

SAND CREEK MASSACRE NATIONAL HISTORIC SITE
INVENTORY AND MONITORING
FINAL REPORT



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Table of Contents

Executive Summary 1
Introduction..... 2
Methods..... 3
 Inventory 3
 Monitoring 4
 Data Analysis 5
Results 5
Discussion and Recommendations 6
Literature Cited 8
Appendix 1. Species detected on Sand Creek Massacre National Historic Site..... 10
Appendix 2. Species expected to be observed during the inventory 12

Executive Summary

In 2005, Rocky Mountain Bird Observatory (RMBO) and the National Park Service established a cooperative agreement to conduct a bird inventory and establish point counts for potential use in a monitoring program at Sand Creek Massacre National Historic Site (SAND). We observed a total of 59 bird species, including two species, burrowing owl and mountain plover, which are listed by the State of Colorado. RMBO also detected 16 species that are species of conservation concern in the shortgrass prairie conservation region by Partners In Flight. The use of these methods have allowed us to compile an initial species list for SAND and establish baseline information that could be used to evaluate population trends in the future.

SAND, located in the shortgrass prairie, is comprised primarily of upland grassland and riparian habitat. Management and past land use at SAND has created a mosaic of habitats and habitat conditions that are important to a wide variety of shortgrass prairie birds. The combination of taller grass structure and the existence of prairie dogs provides a wide range of prairie habitats. This project detected species that require high grass structure, Short-eared Owl and Dickcissel, as well as species that prefer low grass structure and burrows provided by the presence of prairie dogs, Mountain Plover and Burrowing Owl. This suggests a healthy shortgrass prairie habitat mosaic since this suite of birds is representative of diverse parts of this mosaic. This mosaic of conditions is hard to find within the shortgrass prairie ecosystem and hence, are important. The value of the riparian habitat is also important on a local and regional level for bird migration especially within the shortgrass prairie where stopover habitats are limited. Managing for the presence of taller grass species as well as the presence of prairie dog communities is important for sensitive bird species, and efforts should be made to continue to manage SAND for a mosaic of prairie conditions.

Additional inventories conducted in future years and the implementation of a monitoring program at SAND will continue to reveal valuable information on the bird use of this site and would likely detect additional species. The implementation of a long-term monitoring program could use birds as indicators of the success of management practices at the park scale. Long-term monitoring of bird species is also an important indicator of larger scale trends in ecosystem conditions in general and has important implications beyond the boundaries of the park. This cooperative effort on SAND will contribute to and enhance other monitoring efforts currently being conducted at various spatial scales (site, state and region). The principal benefit to participating in a regional monitoring effort is that it will allow the SAND to compare information collected at the site level to state and regional levels.

National Historic Sites are culturally important and sometimes overlooked for their potential in the arena of wildlife management. National Historic sites are a natural part of the historic landscape and provide valuable habitat for wildlife.

Introduction

National Park Service (NPS) lands (including National Parks, Monuments, Historic Sites, and Memorials) often support high-quality biological communities and may have significant natural resource conservation values. In particular, birds are a natural resource for which many parks are highly valued, even if they were not established, and are not managed, with birds in mind. NPS lands have been, and continue to be, subject to a variety of internal and external pressures that can affect the integrity of ecosystems within a park. These pressures may include historical and/or current land use within the park, public visitation/recreation and associated development, management emphasis of other resources, air and water pollution, and changes in the surrounding landscape.

Although park management plans do not always address birds directly, birds are a valuable resource that should be managed carefully in national parks to ensure their enjoyment by future generations. Birding is an increasingly popular activity, as evidenced by the fact that in 2001, 46 million birdwatchers in America spent more than \$32 billion on birding and related activities (USFWS 2003). Thus, the maintenance of healthy bird communities in national parks can have positive impacts on the experience of park visitors and on local economies.

Inventory and long-term monitoring of bird populations provides information that is essential for the effective management and conservation of birds in national parks. However, bird monitoring can also serve other purposes. Because bird communities in a given landscape reflect an integration of a broad array of ecosystem conditions, including productivity, vegetation structure and composition, water quality, and landscape integrity (Adamus et al. 2001), birds are increasingly being recognized as indicators of biological integrity and environmental change (Morrison 1986, Croonquist and Brooks 1991, Bureau of Land Management 1998, O'Connell et al. 2000, U.S. EPA 2002, Birdlife International 2003). Thus, monitoring birds also provides a means to monitor the broader effects of human activities on the ecosystem and to gauge the sustainability of those activities.

In 2005, the National Park Service, in cooperation with Rocky Mountain Bird Observatory (RMBO), initiated an inventory / monitoring protocol on Sand Creek Massacre National Historic Site (SAND) located in Kiowa County, Colorado (Fig. 1). During this pilot year, RMBO conducted standardized monitoring and inventory techniques on SAND that are consistent with those conducted at regional scales. Habitat based point transects are the keystone of RMBO's landscape-level bird monitoring, accompanied by inventories, to provide site-specific information on an array of species that are typically not well represented through randomized sampling efforts.

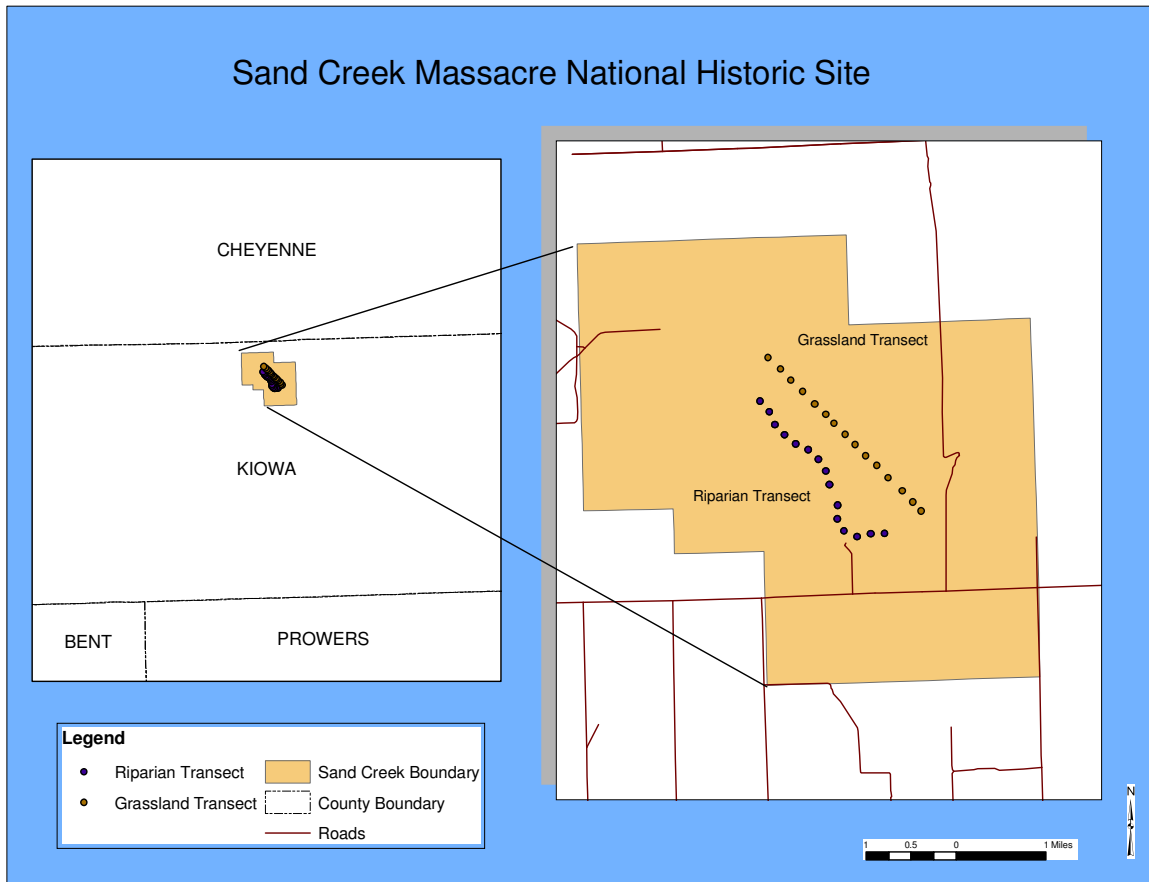


Figure 1. Location of transects on Sand Creek Massacre National Historic Site, Kiowa County, Colorado, USA.

Methods

Inventory

RMBO staff conducted inventories during three separate visits, accompanied by SAND staff, on; 4/21/05, 5/13/05 and 6/27/05. On 4/21/05, RMBO staff spent ~ 10 person hours conducting an early season inventory. On 5/13/05, RMBO staff surveyed the riparian habitat for 4 person hours and the upland sage habitat for 3 hours. Finally, on 6/27/05, RMBO staff spent 8 person hours establishing a transect in upland sage habitat and conducted a transect in the riparian habitat.

In general, field observers attempted to visit and thoroughly search every habitat in the park that could potentially yield a new species for each inventory. They attempted to cover all areas of the park, particularly those not covered by the monitoring effort. Because the primary goal of the inventories was to determine the status of expected species that have not been previously documented, observers focused first and foremost on searching habitats where such species would most likely be found. Trained biologists emphasized searching habitats such as wetlands, rivers, creeks, and prairie dog towns.

It should be kept in mind that the inventories were conducted on 3 separate days during a breeding season that lasts from late April through July. By no means are the lists all conclusive, nor can they necessarily reflect what may have nested in the park in the past, or what will nest there in the future. While the dates chosen for the inventories generally corresponded well to the peak period of detectability among most breeding birds, some species' peak detectability periods did not overlap with our visits. Nonetheless, the lists should represent fairly well the core avifauna of the park, including some of the more rare species. However, bird communities are dynamic systems and they should be expected to change in some regards over time. With additional years of searching this site, we would certainly continue to add more species to the site's list of possible breeding birds.

Monitoring

RMBO staff had originally planned to conduct 2 point transects (Buckland et al. 1993) in order to sample bird populations at SAND for monitoring and assist with the inventory. Unfortunately, due to temporal restrictions and adverse weather conditions we were unable to conduct both of the transects (riparian and upland) and only recorded data on one. We do not conduct point transects with winds speeds over 7 on the Beaufort scale (>31 mph). The riparian transect was surveyed by one observer following protocol delineated by Leukering (2000) and modified by Panjabi (2003). The observer conducted 15, five-minute point counts at stations located at 250-meter (m) intervals along each point transect. The first station was located in a randomly chosen direction, and at a randomly chosen distance between 0-400 m from an access point. In riparian habitats, the size and shape of the stand often determine the placement and course of the transect. The transect surveys were conducted in the mornings, between ½-hour before sunrise and 10 AM.

Observers recorded all bird detections on standardized forms, including fly-overs (birds flying over, but not using the immediate surrounding landscape), which were later excluded from analyses of density. For each bird that was detected, observers recorded the species, sex, how it was detected (e.g., call, song, drumming, etc.), and distance from the observation point. Whenever possible, they measured distances using Bushnell® Yardage Pro 500™ laser rangefinders. When it was not possible to measure the distance to a bird, staff used rangefinders to gauge distance estimates by measuring to some closer object. Observers treated the 250-m intervals between count stations as parts of a line transect, and recorded individuals from a short list of low-density species (all grouse, raptors, woodpeckers, and a few species from other taxonomic groups) and measured the distance and bearing to each from where it was detected along the transect line. They also recorded bearings and distances to individuals of the same low-density species when they were detected at count stations. Birds that were initially detected on points were not recorded between points.

Individual birds that were detected as a result of detecting another bird first, such as birds in a flock, were treated as non-independent detections. Such detections were recorded as part of a 'cluster' together with the first independently observed bird, rather than as separate independent observations of those individuals. In previous years, RMBO protocols dictated that all individual birds were treated as independent observations. Observers also recorded atmospheric data (i.e.,

temperature in degrees Fahrenheit, cloud cover, precipitation, and wind--Beaufort scale) and the time at the start and end of each transect. They measured distances between count stations using hand-held Garmin® E-trex™ Global Positioning System units. All GPS data were logged in Universal Transverse Mercator (UTM) North American Datum 1927. At each count station, observers recorded UTM coordinates, whether or not the station is within 100 m of a road, the primary and secondary habitat types in the area, and the primary and secondary understory types (and percent coverage of each) within a 50 m radius of the point. Observers recorded these data prior to beginning each bird count.

Data Analysis

We used program DISTANCE version 5.0 (Thomas 1998-99) to analyze the point count data. Buckland et al. (1993) developed the notation, concepts, and analysis methods of DISTANCE . Program DISTANCE utilizes distance data associated with point transects to generate a unique detection function for each species in each habitat that is analyzed. This detection function, which addresses the issue of detectability in point count protocols, is generated from radial distance data collected from the object of interest to the observer. We obtained density estimates by analyzing the data in the form of dependent observations or “clusters”. We implemented this type of analyses to improve on the assumption of independent detections for species occurring in clusters and to reduce the bias of detecting clusters at farther distances. The four models used to find the most appropriate detection function, based on Akaike Information Criterion, were Half-normal Cosine, Uniform Cosine, Half-normal Hermite Polynomial and Hazard-rate Simple Polynomial. 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. DISTANCE uses a detection function to model species detectability which is not 100 percent as assumed by fixed-radius point counts.

Results

During the 2005 field season, RMBO technicians conducted three visits to SAND on 4/31, 5/13 and 6/27 of 2005. We were able to detect a total of 59 species during the inventories (Appendix 1). Two species, mountain plover and burrowing owl, were detected that are listed by the State of Colorado. No federally listed species were detected. Data collected using the RMBO point transect monitoring protocol yielded information on 23 species of which we were able to calculate densities for three of these species; Mourning Dove, Western Kingbird, Western Meadowlark and Orchard Oriole (Table 1).

Table 1. Estimated densities for species detected in riparian areas on Sand Creek Massacre National Historic Site.

Species	D	D LCL	D UCL	D CV	n
Mourning Dove	1.10	0.71	1.71	0.22	35
Western Kingbird	2.36	1.37	4.09	0.27	29
Western Meadowlark	0.33	0.14	0.79	0.40	12
Orchard Oriole	0.71	0.25	1.99	0.49	11

D = density estimate expressed in birds/km², D LCL & D UCL = lower and upper 95% confidence limits of D, D CV = coefficient of variation for D, n = number of detections used to calculate D.

Discussion and Recommendations

During the inventory and monitoring study protocol in SAND we collected valuable information on the birds present on this site. The implementation of this protocol has allowed us to compile an initial species list for SAND and establish baseline information that will be used to evaluate population trends in the future. This year we were able to establish one transect in the upland and one in the riparian habitats. We were only able to survey the riparian transect this year. Due to temporal limitations and adverse weather conditions the upland transect was not surveyed. In the future we should plan on allocating more days of sampling the site which would allow us to survey both transects and repeat the number of visits to each transect to increase the number of detections. This will allow us to document trends for additional species. We collected valuable data during this pilot year, providing us with new information on bird occurrences and density on the SAND.

SAND is composed of a diversity of habitats in various conditions within the shortgrass prairie that support the life history requirements of species in various seasons. The site is composed of two main habitats: riparian and upland shortgrass prairie. During spring, the riparian area provides necessary stopover habitat for migrating birds allowing them to replenish reserves essential for the flight to their breeding grounds. While conducting our surveys in May, near the peak of migration for passerines, we documented several species using the riparian areas in SAND (i.e. Chestnut-sided Warbler (*Dendroica pensylvanica*), Indigo Bunting (*Passerina cyanea*), Swainson's Thrush (*Catharus ustulatus*), Hermit Thrush (*Catharus guttatus*), Clay-Colored Sparrow (*Spizella pallida*), and Lincoln's Sparrow (*Melospiza lincolni*)) that will not breed in this area. Stopover locations are limited in the shortgrass prairie and vital to long and short distance migratory bird populations. The value of riparian habitat is important on a local and regional level for bird migration especially within the shortgrass prairie where stopover habitats are limited and where sound land management decisions can be implemented for the benefit of wildlife.

The riparian habitat in SAND also provides suitable habitat for many probable breeding bird species, the most common being Western Kingbird (D= 2.36 birds/ha), Orchard Oriole (D=0.71 birds/ha), and Morning Dove (D=1.10 birds/ha). We also detected several Western Meadowlarks (D=0.33 birds/ha), however, this is a common species that prefers upland habitats that are present in the open riparian area of SAND. Another, less common, probable breeding bird species that was detected in this habitat is the Red-headed Woodpecker (*Melanerpes erythrocephalus*) a species of conservation concern, according to the Partners in Flight Landbird Conservation Plan (Rich et. al. 2004).

The upland habitats of SAND host many species that are designated as species of conservation concern or stewardship species as defined in the Partners in Flight North American Landbird Conservation Plan. During our inventories of upland habitat we detected many of these designated species (i.e. Scaled Quail (*Callipepla squamata*), Northern Harrier (*Circus cyaneus*), Swainson's Hawk (*Buteo swainsoni*), Mountain Plover (*Charadrius montanus*), Burrowing Owl (*Athene cunicularia*), Short-eared Owl (*Asio flammeus*), Say's Phoebe (*Sayornis saya*), Western

Kingbird, Horned Lark (*Eremophila alpestris*), Cassin's Sparrow (*Aimophila cassinii*), Lark Sparrow (*Chondestes grammacus*), Lark Bunting (*Calamospiza melanocorys*), Grasshopper Sparrow (*Ammodramus savannarum*), Dickcissel (*Spiza Americana*) and Western Meadowlark). The most interesting detections from this list are the Short-eared Owl, Dickcissel, Mountain Plover and Burrowing Owl. The former two species require high grass structure and the latter two species prefer low grass structure and burrows provided by the presence of prairie dogs on SAND. The management of this national historic site is conducive to taller grass structure and the maintenance of prairie dogs which provides the mosaic necessary for the presence of the latter mentioned species. These types of conditions are hard to find within the shortgrass prairie ecosystem and hence, are important.

Due to the limited time for the inventories, we were not able to generate a complete list of all of the species using SAND. Potentially SAND could support many other grassland species during a portion of their life history (Appendix 2). Other species that could potentially use SAND during a portion of their life history but were not detected during the surveys are: Northern Bobwhite (*Colinus virginianus*), Lesser Prairie-chicken (*Tympanuchus pallidicinctus*), Ferruginous Hawk (*Buteo regalis*), Golden Eagle (*Aquila chrysaetos*), Prairie Falcon (*Falco mexicanus*), and Long-billed Curlew (*Numenius americanus*). SAND has a mosaic of grassland structure that is conducive to support a wide variety of species that require varying habitat needs.

The importance of SAND can be highlighted by the fact that Swainson's Hawk, Mountain Plover, Burrowing Owl, Loggerhead Shrike, Lark Bunting, Grasshopper Sparrow and Orchard Oriole were detected using this historic site. This suggests a healthy shortgrass prairie habitat mosaic since this suite of birds is representative of diverse parts of this mosaic. In addition, SAND is also providing habitat for species of concern identified by the Colorado Division of Wildlife in their Wildlife Action Plan, which includes: Burrowing Owl, Ferruginous Hawk, Long-billed Curlew and the Mountain Plover.

SAND provides an array of habitat niches making it rich in avifaunal diversity. It would be valuable to expand the inventory effort to include nocturnal owl surveys to document abundance and habitat use within the site for such species.

Continued efforts to conduct an annual inventory and monitoring program on SAND will continue to reveal valuable information on the bird use of this site. In the future, we recommend completing the transects located in both habitat types and surveying these transects more than one time during the breeding season. This temporal replication would generate a larger number of individual detections in order to increase the number of species we can calculate density estimates for and eventually monitor. This cooperative effort on SAND will contribute to and enhance other monitoring efforts currently being conducted at various spatial scales (site, state and region). The principal benefit to participating in a regional monitoring effort is that it will allow the SAND to compare information collected at the site level to state and regional levels.

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Appendix 1. Species detected on Sand Creek Massacre National Historic Site. Below is a comprehensive list of bird species detected during inventories conducted, April 21, May 13 and June 27 2005. Bolded (X) are the species of conservation concern from the Partners in Flight database for the Shortgrass Prairie Bird Conservation Region. Bolded species names designate species listed by the state of Colorado. We listed the species in taxonomic order.

Common Name	Scientific Name	4/21/2005	5/13/2005	6/27/2005	PIF Tiered Species
Mallard	<i>Anas platyrhynchos</i>	X	X		
Blue-winged Teal	<i>Anas discors</i>		X		
Ring-necked Pheasant	<i>Phasianus colchicus</i>	X	X		
Scaled Quail	<i>Callipepla squamata</i>	X		X	X
Great Blue Heron	<i>Ardea herodias</i>	X			
Northern Harrier	<i>Circus cyaneus</i>	X	X		X
Swainson's Hawk	<i>Buteo swainsoni</i>	X			X
Red-tailed Hawk	<i>Buteo jamaicensis</i>	X	X	X	
American Kestrel	<i>Falco sparverius</i>	X		X	
Killdeer	<i>Charadrius vociferus</i>	X	X	X	
Mountain Plover	<i>Charadrius montanus</i>	X	X		X
Mourning Dove	<i>Zenaida macroura</i>	X	X	X	
Barn Owl	<i>Tyto alba</i>	X			
Great Horned Owl	<i>Bubo virginianus</i>	X	X	X	
Burrowing Owl	<i>Athene cunicularia</i>		X	X	X
Short-eared Owl	<i>Asio flammeus</i>			X	X
Common Nighthawk	<i>Chordeiles minor</i>		X	X	
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>		X	X	X
Downy Woodpecker	<i>Picoides pubescens</i>			X	
Northern Flicker	<i>Colaptes auratus</i>	X		X	
Western Wood-Pewee	<i>Contopus sordidulus</i>			X	
Say's Phoebe	<i>Sayornis saya</i>	X			X
Western Kingbird	<i>Tyrannus verticalis</i>		X	X	X
Eastern Kingbird	<i>Tyrannus tyrannus</i>		X	X	
Loggerhead Shrike	<i>Lanius ludovicianus</i>	X			
Blue Jay	<i>Cyanocitta cristata</i>		X	X	
Horned Lark	<i>Eremophila alpestris</i>	X	X		X
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>			X	
Barn Swallow	<i>Hirundo rustica</i>		X		
Rock Wren	<i>Salpinctes obsoletus</i>	X			
House Wren	<i>Troglodytes aedon</i>		X	X	
Eastern Bluebird	<i>Sialia sialis</i>		X		
Swainson's Thrush	<i>Catharus ustulatus</i>		X		
Hermit Thrush	<i>Catharus guttatus</i>		X		
American Robin	<i>Turdus migratorius</i>	X	X		
Northern Mockingbird	<i>Mimus polyglottos</i>		X		
Brown Thrasher	<i>Toxostoma rufum</i>	X	X	X	
European Starling	<i>Sturnus vulgaris</i>	X	X	X	
Yellow Warbler	<i>Dendroica petechia</i>		X	X	

Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>		X		
Spotted Towhee	<i>Pipilo maculatus</i>	X	X		X
Cassin's Sparrow	<i>Aimophila cassinii</i>		X	X	
Chipping Sparrow	<i>Spizella passerina</i>	X			
Clay-colored Sparrow	<i>Spizella pallida</i>		X		
Vesper Sparrow	<i>Poocetes gramineus</i>	X			X
Lark Sparrow	<i>Chondestes grammacus</i>		X	X	X
Lark Bunting	<i>Calamospiza melanocorys</i>	X	X		X
Grasshopper Sparrow	<i>Ammodramus savannarum</i>			X	
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	X	X		
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	X			
Indigo Bunting	<i>Passerina cyanea</i>		X		X
Dickcissel	<i>Spiza americana</i>			X	
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	X	X		
Western Meadowlark	<i>Sturnella neglecta</i>	X	X	X	X
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>			X	
Common Grackle	<i>Quiscalus quiscula</i>		X		
Brown-headed Cowbird	<i>Molothrus ater</i>	X	X	X	
Orchard Oriole	<i>Icterus spurius</i>		X	X	
Bullock's Oriole	<i>Icterus bullockii</i>		X	X	

Appendix 2. Potential list of species expected to be observed on Sand Creek Massacre National Historic Site. The list is derived from observations made by RMBO field technicians conducting road-based point counts throughout eastern Colorado (2001-2005) during the breeding season.

Common Name	Scientific Name
Gadwall	<i>Anas strepera</i>
Mallard	<i>Anas platyrhynchos</i>
Blue-winged Teal	<i>Anas discors</i>
Northern Pintail	<i>Anas acuta</i>
Ring-necked Pheasant	<i>Phasianus colchicus</i>
Scaled Quail	<i>Callipepla squamata</i>
Northern Bobwhite	<i>Colinus virginianus</i>
Great Blue Heron	<i>Ardea herodias</i>
Green Heron	<i>Butorides virescens</i>
Turkey Vulture	<i>Cathartes aura</i>
Mississippi Kite	<i>Ictinia mississippiensis</i>
Northern Harrier	<i>Circus cyaneus</i>
Sharp-shinned Hawk	<i>Accipiter striatus</i>
Cooper's Hawk	<i>Accipiter cooperii</i>
Swainson's Hawk	<i>Buteo swainsoni</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Ferruginous Hawk	<i>Buteo regalis</i>
Golden Eagle	<i>Aquila chrysaetos</i>
American Kestrel	<i>Falco sparverius</i>
Prairie Falcon	<i>Falco mexicanus</i>
Virginia Rail	<i>Rallus limicola</i>
American Coot	<i>Fulica americana</i>
Sandhill Crane	<i>Grus canadensis</i>
Killdeer	<i>Charadrius vociferus</i>
Mountain Plover	<i>Charadrius montanus</i>
Black-necked Stilt	<i>Himantopus mexicanus</i>
American Avocet	<i>Recurvirostra americana</i>
Spotted Sandpiper	<i>Actitis macularia</i>
Upland Sandpiper	<i>Bartramia longicauda</i>
Long-billed Curlew	<i>Numenius americanus</i>
Marbled Godwit	<i>Limosa fedoa</i>
Least Sandpiper	<i>Calidris minutilla</i>
Wilson's Snipe	<i>Gallinago delicata</i>
Ring-billed Gull	<i>Larus delawarensis</i>
Rock Pigeon	<i>Columba livia</i>
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>
Mourning Dove	<i>Zenaida macroura</i>
Greater Roadrunner	<i>Geococcyx californianus</i>

Common Name	Scientific Name
Great Horned Owl	Bubo virginianus
Burrowing Owl	Athene cunicularia
Short-eared Owl	Asio flammeus
Common Nighthawk	Chordeiles minor
White-throated Swift	Aeronautes saxatalis
Broad-tailed Hummingbird	Selasphorus platycercus
Lewis's Woodpecker	Melanerpes lewis
Red-headed Woodpecker	Melanerpes erythrocephalus
Northern Flicker	Colaptes auratus
Western Wood-Pewee	Contopus sordidulus
Willow Flycatcher	Empidonax traillii
Say's Phoebe	Sayornis saya
Vermilion Flycatcher	Pyrocephalus rubinus
Ash-throated Flycatcher	Myiarchus cinerascens
Cassin's Kingbird	Tyrannus vociferans
Western Kingbird	Tyrannus verticalis
Eastern Kingbird	Tyrannus tyrannus
Scissor-tailed Flycatcher	Tyrannus forficatus
Loggerhead Shrike	Lanius ludovicianus
Blue Jay	Cyanocitta cristata
Black-billed Magpie	Pica hudsonia
American Crow	Corvus brachyrhynchos
Chihuahuan Raven	Corvus cryptoleucus
Common Raven	Corvus corax
Horned Lark	Eremophila alpestris
Purple Martin	Progne subis
Tree Swallow	Tachycineta bicolor
Violet-green Swallow	Tachycineta thalassina
Northern Rough-winged Swallow	Stelgidopteryx serripennis
Bank Swallow	Riparia riparia
Cliff Swallow	Petrochelidon pyrrhonota
Barn Swallow	Hirundo rustica
Cactus Wren	Campylorhynchus brunneicapillus
Rock Wren	Salpinctes obsoletus
House Wren	Troglodytes aedon
Blue-gray Gnatcatcher	Polioptila caerulea
Eastern Bluebird	Sialia sialis
Western Bluebird	Sialia mexicana
Mountain Bluebird	Sialia currucoides
Swainson's Thrush	Catharus ustulatus
Wood Thrush	Hylocichla mustelina
American Robin	Turdus migratorius

Common Name	Scientific Name
Gray Catbird	<i>Dumetella carolinensis</i>
Northern Mockingbird	<i>Mimus polyglottos</i>
Sage Thrasher	<i>Oreoscoptes montanus</i>
Brown Thrasher	<i>Toxostoma rufum</i>
Curve-billed Thrasher	<i>Toxostoma curvirostre</i>
European Starling	<i>Sturnus vulgaris</i>
Yellow Warbler	<i>Dendroica petechia</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Yellow-breasted Chat	<i>Icteria virens</i>
Spotted Towhee	<i>Pipilo maculatus</i>
Cassin's Sparrow	<i>Aimophila cassinii</i>
Chipping Sparrow	<i>Spizella passerina</i>
Clay-colored Sparrow	<i>Spizella pallida</i>
Brewer's Sparrow	<i>Spizella breweri</i>
Vesper Sparrow	<i>Poocetes gramineus</i>
Lark Sparrow	<i>Chondestes grammacus</i>
Black-throated Sparrow	<i>Amphispiza bilineata</i>
Sage Sparrow	<i>Amphispiza belli</i>
Lark Bunting	<i>Calamospiza melanocorys</i>
Savannah Sparrow	<i>Passerculus sandwichensis</i>
Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Song Sparrow	<i>Melospiza melodia</i>
Lincoln's Sparrow	<i>Melospiza lincolni</i>
McCown's Longspur	<i>Calcarius mccownii</i>
Chestnut-collared Longspur	<i>Calcarius ornatus</i>
Blue Grosbeak	<i>Passerina caerulea</i>
Lazuli Bunting	<i>Passerina amoena</i>
Dickcissel	<i>Spiza americana</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Eastern Meadowlark	<i>Sturnella magna</i>
Western Meadowlark	<i>Sturnella neglecta</i>
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>
Common Grackle	<i>Quiscalus quiscula</i>
Great-tailed Grackle	<i>Quiscalus mexicanus</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Orchard Oriole	<i>Icterus spurius</i>
Bullock's Oriole	<i>Icterus bullockii</i>
Scott's Oriole	<i>Icterus parisorum</i>
House Finch	<i>Carpodacus mexicanus</i>
American Goldfinch	<i>Carduelis tristis</i>
House Sparrow	<i>Passer domesticus</i>

