National Park Service
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Natural Resource Stewardship and Science

Landbird Monitoring in the Southern Plains Network

2016 Annual Report

Natural Resource Data Series NPS/SOPN/NRDS—2017/1116



TUCSON AUDUBON SOCIETY

ON THE COVER

Audubon's Warbler (*Setophaga coronata auduboni*), a subspecies of Yellow-rumped Warbler, was observed at three parks during point-count surveys in the Southern Plains Inventory & Monitoring Network in 2016. Photo: John Muller.

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The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

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All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner. This report received formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information.

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Acronyms

BEOL	Bent's Old Fort National Historic Site
CAVO	Capulin Volcano National Monument
CHIC	Chickasaw National Recreation Area
FOLS	Fort Larned National Historic Site
FOUN	Fort Union National Monument
LAMR	Lake Meredith National Recreation Area
LYJO	Lyndon B. Johnson National Historical Park
NHP	National Historical Park
NHS	National Historic Site
NM	National Monument
NP	National Park
NPS	National Park Service
PECO	Pecos National Historical Park
RMBO	Rocky Mountain Bird Observatory
SAND	Sand Creek Massacre National Historic Site
SOPN	Southern Plains Inventory & Monitoring Network
TAS	Tucson Audubon Society
WABA	Washita Battlefield National Historic Site

Executive Summary

In 2016, landbirds were surveyed within all of the Southern Plains Inventory & Monitoring Network (SOPN) parks. However, Alibates Flint Quarries National Monument (NM) and Lake Meredith National Recreation Area (NRA) were treated as one park unit, and no sampling was specifically conducted at Alibates Flint Quarries NM. Sample points were located along a transect for linear features (e.g., most riparian habitats) or a grid for areal features. A total of 34 transects or grids was surveyed in 2016. Survey efforts were focused on the breeding season, when increased territorial behavior by songbirds results in higher detection rates and greater sampling efficiency. The window of primary breeding and, therefore, sampling, was from April through June, with adjustments made for individual park visits based on latitude and elevation. To estimate and monitor landbird population parameters, we sampled based on point-transect surveys. Surveys were conducted three times for each transect or grid to facilitate estimates of occupancy, which rely on an encounter-history matrix derived from repeated visits, rather than a detection function to account for detectability.

There was a total of 1,580 point visits (the number of unique points multiplied by the number of visits) on the 34 transects or grids. Of these, 1,161 were point visits in grassland habitats (including 47 point visits in pinyon-juniper woodland habitat) and 419 were point visits in riparian habitats. We recorded a total of 36,695 birds of 217 species on our points. The greatest number of birds were counted at Lake Meredith NRA (n = 6,397), while the smallest number of birds were counted at Lyndon B. Johnson National Historical Park (NHP; n = 2,019). Species richness and community composition varied widely among the parks surveyed. We observed the greatest number of species at Lake Meredith NRA (n = 120) and the fewest at Sand Creek Massacre National Historic Site (NHS; n = 57). The number of birds or species detected is influenced not only by the number of points, but also by the size and diversity of available habitats. Mourning Dove was the most counted species in the SOPN in 2016 (n = 2,242), followed by Western Meadowlark (n = 2,175), Cliff Swallow (n = 1,502), and Red-winged Blackbird (n = 1,068). Eight species, Barn Swallow, Blue Grosbeak, Brown-headed Cowbird, Eurasian Collared-Dove, Lark Sparrow, Mourning Dove, Red-tailed Hawk, and Turkey Vulture, were detected at all 10 parks surveyed. New species, previously unverified for a given park, were recorded during surveys for nine parks (all except Capulin Volcano NM). Overall, the number of new species recorded in 2016 was substantial compared to some previous years.

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1 Introduction

1.1 Background

The mission of the National Park Service (NPS) is to manage park resources "unimpaired for future generations." Protecting and managing some of our nation's most significant natural resources requires basic knowledge of the condition of ecosystems and species that occur in national parks. In order to better meet this mission, the Inventory & Monitoring (I&M) Program was established to determine status and trends in ecological resources (NPS 1992). Established in 2002, the Southern Plains Inventory & Monitoring Network (SOPN) includes 11 parks in southeastern Colorado, Kansas, New Mexico, Oklahoma, and Texas (Table 1.1). The SOPN consists of mostly mixed- and shortgrass ecosystems. It is bordered on the east by tallgrass prairie, and on the west by the forested systems of the Rocky Mountains (NPS, SOPN 2008).

Monitoring changes in landbird population and community parameters can be an important element of a comprehensive, long-term monitoring program, such as that being implemented for the SOPN parks. Landbirds are a conspicuous component of many ecosystems. They have high body temperatures and rapid metabolisms, and they occupy high trophic levels. As such, changes in landbird populations may be indicators of changes in the biotic or abiotic components of the environment upon which they depend (Canterbury et al. 2000; Bryce et al. 2002). Relative to other vertebrates, landbirds are also highly detectable and can be efficiently surveyed with the use of numerous standardized methods (Bibby et al. 2000; Buckland et al. 2001).

Birds select habitat based on the presence of behavioral cues triggered by the environment (Hutto 1985; Alcock 2005). In some environments, however, especially those that vary unpredictably, habitat may not be saturated and changes in resources may not always be tracked by changes in animal populations (Wiens 1985). In these situations, relating changes in bird populations to environmental features can be complex, especially when confounded by time lags that are characteristic of site-tenacious bird species. Additional complications occur if birds respond more sensitively to environmental change than we can detect, and when cyclical environmental changes result in erratic changes in population size that are ultimately inconsequential. However, the utility of monitoring landbirds is strengthened by concurrent monitoring of a broad suite of environmental parameters (Dale and Beyeler 2001) that may assist in relating changes in the bird community to other environmental factors. Such a broad-based approach is now being undertaken by the SOPN (NPS, SOPN 2008) and other broad-based monitoring approaches (e.g., Ringold et al. 1996; Stevens and Gold 2003; Barrows et al. 2005).

Table 1.1. Parks in the Southern Plains Inventory & Monitoring Network (SOPN)

Park	Park acronym	Area (acres)	Acres (hectares)
Alibates Flint Quarries National Monument	ALFL	1,371	555
Bent's Old Fort National Historic Site	BEOL	799	323
Capulin Volcano National Monument	CAVO	793	321
Chicasaw National Recreation Area	CHIC	9,889	4,002
Fort Larned National Historic Site	FOLS	718	291
Fort Union National Monument	FOUN	721	292
Lake Meredith National Recreation Area	LAMR	46,349	18,757
Lyndon B. Johnson National Historical Park	LYJO	674	273
Pecos National Historical Park	PECO	6,670	2,699
Sand Creek Massacre National Historic Site	SAND	2,400	971
Washita Battlefield National Historic Site	WABA	326	132

Perhaps the most compelling reason to monitor landbird communities is that birds themselves are inherently valuable. The high aesthetic and spiritual values that humans place on native wildlife are acknowledged in the agency's Organic Act: "to conserve . . . the wild life therein . . . unimpaired for the enjoyment of future generations." Birdwatching, in particular, is a popular, longstanding recreational pastime in the U.S., and it forms the basis of a large and sustainable industry (Sekercioglu 2002).

The SOPN began monitoring birds in 2009. This effort is now part of a collaboration among the Southern Plains, Sonoran Desert, and Chihuahuan Desert networks, as well as the Tucson Audubon Society.

1.2 Program Goals and Objectives

The overall goal of the SOPN landbird monitoring program is to detect biologically significant changes in population parameters over time. This collaborative program is intended to maximize the strength of inferences within the context of finite resources. The monitoring design is a multitiered, flexible framework that will enable efficient estimation and monitoring of population parameters, periodic evaluation of assumptions, and the opportunity for adaptation to meet additional needs.

We have selected two primary monitoring objectives, described below, that are complementary and together provide a comprehensive assessment of changing bird populations and communities. Although we have selected these objectives, it is neither practical nor useful to conduct comprehensive analyses for each objective on an annual basis. Instead, we will provide annual basic data summaries and, once every five years, a comprehensive synthesis report that will go into much greater depth, including analyses for all objectives and interpretations in a broader ecological context.

1.2.1 Objective 1: Occupancy

We will estimate the proportion of points occupied for most species in most parks. Occupancy is a measure of presence or absence of a species in space that indicates changes in the distribution of a species when evaluated across time. Recent advancements in occupancy theory and modeling have provided sound justification of its application in monitoring programs (MacKenzie et al. 2003; Field et al. 2005; MacKenzie et al. 2006).

1.2.2 Objective 2: Bird species richness and composition

We will estimate parameters related to community dynamics, particularly species richness and species composition. Monitoring the richness and composition of native communities of concern, and the changes occurring within and among these communities, provides a valuable complement to population-based parameters. Species richness data are essential to understanding the effects of changing landscapes on native biodiversity. Species composition helps us to understand the effects of management and other changes by assessing which species are or are not responding to changes in the environment.

2 Methods

2.1 Methods

2.1.1 Sampling design

The details of our sampling design and field methods are presented in Powell et al. (2007) and Beaupré et al. (2013). Our intention for monitoring landbirds extends beyond the birds themselves, and includes a broader vision of landbirds as indicators of the ecosystems they inhabit. This dual purpose influences our sampling design, especially in light of our funding and logistical limitations. In some cases, trade-offs have been made to accommodate particular habitat types or park resources that are considered particularly important to a given park.

We sampled primarily in two habitat classes: grassland and riparian, which are the dominant vegetation communities within the SOPN. However, one transect at Capulin Volcano National Monument (NM) had a significant pinyon-juniper woodland component. Within the broad habitat classes, there is considerable variation. SOPN parks can be further stratified into six more specific habitat types (Table 2.1.1-1 and 2.1.1-2).

In 2016, we surveyed landbirds within all of the SOPN park units (Lake Meredith National Recreation Area [NRA] and Alibates Flint Quarries NM are treated as one park unit, and no sampling was specifically done at Alibates Flint Quarries NM). Sample points were located along a transect for linear features (e.g., most riparian habitats) or a grid for areal features. Note that in Chapter 3, we may use the terms "transect" and "grid" interchangeably. A total of 34 transects or grids were surveyed in 2016 (Table 2.1.1-2). In most parks, we used sites selected with methodology outlined in Powell et al. (2007).

2.1.2 Seasonal timing of surveys

During the breeding season, increased territorial behavior by songbirds results in higher detection rates and greater sampling efficiency. Additionally, occupancy estimates assume that a bird detected is present for the entire period being surveyed. Thus, our surveys were focused on the primary breeding season in order to account for the greatest number of species in each park, recognizing that some species (e.g., migrants) may not have been adequately surveyed because of this restricted window. Although migrants are certainly an important component of bird communities, their presence can be highly variable and substantially influenced by external factors. Focusing on the

Table 2.1.1-2. Number of transects of each habitat class surveyed in each SOPN park unit, 2016

Park unit	Grassland	PJ Woodland	Riparian
BEOL	4	–	1
CAVO	1	1	–
CHIC	4	–	–
FOLS	2	–	1
FOUN	3	–	–
LAMR	2	–	2
LYJO	1	–	1
PECO	4	–	2
SAND	2	–	1
WABA	2	–	–

Table 2.1.1-1. Habitat classes and types by park

Habitat classes	Habitat types	Parks
Grassland	Shortgrass prairie	• BEOL • CAVO • FOUN • PECO • SAND
Grassland	Upland grassland	• CHIC • FOLS • LAMR • LYJO • WABA
Woodland	Pinyon-juniper	• CAVO
Riparian	Bottomland grassland	• LAMR • LYJO • WABA
Riparian	Cottonwood bottom	• BEOL • LAMR • PECO • SAND
Riparian	Riparian woodland	• FOLS

breeding population is expected to provide the most reliable information about changes in bird populations related to changes in condition of SOPN parks.

The timing of breeding varies among species and depends on a number of factors, including latitude and elevation. The window of primary breeding and sampling is from April through June, with adjustments, as described above, for individual park visits based on latitude and elevation (Figure 2.1.2).

2.2 Bird Surveys

To estimate and monitor landbird population parameters, we sampled based on point-transect surveys (Buckland et al. 2001). We estimated occupancy based on the point surveys (Beaupré et al. 2013). Occupancy is a measure of presence or absence of a species in space that, when evaluated across time, indicates changes in the distribution of a species. Like those for density, techniques for estimating occupancy explicitly account for variation in detectability, thereby adjusting estimates for individuals that are present yet undetected during surveys, a situation that can confound the results of most wildlife surveys (Williams et al. 2002).

We spent six minutes at each point along the transect or grid. Six minute counts are consistent with region-wide bird monitoring efforts being conducted by the Bird Conservancy of the Rockies (formerly Rocky Mountain Bird Observatory [RMBO]) and its partners, as well as with monitoring efforts by U.S. Fish and Wildlife Service and Tucson Audubon Society.

All birds detected at a given point were recorded. After counts were completed, observers used a handheld GPS (Global Positioning System) unit to locate successive survey points. While walking between points, observers recorded species that were either previously unconfirmed or that had not been detected on previous point-transect surveys in a particular park.

Surveys were conducted three times for each transect or grid to facilitate occupancy estimates, which rely on an encounter-history matrix derived from repeated visits, rather than a detection function to account for detectability. Note that in the report, we use the terms "points" and "point visits." "Points" are the unique sampling points on transects or grids, while "point visits" are the number of unique points multiplied by the number of visits.

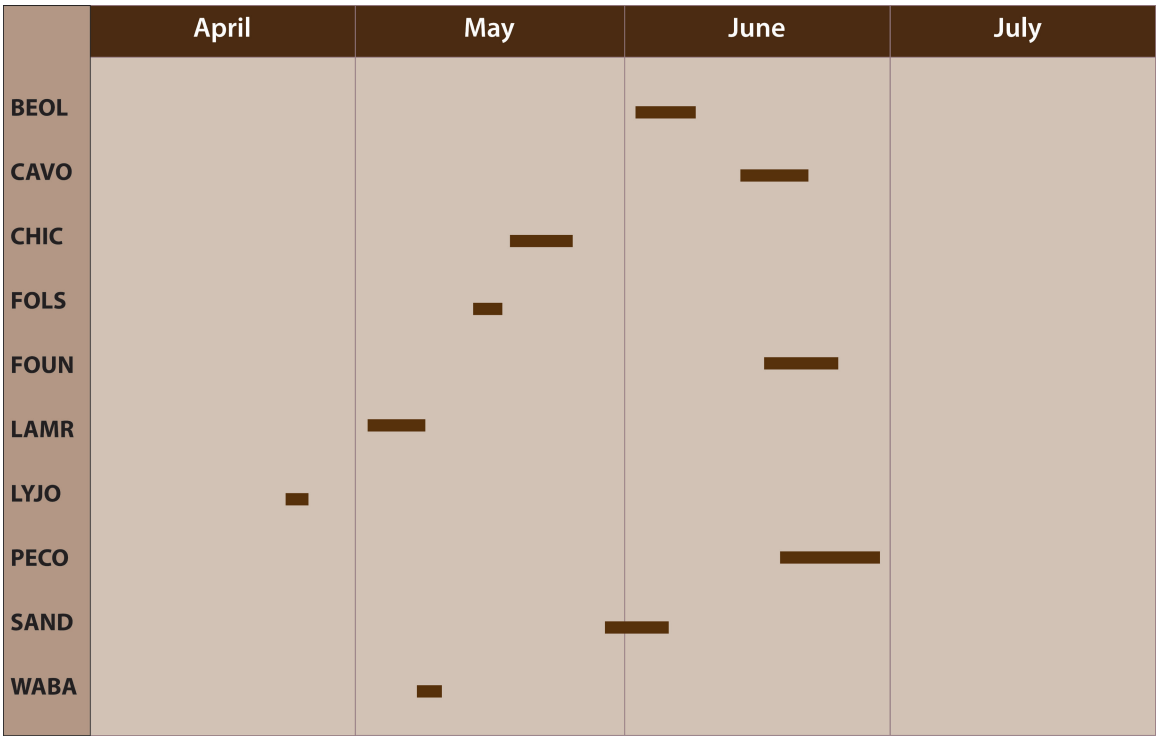


Figure 2.1.2. Dates when sampling was conducted in SOPN parks, 2016.

2.3 Additional Monitoring to Augment Bird Sampling

It is well known that landbird populations are particularly influenced by changes in vegetation structure and composition (Holmes and Sherry 2001; Krueper et al. 2003). Considering environmental data, such as vegetation, will allow us to aggregate (i.e., to stratify, post-hoc) survey sites that share similar characteristics. For this purpose, we will use data collected through the network's vegetation monitoring efforts. We will also use other data (e.g., climate) collected by SOPN and other organizations as covariates when assessing population trends for birds. Finally, landbird population parameters, coupled with detailed environmental information, can be used to build habitat-association models (e.g., Manley et al. 2004) that can inform conservation efforts and scientific inquiry throughout the region.

2.4 Reporting

The primary monitoring objectives focus on long-term changes and trends, and monitoring must be conducted for a number of years before meaningful estimates related to trends are feasible. Consequently, it is neither practical nor useful to conduct comprehensive analyses for each objective on an annual basis. Instead, we will provide annual basic data summaries and, once every five years, a comprehensive synthesis report that will go into much greater depth, including analyses for all objectives and interpretations in a broader ecological context. Field methods for estimating the primary objectives are essentially the same; analyses and evaluation procedures used to estimate trends will differ.

It is neither practical nor useful to conduct comprehensive analyses for each objective on an annual basis. Instead, we will provide annual basic data summaries and, once every five years, a comprehensive synthesis report that will go into much greater depth, including analyses for all objectives and interpretations in a broader ecological context.

3 Results and Discussion

Note that in this chapter we provide a basic summary of the 2016 monitoring results- not results based on detailed statistical analyses (which will be provided at a later date). In this chapter, we report on the "number of birds" counted. Note that these numbers are overestimates in some cases, because the same individual bird may be counted from multiple points on the same grid. The statistical analyses to be conducted in the future will account for these overestimate situations.

We had a total of 1,580 point visits (the number of unique points multiplied by the number of visits) on 34 transects or grids in 2016 (Table 3-1). Of these, 1,161 were point visits in grassland habitats (including 47 in pinyon-juniper woodland habitat), and 419 were point visits in riparian habitats. We recorded a total of 36,695 birds (of 217 species) during our point visits.

Lake Meredith NRA had the greatest number of birds counted (n = 6,397), while Lyndon B. Johnson National Historical Park (NHP) had the lowest number of birds counted (n = 2,019). Although species richness and community composition will be estimated in our synthesis reports, observations suggest that these varied widely among the parks surveyed. We observed the greatest number of species at Lake Meredith NRA (n = 120) and the fewest at Sand Creek Massacre National Historic Site (NHS; n = 57) (Table 3-2). The number of birds or species detected is influenced not only by the number of points and visits, but also by the size and diversity of available habitats.

Mourning Dove was the species counted in the greatest number in the SOPN in 2016 (n = 2,242), followed by Western Meadowlark (2,175), Cliff Swallow (1,502), and Red-winged Blackbird (1,068; Table 3-3). Eight species, such as Blue Grosbeak, Lark Sparrow, and Red-tailed Hawk, were detected at all 10 parks surveyed (see Table 3-4). A substantial number of new species were recorded at individual parks in 2016.

Table 3-1. The number of point visits (# of unique points multiplied by # of visits) and birds counted in each habitat class at each SOPN park, 2016

Park	Grassland		Pinyon-Juniper Woodland		Riparian		Total birds counted
	# Point visits	# Birds	# Point visits	# Birds	# Point visits	# Birds	
Bent's Old Fort NHS	114	2,586	–	–	63	1,507	4,093
Capulin Volcano NM	81	1,431	47	693	–	–	2,124
Chickasaw NRA	140	3,486	–	–	–	–	3,486
Fort Larned NHS	75	2,074	–	–	54	1,208	3,282
Fort Union NM	180	3,170	–	–	–	–	3,170
Lake Meredith NRA	110	4,280	–	–	99	2,117	6,397
Lyndon B. Johnson NHP	18	534	–	–	51	1,485	2,019
Pecos NHP	167	3,853	–	–	104	2,296	6,149
Sand Creek Massacre NHS	119	2,485	–	–	48	1,119	3,604
Washita Battlefield NHS	110	2,371	–	–	–	–	2,371
Total	**1,114**	**26,270**	**47**	**693**	**419**	**9,732**	**36,695**

Note: Bird counts reported here do not include birds observed flying overhead that did not use the habitat (i.e., flyovers).

Table 3-2. Number of species observed in each habitat class at each SOPN park, 2016

Habitat Type	Number of species										
	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA	Total[1]
Grassland	57	53	93	57	59	85	62	79	44	65	198
Woodland	–	39	–	–	–	–	–	–	–	–	39
Riparian	56	–	–	68	–	86	75	80	42	–	174
Total[1]	**66**	**58**	**93**	**78**	**59**	**120**	**85**	**96**	**57**	**65**	**217**

[1] Totals do not equal the sum of the numbers shown for parks/habitat classes, as a single species may have been observed in more than one park/habitat class. Incidental observations (i.e., birds observed outside of formal surveys) are not included.

Table 3-3. Total number of birds observed of each species during surveys in all SOPN parks, 2016

Common name	# of Birds
Mourning Dove	2,242
Western Meadowlark	2,175
Cliff Swallow	1,502
Red-winged Blackbird	1,068
Double-crested Cormorant	934
Cassin's Sparrow	889
Spotted Towhee	875
Northern Cardinal	856
Brown-headed Cowbird	832
Lark Sparrow	706
Cassin's Kingbird	672
Northern Bobwhite	600
Horned Lark	589
Dickcissel	585
Western Wood-Pewee	555
Western Kingbird	522
Grasshopper Sparrow	520
European Starling	510
Pinyon Jay	465
Common Raven	462
Eastern Meadowlark	438
Yellow Warbler	416
Cedar Waxwing	408
American Robin	402
Chipping Sparrow	397
Barn Swallow	380
Bewick's Wren	378
Lesser Goldfinch	369
Bullock's Oriole	367
Northern Mockingbird	363
American Crow	350

Common name	# of Birds
Ash-throated Flycatcher	341
Black-headed Grosbeak	338
Lark Bunting	330
Blue Grosbeak	323
Northern Flicker	320
Vesper Sparrow	313
Common Grackle	312
Franklin's Gull	307
Blue-gray Gnatcatcher	289
Ring-necked Pheasant	288
Eurasian Collared-Dove	272
Carolina Wren	271
Turkey Vulture	268
Ring-billed Gull	265
Eastern Kingbird	257
Painted Bunting	254
Carolina Chickadee	252
Blue Jay	240
Indigo Bunting	232
Red-bellied Woodpecker	229
Rock Wren	226
House Wren	213
Yellow-breasted Chat	212
Red-headed Woodpecker	208
Yellow-billed Cuckoo	205
Woodhouse’s Scrub-Jay	187
Violet-green Swallow	185
American Kestrel	178
Juniper Titmouse	171
Killdeer	169
Mountain Bluebird	169

Table 3-3. Total number of birds observed of each species during surveys in all SOPN parks, 2016, cont.

Common name	# of Birds
Orchard Oriole	166
House Finch	161
Bushtit	160
Black-billed Magpie	157
Tufted Titmouse	148
Field Sparrow	147
Baltimore Oriole	144
White-winged Dove	144
Summer Tanager	143
Black-crested Titmouse	142
Red-tailed Hawk	133
Great Crested Flycatcher	132
American White Pelican	130
Mountain Chickadee	128
Scissor-tailed Flycatcher	128
Plumbeous Vireo	125
Downy Woodpecker	123
Rufous-crowned Sparrow	107
White-crowned Sparrow	105
Song Sparrow	101
White-breasted Nuthatch	98
Brown Thrasher	97
Common Yellowthroat	95
Warbling Vireo	94
Clay-colored Sparrow	90
Mississippi Kite	84
Eastern Bluebird	80
Great Blue Heron	79
American Goldfinch	77
Great-tailed Grackle	75
Pine Siskin	75
Ladder-backed Woodpecker	72
Canyon Wren	71
White-eyed Vireo	71
House Sparrow	68
Gray Catbird	67
Brewer's Blackbird	65
Common Nighthawk	64
Cave Swallow	60
Scaled Quail	59
Black-chinned Hummingbird	58
Say's Phoebe	57
White-faced Ibis	53
Black Vulture	52
Red-eyed Vireo	47
Wood Duck	47
Eastern Phoebe	45
Northern Rough-winged Swallow	45
Hepatic Tanager	44
Greater Roadrunner	43
Bank Swallow	42
Pileated Woodpecker	41
Wild Turkey	41
Least Flycatcher	40
Savannah Sparrow	39
American Coot	38
Pied-billed Grebe	38
Yellow-throated Vireo	36
Mallard	34
Red-shafted Flicker	34
Eared Grebe	33
Gray Flycatcher	33
Golden-fronted Woodpecker	30
Canada Goose	29
Western Bluebird	29
Forster's Tern	28
Hairy Woodpecker	28
Pygmy Nuthatch	27
Chimney Swift	25
Fish Crow	24
Cordilleran Flycatcher	22
Rock Pigeon	22
Great Horned Owl	21
Northern Harrier	21
Swainson's Hawk	21
Canyon Towhee	18
Nashville Warbler	18
Red-shouldered Hawk	18
Red Crossbill	17
Yellow-rumped Warbler	17
Broad-tailed Hummingbird	16
Black-throated Gray Warbler	15

Table 3-3. Total number of birds observed of each species during surveys in all SOPN parks, 2016, cont.

Common name	# of Birds
Chihuahuan Raven	14
Green-tailed Towhee	14
Orange-crowned Warbler	14
Yellow-shafted Flicker	14
Audubon's Warbler	13
Crested Caracara	13
Grace's Warbler	13
Lazuli Bunting	13
Upland Sandpiper	13
Black-and-white Warbler	12
Northern Parula	12
Tree Swallow	12
Lincoln's Sparrow	11
Loggerhead Shrike	11
Purple Martin	11
Great Egret	10
Ruby-throated Hummingbird	10
Swainson's Thrush	10
American Pipit	9
Barred Owl	9
Brewer's Sparrow	9
Cooper's Hawk	9
Virginia Rail	9
American Bittern	8
Baird's Sparrow	8
Bell's Vireo	8
Eastern Wood-Pewee	8
Black Phoebe	7
Black-bellied Whistling-Duck	7
Green Heron	7
MacGillivray's Warbler	7
Sedge Wren	7
Virginia's Warbler	7
Blue-winged Teal	6
Broad-winged Hawk	6
Yellow-headed Blackbird	6
Black Rail	5
Chuck-will's-widow	5
Dusky Flycatcher	5
Olive-sided Flycatcher	5
Spotted Sandpiper	5
Western Tanager	5
Belted Kingfisher	4
Burrowing Owl	4
Cattle Egret	4
Long-billed Curlew	4
Myrtle Warbler	4
Red-breasted Nuthatch	4
Bonaparte's Gull	3
Clark's Grebe	3
Northern Flicker intergrade	3
Sora	3
Common Merganser	2
Curve-billed Thrasher	2
Greater Yellowlegs	2
Lewis's Woodpecker	2
Swamp Sparrow	2
American Redstart	1
Barn Owl	1
Black-capped Chickadee	1
Black-crowned Night-Heron	1
Cassin's Vireo	1
Evening Grosbeak	1
Ferruginous Hawk	1
Gadwall	1
Louisiana Waterthrush	1
Prothonotary Warbler	1
Ruby-crowned Kinglet	1
Rufous Hummingbird	1
Sprague's Pipit	1
Townsend's Solitaire	1
Western Screech-Owl	1
Yellow-throated Warbler	1
Unidentified birds	*944*
Total	**36,695**

Note: Species are listed in rank order from most to least commonly detected. Number of birds is the total number of birds counted. Due to the potential to confound future comparisons, these values exclude birds flying overhead/not using the habitat. Unidentified birds were included in the total number of birds recorded during surveys, but not in counts of the number of species detected per park.

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o)

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Acadian Flycatcher	*Empidonax virescens*			o							
Acorn Woodpecker	*Melanerpes formicivorus*					o					
American Avocet	*Recurvirostra americana*	o		o		o	o				
American Bittern	*Botaurus lentiginosus*	o		+			+	o			
American Coot	*Fulica americana*	o		o		o	+	o			
American Crow	*Corvus brachyrhynchos*	+	+	+	+	o	o	o	+	o	+
American Goldfinch	*Spinus tristis*	+	o	+	+		+	+	o	o	+
American Kestrel	*Falco sparverius*	+	o	+	+	+	+	o	+	+	o
American Pipit	*Anthus rubescens*	o	o		o		+		o		
American Redstart	*Setophaga ruticilla*			+			o	o		o	
American Robin	*Turdus migratorius*	+	+	o	+	+	+	+	+	o	+
American Tree Sparrow	*Spizelloides arborea*		o				o				o
American White Pelican	*Pelecanus erythrorhynchos*			o			+				
American Wigeon	*Anas americana*			o			o	o			
Ash-throated Flycatcher	*Myiarchus cinerascens*	+	+			+	+	o	+		o
Baird's Sandpiper	*Calidris bairdii*			o							
Baird's Sparrow	*Ammodramus bairdii*						+				
Bald Eagle	*Haliaeetus leucocephalus*		o	o							
Baltimore Oriole	*Icterus galbula*		o	o	+					o	
Band-tailed Pigeon	*Patagioenas fasciata*	o									
Bank Swallow	*Riparia riparia*			o	o		+		o		+
Barn Owl	*Tyto alba*	+					o			o	
Barn Swallow	*Hirundo rustica*	+	+	+	+	+	+	+	+	+	+
Barred Owl	*Strix varia*			+	o						o
Bell's Vireo	*Vireo bellii*	o		+	+		o	+			o
Belted Kingfisher	*Megaceryle alcyon*	+	o	o	+		+	o	o		o
Bewick's Wren	*Thryomanes bewickii*		+	+		+	+	+	+	+	+
Black Phoebe	*Sayornis nigricans*		o						+		
Black Rail	*Laterallus jamaicensis*	+									
Black Tern	*Chlidonias niger*	o		o							
Black Vulture	*Coragyps atratus*			+			o	+			o
Black-and-white Warbler	*Mniotilta varia*			+	o			+			
Black-bellied Whistling-Duck	*Dendrocygna autumnalis*							+			o
Black-billed Cuckoo	*Coccyzus erythropthalmus*				o						

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Black-billed Magpie	*Pica hudsonia*	+	o		o	+			+		
Blackburnian Warbler	*Setophaga fusca*							o			
Black-capped Chickadee	*Poecile atricapillus*		o		+				o		
Black-chinned Hummingbird	*Archilochus alexandri*	o	+			+		+	+		o
Black-crested Titmouse	*Baeolophus atricristatus*						o	+			
Black-crowned Night-Heron	*Nycticorax nycticorax*	o		o		o	+				
Black-headed Grosbeak	*Pheucticus melanocephalus*	+	+		+	+	o		+	o	
Black-necked Stilt	*Himantopus mexicanus*	o					o				
Blackpoll Warbler	*Setophaga striata*			o							
Black-throated Gray Warbler	*Setophaga nigrescens*		+						+		
Black-throated Green Warbler	*Setophaga virens*							o			
Black-throated Sparrow	*Amphispiza bilineata*						o				
Blue Grosbeak	*Passerina caerulea*	+	+	+	+	+	+	+	+	+	+
Blue Jay	*Cyanocitta cristata*	+		+	+		+	+		+	+
Blue-gray Gnatcatcher	*Polioptila caerulea*		o	+	+	+	+	o	+		+
Blue-headed Vireo	*Vireo solitarius*			o				o			
Blue-throated Hummingbird	*Lampornis clemenciae*		o								
Blue-winged Teal	*Anas discors*	o	o	o	o	o	+	o	o	o	o
Blue-winged Warbler	*Vermivora cyanoptera*							o			
Boat-tailed Grackle	*Quiscalus major*			o							
Bobolink	*Dolichonyx oryzivorus*		o		o		o				o
Bonaparte's Gull	*Chroicocephalus philadelphia*						+				
Brewer's Blackbird	*Euphagus cyanocephalus*	o	o	o		+	+	o	+	+	o
Brewer's Sparrow	*Spizella breweri*		o			o			o	+	
Broad-tailed Hummingbird	*Selasphorus platycercus*		+			o			+		
Broad-winged Hawk	*Buteo platypterus*			+			o	+			
Bronzed Cowbird	*Molothrus aeneus*						o	o			
Brown Creeper	*Certhia americana*		o					o			
Brown Thrasher	*Toxostoma rufum*	+	o	+	+		+	o		+	+
Brown-headed Cowbird	*Molothrus ater*	+	+	+	+	+	+	+	+	+	+
Bufflehead	*Bucephala albeola*			o			o				
Bullock's Oriole	*Icterus bullockii*	+	+		o	+	+	o	+	+	o
Burrowing Owl	*Athene cunicularia*	+	o			o	o			+	

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Bushtit	*Psaltriparus minimus*		+			+			+		
Cactus Wren	*Campylorhynchus brunneicapillus*						o				
Calliope Hummingbird	*Selasphorus calliope*		o								
Canada Goose	*Branta canadensis*	o	o	+		o	o		o		o
Canvasback	*Aythya valisineria*					o					
Canyon Towhee	*Melozone fusca*		+			o	+		+		
Canyon Wren	*Catherpes mexicanus*		+			+	+		+		
Carolina Chickadee	*Poecile carolinensis*			+			o	+			+
Carolina Wren	*Thryothorus ludovicianus*			+	+	o	o	+			+
Cassin's Finch	*Haemorhous cassinii*		o								
Cassin's Kingbird	*Tyrannus vociferans*	+	+			+			+	+	
Cassin's Sparrow	*Peucaea cassinii*	o	o		+	+	+		+	+	+
Cassin's Vireo	*Vireo cassinii*								+		
Cattle Egret	*Bubulcus ibis*			o			o	o			+
Cave Swallow	*Petrochelidon fulva*			+			o	+			
Cedar Waxwing	*Bombycilla cedrorum*	+	o	+	+		+	+	+	+	+
Chestnut-collared Longspur	*Calcarius ornatus*		o								
Chestnut-sided Warbler	*Setophaga pensylvanica*							o		o	
Chihuahuan Raven	*Corvus cryptoleucus*	o	o				+	+		o	
Chimney Swift	*Chaetura pelagica*	o		+	+		o	+			+
Chipping Sparrow	*Spizella passerina*	o	+	o	o	+	+	+	+	o	+
Chuck-will's-widow	*Antrostomus carolinensis*			+				+			
Chukar	*Alectoris chukar*		o								
Cinnamon Teal	*Anas cyanoptera*	o					o	o			
Clark's Grebe	*Aechmophorus clarkii*						+				
Clark's Nutcracker	*Nucifraga columbiana*		o						o		
Clay-colored Sparrow	*Spizella pallida*			+	+		+	+	o	o	+
Cliff Swallow	*Petrochelidon pyrrhonota*	+	o	+	+	+	+	+	+	o	+
Common Gallinule	*Gallinula galeata*						o				
Common Grackle	*Quiscalus quiscula*	+	o	+	+	o	+	+	+	+	+
Common Ground-Dove	*Columbina passerina*							o			
Common Loon	*Gavia immer*			o			o				
Common Merganser	*Mergus merganser*								+		

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Common Nighthawk	*Chordeiles minor*	+	o	+	+	+	+	o	+	+	+
Common Poorwill	*Phalaenoptilus nuttallii*		o			o	o		o		
Common Raven	*Corvus corax*	o	+			+	+		+		
Common Snipe	*Gallinago gallinago*							o			
Common Yellowthroat	*Geothlypis trichas*	+		+	+	o	+	+	o	o	o
Cooper's Hawk	*Accipiter cooperii*		o	+	+	o	o	+	+		o
Cordilleran Flycatcher	*Empidonax occidentalis*		o						+		
Crested Caracara	*Caracara cheriway*						o	+			
Curve-billed Thrasher	*Toxostoma curvirostre*					o	+				
Dark-eyed Junco	*Junco hyemalis*		o				o	o	o		o
Dickcissel	*Spiza americana*	+		+	+	+	+	+		+	+
Double-crested Cormorant	*Phalacrocorax auritus*			+			+	+			
Downy Woodpecker	*Picoides pubescens*	+	o	+	+	o	o	+	+	+	+
Dusky Flycatcher	*Empidonax oberholseri*								+	+	
Eared Grebe	*Podiceps nigricollis*						+				
Eastern Bluebird	*Sialia sialis*	o		+	+		o	+		o	+
Eastern Kingbird	*Tyrannus tyrannus*	+	o	o	+	o	+	+	o	+	o
Eastern Meadowlark	*Sturnella magna*			+	+		+	o	+		+
Eastern Phoebe	*Sayornis phoebe*		o	+	+	o	o	+			o
Eastern Screech-Owl	*Megascops asio*			o	o		o	o			
Eastern Towhee	*Pipilo erythrophthalmus*							o			
Eastern Wood-Pewee	*Contopus virens*			+	+			o			
Eurasian Collared-Dove	*Streptopelia decaocto*	+	+	+	+	+	+	+	+	+	+
European Starling	*Sturnus vulgaris*	+	o	+	+	o	+	+	o	+	+
Evening Grosbeak	*Coccothraustes vespertinus*								+		
Ferruginous Hawk	*Buteo regalis*	+	o			o				o	
Field Sparrow	*Spizella pusilla*			+	o		+	+			+
Fish Crow	*Corvus ossifragus*			+							
Forster's Tern	*Sterna forsteri*	o		o			+	o			
Fox Sparrow	*Passerella iliaca*							o			
Franklin's Gull	*Leucophaeus pipixcan*			+			+	o			
Gadwall	*Anas strepera*			o		o	o	+			
Golden Eagle	*Aquila chrysaetos*		o			o					

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Golden-crowned Kinglet	*Regulus satrapa*		o					o			
Golden-fronted Woodpecker	*Melanerpes aurifrons*							+			
Grace's Warbler	*Setophaga graciae*								+		
Grasshopper Sparrow	*Ammodramus savannarum*	o	o	o	+	+	+	+		+	+
Gray Catbird	*Dumetella carolinensis*		o	+	+		+	o	+		
Gray Flycatcher	*Empidonax wrightii*		o	o			o		+		
Gray Vireo	*Vireo vicinior*		o						o		
Gray-cheeked Thrush	*Catharus minimus*			o	o		o				
Great Blue Heron	*Ardea herodias*	+	o	+	+	+	+	+	+	+	+
Great Crested Flycatcher	*Myiarchus crinitus*	o		+	+		o	+			+
Great Egret	*Ardea alba*	o		+	o		o	+			o
Great Horned Owl	*Bubo virginianus*	+	+	+	o	o	+	+	o	+	+
Greater Roadrunner	*Geococcyx californianus*	o	o	+		o	+	+	o	+	o
Greater Yellowlegs	*Tringa melanoleuca*			o			+	o			o
Great-tailed Grackle	*Quiscalus mexicanus*	o			+	o	+	+	o		o
Green Heron	*Butorides virescens*	o		+	o		+	+	o		o
Green Kingfisher	*Chloroceryle americana*							o			
Green-tailed Towhee	*Pipilo chlorurus*		+			o			+		
Green-winged Teal	*Anas crecca*					o	o	o			
Hairy Woodpecker	*Picoides villosus*	+	o	+	+	o	o	o	+	o	o
Hammond's Flycatcher	*Empidonax hammondii*									o	
Harris's Sparrow	*Zonotrichia querula*			o				o			o
Henslow's Sparrow	*Ammodramus henslowii*				o						
Hepatic Tanager	*Piranga flava*		+			+			+		
Hermit Thrush	*Catharus guttatus*		o				o	o	o	o	
Hooded Warbler	*Setophaga citrina*			o				o			
Horned Lark	*Eremophila alpestris*	o	+		+	+	+		o	+	o
House Finch	*Haemorhous mexicanus*	o	+	+	+	+	+	+	+	o	o
House Sparrow	*Passer domesticus*	+	o	+	+	o	o	+	o		o
House Wren	*Troglodytes aedon*	+	o	+	+	o	+	o	+	+	o
Hudsonian Godwit	*Limosa haemastica*							o			
Inca Dove	*Columbina inca*							o			
Indigo Bunting	*Passerina cyanea*	+	o	+	+		+	+	o	+	o

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Juniper Titmouse	*Baeolophus ridgwayi*		+			+			+		
Kentucky Warbler	*Geothlypis formosa*			o							
Killdeer	*Charadrius vociferus*	+	+	+	+	+	+	+	o	+	+
Ladder-backed Woodpecker	*Picoides scalaris*	o	+			o	+	+	o	o	o
Lark Bunting	*Calamospiza melanocorys*	o	o		o	+	+			+	o
Lark Sparrow	*Chondestes grammacus*	+	+	+	+	+	+	+	+	+	+
Lazuli Bunting	*Passerina amoena*	+	o	o		o	o		+		
Le Conte's Sparrow	*Ammodramus leconteii*							o			o
Least Flycatcher	*Empidonax minimus*			+	+						o
Least Sandpiper	*Calidris minutilla*			o			o	o			
Lesser Goldfinch	*Spinus psaltria*	+	+			+	+	+	+	+	+
Lesser Nighthawk	*Chordeiles acutipennis*							o	o		
Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*						o			o	
Lesser Scaup	*Aythya affinis*			o			o	o			
Lesser Yellowlegs	*Tringa flavipes*	o		o			o	o			
Lewis's Woodpecker	*Melanerpes lewis*	o	o						+		
Lincoln's Sparrow	*Melospiza lincolnii*			+	o		+	+	o	o	+
Little Blue Heron	*Egretta caerulea*			o				o			
Loggerhead Shrike	*Lanius ludovicianus*	o	+	o		o	+	o		o	o
Long-billed Curlew	*Numenius americanus*					+	+			o	o
Long-billed Dowitcher	*Limnodromus scolopaceus*	o					o	o			
Long-eared owl	*Asio otus*		o								
Louisiana Waterthrush	*Parkesia motacilla*			+				o			
MacGillivray's Warbler	*Geothlypis tolmiei*		o				o	o	+		
Magnolia Warbler	*Setophaga magnolia*			o				o			
Mallard	*Anas platyrhynchos*	+		o	+	o	+	o	+	+	o
Marsh Wren	*Cistothorus palustris*						o				
Mccown's Longspur	*Rhynchophanes mccownii*		o								
Merlin	*Falco columbarius*	o	o								
Mississippi Kite	*Ictinia mississippiensis*	o		+			+	+			+
Mountain Bluebird	*Sialia currucoides*		+			+			+		
Mountain Chickadee	*Poecile gambeli*		+			+			+		
Mountain Plover	*Charadrius montanus*		o							o	

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Mourning Dove	*Zenaida macroura*	+	+	+	+	+	+	+	+	+	+
Nashville Warbler	*Oreothlypis ruficapilla*			o				+			o
Neotropic Cormorant	*Phalacrocorax brasilianus*			o							
Northern Bobwhite	*Colinus virginianus*	+	o	+	+		+	o	+	+	+
Northern Cardinal	*Cardinalis cardinalis*		o	+	+		+	+			+
Northern Flicker	*Colaptes auratus*	+	+	+	+	+	+	o	+	+	+
Northern Goshawk	*Accipiter gentilis*		o								
Northern Harrier	*Circus cyaneus*	o	o		o	+	+	o		o	+
Northern Mockingbird	*Mimus polyglottos*	+	+	+	o	+	+	+	+	+	+
Northern Parula	*Setophaga americana*			+							
Northern Pintail	*Anas acuta*					o	o	o			
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	o	o	o	o	o	+	o	+	+	+
Northern Saw-whet Owl	*Aegolius acadicus*		o								
Northern Shoveler	*Anas clypeata*	o		o		o	o	o	o		
Northern Waterthrush	*Parkesia noveboracensis*										o
Olive-sided Flycatcher	*Contopus cooperi*	o	o	+		o	o	o	o		+
Orange-crowned Warbler	*Oreothlypis celata*		o	o	+		o	+	o	o	o
Orchard Oriole	*Icterus spurius*	+		+	+		o	+		+	+
Osprey	*Pandion haliaetus*			o			o	o	o		o
Painted Bunting	*Passerina ciris*			+			+	+			+
Pectoral Sandpiper	*Calidris melanotos*			o							
Peregrine Falcon	*Falco peregrinus*	o	o				o		o		
Pied-billed Grebe	*Podilymbus podiceps*			o			+	o			
Pileated Woodpecker	*Dryocopus pileatus*			+							o
Pine Siskin	*Spinus pinus*		+	o	+	+	+	+	+	o	o
Pinyon Jay	*Gymnorhinus cyanocephalus*		+			+			+		
Plumbeous Vireo	*Vireo plumbeus*		+			+			+		
Prairie Falcon	*Falco mexicanus*	o	o			o					
Prothonotary Warbler	*Protonotaria citrea*			o	+						
Purple Finch	*Haemorhous purpureus*							o			
Purple Martin	*Progne subis*			+	o			+	o		o
Pygmy Nuthatch	*Sitta pygmaea*		o						+		
Red Crossbill	*Loxia curvirostra*		o						+		

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Red-bellied Woodpecker	*Melanerpes carolinus*			+	+		+	+	o	o	+
Red-breasted Nuthatch	*Sitta canadensis*		+						+		
Red-eyed Vireo	*Vireo olivaceus*	o	o	+	+		o	o		o	o
Red-faced Warbler	*Cardellina rubrifrons*		o								
Redhead	*Aythya americana*					o		o			
Red-headed Woodpecker	*Melanerpes erythrocephalus*	+	o	+	+		+	o		+	+
Red-naped Sapsucker	*Sphyrapicus nuchalis*		o								
Red-necked Phalarope	*Phalaropus lobatus*						o				
Red-shouldered Hawk	*Buteo lineatus*			+				+			
Red-tailed Hawk	*Buteo jamaicensis*	+	+	+	+	+	+	+	+	+	+
Red-winged Blackbird	*Agelaius phoeniceus*	+		+	+	+	+	+	+	+	+
Ring-billed Gull	*Larus delawarensis*	o					+				
Ringed Kingfisher	*Megaceryle torquata*							o			
Ring-necked Duck	*Aythya collaris*							o			
Ring-necked Pheasant	*Phasianus colchicus*	+	o	o	+		+	+		+	o
Rock Pigeon	*Columba livia*	o		o	o		+	o	o	o	o
Rock Wren	*Salpinctes obsoletus*	o	+			+	+		o	+	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*		o	o	o		o	o			
Rough-legged Hawk	*Buteo lagopus*		o								
Ruby-crowned Kinglet	*Regulus calendula*		o		o		o	o	+		o
Ruby-throated Hummingbird	*Archilochus colubris*			+				o			o
Ruddy Duck	*Oxyura jamaicensis*			o		o	o	o			
Rufous Hummingbird	*Selasphorus rufus*		o	o					+		
Rufous-crowned Sparrow	*Aimophila ruficeps*		+	o			+	o	o		
Rusty Blackbird	*Euphagus carolinus*							o			
Sage Thrasher	*Oreoscoptes montanus*		o								
Sagebrush Sparrow	*Artemisiospiza nevadensis*		o								
Sanderling	*Calidris alba*			o							
Sandhill Crane	*Grus canadensis*							o			
Savannah Sparrow	*Passerculus sandwichensis*		o				+	+			o
Say's Phoebe	*Sayornis saya*	o	+		+	+	+	o	+	o	
Scaled Quail	*Callipepla squamata*	o	+			+	+			+	
Scissor-tailed Flycatcher	*Tyrannus forficatus*			+	o		+	+			+

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Sedge Wren	*Cistothorus platensis*			o			+				+
Semipalmated Plover	*Charadrius semipalmatus*			o							
Semipalmated Sandpiper	*Calidris pusilla*			o							
Sharp-shinned Hawk	*Accipiter striatus*			o			o	o			o
Short-billed Dowitcher	*Limnodromus griseus*	o									
Short-eared Owl	*Asio flammeus*									o	o
Snow Bunting	*Plectrophenax nivalis*		o								
Snowy Egret	*Egretta thula*			o				o			
Snowy Plover	*Charadrius nivosus*			o							
Solitary Sandpiper	*Tringa solitaria*			o				o			
Song Sparrow	*Melospiza melodia*	o		+			o	o	+		o
Sora	*Porzana carolina*	o					+				
Spotted Sandpiper	*Actitis macularius*	o		o	+	o	+	+	+		o
Spotted Towhee	*Pipilo maculatus*	o	+		o	+	+		+	o	o
Sprague's Pipit	*Anthus spragueii*						+	o			
Steller's Jay	*Cyanocitta stelleri*		o			o			o		
Stilt Sandpiper	*Calidris himantopus*			o				o			
Summer Tanager	*Piranga rubra*		o	+	+		+	+	+		o
Swainson's Hawk	*Buteo swainsoni*	+	o	o	o	o	+	+		+	+
Swainson's Thrush	*Catharus ustulatus*		o	+	+			+		+	
Swamp Sparrow	*Melospiza georgiana*						+				
Tennessee Warbler	*Oreothlypis peregrina*			o				o			
Townsend's Solitaire	*Myadestes townsendi*		o						+		
Tree Swallow	*Tachycineta bicolor*			o			+	o	o		o
Tricolored Heron	*Egretta tricolor*							o			
Tufted Titmouse	*Baeolophus bicolor*			+				o			+
Turkey Vulture	*Cathartes aura*	+	+	+	+	+	+	+	+	+	+
Upland Sandpiper	*Bartramia longicauda*				o		+	o			+
Veery	*Catharus fuscescens*							o			
Vermilion Flycatcher	*Pyrocephalus rubinus*							o			
Vesper Sparrow	*Pooecetes gramineus*	o	+	o		+	+	o	+	o	o
Violet-green Swallow	*Tachycineta thalassina*	o	o			+			+		
Virginia Rail	*Rallus limicola*	+					+		+		

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Virginia's Warbler	*Oreothlypis virginiae*		+			+	o		+		
Warbling Vireo	*Vireo gilvus*	+	+	+	+		+		+	+	o
Water Pipit	*Anthus spinoletta*							o			
Western Bluebird	*Sialia mexicana*		+			o			+		
Western Grebe	*Aechmophorus occidentalis*						o				
Western Kingbird	*Tyrannus verticalis*	+	+	+	+	+	+	o	+	+	+
Western Meadowlark	*Sturnella neglecta*	+	+		+	+	+	o	+	+	+
Western Sandpiper	*Calidris mauri*			o				o			
Western Screech-Owl	*Megascops kennicottii*	+									
Western Tanager	*Piranga ludoviciana*	o	o			o	+		+	o	
Western Wood-Pewee	*Contopus sordidulus*	+	+			+	o		+	+	
Whimbrel	*Numenius phaeopus*			o							
White-breasted Nuthatch	*Sitta carolinensis*	o	+	+	+		o	o	+	+	
White-crowned Sparrow	*Zonotrichia leucophrys*		o	o	o	o	+	o	o	o	+
White-eyed Vireo	*Vireo griseus*	o		+	+			+			o
White-faced Ibis	*Plegadis chihi*	o					+			o	
White-rumped Sandpiper	*Calidris fuscicollis*			o			o				
White-throated Sparrow	*Zonotrichia albicollis*		o					o			o
White-throated Swift	*Aeronautes saxatalis*		o						o		
White-winged Dove	*Zenaida asiatica*		o	+	+		+	+	+		o
Wild Turkey	*Meleagris gallopavo*	+	+	+	+	o	+	+		o	+
Willet	*Tringa semipalmata*			o					o		
Willow Flycatcher	*Empidonax traillii*	o		o			o		o		
Wilson's Phalarope	*Phalaropus tricolor*			o			o	o			
Wilson's Snipe	*Gallinago delicata*						o				
Wilson's Warbler	*Cardellina pusilla*		o	o		o	o	o	o		
Winter Wren	*Troglodytes hiemalis*				o			o			
Wood Duck	*Aix sponsa*	+		o	+			o			o
Woodhouse's Scrub-Jay	*Aphelocoma woodhouseii*	o	+			+	o		+		
Yellow Warbler	*Setophaga petechia*	+		+	+	o	+	+	+	+	+
Yellow-bellied Flycatcher	*Empidonax flaviventris*							o			
Yellow-bellied Sapsucker	*Sphyrapicus varius*							o			
Yellow-billed Cuckoo	*Coccyzus americanus*	+	o	+	+		+	o		o	+

Table 3-4. Species observed by park in April through June 2016 (+) or previously (o), cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Yellow-breasted Chat	*Icteria virens*	+		o	o	+	o		+		+
Yellow-crowned Night-Heron	*Nyctanassa violacea*			o							
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	+	o				+	o		o	o
Yellow-rumped Warbler	*Setophaga coronata*	o	+	o	o	o	+	+	+	o	o
Yellow-throated Vireo	*Vireo flavifrons*			o				+			o
Yellow-throated Warbler	*Setophaga dominica*			+							

Note: This table does not include subspecies, but subspecies may be mentioned in the individual park tables. Also, unverified observations of additional species in a park are not included.

+ = Species detected in 2016 survey.

o = Species not detected in 2016 survey, but previously documented in the park, including species that migrate through or winter in the park.

3.1 Bent's Old Fort National Historic Site

3.1.1 2016 sampling

During June 2016, we sampled five transects/grids at Bent's Old Fort NHS (Figure 3.1.1). Four grids, with 4 to 16 unique points each, were in grassland habitat (shortgrass prairie; Table 3.1.1). One grid was located in a riparian area (cottonwood bottom) and had 21 unique points. Points were surveyed three times for a total of 177 point visits (the number of unique points multiplied by the number of visits) at the park in 2016.

3.1.2 Results and discussion

During 2016, 4,093 birds of 63 species were counted at Bent's Old Fort NHS (Table 3.1.2). Mourning Dove was the most commonly counted species (15% of the total number of birds counted), followed by Western Meadowlark (13%), European Starling (9%), and Red-winged Blackbird (8%). Four new species were recorded for the park during surveys (see Table 3.1.2).

A majority of bird detections came from the park's surrounding tree line, but some species, such as Western Meadowlark, Orchard Oriole, Blue Grosbeak, and Eastern Kingbird, were frequently observed directly using the prairie habitats. A Mourning Dove was flushed off its nest on the ground between two REST points. Birds such as Burrowing Owl, Yellow-breasted Chat, and Indigo Bunting were observed along the edges. A train occasionally passed on the tracks along the southern boundary and flushed birds that would otherwise have gone undetected (e.g., Killdeer, Common Nighthawk). The marsh on the north side of the park sustains a breeding population of Black Rails, which were detected as "88" birds while walking to points closer to the fort and river. ["88" birds are noteworthy sightings, such as rare birds or new species for the park, that are detected during the survey but outside of the actual 6-minute count period]. On the CWOOD transect, we detected many Yellow-breasted Chat, Yellow-billed Cuckoo, and Yellow Warbler. Black-necked Stilt was an incidental (and new) species (observed at the time of but outside of formal surveys).

Table 3.1.1. Habitat type, number of points, and sampling dates for each transect or grid at Bent's Old Fort NHS, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
CWOOD	Riparian	Cottonwood bottom	21	3	6/5	6/6	6/7
GRASS	Grassland	Shortgrass prairie	9	3	6/2	6/3	6/4
PDOG	Grassland	Shortgrass prairie	9	3	6/2	6/3	6/4
REST	Grassland	Shortgrass prairie	4	3	6/2	6/3	6/4
UPLAND	Grassland	Shortgrass prairie	16	3	6/5	6/6	6/7



PHOTO: JOHN MULLER

Yellow-headed Blackbirds (*Xanthocephalus xanthocephalus*) were observed at the park in 2016.

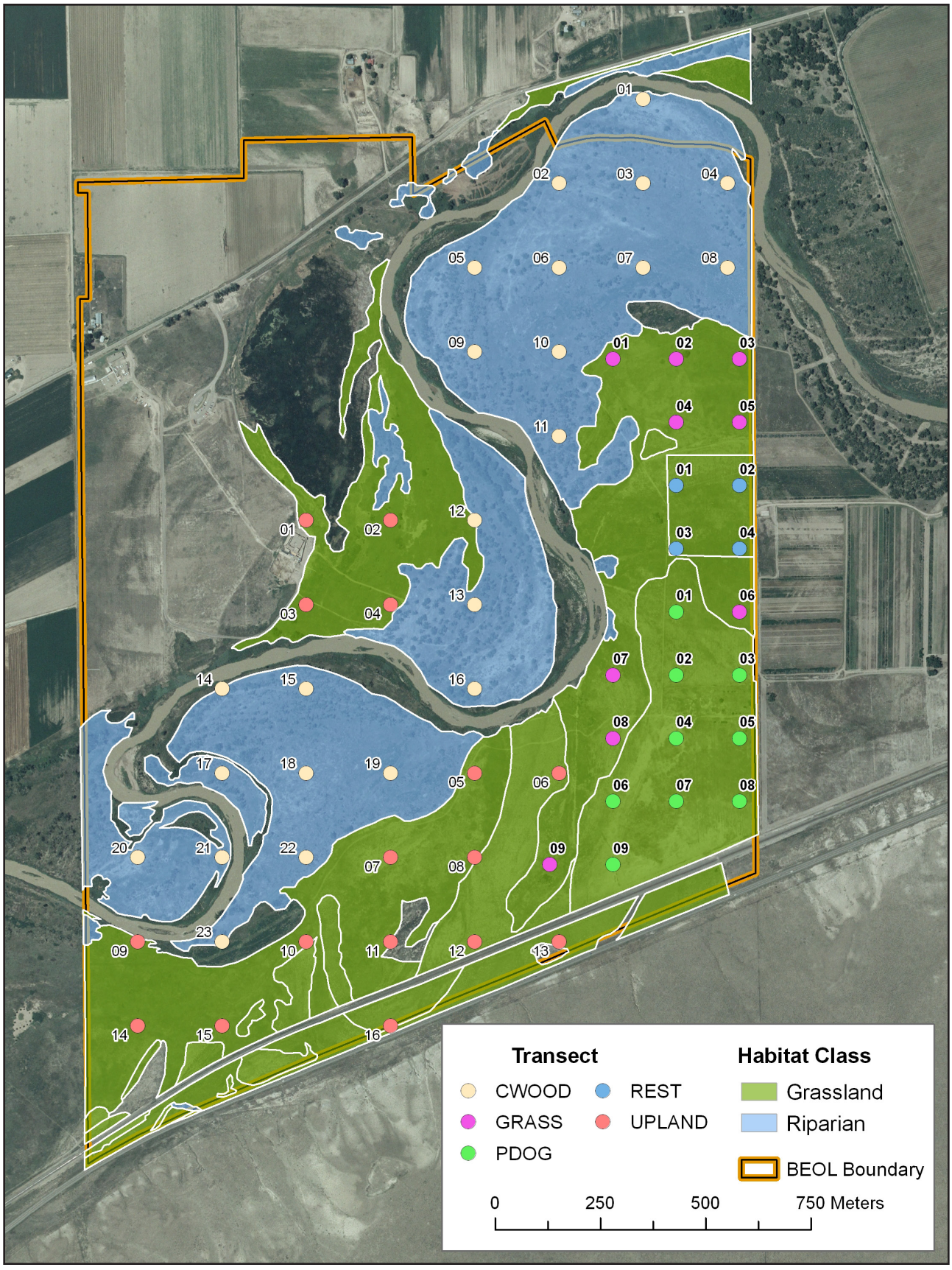


Figure 3.1.1. Point locations targeted for annual sampling at Bent's Old Fort NHS.

Table 3.1.2 Number of birds counted of each species in each habitat class, Bent's Old Fort NHS, 2016

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Mourning Dove	349	247	596	15
Western Meadowlark	366	160	526	13
European Starling	276	84	360	9
Red-winged Blackbird	215	102	317	8
Blue Grosbeak	128	53	181	4
Yellow Warbler	106	68	174	4
Eastern Kingbird	105	40	145	4
Brown-headed Cowbird	77	56	133	3
Ring-necked Pheasant	50	73	123	3
Eurasian Collared-Dove	77	33	110	3
Northern Mockingbird	80	14	94	2
Yellow-breasted Chat	44	49	93	2
Red-headed Woodpecker	33	55	88	2
Northern Flicker	44	42	86	2
American Robin	41	38	79	2
Bullock's Oriole	59	11	70	2
House Wren	20	44	64	2
Killdeer	59	2	61	1
Brown Thrasher	32	21	53	1
Common Grackle	33	20	53	1
Western Kingbird	47	4	51	1
Ash-throated Flycatcher	20	29	49	1
American Goldfinch	25	23	48	1
American Kestrel	21	23	44	1
Yellow-billed Cuckoo	16	27	43	1
Indigo Bunting	27	14	41	1
Orchard Oriole	33	5	38	1
Common Yellowthroat	25	11	36	1
Warbling Vireo	17	19	36	1
Lark Sparrow	24	1	25	1
Black-headed Grosbeak	7	15	22	1
Blue Jay	10	11	21	1
Wood Duck	9	11	20	0
Downy Woodpecker	5	12	17	0
Western Wood-Pewee	3	14	17	0
Common Nighthawk	13	3	16	0
Barn Swallow	11	3	14	0
Cliff Swallow	13	–	13	0
Lazuli Bunting	1	9	10	0
House Sparrow	8	1	9	0

Table 3.1.2. Number of birds counted of each species in each habitat class, Bent's Old Fort NHS, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Yellow-shafted Flicker[1]	**2**	**7**	**9**	**0**
Great Horned Owl	2	6	8	0
Red-tailed Hawk	6	–	6	0
Black Rail	4	1	5	0
Hairy Woodpecker	–	5	5	0
Lesser Goldfinch	4	1	5	0
Wild Turkey	2	3	5	0
American Crow	–	4	4	0
Cedar Waxwing[1]	**3**	**1**	**4**	**0**
Mallard	3	–	3	0
Red-shafted Flicker	–	3	3	0
Swainson's Hawk	–	3	3	0
Yellow-headed Blackbird	3	–	3	0
Black-billed Magpie	2	–	2	0
Burrowing Owl	–	2	2	0
Great Blue Heron	–	2	2	0
Northern Bobwhite	–	2	2	0
Turkey Vulture	1	1	2	0
Virginia Rail	1	1	2	0
Barn Owl[1]	**1**	**–**	**1**	**0**
Belted Kingfisher	1	–	1	0
Cassin's Kingbird	–	1	1	0
Dickcissel	1	–	1	0
Ferruginous Hawk	1	–	1	0
Northern Ficker intergrade	1	–	1	0
Western Screech-Owl[1]	**–**	**1**	**1**	**0**
Unidentified bird	*6*	*4*	*10*	*0*
Unidentified woodpecker	*1*	*9*	*10*	*0*
Unidentified oriole	*3*	*1*	*4*	*0*
Unidentified raptor	*3*	*1*	*4*	*0*
Unidentified bunting	*2*	*–*	*2*	*0*
Unidentified raven	*2*	*–*	*2*	*0*
Unidentified hummingbird	*–*	*1*	*1*	*0*
Unidentified meadowlark	*1*	*–*	*1*	*0*
Unidentified sparrow	*1*	*–*	*1*	*0*
Total	**2,586**	**1,507**	**4,093**	**100%**

[1] New species that have not previously been verified for the park are shown in bold and shaded. Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.

3.2 Capulin Volcano National Monument

3.2.1 2016 sampling

During June 2016, we sampled two transects/grids at Capulin Volcano NM (Figure 3.2.1). One transect was in the grassland habitat class (shortgrass prairie), and one was in the woodland habitat class (pinyon-juniper). The pinyon-juniper transect had 17 unique points, and the shortgrass prairie transect had 28 unique points (Table 3.2.1). Points were surveyed three times for a total of 128 point visits (the number of unique points multiplied by the number of visits) in 2016.

3.2.2 Results and discussion

During 2016, 2,124 birds of 58 species were counted at Capulin Volcano NM (Table 3.2.2). Spotted Towhee was the most commonly counted species (19%), followed by Western Wood-Pewee (9%), and Chipping Sparrow and Cassin's Kingbird (6%). No new species were recorded for the park in 2016 during surveys, but two new species were recorded incidental to surveys; these species are African Collared-Dove and Red-eyed Vireo (not shown in Table 3.2.2).

Common detections on STEPPE points included Spotted Towhee, Black-headed Grosbeak, Cassin's Kingbird, Western Bluebird, Lark Sparrow, and Vesper Sparrow. Some less common, but notably present species, were Hepatic Tanager, Black-chinned Hummingbird, Canyon Towhee, and Blue Grosbeak. Along the south boundary of the STEPPE grid, we observed five different Loggerhead Shrikes of presumably two family groups (recorded as "88" birds). The PJ terrain was steep and made for slow going, but it provided habitat for many detections of Pinyon Jay, Plumbeous Vireo, Mountain Chickadee, Juniper Titmouse, and Mountain Bluebird. Raptors were relatively scarce during our visits, but Common Ravens were numerous, and Turkey Vultures used the air coming off the slopes.

Table 3.2.1. Habitat type, number of points, and sampling dates for each transect or grid at Capulin Volcano NM, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
PJ	Woodland	Pinyon-juniper	17[1]	3	6/13 - 6/16	6/14 - 6/17	6/15 - 6/18
STEPPE	Grassland	Shortgrass prairie	28[1]	3	6/13	6/14	6/15

[1] Not all points were sampled on each occasion.



PHOTO: JOHN MULLER

Broad-tailed Hummingbird (*Selasphorus platycercus)* was recorded in grassland habitat at Capulin Volcano NM in 2016.

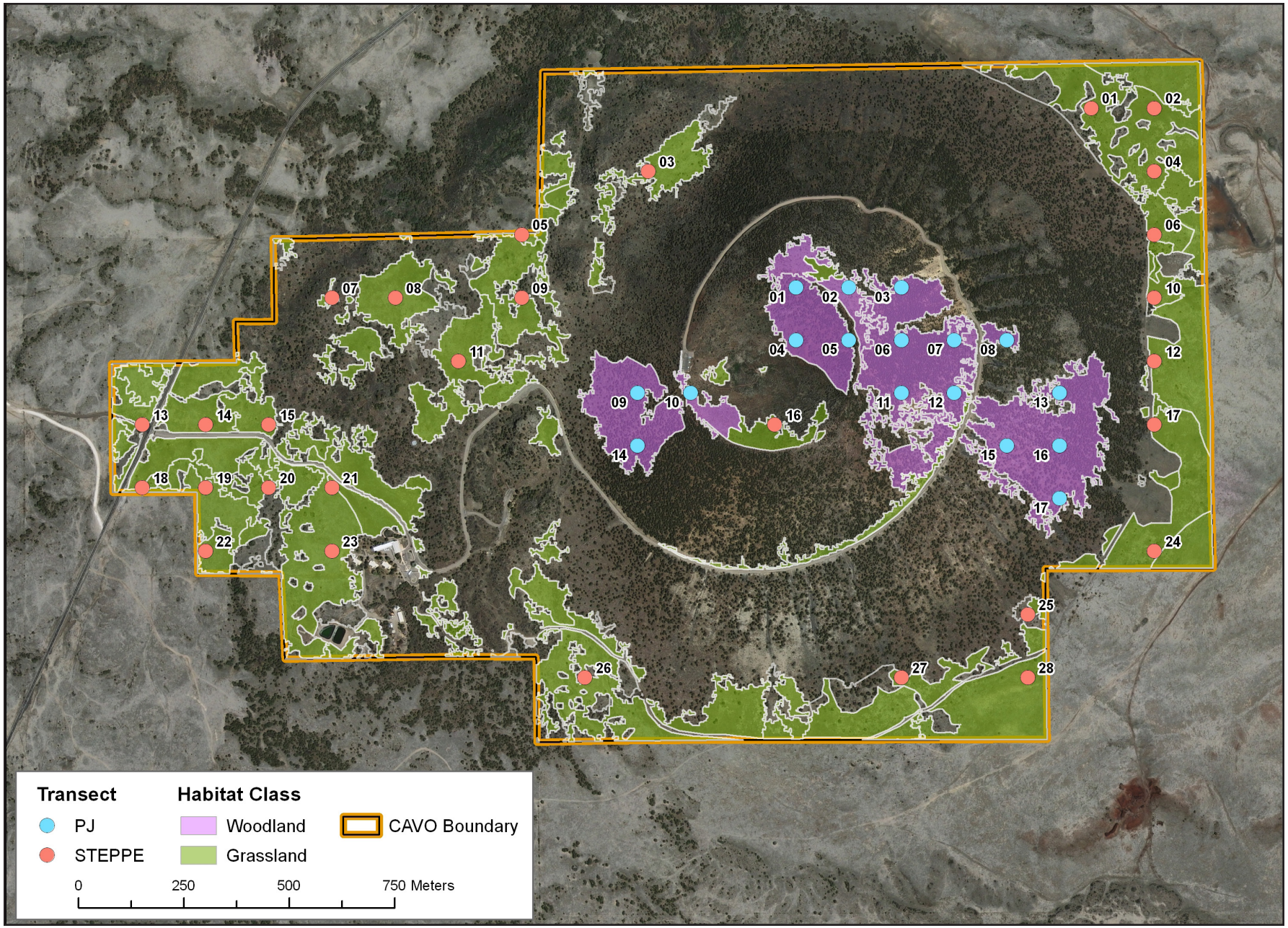


Figure 3.2.1. Point locations targeted for annual sampling at Capulin Volcano NM.

Table 3.2.2. Number of birds counted of each species in each habitat class, Capulin Volcano NM, 2016

Species	Habitat class		# of Birds counted	
	Grassland	Woodland	Total	% of total
Spotted Towhee	251	147	398	19
Western Wood-Pewee	126	75	201	9
Chipping Sparrow	91	45	136	6
Cassin's Kingbird	110	18	128	6
Pinyon Jay	41	58	99	5
Bewick's Wren	46	52	98	5
Black-headed Grosbeak	52	38	90	4
American Robin	51	34	85	4
Rock Wren	51	32	83	4
Common Raven	39	28	67	3
Lark Sparrow	64	3	67	3
Vesper Sparrow	46	3	49	2
Lesser Goldfinch	37	9	46	2
Northern Mockingbird	44	2	46	2
Woodhouse’s Scrub-Jay	26	20	46	2
Mountain Bluebird	29	16	45	2
Brown-Headed Cowbird	31	6	37	2
Western Meadowlark	18	11	29	1
Ash-throated Flycatcher	19	9	28	1
Mourning Dove	25	3	28	1
Hepatic Tanager	17	10	27	1
Eurasian Collared-Dove	24	2	26	1
Mountain Chickadee	4	22	26	1
Horned Lark	22	2	24	1
Plumbeous Vireo	18	5	23	1
Bushtit	8	14	22	1
Pine Siskin	14	–	14	1
Green-tailed Towhee	8	4	12	1
Barn Swallow	9	–	9	0
Bullock's Oriole	8	1	9	0
Canyon Towhee	9	–	9	0
Loggerhead Shrike	9	–	9	0
Red-tailed Hawk	4	4	8	0
Western Kingbird	7	–	7	0
Blue Grosbeak	5	1	6	0
Say's Phoebe	6	–	6	0
House Finch	5	–	5	0
Juniper Titmouse	1	4	5	0
Rufous-crowned Sparrow	5	–	5	0
Wild Turkey	5	–	5	0

Table 3.2.2. Number of birds counted of each species in each habitat class, Capulin Volcano NM, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Woodland	Total	% of total
Broad-tailed Hummingbird	4	–	4	0
Audubon's Warbler	–	3	3	0
Black-throated Gray Warbler	1	2	3	0
Canyon Wren	3	–	3	0
Scaled Quail	3	–	3	0
Western Bluebird	1	2	3	0
White-breasted Nuthatch	2	1	3	0
American Crow	2	–	2	0
Black-chinned Hummingbird	2	–	2	0
Killdeer	2	–	2	0
Turkey Vulture	2	–	2	0
Virginia's Warbler	–	2	2	0
Great Horned Owl	1	–	1	0
Ladder-backed Woodpecker	1	–	1	0
Northern Flicker	–	1	1	0
Red-breasted Nuthatch	–	1	1	0
Warbling Vireo	1	–	1	0
Yellow-rumped Warbler	–	1	1	0
Unidentified bird	*8*	*1*	*9*	*0*
Unidentified sparrow	*6*	*–*	*6*	*0*
Unidentified hummingbird	*3*	*1*	*4*	*0*
Unidentified woodpecker	*2*	*–*	*2*	*0*
Unidentified warbler	*1*	*–*	*1*	*0*
Unidentified wren	*1*	*–*	*1*	*0*
Total	**1,431**	**693**	**2,124**	**100%**

Note: New species that have not previously been verified for the park (if any) are shown in bold and shaded. Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.

3.3 Chickasaw National Recreation Area

3.3.1 2016 sampling

During May of 2016, we sampled four transects/grids at Chickasaw NRA (Figures 3.3.1-1, -2, -3). All transects were in the grassland habitat class (upland grassland) and had 13 to 19 unique points each (Table 3.3.1). Each point was surveyed either one or three times for a total of 140 point visits (the number of unique points multiplied by the number of visits) at the park.

3.3.2 Results and discussion

During 2016, 3,486 birds of 93 species were counted at Chickasaw NRA. This was the third highest number of species counted in the SOPN in 2016 (Table 3-2). Northern Cardinal was the most common species in the park (9% of the birds counted; Table 3.3.2). Other common species, based on the number of birds counted, included American Crow (7%), Carolina Chickadee (6%), Franklin's Gull (6%), Indigo Bunting (5%), and Cedar Waxwing (5%). Four new species for the park were observed during surveys (see Table 3.3.2).

A challenging aspect of sampling at the recreation area was the dense communities of songbirds with complex repertoires (e.g., Carolina Wren, Northern Cardinal, Tufted Titmouse, and Painted Bunting). Nearby lakes, grassy ponds, and cold spring streams provide suitable habitat for wading birds, including Yellow-crowned Night-Heron, Great Egret, Green Heron, and American Bittern. The occasional Black Vulture was spotted among the Turkey Vultures and Mississippi Kites. A flyover detection from one point of a good-sized flock of Franklin's gulls was unexpected.

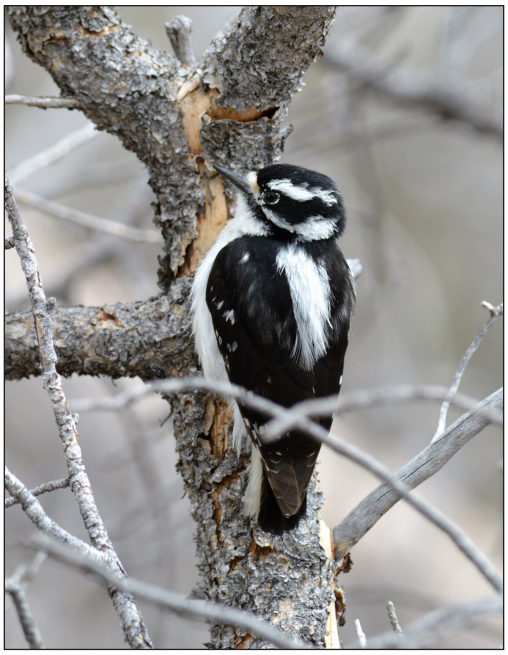


PHOTO: JOHN MULLER

More than 50 Downy Woodpeckers (*Picoides pubescens*) were counted at Chickasaw NRA in 2016.

The bulk of detections on WHunt_E came from Carolina Chickadee, Indigo Bunting, Painted Bunting, Northern Cardinal, Tufted Titmouse, and Yellow-billed Cuckoo. The treeline was a mature forest along the river/creek, where detections included Cave Swallow. WHunt_W was similar to WHunt_E but with less diversity because the river was not adjacent. The other difference was that the grassland was late successional and shrub-encroached. This made it better for species such as Least Flycatcher, Dickcissel, and buntings. The NHunt transect was similar to the other hunt transects in that it had many of the common birds, such as Northern Cardinal, Carolina Chickadee, and Dickcissel. Two species recorded incidental to surveys are new for the park (i.e., Magnolia Warbler and Tennessee Warbler [not shown in the table]).

Table 3.3.1. Habitat type, number of points, and sampling dates for each transect or grid at Chickasaw NRA, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
5LAKES	Grassland	Upland grassland	19	1	5/25	– [1]	– [1]
NHUNT	Grassland	Upland grassland	13	1	5/25	– [1]	– [1]
WHUNT_E	Grassland	Upland grassland	18	3	5/20	5/21	5/22
WHUNT_W	Grassland	Upland grassland	18	3	5/20	5/21	5/22

[1] No sampling conducted on this occasion due to prolonged thunderstorms and heavy rain.

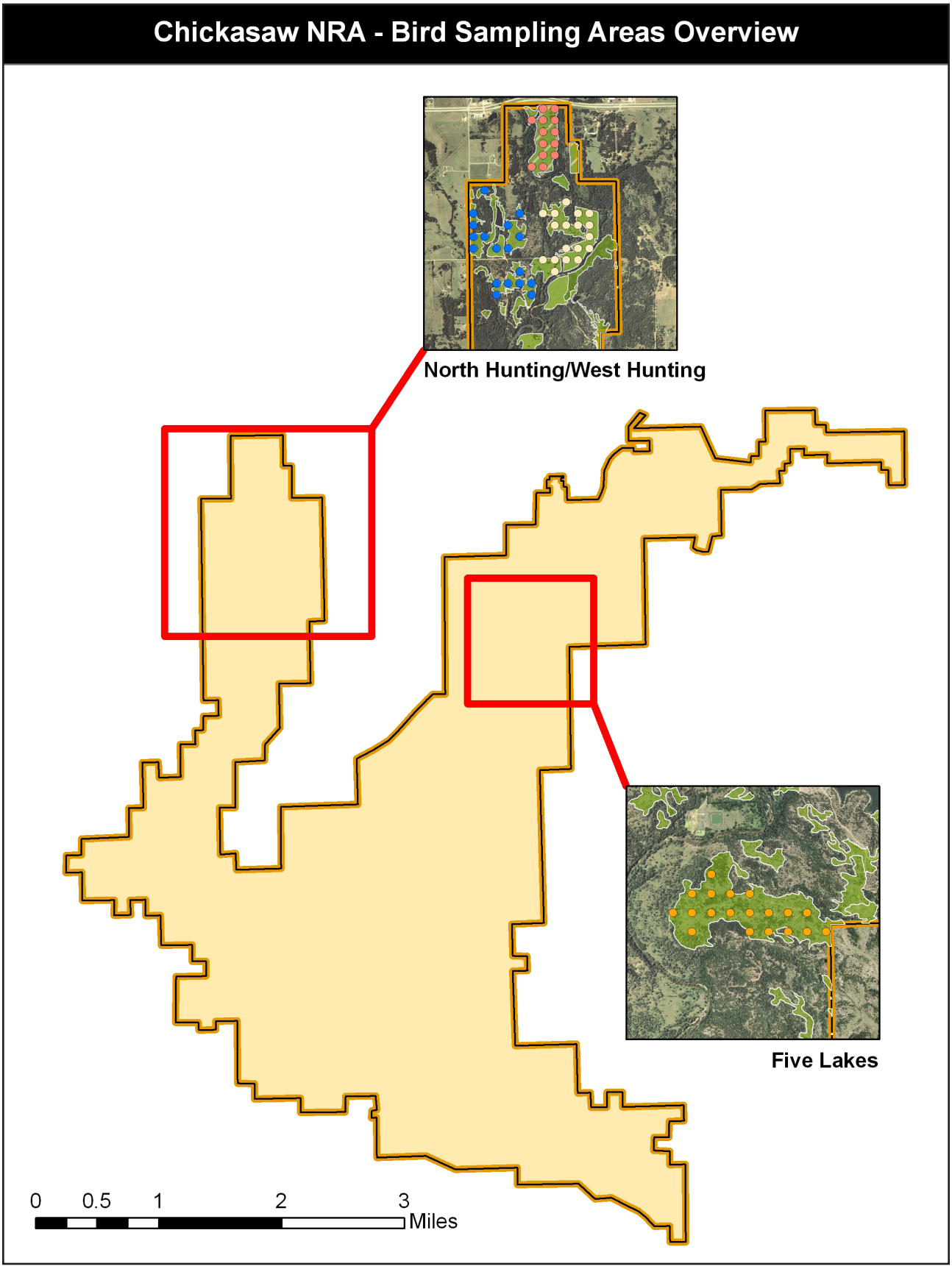


Figure 3.3.1-1. Bird sampling areas at Chickasaw NRA.

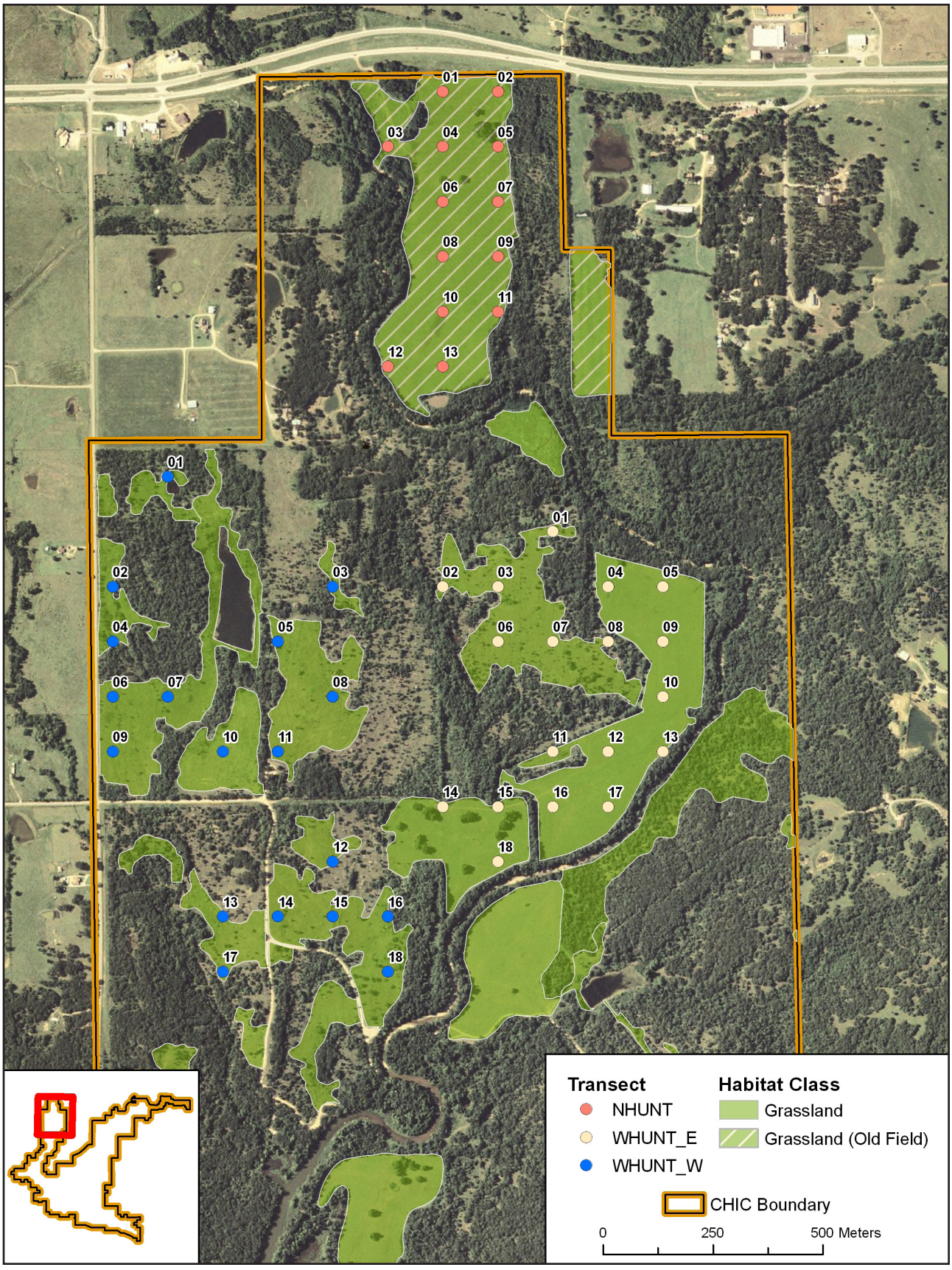


Figure 3.3.1-2. Point locations targeted for annual sampling at Chickasaw NRA, North Hunting/West Hunting.

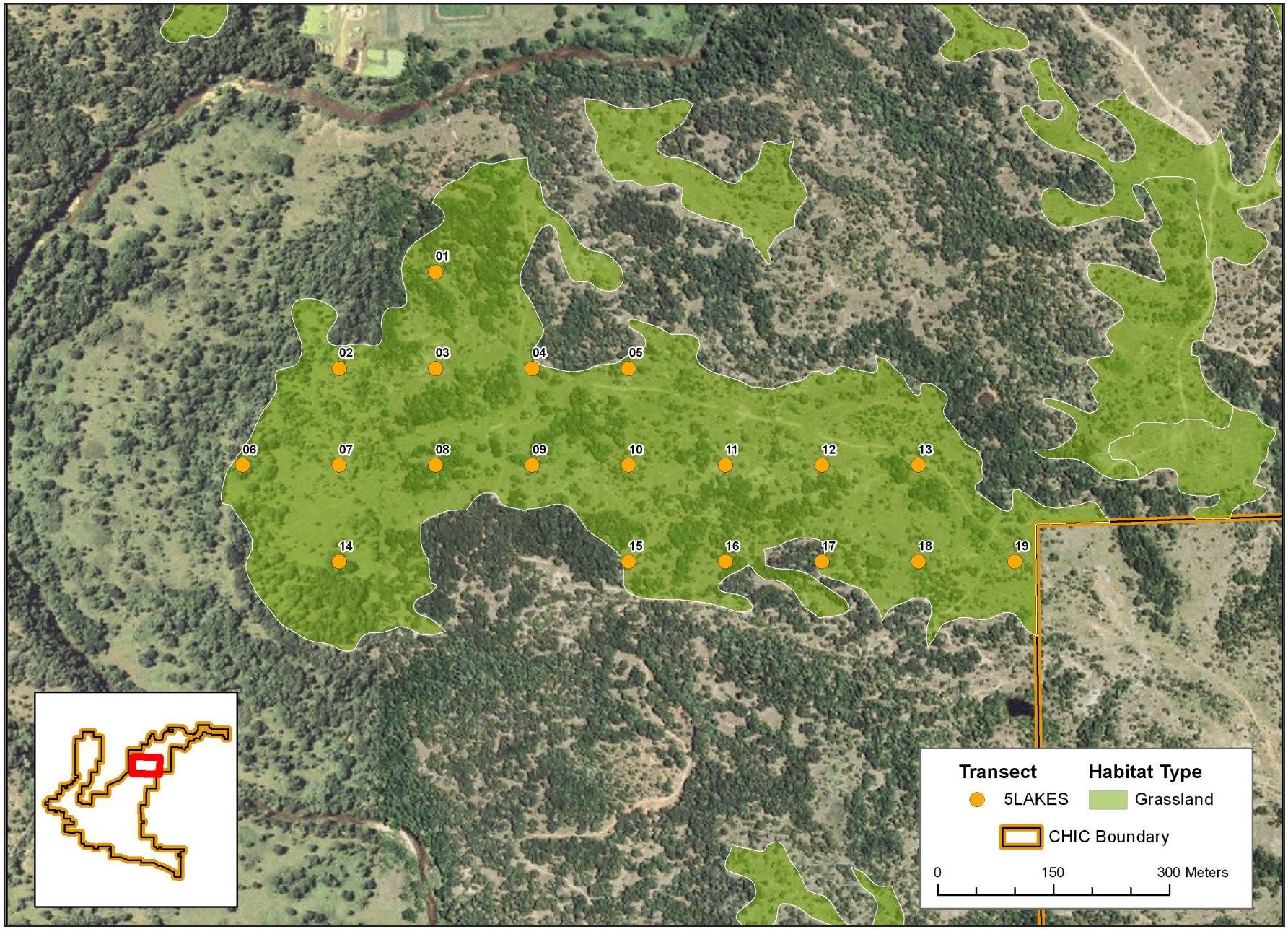


Figure 3.3.1-3. Point locations targeted for annual sampling at Chickasaw NRA, Five Lakes.

Table 3.3.2. Number of birds counted of each species in each habitat class, Chickasaw NRA, 2016

Species	# of Birds counted	
	Total (grassland habitat)	% of total
Northern Cardinal	307	9
American Crow	230	7
Carolina Chickadee	211	6
Franklin's Gull	197	6
Indigo Bunting	183	5
Cedar Waxwing	172	5
Carolina Wren	153	4
Yellow-billed Cuckoo	147	4
Tufted Titmouse	141	4
Blue-gray Gnatcatcher	140	4
Painted Bunting	134	4
Dickcissel	118	3
Field Sparrow	111	3
Brown-headed Cowbird	105	3
Red-bellied Woodpecker	95	3
Turkey Vulture	74	2
Great Crested Flycatcher	69	2
White-eyed Vireo	63	2
Downy Woodpecker	57	2
Summer Tanager	51	1
Scissor-tailed Flycatcher	45	1
Pileated Woodpecker	41	1
Mississippi Kite	39	1
Eastern Bluebird	38	1
Least Flycatcher	37	1
Blue Jay	32	1
Red-eyed Vireo	32	1
Mourning Dove	30	1
Canada Goose	29	1
Fish Crow	24	1
Great Blue Heron	15	0
Red-shouldered Hawk	15	0
Eastern Meadowlark	14	0
Hairy Woodpecker	14	0
Red-headed Woodpecker	14	0
Blue Grosbeak	13	0
Bewick's Wren	12	0
Northern Parula	12	0
Cliff Swallow	11	0
Black Vulture	10	0
Black-and-white Warbler	10	0
Common Yellowthroat	10	0
Ruby-throated Hummingbird	10	0
Barred Owl	9	0
Lark Sparrow	9	0
Orchard Oriole	9	0
Wild Turkey	9	0
American Goldfinch	8	0
Barn Swallow	8	0
House Sparrow	8	0
Purple Martin	8	0
Eastern Phoebe	7	0
Eastern Wood-Pewee	7	0
White-breasted Nuthatch	7	0
White-winged Dove	6	0
Common Grackle	5	0
Double-crested Cormorant	5	0
Northern Mockingbird	5	0
Red-tailed Hawk	5	0
Warbling Vireo	5	0
Yellow Warbler	5	0
Chuck-will's-widow	4	0
European Starling	4	0
Green Heron	4	0
Northern Flicker	4	0
Western Kingbird	4	0
Broad-winged Hawk	3	0
Brown Thrasher	3	0
Olive-sided Flycatcher	3	0
Red-winged Blackbird	3	0
Swainson's Thrush	3	0
Bell's Vireo	2	0
Chimney Swift	2	0
Clay-colored Sparrow[1]	**2**	**0**
Common Nighthawk	2	0
Cooper's Hawk	2	0
Eurasian Collared-Dove	2	0
Great Horned Owl	2	0

Table 3.3.2. Number of birds counted of each species in each habitat class, Chickasaw NRA, 2016, cont.

Species	# of Birds counted	
	Total (grassland habitat)	% of total
House Finch	2	0
House Wren	2	0
Northern Bobwhite	2	0
American Bittern[1]	**1**	**0**
American Kestrel[1]	**1**	**0**
American Redstart[1]	**1**	**0**
Cave Swallow	1	0
Gray Catbird	1	0
Great Egret	1	0
Greater Roadrunner	1	0
Killdeer	1	0
Lincoln's Sparrow	1	0
Louisiana Waterthrush	1	0
Song Sparrow	1	0
Yellow-throated Warbler	1	0
Unidentified woodpecker	*11*	*0*
Unidentified bird	*4*	*0*
Unidentified bunting	*3*	*0*
Unidentified crow	*3*	*0*
Unidentified warbler	*3*	*0*
Unidentified empidonax flycatcher	*2*	*0*
Unidentified raptor	*2*	*0*
Unidentified sparrow	*1*	*0*
Total	**3,486**	**100%**

[1] New species that have not previously been verified for the park are shown in bold and shaded. Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.

3.4 Fort Larned National Historic Site

3.4.1 2016 sampling

During May 2016, we sampled three transects/grids at Fort Larned NHS (Figure 3.4.1). Two transects were in grassland habitat (upland grassland) and had 11 or 14 unique points each (Table 3.4.1). One transect was in the riparian habitat class (riparian woodland) and had 18 unique points. Each point was surveyed three times for a total of 129 point visits (the number of unique points multiplied by the number of visits) at the park.

3.4.2 Results and discussion

During 2016, 3,282 birds of 78 species were counted at Fort Larned NHS (Table 3.4.2). The six most common species, in order of numbers of birds counted, were Cliff Swallow (20% of the total number counted), Mourning Dove (7%), Western Meadowlark (6%), Eastern Meadowlark (5%), Baltimore Oriole (4%), and Blue Jay (4%). Five new species (shown in the table) were recorded in the park during the 2016 surveys.

Fort Larned, largely composed of grassland surrounded by agricultural land, and with a narrow Pawnee River corridor in the middle, proved to be a great study of riparian and open country bird communities in the Southern Plains.



PHOTO: KEVIN WELSH

One Orange-crowned Warbler (*Oreothlypis celata*) was observed during surveys at the park in 2016.

There were observations of birds with eastern and western ranges overlapping– Eastern and Western Kingbirds, and Eastern and Western Meadowlarks. Along the river, both Baltimore and Orchard Orioles were almost a constant presence. There was plenty of water in the river, where Wood Duck, Belted Kingfisher, and Spotted Sandpiper were observed. Some unusual sightings at the park in 2016 included White-winged Dove and Great Horned Owl.

Table 3.4.1. Habitat type, number of points, and sampling dates for each transect or grid at Fort Larned NHS, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
BU2	Grassland	Upland grassland	11	3	5/16	5/17	5/18
BU8	Grassland	Upland grassland	14	3	5/17	5/18	5/19
RIP	Riparian	Riparian woodland	18 [1]	3	5/16 - 5/17	5/17 - 5/18	5/18 - 5/19

[1] All 18 points were sampled three times, but the entire transect was not sampled within one day.



Figure 3.4.1. Point locations targeted for annual sampling at Fort Larned NHS.

Table 3.4.2. Number of birds counted of each species in each habitat class, Fort Larned NHS, 2016

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Cliff Swallow	488	177	665	20
Mourning Dove	129	98	227	7
Western Meadowlark	155	29	184	6
Eastern Meadowlark	131	30	161	5
Baltimore Oriole	58	86	144	4
Blue Jay	64	72	136	4
Grasshopper Sparrow	94	14	108	3
American Robin	50	54	104	3
House Wren	25	76	101	3
Barn Swallow	73	23	96	3
Dickcissel	83	5	88	3
Brown-headed Cowbird	41	46	87	3
Ring-necked Pheasant	53	16	69	2
Red-winged Blackbird	48	16	64	2
European Starling	45	18	63	2
Common Grackle	41	20	61	2
Northern Cardinal	20	36	56	2
Yellow Warbler	3	47	50	2
Eastern Kingbird	37	12	49	1
Killdeer	43	6	49	1
Horned Lark	46	2	48	1
Great Crested Flycatcher	18	27	45	1
Gray Catbird	9	35	44	1
Red-headed Woodpecker	26	18	44	1
Orchard Oriole	18	22	40	1
Western Kingbird	35	2	37	1
Cedar Waxwing	–	32	32	1
House Sparrow	14	18	32	1
Warbling Vireo	6	22	28	1
Wood Duck	23	4	27	1
Red-bellied Woodpecker	5	15	20	1
Downy Woodpecker	5	13	18	1
Northern Flicker	5	10	15	0
Red-eyed Vireo	8	7	15	0
Brown Thrasher	1	13	14	0
Carolina Wren	6	5	11	0
American Goldfinch	1	7	8	0
Common Yellowthroat	3	4	7	0
Eurasian Collared-Dove	7	–	7	0
Lark Sparrow	5	2	7	0

Table 3.4.2. Number of birds counted of each species in each habitat class, Fort Larned NHS, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Black-headed Grosbeak	1	5	6	0
Clay-colored Sparrow	–	6	6	0
Eastern Bluebird	5	1	6	0
Hairy Woodpecker	2	4	6	0
Red-tailed Hawk	5	1	6	0
White-breasted Nuthatch	–	6	6	0
Eastern Phoebe	–	5	5	0
Wild Turkey	5	–	5	0
Swainson's Thrush	–	4	4	0
Cassin's Sparrow	2	1	3	0
Least Flycatcher	–	3	3	0
American Kestrel	2	–	2	0
Bell's Vireo	1	1	2	0
Belted Kingfisher	–	2	2	0
Blue-gray Gnatcatcher	–	2	2	0
Great-tailed Grackle	2	–	2	0
Indigo Bunting	1	1	2	0
Mallard	2	–	2	0
Say's Phoebe	1	1	2	0
Turkey Vulture	1	1	2	0
American Crow	1	–	1	0
Black-capped Chickadee	–	1	1	0
Blue Grosbeak[1]	**–**	**1**	**1**	**0**
Chimney Swift	1	–	1	0
Common Nighthawk	1	–	1	0
Cooper's Hawk[1]	**–**	**1**	**1**	**0**
Eastern Wood-Pewee	1	–	1	0
Great Blue Heron	–	1	1	0
House Finch	–	1	1	0
Northern Bobwhite	1	–	1	0
Orange-crowned Warbler	–	1	1	0
Pine Siskin	–	1	1	0
Prothonotary Warbler[1]	**–**	**1**	**1**	**0**
Spotted Sandpiper	–	1	1	0
Summer Tanager	–	1	1	0
White-eyed Vireo[1]	**–**	**1**	**1**	**0**
White-winged Dove[1]	**–**	**1**	**1**	**0**
Yellow-billed Cuckoo	–	1	1	0
Unidentified swallow	*100*	*–*	*100*	*3*
Unidentified meadowlark	*15*	*3*	*18*	*1*

Table 3.4.2. Number of birds counted of each species in each habitat class, Fort Larned NHS, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Unidentified sparrow	*1*	*3*	*4*	*0*
Unidentified bird	*–*	*3*	*3*	*0*
Unidentified bunting	*–*	*1*	*1*	*0*
Unidentified duck	*–*	*1*	*1*	*0*
Unidentified hawk	*1*	*–*	*1*	*0*
Unidentified warbler	*–*	*1*	*1*	*0*
Total	**2,074**	**1,208**	**3,282**	**100%**

[1] New species that have not previously been verified for the park are shown in bold and shaded. Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.

3.5 Fort Union National Monument

3.5.1 2016 sampling

During June 2016, we sampled three transects or grids at Fort Union NM (Figure 3.5.1). Each transect was in grassland habitat (shortgrass prairie) and had 20 unique points (Table 3.5.1). Each point was surveyed three times for a total of 180 point visits (the number of unique points multiplied by the number of visits) at the park.

3.5.2 Results and discussion

During 2016, 3,170 birds of 59 species were counted at Fort Union NM (Table 3.5.2). As in some previous survey years, Western Meadowlark was once again the most abundant species, accounting for 27% of birds counted (down from 45% in 2013, the last year surveyed). Other prominent species included Cassin's Sparrow (8%), Horned Lark (8%), Cassin's Kingbird (5%), Vesper Sparrow (5%), Cliff Swallow (4%), Pinyon Jay (4%), and Spotted Towhee (4%). Three new species were recorded for the park in 2016 (see Table 3.5.2).

Some noteworthy observations at the SHORT_E grid included: one female Northern Harrier (a ragged-looking individual scaring up flocks of newly congregating Horned Larks); numerous American Kestrels of different ages and sexes; and one Grasshopper Sparrow nest with five eggs in a grassy cup. The only male Lark Bunting observed was near a water tank with some small trees surrounding it (at Point 01). The OLD FORT grid had substantially more diversity due to its proximity to the wooded, rocky escarpment to the west. It was possible to observe open country birds, as well as coniferous species such as Pinyon Jay, Blue-gray Gnatcatcher, Bushtit, and Hepatic Tanager. Cassin's Sparrow and Grasshopper Sparrow were noticeably absent on this grid, and Lark Sparrow and Chipping Sparrow seemed to replace them. The creek could be seen to the east, and Great Blue Herons were detected flying along its course. Also notable was a flyover Long-billed Curlew. The night before the third visit was a full moon that seemed to encourage bird activity longer due to the extended light. Northern Mockingbird and Cassin's Sparrow were heard singing during the night, and Common Nighthawks were very prevalent.

Table 3.5.1. Habitat type, number of points, and sampling dates for each transect or grid at Fort Union NM, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
OLD FORT	Grassland	Shortgrass prairie	20	3	6/19	6/20	6/21
SHORT_E	Grassland	Shortgrass prairie	20	3	6/19	6/20	6/21
SHORT_W	Grassland	Shortgrass prairie	20	3	6/16	6/17	6/18



PHOTO: JOHN MULLER

Black-billed Magpie (*Pica hudsonia*) accounted for 3% of the total number of birds counted at Fort Union NM in 2016.

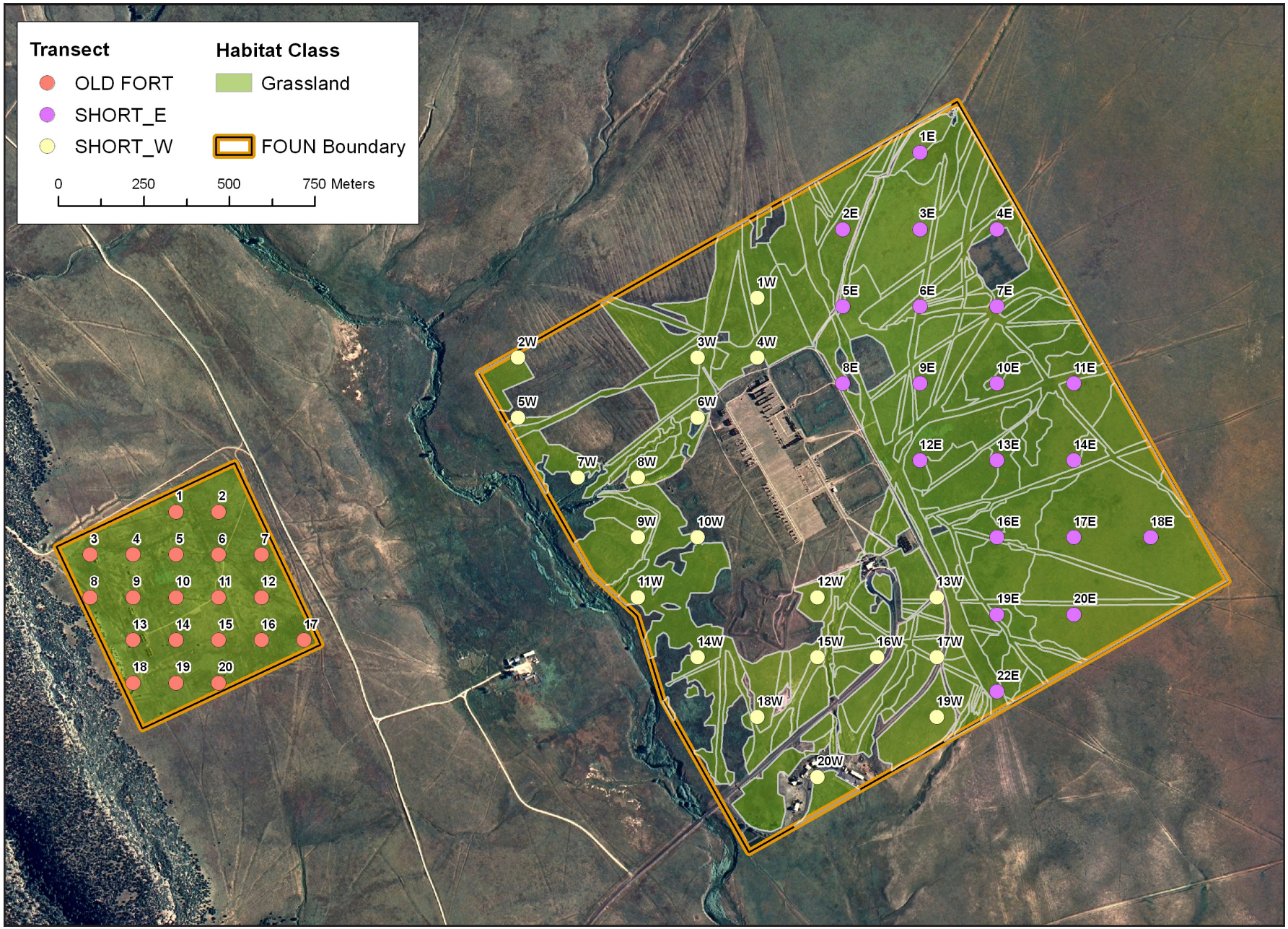


Figure 3.5.1. Point locations targeted for annual sampling at Fort Union NM.

Table 3.5.2. Number of birds counted of each species in each habitat class, Fort Union NM, 2016

Species	# of Birds counted	
	Total (grassland habitat)	% of total
Western Meadowlark	857	27
Cassin's Sparrow	259	8
Horned Lark	241	8
Cassin's Kingbird	158	5
Vesper Sparrow	143	5
Cliff Swallow	137	4
Pinyon Jay	129	4
Spotted Towhee	113	4
Western Wood-Pewee	93	3
Common Raven	89	3
Black-billed Magpie	81	3
Lark Sparrow	72	2
Northern Mockingbird	71	2
American Kestrel	59	2
Barn Swallow	52	2
Rock Wren	50	2
Lesser Goldfinch	44	1
Grasshopper Sparrow	41	1
Mourning Dove	38	1
Canyon Wren	37	1
Red-winged Blackbird	28	1
Blue Grosbeak	27	1
Say's Phoebe	26	1
Black-headed Grosbeak	25	1
Blue-gray Gnatcatcher	21	1
Common Nighthawk	21	1
Killdeer	14	0
Northern Flicker	13	0
Yellow-breasted Chat	13	0
Bewick's Wren	12	0
Eurasian Collared-Dove	11	0
Turkey Vulture	10	0
Ash-throated Flycatcher	9	0
Bullock's Oriole	9	0
Plumbeous Vireo	9	0
Dickcissel	8	0
Red-tailed Hawk	8	0
Western Kingbird	8	0
Mountain Bluebird	7	0
Chipping Sparrow	6	0
American Robin	5	0
Woodhouse's Scrub-Jay	4	0
Brown-headed Cowbird	3	0
House Finch	3	0
Bushtit[1]	**2**	**0**
Great Blue Heron	2	0
Hepatic Tanager	2	0
Pine Siskin	2	0
Red-shafted Flicker[1]	**2**	**0**
Violet-green Swallow	2	0
Black-chinned Hummingbird	1	0
Brewer's Blackbird	1	0
Juniper Titmouse	1	0
Lark Bunting	1	0
Long-billed Curlew	1	0
Mountain Chickadee[1]	**1**	**0**
Northern Harrier	1	0
Scaled Quail	1	0
Virginia's Warbler	1	0
Unidentified swallow	*54*	*2*
Unidentified sparrow	*15*	*0*
Unidentified bird	*12*	*0*
Unidentified meadowlark	*3*	*0*
Unidentified kingbird	*1*	*0*
Total	**3,170**	**100%**

[1] New species that have not previously been verified for the park are shown in bold and shaded. Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.

3.6 Lake Meredith National Recreation Area

3.6.1 2016 sampling

During May 2016, we sampled four transects/grids at Lake Meredith NRA (Figures 3.6.1-1, -2, -3, -4). Two transects were located in grassland habitat (upland grassland) with 19 unique points each, and two were located in riparian habitat (bottomland grassland and cottonwood bottom) with 17 or 19 unique points each (Table 3.6.1). Most points were surveyed three times for a total of 209 point visits (the number of unique points multiplied by the number of visits) at the park.

3.6.2 Results and discussion

We counted 6,397 birds at Lake Meredith NRA in 2016 (Table 3.6.2). Based on sampling, Lake Meredith NRA ranked first in bird diversity among SOPN parks surveyed in 2016, with 120 species recorded (85 in grassland habitat and 86 in riparian habitat). The greatest number of birds was also recorded at Lake Meredith NRA in 2016. Double-crested Cormorant (14% of the total number of birds counted) and Red-winged Blackbird (9%) were counted in the highest numbers. Mourning Dove (5%), Northern Bobwhite (4%), and Ring-billed Gull (4%) were the next most common birds. During surveys, 12 species were recorded for the park for the first time (see Table 3.6.2). Also see text below for new species recorded outside of surveys.

At the HONEY transect, Grasshopper and Cassin's sparrows seemed to dominate as either one or both were counted on every point. Sparrows dominated overall, with White-crowned Sparrow, Vesper Sparrow, Clay-colored Sparrow, Chipping Sparrow, Field Sparrow, Savannah Sparrow, and Lark Sparrow all in good attendance. Most were probably just passing through and not quite in breeding mode. A few notable sightings included Scissor-tailed Flycatcher, Baird's Sparrow, Long-billed Curlew, and over 60 American White Pelicans soaring overhead. Another highlight on this transect was Sprague's Pipit.

On the UPLAND transect, the middle points were very good for sparrows. On the waterfront points, there were hundreds of cormorants and gulls. An American bittern was booming down Bugbee Creek all days surveyed. Many of the grassland birds were the same as at HONEY,



PHOTO: JOHN MULLER

American Bittern (*Botaurus lentiginosus*) was a new species for the park in 2016.

but on water points a new host of birds entered the survey (e.g., American Coot, Black-crowned Night Heron, Forster's Tern, and a pair of Clark's Grebes). Swallows were plentiful along the lake edge, and the cliff element added rough terrain-loving species, like Rufous-crowned Sparrow and Scaled Quail.

At the BOTTOM transect, Ring-necked Pheasants were calling near many of the points. A few singing, male Dickcissels were observed, and Sora and Virginia Rail were an added marsh bird presence. At night, there appeared to be a fair amount of Great Horned and Barn owl activity.

At the CWOOD transect, diversity was substantial along the river wash and among the cottonwoods. Bewick's Wren was very common. Having the only large trees in the area, there was a lot of woodpecker and raptor activity. We observed an active Red-tailed Hawk nest with two juvenile birds (almost fully fledged), and American Kestrels and Mississippi Kites were using the tall trees. Red-headed Woodpeckers, Ladder-backed Woodpeckers, and Northern Flickers were in good attendance as well. Some notable songbirds were Western Tanager, Gray Catbird, Painted Bunting, Curve-billed Thrasher, and Cedar Waxwing. A male Wild Turkey was actively displaying and gobbling at one point.

Several additional, notable species (not shown in Table 3.6.2) were observed incidental to surveys in 2016; these were Broad-winged Hawk, Least Sandpiper, Lesser Yellowlegs, Red-necked Phalarope, Wilson's Snipe, and White-rumped Sandpiper, all new species for the park.

Table 3.6.1. Habitat type, number of points, and sampling dates for each transect or grid at Lake Meredith NRA, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
BOTTOM	Riparian	Bottomland grassland	17 [1]	3	5/5	5/6	5/7
CWOOD	Riparian	Cottonwood bottom	19 [1]	3	5/5	5/6	5/7
HONEY	Grassland	Upland grassland	19	3	5/2	5/3	5/4
UPLAND	Grassland	Upland grassland	19 [1]	3	5/2	5/3	5/4

[1] Not all points were sampled on each occasion.

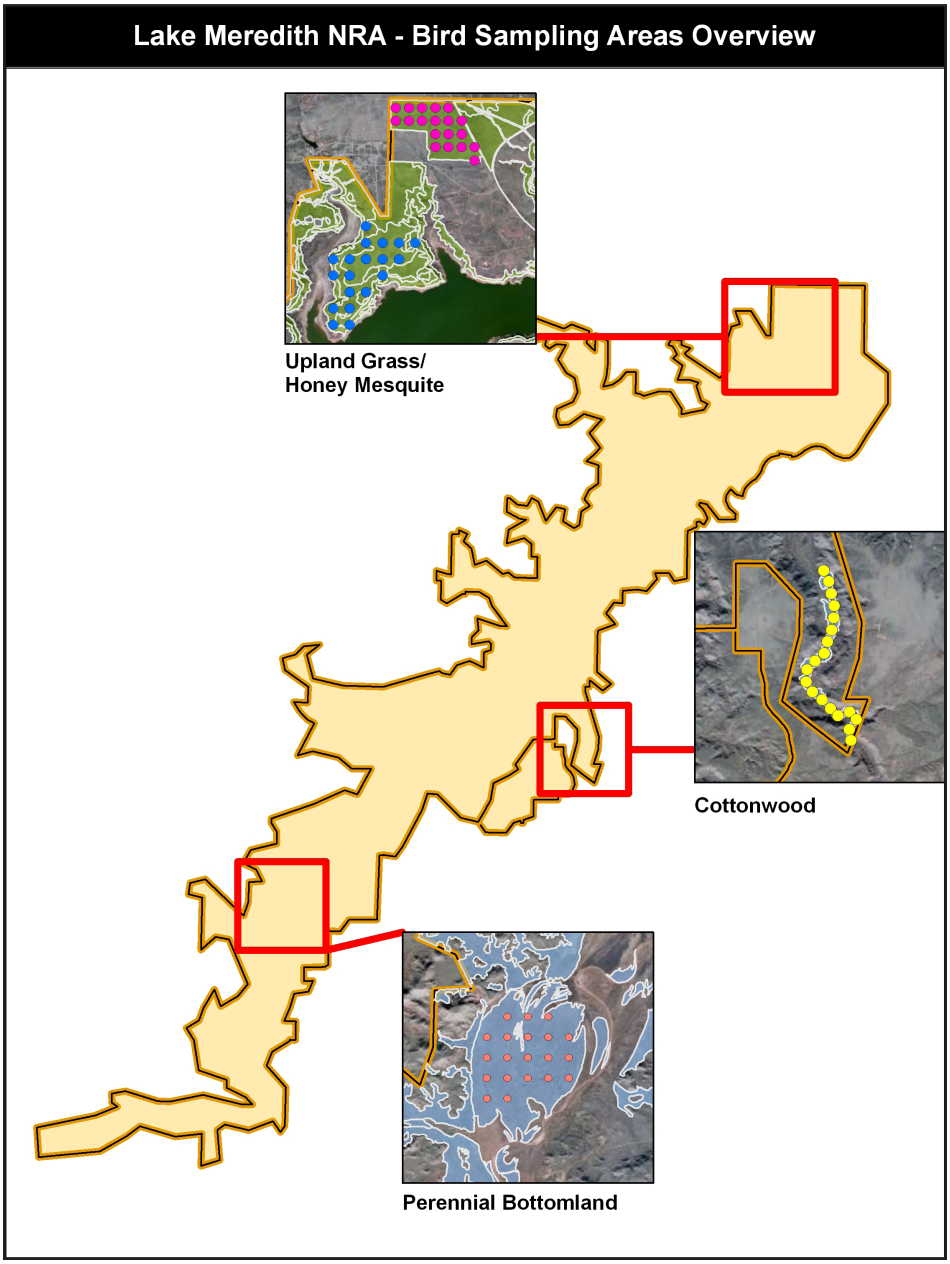


Figure 3.6.1-1. Bird sampling areas at Lake Meredith NRA.

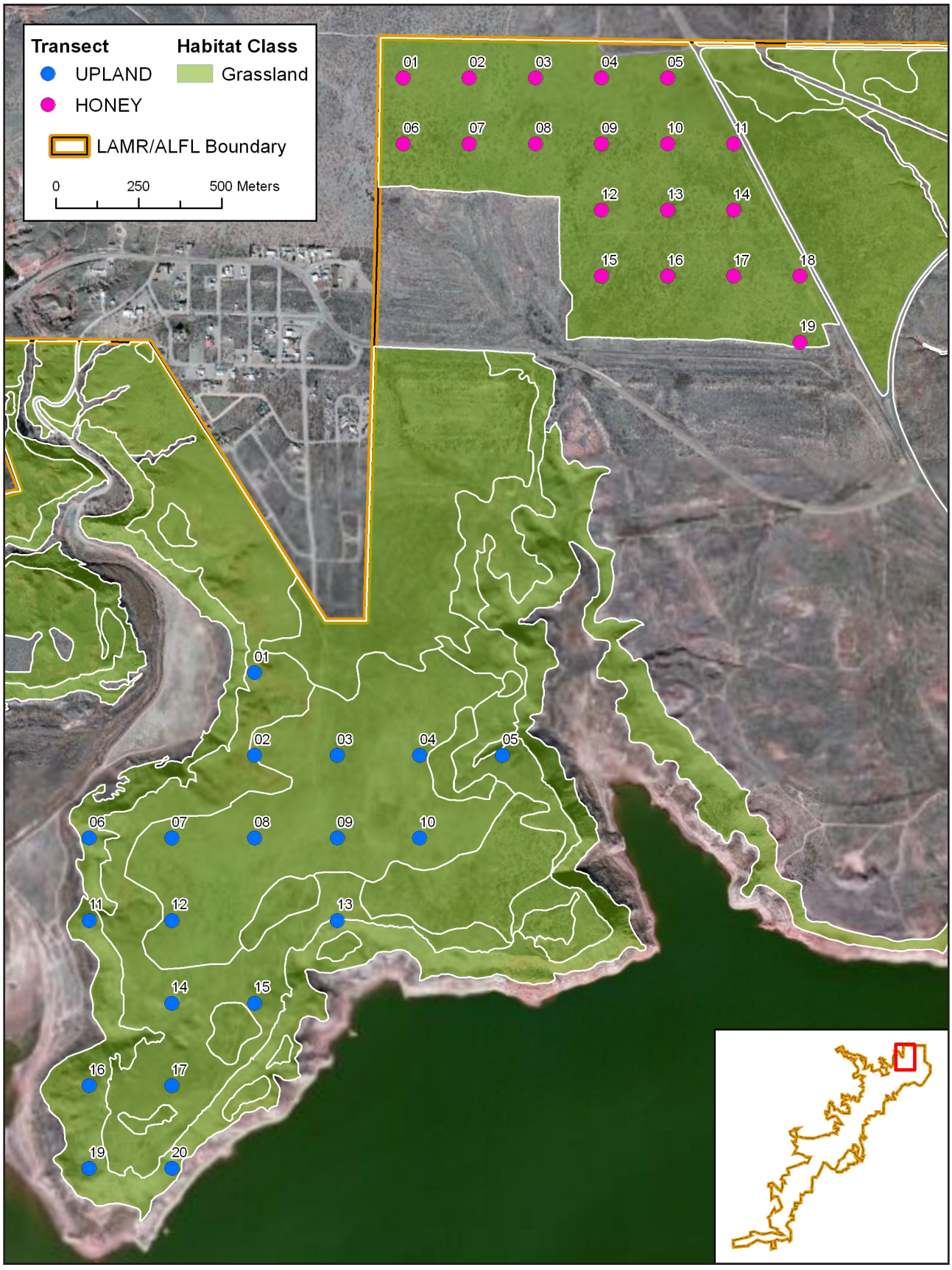


Figure 3.6.1-2. Point locations targeted for annual sampling at Lake Meredith NRA, Upland Grass/Honey Mesquite.

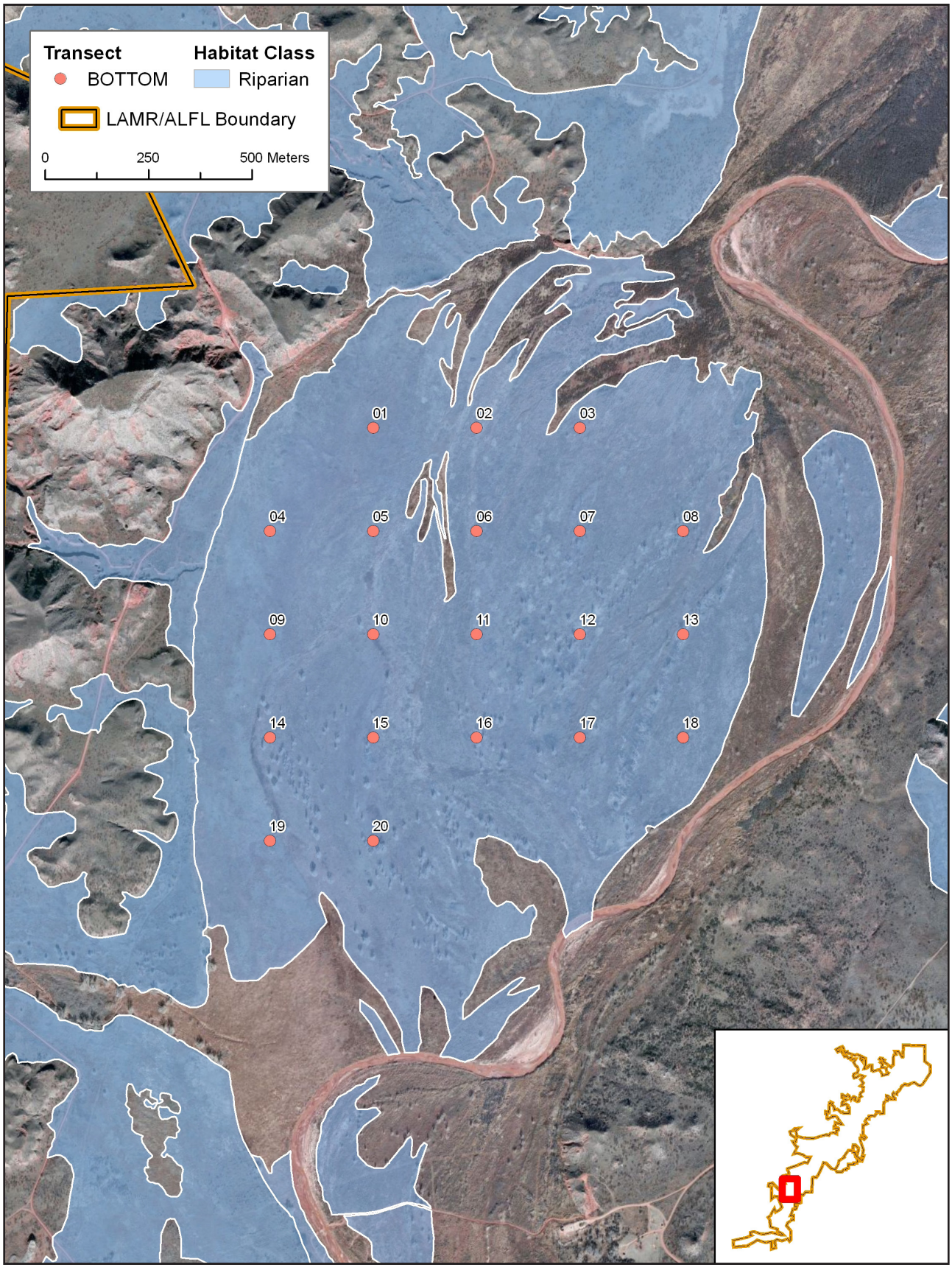


Figure 3.6.1-3. Point locations targeted for annual sampling at Lake Meredith NRA, Perennial Bottomland.

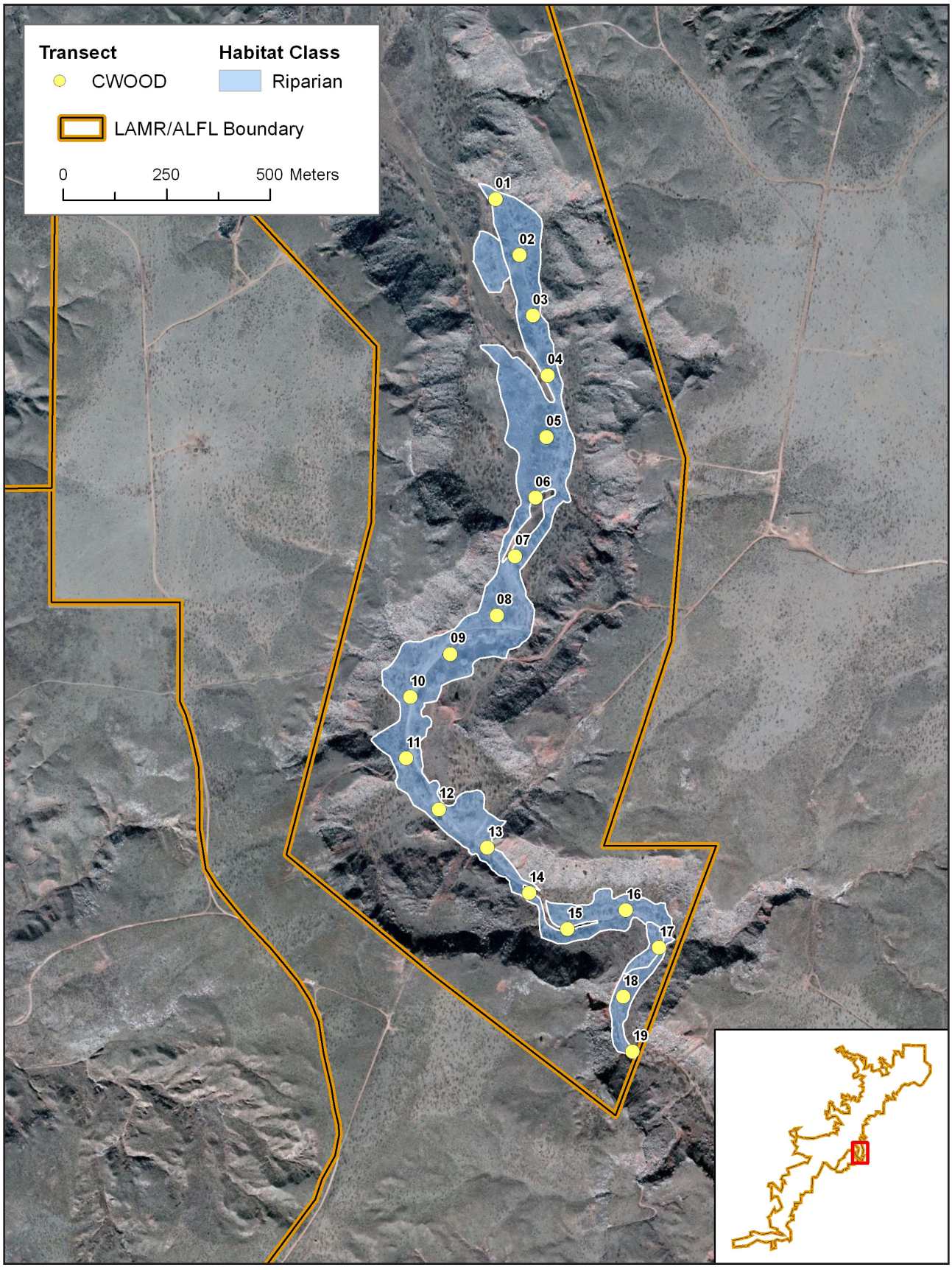


Figure 3.6.1-4. Point locations targeted for annual sampling at Lake Meredith NRA, Cottonwood.

Table 3.6.2. Number of birds counted of each species in each habitat class, Lake Meredith NRA, 2016

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Double-crested Cormorant	925	–	925	14
Red-winged Blackbird	241	317	558	9
Mourning Dove	123	205	328	5
Northern Bobwhite	241	67	308	5
Ring-billed Gull	265	–	265	4
Cassin's Sparrow	207	2	209	3
Cliff Swallow	189	13	202	3
Grasshopper Sparrow	152	1	153	2
Brown-headed Cowbird	31	116	147	2
American White Pelican	130	–	130	2
Northern Cardinal	37	80	117	2
Franklin's Gull	110	–	110	2
Rufous-crowned Sparrow	43	59	102	2
Common Grackle	61	39	100	2
White-crowned Sparrow	75	25	100	2
Rock Wren	29	60	89	1
Bewick's Wren	8	69	77	1
Chipping Sparrow	38	38	76	1
Northern Flicker	19	57	76	1
Lark Sparrow	46	26	72	1
Ash-throated Flycatcher	8	56	64	1
Northern Mockingbird	34	28	62	1
Western Kingbird	31	26	57	1
Eastern Meadowlark	1	55	56	1
Barn Swallow	52	2	54	1
White-faced Ibis	53	–	53	1
Turkey Vulture	21	31	52	1
American Kestrel	8	42	50	1
Bullock's Oriole	4	43	47	1
Ladder-backed Woodpecker	5	42	47	1
Vesper Sparrow	46	–	46	1
Scaled Quail	37	5	42	1
Great-tailed Grackle	41	–	41	1
Bank Swallow	38	2	40	1
Clay-colored Sparrow	25	15	40	1
Eurasian Collared-Dove	40	–	40	1
Greater Roadrunner	16	24	40	1
Great Blue Heron	38	1	39	1
Ring-necked Pheasant	–	39	39	1
American Coot	38	–	38	1

Table 3.6.2. Number of birds counted of each species in each habitat class, Lake Meredith NRA, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Common Yellowthroat	–	38	38	1
Pied-billed Grebe	38	–	38	1
Blue Jay	11	25	36	1
Blue-gray Gnatcatcher	–	33	33	1
Eared Grebe	33	–	33	1
Savannah Sparrow	32	–	32	1
Forster's Tern[1]	**28**	**–**	**28**	**0**
Mississippi Kite	–	28	28	0
Lesser Goldfinch	–	27	27	0
House Wren	4	22	26	0
Canyon Wren	–	22	22	0
Rock Pigeon	22	–	22	0
Red-bellied Woodpecker	2	19	21	0
Painted Bunting	–	20	20	0
Red-tailed Hawk	1	19	20	0
Warbling Vireo[1]	**–**	**18**	**18**	**0**
Blue Grosbeak	1	15	16	0
Horned Lark	16	–	16	0
Red-headed Woodpecker	–	15	15	0
Scissor-tailed Flycatcher	13	2	15	0
Northern Harrier	13	1	14	0
Dickcissel	–	13	13	0
Tree Swallow	12	–	12	0
Western Meadowlark	10	2	12	0
Killdeer	6	5	11	0
Mallard	4	7	11	0
Upland Sandpiper	9	2	11	0
American Pipit	9	–	9	0
Chihuahuan Raven	4	5	9	0
Eastern Kingbird	–	9	9	0
Northern Rough-winged Swallow	9	–	9	0
Wild Turkey	–	9	9	0
Baird's Sparrow	8	–	8	0
Canyon Towhee[1]	**4**	**4**	**8**	**0**
Swainson's Hawk	2	6	8	0
American Bittern[1]	**7**	**–**	**7**	**0**
European Starling	4	3	7	0
Blue-winged Teal	4	2	6	0
Field Sparrow	4	2	6	0
Sedge Wren	–	6	6	0

Table 3.6.2. Number of birds counted of each species in each habitat class, Lake Meredith NRA, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
American Robin	5	–	5	0
Spotted Towhee	–	5	5	0
American Goldfinch	3	1	4	0
Cedar Waxwing[1]	**–**	**4**	**4**	**0**
Lincoln's Sparrow	2	2	4	0
Virginia Rail	–	4	4	0
Bonaparte's Gull	3	–	3	0
Clark's Grebe[1]	**3**	**–**	**3**	**0**
Common Nighthawk	–	3	3	0
Gray Catbird[1]	**–**	**3**	**3**	**0**
House Finch	3	–	3	0
Long-billed Curlew[1]	**3**	**–**	**3**	**0**
Sora	–	3	3	0
Western Tanager[1]	**–**	**3**	**3**	**0**
Yellow-headed Blackbird	1	2	3	0
Brown Thrasher	–	2	2	0
Curve-billed Thrasher[1]	**–**	**2**	**2**	**0**
Greater Yellowlegs	–	2	2	0
Indigo Bunting	–	2	2	0
Lark Bunting	2	–	2	0
Loggerhead Shrike	2	–	2	0
Pine Siskin	2	–	2	0
Red-shafted Flicker	–	2	2	0
Swamp Sparrow	–	2	2	0
Yellow-billed Cuckoo	1	1	2	0
Yellow-rumped Warbler	–	2	2	0
Yellow-shafted Flicker	–	2	2	0
Belted Kingfisher	1	–	1	0
Black-crowned Night-Heron	1	–	1	0
Brewer's Blackbird	1	–	1	0
Common Raven[1]	**1**	**–**	**1**	**0**
Great Horned Owl	–	1	1	0
Green Heron	–	1	1	0
Northern Flicker intergrade	–	1	1	0
Say's Phoebe	1	–	1	0
Spotted Sandpiper	–	1	1	0
Sprague's Pipit[1]	**1**	**–**	**1**	**0**
Summer Tanager	–	1	1	0
White-winged Dove	–	1	1	0
Yellow Warbler	–	1	1	0

Table 3.6.2. Number of birds counted of each species in each habitat class, Lake Meredith NRA, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Unidentified blackbird	*299*	*31*	*330*	*5*
Unidentified sparrow	*62*	*23*	*85*	*1*
Unidentified swallow	*37*	*25*	*62*	*1*
Unidentified bird	*18*	*5*	*23*	*0*
Unidentified woodpecker	*–*	*9*	*9*	*0*
Unidentified duck	*5*	*–*	*5*	*0*
Unidentified hawk	*3*	*1*	*4*	*0*
Unidentified sandpiper	*3*	*–*	*3*	*0*
Unidentified hummingbird	*–*	*2*	*2*	*0*
Uunidentified bunting	*–*	*1*	*1*	*0*
Unidentified meadowlark	*1*	*–*	*1*	*0*
Unidentified raptor	*–*	*1*	*1*	*0*
Unidentified warbler	*–*	*1*	*1*	*0*
Total	**4,280**	**2,117**	**6,397**	**100%**

[1] New species that have not previously been verified for the park are shown in bold and shaded. Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.

3.7 Lyndon B. Johnson National Historical Park

3.7.1 2016 sampling

During April 2016, we sampled two transects or grids at Lyndon B. Johnson NHP (Figure 3.7.1-1, -2, -3). One transect was in riparian habitat (bottomland grassland) with 17 unique points (Table 3.7.1). The other transect was in grassland (upland grassland) habitat with six unique points. Each point was surveyed three times for a total of 69 point visits (the number of unique points multiplied by the number of visits) at the park.

3.7.2 Results and discussion

During 2016, 2,019 birds of 85 species were counted at Lyndon B. Johnson NHP (Table 3.7.2). Northern Cardinal had the highest number of birds counted (12% of the total number of birds counted), with Black-crested Titmouse (7%), White-winged Dove (5%), Brown-headed Cowbird (5%), Carolina Wren (5%), and Cedar Waxwing (5%) the next most common.

The Johnson Ranch unit hosted more diverse species and overall higher numbers than the Johnson City unit owing to its mixed habitats, larger size, and rural location; a variety of both resident and migrant species were recorded during the sampling period. A cold front and thunderstorms also played a role in the heightened bird activity, with several spring migrants "falling out." Additional effort by the field crew to record interesting species as "incidentals" in areas outside the established sampling grids also accounted for several sightings which would have otherwise been overlooked. An example is Sprague's Pipit (not shown in Table 3.7.2), a notable, new species for the park, which was found to winter in good numbers in the grasslands at the airstrip. The grasslands, small ponds, mixed woods, and open habitats at the airstrip and auto loop had the most bird activity, and several species were observed there that were not detected during the surveys. For example, an unexpected flock of 15 migrant, adult breeding-plumaged Franklin's Gulls was photographed grounded on the airstrip during the thunderstorms, and a small group of Yellow-headed Blackbirds in breeding plumage was a nice addition to the expected blackbird species.

The riparian corridor and mixed woods along the Pedernales River were good for passerines and notably, for 10 species of raptors which may have been migrants affected by the weather systems. Expected waterfowl, shorebirds, and waders usually present were scarce due to the fast-flowing high water levels with the ongoing rains, and only Gadwall, Spotted Sandpiper, and Great Blue Heron were observed in low numbers. Cave Swallows were again noted breeding among the Cliff Swallows at the bridge colony, and active nests were observed for Eastern Phoebe, Black-chinned Hummingbird, Red-shouldered Hawk, Great-crested Flycatcher, and Red-bellied Woodpecker. Great Horned Owl and Chuck-will's-Widow were vocal at night in the mixed woodland. Two new species for the park (Swainson's Thrush and Ring-necked Pheasant) were detected on the riparian transect during surveys.

The Johnson City unit had good numbers of species representative of open grasslands (Scissor-tailed Flycatcher, Eastern Bluebird), mixed woodland (Yellow-throated Vireo, Blue Jay), and urban settings (Chimney Swift, European Starling). A territorial and vocal Greater Roadrunner was a rare find at the VIP campsite, and active nests with young were observed for Black-crested Titmouse, Golden-fronted Woodpecker, and Field Sparrow. Black-chinned Hummingbird was more numerous given the presence of feeders at nearby homes, as were seed-eating urban species (e.g., House Sparrow). At night, Great Horned Owl and Chuck-will's-Widow were vocal in suitable breeding habitat.

Table 3.7.1. Habitat type, number of points, and sampling dates for each transect or grid at Lyndon B. Johnson NHP, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
RANCH	Riparian	Bottomland grassland	17	3	4/22	4/23	4/24
RESTORATION	Grassland	Upland grassland	6	3	4/22	4/23	4/24

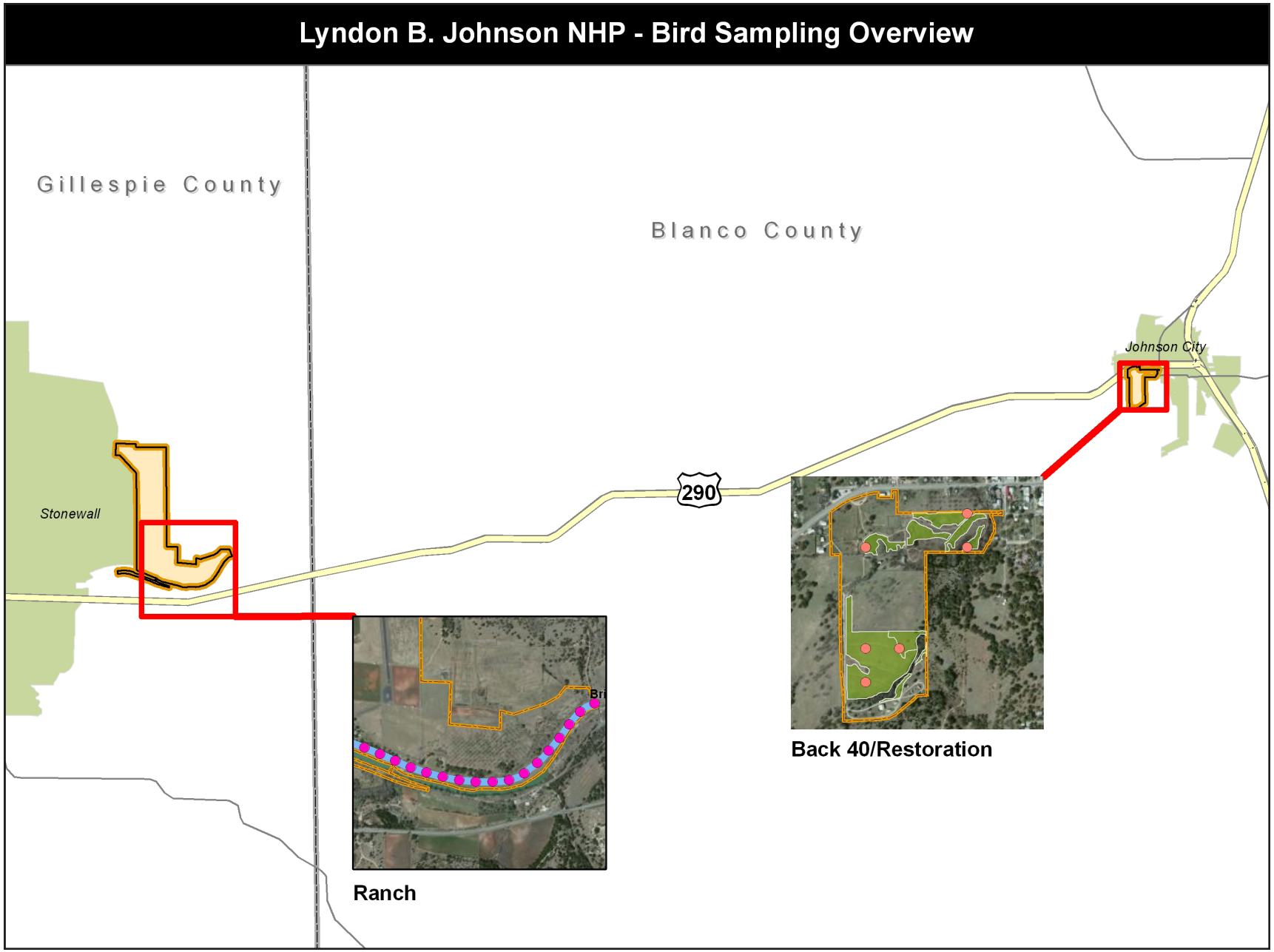


Figure 3.7.1-1. Bird sampling areas at Lyndon B. Johnson NHP.

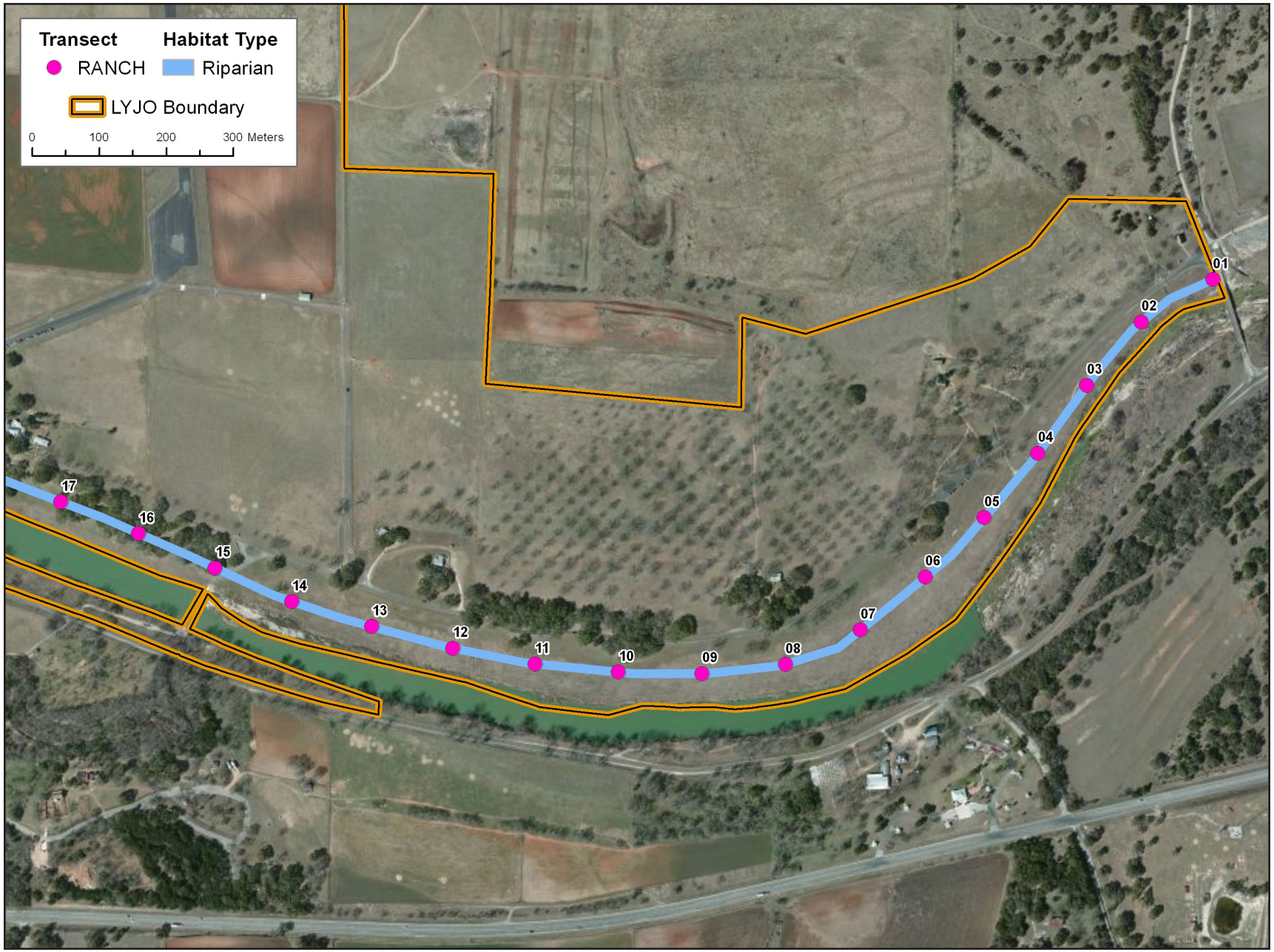


Figure 3.7.1-2. Point locations targeted for annual sampling at Lyndon B. Johnson NHP, Ranch.

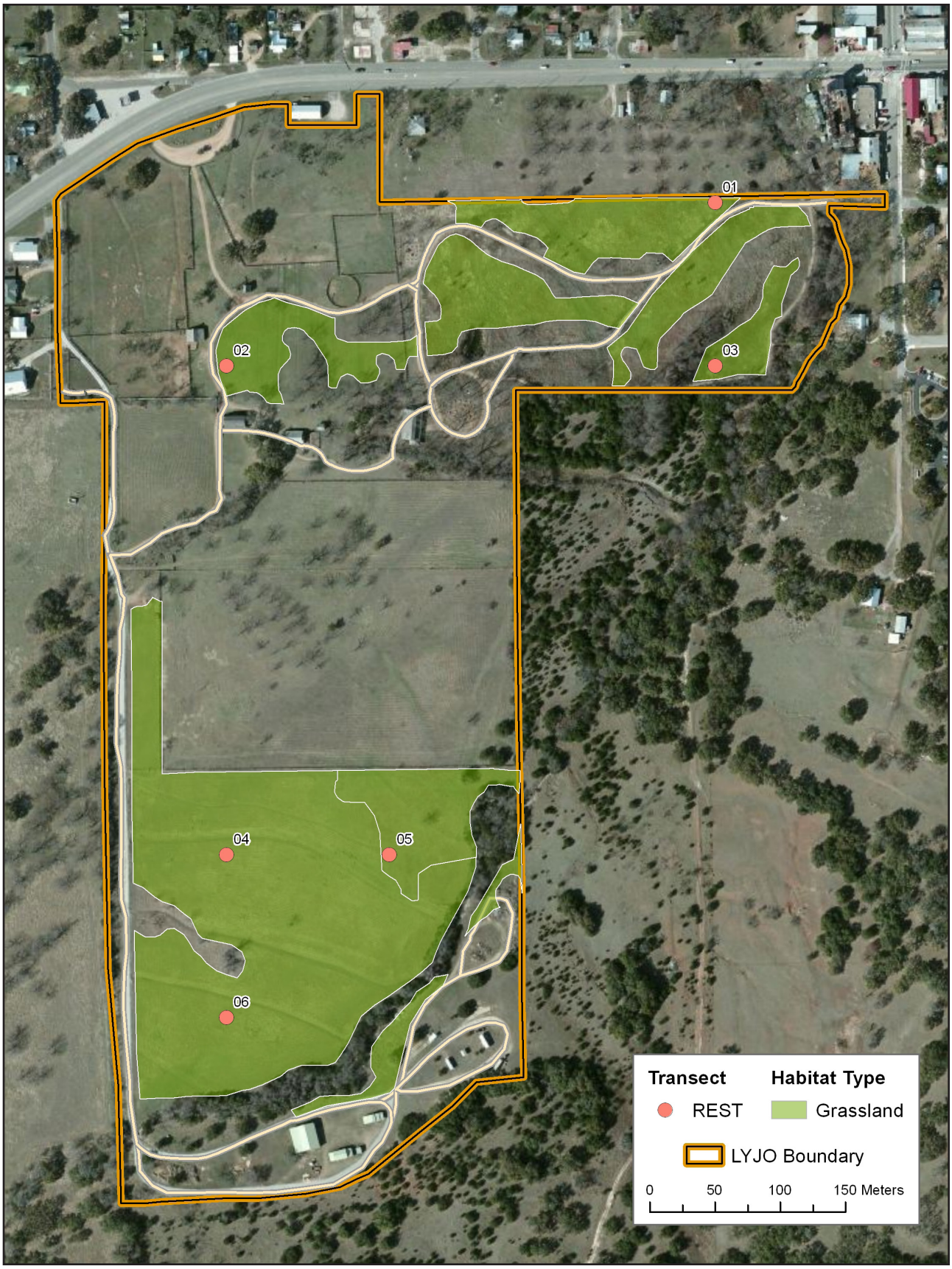


Figure 3.7.1-3. Point locations targeted for annual sampling at Lyndon B. Johnson NHP, Back 40/Restoration.

Table 3.7.2. Number of birds counted of each species in each habitat class, Lyndon B. Johnson NHP, 2016

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Northern Cardinal	56	196	252	12
Black-crested Titmouse	19	123	142	7
White-winged Dove	74	36	110	5
Brown-headed Cowbird	16	86	102	5
Carolina Wren	35	66	101	5
Cedar Waxwing	17	76	93	5
Summer Tanager	9	76	85	4
Bewick's Wren	19	62	81	4
Mourning Dove	36	37	73	4
Turkey Vulture	8	63	71	4
Scissor-tailed Flycatcher	31	33	64	3
Cave Swallow	2	57	59	3
Barn Swallow	9	44	53	3
Orchard Oriole	13	34	47	2
Black Vulture	14	28	42	2
Yellow-throated Vireo	7	29	36	2
Common Grackle	4	29	33	2
Eastern Phoebe	–	33	33	2
Great-tailed Grackle	1	31	32	2
Red-bellied Woodpecker	5	27	32	2
Northern Mockingbird	28	3	31	2
Golden-fronted Woodpecker	2	28	30	1
Carolina Chickadee	8	21	29	1
Ladder-backed Woodpecker	3	21	24	1
Chimney Swift	21	–	21	1
Lark Sparrow	10	11	21	1
House Sparrow	4	15	19	1
Nashville Warbler	2	16	18	1
Black-chinned Hummingbird	4	9	13	1
Blue Grosbeak	–	13	13	1
Crested Caracara	4	9	13	1
European Starling	2	11	13	1
Orange-crowned Warbler	2	11	13	1
Great Crested Flycatcher	–	11	11	1
Painted Bunting	1	9	10	0
Chipping Sparrow	2	7	9	0
Great Egret	–	9	9	0
Eastern Bluebird	8	–	8	0
House Finch	3	5	8	0
American Goldfinch	–	7	7	0

Table 3.7.2. Number of birds counted of each species in each habitat class, Lyndon B. Johnson NHP, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Black-bellied Whistling-Duck	2	5	7	0
Downy Woodpecker	1	6	7	0
Eurasian Collared-Dove	4	3	7	0
Savannah Sparrow	3	4	7	0
White-eyed Vireo	7	–	7	0
Yellow-rumped Warbler	1	6	7	0
Wild Turkey	3	3	6	0
Chihuahuan Raven	2	3	5	0
Clay-colored Sparrow	–	5	5	0
Grasshopper Sparrow	5	–	5	0
Lesser Goldfinch	4	1	5	0
Lincoln's Sparrow	1	4	5	0
Red-tailed Hawk	–	5	5	0
Bell's Vireo	1	3	4	0
Common Yellowthroat	–	4	4	0
Dickcissel	1	3	4	0
Double-crested Cormorant	–	4	4	0
Great Blue Heron	–	4	4	0
Myrtle Warbler	–	4	4	0
Swainson's Hawk	–	4	4	0
Audubon's Warbler	2	1	3	0
Broad-winged Hawk	1	2	3	0
Eastern Kingbird	2	1	3	0
Field Sparrow	2	1	3	0
Mississippi Kite	–	3	3	0
Pine Siskin	1	2	3	0
Purple Martin	–	3	3	0
Red-shouldered Hawk	1	2	3	0
Red-winged Blackbird	–	3	3	0
American Robin	2	–	2	0
Black-and-white Warbler	–	2	2	0
Blue Jay	2	–	2	0
Cliff Swallow	1	1	2	0
Cooper's Hawk	2	–	2	0
Great Horned Owl	1	1	2	0
Green Heron	–	2	2	0
Swainson's Thrush[1]	**–**	**2**	**2**	**0**
Yellow Warbler	–	2	2	0
Chuck-will's-widow	1	–	1	0
Gadwall	–	1	1	0

Table 3.7.2. Number of birds counted of each species in each habitat class, Lyndon B. Johnson NHP, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Greater Roadrunner	1	–	1	0
Indigo Bunting	–	1	1	0
Killdeer	1	–	1	0
Ring-necked Pheasant[1]	**–**	**1**	**1**	**0**
Spotted Sandpiper	–	1	1	0
Total	**534**	**1,485**	**2,019**	**100**

[1] New species that have not previously been verified for the park are shown in bold and shaded. Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.



PHOTO: KEVIN WELSH

Scissor-tailed Flycatcher (*Tyrannus forficatus*) accounted for 3% of the birds counted at the park in 2016.

3.8 Pecos National Historical Park

3.8.1 2016 sampling

During June 2016, we sampled six transects or grids at Pecos NHP (Figure 3.8.1). Four transects were in the grassland habitat class (shortgrass prairie), with 6 to 18 unique points each. Two transects were in the riparian habitat class (cottonwood bottom), with 17 or 18 unique points each (Table 3.8.1). Most points were surveyed three times for a total of 271 point visits (the number of unique points multiplied by the number of visits) at the park in 2016.

3.8.2 Results and discussion

We counted 6,149 birds of 96 species at Pecos NHP in 2016 (Table 3.8.2). This ranked the park second in both the number of birds counted and the number of species counted among the 10 SOPN parks surveyed. Species recorded in the highest numbers were Cassin's Kingbird (6% of the total number of birds counted), Spotted Towhee (6%), Lark Sparrow (5%), Common Raven (5%), and Cliff Swallow (4%). Other prominent species were Pinyon Jay, Western Wood-Pewee, Lesser Goldfinch, and Mourning Dove. During sampling in 2016, eight species were recorded at the park for the first time (see Table 3.8.2).

The willow thickets and cottownwoods hosted numerous Yellow Warbler, Yellow-breasted Chat, and Song Sparrow, as well as some Gray Catbird, Lazuli Bunting, and Violet-green Swallow; this was an interesting mix of species and unlike any other location in SOPN. Near one point, a male Canyon Wren was conspicuously singing and led us to a female sitting on a nest under a ledge in a rock wall alcove. Numerous cavity nesters used the trees near several points (e.g., Violet-green Swallow, Red-shafted Flicker, and White-breasted Nuthatch). The swallows were numerous at times, with Violet-green Swallow, Cliff Swallow, Barn Swallow, and Northern Rough-winged Swallow all present. Some interesting waterbird detections included Common Merganser, Mallard, and Spotted Sandpiper, and some interesting songbird detections included Western Tanager, Grace's Warbler, and Evening Grosbeak.

On the PECOS transect, the riparian woods were mature enough to have species such as Violet-green Swallow, Bank Swallow, and Yellow-breasted Chat. In upland habitat, we observed Mountain Chickadee, Juniper Titmouse, and Bushtit. We had great views of Townsend's Solitaire, and a Lewis's Woodpecker was seen feeding young in a dead snag.

The UNIT 6 grid was quieter than the riparian areas. Being towards the end of the breeding season, not many birds were singing, and juvenile birds were commonly detected. Some species with juveniles on this grid were both Western Bluebird and Mountain Bluebird, Lark Sparrow, and Juniper Titmouse.



PHOTO: KEVIN WELSH

Evening Grosbeak (*Coccothraustes vespertinus*) was recorded in riparian habitat at Pecos NHP in 2016.

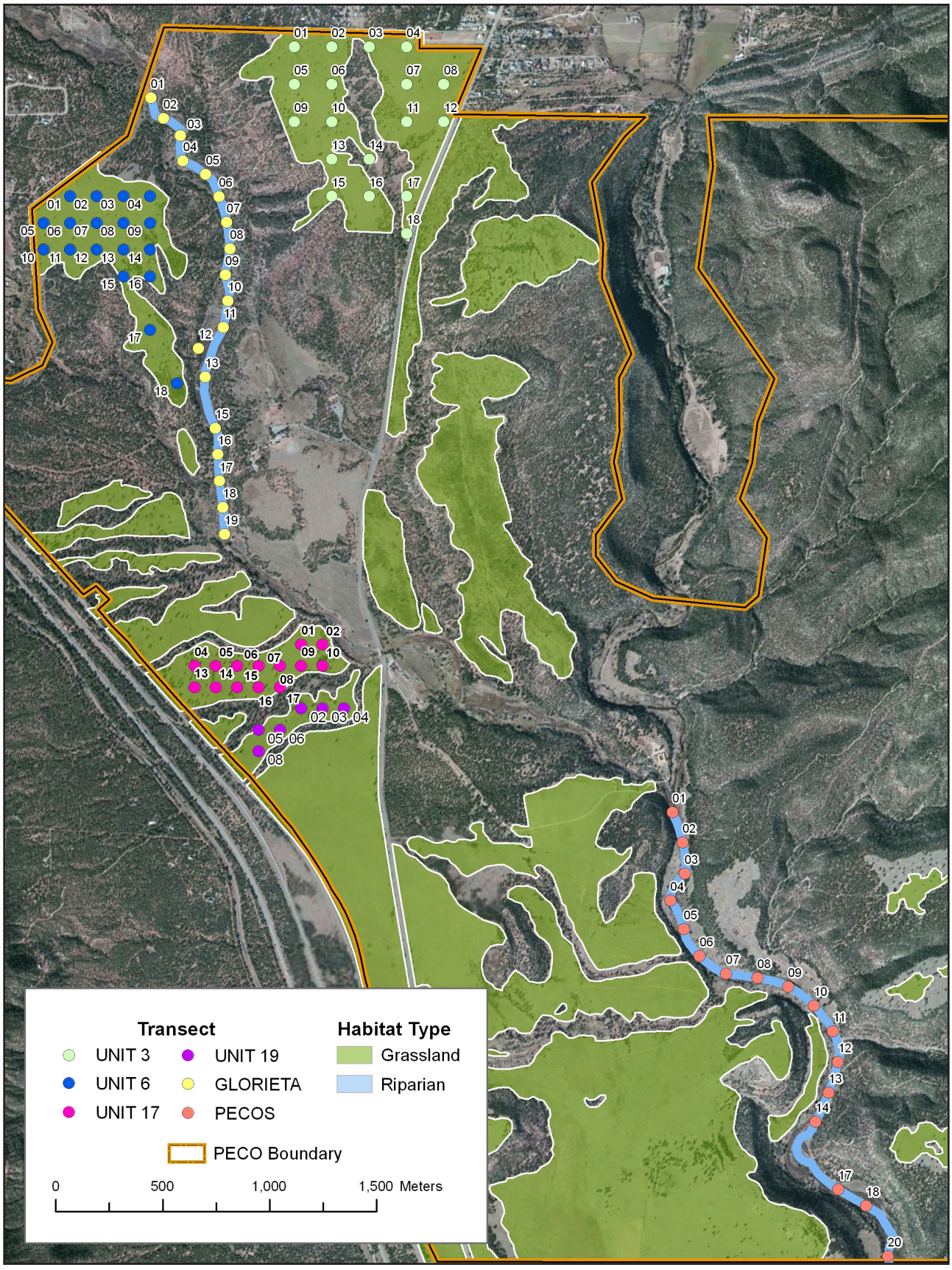


Figure 3.8.1. Point locations targeted for annual sampling at Pecos NHP.

Table 3.8.1. Habitat type, number of points, and sampling dates for each transect or grid at Pecos NHP, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
GLORIETA	Riparian	Cottonwood bottom	18	3	6/24	6/25	6/26
PECOS	Riparian	Cottonwood bottom	17 [1]	3	6/24	6/25	6/26
UNIT 3	Grassland	Shortgrass prairie	18	2	6/22	6/23	6/24
UNIT 6	Grassland	Shortgrass prairie	18 [1]	3	6/25	6/26	6/27
UNIT 17	Grassland	Shortgrass prairie	14	3	6/27	6/28	6/29
UNIT 19	Grassland	Shortgrass prairie	6	3	6/27	6/28	6/29

[1] Not all points were sampled on each occasion.

Table 3.8.2. Number of birds counted of each species in each habitat class, Pecos NHP, 2016

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Cassin's Kingbird	319	65	384	6
Spotted Towhee	116	243	359	6
Lark Sparrow	313	5	318	5
Common Raven	232	73	305	5
Cliff Swallow	222	49	271	4
Pinyon Jay	229	8	237	4
Western Wood-Pewee	125	108	233	4
Lesser Goldfinch	105	127	232	4
Mourning Dove	136	90	226	4
Black-headed Grosbeak	78	117	195	3
Ash-throated Flycatcher	129	62	191	3
Violet-green Swallow	51	132	183	3
Juniper Titmouse	121	44	165	3
Chipping Sparrow	148	9	157	3
House Finch	128	11	139	2
Woodhouse's Scrub-Jay	70	67	137	2
Bushtit	38	98	136	2
Mountain Bluebird	112	5	117	2
American Robin	65	51	116	2
Yellow Warbler	1	106	107	2
Yellow-breasted Chat	13	92	105	2
Mountain Chickadee	49	52	101	2
Song Sparrow	–	100	100	2
Northern Flicker	62	36	98	2
Plumbeous Vireo	75	18	93	2
American Crow	80	11	91	1
Bewick's Wren	54	34	88	1
White-breasted Nuthatch	51	28	79	1

Table 3.8.2. Number of birds counted of each species in each habitat class, Pecos NHP, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Vesper Sparrow	75	–	75	1
Black-billed Magpie	69	5	74	1
Brown-headed Cowbird	26	46	72	1
Brewer's Blackbird	6	56	62	1
Western Meadowlark	58	4	62	1
Eurasian Collared-Dove	57	2	59	1
Pine Siskin	38	15	53	1
Barn Swallow	35	8	43	1
Black-chinned Hummingbird	15	27	42	1
Bullock's Oriole	32	8	40	1
Western Kingbird	31	9	40	1
Gray Flycatcher	23	10	33	1
Northern Rough-winged Swallow	10	22	32	1
Red-tailed Hawk	29	2	31	1
Cedar Waxwing	3	25	28	0
Pygmy Nuthatch	27	–	27	0
Red-shafted Flicker	14	12	26	0
Western Bluebird	19	7	26	0
White-winged Dove	26	–	26	0
Cordilleran Flycatcher	3	19	22	0
Say's Phoebe	20	2	22	0
Gray Catbird	1	18	19	0
Red Crossbill	5	12	17	0
Blue-gray Gnatcatcher	3	13	16	0
Hepatic Tanager	14	1	15	0
Grace's Warbler	13	–	13	0
Mallard	–	13	13	0
Black-throated Gray Warbler	4	8	12	0
Broad-tailed Hummingbird	6	6	12	0
Great Blue Heron	1	10	11	0
Red-winged Blackbird	11	–	11	0
Canyon Wren	–	9	9	0
Turkey Vulture	6	3	9	0
Blue Grosbeak	4	4	8	0
Audubon's Warbler	2	5	7	0
Black Phoebe	–	7	7	0
MacGillivray's Warbler	–	7	7	0
Yellow-rumped Warbler	5	2	7	0
Downy Woodpecker	1	5	6	0
Summer Tanager	–	5	5	0

Table 3.8.2. Number of birds counted of each species in each habitat class, Pecos NHP, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Cooper's Hawk	3	1	4	0
Northern Bobwhite	2	2	4	0
Virginia's Warbler	2	2	4	0
Dusky Flycatcher	3	–	3	0
Hairy Woodpecker	1	2	3	0
Lazuli Bunting[1]	**1**	**2**	**3**	**0**
Northern Mockingbird	3	–	3	0
Red-breasted Nuthatch	3	–	3	0
Virginia Rail[1]	**–**	**3**	**3**	**0**
Common Merganser	–	2	2	0
Eastern Meadowlark[1]	**2**	**–**	**2**	**0**
Green-tailed Towhee	2	–	2	0
House Wren	1	1	2	0
Lewis's Woodpecker[1]	**–**	**2**	**2**	**0**
Spotted Sandpiper	–	2	2	0
Western Tanager	–	2	2	0
American Kestrel	–	1	1	0
Canyon Towhee	1	–	1	0
Cassin's Vireo[1]	**–**	**1**	**1**	**0**
Chipping Sparrow	1	–	1	0
Common Grackle	1	–	1	0
Common Nighthawk	1	–	1	0
Evening Grosbeak	–	1	1	0
Northern Flicker intergrade[1]	**1**	**–**	**1**	**0**
Ruby-crowned Kinglet	1	–	1	0
Rufous Hummingbird[1]	**–**	**1**	**1**	**0**
Townsend's Solitaire[1]	**–**	**1**	**1**	**0**
Warbling Vireo	–	1	1	0
Unidentified bird	*5*	*6*	*11*	*0*
Unidentified hummingbird	*2*	*8*	*10*	*0*
Unidentified swallow	*1*	*5*	*6*	*0*
Unidentified woodpecker	*2*	*–*	*2*	*0*
Unidentified vireo	*–*	*1*	*1*	*0*
Unidentified warbler	*–*	*1*	*1*	*0*
Unidentified warbler	*–*	*1*	*1*	*0*
Total	**3,853**	**2,296**	**6,149**	**100%**

[1] New species that have not previously been verified for the park are shown in bold and shaded. Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.

3.9 Sand Creek Massacre National Historic Site

3.9.1 2016 sampling

During May and June 2016, we sampled three transects or grids at Sand Creek Massacre NHS (Figure 3.9.1). Two transects were in grassland habitat (shortgrass prairie) with 20 unique points each, and one transect was in riparian habitat (cottonwood bottom) with 16 unique points (Table 3.9.1). Most points were surveyed three times for a total of 167 point visits (the number of unique points multiplied by the number of visits) at the park.

3.9.2 Results and discussion

During 2016, 3,604 birds of 57 species were counted at Sand Creek Massacre NHS (Table 3.9.2). Mourning Dove, recorded in both habitat types in substantial numbers, was the most commonly counted species in the park (17% of the total number of birds counted). Other common species, in order of number counted, included Western Meadowlark (14%), Cassin's Sparrow (11%), Lark Bunting (9%), Western Kingbird (9%), Horned Lark (7%), Grasshopper Sparrow (6%), and Bullock's Oriole (5%). There were eight new species for the park in 2016 (see Table 3.9.2).

On the UPLAND SAGE and UPLAND GRASS transects/grids, it was almost impossible to not hear singing males of Cassin's Sparrow and Lark Bunting on territory or see them performing flight displays. Also observed was some interesting habitat usage by Bullock's Oriole, which was seen flying, seemingly from long distances over the open sagebrush, foraging in low scrub, and then flying a long way back towards the cottonwood gallery. SAGE point 6 was near enough to the Sand Creek wash to pick up cottonwood-loving species like Yellow Warbler. Also at that point was a relatively small area of exposed rock and eroded hillside where a pair of Rock Wrens was observed. Lark Buntings were comparably fewer on the GRASS grid even though the two grids are not far apart. Horned Lark and Western Meadowlark were very common. Towards the east side of the GRASS grid was a low draw that holds some water and wetland vegetation. Red-winged Blackbirds were concentrated there, and a few Great Blue Herons were observed traversing the waterway. Past the east boundary is open agricultural land that was mostly bare soil at the time, which may have affected species composition. At least one Burrowing Owl was detected on a point nearby. A pair of Red-tailed Hawks had a nest in the cottonwood gallery. Also on the COTTONWOOD transect were Western Kingbird, Mourning Dove, Bullock's Oriole, and Orchard Oriole.

Table 3.9.1. Habitat type, number of points, and sampling dates for each transect or grid at Sand Creek Massacre NHS, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
COTTONWOOD	Riparian	Cottonwood bottom	16	3	6/2	6/3	6/4
UPLAND GRASS	Grassland	Shortgrass prairie	20[1]	3	5/30	5/31	6/1
UPLAND SAGE	Grassland	Shortgrass prairie	20	3	5/30	5/31	6/1

[1] Not all points were sampled on each occasion.



PHOTO: JOHN MULLER

Greater Roadrunner (*Geococcyx californianus*) was a new species for the park in 2016.



Figure 3.9.1. Point locations targeted for annual sampling at Sand Creek Massacre NHS.

Table 3.9.2. Number of birds counted of each species in each habitat class, Sand Creek Massacre NHS, 2016

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Mourning Dove	360	256	616	17
Western Meadowlark	408	93	501	14
Cassin's Sparrow	349	36	385	11
Lark Bunting	326	1	327	9
Western Kingbird	136	175	311	9
Horned Lark	259	1	260	7
Grasshopper Sparrow	190	10	200	6
Bullock's Oriole	48	144	192	5
Yellow Warbler	2	66	68	2
European Starling	16	45	61	2
Ring-necked Pheasant	45	11	56	2
Red-winged Blackbird	41	11	52	1
Eastern Kingbird	19	32	51	1
Lark Sparrow	36	13	49	1
Brown-headed Cowbird	21	23	44	1
Red-tailed Hawk	32	5	37	1
Common Grackle	22	13	35	1
Northern Mockingbird	10	20	30	1
Red-headed Woodpecker	9	21	30	1
Orchard Oriole	2	26	28	1
Killdeer	18	5	23	1
Northern Flicker	4	18	22	1
American Kestrel	12	9	21	1
House Wren	–	18	18	0
Barn Swallow	17	–	17	0
Common Nighthawk	16	–	16	0
Scaled Quail	9	4	13	0
Western Wood-Pewee	–	11	11	0
Brewer's Sparrow	9	–	9	0
Lesser Goldfinch	6	3	9	0
Eurasian Collared-Dove	4	2	6	0
Great Horned Owl	–	6	6	0
Dickcissel	2	3	5	0
Mallard	5	–	5	0
Swainson's Hawk	4	1	5	0
Warbling Vireo	–	5	5	0
Blue Grosbeak	4	–	4	0
Northern Bobwhite[1]	**4**	**–**	**4**	**0**
Rock Wren	4	–	4	0
Downy Woodpecker	–	3	3	0

Table 3.9.2. Number of birds counted of each species in each habitat class, Sand Creek Massacre NHS, 2016, cont.

Species	Habitat class		# of Birds counted	
	Grassland	Riparian	Total	% of total
Indigo Bunting	–	3	3	0
Turkey Vulture	3	–	3	0
White-breasted Nuthatch	–	3	3	0
Yellow-shafted Flicker	–	3	3	0
Blue Jay	–	2	2	0
Brown Thrasher	1	1	2	0
Burrowing Owl	2	–	2	0
Dusky Flycatcher[1]	**–**	**2**	**2**	**0**
Bewick's Wren[1]	**1**	**–**	**1**	**0**
Brewer's Blackbird	1	–	1	0
Cassin's Kingbird[1]	**–**	**1**	**1**	**0**
Cedar Waxwing	–	1	1	0
Great Blue Heron	1	–	1	0
Greater Roadrunner[1]	**1**	**–**	**1**	**0**
Northern Rough-winged Swallow[1]	**1**	**–**	**1**	**0**
Red-shafted Flicker[1]	**–**	**1**	**1**	**0**
Swainson's Thrush	1	–	1	0
Unidentified bird	*6*	*2*	*8*	*0*
Unidentified empidonax flycatcher	*–*	*7*	*7*	*0*
Unidentified sparrow	*5*	*–*	*5*	*0*
Unidentified woodpecker	*3*	*2*	*5*	*0*
Unidentified meadowlark	*4*	*–*	*4*	*0*
Unidentified blackbird	*2*	*–*	*2*	*0*
Unidentified raptor	*2*	*–*	*2*	*0*
Unidentified bunting	*1*	*–*	*1*	*0*
Unidentified flycatcher	*–*	*1*	*1*	*0*
Unidentified swallow	*1*	*–*	*1*	*0*
Total	**2,485**	**1,119**	**3,604**	**100%**

[1] Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.

3.10 Washita Battlefield National Historic Site

3.10.1 2016 sampling

During May 2016, we sampled two transects/grids at Washita Battlefield NHS (Figure 3.10.1). Both transects were in grassland habitat, bottomland grassland and upland grassland, with 18 and 19 unique points, respectively (Table 3.10.1). Points were surveyed three times for a total of 110 point visits (the number of unique points multiplied by the number of visits) at the historic site.

3.10.2 Results and discussion

During 2016, 2,371 birds of 65 species were counted at Washita Battlefield NHS (Table 3.10.2). Dickcissel had the highest number of birds counted at the park in 2016, accounting for 15% of the total number of birds counted. The next most counted species were Northern Bobwhite (12%), Eastern Meadowlark (9%), Cliff Swallow (8%), Northern Cardinal (5%), Brown-headed Cowbird (4%), and Painted Bunting (4%). Five new species were recorded for the park in 2016 (Table 3.10.2).

On the eastern points of the UPLAND transect, we observed many Clay-colored Sparrow, Cassin's Sparrow, and Grasshopper Sparrow. Eastern Meadowlark, Dickcissel, and Northern Bobwhite were abundant on all points. Some grassland species were detected here that were not detected on the RESTORATION transect, such as Grasshopper Sparrow and Cassin's Sparrow. The highlight on the transect was a singing Olive-sided Flycatcher. On the RESTORATION transect, Dickcissel and Eastern Meadowlark were abundant on territory. Painted Bunting and Blue Grosbeak seemed to be new arrivals. Creekside of points 10, 4, and 1, Yellow-billed Cuckoo were calling and singing.

Table 3.10.1. Habitat type, number of points, and sampling dates for each transect or grid at Washita Battlefield NHS, 2016

Transect/Grid	Habitat class	Habitat type	# Points	# Visits	Visit 1	Visit 2	Visit 3
RESTORATION	Grassland	Bottomland grassland	18	3	5/8	5/9	5/10
UPLAND	Grassland	Upland grassland	19[1]	3	5/8	5/9	5/10

[1] Not all points were sampled on each occasion.



PHOTO: JOHN MULLER

One Swainson's Hawk (*Buteo swainsoni*) was recorded at Washita Battlefield NHS in 2016.

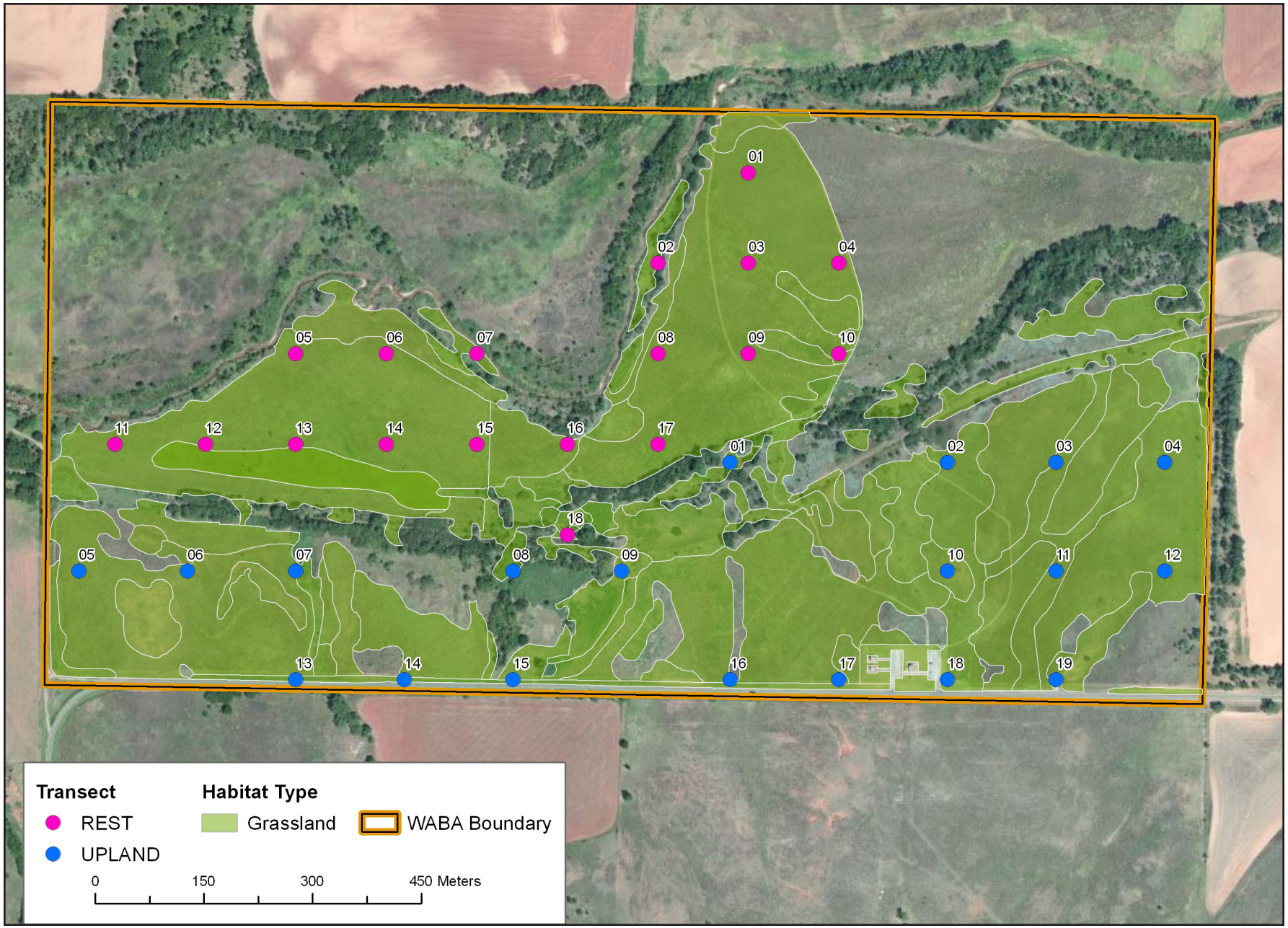


Figure 3.10.1. Point locations targeted for annual sampling at Washita Battlefield NHS.

Table 3.10.2. Number of birds counted of each species in each habitat class, Washita Battlefield NHS, 2016

Species	# of Birds counted	
	Total (grassland habitat)	% of total
Dickcissel	348	15
Northern Bobwhite	279	12
Eastern Meadowlark	205	9
Cliff Swallow	201	8
Northern Cardinal	124	5
Brown-headed Cowbird	102	4
Painted Bunting	90	4
Mourning Dove	80	3
Blue-gray Gnatcatcher	77	3
Cedar Waxwing	74	3
Lark Sparrow	66	3
Red-bellied Woodpecker	61	3
Blue Grosbeak	54	2
Turkey Vulture	43	2
Clay-colored Sparrow	37	2
Barn Swallow	34	1
Cassin's Sparrow	32	1
Red-winged Blackbird	32	1
Eastern Bluebird	28	1
Field Sparrow	27	1
Common Grackle	24	1
Brown Thrasher	23	1
American Crow	22	1
Northern Mockingbird	21	1
Red-headed Woodpecker	17	1
Downy Woodpecker	15	1
Mississippi Kite	14	1
Chipping Sparrow	13	1
Grasshopper Sparrow	13	1
Carolina Chickadee	12	1
Yellow-billed Cuckoo	12	1
Blue Jay	11	0
Bewick's Wren	9	0
Yellow Warbler	9	0
Great Crested Flycatcher	7	0
Killdeer	7	0
Red-tailed Hawk	7	0
Tufted Titmouse	7	0
Western Kingbird	7	0
American Robin	6	0
Carolina Wren	6	0
Northern Harrier	6	0
Northern Flicker	5	0
White-crowned Sparrow	5	0
Cattle Egret[1]	**4**	**0**
Common Nighthawk	4	0
Eurasian Collared-Dove	4	0
Great Blue Heron	4	0
Orchard Oriole[1]	**4**	**0**
Scissor-tailed Flycatcher	4	0
Western Meadowlark	4	0
Northern Rough-winged Swallow	3	0
American Goldfinch	2	0
Bank Swallow	2	0
European Starling	2	0
Olive-sided Flycatcher[1]	**2**	**0**
Upland Sandpiper	2	0
Wild Turkey	2	0
Chimney Swift	1	0
Great Horned Owl	1	0
Lesser Goldfinch	1	0
Lincoln's Sparrow	1	0
Sedge Wren[1]	**1**	**0**
Swainson's Hawk	1	0
Yellow-breasted Chat[1]	**1**	**0**
Unidentified swallow	*22*	*1*
Unidentified sparrow	*16*	*1*
Unidentified bird	*2*	*0*
Unidentified hummingbird	*2*	*0*
Unidentified meadowlark	*2*	*0*
Unidentified raptor	*2*	*0*
Unidentified woodpecker	*2*	*0*
Unidentified blackbird	*1*	*0*
Total	**2,371**	**100%**

[1] New species that have not previously been verified for the park are shown in bold and shaded. Species are listed in rank order of detection, from the most to least commonly observed. Relative detectability among species has not been taken into account; thus, rank order provides only a general indication of relative abundance. Detectability will be explicitly accounted for in periodic synthesis reports. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat.

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