



## 2019 MINNESOTA PRAIRIE-CHICKEN POPULATION SURVEY

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### SUMMARY OF FINDINGS

Greater prairie-chickens (*Tympanuchus cupido pinnatus*) were surveyed in all 17 survey blocks during the spring of 2019. Observers located 45 booming grounds and counted 497 males and birds of unknown sex in the survey blocks, which is a decline of more than 20% in the number of leks and birds counted compared to last year. Including areas outside the survey blocks, observers located 113 booming grounds, 1,039 male prairie-chickens, and 115 birds of unknown sex throughout the prairie-chicken range. Estimated densities of 0.06 (0.05–0.08) booming grounds/km<sup>2</sup> and 11.0 (8.5–13.6) males/booming ground within the survey blocks were similar to densities during recent years and during the 10 years preceding modern hunting seasons (i.e., 1993–2002). All population indices began to decline in 2008, but seem to have stabilized in recent years at a lower level.

### INTRODUCTION

Historically, greater prairie-chicken (*Tympanuchus cupido pinnatus*) range in Minnesota was restricted to the southeastern portion of the state. However, dramatic changes in their range occurred in the 19<sup>th</sup> century as settlers expanded and modified the landscape with farming and forest removal, providing abundant food sources and access to new areas. However, as grass was lost from the landscape, prairie-chicken populations began to decline,

their range contracted, and hunting seasons closed after 1942. In an attempt to bolster populations and expand prairie-chicken range, the Minnesota Department of Natural Resources (DNR) conducted a series of translocations in the Upper Minnesota River Valley during 1998-2006. Today, the beach ridges of glacial Lake Agassiz hold most of Minnesota's prairie-chickens, but their populations do extend southward (Figure 1). Hunting was re-opened using a limited-entry season in 2003, and approximately 120 prairie-chickens are now harvested annually.

With the opening of the new hunting season, the DNR had a greater interest in the monitoring of prairie-chicken populations, which the Minnesota Prairie-Chicken Society (MPCS) had been coordinating since 1974. The DNR, in collaboration with MPCS members, began coordinating prairie-chicken surveys and adopted a standardized survey design in 2004. These surveys are conducted at small open areas called leks, or booming grounds, where male prairie-chickens display for females in the spring and make a low-frequency booming vocalization that can be heard for miles.

Prairie-chickens continue to be surveyed to monitor changes in population densities over time. However, density estimates can be costly and difficult to obtain, so instead we count individuals and make the assumption that changes in density are the primary source of variation in counts among years. If true, counts should provide a reasonable index to long-term trends in prairie-chicken populations. However, counts are also influenced by weather, habitat conditions, observer ability, and bird behavior among other factors, which make it difficult to make inferences over short periods of time (e.g., a few annual surveys) or from small changes in index values. Nevertheless, over long time periods and when changes in index values are large, inferences from prairie-chicken surveys are more likely to be valid.

## **METHODS**

Cooperating biologists and volunteers surveyed booming grounds in all 17 designated survey blocks in western Minnesota (Figure 2) during April and May. Each survey block was

nonrandomly selected so that surveys would be conducted in areas where habitat was expected to be good (i.e., grassland was relatively abundant) and leks were known to occur. Each observer attempted to find and survey each booming ground repeatedly in his/her assigned block, which comprised 4 sections of the Public Land Survey (approximately 4,144 ha). Observers obtained multiple counts at each booming ground in the morning because male attendance at leks varies throughout the season and throughout the day.

During each survey, observers obtained visual counts of males, females, and birds of unknown sex from a distance with binoculars. Sex was determined through behavior; males display conspicuously, and females do not. If no birds were displaying during the survey period, then sex was recorded as unknown. When a reliable count could not be obtained visually because vegetation or topography prevented it, birds were flushed for counts and sex was recorded as unknown. Most birds for which sex was unknown were likely male because female attendance at leks is sporadic, and they are less conspicuous during lek attendance than displaying males.

In the analysis, I used counts of males and unknowns at each booming ground but not females. Leks were defined as having  $\geq 2$  males, so observations of single males were not counted as leks. Data were summarized by hunting permit area and spring survey block. The survey blocks were separated into a core group and a periphery group for analysis. The core group had a threshold density of approximately 1.0 male/km<sup>2</sup> during 2010, and was located proximally to other such blocks (Figure 2). I compared densities of leks and prairie-chickens to estimated densities from previous years.

I also encouraged observers to submit surveys of booming grounds outside the survey blocks because these observations may provide additional information that is helpful to prairie-chicken management. These data were included in estimates of minimum abundance of prairie-chickens. However, these data were not used in the analysis of lek and prairie-chicken densities because effort and methods may have differed from those used in the survey blocks.

## RESULTS & DISCUSSION

Observers from DNR Division of Fish and Wildlife, the U.S. Fish & Wildlife Service, and The Nature Conservancy, as well as many unaffiliated volunteers counted prairie-chickens between 6 April and 14 May 2019. Observers located 113 booming grounds and observed 1,039 male prairie-chickens and 115 birds of unknown sex within and outside the survey blocks (Table 1). These counts represent a minimum number of prairie-chickens in Minnesota during 2019, but because survey effort outside of survey blocks is not standardized among years, these counts should not be compared among years or permit areas.

Table 1. Minimum abundance of prairie-chickens within and outside hunting permit areas in Minnesota during spring 2019. Lek and bird counts are not comparable among permit areas or years.

Permit Area	Area (km <sup>2</sup> )	Leks	Males	Unk <sup>a</sup>
803A	1,411	11	68	0
804A	435	1	8	0
805A	267	12	89	4
806A	747	13	58	19
807A	440	14	164	25
808A	417	20	309	0
809A	744	13	161	0
810A	505	3	39	11
811A	706	7	31	15
812A	914	6	23	0
813A	925	4	29	2
PA subtotal	7,511	104	979	76
Outside PAs <sup>b</sup>	NA <sup>c</sup>	9	60	39
Grand total	NA <sup>c</sup>	113	1,039	115

<sup>a</sup> Unk = prairie-chickens for which sex was unknown, but which were probably males.

<sup>b</sup> Counts done outside permit areas (PA).

<sup>c</sup> NA = not applicable because the area outside permit areas was not defined.

Within the standardized survey blocks, 497 males and birds of unknown sex were counted on 45 booming grounds during 2019 (Table 2). These counts are the lowest since the standardized survey began in 2004 when 1,566 males and 95 booming grounds were counted. This contrasts with the high count of 1,618 males and 114 booming grounds in 2007. Each lek was observed an average of 2.5 times (median = 2), with 35% of booming grounds observed

just once. These counts should not be regarded as estimates of abundance because detection probabilities of leks and birds were not estimated. However, if we assume that detection probabilities and effort are similar among years in the survey blocks, then population indices based on survey block data can be used to monitor changes in abundance among years.

Densities of prairie-chickens in the 10 core survey blocks were 0.08 (0.05–0.10) booming grounds/km<sup>2</sup> and 12.3 (9.2–15.4) males/booming ground (Table 2, Figure 2). In the 7 peripheral survey blocks, densities were 0.04 (0.02–0.07) booming grounds/km<sup>2</sup> and 8.0 (4.1–11.9) males/booming ground. The density of 0.06 (0.05–0.08) booming grounds/km<sup>2</sup> in all survey blocks during 2019 was similar to densities during recent years (Table 2, Figure 3) and the average of 0.08 (0.06–0.09) booming grounds/km<sup>2</sup> during the 10 years preceding recent hunting seasons (i.e., 1993–2002). Similarly, the density of 11.0 (8.5–13.6) males/booming ground in all survey blocks during 2019 was comparable to densities during recent years and similar to the average of 11.5 (10.1–12.9) males/booming ground observed during 1993–2002 (Table 2, Figure 3). However, these densities are lower than the years preceding 2008 when CRP enrollments in the counties containing the survey blocks were highest.

Densities appear to have stabilized over the last several years at a new lower level. These changes in the population indices coincide with gains and losses in enrollments in the Conservation Reserve Program. More explicit examination of these patterns can be found in the recent publication, *Adkins, K., C. L. Roy, D. E. Anderson, R. Wright. 2019. Landscape-scale Greater Prairie-chicken Habitat Relations and the Conservation Reserve Program. The Journal of Wildlife Management DOI: 10.002/jwmg.21724*

Table 2. Prairie-chicken counts within survey blocks in Minnesota.

Range <sup>b</sup>	Survey Block	Area (km <sup>2</sup> )	2019		Change from 2018 <sup>a</sup>	
			Booming grounds	Males <sup>c</sup>	Booming grounds	Males <sup>c</sup>
Core	Polk 1	41.2	5	26	1	-9
	Polk 2	42.0	3	32	-2	-33
	Norman 1	42.0	1	3	0	-5
	Norman 2	42.2	3	21	-2	-10
	Norman 3	41.0	3	25	-4	-25
	Clay 1	46.0	7	126	1	22
	Clay 2	41.0	2	55	0	0
	Clay 3	42.0	4	61	-1	-25
	Clay 4	39.0	2	7	1	4
	Wilkin 1	40.0	2	38	-2	-3
	Core subtotal	415.0	32	393	-8	-84
Periphery	Mahnomen	41.7	2	42	-1	-20
	Becker 1	41.4	4	17	-3	-31
	Becker 2	41.7	1	6	-1	1
	Wilkin 2	41.7	1	10	0	6
	Wilkin 3	42.0	3	13	0	0
	Otter Tail 1	41.0	1	8	-1	-3
	Otter Tail 2	40.7	1	9	-2	-12
	Periphery subtotal	290.6	13	104	-8	-59
Grand total		705.5	45	497	-16	-143

<sup>a</sup> The 2018 count was subtracted from the 2019 count, so positive values indicate increases.

<sup>b</sup> Survey blocks were categorized as within the core or periphery of the Minnesota prairie-chicken range based upon bird densities and geographic location.

<sup>c</sup> Includes birds recorded as being of unknown sex but excludes lone males.

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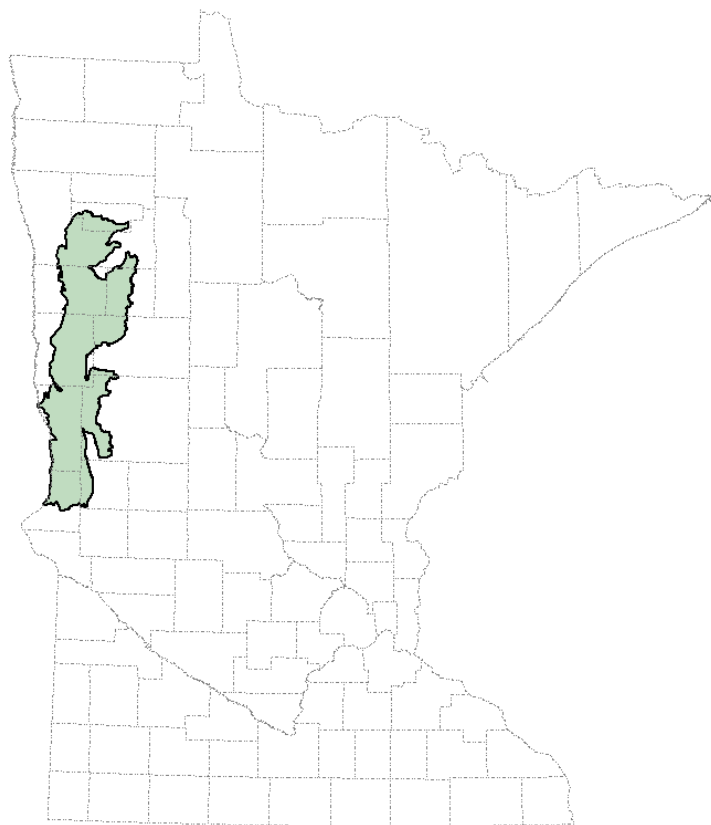


Figure 1. Primary greater prairie-chicken range in Minnesota (shaded area) relative to county boundaries. The range boundary was based on Ecological Classification System Land Type Associations and excludes some areas known to be occupied by prairie-chickens.

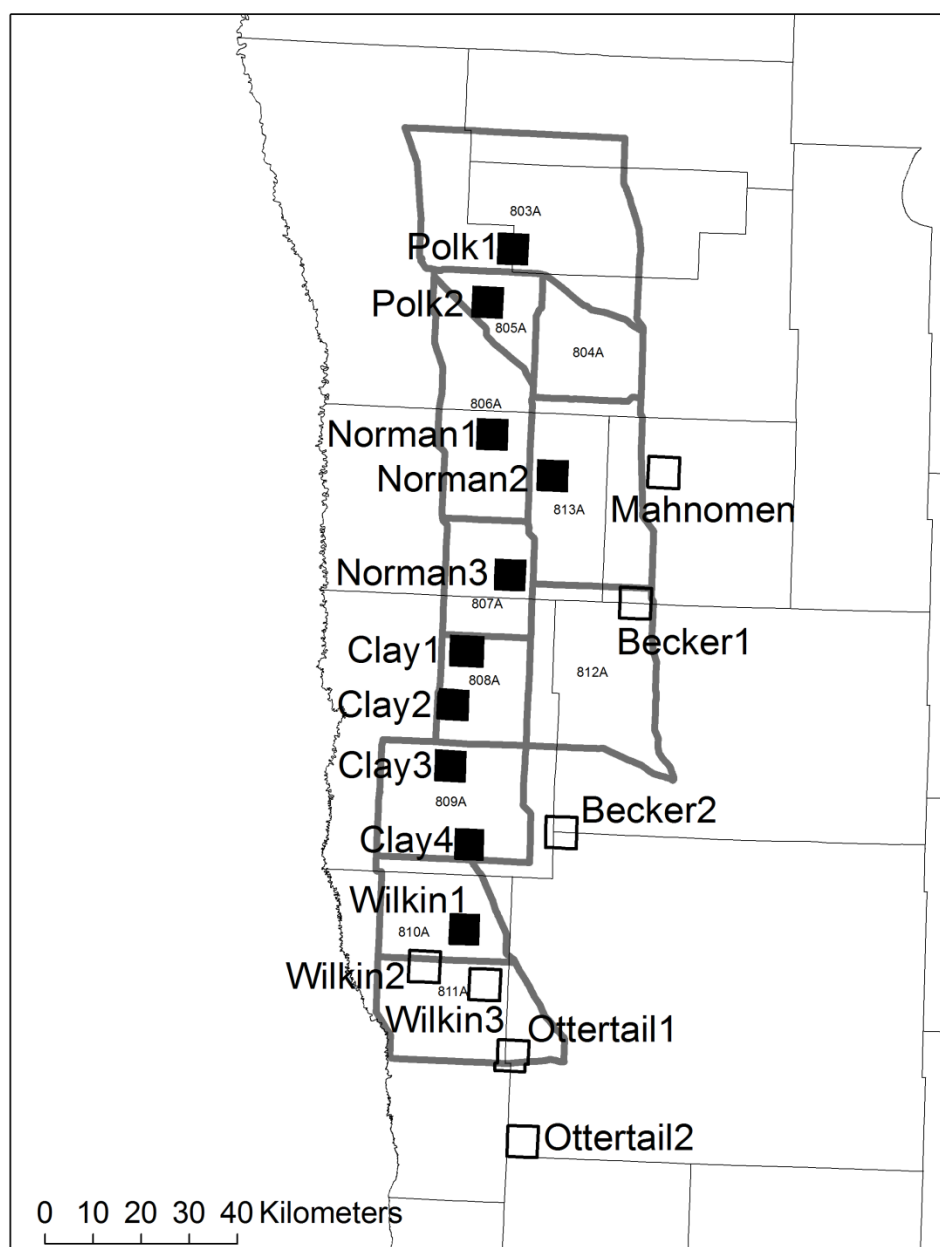


Figure 2. Prairie-chicken lek survey blocks (41 km<sup>2</sup>, labeled squares) and hunting permit areas (thick grey lines) in western Minnesota. Survey blocks were either in the core (black) or periphery (white) of the range with a threshold of 1.0 male/km<sup>2</sup> in 2010, and were named after their respective counties (thin black lines). Permit areas were revised in 2013 to eliminate 801A and 802A, modify 803A, and add 812A and 813A. See previous reports for former permit area boundaries.

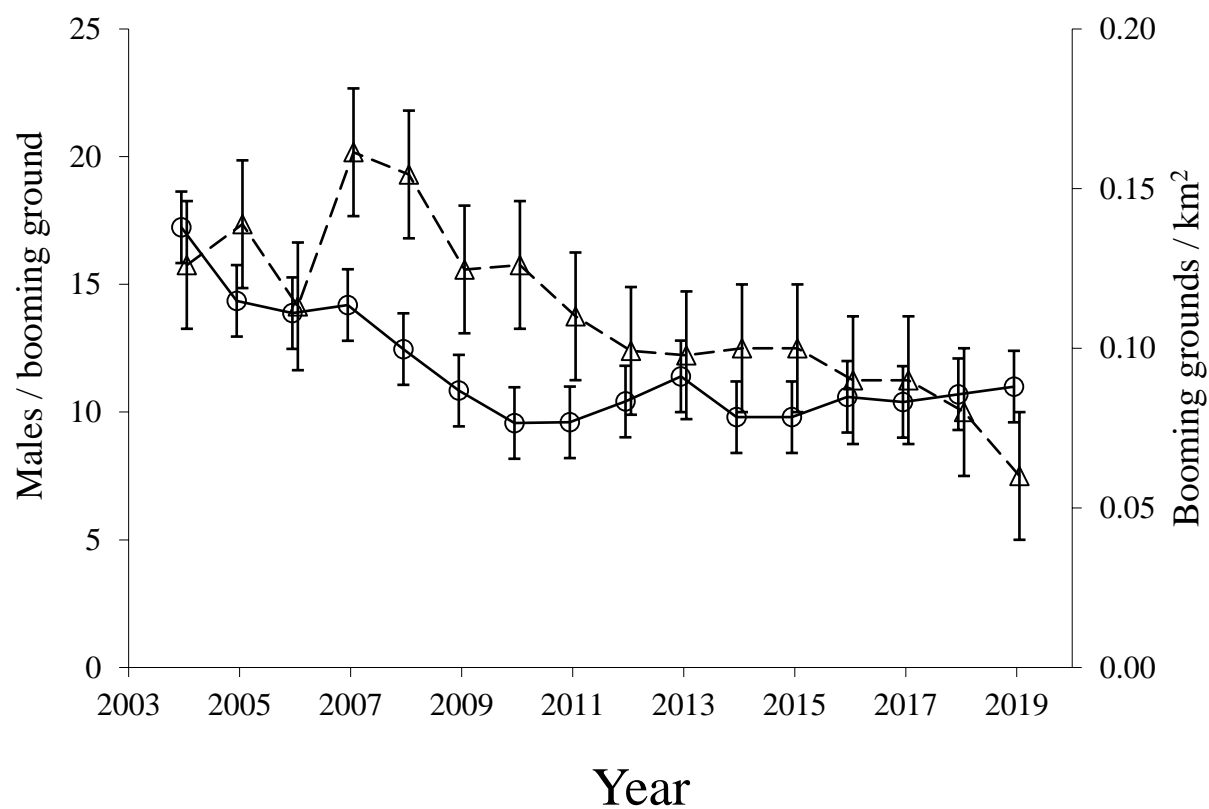


Figure 3. Mean prairie-chicken males/booming ground (circles connected by solid line) and booming grounds/km<sup>2</sup> (triangles connected by dashed line) in survey blocks in Minnesota with 95% confidence intervals.