PRAIRIE-CHICKEN SURVEY IN MINNESOTA DURING 2010

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September 15, 2010

SUMMARY OF FINDINGS

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

INTRODUCTION

Index Surveys

The purpose of surveys of grouse populations in Minnesota is to monitor changes in the densities of grouse over time. Estimates of density, however, are difficult and expensive to obtain. Simple counts of animals, on the other hand, are convenient and, assuming that changes in density are the major source of variation in counts among years, they can provide a reasonable index to long-term trends in populations. Other factors, such as weather and habitat conditions, observer ability, and grouse behavior, vary over time and also affect simple counts of animals. These other factors make it difficult to make inferences about potential changes in wildlife populations over short periods of time (e.g., a few annual surveys) or from small changes in index values. Over longer periods of time or when changes in index values are

large, assumptions upon which grouse surveys in Minnesota depend are more likely to be valid, thereby making inferences about grouse populations more valid. For example, index values from the ruffed grouse drumming count survey have documented what is believed to be true periodic fluctuations in ruffed grouse densities (i.e., the 10-year cycle).

Greater Prairie-Chickens

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

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

METHODS

During the few hours near sunrise from late-March until mid-May cooperating biologists and numerous volunteers counted prairie-chickens at booming grounds in western Minnesota. They attempted to locate and observe multiple times all booming grounds within 17 designated survey blocks (Figure 2). Each block was a square comprising 4 sections of the Public Land Survey (approximately 4,144 ha) and was selected nonrandomly based upon the spatial distribution of booming grounds and the presence of relatively abundant grassland habitat. I

separated the survey blocks into 2 groups—core and periphery—based upon densities of prairie-chickens, with a threshold of approximately 1.0 male/km^2 during 2010, and geographic location relative to other survey blocks (Figure 2).

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

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

I summarized counts of booming grounds and prairie-chickens by hunting permit areas and spring survey blocks. I calculated confidence intervals for the mean of estimated densities using the standard deviation of density estimates among survey blocks. I compared densities from the current year to estimates from the 10 years before recent hunting seasons (i.e., 1993–

2002). Such comparisons should be made cautiously because prior to 2004 there was less emphasis on standardization of effort and timing of surveys. Survey protocols were similar in the past, however, and the current survey blocks were located in areas surveyed regularly since the mid-1970s. Also, sex-specific counts were not recorded prior to 2000 and they likely included females, so counts from those years were reduced by the proportion of females observed in 2004 to make them more comparable to current counts of males and birds of unknown sex.

RESULTS & DISCUSSION

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

Each booming ground was observed on a median of 2 (mean = 2.0) different days, and 43% of booming grounds were observed only once during 2010. Attendance of males at booming grounds varies among days and by time of day. Single counts of males at a booming ground, therefore, may be an unreliable indication of true abundance. Similar counts on multiple days, on the other hand, demonstrate that the counts may be a good indicator of true abundance. Even multiple counts, however, cannot overcome the problems associated with the failure to estimate the probability of detecting booming grounds and individual birds at booming grounds. Without estimates of detection probability, the prairie-chicken survey is an index to,

not an estimate of, prairie-chicken abundance within the survey blocks. The credibility of the index for monitoring changes in abundance among years is dependent upon the untested assumption that a linear relationship exists between counts of male prairie-chickens and true abundance. In other words, we assume that (the expected value of) the probability of detection does not change among years.

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

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

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

Within survey blocks we counted 852 males, including birds of unknown sex, on 89 booming grounds during 2010 (Table 2). Booming grounds were defined as having ≥2 males, so observations of single males were excluded from summaries by survey block. In the 10 core survey blocks we observed 0.16 (0.12–0.21) booming grounds/km^2 and 9.5 (8.2–10.9) males/booming ground (Table 2, Figure 2). In the 7 peripheral survey blocks we observed 0.07 (0.04–0.10) booming grounds/km^2 and 9.8 (7.1–12.4) males/booming ground. The density of

booming grounds observed among all survey blocks during 2010 was greater than the average of 0.08 (0.06–0.09) booming grounds/km^2 observed during the 10 years before recent hunting seasons (i.e., 1993–2002), whereas the density of males at booming grounds observed among all survey blocks during 2010 was less than the average of 11.5 (10.1–12.9) males/booming ground observed during 1993–2002 (Table 2, Figure 3).

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

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

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

ACKNOWLEDGEMENTS

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

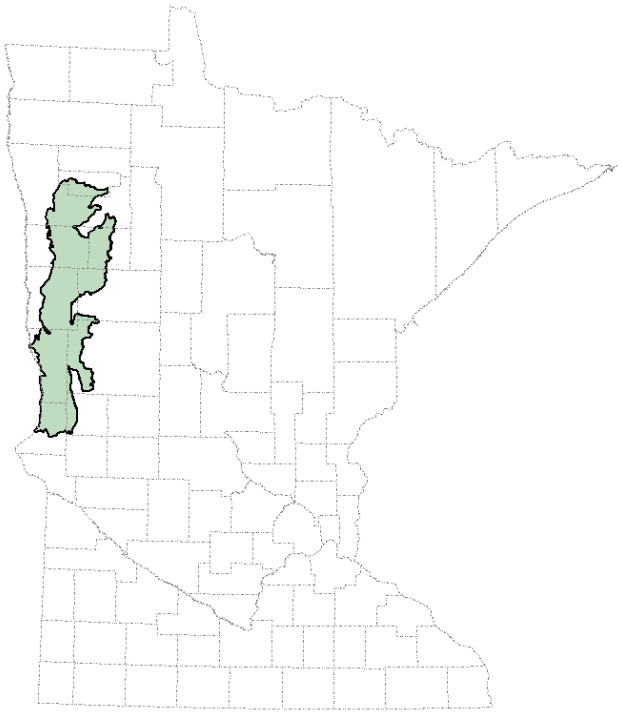

Figure 1. Primary range of greater prairie-chickens (shaded area) relative to county boundaries in Minnesota. This range boundary was based on ECS Land Type Associations and does not include all areas that are known to be occupied by prairie-chickens.

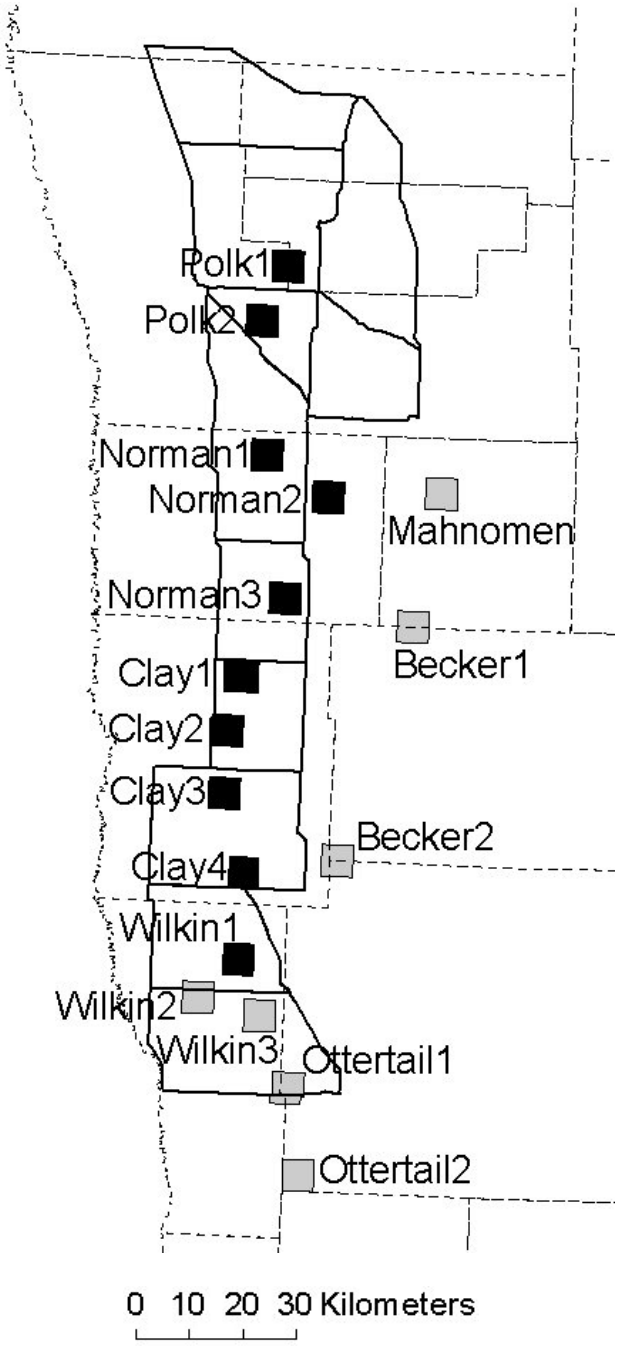

Figure 2. Survey blocks (41 km^2, labeled squares) and hunting permit area boundaries (solid lines) for prairie-chickens in western Minnesota. Survey blocks were designated as being in either the core (black) or periphery (gray) of the range. Blocks were named after the counties (dashed lines) in which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

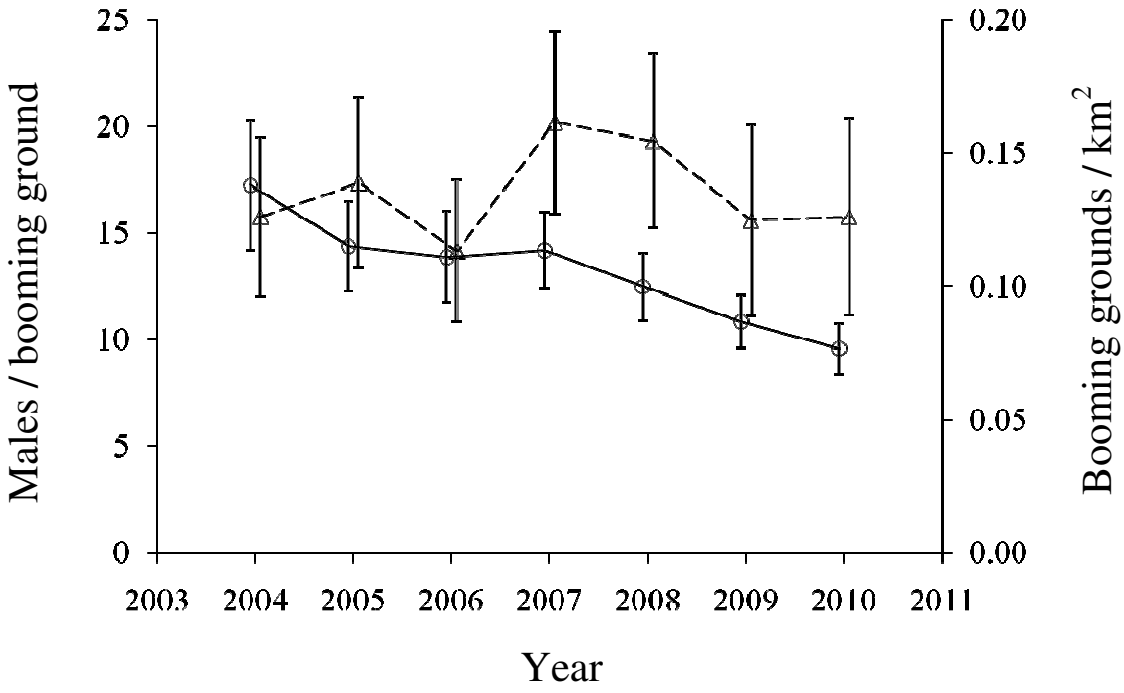

Figure 3. Number of prairie-chicken males/booming ground (circles connected by solid line) and booming grounds/km^2 (triangles connected by dashed line) observed in 17 41-km^2 survey blocks in western Minnesota. Vertical error bars represent 95% confidence intervals. The average densities during the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