# 2014 MINNESOTA PRAIRIE-CHICKEN SURVEY

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8 August 2014

## SUMMARY OF FINDINGS

Greater prairie-chickens (*Tympanuchus cupido pinnatus*) were surveyed in 16 of 17 survey blocks during the spring of 2014. Observers located 138 booming grounds and counted 1,245 male prairie-chickens and 101 birds of unknown sex. Estimated densities of 0.10 (0.07-0.13) booming grounds/km$^2$ and 9.8 (8.4-11.2) 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).

## 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$^{th}$ 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 continued to be lost from the landscape, prairie-chicken populations began to decline, their range contracted, and hunting 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 16 of 17 designated survey blocks in western Minnesota (Figure 2) during late-March through mid-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 booming grounds were known to occur. Each surveyor attempted to find and observe each booming ground repeatedly in his/her assigned block, which comprised 4 sections of the Public Land Survey (approximately 4,144 ha). We 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. Booming grounds were defined as having ≥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 block data 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$^2$ 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 surveyors to submit observations 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 24 March and 23 May 2014. Observers located 138 booming grounds and observed 1,245 male prairie-chickens and 101 birds of unknown sex within and outside survey blocks during 2014 (Table 1). These counts represent a minimum number of prairie-chickens in

Minnesota during 2014, 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 2014. Lek and bird counts are not comparable among permit areas or years.

| Permit Area | Area ($km^2$) | Leks | Males | Unk[a] |
|---|---|---|---|---|
| 803A | 1,411 | 18 | 163 | 0 |
| 804A | 435 | NA | NA | NA |
| 805A | 267 | 14 | 168 | 0 |
| 806A | 747 | 10 | 60 | 0 |
| 807A | 440 | 25 | 151 | 26 |
| 808A | 417 | 19 | 248 | 0 |
| 809A | 744 | 13 | 152 | 0 |
| 810A | 505 | 7 | 83 | 0 |
| 811A | 706 | 8 | 37 | 27 |
| 812A | 914 | 10 | 30 | 28 |
| 813A | 925 | 3 | 56 | 0 |
| PA subtotal | 7,511 | 127 | 1,148 | 81 |
| Outside PAs[b] | NA[c] | 11 | 97 | 20 |
| Grand total | NA[c] | 138 | 1,245 | 101 |

[a] Unk = prairie-chickens for which sex was unknown, but which were probably males.
[b] Counts done outside permit areas (PA).
[c] NA = not applicable because the area outside permit areas was not defined.

Within the standardized survey blocks, 669 males and birds of unknown sex were counted on 68 booming grounds during 2014 (Table 2). Each lek was observed an average of 1.8 times (median = 1), with 53% of booming grounds observed just once. Densities of prairie-chickens in the 10 core survey blocks were 0.11 (0.07–0.14) booming grounds/$km^2$ and 10.9 (9.1–12.7) males/booming ground (Table 2, Figure 2). In 6 of the 7 peripheral survey blocks, densities were 0.08 (0.03–0.14) booming grounds/$km^2$ and 7.8 (5.9–9.6) males/booming ground.

The density of 0.10 (0.07-0.13) booming grounds/$km^2$ in all survey blocks during 2014 was similar to densities during recent years (Table 2, Figure 3) and the average of 0.08 (0.06–0.09) booming grounds/$km^2$ during the 10 years preceding recent hunting seasons (i.e., 1993–2002). Similarly, the density of 9.8 (8.4-11.2) males/booming ground in all survey blocks during 2014 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). These counts should not be regarded as estimates of abundance because detection probabilities of leks and birds have not been estimated. However, if we assume that detection probabilities are similar among years, then this index can be used to monitor changes in abundance among years.

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

| | | | 2014 | | Change from 2013[a] | |
|---|---|---|---|---|---|---|
| Range[b] | Survey Block | Area ($km^2$) | Booming grounds | Males[c] | Booming grounds | Males[c] |
| Core | Polk 1 | 41.2 | 6 | 49 | -1 | -13 |
| | Polk 2 | 42.0 | 6 | 97 | -8 | -51 |
| | Norman 1 | 42.0 | 1 | 13 | -1 | -3 |
| | Norman 2 | 42.2 | 2 | 33 | -5 | -37 |
| | Norman 3 | 41.0 | 9 | 49 | 4 | -9 |
| | Clay 1 | 46.0 | 6 | 73 | 0 | -24 |
| | Clay 2 | 41.0 | 2 | 43 | 0 | -6 |
| | Clay 3 | 42.0 | 5 | 51 | -1 | -35 |
| | Clay 4 | 39.0 | 3 | 27 | 1 | 0 |
| | Wilkin 1 | 40.0 | 4 | 47 | -1 | -20 |
| | Core subtotal | 415.0 | 44 | 482 | -12 | -198 |
| Periphery | Mahnomen | 41.7 | 3 | 37 | 1 | 21 |
| | Becker 1 | 41.4 | 10 | 58 | NA[d] | NA[d] |
| | Becker 2 | 41.7 | 4 | 33 | 2 | -1 |
| | Wilkin 2 | 41.7 | 2 | 20 | 0 | 5 |
| | Wilkin 3 | 42.0 | 3 | 25 | -1 | -4 |
| | Otter Tail 1 | 41.0 | 2 | 14 | -1 | -6 |
| | Otter Tail 2 | 40.7 | NA | NA | NA | NA |
| | Periphery subtotal | 290.6 | 24[e] | 187[e] | 11[e] | 73 |
| Grand total | | 705.5 | 68[e] | 669[e] | -1[e] | -125[e] |

[a] The 2013 count was subtracted from the 2014 count, so positive values indicate increases.
[b] Survey blocks were categorized as within the core or periphery of the Minnesota prairie-chicken range based upon bird densities and geographic location.
[c] Includes birds recorded as being of unknown sex but excludes lone males.
[d] Surveys were not conducted in this block during 2013.
[e] These totals only reflect blocks for which count data were available.

**ACKNOWLEDGMENTS**

I would like to thank cooperators who conducted and helped coordinate the prairie-chicken survey. Cooperators within the DNR included Ross Hier, Emily Hutchins, Brian Torgusson, and Michael Oehler; cooperators with The Nature Conservancy included Brian Winter, Travis Issendorf, and volunteers Pat Beauzay, Rick Julian, Dennis Thielen, Matt Mecklenburg, Candis Sommerfeld, Bob O'Connor, and Tony Nelson; cooperators with the US Fish and Wildlife Service included Doug Wells, Shawn Papon, Chad Raitz, Maria Fosado, Larry

Hanson, Stacy Salvevold, Jessica Dowler, Jacob Kaplan, and Trina Brennan; and numerous additional volunteers participated including Steve Bommersbach, Dan Svedarsky, Tom Kucera, and Doug Hedtke. This survey was funded in part by the Wildlife Restoration (Pittman-Robertson) Program W-69-S-13 Project #16. Mike Larson provided assistance and comments which improved this report.

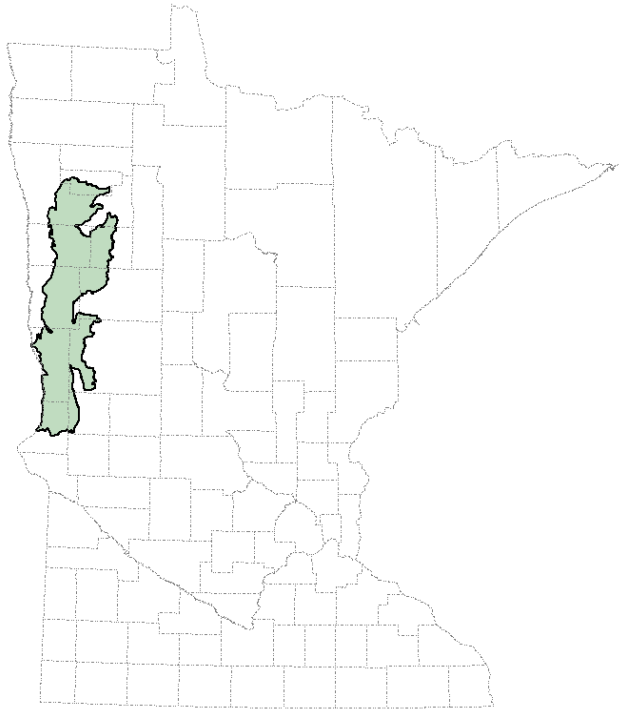

Figure 1. Primary greater prairie-chicken range in Minnesota (shaded area) relative to county boundaries. The range boundary was based on Ecological Classification System Land Type Associations and excludes some areas known to be occupied by prairie-chickens.

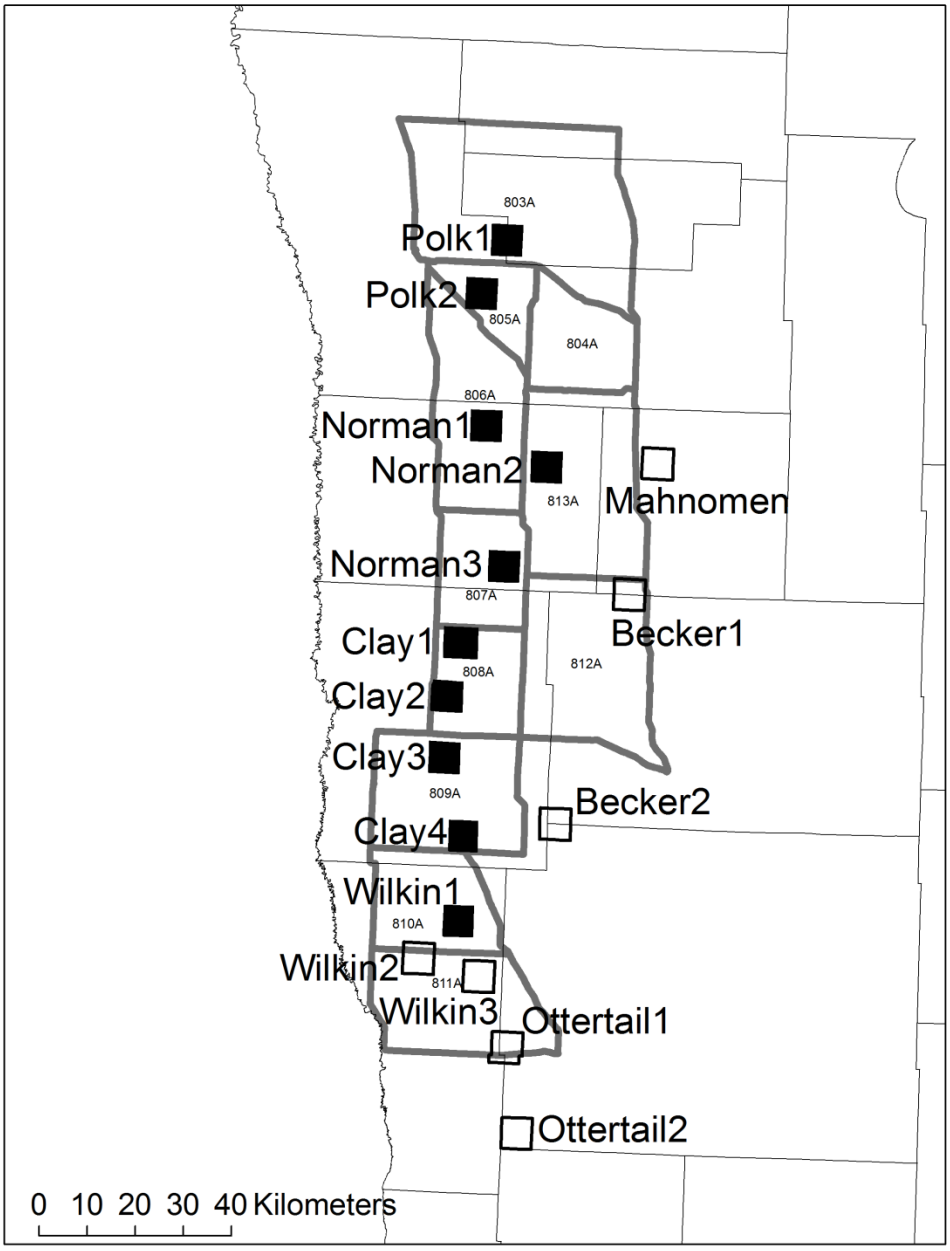


Figure 2. Prairie-chicken lek survey blocks (41 $km^2$, labeled squares) and hunting permit areas (thick grey lines) in western Minnesota. Survey blocks were either in the core (black) or periphery (white) of the range with a threshold of 1.0 male/$km^2$ in 2010, and were named after their respective 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.

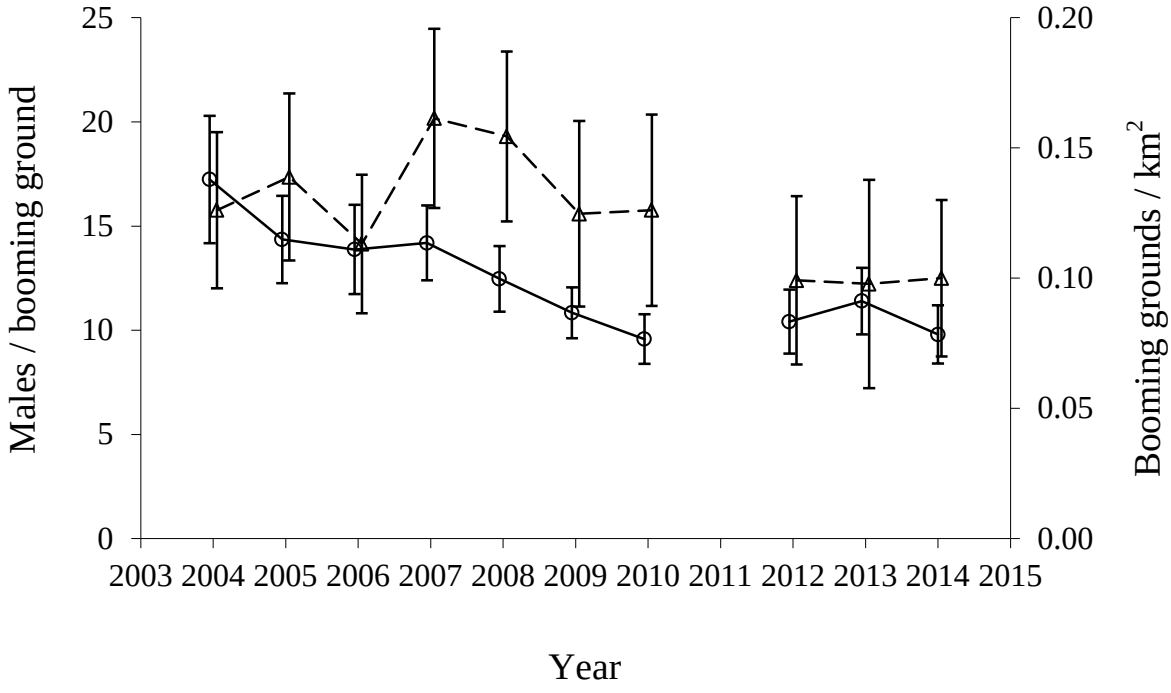


Figure 3. Mean prairie-chicken males/booming ground (circles connected by solid line) and booming grounds/km$^2$ (triangles connected by dashed line) in survey blocks in Minnesota with 95% confidence intervals. Counts for 6 of the survey blocks in 2011, including 4 blocks in the core, were not available for this report.