Monitoring of Grassland Birds on Little Missouri, Sheyenne and Grand River National Grasslands

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The mission of the Rocky Mountain Bird Observatory (RMBO) is the conservation of birds of the Rocky Mountains, Great Plains, and Intermountain West, and the habitats on which they depend. RMBO practices a multi-faceted approach to bird conservation that integrates scientific research and monitoring studies with education and outreach programs to bring bird conservation issues to the public and other conservation partners. RMBO works closely with state and federal natural resource agencies, private landowners, schools, and other nonprofit organizations. RMBO accomplishes its mission by working in four areas:

**Research:** RMBO studies avian responses to habitat conditions, ecological processes, and management actions to provide scientific information that guides bird conservation efforts.

**Monitoring:** RMBO monitors the distribution and abundance of birds through long-term, broad-scale monitoring programs designed to track population trends for birds of the region.

**Education:** RMBO provides active, experiential, education programs for K-12 students in order to create an awareness and appreciation for birds, with a goal of their understanding of the need for bird conservation.

**Outreach:** RMBO shares the latest information in land management and bird conservation practices with private landowners, land managers, and resource professionals at natural resource agencies. RMBO develops voluntary, working partnerships with these individuals and groups for habitat conservation throughout the Great Plains and Rocky Mountains.

Bill Schmoker

**Suggested Citation:**

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Executive Summary

Monitoring grassland birds is a valuable tool for effective management planning. The Forest Service and Rocky Mountain Bird Observatory (RMBO) recognized the need to monitor breeding bird populations in the Dakota grasslands, specifically on the Little Missouri, Sheyenne and Grand River National Grasslands. The objectives of this study were to: 1) use monitoring techniques to determine population trends and distributions for breeding birds on these National Grasslands, and 2) to compare these population trends with grouse lek counts within the same study area.

In 2004, we conducted thirty transects, in 2005 we conducted twenty four transects, in 2006 we conducted thirty four transects, and in 2007 we conducted twenty seven transects on Little Missouri, Sheyenne and Grand River National Grasslands using a point transect survey method developed by RMBO (Leukering 2000). Following this method, transects were carried out on 17 blocks located on these national grasslands. Monitoring National Grasslands in the Dakotas will provide density estimates for at least thirty two bird species and raw count data for 143 bird species. This report presents density estimate results and describes the goals and methodology of this bird monitoring program.

There is little information regarding bird species distributions and density estimates within these National Grasslands highlighting the importance of developing monitoring programs with the aim to understand population trends and underlying factors contributing to such trends. Monitoring National Grassland bird populations is a conservation need, which will help direct management actions for the preservation of bird populations and their ecosystem.
Introduction

Grassland birds have experienced steeper, more consistent, and geographically more widespread declines than any other guild of North American avian species (Sampson and Knopf 1996). There is little doubt that the main bodies of North American prairie are among the continent’s most endangered ecosystems (Sampson et al. 2004). Historically ecological drivers on the Great Plains included drought at the broad scale and grazing and fire at the landscape and local scales (Fuhlendorf and Engle 2001). Partners in Flight (PIF) found that 41% of upland breeding grassland bird species are declining and 30% lack enough data to assess population trends and stability in Bird Conservation Region (BCR) 11, in BCR 17, 38% of upland breeding grassland bird species are declining and 31% lack enough data to assess population trends and stability (Partners in Flight Species Assessment Database 2004). Little Missouri National Grassland and Grand River National Grassland fall in BCR 17 (Badlands and Prairies) and Sheyenne National Grassland falls in BCR 11 (Prairie Potholes) as designated by North American Bird Conservation Initiative.

Some managers have relied on data derived from the Breeding Bird Survey (BBS), currently the best and most extensive bird-monitoring program, to monitor bird populations (Robbins et al. 1989, Sauer 1993). The BBS, operational in the Great Plains since 1967, uses volunteers to conduct roadside surveys of birds across North America and produces indices of population abundance at the continental scale for many common bird species (Robbins et al. 1989). BBS data and analyses are relatively inexpensive and have proven to be a very valuable source of information on bird population trends. BBS data can be used to produce continental-scale relative abundance maps. These maps provide a reasonably good indication of the relative abundances of species that are well sampled by the BBS. However, many species and habitats are inadequately sampled by the BBS (Robbins et al. 1993, Sauer 1993), and BBS data do not reliably predict population trends at small geographic scales such as a National Grassland (Sauer 2000). For these and other reasons, BBS data are generally insufficient to guide local and regional management decisions (Leukering et al. 2000), such as those of National Grassland managers.

Consequently there are social and economic benefits with sustaining bird populations since observing birds is an increasing popular activity. United States Fish and Wildlife Service reported 46 million birdwatchers in America spent more than $32 billion on birding and related activities (USFWS 2003).

In 2004, RMBO and the Forest Service initiated this study in response to the need for more comprehensive population trends and distributions for breeding birds and to compare Sharp-tailed Grouse counts with the monitoring data within the Dakota Grasslands (Figure 1).
Figure 1. Study Area.

Monitoring Dakota Grassland Birds ................................................................. 3
Methodology

Data was collected on three National Grasslands, Little Missouri, Sheyenne and Grand River on June 4 - 15, 2004 and June 5 – 12, 2005, June 18 – July 10, 2006, and June 15-July 17, 2007. Experienced field biologists trained in bird identification and point transect methodology conducted all field work.

Section Selection

North Dakota State University and Dakota Parks and Game have cooperatively designed a grouse-survey protocol. Under this protocol, they will annually conduct lek surveys within 17 randomly chosen blocks. In spring 2003 the Forest Service investigated approximately 24 randomly chosen blocks, and selected the 17 blocks that best met design criteria (such as containing a minimum number of leks, minimum road access network, etc.). The total acreage of all 17 blocks is 136,960 acres. Two point transects were established in each of these seventeen blocks. (Figure 2). Due to a road closure one block in Little Missouri was not surveyed and due to bad weather two point transects were not conducted, one in Little Missouri National Grassland and Sheyenne National Grassland. Two transects were placed in each block with each transect starting point established systematically with a random bearing within the designated blocks.

Point Transect Protocol

RMBO surveyed bird populations in each block selected for monitoring using the point transect method (Buckland et al. 1993). Each transect was surveyed by one observer following protocol established by Leukering (2000). On the morning of the survey, the observer began the point transect at the first count station and then continued along the pre-selected bearing for all remaining points if possible. Observers conducted up to eight five-minute point counts at stations located at 250 meter intervals along each point transect, recording all bird detections on standardized forms.
Figure 2. Monitoring blocks and transect locations.
Distance from the observer to the point of first detection was also recorded for each bird observed. Distances were determined using a Bushnell Yardage Pro 500 Rangefinder. Method of detection (e.g., visually,aurally), sex (if known), and habitat (e.g., shrub, ground, fence, etc.) were recorded. Birds flying over the section were tallied separately. Locations of the points were recorded using a Garmin etrex global positioning system (GPS) unit.

Observers conducted point counts from sunrise until no later than 1100 hrs when detectable activity typically slowed or ceased. We also recorded survey “start” and “end” times. Surveys were not conducted during times of rain or wind in excess of 18 mph. Observers recorded weather conditions such as percent cloud cover, wind speed (Beaufort Scale), and temperature in Fahrenheit. In addition to point count data, we documented vegetation characteristics, and locations of raptor nests and black-tailed prairie dog colonies.

We recorded vegetation characteristics within a 50- m radius of each point count. Vegetation data collected included the percent coverage and types of shrubs and percent coverage and height of ground cover.

Data Analysis

Program DISTANCE version 5.0 (Thomas 1998-99) will be used to analyze the point count data. The notation, concepts, and analysis methods of DISTANCE were developed by Buckland et al. (1993). Density estimates (D) will be calculated for species that had a minimum of 20 observations or had a coefficient of variation (CV) of less than 50%, a level which indicates robust data. No flyover detections were used in the DISTANCE analysis. In DISTANCE analysis, a unique detection function is fit to each distribution of distances associated with a species. Because the detection function is unique to each species, DISTANCE analysis avoids some serious problems inherent in traditional analyses of point count data (e.g., unquantifiable differences in detectability among habitats, species, and years). The three models that were used to find the most appropriate detection function is Half-normal Cosine, Hazard-rate Simple Polynomial and Hazard-rate Cosine. We pooled data from all years for each grassland and used Akaike’s Information Criteria (AIC) to evaluate three models and determined the most appropriate detection function for each species. Density estimates for species in individual grasslands were derived using this global detection function, with year as a stratum. We calculated the global density estimate (i.e. across years) for each grassland using the mean of the year estimates weighted by total effort. Analysis using DISTANCE assumes that: 1) all birds at distance zero are detected, 2) distances of the birds close to the points or line are measured accurately, and 3) birds do not move in response to the observer’s presence.

The distribution maps are represented by round symbols, that indicate the presence of a given species in at least one year from 2004 to 2007 (Appendix A).
Results

We conducted 30 point transects in 2004, 33 transects in 2005, 34 transects in 2006 and 27 transects in 2007 on Little Missouri, Sheyenne and Grand River National Grasslands. We observed 143 species in total; 93 in 2004, 102 in 2005, 91 in 2006 and 116 in 2007. We should be able to calculate density estimates for thirty two species using a global detection function to estimate density per year. Appendix A presents species distribution for 2004 to 2007. The species distribution maps indicate the presence of a species if it was observed in at least one year (2004 – 2007) symbolized by a round marker. Appendix B presents species observed and number of detections for all years.

Table 1. Grand River National Grassland density estimates of breeding birds by year with a global estimate. $D$ = Density estimate expressed in birds/ km$^2$, LCL & UCL = 90% lower and upper confidence limits of $D$, n = number of detections used to obtain density estimates, %CV = percent coefficient of variation.

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Table 2. Little Missouri National Grassland density estimates of breeding birds by year with a global estimate. D = Density estimate expressed in birds/km², LCL & UCL = 90% lower and upper confidence limits of D, n = number of detections used to obtain density estimates, %CV = percent coefficient of variation.

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<td>13.17</td>
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Table 3. Sheyenne National Grassland density estimates of breeding birds by year with a global estimate. \(D = \) Density estimate expressed in birds/\(km^2\), LCL & UCL = 90% lower and upper confidence limits of \(D\), \(n\) = number of detections used to obtain density estimates, \(\%CV\) = percent coefficient of variation.
<table>
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<th>Common Name</th>
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<th>Density</th>
<th>%CV</th>
<th>LCI</th>
<th>UCI</th>
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<td>23</td>
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Discussion

Monitoring National Grasslands in the Dakotas will provide density estimates for at least thirty two bird species and presence absence data for 143 bird species. Density estimates will describe population trends over time and the presence absence data will characterize bird distribution on these National Grasslands over time. This data can be used to address management actions needed to sustain healthy bird populations and ecosystem integrity.

According to the North American Landbird Conservation Plan (Rich et al. 2004), four species we will be able to calculate density estimates for – Baird’s Sparrow, Sprague’s Pipit, Lark Bunting, and Grasshopper Sparrow - are species of Continental Importance within the Prairie Avifaunal Biome. One species- Mountain Bluebird- is considered a species of Continental Importance within the Intermountain West Avifaunal Biome.

Baird’s Sparrow is in the immediate action category while Lark Bunting, Grasshopper Sparrow, and Sprague’s Pipit are in the management action category in need of on the ground conservation actions to reverse significant, long-term population declines or sustain vulnerable populations. Mountain Bluebird is placed in the long-term planning and responsibility action category indicating the need for long-term planning to maintain a sustainable population. Lark Bunting, Mountain Bluebird, and Grasshopper Sparrow are also listed as stewardship species; hence they are representative of their biome and are intended to represent bird characteristics and habitat within their biome. This plan was developed by Partners in Flight and serves as a blueprint for continental habitat conservation under the North American Bird Conservation Initiative (Rich et al. 2004).

In establishing bird monitoring at the grassland scale, important data is obtained with regard to frequency of occurrence and habitat types species are found in. National Grasslands form an integral part to understanding bird ecology and sustain healthy grassland conditions.

Monitoring at a local scale will result in more informed land management decisions regarding conservation of grassland birds and their habitat. Correlations can be drawn among avian trends, densities, diversity, and management practices. Evaluating management practices based on population trends and distributions will enable RMBO to focus conservation efforts and help land managers make decisions that conserve prairie birds in the Dakota grasslands.

Overall, point transect monitoring at a local scale is inexpensive, defensible, site-specific, and habitat-specific. It fills an important management need at a modest cost. However, there should be no expectation that this technique will detect trends for all grassland bird species. No single technique can accomplish such an assessment of all grassland birds. Point transect monitoring provides an overview of the avian community and can be used to identify areas in need of particular management attention, resulting in more effective conservation of Great Plains birds in the Dakota Grasslands.

Monitoring Dakota Grassland Birds ............................................................... 14
Acknowledgements

We thank the U.S Forest Service for funding the project in particular Dan Svingen and to RMBO staff for review of the document and especially the field crew that collected the data.
Literature Cited


APPENDIX A - Species Distribution Maps

The distribution map for each species indicates presence of species from 2004 to 2007.
Northern Harrier

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds .................................................... 20
Killdeer

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence

Survey Blocks

Monitoring Dakota Grassland Birds ................................................................. 22
Upland Sandpiper
Marbled Godwit

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds .............................................................. 24
Mourning Dove

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds ...................................... 25
Say's Phoebe

Presence of a species from 2004 to 2007

+ Point Transect Location  ● Presence

Survey Blocks

Monitoring Dakota Grassland Birds ......................................................... 26
Eastern Kingbird

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds .......................................................... 27
Monitoring Dakota Grassland Birds .................................................. 28
Mountain Bluebird

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds .................................................. 29
Sprague's Pipit

**Presence of a species from 2004 to 2007**
- + Point Transect Location
- ● Presence
- □ Survey Blocks

Monitoring Dakota Grassland Birds .......................................................... 30
Yellow Warbler

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence

Survey Blocks

Monitoring Dakota Grassland Birds .......................................................... 31
Spotted Towhee

Presence of a species from 2004 to 2007
+
Point Transect Location
● Presence

Survey Blocks

Monitoring Dakota Grassland Birds ......................................................... 32
Clay-colored Sparrow

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence

Survey Blocks

Monitoring Dakota Grassland Birds

33
Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds .......................................................... 34
Lark Bunting

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds .......................................................... 35
Grasshopper Sparrow

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence

Survey Blocks

Monitoring Dakota Grassland Birds ......................................................... 36
**Baird's Sparrow**

Presence of a species from 2004 to 2007

- + Point Transect Location
- ○ Presence
- □ Survey Blocks

Monitoring Dakota Grassland Birds ............................................................ 37
Le Conte's Sparrow

Presence of a species from 2004 to 2007

- + Point Transect Location
- ○ Presence
- Survey Blocks

Monitoring Dakota Grassland Birds ......................................................... 38
Chestnut-collared Longspur

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds ......................................................... 39
Dickcissel

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds ............................................................. 40
Bobolink

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence

Survey Blocks

Monitoring Dakota Grassland Birds .......................................................... 41
Red-winged Blackbird

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds ...................................................... 42
Yellow-headed Blackbird

Presence of a species from 2004 to 2007

- ♦ Point Transect Location
- • Presence
- ■ Survey Blocks

Monitoring Dakota Grassland Birds ......................................................... 44
Brown-headed Cowbird

Presence of a species from 2004 to 2007

- Point Transect Location
- Presence
- Survey Blocks

Monitoring Dakota Grassland Birds ......................................................... 45
### APPENDIX B - Species List

A complete list of all species detected on Grand River, Little Missouri and Sheyenne National Grasslands with number of detections.

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Monitoring Dakota Grassland Birds .......................... 49
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Monitoring Dakota Grassland Birds ................................................................. 50
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