Avian Management Indicator Species on Cimarron and Comanche National Grasslands

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Rocky Mountain Bird Observatory
PO Box 1232
Brighton, CO 80601-1232
303.659.4348
www.rmbo.org
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In Cooperation With:

ROCKY MOUNTAIN BIRD OBSERVATORY

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Contact Information:

Jennifer Blakesley (Jennifer.blakesley@rmbo.org)
Rocky Mountain Bird Observatory
14500 Lark Bunting Lane
PO Box 1232
Brighton, CO 80601-1232
303-659-4348

EXECUTIVE SUMMARY

Rocky Mountain Bird Observatory (RMBO) conducted bird surveys within the Shortgrass Prairie Bird Conservation Region (BCR 18) and within Grasslands of Colorado in 2001-2007, under three sampling designs (Beason et al. 2008).

The Cimarron and Comanche National Grasslands (CCNG) designated three birds as Management Indicator Species (MIS): The Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*), Long-billed Curlew (*Numenius americanus*), and Bullock's Oriole (*Icterus bullockii*). No Lesser Prairie-Chickens were detected on either National Grassland. No Long-billed Curlews were detected on Cimarron National Grassland. Fourteen to eighty-six Curlews were detected on Comanche National Grassland each year. However, estimation of population size using Distance sampling requires 60-80 independent observations of a species to generate a detection function, and the majority of Curlews were detected in flocks. Therefore, I was able to estimate only an average annual density of Long-billed Curlews. Bullock's Orioles were detected in insufficient numbers on both National Grasslands to estimate population density.

This report summarizes the results of all point transect surveys conducted by RMBO on Cimarron and Comanche National Grasslands with respect to avian MIS.

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INTRODUCTION

Rocky Mountain Bird Observatory (RMBO) surveyed birds in Grasslands in Colorado and within the Shortgrass Prairie Bird Conservation Region (BCR 18), including the Cimarron and Comanche National Grasslands, in 1999-2007. RMBO conducted surveys under two monitoring programs that used different sampling frames. Our objectives were to monitor population trends and distributions of breeding birds.

RMBO established the first program in 1998 to monitor bird populations throughout Colorado (Monitoring Colorado's Birds; MCB). Sampling design was based on habitat strata, with 30 transects randomly located in each of 11 habitats, including grasslands. RMBO sampled bird populations in grassland habitat in 1999-2005. In 2007, we used a new, spatially balanced sampling frame to select transects within the Colorado portion BCR18. We surveyed 1-3 MCB transects within the Comanche National Grassland each year. Because Cimarron National Grassland lies outside of Colorado, it contained no MCB transects.

RMBO established a separate program in 2001 to monitor birds at the scale of BCR 18, including portions of Colorado, Nebraska, Kansas, Oklahoma, and New Mexico. Under this program, the sampling unit was a legal Section (1 mile x 1 mile, based on the Public Land Survey System), and sampling was conducted from roads. We surveyed 1-31 sections within Cimarron National Grassland and 40-132 sections within Comanche National Grassland each year.

The Cimarron and Comanche National Grasslands (CCNG) designated three birds as Management Indicator Species (MIS): The Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*), Long-billed Curlew (*Numenius americanus*), and Bullock's Oriole (*Icterus bullockii*).

Herein, I present counts of surveys conducted, MIS individual birds detected, and an average density estimate for Long-billed Curlews on the Comanche National Grassland.

METHODS

Study Area

RMBO and its partners used digital GAP vegetation maps to define habitat strata (e.g., Grasslands) for the Monitoring Colorado's Birds program, and placed transects within strata without respect to land ownership. Two Grassland transects fell within the Comanche National Grassland in 1999-2000, and we added and surveyed an additional transect in 2001-2005. RMBO did not survey MCB Grassland transects in 2006. In 2007, RMBO established a new sampling frame within native prairie habitat of BCR 18 in Colorado, using a spatially balanced sampling algorithm to establish new point transects (Beason et al. 2008). One transect fell within Comanche NG in 2007 (Table 1).

RMBO and its partners designed the Shortgrass Prairie (BCR 18) Section Survey program to sample birds within three habitat strata: native prairie, dryland agriculture, and Conservation Reserve Program. We randomly selected 1-mi^2 sections for sampling in proportion to the area of each stratum on the landscape. In 2003-2005, Cimarron and Comanche National Grasslands were specifically targeted for monitoring (Tables 1 and 2).

Table 1. Numbers of transects surveyed under the Monitoring Colorado's Birds program (MCB) and sections surveyed under the BCR 18 Section Survey program on the Comanche National Grassland. MCB transects consisted of 15 survey points. Section Survey samples usually consisted of 3 survey points.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
MCB Transects	2	2	3	3	3	3	3	--	1	20
BCR 18 Sections	--	--	40	75	132	131	130	126	--	634

Table 2. Numbers sections surveyed under the BCR 18 Section Survey program on the Cimarron National Grassland. Section Survey samples usually consisted of 3 survey points.

	2001	2002	2003	2004	2005	2006	Total
BCR 18 Sections	1	1	21	31	29	30	113

Field Methods

Both MCB and Section Survey monitoring used point transect sampling. MCB transects consisted of 15 points located at 250 m intervals along each transect. Additional details of the MCB program can be found in Beason et al. (2008). Section Surveys consisted of 3-4 points randomly located along roads bounding a 1-mi^2 section. If roads occurred on 3-4 sides of a section, one point was selected per side (up to 4 points in 2001 and up to 3 points in subsequent years). If roads occurred on only one or two sides of a section, two or three points would occur along individual roads. Survey points were at least 322 m apart and at least 161 m from section corners. Data were collected within the targeted section, 180 degrees surrounding the observer. Additional details of section-based monitoring of breeding birds within the shortgrass prairie can be found in Sparks and Hanni (2006). Each transect was surveyed by one observer collecting data for five minutes per point following protocol established by Leukering et al. (1998) and modified by RMBO in 2006. Technicians conducted all transect surveys in the morning, between ½-hour before sunrise and 11 AM; most surveys were completed before 10 AM.

Point transect sampling is based on distance sampling theory, which estimates detection probability as a function of the distances between the observer and the

birds detected (Buckland et al. 1993). The detection probability is used to adjust the count of birds to account for birds that were present but undetected. Details of field sampling methods appear in the 2007 MCB annual report (Beason et al. 2008). Following is a brief summary of the sampling protocol.

Data Analysis

Distance sampling theory was developed to account for the decreasing probability of detecting an object of interest (e.g., a bird) with increasing distance from the observer to the object (Buckland et al. 2001). Application of distance theory requires that three critical assumptions be met: 1) all birds at and near the sampling location (distance = 0) are detected; 2) distances of birds are measured accurately; and 3) birds do not move in response to the observer's presence. These assumptions are reasonably well met following the MCB protocol. Analysis of distance data is accomplished by fitting a detection function to the distribution of recorded distances. The distribution of distances can be a function of characteristics of the object (e.g., for birds, its size and color, movement, volume of song or call, and frequency of call), the surrounding environment (e.g., density of vegetation), and observer ability. Because detectability varies among species, I analyzed the data separately for each species.

I used Program Distance 5.0 (Thomas et al. 2006) to estimate the density of each bird species. I fit the following functions to the distribution of distances for each species: Half normal key function with cosine series expansion, Uniform function with cosine series expansion, Hazard rate key function with cosine series expansion, and Hazard rate key function with simple polynomial series expansion (Buckland et al. 2001). I used Akaike's Information Criterion (AIC) corrected for small sample size (AIC_c) and model selection theory to select the most parsimonious detection function for each species (Burnham and Anderson 2002).

Sample sizes were insufficient for all MIS species to estimate observed population trends.

RESULTS

No Lesser Prairie-Chickens were detected on the Cimarron and Comanche National Grasslands through either BCR 18 section surveys or MCB grassland surveys. No Long-billed Curlews were detected on the Cimarron National Grassland through BCR 18 section surveys. Sample sizes were insufficient to estimate densities of Long-billed Curlews and Bullock's Orioles on the Comanche National Grassland from the MCB data (Table 3).

Sample sizes were also insufficient to estimate densities of Bullock's Orioles on both National Grassland from the section survey data (Tables 4 and 5).

Table 3. Numbers of avian Management Indicator Species detected during MCB surveys on the Comanche National Grassland, 1999-2007.

Year	Lesser Prairie-Chicken	Long-billed Curlew	Bullock's Oriole
1999	0	0	7
2000	0	1	1
2001	0	0	0
2002	0	1	2
2003	0	2	7
2004	0	2	0
2005	0	3	0
2007	0	0	0
Total	0	9	17

Table 4. Numbers of avian Management Indicator Species detected during section surveys on the Cimarron National Grassland, 2001-2006.

Year	Lesser Prairie-Chicken	Long-billed Curlew	Bullock's Oriole
2001	0	0	0
2002	0	0	0
2003	0	0	1
2004	0	0	13
2005	0	0	0
2006	0	0	8
Total	0	0	22

Table 5. Numbers of avian Management Indicator Species detected during section surveys on the Comanche National Grassland, 2001-2006.

Year	Lesser Prairie-Chicken	Long-billed Curlew	Bullock's Oriole
2001	0	86	2
2002	0	14	1
2003	0	19	3
2004	0	23	2
2005	0	17	2
2006	0	20	2
Total	0	179	12

Buckland et al. (2001) recommend 60-80 independent observations to fit a detection curve to Distance data. Note that of the 86 Long-billed Curlews detected on the Comanche National Grassland in 2001, 80 individuals were detected in two flocks within a single section (two independent observations). Consequently, the Comanche National Grassland yielded only 77 independent detections Curlews across all years. After truncating observations at extreme distances, as required in Distance analysis, 58 independent observations remained to estimate a detection function.

Despite the low number of independent detections, I estimated an average annual density of Curlews on the Comanche National Grassland = 3.85 birds/km^2 (CV = 79%, 90% Confidence interval = 1.09 to 13.59).

DISCUSSION AND RECOMMENDATIONS

Monitoring avian Management Indicator Species requires rigorous long-term sampling. The MCB transect and BCR 18 section survey sampling designs have yielded precise density estimates for many breeding landbirds, especially passerines (Beason et al. 2008). None of the three CCNG avian Management Indicator Species were monitored sufficiently in 1999-2007 to estimate population trends through RMBO's monitoring programs. Lesser Prairie-Chickens would require a different sampling design than those described in this report. Grouse species are usually monitored when they are most conspicuous during the lekking period. Bullock's Orioles are generally well-sampled using point transect methods. The low numbers of Bullock's Orioles detected may simply reflect a paucity of this species on the Cimarron and Comanche National Grasslands.

Stanley and Skagen (2007) conducted nation-wide surveys for breeding Long-billed Curlews in 2004-2005, and did not detect Curlews in Colorado in either year (n = 18, 20-32 km survey transects). Stanley and Skagen (2007) estimated that more than 1500 survey transects would be required to detect a 20% decline in the Long-billed Curlew population in the western United States over a 20 year period (with alpha = 0.05, power = 0.80). In addition to the challenges of monitoring an uncommon species, Long-billed Curlews breed in April and May and may be less visible during surveys targeted for later-breeding grassland species.

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