National Park Service
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Natural Resource Stewardship and Science

Landbird Monitoring in the Southern Plains Network

2011 Annual Report

Natural Resource Technical Report NPS/SOPN/NRTR—2012/522



ON THE COVER

Bullock's oriole (*Icterus bullockii*). Photo © Robert Shantz.

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2011 Annual Report

Natural Resource Technical Report NPS/SOPN/NRTR—2012/522

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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
WABA	Washita Battlefield National Historic Site

Executive Summary

In 2011, 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 were surveyed in 2011. 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 early July, with adjustments made for individual park visits based on latitude and elevation. We used point-transect surveys to estimate and monitor landbird population parameters. 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. Note, however, that for four parks, some points may have been sampled fewer than three times, or not all of the points were sampled, due to logistical contstraints during sampling.

There were a total of 1,552 point visits (the number of unique points multiplied by the number of visits) on the 34 transects or grids. Of these, 1,140 were point visits in grassland habitats (including 33 point visits in pinyon-juniper woodland habitat) and 412 were point visits in riparian habitats. We recorded a total of 12,528 individual birds of 164 species on our points, with an additional 422 individual birds detected as flyovers. Chickasaw NRA had the highest number of birds counted (n = 3,709). Lyndon B. Johnson National Historical Park (NHP) had the lowest number of birds detected (n = 466). We observed the greatest number of species at Chickasaw NRA (n = 85) and the fewest at Lyndon B. Johnson NHP (n = 32). Species richness and community composition varied widely among the parks surveyed. The number of individuals or species detected is influenced not only by the number of points, but also by the size and diversity of available habitats. Western meadowlark was the most commonly detected species within the SOPN (n = 1,155). Three species (brown-headed cowbird, western kingbird, and mourning dove) were detected at all SOPN parks. Eight species were detected only once during surveys, and a number of others were detected only a few times. New species, previously unverified in a given park, were recorded for seven parks, with eight new species (including four species passing through on migration) recorded for Chickasaw NRA.

No changes were made to the protocol in 2011. The Rocky Mountain Bird Observatory (RMBO), our primary cooperator for this project, manages the network's bird monitoring data. Other networks using RMBO also use this service and have found it to be efficient and effective. This enables SOPN data to be in the same database as those of several other networks and organizations, which in turn allows for a more comprehensive regional assessment.

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 1.1-1). 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 and have high body temperatures, rapid metabolisms, and 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 with elucidating changes in the bird community to other environmental factors. Such a broad-based approach is now being undertaken by the SODN (NPS 2008) and other broad-based monitoring approaches (e.g., Ringold et al. 1996; Stevens and Gold 2003; Barrows et al. 2005).

Perhaps the most compelling reason to monitor landbird communities is that birds themselves are

Table 1.1-1. Parks in the Southern Plains Inventory & Monitoring Network (SOPN)

Park	Park Acronymn	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

inherently valuable. The high aesthetic and spiritual values that humans place on native wildlife is 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.

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 three 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.

1.2.3 Objective 3: Density (when feasible)

We will estimate density of the most-common species using the point-transect distance-sampling method at fixed points and subsequent analyses using the Distance program (Thomas et al. 2005). Provided that assumptions are reasonably met, distance-sampling methods allow researchers to model a detection function that adjusts for imperfect detectability and is a robust, widely accepted method for estimating landbird abundance (Buckland et al. 2001). With reasonable effort, we will likely only be able to estimate density annually for the most-common species in larger parks.

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 Bennetts et al. (2012, in review). 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 with the SOPN. One pinyon-juniper woodland transect at Capulin Volcano National Monument (NM) was also sampled, however, because the area had been targeted to become grassland; that management strategy may no longer be planned. 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, -2).

Table 2.1.1-2. Number of transects of each habitat class surveyed in each SOPN park unit, 2011

Park unit	Grassland	PJ Woodland [1]	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	--	--

[1]Some pinyon-juniper woodlands that were targeted for conversion to grassland prior to 2010 sampling were surveyed.

In 2011, we surveyed landbirds within all of the SOPN park units (Lake Meredith National Recreation Area [NRA] and Alibates Flint Quarries NM were 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 area features. Note that in Chapter 3 we may use the terms "transect" and

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

"grid" interchangeably. A total of 34 transects or grids were surveyed in 2011 (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 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 was from April through early July, with adjustments, as described above, for individual park visits based on latitude and elevation (Figure 2.1.2).

2.2 Bird Surveys

We used point-transect surveys to estimate and monitor landbird population parameters (Buckland et al. 2001). The point-transect approach evolved from the variable circular plot approach (Reynolds et al. 1980) and distance sampling of line transects (Burnham et al. 1980), where points are considered as a transect with zero distance (Buckland et al. 2001). For density estimates, the method involves estimating the linear distance to individual birds while standing for a predetermined period of time at a fixed point in space (Figure 2.2). For groups of birds, we estimated the distance to the group and the number of birds in the group. Estimating the distance to each bird allows the observer to approximate density via a species-specific detection function that accounts

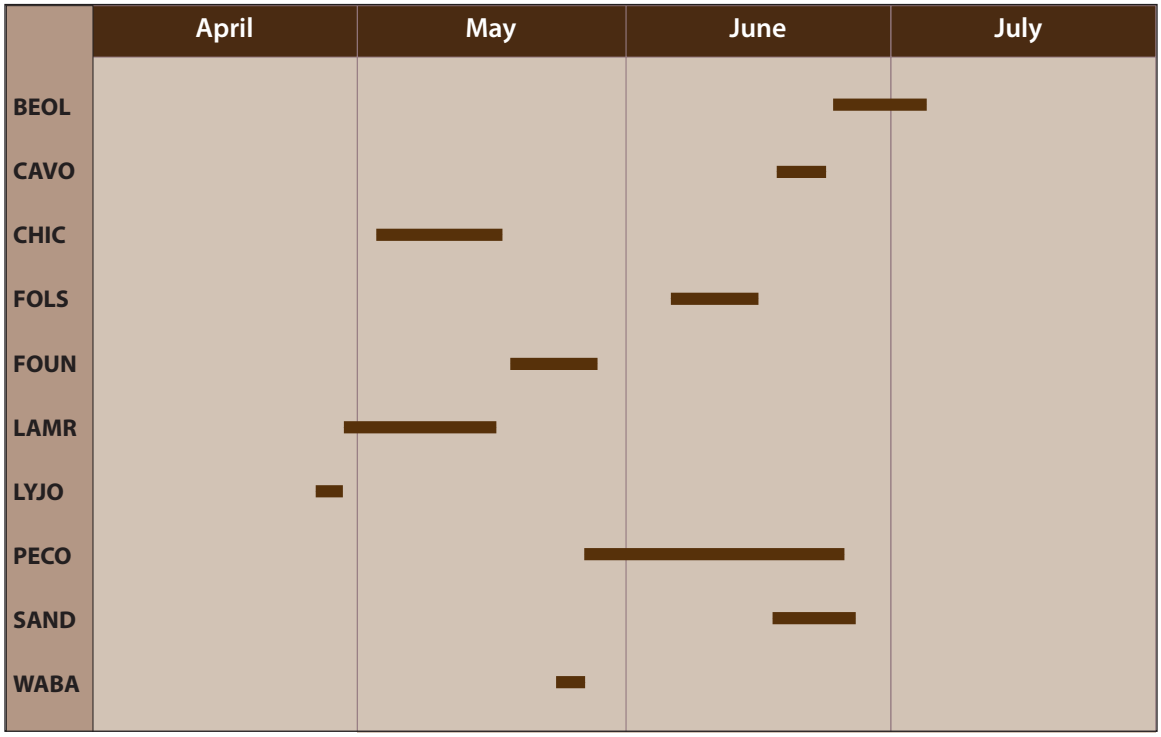


Figure 2.1.2. Dates when sampling was conducted in SOPN parks, 2011.

for variation in detectability due to surveyor, environmental, or weather-related factors (Buckland et al. 2001; Diefenbach et al. 2003).

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 previously unconfirmed 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 2011 at some of the parks, logistical constraints led to some points being visited fewer than three times. Also 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.

We spent six minutes at each point along the transect or grid and used a rangefinder to estimate the linear distance to each bird or group detected. Six minute counts are consistent with region wide bird monitoring efforts being conducted by Rocky Mountain Bird Observatory (RMBO) and its partners.

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, land-

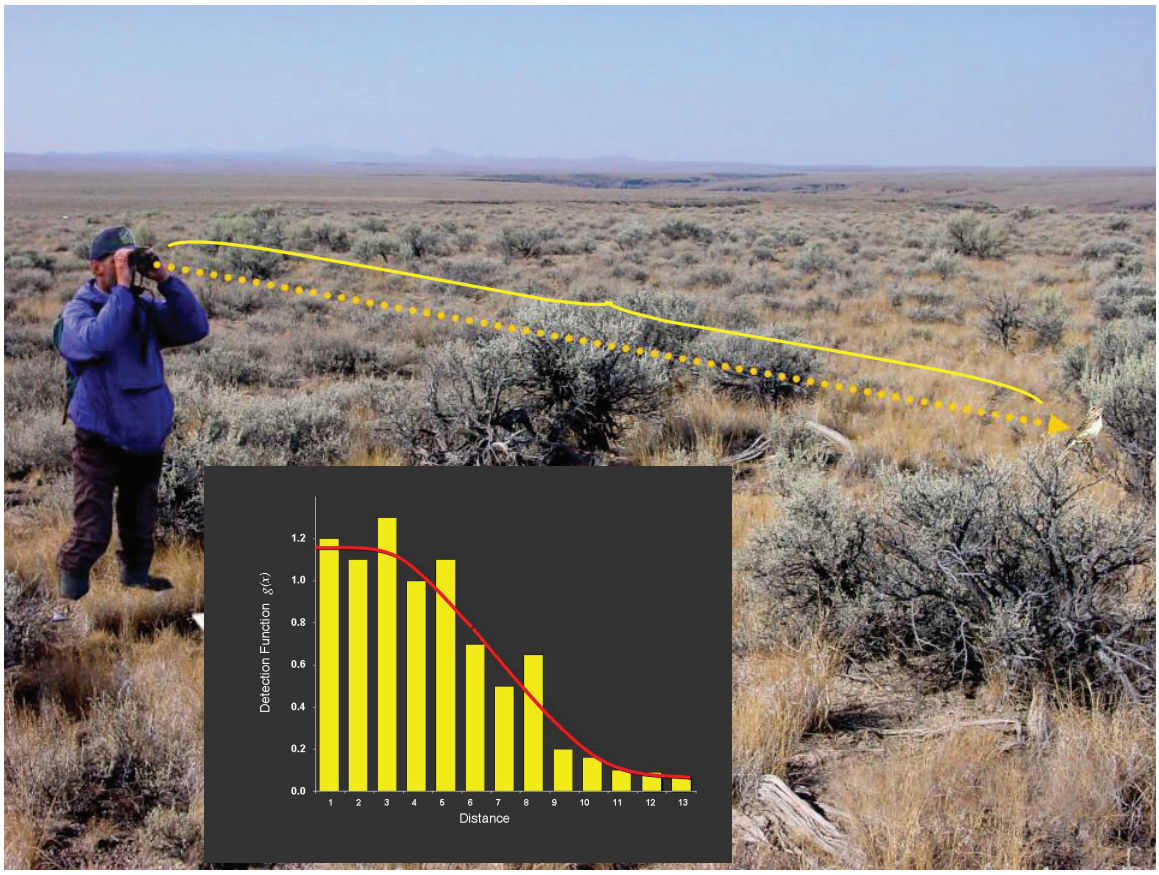


Figure 2.2. Distance sampling works by estimating a detection profile (graph) as a function of distance from which either individual or groups of birds are observed from the transect.

bird 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 broader ecological context.

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 broader ecological context.

Field methods for estimating all three primary objectives are essentially the same; analyses and evaluation procedures used to estimate trends will differ.

2.5 Accessing the Data

The Rocky Mountain Bird Observatory (RMBO), our primary cooperator for this project, manages the bird monitoring data associated with it. Other networks using RMBO also use this service and have found it to be efficient and effective. This enables SOPN data to be stored in the same database as that of several other networks and organizations, which in turn allows for a more comprehensive regional assessment. SOPN and its parks will have easy access to the data upon completion of the new Avian Data Center, expected in February, 2012.

3 Results and Discussion

We had a total of 1,552 point visits (the number of unique points multiplied by the number of visits) on 34 transects or grids (Table 3-1). Of these, 1,140 were point visits in grassland habitats (including 33 in pinyon-juniper woodland habitat) and 412 were point visits in riparian habitats. We recorded a total of 12,528 individual birds (of 164 species) during our point visits, with an additional 422 individual birds detected as flyovers.

Chickasaw NRA had the highest number of individual birds counted (n = 3,079). Lyndon B. Johnson National Historical Park (NHP) had the lowest number of birds counted (n = 466). We observed the greatest number of species at Chickasaw NRA (n = 85) and the fewest at Lyndon B. Johnson NHP (n = 32) (Table 3-2). Species richness and community composition varied widely among the parks surveyed. The number of individuals or species detected is influenced not only by the number of points and visits, but also by the size and diversity of available habitats.

Western meadowlark was the most commonly detected species within the SOPN (n = 1,155) (see Table 3-3). Eight species were detected only once during surveys. Three species, brown-headed cowbird, western kingbird, and mourning dove, were detected at all surveyed parks (as they were in 2010), whereas numerous species were detected at one or very few parks.

Table 3-2. Number of species observed in each habitat class (grassland, pinyon-juniper woodland, and riparian) at each park, 2011

Park	Species detected			
	Grass.	Wood.	Rip.	Total[1]
Bent's Old Fort NHS	44	--	43	53
Capulin Volcano NM	42	36[2]	--	52
Chickasaw NRA	85	--	--	85
Fort Larned NHS	29	--	40	45
Fort Union NM	35	--	--	35
Lake Meredith NRA	33	--	48	60
Lyndon B. Johnson NHP	15	--	28	32
Pecos NHP	42	--	61	68
Sand Creek Massacre NHS	28	--	29	39
Washita Battlefield NHS	60	--	--	60
Total[1]	**146**	**36**	**118**	**164**

[1] Totals do not necessarily equal the sum of the numbers shown for parks or habitat classes, as a single species may have been observed in more than one park or habitat class. Numbers do not include incidental observations.

[2]Some pinyon-juniper woodlands that were targeted for conversion to grassland prior to 2010 sampling were sampled in both 2010 and 2011.

Table 3-1. The number of point visits (# of unique points multiplied by # of visits) and individual birds counted in each habitat class at each SOPN park, 2011

Park	Grassland		Pinyon-Juniper Woodland		Riparian		Total birds detected
	# Point Visits	# Birds	# Point Visits	# Birds	# Point Visits	# Birds	
Bent's Old Fort NHS	105	702	---	---	57	613	**1,315**
Capulin Volcano NM	50	468	33	315	---	---	**783**
Chickasaw NRA	204	3,079	---	---	---	---	**3,079**
Fort Larned NHS	75	362	---	---	54	502	**864**
Fort Union NM	180	719	---	---	---	---	**719**
Lake Meredith NRA	114	384	---	---	114	572	**956**
Lyndon B. Johnson NHP	18	114	---	---	51	352	**466**
Pecos NHP	136	717	---	---	88	616	**1,333**
Sand Creek Massacre NHS	120	916	---	---	48	639	**1,555**
Washita Battlefield NHS	105	1,458	---	---	---	---	**1,458**
Total	**1,107**	**8,919**	**33**	**315**	**412**	**3,294**	**12,528**

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

Table 3-3. Total number of individual birds observed of each species during surveys in all SOPN parks, 2011

Common name	# of birds
Western Meadowlark	1155
Mourning Dove	896
Northern Cardinal	505
Cassin's Sparrow	440
Northern Mockingbird	412
Franklin's Gull	374
Red-winged Blackbird	372
Barn Swallow	363
Dickcissel	361
Field Sparrow	352
Brown-headed Cowbird	322
Western Kingbird	299
Chipping Sparrow	288
Eastern Meadowlark	243
Lark Sparrow	229
Turkey Vulture	204
Spotted Towhee	187
Cassin's Kingbird	183
House Wren	165
American Crow	160
Northern Bobwhite	160
Bullock's Oriole	144
Western Wood-Pewee	141
Painted Bunting	133
Black-headed Grosbeak	122
Carolina Chickadee	120
Blue-gray Gnatcatcher	110
Black Vulture	106
Orchard Oriole	99
Horned Lark	98
Vesper Sparrow	98
Common Raven	96
Baltimore Oriole	95
American Robin	90
Pinyon Jay	86
Common Grackle	85
Red-headed Woodpecker	85
Northern Rough-winged Swallow	81
Ring-necked Pheasant	80
Tufted Titmouse	79
Mississippi Kite	76
Cliff Swallow	72
Blue Grosbeak	71

Common name	# of birds
Indigo Bunting	71
Northern Flicker	71
Bewick's Wren	70
Yellow Warbler	69
Cedar Waxwing	67
Carolina Wren	65
Eastern Kingbird	65
Western Scrub-Jay	64
Scissor-tailed Flycatcher	62
Great Crested Flycatcher	61
Grasshopper Sparrow	59
Red-bellied Woodpecker	59
Blue Jay	58
Violet-green Swallow	58
Canada Goose	56
Common Yellowthroat	56
Black-crested Titmouse	55
Brown Thrasher	54
Yellow-billed Cuckoo	50
Ash-throated Flycatcher	45
Downy Woodpecker	45
Eurasian Collared-Dove	45
Lincoln's Sparrow	40
Juniper Titmouse	39
American Kestrel	38
Eastern Bluebird	38
Yellow-breasted Chat	37
Mountain Chickadee	34
Warbling Vireo	34
Wild Turkey	31
Red-tailed Hawk	30
Say's Phoebe	30
Song Sparrow	30
Mallard	29
Green-tailed Towhee	28
Common Nighthawk	26
Lark Bunting	25
White-crowned Sparrow	25
Rock Wren	24
Summer Tanager	23
European Starling	22
Killdeer	22
White-breasted Nuthatch	22

Table 3-3. Total number of individual birds observed of each species during surveys in all SOPN parks, 2011, cont.

Common name	# of birds
American Goldfinch	20
Great-tailed Grackle	20
Lesser Goldfinch	20
Gray Catbird	19
Chimney Swift	18
Great Blue Heron	18
Hairy Woodpecker	18
Mountain Bluebird	18
Eastern Phoebe	17
Hepatic Tanager	16
Wood Duck	15
Western Bluebird	14
Great Egret	13
Eastern Wood-Pewee	12
Ruby-throated Hummingbird	12
Yellow-rumped Warbler	12
Black Phoebe	11
Brewer's Blackbird	11
Ladder-backed Woodpecker	11
Plumbeous Vireo	11
Snowy Egret	11
Black-chinned Hummingbird	10
Red-shouldered Hawk	10
Belted Kingfisher	9
Canyon Towhee	9
Great Horned Owl	9
Ruddy Duck	9
Spotted Sandpiper	9
Western Tanager	9
White-eyed Vireo	9
White-winged Dove	9
Rose-breasted Grosbeak	8
Rufous-crowned Sparrow	8
House Sparrow	7
Lewis's Woodpecker	7
Clay-colored Sparrow	6
Dark-eyed Junco	6
Purple Martin	6
Black-throated Sparrow	5
Blue-winged Teal	5
Swainson's Thrush	5
Bell's Vireo	4
Black-and-white Warbler	4
Burrowing Owl	4
Cattle Egret	4
Double-crested Cormorant	4
Greater Roadrunner	4
Northern Harrier	4
Pine Siskin	4
Swainson's Hawk	4
Black-throated Gray Warbler	3
Cooper's Hawk	3
Gray Vireo	3
Green Heron	3
Little Blue Heron	3
Northern Parula	3
Olive-sided Flycatcher	3
Savannah Sparrow	3
Yellow-throated Vireo	3
Yellow-throated Warbler	3
American Avocet	2
Black-capped Chickadee	2
Bushtit	2
Canyon Wren	2
Clark's Nutcracker	2
Gray Flycatcher	2
House Finch	2
Red-eyed Vireo	2
Virginia's Warbler	2
Willow Flycatcher	2
Acadian Flycatcher	1
Black-billed Magpie	1
Ferruginous Hawk	1
Louisiana Waterthrush	1
Red Crossbill	1
Ruby-crowned Kinglet	1
Tree Swallow	1
Virginia Rail	1
Unidentified birds	*193*
Total	**12,528**

Note: Species are listed in rank order from most to least commonly detected. No. of birds is the total no. of individuals 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 no. of birds recorded during surveys, but not in counts of the no. of species detected per park.

Table 3-4. Parks where each species was detected, April through July 2011

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Acadian flycatcher	*Empidonax virescens*			●							
American avocet	*Recurvirostra americana*	o					●				
American bittern	*Botaurus lentiginosus*	o						o			
American coot	*Fulica americana*	o		o			o	o			
American crow	*Corvus brachyrhynchos*	o		●	o	o	o	o	●		●
American goldfinch	*Spinus tristis*	●		●	●		o	o	o	o	●
American kestrel	*Falco sparverius*	●	o			●	●	o	o	o	o
American pipit	*Anthus rubescens*							o			
American redstart	*Setophaga ruticilla*	o									
American robin	*Turdus migratorius*	●	●	●	●	●	o	o	●	o	
American tree sparrow	*Spizella arborea*						o				o
American wigeon	*Anas americana*							o			
Ash-throated flycatcher	*Myiarchus cinerascens*	●	●			●	●	o	●		
Bald eagle	*Haliaeetus leucocephalus*							o			
Baltimore oriole	*Icterus galbula*			●	●					●	
Barn owl	*Tyto alba*					o	o			o	
Barn swallow	*Hirundo rustica*	●	o	●	●	●	●	●	●	●	●
Barred owl	*Strix varia*			o							o
Bell's vireo	*Vireo bellii*	●			o		o	o			o
Belted kingfisher	*Megaceryle alcyon*	●		●			o		o		●
Bewick's wren	*Thryomanes bewickii*		●	●			●	●	●		●
Black phoebe	*Sayornis nigricans*								●		
Black rail	*Laterallus jamaicensis*	o									
Black tern	*Chlidonias niger*	o									
Black vulture	*Coragyps atratus*			●				●			
Black-and-white warbler	*Mniotilta varia*			●				o			
Black-billed cuckoo	*Coccyzus erythropthalmus*				o						
Black-billed magpie	*Pica hudsonia*				o	●			o		
Blackbird	Icteridae						o	o	o		o
Blackburnian warbler	*Dendroica fusca*							o			
Black-capped chickadee	*Poecile atricapillus*		●		o						
Black-capped gnatcatcher	*Polioptila nigriceps*			o							
Black-chinned hummingbird	*Archilochus alexandri*		●			o		o	●		
Black-crested titmouse	*Baeolophus atricristatus*							●			

Table 3-4. Parks where each species was detected, April through July 2011, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Black-crowned night-heron	*Nycticorax nycticorax*	o		o			o				
Black-headed grosbeak	*Pheucticus melanocephalus*	●	●			●	o		●		
Black-necked stilt	*Himantopus mexicanus*						o				
Black-throated gray warbler	*Dendroica nigrescens*								●		
Black-throated green warbler	*Dendroica virens*							o			
Black-throated sparrow	*Amphispiza bilineata*						●				
Blue grosbeak	*Passerina caerulea*	●	o	●		o	●	o	●	●	●
Blue jay	*Cyanocitta cristata*	●		●	●		●	●		●	o
Blue-gray gnatcatcher	*Polioptila caerulea*		●	●		●		o	o		●
Blue-headed vireo	*Vireo solitarius*							o			
Blue-winged teal	*Anas discors*	o					●	o		o	
Blue-winged warbler	*Vermivora cyanoptera*							o			
Boat-tailed grackle	*Quiscalus major*			o							
Brewer's blackbird	*Euphagus cyanocephalus*					o		o	●	o	
Brewer's sparrow	*Spizella breweri*		o			o					
Broad-tailed hummingbird	*Selasphorus platycercus*		o			o			o		
Broad-winged hawk	*Buteo platypterus*			o				o			
Bronzed cowbird	*Molothrus aeneus*							o			
Brown creeper	*Certhia americana*		o					o			
Brown thrasher	*Toxostoma rufum*	●		●	●		o	o		o	●
Brown-headed cowbird	*Molothrus ater*	●	●	●	●	●	●	●	●	●	●
Bullock's oriole	*Icterus bullockii*	●	●			●	●	●	●	●	●
Burrowing owl	*Athene cunicularia*	●								o	
Bushtit	*Psaltriparus minimus*								●		
Cactus wren	*Campylorhynchus brunneicapillus*						o				
Calliope hummingbird	*Stellula calliope*		o								
Canada goose	*Branta canadensis*			●		●	o		o		o
Canyon towhee	*Melozone fusca*		●			o			●		
Canyon wren	*Catherpes mexicanus*		o			o	●		o		
Carolina chickadee	*Poecile carolinensis*			●			●	●			●
Carolina wren	*Thryothorus ludovicianus*			●				●			●
Cassin's kingbird	*Tyrannus vociferans*	o	●			●			●		

● = species detected in 2011 survey

o = species not detected in 2011 survey, but known to occur in the park, including species that migrate through or winter in the park

Table 3-4. Parks where each species was detected, April through July 2011, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Cassin's sparrow	*Peucaea cassinii*	●	●			●	●		o	●	●
Cattle egret	*Bubulcus ibis*			o				●			
Cedar waxwing	*Bombycilla cedrorum*			●				o	o		●
Chestnut-sided warbler	*Dendroica pensylvanica*							o		o	
Chihuahuan raven	*Corvus cryptoleucus*	o	o								
Chimney swift	*Chaetura pelagica*	●		●	o			o			●
Chipping sparrow	*Spizella passerina*	o	●	●		o	o	o	●	o	o
Chuck-will's-widow	*Caprimulgus carolinensis*			o				o			
Cinnamon teal	*Anas cyanoptera*	o					o	o			
Clark's nutcracker	*Nucifraga columbiana*								●		
Clay-colored sparrow	*Spizella pallida*						●	o		o	●
Cliff swallow	*Petrochelidon pyrrhonota*	●	●	●	●	●	●	●	●	o	●
Common grackle	*Quiscalus quiscula*	●	o	●	●	o	●	●		●	●
Common moorhen	*Gallinula chloropus*						o				
Common nighthawk	*Chordeiles minor*	●	●	o	o	o	o	o	●	●	o
Common poorwill	*Phalaenoptilus nuttallii*	o	o				o				
Common raven	*Corvus corax*		●			●			●		
Common snipe	*Gallinago gallinago*							o			
Common yellowthroat	*Geothlypis trichas*	●		●	o	o	●	o	●	●	●
Cooper's hawk	*Accipiter cooperii*		o	●			●	o	o		o
Cordilleran flycatcher	*Empidonax occidentalis*		o						o		
Crested caracara	*Caracara cheriway*							o			
Curve-billed thrasher	*Toxostoma curvirostre*					o					
Dark-eyed junco	*Junco hyemalis*		●				o	o	o		●
Dickcissel	*Spiza americana*	o		●	●		●	o		●	●
Double-crested cormorant	*Phalacrocorax auritus*						o	●			
Downy woodpecker	*Picoides pubescens*	●		●	●		o	o		●	●
Eastern bluebird	*Sialia sialis*	o		●	o		o	o		●	●
Eastern kingbird	*Tyrannus tyrannus*	●		●	●		o	o		●	o
Eastern meadowlark	*Sturnella magna*			o	●		●	o			●
Eastern phoebe	*Sayornis phoebe*			●		o	o	●			●
Eastern screech-owl	*Megascops asio*			o	o		o	o			
Eastern towhee	*Pipilo erythrophthalmus*							o			
Eastern wood-pewee	*Contopus virens*			●	o			o			

Table 3-4. Parks where each species was detected, April through July 2011, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Eurasian collared-dove	*Streptopelia decaocto*	●	●	o	●	●	●	o	●	●	
European starling	*Sturnus vulgaris*	●		o	●	o	●	o		●	
Ferruginous hawk	*Buteo regalis*	o				●					
Field sparrow	*Spizella pusilla*			●			●	●			●
Forster's tern	*Sterna forsteri*	o						o			
Fox sparrow	*Passerella iliaca*							o			
Franklin's gull	*Leucophaeus pipixcan*			●				o			
Gadwall	*Anas strepera*						o	o			
Golden-crowned kinglet	*Regulus satrapa*							o			
Golden-fronted woodpecker	*Melanerpes aurifrons*							o			
Grace's warbler	*Dendroica graciae*								o		
Grasshopper sparrow	*Ammodramus savannarum*	o			●		●	o		●	●
Gray catbird	*Dumetella carolinensis*			●	●			o	●		
Gray flycatcher	*Empidonax wrightii*			o			o		●		
Gray vireo	*Vireo vicinior*								●		
Gray-cheeked thrush	*Catharus minimus*						o				
Great blue heron	*Ardea herodias*	●		●	o	o	o	●	●	●	●
Great crested flycatcher	*Myiarchus crinitus*	o		●	●			●			●
Great egret	*Ardea alba*			●	o		o	o			●
Great horned owl	*Bubo virginianus*	●	o	o	o	o	●	o	o	●	o
Greater roadrunner	*Geococcyx californianus*			o			●	o	o		o
Greater yellowlegs	*Tringa melanoleuca*							o			
Great-tailed grackle	*Quiscalus mexicanus*	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			
Hairy woodpecker	*Picoides villosus*		●	●				o	●		●
Harris' sparrow	*Zonotrichia querula*							o			o
Hepatic tanager	*Piranga flava*		●						●		
Hermit thrush	*Catharus guttatus*		o					o		o	
Hooded warbler	*Wilsonia citrina*			o				o			

● = species detected in 2011 survey

o = species not detected in 2011 survey, but known to occur in the park, including species that migrate through or winter in the park

Table 3-4. Parks where each species was detected, April through July 2011, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Horned lark	*Eremophila alpestris*	o	●			●				●	
House finch	*Carpodacus mexicanus*		●		●	o		o	o		
House sparrow	Passer domesticus	●	o	o	●		o	o			o
House wren	*Troglodytes aedon*	●	●	●	●	o		o	o	●	●
Hudsonian godwit	*Limosa haemastica*							o			
Inca dove	*Columbina inca*							o			
Indigo bunting	*Passerina cyanea*	●		●	●		●	o		o	o
Juniper titmouse	*Baeolophus ridgwayi*		●			●			●		
Killdeer	*Charadrius vociferus*	●		o	●	o	●	o	o	●	●
Ladder-backed woodpecker	*Picoides scalaris*	o					o	●	●		
Lark bunting	*Calamospiza melanocorys*	o			o		●			o	o
Lark sparrow	*Chondestes grammacus*	●	●	●		●	o	●	●	●	●
Lazuli bunting	*Passerina amoena*	o									
Le Conte's sparrow	*Ammodramus leconteii*							o			
Least flycatcher	*Empidonax minimus*			o							
Least sandpiper	*Calidris minutilla*			o				o			
Lesser goldfinch	*Spinus psaltria*	o	●			o		o	●		●
Lesser nighthawk	*Chordeiles acutipennis*							o			
Lesser scaup	*Aythya affinis*							o			
Lesser yellowlegs	*Tringa flavipes*							o			
Lewis's woodpecker	*Melanerpes lewis*	●	o								
Lincoln's sparrow	*Melospiza lincolnii*			●				o		o	o
Little blue heron	*Egretta caerulea*			●				o			
Loggerhead shrike	*Lanius ludovicianus*	o				o	o	o		o	o
Long-billed dowitcher	*Limnodromus scolopaceus*							o			
Louisiana waterthrush	*Parkesia motacilla*			●				o			
MacGillivray's warbler	*Oporornis tolmiei*		o					o	o		
Magnolia warbler	*Dendroica magnolia*							o			
Mallard	*Anas platyrhynchos*	o			●	●	●	o	●	o	o
Mississippi kite	*Ictinia mississippiensis*			●			●	o			●
Mountain bluebird	*Sialia currucoides*		●			●			●		
Mountain chickadee	*Poecile gambeli*		●						●		
Mountain plover	*Charadrius montanus*									o	
Mourning dove	*Zenaida macroura*	●	●	●	●	●	●	●	●	●	●

Table 3-4. Parks where each species was detected, April through July 2011, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Northern bobwhite	*Colinus virginianus*	●		●	o		●	o	o		●
Northern cardinal	*Cardinalis cardinalis*		●	●	●		●	●			●
Northern flicker	*Colaptes auratus*	●	●	●	●	●	●	o	●	●	●
Northern harrier	*Circus cyaneus*	●			o		o	o		o	o
Northern mockingbird	*Mimus polyglottos*	●	●	●		●	●	●	●	●	●
Northern parula	*Parula americana*			●							
Northern pintail	*Anas acuta*							o			
Northern rough-winged swallow	*Stelgidopteryx serripennis*	o	●	●		o		o	●		o
Northern shoveler	*Anas clypeata*	o					o	o			
Olive-sided flycatcher	*Contopus cooperi*			o			●	o			
Orange-crowned warbler	*Oreothlypis celata*							o			
Orchard oriole	*Icterus spurius*	●		●	●		●	●		●	
Osprey	*Pandion haliaetus*							o	o		
Painted bunting	*Passerina ciris*			●			●	o			●
Peregrine falcon	*Falco peregrinus*		o								
Pied-billed grebe	*Podilymbus podiceps*			o				o			
Pileated woodpecker	*Dryocopus pileatus*			o							o
Pine siskin	*Spinus pinus*		o					o	●		
Pinyon jay	*Gymnorhinus cyanocephalus*		●			●			●		
Plumbeous vireo	*Vireo plumbeus*		●						●		
Prairie falcon	*Falco mexicanus*	o	o			o					
Prothonotary warbler	*Protonotaria citrea*			o							
Purple finch	*Carpodacus purpureus*							o			
Purple martin	*Progne subis*			o				o			●
Red crossbill	*Loxia curvirostra*								●		
Red-bellied woodpecker	*Melanerpes carolinus*			●	●		●		●		●
Red-breasted nuthatch	*Sitta canadensis*								o		
Red-eyed vireo	*Vireo olivaceus*			●							
Redhead	*Aythya americana*							o			
Red-headed woodpecker	*Melanerpes erythrocephalus*	●		●	●		●	o		●	●
Red-shouldered hawk	*Buteo lineatus*			●				o			
Red-tailed hawk	*Buteo jamaicensis*	●	●	●	●	o	●	o	●	●	●

● = species detected in 2011 survey

o = species not detected in 2011 survey, but known to occur in the park, including species that migrate through or winter in the park

Table 3-4. Parks where each species was detected, April through July 2011, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Red-winged blackbird	*Agelaius phoeniceus*	●		●	●	●	●	●	●	●	●
Ringed kingfisher	*Megaceryle torquata*							o			
Ring-necked duck	*Aythya collaris*							o			
Ring-necked pheasant	Phasianus colchicus	●		●	●		●			●	
Rock pigeon	*Columba livia*	o		o	o			o			
Rock wren	*Salpinctes obsoletus*	o	●			●	●		●	o	
Rose-breasted grosbeak	*Pheucticus ludovicianus*				●		o	o			
Rough-legged hawk	*Buteo lagopus*										o
Ruby-crowned kinglet	*Regulus calendula*							o	●		
Ruby-throated hummingbird	*Archilochus colubris*			●				o			●
Ruddy duck	*Oxyura jamaicensis*						●	o			
Rufous hummingbird	*Selasphorus rufus*		o	o							
Rufous-crowned sparrow	*Aimophila ruficeps*			●			●	o	o		
Rusty blackbird	*Euphagus carolinus*							o			
Sandhill crane	*Grus canadensis*							o			
Savannah sparrow	*Passerculus sandwichensis*							o			●
Say's phoebe	*Sayornis saya*	o	o			●	●	o	●	●	
Scaled quail	*Callipepla squamata*						o			o	
Scissor-tailed flycatcher	*Tyrannus forficatus*			●	●		●	●			●
Sharp-shinned hawk	*Accipiter striatus*						o	o			
Short-eared owl	*Asio flammeus*									o	o
Snowy egret	*Egretta thula*			●				o			
Solitary sandpiper	*Tringa solitaria*							o			
Song sparrow	Melospiza melodia			●			o	o	●		o
Sora	*Porzana carolina*	o									
Spotted sandpiper	*Actitis macularius*	o		o			o	o	●		
Spotted towhee	*Pipilo maculatus*		●		o	●	o		●	o	o
Steller's jay	*Cyanocitta stelleri*								o		
Stilt sandpiper	*Calidris himantopus*							o			
Summer tanager	*Piranga rubra*			●			●	●			o
Swainson's hawk	*Buteo swainsoni*	●		o		o	o	o		●	o
Swainson's thrush	*Catharus ustulatus*			●						o	
Tennessee warbler	*Oreothlypis peregrina*							o			
Tree swallow	*Tachycineta bicolor*			●							o

Table 3-4. Parks where each species was detected, April through July 2011, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Tricolored heron	*Egretta tricolor*							o			
Tufted titmouse	*Baeolophus bicolor*			●				o			●
Turkey vulture	*Cathartes aura*	●	●	●	●	●	●	●	●	o	●
Upland sandpiper	*Bartramia longicauda*							o			o
Veery	*Catharus fuscescens*							o			
Vermilion flycatcher	*Pyrocephalus rubinus*							o			
Vesper sparrow	*Pooecetes gramineus*		●	●		●	●	o	o	o	
Violet-green swallow	*Tachycineta thalassina*	o	●			●			●		
Virginia rail	*Rallus limicola*	●					o				
Virginia's warbler	*Oreothlypis virginiae*		●			o			o		
Warbling vireo	*Vireo gilvus*	●	o	●	●				o	●	
Western bluebird	*Sialia mexicana*		●						●		
Western kingbird	*Tyrannus verticalis*	●	●	●	●	●	●	●	●	●	●
Western meadowlark	*Sturnella neglecta*	●	●		●	●	●	o	●	●	●
Western sandpiper	*Calidris mauri*							o			
Western scrub-jay	*Aphelocoma californica*		●			●			●		
Western tanager	*Piranga ludoviciana*	o	●						●		
Western wood-pewee	*Contopus sordidulus*	●	●			o	o		●	●	
White-breasted nuthatch	*Sitta carolinensis*	●	●	●	●		●		●		
White-crowned sparrow	*Zonotrichia leucophrys*			●			●	o	o	o	o
White-eyed vireo	*Vireo griseus*			●				o			
White-faced ibis	*Plegadis chihi*	o					o				
White-throated sparrow	*Zonotrichia albicollis*							o			o
White-throated swift	*Aeronautes saxatalis*		o								
White-winged dove	*Zenaida asiatica*		●					●	●		
Wild turkey	*Meleagris gallopavo*	●	o	●	●	o	o	o			●
Willet	*Tringa semipalmata*								o		
Willow flycatcher	*Empidonax traillii*	o					●		o		
Wilson's phalarope	*Phalaropus tricolor*							o			
Wilson's warbler	*Wilsonia pusilla*							o	o		
Winter wren	*Troglodytes hiemalis*							o			

● = species detected in 2011 survey

o = species not detected in 2011 survey, but known to occur in the park, including species that migrate through or winter in the park

Table 3-4. Parks where each species was detected, April through July 2011, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Wood duck	*Aix sponsa*			o	●			o			
Yellow warbler	*Dendroica petechia*	●		●	●	o	●	o	●	●	●
Yellow-bellied flycatcher	*Empidonax flaviventris*							o			
Yellow-bellied sapsucker	*Sphyrapicus varius*							o			
Yellow-billed cuckoo	*Coccyzus americanus*	●		●	●		o	●		●	●
Yellow-breasted chat	*Icteria virens*	●		●			o		●		
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	o						o			o
Yellow-rumped warbler	*Dendroica coronata*		●	●			●	o	●		●
Yellow-throated vireo	*Vireo flavifrons*			●				o			
Yellow-throated warbler	*Dendroica dominica*			●							

Note: Unverified observations of additional species in a park are not included.

● = species detected in 2011 survey

o = species not detected in 2011 survey, but known to occur 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 2011 sampling

During June and July of 2011, we sampled five transects/grids at Bent's Old Fort National Historic Site (NHS) (Figure 3.1.1). Not all points targeted for sampling were sampled in 2011 due to logistical constraints. Four grids were in grassland habitat (shortgrass prairie) with 4 to 13 unique points each (Table 3.1.1). One grid was located in a riparian area (cottonwood bottom) with 19 unique points. Most points were surveyed three times for a total of 162 point visits (the number of unique points multiplied by the number of visits) at the park in 2011, compared to 187 point visits in 2010.

3.1.2 Results and discussion

During 2011, 1,315 birds of 53 species were counted at Bent's Old Fort NHS (Table 3.1.2). Mourning dove was the most commonly counted species (22%), followed by western meadowlark (14%), red-winged blackbird (9%), and northern mockingbird (5%). No new species were detected for the park during the survey.

The cottonwood transect along the Arkansas River and the adjacent upland transect continue to yield the highest species diversity among the transects at the park. Species detected at these two transects included the three most abundant bird species in the park— mourning dove, western meadowlark, and red-winged blackbird— and other prominent species, such as blue grosbeak, brown-headed cowbird, house wren, northern bobwhite, northern mockingbird, western kingbird, and yellow-breated chat. Black rail and dickcissel, detected in 2010, were absent in 2011. Although not new species for the park, Virginia rail and Lewis's woodpecker were detected in point count surveys for the first time since the surveys were initiated in 2009. Other interesting species were northern harrier, a singing indigo bunting, a pair of burrowing owls in the prairie dog colony, and a singing Cassin's sparrow.

Table 3.1.1. Habitat type, number of points, and sampling dates for each transect or grid at Bent's Old Fort NHS, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
CWOOD	Riparian	Cottonwood bottom	19	3	6/26 - 7/1	6/27 - 7/3	6/28 - 7/3
GRASS	Grassland	Shortgrass prairie	9	3	6/26 - 6/30	6/27 - 7/1	6/28 - 7/3
PDOG	Grassland	Shortgrass prairie	9	3	7/1	7/2	7/4
REST	Grassland	Shortgrass prairie	4	3	6/26 - 6/30	6/27 - 7/1	6/28 - 7/2
UPLAND	Grassland	Shortgrass prairie	13	3	6/30	7/2	7/2 - 7/3



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Burrowing owls (*Athene cunicularia*) were observed at the prairie dog colony at Bent's Old Fort NHS in 2011.

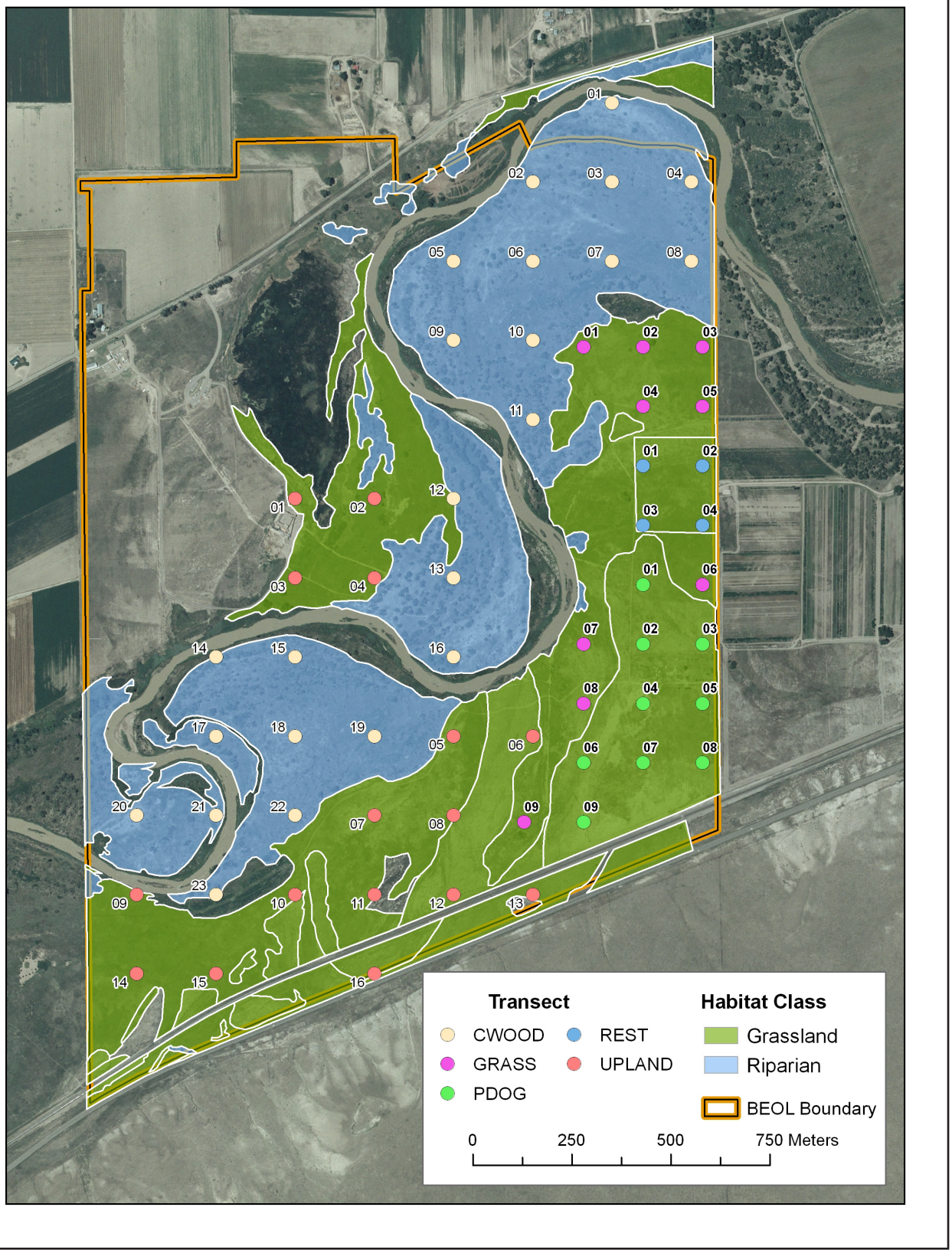


Figure 3.1.1. Point locations targeted for annual sampling at Bent's Old Fort NHS.

Table 3.1.2 Number of birds detected of each species counted in each habitat class, Bent's Old Fort NHS, 2011

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Mourning Dove	100	188	288	22
Western Meadowlark	139	43	182	14
Red-winged Blackbird	67	48	115	9
Northern Mockingbird	43	26	69	5
Northern Bobwhite	36	20	56	4
Western Kingbird	37	18	55	4
Brown-headed Cowbird	19	23	42	3
House Wren	12	26	38	3
Blue Grosbeak	23	10	33	3
Yellow-breasted Chat	4	26	30	2
Red-headed Woodpecker	13	14	27	2
Barn Swallow	25	1	26	2
Bullock's Oriole	7	18	25	2
Eastern Kingbird	18	7	25	2
Eurasian Collared-Dove	17	8	25	2
American Kestrel	14	10	24	2
Ring-necked Pheasant	14	10	24	2
American Robin	8	9	17	1
Northern Flicker	5	12	17	1
Brown Thrasher	3	12	15	1
European Starling	5	9	14	1
Lark Sparrow	7	4	11	1
Yellow Warbler	6	5	11	1
Common Grackle	2	8	10	1
Black-headed Grosbeak	3	6	9	1
Common Yellowthroat	6	3	9	1
Warbling Vireo	5	3	8	1
Lewis's Woodpecker	6	1	7	1
Cliff Swallow	6	--	6	0
Killdeer	6	--	6	0
Western Wood-Pewee	--	6	6	0
American Goldfinch	3	2	5	0
Blue Jay	3	2	5	0
Orchard Oriole	--	5	5	0
Bell's Vireo	--	4	4	0
Burrowing Owl	4	--	4	0
Northern Harrier	4	--	4	0
White-breasted Nuthatch	--	4	4	0
Ash-throated Flycatcher	2	1	3	0
Common Nighthawk	2	1	3	0
Great Horned Owl	2	1	3	0

Table 3.1.2. Number of birds detected of each species in each habitat class, Bent's Old Fort NHS, 2011, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
House Sparrow	3	--	3	0
Yellow-billed Cuckoo	2	1	3	0
Downy Woodpecker	--	2	2	0
Red-tailed Hawk	2	--	2	0
Belted Kingfisher	--	1	1	0
Cassin's Sparrow	1	--	1	0
Chimney Swift	--	1	1	0
Great Blue Heron	1	--	1	0
Indigo Bunting	--	1	1	0
Turkey Vulture	--	1	1	0
Virginia Rail	1	--	1	0
Wild Turkey	1	--	1	0
Unidentified Woodpecker	*8*	*9*	*17*	*1*
Unidentified Bird	*3*	*3*	*6*	*0*
Unidentified Oriole	*2*	--	*2*	*0*
Unidentified Swallow	*2*	--	*2*	*0*
Total	**702**	**613**	**1,315**	**100**

Note: 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 2011 sampling

During June of 2011, 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 woodland habitat in which the transect was located was targeted for conversion to grassland prior to the 2010 sampling year, but this may no longer be the case. Not all points targeted for sampling in 2011 were sampled due to logistical constraints. The pinyon-juniper transect had 11 unique points and the shortgrass prairie transect had 17 unique points (Table 3.2.1). Most points were surveyed three times for a total of 83 point visits (the number of unique points multiplied by the number of visits) at the park in 2011, compared to 135 point visits in 2010.

3.2.2 Results and discussion

During 2011, 783 birds of 52 species were counted at Capulin Volcano NM (Table 3.2.2). Spotted towhee was the most commonly counted species (17%). Also common were western wood-pewee (10%), northern mockingbird (10%), mourning dove (8%), black-headed grosbeak (6%), and lark sparrow (5%). Other prominent species included brown-headed cowbird (4%), chipping sparrow (4%), and mountain chickadee (4%).

Three new species were recorded in Capulin Volcano NM in 2011: northern cardinal, northern rough-winged swallow, and western bluebird. Several other interesting birds were noted: hepatic and western tanager, white-winged dove, canyon, green-tailed, and spotted towhee, and three species of wrens— Bewick's, house, and rock. Black-billed magpie and hairy woodpecker were detected for the first time in three years of point count surveys, but they are not new species for the park.

Table 3.2.1. Habitat type, number of points, and sampling dates for each transect or grid at Capulin Volcano NM, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
PJ	Woodland	Pinyon-juniper	11	3	6/19 - 6/20	6/20 - 6/21	6/21 - 6/22
STEPPE	Grassland	Shortgrass prairie	17	3	6/20	6/20 - 6/21	6/21 - 6/22



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The first verified observation of a western bluebird (*Sialia mexicana*) at Capulin Volcano NM was recorded in 2011.

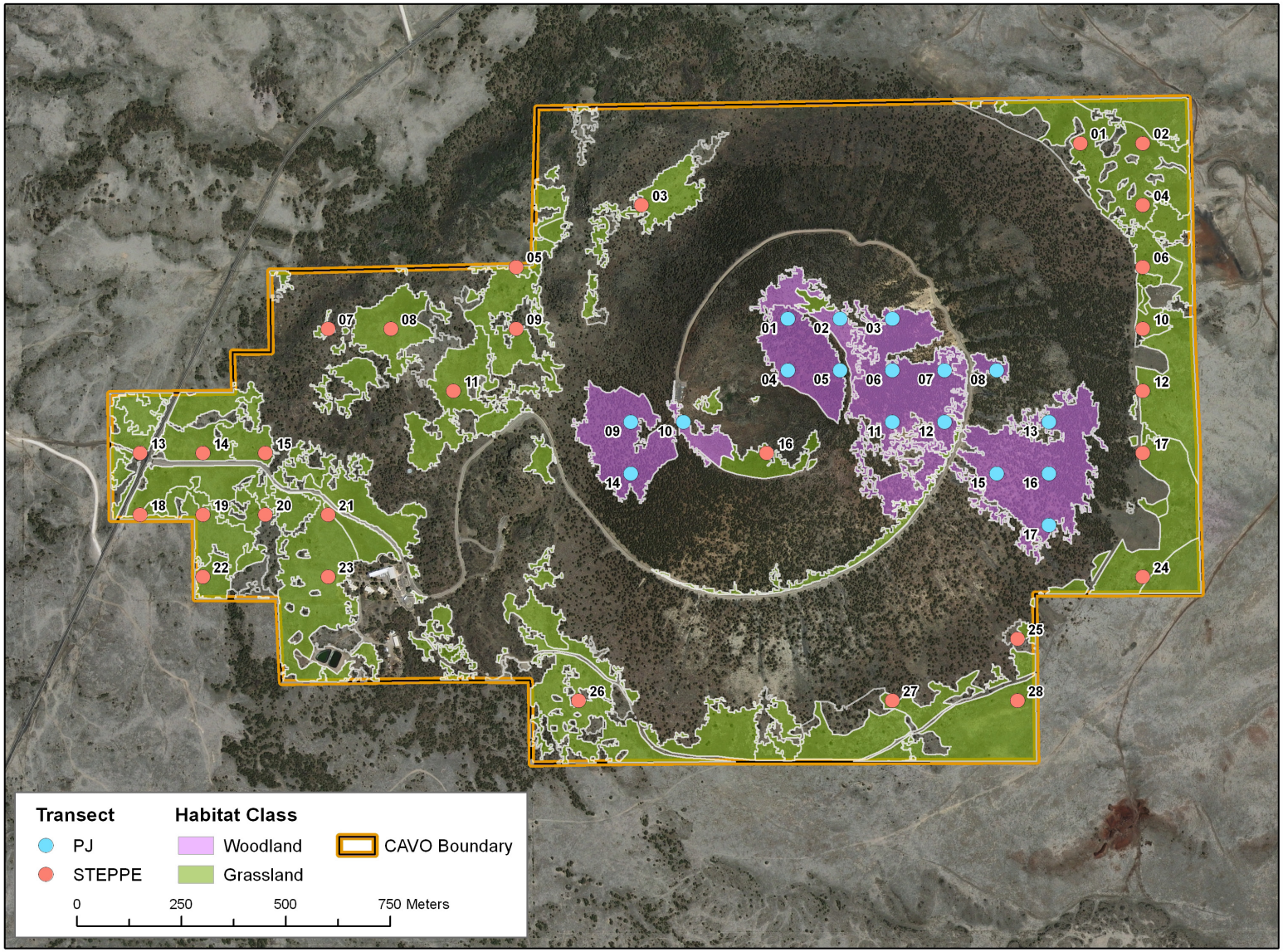


Figure 3.2.1. Point locations targeted for annual sampling at Capulin Volcano NM.

Table 3.2.2. Number of birds detected of each species in each habitat class, Capulin Volcano NM, 2011

Species	Habitat class		# of birds detected	
	Grassland	Woodland	Total	% of total
Spotted Towhee	67	63	130	17
Northern Mockingbird	67	10	77	10
Western Wood-Pewee	30	47	77	10
Mourning Dove	44	17	61	8
Black-headed Grosbeak	25	23	48	6
Lark Sparrow	34	5	39	5
Brown-headed Cowbird	15	16	31	4
Chipping Sparrow	6	23	29	4
Mountain Chickadee	--	28	28	4
Green-tailed Towhee	8	19	27	3
Vesper Sparrow	20	--	20	3
Cassin's Kingbird	17	--	17	2
Pinyon Jay	12	5	17	2
Blue-gray Gnatcatcher	12	3	15	2
Violet-green Swallow	13	2	15	2
Common Raven	10	2	12	2
Ash-throated Flycatcher	3	7	10	1
Lesser Goldfinch	5	4	9	1
Turkey Vulture	9	--	9	1
Bullock's Oriole	7	1	8	1
Cassin's Sparrow	6	2	8	1
Juniper Titmouse	--	6	6	1
Western Kingbird	6	--	6	1
Canyon Towhee	2	3	5	1
Red-tailed Hawk	5	--	5	1
Western Scrub-Jay	5	--	5	1
Bewick's Wren	2	2	4	1
Dark-eyed Junco	3	1	4	1
House Wren	3	1	4	1
Northern Flicker	4	--	4	1
Western Meadowlark	3	1	4	1
Mountain Bluebird	2	1	3	0
Northern Cardinal	**3**	--	**3**	**0**
Western Tanager	2	1	3	0
White-breasted Nuthatch	--	3	3	0
American Robin	2	--	2	0
Black-capped Chickadee	1	1	2	0
Common Nighthawk	--	2	2	0
Hairy Woodpecker	--	2	2	0
Horned Lark	2	--	2	0
Northern Rough-winged Swallow	**2**	--	**2**	**0**

Table 3.2.2. Number of birds detected of each species in each habitat class, Capulin Volcano NM, 2011, cont.

Species	Habitat class		# of birds detected	
	Grassland	Woodland	Total	% of total
Plumbeous Vireo	1	1	2	0
Rock Wren	--	2	2	0
Virginia's Warbler	--	2	2	0
Western Bluebird	--	**2**	**2**	**0**
Yellow-rumped Warbler	--	2	2	0
Black-chinned Hummingbird	1	--	1	0
Cliff Swallow	1	--	1	0
Eurasian Collared-Dove	1	--	1	0
Hepatic Tanager	--	1	1	0
House Finch	1	--	1	0
White-winged Dove	1	--	1	0
Unidentified Chickadee	--	*3*	*3*	*0*
Unidentified Woodpecker	*2*	*1*	*3*	*0*
Unidentified Hummingbird	*1*	--	*1*	*0*
Unidentified Raptor	*1*	--	*1*	*0*
Unidentified Sparrow	*1*	--	*1*	*0*
Total	**468**	**315**	**783**	**100**

Note: 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.

3.3 Chickasaw National Recreation Area

3.3.1 2011 sampling

During May of 2011, 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) with 13 to 19 unique points each (Table 3.3.1). Each point was surveyed three times for a total of 204 point visits (the number of unique points multiplied by the number of visits) at Chickasaw NRA.

3.3.2 Results and discussion

During 2011, 3,709 birds of 85 species were counted at Chickasaw NRA; this park is unique among the SOPN because of its species richness (Table 3.3.2). Northern cardinal was the most commonly counted of the breeding birds in the park (11%). Other common species, in order of relative abundance, were field sparrow (9%), chipping sparrow (8%), turkey vulture (4%), American crow (4%), and brown-headed cowbird (4%). Four new species were found during surveys at the park; yellow-throated vireo and tree swallow were detected at points, and Acadian flycatcher (1 bird) and snowy egret (11 birds) were detected between points. Other new park species passing through on migration included white-crowned sparrow, vesper sparrow, yellow-rumped warbler, and Franklin's gull (counted in relatively high numbers).


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The yellow warbler (*Dendroica petechia*) was one of eight warbler species detected at Chickasaw NRA in 2011.

Several other species were prominent, most notably black vulture, blue-gray gnatcatcher, tufted titmouse, Carolina chickadee, painted bunting, indigo bunting, and mourning dove. Interesting birds included eight species of warblers, four species of vireos (white-eyed, warbling, red-eyed, and yellow-throated), and five species of woodpeckers. Although not new species for the park, yellow-throated warbler and little blue heron had not been detected in point count surveys since they were initiated in 2009.

Table 3.3.1. Habitat type, number of points, and sampling dates for each transect or grid at Chickasaw NRA, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
5LAKES	Grassland	Upland grassland	19	3	5/5 - 5/9	5/12 - 5/13	5/13 - 5/14
NHUNT	Grassland	Upland grassland	13	3	5/5	5/11	5/13 - 5/15
WHUNT_E	Grassland	Upland grassland	18	3	5/4 - 5/5	5/11	5/14
WHUNT_W	Grassland	Upland grassland	18	3	5/3 - 5/4	5/9 - 5/10	5/15

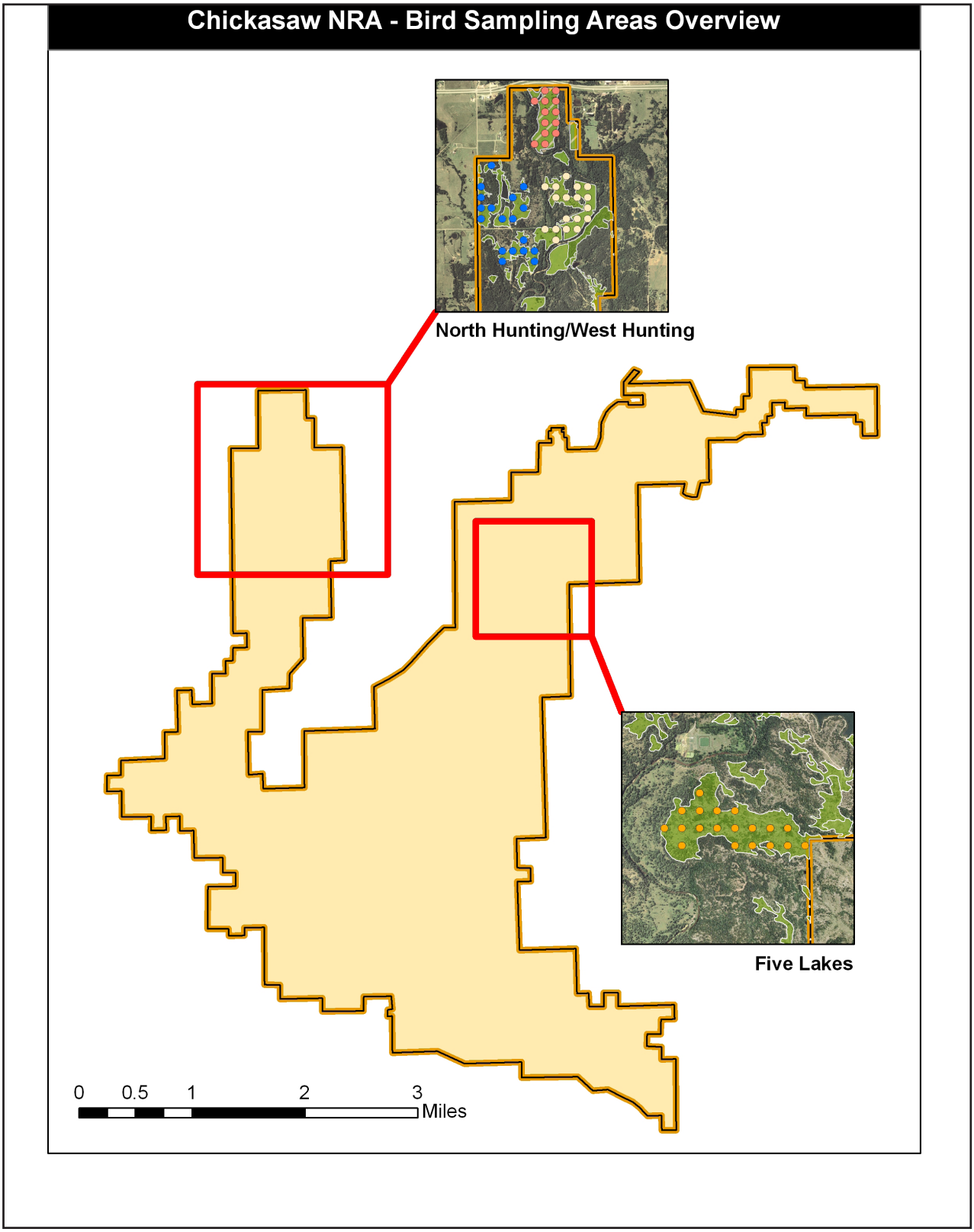


Figure 3.3.1-1. Bird sampling areas at Chickasaw NRA.

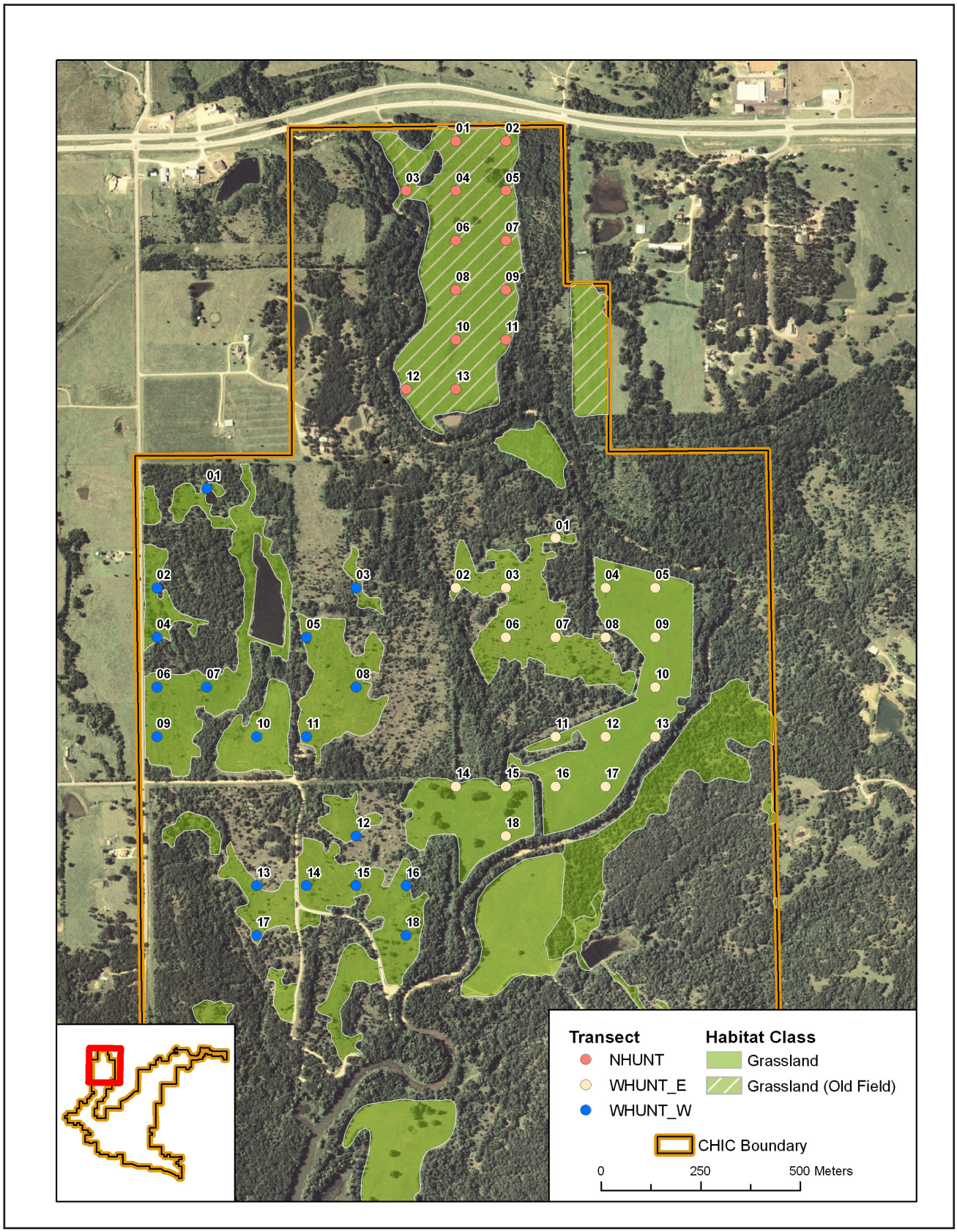


Figure 3.3.1-2. Point locations targeted for annual sampling at Chickasaw NRA, North Hunting/West Hunting.

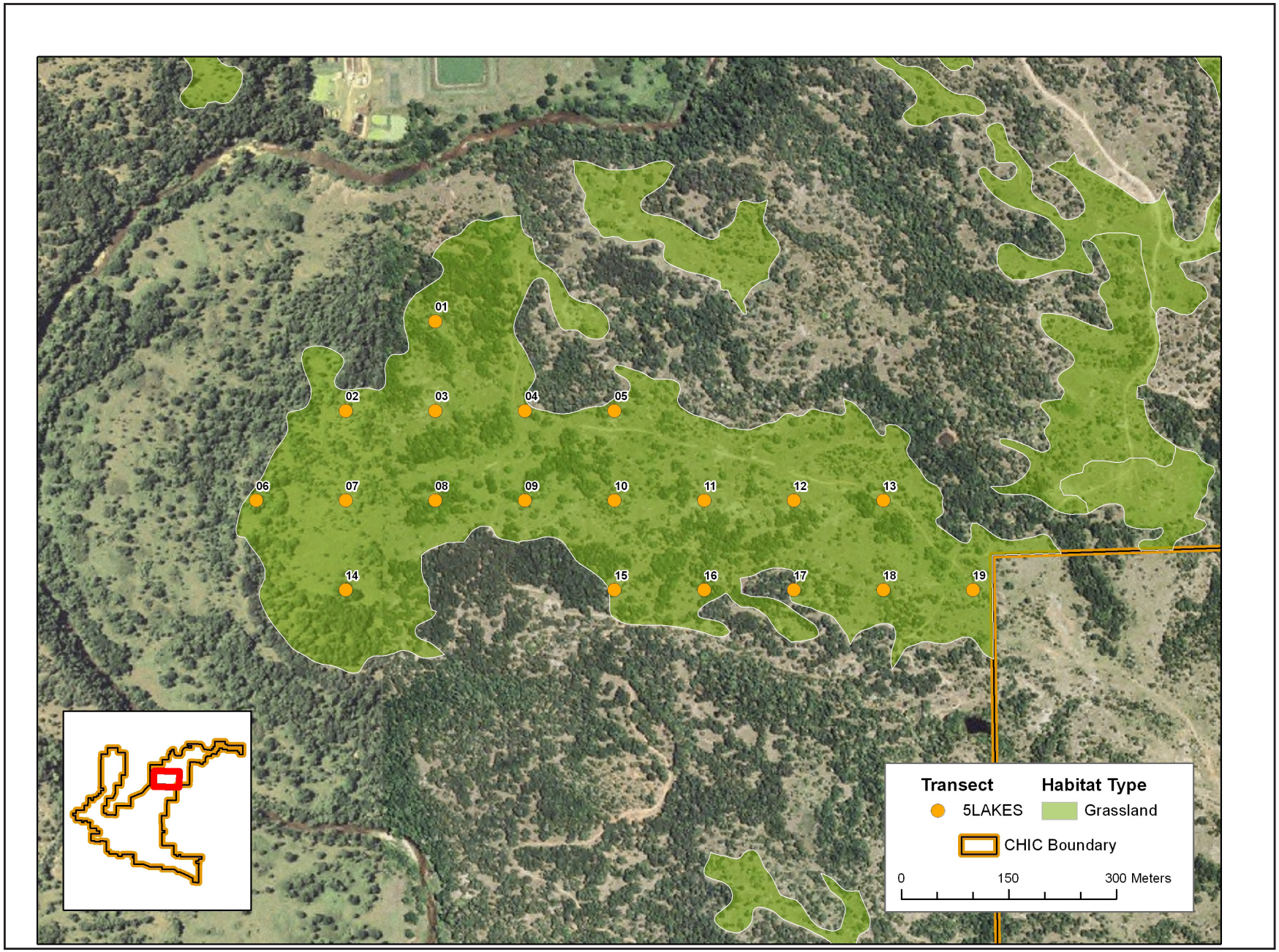


Figure 3.3.1-3. Point locations targeted for annual sampling at Chickasaw NRA, Five Lakes.

Table 3.3.2. Number of birds detected of each species in each habitat class, Chickasaw NRA, 2011

Species	# of birds detected	
	Total (grassland habitat)	% of total
Franklin's Gull	**374**	**12**
Northern Cardinal	330	11
Field Sparrow	288	9
Chipping Sparrow	232	8
Turkey Vulture	137	4
American Crow	128	4
Brown-headed Cowbird	116	4
Carolina Chickadee	89	3
Painted Bunting	89	3
Black Vulture	78	3
Blue-gray Gnatcatcher	75	2
Tufted Titmouse	75	2
Indigo Bunting	66	2
Mourning Dove	54	2
Canada Goose	52	2
Cedar Waxwing	52	2
Great Crested Flycatcher	49	2
Barn Swallow	42	1
Lincoln's Sparrow	40	1
Eastern Bluebird	34	1
Yellow Warbler	33	1
Mississippi Kite	31	1
Dickcissel	30	1
Northern Rough-winged Swallow	25	1
White-crowned Sparrow	**23**	**1**
Downy Woodpecker	21	1
Eastern Kingbird	19	1
Summer Tanager	19	1
Blue Jay	18	1
Vesper Sparrow	**18**	**1**
Common Yellowthroat	17	1
Warbling Vireo	17	1
Wild Turkey	17	1
Northern Mockingbird	16	1
Chimney Swift	15	0
Red-headed Woodpecker	15	0
Brown Thrasher	14	0
Red-winged Blackbird	14	0
Yellow-billed Cuckoo	14	0
Hairy Woodpecker	13	0
Northern Flicker	13	0
Eastern Wood-Pewee	12	0
Great Egret	12	0
Song Sparrow	12	0
Carolina Wren	11	0
Red-bellied Woodpecker	11	0
Snowy Egret	**11**	**0**
Red-shouldered Hawk	10	0
Ruby-throated Hummingbird	10	0
Baltimore Oriole	9	0
White-eyed Vireo	9	0
Cliff Swallow	8	0
Red-tailed Hawk	8	0
American Goldfinch	7	0
Bewick's Wren	7	0
Northern Bobwhite	7	0
Lark Sparrow	6	0
Scissor-tailed Flycatcher	6	0
Western Kingbird	6	0
American Robin	5	0
Great Blue Heron	5	0
Swainson's Thrush	5	0
Black-and-white Warbler	4	0
Common Grackle	4	0
Eastern Phoebe	4	0
Yellow-rumped Warbler	**4**	**0**
Gray Catbird	3	0
House Wren	3	0
Little Blue Heron	3	0
Northern Parula	3	0
White-breasted Nuthatch	3	0
Yellow-throated Vireo	**3**	**0**
Yellow-throated Warbler	3	0
Orchard Oriole	2	0
Red-eyed Vireo	2	0
Rufous-crowned Sparrow	2	0
Acadian Flycatcher	**1**	**0**
Belted Kingfisher	1	0
Blue Grosbeak	1	0
Cooper's Hawk	1	0
Great-tailed Grackle	1	0

Table 3.3.2. Number of detections of each species in each habitat class, Chickasaw NRA, 2011, cont.

Species	# of birds detected	
	Total (grassland habitat)	**% of total**
Louisiana Waterthrush	1	0
Ring-necked Pheasant	1	0
Tree Swallow	**1**	**0**
Yellow-breasted Chat	1	0
Unidentified Woodpecker	*36*	*1*
Unidentified Bird	*6*	*0*
Unidentified Duck	*2*	*0*
Unidentified Sparrow	*2*	*0*
Unidentified Hummingbird	*1*	*0*
Unidentified Warbler	*1*	*0*
Total	**3,079**	**100%**

Note: 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 2011 sampling

During June of 2011, we sampled three transects/grids at Fort Larned NHS (Figure 3.4.1). Two transects were in grassland habitat (upland grassland) with 11 and 14 unique points each. One transect was in the riparian habitat class (riparian woodland) with 18 unique points (Table 3.4.1). 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 Fort Larned NHS.

3.4.2 Results and discussion

During 2011, 864 birds of 45 species were counted at Fort Larned NHS (Table 3.4.2). The Baltimore oriole was the most commonly counted species (10%). House wren (8%), dickcissel (8%), mourning dove (7%), eastern meadowlark (6%), and American robin (6%) were also common. Four new species for the park were detected in 2011— cliff swallow, great-tailed grackle, scissor-tailed flycatcher, and white-breasted nuthatch.

Of the 45 species detected, eight are national or regional species of concern. Other prominent species at the park included brown-headed cowbird, cliff swallow, western meadowlark, red-winged blackbird, ring-necked pheasant, and orchard oriole. Although not new for the park, house finch, indigo bunting, and yellow warbler were detected for the first time in three years of point count surveys.



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The white-breasted nuthatch (*Sitta carolinensis*) was one of four new species at Fort Larned NHS in 2011.

Table 3.4.1. Habitat type, number of points, and sampling dates for each transect or grid at Fort Larned NHS, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
BU2	Grassland	Upland grassland	11	3	6/12	6/14	6/15
BU8	Grassland	Upland grassland	14	3	6/10	6/11	6/13
RIP	Riparian	Riparian woodland	18	3	6/9 - 6/11	6/10 - 6/13	6/12 - 6/14



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

Table 3.4.2. Number of birds detected of each species in each habitat class, Fort Larned NHS, 2011

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Baltimore Oriole	14	69	83	10
House Wren	4	66	70	8
Dickcissel	54	11	65	8
Mourning Dove	12	49	61	7
Eastern Meadowlark	51	1	52	6
American Robin	12	36	48	6
Brown-headed Cowbird	22	13	35	4
Cliff Swallow	**18**	**14**	**32**	**4**
Western Meadowlark	32	--	32	4
Red-winged Blackbird	13	14	27	3
Ring-necked Pheasant	17	9	26	3
Orchard Oriole	8	17	25	3
Brown Thrasher	--	24	24	3
Barn Swallow	12	11	23	3
Blue Jay	8	14	22	3
Yellow-billed Cuckoo	3	14	17	2
Eastern Kingbird	10	5	15	2
Gray Catbird	--	15	15	2
Western Kingbird	15	--	15	2
Wood Duck	--	15	15	2
Northern Cardinal	2	12	14	2
Common Grackle	4	9	13	2
Red-headed Woodpecker	2	10	12	1
Wild Turkey	11	--	11	1
Grasshopper Sparrow	10	--	10	1
Eurasian Collared-Dove	2	6	8	1
Rose-breasted Grosbeak	--	8	8	1
White-breasted Nuthatch	--	**7**	**7**	**1**
Downy Woodpecker	2	4	6	1
Great Crested Flycatcher	--	6	6	1
Mallard	2	4	6	1
Killdeer	2	3	5	1
House Sparrow	--	4	4	0
Scissor-tailed Flycatcher	**4**	--	**4**	**0**
Warbling Vireo	--	4	4	0
European Starling	--	3	3	0
American Goldfinch	--	2	2	0
Red-tailed Hawk	1	1	2	0
Turkey Vulture	1	1	2	0
Yellow Warbler	--	2	2	0
Great-tailed Grackle	--	**1**	**1**	**0**

Table 3.4.2. Number of birds detected of each species in each habitat class, Fort Larned NHS, 2011, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
House Finch	--	1	1	0
Indigo Bunting	--	1	1	0
Northern Flicker	--	1	1	0
Red-bellied Woodpecker	--	1	1	0
Unidentified Meadowlark	*13*	*1*	*14*	*2*
Unidentified Bird	*--*	*9*	*9*	*1*
Unidentified Woodpecker	*1*	*3*	*4*	*0*
Unidentified Empidonax	*--*	*1*	*1*	*0*
Total	**362**	**502**	**864**	**100%**

Note: 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 2011 sampling

During May of 2011, we sampled three transects or grids at Fort Union NM (Figure 3.5.1). Each transect was in grassland habitat (shortgrass prairie) with 20 unique points each (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 Fort Union NM.

3.5.2 Results and discussion

During 2011, 719 birds of 35 species were counted at Fort Union NM (Table 3.5.2). Western meadowlark was once again the most abundant species, by far, occurring throughout the park; it accounted for 58% of birds counted. Other prominent species included: vesper sparrow (7%), primarily in the grassland habitat at the old fort transect; common raven (5%); red-winged blackbird (4%) along Wolf Creek; barn (3%) and cliff (1%) swallow in and around the staff residence area; and northern mockingbird (3%), detected primarily in the pine-juniper immediately adjacent to the old fort boundary, the riparian area along Wolf Creek, and at the visitor's center and staff residence area.

One ferruginous hawk, a new species for the park, was detected hunting at the old fort transect. Nine species, including ash-throated flycatcher, black-headed grosbeak, blue-gray gnatcatcher, Cassin's kingbird, juniper titmouse, northern flicker, pinyon jay, spotted towhee, and western scrub jay, were found on or just outside of the old fort park boundary in pine-juniper habitat. A black-billed magpie was detected at the shortgrass-west transect near Wolf Creek for the first time in three years of point count surveys, and after being notably absent in 2010, at least three Cassin's sparrows were found northeast of the visitor's center.



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Western meadowlark (*Sturnella neglecta*) was the most commonly detected species at Fort Union NM in 2011.

Table 3.5.1. Habitat type, number of points, and sampling dates for each transect or grid at Fort Union NM, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
OLD FORT	Grassland	Shortgrass prairie	20	3	5/22	5/23	5/26
SHORT_E	Grassland	Shortgrass prairie	20	3	5/18	5/20	5/24
SHORT_W	Grassland	Shortgrass prairie	20	3	5/19	5/20 - 5/21	5/25

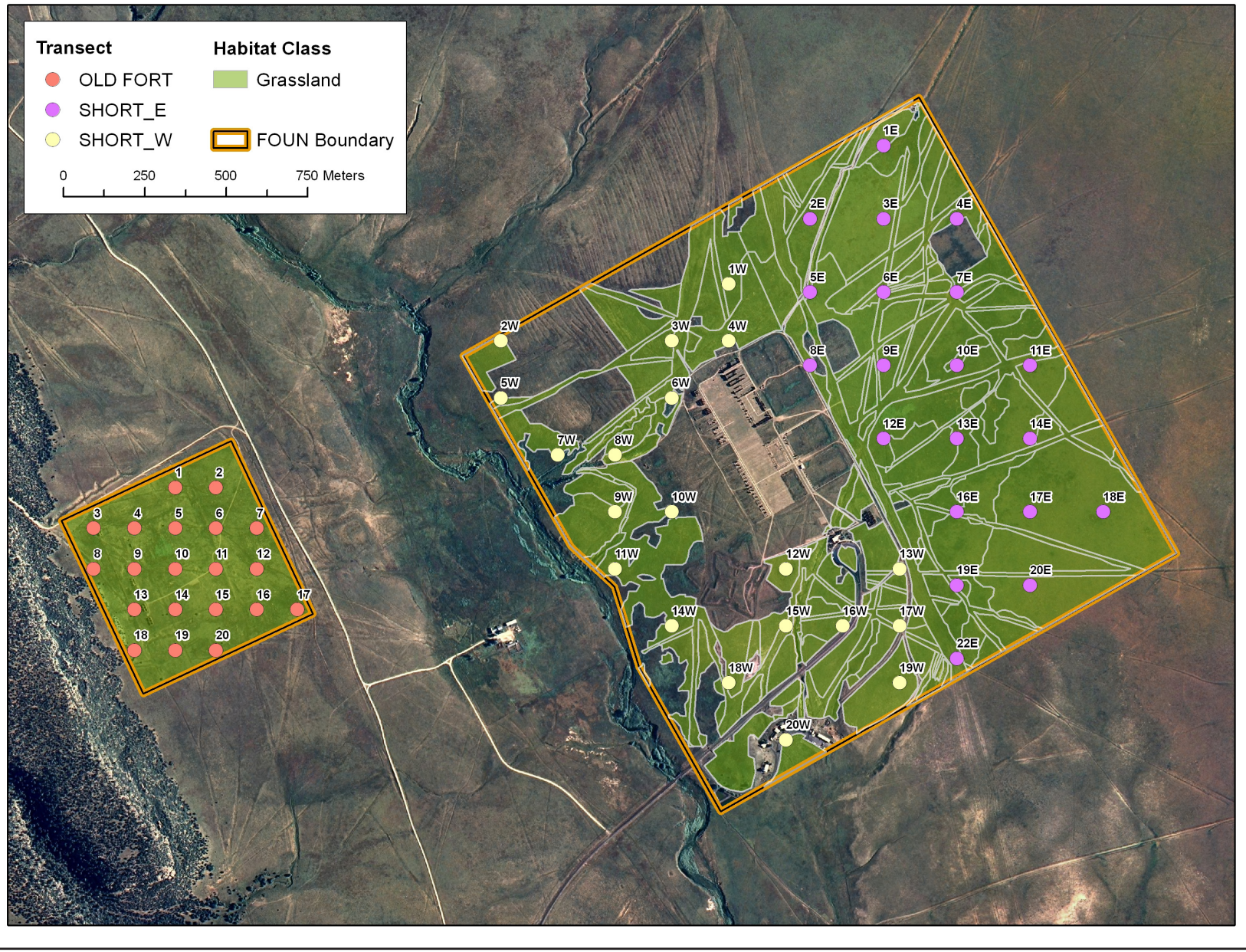


Figure 3.5.1. Point locations targeted for annual sampling at Fort Union NM.

Table 3.5.2. Number of birds detected of each species in each habitat class, Fort Union NM, 2011

Species	# of birds detected	
	Total (grassland habitat)	% of total
Western Meadowlark	415	58
Vesper Sparrow	49	7
Common Raven	33	5
Red-winged Blackbird	31	4
Barn Swallow	22	3
Cassin's Kingbird	21	3
Northern Mockingbird	20	3
Say's Phoebe	14	2
Cliff Swallow	10	1
Black-headed Grosbeak	9	1
Mourning Dove	8	1
Western Kingbird	8	1
Mountain Bluebird	7	1
Cassin's Sparrow	6	1
Pinyon Jay	6	1
Juniper Titmouse	5	1
Lark Sparrow	5	1
Canada Goose	4	1
Horned Lark	4	1
American Kestrel	3	0
Ash-throated Flycatcher	3	0
Eurasian Collared-Dove	3	0
Northern Flicker	3	0
Turkey Vulture	3	0
Violet-green Swallow	3	0
Spotted Towhee	2	0
American Robin	1	0
Black-billed Magpie	1	0
Blue-gray Gnatcatcher	1	0
Brown-headed Cowbird	1	0
Bullock's Oriole	1	0
Ferruginous Hawk	**1**	**0**
Mallard	1	0
Rock Wren	1	0
Western Scrub-Jay	1	0
Unidentified Swallow	*5*	*1*
Unidentified Sparrow	*4*	*1*
Unidentified Buteo	*1*	*0*
Unidentified Hummingbird	*1*	*0*
Unidentified Kingbird	*1*	*0*
Unidentified Woodpecker	*1*	*0*
Total	**719**	**100%**

Note: 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 2011 sampling

During April and May of 2011, 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 19 unique points each (Table 3.6.1). Each point was surveyed three times for a total of 228 point visits (the number of unique points multiplied by the number of visits) at Lake Meredith NRA.

3.6.2 Results and discussion

During 2011, 956 birds of 60 species were counted at Lake Meredith NRA (Table 3.6.2). The most commonly counted species was Cassin's sparrow (17%), which occurred primarily at the honey mesquite transect. The count of Cassin's sparrow nearly doubled compared to 2010, possibly due to substantial regrowth of mesquite. Red-winged blackbird (9%), northern mockingbird (7%), mourning dove (5%), and western kingbird (4%) were also common.

The park's diverse habitat, ranging from upland grassland to riparian canyon land and bottomland with a mix of grassland/savannah/wetland, attracts a high diversity of bird species. Red-winged blackbird was still abundant at the bottomland transect, despite extremely dry soil, along with many mourning dove, eastern meadowlark, Bullock's oriole, and western kingbird.

The cottonwood transect along Turkey Creek produced two of the three new park species detected in 2011, including a singing Say's phoebe and at least two singing, male black-throated sparrows. The other new species for the park was the clay-colored sparrow, passing through on migration, at the honey mesquite transect. Although not new species for the park, indigo bunting and Carolina chickadee, found at the cottonwood transect, had not been detected in point count surveys since they were initiated in 2009. A group of three olive-sided flycatchers, one singing, represents the third consecutive season that this species has been detected on Turkey Creek.

Table 3.6.1. Habitat type, number of points, and sampling dates for each transect or grid at Lake Meredith NRA, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
BOTTOM	Riparian	Bottomland grassland	19	3	5/14	5/15	5/16
CWOOD	Riparian	Cottonwood bottom	19	3	5/10	5/10	5/12
HONEY	Grassland	Upland grassland	19	3	4/29 - 4/30	5/3	5/7
UPLAND	Grassland	Upland grassland	19	3	5/2 - 5/3	5/4 to 5/5	5/5 - 5/7



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Cassin's sparrow (*Peucaea cassinii*) was the most commonly detected species at Lake Meredith NRA in 2011.

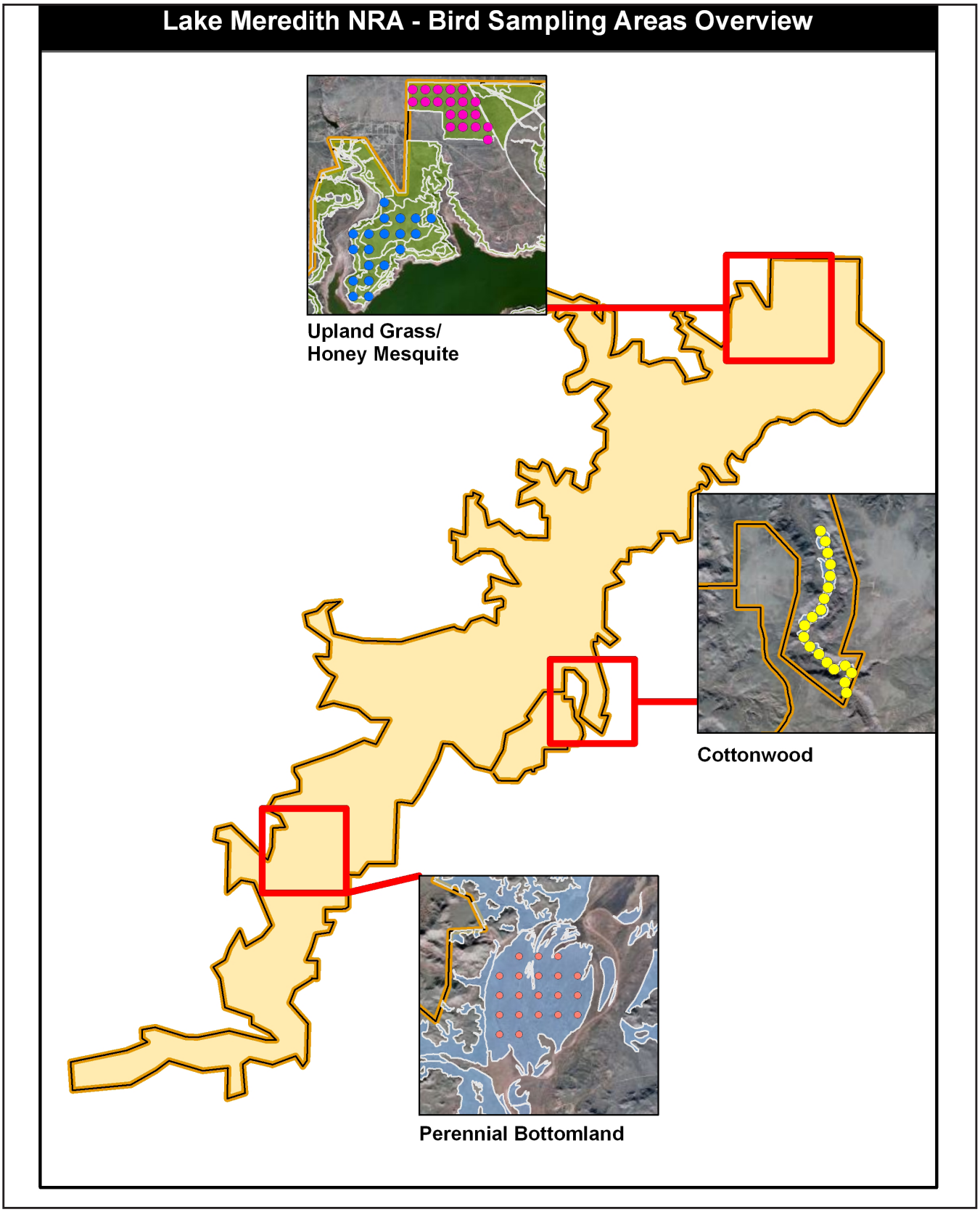


Figure 3.6.1-1. Bird sampling areas at Lake Meredith NRA.

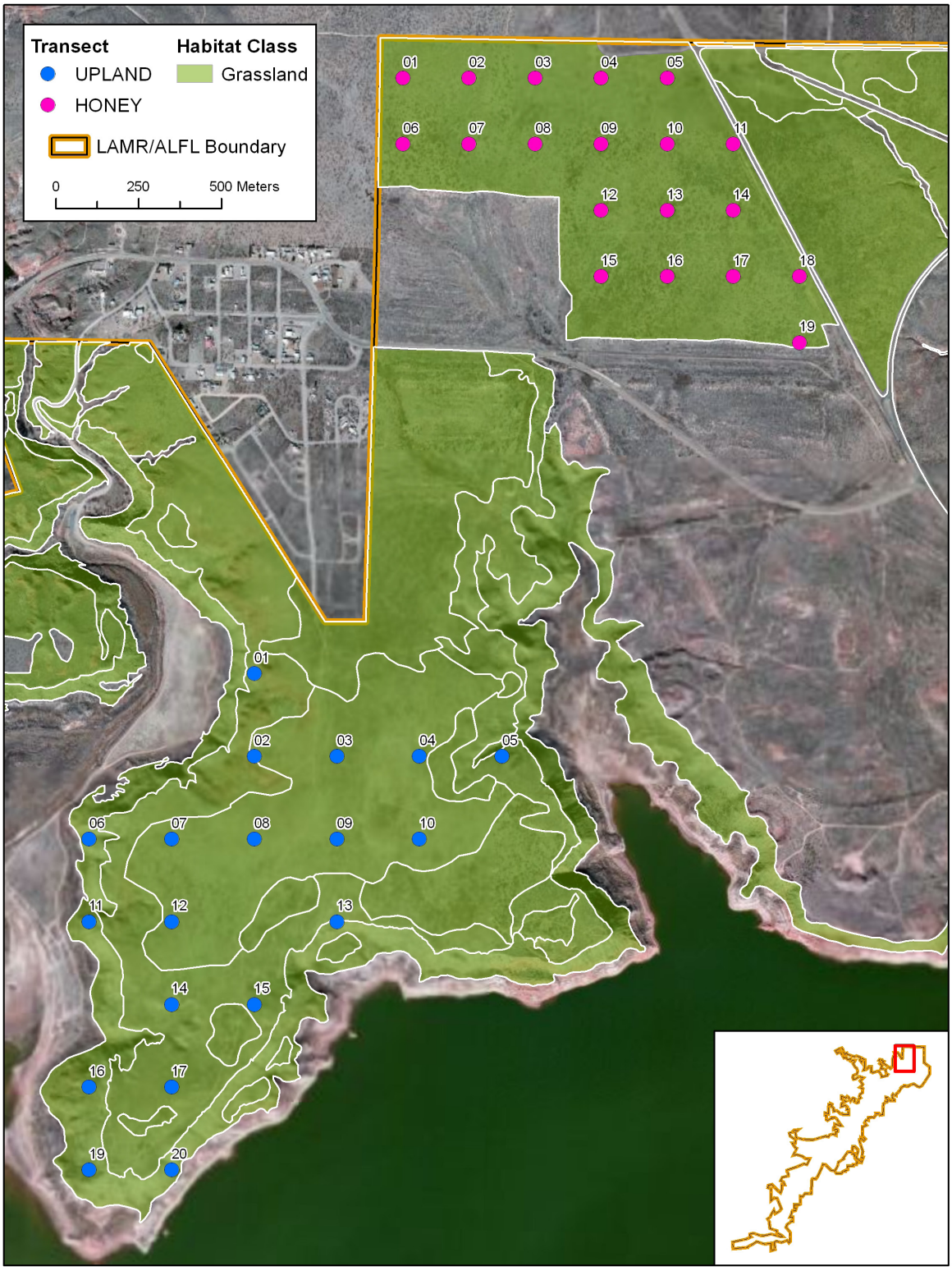


Figure 3.6.1-2. Point locations targeted for annual sampling at Lake Meredith NRA, Upland Grass/Honey Mesquite.

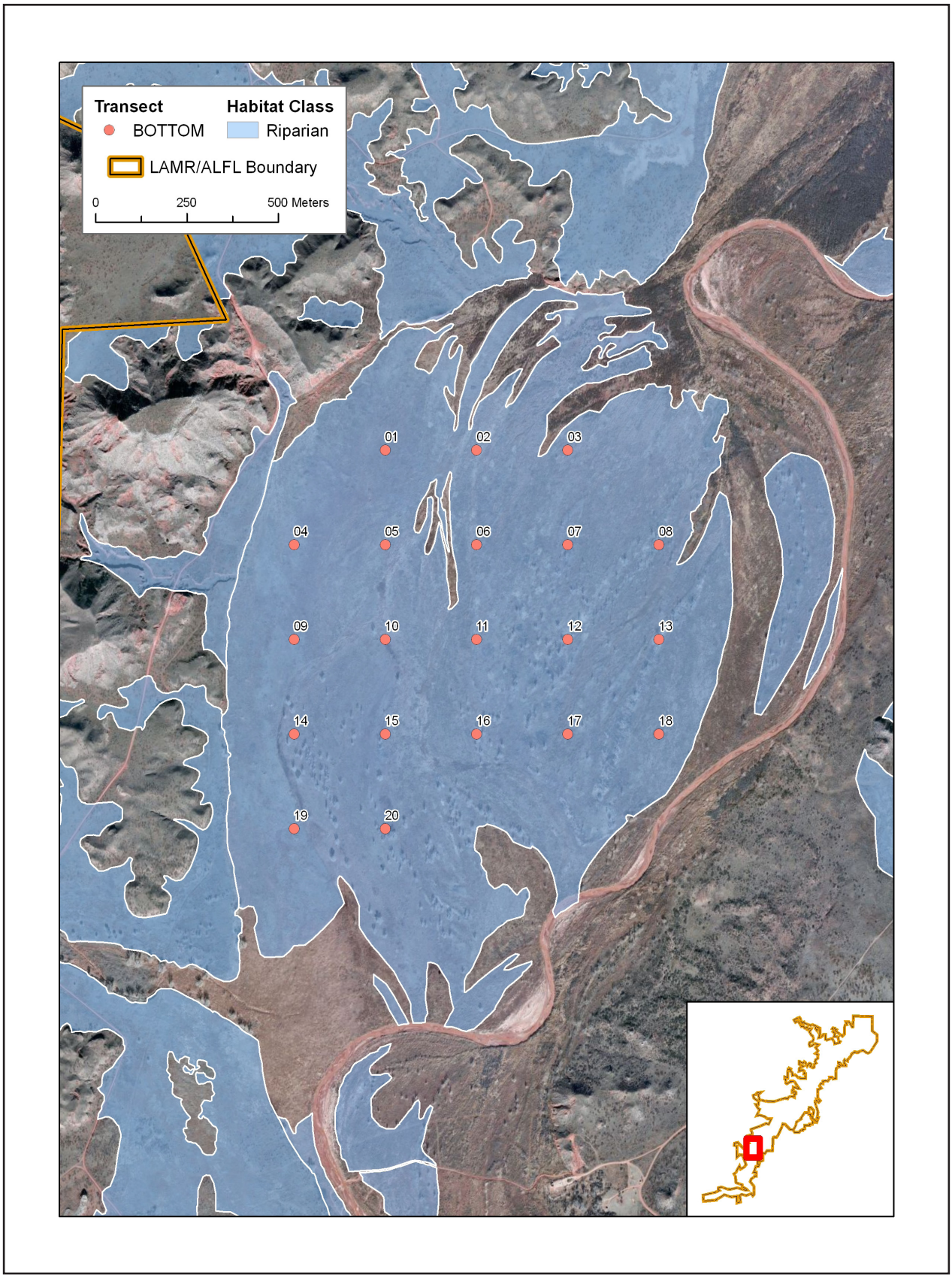


Figure 3.6.1-3. Point locations targeted for annual sampling at Lake Meredith NRA, Pernnial Bottomland.

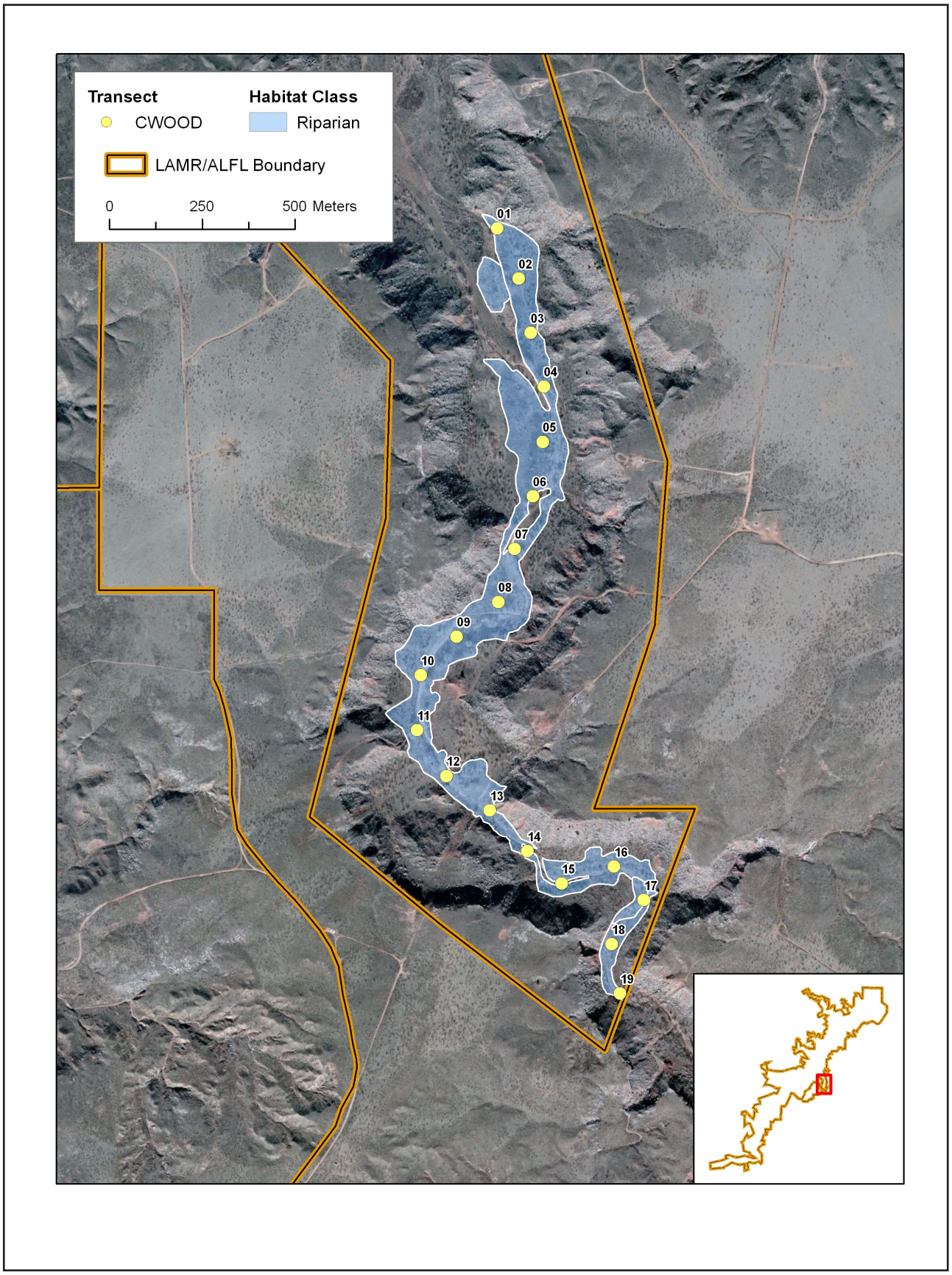


Figure 3.6.1-4. Point locations targeted for annual sampling at Lake Meredith NRA, Cottonwood.

Table 3.6.2. Number of birds detected of each species in each habitat class, Lake Meredith NRA, 2011

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Cassin's Sparrow	164	2	166	17
Red-winged Blackbird	1	83	84	9
Northern Mockingbird	28	39	67	7
Mourning Dove	11	33	44	5
Western Kingbird	28	7	35	4
Eastern Meadowlark	--	32	32	3
Northern Cardinal	2	30	32	3
Bullock's Oriole	2	28	30	3
Lark Bunting	--	25	25	3
Orchard Oriole	--	23	23	2
Bewick's Wren	1	21	22	2
Dickcissel	--	21	21	2
Ash-throated Flycatcher	--	19	19	2
Common Grackle	12	7	19	2
Rock Wren	8	11	19	2
Northern Flicker	--	18	18	2
Mississippi Kite	--	17	17	2
Northern Bobwhite	12	5	17	2
Painted Bunting	6	11	17	2
Turkey Vulture	6	11	17	2
Western Meadowlark	17	--	17	2
Barn Swallow	14	--	14	1
Red-headed Woodpecker	--	14	14	1
Field Sparrow	--	13	13	1
American Kestrel	2	9	11	1
Scissor-tailed Flycatcher	8	3	11	1
Red-bellied Woodpecker	--	10	10	1
Blue Grosbeak	3	6	9	1
Ruddy Duck	9	--	9	1
Common Yellowthroat	--	8	8	1
Blue Jay	--	7	7	1
Killdeer	6	1	7	1
Rufous-crowned Sparrow	--	6	6	1
Black-throated Sparrow	--	**5**	**5**	**1**
Blue-winged Teal	5	--	5	1
Eurasian Collared-Dove	4	1	5	1
Great Horned Owl	2	3	5	1
Vesper Sparrow	5	--	5	1
Clay-colored Sparrow	**4**	--	**4**	**0**
Greater Roadrunner	1	3	4	0
Yellow Warbler	--	4	4	0

Table 3.6.2. Number of birds detected of each species in each habitat class, Lake Meredith NRA, 2011, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Cliff Swallow	1	2	3	0
European Starling	--	3	3	0
Indigo Bunting	--	3	3	0
Olive-sided Flycatcher	--	3	3	0
American Avocet	2	--	2	0
Canyon Wren	--	2	2	0
Cooper's Hawk	--	2	2	0
Grasshopper Sparrow	2	--	2	0
Mallard	2	--	2	0
Red-tailed Hawk	--	2	2	0
White-crowned Sparrow	2	--	2	0
Willow Flycatcher	--	2	2	0
Yellow-rumped Warbler	2	--	2	0
Brown-headed Cowbird	--	1	1	0
Carolina Chickadee	--	1	1	0
Ring-necked Pheasant	1	--	1	0
Say's Phoebe	--	**1**	**1**	**0**
Summer Tanager	--	1	1	0
White-breasted Nuthatch	--	1	1	0
Unknown Woodpecker	*2*	*5*	*7*	*1*
Unknown Bird	*3*	*3*	*6*	*1*
Unknown Sparrow	*3*	--	*3*	*0*
Unknown Gull	*2*	--	*2*	*0*
Unknown Buteo	*1*	--	*1*	*0*
Unknown Flycatcher	--	*1*	*1*	*0*
Unknown Meadowlark	--	*1*	*1*	*0*
Unknown Oriole	--	*1*	*1*	*0*
Unknown Thrush	--	*1*	*1*	*0*
Total	**384**	**572**	**956**	**100%**

Note: 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 2011 sampling

During April of 2011, 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. The other transect was in grassland (upland grassland) habitat with six unique points (Table 3.7.1). 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 2011, 466 birds of 32 species were counted at Lyndon B. Johnson NHP (Table 3.7.2). Northern cardinal was the most commonly counted species (15%). Black-crested titmouse (12%), red-winged blackbird (11%), black vulture (6%), Carolina wren (6%), and scissor-tailed flycatcher (6%) were also common. No new species were recorded at the park in 2011.

Prominent species worth noting include scissor-tailed flycatcher and Bewick's wren at the riparian ranch transect, and black vulture, Carolina wren, and mourning dove at both transects. Notably absent was the large breeding colony of cliff swallow under the Pedernales River bridge on the east side of the ranch transect. Several interesting detections at the ranch transect included Bullock's and orchard oriole, at least two apparent pairs of lark sparrows, and for the second consecutive year, an eastern phoebe nest with nestlings in the guard booth on the road to the White House. A singing field sparrow, at the restoration transect, represents the first detection of this species in three years of point count surveys.

Table 3.7.1. Habitat type, number of points, and sampling dates for each transect or grid at Lyndon B. Johnson NHP, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
RANCH	Riparian	Bottomland grassland	17	3	4/26/2011	4/27/2011	4/28/2011
RESTORATION	Grassland	Upland grassland	6	3	4/26/2011	4/27/2011	4/28/2011



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Lark sparrow (*Chondestes grammacus*) was one of the more commonly detected species at Lyndon B. Johnson NHP in 2011.

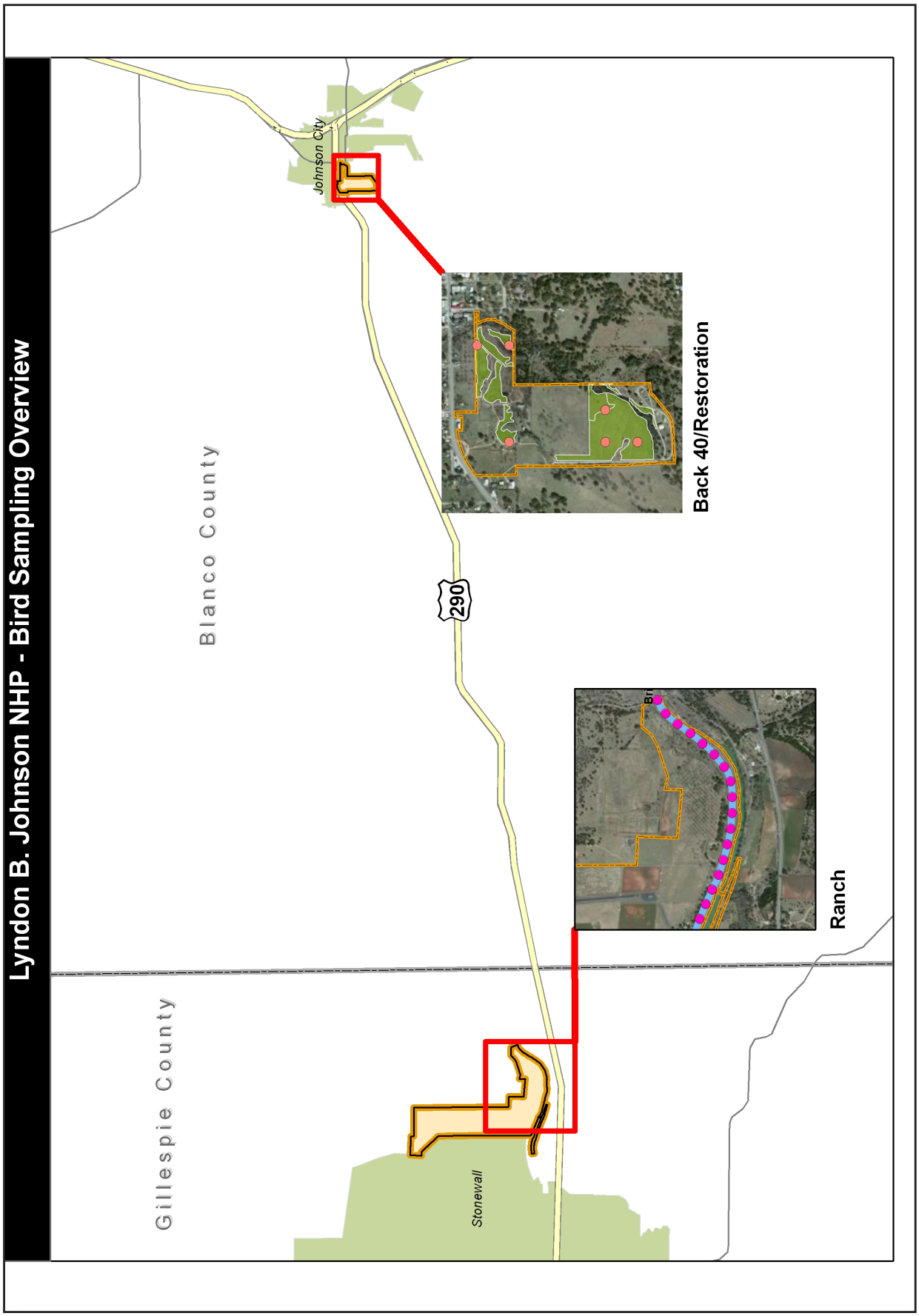


Figure 3.7.1-1. Bird sampling areas at Lyndon B. Johnson NHP.

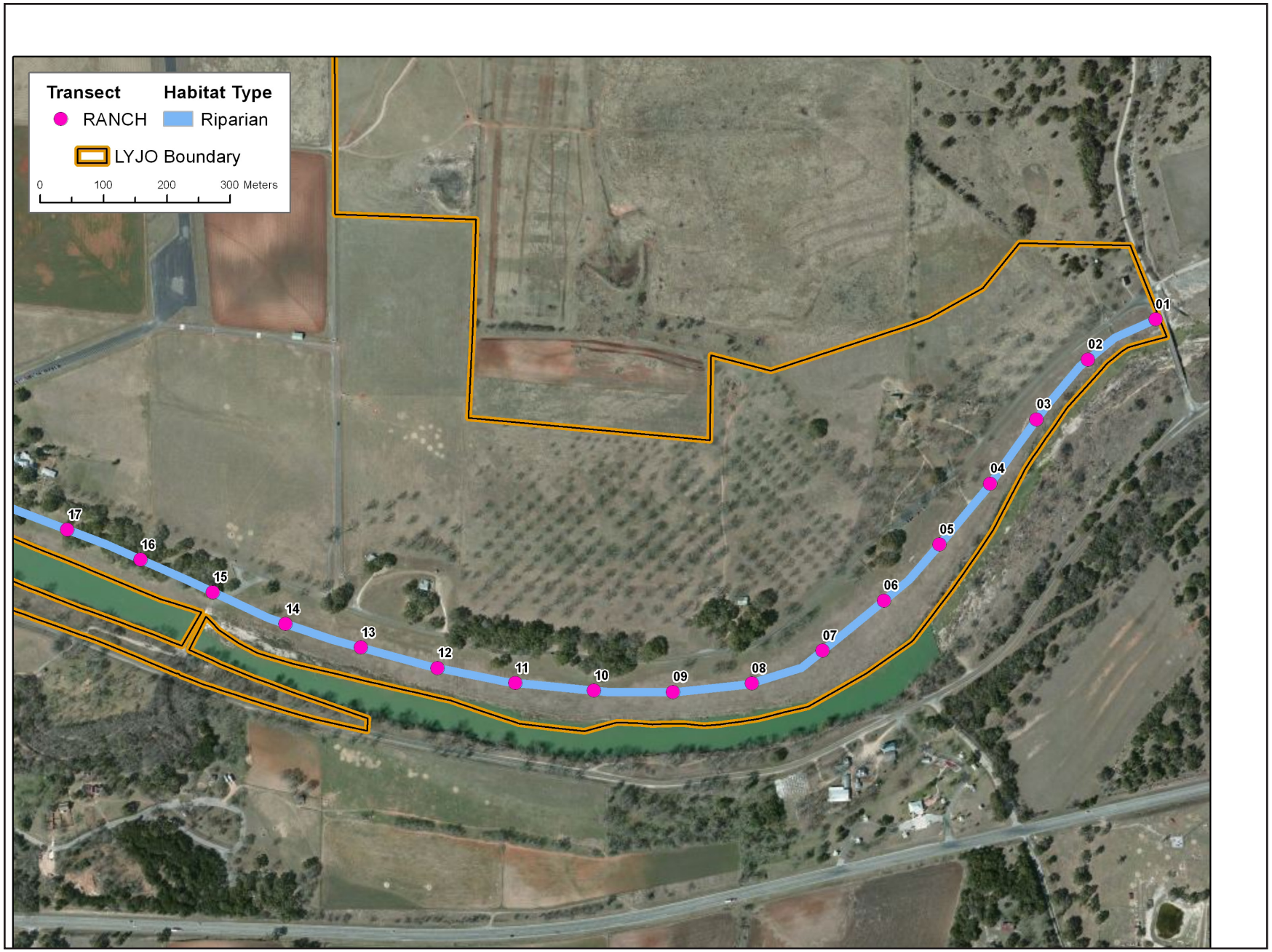


Figure 3.7.1-2. Point locations targeted for annual sampling at Lyndon B. Johnson NHP, Ranch,

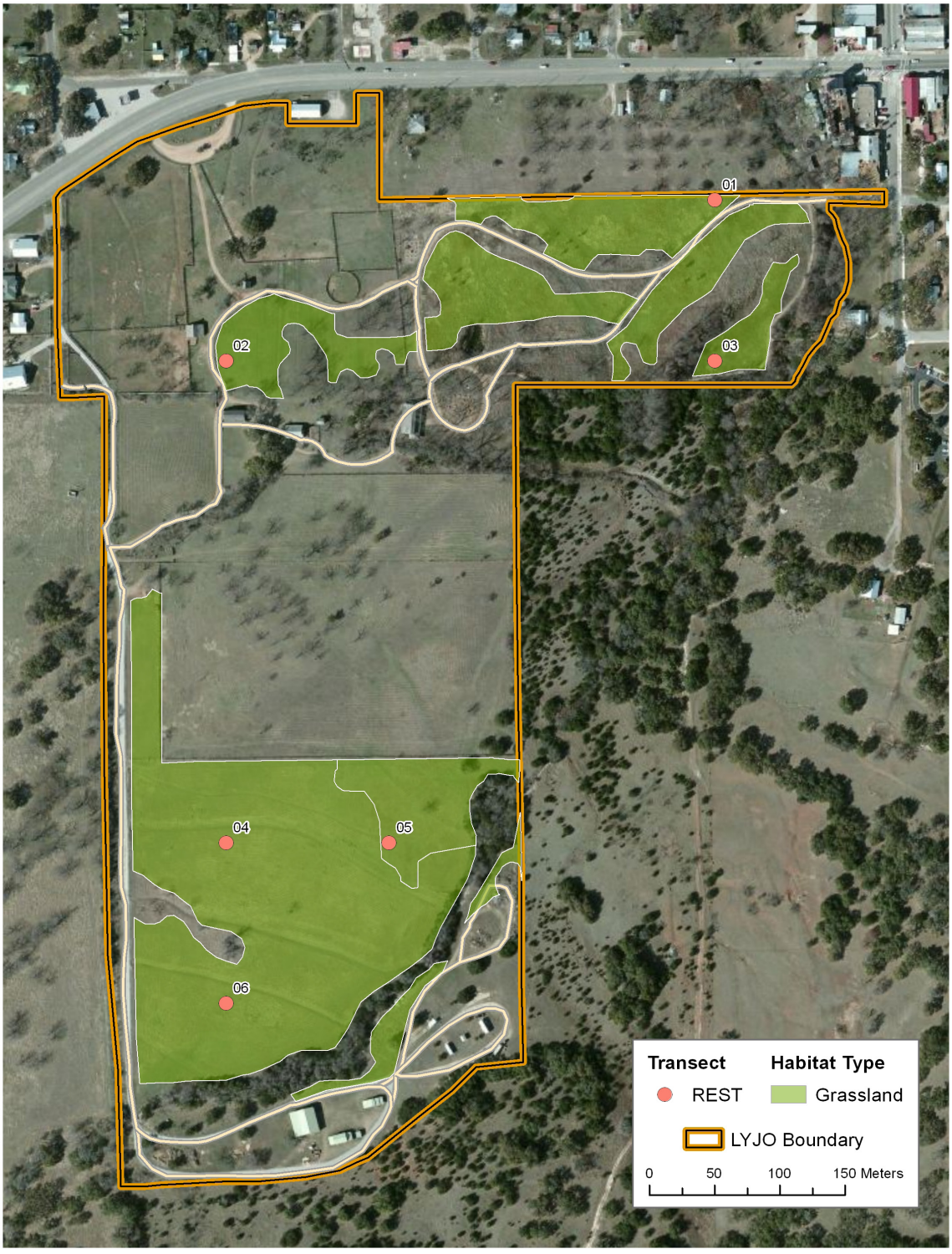


Figure 3.7.1-3. Point locations targeted for annual sampling at Lyndon B. Johnson NHP, Back 40/Restoration.

Table 3.7.2. Number of birds detected of each species in each habitat class, Lyndon B. Johnson NHP, 2011

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Northern Cardinal	26	46	72	15
Black-crested Titmouse	15	40	55	12
Red-winged Blackbird	--	53	53	11
Black Vulture	15	13	28	6
Carolina Wren	15	13	28	6
Scissor-tailed Flycatcher	1	27	28	6
Bewick's Wren	3	24	27	6
Mourning Dove	8	19	27	6
Lark Sparrow	--	22	22	5
Orchard Oriole	--	17	17	4
Northern Mockingbird	12	4	16	3
Barn Swallow	1	11	12	3
Brown-headed Cowbird	--	12	12	3
Eastern Phoebe	4	7	11	2
Western Kingbird	1	9	10	2
White-winged Dove	7	--	7	2
Ladder-backed Woodpecker	--	6	6	1
Cattle Egret	--	4	4	1
Double-crested Cormorant	--	4	4	1
Common Grackle	--	3	3	1
Summer Tanager	--	3	3	1
Turkey Vulture	--	3	3	1
Blue Jay	2	--	2	0
Carolina Chickadee	--	2	2	0
Field Sparrow	2	--	2	0
Great Crested Flycatcher	--	2	2	0
Yellow-billed Cuckoo	--	2	2	0
Bullock's Oriole	--	1	1	0
Cliff Swallow	--	1	1	0
Great Blue Heron	--	1	1	0
Great-tailed Grackle	1	--	1	0
Green Heron	--	1	1	0
Unidentified Bird	*1*	*1*	*2*	*0*
Unidentified Oriole	--	*1*	*1*	*0*
Total	**114**	**352**	**466**	**100%**

Note: 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.

3.8 Pecos National Historical Park

3.8.1 2011 sampling

During May and June of 2011, we sampled six transects or grids at Pecos NHP (Figures 3.8.1). Not all points targeted for sampling were sampled in 2011 due to logistical constraints. 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 11 and 18 unique points each (Table 3.8.1). Most points were surveyed three times for a total of 224 point visits (the number of unique points multiplied by the number of visits) at Pecos NHP in 2011 (compared to 270 point visits in 2010).



DAVE MENKE, USFWS

Pinyon jay (*Gymnorhinus cyanocephalus*) was one of the most commonly counted species at Pecos NHP in 2011.

3.8.2 Results and discussion

During 2011, 1,333 birds of 68 species were counted at Pecos NHP (Table 3.8.2). This was the second highest species diversity in the SOPN in 2011. Species counted in the highest numbers were Cassin's kingbird (11%), lark sparrow (8%), northern mockingbird (6%), mourning dove (5%), pinyon jay (5%), and western scrub-jay (4%). Other prominent species were spotted towhee, black-head grosbeak, common raven, and western wood-pewee. A pair of Clark's nutcracker, at least one calling ladder-backed woodpecker, and one calling red-bellied woodpecker, were all detected at the Glorieta transect. These three species, and a ruby-crowned kinglet at the river transect, represent new species for the park.

Table 3.8.1. Habitat type, number of points, and sampling dates for each transect or grid at Pecos NHP, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
GLORIETA	Riparian	Cottonwood bottom	18	3	6/2	6/3	6/5
PECOS	Riparian	Cottonwood bottom	11	3	6/17	6/18	6/19
UNIT 3	Grassland	Shortgrass prairie	11	2	na	6/17 - 6/23	6/25
UNIT 6	Grassland	Shortgrass prairie	18	3	6/6	6/7	6/8
UNIT 17	Grassland	Shortgrass prairie	14	3	5/27	6/1	6/4
UNIT 19	Grassland	Shortgrass prairie	6	3	5/27	6/1	6/4

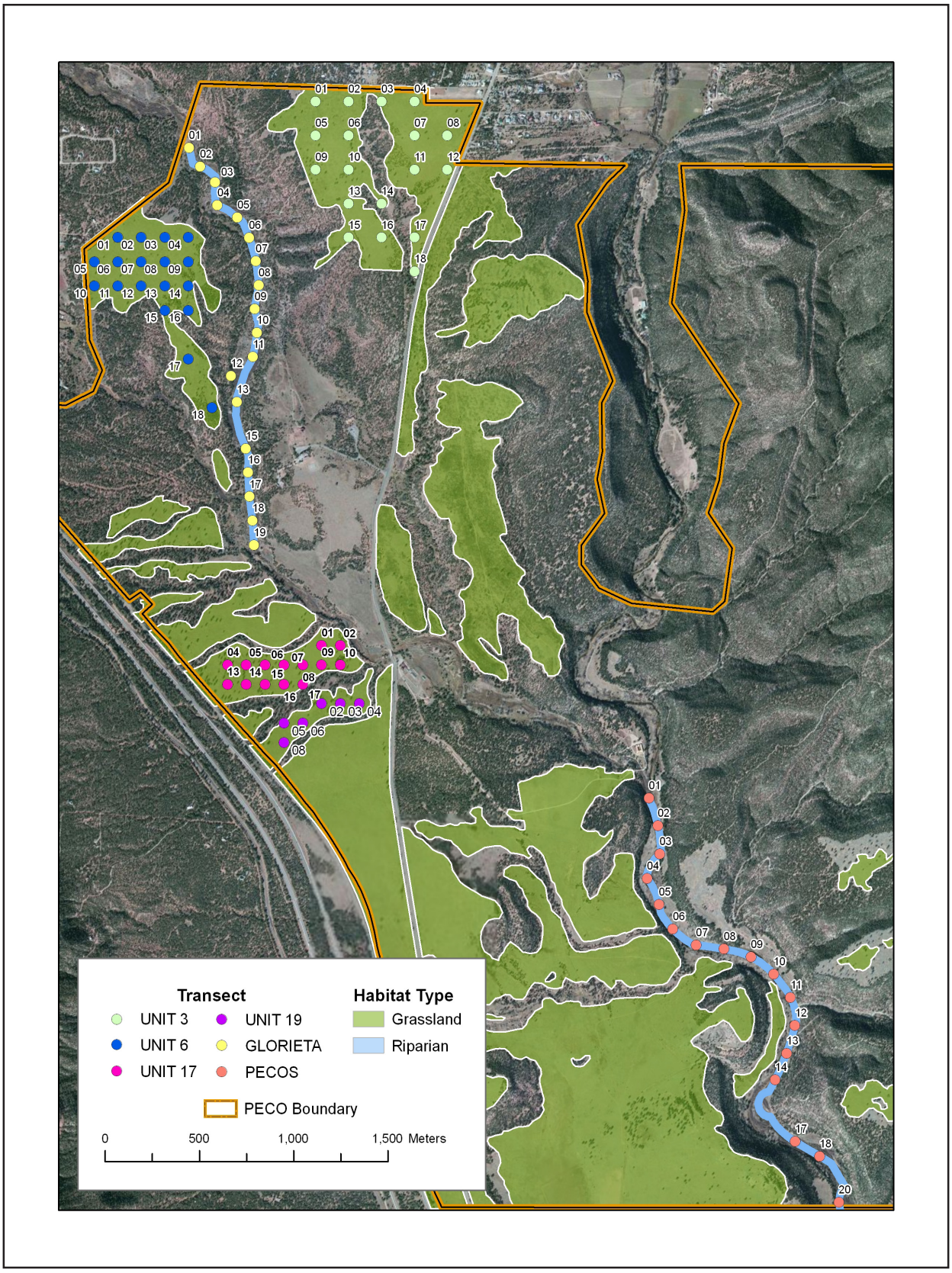


Figure 3.8.1. Point locations targeted for annual sampling at Pecos NHP.

Table 3.8.2. Number of birds detected of each species in each habitat class, Pecos NHP, 2011

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Cassin's Kingbird	129	16	145	11
Lark Sparrow	97	4	101	8
Northern Mockingbird	57	23	80	6
Mourning Dove	42	24	66	5
Pinyon Jay	59	4	63	5
Western Scrub-Jay	21	37	58	4
Black-headed Grosbeak	17	39	56	4
Spotted Towhee	8	47	55	4
Western Meadowlark	48	7	55	4
Northern Rough-winged Swallow	21	33	54	4
Western Wood-Pewee	27	26	53	4
Common Raven	37	14	51	4
Violet-green Swallow	9	31	40	3
Red-winged Blackbird	--	28	28	2
Juniper Titmouse	7	21	28	2
Chipping Sparrow	22	5	27	2
Mallard	--	20	20	2
Song Sparrow	--	18	18	1
American Robin	3	14	17	1
Brown-headed Cowbird	--	16	16	1
Hepatic Tanager	15	--	15	1
Common Yellowthroat	--	14	14	1
Say's Phoebe	11	3	14	1
Western Bluebird	5	7	12	1
Yellow Warbler	--	12	12	1
Black Phoebe	--	11	11	1
Brewer's Blackbird	1	10	11	1
Ash-throated Flycatcher	1	9	10	1
Turkey Vulture	6	4	10	1
Black-chinned Hummingbird	1	8	9	1
Bullock's Oriole	--	9	9	1
Lesser Goldfinch	1	8	9	1
Plumbeous Vireo	7	2	9	1
Spotted Sandpiper	--	9	9	1
Barn Swallow	6	2	8	1
Mountain Bluebird	7	1	8	1
Western Kingbird	7	--	7	1
American Crow	4	2	6	0
Cliff Swallow	5	1	6	0
Common Nighthawk	4	2	6	0
Mountain Chickadee	3	3	6	0

Table 3.8.2. Number of birds detected of each species in each habitat class, Pecos NHP, 2011, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Vesper Sparrow	--	6	6	0
Western Tanager	--	6	6	0
Yellow-breasted Chat	--	6	6	0
Great Blue Heron	--	5	5	0
Ladder-backed Woodpecker	**2**	**3**	**5**	**0**
Canyon Towhee	1	3	4	0
Northern Flicker	1	3	4	0
Pine Siskin	4	--	4	0
White-breasted Nuthatch	4	--	4	0
Black-throated Gray Warbler	--	3	3	0
Blue Grosbeak	--	3	3	0
Gray Vireo	2	1	3	0
Bewick's Wren	--	2	2	0
Bushtit	--	2	2	0
Clark's Nutcracker	--	**2**	**2**	**0**
Eurasian Collared-Dove	1	1	2	0
Gray Flycatcher	--	2	2	0
Hairy Woodpecker	2	--	2	0
Rock Wren	--	2	2	0
Yellow-rumped Warbler	--	2	2	0
Gray Catbird	1	--	1	0
Green-tailed Towhee	--	1	1	0
Red Crossbill	--	1	1	0
Red-bellied Woodpecker	--	**1**	**1**	**0**
Red-tailed Hawk	--	1	1	0
Ruby-crowned Kinglet	--	**1**	**1**	**0**
White-winged Dove	1	--	1	0
Unidentified Bird	*4*	*5*	*9*	*1*
Unidentified Hummingbird	*3*	*5*	*8*	*1*
Unidentified Swallow	*1*	*2*	*3*	*0*
Unidentified Sparrow	*2*	--	*2*	*0*
Unidentified Empidonax	--	*1*	*1*	*0*
Unidentified Hawk	--	*1*	*1*	*0*
Unidentified Woodpecker	--	*1*	*1*	*0*
Total	**717**	**616**	**1,333**	**100%**

Note: 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 2011 sampling

During June of 2011, 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). Each point was surveyed three times for a total of 168 point visits (the number of unique points multiplied by the number of visits) at Sand Creek Massacre NHS.

3.9.2 Results and discussion

During 2011, 1,555 birds of 39 species were counted at Sand Creek Massacre NHS (Table 3.9.2). Western meadowlark, the most commonly detected species in the park (27%), was noted throughout the park, particularly in the sand sage and upland grassland. Mourning dove (15%), Cassin's sparrow (12%), western kingbird (10%), and horned lark (6%) were also common. No new species were detected in 2011.

Cassin's sparrow was found at both grassland transects, but was more common in the sand sage. Though grasshopper sparrow was still common at the sand sage and upland grassland transects, the total count was considerably less than in 2010. Notable bird species found in the riparian cottonwood included mourning dove, western kingbird, and three species of orioles – Baltimore, Bullock's, and orchard. Other interesting birds detected included common yellowthroat, warbling vireo, yellow-billed cuckoo, one dickcissel, and one singing eastern bluebird. Burrowing owl and mountain plover, detected in the prairie dog colony at the upland grassland transect in the 2009 point count survey, were absent for the second consecutive year. No prairie dogs were present during the 2010 and 2011 point count surveys.

Table 3.9.1. Habitat type, number of points, and sampling dates for each transect or grid at Sand Creek Massacre NHS, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
COTTONWOOD	Riparian	Cottonwood bottom	16	3	6/18	6/20	6/20 - 6/21
UPLAND GRASS	Grassland	Shortgrass prairie	20	3	6/17 - 6/23	6/19 - 6/24	6/20 - 6/25
UPLAND SAGE	Grassland	Shortgrass prairie	20	3	6/17	6/19	6/23



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Horned lark (*Eremophila alpestris*) was a common species at Sand Creek Massacre NHS in 2011.



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

Table 3.9.2. Number of birds detected of each species in each habitat class, Sand Creek Massacre NHS, 2011

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Western Meadowlark	385	42	427	27
Mourning Dove	41	196	237	15
Cassin's Sparrow	189	4	193	12
Western Kingbird	27	129	156	10
Horned Lark	92	--	92	6
Bullock's Oriole	21	48	69	4
House Wren	--	48	48	3
Northern Mockingbird	3	39	42	3
Grasshopper Sparrow	38	--	38	2
Lark Sparrow	16	20	36	2
Ring-necked Pheasant	26	2	28	2
Orchard Oriole	1	26	27	2
Brown-headed Cowbird	16	2	18	1
Common Grackle	5	13	18	1
Red-winged Blackbird	16	2	18	1
Common Nighthawk	13	2	15	1
Red-headed Woodpecker	1	12	13	1
Northern Flicker	1	7	8	1
Downy Woodpecker	--	6	6	0
Eastern Kingbird	2	4	6	0
Yellow Warbler	--	6	6	0
Blue Grosbeak	--	5	5	0
Warbling Vireo	--	5	5	0
Western Wood-Pewee	--	5	5	0
Blue Jay	1	3	4	0
Red-tailed Hawk	2	2	4	0
Swainson's Hawk	4	--	4	0
Baltimore Oriole	--	3	3	0
Common Yellowthroat	3	--	3	0
Great Blue Heron	3	--	3	0
European Starling	--	2	2	0
Killdeer	2	--	2	0
Yellow-billed Cuckoo	--	2	2	0
Barn Swallow	1	--	1	0
Dickcissel	1	--	1	0
Eastern Bluebird	1	--	1	0
Eurasian Collared-Dove	1	--	1	0
Great Horned Owl	--	1	1	0
Say's Phoebe	--	1	1	0
Unidentified Oriole	*2*	*1*	*3*	*0*
Unidentified Buteo	*1*	--	*1*	*0*

Table 3.9.2. Number of birds detected of each species in each habitat class, Sand Creek Massacre NHS, 2011, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Unidentified Sparrow	*1*	--	*1*	*0*
Unidentified Woodpecker	--	*1*	*1*	*0*
Total	**916**	**639**	**1,555**	**100%**

Note: 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 2011 sampling

During May of 2011, we sampled two transects/grids at Washita Battlefield NHS (Figure 3.10.1). Not all points targeted for sampling were sampled in 2011 due to logistical constraints. Both transects were in grassland habitat, bottomland grassland and upland grassland, with 16 and 19 unique points, respectively (Table 3.10.1). Most points were surveyed three times for a total of 105 point visits (the number of unique points multiplied by the number of visits) at Washita Battlefield NHS (compared to 111 point visits in 2010).

3.10.2 Results and discussion

During 2011, 1,458 birds of 60 species were counted at Washita Battlefield NHS (Table 3.10.2). The occurrence of a nice mix of grassland and savannah/woodland bird species on WABA is a reflection of the diverse habitat. Dickcissel was the most commonly counted species (17%), and its total count was nearly triple the count recorded in 2010. Other common species were barn swallow (15%), eastern meadowlark (11%), northern bobwhite (5%), Cassin's sparrow (5%), and northern cardinal (4%). Three species of wrens (Bewick's, Carolina, and house) and six species of sparrows (e.g., Cassin's, field, lark, and grasshopper) were detected. The other two species of sparrow, clay-colored and Savannah, were passing through on migration.

Five new species for the park were found during surveys, including tufted titmouse, western meadowlark, lesser goldfinch, great egret, and cedar waxwing (passing through on migration). Although not a new species for the park, belted kingfisher was detected for the first time in three years of point count surveys.


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Dickcissel (*Spiza americana*), the most commonly counted species at Washita Battlefield NHS in 2011.

Table 3.10.1. Habitat type, number of points, and sampling dates for each transect or grid at Washita Battlefield NHS, 2011

Transect/Grid	Habitat class	Habitat type	# points	# visits	Visit 1	Visit 2	Visit 3
RESTORATION	Grassland	Bottomland grassland	16	3	5/21	5/22	5/23
UPLAND	Grassland	Upland grassland	19	3	5/21	5/22	5/23

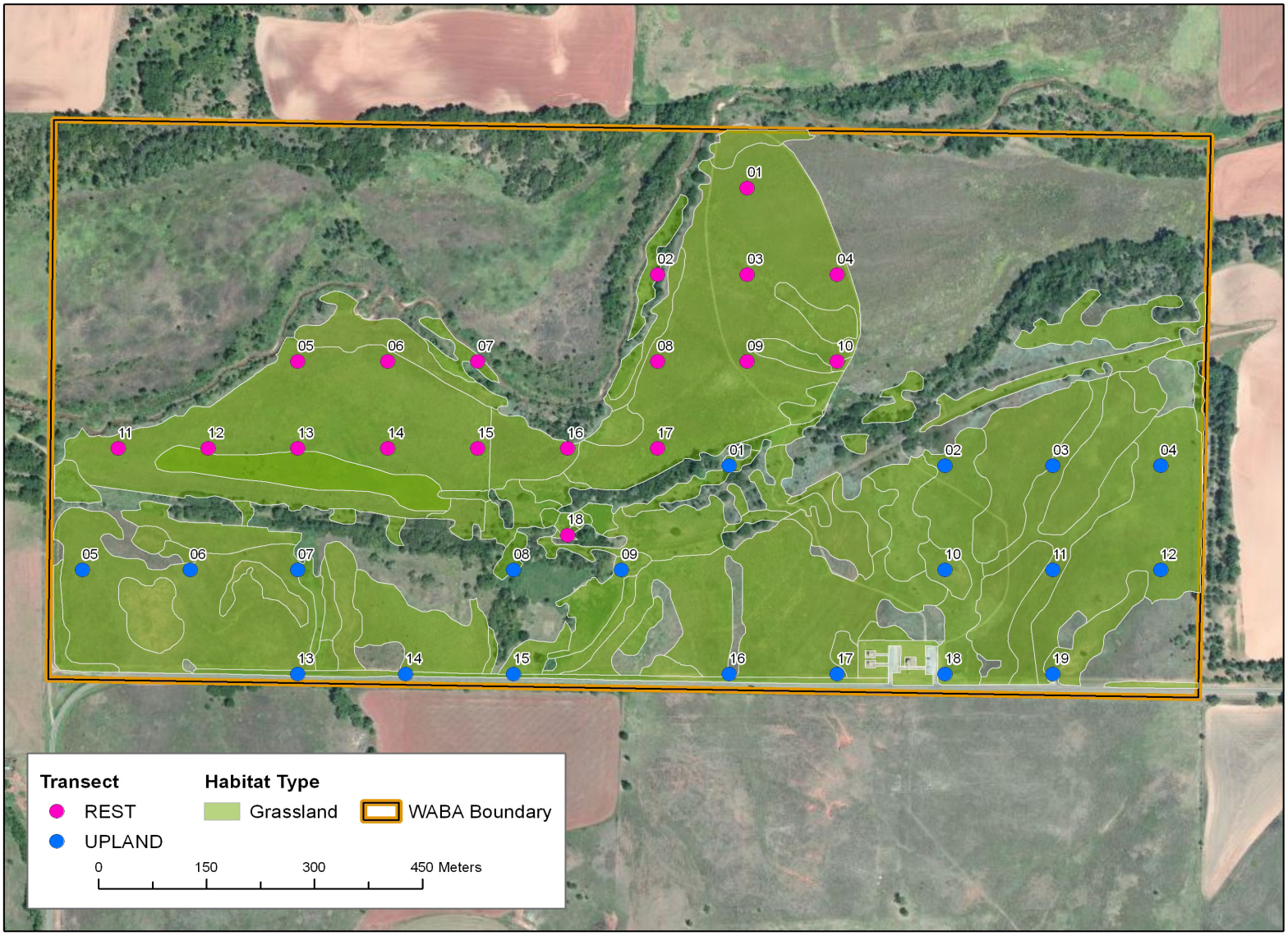


Figure 3.10.1. Point locations targeted for annual sampling at Washita Battlefield NHS.

Table 3.10.2. Number of birds detected of each species in each habitat class, Washita Battlefield NHS, 2011

Species	# of birds detected	
	Total (grassland habitat)	% of total
Dickcissel	244	17
Barn Swallow	215	15
Eastern Meadowlark	159	11
Northern Bobwhite	80	5
Cassin's Sparrow	66	5
Northern Cardinal	54	4
Brown-headed Cowbird	50	3
Mourning Dove	50	3
Field Sparrow	49	3
Red-bellied Woodpecker	36	2
Carolina Chickadee	28	2
Mississippi Kite	28	2
Painted Bunting	27	2
American Crow	26	2
Carolina Wren	26	2
Northern Mockingbird	25	2
Western Meadowlark	**23**	**2**
Turkey Vulture	22	2
Blue Grosbeak	20	1
Blue-gray Gnatcatcher	19	1
Common Grackle	18	1
Great-tailed Grackle	17	1
Cedar Waxwing	**15**	**1**
Scissor-tailed Flycatcher	13	1
Yellow-billed Cuckoo	12	1
Downy Woodpecker	10	1
Grasshopper Sparrow	9	1
Lark Sparrow	9	1
Bewick's Wren	8	1
Belted Kingfisher	7	0
American Goldfinch	6	0
Purple Martin	6	0
Red-tailed Hawk	6	0
Cliff Swallow	5	0
Common Yellowthroat	5	0
Great Crested Flycatcher	4	0
Red-headed Woodpecker	4	0
Tufted Titmouse	**4**	**0**
Eastern Bluebird	3	0
Great Blue Heron	3	0
Northern Flicker	3	0
Savannah Sparrow	3	0
Chimney Swift	2	0
Clay-colored Sparrow	2	0
Dark-eyed Junco	2	0
Eastern Phoebe	2	0
Green Heron	2	0
House Wren	2	0
Killdeer	2	0
Lesser Goldfinch	**2**	**0**
Red-winged Blackbird	2	0
Ruby-throated Hummingbird	2	0
Wild Turkey	2	0
Yellow-rumped Warbler	2	0
Brown Thrasher	1	0
Bullock's Oriole	1	0
Great Egret	**1**	**0**
Hairy Woodpecker	1	0
Western Kingbird	1	0
Yellow Warbler	1	0
Unidentified Woodpecker	*8*	*1*
Unidentified Hummingbird	*3*	*0*
Total	**1,458**	**100%**

Note: 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.

4 Literature Cited

Alcock, J. 2005. Animal behavior: An evolutionary approach. Sunderland, Ma.: Sinauer Associates.

Barrows, C. W., M. B. Swartz, W. L. Hodges, M. F. Allen, J. T. Rotenberry, B. L. Li, T. A. Scott, and X. W. Chen. 2005. A framework for monitoring multiple-species conservation plans. Journal of Wildlife Management 69:1333–1345.

Bennetts, R.E., B.F. Powell, A. D. Flesch, D. Angell, K. Beaupré, and W. L. Halvorson. 2012 (in review). Landbird monitoring protocol for the Sonoran Desert, Southern Plains, and Chihuahuan Desert Networks. Version 1.00. Natural Resource Report NPS/SOPN/NRTR-2012/XXX. National Park Service, Fort Collins, Colorado.

Bibby, C. J., N. D. Burgess, D. A. Hill, and S. Mustoe. 2000. Bird census techniques. Second ed. London: Academic Press.

Bryce, S. A., R. M. Hughes, and P. R. Kaufmann. 2002. Development of a bird integrity index: Using bird assemblages as indicators of riparian condition. Environmental Management 30:294–310.

Buckland, S. T., D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. 2001. Introduction to distance sampling: Estimating abundance of biological populations. Oxford, U.K.: Oxford University Press.

Burnham, K. P., D. R. Anderson, and J. L. Laake. 1980. Estimation of density from line transect sampling of biological populations. Wildlife Monographs, no. 72.

Canterbury, G. E., T. E. Martin, D. R. Petit, L. J. Petit, and D. F. Bradford. 2000. Bird communities and habitat as ecological indicators of forest condition in regional monitoring. Conservation Biology 14:544–558.

Dale, V. H., and S. C. Beyeler. 2001. Challenges in the development and use of ecological indicators. Ecological Indicators 1:3–10.

Diefenbach, D. R., D. W. Brauning, and J. A. Mattice. 2003. Variability in grassland bird counts related to observer differences and species detection rates. Auk 120:1168–1179.

Field, S. A., A. J. Tyre, and H. P. Possingham. 2005. Optimizing allocation of monitoring effort under economic and observational constraints. Journal of Wildlife Management 69:473–482.

Holmes, R. T., and T. W. Sherry. 2001. Thirty-year bird population trends in an unfragmented temperate deciduous forest: Importance of habitat change. Auk 118:589–609.

Hutto, R. L. 1985. Habitat selection by nonbreeding, migratory, land birds. Pages 455–476 in M. L. Cody, ed., Habitat selection in birds. Orlando, Fla.: Academic Press.

Krueper, D., J. Bart, and T. D. Rich. 2003. Response of vegetation and breeding birds to the removal of cattle on the San Pedro River, Arizona (USA). Conservation Biology 17:607–615.

MacKenzie, D. I., J. D. Nichols, J. A. Royle, K. H. Pollock, L. L. Bailey, and J. E. Hines. 2006. Occupancy estimation and modeling: Inferring patterns and dynamics of species. Burlington, Ma.: Elsevier Press.

MacKenzie, D. I., J. D. Nichols, J. E. Hines, M. G. Knutson, and A. B. Franklin. 2003. Estimating site occupancy, colonization, and local extinction when a species is detected imperfectly. Ecology 84:2200–2207.

Manley, P. N., W. J. Zielinski, M. D. Schlesinger, and S. R. Mori. 2004. Evaluation of a multiple-species approach to monitoring species at the ecoregional scale. Ecological Applications 14:296–310.

National Park Service (NPS). 1992. NPS-75: Natural resources inventory and monitoring guidelines. U.S. Department of Interior, Washington, D.C.

NPS, Southern Plains Inventory and Monitoring Network (SOPN). 2008. Southern Plains Network Vital Signs Monitoring Plan. Natural Resource Report NPS/SOPN/NRR-2008/028. National Park Service, Fort Collins, Colorado.

Powell, B. F., A. D. Flesch, T. Mau-Crimmins, D. Angell, K. Beaupre, and W. L. Halvorson. 2007. Landbird monitoring protocol for the Sonoran Desert Network. Version 1.02. Unpublished protocol to the National Park Service, Sonoran Desert Network Inventory and Monitoring Program, Tucson, Az.

Reynolds, R. T., J. M. Scott, and R. A. Nussbaum. 1980. A variable circular-plot method for estimating bird numbers. Condor 82:309–313.

Ringold, P. L., J. Alegria, R. L. Czaplewski, B. S. Mulder, T. Tolle, and K. Burnett. 1996. Adaptive monitoring design for ecosystem management. Ecological Applications 6:745–747.

Sekercioglu, C. H. 2002. Impacts of birdwatching on human and avian communities. Environmental Conservation 29:282–289.

Stevens, L. E., and B. D. Gold. 2003. Monitoring for adaptive management of the Colorado River Ecosystem in Glen and Grand canyons. Pages 101–134 in D. E. Busch and J. C. Trexler, eds., Monitoring ecosystems: Interdisciplinary approaches for evaluating ecoregional initiatives. Washington, D.C.: Island Press.

Thomas, L., J. L. Laake, S. Strindberg, F. F. C. Marques, S. T. Buckland, D. L. Borchers, D. R. Anderson, K. P. Burnham, S. L. Pollard J. H. Hedley, J. R. B. Bishop, and T. A. Marques. 2005. Distance 5.0. Release Beta 5. Research unit for wildlife population assessment, University of St. Andrews, U.K. http:/www.ruspa.st-and.ac.uk/distance.

Wiens, J. A. 1985. Habitat selection in variable environments: Shrub-steppe birds. Pages 191–226 *in* M. L. Cody, ed., Habitat selection in birds. Orlando, Fl.: Academic Press.

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