

Avian Area Searches on Little Bighorn Battlefield National Monument: 2012 Report



November 2012

ROCKY MOUNTAIN BIRD OBSERVATORY
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ROCKY MOUNTAIN BIRD OBSERVATORY

Mission: *To conserve birds and their habitats*

Vision: *Native bird populations are sustained in healthy ecosystems*

Core Values:

1. **Science** provides the foundation for effective bird conservation.
2. **Education** is critical to the success of bird conservation.
3. **Stewardship** of birds and their habitats is a shared responsibility.

RMBO accomplishes its mission by:

- **Monitoring** long-term bird population trends to provide a scientific foundation for conservation action.
- **Researching** bird ecology and population response to anthropogenic and natural processes to evaluate and adjust management and conservation strategies using the best available science.
- **Educating** people of all ages through active, experiential programs that create an awareness and appreciation for birds.
- **Fostering** good stewardship on private and public lands through voluntary, cooperative partnerships that create win-win situations for wildlife and people.
- **Partnering** with state and federal natural resource agencies, private citizens, schools, universities, and other non-governmental organizations to build synergy and consensus for bird conservation.
- **Sharing** the latest information on bird populations, land management and conservation practices to create informed publics.
- **Delivering** bird conservation at biologically relevant scales by working across political and jurisdictional boundaries in western North America.

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Cover Photo:

Reno-Benteen Battlefield, by Nick Van Lanen

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EXECUTIVE SUMMARY

The Rocky Mountain Bird Observatory, in conjunction with the US National Park Service, conducted five days of avian area searches covering the full extent of Little Bighorn Battlefield National Monument (LIBI) from 30 May to 3 June, 2012. The goal of the project was to compare data from this survey to previous surveys. A single observer counted the number of individual birds on LIBI while slowly walking transect lines spaced approximately 250m apart. The method of detection and indication of breeding behavior were recorded in addition to the species and number of individuals for each separate observation. In total, 577 individuals of 47 species were detected during the avian area searches. Breeding behavior was confirmed for four species, strong evidence of breeding was observed for eight species, and moderate evidence of breeding was witnessed for an additional eight species.

Of the 47 species detected during the 2012 area searches, 10 species had not been previously detected in avian surveys conducted on LIBI by Bock and Bock (2006) in 1985, 1986, and between 2002 and 2006. In contrast, Bock and Bock detected 23 species which were not observed during the 2012 area searches. Some of these species were likely migrating when observed by Bock and Bock and would not be expected to be present during the 2012 survey window. Other species detected by Bock and Bock that were not observed in 2012 are strongly associated with water and are unlikely to regularly occur within the LIBI boundary and/or are unlikely to breed within LIBI at the present time as a result of two fires that reduced sagebrush and shrub cover on both the Reno-Benteen and Custer Battlefields. It is likely that some of the species recorded by Bock and Bock are still present on LIBI but went undetected during the short survey duration in 2012.

Results of the 2012 area searches on Little Bighorn Battlefield National Monument were compared to bird detections recorded at point count stations classified as either “grassland” or “riparian” under the Integrated Monitoring of Bird Conservation Regions program within the Montana portion of Bird Conservation Region 17 (BCR 17, Badlands and Prairies). Five of the ten most commonly detected species on LIBI were among the ten most commonly detected species within the Montana portion of BCR17, indicating that the avian community residing within LIBI is fairly representative of that found in the surrounding area.

Continued monitoring on LIBI is recommended to assist in informing LIBI managers on the effects of succession, natural disturbance, and the introduction of exotic species on the avian community. Future monitoring efforts which account for incomplete detection of individuals and allow for the production of density and occupancy estimates for species residing within LIBI would likely be more informative to LIBI managers.

ACKNOWLEDGEMENTS

Funding for this project was provided by the National Park Service. Robert Bennetts, Mike Britten, and Melana Stichman of the National Park Service were instrumental in providing the funding and logistical support to facilitate the survey work and provided helpful comments on the draft of this report. Avian detection data for the Montana portion of Bird Conservation Region 17 were obtained under the Integrated Monitoring of Bird Conservation Regions program and were made possible by the numerous funding partners of that program; including the US Forest Service, the US Bureau of Land Management, and Montana Fish, Wildlife, and Parks. Jenny Berven, of the Rocky Mountain Bird Observatory (RMBO), provided GIS assistance for this report. Finally, this report benefitted from review by Carl Bock and RMBO staff.

TABLE OF CONTENTS

Executive Summary	i
Acknowledgements	ii
Table of Contents	iii
List of Tables	iii
List of Figures	iii
Introduction	1
Methods	1
Study Area.....	1
Avian Surveys	2
Data Recording and Analysis.....	3
Results	3
Discussion	10
Literature Cited	13

LIST OF TABLES

Table 1. Number of individual birds detected by species at the Reno-Benteen Battlefield, Custer Battlefield, and the total number of individuals detected on Little Bighorn Battlefield National Monument (Total LIBI Count) during area searches in 2012. Bolded species are designated as species of continental concern, continental stewardship, or regional concern by Partner's in Flight for Bird Conservation Region 17. Non-indigenous species are represented with an asterisk. 5

Table 2. Indications of breeding status for avian species detected during RMBO surveys on Little Bighorn Battlefield National Monument in 2012. Behavior codes are as follows: Cop = Copulation, Dsp = Territorial/Breeding display, Fdg = Fledgling observed, Flk = Flock, Fd = Carrying food, For = Foraging, Mat = Carrying material, Nst = Active nest observed, and Pr = Pair. Behaviors leading to the determination of the breeding status are bolded..... 7

Table 3. Number of individual birds detected by species at points in grassland and riparian habitat in the Montana portion of Bird Conservation Region 17 (Badlands and Prairies) under the Integrated Monitoring of Bird Conservation Regions program. The numbers of individuals were obtained from 145 point counts conducted within 30 1km² grid cells in 2012. Bolded species are designated as species of continental concern, continental stewardship, or regional concern by Partner's in Flight for Bird Conservation Region 17..... 8

LIST OF FIGURES

Figure 1. Little Bighorn Battlefield National Monument located within Bird Conservation Region 17 (Badlands and Prairies) in southeastern Montana. 2

Figure 2. Fledgling Great Horned Owl near the natural resource office on the Custer Battlefield. Photo by National Park Service staff. 3

Figure 3. Lark Sparrow nest found near the cemetery on the Custer Battlefield in 2012. Photo by Nick Van Lanen. 4

INTRODUCTION

Birds can be excellent indicators of biological integrity and ecosystem health (Morrison 1986, Hutto 1998, O'Connell et al. 2000, Rich 2002, U.S. EPA 2002, Birdlife International 2003). Birds comprise a diverse group of niche specialists, occupy a broad range of habitats, are relatively easy to monitor and are sensitive to both physical and chemical impacts on the environment. They are useful barometers for environmental change and measuring the sustainability of ecosystems impacted by human activities.

Monitoring is an essential component of wildlife management and conservation science (Witmer 2005, Marsh and Trenham 2008). Common goals of population monitoring are to estimate the population status of target species and to detect changes in populations over time (Thompson et al. 1998, Sauer and Knutson 2008). Effective monitoring programs can identify species that are at-risk due to small or declining populations (Dreitz et al. 2006), provide an understanding of how management actions affect populations (Alexander et al. 2008, Lyons et al. 2008), evaluate population responses to landscape alteration and climate change (Baron et al. 2008, Lindenmayer and Likens 2009) as well as provide basic information on species distributions.

The last known avian monitoring that occurred on Little Bighorn Battlefield National Monument (hereafter LIBI) was conducted in 2006 (Bock and Bock 2006). Although LIBI is unique from other areas in eastern Montana in that it is not subject to cattle grazing and is largely free of human-related disturbance (visitor access is restricted to paved portions of the Monument and along one short trail), changes to the vegetative and bird community are nevertheless expected to occur over time. The spread of exotic plant species, alterations in the vegetation community resulting from climate change, changing hydrologic patterns, disease, natural disturbance (e.g., fire and flooding), and succession all are likely to influence the bird community of LIBI. Also, LIBI is a small national park and, even though it is protected, land cover and land use changes around the park and in the region would be expected to influence bird populations in LIBI. As such, periodic avian monitoring to assess the impacts of landscape changes on the bird community can be particularly instructive. To better inform the managers at LIBI on avian response to these changes a Rocky Mountain Bird Observatory (hereafter RMBO) staff member conducted avian area searches over five days from 30 May to 3 June, 2012 to inventory the breeding bird community within LIBI. Raw count data from the area searches were then compared to data collected under the Integrated Monitoring of Bird Conservation Regions (IMBCR) (White et al. 2011) program within the Montana portion of Bird Conservation Region 17 (BCR17) (Badlands and Prairies BCR) in 2012.

METHODS

Study Area

The area searches were conducted over the entire extent of the Little Bighorn Battlefield National Monument. LIBI is made up of two parcels separated by approximately three miles; the Custer Battlefield and the Reno-Benteen Battlefield. The Custer Battlefield represents the larger parcel spanning approximately 600 acres. The Reno-Benteen Battlefield is considerably smaller and encompasses approximately 165 acres. Together these parcels span 765 acres (Land Resource Division, National Park Service 2012) located within BCR17 in southeastern Montana (Figure 1). The landscape is characterized by gently rolling hills with the upland portions of LIBI dominated by northern mixed grass prairie. Swales and ravines throughout the

Custer Battlefield are inhabited by shrub species including Western Snowberry (*Symphoricarpos occidentalis*), Prairie Rose (*Rosa arkansana*), Chokecherry (*Prunus virginiana*), and Silver Sagebrush (*Artemisia cana*) (Bock and Bock 2006). The southern extent of the Custer Battlefield borders the Little Bighorn River and represents riparian habitat with mature Eastern Cottonwood (*Populus deltoides*), willow trees (*Salix amygdaloides* and *S. exigua*), Green Ash (*Fraxinus pennsylvanica*), Box Elder (*Acer negundo*), and a few Russian Olives (*Elaeagnus angustifolia*). The only other area with substantial tree cover is located around the Custer National Cemetery and the visitor center with cottonwood species (*Populus* spp.), Blue Spruce (*Picea pungens*), Rocky Mountain Juniper (*Juniperus scopulorum*), and Green Ash representing the most abundant overstory species.

LIBI data were compared to data collected under the IMBCR design within the BCR17 portion of Montana (Figure 1) at point count stations where the primary habitat was classified as either “grassland” or “riparian” (Hanni et al. 2012). BCR17 is an ecoregion characterized by rolling plains and mixed grass prairie that contains large tracts of intact dry grassland (White et al. 2011). BCR17 includes the Little Bighorn basin and was considered representative of habitat found within LIBI. As such, the Montana portion of BCR17 was expected to have a similar bird community as LIBI and was therefore considered an appropriate region for comparisons.

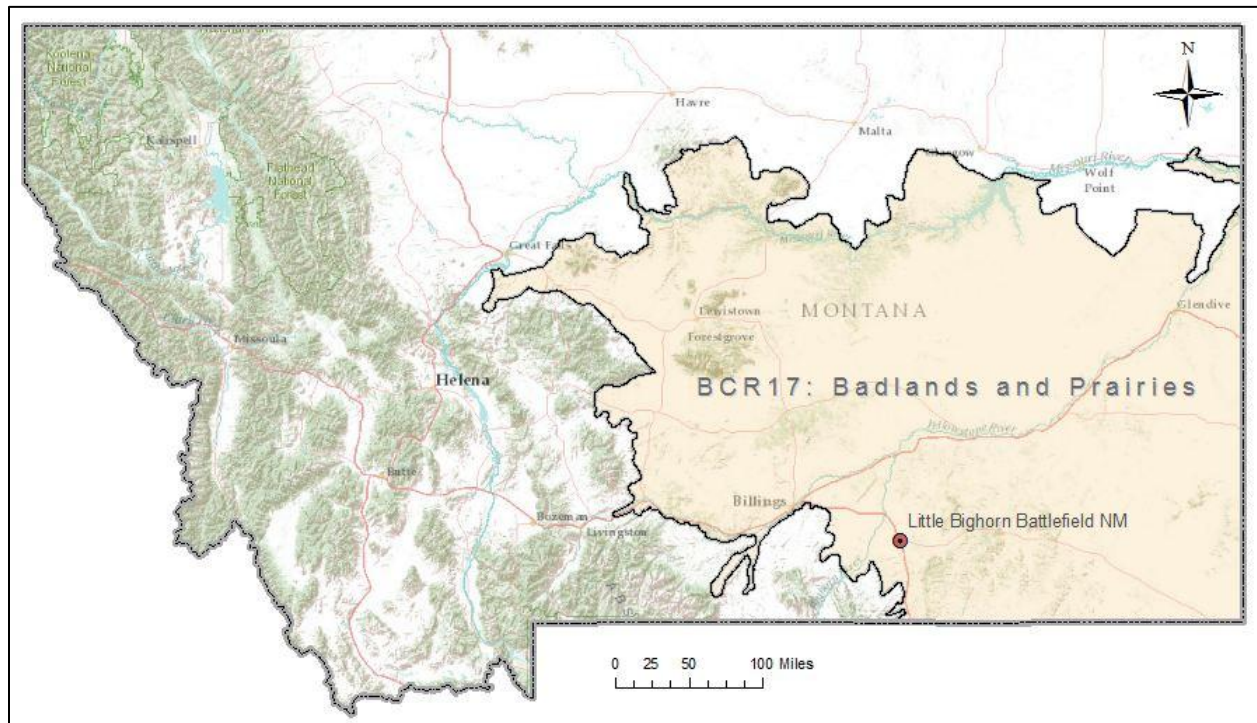


Figure 1. Little Bighorn Battlefield National Monument located within Bird Conservation Region 17 (Badlands and Prairies) in southeastern Montana.

Avian Surveys

A RMBO staff member, skilled in both ocular and aural identification of avian species, visited LIBI for five days from 30 May to 3 June in 2012 to catalogue avian diversity and raw counts of species. The first day was spent traversing the boundaries of both battlefields and recording spatial data via GPS in order to facilitate complete coverage of LIBI during the formal area searches. Area searches were then conducted over four consecutive days from 31 May to 3 June in which the observer walked transect lines spaced roughly 250m apart. Surveys were

conducted in the morning (beginning at roughly 5 AM and concluding no later than 10:30 AM) in order to collect data when the birds were most active and detectable. Three mornings were spent searching the larger Custer Battlefield and a single morning was spent searching the Reno-Benteen Battlefield.

Data Recording and Analysis

Each individual bird detected was recorded along with behavioral data including if the individual was a member of a flock, paired up with another individual, copulating, engaging in courtship or territorial displays, carrying food or a fecal sack, carrying nesting material, observed on or visiting a nest, or if a juvenile bird was detected. The detection method for each avian observation was also classified as either song, call, or a visual observation. Individuals or flocks of birds were not recorded if the observer had reason to believe they had already been detected (e.g., flocks of European Starlings which were repeatedly making trips from the riparian area towards the visitor center). The observer only recorded birds that were located within, or passed over, the boundary of LIBI. Birds were not recorded if they were detected from within the Monument but were only observed outside of the LIBI boundary.

Raw counts of individuals by species were totaled for each battlefield and for LIBI as a whole. Additionally, raw count data collected in 2012 under the IMBCR program at point count stations classified as being in “grassland” or “riparian” habitat (Hanni et al. 2012) within the Montana portion of BCR17 (hereafter known as MT BCR17) were used as a regional comparison. In total, the MT BCR17 data represented avian detections recorded during 6-minute point counts at 145 point count stations on 30 different 1km² grid cells selected for sampling (White et al. 2011). The numbers for LIBI and the MT BCR17 reflect relative abundance and do not account for individuals that were present but went undetected.

RESULTS

On the Custer Battlefield 464 individual birds of 43 species were detected during 3 days of area searches compared to 113 individual birds of 25 species on the Reno-Benteen Battlefield during a single morning of surveying. In total, 577 individual birds of 47 species were detected during the 4 days of avian area searches on LIBI (Table 1) for an average of 0.754 individuals detected per acre. The five most common species detected on LIBI were Western Meadowlark, Canada Goose, Lark Bunting, Common Grackle, and European Starling, a non-indigenous avian species (NIS).

Of the 47 species documented on LIBI, 4 species were confirmed to be nesting (either juveniles or a nest were observed), strong evidence of breeding was confirmed for 8 species (individuals were observed copulating, engaging in breeding/territorial displays, and/or birds were observed carrying food or nesting material), and moderate evidence of breeding was recorded for 8 species (a pair of birds were observed together) (Table 2).



Figure 2. Fledgling Great Horned Owl near the natural resource office on the Custer Battlefield. Photo by National Park Service staff.

In comparison, 2421 individual birds were detected of 108 species during the 145 point counts conducted in grassland and riparian habitats under the IMBCR program in the Montana portion of BCR17 (Table 3). Approximately 2238 acres were surveyed during these counts resulting in an average bird density of 1.08 individuals per acre. The five most common species detected within the Montana portion of BCR17 were Western Meadowlark, Brown-headed Cowbird, Grasshopper Sparrow, Vesper Sparrow, and Mourning Dove.



Figure 3. Lark Sparrow nest found near the cemetery on the Custer Battlefield in 2012. Photo by Nick Van Lanen.

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Table 1. Number of individual birds detected by species at the Reno-Benteen Battlefield, Custer Battlefield, and the total number of individuals detected on Little Bighorn Battlefield National Monument (Total LIBI Count) during area searches in 2012. Bolded species are designated as species of continental concern, continental stewardship, or regional concern by Partner's in Flight for Bird Conservation Region 17. Non-indigenous species are represented with an asterisk.

Common Name	Family	Scientific Name	Reno-Benteen Battlefield	Custer Battlefield	Total LIBI Count
Northern Harrier	<i>Accipitridae</i>	<i>Circus cyaneus</i>	1	1	2
Red-tailed Hawk	<i>Accipitridae</i>	<i>Buteo jamaicensis</i>	2	2	4
Canada Goose	<i>Anatidae</i>	<i>Branta canadensis</i>	0	63	63
Great Blue Heron	<i>Ardeidae</i>	<i>Ardea herodias</i>	0	1	1
Cedar Waxwing	<i>Bombycillidae</i>	<i>Bombycilla cedrorum</i>	3	9	12
Common Nighthawk	<i>Caprimulgidae</i>	<i>Chordeiles minor</i>	0	1	1
Lazuli Bunting	<i>Cardinalidae</i>	<i>Passerina amoena</i>	2	3	5
Eurasian Collared-Dove*	<i>Columbidae</i>	<i>Streptopelia decaocto</i>	0	5	5
Mourning Dove	<i>Columbidae</i>	<i>Zenaida macroura</i>	4	11	15
American Crow	<i>Corvidae</i>	<i>Corvus brachyrhynchos</i>	1	2	3
Black-billed Magpie	<i>Corvidae</i>	<i>Pica hudsonia</i>	1	0	1
Common Raven	<i>Corvidae</i>	<i>Corvus corax</i>	0	1	1
Chipping Sparrow	<i>Emerizidae</i>	<i>Spizella passerina</i>	0	9	9
Grasshopper Sparrow	<i>Emerizidae</i>	<i>Ammodramus savannarum</i>	9	9	18
Lark Bunting	<i>Emerizidae</i>	<i>Calamospiza melanocorys</i>	2	28	30
Lark Sparrow	<i>Emerizidae</i>	<i>Chondestes grammacus</i>	10	18	28
Spotted Towhee	<i>Emerizidae</i>	<i>Pipilo maculatus</i>	9	13	22
Vesper Sparrow	<i>Emerizidae</i>	<i>Poocetes gramineus</i>	6	0	6
American Kestrel	<i>Falconidae</i>	<i>Falco sparverius</i>	0	2	2
American Goldfinch	<i>Fringillidae</i>	<i>Carduelis tristis</i>	5	0	5
House Finch	<i>Fringillidae</i>	<i>Carpodacus mexicanus</i>	0	1	1
Barn Swallow	<i>Hirundinidae</i>	<i>Hirundo rustica</i>	0	5	5
Cliff Swallow	<i>Hirundinidae</i>	<i>Petrochelidon pyrrhonota</i>	3	2	5
Northern Rough-winged Swallow	<i>Hirundinidae</i>	<i>Stelgidopteryx serripennis</i>	1	2	3
Tree Swallow	<i>Hirundinidae</i>	<i>Tachycineta bicolor</i>	0	1	1
Brown-headed Cowbird	<i>Icteridae</i>	<i>Molothrus ater</i>	7	22	29

Avian Area Searches on Little Bighorn National Battlefield: 2012 Report

Common Name	Family	Scientific Name	Reno-Benteen Battlefield	Custer Battlefield	Total LIBI Count
Bullock's Oriole	<i>Icteridae</i>	<i>Icterus bullockii</i>	1	13	14
Common Grackle	<i>Icteridae</i>	<i>Quiscalus quiscula</i>	0	32	32
Western Meadowlark	<i>Icteridae</i>	<i>Sturnella neglecta</i>	22	69	91
Brown Thrasher	<i>Mimidae</i>	<i>Toxostoma rufum</i>	0	2	2
Gray Catbird	<i>Mimidae</i>	<i>Dumetella carolinensis</i>	0	1	1
Yellow Warbler	<i>Parulidae</i>	<i>Dendroica petechia</i>	3	10	13
Yellow-breasted Chat	<i>Parulidae</i>	<i>Icteria virens</i>	0	4	4
Ring-necked Pheasant*	<i>Phasianidae</i>	<i>Phasianus colchicus</i>	1	9	10
Sharp-tailed Grouse	<i>Phasianidae</i>	<i>Tympanuchus phasianellus</i>	1	5	6
Northern Flicker	<i>Picidae</i>	<i>Colaptes auratus</i>	0	2	2
Great Horned Owl	<i>Strigidae</i>	<i>Bubo virginianus</i>	0	1	1
Short-eared Owl	<i>Strigidae</i>	<i>Asio flammeus</i>	0	2	2
European Starling*	<i>Sturnidae</i>	<i>Sturnus vulgaris</i>	12	48	60
Western Tanager	<i>Thraupidae</i>	<i>Piranga ludoviciana</i>	0	1	1
House Wren	<i>Troglodytidae</i>	<i>Troglodytes aedon</i>	1	3	4
American Robin	<i>Turdidae</i>	<i>Turdus migratorius</i>	5	25	30
Eastern Kingbird	<i>Tyrannidae</i>	<i>Tyrannus tyrannus</i>	0	8	8
Say's Phoebe	<i>Tyrannidae</i>	<i>Sayornis saya</i>	0	4	4
Western Kingbird	<i>Tyrannidae</i>	<i>Tyrannus verticalis</i>	0	13	13
Western Wood-Pewee	<i>Tyrannidae</i>	<i>Contopus sordidulus</i>	1	0	1
Warbling Vireo	<i>Vireonidae</i>	<i>Vireo gilvus</i>	0	1	1
Total Number of Individuals			113	464	577

Avian Area Searches on Little Bighorn National Battlefield: 2012 Report

Table 2. Indications of breeding status for avian species detected during RMBO surveys on Little Bighorn Battlefield National Monument in 2012. Behavior codes are as follows: Cop = Copulation, Dsp = Territorial/Breeding display, Fdg = Fledgling observed, Flk = Flock, Fd = Carrying food, For = Foraging, Mat = Carrying material, Nst = Active nest observed, and Pr = Pair. Behaviors leading to the determination of the breeding status are bolded.

Species	Behavior	Breeding Status
Cedar Waxwing	For, Flk, Fdg	Confirmed Nesting
Great Horned Owl	Fdg	Confirmed Nesting
Lark Sparrow	Cop, Nst , Pr	Confirmed Nesting
Western Kingbird	Dsp, Pr, Nst	Confirmed Nesting
American Goldfinch	Flk, Pr, Mat	Strong Evidence
American Robin	For, Pr, Fd	Strong Evidence
Common Grackle	For, Flk, Pr, Fd	Strong Evidence
Eastern Kingbird	Dsp , Pr	Strong Evidence
European Starling	For, Flk, Fd	Strong Evidence
Lark Bunting	Dsp , Pr	Strong Evidence
Red-tailed Hawk	Pr, Dsp	Strong Evidence
Western Meadowlark	For, Dsp , Pr, Fd	Strong Evidence
Brown-headed Cowbird	Flk, Pr	Moderate Evidence
Bullock's Oriole	Pr	Moderate Evidence
Canada Goose	Flk, Pr	Moderate Evidence
Grasshopper Sparrow	Pr	Moderate Evidence
Lazuli Bunting	Pr	Moderate Evidence
Mourning Dove	Pr	Moderate Evidence
Ring-necked Pheasant	Pr	Moderate Evidence
Spotted Towhee	For, Pr	Moderate Evidence

Avian Area Searches on Little Bighorn National Battlefield: 2012 Report

Table 3. Number of individual birds detected by species at points in grassland and riparian habitat in the Montana portion of Bird Conservation Region 17 (Badlands and Prairies) under the Integrated Monitoring of Bird Conservation Regions program. The numbers of individuals were obtained from 145 point counts conducted within 30 1km² grid cells in 2012. Bolded species are designated as species of continental concern, continental stewardship, or regional concern by Partner's in Flight for Bird Conservation Region 17.

Common Name	Family	Scientific Name	2012 Count
Bald Eagle	<i>Accipitridae</i>	<i>Haliaeetus leucocephalus</i>	1
Northern Harrier	<i>Accipitridae</i>	<i>Circus cyaneus</i>	3
Osprey	<i>Accipitridae</i>	<i>Pandion haliaetus</i>	1
Red-tailed Hawk	<i>Accipitridae</i>	<i>Buteo jamaicensis</i>	12
Horned Lark	<i>Alaudidae</i>	<i>Eremophila alpestris</i>	46
Belted Kingfisher	<i>Alcedinidae</i>	<i>Ceryle alcyon</i>	2
American Wigeon	<i>Anatidae</i>	<i>Anas americana</i>	15
Blue-winged Teal	<i>Anatidae</i>	<i>Anas discors</i>	1
Canada Goose	<i>Anatidae</i>	<i>Branta canadensis</i>	53
Common Merganser	<i>Anatidae</i>	<i>Mergus merganser</i>	3
Gadwall	<i>Anatidae</i>	<i>Anas strepera</i>	7
Mallard	<i>Anatidae</i>	<i>Anas platyrhynchos</i>	12
Wood Duck	<i>Anatidae</i>	<i>Aix sponsa</i>	8
Chimney Swift	<i>Apodidae</i>	<i>Chaetura pelagica</i>	9
Great Blue Heron	<i>Ardeidae</i>	<i>Ardea herodias</i>	21
Cedar Waxwing	<i>Bombycillidae</i>	<i>Bombycilla cedrorum</i>	20
Common Nighthawk	<i>Caprimulgidae</i>	<i>Chordeiles minor</i>	3
Black-headed Grosbeak	<i>Cardinalidae</i>	<i>Pheucticus melanocephalus</i>	7
Lazuli Bunting	<i>Cardinalidae</i>	<i>Passerina amoena</i>	8
Turkey Vulture	<i>Cathartidae</i>	<i>Cathartes aura</i>	5
Killdeer	<i>Charadriidae</i>	<i>Charadrius vociferus</i>	34
Eurasian Collared-Dove	<i>Columbidae</i>	<i>Streptopelia decaocto</i>	1
Mourning Dove	<i>Columbidae</i>	<i>Zenaida macroura</i>	96
American Crow	<i>Corvidae</i>	<i>Corvus brachyrhynchos</i>	13
Black-billed Magpie	<i>Corvidae</i>	<i>Pica hudsonia</i>	6
Blue Jay	<i>Corvidae</i>	<i>Cyanocitta cristata</i>	2
Black-billed Cuckoo	<i>Cuculidae</i>	<i>Coccyzus erythrophthalmus</i>	1
Baird's Sparrow	<i>Emberizidae</i>	<i>Ammodramus bairdii</i>	13
Brewer's Sparrow	<i>Emberizidae</i>	<i>Spizella breweri</i>	24
Chestnut-collared Longspur	<i>Emberizidae</i>	<i>Calcarius ornatus</i>	28
Chipping Sparrow	<i>Emberizidae</i>	<i>Spizella passerina</i>	32
Clay-colored Sparrow	<i>Emberizidae</i>	<i>Spizella pallida</i>	14
Dark-eyed Junco	<i>Emberizidae</i>	<i>Junco hyemalis</i>	1
Field Sparrow	<i>Emberizidae</i>	<i>Spizella pusilla</i>	8
Grasshopper Sparrow	<i>Emberizidae</i>	<i>Ammodramus savannarum</i>	134
Lark Bunting	<i>Emberizidae</i>	<i>Calamospiza melanocorys</i>	91
Lark Sparrow	<i>Emberizidae</i>	<i>Chondestes grammacus</i>	25

Avian Area Searches on Little Bighorn National Battlefield: 2012 Report

Common Name	Family	Scientific Name	2012 Count
Savannah Sparrow	<i>Emberizidae</i>	<i>Passerculus sandwichensis</i>	17
Song Sparrow	<i>Emberizidae</i>	<i>Melospiza melodia</i>	7
Spotted Towhee	<i>Emberizidae</i>	<i>Pipilo maculatus</i>	20
Vesper Sparrow	<i>Emberizidae</i>	<i>Poocetes gramineus</i>	120
American Kestrel	<i>Falconidae</i>	<i>Falco sparverius</i>	7
Prairie Falcon	<i>Falconidae</i>	<i>Falco mexicanus</i>	1
American Goldfinch	<i>Fringillidae</i>	<i>Carduelis tristis</i>	14
Pine Siskin	<i>Fringillidae</i>	<i>Carduelis pinus</i>	4
Red Crossbill	<i>Fringillidae</i>	<i>Loxia curvirostra</i>	30
Sandhill Crane	<i>Gruidae</i>	<i>Grus canadensis</i>	7
Bank Swallow	<i>Hirundinidae</i>	<i>Riparia riparia</i>	2
Barn Swallow	<i>Hirundinidae</i>	<i>Hirundo rustica</i>	7
Cliff Swallow	<i>Hirundinidae</i>	<i>Petrochelidon pyrrhonota</i>	9
Northern Rough-winged Swallow	<i>Hirundinidae</i>	<i>Stelgidopteryx serripennis</i>	7
Tree Swallow	<i>Hirundinidae</i>	<i>Tachycineta bicolor</i>	26
Violet-green Swallow	<i>Hirundinidae</i>	<i>Tachycineta thalassina</i>	1
Bobolink	<i>Icteridae</i>	<i>Dolichonyx oryzivorus</i>	20
Brewer's Blackbird	<i>Icteridae</i>	<i>Euphagus cyanocephalus</i>	21
Brown-headed Cowbird	<i>Icteridae</i>	<i>Molothrus ater</i>	136
Bullock's Oriole	<i>Icteridae</i>	<i>Icterus bullockii</i>	14
Common Grackle	<i>Icteridae</i>	<i>Quiscalus quiscula</i>	20
Orchard Oriole	<i>Icteridae</i>	<i>Icterus spurius</i>	2
Red-winged Blackbird	<i>Icteridae</i>	<i>Agelaius phoeniceus</i>	53
Western Meadowlark	<i>Icteridae</i>	<i>Sturnella neglecta</i>	442
Loggerhead Shrike	<i>Laniidae</i>	<i>Lanius ludovicianus</i>	1
California Gull	<i>Laridae</i>	<i>Larus californicus</i>	10
Ring-billed Gull	<i>Laridae</i>	<i>Larus delawarensis</i>	1
Brown Thrasher	<i>Mimidae</i>	<i>Toxostoma rufum</i>	2
Gray Catbird	<i>Mimidae</i>	<i>Dumetella carolinensis</i>	4
Sage Thrasher	<i>Mimidae</i>	<i>Oreoscoptes montanus</i>	1
Sprague's Pipit	<i>Motacillidae</i>	<i>Anthus spragueii</i>	1
Black-capped Chickadee	<i>Paridae</i>	<i>Poecile atricapillus</i>	11
Mountain Chickadee	<i>Paridae</i>	<i>Poecile gambeli</i>	1
Common Yellowthroat	<i>Parulidae</i>	<i>Geothlypis trichas</i>	10
Yellow Warbler	<i>Parulidae</i>	<i>Dendroica petechia</i>	95
Yellow-breasted Chat	<i>Parulidae</i>	<i>Icteria virens</i>	12
Yellow-rumped Warbler	<i>Parulidae</i>	<i>Dendroica coronata</i>	5
Greater Sage-Grouse	<i>Phasianidae</i>	<i>Centrocercus urophasianus</i>	1
Ring-necked Pheasant	<i>Phasianidae</i>	<i>Phasianus colchicus</i>	32
Sharp-tailed Grouse	<i>Phasianidae</i>	<i>Tympanuchus phasianellus</i>	25
Downy Woodpecker	<i>Picidae</i>	<i>Picoides pubescens</i>	3
Hairy Woodpecker	<i>Picidae</i>	<i>Picoides villosus</i>	1

Avian Area Searches on Little Bighorn National Battlefield: 2012 Report

Common Name	Family	Scientific Name	2012 Count
Northern Flicker	<i>Picidae</i>	<i>Colaptes auratus</i>	39
Red-headed Woodpecker	<i>Picidae</i>	<i>Melanerpes erythrocephalus</i>	10
Sora	<i>Rallidae</i>	<i>Porzana carolina</i>	2
American Avocet	<i>Recurvirostridae</i>	<i>Recurvirostra americana</i>	1
Long-billed Curlew	<i>Scolopacidae</i>	<i>Numenius americanus</i>	7
Marbled Godwit	<i>Scolopacidae</i>	<i>Limosa fedoa</i>	1
Spotted Sandpiper	<i>Scolopacidae</i>	<i>Actitis macularia</i>	7
Upland Sandpiper	<i>Scolopacidae</i>	<i>Bartramia longicauda</i>	15
Willet	<i>Scolopacidae</i>	<i>Catoptrophorus semipalmatus</i>	3
Wilson's Phalarope	<i>Scolopacidae</i>	<i>Phalaropus tricolor</i>	1
Wilson's Snipe	<i>Scolopacidae</i>	<i>Gallinago delicata</i>	10
Red-breasted Nuthatch	<i>Sittidae</i>	<i>Sitta canadensis</i>	4
White-breasted Nuthatch	<i>Sittidae</i>	<i>Sitta carolinensis</i>	1
Great Horned Owl	<i>Strigidae</i>	<i>Bubo virginianus</i>	1
Short-eared Owl	<i>Strigidae</i>	<i>Asio flammeus</i>	1
European Starling	<i>Sturnidae</i>	<i>Sturnus vulgaris</i>	33
House Wren	<i>Troglodytidae</i>	<i>Troglodytes aedon</i>	85
Rock Wren	<i>Troglodytidae</i>	<i>Salpinctes obsoletus</i>	15
American Robin	<i>Turdidae</i>	<i>Turdus migratorius</i>	47
Mountain Bluebird	<i>Turdidae</i>	<i>Sialia currucoides</i>	3
Townsend's Solitaire	<i>Turdidae</i>	<i>Myadestes townsendi</i>	1
Dusky Flycatcher	<i>Tyrannidae</i>	<i>Empidonax oberholseri</i>	4
Eastern Kingbird	<i>Tyrannidae</i>	<i>Tyrannus tyrannus</i>	35
Least Flycatcher	<i>Tyrannidae</i>	<i>Empidonax minimus</i>	31
Say's Phoebe	<i>Tyrannidae</i>	<i>Sayornis saya</i>	3
Western Kingbird	<i>Tyrannidae</i>	<i>Tyrannus verticalis</i>	29
Western Wood-Pewee	<i>Tyrannidae</i>	<i>Contopus sordidulus</i>	33
Warbling Vireo	<i>Vireonidae</i>	<i>Vireo gilvus</i>	15
Unidentified Individuals			20
Total Number of Individuals			2420

DISCUSSION

Bird species detected during the 2012 area searches differed from those found by Bock and Bock (2006) considerably. In total, 10 species were detected during the 2012 area searches that were not previously detected by Bock and Bock (2006); Common Nighthawk, Common Raven, Great Horned Owl, Lazuli Bunting, Say's Phoebe, Short-eared Owl, Tree Swallow, Warbling Vireo, Western Tanager, and Yellow-breasted Chat. Each of these species were detected in low numbers indicating that they may not have been present during the Bock and Bock (2006) surveys or could have been missed due to the low densities. In contrast, Bock and Bock recorded 23 species that were not detected during the 2012 area searches; Belted Kingfisher, Black-capped Chickadee, Black-headed Grosbeak, Brewer's Blackbird, Brewer's

Sparrow, Common Merganser, Downy Woodpecker, Ferruginous Hawk, Hairy Woodpecker, Horned Lark, Killdeer, Loggerhead Shrike, Mallard, Rock Pigeon, Song Sparrow, Spotted Sandpiper, Swainson's Hawk, Turkey Vulture, Upland Sandpiper, Veery, White-breasted Nuthatch, White-crowned Sparrow, and Wilsons' Warbler. One reason some of these species may have been detected during the Bock and Bock (2006) study is that their surveys were conducted during a much broader seasonal window (surveys were conducted between 11 May and 21 October) which included portions of the migratory season. Species such as Brewer's Sparrow, Brewer's Blackbird, Ferruginous Hawk, Turkey Vulture, and White-crowned Sparrow are likely to pass through LIBI during migration but are unlikely to be found in late May and early June when the 2012 area searches were conducted. Additionally, some of the Bock and Bock (2006) surveys occurred prior to two extensive fires that burned both battlefields (Custer Battlefield burned in 1983 and the Reno-Benteen Battlefield burned in 1991). These fires killed a considerable amount of *Artemisia tridentate* (big sagebrush) and removed other shrub cover that likely contributed to Brewer's Sparrow occupancy in the area. Also, these fires likely reduced the amount of ground cover making the habitat more suitable for species that are affiliated with bare ground such as Horned Lark. Another reason for the discrepancy in species observed is that a number of the species detected by Bock and Bock that were not detected in 2012 are birds associated with water (i.e., Belted Kingfisher, Common Merganser, Mallard, and Spotted Sandpiper). These species were detected in 2012 but were not witnessed within the Monument boundary and therefore were not recorded. Bock and Bock may have recorded birds that were detected from within LIBI even if they were outside of the Monument boundary or those species may have flown over the Monument boundary during their surveys. Finally, given the brief survey effort (five days) by RMBO in 2012, several species were likely present but went undetected. Shortly after the RMBO surveys Mike Britton of the National Park Service observed six additional species: Killdeer, Red-winged Blackbird, House Sparrow, Wood Duck, Swainson's Hawk, and Red Crossbill and witnessed an American Kestrel carrying food (personal communication). Increased sampling intensity by RMBO throughout the breeding season would likely have increased the number of species observed in 2012 and confirmed breeding for additional species.

The ten most frequently detected bird species at LIBI during the 2012 area searches were also some of the most common species detected during the 2012 IMBCR surveys within the Montana portion of BCR17. Five of the ten most commonly detected species at LIBI are also in the top ten most commonly detected species on the IMBCR surveys. Only one of the top ten most commonly detected species within the Montana portion of BCR17 was not detected on LIBI during the RMBO surveys; Red-winged Blackbird. This is not surprising as there is not a substantial wetland component within LIBI which Red-winged Blackbirds show a strong association with. The relatively similar density of individual birds in LIBI (0.754 individuals/acre) and other portions of Montana BCR17 (1.08 individuals/acre) indicates that LIBI habitat quality is fairly representative of adjacent lands within the ecoregion. The slightly higher number of individual birds per acre in the Montana portion of BCR17 may be a result of a more heterogeneous environment across the BCR than is found within LIBI or because the IMBCR surveys occurred on a larger proportion of riparian habitat which typically supports a higher density of birds than mixed grass prairie.

In total, ten species designated as species of continental concern, continental stewardship, or regional concern by Partner's in Flight for Bird Conservation Region 17 were detected on LIBI, indicating that LIBI represents some important habitat for potentially vulnerable avian species. Given that LIBI is currently dominated by mixed-grass prairie, the ten special designation species detected represent nearly the full suite expected to inhabit LIBI. In the event that a substantial sagebrush component returns to LIBI additional species such as Greater Sage-

Grouse, Brewer's Sparrow, and Sage Thrasher would be more likely to inhabit LIBI. However, an increase in sagebrush cover on LIBI would likely be detrimental to several grassland species of special designation such as Grasshopper Sparrow, Short-eared Owl, and Lark Bunting. Since LIBI represents a rather small geographic area, it is unlikely that managers can take action to provide ample acreage of both habitat types simultaneously. We therefore recommend that managers allow natural succession to occur and do not actively manage for either the sagebrush or grassland suite of species.

Given that birds are easy to study, act as excellent indicators of habitat quality, and readily respond to changes in habitat condition we recommend that avian monitoring continue on LIBI to better inform managers on the impacts of succession, disturbance, and the introduction of exotic species on the wildlife community. Future monitoring efforts would benefit from an adoption of procedures that allow for distance estimation and account for incomplete detection. If IMBCR procedures are utilized then results could be directly compared to data collected within MT portion of BCR17 and detection data from approximately 1000 sampled grids could be used to increase precision of occupancy and density estimates.

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