

PRAIRIE-CHICKEN SURVEY IN MINNESOTA DURING 2008 AND 2009

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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/mi² 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/mi² 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 nonrandomly 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/mi² (0.03 leks/km²) and 12.8 males/lek during 2008 and 0.05 leks/mi² (0.02 leks/km²) 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.

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.

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 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/mi² 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/mi² 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/mi² 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		Change from 2008 ^a	
			Leks	Males ^c	Leks	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.

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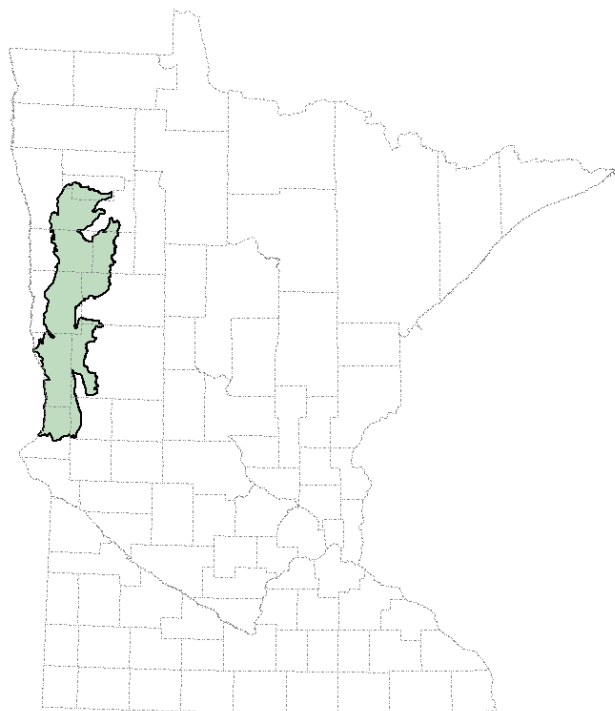


Figure 1. Primary range of greater prairie-chickens (shaded area) relative to county boundaries in Minnesota. The prairie-chicken range was based on ECS Land Type Associations.

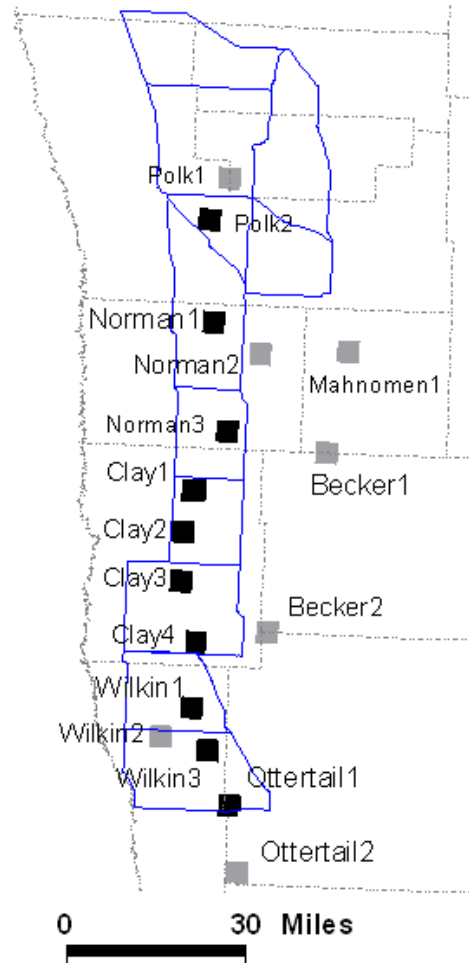


Figure 2. Survey blocks (labeled squares) and hunting permit area boundaries (solid lines) for prairie-chickens in western Minnesota. Survey blocks were designated as being in either the core (black) or periphery (gray) of the range. Blocks were named after the counties (dashed lines) in which they were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

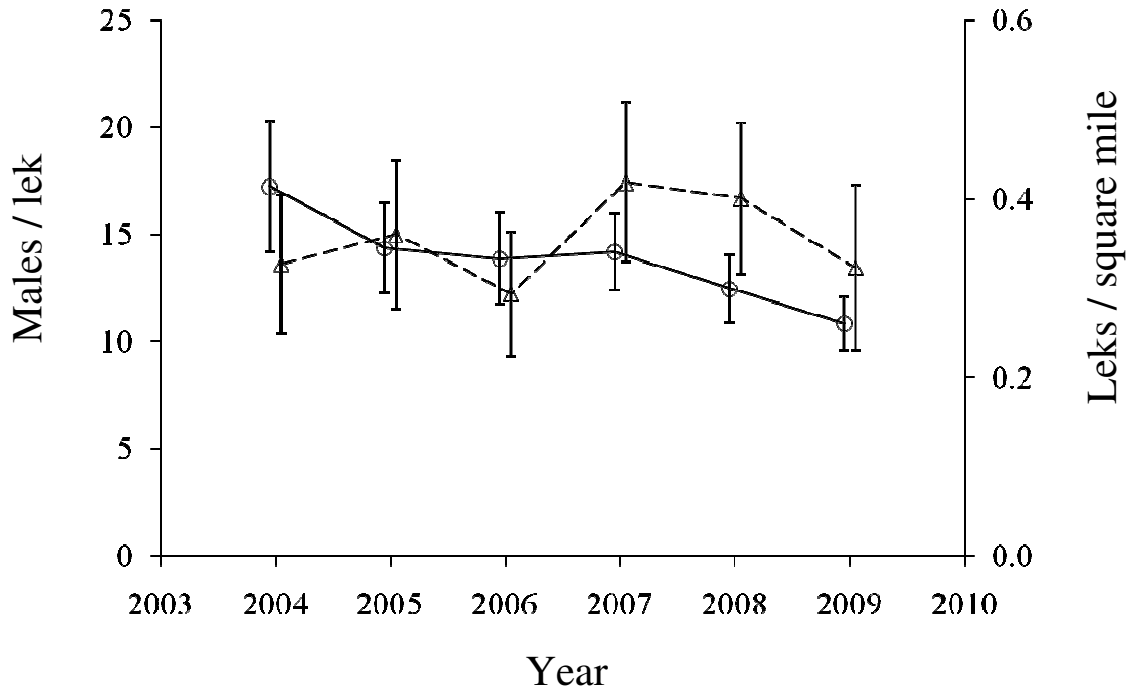


Figure 3. Number of prairie-chicken males/lek (circles connected by solid line) and leks/mi² (triangles connected by dashed line) observed in 17 16-mi² survey blocks in western Minnesota. Vertical error bars represent 95% confidence intervals.