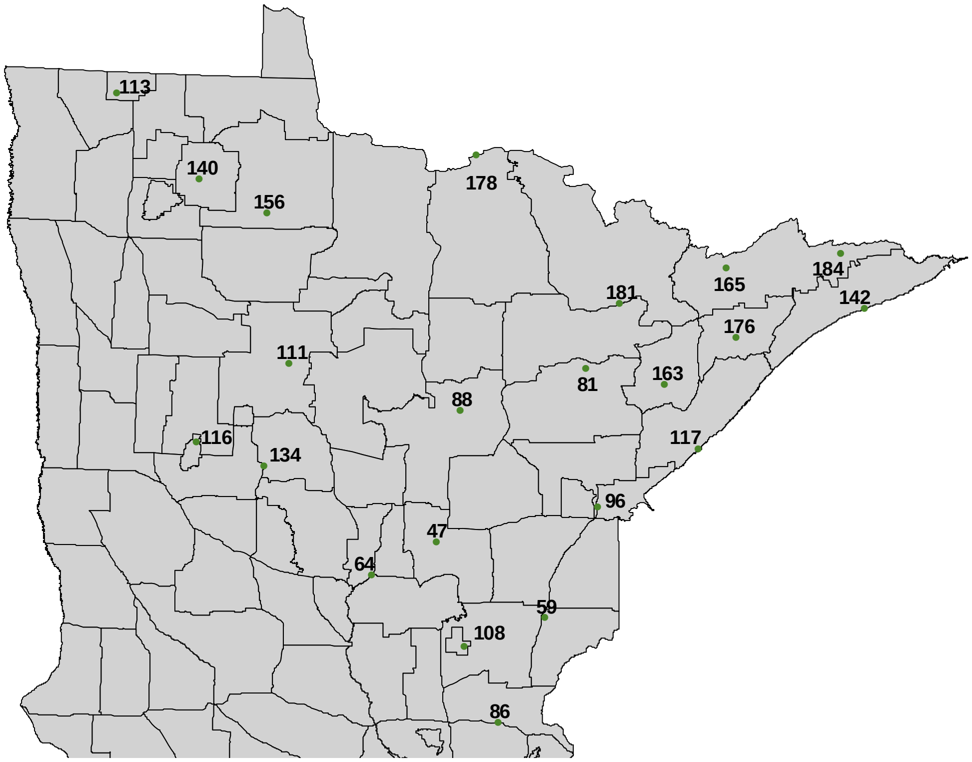

Figure 3. Final WSI values for the forested zone of Minnesota, winter of 2008-2009.

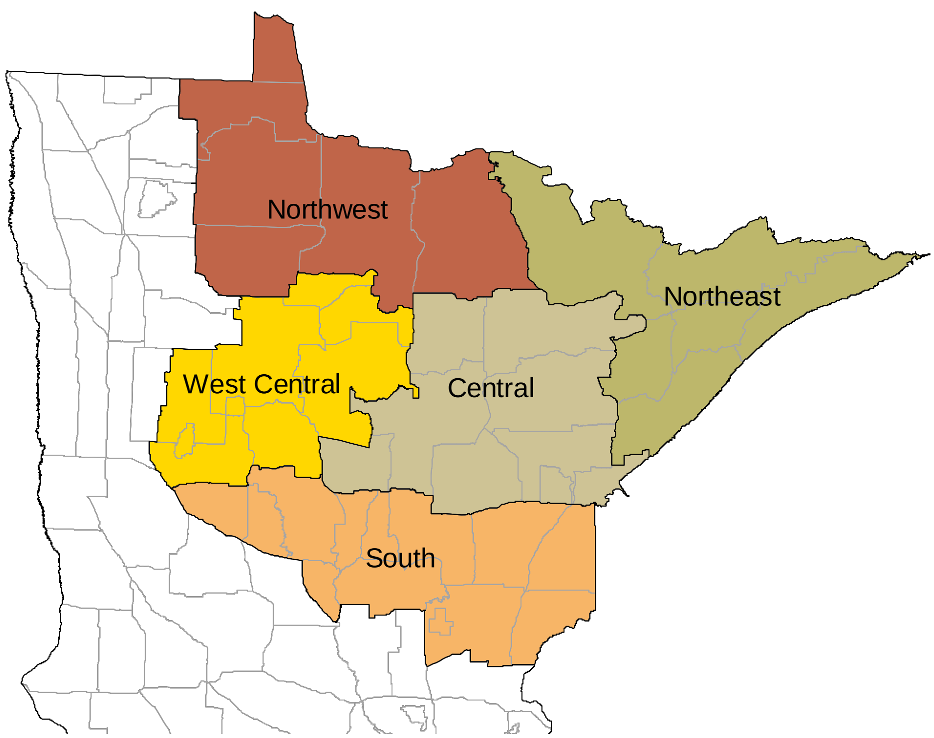

Figure 4. Permit areas grouped for summary discussion.

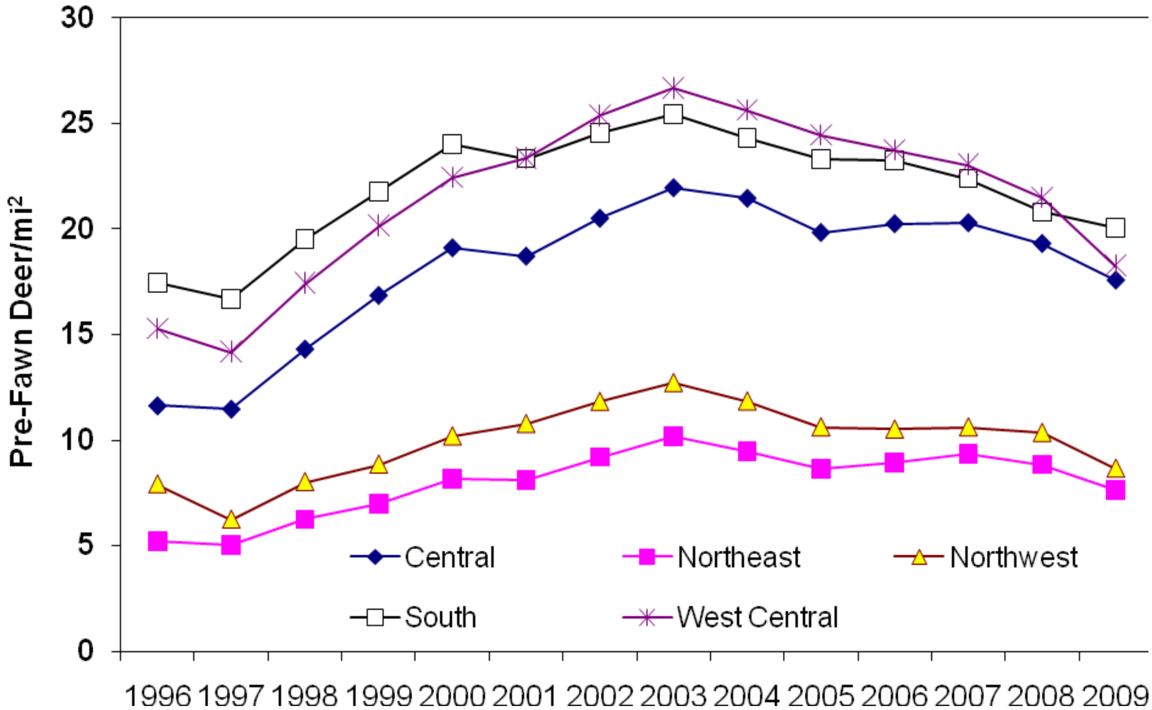

Figure 5. Population trends of deer in forest zone. Trend lines represent the groups of permit areas as illustrated in figure 4. Density represents pre-fawn density.

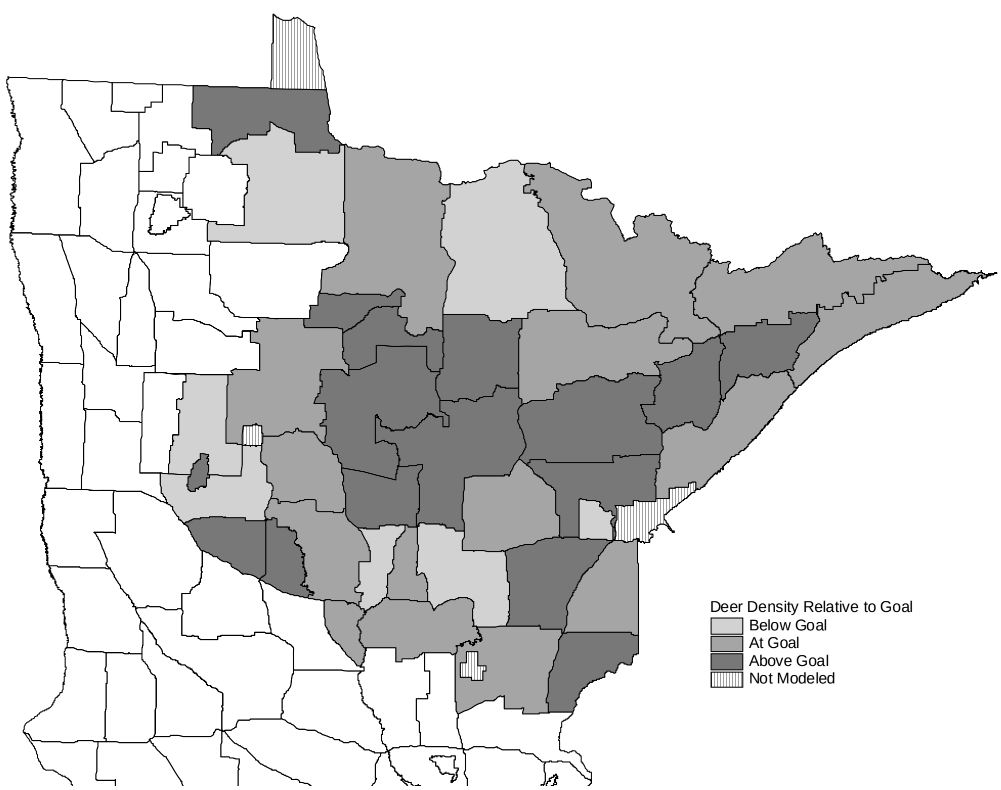

Figure 6. Deer density expressed relative to pre-fawn population goals.

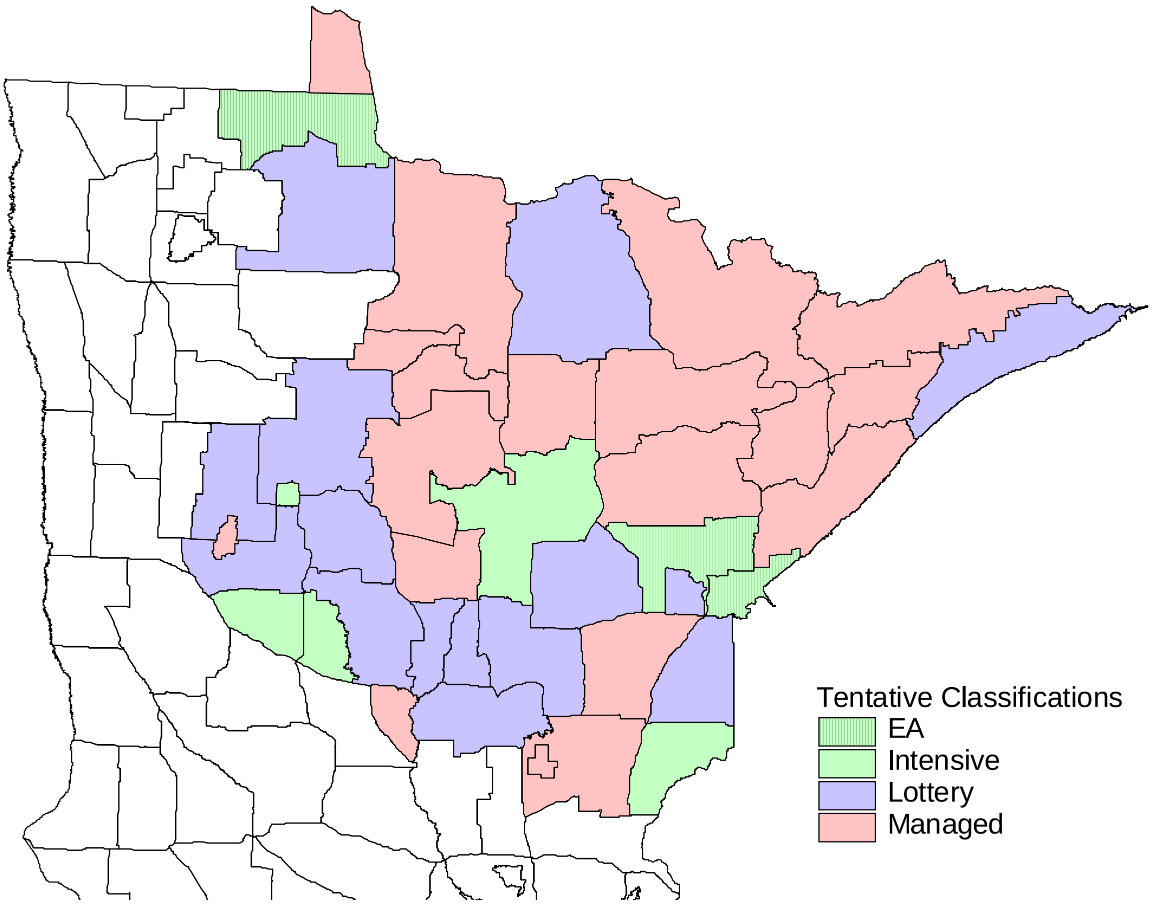

Figure 7. Tentative designation of permit areas in the Forest Zone for the 2009 hunting season.

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	Change
104	1,372	1,837	1,939	2,253	3,421	2,902	2,483	2,632	2,557	2,100	-18%
105	1,389	1,821	1,962	2,385	3,740	3,106	3,557	3,210	3,344	2,391	-28%
107	1,994	2,846	3,547	3,499	5,206	4,027	3,936	3,825	3,874	3,148	-19%
110	1,511	1,376	1,371	1,553	2,180	2,122	1,945	1,910	1,935	1,865	-4%
111	1,169	1,644	2,223	2,264	3,064	2,621	2,687	2,812	1,608	1,558	-3%
114	40	55	72	80	96	110	123	174	127	120	-6%
115	2,334	3,174	3,586	3,815	5,431	4,333	4,378	4,480	4,250	3,438	-19%
116	138	150	156	157	265	298	261	270	350	394	13%
122	296	556	617	574	696	716	657	1067	1118	1,014	-9%
126	306	445	470	597	702	841	904	977	1150	990	-14%
127	176	81	95	99	146	177	151	188	215	181	-16%
152	225	283	264	217	235	246	271	330	377	292	-23%
154	2,978	4,418	4,169	5,032	5,717	5,176	4,583	4,546	4,526	2,578	-43%
156	2,643	3,795	3,055	3,258	4,966	4,594	4,517	4,767	5,164	4,486	-13%
157	5,385	6,990	7,194	7,728	9,001	7,606	6,901	7,989	7,828	6,276	-20%
159	4,371	5,311	4,459	4,153	5,207	3,887	3,968	3,905	4,165	3,205	-23%
167	1,452	1,601	1,967	2,488	1,572	1,463	1,257	1,738	1,977	1,812	-8%
168	2,410	2,686	2,376	3024	3,218	3,978	2,534	3,627	3,357	2,941	-12%
170	2,880	4,938	4,829	4,716	8,460	7,154	7,221	6,951	8,346	7,412	-11%
172	2,961	4,253	4,621	4,910	7,004	5,489	5,227	5,345	4,877	3,966	-19%
174	1,927	2,438	2,140	2,678	3,825	3,347	3,095	3,180	3,245	2,856	-12%
175	2,326	3,035	3,338	3233	5,071	4,254	3,103	4,559	4,419	4,318	-2%
178	2,351	3,050	3,347	3,666	5,523	5,297	5,373	5,476	6,562	5,884	-10%
180	946	1,540	1,703	1,867	3,123	2,355	2,837	3,553	3,755	3,366	-10%
181	1,780	2,362	2,457	2,419	3,599	3,544	3,755	4,475	5,005	4,527	-10%
182	614	827	862	869	1,309	1,206	1,256	1,460	1,599	1,621	1%
183	2,147	2,748	2,743	2,771	3,960	3,533	3,449	4,006	3,747	3,060	-18%
184	5,970	7,283	7,762	8,811	14,023	12,307	11,482	10,261	11,005	9,335	-15%
197	933	1,372	1,167	1,413	1,652	1,723	1,594	2,471	2,248	2,051	-9%
199	130	169	166	164	140	172	188	167	206	218	6%
241	2651	4284	3927	3857	4549	4449	4,288	4,369	4,787	4,261	-11%
242	1,552	1,820	2,072	2,426	2,767	2,244	2,116	2,170	2,259	2,215	-2%
243	1,907	2,634	2,864	3,238	4,131	3,684	3,165	3,429	3,458	2,342	-32%
244	2,956	3,771	4,841	5,805	7,452	6,702	6,162	6,192	7,102	5,499	-23%
245	3,524	4,695	5,053	5,626	8,231	6,377	5,737	6,115	5,393	4,853	-10%
246	4,075	5,599	6,090	5,149	7,530	6,782	5,835	6,389	5,339	2,847	-47%
247	1,631	1,923	2,115	2101	2,744	2,582	2,115	2,393	2,064	1,230	-40%
248	850	1,039	881	1,352	1,897	1,864	1,670	1,280	1,387	952	-31%
249	2,217	2,826	3,148	3,238	4,223	3,800	3,211	3,667	3,305	2,063	-38%
251	246	326	254	298	470	387	325	301	253	145	-43%
287	368	376	460	470	529	425	280	305	306	250	-18%
298	704	803	826	932	1988	1733	1664	1727	1610	1,522	-5%
Forested Zone	77,834	103,180	107,189	115,185	159,063	139,613	130,261	138,688	140,199	115,582	-18%

Note: Permit area totals prior to 1999 are estimates that assume an evenly distributed harvest in the old permit areas and may be biased. Harvest in permit areas such as 182 (created in 2005) were calculated in a similar manner.

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	Change
104	1,137	1,240	1,266	1,332	1,589	1,586	1,250	1,176	1,279	1,070	-16%
105	846	945	813	1,138	1,488	1,326	1,364	1,122	1,206	964	-20%
107	1,706	1,948	2,174	2,119	2,523	2,277	1,861	1,725	1,921	1,576	-18%
110	685	732	674	699	852	813	694	658	784	653	-17%
111	1,088	1,168	1,395	1,463	1,467	1,408	1,316	1,149	830	741	-11%
114	40	43	56	63	55	55	72	95	83	69	-17%
115	1,898	2,038	2,145	2,376	2,915	2,679	2,262	2,242	2,228	1,764	-21%
116	138	150	156	157	238	251	230	186	261	219	-16%
122	293	417	452	449	501	567	534	565	658	587	-11%
126	306	390	417	495	585	591	595	606	686	518	-24%
127	176	80	82	86	126	149	127	147	148	104	-30%
152	173	191	182	130	106	152	141	158	149	126	-15%
154	2,018	2,305	2,142	2,169	2,071	2,049	1,789	1,677	1,911	1,468	-23%
156	1,836	2,084	1,690	1,653	2,001	2,003	1,811	1,881	2,068	1,831	-11%
157	3,009	3,327	3,144	3,048	3,207	3,030	2,745	2,916	2,832	2,334	-18%
159	2,121	2,431	1,947	1,667	1,995	1,518	1,528	1,548	1,674	1,229	-27%
167	906	1,036	968	1,211	821	819	709	692	821	706	-14%
168	1,579	1,653	1,454	1,675	1,698	1,889	1,435	1,439	1,525	1,233	-19%
170	1,621	3,106	2,786	2,611	3,435	3,233	2,987	2,920	3,285	2,698	-18%
172	1,821	2,292	2,259	2,200	2,359	2,147	1,853	1,799	1,866	1,429	-23%
174	1,234	1,448	1,257	1,363	1,542	1,597	1,367	1,313	1,400	1,247	-11%
175	1,923	2,108	2,074	2,115	2,480	2,320	2,074	2,192	2,223	1,872	-16%
178	1,946	2,059	2,013	2,218	2,651	2,767	2,704	2,503	2,966	2,310	-22%
180	941	1,215	1,358	1,398	1,831	1,833	1,692	1,829	1,878	1,579	-16%
181	1,351	1,596	1,562	1,590	1,943	1,940	1,779	1,998	2,240	1,823	-19%
182	484	577	564	568	685	684	511	520	544	489	-10%
183	1,633	1,919	1,650	1,575	1,661	1,654	1,514	1,634	1,745	1,430	-18%
184	3,813	4,124	3,925	4,310	4,774	4,848	4,161	3,554	3,553	3,433	-3%
197	923	1,142	953	998	1,040	1,143	999	1,090	1,108	999	-10%
199	91	137	123	132	104	130	151	119	150	119	-21%
241	1030	1382	1396	1477	1559	1621	1,460	1,506	1,498	1,370	-9%
242	812	988	885	824	912	740	721	692	688	656	-5%
243	1,081	1,192	1,169	1,247	1,343	1,217	1,066	1,142	1,066	957	-10%
244	1,848	2,014	2,048	2,300	2,540	2,390	2,170	2,155	2,080	1,893	-9%
245	2,216	2,350	2,179	2,430	2,743	2,449	2,036	2,229	1,932	1,887	-2%
246	2,355	2,784	2,479	2,384	2,599	2,527	2,082	2,178	1,935	1,595	-18%
247	970	1,181	1,056	948	1,047	955	861	848	802	651	-19%
248	641	778	622	720	714	739	656	638	487	410	-16%
249	1,310	1,590	1,479	1,429	1,479	1,327	1,261	1,285	1,246	1,134	-9%
251	129	134	152	132	176	183	128	145	91	59	-35%
287	167	189	201	184	207	182	106	104	92	81	-12%
298	601	648	685	654	952	894	810	799	753	762	1%
Forested Zone	50,896	59,131	56,033	57,736	65,014	62,682	55,612	55,174	56,692	48,075	-15%

Note: Permit area totals prior to 1999 are estimates that assume an evenly distributed harvest in the old permit areas and may be biased. Harvest in permit areas such as 182 (created in 2005) were calculated in a similar manner.

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	Change
104	235	597	673	921	1,832	1,316	1,233	1,456	1,278	1,030	-19%
105	543	876	1,149	1,247	2,252	1,780	2,193	2,088	2,138	1,427	-33%
107	288	898	1,373	1,380	2,683	1,750	2,075	2,100	1,953	1,572	-20%
110	826	644	697	854	1,328	1,309	1,251	1,252	1,151	1,212	5%
111	81	476	828	801	1,597	1,213	1,371	1,663	778	817	5%
114	0	12	16	17	41	55	51	79	44	51	16%
115	436	1,136	1,441	1,439	2,516	1,654	2,116	2,238	2,022	1,674	-17%
116	0	0	0	0	27	47	31	84	89	175	97%
122	3	139	165	125	195	149	123	502	460	427	-7%
126	0	55	53	102	117	250	309	371	464	472	2%
127	0	1	13	13	20	28	24	41	67	77	15%
152	52	92	82	87	129	94	130	172	228	166	-27%
154	960	2,113	2,027	2,863	3,646	3,127	2,794	2,869	2,615	1,110	-58%
156	807	1,711	1,365	1,605	2,965	2,591	2,706	2,886	3,096	2,655	-14%
157	2,376	3,663	4,050	4,680	5,794	4,576	4,156	5,073	4,996	3,942	-21%
159	2,250	2,880	2,512	2,486	3,212	2,369	2,440	2,357	2,491	1,976	-21%
167	546	565	999	1,277	751	644	548	1,046	1,156	1,106	-4%
168	831	1,033	922	1,349	1,520	2,089	1,099	2,188	1,832	1,708	-7%
170	1,259	1,832	2,043	2,105	5,025	3,921	4,234	4,031	5,061	4,714	-7%
172	1,140	1,961	2,362	2,710	4,645	3,342	3,374	3,546	3,011	2,537	-16%
174	693	990	883	1,315	2,283	1,750	1,728	1,867	1,845	1,609	-13%
175	403	927	1,264	1,118	2,591	1,934	1,029	2,367	2,196	2,446	11%
178	405	991	1,334	1,448	2,872	2,530	2,669	2,973	3,596	3,574	-1%
180	5	325	345	469	1,292	522	1,145	1,724	1,877	1,787	-5%
181	429	766	895	829	1,656	1,604	1,976	2,477	2,765	2,704	-2%
182	130	250	298	301	624	521	745	940	1,055	1,132	7%
183	513	829	1,093	1,197	2,299	1,879	1,935	2,372	2,002	1,630	-19%
184	2,157	3,159	3,837	4,501	9,249	7,459	7,321	6,707	7,452	5,902	-21%
197	10	230	214	415	612	580	595	1,381	1,140	1,052	-8%
199	39	32	43	32	36	42	37	48	56	99	77%
241	1,621	2,902	2,531	2,380	2,990	2,828	2,828	2,863	3,289	2,891	-12%
242	740	832	1,187	1,602	1,855	1,504	1,395	1,478	1,571	1,559	-1%
243	826	1,442	1,695	1,991	2,788	2,467	2,099	2,287	2,392	1,385	-42%
244	1,108	1,757	2,793	3,505	4,912	4,312	3,992	4,037	5,022	3,606	-28%
245	1,308	2,345	2,874	3,196	5,488	3,928	3,701	3,886	3,461	2,966	-14%
246	1,720	2,815	3,611	2,765	4,931	4,255	3,753	4,211	3,404	1,252	-63%
247	661	742	1,059	1,153	1,697	1,627	1,254	1,545	1,262	579	-54%
248	209	261	259	632	1,183	1,125	1,014	642	900	542	-40%
249	907	1,236	1,669	1,809	2,744	2,473	1,950	2,382	2,059	929	-55%
251	117	192	102	166	294	204	197	156	162	86	-47%
287	201	187	259	286	322	243	174	201	214	169	-21%
298	103	155	141	278	1,036	839	854	928	857	760	-11%
Forested Zone	26,938	44,049	51,156	57,449	94,049	76,931	74,649	83,514	83,507	67,507	-19%

Note: Permit area totals prior to 1999 are estimates that assume an evenly distributed harvest in the old permit areas and may be biased. Harvest in permit areas such as 182 (created in 2005) were calculated in a similar manner.

Table 4. Change in anterless harvest in response to change in harvest strategy between 2007 and 2008 seasons for Deer Permit Areas in Minnesota's forest zone.

Permit Area	L-M	M-I	I-EA	M-M	I-I	I-M	EA-EA	M-EA	M-L	EA-I	EA-M
104				-19%							
105							-33%				
107				-20%							
110			5%								
111								5%			
114				16%							
115				-17%							
116	97%										
122		-7%									
126					2%						
127		15%									
152				-27%							
154									-58%		
156					-14%						
157							-21%				
159			-21%								
167					-4%						
168				-7%							
170					-7%						
172				-16%							
174				-13%							
175				11%							
178			-1%								
180			-5%								
181			-2%								
182			7%								
183				-19%							
184										-21%	
197				-8%							
199	77%										
241							-12%				
242					-1%						
243											-42%
244										-28%	
245				-14%							
246		-63%									
247		-54%									
248						-40%					
249									-55%		
251				-47%							
287					-21%						
298				-11%							
Mean	87%	-27%	-3%	-14%	-8%	-40%	-22%	5%	-56%	-24%	-42%
n	2	4	6	14	6	1	3	1	2	2	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	Change
104	2,078	7	7	8	9	8	7	7	7	7	6	-14%
105	766	24	27	30	32	32	29	29	29	29	25	-14%
107	1,895	12	12	13	14	13	11	11	11	11	8	-21%
110	300	25	26	28	30	30	28	28	27	26	23	-11%
111	1,707	6	7	7	8	7	6	6	6	6	5	-16%
115	1,872	11	11	13	14	12	10	11	11	10	8	-19%
116	1,158	1	1	1	2	1	1	2	2	2	1	-20%
122	620	15	15	17	19	18	17	16	18	17	15	-13%
126	941	4	4	5	6	6	6	6	6	6	5	-11%
127	561	1	1	2	2	2	2	2	2	2	1	-13%
154	760	18	18	18	18	17	16	16	15	14	15	6%
156	826	18	18	20	21	21	21	21	21	19	18	-6%
157	889	23	23	24	24	22	21	22	20	18	16	-11%
159	568	23	21	21	22	20	20	20	20	19	18	-4%
167	432	22	22	23	22	21	20	20	20	20	16	-19%
168	724	17	16	17	17	17	15	16	15	15	14	-5%
170	1,315	23	22	24	26	25	24	24	25	23	22	-7%
172	451	36	35	38	40	37	34	33	31	29	27	-6%
174	836	14	13	15	16	15	14	14	14	13	13	-5%
175	1,276	14	13	14	15	14	12	13	13	13	11	-16%
178	1,267	17	18	20	22	22	20	21	22	21	18	-15%
180	982	14	14	16	17	17	16	17	17	17	16	-7%
181	856	23	23	25	28	28	26	27	27	26	25	-5%
183	663	25	25	26	28	27	25	25	24	23	22	-3%
184	1,232	23	24	27	29	27	26	24	23	21	18	-15%
197	975	14	14	15	15	16	15	16	15	14	13	-11%
241	417	39	39	41	43	43	42	42	42	41	35	-14%
242	215	33	33	35	35	32	32	31	30	26	21	-19%
243	314	37	37	40	41	39	38	37	36	33	32	-3%
244	586	32	35	38	40	39	37	36	35	32	26	-18%
245	583	32	33	36	37	34	32	31	30	28	24	-16%
246	772	26	25	25	26	25	23	23	21	20	22	8%
247	231	24	23	24	25	23	21	21	19	18	19	9%
248	212	24	23	25	27	26	25	25	24	21	20	-8%
249	502	18	17	18	19	18	17	17	16	15	16	7%
251	55	17	17	18	19	16	15	14	13	13	14	6%
298	619	17	17	18	20	20	19	18	18	18	15	-13%
Forest Zone	30,456	17	17	18	19	18	17	17	17	16	14	-10%

2009 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 2004. 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 and Enstrom 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

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 5 January and completed it on 24 January. Observers rated survey conditions as "good" (highest rank) on 38 plots and "marginal" on 2 plots. Snow conditions for the survey were excellent and always exceeded 16"in depth. During the survey flights, observers located 474 moose on the 40 plots (532 mi^2) including 208 bulls, 197 cows, 63 calves, and 6 unidentified moose.

After adjusting for sampling and sightability, we estimated that the moose population in northeastern Minnesota contained 7,593±1761 animals (Table 1). Estimates of the calf:cow and bull:cow ratio were 0.32 and 0.94, respectively (Table 1).

DISCUSSION

We have used the sightability model approach for 6 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 -2009 and as a result, population estimates were more comparable. Because of this bias, the population estimate for 2004 was not included in subsequent analyses.

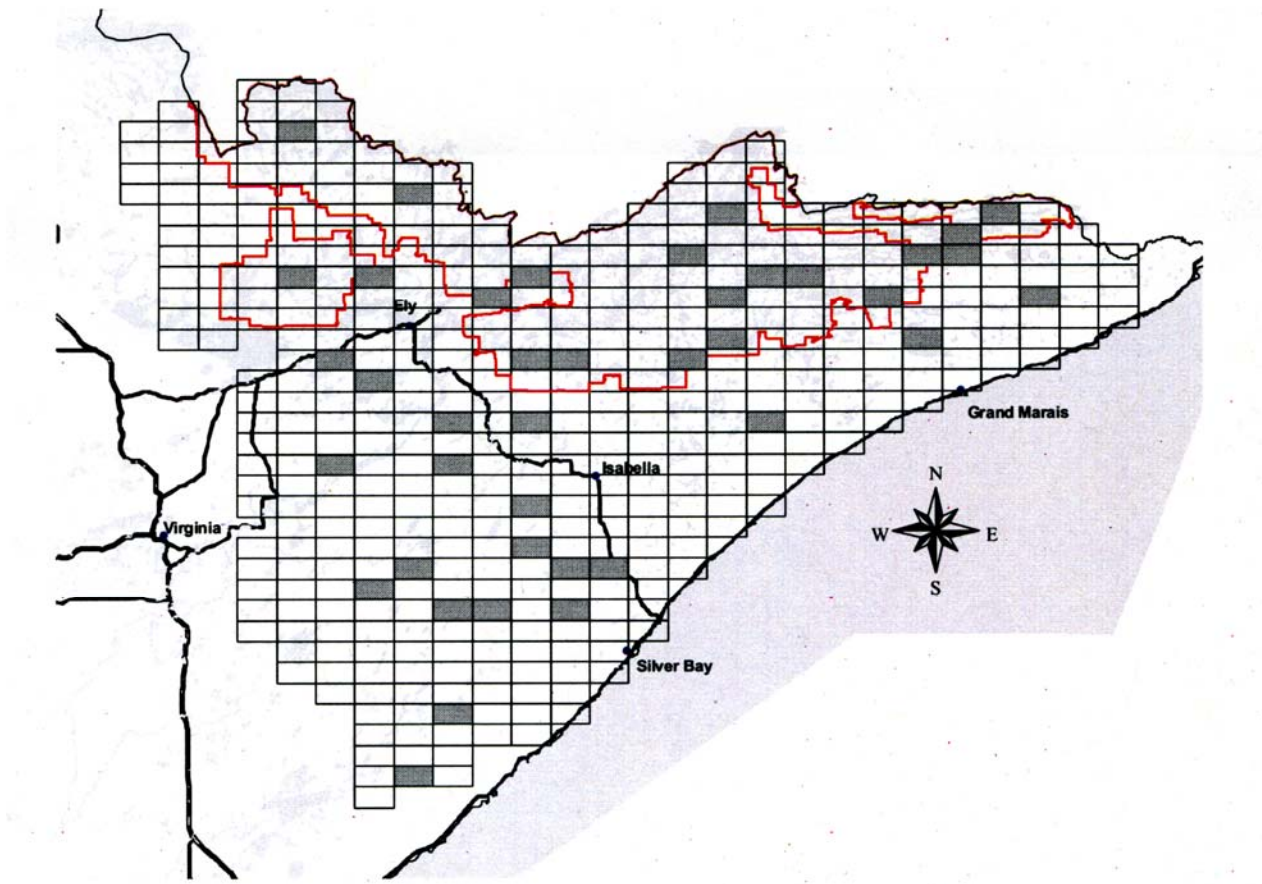

Figure 1. Northeast moose survey area and sample plots (shaded squares) flown in the 2009 aerial moose survey.

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

The 2009 population estimate was almost identical to the 2008 estimate. As would be expected, the overlap in confidence intervals (Table 1, Figure 2) indicates that there was no statistical difference between the 2008 and 2009 point estimates. There was no trend in survey estimates collected in the last 5 years (P=0.551), which suggests that the population has been stable. Several data sets, however, suggest that this population is in fact declining and the lack of a downward trend in the survey estimates is an artifact of the small sample size (n=5). Survey estimates prior to 2004 were based on fixed-wing aircraft surveys and are not comparable to estimates based on post 2003 helicopter surveys.

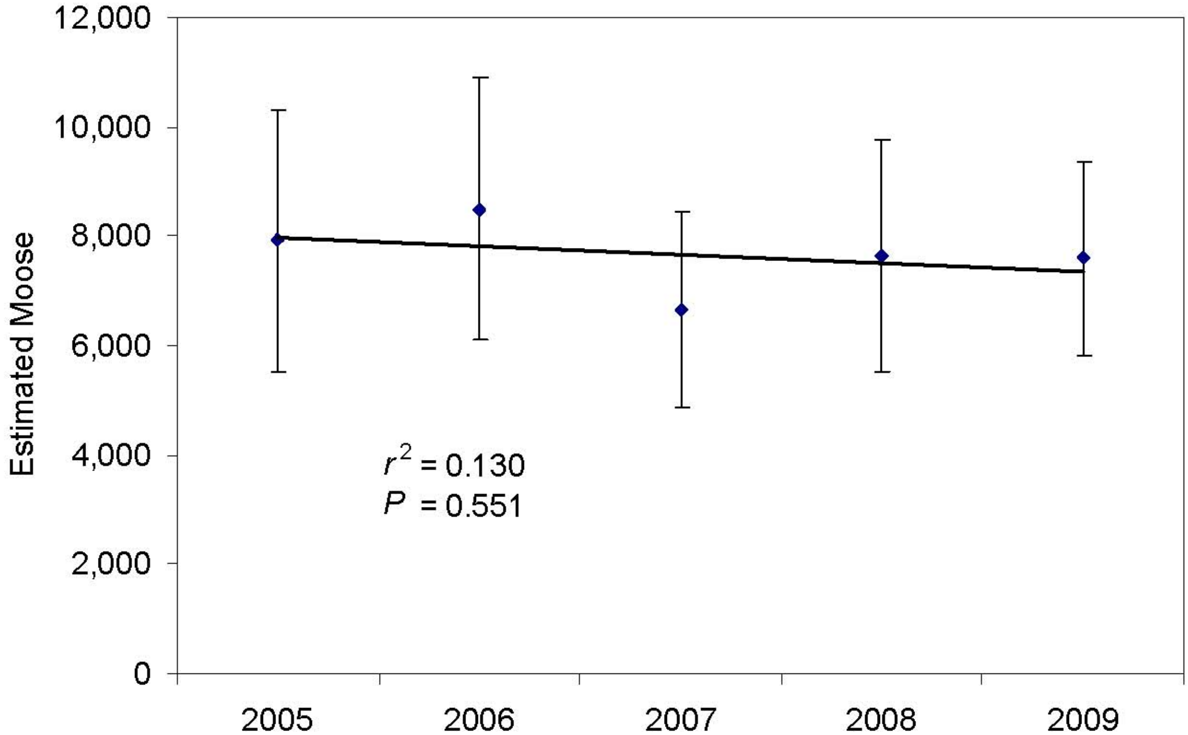

Figure 2. Point estimates, 90% confidence intervals, and trend line of estimated moose numbers in northeastern Minnesota, 2005-2009.

The calf:cow ratio, for example, is an important measure of the number of calves recruited into the population. Over the past 12 years, this ratio has exhibited a significant decline (Figure 3; P = 0.004). If only the last 5 years of calf:cow ratio data are included in the analysis, however, the trend is not significant (P = 0.227). A similar measure, the % calves observed on the survey displays a significant trend over 12 years (P = 0.015) but non-significant trend over 5 years (P = 0.456). In addition, the proportion of cows accompanied by twins has steadily declined since 2002 (Table 1, P = 0.009).

Independent of the aerial survey, hunter success rates have steadily declined since 2001, for both either sex hunting (P = 0.001; Figure 4) and for bulls-only hunting (P <0.001). Prior to 2007, moose hunters were allowed to harvest moose of either sex, but beginning in 2007, hunters were restricted to harvesting antlered bulls.

Annual non-hunting mortality of both bull and cow moose in a sample of 116 radiocollared moose in northeastern Minnesota has been substantially higher than elsewhere in North America (Lenarz et al. 2007). Over a 6-year period, annual non-hunting mortality has averaged 21%; a figure identical to that found for moose in northwestern moose (Murray et al. 2006). Elsewhere in North America, non-hunting mortality normally falls in the 8 to 12% range (Lenarz et al. 2007). When combined with estimates of age specific fertility into a matrix population model (Caswell 2001), annual estimates of the finite rate of increase (λ) ranged from 0.69 to 0.97 ($\bar{x}$ = 0.85). A finite rate of increase = 1 implies that the population is stable and values below 1 indicate that the population is declining. A mean λ of 0.85 implies that the radio collared moose population has declined an average of 15% per year in the last 6 years (Lenarz et al. in prep.). Unless the radiocollared population is not representative of the population at large, it is likely that the entire northeastern moose population has been declining.

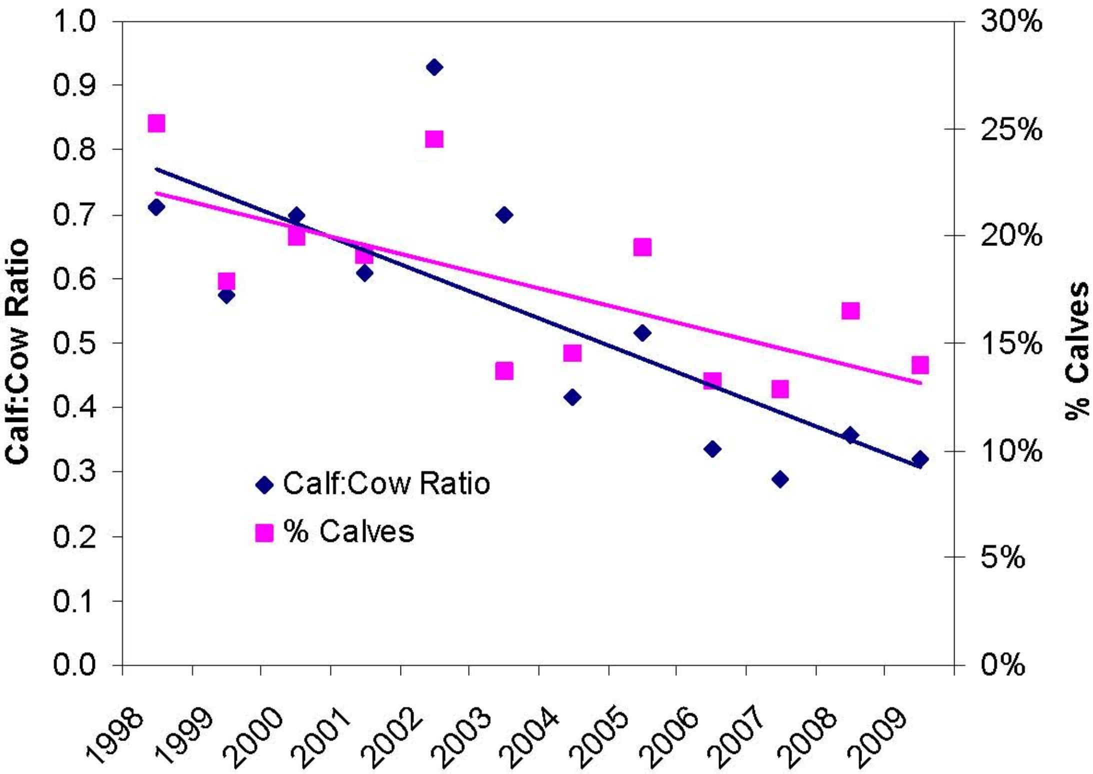

Figure 3. Estimated calf:cow ratio and % calves from aerial moose surveys in northeastern Minnesota. The % calves is less biased than the calf:cow ratio because it isn't dependent on adult cow moose being correctly classified. The calf:cow ratio is not adjusted for sightability and can be compared with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

The estimated bull:cow ratio (Table 1) was significantly lower than the mean bull:cow ratio estimated for the previous 11 years ($\bar{x}$ = 1.17, t=2.38, P=0.039). Although there was a negative trend in this statistic, the slope of the line was not significant (P=0.234). If the estimate for 2003 (2.01) is omitted, however, the trend was significant (P = 0.039). The departure indicated by the 2003 estimate is biologically impossible if estimates for 2002 and 2004 are accurate.

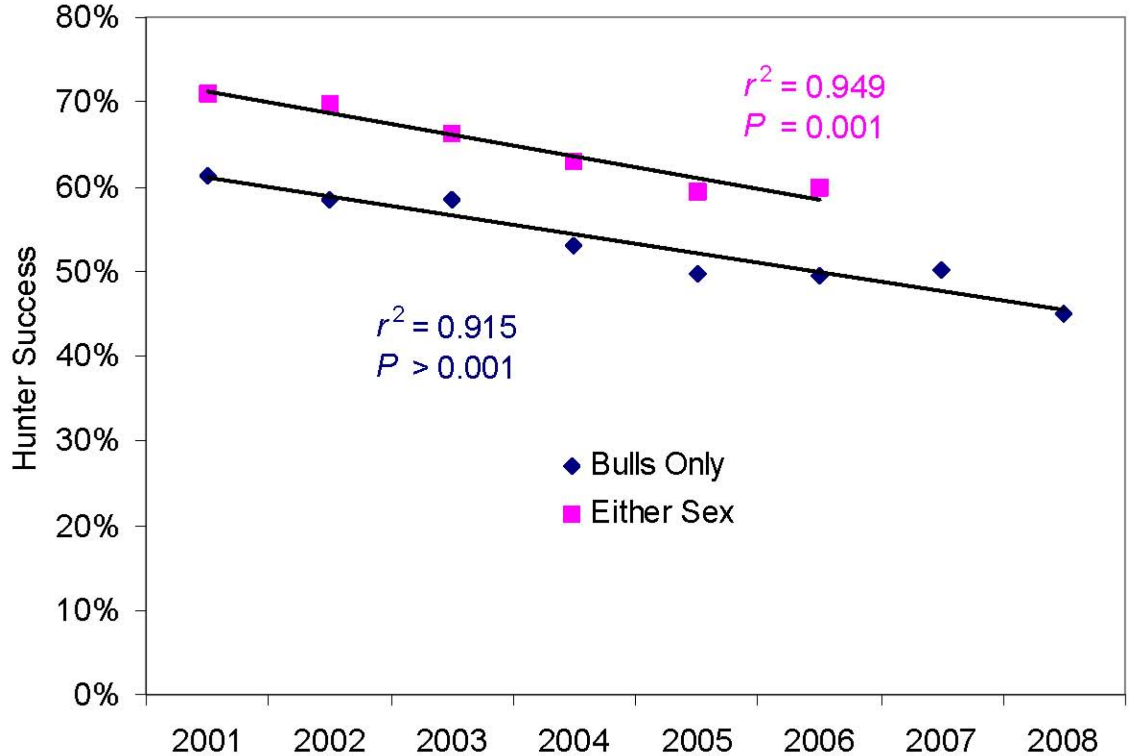

Figure 4. Hunter success rates in northeastern Minnesota, 2001-2008. Prior to 2007, hunters were allowed to harvest moose of either sex. Beginning in 2007, hunters were restricted to taking an antlered bull.

In the January survey, only 2% of the moose exhibited hair loss, which is indicative of infestation with the winter tick (*Dermacentor albipictus*). In 2008, 4% were observed with hair loss. Moose will often rub off patches of hair when high numbers of the tick begin to engorge. Normally, hair loss associated with winter ticks doesn't become noticeable until later in the winter.

ACKNOWLEDGMENTS

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MIGRATORY BIRD POPULATIONS

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2009 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 2009 aerial survey portion was flown from 5-19 May. Spring wetland habitat conditions were above average across the state but highly variable. Portions of southern and east central Minnesota were extremely dry and portions of west central to northwest Minnesota were extremely wet. Wetland numbers decreased 2% compared to 2008 but remained 26% above the 10-year average and 28% above the long-term average. The estimated numbers of temporary (Type 1) wetlands decreased 44% from 2008 and were 43% below the long-term average. The mallard breeding population index (236,000) declined 21% from 2008 (298,000) but was statistically unchanged ($P = 0.18$). Mallard numbers were 19% below the 10-year average but 6% above the long-term average of 224,000 breeding mallards. The blue-winged teal breeding population index (135,000) was 11% lower than the 2008 estimate (152,000) and remained well below both the 10-year (-36%) and long-term (-39%) averages. The combined population index of other ducks (170,000), excluding scaup, decreased 41% from last year and was 29% below the 10-year average and 5% below the long-term average of 179,000. Population estimates of ring-necked duck (61,000), wood duck (53,000), gadwall (10,000), northern shoveler (9,000) and canvasback (7,500) accounted for 85% of the total population of other ducks. Although ring-necked duck numbers declined 52% from 2008, this year's estimate was still the 3rd highest on record and likely comprised of migrant birds still present in the state due to the late spring weather conditions. The estimate of total duck abundance (507,000), which excludes scaup, decreased 31% compared to 2008 and was 32% below the 10-year average and 19% below the long-term average (626,000) and was the 3rd lowest estimate since 1983. The estimated number of Canada geese (corrected for visibility) was 164,000 and 18% higher than 2008, 21% below the 10-year average and 1% above the long-term average of 163,000 geese. Although ice-out dates this spring were near average on most lakes, temperatures and precipitation were below average across much of the state in April and May. Based on the social status of ducks observed (number of pairs, lone males, and flocked birds), the survey timing for mallards was consistent with previous years. For later migrating species (i.e. blue-winged teal, ring-necked ducks), the results suggest most migrant blue-winged teal had moved through the state but the late spring may have contributed to higher than average counts of ring-necked ducks.

METHODS: The aerial survey is based on a sampling design that includes three survey strata (Table 1, Fig. 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.

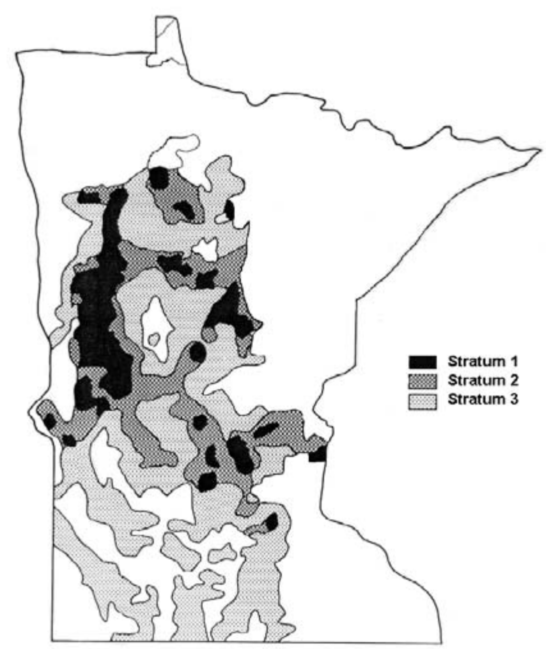

Fig. 1. Location of waterfowl breeding population survey strata in Minnesota.

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. 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.

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.

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 2008 and 2009 using two-tailed Z-tests.

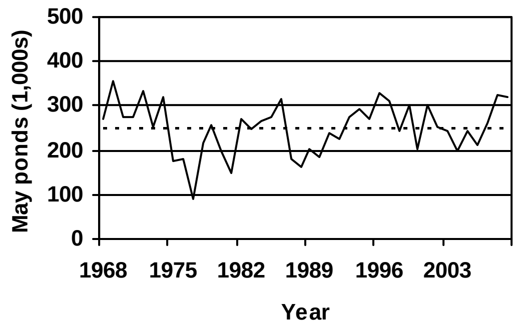

Fig. 2. Number of May ponds (Types II-V) and long-term average (dashed line) in Minnesota, 1968-2009.

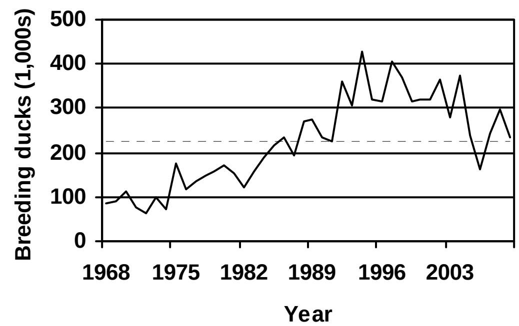

Fig. 3. Mallard population estimates (adjusted for visibility bias) and long-term average (dashed line) in Minnesota, 1968-2009.

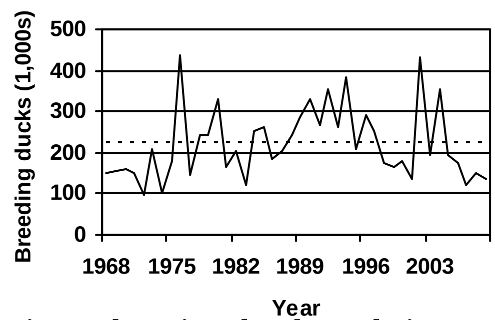

Fig. 4. Blue-winged teal population estimates (adjusted for visibility bias) and long-term average (dashed line) in Minnesota, 1968-2009.

SURVEY CHRONOLOGY: The 2009 aerial survey began on 5 May in southern Minnesota and concluded in northern Minnesota on 19 May. The survey was completed in 11 days of flight time. Transects were flown May 5-11, 15, and 17-19; flights began no earlier than 7 AM and were completed by 12:30 PM each day.

WEATHER AND HABITAT CONDITIONS: Wetland conditions in spring 2009 were similar to 2008. Ice out on most lakes across the state was near average and all lakes were ice-free when the survey began. Temperatures in April averaged 0.3°F below normal statewide; regional temperatures ranged from 2.2°F below average in west central Minnesota to 0.6°F above average in southern Minnesota. April precipitation was 0.7 inches below normal statewide and ranged from 1.0 inches below normal in central Minnesota to 0.1 inches below normal in northeast Minnesota. May temperatures averaged 1.7°F below normal statewide. May precipitation was 1.4 inches below normal statewide and ranged from 2.4 inches below normal in east central Minnesota to 0.3 inches above normal in northwest Minnesota (http://climate.umn.edu). Additional temperature and precipitation data are provided in Appendix A.

In early May 2009, statewide topsoil moisture indices were rated as 11 % short or very short, 66 % adequate, and 23% surplus moisture. In late May, statewide indices were rated as 19% very short, 31% short, 42% adequate and 8% surplus moisture. For comparison, in early May 2008 statewide topsoil moisture indices were rated as 1% short, 67% adequate, and 32% surplus moisture.

Planting dates for row crops were earlier in 2009 than recent years. By 3 May, 59% of the corn acres had been planted statewide compared to 7% in 2008 and 47% for the previous 5-year average. By 1 June, 17% of alfalfa hay had been cut compared to 6% in 2008 and a 5-year average of 15% (Minnesota Agricultural Statistics Service Weekly Crop Weather Reports, (http://www.nass.usda.gov/mn/).

Wetland numbers (Type II-V) declined 2% from 2008 but remained 26 % above the 10-year average and 28% above the long-term averages (Table 2; Fig. 2). The numbers of temporary (Type 1) wetlands decreased 44% from 2008 and were 44% below the long-term average.

Leaf-out dates were later than average, but similar to last year, which improved visibility from the air. The emergence of wetland vegetation was also much later than average, which also improved visibility.

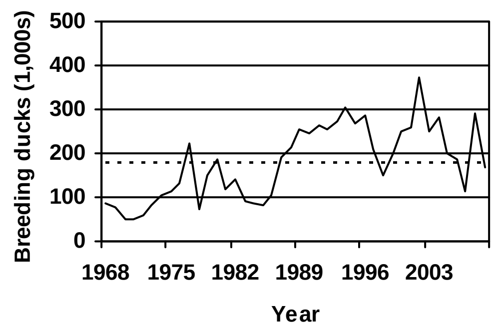

Fig. 5. Other duck (excluding scaup) populations (adjusted for visibility bias) and long-term average (dashed line) in Minnesota, 1968-2009.

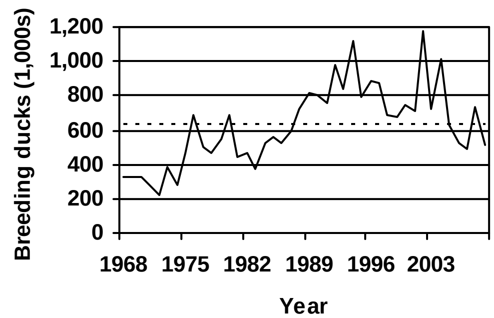

Fig. 6. Total duck (excluding scaup) population estimate and long-term average (dashed line) in Minnesota, 1968-2009.

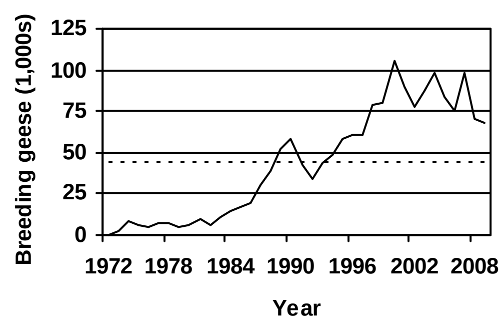

Fig. 7. Canada goose population estimates (not adjusted for visibility bias) and long-term average in Minnesota, 1972-2009.

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 2009 breeding population estimate of mallards was 236,436 (SE = 36,539), which was 21% lower but statistically unchanged from 2008 (Z = 1.33, P = 0.18) (Table 7, Fig. 3). Mallard numbers were 21% below the 10-year average and 6% above the long-term average of 224,000. In 2009, 5% of the total mallards were in flocks compared to 2% in 2008 and 6% in 2007. Pairs comprised 14% of the mallards observed, compared to 13% and 9% in 2007 and 2008, respectively. This suggests that survey timing was similar to recent years based on their social status.

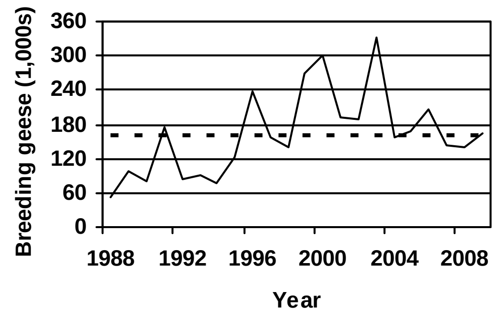

Fig. 8. Canada goose population estimates (adjusted for visibility bias) and long-term average in Minnesota, 1988-2009.

The estimated blue-winged teal population was 135,262 (SE = 32,155), which was 11% lower than 2008 (152,000) but statistically unchanged from last year (Z = 0.43, P = 0.67). Blue-winged teal numbers remained 36% below the 10-year average and 39% below the long-term average (Table 7, Fig. 4). In 2009, 7% of the blue-winged teal were observed in flocks compared to an average of 14% since 2000. Pairs comprised 69% of the blue-winged teal observed, compared to an average of 57% counted as pairs since 2000. Since the number of pairs was higher than average and the number of flocked birds lower than average, this index of social status suggests that fewer than average migrant blue-winged teal may have been present in the state during the survey.

Other duck numbers (excluding scaup) decreased 41% to 169,568 and were 29% below the 10-year average and 5% below the long-term average (Table 7, Fig. 5). Population estimates of ring-necked duck (61,000), wood duck (53,000), gadwall (10,000), northern shoveler (9,000) and canvasback (7,500) accounted for 85% of the total population of other ducks. Although ring-necked duck estimates declined 52% from last year, this year's estimate was still the 3rd highest on record and likely comprised of migrant ring-necked ducks. Scaup numbers were 21% below last year and 49% below the long-term average. Scaup are rare nesting ducks in Minnesota and late migrants, but below average counts indicate most migrant scaup had moved through the state prior to the start of the survey.

The total duck population index, excluding scaup, was 507,000, which was 31% lower than 2008 and 19% below the long-term average (Table 7, Fig. 6).

Visibility Correction Factors (VCFs) for mallards, blue-winged teal, and other ducks were similar to 2008 (Table 7). The mallard VCF (3.02) was 40% above the long-term average. The blue-winged teal VCF (3.63) was similar to last year (3.74) and 7% below the long-term average. The VCF for other ducks (2.70) was also lower than last year (2.91) and 15% lower than the long-term average (3.18).

Canada goose numbers (uncorrected for visibility) decreased 4% compared to 2008 but remained 56% above the long-term average (Table 7, Fig. 7). The VCF for Canada geese was 2.44 and similar to the long-term average of 2.37. The population estimate of Canada geese (adjusted for visibility) was 164,000, which was below the 10-year average of 210,000 but similar to the long-term average of 163,000 (Table 7, Fig. 8). There were 20 Canada goose broods observed during the survey which was similar to most recent years.

The estimated coot population, uncorrected for visibility, was 9,000 in 2009 compared to 56,000 in 2008.

SUMMARY: Overall wetland conditions were above average but highly variable across the state. Mallard abundance in 2009 (236,000) was lower than 2008 (298,000) but statistically unchanged (P=0.18). Mallard numbers were 6% above the long-term average (224,000) but below the 10-year average (292,000). Blue-winged teal abundance (135,000) was lower than 2008 (152,000) but statistically unchanged (P=0.67); blue-winged teal were 36% below the 10-year average (210,000) and 39% below the long-term average (223,000). The combined population index of other ducks (170,000) declined 41% from 2008 and was 5% below the long-term average. Ring-necked ducks (61,000), wood ducks (53,000), gadwall (10,000), northern shoveler (9,000) and canvasback (7,500) accounted for most of the total population of other ducks. Total duck abundance (507,000), excluding scaup, decreased 31% from 2008 and was 19% below the long-term average. Canada goose numbers, adjusted for visibility bias, increased 18% from 2008 and above the long-term average.

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Minnesota Department of Natural Resources (MNDNR) and the U.S. Fish and Wildlife Service (USFWS)
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Table 1. Survey design for Minnesota, May 2009.[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 1 and Types II-V), 1968-2009.

	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
10-year average (1998-2008)		46,241	253,273
Long-term average (1968-2008)		69,134	248,415
Change from:			
2008		-44%	-2%
10-year average		-15%	26%
Long-term average		-43%	28%

[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, 1991-2009.

	Year																		
Species	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Dabblers:																			
Mallard	25,854	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
Black Duck	56	0	0	56	0	0	0	0	0	0	0	0	0	0	56	0	0	0	0
Gadwall	2,721	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
American Wigeon	0	56	0	0	194	0	0	56	56	56	111	0	56	555	167	0	56	111	56
Green-winged Teal	56	0	111	278	0	278	56	333	0	278	56	278	222	444	56	56	167	278	167
Blue-winged Teal	15,940	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
Northern Shoveler	1,777	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
Northern Pintail	389	222	611	167	167	167	111	111	167	167	389	56	111	56	0	56	0	56	56
Wood Duck	10,775	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
Dabbler Subtotal	57,568	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
Divers:																			
Redhead	2,555	3,499	1,416	1,972	639	722	778	944	500	583	1,444	750	333	805	666	666	916	1,389	472
Canvasback	2,305	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
Scaup	9,858	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
Ring-necked Duck	1,777	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
Goldeneye	0	222	111	222	111	167	0	111	56	56	333	111	0	222	222	56	222	278	278
Bufflehead	333	722	0	444	56	278	0	56	111	56	111	222	111	389	167	222	56	1,611	833
Ruddy Duck	361	500	1,250	639	167	139	528	11,052	972	0	83	1,305	417	305	1,222	305	0	1,027	861
Hooded Merganser	0	444	222	111	278	611	555	389	722	500	722	555	333	278	333	555	111	666	944
Large Merganser	56	111	0	56	0	0	56	0	0	0	111	0	972	0	111	0	278	333	333
Diver Subtotal	17,245	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
Total Ducks	74,813	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
Other:																			
Coot	11,108	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
Canada Goose	9,803	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

Table 4. Minnesota waterfowl breeding populations by species for Stratum II (medium wetland density), expanded for area but not visibility, 1991-2009.

	Year																		
Species	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Dabblers:																			
Mallard	39,215	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
Black Duck	0	0	0	0	0	0	0	0	0	0	117	0	0	0	0	0	0	0	0
Gadwall	1,870	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
American Wigeon	701	351	0	117	0	468	351	818	0	468	0	0	0	2,513	117	0	0	351	0
Green-winged Teal	0	0	351	117	0	935	234	351	117	117	117	468	234	234	0	117	0	0	234
Blue-winged Teal	24,663	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
Northern Shoveler	3,857	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
Northern Pintail	701	234	351	468	234	117	234	468	117	117	117	0	117	0	0	0	234	0	0
Wood Duck	8,065	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
Dabbler subtotal	79,072	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
Divers:																			
Redhead	1,519	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
Canvasback	117	0	584	1,052	0	234	701	117	117	935	0	468	1,052	234	0	0	1,169	468	234
Scaup	13,383	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
Ring-necked Duck	2,104	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
Goldeneye	818	351	584	701	701	1,753	818	234	935	584	468	234	234	351	117	117	0	351	584
Bufflehead	0	526	117	234	0	117	117	0	0	0	0	1,169	117	468	351	117	117	1,403	818
Ruddy Duck	4,558	1,227	3,390	409	117	58	117	0	468	0	0	1,870	2,688	0	351	58	0	0	175
Hooded Merganser	0	351	584	468	117	234	468	117	701	935	1,403	701	701	234	234	351	234	584	701
Large Merganser	0	117	0	0	0	0	0	0	0	117	117	0	0	234	351	0	0	351	0
Diver subtotal	22,499	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
Total Ducks	101,571	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
Other:																			
Coot	5,552	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
Canada Goose	8,591	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

Table 5. Minnesota waterfowl breeding populations by species for Stratum III (low wetland density), expanded for area but not visibility, 1991-2009.

	Year																		
Species	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Dabblers:																			
Mallard	63,246	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
Black Duck	0	0	0	0	0	0	0	0	0	0	0	0	0	174	0	0	174	174	0
Gadwall	2,262	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
American Wigeon	696	522	348	1,218	0	1,044	348	696	0	522	174	1,218	174	1,566	1,044	174	348	348	174
Green-winged Teal	348	0	348	174	0	957	348	174	0	1,218	1,392	522	174	0	174	522	0	0	0
Blue-winged Teal	50,893	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
Northern Shoveler	5,568	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
Northern Pintail	1,914	870	1,218	696	174	870	522	870	870	696	522	0	174	348	174	174	348	174	0
Wood Duck	17,747	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
Dabbler subtotal	142,674	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
Divers:																			
Redhead	2,610	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
Canvasback	696	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
Scaup	17,486	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
Ring-necked Duck	3,480	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
Goldeneye	696	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
Bufflehead	552	696	348	696	0	1,044	174	348	0	0	0	1,218	783	2,088	0	174	696	1,218	870
Ruddy Duck	9,396	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
Hooded Merganser	348	348	348	696	1,044	1,566	696	696	1,218	957	174	2,175	174	1,740	1,218	870	174	696	348
Large Merganser	0	348	0	174	174	0	0	0	0	0	0	522	0	0	261	957	348	348	348
Diver subtotal	35,264	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
Total Ducks	177,938	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
Other:																			
Coot	47,587	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
Canada Goose	23,837	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

Table 6. Minnesota waterfowl breeding populations by species for Stratum I-III combined, expanded for area coverage but not for visibility, 1991-2009.

	Year																		
Species	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Dabblers:																			
Mallard	128,315	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
Black Duck	56	0	0	56	0	0	0	0	0	0	117	0	0	174	56	0	174	174	0
Gadwall	6,853	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
American Wigeon	1,397	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
Green-winged Teal	404	0	810	569	0	2,170	638	858	117	1,613	1,564	1,267	630	678	230	694	167	278	400
Blue-winged Teal	91,496	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
Northern Shoveler	11,202	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
Northern Pintail	3,004	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
Wood Duck	36,587	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
Dabbler subtotal	279,314	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
Divers:																			
Redhead	6,684	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
Canvasback	3,118	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
Scaup	40,727	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
Ring-necked Duck	7,361	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
Goldeneye	1,514	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
Bufflehead	885	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
Ruddy Duck	14,315	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
Hooded Merganser	348	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
Large Merganser	56	576	0	230	174	0	56	0	0	117	228	522	972	234	723	957	626	1,032	681
Diver subtotal	75,008	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
Total Ducks	354,322	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
Other:																			
Coot	64,247	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
Canada Goose	42,231	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

Table 7. Estimated waterfowl populations during the Minnesota Waterfowl breeding population survey, 1968-2009.

	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
Averages:											
10-year (1999-2008)	122,839	2.45	291,680	39,873	52,390	4.01	209,845	40,989	74,612	3.50	240,510
Long-term (1968-2008)	103,563	2.16	224,116	35,953	60,085	3.90	223,060	42,111	60,590	3.18	178,795
% change from:											
2008	-24%	5%	-21%	32%	-9%	-3%	-11%	33%	-37%	-7%	-41%
10-year average	-36%	23%	-19%	-8%	-29%	-9%	-36%	-22%	-16%	-23%	-29%
Long-term average	-24%	40%	6%	2%	-38%	-7%	-39%	-24%	4%	-15%	-5%

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

Table 7. Cont.

	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	3.98	49,340	177,663	631,980	190,060	681,320	83,384	2.02	168,469
2006	1,971	4.22	8,322	153,504	521,109	155,475	529,431	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	178,389	507,287	190,960	541,266	67,473	2.44	164,405
Averages:										
10-year (1998-2008)	14,232	3.46	42,601	249,640	742,742	263,873	785,343	86,726	2.44	209,888
Long-term (1968-2008)	22,713	3.17	67,043	224,189	626,144	246,903	693,186	43,266	2.37	162,521
% change from:										
2008	-15%	-7%	-21%	-27%	-31%	-26%	-31%	-4%	23%	18%
10-year average	-12%	-22%	-20%	-29%	-32%	-28%	-31%	-22%	0%	-21%
Long-term average	-45%	-15%	-49%	-20%	-19%	-23%	-22%	56%	3%	1%

[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, 13 April - 17 May 2009 (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	46.4	4.3	42.6	-3.3	45.2	-4.3	46.5	-6.4	46.8	-9.1	0.14	0.32	0.36	0.00	0.51	-1.12
NC	Grand Rapids	48.6	7.2	45.6	0.9	45.5	-2.5	50.2	-0.8	49.4	-4.4	0.00	0.58	0.50	0.11	1.32	-0.36
	Itasca	47.6	9.5	42.7	0.9	41.8	-3.6	47.2	-1.7	47.4	-4.6	0.00	0.28	0.61	0.13	0.89	-0.63
WC	Alexandria	50.2	7.3	47.8	1.4	46.8	-3.0	53.2	0.2	51.4	-4.4	0.00	0.14	0.61	0.10	0.09	-0.55
	Fergus Falls	49.4	6.3	46.1	-0.7	45.8	-4.4	51.6	-1.8	49.1	-7.2	0.00	0.05	0.78	0.14	0.92	0.24
	Montevideo	49.8	5.2	48.0	-0.1	45.6	-5.8	54.2	-0.4	52.8	-4.8	0.01	0.00	0.56	0.18	0.13	-2.72
	Morris	48.8	4.3	47.0	-1.0	45.0	-6.3	52.5	-2.0	51.4	-6.0	0.00	0.00	0.68	0.13	0.11	-2.29
C	Becker	51.2	6.3	50.2	2.1	49.3	-1.8	53.0	-1.0	54.8	-1.8	0.01	0.46	0.21	0.20	0.41	-2.40
	Hutchinson	53.0	7.5	51.8	2.8	48.5	-3.8	55.7	0.3	55.6	-2.6	0.01	0.00	0.71	0.34	0.46	-1.60
	St. Cloud	51.0	7.0	49.8	2.5	48.4	-2.1	52.6	-0.8	52.3	-3.8	0.00	0.85	0.28	0.21	1.35	-0.60
	Staples	50.0	7.6	47.6	1.8	44.9	-4.1	52.1	0.2	50.0	-4.5	0.00	0.18	0.46	0.07	0.36	-2.06
	Willmar	52.2	7.7	50.0	2.0	47.4	-4.0	54.6	0.0	49.8	-7.7	0.02	0.00	0.93	0.17	0.80	-1.29
EC	Aitkin	47.2	5.9	46.8	2.3	42.5	-5.1	49.6	-0.9	46.2	-7.0	0.00	0.16	1.04	0.41	1.25	0.28
	Cambridge	Missing															
	Msp Airport	54.2	7.3	52.8	2.7	52.1	-1.1	57.6	1.5	56.0	-2.7	0.06	0.87	0.17	0.33	0.05	-1.96
SW	Pipestone	49.2	4.3	48.5	0.4	45.4	-5.9	55.4	1.1	54.4	-2.7	0.21	0.54	0.48	0.69	0.02	-1.27
	Redwood Falls	53.0	5.8	52.2	1.7	51.0	-2.7	55.5	-1.3	55.0	-4.7	0.05	0.37	0.35	0.91	0.28	-1.73
	Worthington	49.8	6.1	49.8	2.7	46.2	-4.2	53.4	-0.2	52.6	-4.0	0.34	0.14	1.36	1.73	0.09	-0.27
SC	Faribault	50.6	6.2	52.2	4.5	48.8	-2.0	56.0	2.2	51.8	-4.9	0.24	0.44	1.20	0.78	0.09	-1.56
	Waseca	52.4	7.2	50.6	2.1	48.8	-3.0	55.6	0.7	52.8	-5.0	0.30	0.36	1.27	1.40	0.33	-1.34
	Winnebago	52.6	6.3	53.6	4.1	50.0	-2.5	57.2	1.8	54.6	-3.5	0.22	0.44	1.18	1.38	0.18	-1.12
Statewide		49.4	5.9	47.9	1.0	46.6	-3.4	52.6	-0.4	51.1	-4.8	0.09	0.41	0.70	0.51	0.54	

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

Waterfowl information is taken from the U.S. Fish and Wildlife Service report Waterfowl Population Status, 2009 by Kathy Fleming, Timothy Moser, Pamela R. Garrettson, 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, 1971-2009 (from: U.S. Fish and Wildlife Service. 2009. Waterfowl population status, 2009. U.S. Department of the Interior, Washington, D.C. U.S.A.).

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

[a] Surveys conducted in Spring.
[b] Indirect or preliminary estimate.

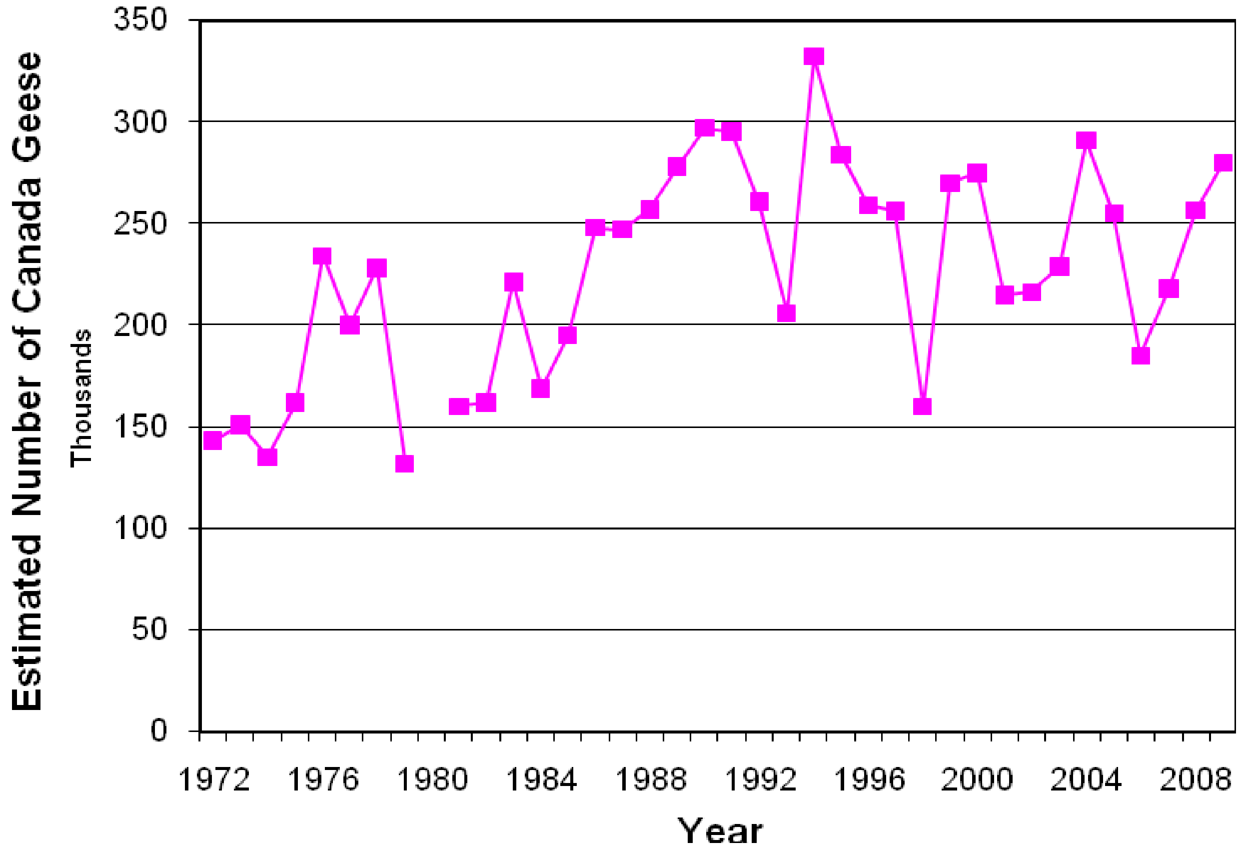

Figure 1. Breeding ground survey estimates of the Eastern Prairie Population of Canada geese, 1972-2009. (from: U.S. Fish and Wildlife Service. 2009. Waterfowl population status, 2009. U.S. Department of the Interior, Washington, D.C. U.S.A.). Surveys conducted in spring. Indirect or preliminary estimates. Data not available for 1980.

Table 2. Estimated number of May ponds (adjusted for visibility) in Prairie Canada (portions of Alberta, Saskatchewan and Manitoba) 1964-2009 and north-central U.S. (North Dakota, South Dakota and Montana) 1974-2009. (from: U.S. Fish and Wildlife Service. 2009. Waterfowl population status, 2009. U.S. Department of the Interior, Washington, D.C. U.S.A.)

	Ponds (thousands)	
Year	Prairie Canada	North Central U.S.[a]
1964	3,371	--
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
Average	3,433	1,571
% Change in 2008 from:		
2007	+ 17	+ 108
Long term Average	- 11	- 12

[a] No comparable survey data available for the north-central U.S. during 1964-73.

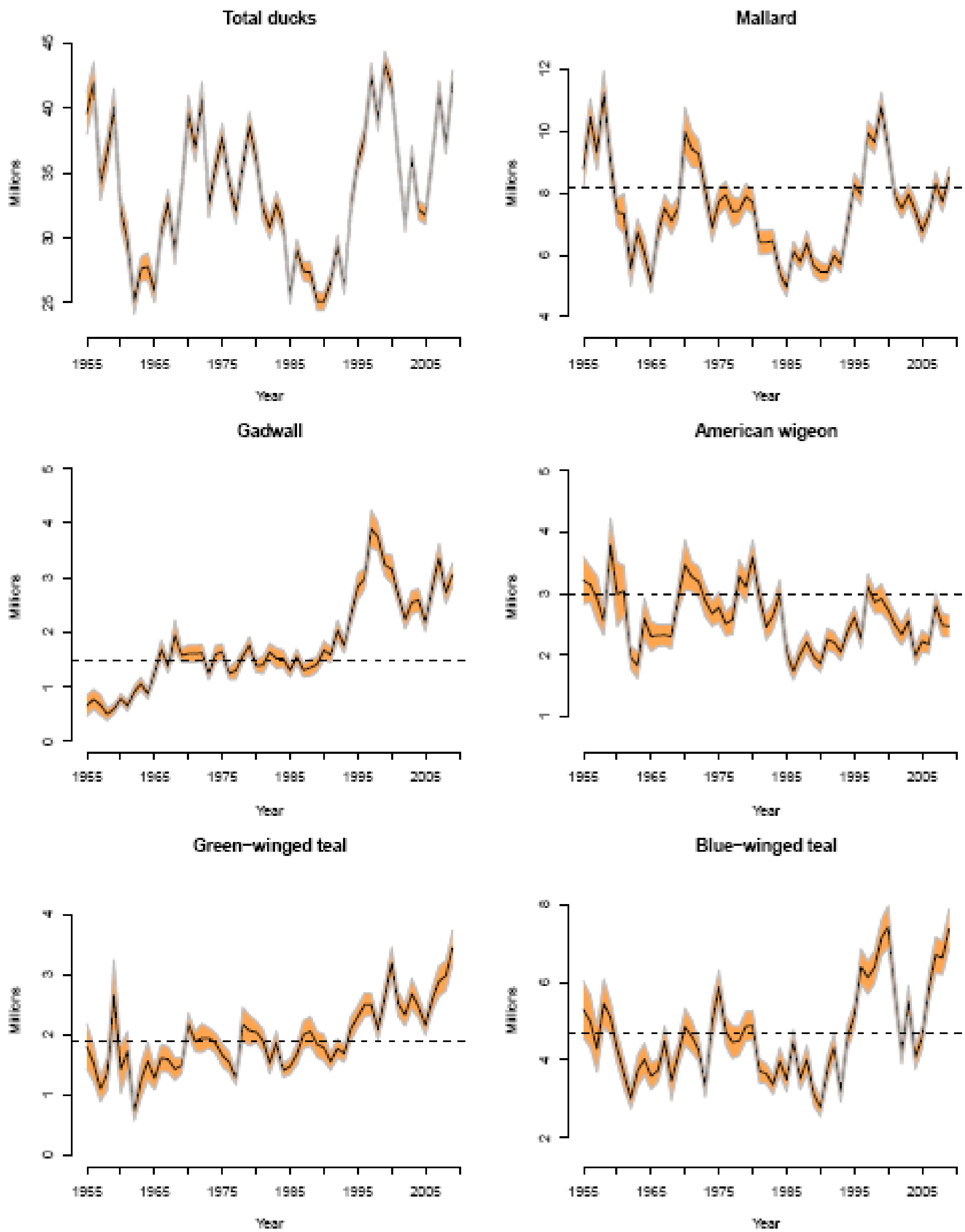

Figure 2. Estimates of North American breeding populations, 95% confidence intervals, and North American Waterfowl Management Plan population goal (dashed line) for selected species and number of water areas in May in Prairie Canada and Northcentral U.S. (from: U.S. Fish and Wildlife Service. 2009. Waterfowl population status, 2009. U.S. Department of the Interior, Washington, D.C. U.S.A.)

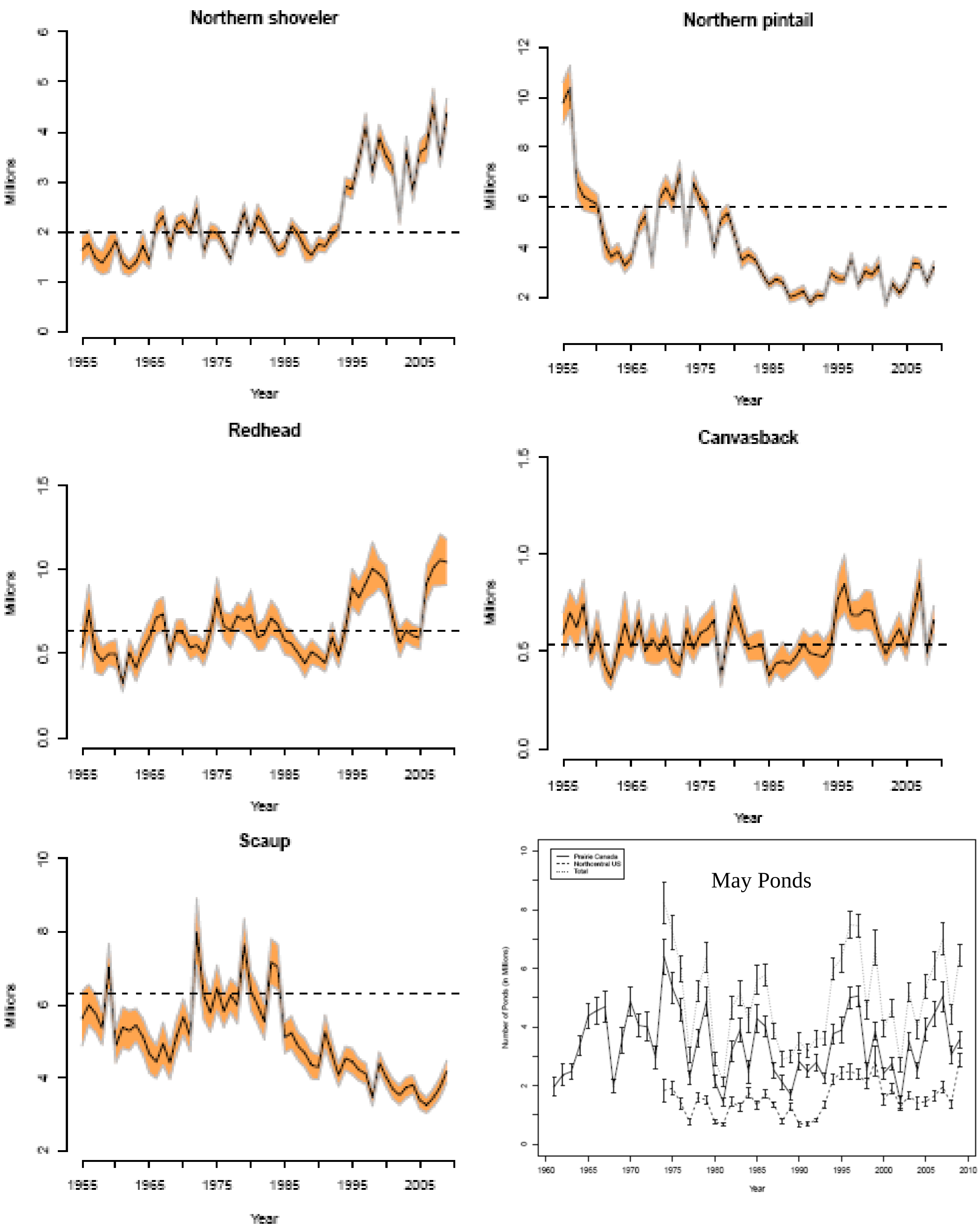

Figure 2. (continued).

2009 MINNESOTA SPRING CANADA GOOSE SURVEY

David Rave, Wetland Wildlife Populations and Research Group

INTRODUCTION

This report presents results from the ninth 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 ≥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.

Pilot John Heineman and I flew the survey on seven days between 21 April and 1 May, 2009. 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 2009 was 267,496 (±70,607). Adding 17,500 for the Twin Cities metro area (Cooper 2004) yields a statewide estimate of 284,996 (Table 1). Relative error (95% CI half-width) was 26.4% of the estimate, close to the goal of 25.0%. The survey tallied 41.8% singles, 50.7% pairs, and 7.5% 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 2009, 45.2% of the geese seen were classified as Productive Geese (Table 2).

The 2009 Canada goose breeding population estimate for the surveyed area was similar to the 2008 estimate, although goose numbers appeared to be slightly lower in the Forest and Transition regions and slightly higher in the Prairie region (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 2009 were characterized by less snow during the survey than the previous 2 years. The number of productive geese observed this year indicates that 2009 will likely be a good year for Canada goose production. Weather conditions throughout May and June will influence goose productivity. Regardless, the 2009 Canada goose population estimate remained above the state Canada goose population goal.

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 average to above average Canada goose production throughout the state in 2009, depending upon May and June weather conditions.

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.

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Table 1. Spring Canada goose population estimates in Minnesota, 2001-2009.

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**

*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, 2001-2009.

Year	Singles[1]	Pairs[1]	Groups	Productive Geese[2]
2001	27.0	63.9	9.1	36.4
2002	30.7	52.0	17.2	41.5
2003	27.9	58.2	13.9	29.3
2004	26.5	57.5	16.0	35.5
2005	33.0	50.2	16.8	40.7
2006	43.5	45.9	10.6	50.3
2007	31.0	51.5	17.5	36.2
2008	38.4	55.4	6.2	42.6
2009	41.8	50.7	7.5	45.2

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

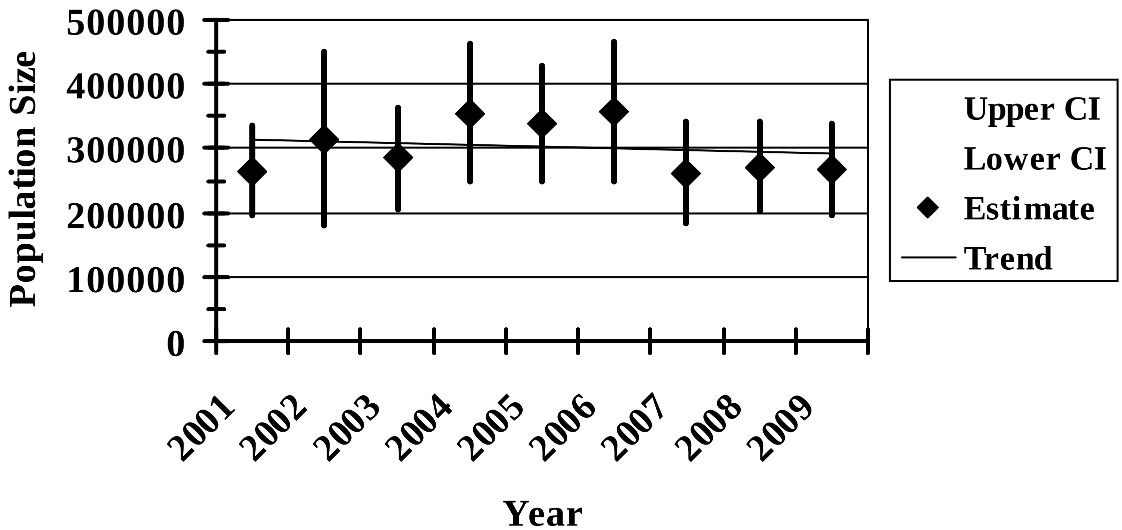

Figure 1. Spring Canada goose population estimates (±95% CI) in Minnesota, 2001-2009. (Does not include Metro area.)

Mourning dove information is taken from the U.S. Fish and Wildlife Service report by Dolton, D.D., T. A. Sanders, and K. Parker. 2009. Mourning dove, White-winged dove, and Band-tailed Pigeon population status, 2009. U.S. Fish and Wildlife Service, Laurel, Maryland, USA. 43 pp. The entire report is available on the Division of Migratory Bird Management home page (http://migratorybirds.fws.gov).

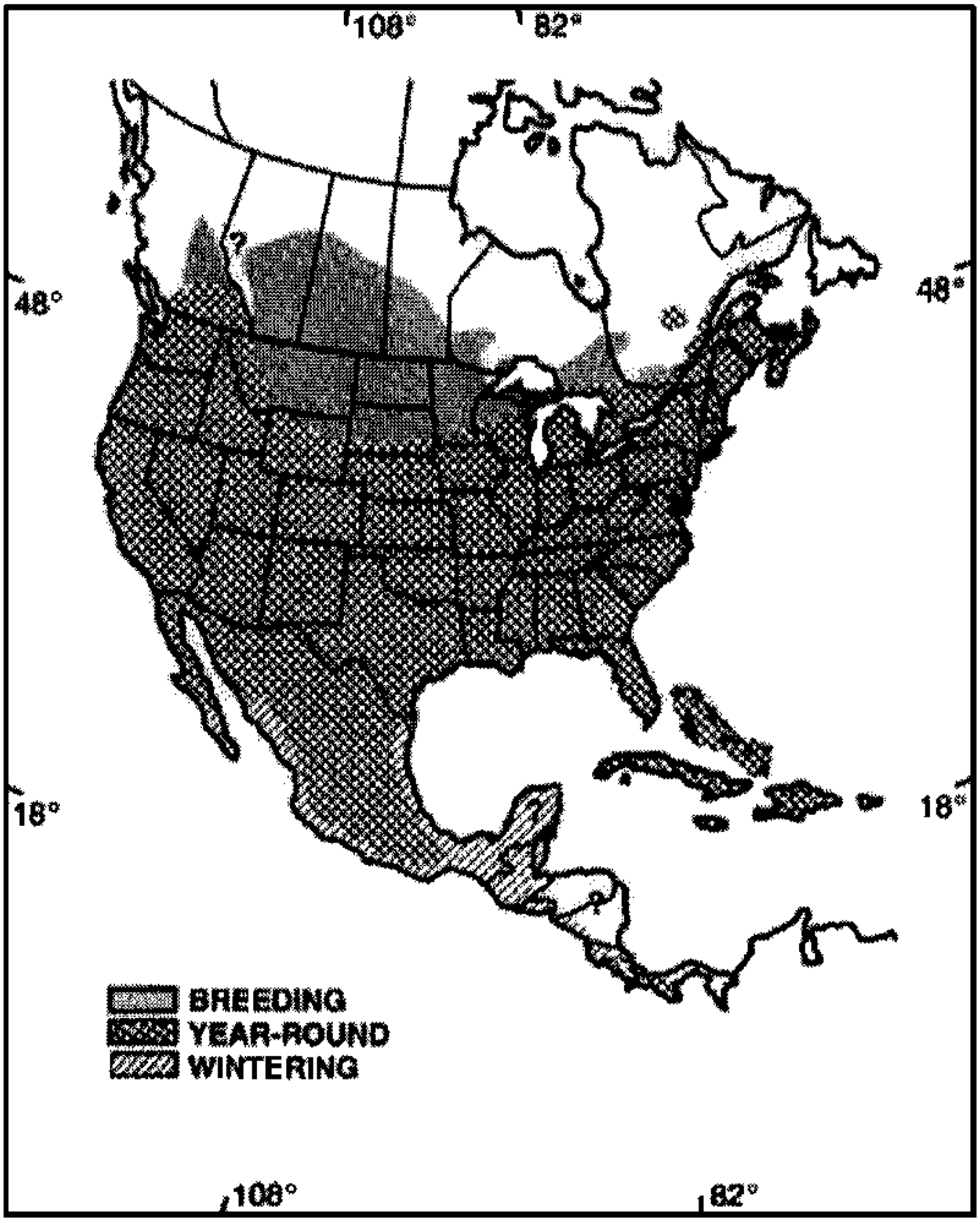

Figure 1. Breeding and wintering ranges of the mourning dove (adapted from Mirarchi and Baskett 1994). (From: Mourning dove, White-winged dove, and Band-tailed Pigeon population status, 2009. Dolton, D.D., T. A. Sanders and K. Parker. U.S. Fish and Wildlife Service, Laurel, Maryland, USA. 43 pp.)

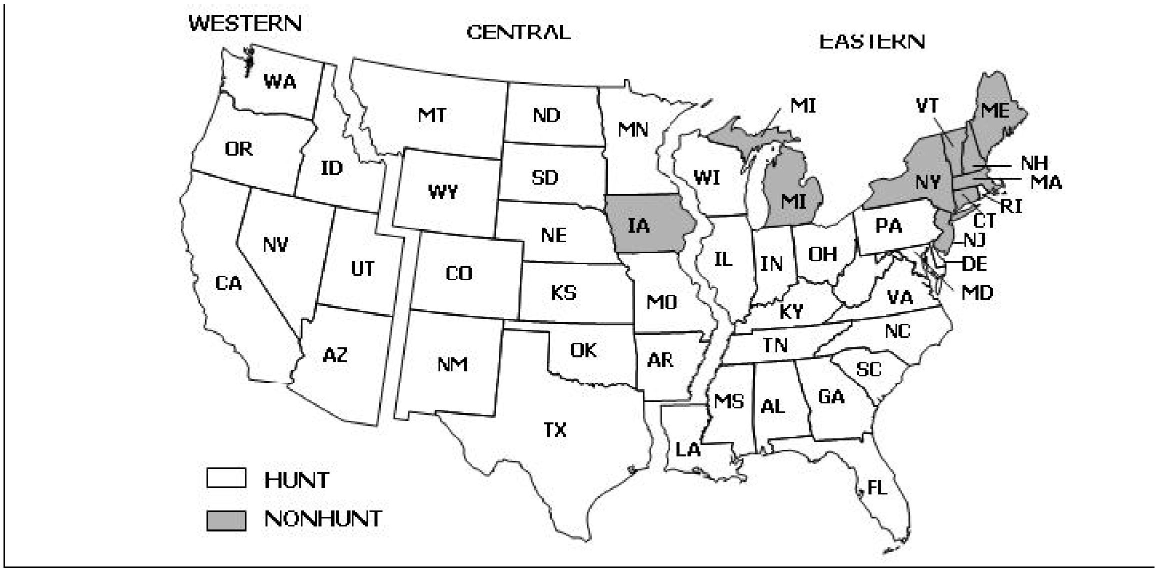

Figure 2. Mourning dove management units with 2008 hunting and nonhunting states. (From: Mourning dove, White-winged dove, and Band-tailed Pigeon population status, 2009. Dolton, D.D., T. A. Sanders and K. Parker U.S. Fish and Wildlife Service, Laurel, Maryland, USA. 43 pp.)

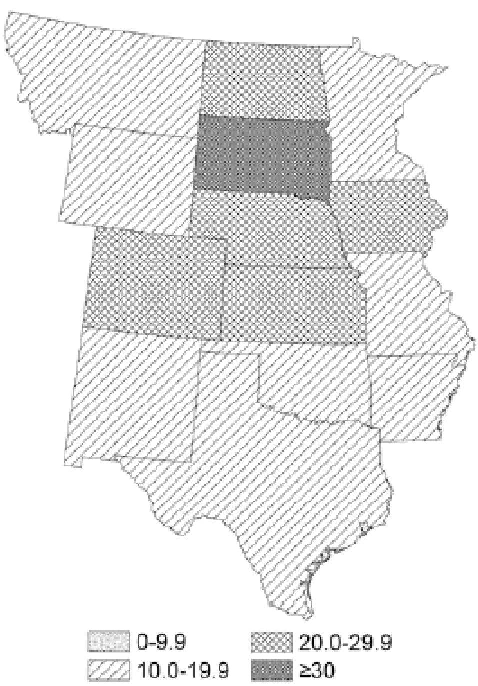

Figure 3. Mean number of mourning doves heard per route by state in the Central Management Unit, 2008-09. (From: Mourning dove, White-winged dove, and Band-tailed Pigeon population status, 2009. Dolton, D.D., T. A. Sanders and K. Parker. U.S. Fish and Wildlife Service, Laurel, Maryland, USA. 43 pp.).

Table 1. Preliminary estimates of the number of hunters, days hunted, and total bag from Harvest Information Program surveys for the 2006-07, 2007-08, and 2008-09 seasons. (From: Mourning dove, White-winged dove, and Band-tailed Pigeon population status, 2009. Dolton, D.D., T. A. Sanders and K. Parker. U.S. Fish and Wildlife Service, Laurel, Maryland, USA. 43 pp.)

Management unit / State	Hunters			Days Hunted			Birds bagged		
	2006-07	2007-08	2008-09	2006-07	2007-08	2008-09	2006-07	2007-08	2008-09
CENTRAL	470,800 [2]	485,700 [2]	443,900	1,605,900 ± 9%	1,803,900 ± 9%	1,496,900 ± 9%	8,887,000 ± 9%	9,180,200 ± 9%	7,520,000 ± 10%
AR	31,300 ± 16% [2]	37,000 ± 16%	23,300 ± 18%	77,500 ± 18%	115,900 ± 23%	76,600 ± 33%	621,500 ± 20%	791,700 ± 24%	422,000 ± 23%
CO	19,800 ± 11%	21,800 ±11%	23,200 ± 12%	45,700 ± 13%	57,800 ± 14%	60,400 ± 18%	270,300 ± 19%	315,000 ± 14%	288,400 ± 19%
KS	35,400 ± 8%	36,300 ±8%	26,800 ± 11%	116,400 ± 11%	119,100 ± 11%	78,500 ± 15%	711,800 ± 12%	725,100 ± 13%	443,700 ± 15%
MN	8,000 ± 33%	7,700 ± 35%	11,300 ± 28%	24,200 ± 39%	27,600 ± 49%	34,900 ± 42%	50,000 ± 46%	67,400 ± 52%	83,500 ± 48%
MO	44,700 ± 7%	42,600 ± 8%	34,300 ± 9%	129,800 ± 12%	124,400 ± 13%	93,400 ± 14%	709,500 ± 15%	603,300 ± 15%	467,800 ± 16%
MT	1,800 ± 36%	1,700 ± 31%	2,100 ± 45%	3,900 ± 38%	4,000 ± 34%	3,700 ± 44%	14,800 ± 33%	20,900 ± 43%	18,400 ± 51%
NE	15,000 ± 12%	17,000 ± 12%	13,600 ± 33%	43,000 ± 12%	55,300 ± 16%	48,800 ± 52%	249,700 ± 12%	319,600 ± 18%	238,600 ± 49%
NM	7,100 ± 20%	8,600 ± 18%	6,300 ± 18%	33,900 ± 28%	40,100 ± 33%	26,200 ± 29%	226,900 ± 33%	198,700 ± 25%	138,100 ± 30%
ND	4,000 ± 23%	3,200 ± 27%	2,700 ± 30%	10,800 ± 24%	9,900 ± 26%	9,200 ± 44%	56,400 ± 25%	48,700 ± 27%	26,400 ± 31%
OK	36,100 ± 9%	24,600 ± 14%	19,300 ± 17%	108,300 ± 17%	73,100 ± 19%	57,800 ± 17%	704,400 ± 24%	480,000 ± 24%	361,200 ± 18%
SD	6,400 ± 16%	6,000 ± 20%	7,300 ± 185	19,600 ± 17%	18,200 ± 25%	27,500 ±34%	103,300 ± 18%	104,000 ± 30%	152,100 ± 30%
TX	258,900 ± 10%	275,200 ± 10%	271,300 ± 10%	986,200 ± 14%	1,149,600 ± 13%	974,100 ± 13%	5,138,700 ± 14%	5,463,300 ± 14%	4,849,600 ± 14%
WY	2,300 ± 29%	4,000 ± 20%	2,500 ± 25%	6,500 ± 36%	8,800 ± 24%	5,900 ± 33%	29,500 ± 37%	42,600 ± 27%	30,100 ± 36%

[1] This represents the 95% confidence interval expressed as a percent of the point estimate.
[2] This total is slightly exaggerated because people are counted more than once if they hunted in more than one state.

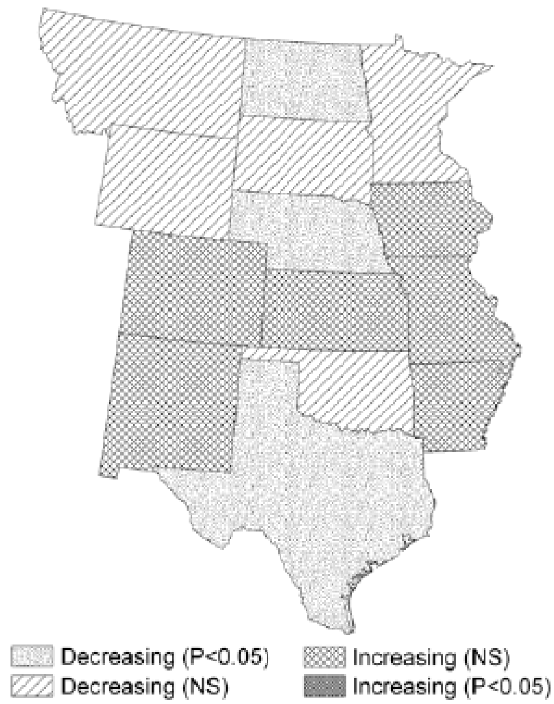

Figure 4. Trends in number of mourning doves heard per route by state in the Central Management Unit, 2000-2009. A stable trend is considered increasing non-significant. From: Mourning dove, White-winged dove, and Band-tailed Pigeon population status, 2009. Dolton, D.D., T. A. Sanders and K. Parker. U.S. Fish and Wildlife Service, Laurel, Maryland, USA. 43 pp.).

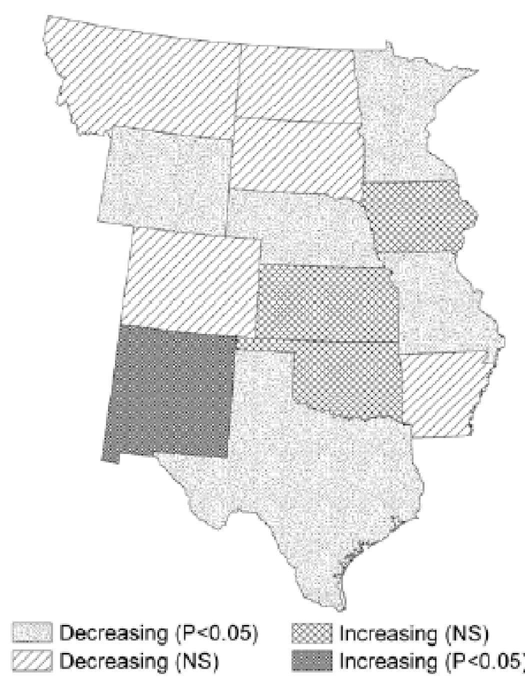

Figure 5. Trends in mourning doves heard per route by state in the Central Management Unit, 1966-2009 A stable trend is considered increasing non-significant. (From: Mourning dove, White-winged dove, and Band-tailed Pigeon population status, 2009. Dolton, D.D., T. A. Sanders and K. Parker. U.S. Fish and Wildlife Service, Laurel, Maryland, USA. 43 pp.).

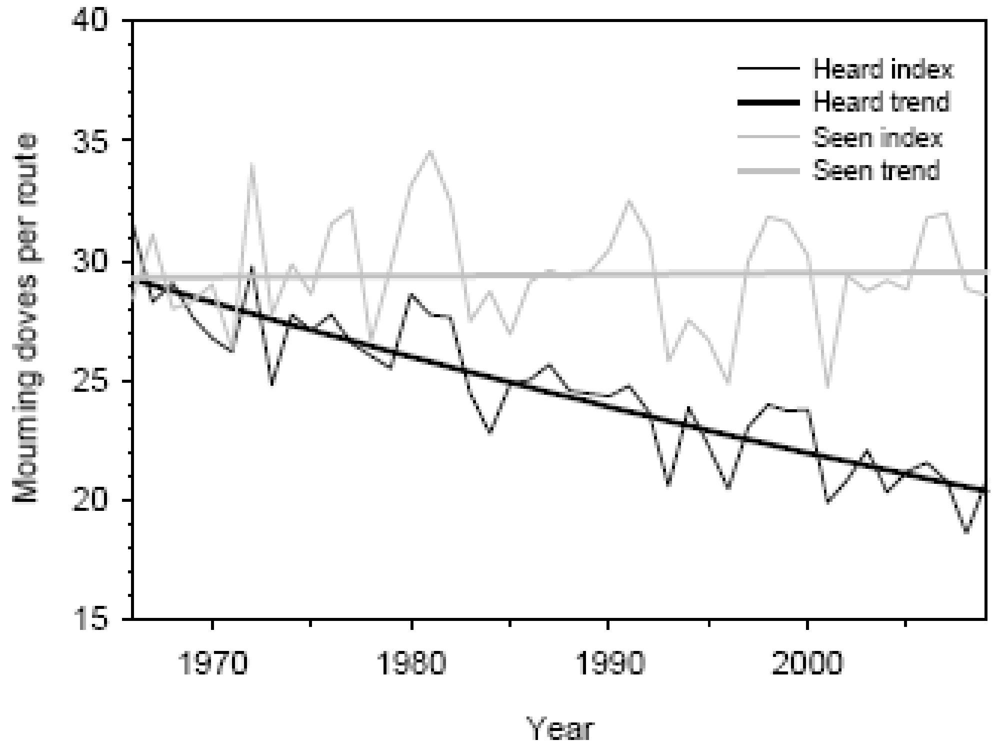

Figure 6. Population indices and trends of breeding mourning doves in the Central Management Unit, 1966-2009. (From: Mourning dove, White-winged dove, and Band-tailed Pigeon population status, 2009. Dolton, D.D., T. A. Sanders and K. Parker. U.S. Fish and Wildlife Service, Laurel, Maryland, USA. 43 pp.)

American Woodcock information is taken from the U.S. Fish and Wildlife Service report American Woodcock Population Status, 2009. Cooper, T.R. and K. Parker. Us. Fish and Wildlife Service, Laurel, MD. 15 pp. The entire report is available on the Division of Migratory Bird Management home page (http://www.fws.gov/migratorybirds/NewsPublicationsReports.html).

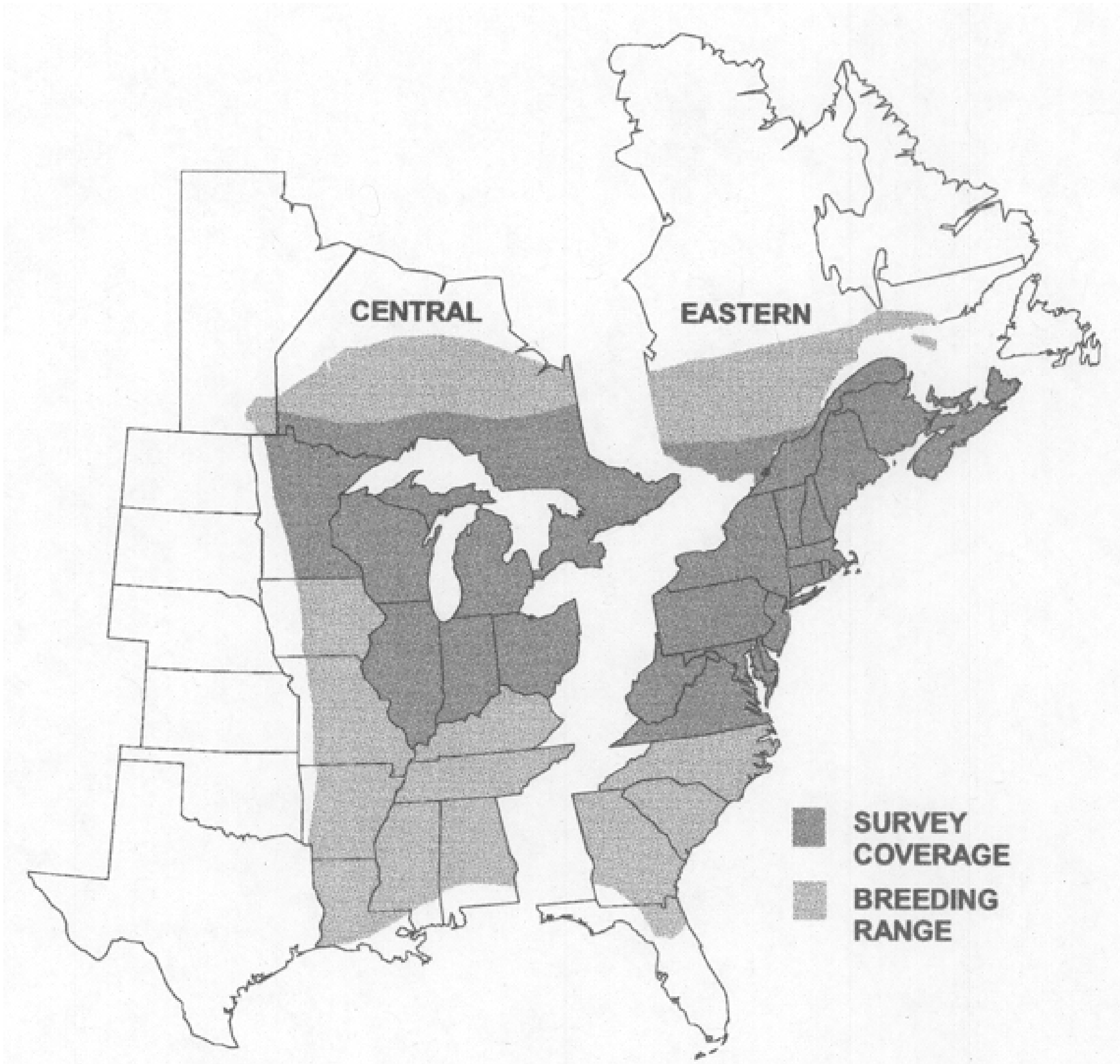

Figure 1. Woodcock management regions, breeding range, singing-ground survey coverage, (from: Cooper, T.R. and K. Parker. 2009. American woodcock population status, 2009. U.S. Fish and Wildlife Service, Laurel, MD. 15pp.)

Table 24. Trends (% change per year [a]) in number of American woodcock heard in singing-ground survey during 1968-2009, as determined by using the hierarchical log-linear modeling technique (Sauer et al. 2008) (from: Cooper, T.R.and K. Parker. 2009. American woodcock population status, 2009. U.S. Fish and Wildlife Service, Laurel, MD. 15pp.).

Management Unit/State	Number of Routes[b]	n[c]	(2008-09) % Change	(1999-09) % Change	(1968-09) % Change
CENTRAL	405	639	2.39	-0.74	- 1.07
IL	45	26	1.72	-1.69	0.86
IN	17	40	- 4.55	- 4.24	- 4.19
MB[d]	18	23	4.69	- 1.11	- 1.93
MI	109	148	1.39	- 0.98	- 1.18
MN	78	103	10.70	0.18	- 0.05
OH	28	57	12.29	- 0.49	- 1.93
ON	32	139	- 1.54	- 0.59	- 0.86
WI	78	103	1.15	- 1.08	- 0.69

[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 2009 for which data were received by 1 June, 2009.

[c] Number of routes that could be used for trend analysis, routes with <2 years of data were not used.

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

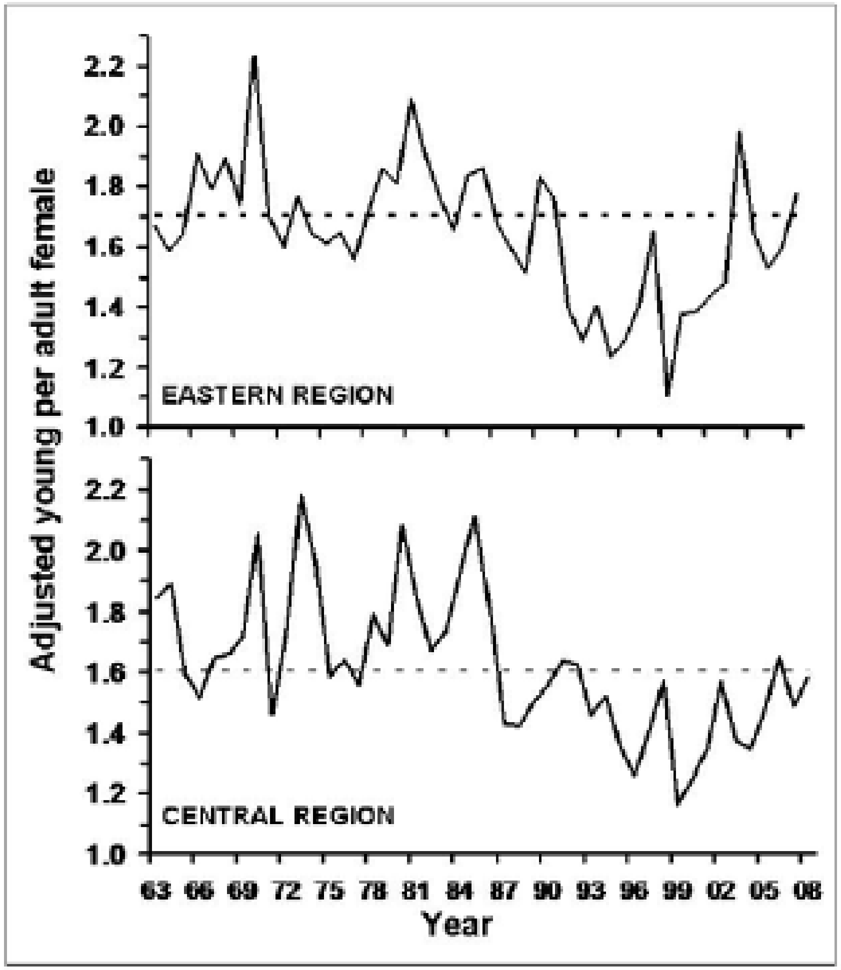

Figure 2. Weighted annual indices of American woodcock recruitment, 1963-2008. Dashed line is the 1963-2008 average. (from: Cooper, T.R. and K. Parker. 2009. American woodcock population status, 2009. U.S. Fish and Wildlife Service, Laurel, MD. 15pp.).

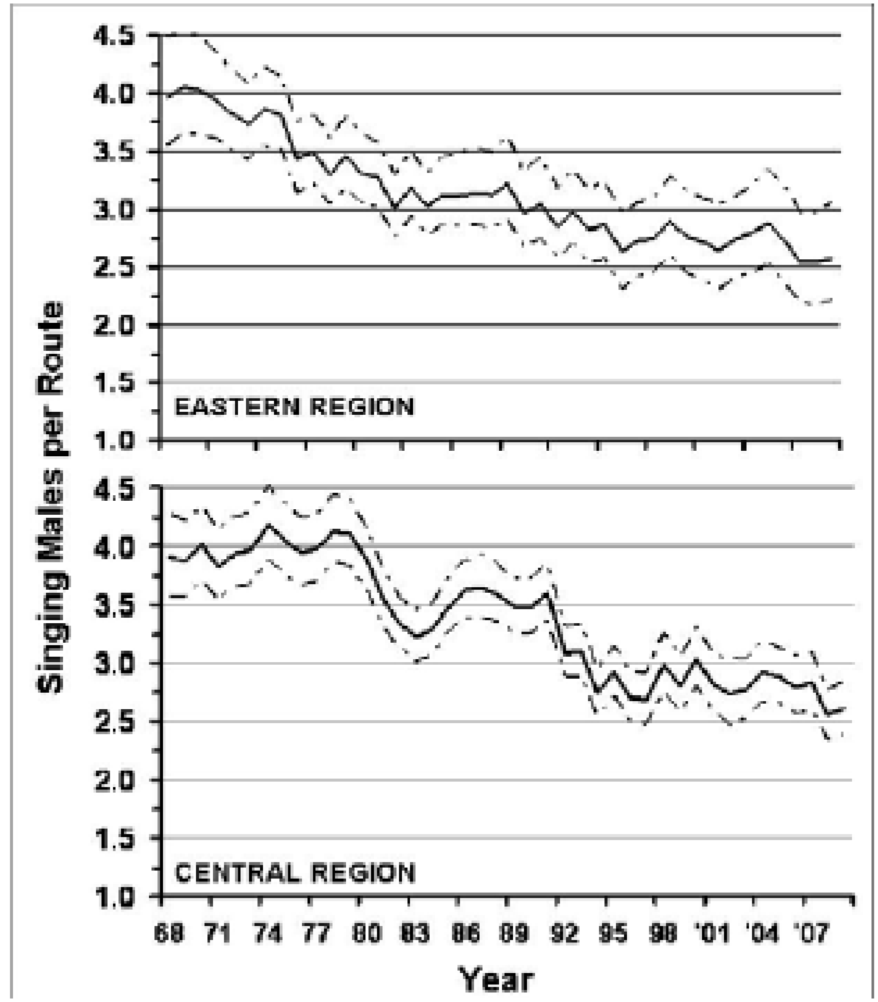

Figure 3. Annual indices of the number of woodcock heard on the Singing-ground Survey, 1968-2009. The dashed lines represent the 95th percentile credible interval. (from: Cooper, T.R. and K. Parker. 2009. American woodcock population status, 2009. U.S. Fish and Wildlife Service, Laurel, MD. 15pp.).

Table 25. Preliminary estimates of woodcock hunter numbers, days afield, and harvest for selected states, from the 2005-06, 2006-07, 2007-08 and 2008-09. Harvest Information Program surveys. (from: Cooper, T.R. and K. Parker. 2009. American woodcock population status, 2009. U.S. Fish and Wildlife Service, Laurel, MD. 15pp.).

Management Unit / State	Active woodcock hunters				Days afield				Harvest			
	2005-06	2006-07	2007-08	2008-09	2005-06	2006-07	2007-08	2008-09	2005-06	2006-07	2007-08	2008-09
Central Region	n.a.	n.a.	n.a.	n.a.	356,100 ± 14%	344,262 ± 12%	358,480 ± 14%	369,800 ± 16%	225,000 ± 19%	232,557 ± 17%	214,162 ± 16%	174,300 ± 16%
IL	2,100 ± 79%	1,973 ± 87%	3,111 ± 73%	2,100 ± 90%	5,300 ± 89%	8,944 ± 115%	7,644 ± 72%	6,100 ± 103%	3,900 ± 196%	2,171 ± 160%	3,819 ± 149%	4,300 ± 100%
IN	2,100 ± 55%	1,000 ± 58%	1,788 ± 71	900 ± 69%	7,400 ± 69%	4,377 ± 75%	3,342 ± 58%	2,400 ± 63%	4,400 ± 91%	2,403 ± 69%	1,203 ± 53%	800 ± 31%
MI	28,000 ± 13%	30,017 ± 14%	28,412 ± 13%	34,600 ± 13%	151,200 ±17%	155,333 ± 17%	138,881 ±15%	156,000 ± 17%	106,800 ± 27%	116,216 ± 27%	86,825 ± 17%	78,900 ± 17%
MN	12,000 ± 31%	14,934 ± 24%	15,295 ± 29%	8,700 ± 37%	60,200 ± 42%	60,160 ± 31%	62,810 ± 36%	37,900 ± 43%	42,200 ± 54%	38,738 ± 41%	34,400 ± 38%	19,900 ± 67%
OH	4,700 ± 65%	2,249 ± 68%	2,611 ± 73%	2,900 ± 69%	15,800 ± 79%	9,764 ± 67%	9,259 ± 72%	10,300 ± 70%	6,900 ± 83%	4,060 ± 51%	2,598 ± 68%	2,300 ± 68%
WI	15,600 ± 25%	19,390 ± 22%	17,258 ± 23%	14,200 ± 24%	73,100 ± 31%	72,365 ± 25%	79,139 ± 31%	65,400 ± 35%	37,600 ± 28%	42,958 ± 25%	48,027 ± 31%	36,000 ± 27%

[a] 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.

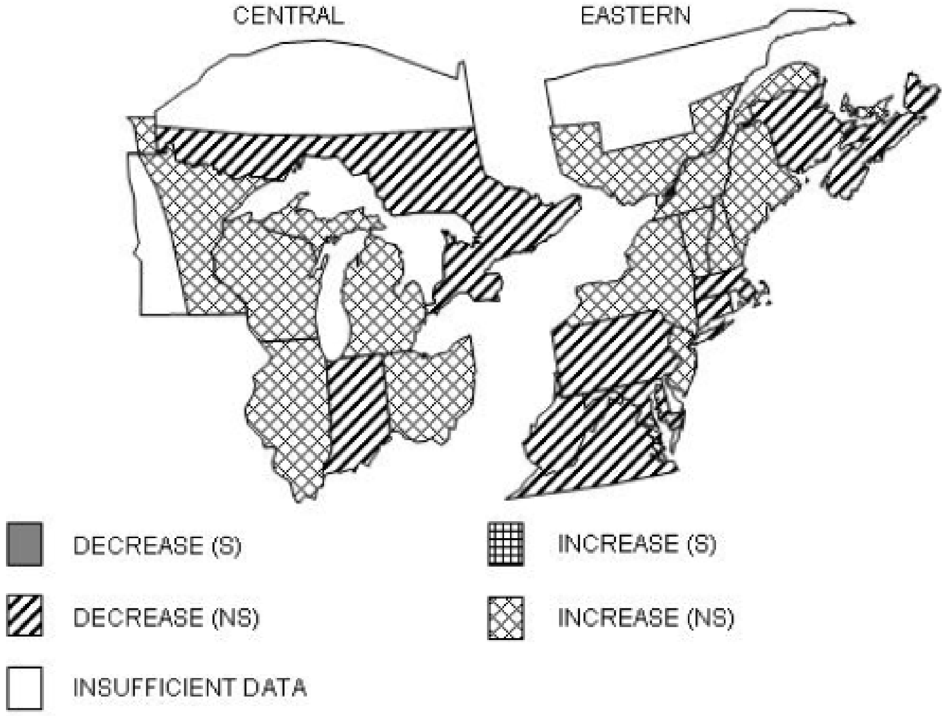

Figure 4. Short-term trends in number of American woodcock heard on the Singing-ground Survey; 2008-09. (from: Cooper, T.R. and K. Parker. 2009. American woodcock population status, 2009. U.S. Fish and Wildlife Service, Laurel, MD. 15pp.).

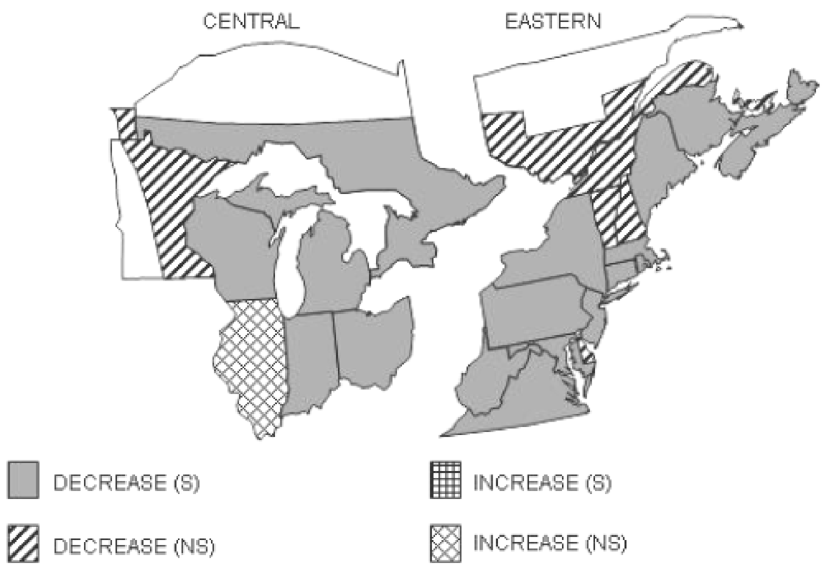

Figure 5. Long-term trends in number of American woodcock heard on the Singing-ground Survey; 1968-2009, as determined by the hierarchical modeling method. A significant trend (S) does not include zero in the 95% credible interval, while a non-significant (NS) trend does include zero. (from: Cooper, T.R. and K. Parker. 2009. American woodcock population status, 2009. U.S. Fish and Wildlife Service, Laurel, MD. 15pp.).

HUNTING HARVEST STATISTICS

Division of Fish and Wildlife
500 Lafayette Road, Box 20
Saint Paul, MN 55155 - 4020
(651) 259-5207

2008 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, 2009 to ensure that each license holder had an equal chance of being in the survey sample. The sample consisted of 5,996 (approximately 2%) Small Game License holders, drawn proportionately from each of the Small Game license types available.

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 American coot, crow, woodcock, snowshoe hare and coyote (Table 3). Number of hunters declined for duck, Canada goose, pheasant, ruffed grouse, spruce grouse, gray partridge, squirrels, cottontails, jackrabbits, and raccoons (Table 3) even though the estimated take per hunter (Table 4) increased for all these species except pheasants and jackrabbits. Mean harvest and hunter success rates increased slightly (Table 5) for geese, coots, doves, ruffed grouse, gray partridge, squirrels, cottontails, snowshoe hares, raccoons, gray fox, and badgers. Total estimated harvests (Table 6) increased for geese, coots, woodcock, mourning doves, ruffed grouse, fox squirrels, cottontails, snowshoe hares, raccoons, gray fox, and coyotes. Estimated harvests declined for ducks, snipe, rails, crows, pheasants, crows, spruce grouse, gray partridge, gray squirrel, jack rabbits, and red fox. 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 detailed survey results. All estimates were statewide unless otherwise indicated.

ACKNOWLEDGMENTS

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

Table 1. Small game hunter response to mail surveys, 1979 - 80 through 2008 - 09.

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

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

Table 2. Use of small game hunter licenses, 1998-99 through 2008-2009.

		Returns from mail survey	Projections from license sales
1998-99	Hunted	2,612 (82.8%)	265,215
	Did not hunt	541 (17.2%)	55,093
		3,153 (100.0%)	320,308
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

Includes resident and non-resident information. Excludes duplicates.

2008 Small Game Hunter Report

1. Did you hunt small game, listed below, in Minnesota this year (March 2008 - Feb 2009)? ☐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 2008-2009 small game hunting season **(March 2008-February 2009)**. We need information to estimate the season's harvest and to help set future small game seasons. Answer only for your Minnesota 2008 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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395 JOHN IRELAND BLVD
SAINT PAUL MN 55101-9798

Figure 1. Sample of Small Game Hunter survey card

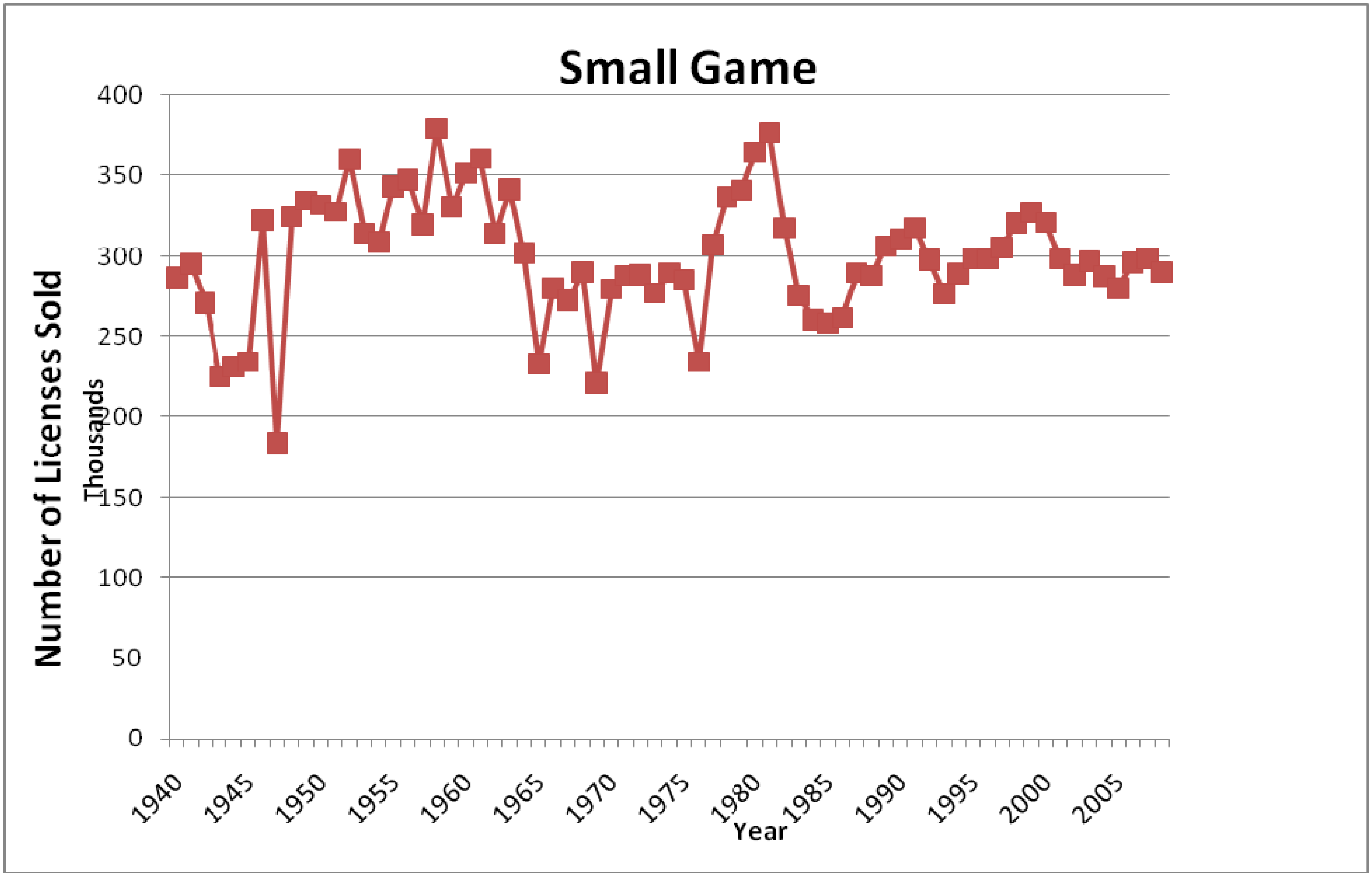

Figure 2. Number of Minnesota small game licenses sold, 1940–2008

Table 3. Estimated number of hunters (thousands) for various species, 1994-95 through 2008-09.

	1994-95	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
Ducks	118	119	114	122	117	122	109	109	112	101	105	92	87	87	81
Canada goose	70	73	75	79	77	80	77	76	79	75	75	69	66	63	59
Other geese	7	10	6	5	6	5	7	7	6	7	5	5	5	4	4
American coot	7	9	6	7	5	6	4	4	4	4	5	4	5	3	4
Common snipe	2	2	2	2	2	2	2	1	2	1	2	1	2	2	2
Rails / gallinules	1	1	<1	<1	<1	<1	<1	<1	1	<1	<1	0	1	<1	<1
Crow [*]	12	15	13	11	11	14	14	11	13	12	12	12	11	9	10
American woodcock	21	21	18	17	19	19	16	11	12	13	12	11	14	11	12
Mourning dove [γ]											16	11	13	13	12
Ring-necked pheasant	92	96	88	80	88	93	100	85	91	105	104	111	119	118	107
Ruffed grouse	107	116	118	127	142	139	121	101	91	94	79	76	92	91	87
Spruce grouse	12	14	11	11	11	11	9	9	7	9	7	7	10	11	8
Sharp-tailed grouse	7	8	7	8	8	8	10	8	6	7	6	5	7	7	7
Gray partridge	14	12	11	8	10	10	8	7	7	8	5	6	6	7	4
Gray squirrel	35	35	33	27	30	31	27	26	25	29	23	25	25	26	22
Fox squirrel	24	23	20	16	18	20	17	15	15	20	15	15	16	15	13
Eastern cottontail	21	23	19	14	19	18	20	17	16	21	19	20	20	20	18
White-tailed jackrabbit	4	5	4	3	3	3	2	3	2	3	3	2	3	3	2
Snowshoe hare	6	5	4	4	7	7	5	6	6	6	4	3	6	4	5
Raccoon (Sept - Feb)	10	10	10	9	9	6	6	6	6	6	6	5	9	10	7
Raccoon[‡] (March -Aug)	3	5	4	3	4	3	5	4	4	5	3	3			
Red fox (Sept -Feb)	15	15	11	9	9	8	10	6	7	7	6	6	6	6	6
Red fox[‡] (March -Aug)	3	4	3	2	3	2	2	3	2	2	1	1			
Gray fox	2	3	n.a.	2	2	2	1	1	1	2	2	1	2	2	2
Coyote	11	15	13	10	11	11	16	11	12	15	16	19	17	16	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, 1994-95 through 2008-09.

	Estimated take per hunter														
	1994-95	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
Ducks	8.1	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
Canada geese	2.4	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
Other geese	0.8	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
American coot	3.2	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
Common snipe	1.3	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
Rails/gallinules	1.3	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
Crow *	9.4	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
American woodcock	3.5	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
Mourning dove[γ]											6.2	7	6.7	7.7	11.4
Ring-necked pheasant	3.5	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
Ruffed grouse	3.5	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
Spruce grouse	1.9	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
Sharp-tailed grouse	1.2	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
Gray partridge	1.8	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
Gray squirrel	5.4	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
Fox squirrel	4.2	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
Eastern cottontail	3.6	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
White-tailed jackrabbit	1.5	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
Snowshoe hare	3.2	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
Raccoon (Sept - Feb)	15.9	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
Raccoon[‡] (March -Aug)	8.0	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)	2.8	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
Red fox[‡] (March -Aug)	1.4	1.5	1.3	0.8	1.2	0.6	0.9	1.5	1.7	0.6	0.6	0.9			
Gray fox	0.6	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
Coyote	1.1	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
Badger	1.4	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

[*]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 (%), 1998-99 through 2008-09.

	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Ducks	10.8 (87.8)	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)
Canada geese	4.0 (70.9	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)
Other geese	2.3 (44.6)	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)
American coot	6.0 (78.8)	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)
Common snipe	3.5 (83.3)	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)
Rails / gallinules	1.0 (50.0)	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)
Crow	10.6 (87.6)	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)
American woodcock	3.7 (87.3)	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)
Mourning dove $^{\gamma}$							7.9 (78.9)	8.7 (80.1)	8.2 (81.2)	9.8 (78.7)	13.2 (86.6)
Ring-necked pheasant	5.0 (70.9)	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)
Ruffed grouse	8.0 (82.9)	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)
Spruce grouse	3.4 (68.8)	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)
Sharp-tailed grouse	4.4 (60.2)	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)
Gray partridge	3.8 (64.2)	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)
Gray squirrel	5.8 (86.9)	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)
Fox squirrel	3.9 (82.7)	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)
Eastern cottontail	5.6 (83.1)	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)
White-tailed jackrabbit	3.2 (78.6)	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)
Snowshoe hare	4.7 (75.4)	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)
Raccoon (Sept - Feb)	18.1 (91.8)	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)
Raccoon‡ (March -Aug)	6.2 (92.5)	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)	2.6 (52.7)	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)
Red fox‡ (March -Aug)	1.8 (65.4)	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	1.6 (53.3)	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)
Coyote	2.9 (45.0)	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)
Badger	6.5 (66.7)	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)

‡ Raccoon and red fox season continuous May 1994 thru March 15, 2006. $^{\gamma}$ 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, 1996-97 through 2008-09.

	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
Small game license sales[a]	298,337	305,186	320,308	327,431	320,862	298,055	288,729	296,939	287,725	280,156	295,898	298,467	290,064
Federal duck stamp sales	132,738	138,331	134,098	134,138	135,884	140,980[e]	144,851[e]						
State duck stamp sales	122,634	126,009	126,488	128,245	121,709	118,590	119,677	118,757	114,003	102,143	101,792	100,134	95,675
Pheasant stamp sales	95,866	85,093	99,664	106,945	114,440	97,665	102,097	121,456	114,653	117,301	129,546	129,315	123,270
Estimated harvest[b] (thousands)													
Ducks[c]	1,098	1,206	1,119	1,021	969	990	1,024	914	727	677	731	708	658
Canada geese[c]	241	230	218	285	301	308	257	290	284	282	324	244	288
Other geese[c]	8	11	6	6	15	8	11	13	8	9	7	8	14
American coot [c]	23	29	25	25	10	17	20	11	20	16	25	16	24
Common snipe	5	4	5	3	3	2	3	3	2	5	4	4	2
Rails / gallinules	<1	<1	<1	<1	1	<1	2	<1	<1	0	1	3	<1
Crow	96	74	106	60	96	88	72	82	72	93	69	54	52
American woodcock	58	58	63	54	45	27	28	30	41	28	43	28	29
Mourning dove[f]									97	78	86	101	133
Ring-necked pheasant	341	248	309	339	375	267	358	511	420	586	588	655	522
Ruffed grouse	533	654	946	685	619	332	249	351	194	224	417	294	318
Spruce grouse	16	25	27	19	23	9	12	18	9	10	27	18	17
Sharp-tailed grouse	8	13	22	14	16	10	9	12	10	6	12	14	14
Gray partridge	24	16	24	19	17	10	11	22	13	16	11	11	10
Gray squirrel	158	131	149	132	140	146	134	175	133	122	141	133	122
Fox squirrel	75	68	57	71	65	63	67	85	62	62	66	48	51
Eastern cottontail	65	65	89	59	78	63	52	93	87	90	78	79	80
White-tailed jack rabbit	10	4	7	6	7	8	4	7	7	5	4	9	6
Snowshoe hare	10	8	25	21	27	22	11	12	8	10	17	6	11
Raccoon (Sept - Feb)	207	124	143	65	49	59	60	50	57	29	63	47	72
Raccoon‡ (March -Aug)	99	17	2	16	36	18	19	22	20	7			
Red fox (Sept -Feb)	33	13	13	10	19	7	11	13	6	10	8	6	4
Red fox‡ (March -Aug)	4	2	3	1	2	4	4	1	1	1			
Gray fox	n.a.	3	1	2	1	1	1	1	2	1	4	1	2
Coyote	30	16	14	13	29	12	14	20	18	39	21	34	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 2003 are:
Ducks . . . . 884,500 Canada geese . . . . 282,495 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.

	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
Nonresident licenses issued[a]	5,488	6,361	7,155	7,572	7001	5,843	5,852	6,291	6,385	5,897	7,356	7,858	7,114
Questionnaires:													
Number mailed	51	269	200	199	98	124	130	123	182	210	185	185	226
Number not delivered	4	18	17	16	6	9	9	17	13	10	11	11	15
Number (percent) returned	32 (68)	183 (73)	117 (64)	136 (74)	56 (61)	77 (67)	75 (66)	68 (64)	114 (67)	134 (67)	115 (62)	101 (58)	89 (42)
Estimated nonresidents and (percent) of all nonresidents hunting:													
Ducks	1,209 (19)	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)
Canada goose	686 (13)	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)
Ruffed grouse	2,744 (50)	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)
Ring-necked pheasant	515 (9)	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)
Raccoon	172 (3)	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)
Estimated nonresident take:													
Ducks	6,346	15,967	26,663	26,391	18,253	42,225	17,556	17,855	19,269	12,149	12,173	22,718	15,463
Canada goose	1,544	4,905	4,587	6,960	5,001	13,400	5,852	5,736	6,214	3,946	3,580	3,501	5,762
Ruffed grouse	23,153	16,072	27,886	23,384	24,003	6,622	9,207	9,437	7,924	6,429	11,522	7,236	6,938
Ring-necked pheasant	1,887	2,505	1,712	4,844	4,001	3,740	7,647	9,344	11,174	13,656	16,079	17,661	10,642
Raccoon [b]	8,061	70	0	724	3,375	0	0	0	0	887	0	3,268	0

[a] Excludes duplicate licenses and nonresident shooting preserve licenses.
[c] In 2001, 2002, 2003, 2004, 2006, and 2008 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

The following information has been excerpted from: U.S. Fish and Wildlife Service. Migratory bird hunting activity and harvest during the 2007 and 2008 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, 2006 and 2007. (from: Raftovich, R.V., K.A. Wilkins, K.D. Richkus, S.S. Williams, and H.L. Spriggs. 2009. Migratory Bird Hunting activity and harvest during the 2007 and 2008 hunting seasons: Preliminary estimates. U.S. Fish and Wildlife Service, Laurel, Maryland. USA July 2009. 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	2007	% of Harvest	2008	% of Harvest	Percent change in Harvest 07-08	2007	2008	Percent change Harvest 07-08
Mallard	178,969	31.74	188,974	32.36	+ 5	2,514,119	2,282,091	- 10
Domestic mallard	270	0.05	0	0.00	0	3,828	3,311	- 16
American black duck	540	0.10	1,120	0.19	+ 52	38,692	29,641	- 31
Black x mallard	270	0.05	560	0.10	+ 52	5,246	5,850	+ 10
Gadwall	24,834	4.40	19,877	3.40	- 25	842,192	906,308	+ 7
American wigeon	12,417	2.20	13,718	2.35	+ 9	148,774	160,218	+ 7
Green-winged teal	49,399	8.76	61,592	10.55	+ 20	792,182	852,849	+ 7
Blue-winged /cinnamon teal	60,196	10.67	60,752	10.40	+ 1	626,720	517,937	- 21
Northern shoveler	10,798	1.91	10,079	1.73	- 7	289,071	252,481	- 14
Northern pintail	13,227	2.35	7,279	1.25	- 82	162,416	158,218	- 3
Wood duck	80,981	14.36	78,949	13.52	! 3	621,615	662,706	+ 6
Redhead	18,896	3.35	10,079	1.73	- 87	63,027	43,108	- 46
Canvasback	8,098	1.44	280	0.05	- 2792	56,432	1,234	- 4473
Greater scaup	1,890	0.34	840	0.14	- 125	21,964	24,649	+ 11
Lesser scaup	12,147	2.15	10,639	1.82	- 14	84,791	97,340	+ 13
Ring-necked duck	68,024	12.06	80,629	13.81	+ 16	241,239	251,356	+ 4
Goldeneye	9,448	1.68	11,198	1.92	+ 16	26,478	29,540	+ 10
Bufflehead	9,718	1.72	17,358	2.97	+ 44	60,383	101,118	+ 40
Ruddy duck	1,350	0.24	280	0.05	- 382	10,891	10,970	+ 1
Scoters	0	0	0	0.00	0	4,438	1,585	- 180
Hooded merganser	1,890	0.34	8,679	1.49	+ 78	38,686	38,201	- 1
Other mergansers	540	0.10	1,120	0.19	+ 52	4,670	8,139	+ 43
Total Duck Harvest (retrieved kill)	563,900 ∀ 11%		584,000 ∀ 14%		+ 3	6,719,700 ∀ 6%	6,522,900 ∀ 6%	- 3

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

Table 2. Top 10 states in number of **adult duck hunters**, 2008, 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. 2009. Migratory Bird Hunting activity and harvest during the 2007 and 2008 hunting seasons: Preliminary estimates. U.S. Fish and Wildlife Service, Laurel, Maryland. USA July 2009. 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
Texas	72,700 ± 20%	331,600 ± 19%	760,600± 18%	10.5 ± 27%
Minnesota	71,700 ± 9%	409,900 ± 11%	584,000 ± 14%	8.1 ± 17%
Louisiana	68,800 ± 9%	608,300 ± 13%	1,750,500 ± 15%	25.4 ±17%
Arkansas	58,700 ± 9%	520,100 ± 12%	1,258,300 ± 11%	21.4 ± 14%
Wisconsin	58,500 ± 10%	360,200 ± 12%	382,500 ± 11%	6.5 ± 15%
California	58,100 ± 10%	591,300 ± 16%	1,634,300 ± 19%	28.1 ± 22%
Michigan	38,500 ± 10%	237,600 ± 12%	326,700 ± 15%	8.5 ± 18%
Illinois	33,400 ± 10%	288,500 ± 12%	404,600 ± 16%	12.1 ± 19%
Missouri	29,000 ± 12%	228,100 ± 20%	477,700 ± 35%	16.5 ± 37%
Pennsylvania	26,300 ± 16%	130,000 ± 18%	176,600 ± 37%	6.7 ± 40%
Mississippi Flyway		3,410,000 ± 4%	6,522,900 ± 6%	
United States		6,686,400 ± 3%	13,723,200 ± 4%	

Table 3. Top 10 states in number of **adult goose hunters**, 2008, 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. 2009. Migratory Bird Hunting activity and harvest during the 2007 and 2008 hunting seasons: Preliminary estimates. U.S. Fish and Wildlife Service, Laurel, Maryland. USA July 2009. 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	50,500 ± 10%	275,800 ± 13%	222,900 ± 19%	4.4 ± 21%
Texas	49,400 ± 20%	170,700 ± 38%	272,400 ± 29%	5.5 ± 36%
Wisconsin	43,600 ± 11%	289,400 ± 17%	110,300 ± 13%	2.5 ± 17%
Pennsylvania	37,800 ± 11%	204,500 ± 14%	241,600 ± 26%	6.4 ± 29%
California	37,800 ± 12%	258,800 ± 19%	245,500 ± 48%	6.5 ± 50%
Michigan	37,500 ± 10%	217,200 ± 15%	173,700 ± 22%	4.6 ± 24%
Maryland	28,200 ± 7%	160,200 ± 12%	231,600 ± 13%	8.2 ± 15%
Illinois	25,600 ± 11%	221,100 ± 15%	159,500 ± 20%	6.2 ± 23%
Arkansas	21,600 ± 15%	90,900 ± 22%	137,500 ± 29%	6.4 ± 33%
North Dakota	21,300 ± 7%	94,500 ± 10%	133,600 ± 15%	6.3 ± 17%
Mississippi Flyway		1,733,800 ± 5%	1,342,900 ± 8%	
United States [b]		3,851,400 ± 4%	3,825,900 ± 5%	

HUNTER ACTIVITY AND GOOSE HARVEST DURING THE SEPTEMBER 2008 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 6-22 September 2008 (17 days). Beginning in 2007 and continuing in 2008, a 7-day (16 - 22 Sep) experimental season addition was added in the Northwest Goose Zone (Fig. 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, except in the Southeast Goose Zone where the daily bag was 2. 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, Southeast, and Twin Cities Metro Goose Zones, 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 2008 September goose hunter mail questionnaire survey.

METHODS

Permittees were randomly selected to receive a post-season hunter survey. Questionnaires were sent to 3,100 permittees 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. The questionnaire also 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. Finally, hunters were asked their preference of opening dates for the 2009 September goose season, either Tuesday September 1, or Saturday September 5.

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 37,252 Special Canada Goose Season permits were sold prior to 23 September, 2008. Response rate to the survey was 55.5%. Among those respondents, 73.5% 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 (Fig. 1). Active hunters were afield an average of 2.9 to 3.8 days and retrieved 2.6 to 4.1 geese, depending upon their hunt zone (Table 1). Overall, the success rate for active hunters was 68.4%.

The survey estimates that 100,748 Canada geese were harvested during the 2008 September season with approximately 62% of the harvest in the Remainder Zone and 16% in the West Zone (Table 1). This harvest pattern has remained rather consistent during the 2000-2008 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 2008 retrieved harvest of 85,434.

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, 2008. This equates to 738 hunters, 862 hunter days, and a retrieved harvest of 844 geese during the experimental season (Sep 16 – 22) in the Northwest zone.

Lastly, we asked hunters about their preference for opening day of the September Canada goose season in 2009. The framework dates of the season are September 1 – 22 every year. Traditionally, Minnesota has opened the September Season on the first weekend in September. In 2009, the first Saturday in September is September 5. By opening the season on September 5, the season would be 4 days shorter than opening on Tuesday, September 1. Sixty-five percent of respondents in the survey preferred to hunt on the first weekend in September, while 32% preferred opening on September 1. Three percent of respondents had no preference as to opening date.

LITERATURE CITED

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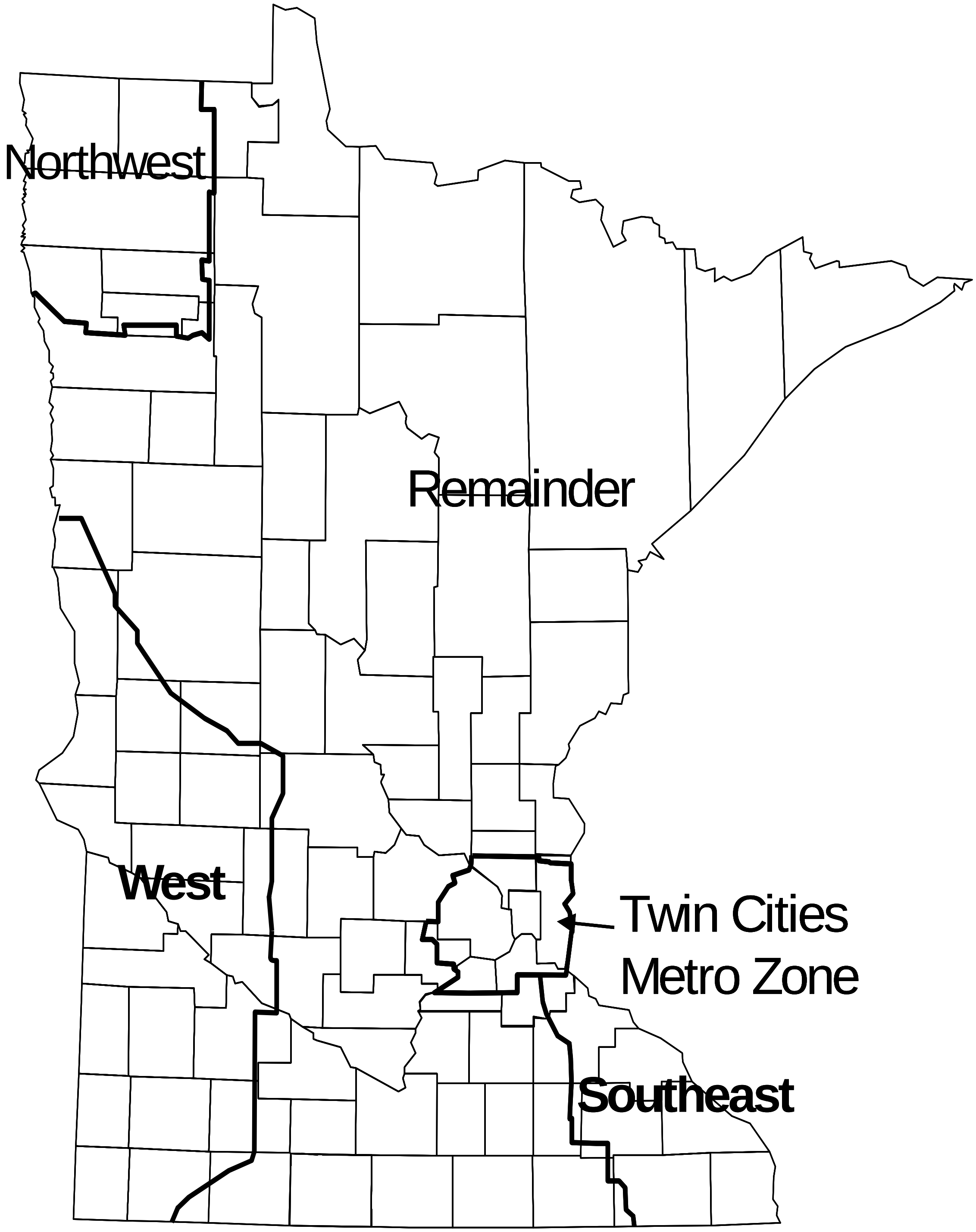


Figure 1. September season Goose Zones in Minnesota.

Table 1. Permit sales, hunter activity, and harvest[a] by zone during the September Canada Goose season (1-22 September) in Minnesota, 2008.

Parameter	Northwest	West	Southeast	Twin Cities Metro	Remainder	Total
ALL ZONES						
Total permits sold						37,252
Questionnaires delivered						3,100
Useable questionnaires returned						1,719
% responding						55.5
Active hunters						1,264
% active hunters						73.5
BY ZONE						
% Distribution of hunters by primary hunt zone	5.0	21.4	3.6	16.1	57.8	100
%successful	66.7	63.1	63.0	66.5	70.2	68.4
Days/active hunter	3.41	3.35	2.85	3.26	3.84	3.73
Geese/active hunter	4.05	2.75	2.59	3.10	3.97	3.68
Unretrieved harvest/active	0.57	0.37	0.24	0.36	0.61	0.53
% unretrieved harvest	12.4	11.9	8.5	10.4	13.3	12.5
EXPANDED:						
Active hunters	1,366	5,873	997	4,400	15,842	27,392
Hunter days	4,662	19,678	2,840	14,349	60,768	102,287
Retrieved harvest	5,530	16,168	2,580	13,656	62,827	**100,748**
Est. unretrieved harvest	781	2,189	239	1,583	9,601	14,390
Total harvest	6,310	18,356	2,818	15,238	72,427	115,138

[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 – 2008.

Year	Northwest	West	Southeast	Twin Cities Metro	Remainder	Total
2000	2,750	18,909	1,183	15,594	51,685	**90,121**
2001	2,047	27,663	538	8,164	62,608	**101,021**
2002	1,568	22,075	848	8,504	50,769	**83,764**
2003	2,805	17,779	2,357	9,890	48,157	**80,988**
2004	4,326	16,843	1,197	11,090	56,480	**89,936**
2005	4,888	15,304	1,717	11,139	61,218	**94,266**
2006	6,826	17,987	1,461	11,844	53,321	**91,439**
2007	7,948	14,952	1,469	11,702	58,243	**94,314**
2008	5,530	16,168	2,580	13,656	62,827	**100,748**

2009 LIGHT GOOSE CONSERVATION ORDER HARVEST IN MINNESOTA

David Rave and Margaret Dexter, Wildlife Populations and Research Unit

INTRODUCTION

This report documents results of the 2009 Light Goose Conservation Order hunter mail questionnaire survey.

METHODS

Minnesota held a light goose Conservation Order harvest from 1 March - 30 April 2009. 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 1,670 permits was issued and 1057 responses (63.3%) to the questionnaire were obtained (Table 2). In calculating harvest estimates, we assumed that the 619 non-respondents participated in the conservation action and took light geese in the same manner as respondents (i.e., tallies were expanded by 1.58). More light geese were present in Minnesota during spring 2009 than spring 2008, and harvest was again concentrated in the southwest portion of the state with some also being taken in west-central Minnesota. One thousand one hundred and three people attempted to take light geese during the 61-day conservation order period. Active participants pursued light geese for 4,647 days and 4,366 light geese were shot and retrieved. This was an average retrieved take of 4.0 geese per active participant. Another 640 light geese were reported wounded and not retrieved.

Unplugged shotguns were used by 640 (46.8%) individuals to take 2,413 (55.3%) geese, of which 822 (34.0%) were taken with the 4th, 5th, or 6th shell. Electronic calls were used by 260 (23.5%) participants to take 1,171 (26.8%) light geese. During the 1/2 hour after sunset period, 713 (16.3%) geese were harvested by 475 (43.1%) 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, 2009?
2. How many days did you hunt light geese in Minnesota during March 1 – April 30, 2009?
3. In what County did you hunt light geese most often during March 1 – April 30, 2009?
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, 2000 - 2008

Parameter	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Total permits sold	1,982	1,128	1,997	1,438	1,424	1,383	1,363	1,292	1,406	1,670
Usable questionnaires returned	1,457	769	1,375	1,071	1,095	998	955	921	910	1,057
% Responding	73.5	68.2	68.9	74.4	76.9	72.2	70.1	71.3	64.7	63.3
Active hunters	1,461	393	1,209	553	690	618	516	514	775	1,103
% Active hunters	73.7	34.8	60.5	38.5	48.5	44.7	37.3	39.8	55.1	66.0
Total hunter days	8,244	2,112	5,517	2,600	3,372	2,643	2,665	2,302	3,415	4,647
Days/active hunter	5.6	5.4	4.6	4.7	4.9	4.3	5.2	4.5	4.4	4.2
Retrieved harvest	6,290	316	3,516	2,005	2,735	1,395	1,360	1,786	2,412	4,366
Geese/active hunter	4.3	0.8	2.9	3.6	4.0	2.3	2.6	3.5	3.1	4.0
Unretrieved harvest	904	19	637	253	315	150	163	172	288	640
No. using unplugged guns	830	193	560	280	333	272	215	224	361	516
Take w/unplugged guns	4,416	129	2,137	996	1,385	777	689	1,032	1,279	2,413
Take w/shell 4-5-6	1,316	68	615	401	491	269	287	277	339	822
No. using electronic calls	218	56	142	87	133	110	73	88	147	260
Take w/electronic calls	854	103	512	474	326	268	280	329	567	1,171
No. hunting ½ hr after sunset	696	141	550	228	265	264	223	197	326	475
Take ½ hr after sunset	1,185	43	841	267	311	242	246	209	512	713

2008 FALL WILD TURKEY HARVEST REPORT

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 50 permit areas (PAs; Figure 1) during 2, 5-day time periods in PAs 157-467 and 1, 30-day time period in PA 601.

Three types of permits were available to hunters: 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 during 2008 with the addition of 3,070 permits (68% increase from 2007) and 18 new permit areas. Almost 5,000 permits were issued in 2008, a 76% increase from 2007 (Table 1, Figure 2). Hunters registered 1,187 turkeys, a 71% increase from 2007 (Table 1, Figure 2). Hunter success averaged 24%, similar to the 5-year average (Table 1). Hunter success varied among PAs from 0% in PA 459 to 47% in PA 440 (Table 2). The majority of permits issued were general lottery (77%), followed by surplus (20%), and landowner permits (3%; Table 3).

In response to wild turkey range expansion, the number of PAs open to fall turkey hunting was increased from 33 in 2007 to 50 in 2008. Permit areas 228 and 337 were consolidated to PA 601, and 1,000 permits were available during a 30-day season. Permit areas were consolidated and the time period was extended 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 18 new PAs accounted for 55% of the additional permits available in 2008 and 45% of the registered harvest. Expanded permit allocation in traditional PAs accounted for the remainder of the increase in the number of hunters and registered harvest.

Table 1. Permits available, applicants, permits issued, registered harvest, and hunter success rates for fall turkey hunting seasons 1990 – 2008, Minnesota.

Year	Permits available	Applicants	Permits issued	Registered harvest	Hunter success (%)
1990	1000	4522	951	326	34
1991	2200	2990	2020	552	27
1992	2200	2782	2028	588	29
1993	2400	2186	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

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

Table 2. Registered harvest and hunter success rates by permit area for the 2008 fall turkey season, Minnesota.

	Registered harvest			Hunter success (%)	
Permit area	Time period A	Time period B	Total	2008	Average
157	3	7	10	26	[a]
213	6	5	11	30	[a]
214	12	10	22	29	[a]
215	30	21	51	30	[a]
221	10	5	15	19	[a]
222	10	11	21	30	[a]
223	16	11	27	18	[a]
227	12	6	18	18	24 [b]
229	4	1	5	38	[a]
236	32	28	60	26	26 [c]
239	24	35	59	22	[a]
240	23	24	47	31	[a]
248	7	6	13	32	[a]
249	0	8	8	23	[a]
262	2	2	4	29	[a]
338	25	10	35	24	23 [c]
339	13	7	20	17	20 [c]
341	36	42	78	24	25 [c]
342	23	17	40	21	22 [c]
343	42	30	72	34	29 [c]
344	17	12	29	21	21 [c]
345	7	2	9	12	18 [c]
346	30	14	44	27	24 [c]
347	15	12	27	24	26 [c]
348	26	23	49	24	25 [c]
349	22	11	33	18	22 [c]
412	2	3	5	33	33 [a]
420	5	1	6	32	33 [b]
422	2	4	6	43	39 [b]
425	6	4	10	27	28 [b]
428	1	4	5	38	[a]
431	1	1	2	17	17 [b]
433	4	2	6	29	25 [b]
440	2	5	7	47	[a]
442	30	25	55	26	26 [c]
443	10	0	10	16	17 [c]
446	5	1	6	43	38 [b]
447	0	1	1	7	5 [b]
448	3	1	4	16	24 [c]
449	4	1	5	21	32 [d]
450	0	1	1	17	14 [b]
459	0	0	0	0	[a]
461	29	23	52	28	32 [c]
462	31	11	42	26	27 [c]

Table 2 (Continued).

	Registered Harvest			Hunter success (%)	
Permit area	Time period A	Time period B	Total	2008	Average
463	2	0	2	14	[a]
464	8	6	14	30	27 [c]
465	3	2	5	10	22 [c]
466	22	9	31	28	28 [c]
467	15	9	24	27	20 [c]
601 [e]			81 [e]	17	23 [c]
Total	632	474	1187	24	

[a] Permit area was not open to fall turkey hunting prior to 2008.

[b] 2-year average.

[c] 5-year average.

[d] 4-year average.

[e] Permit areas 228 and 337 were combined in 2008 to PA 601 and the season consisted of 1, 30-day time period.

Table 3. Number of permits available and issued by permit type, time period, and permit area for the 2008 fall turkey season, Minnesota.

			General lottery		Landowner		Surplus	
Permit area	Available	Issued	Time period A	Time period B	Time period A	Time period B	Time period A	Time period B
157	50	38	12	19	5	2	0	0
213	50	37	14	14	5	4	0	0
214	100	75	39	21	3	1	0	11
215	300	168	59	48	6	0	29	26
221	120	79	37	19	1	0	5	17
222	100	70	30	30	1	0	0	9
223	200	152	66	30	1	1	12	42
227	150	98	38	28	7	2	0	23
229	20	13	8	3	0	0	0	2
236	300	231	105	81	3	1	0	41
239	300	267	84	94	1	5	22	61
240	200	152	63	25	1	3	0	60
248	50	41	20	11	1	0	0	9
249	50	35	19	15	0	1	0	0
262	20	14	8	2	0	0	0	4
338	180	145	62	58	6	1	0	18
339	180	118	52	35	1	0	8	22
341	500	331	147	116	3	1	42	22
342	350	188	107	60	3	2	11	5
343	250	210	100	80	6	4	0	20
344	200	135	59	45	0	0	18	13

Table 3. (Continued).

			General lottery		Landowner		Surplus	
Permit area	Available	Issued	Time period A	Time period B	Time period A	Time period B	Time period A	Time period B
345	180	76	32	18	1	1	12	12
346	300	166	98	29	9	1	10	19
347	150	111	42	48	4	0	9	8
348	250	205	93	81	4	5	7	15
349	450	179	80	72	3	0	15	9
412	20	15	5	9	1	0	0	0
420	40	19	5	4	2	0	6	2
422	20	14	6	7	0	1	0	0
425	40	37	15	18	3	1	0	0
428	20	13	5	6	0	2	0	0
431	20	12	5	1	2	0	2	2
433	20	21	8	11	0	0	2	0
440	20	15	7	6	0	2	0	0
442	250	213	96	93	8	6	0	10
443	100	63	37	14	0	1	0	11
446	20	14	1	7	0	0	6	0
447	20	14	9	4	0	0	0	1
448	30	25	11	13	0	0	0	1
449	30	24	12	12	0	0	0	0
450	20	6	3	1	1	0	0	1
459	20	17	7	10	0	0	0	0
461	220	184	88	79	4	2	0	11
462	220	159	80	46	6	0	1	26
463	20	14	4	5	1	0	3	1
464	70	47	23	10	0	0	0	14
465	80	49	30	8	0	0	3	8
466	160	110	52	29	2	0	14	13
467	100	88	42	32	1	3	0	10
601	1000	474 a						
Total	7560	4981	2025	1507	106	53	237	579

[a] Permits issued by for PA 601 (i.e., 1, 30-day time period) consisted of 301 General lottery, 2 Landowner, and 171 Surplus permits.

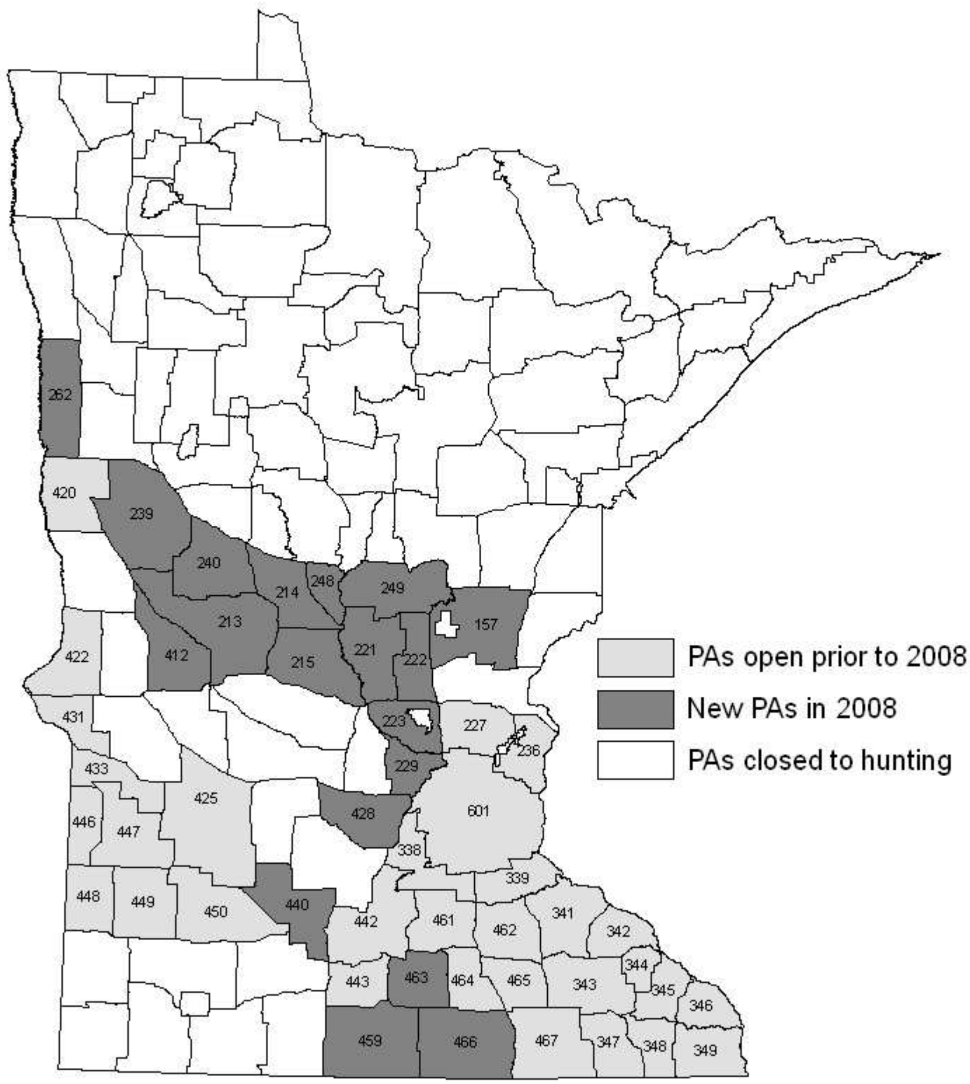


Figure 1. Permit areas (PAs) open to hunting for the 2008 fall turkey hunting season, Minnesota.

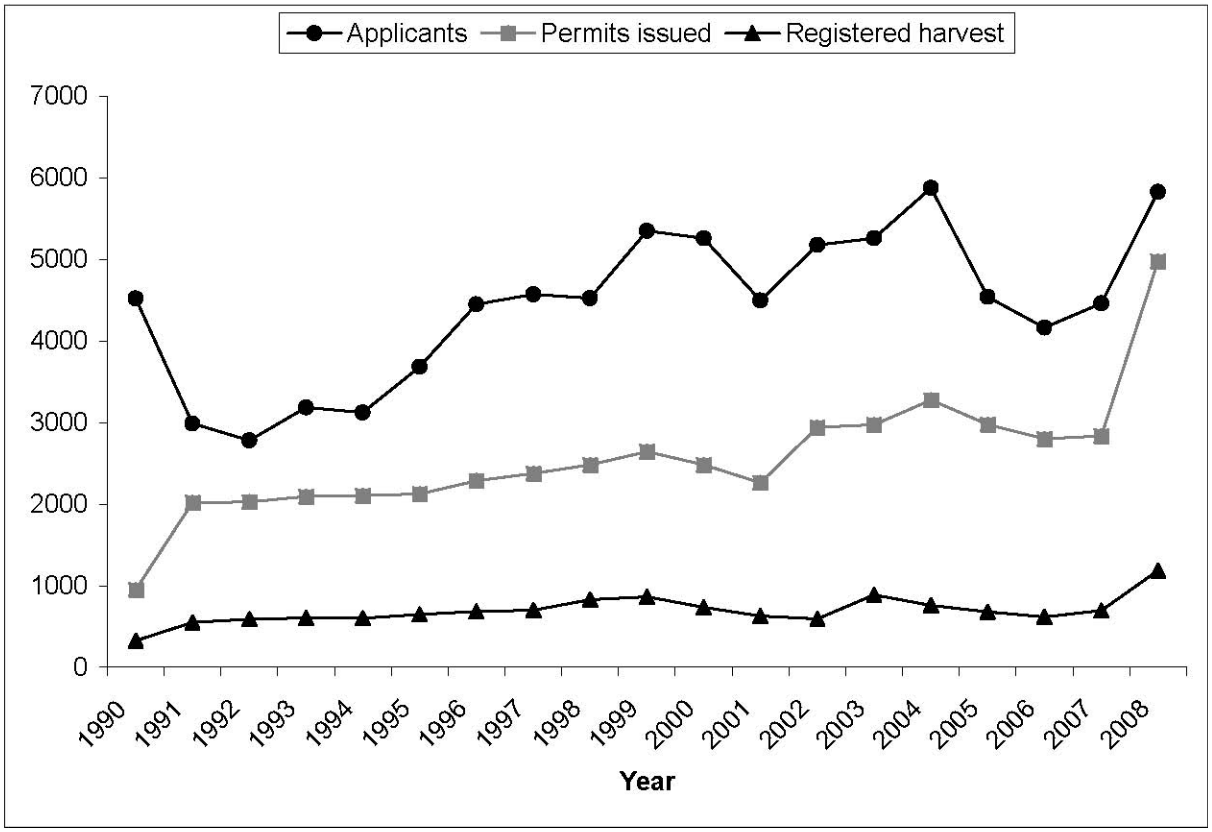


Figure 2. Applicants, permits issued, and registered harvest for fall turkey seasons 1990 2008, Minnesota.

SPRING WILD TURKEY HARVEST REPORT, 2009

Eric Dunton, Farmland Wildlife Populations and Research Group

In Minnesota, the demand for spring turkey permits exceeds the supply of permits available. To regulate harvest and distribute hunting pressure, permits are allocated across 76 permit areas (PAs) and 8 time periods using a quota system (Figure 1). Hunters interested in pursuing wild turkeys are 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 members, and may apply for a second choice permit area and time period. 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 populations can sustain harvest.

Three types of hunting licenses were available to spring 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; and (3) archery permits which could be purchased for the last 2 time periods of any PA with 50 or more permits per period.

During 2009 we received 57,692 applications for 42,328 permits (Table 1, Figure 2). Over 36,000 general lottery and landowner permits were issued to hunters, and almost 4,500 were issued to archers (Table 2, Appendix A and B). Hunters registered over 12,000 turkeys, an increase of 11% from 2008 which is the highest turkey harvest on record (Table 1, Figure 2). Hunter success averaged 34%, which is above the 5-year average of 32% (Table 1). Hunter success by PA ranged from 15% (PA 423) to 64% (PA 266; Table 2). Similar to the 5-year average, hunter success rates were highest during the first 2 time periods (Table 3), but chance of drawing a permit were generally highest during the last 3-4 time periods (Appendix C).

A mentored youth hunt sponsored by non-profit organizations was held on weekends from mid April through May. During 2009, 294 youth hunters registered 118 turkeys, an increase in turkey harvest of 18% from 2008. Success averaged 40%, which was above the 2008 success rate (37%; Table 3).

At the turkey management unit (TMU) level success rates continue to be the highest across the northern units (TMUs J, K, L, M, N, O; Table 4). Turkey populations in these areas have recently been established and survey data show evidence that these populations are expanding (Dunton and Snyders 2009; Table 4). In southeastern Minnesota (TMUs A, B, C), turkey populations are well established and success rates and populations appear to be fluctuating around a stable mean (Dunton and Snyders 2009; Table 4, Figure 3).

Overall weather conditions for the 2009 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 2009). April temperatures were near average and May temperatures were below historic averages in west-central and northern Minnesota and near average in the remainder of the state (Minnesota Climatology Working Group 2009). 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., 11% increase in the number of permits available and an 11% increase in registered harvest) from 2008 and 3 new permit areas open to hunting. 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. 2009. Climate journal. http://climate.umn.edu/ Accessed 30 June 2009.

Table 1. Spring applicants, permits available and issued, and registered harvest from 1978 – 2009 for all spring wild turkey hunting seasons, Minnesota.

		Permits				
Year	Applicants	Available	Issued	Issued (%)	Registered harvest	Success (%)[a]
1978	10,740	420	411	98	94	23
1979	11,116	840	827	99	116	14
1980	9,613	1,200	1,191	99	98	8
1981	8,398	1,500	1,437	96	113	8
1982	7,223	2,000	1,992	99	106	5
1983	8,153	2,100	2,079	99	116	6
1984	7,123	3,000	2,837	95	178	6
1985	5,662	2,750	2,449	89	323	13
1986	5,715	2,500	2,251	90	333	15
1987	6,361	2,700	2,520	93	520	21
1988	8,402	3,000	2,994	99	674	23
1989	13,007	4,000	3,821	96	930	24
1990	14,326	6,600	6,126	93	1,709	28
1991	15,918	9,170	8,607	94	1,724	20
1992	16,401	9,310	9,051	97	1,691	19
1993	17,800	9,625	9,265	96	2,082	23
1994	19,853	9,940	9,479	95	1,975	21
1995	21,345	9,975	9,550	96	2,339	25
1996	23,757	12,131	10,983	91	2,841	26
1997	25,958	12,530	11,610	93	3,302	28
1998	29,727	14,035	13,229	94	4,361	33
1999	39,957	18,360	16,387	89	5,132	31
2000	42,022	20,160	18,661	93	6,154	33
2001	41,048	22,936	21,404	93	6,383	30
2002	42,415	24,136	22,607	94	6,516	29
2003	44,415	25,016	22,770	91	7,666	34
2004	48,059	27,600	25,261	92	8,434	33
2005	49,181	31,748	27,638	87	7,800	28
2006	45,704	32,624	27,876	85	8,241	30
2007[b]	52,566	33,976	28,320	83	9,412	33
2008[b]	51,000	37,992	31,942	84	10,994	34
2009[b]	57,692	42,328	36,193[c]	85	12,210	34

[a] Success rates not adjusted for non-participation
[b] Youth hunt data included
[c] 4,483 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 2009 spring wild turkey season, Minnesota.

	Permits		2009		Historic mean[c]	
Permit Area	Available	Issued[a]	Registered harvest	Success (%)[b]	Success (%)	*n*
152	40	41	11	27	31	2
156	80	76	29	38	47	2
157	400	358	178	50	46	6
159	120	111	37	33	36	6
183	40	42	16	38	29	2
213	640	576	260	45	46	3
214	720	638	232	36	38	6
215	920	792	355	45	43	11
218	800	734	351	48	50	3
219	480	435	160	37	31	11
221	480	411	192	47	51	5
222	400	353	132	37	44	5
223	760	668	273	41	36	11
225	1320	1181	324	27	27	11
227	1200	1020	282	28	34	11
229	360	317	82	26	25	10
235	160	149	50	34	34	11
236	1200	1058	401	38	39	11
239	960	855	375	44	43	8
240	800	704	286	41	40	5
241	200	176	72	41	42	2
242[d]	40	26	10	38	38	1
243	120	99	39	39	40	2
244	360	300	115	38	34	8
246[d]	80	63	37	59	59	1
248	400	430	165	38	43	6
249	400	356	115	32	32	7
262	80	60	25	42	44	2
266[d]	40	22	14	64	64	1
338	720	623	243	39	33	9
339	680	607	232	38	35	9
341	1880	1663	612	37	34	9
342	1800	1452	387	27	27	9
343	1440	1290	542	42	41	9
344	1000	859	208	24	27	11
345	1400	1054	247	23	22	9

Table 2. Continued

	Permits		2009		Historic mean[c]	
Permit Area	Available	Issued[a]	Registered harvest	Success (%)[b]	Success (%)	*n*
346	2600	1831	385	21	25	11
347	1200	1021	326	32	27	9
348	1400	1210	296	24	25	9
349	3400	2615	509	19	24	11
412	360	327	132	40	42	3
416	120	114	47	41	39	10
417	400	375	169	45	43	3
420	120	77	23	30	37	6
421	56	31	15	48	35	2
422	160	123	61	50	46	11
423	40	27	4	15	21	2
424	80	74	14	19	32	5
425	520	485	160	33	39	6
426	40	34	11	32	24	9
427	96	80	31	39	34	9
428	280	257	109	42	43	9
431	120	107	43	40	41	11
433	96	89	43	48	51	6
440	600	540	168	31	32	11
442	1280	1141	412	36	35	11
443	680	598	191	32	32	11
446	80	71	21	30	39	5
447	80	73	20	27	27	5
448	80	72	40	56	52	6
449	80	76	35	46	47	6
450	120	101	30	30	29	11
451	120	106	47	44	47	7
454	40	36	10	28	34	5
456	40	32	6	19	11	5
457	120	104	33	32	35	11
458	80	50	17	34	30	5
459	200	175	38	22	25	11
461	1000	903	319	35	34	11
462	960	833	343	41	37	9
463	240	211	73	35	30	11
464	320	294	103	35	29	9
465	320	269	89	33	28	9

Table 2. Continued

Permit Area	Permits Available	Permits Issued[a]	2009 Registered harvest	2009 Success (%)[b]	Historic mean[c] Success (%)	Historic mean[c] n
466	640	553	170	31	32	8
467	440	418	160	38	35	8
601	1200	1057	414	39	39	10
Unknown[e]		4	4			
Total	42,328	36,193	12,210	34.0		

[a] 4,483 permits were issued to archery hunters and are not included in these figures
[b] Success rates not adjusted for non-participants
[c] Mean success rate (%) over all spring turkey seasons (n) between 1999 – 2009 or since a permit area boundary change occurred.
[d] New permits areas for the 2009 spring season
[e] Unknown harvest location (permit area) due to registration station error

Table 3. Permits available and issued, registered harvest, and success (2009 and mean) by time period for the 2009 spring wild turkey season, Minnesota.

Time Period[a]	Permits Available	Permits Issued	2009 Registered harvest	2009 Success (%)[b]	1999 - 2009 mean success (%)
A	5291	4799	2222	46	43
B	5291	4748	1900	40	39
C	5291	4807	1576	33	31
D	5291	4686	1432	31	29
E	5291	4809	1634	34	33
F	5291	3950	1081	27	29
G	5291	4303	1327	31	25
H	5291	3793	911	24	24
Unknown[c]		4	9		
Youth Hunt					
W	-	1	0	0	
X	-	1	0	0	
Y	-	280	113	40	
Z	-	12	5	42	
Total		36,193	12,210		

[a] A = April 15-19, B = April 20-24, C = April 25-29, D = April 30-May 4, E = May5-9, F = May 10-14, G = May 15-21, H = May 22-28, W = May 2-3, X = April 25-26, Y = April 18-19, and Z = April 11-12
[b] Success rates not adjusted for non-participants
[c] Unknown harvest location and unknown harvest time periods due to registration station error

Table 4. Permits available and issued, registered harvest, success (2009 and mean), and mean finite rate of population change (Dunton and Snyders 2009) by Turkey Management Unit for the 2009 spring wild turkey season, Minnesota.

	Permits		2009		Mean success[e]		Mean finite rate of change[f]	
TMU[a,b]	Available	Issued	Registered harvest	Success (%)	*n*	Mean	λ	99% CI[g]
A	8800	6710	1437	21	9	24	0.99*	(0.94, 1.04)
B	1000	859	208	24	11	27	0.98	(0.89, 1.07)
C	6320	5426	1867	34	9	32	0.99	(0.91, 1.09)
D	4480	3907	1390	36	9	31	1.06*	(1.04, 1.07)
E	2000	1809	595	33	2	33	1.15*	(1.09, 1.20)
F	4600	4088	1489	36	8	35	1.03	(0.96, 1.12)
G	1040	896	297	33	5	33	1.07*	(1.02, 1.11)
H	3296	2960	1017	34	6	34	1.03	(0.95, 1.13)
I	416	371	151	41	9	37	1.08	(0.99, 1.19)
J	2080	1814	722	40	1	40	1.11	(0.96, 1.30)
K	2960	2653	1117	42	3	43	1.09	(0.99, 1.20)
L	2080	1872	814	43	3	43	1.15	(0.91, 1.45)
M	456	332	117	35	2	36	1.18	(1.01, 1.37)
N	2680	2410	946	39	1	39	1.18	(0.93, 1.51)
O	120	82	39	48	1	48	1.17	(0.70, 1.97)
P[c]	-	-	-	-	-	-	1.12	
Unknown[d]		4	4					

[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 are open to spring hunting

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

[d] Unknown harvest location (permit area) due to registration station error

[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 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

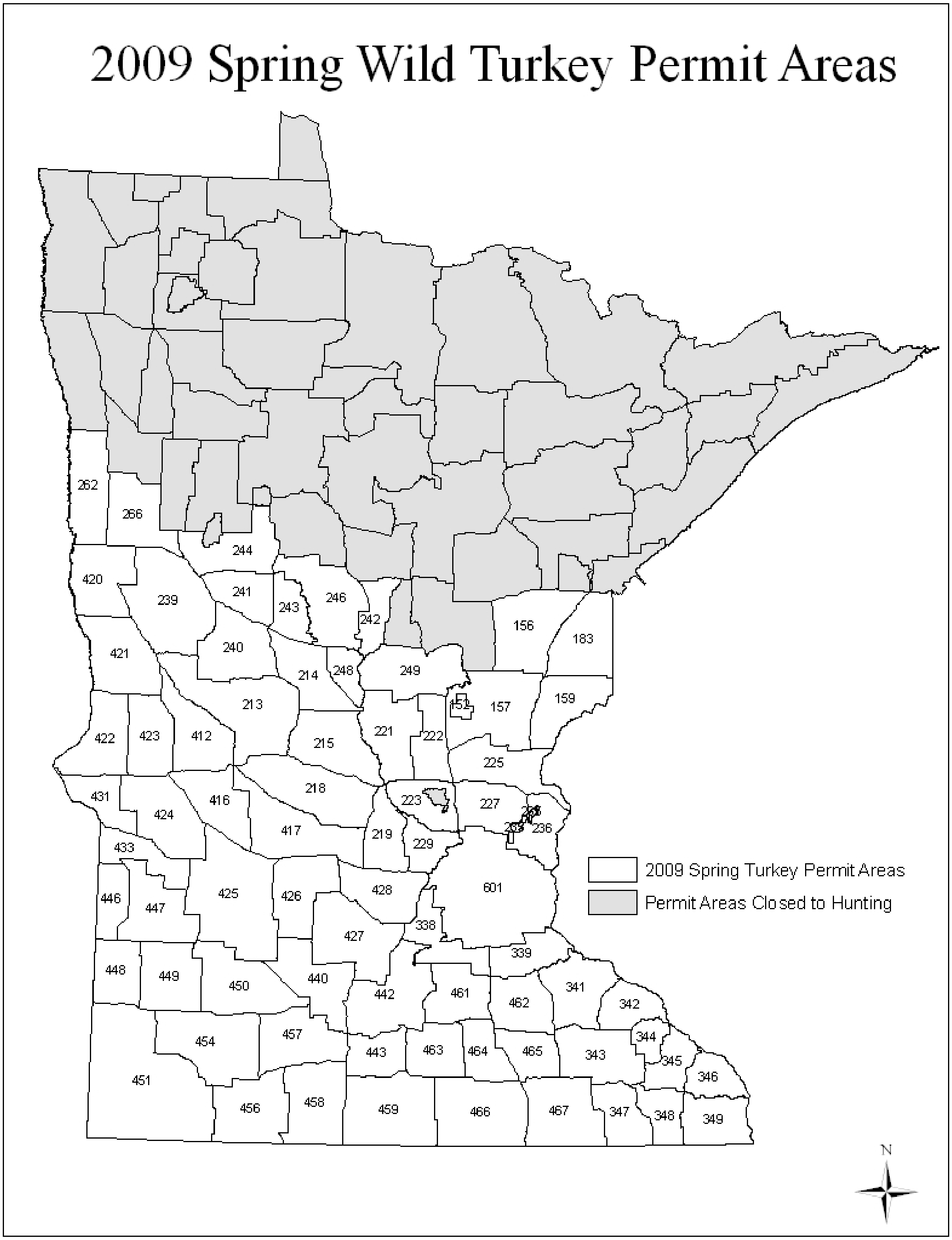


Figure 1. Permit areas open for hunting during the 2009 spring turkey hunting season, Minnesota.

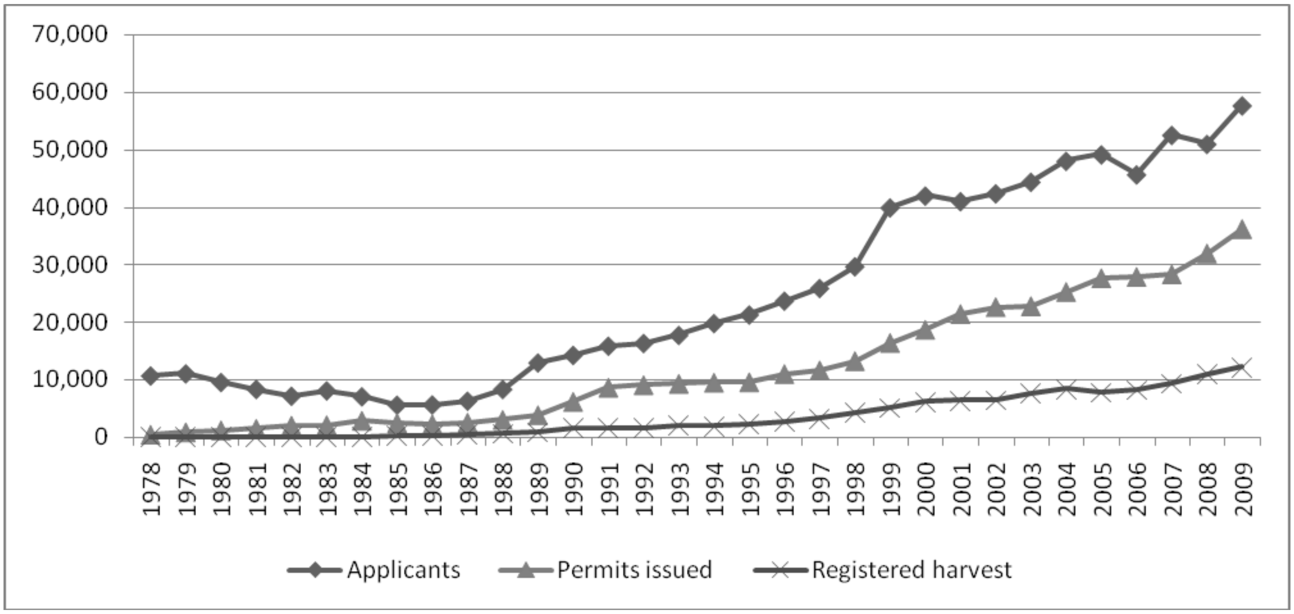


Figure 2. Applicants, permits issued, and registered harvest for the spring wild turkey seasons 1978-2008, Minnesota.

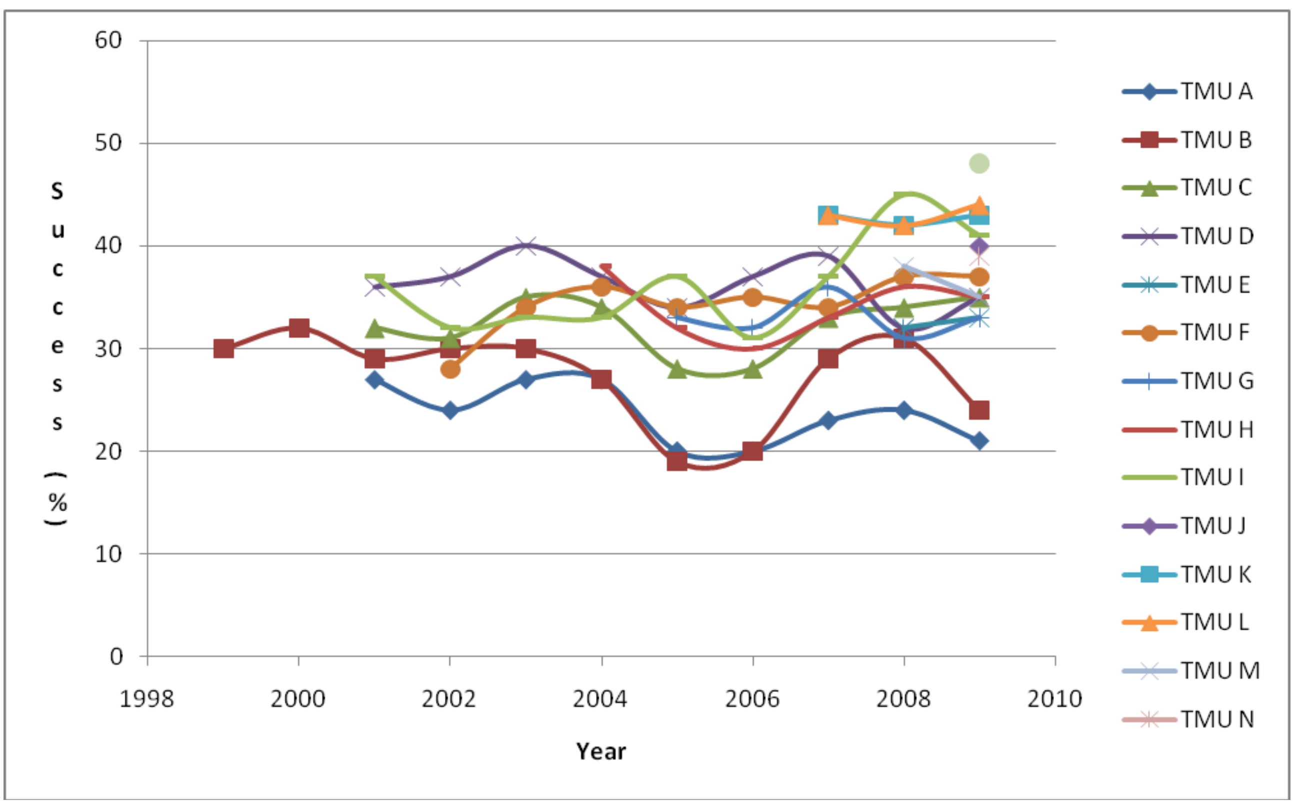


Figure 3. Mean success rate (%) for turkey management units (TMUs) based on cumulative permit area success rates since a boundary change occurred or permit areas opened for hunting, Minnesota.

Appendix A. Permits available and issued by type and permit area for the 2009 spring wild turkey season, Minnesota.

		Permits issued					
Permit Area	Permits available	General	Landowner	Second choice	Surplus	Youth	Total
152	40	28	0	2	11	-	41
156	80	55	11	10	0	-	76
157	400	266	33	56	0	3	358
159	120	91	14	6	0	-	111
183	40	39	3	0	0	-	42
213	640	436	71	61	0	8	576
214	720	366	39	134	99	-	638
215	920	584	65	137	0	6	792
218	800	575	73	70	2	14	734
219	480	314	20	83	11	7	435
221	480	292	24	89	3	3	411
222	400	246	33	53	17	4	353
223	760	487	33	118	15	15	668
225	1320	694	80	215	178	14	1181
227	1200	665	36	192	112	15	1020
229	360	186	9	66	56	-	317
235	160	130	0	9	10	-	149
236	1200	721	32	188	105	12	1058
239	960	595	73	157	15	15	855
240	800	493	55	107	34	15	704
241	200	118	12	35	11	-	176
242	40	6	0	2	18	-	26
243	120	72	11	14	2	-	99
244	360	235	21	44	0	-	300
246	80	37	12	14	0	-	63
248	400	204	36	61	129	-	430
249	400	242	21	55	31	7	356
262	80	34	0	3	23	-	60
266	40	14	1	0	7	-	22
338	720	437	50	98	38	-	623
339	680	442	32	86	44	3	607
341	1880	1,257	102	199	93	12	1663
342	1800	967	66	213	206	-	1452
343	1440	1,007	106	91	60	26	1290
344	1000	677	36	63	76	7	859
345	1400	697	52	99	202	4	1054

Appendix A. Continued

Permit Area	Permits available	Permits issued					
		General	Landowner	Second choice	Surplus	Youth	Total
346	2600	1283	90	126	326	6	1831
347	1200	677	51	155	127	11	1021
348	1400	865	58	165	117	5	1210
349	3400	1877	128	231	377	2	2615
412	360	252	24	51	0	-	327
416	120	105	9	0	0	-	114
417	400	291	39	38	0	7	375
420	120	31	3	7	36	-	77
421	56	21	0	1	9	-	31
422	160	86	3	17	17	-	123
423	40	9	0	0	18	-	27
424	80	40	0	19	15	-	74
425	520	363	45	70	0	7	485
426	40	20	2	5	7	-	34
427	96	58	8	10	4	-	80
428	280	190	19	42	6	-	257
431	120	67	4	21	15	-	107
433	96	70	9	7	3	-	89
440	600	328	31	104	67	10	540
442	1280	809	107	183	33	9	1141
443	680	386	20	107	83	2	598
446	80	52	7	4	8	-	71
447	80	48	5	9	11	-	73
448	80	45	15	9	3	-	72
449	80	64	9	3	0	-	76
450	120	64	4	16	17	-	101
451	120	56	5	25	20	-	106
454	40	31	5	0	0	-	36
456	40	24	0	4	4	-	32
457	120	55	6	22	21	-	104
458	80	20	0	3	27	-	50
459	200	128	12	35	0	-	175
461	1000	588	57	177	69	12	903
462	960	568	39	130	95	1	833
463	240	137	14	54	6	-	211
464	320	169	5	65	55	-	294
465	320	164	1	40	64	-	269

Appendix A. Continued.

Permit Area	Permits available	Permits issued					
		General	Landowner	Second choice	Surplus	Youth	Total
466	640	320	30	111	92	-	553
467	440	270	31	69	48	-	418
601	1200	747	24	153	101	32	1057
Unknown							4
Total	42,328	25,087	2,181	5,118	3,509	294	36,193

Appendix B. Permits available and issued by type and time period for the 2009 spring wild turkey season, Minnesota.

Time Period	Permits available	Permits issued by type[a]				
		General	Landowner	Second choice	Surplus	Total
A	5291	3985	784	-	30	4799
B	5291	4208	413	-	127	4748
C	5291	4255	495	-	57	4807
D	5291	4385	265	-	36	4686
E	5291	3439	88	-	1282	4809
F	5291	1536	31	2157	226	3950
G	5291	2494	67	1473	269	4303
H	5291	785	38	1488	1482	3793
Unknown						4
Total	42,328	25,087	2,181	5,118	3,509	35,899[a]

[a] Does not include youth information (see Table 3 for youth data)

Appendix C. 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 2009 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	2	5	5	0	5	100
	B	1	3	5	0	5	100
	C	2	14	5	0	5	36
	D	0	8	5	0	5	63
	E	3	6	5	0	5	72
	F	2	1	5	0	5	100
	G	1	1	5	0	5	100
	H	0	0	5	0	5	100
156	A	6	34	10	2	8	24
	B	3	18	10	2	8	44
	C	4	27	10	1	9	33
	D	3	32	10	2	8	25
	E	2	19	10	0	10	53
	F	4	3	10	1	9	100
	G	6	12	10	2	8	67
	H	1	5	10	1	9	100
157	A	36	253	50	12	38	15
	B	24	118	50	6	44	37
	C	24	183	50	8	42	23
	D	24	158	50	5	45	28
	E	17	52	50	0	50	96
	F	17	37	50	0	50	100
	G	20	38	50	1	49	100
	H	16	15	50	1	49	100
159	A	3	97	15	4	11	11
	B	7	42	15	2	13	31
	C	8	71	15	3	12	17
	D	3	42	15	3	12	29
	E	6	20	15	1	14	70
	F	3	14	15	1	14	100
	G	5	20	15	0	15	75
	H	2	9	15	0	15	100
183	A	3	18	5	1	4	22
	B	1	10	5	1	4	40
	C	2	17	5	1	4	24
	D	6	30	5	0	5	17
	E	1	21	5	0	5	24
	F	1	7	5	0	5	71
	G	1	7	5	0	5	71
	H	1	5	5	0	5	100

Appendix C. 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	44	295	80	18	62	21
	B	38	195	80	15	65	33
	C	39	333	80	16	64	19
	D	32	283	80	10	70	25
	E	25	90	80	6	74	82
	F	28	49	80	1	79	100
	G	28	69	80	5	75	100
	H	22	35	80	0	80	100
214	A	38	191	90	12	78	41
	B	38	104	90	6	84	81
	C	28	169	90	12	78	46
	D	27	117	90	4	86	74
	E	31	41	90	0	90	100
	F	28	8	90	0	90	100
	G	26	21	90	0	90	100
	H	16	12	90	5	85	100
215	A	69	368	115	19	96	26
	B	60	184	115	10	105	57
	C	45	460	115	20	95	21
	D	33	293	115	8	107	37
	E	45	124	115	1	114	92
	F	33	42	115	1	114	100
	G	38	74	115	4	111	100
	H	27	33	115	2	113	100
218	A	62	399	100	20	80	20
	B	43	199	100	10	90	45
	C	50	425	100	22	78	18
	D	33	256	100	12	88	34
	E	37	120	100	2	98	82
	F	33	70	100	4	96	100
	G	47	104	100	2	98	94
	H	38	32	100	1	99	100
219	A	29	221	60	6	54	24
	B	22	140	60	6	54	39
	C	23	198	60	2	58	29
	D	21	152	60	1	59	39
	E	13	63	60	3	57	90
	F	11	9	60	0	60	100
	G	22	46	60	2	58	100
	H	14	10	60	0	60	100

Appendix C. 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	31	164	60	6	54	33
	B	28	99	60	7	53	54
	C	26	197	60	3	57	29
	D	23	92	60	4	56	61
	E	25	60	60	3	57	95
	F	13	15	60	0	60	100
	G	26	31	60	1	59	100
	H	18	10	60	0	60	100
222	A	24	156	50	10	40	26
	B	21	102	50	4	46	45
	C	20	156	50	5	45	29
	D	16	105	50	5	45	43
	E	16	35	50	4	46	100
	F	12	16	50	1	49	100
	G	10	40	50	3	47	100
	H	13	9	50	1	49	100
223	A	53	407	95	12	83	20
	B	40	208	95	6	89	43
	C	44	365	95	8	87	24
	D	28	224	95	4	91	41
	E	32	92	95	1	94	100
	F	27	30	95	0	95	100
	G	19	69	95	2	93	100
	H	20	19	95	0	95	100
225	A	57	420	165	31	134	32
	B	41	251	165	17	148	59
	C	46	370	165	18	147	40
	D	39	223	165	11	154	69
	E	45	102	165	3	162	100
	F	32	52	165	0	165	100
	G	34	45	165	0	165	100
	H	26	12	165	0	165	100
227	A	54	400	150	15	135	34
	B	34	246	150	10	140	57
	C	33	318	150	5	145	46
	D	38	195	150	4	146	75
	E	36	101	150	0	150	100
	F	23	25	150	0	150	100
	G	39	56	150	2	148	100
	H	19	22	150	0	150	100

Appendix C. 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	11	114	45	3	42	37
	B	13	77	45	3	42	55
	C	11	96	45	1	44	46
	D	10	49	45	1	44	90
	E	7	18	45	0	45	100
	F	7	8	45	0	45	100
	G	15	10	45	0	45	100
	H	8	3	45	1	44	100
235	A	10	81	20	0	20	25
	B	12	55	20	0	20	36
	C	6	50	20	0	20	40
	D	7	46	20	0	20	43
	E	5	21	20	0	20	95
	F	5	13	20	0	20	100
	G	3	20	20	0	20	100
	H	2	7	20	0	20	100
236	A	58	436	150	15	135	31
	B	56	232	150	5	145	63
	C	57	381	150	8	142	37
	D	53	273	150	3	147	54
	E	44	126	150	1	149	100
	F	34	49	150	0	150	30
	G	57	61	150	0	150	100
	H	37	14	150	0	150	100
239	A	69	367	120	22	98	27
	B	55	213	120	20	100	47
	C	46	359	120	13	107	30
	D	43	304	120	11	109	36
	E	45	103	120	4	116	100
	F	34	46	120	1	119	100
	G	44	76	120	2	118	100
	H	33	37	120	0	120	100
240	A	76	256	100	16	84	33
	B	46	153	100	14	86	56
	C	32	307	100	9	91	30
	D	26	203	100	12	88	43
	E	36	82	100	1	99	100
	F	24	40	100	1	99	100
	G	20	71	100	2	98	100
	H	22	18	100	0	100	100

Appendix C. 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	11	59	25	0	25	42
	B	10	33	25	2	23	70
	C	16	59	25	5	20	34
	D	7	53	25	5	20	38
	E	10	13	25	0	25	100
	F	6	12	25	0	25	100
	G	4	15	25	0	25	100
	H	8	7	25	0	25	100
242	A	1	2	5	0	5	100
	B	3	0	5	0	5	100
	C	1	3	5	0	5	100
	D	1	4	5	0	5	100
	E	2	3	5	0	5	100
	F	0	0	5	0	5	100
	G	1	3	5	0	5	100
	H	1	0	5	0	5	100
243	A	7	39	15	3	12	31
	B	9	17	15	1	14	82
	C	2	41	15	3	12	29
	D	4	33	15	0	15	45
	E	6	14	15	1	14	100
	F	5	4	15	2	13	100
	G	5	9	15	1	14	100
	H	1	4	15	0	15	100
244	A	19	154	45	7	38	25
	B	20	102	45	1	44	43
	C	18	164	45	5	40	24
	D	17	110	45	5	40	36
	E	12	70	45	1	44	63
	F	14	23	45	0	45	100
	G	8	36	45	2	43	100
	H	7	14	45	0	45	100
246	A	7	25	10	1	9	36
	B	4	18	10	2	8	44
	C	4	35	10	4	6	17
	D	5	48	10	2	8	17
	E	3	15	10	3	7	47
	F	6	1	10	0	10	100
	G	3	12	10	0	10	83
	H	5	3	10	0	10	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
248	A	35	83	50	12	38	46
	B	34	55	50	4	46	84
	C	33	101	50	8	42	42
	D	17	62	50	8	42	68
	E	12	36	50	3	47	100
	F	9	9	50	1	49	100
	G	17	7	50	0	50	100
	H	8	6	50	0	50	100
249	A	15	154	50	7	43	28
	B	21	85	50	8	42	49
	C	12	154	50	2	48	31
	D	11	119	50	2	48	40
	E	19	38	50	1	49	100
	F	10	9	50	1	49	100
	G	18	42	50	0	50	100
	H	7	3	50	0	50	100
262	A	3	14	10	0	10	71
	B	3	10	10	0	10	100
	C	5	14	10	0	10	71
	D	5	8	10	0	10	100
	E	4	3	10	0	10	100
	F	3	3	10	0	10	100
	G	1	3	10	0	10	100
	H	1	0	10	0	10	100
266	A	3	4	5	0	5	100
	B	1	5	5	0	5	100
	C	1	5	5	0	5	100
	D	5	1	5	1	4	100
	E	2	2	5	0	5	100
	F	0	0	5	0	5	100
	G	2	2	5	0	5	100
	H	0	0	5	0	5	100
338	A	45	319	90	18	72	23
	B	34	219	90	12	78	36
	C	26	307	90	10	80	26
	D	35	191	90	5	85	45
	E	33	66	90	1	89	100
	F	17	38	90	0	90	100
	G	35	70	90	0	90	100
	H	17	11	90	4	86	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
339	A	32	249	85	11	74	30
	B	33	139	85	5	80	58
	C	35	240	85	8	77	32
	D	31	142	85	6	79	56
	E	30	92	85	1	84	91
	F	21	29	85	0	85	100
	G	32	73	85	0	85	100
	H	18	8	85	1	84	100
341	A	87	695	235	32	203	29
	B	89	410	235	20	215	52
	C	84	659	235	24	211	32
	D	72	465	235	13	222	48
	E	102	236	235	5	230	97
	F	57	91	235	2	233	100
	G	71	205	235	3	232	100
	H	43	46	235	3	232	100
342	A	72	408	225	33	192	47
	B	82	305	225	9	216	71
	C	55	469	225	14	211	45
	D	39	357	225	6	219	61
	E	64	124	225	1	224	100
	F	39	74	225	2	223	100
	G	25	66	225	1	224	100
	H	11	21	225	0	225	100
343	A	73	510	180	30	150	29
	B	93	352	180	14	166	47
	C	61	623	180	27	153	25
	D	61	356	180	19	161	45
	E	73	200	180	5	175	88
	F	55	112	180	0	180	100
	G	64	172	180	7	173	100
	H	48	50	180	4	176	100
344	A	38	449	125	21	104	23
	B	42	220	125	9	116	53
	C	26	349	125	3	122	35
	D	18	219	125	0	125	57
	E	28	118	125	0	125	100
	F	20	62	125	0	125	100
	G	22	128	125	3	122	95
	H	11	21	125	0	125	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
345	A	57	258	175	33	142	55
	B	43	195	175	9	166	85
	C	32	286	175	5	170	59
	D	35	208	175	3	172	83
	E	44	68	175	0	175	100
	F	15	13	175	0	175	100
	G	17	43	175	2	173	100
	H	3	16	175	0	175	100
346	A	88	472	325	45	280	59
	B	95	268	325	14	311	100
	C	40	458	325	22	303	66
	D	52	364	325	6	319	88
	E	55	156	325	2	323	100
	F	24	65	325	0	325	100
	G	26	69	325	1	324	100
	H	4	11	325	0	325	100
347	A	52	303	150	12	138	46
	B	61	224	150	8	142	63
	C	35	370	150	23	127	34
	D	41	260	150	6	144	55
	E	61	95	150	1	149	100
	F	24	44	150	0	150	100
	G	30	70	150	1	149	100
	H	17	21	150	0	150	100
348	A	66	417	175	26	149	36
	B	57	253	175	8	167	66
	C	27	435	175	16	159	37
	D	35	343	175	6	169	49
	E	41	146	175	0	175	100
	F	32	65	175	0	175	100
	G	21	94	175	0	175	100
	H	15	40	175	2	173	100
349	A	128	831	425	65	360	43
	B	93	489	425	17	408	83
	C	59	729	425	32	393	54
	D	57	512	425	10	415	81
	E	70	261	425	3	422	100
	F	37	134	425	0	425	100
	G	47	189	425	1	424	100
	H	18	57	425	0	425	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
412	A	22	127	45	7	38	30
	B	19	65	45	3	42	65
	C	15	123	45	3	42	34
	D	20	79	45	3	42	53
	E	16	52	45	7	38	73
	F	14	21	45	0	45	100
	G	16	36	45	1	44	100
	H	10	14	45	0	45	100
416	A	10	64	15	2	13	20
	B	4	44	15	2	13	30
	C	7	53	15	4	11	21
	D	3	50	15	0	15	30
	E	9	25	15	1	14	56
	F	4	30	15	0	15	20
	G	4	24	15	0	15	63
	H	6	18	15	0	15	83
417	A	31	220	50	10	40	18
	B	19	135	50	9	41	30
	C	16	251	50	9	41	16
	D	21	101	50	7	43	43
	E	19	73	50	1	49	67
	F	10	32	50	2	48	100
	G	26	61	50	0	50	82
	H	22	22	50	1	49	100
420	A	7	5	15	0	15	100
	B	2	7	15	0	15	100
	C	4	28	15	3	12	43
	D	5	7	15	0	15	100
	E	2	1	15	0	15	100
	F	0	1	15	0	15	100
	G	2	2	15	0	15	100
	H	1	3	15	0	15	100
421	A	5	9	7	0	7	78
	B	5	5	7	0	7	100
	C	2	6	7	0	7	100
	D	0	0	7	0	7	100
	E	3	2	7	0	7	100
	F	0	0	7	0	7	100
	G	0	5	7	0	7	100
	H	0	0	7	0	7	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
422	A	9	36	20	2	18	50
	B	9	9	20	1	19	100
	C	8	34	20	0	20	59
	D	11	26	20	0	20	77
	E	7	9	20	0	20	100
	F	0	1	20	0	20	100
	G	9	6	20	0	20	100
	H	8	3	20	0	20	100
423	A	0	7	5	0	5	71
	B	1	1	5	0	5	100
	C	0	4	5	0	5	100
	D	0	0	5	0	5	100
	E	3	1	5	0	5	100
	F	0	0	5	0	5	100
	G	0	0	5	0	5	100
	H	0	1	5	0	5	100
424	A	4	23	10	0	10	43
	B	2	6	10	0	10	100
	C	2	12	10	0	10	83
	D	1	14	10	0	10	71
	E	1	6	10	0	10	100
	F	1	1	10	0	10	100
	G	1	1	10	0	10	100
	H	2	0	10	0	10	100
425	A	28	211	65	14	51	24
	B	22	111	65	11	54	49
	C	14	251	65	11	54	22
	D	13	196	65	5	60	31
	E	22	72	65	2	63	88
	F	19	21	65	1	64	100
	G	21	49	65	1	64	100
	H	21	41	65	0	65	100
426	A	1	10	5	1	4	40
	B	4	4	5	1	4	100
	C	1	15	5	0	5	33
	D	1	3	5	0	5	100
	E	3	0	5	0	5	100
	F	0	4	5	0	5	100
	G	1	7	5	0	5	71
	H	0	1	5	0	5	100

Appendix C. 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]
427	A	2	25	12	5	7	28
	B	4	20	12	1	11	55
	C	6	27	12	0	12	44
	D	6	25	12	1	11	44
	E	5	9	12	1	11	100
	F	3	3	12	0	12	100
	G	3	10	12	0	12	100
	H	2	3	12	0	12	100
428	A	19	88	35	7	28	32
	B	13	65	35	2	33	51
	C	17	83	35	4	31	37
	D	15	66	35	3	32	48
	E	17	34	35	2	33	97
	F	11	24	35	1	34	100
	G	10	19	35	0	35	100
	H	7	5	35	0	35	100
431	A	9	30	15	1	14	47
	B	6	18	15	3	12	67
	C	6	14	15	0	15	100
	D	2	22	15	0	15	68
	E	3	7	15	0	15	100
	F	6	5	15	0	15	100
	G	5	5	15	0	15	100
	H	6	4	15	0	15	100
433	A	11	57	12	3	9	16
	B	5	43	12	2	10	23
	C	5	45	12	2	10	22
	D	7	20	12	0	12	60
	E	6	8	12	1	11	100
	F	3	8	12	0	12	100
	G	3	12	12	1	11	92
	H	3	7	12	0	12	100
440	A	42	209	75	14	61	29
	B	23	104	75	8	67	64
	C	23	166	75	6	69	42
	D	23	108	75	3	72	67
	E	16	42	75	0	75	100
	F	13	19	75	0	75	100
	G	14	25	75	0	75	100
	H	11	13	75	0	75	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available: Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
442	A	67	498	160	26	134	27
	B	56	303	160	20	140	46
	C	50	547	160	32	128	23
	D	55	304	160	12	148	49
	E	45	154	160	8	152	99
	F	43	65	160	3	157	100
	G	50	118	160	2	158	100
	H	43	31	160	4	156	100
443	A	33	156	85	11	74	47
	B	27	103	85	0	85	83
	C	29	156	85	4	81	52
	D	21	123	85	1	84	68
	E	30	50	85	1	84	100
	F	20	16	85	2	83	100
	G	21	27	85	0	85	100
	H	9	7	85	1	84	100
446	A	6	19	10	1	9	47
	B	0	16	10	1	9	56
	C	0	9	10	1	9	100
	D	3	7	10	2	8	100
	E	5	7	10	1	9	100
	F	4	8	10	1	9	100
	G	0	11	10	0	10	91
	H	3	2	10	0	10	100
447	A	3	15	10	1	9	60
	B	5	12	10	1	9	75
	C	1	22	10	1	9	41
	D	3	11	10	1	9	82
	E	4	5	10	0	10	100
	F	0	2	10	0	10	100
	G	2	6	10	1	9	100
	H	2	3	10	0	10	100
448	A	8	31	10	4	6	19
	B	6	17	10	5	5	29
	C	6	23	10	4	6	26
	D	5	23	10	1	9	39
	E	6	7	10	0	10	100
	F	4	5	10	0	10	100
	G	4	14	10	1	9	64
	H	1	3	10	0	10	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available: Total	Landowner [a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
449	A	5	51	10	2	8	16
	B	3	34	10	2	8	24
	C	3	49	10	2	8	16
	D	5	37	10	0	10	27
	E	3	18	10	0	10	56
	F	4	12	10	0	10	83
	G	6	12	10	3	7	58
	H	6	8	10	0	10	100
450	A	6	36	15	2	13	36
	B	5	11	15	1	14	100
	C	3	18	15	1	14	78
	D	5	11	15	0	15	100
	E	2	5	15	0	15	100
	F	5	9	15	0	15	100
	G	2	11	15	0	15	100
	H	2	1	15	0	15	100
451	A	11	31	15	1	14	45
	B	1	17	15	3	12	71
	C	9	39	15	0	15	38
	D	5	17	15	1	14	82
	E	8	3	15	0	15	100
	F	3	5	15	0	15	100
	G	5	3	15	0	15	100
	H	5	1	15	0	15	100
454	A	3	31	5	2	3	10
	B	1	16	5	0	5	31
	C	0	26	5	0	5	19
	D	0	24	5	1	4	17
	E	2	9	5	1	4	44
	F	2	8	5	0	5	63
	G	1	7	5	1	4	57
	H	1	6	5	0	5	83
456	A	1	6	5	0	5	83
	B	0	6	5	0	5	83
	C	2	6	5	0	5	83
	D	1	11	5	0	5	45
	E	2	3	5	0	5	100
	F	0	2	5	0	5	100
	G	0	2	5	0	5	100
	H	0	0	5	0	5	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
457	A	4	32	15	2	13	41
	B	5	8	15	2	13	100
	C	5	29	15	1	14	48
	D	4	17	15	0	15	88
	E	4	8	15	1	14	100
	F	6	0	15	0	15	100
	G	2	7	15	0	15	100
	H	3	0	15	0	15	100
458	A	3	18	10	0	10	56
	B	4	5	10	0	10	100
	C	4	5	10	0	10	100
	D	3	1	10	0	10	100
	E	0	1	10	0	10	100
	F	2	1	10	0	10	100
	G	1	1	10	0	10	100
	H	0	0	10	0	10	100
459	A	5	92	25	4	21	23
	B	7	37	25	3	22	59
	C	11	57	25	2	23	40
	D	5	54	25	0	25	46
	E	4	26	25	1	24	92
	F	3	4	25	0	25	100
	G	1	21	25	0	25	100
	H	2	6	25	2	23	100
461	A	61	309	125	23	102	33
	B	50	222	125	10	115	52
	C	37	382	125	15	110	29
	D	31	234	125	8	117	50
	E	44	111	125	0	125	100
	F	26	33	125	0	125	100
	G	37	54	125	1	124	100
	H	30	11	125	0	125	100
462	A	51	287	120	14	106	37
	B	54	145	120	9	111	77
	C	42	283	120	13	107	38
	D	43	192	120	1	119	62
	E	62	88	120	0	120	100
	F	26	29	120	0	120	100
	G	38	64	120	2	118	100
	H	26	22	120	0	120	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available Total	Landowner[a]	General lottery	Chance of general lottery applicant being drawn (%)[b]
463	A	11	89	30	6	24	27
	B	8	46	30	3	27	59
	C	8	74	30	4	26	35
	D	13	56	30	0	30	54
	E	10	25	30	1	29	100
	F	6	8	30	0	30	100
	G	9	10	30	0	30	100
	H	8	8	30	0	30	100
464	A	19	96	40	4	36	38
	B	17	56	40	0	40	71
	C	15	113	40	0	40	35
	D	11	62	40	1	39	63
	E	17	12	40	0	40	100
	F	13	5	40	0	40	100
	G	6	12	40	0	40	100
	H	5	5	40	0	40	100
465	A	11	86	40	1	39	45
	B	19	43	40	0	40	93
	C	16	79	40	0	40	51
	D	9	40	40	0	40	100
	E	14	17	40	0	40	100
	F	10	4	40	0	40	100
	G	6	8	40	0	40	100
	H	4	0	40	0	40	100
466	A	33	188	80	15	65	35
	B	25	113	80	6	74	65
	C	21	182	80	2	78	43
	D	12	94	80	3	77	82
	E	24	25	80	1	79	100
	F	12	17	80	2	78	100
	G	28	25	80	1	79	100
	H	15	5	80	0	80	100
467	A	27	142	55	12	43	30
	B	19	80	55	5	50	63
	C	24	154	55	3	52	34
	D	13	93	55	7	48	52
	E	18	41	55	0	55	100
	F	13	18	55	0	55	100
	G	24	36	55	2	53	100
	H	21	11	55	2	53	100

Appendix C. Continued

Permit area	Time period	Registered harvest	Applicants	Permits Available			Chance of general lottery applicant being drawn (%)[b]
				Total	Landowner[a]	General lottery	
601	A	80	522	150	7	143	27
	B	40	239	150	12	138	58
	C	46	370	150	2	148	40
	D	44	311	150	1	149	48
	E	56	115	150	0	150	100
	F	30	53	150	0	150	100
	G	59	94	150	0	150	100
	H	48	29	150	2	148	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 2008

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. Permits were awarded through a lottery system, and each 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 remained the same during the 2007 and 2008 hunting seasons (Figure 1). The objective of this report is to document results of the 2008 prairie chicken hunting season.

METHODS

Information about the 2008 hunting season came from 2 sources. First, the Electronic Licensing System (ELS) recorded all permit applications, lottery results, and purchases of permits. Prairie-chicken hunters no longer are required to register their harvested birds in the ELS. Second, I sent a postcard survey by mail to all people who were successful in the lottery. I did not restrict the survey to hunters who purchased a prairie-chicken hunting permit because I had the postcards printed and sent a few days before the hunting season began, and some hunters may not have purchased a permit yet. Approximately 3 weeks later I sent the postcard survey a second time to hunters who had not responded to the first mailing. The survey consisted of 5 questions: (1) did you hunt?, (2) how many days did you hunt?, (3) how many prairie-chickens did you bag?, (4) how many sharp-tailed grouse did you bag while hunting for prairie-chickens?, and (5) how satisfied were you with the hunt?

RESULTS & DISCUSSION

One hundred eighty-six prairie-chicken hunting permits were available during 2008. There were 183 lottery winners, and 17 of them were landowners (Table 1). One hundred forty-four lottery winners purchased a permit. One landowner who was listed in the ELS data as a lottery winner but not a permit purchaser reported hunting, so I considered there to be 145 permit purchasers in 2008.

One hundred thirteen permit purchasers (78%) responded to the first mailing of the survey, and 22 (15%) responded to the second mailing, so the response rate was 93.1%. I assumed that the few nonrespondents would have had the same average response as all those who responded to either mailing of the survey.

Eight (6% of) purchasers who responded to the survey reported that they did not hunt, and 127 respondents reported hunting (Table 2). Hunters hunted an average of 2 days out of the 5-day season. Of an estimated 137 hunters, I estimated that 85 (62%) bagged at least 1 prairie-chicken (Table 2). Hunters reported harvesting 123 prairie-chickens, and the estimated total harvest was 141 prairie-chickens. Harvest was greater in 2008 than in any other year since the modern seasons began in 2003, and the hunter success rate was the best of any year except 2003 (Table 3). The number of applicants has been similar during the last 4 years; hunter success rates and total harvest have been more variable (Table 3).

Prairie-chicken hunters reported bagging 31 sharp-tailed grouse while hunting prairie-chickens. These sharp-tailed grouse were harvested from permit areas 801A–806A (Figure 1). The estimated harvest of sharp-tailed grouse during the prairie-chicken hunting season was 39.

The average rating for hunter satisfaction on a 1–5 scale was 3.9 (median = 4), and 86% of the 126 respondents to this question reported a satisfaction level of 3 or greater.

ACKNOWLEDGEMENTS

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

Table 1. Results of the lottery for prairie-chicken hunting permits in Minnesota during 2008.

Permit area	Permits available	No. of applicants	Lottery winners	
			Number[a]	Proportion
801A	10	5	5	1.00
802A	10	20	12	0.60
803A	10	8	8	1.00
804A	17	24	17	0.71
805A	20	69	20	0.29
806A	17	83	17	0.20
807A	25	67	25	0.37
808A	20	41	20	0.49
809A	20	71	21	0.30
810A	27	114	27	0.24
811A	10	33	11	0.33
All	186	535	183	0.34

[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 2008.

Permit	No. of hunters[a]		Birds harvested		Birds per	Success
area	Self-reported	Estimated	Self-reported	Estimated	harvester[b]	rate[c]
801A	1	2	1	2	1.0	1.00
802A	7	9	7	10	1.7	0.67
803A	7	8	6	7	2.3	0.38
804A	15	15	20	21	1.9	0.73
805A	16	17	18	20	1.7	0.71
806A	11	12	16	20	1.8	0.92
807A	14	15	15	18	1.5	0.80
808A	14	15	15	16	1.5	0.73
809A	15	16	10	11	1.8	0.38
810A	18	18	10	10	1.4	0.39
811A	9	10	5	6	1.5	0.40
All	127	137	123	141	1.7	0.62

[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 2003–2008.

Year	Permits available	Applicants	Birds harvested	Success rate[a]
2003	100	853	115	0.68
2004	101	759	51	0.37
2005	110	500	90	0.58
2006	182	512	92	0.40
2007	187	519	122	0.53
2008	186	535	141	0.62

[a] Proportion of hunters who harvested ≥1 prairie-chicken.

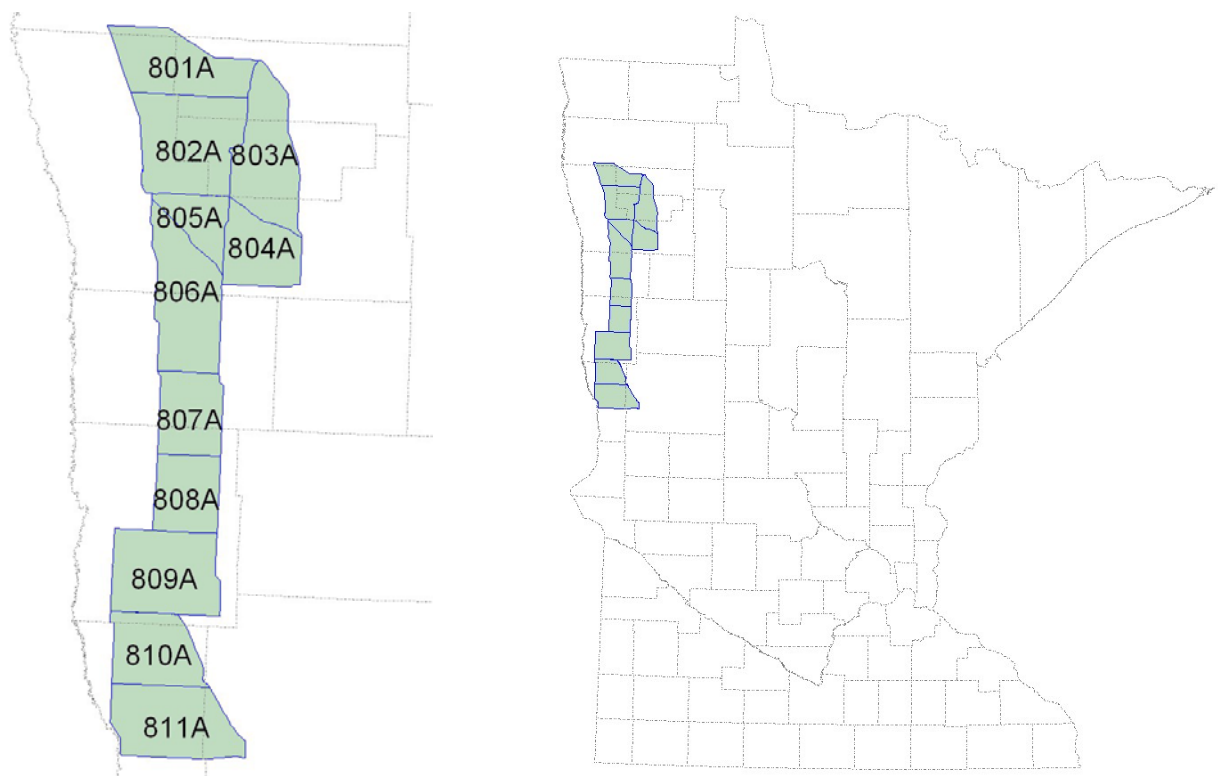


Figure 1. Map of permit areas for prairie-chicken hunting in Minnesota (left) and their location relative to counties within the state (right).

2008 MINNESOTA BEAR HARVEST REPORT

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

INTRODUCTION

The Minnesota bear range is divided into 11 bear management units (BMUs, Fig. 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 (see below). Hunters receive a tooth envelope when they register their bear, and extract and submit the tooth and rib samples themselves.

We conducted our fourth tetracycline-marking population estimate in 2008. During June and July, DNR and other field personnel set out baits (bacon and ground beaver) containing capsules of tetracycline (9 500-mg capsules) across the bear range. Each bait was enclosed in a wooden box to deter small carnivores from taking it. Each box was nailed to a tree at a height of ~8 feet, and about 3 miles apart. Grease was smeared on the outside of most boxes as an added attractant. Baits were checked and removed a few weeks later. We differentiated those taken by bears from other animals based on claw marks on the tree and the condition of the bait box.

Bears that ingested baits were biomarked by the tetracycline: bones and teeth from these bears, when sectioned and examined under ultraviolet light show a characteristic yellow banding. An estimate of population size can be derived from the number of bears marked divided by the proportion marked. We estimated the proportion marked by examining bone and/or tooth samples submitted by hunters. We used the number of baits taken by bears as an initial estimate of the number marked, and then corrected this value for the number of bears that took two baits, based on the proportion of bone samples that were double-marked.

RESULTS

The number of permits available to hunters steadily increased through the 1980–1990s, peaking at 20,840 in 1999, and remaining at >20,000 for 5 years (Table 1). In 3 years, >15,000 people hunted bears (Fig. 2). However, from 2000 to 2003, the proportion of permittees who bought licenses sharply declined, from >80% to near 60%. This resulted in 7 of 11 BMUs being undersubscribed by 2003. Accordingly, available permits were reduced each year after 2003 (Table 2). In 2008, permits were reduced in 9 of 11 BMUs (Table 2), and only 2 BMUs were undersubscribed (Table 3). Possibly in response to diminished availability of permits, the number of applicants increased (Table 1).

The 2008 registered harvest (2135) was the lowest in the last 6 years; harvests during the previous 5 years had been remarkably similar (3200–3600; Table 1, Fig. 2). The 2008 harvest was below the 5-year mean in every BMU, and 4 BMUs (all in north-central and northeastern Minnesota, Fig. 1) had the lowest harvest since 1996 (Table 4). The 2008 harvest was also heavily skewed toward males (62%). Four BMUs had the highest percent males ever recorded (Table 4). A skew towards males is indicative of plentiful foods: females are disproportionately harder to attract to bait when natural foods are plentiful. Hunting success is generally low when foods are abundant, and that was the case in 2008. Statewide, success averaged 20%, compared to ~25% for more normal food years (Table 5). Also typical of a year with abundant fall foods, a higher proportion of the harvest occurred later in the season. Normally ~70% of the harvest occurs in the first week; in 2008, only 58% occurred the first week and 71% by the end of the second 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. A regression model based on these 2 factors more accurately predicts the number of females than males killed (Fig. 3). However, for each of the past 7 years, this model predicted slightly higher harvests than actually occurred, suggesting that bears are somewhat harder to harvest now than they were during the 1990s, when the population was growing.

A diminishing median age among harvested females, reflecting an increasing proportion of harvested 1–2 year-olds (Figs. 4 & 5), indicate changes in the composition of the living population, and possibly a downturn in population size.

Preliminary results from the tetracycline-marking confirm this downturn. During June–July, >3500 baits were set, but fewer bears were marked than anticipated (Table 7), due to abundant natural foods combined with less attractive baits, owing to the wooden boxes used for the first time this year. This sample was still adequate to derive a statewide population estimate. However, in all previous tetracycline surveys, the estimates derived from the first year's samples have been biased low (by 7–45%). This became evident after collecting a second or third year of samples, which tend to be much less biased than the first. We project that the eventual population estimate, after 1–2 more years of bone collections from hunters, will be <20,000 bears, or a >20% decline since 2002.

DISCUSSION

Harvests of bears remained consistently high during 2003–2007 (Fig. 2), masking an apparent decline in the population. These high harvests (>3000 bears) were due to consistently high hunting success. We do not know whether hunters invested an increasing effort. We will survey hunters in 2009 to quantify hunting effort, and compare that to the effort expended by hunters in 2001, the year of the last hunter survey. It was not until food conditions in the forest reached the high level of 2008 that hunting success markedly declined. 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 and still be publicly acceptable.

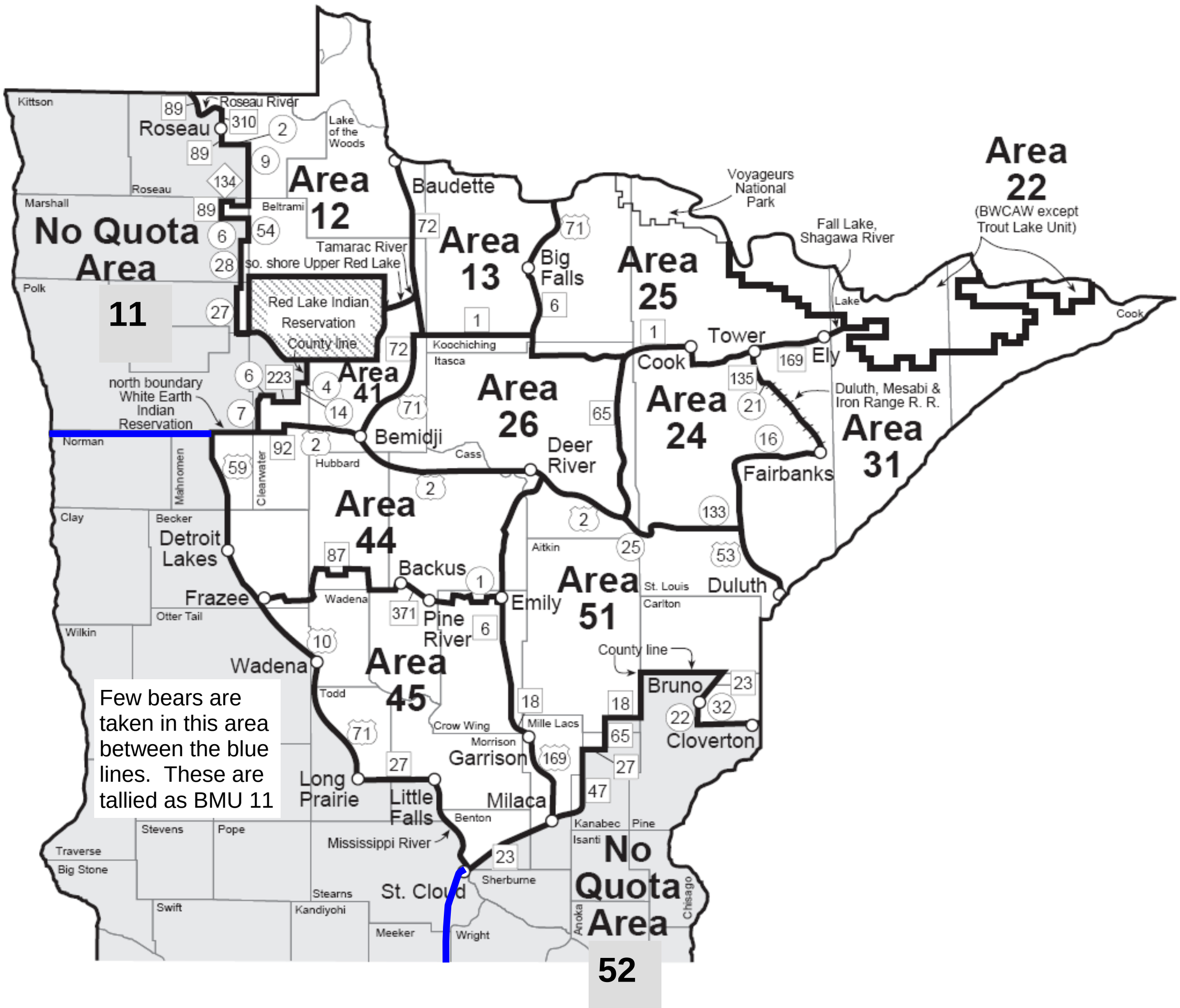


Figure. 1. Bear management units (BMUs) within quota (white) and no-quota (gray) zones. Hunters in the quota zone are restricted to a single BMU, whereas no-quota hunters can hunt anywhere within that zone.

Table 1. Bear permits, licenses, hunters, harvests, and success rates, 1990–2008.

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

[a] Includes 528 applicants for area 99, a designation to increase preference but not to obtain a license.

[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. Total licenses = quota + quota surplus + no-quota + military (no permit needed).

[c] 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.

[d] 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%).

[e] 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.

[f] Record high percent males in harvest (equal only to 1992)

[g] Success rates in 2001–2008 were calculated as number of successful hunters/total hunters, rather than bears killed/total hunters, because hunters could take 2 bears. In 2008, 36 hunters took more than 1 bear (34 took 2 bears on NQ license, 1 hunter took 1 quota and 1 NQ bear, and 1 hunter took 1 quota and 2 NQ bears): thus, the 2135 bears were taken by 2098 different hunters, so success = 2098/9800 = 21%.

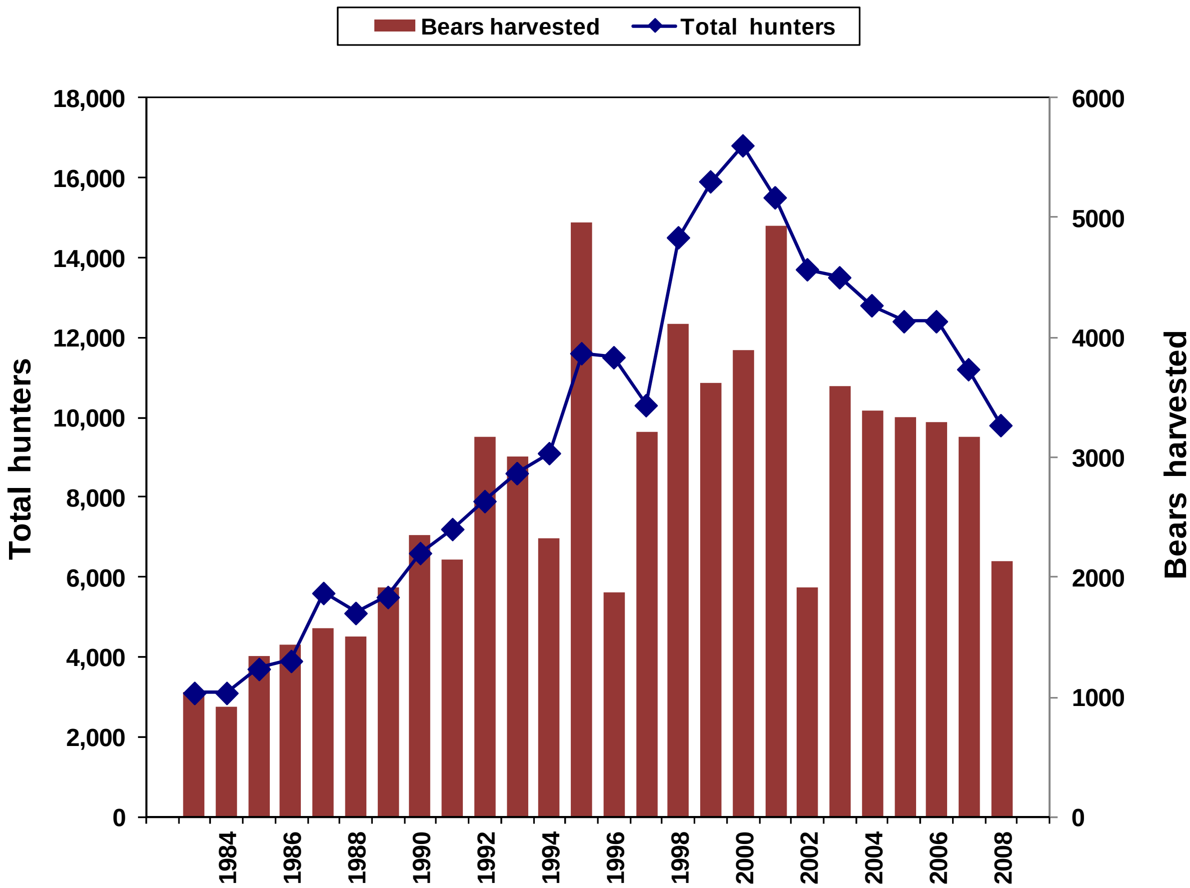


Figure 2. Bears harvested and estimated number of hunters, 1983–2008.

Table 2. Number of bear hunting permits available per year, 2004–2008 (aligned with permit applications in Table 3 below; highlighted numbers show drop from previous year).

BMU	2008	2007	2006	2005	2004
12	450	500	550	550	700
13	650	700	800	900	900
22	150	150	150	150	150
24	750	900	1000	1200	1200
25	1550	1700	1900	1900	1900
26	1150	1250	1500	1500	1500
31	1700	1900	2100	2100	2100
41	400	400	450	450	500
44	1350	1500	1700	1700	2000
45	1000	1200	1200	1500	1500
51	2700	3000	3500	4000	4000
Total	11850	13200	14850	15950	16450

Table 3. Number of bear hunting license applicants, and number and percent of available surplus licenses bought, 2004–2008. Highlighted values indicate undersubscribed.

BMU	2008		2007		2006		2005		2004	
	Apps	Surplus bought	Apps	Surplus bought	Apps	Surplus bought	Apps	Surplus bought	Apps	Surplus bought
12	857		811		1005		864		808	
13	709		745		680	120 100%	714	186 100%	670	129 56%
22	85	50 77%	87	51 81%	92	58 100%	65	46 54%	73	47 61%
24	825		742	159 100%	624	367 98%	749	270 60%	766	259 60%
25	1793	4	1799		1789	112 100%	1923		1793	111 100%
26	1999	2	2028		1915		1997		2110	
31	2388	3	2383		2290		2097	4 100%	2006	92 100%
41	656		577		683		653		601	
44	2821		2669		2838		2884		2934	
45	873	128 100%	936	266 100%	840	360 100%	927	346 60%	1092	332 81%
51	3828		3568		2969	531 100%	3276	726 100%	3613	386 100%
Total	16834	178 92%	16345	476 98%	15725	1548 ~100%	16149	1578 78%	16466	1356 78%

Table 4. Minnesota bear harvest tally[a] for 2008 by Bear Management Unit (BMU) and sex compared to harvests during 2003-2007 and record high harvests.

BMU	2008 M	(%M)	F	U	**Total**	**2007**	**2006**	**2005**	**2004**	**2003**	**5 year mean**	**Record high harvest** (yr)
Quota												
12	74	(74) [b]	26	1	101	124	70	165	165	174	140	263 (01)
13	80	(62)	49	0	129	163	151	205	197	185	180	258 (95)
22	5	(71)	2	0	7	15	15	8	10	3	10	41 (89)
24	73	(73) [b]	27	0	100 [c]	134	194	144	212	163	169	288 (95)
25	165	(55)	133	0	298 [c]	369	421	404	546	510	450	584 (01)
26	71	(52)	66	0	137 [c]	315	314	285	320	303	307	513 (95)
31	168	(68) [b]	80	0	248 [c]	398	482	445	484	436	449	697 (01)
41	44	(57)	33	0	77	104	40	104	83	100	86	201 (01)
44	119	(61)	77	0	196	333	192	273	283	444	305	643 (95)
45	35	(49)	37	0	72	113	118	107	118	143	120	178 (01)
51	217	(63) [b]	127	0	344	557	721	505	544	667	599	895 (01)
Total	1051	(62)	657	1	1709	2625	2718	2759[d]	2962	3128	2838	4288 (01)
No Quota [e]												
11	124	(71)	51	0	175	328	120	335	177	200	232	351 (05)
52	148	(59)	103	0	251	219	400	223	252	270	273	400 (06)
Total	272	(64)	154	0	426	547	520	581[d]	429	470	509	678 (95)
State	1323	(62)	811	1	**2135**	3172	3290[d]	3340[d]	3391	3598	3358	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
2003	84	13
2004	96	39
2005	179	31
2006	63	15
2007	27	9
2008	23	4

[b] Highest percent males ever recorded for BMUs 24, 31 and 51; second highest for BMU 12 (76% in 1992).

[c] Lowest harvest since 1996.

[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 other data on table are uncorrected for estimated 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). Some quota area hunters also apparently hunted in the wrong BMU, based on the block where they said they killed a bear. However, some of these blocks may have been read wrong from the map, so all these were recorded in the BMU where they were assigned, not the BMU of the indicated harvest block.

Table 5. Bear hunting success (%) by BMU, measured as the registered harvest (excluding second bear) divided by the number of licenses sold[a], 2003–2008.

BMU	Mean success 2003-2007	2008		2007		2006		2005[b]		2004		2003		2002
		% Success	% 2 bears[c]	% Success	% 2 bears[c]	% Success	% 2 bears[c]	% Success	% 2 bears[c]	% Success	% 2 bears[c]	% Success	% 2 bears[c]	% Success
Quota	26	21		28		25		25		26		25		14
12	33	32		36		19		41		33		35		22
13	30	28		31		24		32		33		31		19
22	11	8		14		14		10		11		4		8
24	23	20		20		25		20		27		25		15
25	33	28[d]		31		30		30		38		34		23
26	32	17[d]		36		30		34		31		29		17
31	30	21[d]		28		33		31		33		25		17
41	26	27		35		13		31		23		29		14
44	23	21		30		16		24		20		26		9
45	13	11[d]		14		14		13		12		13		4
51	23	19		27		28		18		19		21		9
No Quota	21	17[d]	(8)	19	(11)	22	(9)	23	(9)	18	(7)	21	(10)	10
Statewide	25	20		26		25		25		25		25		13

[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 in 2002–2008.

[d] Lowest success since 2002.

Table 6. Cumulative bear harvest (% of total harvest) by date, 1990–2008.

Year	Day of week for opener	Aug 22/23 – Aug 31 (9–10 days)	Sep 1 – Sep 7 (7 days)	Sep 8 – Sep 14 (7 days)	Sep 15 – Sep 30 (16 days)
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

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

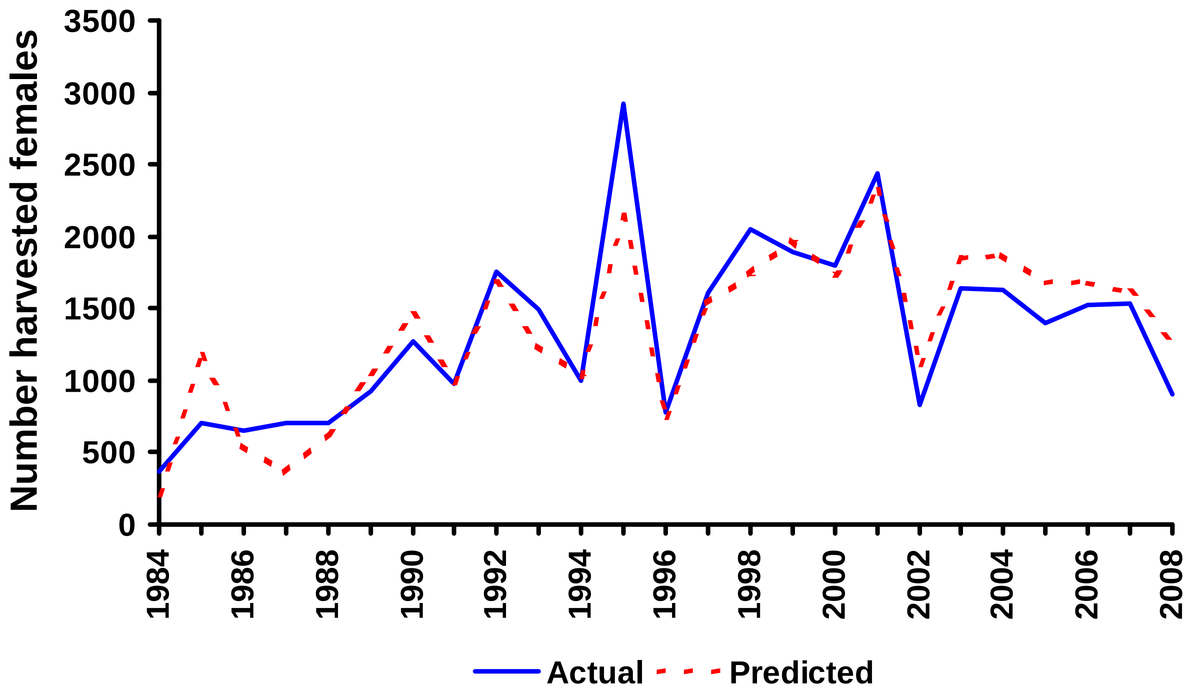


Figure 3. Number of female bears harvested vs. number predicted, based on fall food abundance and hunter numbers. Prediction for 2008 based on regression from 1984–2007 ($R^2 = 0.82$). Note that predictions exceed actual harvest for all years since 2002.

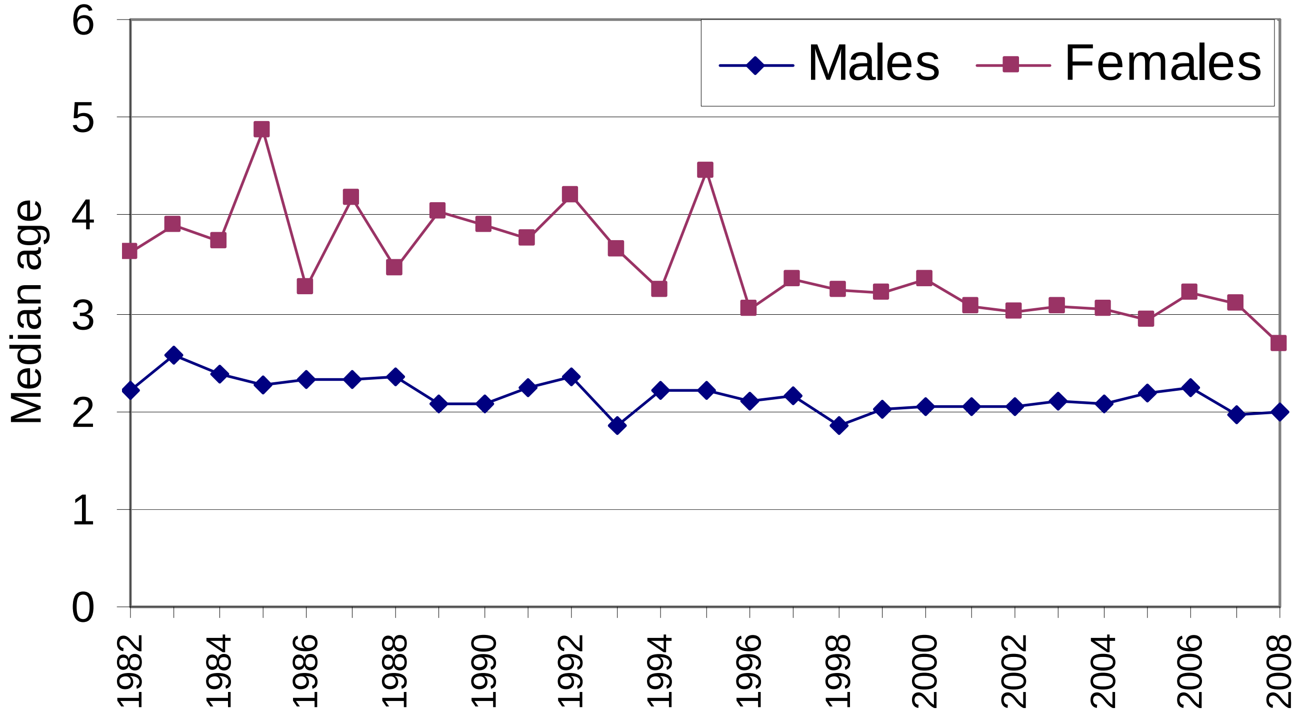


Figure 4. Statewide harvest age structure: median ages by sex, 1982–2008.

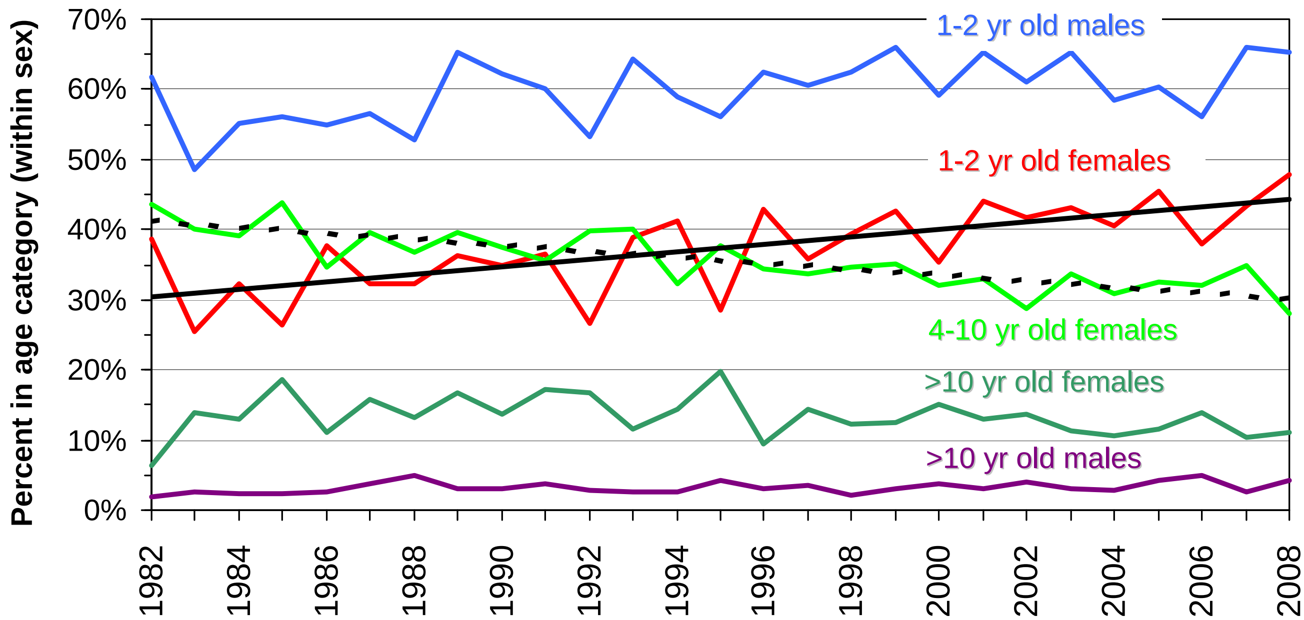


Figure 5. Statewide harvest age structure: proportion of each sex in age category, 1982–2008. Trend lines are significant, indicating a long-term change in age structure.

Table 7. Tetracycline-marking data: 1991, 1997, 2002, and 2008 (years of marking).

	1991	1997	2002	2008
Baits set	2905	2989	3122	3539
Baits eaten by bears	998	1213	707	490
Ribs/teeth checked for tetracycline [a]	1958	2611	1429	1498
Tetracycline-marked samples	122	149	56	57
(% marked)	(6.2%)	(5.7%)	(3.9%)	(3.8%)
Double-marked samples	11	10	2	2
(% double-marked)	(9.0%)	(6.7%)	(3.6%)	(3.5%)

[a] **Excluding cubs, which are not counted in population estimates.**

2008 Minnesota Deer Harvest Report

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

INTRODUCTION

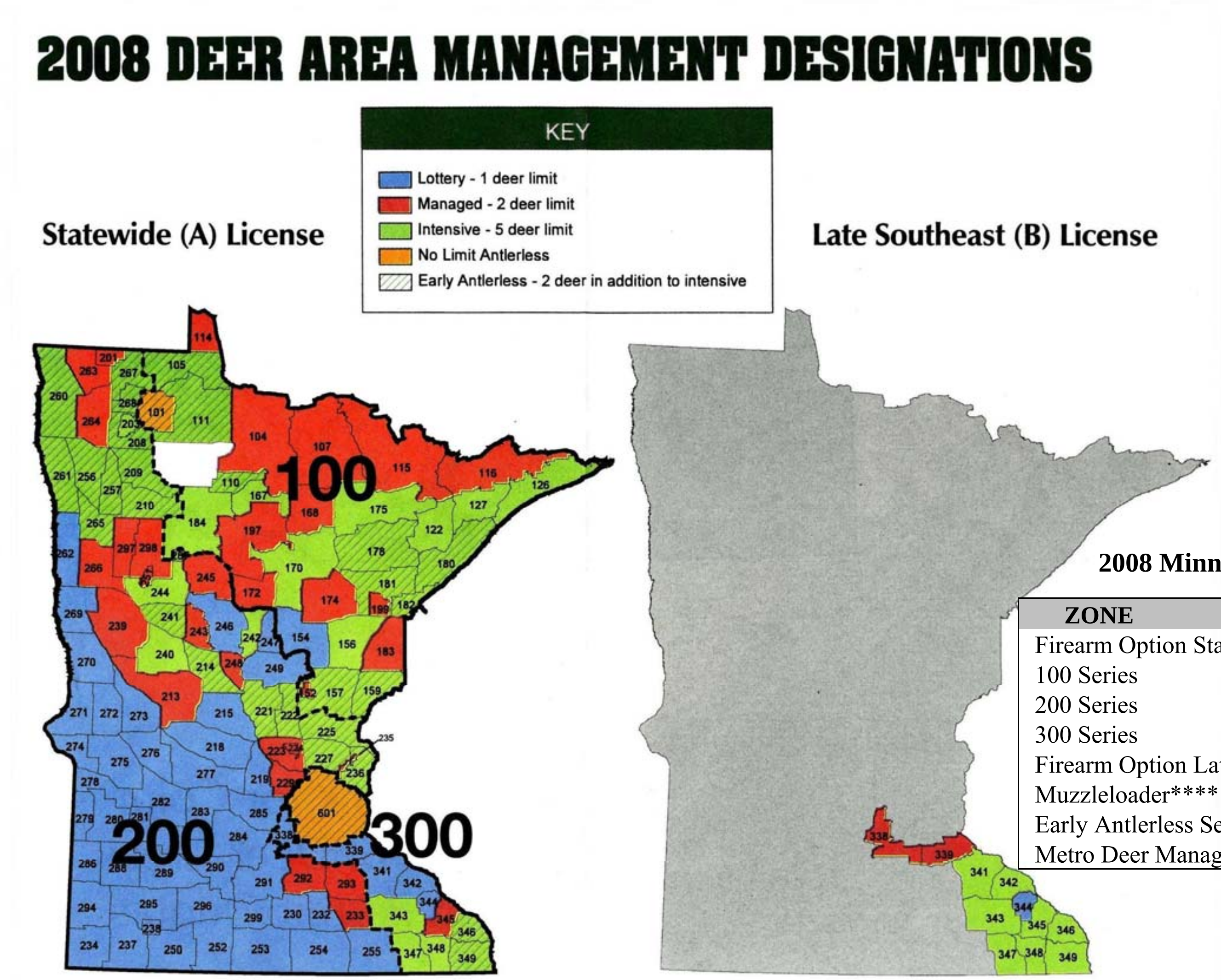
The white-tailed deer may be considered Minnesota's most popular wildlife species. Each year 500,000 hunters harvest over 200,000. In 2008, hunters registered 221,837 deer

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 2008 deer harvest are presented in the following tables.



2008 Minnesota Firearms Deer Seasons

ZONE	DATES
Firearm Option Statewide (A)*	
100 Series	Nov. 8-23
200 Series	Nov. 8-16
300 Series	Nov. 8-14
Firearm Option Late Southeast (B)**	Nov. 22-30
Muzzleloader****	Nov. 29-Dec. 14
Early Antlerless Season***	Oct. 11-12
Metro Deer Management Area (601)***	Nov. 8-30A

Figure 1. 2008 Firearms and Archery Deer Seasons.

2008 Minnesota Archery Deer Season Dates: September 13-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, 1992-2008.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
REGULAR FIREARMS																	
Resident License Sales	443,005	426,215	427,343	419,965	389,745	369,190	378,320	395,745	400,814	401,005	367,964	344,875	309,698	291,298	299,774	285,286	376,006
Non-Resident License Sales	8,033	8,498	9,190	9,339	8,535	7,830	8,852	9,970	10,595	10,972	10,835	11,334	12,036	12,523	12,520	12,520	11,883
Bonus Permit Sales	40,471	18,140	19,308	22,603	27,148	32,229	20,884	23,785	34,802	59,013	105,699	194,201	183,186	184,566	167,343	145,522	190,156
Multi-Zone Buck License Sales	5,711	16,881	24,590	29,902	38,806	42,803	44,739	43,903	42,669	41,921	35,658	32,929	32,359	28,233	15,984	15,051	N/A
Resident Youth License Sales				1,835	2,964	3,844	3,445	2,038	3,215	4,011	2,884	34,463	51,347	50,501	49,599	49,242	50,397
All Season Deer License Sales									2,384	3,986	22,125	30,998	46,008	59,090	75,511	76,385	N/A
Total License Sales	497,220	469,734	480,879	483,644	467,198	455,896	456,240	475,441	495,289	519,601	545,165	648,800	634,634	626,211	620,731	584,006	628,442
Registered Buck Harvest[1]	95,503	79,463	85,579	88,997	71,242	64,867	82,921	92,584	102,961	98,894	101,333	110,440	116,612	95,594	95,695	97,528	85,646
Antlerless Permits Offered	322,030	236,055	199,950	201,525	154,195	150,195	140,280	177,380	232,595	286,540	365,667	31,625	30,760	28,830	28,830	28,830	28,830
Antlerless Permits Issued	277,776	194,888	164,418	162,761	116,650	105,481	108,016	135,852	180,490	196,603	192,907	25,386	24,111	25,656	25,656	25,656	25,656
Antlerless Permits App.	317,947	262,402	260,086	257,653	174,329	142,260	151,148	214,597	237,571	225,341	202,086	30,253	28,454	31,403	31,403	31,403	31,403
Registered AL Harvest[1]	133,733	108,646	92,704	109,196	68,106	62,038	60,475	71,681	88,492	98,169	102,280	147,420	123,278	119,363	135,981	118,860	98,147
Registered Total Harvest[1]	229,236	188,109	178,283	198,193	139,348	126,905	143,396	164,265	191,453	197,063	203,613	257,860	239,890	214,957	231,676	216,388	183,793
Registered % Successful[2]	46.1	40	37.1	40.1	29.8	27.8	31.4	34.8	38.6	37.9	37.3	39.7	37.8	34.3	37.3	37.1	35.1
ARCHERY																	
Resident License Sales	71,946	69,434	71,409	70,056	67,058	63,499	63,826	66,226	68,947	69,608	57,532	59,339	50,601	50,293	49,595	52,780	87,872
Non-Resident License Sales	914	1,128	1,156	1,171	1,098	980	1,029	1,073	1,271	1,288	1,275	1,428	1,144	1,207	1,286	1,509	1,509
Youth Archery Sales	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3,748	7,261	7,489	7,688	7,663	9,005
Mgmt Permit License Sales	14,349	14,907	13,121	15,387	15,632	17,478	15,846	16,945	20,393	22,141	18,126	N/A	N/A	N/A	N/A	N/A	N/A
Total License Sales	87,209	85,469	85,686	86,614	83,788	81,957	80,701	84,244	90,611	93,037	76,933	60,767	59,006	58,989	58,569	61,952	99,033
Total Harvest - Archery Lic/Bonus	13,004	13,722	13,818	14,521	14,338	13,258	12,306	13,376	15,776	15,884	14,744	19,335	17,237	18,975	17,076	17,261	22,632
Total Harvest - All-Season license												2,356	3,489	4,563	8,284	6,900	N/A
Total Archery Harvest	13,004	13,722	13,818	14,521	14,338	13,258	12,306	13,376	15,776	15,884	14,744	21,691	20,726	23,538	25,360	24,161	22,632
Registered % Successful[2]	14.9	16.1	16.1	16.8	17.1	16.2	15.2	15.8	17.4	17.1	19.2	22.3	29.2	24.6	24.8	24.3	18.5
MUZZLELOADER																	
Total Muzzleloader License Sales	--	--	--	--	--	--	--	--	11,972	13,043	11,764	9,142	10,512	9,226	10,781	9,867	64,673
Estimated All-Season Hunters	--	--	--	--	--	--	--	--	--	--	--	12,020	14,168	23,293	23,293	26,813	N/A
Total Muzzleloader Harvest	828	1,097	1,725	2,452	3,367	3,164	3,152	2,928	4,548	4,494	3,505	9,466	9,289	15,421	13,507	12,138	9,572
Registered % Successful[2]									38.0	34.5	29.8	44.7	37.6	47.4	39.6	28.2	13.4
TOTAL Registered Harvest	243,068	202,928	193,826	215,166	157,317	143,327	158,854	180,569	211,777	217,452	222,050	290,525	260,604	255,736	270,778	260,434	221,837

[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, 2008.

Firearms/Zone	Hunters	Harvest Bucks	Harvest Antlerless	Harvest Total	Overall Success
1	174,479	35,250	43,385	78,635	37.3%
2	226,694	42,492	43,908	86,400	33.0%
3A	21,492	4,947	3,224	8,171	33.1%
3B	18,907	2,215	6,315	9,645	41.9%
4A	40,151	7,818	4,154	11,972	28.7%
4B	20,048	5,064	3,926	8,990	42.9%
Early Season	26,934	0	5,372	5,372	17.7%
Free Landowner[1]	4,393	0	1,222	1,222	27.8%
Muzzleloader[2]	64,673	2,583	6,989	9,572	13.4%
Archery[3]	99,033	7,224	15,408	22,632	18.5%
TOTAL[4]	**482,613**	**95,511**	**126,326**	**221,837**	37.5%

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

[2] Total number of people who bought only an archery 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, 2008. 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	273	101	238	92	704	496	0.55	0.87	1.42
104	1A	1056	167	673	121	2,017	2,078	0.51	0.46	0.97
105	1A	923	228	762	176	2,089	740	1.25	1.58	2.82
107	1A	1522	267	997	182	2,968	1,896	0.80	0.76	1.57
110	1A	631	198	602	165	1,596	300	2.10	3.22	5.32
111	1A	732	145	422	99	1,398	1,437	0.51	0.46	0.97
114	1A	62	5	30	2	99	123	0.50	0.30	0.80
115	1A	1713	292	1037	197	3,239	1,867	0.92	0.82	1.74
116	1A	207	18	100	8	333	1,164	0.18	0.11	0.29
122	1A	575	69	275	57	976	619	0.93	0.65	1.58
126	1A	500	65	307	34	906	943	0.53	0.43	0.96
127	1A	104	5	55	6	170	561	0.19	0.12	0.30
152	1A	121	37	82	36	276	61	1.98	2.54	4.52
154	1A	1401	211	685	129	2,426	760	1.84	1.35	3.19
156	1A	1766	509	1493	385	4,153	825	2.14	2.89	5.03
157	1A	2228	780	1828	520	5,356	889	2.51	3.52	6.02
159	1A	1167	298	1018	237	2,720	568	2.06	2.73	4.79
167	1A	691	201	632	177	1,701	432	1.60	2.34	3.94
168	1A	1199	298	1068	234	2,799	723	1.66	2.21	3.87
170	1A	2575	925	2547	628	6,675	1,311	1.96	3.13	5.09
172	1A	1369	423	1580	345	3,717	451	3.04	5.21	8.25
174	1A	1207	316	939	241	2,703	835	1.45	1.79	3.24
175	1A	1817	412	1492	327	4,048	1,249	1.45	1.79	3.24
178	1A	2229	570	1705	422	4,926	1,259	1.77	2.14	3.91
180	1A	1476	227	919	140	2,762	983	1.50	1.31	2.81
181	1A	1690	375	1219	341	3,625	709	2.38	2.73	5.12
182	1A	315	72	262	60	709	269	1.17	1.47	2.64
183	1A	1368	309	960	223	2,860	663	2.06	2.25	4.31
184	1A	3253	1077	3164	1032	8,526	1,231	2.64	4.28	6.93
197	1A	967	179	659	150	1,955	975	0.99	1.01	2.01
199	1A	113	13	65	6	197	148	0.76	0.57	1.33
201	2A	93	17	47	11	168	161	0.58	0.47	1.04
203	2A	92	21	45	15	173	118	0.78	0.69	1.47
208	2A	205	55	178	45	483	379	0.54	0.73	1.28
209	2A	508	135	466	140	1,249	639	0.79	1.16	1.95
210	2A	1082	288	813	264	2,447	615	1.76	2.22	3.98
213	2A	1587	479	1065	357	3,488	1,057	1.50	1.80	3.30
214	2A	1222	508	1072	436	3,238	557	2.20	3.62	5.82
215	2A	873	216	566	178	1,833	701	1.24	1.37	2.61
218	2A	637	143	389	106	1,275	884	0.72	0.72	1.44
219	2A	418	74	180	50	722	392	1.07	0.78	1.84
221	2A	900	354	641	249	2,144	642	1.40	1.94	3.34
222	2A	775	256	523	197	1,751	413	1.88	2.36	4.24
223	2A	430	112	220	80	842	377	1.14	1.09	2.23
224	2A	109	26	71	30	236	47	2.33	2.72	5.05
225	2A	1204	321	785	270	2,580	618	1.95	2.23	4.17
227	2A	775	165	415	133	1,488	471	1.65	1.51	3.16

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	198	63	135	34	430	287	0.69	0.81	1.50
230	2A	199	29	132	22	382	452	0.44	0.40	0.85
232	2A	195	27	95	14	331	377	0.52	0.36	0.88
233	2A	190	47	135	25	397	385	0.49	0.54	1.03
234	2A	167	10	106	14	297	636	0.26	0.20	0.47
235	2A	52	12	35	8	107	32	1.62	1.71	3.34
236	2A	666	139	403	75	1,283	372	1.79	1.66	3.45
237	2A	259	20	83	15	377	728	0.36	0.16	0.52
238	2A	53	5	19	0	77	95	0.56	0.25	0.81
239	2A	1458	364	1062	308	3,192	922	1.58	1.88	3.46
240	2A	1701	629	1425	547	4,302	642	2.65	4.05	6.71
241	2A	1293	548	1068	481	3,390	417	3.10	5.03	8.14
242	2A	543	226	628	185	1,582	215	2.53	4.84	7.37
243	2A	895	247	751	230	2,123	314	2.85	3.92	6.77
244	2A	1762	701	1728	651	4,842	583	3.02	5.28	8.30
245	2A	1779	569	1625	489	4,462	583	3.05	4.60	7.66
246	2A	1545	250	727	192	2,714	772	2.00	1.52	3.52
247	2A	589	121	311	66	1,087	229	2.57	2.17	4.74
248	2A	360	118	256	69	803	212	1.70	2.09	3.79
249	2A	1060	193	495	149	1,897	502	2.11	1.67	3.78
250	2A	336	18	158	17	529	711	0.47	0.27	0.74
251	2A	57	11	58	15	141	55	1.03	1.52	2.56
252	2A	271	9	76	9	365	715	0.38	0.13	0.51
253	2A	387	36	139	18	580	974	0.40	0.20	0.60
254	2A	415	51	211	31	708	930	0.45	0.32	0.76
255	2A	350	35	129	35	549	774	0.45	0.26	0.71
256	2A	502	104	412	102	1,120	653	0.77	0.95	1.71
257	2A	416	98	385	70	969	412	1.01	1.34	2.35
260	2A	607	110	526	134	1,377	1,249	0.49	0.62	1.10
261	2A	178	33	179	34	424	795	0.22	0.31	0.53
262	2A	188	10	48	12	258	677	0.28	0.10	0.38
263	2A	369	59	222	67	717	512	0.72	0.68	1.40
264	2A	709	134	503	107	1,453	669	1.06	1.11	2.17
265	2A	455	128	493	153	1,229	494	0.92	1.57	2.49
266	2A	338	80	261	67	746	617	0.55	0.66	1.21
267	2A	201	49	136	31	417	472	0.43	0.46	0.88
268	2A	262	58	185	39	544	229	1.14	1.23	2.37
269	2A	216	18	62	9	305	650	0.33	0.14	0.47
270	2A	145	2	21	3	171	748	0.19	0.03	0.23
271	2A	163	4	19	4	190	632	0.26	0.04	0.30
272	2A	170	4	30	5	209	531	0.32	0.07	0.39
273	2A	393	40	191	33	657	572	0.69	0.46	1.15
274	2A	216	18	39	16	289	355	0.61	0.21	0.81
275	2A	328	17	57	11	413	764	0.43	0.11	0.54
276	2A	524	33	107	18	682	543	0.97	0.29	1.26
277	2A	1049	98	299	53	1,499	813	1.29	0.55	1.84
278	2A	411	32	110	20	573	401	1.03	0.40	1.43

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	222	14	78	12	326	344	0.65	0.30	0.95
280	2A	229	11	76	7	323	675	0.34	0.14	0.48
281	2A	502	13	99	8	622	575	0.87	0.21	1.08
282	2A	111	8	37	6	162	779	0.14	0.07	0.21
283	2A	221	11	40	10	282	614	0.36	0.10	0.46
284	2A	272	18	61	11	362	838	0.32	0.11	0.43
285	2A	359	47	135	21	562	550	0.65	0.37	1.02
286	2A	311	14	58	9	392	446	0.70	0.18	0.88
287	2A	81	27	112	29	249	46	1.76	3.66	5.42
288	2A	428	23	95	15	561	625	0.69	0.21	0.90
289	2A	197	13	42	10	262	816	0.24	0.08	0.32
290	2A	425	22	150	14	611	662	0.64	0.28	0.92
291	2A	635	45	251	49	980	802	0.79	0.43	1.22
292	2A	414	99	332	72	917	480	0.86	1.05	1.91
293	2A	403	85	274	68	830	511	0.79	0.83	1.62
294	2A	246	21	75	22	364	686	0.36	0.17	0.53
295	2A	493	23	125	32	673	840	0.59	0.21	0.80
296	2A	298	16	110	19	443	666	0.45	0.22	0.66
297	2A	192	42	136	56	426	438	0.44	0.53	0.97
298	2A	690	145	406	111	1,352	618	1.12	1.07	2.19
299	2A	233	19	126	20	398	386	0.60	0.43	1.03
338	3A	193	16	41	5	255	454	0.43	0.14	0.56
338	3B	58	29	102	24	213	454	0.13	0.34	0.47
339	3A	180	12	27	6	225	394	0.46	0.11	0.57
339	3B	74	43	99	37	253	394	0.19	0.45	0.64
341	3A	533	25	90	17	665	611	0.87	0.22	1.09
341	3B	315	212	537	141	1,205	611	0.52	1.46	1.97
342	3A	471	22	86	12	591	350	1.34	0.34	1.69
342	3B	244	177	438	112	971	350	0.70	2.08	2.77
343	3A	491	101	298	67	957	662	0.74	0.70	1.44
343	3B	218	127	393	97	835	662	0.33	0.93	1.26
344	3A	394	17	66	11	488	189	2.08	0.50	2.58
344	3B	95	35	102	21	253	189	0.50	0.83	1.34
345	3A	310	51	129	42	532	326	0.95	0.68	1.63
345	3B	188	84	284	62	618	326	0.58	1.32	1.90
346	3A	664	92	329	75	1,160	319	2.08	1.56	3.64
346	3B	271	162	499	137	1,069	319	0.85	2.50	3.35
347	3A	360	94	201	44	699	434	0.83	0.78	1.61
347	3B	158	107	344	74	683	434	0.36	1.21	1.58
348	3A	499	87	367	59	1,012	332	1.50	1.55	3.05
348	3B	185	100	401	90	776	332	0.56	1.78	2.34
349	3A	852	146	452	137	1,587	492	1.73	1.49	3.23
349	3B	409	241	786	218	1,654	492	0.83	2.53	3.36
601	Metro	561	132	396	79	1,168	1,633	0.34	0.37	0.72
901		0	0	1	0	1				
902		2	2	7	0	11				
903		34	38	90	32	194				

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
904		0	5	10	0	15				
905		3	1	6	3	13				
906		3	2	1	1	7				
907		7	1	4	4	16				
908		0	0	1	0	1				
909		0	1	0	1	2				
910		1	0	0	0	1				
911		0	3	7	1	11				
912		1	6	12	6	25				
913		1	0	0	0	1				
914		18	22	38	14	92				
915		0	1	3	4	8				
916		19	7	13	6	45				
918		0	0	2	0	2				
919		30	16	56	20	122				
920		0	0	1	0	1				
921		5	1	1	0	7				
922		0	1	6	1	8				
923		0	2	3	2	7				
924		7	1	12	0	20				
925		0	0	6	2	8				
926		3	9	21	11	44				
927		8	2	18	5	33				
928		7	15	37	16	75				
929		0	6	16	5	27				
930		10	5	23	3	41				
931		5	0	6	2	13				
932		14	3	11	1	29				
933		3	2	6	1	12				
TOTAL		**85,646**	**20,549**	**61,269**	**16,329**	**183,793**				

Table 4. Firearm Bonus Permit Harvest by Permit Area, 2008
Managed Permit Areas.

Permit Area	Zone	Fawn Male	Adult Female	Fawn Female	Total
104	1A	87	390	70	547
107	1A	148	555	116	819
114	1A	2	18	1	21
115	1A	166	559	105	830
116	1A	12	61	6	79
152	1A	16	36	21	73
168	1A	148	516	100	764
172	1A	207	774	195	1,176
174	1A	161	472	141	774
183	1A	144	474	115	733
197	1A	89	352	83	524
199	1A	8	40	3	51
201	2A	12	24	5	41
213	2A	213	492	170	875
223	2A	53	115	31	199
224	2A	9	37	18	64
229	2A	27	80	17	124
233	2A	20	79	13	112

Permit Area	Zone	Fawn Male	Adult Female	Fawn Female	Total
235	2A	6	19	7	32
239	2A	214	562	195	971
243	2A	120	426	127	673
245	2A	276	820	266	1,362
248	2A	65	148	42	255
251	2A	4	34	9	47
263	2A	29	117	40	186
264	2A	70	284	63	417
266	2A	46	149	36	231
292	2A	43	154	41	238
293	2A	37	135	42	214
297	2A	24	72	35	131
298	2A	79	207	67	353
345	3A	12	18	8	38
338	3B	14	37	12	63
339	3B	20	50	20	90
Total		**2,581**	**8,306**	**2,220**	**13,107**

Table 4. Firearm Bonus Permit Harvest by Permit Area, 2008.

Intensive Permit Areas

Permit Area	Zone	Fawn Male	Adult Female	Fawn Female	Total
101	1A	3	32	5	40
105	1A	179	580	124	883
110	1A	131	414	129	674
111	1A	88	264	64	416
122	1A	42	158	32	232
126	1A	45	204	23	272
127	1A	2	28	2	32
156	1A	308	960	275	1,543
157	1A	479	1067	328	1,874
159	1A	182	623	161	966
167	1A	110	380	109	599
170	1A	635	1681	442	2,758
175	1A	247	959	227	1,433
178	1A	330	1043	278	1,651
180	1A	162	646	107	915
181	1A	248	808	262	1,318
182	1A	44	180	42	266
184	1A	768	2331	786	3,885
203	2A	7	33	10	50
208	2A	37	128	36	201
209	2A	97	340	117	554
210	2A	194	565	186	945
214	2A	300	654	255	1,209
221	2A	216	410	176	802
222	2A	141	313	129	583
225	2A	172	463	176	811
227	2A	113	258	92	463
236	2A	94	280	53	427

Permit Area	Zone	Fawn Male	Adult Female	Fawn Female	Total
240	2A	400	925	374	1,699
241	2A	376	755	340	1,471
242	2A	139	407	126	672
244	2A	483	1207	466	2,156
256	2A	69	289	79	437
257	2A	60	271	51	382
260	2A	76	390	95	561
261	2A	25	133	27	185
265	2A	80	324	112	516
267	2A	27	89	19	135
268	2A	44	132	28	204
287	2A	19	71	21	111
341	3A	3	5	2	10
341	3B	97	268	80	445
342	3A	0	6	1	7
342	3B	99	234	67	400
343	3A	69	221	49	339
343	3B	67	197	67	331
345	3A	19	62	22	103
345	3B	35	118	33	186
346	3A	62	248	56	366
346	3B	80	279	80	439
347	3A	59	157	31	247
347	3B	65	199	46	310
348	3A	54	260	46	360
348	3B	50	208	53	311
349	3A	94	342	102	538
349	3B	125	461	143	729
601	Metro	97	277	59	433
Total		**8,247**	**24,337**	**7,301**	**39,885**

Table 5. Early Antlerless Season Harvest by Permit Area, 2008.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
101	6	22	7	35
105	20	88	18	126
110	19	113	29	161
111	12	63	14	89
157	74	247	76	397
159	33	128	30	191
178	107	356	124	587
180	50	169	40	259
181	62	267	85	414
182	16	73	22	111
208	5	19	4	28
209	28	105	28	161
210	41	165	64	270
214	103	176	102	381
221	59	129	65	253
222	41	74	34	149
225	54	108	56	218
227	24	43	14	81
236	19	49	17	85
241	92	195	105	392
256	28	63	20	111
257	25	55	27	107
260	17	76	19	112
261	1	34	4	39
265	29	63	29	121
267	6	17	6	29
268	3	25	8	36
346	35	86	25	146
349	38	131	69	238
601	8	30	7	45
Total	1,055	3,169	1,148	5,372

Table 6. Summary of Firearms Special Hunts, 2008. Includes regular, youth, and bonus permits.

				Harvest				
Area	Dates	Zone	Permits Issued	Adult Male	Adult Femal	Fawn Male	Fawn Female	Total
901 - Rice Lake Nat. Wildlife Refuge	11/15-11/23	1A	100*	6	2	1	0	9
902 - St. Croix State Park[1]	11/15-11/18	1A	550**	65	142	60	51	318
903 - Savanna Portage State Park[1]	11/15-11/19	1A	40***	6	12	3	4	25
904 - Gooseberry Falls State Park[1]	11/8-11/23	1A	30*	2	4	0	0	6
905 - Split Rock Lighthouse State Park[1]	11/8-11/23	1A	30*	4	2	1	0	7
906 - Tettegouche State Park[1]	11/8-11/23	1A	125*	6	12	3	2	23
907 - Scenic State Park[1]	11/8-11/23	1A	30*	0	3	1	0	4
908 - Hayes Lake State Park[1]	11/8-11/23	1A	Unl.	0	2	0	0	2
909 - Lake Bemidji State Park[1]	11/8-11/11	1A	35#	1	9	5	1	16
910 - Zippel Bay State Park[1]	11/8-11/23	1A	55#	0	4	0	0	4
911 - Judge CR Magney SP*	11/8-11/23	1A	Unl.	1	1	0	1	3
912 - Wild River State Park[1]	11/8-11/11	2A	150**	19	36	16	32	103
913 - Lake Carlos State Park[1]	11/8-11/11	2A	25#	0	11	5	2	18
914 - William O'Brien State Park[1]	11/8-11/10	2A	65*	18	23	7	6	54
915 - Lake Bronson State Park[1]	11/8-11/16	2A	30#	0	2	1	1	4
916 - Maplewood State Park[1]	11/8-11/16	2A	100**	23	55	30	20	128
917 - Rydell NWR	11/8-11/16	2A	12#	0	0	0	0	0
918 - Lake Alexander SNA[1]	11/8-11/16	2A	40*	4	2	0	0	6
919 - Buffalo River State Park[1]	11/8-11/9	3A	16#	7	11	9	3	30
920 - Glacial Lakes State Park	11/13-11/16	3A	30#	0	4	1	0	5
921 - Lake Louise State Park[1]	11/8-11/9	3A	25**	10	31	22	24	87
922 - Beaver Creek Valley State Park[1]	11/8-11/10	3A	20**	13	28	14	9	64
923 - Zumbro Falls SNA[1]	11/8-11/14	3A	12#	0	6	0	2	8
924 - Forestville/Mystery Cave SP[1]	11/22-11/24 11/28-11/30	3B	110***	0	10	3	0	13
925 - Frontenac State Park[1]	11/22-11/24	3B	50**	2	18	8	2	30
926 - Great River Bluffs SP[1]	11/22-11/24 11/28-11/30	3B	100**	14	50	11	20	95
927 - Whitewater State Park[1]	11/22-11/24	3B	50**	16	27	14	14	71
928 - Zumbro Falls SNA[1]	11/22-11/30	3B	12#	0	6	1	1	8
929 - Whitewater Refuge	11/22-11/30	3B	50#	6	5	6	2	19
930 - Lake Elmo Park Reserve	11/8-11/16	Metro	50**	0	19	5	7	31
931 - Vermillion Highlands WMA[1]	11/8-11/21	Metro	25*	8	8	2	2	20
932 - Elm Creek Park Reserve[1]	11/22-11/23	Metro	150*	28	13	33	3	77
933 - Murphy-Hanrahan Park Rsv[1]	11/29-11/30	Metro	90*	8	5	21	4	38
TOTAL				267	563	283	213	1,326

[1] Bonus permits available *Either sex ** Earn-A-Buck
***Antler Point Restriction #Antlerless Only

Table 7. Free Landowner Firearms Harvest by Permit Area, 2008.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
101	0	3	0	3
104	2	10	4	16
105	1	9	3	13
107	1	8	2	11
110	3	6	1	10
111	1	2	1	4
115	0	3	1	4
122	0	1	1	2
156	1	7	3	11
157	11	24	7	42
159	1	2	0	3
167	0	5	0	5
168	0	4	0	4
170	3	14	0	17
172	0	4	2	6
174	3	5	2	10
175	0	8	1	9
178	1	5	1	7
180	1	3	1	5
181	2	4	0	6
182	2	1	0	3
183	1	4	1	6
184	12	36	14	62
197	2	5	2	9
203	0	1	0	1
208	1	2	3	6
209	3	10	2	15
210	5	12	5	22
213	18	28	5	51
214	19	45	19	83
221	8	15	6	29
222	5	5	1	11
223	0	2	0	2
225	8	7	10	25
227	0	2	1	3
229	1	2	0	3
233	0	2	1	3
236	0	1	2	3
239	6	29	2	37
240	15	26	11	52
241	12	27	10	49
243	5	16	9	30
244	10	22	7	39
245	4	12	1	17
248	3	3	2	8
251	0	1	0	1
256	1	7	1	9
257	5	10	2	17
260	1	11	4	16
261	0	2	0	2
263	0	3	1	4
264	2	22	4	28
265	3	10	4	17
266	2	6	3	11
267	0	4	0	4
268	3	2	1	6
292	5	8	4	17
293	2	3	1	6
297	0	5	2	7
298	2	8	4	14
341	5	15	5	25
342	8	14	1	23
343	0	11	5	16
345	0	10	1	11
345	2	1	2	5
346	8	35	6	49
347	5	7	3	15
348	3	18	2	23
349	12	37	9	58
601	0	1	0	1
TOTAL	240	693	209	1,142

Table 8. Archery Harvest by Permit Area, 2008.
Includes Regular, Youth, All-Season, and Bonus Permits.

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
101	8	1	7	0	16
104	7	3	31	1	42
105	28	8	56	6	98
107	31	5	47	6	89
110	19	11	44	5	79
111	4	0	13	1	18
114	7	2	10	2	21
115	30	4	49	3	86
116	3	2	16	2	23
122	8	0	11	3	22
126	13	8	38	6	65
127	1	0	9	0	10
152	2	0	5	2	9
154	60	10	41	4	115
156	57	35	147	23	262
157	95	43	248	35	421
159	59	25	150	18	252
167	9	9	59	8	85
168	30	8	53	11	102
170	94	53	355	55	557
172	47	16	93	16	172
174	29	14	59	3	105
175	46	18	123	15	202
178	71	35	174	23	303
180	90	28	144	22	284
181	121	39	232	38	430
182	170	109	421	97	797
183	49	10	86	10	155
184	122	55	335	64	576
197	24	4	30	1	59
199	6	2	5	0	13
201	1	0	0	0	1
203	0	0	3	0	3
208	8	1	7	0	16
209	20	7	45	5	77
210	27	9	66	13	115
213	177	42	227	30	476
214	61	41	204	32	338
215	119	19	45	4	187
218	92	10	64	13	179
219	79	11	49	7	146
221	76	45	172	37	330
222	50	24	118	19	211
223	124	33	123	29	309
224	17	2	11	4	34
225	99	45	217	51	412
227	178	54	314	54	600
229	43	18	73	17	151
230	38	5	17	0	60
232	16	4	16	2	38
233	47	12	66	15	140
234	13	1	13	0	27

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
235	7	1	15	1	24
236	218	78	319	47	662
237	25	1	13	0	39
238	4	0	1	0	5
239	62	17	85	19	183
240	81	43	266	38	428
241	61	36	241	35	373
242	104	60	336	57	557
243	48	16	77	14	155
244	87	61	251	52	451
245	77	23	121	26	247
246	36	17	30	6	89
247	54	12	41	3	110
248	37	10	51	12	110
249	58	6	44	4	112
250	30	2	19	2	53
251	1	0	1	0	2
252	37	2	16	6	61
253	55	4	40	3	102
254	54	1	31	1	87
255	67	4	32	5	108
256	16	3	43	7	69
257	13	6	29	3	51
260	26	16	49	7	98
261	14	2	25	1	42
262	21	1	10	5	37
263	4	1	10	2	17
264	15	3	14	2	34
265	20	6	45	6	77
266	23	3	22	1	49
267	6	6	20	2	34
268	5	2	24	3	34
269	25	5	5	1	36
270	22	3	7	1	33
271	21	1	11	2	35
272	13	0	3	1	17
273	34	1	14	1	50
274	17	4	16	2	39
275	21	1	23	2	47
276	35	2	16	2	55
277	147	12	86	11	256
278	53	3	34	6	96
279	9	2	12	3	26
280	18	3	14	3	38
281	48	1	33	1	83
282	9	0	6	1	16
283	21	2	13	0	36
284	36	4	15	3	58
285	61	9	34	4	108
286	18	1	15	2	36
288	59	8	33	6	106
289	15	1	12	1	29

Table 8. (Continued)

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
290	45	3	46	9	103
291	132	10	74	8	224
292	52	21	84	6	163
293	85	21	77	10	193
294	23	4	16	7	50
295	43	4	36	6	89
296	40	0	17	0	57
297	4	2	4	2	12
298	10	4	14	3	31
299	55	3	36	3	97
338	73	10	64	7	154
339	64	10	53	5	132

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
341	152	65	262	36	515
342	95	30	156	34	315
343	238	91	486	66	881
344	57	5	28	2	92
345	77	26	120	20	243
346	166	39	227	37	469
347	88	37	209	29	363
348	104	30	169	43	346
349	164	47	250	58	519
601	616	241	1010	188	2,055
970*	98	34	147	41	320
971**	70	31	74	16	191
Total	**7,224**	**2,214**	**11,323**	**1,871**	**22,632**

*Camp Ripley First Hunt

**Camp Ripley Second Hunt

Table 9. Archery Harvest using Bonus Permits by Permit Area, 2008.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
101	0	4	0	4
104	2	19	0	21
105	7	46	6	59
107	2	31	5	38
110	9	35	5	49
111	0	9	1	10
114	2	7	1	10
115	2	33	1	36
116	1	7	2	10
122	0	8	2	10
126	5	35	6	46
127	0	8	0	8
152	0	4	2	6
156	29	118	23	170
157	38	199	30	267
159	21	126	16	163
167	8	47	6	61
168	7	32	6	45
170	40	269	39	348
172	9	58	9	76
174	7	44	1	52
175	14	81	9	104
178	19	130	18	167
180	23	117	16	156
181	30	177	30	237
182	99	383	87	569
183	7	58	6	71
184	48	288	54	390
197	3	17	0	20
199	0	4	0	4
201	0	0	0	0
203	0	1	0	1
208	0	6	0	6
209	5	37	5	47
210	6	54	11	71
213	30	147	21	198
214	35	169	26	230
221	37	144	31	212
222	20	89	15	124
223	17	94	23	134

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
235	1	12	1	14
236	65	271	42	378
239	15	62	15	92
240	39	240	33	312
241	33	211	27	271
242	50	278	54	382
243	7	61	9	77
244	52	219	45	316
245	17	78	20	115
248	8	38	10	56
251	0	1	0	1
256	3	32	6	41
224	1	6	4	11
225	33	185	44	262
227	43	268	51	362
229	11	57	12	80
233	8	57	7	72
257	4	28	3	35
260	13	39	6	58
261	2	23	1	26
263	0	8	2	10
264	2	10	1	13
265	6	41	6	53
266	3	17	1	21
267	5	19	2	26
268	2	17	2	21
292	15	64	5	84
293	16	66	5	87
297	2	2	1	5
298	2	9	3	14
338	3	47	7	57
339	8	40	5	53
341	56	229	34	319
342	23	136	30	189
343	77	440	59	576
345	24	102	18	144
346	36	197	34	267
347	32	190	27	249
348	28	155	37	220
349	38	217	49	304
601	201	902	173	1276
TOTAL	**1,566**	**8,209**	**1,404**	**11,179**

Table 10. Summary of Archery Special Hunts, 2008. Includes Regular, Youth, and Bonus Permits.

Area	Dates	Permits Issued	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
970 - Camp Ripley	10/19-10/20	2,500	102	148	34	41	325
971 - Camp Ripley	10/26-10/27	2,500	70	74	31	16	191
972 - Crow-Hassan Park Reserve	11/14-11/16	130	4	7	1	2	14
973 - Murphy-Hanrahan Park Reserve	11/14-11/16	180	10	14	3	5	32
974 - Cleary Lake	11/14-11/16	55	1	3	1	1	6
975 - Vermillion Highlands WMA	9/13 - 11/2	60	0	9	2	2	13
976 - City of New Ulm	10/11-12/31	50	1	27	0	3	31
977 - City of Red Wing	9/13 - 12/31	Unl.	No Data				0
978 - City of Sandstone	9/13 - 12/31	Unl.	No Data				0
979 - City of St. Cloud	9/13 - 12/31	50	3	5	2	3	13
980 - City of Taylors Falls	9/13 - 12/31	Unl.	No Data				0
981 - City of Mankato	10/18-12/31	40	No Data				0
982 - City of Granite Falls	9/13 - 12/31	10	0	4	0	0	4
983 - City of Ortonville	10/1 - 12/31	30	3	11	3	0	17
984 - City of Canby	9/13 - 12/31	20	1	2	0	1	4
985 - City of Bemidji	9/13 - 12/31	40	1	11	0	0	12
986 – City of Albert Lea	9/13 – 12/31	40	2	1	0	0	3
Total			198	316	77	74	665

*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, 2008.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
104	0	1	0	1
107	0	4	0	4
110	0	1	0	1
156	1	0	0	1
175	0	1	0	1
181	0	1	0	1
184	0	1	1	2
197	0	1	0	1
214	1	0	0	1
221	0	2	0	2
222	0	1	0	1
223	1	0	0	1
227	0	0	1	1
241	0	1	1	2
244	1	0	0	1
245	0	1	0	1
266	0	1	0	1
293	0	1	0	1
341	1	1	1	3
342	0	2	0	2
343	1	4	1	6
345	0	1	0	1
346	0	0	1	1
348	0	1	0	1
349	1	2	0	3
TOTAL	74	28	6	41

Table 12. Muzzleloader Harvest by Permit Area, 2008.
Includes Regular, Muzzleloader, Youth, All-Season, and Bonus permits.

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
101	4	3	15	2	24
104	8	3	28	3	42
105	11	8	29	5	53
107	26	7	57	7	97
110	5	3	22	2	32
111	8	4	12	5	29
114	0	0	1	0	1
115	26	10	71	11	118
116	9	4	21	4	38
122	6	0	6	3	15
126	10	3	19	2	34
127	0	1	2	0	3
152	3	2	3	0	8
154	12	4	23	5	44
156	8	10	47	8	73
157	17	10	75	11	113
159	7	5	35	1	48
167	7	2	16	4	29
168	10	4	31	4	49
170	34	29	105	20	188
172	16	15	45	8	84
174	14	7	28	2	51
175	11	9	47	10	77
178	15	9	44	10	78
180	18	10	41	6	75
181	18	7	39	4	68
182	7	2	10	4	23
183	12	6	25	3	46
184	41	32	112	24	209
197	11	3	23	4	41
199	0	2	5	1	8
201	3	2	2	0	7
203	12	1	14	4	31
208	10	7	18	0	35
209	8	3	24	3	38
210	23	6	40	9	78
213	42	26	86	10	164
214	23	32	75	23	153
215	31	9	47	14	101
218	34	11	41	6	92
219	19	9	42	7	77
221	25	28	62	23	138
222	14	16	44	10	84
223	23	16	43	9	91
224	1	0	0	0	1
225	27	23	59	29	138
227	46	19	79	10	154
229	7	7	22	5	41
230	5	2	13	2	22
232	16	1	16	6	39
233	23	11	32	4	70
234	17	3	13	0	33
235	2	0	8	1	11
236	32	22	93	12	159
237	34	2	26	4	66
238	4	2	3	2	11
239	37	16	62	8	123
240	28	26	88	13	155
241	23	19	72	15	129
242	15	17	52	15	99
243	15	11	39	6	71
244	44	21	119	24	208
245	39	15	87	17	158
246	19	6	28	7	60
247	14	9	20	7	50
248	13	1	15	5	34
249	19	6	35	3	63
250	36	3	25	1	65
252	30	4	24	5	63
253	53	7	61	9	130
254	45	7	44	9	105
255	35	7	31	4	77
256	13	8	24	5	50
257	6	2	9	4	21
260	35	17	73	11	136
261	13	6	22	4	45
262	13	1	8	1	23
263	14	2	10	1	27
264	13	3	24	3	43
265	19	14	33	6	72
266	23	8	27	4	62
267	9	3	4	2	18
268	6	1	10	1	18
269	17	3	14	1	35
270	15	2	3	1	21
271	22	1	10	0	33
272	11	1	6	1	19
273	14	2	9	4	29
274	17	6	20	4	47
275	33	4	40	4	81

Table 12. (Continued).

Permit Area	Adult Male	Fawn Male	Adult Female	Fawn Female	Total
276	26	3	25	4	58
277	63	8	74	7	152
278	42	8	63	8	121
279	17	4	15	1	37
280	16	3	12	2	33
281	31	4	25	3	63
282	5	1	10	0	16
283	10	2	16	2	30
284	15	4	16	0	35
285	14	6	21	1	42
286	21	2	16	2	41
288	35	12	55	7	109
289	17	1	13	0	31
290	37	7	47	8	99
291	59	15	67	13	154
292	25	13	68	11	117
293	18	10	59	8	95
294	55	10	39	4	108
295	41	9	53	4	107
296	20	6	28	5	59
297	5	0	9	2	16
298	12	5	17	3	37
299	21	6	30	5	62
338	12	8	30	0	50
339	9	1	19	4	33
341	46	31	124	32	233
342	38	14	89	19	160
343	46	37	166	28	277
344	25	4	26	3	58
345	21	12	62	13	108
346	40	24	130	27	221
347	32	21	108	18	179
348	21	24	127	30	202
349	59	36	208	38	341
601	16	14	50	6	86
TOTAL	**2,583**	**1,096**	**5,004**	**889**	**9,572**

Table 13. Muzzleloader Harvest using Bonus Permits by Permit Area, 2008.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
101	0	4	0	4
104	1	9	1	11
105	4	22	3	29
107	2	30	2	34
110	2	17	1	20
111	4	9	4	17
115	5	37	7	49
116	2	10	2	14
122	0	4	2	6
126	1	12	2	15
127	0	1	0	1
152	2	1	0	3
156	3	26	3	32
157	5	46	4	55
159	3	18	1	22
167	2	11	4	17
168	1	13	2	16
170	20	69	12	101
172	10	29	6	45
174	2	13	1	16
175	7	28	8	43
178	4	21	4	29
180	5	29	6	40
181	2	26	1	29
182	2	5	2	9
183	1	13	1	15
184	23	78	17	118
197	2	15	2	19
199	2	2	0	4
201	1	2	0	3
203	0	2	1	3
208	4	15	0	19
209	3	18	3	24
210	1	25	7	33
213	13	45	3	61
214	21	50	17	88
221	16	41	18	75
222	11	31	5	47
223	9	25	6	40
225	0	1	1	2
227	6	19	1	26
229	3	3	4	10
233	6	17	6	29
235	7	25	6	38
236	3	15	4	22
239	12	34	8	54
240	6	15	1	22
241	1	7	2	10
242	1	6	2	9
243	1	8	3	12
244	2	5	2	9
245	0	1	0	1
248	2	8	2	12
256	1	7	3	11
257	4	17	6	27
260	1	13	3	17
261	0	1	0	1
263	0	3	0	3
264	2	6	3	11
265	4	3	2	9
266	0	0	0	0
267	0	3	0	3
268	0	1	1	2
292	1	2	0	3
293	3	10	3	16
297	0	8	2	10
298	9	38	6	53
338	0	11	1	12
339	10	33	9	52
341	3	33	6	42
342	8	33	8	49
343	11	36	14	61
345	3	9	0	12
346	1	7	1	9
347	2	1	0	3
348	1	5	0	6
349	3	15	1	19
601	5	8	2	15
TOTAL	**318**	**1,319**	**271**	**1,908**

Table 14. Summary of Muzzleloader Special Hunts, 2008.
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]	11/29 - 12/3	120*	12	3	15	2	32
936 - Crow Wing SP[1]	12/5 - 12/7	45*	3	8	16	4	31
937 - Soudan SP[1]	11/29 - 12/14	20*	0	3	9	1	13
938 – City of Tower	11/29 - 12/14	40*	0	1	9	1	11
939 - Interstate SP[1]	11/29 - 12/14	20**	0	0	0	0	0
940 - Lake Shetek SP[1]	12/6 - 12/7	15**	0	4	10	2	16
941 – Lake Maria SP[1]	12/6 - 12/8	25**	0	5	11	4	20
942 - Nerstrand Big Woods SP[1]	11/29 - 12/1	50*	5	3	12	1	21
943 – Rice Lake SP	11/29 – 12/1	20**	0	5	12	3	20
944 – Sibley SP	12/6 – 12/7	40**	1	6	7	3	17
945 - Vermillian Highlands WMA[1]	11/29 - 12/14	25*	0	0	4	0	4
TOTAL			21	38	105	21	185

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

Table 15. Free Landowner Muzzleloader Harvest by Permit Area, 2007.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
104	0	2	0	2
115	0	1	0	1
156	0	1	0	1
157	0	1	0	1
209	0	1	0	1
210	0	1	0	1
213	1	2	0	3
214	2	0	0	2
225	0	1	0	1
227	0	1	0	1
239	0	1	0	1
240	0	1	0	1
243	0	2	0	2
244	0	2	0	2
256	0	1	0	1
260	1	0	0	1
264	0	1	0	1
265	0	1	0	1
268	0	1	0	1
292	0	1	0	1
293	0	1	0	1
341	0	2	0	2
342	0	1	0	1
343	0	1	0	1
345	0	1	0	1
346	1	0	0	1
347	0	1	0	1
348	0	2	0	2
349	2	1	0	3
Total	**7**	**32**	**0**	**39**

Table 16. Summary of Youth Firearm Hunts and NW Youth Season, 2008.

Area	Dates	Permits Issued	Harvest Adult Male	Fawn Male	Adult Female	Fawn Female	Total
950 – Camp Ripley Archery	10/10 – 10/12	150	1	5	2	2	10
951 – Arden Hills A	10/16 - 10/17	20	No Data				0
952 – Arden Hills B	10/18 – 10/19	20	No Data				0
953 – Whitewater Game Refuge	10/16 - 10/19	75	4	5	3	0	12
954 – Lake Bemidji SP	10/18 – 10/19	25	1	3	1	0	5
955 – Lake Alexander SNA	10/10 – 10/12	20	0	1	0	0	1
956 – St Croix SP	10/25 – 10/26	75	4	4	2	4	14
957 – Rydell NWR	10/18 - 10/19	20	No Data				0
958 – Savanna Portage SP	10/25 - 10/26	20	2	2	0	0	4
959 – Buffalo River SP	10/25 – 10/26	10	0	3	1	0	4
960 – Tettegouche SP	10/18 - 10/19	10	0	0	0	1	1

Northwest Youth Season – October 17-18, unlimited permits.

Permit Area	Fawn Male	Adult Female	Fawn Female	Total
101	9	2	0	11
105	19	4	1	24
111	2	1	1	4
201	3	0	1	4
208	8	1	1	10
209	1	0	2	3
210	1	0	1	2
244	0	0	1	1
256	4	2	1	7
260	15	2	1	18
263	6	2	3	11
264	14	5	2	21
267	5	0	1	6
268	7	0	0	7
Total	94	19	16	129

Table 17. Total Deer Harvest by Permit Area, 2008.
Includes all license types, permits, and special hunts.

Permit Area	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
101	291	317	116	103	827
104	1071	732	173	125	2,101
105	963	954	268	206	2,391
107	1579	1101	279	195	3,154
110	656	781	231	201	1,869
111	744	512	162	120	1,538
114	69	41	7	4	121
115	1769	1157	306	211	3,443
116	219	137	24	14	394
122	589	292	69	63	1,013
126	523	364	76	42	1,005
127	105	66	6	6	183
152	126	90	39	38	293
154	1473	749	225	138	2,585
156	1831	1687	554	416	4,488
157	2340	2398	907	642	6,287
159	1233	1331	361	286	3,211
167	707	707	212	189	1,815
168	1239	1152	310	249	2,950
170	2703	3007	1007	703	7,420
172	1432	1718	454	369	3,973
174	1250	1026	337	246	2,859
175	1874	1662	439	352	4,327
178	2315	2279	721	579	5,894
180	1584	1273	315	208	3,380
181	1829	1757	483	468	4,537
182	492	766	199	183	1,640
183	1429	1071	325	236	3,061
184	3416	3611	1164	1120	9,311
197	1002	712	186	155	2,055
199	119	75	17	7	218
201	97	52	19	12	180
203	104	62	22	19	207
208	223	230	69	50	572
209	536	641	173	178	1,528
210	1132	1085	344	351	2,912
213	1806	1378	547	397	4,128
214	1306	1527	684	593	4,110
215	1023	658	244	196	2,121
218	763	494	164	125	1,546
219	516	271	94	64	945
221	1002	1004	486	374	2,866
222	839	759	337	260	2,195
223	577	386	161	118	1,242
224	127	82	28	34	271
225	1330	1169	443	406	3,348
227	999	851	262	211	2,323
229	248	230	88	56	622
230	242	162	36	24	464

Permit Area	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
232	227	127	32	22	408
233	260	233	70	44	607
234	197	132	14	14	357
235	61	58	13	10	142
236	916	864	258	151	2,189
237	318	122	23	19	482
238	61	23	7	2	93
239	1557	1209	397	335	3,498
240	1810	1779	698	598	4,885
241	1377	1576	695	636	4,284
242	663	1016	303	257	2,239
243	958	867	274	250	2,349
244	1893	2098	783	728	5,502
245	1895	1833	607	532	4,867
246	1600	785	273	205	2,863
247	657	372	142	76	1,247
248	410	326	130	86	952
249	1137	574	205	156	2,072
250	402	202	23	20	647
251	58	59	11	15	143
252	338	116	15	20	489
253	495	240	47	30	812
254	514	286	59	41	900
255	452	192	46	44	734
256	535	546	145	135	1,361
257	435	478	131	104	1,148
260	668	739	162	172	1,741
261	205	260	42	43	550
262	222	66	12	18	318
263	387	248	64	73	772
264	737	555	145	114	1,551
265	494	634	177	194	1,499
266	384	310	91	72	857
267	216	182	64	42	504
268	273	251	64	51	639
269	258	81	26	11	376
270	182	31	7	5	225
271	206	40	6	6	258
272	194	39	5	7	245
273	441	214	43	38	736
274	250	75	28	22	375
275	382	120	22	17	541
276	585	148	38	24	795
277	1259	459	118	71	1,907
278	511	216	44	34	805
279	248	105	20	16	389
280	263	102	17	12	394
281	581	157	18	12	768
282	125	53	9	7	194

Table 17. (Continued).

Permit Area	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
283	252	69	15	12	348
284	323	92	26	14	455
285	434	190	62	26	712
286	350	89	17	13	469
287	81	112	27	29	249
288	522	183	43	28	776
289	229	67	15	11	322
290	507	243	32	31	813
291	826	392	70	70	1,358
292	491	484	133	89	1,197
293	506	410	116	86	1,118
294	324	130	35	33	522
295	577	214	36	42	869
296	358	155	22	24	559
297	201	149	44	60	454
298	712	437	154	117	1,420
299	309	192	28	28	557
338	336	238	63	36	673
339	327	198	66	52	643
341	1046	1013	333	226	2,618
342	848	769	243	177	2,037
343	993	1344	356	258	2,951
344	571	222	61	37	891
345	596	595	173	137	1,501
346	1141	1271	352	301	3,065
347	638	862	259	165	1,924
348	809	1064	241	222	2,336
349	1484	1827	508	520	4,339
601	1193	1486	395	280	3,354
901	3	9	2	0	14
902	34	90	38	32	194
903	0	10	5	0	15
904	3	6	1	3	13
905	3	1	2	1	7
906	7	4	1	4	16
907	0	1	0	0	1
908	1	0	1	1	3
909	0	7	3	1	11
910	1	12	7	6	26
911	1	0	0	0	1
912	18	38	22	14	92
913	0	3	1	4	8
914	19	13	7	6	45

Permit Area	Adult Male	Adult Female	Fawn Male	Fawn Female	Total
915	0	2	0	0	2
916	30	56	16	20	122
917	0	1	0	0	1
918	5	1	1	0	7
919	0	6	1	1	8
920	0	3	2	2	7
922	7	12	1	0	20
923	0	6	0	2	8
925	3	21	9	11	44
926	8	18	2	5	33
927	7	37	15	16	75
928	0	6	1	1	8
929	0	16	6	5	27
930	10	23	5	3	41
931	5	6	0	2	13
932	14	11	3	1	29
933	3	6	2	1	12
935	12	15	3	2	32
936	3	16	8	4	31
937	0	9	3	1	13
938	0	9	1	1	11
940	0	10	4	2	16
941	0	11	5	4	20
942	5	12	3	1	21
943	0	12	5	3	20
944	1	7	6	3	17
945	0	1	0	0	1
950	1	5	2	2	10
953	4	5	3	0	12
954	1	1	0	0	2
955	0	1	0	0	1
956	4	4	2	4	14
958	2	2	0	0	4
959	0	3	1	0	4
960	0	0	0	1	1
970	102	148	34	41	325
971	70	74	31	16	191
973	0	1	0	1	2
975	0	2	0	0	2
976	0	2	0	0	2
978	0	2	0	1	3
980	0	1	0	0	1
984	0	3	0	1	4
985	1	11	0	0	12
TOTAL	**95,511**	**81,053**	**24,986**	**20,287**	**221,837**

Table 18. Estimated firearm hunter numbers, density, and harvest by Permit Area, 2008.

Permit Area	Firearm Hunters	Area Size (sq mi)	Hunters/ $mile^2$	Harvest/ $mile^2$	Permit Area	Firearm Hunters	Area Size (sq mi)	Hunters/ $mile^2$	Harvest/ $mile^2$
101	1,719	496	3.5	1.6	223	2,656	377	7.0	2.2
104	4,439	2,078	2.1	1.0	224	737	47	15.8	5.1
105	3,849	740	5.2	3.0	225	6,667	618	10.8	4.5
107	7,106	1,896	3.7	1.6	227	4,329	471	9.2	3.3
110	2,636	300	8.8	5.9	229	1,457	287	5.1	1.5
111	3,293	1,437	2.3	1.0	230	1,374	452	3.0	0.8
114	158	123	1.3	0.8	232	1,287	377	3.4	0.9
115	7,885	1,867	4.2	1.7	233	1,081	385	2.8	1.0
116	901	1,164	0.8	0.3	234	891	636	1.4	0.5
122	1,990	619	3.2	1.6	233	1,081	385	2.8	1.0
126	2,022	943	2.1	1.0	234	891	636	1.4	0.5
127	570	561	1.0	0.3	235	446	32	13.9	3.3
152	1,000	61	16.4	4.5	236	3,232	372	8.7	3.7
154	8,553	760	11.3	3.2	237	1,113	728	1.5	0.5
156	8,776	825	10.6	5.0	238	245	95	2.6	0.8
157	12,933	889	14.5	6.5	239	7,139	922	7.7	3.5
159	7,140	568	12.6	5.1	240	7,398	642	11.5	6.7
167	3,588	432	8.3	3.9	241	5,287	417	12.7	9.1
168	7,102	723	9.8	3.9	242	2,897	215	13.5	7.4
170	13,417	1,311	10.2	5.1	243	4,564	314	14.6	6.8
172	9,092	451	20.2	8.2	244	8,153	583	14.0	8.3
174	6,445	835	7.7	3.2	245	8,870	583	15.2	7.7
175	8,547	1,249	6.8	3.2	246	9,211	772	11.9	3.5
178	10,098	1,259	8.0	4.4	247	3,541	229	15.5	4.7
180	6,231	983	6.3	3.1	248	1,943	212	9.2	3.8
181	6,944	709	9.8	5.7	249	5,413	502	10.8	3.8
182	1,828	269	6.8	3.1	250	1,507	711	2.1	0.7
183	7,146	663	10.8	4.3	251	531	55	9.6	2.6
184	13,742	1,231	11.2	6.9	252	1,223	715	1.7	0.5
197	4,796	975	4.9	2.0	253	2,003	974	2.1	0.6
199	485	148	3.3	1.3	254	2,626	930	2.8	0.8
201	332	161	2.1	1.1	255	1,727	774	2.2	0.7
203	305	118	2.6	1.5	256	2,467	653	3.8	1.9
208	1,173	379	3.1	1.4	257	1,896	412	4.6	2.6
209	2,344	639	3.7	2.2	260	2,381	1,249	1.9	1.2
210	4,340	615	7.1	4.4	261	925	795	1.2	0.6
213	8,737	1,057	8.3	3.3	262	895	677	1.3	0.4
214	6,835	557	12.3	6.5	263	1,691	512	3.3	1.4
215	6,303	701	9.0	2.6	264	3,113	669	4.7	2.2
218	4,857	884	5.5	1.4	265	2,048	494	4.1	2.7
219	2,744	392	7.0	1.8	266	2,026	617	3.3	1.2
221	4,887	642	7.6	3.7	267	1,144	472	2.4	1.0
222	4,589	413	11.1	4.6	268	1,186	229	5.2	2.6

Table 18. (Continued).

Permit Area	Firearm Hunters	Area Size (sq mi)	Hunters/ mile^2	Harvest/ mile^2
269	1,274	650	2.0	0.5
270	1,015	748	1.4	0.2
271	812	632	1.3	0.3
272	861	531	1.6	0.4
273	2,671	572	4.7	1.1
274	882	355	2.5	0.8
275	1,754	764	2.3	0.5
276	2,849	543	5.2	1.3
277	5,700	813	7.0	1.8
278	2,043	401	5.1	1.5
279	1,042	344	3.0	0.9
280	1,355	675	2.0	0.5
281	2,295	575	4.0	1.1
282	861	779	1.1	0.2
283	1,276	614	2.1	0.5
284	1,516	838	1.8	0.4
285	2,149	550	3.9	1.0
286	1,317	446	3.0	0.9
287	565	46	12.3	5.4
288	1,822	625	2.9	0.9
289	977	816	1.2	0.3
290	2,266	662	3.4	0.9
291	3,462	802	4.3	1.2
292	2,757	480	5.7	1.9
293	2,501	511	4.9	1.6
294	1,204	686	1.8	0.5
295	2,147	840	2.6	0.8
296	1,595	666	2.4	0.7
297	1,296	438	3.0	1.0
298	3,143	618	5.1	2.2
299	1,433	386	3.7	1.0
338	1,869	454	4.1	1.0
339	1,665	394	4.2	1.2
341	5,005	611	8.2	3.1
342	3,690	350	10.5	4.5
343	4,448	662	6.7	2.7
344	2,662	189	14.0	3.9
345	2,876	326	8.8	3.5
346	4,288	319	13.5	7.5
347	3,354	434	7.7	3.2
348	3,999	332	12.1	5.4
349	6,362	492	12.9	7.1
601	2,550	1,633	1.6	0.7
Total	440,805	78,929	5.6	2.4

Table 19. Deer harvest per square mile by season, 2008.

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	1.4	0.05	0.07	1.6
104	2,078	0.02	1.0	0.02		1.0
105	740	0.13	2.8	0.07	0.17	3.2
107	1,896	0.05	1.6	0.05		1.7
110	300	0.26	5.3	0.11	0.54	6.2
111	1,437	0.01	1.0	0.02	0.06	1.1
114	123	0.17	0.8	0.01		1.0
115	1,867	0.05	1.7	0.06		1.8
116	1,164	0.02	0.3	0.03		0.3
122	619	0.04	1.6	0.02		1.6
126	943	0.07	1.0	0.04		1.1
127	561	0.02	0.3	0.01		0.3
152	61	0.15	4.5	0.13		4.8
154	760	0.15	3.2	0.06		3.4
156	825	0.32	5.0	0.09		5.4
157	889	0.47	6.0	0.13	0.45	7.1
159	568	0.44	4.8	0.08	0.34	5.7
167	432	0.20	3.9	0.07		4.2
168	723	0.14	3.9	0.07		4.1
170	1,311	0.42	5.1	0.14		5.7
172	451	0.38	8.2	0.19		8.8
174	835	0.13	3.2	0.06		3.4
175	1,249	0.16	3.2	0.06		3.5
178	1,259	0.24	3.9	0.06	0.47	4.7
180	983	0.29	2.8	0.08	0.26	3.4
181	709	0.61	5.1	0.10	0.58	6.4
182	269	2.96	2.6	0.09	0.41	6.1
183	663	0.23	4.3	0.07		4.6
184	1,231	0.47	6.9	0.17		7.6
197	975	0.06	2.0	0.04		2.1
199	148	0.09	1.3	0.05		1.5
201	161	0.01	1.0	0.04		1.1
203	118	0.03	1.5	0.26		1.8
208	379	0.04	1.3	0.09	0.07	1.5
209	639	0.12	2.0	0.06	0.25	2.4
210	615	0.19	4.0	0.13	0.44	4.7
213	1,057	0.45	3.3	0.16		3.9
214	557	0.61	5.8	0.27	0.68	7.4
215	701	0.27	2.6	0.14		3.0
218	884	0.20	1.4	0.10		1.7
219	392	0.37	1.8	0.20		2.4
221	642	0.51	3.3	0.22	0.40	4.5
222	413	0.51	4.2	0.20	0.36	5.3
223	377	0.82	2.2	0.24		3.3
224	47	0.73	5.1	0.02		5.8

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	0.67	4.2	0.22	0.35	5.4
227	471	1.27	3.2	0.33	0.17	4.9
229	287	0.53	1.5	0.14		2.2
230	452	0.13	0.8	0.05		1.0
232	377	0.10	0.9	0.10		1.1
233	385	0.36	1.0	0.18		1.6
234	636	0.04	0.5	0.05		0.6
235	32	0.75	3.3	0.34		4.4
236	372	1.78	3.4	0.43	0.23	5.9
237	728	0.05	0.5	0.09		0.7
238	95	0.05	0.8	0.12		1.0
239	922	0.20	3.5	0.13		3.8
240	642	0.67	6.7	0.24		7.6
241	417	0.90	8.1	0.31	0.94	10.3
242	215	2.59	7.4	0.46		10.4
243	314	0.49	6.8	0.23		7.5
244	583	0.77	8.3	0.36		9.4
245	583	0.42	7.7	0.27		8.4
246	772	0.12	3.5	0.08		3.7
247	229	0.48	4.7	0.22		5.4
248	212	0.52	3.8	0.16		4.5
249	502	0.22	3.8	0.13		4.1
250	711	0.07	0.7	0.09		0.9
251	55	0.04	2.6	0.00		2.6
252	715	0.09	0.5	0.09		0.7
253	974	0.10	0.6	0.13		0.8
254	930	0.09	0.8	0.11		1.0
255	774	0.14	0.7	0.10		0.9
256	653	0.11	1.7	0.08	0.17	2.1
257	412	0.12	2.3	0.05	0.26	2.8
260	1,249	0.08	1.1	0.11	0.09	1.4
261	795	0.05	0.5	0.06	0.05	0.7
262	677	0.05	0.4	0.03		0.5
263	512	0.03	1.4	0.05		1.5
264	669	0.05	2.2	0.06		2.3
265	494	0.16	2.5	0.15	0.24	3.0
266	617	0.08	1.2	0.10		1.4
267	472	0.07	0.9	0.04	0.06	1.1
268	229	0.15	2.4	0.08	0.16	2.8
269	650	0.06	0.5	0.05		0.6
270	748	0.04	0.2	0.03		0.3
271	632	0.06	0.3	0.05		0.4
272	531	0.03	0.4	0.04		0.5
273	572	0.09	1.1	0.05		1.3
274	355	0.11	0.8	0.13		1.1

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
275	764	0.06	0.5	0.11		0.7
276	543	0.10	1.3	0.11		1.5
277	813	0.32	1.8	0.19		2.3
278	401	0.24	1.4	0.30		2.0
279	344	0.08	0.9	0.11		1.1
280	675	0.06	0.5	0.05		0.6
281	575	0.14	1.1	0.11		1.3
282	779	0.02	0.2	0.02		0.2
283	614	0.06	0.5	0.05		0.6
284	838	0.07	0.4	0.04		0.5
285	550	0.20	1.0	0.08		1.3
286	446	0.08	0.9	0.09		1.1
287	46	0.00	5.4	0.00		5.4
288	625	0.17	0.9	0.17		1.2
289	816	0.04	0.3	0.04		0.4
290	662	0.16	0.9	0.15		1.2
291	802	0.28	1.2	0.19		1.7
292	480	0.34	1.9	0.24		2.5
293	511	0.38	1.6	0.19		2.2
294	686	0.07	0.5	0.16		0.8
295	840	0.11	0.8	0.13		1.0
296	666	0.09	0.7	0.09		0.8
297	438	0.03	1.0	0.04		1.0
298	618	0.05	2.2	0.06		2.3
299	386	0.25	1.0	0.16		1.4
338	454	0.34	1.0	0.11		1.5
339	394	0.33	1.2	0.08		1.6
341	611	0.84	3.1	0.38		4.3
342	350	0.90	4.5	0.46		5.8
343	662	1.33	2.7	0.42		4.5
344	189	0.49	3.9	0.31		4.7
345	326	0.75	3.5	0.33		4.6
346	319	1.47	7.0	0.69	0.46	9.6
347	434	0.84	3.2	0.41		4.4
348	332	1.04	5.4	0.61		7.0
349	492	1.06	6.6	0.69	0.48	8.8
601	1,633	1.26	0.7	0.05	0.03	2.1
Total	78,929	0.28	2.3	0.12	0.07	2.8

Table 20. 2008 Antlerless Lottery Distribution Report.

Permit Area Number	Preference Level	Applications		Unsuccessful	Winners	Permits Available	% Under-Subscribed
		Total	Rejected				
154	1	3,577	199	762	2,815	**3,000**	**0.0%**
	2	173	1	0	173		
	3	11	0	0	11		
	9	1	0	0	1		
		3,762	**200**	**762**	**3,000**		
215	1	2,466	223	0	2,466	**5,000**	**37.2%**
	2	659	4	0	659		
	3	13	2	0	13		
	4	1	0	0	1		
	9	2	0	0	2		
		3,141	**229**	**0**	**3,139**		
218	1	1,944	122	174	1,770	**2,500**	**0.0%**
	2	722	84	0	722		
	3	7	5	0	7		
	4	1	0	0	1		
		2,674	**211**	**174**	**2,500**		
219	1	971	40	0	971	**1,200**	**4.4%**
	2	170	27	0	170		
	3	6	1	0	6		
	4	1	0	0	1		
		1,148	**68**	**0**	**1,147**		
230	1	537	27	60	477	**600**	**1.0%**
	2	118	7	7	111		
	3	3	1	0	3		
	4	3	4	0	3		
		658	**39**	**67**	**594**		
232	1	474	22	1	473	**700**	**29.0%**
	2	21	1	0	21		
	3	1	0	0	1		
	4	2	0	0	2		
		498	**23**	**1**	**497**		
234	1	286	14	0	286	**500**	**39.8%**
	2	14	6	0	14		
	4	0	1	0	0		
	5	1	0	0	1		
		301	**21**	**0**	**301**		
237	1	252	8	251	1	**100**	**1.0%**
	2	134	3	39	95		
	3	3	1	0	3		
	4	0	2	0	0		
	5	1	1	0	0		
		390	**15**	**290**	**99**		
238	1	97	3	56	41	**50**	**0.0%**
	2	7	0	0	7		
	4	2	0	0	2		
		106	**3**	**56**	**50**		
246	1	4,296	287	1,452	2,844	**3,000**	**0.0%**
	2	139	1	0	139		
	3	13	0	0	13		
	4	2	0	0	2		
	9	2	0	0	2		
		4,452	**288**	**1,452**	**3,000**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications		Unsuccessful	Winners	Permits Available	% Under-Subscribed
		Total	Rejected				
247	1	1,390	66	0	1,390	1,500	2.5%
	2	61	0	0	61		
	3	9	0	0	9		
	4	3	0	0	3		
		1,463	**66**	**0**	**1,463**		
249	1	2,564	142	148	2,416	2,500	0.0%
	2	64	0	0	64		
	3	19	0	0	19		
	4	2	0	0	2		
		2,649	**142**	**148**	**2,501**		
250	1	568	19	325	243	500	50.2%
	2	5	5	0	5		
	3	0	8	0	0		
	4	1	1	0	1		
		574	**33**	**325**	**249**		
252	1	298	7	298	0	150	0.0%
	2	221	7	76	145		
	3	2	4	0	2		
	4	1	2	0	1		
	5	1	0	0	1		
	7	1	0	0	1		
		524	**20**	**374**	**150**		
253	1	487	22	487	0	300	0.0%
	2	334	12	49	285		
	3	9	6	0	9		
	4	3	1	0	3		
	5	2	1	0	2		
	7	1	0	0	1		
		836	**42**	**536**	**300**		
254	1	889	51	0	889	1,900	50.7%
	2	47	3	0	47		
	3	1	0	0	1		
	4	0	1	0	0		
		937	**55**	**0**	**937**		
255	1	553	37	0	553	800	27.9%
	2	17	0	0	17		
	3	7	0	0	7		
		577	**37**	**0**	**577**		
262	1	211	11	145	66	150	-2.0%
	2	86	6	0	86		
	9	1	0	0	1		
		298	**17**	**145**	**153**		
269	1	488	24	293	195	250	0.0%
	2	52	1	0	52		
	3	2	0	0	2		
	9	1	0	0	1		
		543	**25**	**293**	**250**		
270	1	243	11	243	0	25	-4.0%
	2	74	11	48	26		
		317	**22**	**291**	**26**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications: Total	Applications: Rejected	Unsuccessful	Winners	Permits Available	% Under-Subscribed
271	1	95	2	95	0	25	0.0%
	2	100	4	99	1		
	3	25	0	2	23		
	4	1	0	0	1		
		221	**6**	**196**	**25**		
272	1	165	8	165	0	25	0.0%
	2	144	7	121	23		
	3	2	0	0	2		
		311	**15**	**286**	**25**		
273	1	1,206	27	0	1,206	2,400	47.3%
	2	57	18	0	57		
	3	1	0	0	1		
		1,264	**45**	**0**	**1,264**		
274	1	102	12	102	0	30	0.0%
	2	104	1	103	1		
	3	62	1	46	16		
	4	13	0	0	13		
		281	**14**	**251**	**30**		
275	1	202	22	202	0	30	0.0%
	2	248	4	248	0		
	3	148	5	121	27		
	4	0	1	0	0		
	6	2	0	0	2		
	9	1	0	0	1		
		601	**32**	**571**	**30**		
276	1	799	31	798	1	250	0.0%
	2	507	6	266	241		
	3	7	70	0	7		
	5	1	0	0	1		
		1,314	**107**	**1,064**	**250**		
277	1	1,573	61	1,573	0	800	0.0%
	2	1,270	41	501	769		
	3	22	24	0	22		
	4	6	2	0	6		
	5	1	1	0	1		
	9	2	0	0	2		
		2,874	**129**	**2,074**	**800**		
278	1	535	20	535	0	250	0.4%
	2	527	9	300	227		
	3	18	5	0	18		
	4	1	4	0	1		
	5	1	1	0	1		
	6	1	1	0	1		
	9	1	0	0	1		
		1,084	**40**	**835**	**249**		
279	1	246	16	246	0	150	0.0%
	2	251	6	112	139		
	3	8	7	0	8		
	4	0	1	0	0		
	5	2	1	0	2		
	6	1	0	0	1		
		508	**31**	**358**	**150**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications		Unsuccessful	Winners	Permits Available	% Under-Subscribed
		Total	Rejected				
280	1	215	11	215	0	75	0.0%
	2	251	8	218	33		
	3	37	2	0	37		
	4	2	1	0	2		
	5	1	1	0	1		
	6	1	0	0	1		
	9	1	0	0	1		
		508	**23**	**433**	**75**		
281	1	353	11	353	0	100	0.0%
	2	442	12	442	0		
	3	109	3	17	92		
	4	4	3	0	4		
	5	3	1	0	3		
	6	1	0	0	1		
		912	**30**	**812**	**100**		
282	1	100	14	100	0	30	0.0%
	2	121	3	119	2		
	3	27	2	0	27		
	5	0	2	0	0		
	9	1	0	0	1		
		249	**21**	**219**	**30**		
283	1	150	7	150	0	30	0.0%
	2	231	6	231	0		
	3	31	1	4	27		
	4	1	1	0	1		
	5	2	0	0	2		
		415	**15**	**385**	**30**		
284	1	173	11	173	0	30	0.0%
	2	166	8	166	0		
	3	133	2	133	0		
	4	69	1	44	25		
	5	3	1	0	3		
	6	1	1	0	1		
	9	1	0	0	1		
		546	**24**	**516**	**30**		
285	1	706	29	600	106	500	0.0%
	2	367	9	0	367		
	3	18	4	0	18		
	4	4	2	0	4		
	5	3	0	0	3		
	6	2	0	0	2		
		1,100	**44**	**600**	**500**		
286	1	297	11	297	0	50	0.0%
	2	232	8	190	42		
	3	5	2	0	5		
	4	1	1	0	1		
	7	2	0	0	2		
		537	**22**	**487**	**50**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications		Unsuccessful	Winners	Permits Available	% Under-Subscribed
		Total	Rejected				
288	1	302	27	302	0	50	0.0%
	2	331	7	290	41		
	3	5	7	0	5		
	4	2	4	0	2		
	5	1	1	0	1		
	6	1	0	0	1		
		642	**46**	**592**	**50**		
289	1	130	7	130	0	25	0.0%
	2	100	4	100	0		
	3	64	1	40	24		
	4	1	1	0	1		
		295	**13**	**270**	**25**		
290	1	503	17	503	0	200	0.0%
	2	529	9	425	104		
	3	91	5	0	91		
	4	3	3	0	3		
	5	0	1	0	0		
	6	1	0	0	1		
	9	1	0	0	1		
		1,128	**35**	**928**	**200**		
291	1	882	37	877	5	600	0.0%
	2	752	14	249	503		
	3	82	11	0	82		
	4	6	2	0	6		
	5	1	5	0	1		
	6	2	0	0	2		
	9	1	0	0	1		
		1,726	**69**	**1,126**	**600**		
294	1	279	12	279	0	100	0.0%
	2	185	2	91	94		
	3	4	3	0	4		
	4	0	1	0	0		
	6	1	0	0	1		
	7	1	0	0	1		
		470	**18**	**370**	**100**		
295	1	579	12	579	0	250	0.0%
	2	359	19	115	244		
	3	4	5	0	4		
	4	1	4	0	1		
	5	1	1	0	1		
		944	**41**	**694**	**250**		

Table 20. (Continued).

Permit Area Number	Preference Level	Applications		Unsuccessful	Winners	Permits Available	% Under-Subscribed
		Total	Rejected				
296	1	387	28	387	0	150	0.0%
	2	298	7	217	81		
	3	61	3	0	61		
	4	4	2	0	4		
	5	3	4	0	3		
	6	1	2	0	1		
		754	**46**	**604**	**150**		
299	1	389	15	389	0	250	0.0%
	2	306	1	64	242		
	3	3	3	0	3		
	4	2	21	0	2		
	5	2	1	0	2		
	9	1	0	0	1		
		703	**41**	**453**	**250**		
338A	1	164	10	164	0	100	0.0%
	2	102	2	5	97		
	3	2	2	0	2		
	4	1	0	0	1		
		269	**14**	**169**	**100**		
339A	1	120	5	104	16	100	0.0%
	2	83	2	0	83		
	3	1	0	0	1		
	4	0	1	0	0		
		204	**8**	**104**	**100**		
341A	1	420	14	211	209	350	0.0%
	2	138	3	0	138		
	3	2	3	0	2		
	4	0	2	0	0		
	5	0	1	0	0		
	6	1	0	0	1		
		561	**23**	**211**	**350**		
342A	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	247	5	247	0	100	0.0%
	2	203	9	105	98		
	3	0	2	0	0		
	4	2	4	0	2		
		452	**20**	**352**	**100**		
344B	1	340	5	334	6	250	0.0%
	2	238	9	0	238		
	3	2	2	0	2		
	4	4	4	0	4		
		584	**20**	**334**	**250**		
TOTAL		**47,682**	**2,570**	**20,285**	**27,396**	**32,325**	

Table 21. 2008 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	126	0	24	102	100	No
	3	1	0	0	1		
		126	**0**	**24**	**102**		
902 - St. Croix State Park	1	679	0	228	451	550	Yes
	2	96	0	0	96		
	3	4	0	0	4		
		779	**0**	**228**	**551**		
903 - Savanna Portage State Park	1	60	0	38	22	40	Yes
	2	18	0	0	18		
		78	**0**	**38**	**40**		
904 - Gooseberry Falls State Park	1	20	0	0	20	30	Yes
	2	2	0	0	2		
		22	**0**	**0**	**22**		
905 - Split Rock Lighthouse State Park	1	18	0	0	18	30	Yes
		18	**0**	**0**	**18**		
906 - Tettegouche State Park	1	53	0	0	53	125	Yes
	2	4	0	0	4		
	3	1	0	0	1		
		58	**0**	**0**	**58**		
907 - Scenic State Park	1	20	0	0	20	30	Yes
	2	5	0	0	5		
		25	**0**	**0**	**25**		
908 - Hayes Lake State Park						N/A	Yes
909 - Lake Bemidji State Park	1	37	0	2	35	35	Yes
		37	**0**	**2**	**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	180	0	134	46	150	Yes
	2	103	0	0	103		
	3	3	0	0	3		
		286	**0**	**134**	**152**		
913 - Lake Carlos State Park	1	44	0	16	28	25	Yes
		44	**0**	**16**	**28**		
914 - William O'Brien State Park	1	59	0	7	52	65	Yes
	2	13	0	0	13		
	3	1	0	0	1		
		73	**0**	**7**	**66**		
915 - Lake Bronson State Park	1	14	0	0	14	30	Yes
		14	**0**	**0**	**14**		
916 - Maplewood State Park	1	187	0	187	0	100	Yes
	2	164	0	151	13		
	3	87	0	0	87		
	4	1	0	0	1		
		439	**0**	**338**	**101**		
917 - Rydell NWR	1	8	0	0	8	12	Yes
	2	1	0	0	1		
		9	**0**	**0**	**9**		
918 - Lake Alexander SNA	1	39	0	8	31	40	Yes
	2	9	0	0	9		
		48	**0**	**8**	**40**		

Table 21. (Continued).

Special Hunt	Preference Level	Applications		Unsuccessful	Winners	Permits Available	Bonus Permits
		Total	Rejected				
919 - Buffalo River State Park	1	25	0	10	15	**16**	**Yes**
	2	1	0	0	1		
		26	**0**	**10**	**16**		
920 - Glacial Lakes State Park	1	26	0	0	26	**30**	**Yes**
	2	5	0	0	5		
		31	**0**	**0**	**31**		
921 - Lake Louise State Park	1	40	0	29	11	**25**	**Yes**
	2	15	0	0	15		
		55	**0**	**29**	**26**		
922 - Beaver Creek Valley State Park	1	56	0	44	12	**20**	**Yes**
	2	8	0	0	8		
		64	**0**	**44**	**20**		
923 - Zumbro Falls SNA	1	8	0	0	8	**12**	**Yes**
	2	2	0	0	2		
		10	**0**	**0**	**10**		
924 - Forestville/Mystery Cave SP	1	143	0	54	89	**110**	**Yes**
	2	23	0	0	23		
		166	**0**	**54**	**112**		
925 - Frontenac State Park	1	74	0	48	26	**50**	**Yes**
	2	27	0	0	27		
		101	**0**	**48**	**53**		
926 - Great River Bluffs SP	1	56	0	0	56	**100**	**Yes**
	2	1	0	0	1		
		57	**0**	**0**	**57**		
927 - Whitewater State Park	1	120	0	100	20	**50**	**Yes**
	2	30	0	0	30		
	3	1	0	0	1		
		151	**0**	**100**	**51**		
928 - Zumbro Falls SNA	1	14	0	4	10	**12**	**Yes**
	2	2	0	0	2		
		16	**0**	**4**	**12**		
929 - Whitewater Refuge	1	47	0	0	47	**50**	**No**
	2	1	0	0	1		
		48	**0**	**0**	**48**		
930 - Lake Elmo Park Reserve	1	161	0	150	11	**50**	**Yes**
	2	42	0	3	39		
	3	2	0	0	2		
		205	**0**	**153**	**52**		
931 - 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**		
932 - Elm Creek Park Reserve	1	274	0	160	114	**150**	**Yes**
	2	37	0	0	37		
	3	1	0	0	1		
		311	**0**	**160**	**151**		
933 - Murphy-Hanrahan Park Reserve	1	65	0	0	65	**90**	**Yes**
	2	18	0	0	18		
		83	**0**	**0**	**83**		
		3,506	**0**	**1,443**	**2,063**	**2,207**	

Table 22. 2008 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	210	0	210	0	120	Yes (4)
	2	126	0	11	115		
	3	5	0	0	5		
		341	**0**	**221**	**120**		
936 - Crow Wing SP	1	90	0	90	0	45	Yes (4)
	2	59	0	56	3		
	3	41	0	0	41		
	9	1	0	0	1		
		191	**0**	**146**	**45**		
937 - Soudan Mine SP	1	15	0	0	15	20	Yes (1)
	2	2	0	0	2		
	3	2	0	0	2		
		19	**0**	**0**	**19**		
938 - City of Tower	1	10	0	0	10	40	No
	2	1	0	0	1		
		11	**0**	**0**	**11**		
939 - Interstate SP	1	6	0	0	6	20	Yes (1)
	2	3	0	0	3		
		9	**0**	**0**	**9**		
940 - Lake Shetek SP	1	35	0	35	0	15	Yes (4)
	2	25	0	19	6		
	3	10	0	0	10		
		70	**0**	**54**	**16**		
941 - Lake Maria SP	1	62	0	47	15	25	Yes (4)
	2	9	0	0	9		
	3	2	0	0	2		
		73	**0**	**47**	**26**		
942 - Nerstrand Woods SP	1	107	0	107	0	50	Yes (1)
	2	63	0	32	31		
	3	18	0	0	18		
		188	**0**	**139**	**49**		
943 - Rice Lake SP	1	42	0	37	5	20	Yes (1)
	2	7	0	0	7		
	3	8	0	0	8		
		57	**0**	**37**	**20**		
944 - Sibley SP	1	57	0	55	2	40	Yes (1)
	2	34	0	0	34		
	3	4	0	0	4		
		95	**0**	**55**	**40**		
944 - Vermillian Highlands WMA	1	28	0	13	15	25	Yes (1)
	2	10	0	0	10		
		38	**0**	**13**	**25**		
TOTAL		**1,019**	**0**	**665**	**354**	**420**	

GRAND TOTAL		**52,207**	**2,570**	**22,393**	**29,813**	**34,952**

2008 ELK HARVEST 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 (about 60 miles from the Grygla herd), and is comprised 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 border herd is comprised of three sub-populations – the Caribou 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. In an effort to limit depredation in this area, an elk season was established this year in a zone that encompassed the range of the Lancaster 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 Thief Lake WMA, Thief River Falls area office and the Karlstad area 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 Border 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 Border 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. This year, after experiencing extensive depredation in the Lancaster area, it was decided to define a hunting zone there and offer elk permits there as well to address depredation concerns. 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). Hunters were allowed to choose between zone 10 (Grygla herd) and zone 20 (Lancaster herd – figure 2). Permits are distributed based on a lottery. 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 2008 was 55 animals (see Figure 3). The aerial survey of the Border herd showed 60 animals (Figure 4), while a concurrent survey by the Manitoba Ministry of Natural Resources showed an additional 85 elk in adjacent portions of Manitoba. Based on the survey and observed additional mortality since the 2007 survey, a total of 12 permits were offered in the Grygla herd, and 11 permits were offered in the Lancaster herd. Permit distribution by area and season are shown in Table 1. All of the either sex permits were offered during a September bugle season (two antlerless only permits were also offered during this time frame in the Lancaster hunt zone). One antlerless hunt was held in late November, and another in December.

Harvest statistics for this season are presented in Table 2, while Table 3 presents hunt results in the Grygla area from 1987-2007. The elk rut was going on during the September hunt, and all parties were able to fill their tags. In the Grygla zone, 1 bull was taken on opening day, and the other tag was filled with a bull the following Tuesday. In the Lancaster zone, a bull was taken opening morning, and cows were taken on Monday and Tuesday.

Cold weather and snow were present during the late November hunt. One of the permittees in the Grygla zone was not able to hunt due to health reasons. The remaining four parties hunted until Wednesday, when three adult cows were taken. The fourth party hunted several days longer, but did not fill a tag. In the Lancaster zone, the four parties had filled all four tags by Thursday morning.

The December hunt was cold (7 of 9 days were below zero) and had plenty of snow. In the Grygla zone, no elk were taken until Thursday, when a single adult cow was tagged. Several of the parties had left the area by this time, and the remaining party hunted without getting an opportunity. In the Lancaster zone, one cow was harvested on Tuesday, two on Thursday, and the final one was harvested on Friday.

Because only 4 of 10 antlerless tags had been filled in the Grygla zone, an alternate hunt was held in January (3-11) of 2009. During this hunt, holders of unfilled tags for the Grygla zone were allowed another opportunity to hunt. Five of the 6 potential parties expressed interest in participating, but only 3 parties actually went afield. Conditions were cold (below zero every day) and deep snow. One adult cow was taken on Wednesday, and a female calf was taken on Thursday. Biological samples to examine elk health and screen for bovine tuberculosis and chronic wasting disease were collected from all animals.

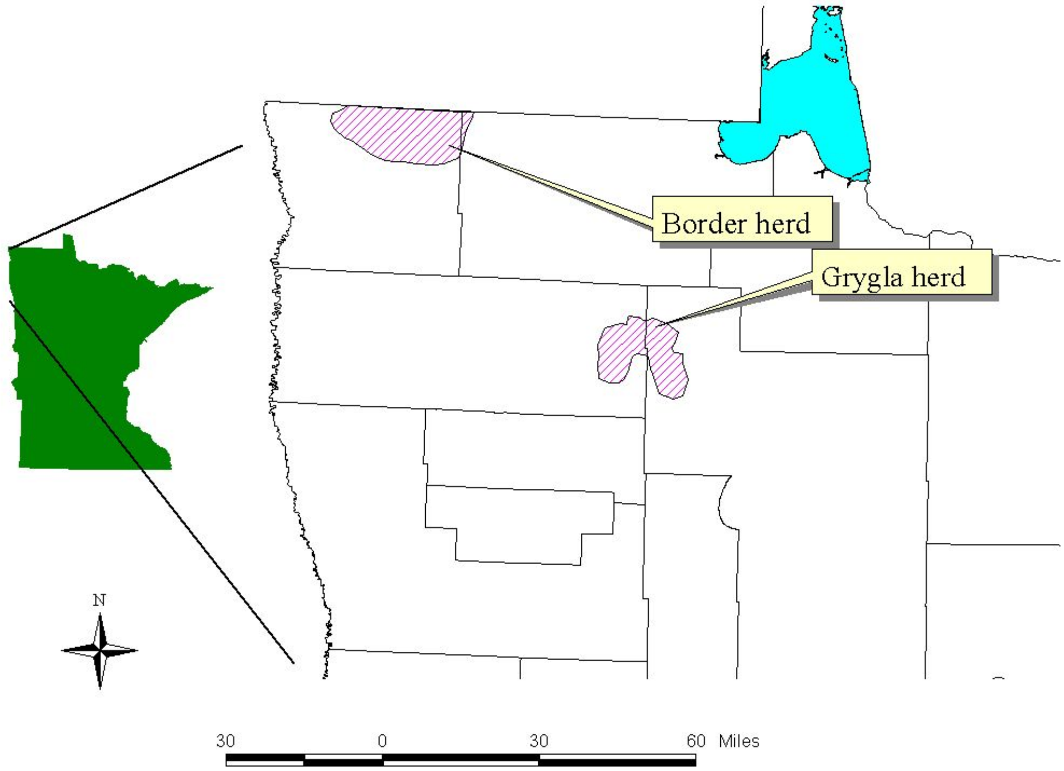


Figure 1. Current elk range in Minnesota, 2008.

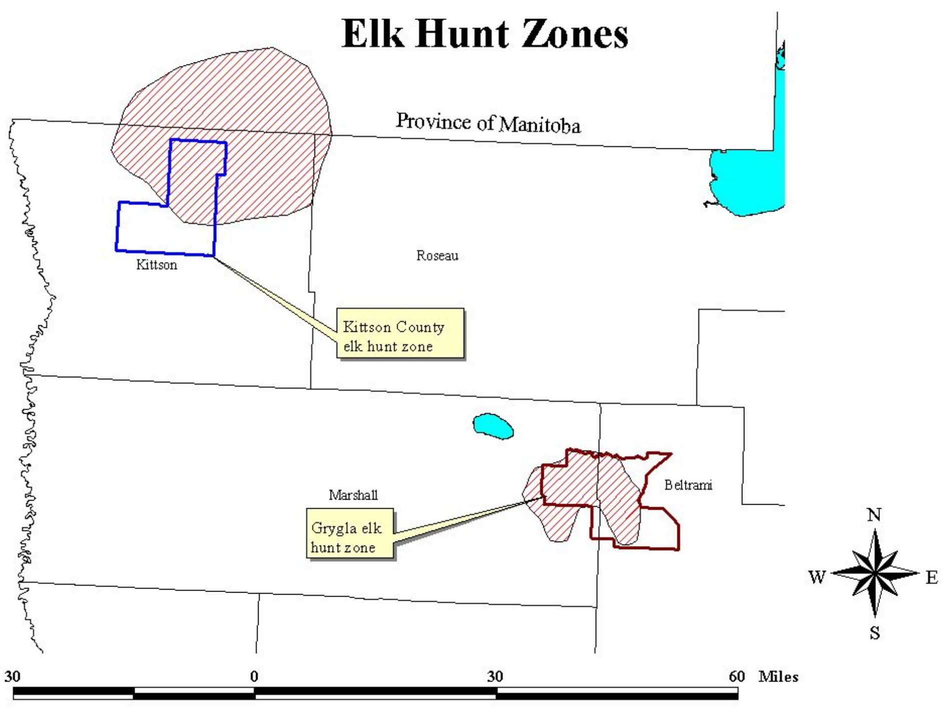


Figure 2. Elk hunting zones in Minnesota, 2008.

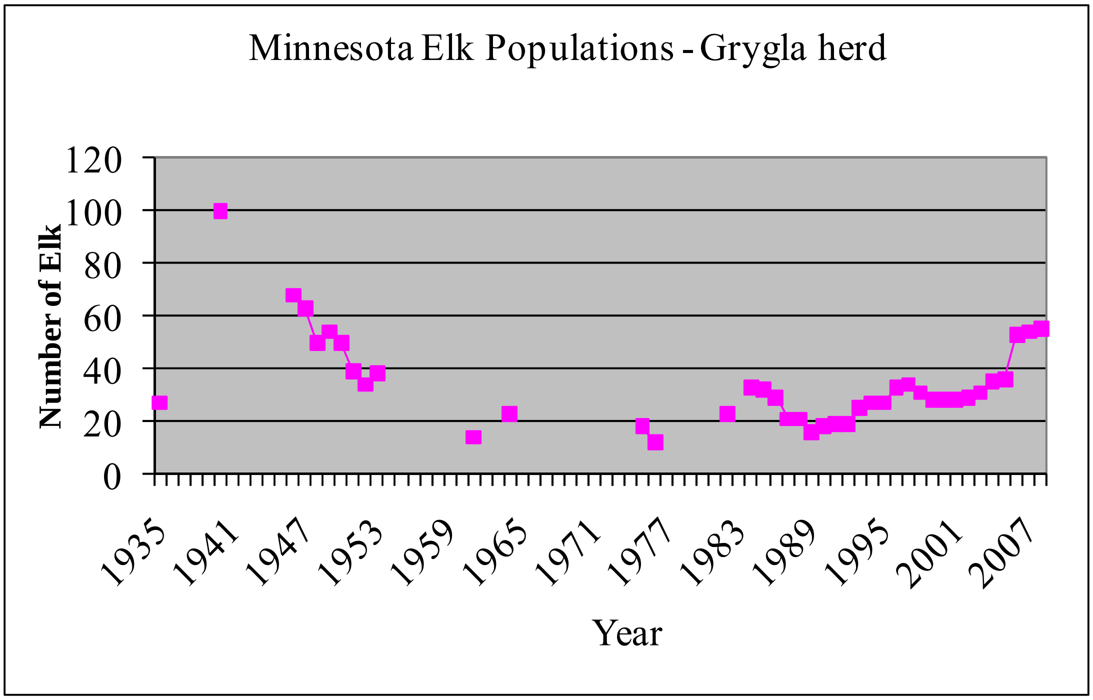


Figure 3. Pre-calving elk numbers in the Grygla herd, 2008.

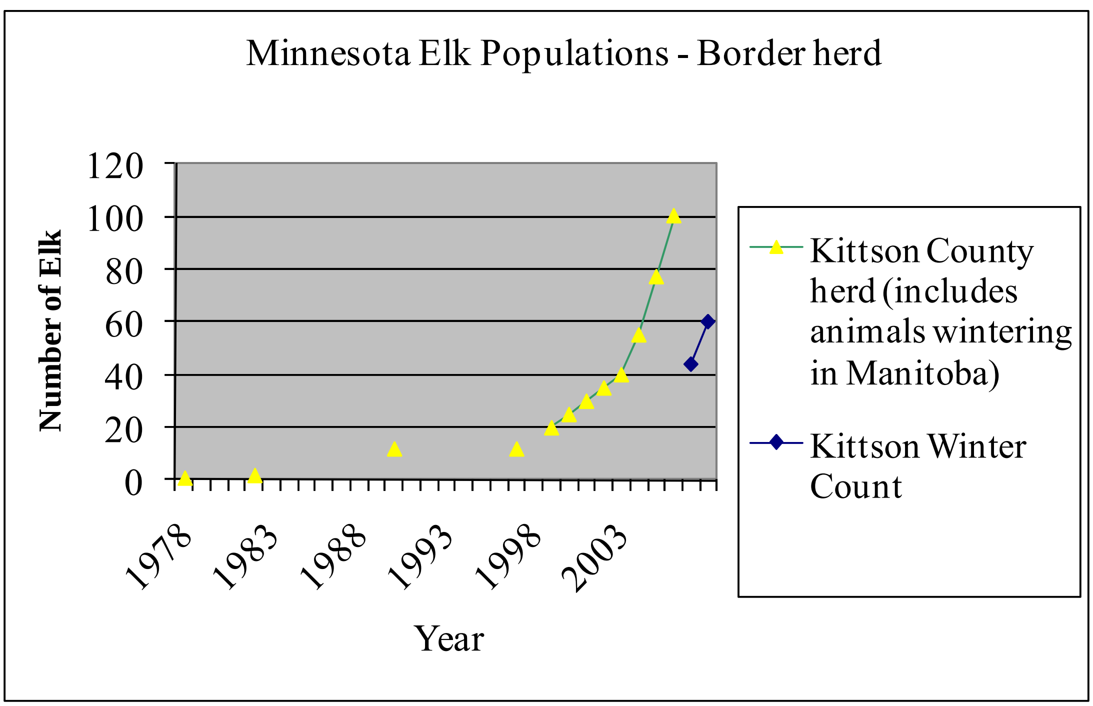


Figure 4. Pre-calving elk numbers in the Border herd, 2008.

Table 1. Elk permits offered by area and season, 2008.

Season	Grygla herd		Lancaster herd	
	Either-sex	Antlerless-only	Either-sex	Antlerless-only
September 13-21	2	0	1	2
November 22-30	0	5	0	4
December 6-14	0	5	0	4
Total	2	10	1	10

Table 2. Elk harvest by area and season, 2008.

Season	Grygla herd		Lancaster herd	
	Bull	Antlerless	Bull	Antlerless
September 13-21	2	0	1	2
November 22-30	0	3	0	4
December 6-14	0	1	0	4
January 3-11 (alternate)		2		
Total	2	6	1	10

Table 3. Minnesota elk harvest (Grygla herd) by year including 1987-2007.

	Bulls		**Antlerless**	
Year	**Permits**	**Harvest**	**Permits**	**Harvest**
1987	2	1	2	1
1996	2	2	7(1 alternate)	6
1997	5(2 alternate)	1	5(2 alternate)	2
1998	4(2 alternate)	2	0	0
2004	1	1	4	2
2005	1	0	4	0
2006	2	2	6	2*
2007			6	6
Total	17(3 alternate)	9	34	19*

*One of two elk taken was actually a spike bull

2008 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 10 registration stations and provide information on the location where they killed their moose, date of kill, and sex of moose harvested.

RESULTS

In 2008, State hunters harvested 110 moose in northeastern Minnesota. No season was held in northwestern Minnesota. Of the 2,706 parties that applied for this year's moose hunt, 247 (9%) were drawn, and 245 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 47 hunter permits and 8 subsistence permits. Band members killed 16 moose (13 bulls and 3 cows). The Fond du Lac band issued 70 permits and the preliminary harvest (as of 10/24/2008) was 12 moose (bulls only). The Fond du Lac season closes 12/31/2007.

DISCUSSION

The success rate of State hunters in 2008 was 45%, a decrease of 5% over 2007 (Tables 1 and 2). This was the second year of hunting was for bulls only. In 2005, and 2006, hunter success for bulls was 50% and 49%, respectively. The success rate for members of the 1854 Treaty Authority was 29%. The preliminary success rate for the Fond du Lac band was 17%, as of 10/24/2008.

Table 1. Moose harvested, licenses offered and sold, application rate, and party success, in 2008 moose hunt by State hunters in northeastern Minnesota

Zone	Bulls	Cows	Total	Licenses Offered	Licenses Sold*	Party Applications*	Chances for Permit	% Success
20	1	0	1	15	15	104	14%	7%
21	3	0	3	10	9	124	8%	33%
22	1	0	1	7	7	58	12%	14%
23	0	0	0	3	3	25	12%	0%
24	6	0	6	8	8	168	5%	75%
25	7	0	7	13	13	276	5%	54%
26	2	0	2	4	3	32	13%	67%
27	2	0	2	5	5	31	16%	40%
28	3	0	3	9	9	47	19%	33%
29	5	0	5	7	7	109	6%	71%
30	3	0	3	8	8	140	6%	38%
31	10	0	10	18	18	392	5%	56%
32	1	0	1	5	5	19	26%	20%
33	3	0	3	7	7	95	7%	43%
34	1	0	1	2	2	44	5%	50%
36	3	0	3	10	10	42	24%	30%
37	2	0	2	3	3	20	15%	67%
60	1	0	1	6	6	33	18%	17%
61	6	0	6	10	10	49	20%	60%
62	8	0	8	22	22	159	14%	36%
63	2	0	2	6	6	33	18%	33%
64	2	0	2	8	8	25	32%	25%
70	7	0	7	8	8	126	6%	88%
72	10	0	10	13	13	123	11%	77%
73	3	0	3	6	6	71	8%	50%
74	3	0	3	4	4	59	7%	75%
76	2	0	2	6	6	88	7%	33%
77	5	0	5	13	13	104	13%	38%
79	3	0	3	5	5	32	16%	60%
80	5	0	5	6	6	78	8%	83%
Total	110	0	110	247	245	2,706	9%	45%

*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%

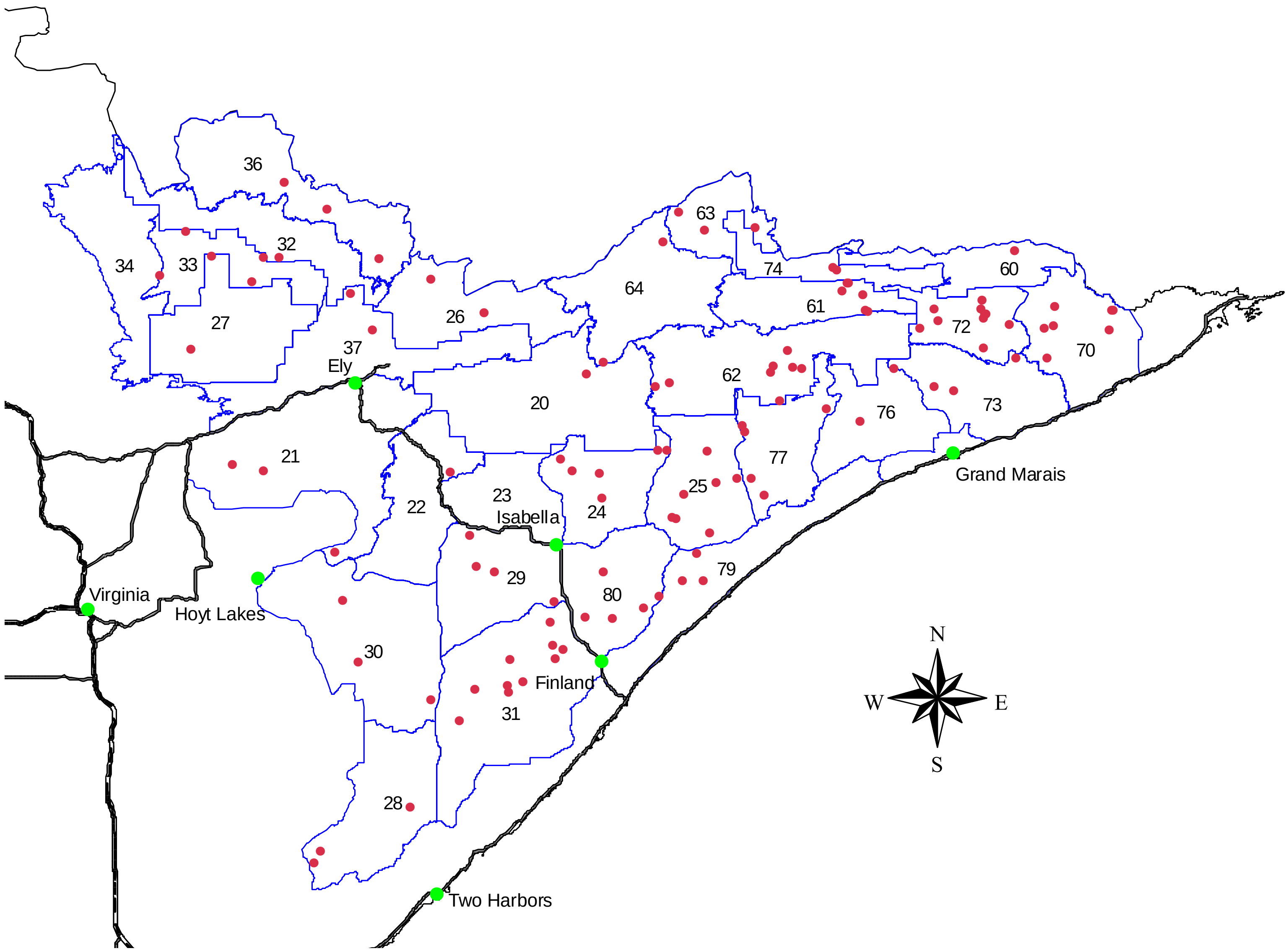


Figure 1. 2008 moose harvest and hunting zones in northeastern Minnesota.

TRAPPING HARVEST STATISTICS

Division of Fish and Wildlife
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2008 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 2008-09 trapping season there were 5,606 Resident Regular Trappers, 464 Resident Junior Trappers, 817 Resident Senior Trappers, 133 Lifetime Trappers, and 7 Nonresident (MN landowners) Trappers surveyed. Of the 7,027 valid licenses, 6,203 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).

ACKNOWLEDGMENTS

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

Table 1. Trapper response to mail surveys, 1988-83 through 2008-09.

Year	Number mailed	Number not delivered	Delivered questionnaires completed and returned	
			Number	Percent
1982-83	925	28	794	88.5
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

Table 2. Use of trapper licenses, 1996-97 through 2008-09.

		Return from mail survey	Projections from license sales
1996-97	Trapped	2,505 (84.8%)	5,660
	Did not trap	450 (15.2%)	1,015
		2,955 (100.0%)	6,675[a]
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]

[a] excludes duplicates.

Table 3. Estimated number of trappers of various furbearers, 1995-96 through 2008-09.

	Estimated number of trappers (thousands)													
	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
Muskrat	3	4	4	3	2	2	2	2	2	2	2	4	2	2
Mink	2	3	3	3	2	2	2	2	2	2	2	3	2	2
Short-tailed weasel	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	1	1	1
Long-tailed weasel	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1
Raccoon (Sept -Feb)	2	3	3	3	2	2	2	2	2	3	2	4	3	3
Raccoon (Mar -Aug)[a]	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			
Striped skunk	1	1	1	1	1	1	1	1	1	1	1	2	1	1
Eastern spotted skunk	<1	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Badger	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Opossum	1	1	1	1	<1	<1	1	1	1	1	1	2	1	1
Red fox (Sept -Feb)	2	2	2	1	1	1	1	1	1	1	1	2	1	1
Red fox (Mar -Aug)[a]	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			
Gray fox	<1	n.a.	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1	1
Coyote	1	1	1	1	1	<1	1	1	1	1	1	1	1	1
Beaver (Oct 08- Feb 09)	2	2	3	3	2	2	2	2	2	2	2	3	2	2
Beaver (Mar 08- Apr 08)	1	2	2	2	1	1	1	1	1	1	1	2	1	1

[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 2008-2009.

	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
Muskrat	70	55	58	42	46	42	42	35	33	32	39	58	32	34
Mink	11	11	11	13	14	12	14	10	9	10	10	9	9	8
Short-tailed weasel	10	9	10	7	5	8	10	7	7	6	6	9	7	7
Long-tailed weasel	5	5	5	5	5	5	7	4	5	3	3	5	5	3
Raccoon (Sept -Feb)	23	23	24	23	20	20	27	25	22	23	21	21	23	23
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
Eastern spotted skunk	5	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
Opossum	9	9	9	11	13	11	8	11	12	14	12	14	12	10
Red fox (Sept -Feb)	9	7	7	5	6	6	6	6	5	4	4	4	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
Coyote	5	4	3	3	4	4	4	4	5	4	5	4	4	4
Beaver (Oct 08-Feb 09)	14	16	16	16	16	15	18	13	12	13	13	13	11	11
Beaver (Mar 08 - Apr 08)	29	31	32	29	27	26	31	26	21	26	24	24	19	22

[a] Raccoon and red fox season continuous May 1994 thru March 15, 2006.

Table 5. Minnesota trapper license sales and estimated annual harvest, 1995-96 through 2008-2009[a]

	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
Trapper license sales[b]	5,630	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
Estimated harvest[c] (thousands)														
Muskrat	195	202	194	131	97	86	101	75	69	72	91	243	75	80
Mink	26	35	34	36	27	23	29	20	17	21	18	26	19	17
Short-tailed weasel	4	4	4	2	2	3	4	3	4	3	2	8	4	4
Long-tailed weasel	2	2	2	2	2	1	2	1	2	1	1	3	2	1
Raccoon (Sept - Feb)	53	69	66	64	37	32	60	61	54	57	49	79	73	72
Raccoon (Mar -Aug)[f]	5	5	5	7	4	4	6	4	5	5	4			
Striped skunk	8	11	11	9	5	5	7	8	8	9	7	11	11	10
Eastern spotted skunk[g]	<1	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Badger	<1	1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1
Opossum	6	6	6	7	6	5	5	8	11	14	12	20	17	11
Red fox (Sept - Feb)	14	13	12	6	7	6	7	8	7	5	4	7	4	4
Red fox (Mar -Aug)[f]	1	1	1	<1	<1	<1	<1	1	1	<1	<1			
Gray fox	1	n.a.	1	1	1	<1	1	1	1	1	1	2	1	1
Coyote	3	3	3	2	2	2	2	4	4	4	4	5	5	5
Beaver (Oct 08- Feb 09)	25	38	36	39	31	25	36	24	23	29	26	34	22	21
Beaver (Mar 08-Apr 08)	41	48	47	55	36	37	42	34	26	38	35	42	26	28
Registered harvest														
Otter	1,435	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
Lynx[g]	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Bobcat[e]	134	223	359	103	206	231	250	544	483	631	590	890	702	853
Fisher	942	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
Marten	1,500	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

[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 March 2, 2009 7,027 trapping licenses were sold in 2008 464 (6.6%) were juvenile licenses, 5,606 (79.8%) were Regular adult licenses, 817 (11.6%) were Senior licenses, 133(2%) were Lifetime licenses, and 7 (<1%) were Nonresident (MN Landowner) licenses. Duplicate licenses excluded.
[c] Based upon trappers' responses to mail surveys. [d] 1 is any number which rounds to 1. <1 is any number which is <0.5.
[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 2008-2009 HUNTING AND TRAPPING SEASON

Jason Abraham, Wildlife Furbearer Program Consultant
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 2009, questionnaires were mailed to the 37 licensed fur buyers in Minnesota. The survey asked them to report the number and type of fur purchased from Minnesota trappers and hunters in 2008-09 and the “average price” paid to those hunters and trappers based on all furs purchased. A total of 25 usable surveys were received, for a return rate of 67 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 2008-09 was $606,687 a decrease of about 35 percent from 2007-08.

RESULTS

Survey summaries are presented in the following tables.

Table 1. Minnesota fur prices as reported by licensed fur dealers, 2008-09.

Species	Number Buyers	Number Pelts	Minimum Price	Maximum Price	Weighted Mean
Muskrat	18	18321	1.00	2.50	1.85
Mink Female	17	1984	4.25	12.00	7.45
Mink male	16	2991	6.00	13.00	9.14
Raccoon	17	31269	5.00	11.00	9.34
Red Fox	17	1643	8.00	17.00	11.79
Gray Fox	13	369	2.50	20.00	14.08
Coyote	16	2009	1.78	15.00	7.12
Bobcat	11	97	30.00	100.00	74.74
River Otter	14	316	13.25	30.00	24.33
Beaver (fall)	17	5659	5.00	18.00	14.63
Beaver (Spring)	14	6126	7.00	15.00	9.36
L.T. Weasel	5	166	2.00	4.00	3.57
S.T. Weasel	12	461	1.00	4.00	2.21
Striped Skunk	12	324	1.00	5.00	2.56
Badger	9	190	4.18	20.00	7.70
Opossum	9	885	0.50	2.33	1.21
Fisher Male	9	147	22.00	45.00	22.27
Fisher Female	11	164	20.00	55.00	37.22
Marten Male	9	179	20.00	50.00	30.61
Marten Female	7	125	20.00	30.00	28.19
Deer Hides	15	7266	2.00	4.50	3.53
Bear Hides	5	0	25.00	50.00	29.81

Table 2. Average price per pelt paid to hunters and trappers in Minnesota, 1993-94 through 2008-09.

	Average pelt prices paid hunters and trappers in Minnesota (dollars)															
Species	1993-94	1994-95	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
Muskrat	1.35	1.61	1.53	3.49	2.24	1.11	1.57	1.83	2.32	2.11	2.05	1.9	2.81	5.79	2.96	1.85
Mink (female)	12.18	11.43	8.56	13.71	9.65	6.11	8.22	7.7	6.76	6.52	7.23	10.22	10.23	13.18	9.05	7.45
Mink (male)	21.89	14.9	11.75	20.82	13.52	9.83	11.61	11.15	9.34	9.55	11.41	11.34	14.29	18.04	12.32	9.14
S.T. Weasel	1.72	1.73	1.84	2.32	2.33	1.72	2.16	2.3	2.41	2.63	2.53	2.52	2.6	3.58	3.18	2.21
L.T. Weasel	1.05	2.05	1.24	3.33	2.67	2.05	2.34	1.8	2.98	1.94	3.34	3.05	2.56	4.35	5.00	3.57
Raccoon	8.26	9.02	9.4	15.16	13.92	7.25	5.09	8.86	9.53	10.33	11.45	10.49	9.61	11.92	14.32	9.34
Striped Skunk	3.7	3.52	3.21	2.11	3.18	4.72	4.4	4.79	3.91	5.81	4.66	3.95	3.77	4.46	5.27	2.56
Badger	4.62	6.12	6.33	8.49	6.53	6.3	7.3	10.15	9.39	13.18	14.23	12.94	13.4	15.71	13.92	7.70
Opossum	0.89	0.98	0.97	1.04	1.1	0.58	0.96	0.97	1.19	1.22	1.23	1.51	1.4	1.52	1.76	1.21
Red Fox	10.59	13.42	14.21	14.81	11.23	8.04	11.82	14.45	17.07	22.08	20.02	17.28	16.96	17.68	14.69	11.79
Gray Fox	6.55	9.69	7.49	9	7.69	5.63	7.06	7.52	8.36	9.05	13.64	12.58	15	22.36	30.09	14.08
Coyote	14.68	13.55	10.89	12.25	10.12	5.57	9.42	12.4	13.37	16.12	18.37	15.24	13.57	17.76	13.51	7.12
Bobcat	43.42	36.36	31.81	32.82	30.39	27.66	24.23	33.09	46	71.54	95.9	98.99	95.74	101.07	93.41	74.74
Beaver (fall-winter)	11.24	13.8	12.56	19.24	16.48	11.4	11.51	14.66	12.74	10.05	12.57	13.62	14.48	18.35	14.60	14.63
Beaver (spring)	9.41	14.48	10.96	19.14	17.39	14.06	11.02	12.8	12.47	9.99	11.09	13.8	16.49	14.81	17.77	9.36
Otter	43.14	47.5	38.76	38.75	39.81	34.03	41.41	50.52	46.19	61.16	85.33	87.23	88.89	42.85	29.49	24.33
Fisher (male)	14.17	19.06	16.17	25.48	31.09	18.92	19.45	20.14	23.18	26.7	27.15	30.02	36.03	76.33	63.09	22.27
Fisher (female)	28.4	29.93	24.9	34.47	33.65	21.76	19.91	19.01	22.86	25.44	25.71	27.47	31.46	67.82	48.24	37.22
Marten (male)	35.86	34.07	28.3	34.47	27.82	19.7	24.89	27.56	24.1	28	30.09	30.65	37.47	74.04	58.72	30.61
Marten (female)	29.58	28.34	21.42	29.26	21.79	16.12	21.27	21.25	22.52	27.3	26.7	27.42	31.53	66.09	50.05	28.19
Deer Hides	5.27	7.17	6.92		6.97	6.4	6.32	6.46	2.86	3.48	5.41	3.95	4.14	4.51	3.92	3.53
Bear Hides	46.77	38.93	50.72		37.27	36.23	33.87	39.81	36.1	40.56	41.55	46.61	39.3	43.03	36.57	29.81

REGISTERED FURBEARER HARVEST STATISTICS

Forest Wildlife Populations and Research Group
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REGISTERED FURBEARER HARVEST STATISTICS 2008-09 REPORT

John Erb, Forest Wildlife Populations and Research Group

Drawing by Gilbert Proulx

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 2 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.

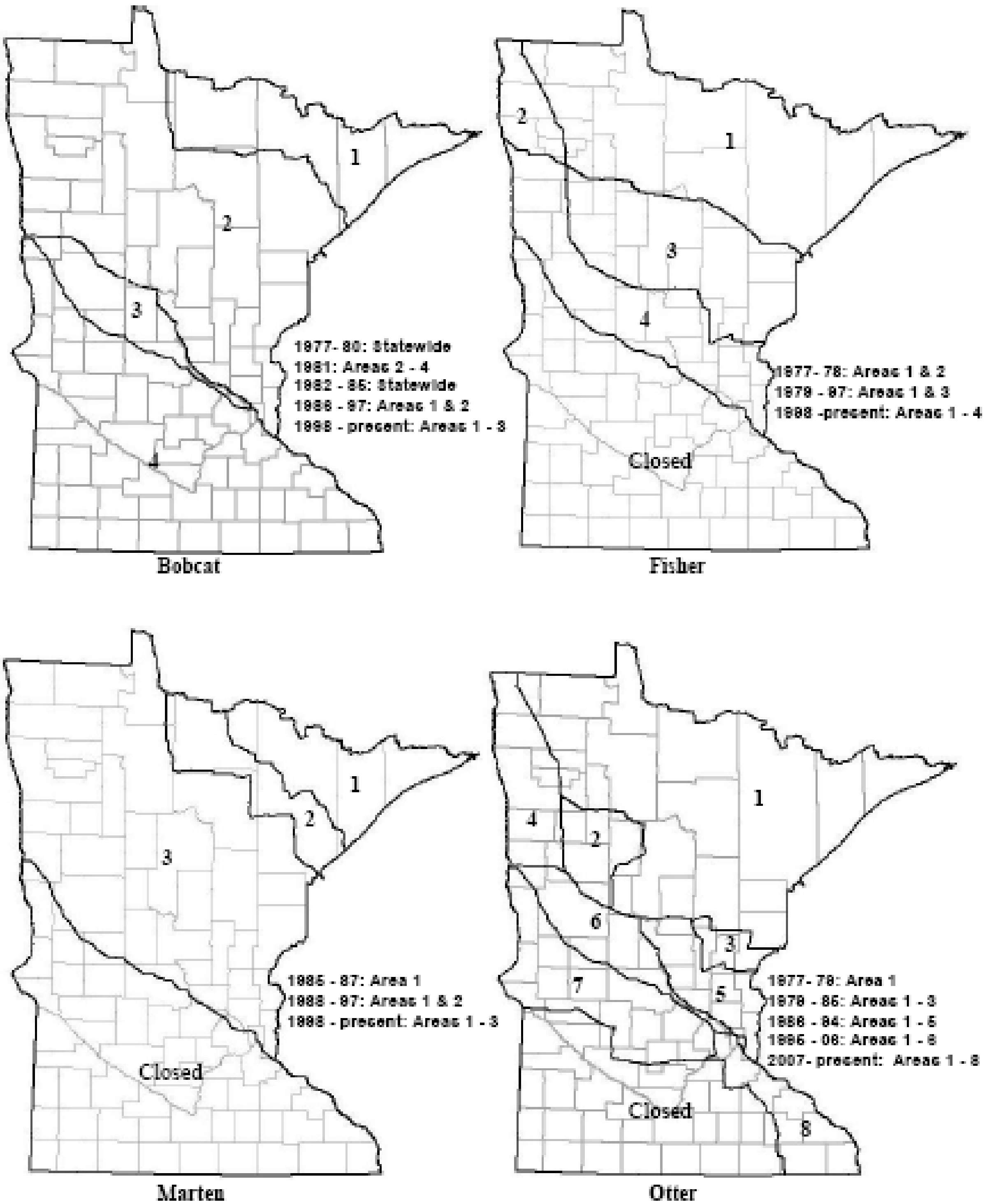

Figure 1. Open trapping areas for fisher, marten, bobcat, and otter, 1977 - present.

Table 1. Registered furbearer seasons and harvests, 1981-2008.

	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

[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).

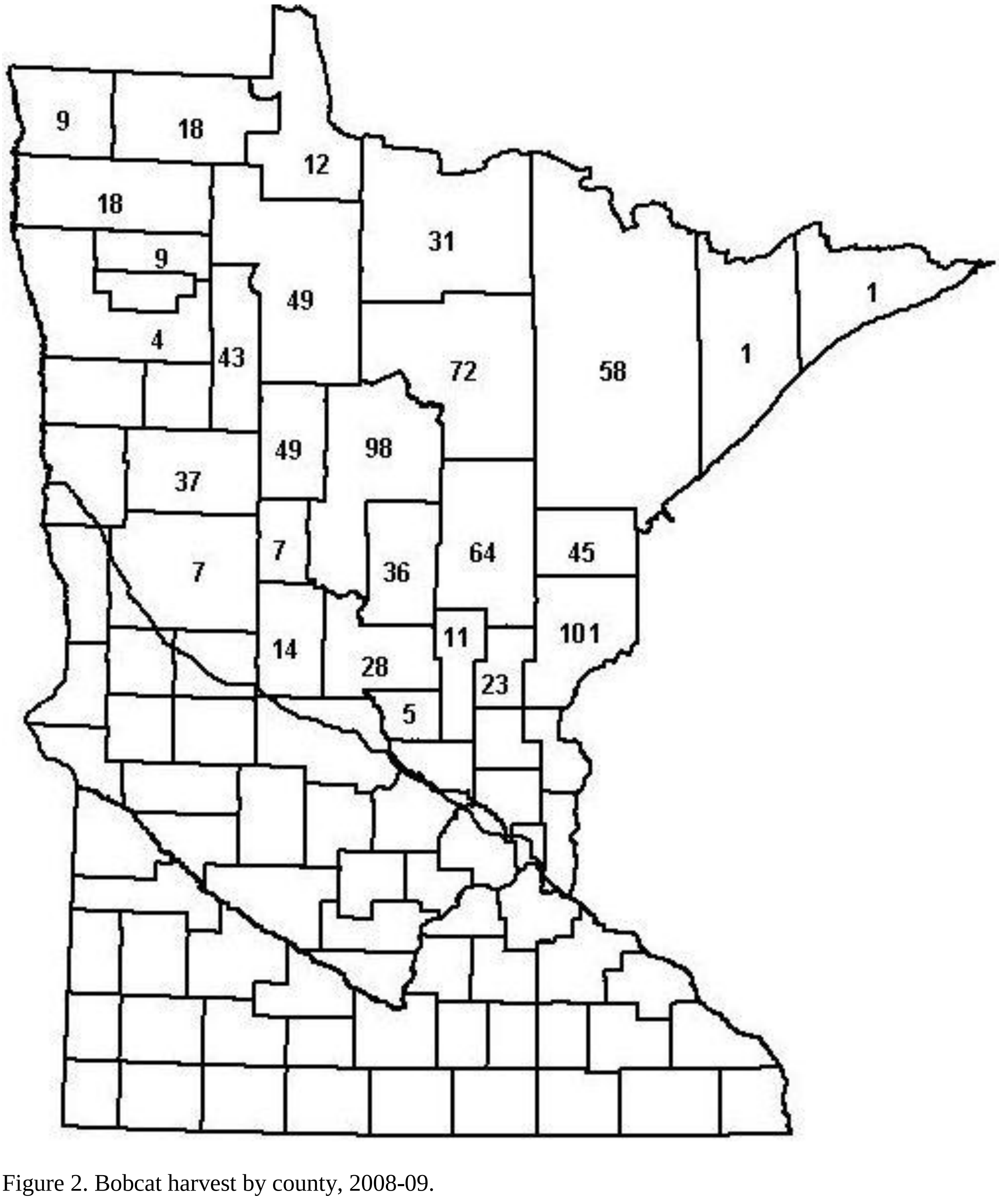

Figure 2. Bobcat harvest by county, 2008-09.

Table 2. Bobcat harvest by county and sex, 2008-09.

	Sex*			
County	Male	Female	Unknown	Total
Aitkin	27	37		64
Becker	17	20		37
Beltrami	20	29		49
Benton	1	4		5
Carlton	19	26		45
Cass	37	61		98
Chisago	0	0		0
Clay	0	0		0
Clearwater	22	21		43
Cook	0	1		1
Crow Wing	17	19		36
Hubbard	22	27		49
Isanti	0	0		0
Itasca	36	35	1	72
Kanabec	13	10		23
Kittson	6	3		9
Koochiching	11	20		31
Lake	0	1		1
LOW	5	7		12
Mahnomen	0	0		0
Marshall	6	12		18
Mille Lacs	7	4		11
Morrison	15	13		28
Norman	0	0		0
Ottertail	2	5		7
Pennington	5	4		9
Pine	52	49		101
Polk	1	3		4
Red Lake	0	0		0
Roseau	10	8		18
St. Louis	23	35		58
Stearns	0	0		0
Todd	5	9		14
Wadena	3	4		7
Unknown	2	1		3
Total	384	468	1	853

* 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, 1998-2008.

County	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Aitkin	6	25	32	20	35	19	37	32	46	56	64
Becker	1	8	6	28	26	19	28	19	46	24	37
Beltrami	7	13	16	26	63	47	66	34	90	33	49
Benton	0	0	0	0	0	0	0	0	0	1	5
Carlton	4	10	12	14	11	20	27	25	34	25	45
Cass	16	24	11	17	59	48	56	103	137	50	98
Chisago	0	0	0	0	1	0	0	0	0	3	0
Clay	0	0	0	0	0	1	0	0	0	0	0
Clearwater	1	4	0	6	24	19	18	18	42	25	43
Cook	0	0	0	0	1	1	2	3	0	0	1
Crow Wing	15	21	13	4	20	15	19	18	27	21	36
Hubbard	1	7	4	10	31	21	35	22	69	40	49
Isanti	0	2	0	0	0	2	0	1	0	0	0
Itasca	10	23	40	33	74	76	93	68	113	86	72
Kanabec	3	4	11	8	10	9	17	11	14	16	23
Kittson	0	7	6	7	5	8	6	3	5	4	9
Kooch	2	8	11	12	23	25	14	22	16	37	31
Lake	1	0	1	0	0	0	1	2	1	0	1
LOW	2	2	3	0	6	4	6	3	2	9	12
Mahnomen	0	1	1	1	0	3	7	2	7	8	0
Marshall	4	10	2	4	24	14	20	16	19	32	18
Mille Lacs	0	1	2	0	10	4	11	9	8	13	11
Morrison	2	6	8	4	6	14	18	18	17	23	28
Norman	0	0	0	0	0	0	0	0	1	0	0
Ottertail	0	0	0	1	0	0	5	1	7	9	7
Pennington	0	0	1	1	1	0	6	3	2	11	9
Pine	12	15	21	23	49	44	59	47	59	87	101
Polk	0	0	1	0	2	2	4	1	3	0	4
Red Lake	0	0	2	0	1	1	0	6	1	0	0
Roseau	3	7	12	18	22	28	27	28	36	32	18
St. Louis	10	5	9	7	30	25	37	44	45	39	58
Stearns	0	0	0	0	0	0	0	0	0	1	0
Todd	2	1	0	1	3	6	5	7	12	6	14
Wadena	1	2	0	5	7	8	3	17	16	9	7
Unknown	0	0	4	0	0	0	4	7	15	2	3
Total	103	206	229	250	544	483	631	590	890	702	853

Table 4. Bobcat harvest by sex and week, 2008-09 season.

Date	Sex* Male	Female	Unknown	Total	% of Total	Cumulative %
Nov.29 - Dec.5	136	142		278	32.59	32.59
Dec.6 - Dec.12	77	127		204	23.92	56.51
Dec.13 - Dec.19	49	54		103	12.08	68.58
Dec.20 - Dec.26	60	60		120	14.07	82.65
Dec.27 - Jan.4**	57	72	1	130	15.24	97.89
Unknown	5	13		18	2.11	100.00
Total	384	468	1	853	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, 1984-2008.

Number (%) of Takers	Number Taken					
	1	2	3	4	5	Total Takers
1984-85	116 (65)	39 (22)	13 (7)	9 (5)	1 (1)	178
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

* Product of categories above may not equal total harvest due to some missing names/license numbers

Table 6. Bobcat harvest by method of take, 1982-2008.

	Total	Trapping					Hunting				
Year	Harvest[a]	Harvest	% of Total	# Takers	Ave. Take	% Males[b]	Harvest	% of Total	# Takers	Ave. Take	% Males[b]
1982-83	274	239	87	147	1.6		35	13	23	1.5	
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

[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

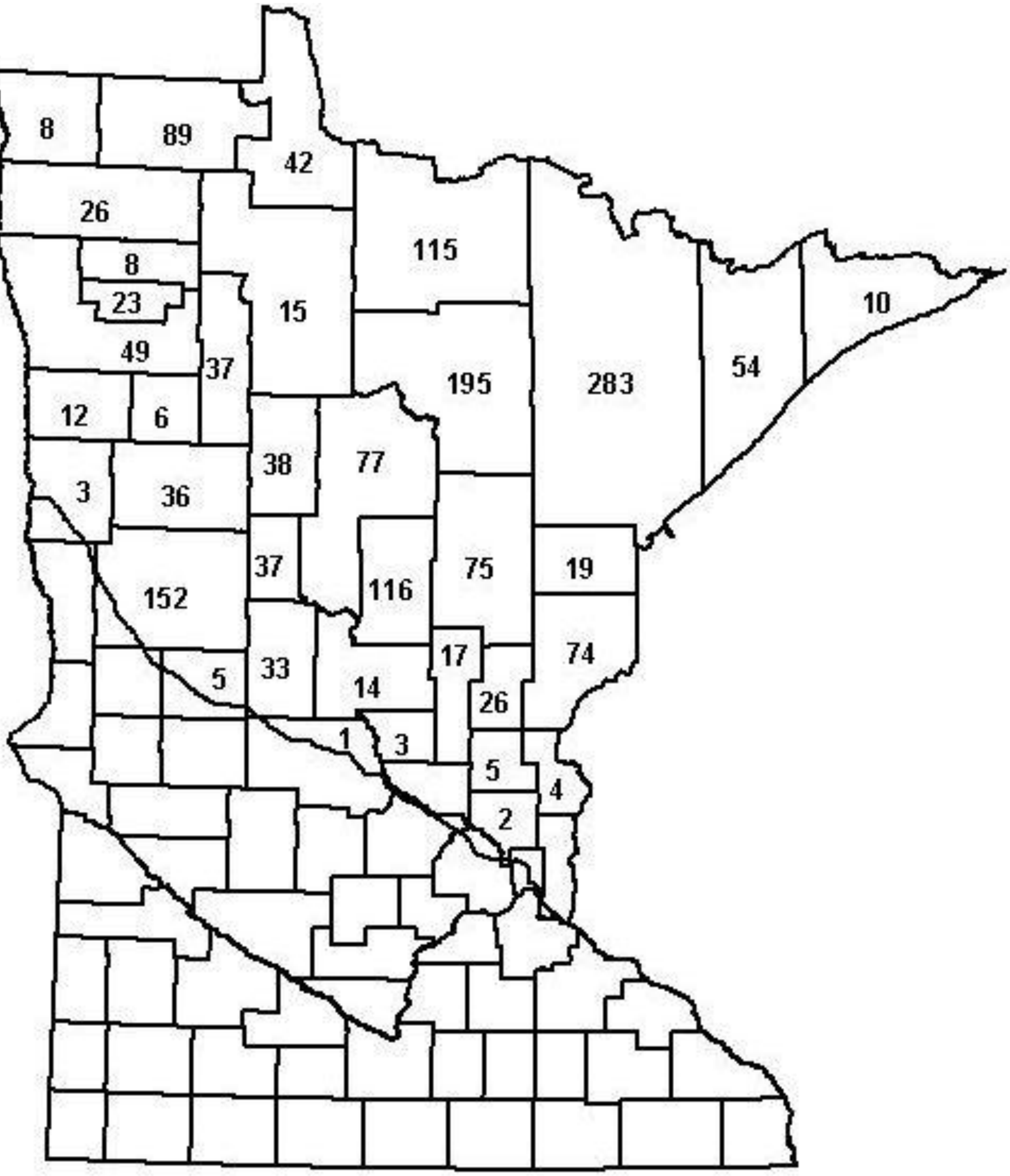

Figure 3. Fisher harvest by county, 2008-09.

Table 7. Fisher harvest by county and sex, 2008-09 season.

County	Sex: Male	Female	Unknown	Total
Aitkin	41	34		75
Anoka	2	0		2
Becker	23	13		36
Beltrami	7	8		15
Benton	2	1		3
Carlton	10	9		19
Cass	44	33		77
Chisago	1	3		4
Clay	2	1		3
Clearwater	16	20	1	37
Cook	3	7		10
Crow Wing	59	57		116
Douglas	4	1		5
Hubbard	24	14		38
Isanti	3	2		5
Itasca	100	92	3	195
Kanabec	12	14		26
Kittson	6	2		8
Koochiching	54	61		115
Lake	17	37		54
LOW	23	19		42
Mahnomen	3	3		6
Marshall	11	15		26
Mille Lacs	9	8		17
Morrison	7	7		14
Norman	7	5		12
Ottertail	88	64		152
Pennington	5	3		8
Pine	43	31		74
Polk	23	26		49
Red Lake	11	12		23
Roseau	47	42		89
St. Louis	130	153		283
Sherburne	0	0		0
Stearns	0	1		1
Todd	17	16		33
Wadena	17	20		37
Washington	0	0		0
Unknown	1	2		3
Total	872	836	4	1,712

Table 8. Comparison of fisher harvest by county, 1997-2008.

County	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Aitkin	86	105	84	68	103	122	124	96	97	156	67	75
Anoka	0	0	0	0	0	0	1	0	0	0	0	2
Becker	25	15	32	42	46	96	88	92	49	87	57	36
Beltrami	140	105	70	60	73	117	74	71	47	54	40	15
Benton	0	0	0	0	0	0	1	0	1	1	0	3
Carlton	45	25	23	27	37	48	42	40	35	49	13	19
Cass	212	133	123	122	134	225	205	186	149	209	80	77
Chisago	0	1	0	3	2	6	5	6	2	18	7	4
Clay	0	0	0	0	0	0	0	0	0	1	0	3
Clearwater	31	18	13	15	45	45	52	41	35	54	19	37
Cook	24	26	19	19	33	27	28	24	40	35	29	10
Crow Wing	65	75	53	71	82	106	106	113	79	140	81	116
Douglas	0	0	0	1	0	0	3	3	3	6	2	5
Hubbard	66	38	34	34	64	59	62	32	20	51	20	38
Isanti	0	0	0	0	0	0	0	2	3	5	1	5
Itasca	477	441	248	288	298	354	319	323	320	405	195	195
Kanabec	7	3	11	4	4	19	21	13	15	26	11	26
Kittson	7	3	3	3	7	3	11	2	7	2	5	8
Koochiching	386	369	150	159	156	178	171	179	209	221	105	115
Lake	123	84	46	62	54	72	74	87	85	87	49	54
LOW	59	99	83	71	48	115	78	33	63	74	17	42
Mahnomen	0	0	3	0	12	16	14	13	9	27	25	6
Marshall	21	7	10	27	19	18	21	25	18	26	19	26
Mille Lacs	0	3	0	4	3	16	22	14	16	20	15	17
Morrison	0	0	2	0	1	6	3	7	5	23	21	14
Norman	0	0	6	0	0	1	1	11	6	4	9	12
Ottertail	0	1	0	0	1	12	40	52	60	158	110	152
Pennington	1	0	2	4	4	10	18	42	22	22	16	8
Pine	34	55	36	37	29	44	54	56	42	82	39	74
Polk	6	5	6	8	24	46	65	47	38	72	61	49
Red Lake	5	0	2	18	16	15	16	29	34	32	29	23
Roseau	134	171	111	157	180	106	141	114	110	127	84	89
St. Louis	783	880	546	369	608	734	611	740	688	898	407	283
Sherburne	0	0	0	0	0	0	2	0	0	0	0	0
Stearns	0	0	0	0	0	0	0	1	0	0	0	1
Todd	2	0	0	0	2	5	14	18	23	21	13	33
Wadena	10	5	8	0	31	39	32	31	40	44	27	37
Washington	0	0	0	0	0	0	0	0	0	0	1	0
Unknown	12	28	2	1	1	0	2	9	18	14	8	3
Total	2,761	2,695	1,726	1,674	2,117	2,660	2,521	2,552	2,388	3,251	1,682	1,712

Table 9. Fisher harvest by date and sex, 2008-09 season.

	Sex				% of Known	Cumulative
Date	Male	Female	Unknown	Total	Total	%
Nov. 29	5	5		10	0.58	0.58
Nov. 30	76	79		155	9.05	9.64
Dec. 1	159	125		284	16.59	26.23
Dec. 2	104	119	2	225	13.14	39.37
Dec. 3	120	112		232	13.55	52.92
Dec. 4	96	100		196	11.45	64.37
Dec. 5	90	103	1	194	11.33	75.70
Dec. 6	109	102	1	212	12.38	88.08
Dec. 7	95	77		172	10.05	98.13
Unknown	18	14		32	1.87	100%
Total	872	836	4	1,712	100%	

Table 10. Distribution of fisher harvest* among trappers, 1993-2008.

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

* Product of categories above may not equal total harvest due to some missing name/license numbers

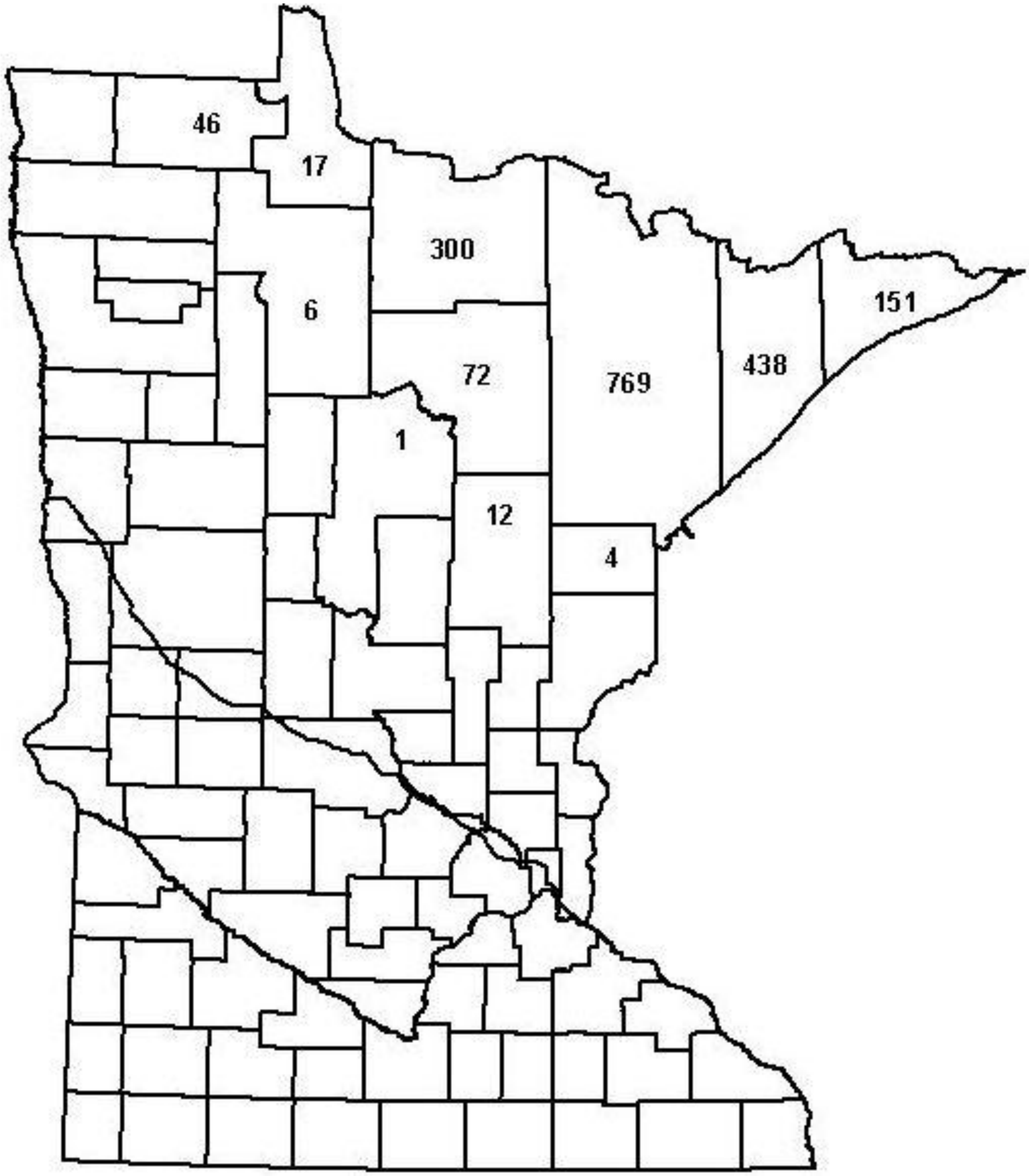

Figure 4. Marten harvest by county, 2008-09.

Table 11. Marten harvest by county and sex, 2008-09 season.

County	Sex			Total
	Male	Female	Unknown	
Aitkin	7	5		12
Beltrami	2	4		6
Carlton	2	2		4
Cass	1	0		1
Clearwater	0	0		0
Cook	102	49		151
Crow Wing	0	0		0
Itasca	37	33	2	72
Kanabec	0	0		0
Koochiching	186	114		300
Lake	242	196		438
Lake of the Woods	10	7		17
Mahnomen	0	0		0
Marshall	0	0		0
Pennington	0	0		0
Pine	0	0		0
Red Lake	0	0		0
Roseau	34	12		46
St. Louis	462	307		769
Unknown	3	4		7
Total	1,088	733	2	1,823

Table 12. Comparison of marten harvest by county in Minnesota, 1997-2008.

County	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Aitkin	0	1	2	2	3	5	6	6	6	13	4	12
Beltrami	12	12	37	2	24	30	38	65	17	19	8	6
Carlton	0	3	6	5	11	4	11	1	10	6	1	4
Cass	0	1	2	3	1	3	2	3	1	4	0	1
Clearwater	0	0	0	0	0	0	1	1	0	0	0	0
Cook	195	208	240	190	164	228	411	318	369	446	269	151
Crow Wing	0	0	3	0	0	0	0	0	0	0	0	0
Itasca	164	155	114	82	102	147	141	136	98	155	74	72
Kanabec	0	0	0	0	0	0	0	0	0	2	0	0
Koochiching	597	517	492	306	327	525	534	549	418	592	348	300
Lake	287	284	284	323	243	492	541	551	536	892	520	438
LOW	12	26	58	15	13	104	71	122	54	46	31	17
Mahnomen	0	0	0	0	0	0	0	2	0	0	0	0
Marshall	0	0	1	1	1	1	1	5	3	0	1	0
Pennington	0	0	0	2	0	0	0	0	0	0	1	0
Pine	0	0	0	0	0	0	1	2	1	1	1	0
Red Lake	0	0	0	3	0	0	0	0	0	0	0	0
Roseau	0	41	51	98	48	116	104	127	51	31	69	46
St. Louis	980	1,020	1,131	596	991	1,184	1,352	1,346	1,065	1,579	885	769
Unknown	14	31	2	1	0	0	0	7	24	2	9	7
Total	2,261	2,299	2,423	1,629	1,928	2,839	3,214	3,241	2,653	3,788	2,221	1,823

Table 13. Marten harvest by date and sex, 2008-09 season.

Date	Sex: Male	Sex: Female	Sex: Unknown	Total	% of Known Total	Cumulative %
Nov. 29	8	4		12	0.66	0.66
Nov. 30	149	91		240	13.17	13.82
Dec. 1	173	105		278	15.25	29.07
Dec. 2	188	110	1	299	16.40	45.47
Dec. 3	161	113		274	15.03	60.50
Dec. 4	121	89		210	11.52	72.02
Dec. 5	108	80	1	189	10.37	82.39
Dec. 6	95	79		174	9.54	91.94
Dec. 7	67	43		110	6.03	97.97
Unknown	18	19		37	2.03	100%
Total	1,088	733	2	1,823	100%	

Table 14. Distribution of marten harvest* among trappers, 1993-2008.

Number (%) of Takers	Number Taken						
	1	2	3	4	5	Total Takers	Ave. Take
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

* 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, 2008-09. (Combined limit = 5)

Number of Takers		Number of Marten					
		0	1	2	3	4	5
Number of Fisher	0		80	71	51	47	120
	1	225	32	38	25	62	
	2	120	17	10	35		
	3	60	11	20			
	4	52	13				
	5	79			Total takers of at least 1 fisher or marten		1168

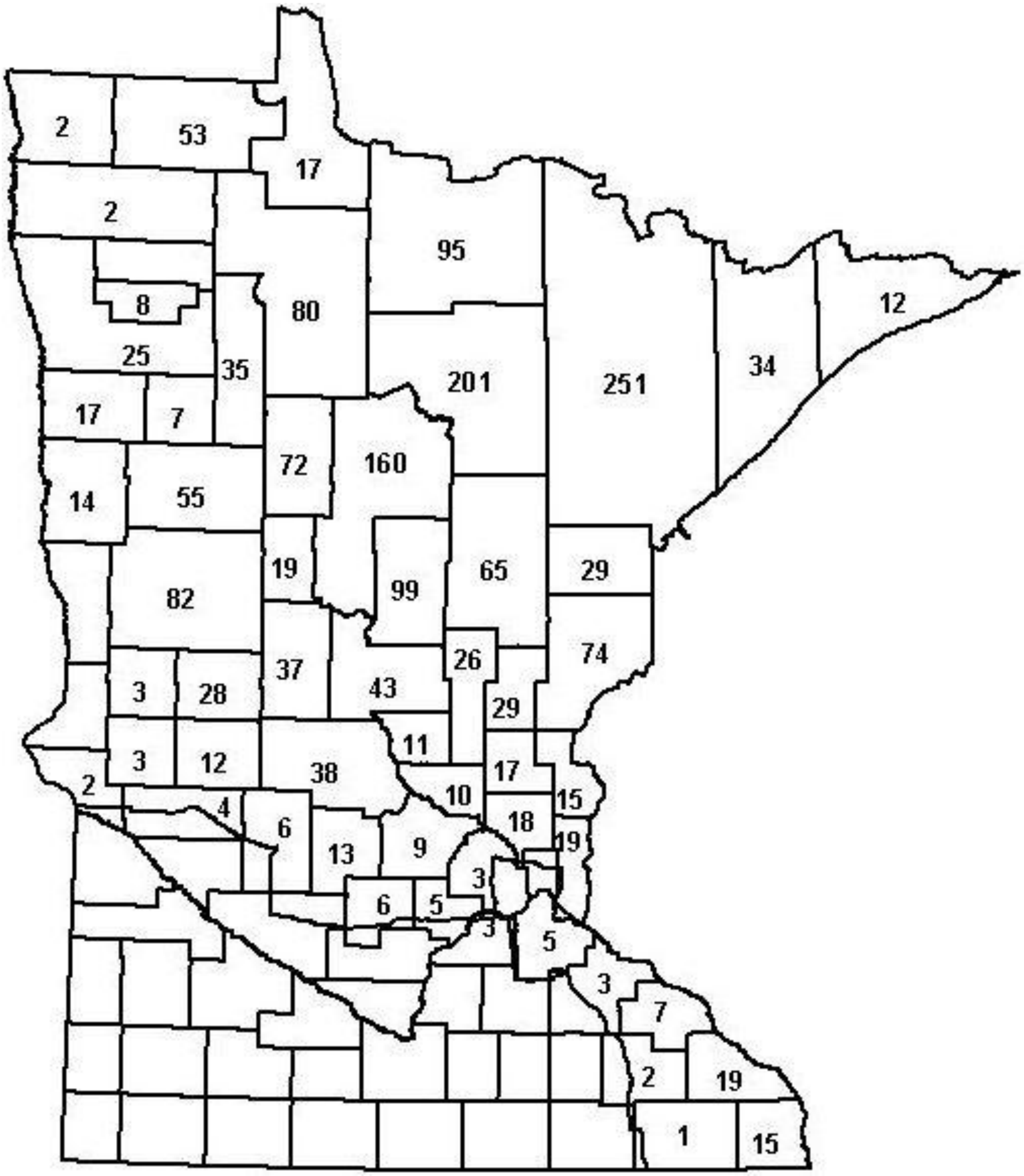

Figure 5. Otter harvest by county, 2008-09.

Table 16. Otter harvest by county and sex, 2007-08 season.

County	Sex: Male	Female	Unknown	Total
Aitkin	37	28		65
Anoka	14	4		18
Becker	32	23		55
Beltrami	35	45		80
Benton	4	7		11
Big Stone	0	2		2
Carlton	21	8		29
Carver	3	2		5
Cass	83	77		160
Chisago	9	6		15
Clay	8	6		14
Clearwater	19	16		35
Cook	5	7		12
Crow Wing	57	42		99
Dakota	2	3		5
Douglas	18	10		28
Fillmore	1	0		1
Goodhue	1	2		3
Grant	0	3		3
Hennepin	2	1		3
Houston	12	3		15
Hubbard	48	24		72
Isanti	8	9		17
Itasca	115	86		201
Kanabec	17	12		29
Kandiyohi	3	3		6
Kittson	1	1		2
Koochiching	63	32		95
Lake	14	20		34
Lake of the Woods	9	8		17
McLeod	1	5		6
Mahnomen	5	2		7
Marshall	1	1		2
Meeker	8	5		13
Mille Lacs	16	10		26
Morrison	26	17		43
Norman	9	8		17
Olmsted	0	2		2
Ottertail	45	36	1	82
Pennington	0	0		0
Pine	57	17		74
Polk	16	9		25
Pope	4	8		12
Red Lake	5	3		8
Roseau	30	23		53
St. Louis	157	94		251
Scott	2	1		3
Sherburne	7	3		10
Stearns	22	16		38
Stevens	2	1		3
Swift	2	2		4
Todd	23	14		37
Traverse	0	0		0
Wabasha	5	2		7
Wadena	12	7		19
Washington	12	7		19
Wilkin	0	0		0
Winona	11	8		19
Wright	8	1		9
Unknown	11	7		18
Total	1,138	799	1	1,938

Table 17. Comparison of otter harvest by county, 1997-2008.

County	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Aitkin	95	87	103	82	100	78	87	113	132	124	53	65
Anoka	21	23	25	14	17	17	13	32	22	16	26	18
Becker	85	30	64	45	125	104	105	178	107	117	54	55
Beltrami	133	81	103	74	108	127	173	216	170	154	105	80
Benton	4	6	2	7	10	6	7	19	14	16	9	11
Big Stone	0	0	0	0	0	0	0	0	0	0	0	2
Carlton	43	39	45	29	33	40	38	53	36	39	36	29
Carver	0	0	0	0	0	0	0	0	0	0	2	5
Cass	189	149	109	107	197	189	198	255	231	236	124	160
Chisago	20	20	13	12	26	18	22	20	28	33	16	15
Clay	7	0	7	3	1	7	7	15	18	35	8	14
Clearwater	25	18	29	25	47	61	52	62	48	41	39	35
Cook	29	48	30	26	26	31	41	56	46	39	13	12
Crow Wing	84	81	77	76	96	108	119	141	102	111	63	99
Dakota	0	0	0	0	0	0	0	0	0	0	0	5
Douglas	7	7	1	1	1	0	12	27	16	30	18	28
Fillmore	0	0	0	0	0	0	0	0	0	0	6	1
Goodhue	0	0	0	0	0	0	0	0	0	0	3	3
Grant	0	0	0	0	0	0	0	0	0	0	3	3
Hennepin	0	0	0	0	0	0	0	0	0	0	1	3
Houston	0	0	0	0	0	0	0	0	0	0	9	15
Hubbard	95	28	23	19	61	64	70	91	80	72	59	72
Isanti	29	26	20	28	33	33	27	35	38	30	30	17
Itasca	371	339	220	296	337	310	382	483	362	334	205	201
Kanabec	43	24	29	32	56	40	38	57	79	62	44	29
Kandiyohi	0	0	0	0	0	0	0	0	0	0	2	6
Kittson	2	1	0	0	1	2	3	3	3	5	11	2
Koochiching	109	126	63	107	118	96	164	167	131	118	70	95
Lake	57	77	44	70	57	57	81	88	65	60	35	34
LOW	24	32	36	18	17	21	42	31	34	24	30	17
McLeod	0	0	0	0	0	0	0	0	0	0	6	6
Mahnomen	6	9	10	10	17	7	23	24	29	26	24	7
Marshall	14	5	8	16	13	35	34	29	18	7	6	2
Meeker	0	0	0	0	0	0	0	0	0	0	13	13
Mille Lacs	18	17	15	12	20	22	33	48	51	21	33	26
Morrison	25	18	30	17	45	36	46	64	77	60	45	43
Norman	1	0	2	4	3	4	1	16	17	11	9	17
Olmsted	0	0	0	0	0	0	0	0	0	0	0	2
Ottertail	41	29	20	14	51	32	45	113	85	81	50	82
Pennington	6	2	10	2	6	12	16	18	33	15	9	0
Pine	73	62	21	35	42	61	78	99	51	111	50	74

Table 17 (continued). Comparison of otter harvest by county, 1997-2008.

County	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Polk	35	23	21	34	60	63	72	104	45	47	32	25
Pope	0	0	0	0	0	0	0	0	0	0	11	12
Red Lake	9	7	8	22	18	27	35	58	26	30	19	8
Roseau	41	40	37	40	36	27	72	69	60	53	32	53
St. Louis	332	421	353	255	453	316	483	508	428	344	290	251
Scott	0	0	0	0	0	0	0	0	0	0	3	3
Sherburne	15	13	14	10	11	11	24	25	15	29	26	10
Stearns	15	11	7	5	5	17	13	22	21	33	9	38
Stevens	0	0	0	0	0	0	0	0	0	0	1	3
Swift	0	0	0	0	0	0	0	0	0	0	9	4
Todd	22	23	16	22	24	30	49	53	63	81	35	37
Traverse	0	0	0	0	0	0	0	0	0	0	1	0
Wabasha	0	0	0	0	0	0	0	0	0	0	15	7
Wadena	8	6	13	3	23	23	35	34	38	32	15	19
Washington	4	6	4	4	4	12	10	8	11	16	18	19
Wilkin	0	0	0	0	0	0	0	0	0	0	2	0
Winona	0	0	0	0	0	0	0	0	0	0	11	19
Wright	0	0	0	0	0	1	2	3	2	5	7	9
Unknown	8	12	3	2	3	0	14	13	14	22	6	18
Totals	2,145	1,946	1,635	1,578	2,301	2,145	2,766	3,450	2,846	2,720	1,861	1,938

Table 18. Otter harvest by sex and week, 2008-09 season.

Date	Sex			Total	% of	Cumulative
	Male	Female	Unknown	Harvest	Total	%
Oct.25 - Oct.31	124	75		199	10.27	10.27
Nov.1 - Nov.7	285	218		503	25.95	36.22
Nov.8 - Nov.14	172	114		286	14.76	50.98
Nov.15 - Nov.21	146	99		245	12.64	63.62
Nov.22 - Nov.28	99	66		165	8.51	72.14
Nov.29 - Dec.5	151	98		249	12.85	84.98
Dec.6 - Dec.12	53	59		112	5.78	90.76
Dec.13 - Dec.19	41	22		63	3.25	94.01
Dec.20 - Dec.26	28	19		47	2.43	96.44
Dec.27 - Jan.4*	19	18		37	1.91	98.35
Unknown	20	11	1	32	1.65	100%
Total	1,138	799	1	1,938	100%	

* 9-day interval.

Table 19. Distribution of otter harvest* among trappers, 1993-2008.

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	319 (39)	164 (20)	120 (15)	209 (26)	812	2.3
2008-09	314 (38)	168 (20)	121 (15)	218 (27)	821	2.3

* Product of categories above may not equal total harvest due to some unknown name/license numbers