



Landbird Monitoring in the Southern Plains Network

Annual Report, 2010

Natural Resource Technical Report NPS/SOPN/NRTR—2011/426



ON THE COVER

Western meadowlark (*Sturnella neglecta*). Photo © Robert Shantz.

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Authors

Ross Lock
Rocky Mountain Bird Observatory
230 Cherry Street, Suite 150
Fort Collins, Colorado 80521

Robert E. Bennetts
National Park Service
Southern Plains Network
Capulin Volcano National Monument
PO Box 40
Des Moines, New Mexico 88418

Heidi Sosinski
National Park Service
Southern Plains Network
PO Box 329
Johnson City, Texas 78636

Editing

Emily Yost
Utah State University
Department of Environment and Society
5215 Old Main Hill
Logan, Utah 84322-5215

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The red-winged blackbird (*Agelaius phoeniceus*) was the fourth most commonly counted species at Bent's Old Fort NHS in 2010. 19

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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 2010, landbirds were surveyed within all of the Southern Plains Inventory & Monitoring Network (SOPN) parks. 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 2010. Survey efforts were focused on the breeding season, when increased territorial behavior by songbirds results in higher detection rates and greater sampling efficiency. The window of primary breeding and, therefore, sampling was from April through June, with adjustments made for individual park visits based on latitude and elevation. 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.

We sampled a total of 1,677 points on 34 transects or grids. Of these, 1,239 points were sampled in grassland habitats (including 51 in woodland habitat) and 438 in riparian habitats. We recorded a total of 13,400 birds of 158 species on our survey points, with an additional 245 birds detected as flyovers. Bent's Old Fort National Historic Site had the highest number of birds counted ($n = 2,729$). Lyndon B. Johnson National Historical Park (NHP) had the lowest number of birds detected ($n = 463$). We observed the greatest number of species at Chickasaw National Recreation Area ($n = 80$) and the fewest at Lyndon B. Johnson NHP ($n = 31$). 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 survey points, but also by the size and diversity of available habitats. Western meadowlark was the most commonly detected species within the SOPN ($n = 1,251$). Fourteen species were detected only once during surveys, and several others were detected only a few times. Three species (brown-headed cowbird, western kingbird, and mourning dove) were detected at all SOPN parks, whereas numerous species were detected at one or very few parks. New species, previously unverified in a given park, were recorded for all nine parks, with 13 new species recorded for Washita Battlefield National Historic Site.

Minor changes made to the protocol in the previous year were adopted. 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. We also increased the number of visits to each survey point from two to three. We are considering adding an additional revisit to each transect or grid.

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. 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 2005).

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 con-

current 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 SOPN (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 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 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 that are complementary and together provide a comprehensive assessment of changing bird populations and communities.

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 model-

ing 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. (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. Within these broad classes, there is considerable variation for which SOPN parks can be further stratified into six more specific habitat types (Table 2.1.1-1, -2).

In 2010, we surveyed landbirds within all of the SOPN park units (Lake Meredith National Recreation Area [NRA] and Alibates Flint Quarry National Monument [NM] were treated as one park unit, and no sampling was specifically done

Table 2.1.1-2. Number of transects of each habitat class surveyed in each SOPN park unit, 2010

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

¹Some pinyon-juniper woodlands that were targeted for conversion to grassland are also included.

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. A total of 34 transects or grids were surveyed in 2010 (Table 2.1.1-2). In most parks, we used sites selected with methodology outlined in Powell et al. (2007).

Table 2.1.1-1. Habitat classes and types by park

Habitat classes	Habitat types	Parks
Grassland	Shortgrass prairie	• Bent's Old Fort National Historic Site (BEOL) • Capulin Volcano National Monument (CAVO) • Fort Union National Monument (FOUN) • Pecos National Historical Park (PECO) • Sand Creek Massacre National Historic Site (SAND)
Grassland	Upland grassland	• Chickasaw National Recreation Area (CHIC) • Fort Larned National Historic Site (FOLS) • Lake Meredith National Recreation Area (LAMR) • Lyndon B. Johnson National Historical Park (LYJO) • Washita Battlefield National Historic Site (WABA)
Woodland	Pinyon-juniper	• CAVO
Riparian	Bottomland grassland	• LAMR • LYJO • WABA
Riparian	Cottonwood bottom	• BEOL • LAMR • PECO • SAND
Riparian	Riparian woodland	• FOLS

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 (in this case, both survey periods). 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

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

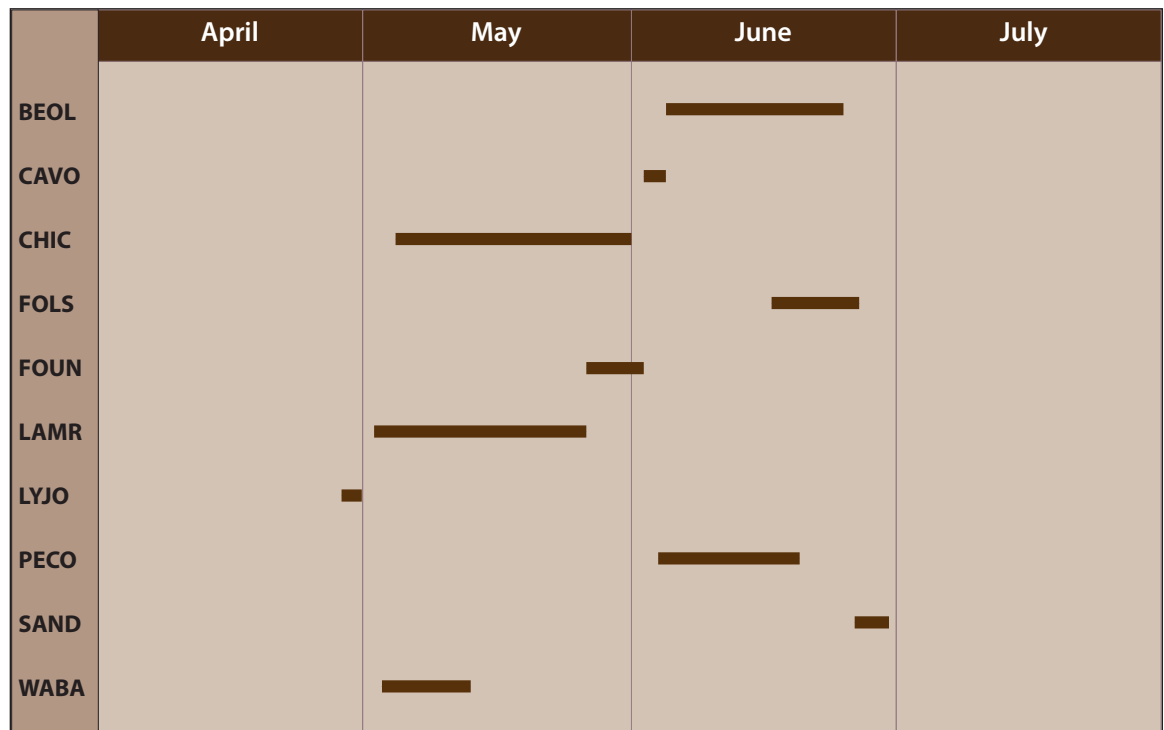


Figure 2.1.2. Dates when sampling was conducted in SOPN parks, 2010.

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 searched for species not recorded during the count period.

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.

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. Our current protocol of spending six minutes per site is inconsistent with other efforts being conducted by Rocky Mountain Bird Observatory (RMBO) and to increase efficiency by allowing more points to be surveyed.

2.3 Additional Monitoring to Augment Bird Sampling

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

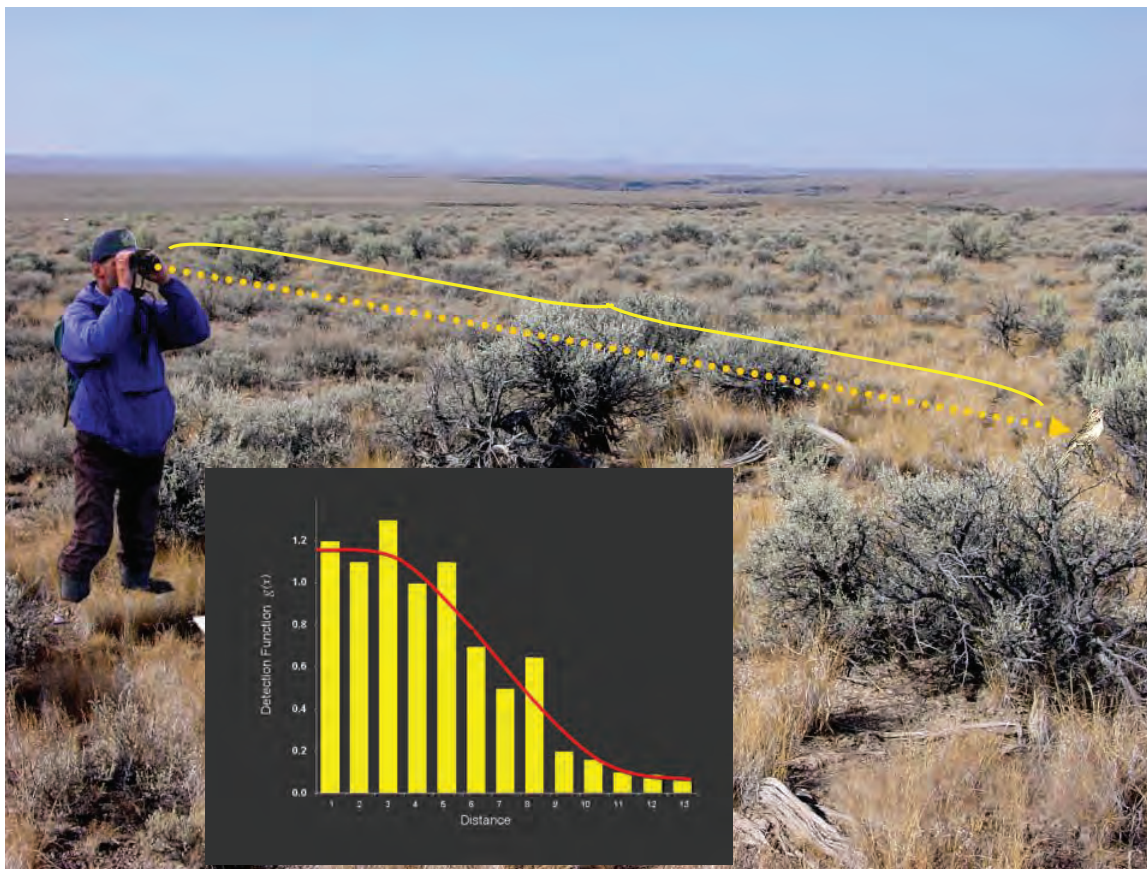


Figure 2.2. Distance sampling works by estimating a detection profile (graph) as a function of distance from which either individual or groups of birds are observed from the transect.

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.

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

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

2.5 Accessing the Data

The Rocky Mountain Bird Observatory (RMBO), our primary cooperators 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 have easy access to the data through the RMBO Avian Data Center, <http://www.rmbo.org/public/monitoring/CountsEffort.aspx> (see Figure 2.4).

To access the data,

1. Visit <http://www.rmbo.org/public/monitoring/>
2. Click on the “Data Queries” tab
3. Click on “Species Counts (total individuals detected with effort)”
4. For a basic query about a park’s bird data, make the following selections:
Program: Southern Plains Network
ManagementEntity: Southern Plains Network
Management Unit: select desired park unit
Habitat: select desired habitat
5. Click “Show All Available Species” for park list of species with data
6. Click “Submit Query” for query results.

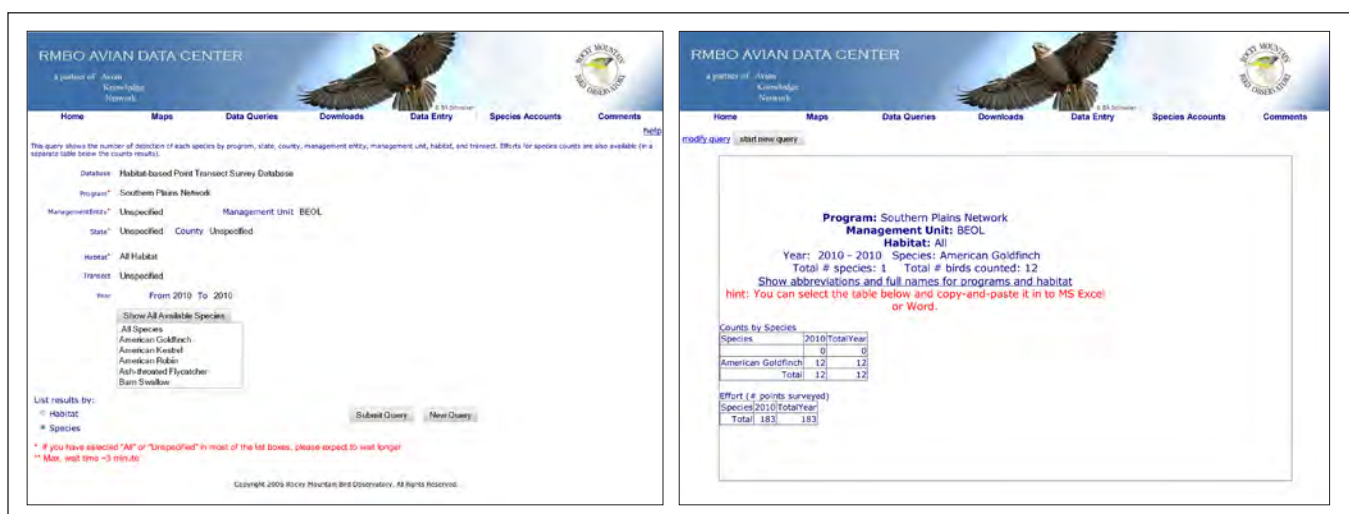


Figure 2.5. Screen shot of data query on Rocky Mountain Bird Observatory website (left) and results (right).

3 Results and Discussion

We sampled a total of 1,677 points on 34 transects or grids (Table 3-1). Of these, 1,239 points were sampled in grassland habitats (including 51 in woodland habitat) and 438 in riparian habitat. We recorded a total of 13,400 birds of 158 species on our survey points, with an additional 245 birds detected as flyovers.

Bent's Old Fort National Historic Site (NHS) had the highest number of birds counted (n = 2,729). Lyndon B. Johnson National Historical Park (NHP) had the lowest number of birds detected (n = 463). We observed the greatest number of species at Chicasaw National Recreation Area (NRA) (n = 80) and the fewest at Lyndon B. Johnson NHP (n = 31) (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 survey 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 = 1,251) (see Table 3-3). Fourteen species were detected only once during surveys.

Three species (brown-headed cowbird, western kingbird, and mourning dove) were detected at all 10 surveyed parks, whereas numerous species were detected at one or very few parks.

Table 3-2. Number of species observed in each habitat class at each park, 2010

Park	Species detected		
	Grassland	Riparian	Total ¹
Bent's Old Fort NHS	51	44	57
Capulin Volcano NM	53 ²	--	53
Chickasaw NRA	80	--	80
Fort Larned NHS	21	34	37
Fort Union NM	34	--	34
Lake Meredith NRA	33	49	60
Lyndon B. Johnson NHP	29	13	31
Pecos NHP	45	52	63
Sand Creek Massacre NHS	32	31	38
Washita Battlefield NHS	55	--	55
Total¹	147	109	158

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, and do not include incidental observations.

²Some pinyon-juniper woodlands that were targeted for conversion to grassland were also sampled.

Table 3-1. Numbers of survey points and individual birds counted in each habitat class at each SOPN park, 2010

Park	Grassland		Riparian		Total birds detected
	Survey points	Birds counted	Survey points	Birds counted	
Bent's Old Fort NHS	114	1,532	69	1,197	2,729
Capulin Volcano NM	135	1,084	--	--	1,084
Chickasaw NRA	204	1,814	--	--	1,814
Fort Larned NHS	75	320	54	392	712
Fort Union NM	180	792	--	--	792
Lake Meredith NRA	114	346	114	627	973
Lyndon B. Johnson NHP	18	341	51	122	463
Pecos NHP	168	822	102	691	1,513
Sand Creek Massacre NHS	120	1,304	48	634	1,938
Washita Battlefield NHS	111	1,382	--	--	1,382
Total	1,239	9,737	438	3,663	13,400

Note: Bird counts reported here do not include birds observed flying overhead that did not use the habitat (flyovers). Survey points represent the sum of the three visits, rather than independent visits.

Table 3-3. Total number of birds observed of each species during surveys in all SOPN parks, 2010

Common name	# of birds	Common name	# of birds
Western meadowlark	1,251	Common grackle	82
Mourning dove	1,143	American kestrel	80
Red-winged blackbird	609	Common yellowthroat	75
Northern cardinal	496	Red-bellied woodpecker	75
Western kingbird	444	Tufted titmouse	74
Brown-headed cowbird	442	American goldfinch	71
Northern mockingbird	412	Baltimore oriole	70
European starling	382	Northern rough-winged swallow	68
Cassin's kingbird	297	Western scrub-jay	68
Cassin's sparrow	275	Orchard oriole	65
<i>Eastern meadowlark</i>	258	Carolina chickadee	64
Lark sparrow	243	Juniper titmouse	58
Dickcissel	239	Clay-colored sparrow	57
Spotted towhee	234	Violet-green swallow	52
American crow	227	Yellow-billed cuckoo	49
Painted bunting	206	Green-tailed towhee	48
House wren	204	Killdeer	48
Grasshopper sparrow	179	Eurasian collared-dove	45
Turkey vulture	173	Brown thrasher	42
Cliff swallow	167	Great crested flycatcher	42
Barn swallow	163	Ash-throated flycatcher	40
Western wood-pewee	156	Rock wren	38
Northern bobwhite	153	Black vulture	37
Yellow warbler	149	Indigo bunting	36
Field sparrow	138	Mississippi kite	36
Bullock's oriole	132	Canada goose	35
Horned lark	126	Hepatic tanager	35
Ring-necked pheasant	125	Say's phoebe	34
Black-headed grosbeak	122	Pinyon jay	33
American robin	119	Red-tailed hawk	32
Chipping sparrow	116	Common nighthawk	31
Northern flicker	104	Mallard	29
Eastern kingbird	102	Mountain chickadee	27
Black-crested titmouse	100	Northern parula	24
Bewick's wren	98	Summer tanager	24
Carolina wren	91	White-eyed vireo	23
Blue-gray gnatcatcher	89	Wild turkey	23
Common raven	89	Chimney swift	22
Blue jay	87	Downy woodpecker	22
Scissor-tailed flycatcher	86	Plumbeous vireo	22
Vesper sparrow	84	White-crowned sparrow	22
Red-headed woodpecker	83	Eastern bluebird	20
Blue grosbeak	82	Mountain bluebird	18

Table 3-3. Total number of birds observed of each species during surveys in all SOPN parks, 2010, cont.

Common name	# of birds	Common name	# of birds
Rose-breasted grosbeak	18	Virginia's warbler	4
Yellow-breasted chat	18	Barred owl	3
Cedar waxwing	16	Bell's vireo	3
Hairy woodpecker	16	Black rail	3
Lesser goldfinch	15	Great egret	3
Swainson's thrush	15	Red-shouldered hawk	3
Western bluebird	15	Tree swallow	3
Great blue heron	14	Black-throated gray warbler	2
Western tanager	13	Brewer's blackbird	2
Lark bunting	12	Broad-tailed hummingbird	2
Rufous-crowned sparrow	12	Greater roadrunner	2
Warbling vireo	12	Hermit thrush	2
White-winged dove	12	Least flycatcher	2
Cooper's hawk	11	Louisiana waterthrush	2
House sparrow	11	Pileated woodpecker	2
Olive-sided flycatcher	11	American coot	1
Song sparrow	11	Black-billed cuckoo	1
Eastern wood-pewee	9	Black-billed magpie	1
Swainson's hawk	9	Black-capped chickadee	1
Canyon towhee	8	Black-crowned night-heron	1
Dark-eyed junco	8	Cactus wren	1
Eastern phoebe	8	Canyon wren	1
Great horned owl	8	Curve-billed thrasher	1
Red-eyed vireo	8	Gray flycatcher	1
Chihuahuan raven	7	Gray vireo	1
Ruby-throated hummingbird	7	Gray-cheeked thrush	1
White-breasted nuthatch	7	Peregrine falcon	1
Pine siskin	6	Prairie falcon	1
Wood duck	6	Yellow-headed blackbird	1
Yellow-rumped warbler	6	<i>Unidentified birds</i>	589
Black phoebe	5	Total	13,400
Gray catbird	5	<i>Note:</i> Species are listed in rank order from most to least commonly detected. Number of birds is the total number of individuals counted. Because of the potential to confound future comparisons, these values exclude observations of species flying overhead/not using the habitat. Unidentified birds were included in the total number of birds recorded during surveys, but these birds were not included in counts of the number of species detected per park. Incidental sightings (i.e., species noted as incidental were identified by our birding team, but not as part of our regular survey) are not included in this table, but are included in individual park species tables.	
Great-tailed grackle	5		
Hooded warbler	5		
House finch	5		
Ladder-backed woodpecker	5		
Northern harrier	5		
Black-and-white warbler	4		
Lincoln's sparrow	4		
Loggerhead shrike	4		
Purple martin	4		
Rock pigeon	4		
Savannah sparrow	4		

Table 3-4. Parks where each species was detected through April–June 2010

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

Table 3-4. Parks where each species was detected through April–June 2010, cont.

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

● = species detected in 2010 survey

○ = species not detected in 2010 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 through April–June 2010, cont.

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

Table 3-4. Parks where each species was detected through April–June 2010, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Eastern wood-pewee	<i>Contopus virens</i>			●	●			o			
Eurasian collared-dove	<i>Streptopelia decaocto</i>	●	●	●	●	●	●	●	●		
European starling	<i>Sturnus vulgaris</i>	●		o	●	o	o	o		o	
Ferruginous hawk	<i>Buteo regalis</i>	o									
Field sparrow	<i>Spizella pusilla</i>			●			●	o			●
Flickers	<i>Colaptes</i>		o	o			o	o	o		
Florida scrub-jay	<i>Aphelocoma coerulescens</i>							o			
Forster's tern	<i>Sterna forsteri</i>	o						o			
Fox sparrow	<i>Passerella iliaca</i>							o			
Franklin's gull	<i>Leucophaeus pipixcan</i>							o			
Gadwall	<i>Anas strepera</i>						o	o			
Golden-crowned kinglet	<i>Regulus satrapa</i>							o			
Golden-fronted woodpecker	<i>Melanerpes aurifrons</i>							o			
Grace's warbler	<i>Dendroica graciae</i>								o		
Grasshopper sparrow	<i>Ammodramus savannarum</i>	o			o		●	o		●	●
Gray catbird	<i>Dumetella carolinensis</i>			●	●			o			
Gray flycatcher	<i>Empidonax wrightii</i>			o			o		●		
Gray vireo	<i>Vireo vicinior</i>								●		
Gray-cheeked thrush	<i>Catharus minimus</i>						●				
Great blue heron	<i>Ardea herodias</i>	●		●	●	o	●	●	●	o	●
Great crested flycatcher	<i>Myiarchus crinitus</i>	o		●	●			●			●
Great egret	<i>Ardea alba</i>			●	o		o	o			
Great horned owl	<i>Bubo virginianus</i>	●	o	o	o	o	●	o	o	●	●
Greater roadrunner	<i>Geococcyx californianus</i>			o			●	o	o		o
Greater yellowlegs	<i>Tringa melanoleuca</i>							o			
Great-tailed grackle	<i>Quiscalus mexicanus</i>	●		o		o		●	o		●
Green heron	<i>Butorides virescens</i>	o		o			o	o	o		o
Green kingfisher	<i>Chloroceryle americana</i>							o			
Green-tailed towhee	<i>Pipilo chlorurus</i>		●			o			●		
Green-winged teal	<i>Anas crecca</i>						o	o			
Hairy woodpecker	<i>Picoides villosus</i>			●				●	o		●
Harris' sparrow	<i>Zonotrichia querula</i>							o			o

● = species detected in 2010 survey

o = species not detected in 2010 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 through April–June 2010, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Hepatic tanager	<i>Piranga flava</i>		●						●		
Hermit thrush	<i>Catharus guttatus</i>		●					○		○	
Hooded warbler	<i>Wilsonia citrina</i>			●				○			
Horned lark	<i>Eremophila alpestris</i>	○	●			●				●	
House finch	<i>Carpodacus mexicanus</i>		●		○	○		○	●		
House sparrow	<i>Passer domesticus</i>	●	○	●	●		○	○			○
House wren	<i>Troglodytes aedon</i>	●	●		●	○		○	●	●	●
Hudsonian godwit	<i>Limosa haemastica</i>							○			
Hummingbirds	Trochilidae								○		
Inca dove	<i>Columbina inca</i>							○			
Indigo bunting	<i>Passerina cyanea</i>	○		●	○		○	○		○	○
Juniper titmouse	<i>Baeolophus ridgwayi</i>		●			●			●		
Killdeer	<i>Charadrius vociferus</i>	●		○	○	○	●	○	○	●	●
Ladder-backed woodpecker	<i>Picoides scalaris</i>	○					●	●			
Lark bunting	<i>Calamospiza melanocorys</i>	○			○		●			●	●
Lark sparrow	<i>Chondestes grammacus</i>	●	●	●		●	●	○	●	●	●
Lazuli bunting	<i>Passerina amoena</i>	○									
Le Conte's sparrow	<i>Ammodramus leconteii</i>							○			
Least flycatcher	<i>Empidonax minimus</i>			●							
Least sandpiper	<i>Calidris minutilla</i>			○				○			
Lesser goldfinch	<i>Spinus psaltria</i>	●	●			○		●	●		
Lesser nighthawk	<i>Chordeiles acutipennis</i>							○			
Lesser scaup	<i>Aythya affinis</i>							○			
Lesser yellowlegs	<i>Tringa flavipes</i>							○			
Lewis's woodpecker	<i>Melanerpes lewis</i>	○	○								
Lincoln's sparrow	<i>Melospiza lincolni</i>			●				○		○	●
Little blue heron	<i>Egretta caerulea</i>			○				○			
Loggerhead shrike	<i>Lanius ludovicianus</i>	○				○	●	○		○	○
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>							○			
Louisiana waterthrush	<i>Parkesia motacilla</i>			●				○			
MacGillivray's warbler	<i>Oporornis tolmiei</i>		○					○	○		
Magnolia warbler	<i>Dendroica magnolia</i>							○			
Mallard	<i>Anas platyrhynchos</i>	●			○	○	○	○	●	●	○
Mississippi kite	<i>Ictinia mississippiensis</i>			●			●	○			●

Table 3-4. Parks where each species was detected through April–June 2010, cont.

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

● = species detected in 2010 survey

o = species not detected in 2010 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 through April–June 2010, cont.

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

Table 3-4. Parks where each species was detected through April–June 2010, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
Summer tanager	<i>Piranga rubra</i>			●			●	●			○
Swainson's hawk	<i>Buteo swainsoni</i>	●		○		○	○	○		●	●
Swainson's thrush	<i>Catharus ustulatus</i>			●						○	
Swallow	Hirundinidae		○			○	○	○	○		○
Tennessee warbler	<i>Oreothlypis peregrina</i>							○			
Tree swallow	<i>Tachycineta bicolor</i>										●
Tricolored heron	<i>Egretta tricolor</i>							○			
Tufted titmouse	<i>Baeolophus bicolor</i>			●				○			
Turkey vulture	<i>Cathartes aura</i>	●	●	●	○	●	●	●	●	●	●
Upland sandpiper	<i>Bartramia longicauda</i>							○			○
Veery	<i>Catharus fuscescens</i>							○			
Vermilion flycatcher	<i>Pyrocephalus rubinus</i>							○			
Vesper sparrow	<i>Pooecetes gramineus</i>		●			●	●	○	●	○	
Violet-green swallow	<i>Tachycineta thalassina</i>	○	●			○			●		
Virginia rail	<i>Rallus limicola</i>						○				
Virginia's warbler	<i>Oreothlypis virginiae</i>		●			○			○		
Warbler	Parulidae		○	○					○		
Warbling vireo	<i>Vireo gilvus</i>	●	○	●	●				○	●	
Western bluebird	<i>Sialia mexicana</i>								●		
Western kingbird	<i>Tyrannus verticalis</i>	●	●	●	●	●	●	●	●	●	●
Western meadowlark	<i>Sturnella neglecta</i>	●	●		●	●	●	○	●	●	
Western sandpiper	<i>Calidris mauri</i>							○			
Western scrub-jay	<i>Aphelocoma californica</i>		●			●			●		
Western tanager	<i>Piranga ludoviciana</i>	○	●						●		
Western wood-pewee	<i>Contopus sordidulus</i>	●	●			○	●		●	●	
White-breasted nuthatch	<i>Sitta carolinensis</i>	●	●	○					●		
White-crowned sparrow	<i>Zonotrichia leucophrys</i>						○	○	○	○	●
White-eyed vireo	<i>Vireo griseus</i>			●				○			
White-faced ibis	<i>Plegadis chihi</i>	○					○				
White-throated sparrow	<i>Zonotrichia albicollis</i>							○			○
White-throated swift	<i>Aeronautes saxatalis</i>		○								

● = species detected in 2010 survey

○ = species not detected in 2010 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 through April–June 2010, cont.

Common name	Scientific name	BEOL	CAVO	CHIC	FOLS	FOUN	LAMR	LYJO	PECO	SAND	WABA
White-winged dove	<i>Zenaida asiatica</i>		●					●	●		
Wild turkey	<i>Meleagris gallopavo</i>	●	o	●	o	●	o	●			●
Willet	<i>Tringa semipalmata</i>								o		
Willow flycatcher	<i>Empidonax traillii</i>	o					o		o		
Wilson's phalarope	<i>Phalaropus tricolor</i>							o			
Wilson's warbler	<i>Wilsonia pusilla</i>							o	o		
Winter wren	<i>Troglodytes hiemalis</i>							o			
Wood duck	<i>Aix sponsa</i>			●	●			o			
Woodpecker	Picidae	o		o	o		o	o			o
Yellow warbler	<i>Dendroica petechia</i>	●		●	o	o	●	o	●	●	
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>							o			
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>							o			
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	●		●	●		●	o		●	o
Yellow-breasted chat	<i>Icteria virens</i>	●		●			o		●		
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	o						o			●
Yellow-rumped warbler	<i>Dendroica coronata</i>		o					o	●		●
Yellow-throated vireo	<i>Vireo flavifrons</i>							o			
Yellow-throated warbler	<i>Dendroica dominica</i>			o							

Note: Additional species occur in the park that have not been formally observed.

● = species detected in 2010 survey

o = species not detected in 2010 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 2010 sampling

During June of 2010, we sampled five transects at Bent's Old Fort NHS (Figure 3.1.1). Four grids were in grassland habitat (shortgrass prairie) with 4 to 16 survey points each. One grid was located in a riparian area (cottonwood bottom) with 23 survey points (Table 3.1.1). Each point was surveyed three times for a total sample of 183 survey points at Bent's Old Fort NHS.

3.1.2 Results and discussion

During 2010, 2,729 birds of 57 species were counted at Bent's Old Fort NHS (Table 3.1.2). Mourning dove was the most commonly counted species (15%), followed by European starling (14%), western meadowlark (12%), and red-winged blackbird (12%).

Six new species for the park were detected during the survey: Bell's vireo, Chihuahuan raven, chimney swift, great-tailed grackle, lesser goldfinch, and northern rough-winged swallow.

The cottonwood transect along the Arkansas River and the adjacent upland transect continue to yield the highest species diversity, including the four most abundant bird species in the park as well as prominent species such as American kestrel, blue grosbeak, brown-headed cowbird, common yellowthroat, eastern kingbird, house wren, northern flicker, northern mockingbird, and yellow warbler. Other interesting species were northern harrier, a singing dickcissel, and at least two calling black rail. The burrowing owl and great-crested flycatcher were notably absent in 2010, as both species were detected in 2009.

Table 3.1.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Bent's Old Fort NHS, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
CWOOD	Riparian	Cottonwood bottom	23	3	6/9/2010	6/14/2010	6/19/2010
GRASS	Grassland	Shortgrass prairie	9	3	6/10/2010	6/15/2010	6/19/2010
PDOG	Grassland	Shortgrass prairie	9	3	6/10/2010	6/15/2010	6/19/2010
REST	Grassland	Shortgrass prairie	4	3	6/10/2010	6/11/2010	6/15/2010
UPLAND	Grassland	Shortgrass prairie	16	3	6/9/2010	6/17/2010	6/19/2010



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The red-winged blackbird (*Agelaius phoeniceus*) was the fourth most commonly counted species at Bent's Old Fort NHS in 2010.

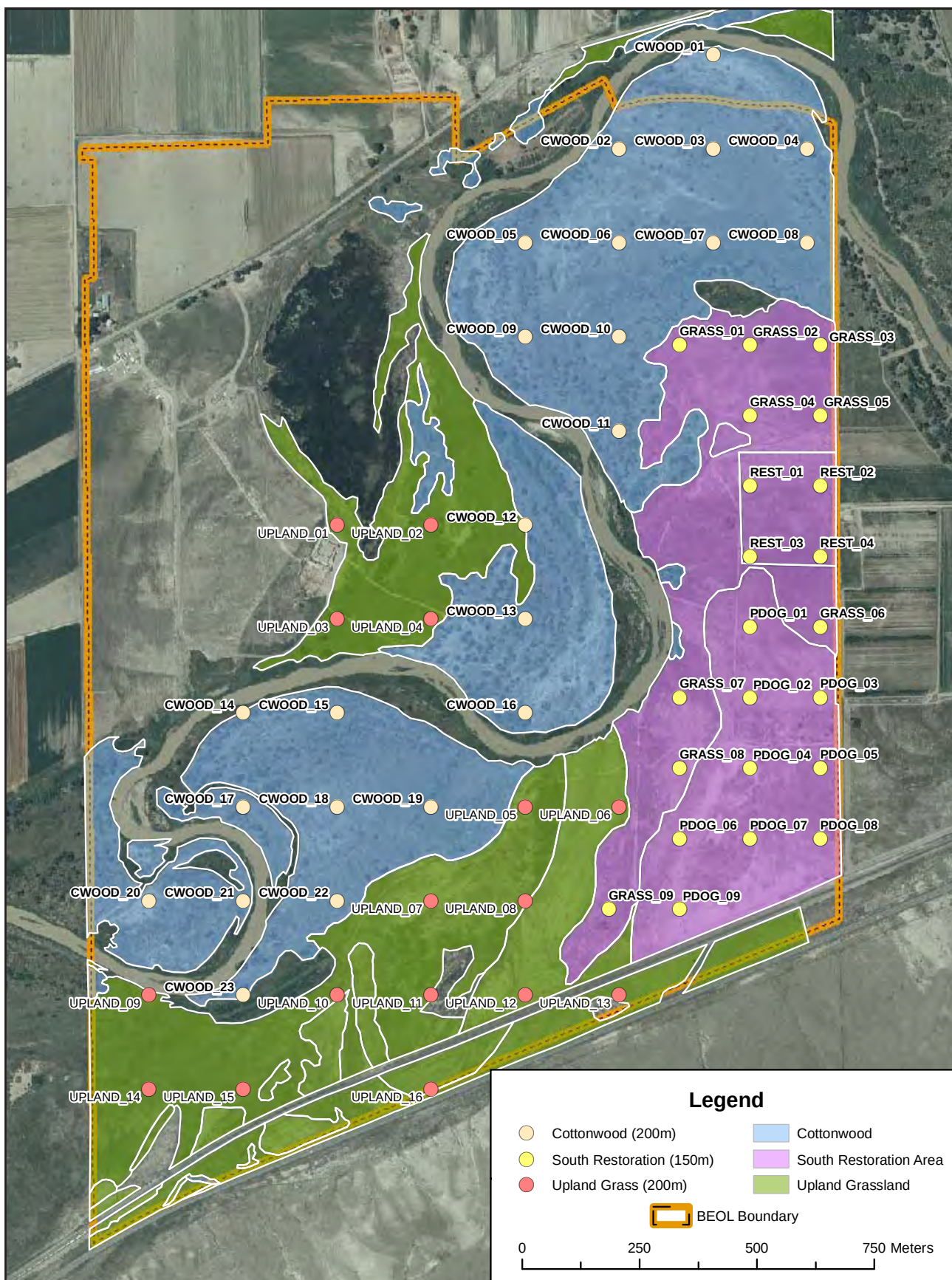


Figure 3.1.1. Point locations sampled at Bent's Old Fort NHS, 2010.

Table 3.1.2 Number of birds detected of each species counted in each habitat class, Bent's Old Fort NHS, 2010

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Mourning dove	207	213	420	15%
European starling	191	187	378	14%
Western meadowlark	231	85	316	12%
Red-winged blackbird	191	124	315	12%
House wren	28	86	114	4%
Northern mockingbird	80	32	112	4%
Yellow warbler	43	50	93	3%
Brown-headed cowbird	50	36	86	3%
Eastern kingbird	32	37	69	3%
American kestrel	38	28	66	2%
Blue grosbeak	30	26	56	2%
Northern flicker	23	33	56	2%
Common yellowthroat	32	22	54	2%
Barn swallow	44	5	49	2%
Western kingbird	39	10	49	2%
Ring-necked pheasant	21	23	44	2%
Bullock's oriole	20	17	37	1%
Common grackle	25	10	35	1%
Eurasian collared-dove	18	13	31	1%
American robin	15	15	30	1%
Northern bobwhite	8	21	29	1%
Mallard	10	11	21	1%
Brown thrasher	12	8	20	1%
Blue jay	10	10	20	1%
Red-headed woodpecker	8	12	20	1%
Chimney swift	6	13	19	1%
Killdeer	15	1	16	1%
Red-tailed hawk	8	7	15	1%
Ash-throated flycatcher	3	11	14	1%
Cliff swallow	12	--	12	0%
American goldfinch	10	2	12	0%
Black-headed grosbeak	8	4	12	0%
Northern rough-winged swallow	5	7	12	0%
Orchard oriole	--	10	10	0%
Downy woodpecker	1	8	9	0%
Cassin's sparrow	7	--	7	0%
House sparrow	7	--	7	0%
Lark sparrow	5	2	7	0%
Say's phoebe	6	--	6	0%
Yellow-breasted chat	--	5	5	0%
Northern harrier	4	1	5	0%

Table 3.1.2. Number of birds detected of each species in each habitat class, Bent's Old Fort NHS, 2010, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Common nighthawk	2	3	5	0%
Swainson's hawk	4	--	4	0%
Wild turkey	3	1	4	0%
Great horned owl	1	3	4	0%
Bell's vireo	3	--	3	0%
Black rail	3	--	3	0%
Warbling vireo	--	2	2	0%
Chihuahuan raven	2	--	2	0%
Great-tailed grackle	2	--	2	0%
Lesser goldfinch	2	--	2	0%
Western wood-pewee	--	1	1	0%
White-breasted nuthatch	--	1	1	0%
Yellow-billed cuckoo	--	1	1	0%
Dickcissel	1	--	1	0%
Great blue heron	1	--	1	0%
Turkey vulture	1	--	1	0%
<i>Unknown woodpecker</i>	2	--	2	0%
<i>Unknown bird</i>	1	--	1	0%
<i>Unknown swallow</i>	1	--	1	0%
Total	1,532	1,197	2,729	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 2010 sampling

During June of 2010, we sampled two transects at Capulin Volcano NM (Figure 3.2.1). Two transects were in the grassland habitat class: shortgrass prairie and woodland (pinyon-juniper that was targeted for conversion to grassland). The pinyon-juniper transect had 17 survey points and the shortgrass prairie transect had 28 survey points, for a total of 135 samples at Capulin Volcano NM (Table 3.2.1).

3.2.2 Results and discussion

During 2010, 1,084 birds of 53 species were counted at Capulin Volcano NM (Table 3.2.2).

Spotted towhee was the most commonly counted species (14%). Also common were western wood-pewee (10%), northern mockingbird (10%), black-headed grosbeak (6%), and Cassin’s kingbird (5%). Other prominent species included green-tailed towhee (4%), chipping sparrow (4%), mourning dove (4%), and lark sparrow (4%).

Two new species were recorded in Capulin Volcano NM in 2010: peregrine falcon and prairie falcon. Several other interesting birds were noted: Cassin’s sparrow, hepatic and western tanager, common and Chihuahuan raven, and three species of wrens—Bewick’s, house, and rock.

Table 3.2.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Capulin Volcano NM, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
PJ	Woodland	Pinyon-juniper	17	3	6/5/2010	6/7/2010	6/9/2010
STEPPE	Grassland	Shortgrass prairie	28	3	6/5/2010	6/7/2010	6/9/2010



The first confirmed observation of a canyon towhee (*Pipilo fuscus*) at Capulin Volcano NM was recorded in 2010.

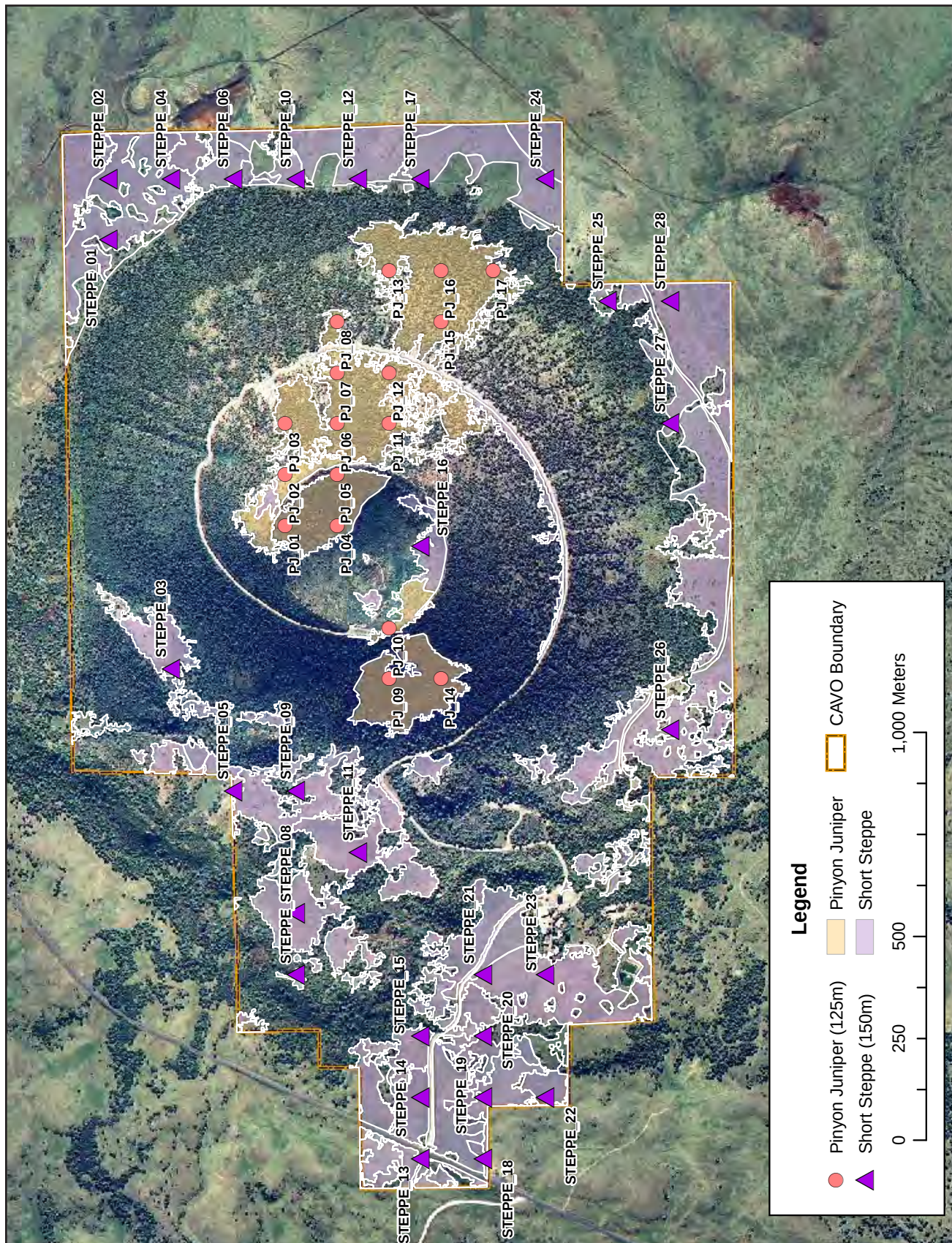


Figure 3.2.1. Point locations sampled at Capulin Volcano NM, 2010.

Table 3.2.2. Number of birds detected of each species in each habitat class, Capulin Volcano NM, 2010

Species	Habitat class		# of birds detected	
	Grassland	Woodland	Total	% of total
Spotted towhee	64	87	151	14%
Western wood-pewee	49	60	109	10%
Northern mockingbird	76	29	105	10%
Black-headed grosbeak	38	32	70	6%
Cassin's kingbird	44	9	53	5%
Green-tailed towhee	28	19	47	4%
Chipping sparrow	23	20	43	4%
Mourning dove	37	4	41	4%
Lark sparrow	41	--	41	4%
Brown-headed cowbird	24	11	35	3%
Common raven	19	3	22	2%
Bewick's wren	6	13	19	2%
American robin	12	7	19	2%
Mountain chickadee	8	10	18	2%
Pinyon jay	8	9	17	2%
Blue-gray gnatcatcher	15	--	15	1%
Western scrub-jay	15	--	15	1%
Hepatic tanager	6	8	14	1%
Western meadowlark	13	1	14	1%
Vesper sparrow	14	--	14	1%
Ash-throated flycatcher	3	8	11	1%
Bullock's oriole	7	4	11	1%
Turkey vulture	6	3	9	1%
Lesser goldfinch	8	1	9	1%
Rock wren	3	5	8	1%
Northern flicker	5	3	8	1%
Western tanager	5	3	8	1%
Mountain bluebird	2	5	7	1%
Canyon towhee	3	4	7	1%
Dark-eyed junco	4	3	7	1%
Horned lark	6	--	6	1%
Violet-green swallow	1	4	5	0%
Juniper titmouse	2	3	5	0%
Chihuahuan raven	4	1	5	0%
Say's phoebe	4	1	5	0%
House wren	5	--	5	0%
Pine siskin	--	4	4	0%
Virginia's warbler	4	0	4	0%
White-winged dove	4	--	4	0%
Western kingbird	1	2	3	0%
House finch	3	--	3	0%

Table 3.2.2. Number of birds detected of each species in each habitat class, Capulin Volcano NM, 2010, cont.

Species	Habitat class		# of birds detected	
	Grassland	Woodland	Total	% of total
White-breasted nuthatch	--	2	2	0%
Broad-tailed hummingbird	2	--	2	0%
Cassin's sparrow	2	--	2	0%
Eurasian collared-dove	2	--	2	0%
Hermit thrush	2	--	2	0%
Plumbeous vireo	2	--	2	0%
Peregrine falcon	--	1	1	0%
Prairie falcon	--	1	1	0%
Red-tailed hawk	--	1	1	0%
Black-capped chickadee	1	--	1	0%
Cliff swallow	1	--	1	0%
Cooper's hawk	1	--	1	0%
<i>Unidentified bird</i>	25	14	39	4%
<i>Unidentified sparrow</i>	9	--	9	1%
<i>Unidentified swallow</i>	9	--	9	1%
<i>Unidentified towhee</i>	3	--	3	0%
<i>Unidentified Empidonax</i>	2	--	2	0%
<i>Unidentified flycatcher</i>	2	--	2	0%
<i>Unidentified hummingbird</i>	2	--	2	0%
<i>Unidentified jay</i>	2	--	2	0%
<i>Unidentified wren</i>	--	1	1	0%
<i>Unidentified thrush</i>	1	--	1	0%
Total	688	396	1,084	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 2010 sampling

During May of 2010, we sampled four transects at Chickasaw NRA (Figures 3.3.1-1, -2, -3). All transects were in the grassland habitat class (upland grassland) with 13 to 19 survey points each (Table 3.3.1). Each point was surveyed three times for a total sample of 204 at Chickasaw NRA.



3.3.2 Results and discussion

During 2010, 1,814 birds of 80 species were counted at Chickasaw NRA, including 16 species which are of national or regional special concern (Table 3.3.2). Northern cardinal was the most commonly counted species (13%). Brown-headed cowbird (8%), painted bunting (8%), and American crow (6%) were also common. A total of 11 new species were recorded during surveys in Chickasaw NRA: American coot, Baltimore oriole, blue grosbeak, chipping sparrow, eastern kingbird, Eurasian collared-dove, gray catbird, and lark sparrow, and including three additional new migrant

The northern cardinal (*Cardinalis cardinalis*) was the most commonly counted species at Chickasaw NRA in 2010.

species: cedar waxwing, Lincoln's sparrow, and song sparrow. A western vagrant gray flycatcher was detected by call and least flycatcher and olive-sided flycatcher were late migrants.

Several other species were prominent: blue-gray gnatcatcher, tufted titmouse, Carolina wren, red-bellied woodpecker, turkey vulture, and indigo bunting. Interesting birds included seven species of warblers, white-eyed, warbling and red-eyed vireo, and five species of woodpecker.

Table 3.3.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Chickasaw NRA, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
5LAKES	Grassland	Upland grassland	19	3	5/8/2010	5/15/2010	5/18/2010
NHUNT	Grassland	Upland grassland	13	3	5/12/2010	5/15/2010	5/16/2010
WHUNT_E	Grassland	Upland grassland	18	3	5/20/2010	5/26/2010	5/30/2010
WHUNT_W	Grassland	Upland grassland	18	3	5/12/2010	5/16/2010	5/31/2010

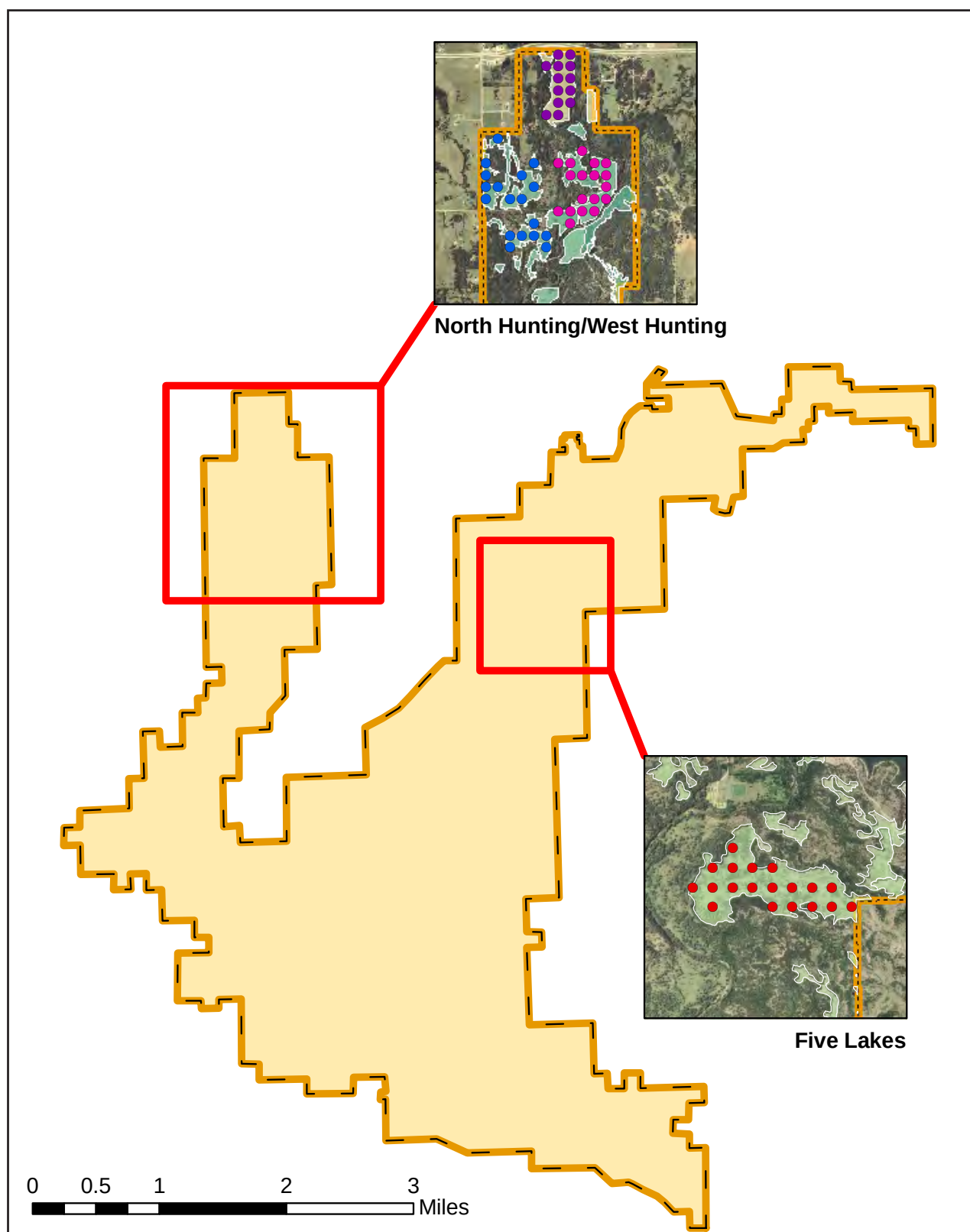


Figure 3.3.1-1. Bird sampling areas at Chickasaw NRA, 2010.

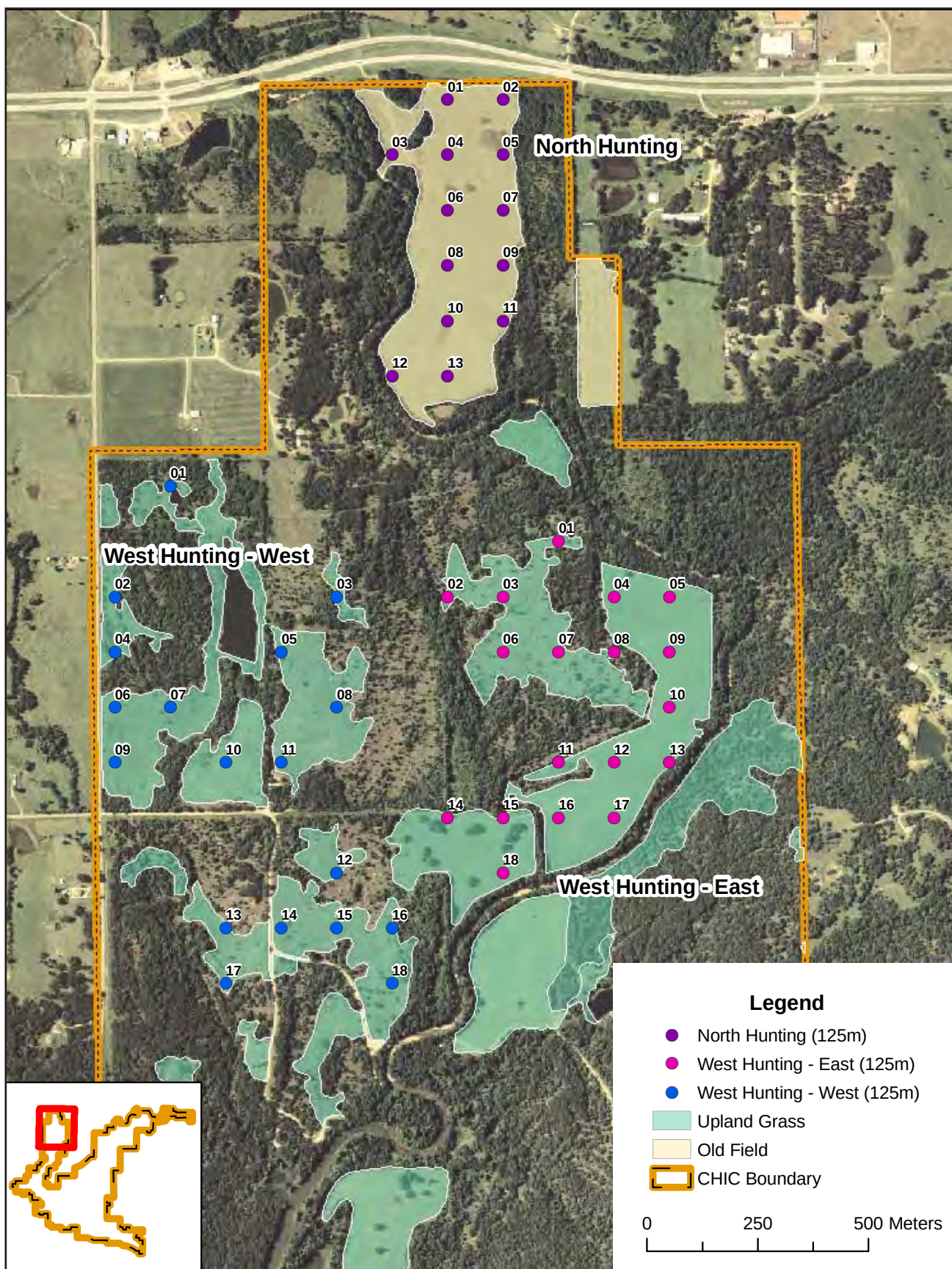


Figure 3.3.1-2. Point locations sampled at Chickasaw NRA, North Hunting/West Hunting, 2010.

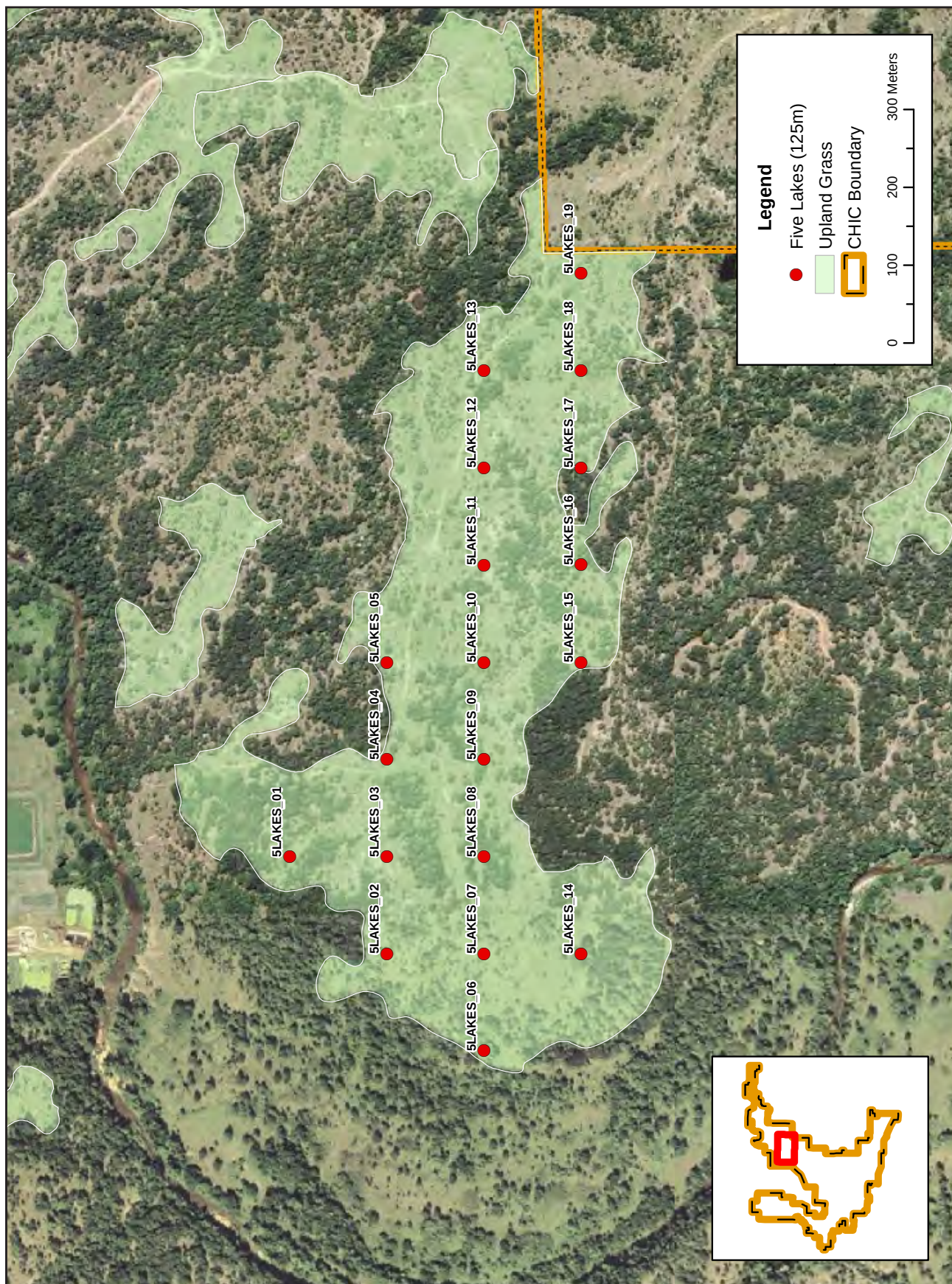


Figure 3.3.1-3. Point locations sampled at Chickasaw NRA, Five Lakes, 2010.

Table 3.3.2. Number of birds detected of each species in each habitat class, Chickasaw NRA, 2010

Species	# of birds detected		Species	# of birds detected	
	Total (grassland habitat)	% of total		Total (grassland habitat)	% of total
Northern cardinal	232	13%	Bewick's wren	5	0%
Brown-headed cowbird	144	8%	Downy woodpecker	5	0%
Painted bunting	139	8%	Eastern wood-pewee	5	0%
American crow	116	6%	Hooded warbler	5	0%
Field sparrow	75	4%	Rufous-crowned sparrow	5	0%
Tufted titmouse	74	4%	Black-and-white warbler	4	0%
Blue-gray gnatcatcher	65	4%	Great blue heron	4	0%
Turkey vulture	60	3%	Purple martin	4	0%
Carolina wren	59	3%	Red-tailed hawk	4	0%
Red-bellied woodpecker	51	3%	Rock pigeon	4	0%
Carolina chickadee	39	2%	Warbling vireo	4	0%
Indigo bunting	36	2%	Western kingbird	4	0%
Yellow-billed cuckoo	33	2%	American robin	3	0%
Cliff swallow	32	2%	Barred owl	3	0%
Black vulture	30	2%	Chimney swift	3	0%
Blue jay	27	1%	Great egret	3	0%
Great crested flycatcher	25	1%	Lark sparrow	3	0%
Northern parula	24	1%	Lincoln's sparrow	3	0%
White-eyed vireo	23	1%	Northern flicker	3	0%
Mourning dove	19	1%	Red-shouldered hawk	3	0%
Cedar waxwing	16	1%	Ruby-throated hummingbird	3	0%
Scissor-tailed flycatcher	15	1%	Wild turkey	3	0%
Swainson's thrush	15	1%	Brown thrasher	2	0%
American goldfinch	14	1%	Cooper's hawk	2	0%
Chipping sparrow	14	1%	House sparrow	2	0%
Common grackle	14	1%	Least flycatcher	2	0%
Mississippi kite	14	1%	Louisiana waterthrush	2	0%
Hairy woodpecker	13	1%	Orchard oriole	2	0%
Summer tanager	13	1%	Pileated woodpecker	2	0%
Eastern bluebird	12	1%	American coot	1	0%
Northern mockingbird	12	1%	Baltimore oriole	1	0%
Yellow warbler	11	1%	Black-crowned night-heron	1	0%
Olive-sided flycatcher	10	1%	Common yellowthroat	1	0%
Blue grosbeak	9	0%	Eastern kingbird	1	0%
Canada goose	9	0%	Eastern phoebe	1	0%
Eastern meadowlark	9	0%	Eurasian collared-dove	1	0%
Dickcissel	8	0%	Gray catbird	1	0%
Red-eyed vireo	8	0%	Northern bobwhite	1	0%
Barn swallow	7	0%	Wood duck	1	0%
Song sparrow	7	0%	<i>Unidentified bird</i>	<i>105</i>	<i>6%</i>
Yellow-breasted chat	6	0%	<i>Unidentified sparrow</i>	<i>14</i>	<i>1%</i>

Table 3.3.2. Number of detections of each species in each habitat class, Chickasaw NRA, 2010, cont.

Species	# of birds detected	
	Total (grassland habitat)	% of total
<i>Unidentified woodpecker</i>	13	1%
<i>Unidentified flycatcher</i>	9	0%
<i>Unidentified hawk</i>	5	0%
<i>Unidentified hummingbird</i>	5	0%
<i>Unidentified swallow</i>	5	0%
<i>Unidentified warbler</i>	4	0%
<i>Unidentified Empidonax</i>	2	0%
<i>Unidentified wren</i>	2	0%
<i>Unidentified accipiter</i>	1	0%
<i>Unidentified chickadee</i>	1	0%
<i>Unidentified thrush</i>	1	0%
<i>Unidentified vireo</i>	1	0%
Total	1,814	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 2010 sampling

During June of 2010, we sampled three transects at Fort Larned NHS (Figure 3.4.1). Two transects were in grassland habitat (upland grassland) with 11 and 14 survey points each. One transect was in the riparian habitat class (riparian woodland) with 18 survey points (Table 3.4.1). Each point was surveyed three times for a total sample of 129 survey points at Fort Larned NHS.

3.4.2 Results and discussion

During 2010, 712 birds of 37 species were counted at Fort Larned NHS (Table 3.4.2). The dickcissel was the most commonly counted species (14%). Baltimore oriole (9%), eastern meadowlark (8%), house wren (8%), American robin (6%), and mourning dove (6%) were also common. At least two singing Eurasian collared-doves were detected, representing a new species for the park.

Of the 37 species detected, 10 are national or regional species of concern. Prominent species included brown-headed cowbird, orchard oriole, ring-necked pheasant, and red-winged blackbird. Notable interesting species detected were a call-



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The dickcissel (*Spiza americana*) was the most commonly counted species at Fort Larned NHS in 2010.

ing black-billed cuckoo (a rare species in Fort Larned NHS), gray catbird, a calling northern bobwhite, rose-breasted grosbeak, yellow-billed cuckoo, and warbling vireo. Fort Larned is the only site in the SOPN with breeding populations of eastern meadowlark and western meadowlark.

Table 3.4.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Fort Larned NHS, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
BU2	Grassland	Upland grassland	11	3	6/18/2010	6/19/2010	6/21/2010
BU8	Grassland	Upland grassland	14	3	6/16/2010	6/17/2010	6/20/2010
RIP	Riparian	Riparian woodland	18	3	6/16/2010	6/19/2010	6/21/2010

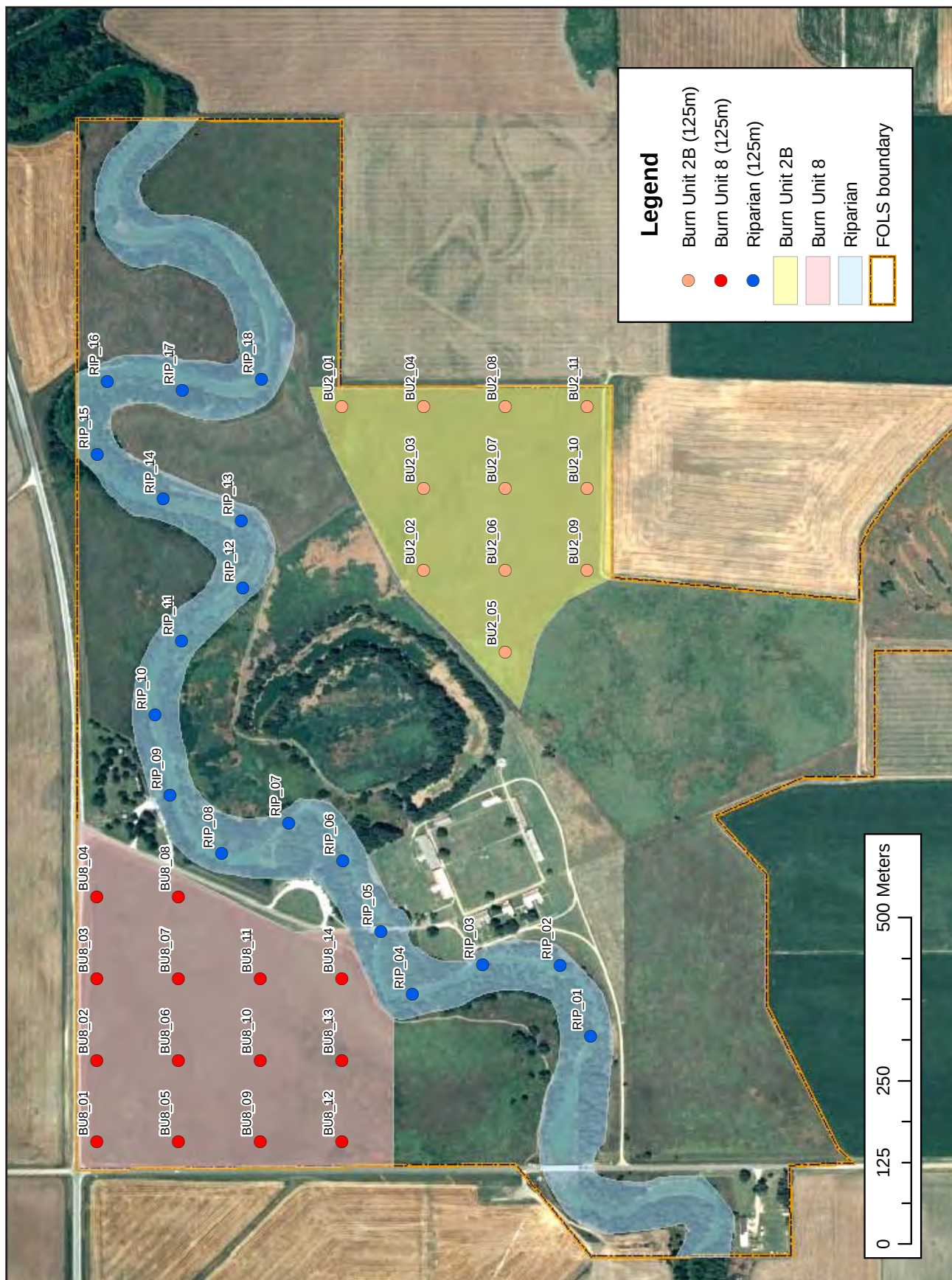


Figure 3.4.1. Point locations sampled at Fort Larned NHS, 2010.

Table 3.4.2. Number of birds detected of each species in each habitat class, Fort Larned NHS, 2010

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Dickcissel	89	10	99	14%
Baltimore oriole	8	58	66	9%
Eastern meadowlark	53	3	56	8%
House wren	4	50	54	8%
American robin	2	39	41	6%
Mourning dove	7	33	40	6%
Orchard oriole	8	27	35	5%
Red-winged blackbird	34	--	34	5%
Ring-necked pheasant	20	10	30	4%
Western meadowlark	29	--	29	4%
Brown-headed cowbird	19	7	26	4%
Brown thrasher	--	20	20	3%
Blue jay	3	17	20	3%
Rose-breasted grosbeak	--	17	17	2%
Western kingbird	11	5	16	2%
Eastern kingbird	4	11	15	2%
Barn swallow	7	8	15	2%
Northern cardinal	2	9	11	2%
Red-headed woodpecker	2	9	11	2%
Yellow-billed cuckoo	2	7	9	1%
Eurasian collared-dove	--	5	5	1%
Wood duck	1	4	5	1%
Eastern wood-pewee	--	4	4	1%
European starling	--	4	4	1%
Gray catbird	--	4	4	1%
Common grackle	--	3	3	0%
Warbling vireo	--	3	3	0%
Great crested flycatcher	1	2	3	0%
House sparrow	--	2	2	0%
Northern flicker	--	2	2	0%
American crow	--	1	1	0%
American goldfinch	--	1	1	0%
Black-billed cuckoo	--	1	1	0%
Downy woodpecker	--	1	1	0%
Great blue heron	--	1	1	0%
Northern bobwhite	1	--	1	0%
Red-bellied woodpecker	--	1	1	0%
<i>Unidentified meadowlark</i>	<i>13</i>	<i>3</i>	<i>16</i>	<i>2%</i>
<i>Unidentified woodpecker</i>	<i>--</i>	<i>5</i>	<i>5</i>	<i>1%</i>
<i>Unidentified bird</i>	<i>--</i>	<i>3</i>	<i>3</i>	<i>0%</i>
<i>Unidentified swallow</i>	<i>--</i>	<i>2</i>	<i>2</i>	<i>0%</i>

Table 3.4.2. Number of birds detected of each species in each habitat class, Fort Larned NHS, 2010, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Total	320	392	712	96%

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 2010 sampling

During May and June of 2010, we sampled three transects at Fort Union NM (Figure 3.5.1). Each transect was in grassland habitat (shortgrass prairie) with 20 survey points each (Table 3.5.1). Each point was surveyed three times for a total sample of 180 survey points at Fort Union NM.

3.5.2 Results and discussion

During 2010, 792 birds of 34 species were counted at Fort Union NM (Table 3.5.2). Western meadowlark was again the most abundant species by far occurring throughout Fort Union NM, accounting for 58% of birds counted. Other prominent species included cliff swallows in and around the staff residence area (8%) and vesper sparrows in the grassland habitat at the old fort transect (7%). Western kingbird (3%) and northern mockingbird (3%) were detected primarily in the pinyon-juniper immediately adjacent to the old fort boundary, riparian area along Wolf Creek, the visitors center, and staff residence area.

One curved-billed thrasher, a new species for the monument, was visually detected off transect on the west side of the visitors center, and a singing male was found at the old fort transect in the pinyon-juniper along the monument boundary. Eur-



Cliff swallows (*Petrochelidon pyrrhonota*) were observed at Fort Union NM in 2010.

asian collared-dove and Juniper titmouse were also new species. Eight species (black-headed grosbeak, blue grosbeak, blue-gray gnatcatcher, Cassin's kingbird, juniper titmouse, northern flicker, spotted towhee, and western scrub jay) not detected at transects in 2009, were found on or just outside of the old fort site boundary in pinyon-juniper habitat. The Cassin's sparrow was notably absent this year.

Table 3.5.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Fort Union NM, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
OLD_FORT	Grassland	Shortgrass prairie	20	3	5/26/2010	6/1/2010	6/3/2010
SHORT_E	Grassland	Shortgrass prairie	20	3	5/23/2010	5/27/2010	6/2/2010
SHORT_W	Grassland	Shortgrass prairie	20	3	5/24/2010	5/27/2010	6/1/2010

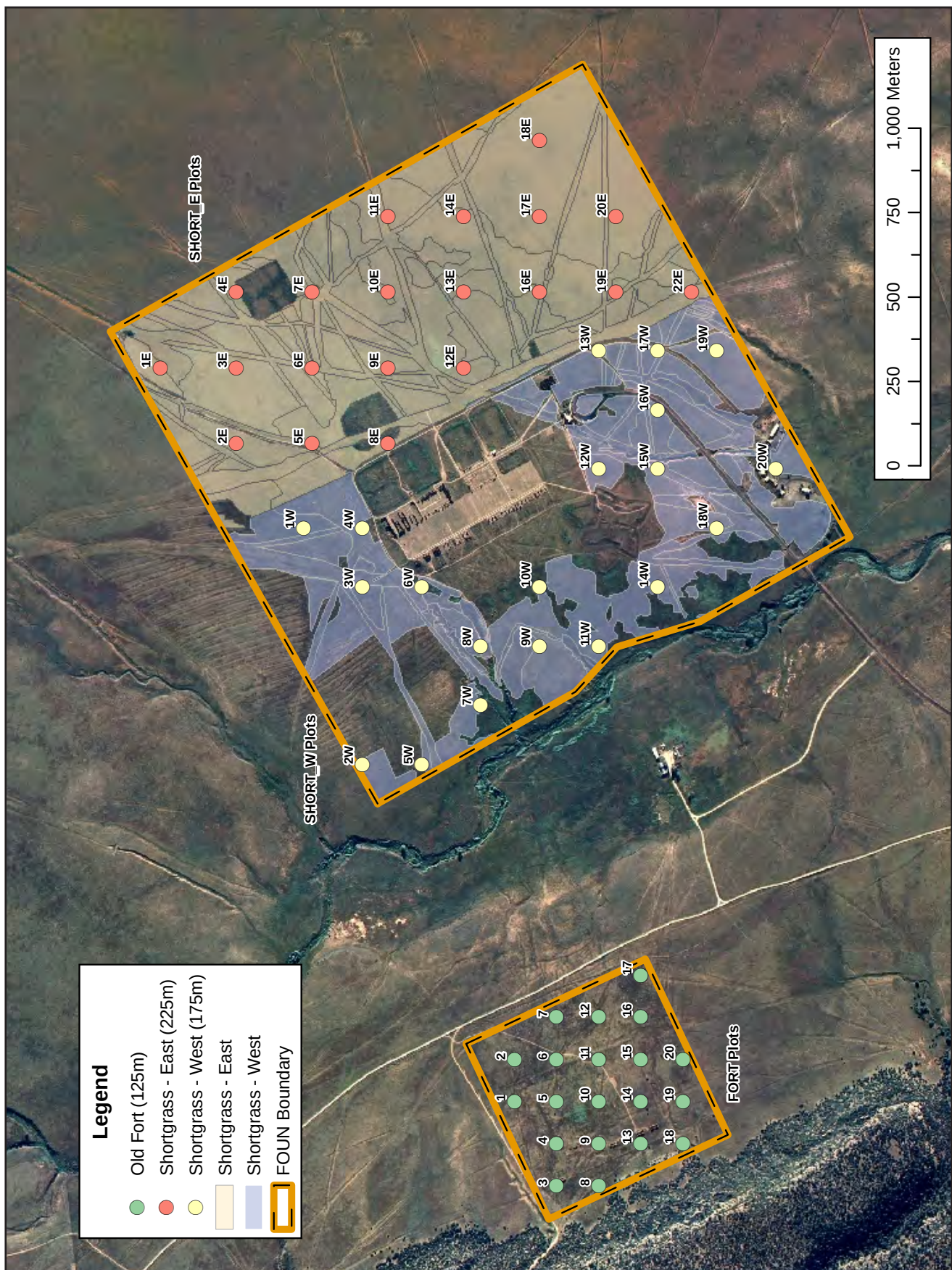


Figure 3.5.1. Point locations sampled at Fort Union NM, 2010.

Table 3.5.2. Number of birds detected of each species in each habitat class, Fort Union NM, 2010

Species	# of birds detected		Species	# of birds detected	
	Total (grassland habitat)	% of total		Total (grassland habitat)	% of total
Western meadowlark	462	58%	<i>Unidentified Empidonax</i>	1	0%
Cliff swallow	64	8%	Total	792	100%
Vesper sparrow	55	7%	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.		
Western kingbird	27	3%			
Northern mockingbird	25	3%			
Red-winged blackbird	13	2%			
Pinyon jay	12	2%			
Say's phoebe	12	2%			
Cassin's kingbird	10	1%			
Lark sparrow	10	1%			
Juniper titmouse	9	1%			
Mountain bluebird	9	1%			
Mourning dove	9	1%			
American robin	7	1%			
Barn swallow	6	1%			
Common raven	6	1%			
Black-headed grosbeak	5	1%			
Brown-headed cowbird	4	1%			
Common nighthawk	4	1%			
Horned lark	4	1%			
Eurasian collared-dove	3	0%			
Northern flicker	3	0%			
Rock wren	3	0%			
Turkey vulture	3	0%			
Western scrub-jay	3	0%			
American kestrel	2	0%			
Ash-throated flycatcher	2	0%			
Bullock's oriole	2	0%			
Canada goose	2	0%			
Blue grosbeak	1	0%			
Blue-gray gnatcatcher	1	0%			
Curve-billed thrasher	1	0%			
Spotted towhee	1	0%			
Wild turkey	1	0%			
<i>Unidentified sparrow</i>	4	1%			
<i>Unidentified swallow</i>	3	0%			
<i>Unidentified flycatcher</i>	2	0%			
<i>Unidentified bird</i>	1	0%			

3.6 Lake Meredith National Recreation Area

3.6.1 2010 sampling

During May of 2010, we sampled four transects at Lake Meredith NRA (Figures 3.6.1-1, -2, -3, -4). Two transects were located in grassland habitat (upland grassland) with 19 survey points each. Two were located in riparian habitat (bottomland grassland and cottonwood bottom) with 19 points each. (Table 3.6.1). Each point was surveyed three times for a total sample of 228 survey points at Lake Meredith NRA.

3.6.2 Results and discussion

During 2010, 973 birds of 60 species were counted at Lake Meredith NRA (Tables 3.6.2). The most commonly counted species was red-winged blackbird (10%). Cassin's sparrow (9%), mourning dove (8%), western kingbird (7%), and northern mockingbird (6%) were also common.

The diverse habitat in Lake Meredith NRA, 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 blackbirds were abundant at the bottomland transect along with many dickcissel, mourning dove, and eastern meadowlark. A number of Bullock's oriole, field sparrow, scissor-tailed flycatcher, and western kingbird were recorded in the bottomland. The highest species diversity was again found on Turkey Creek with detections of many interesting or unusual birds including canyon wren, greater roadrunner, red-bellied woodpecker, rufous-crowned sparrow, spotted towhee, and at least one singing summer tanager. Cassin's sparrow was abundant at the honey mesquite transect. Blue grosbeak, painted bunting, and rock wren were detected at the upland transect on the rocky/shrub bluffs near the lake shoreline.

Four of nine new species detected in 2010 were recorded in Turkey Creek: a southern vagrant singing cactus wren, Cooper's hawk on a nest, and a gray-cheeked thrush, and one rose-breasted grosbeak that were late migrants. The other new species for the park were the barn swallow detected foraging over the honey mesquite transect, and chipping sparrow, lark bunting, and vesper sparrow passing through on migration, and Eurasian collared-dove.

Table 3.6.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Lake Meredith NRA, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
BOTTOM	Riparian	Bottomland grassland	19	3	5/13/2010	5/20/2010	5/21/2010
CWOOD	Riparian	Cottonwood bottom	19	3	5/11/2010	5/14/2010	5/19/2010
HONEY	Grassland	Upland grassland	19	3	5/4/2010	5/6/2010	5/10/2010
UPLAND	Grassland	Upland grassland	19	3	5/5/2010	5/9/2010	5/12/2010



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The first confirmed observation of a cactus wren (*Passer domesticus*) at Lake Meredith NRA was recorded in 2010.

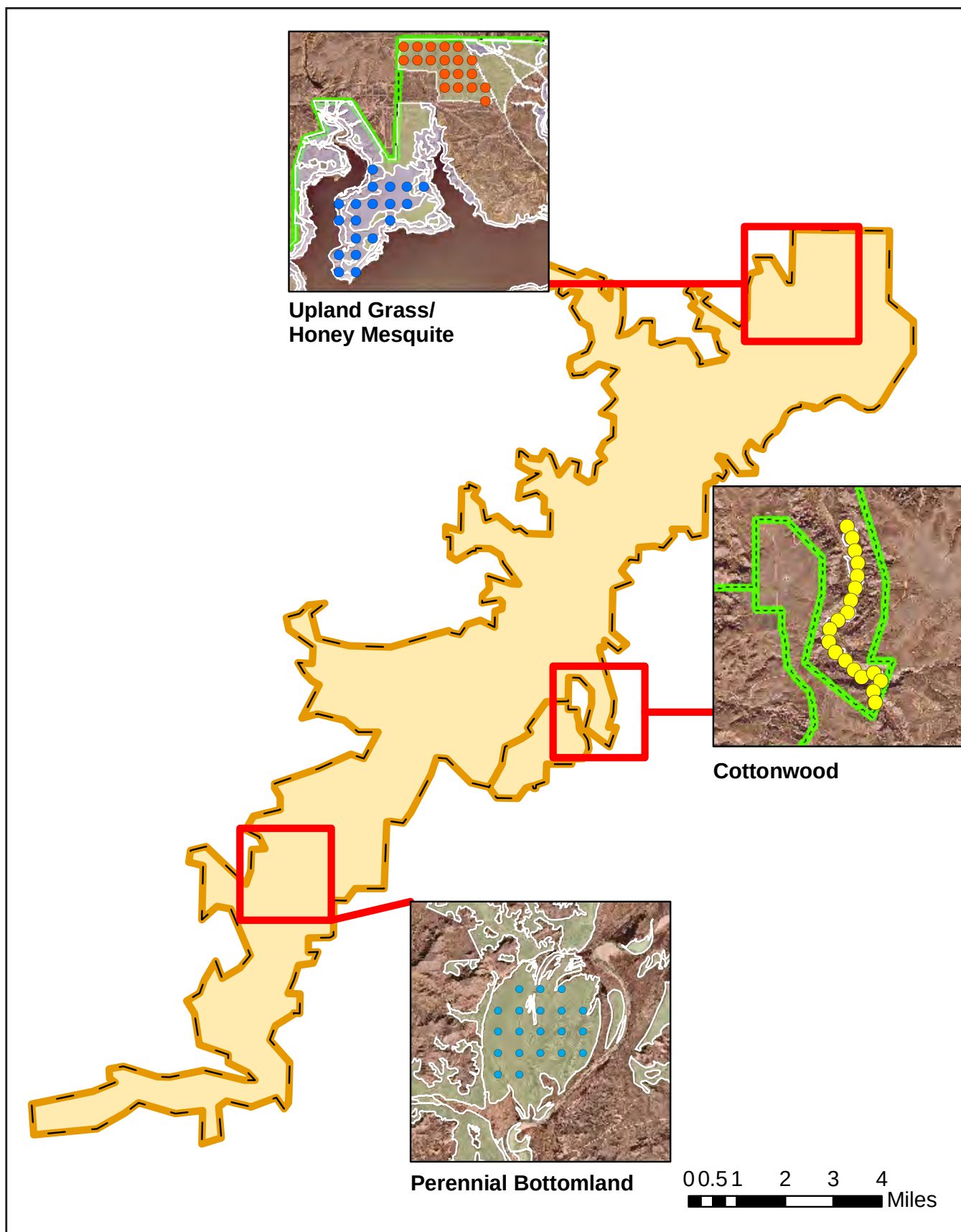


Figure 3.6.1-1. Bird sampling areas at Lake Meredith NRA 2010.

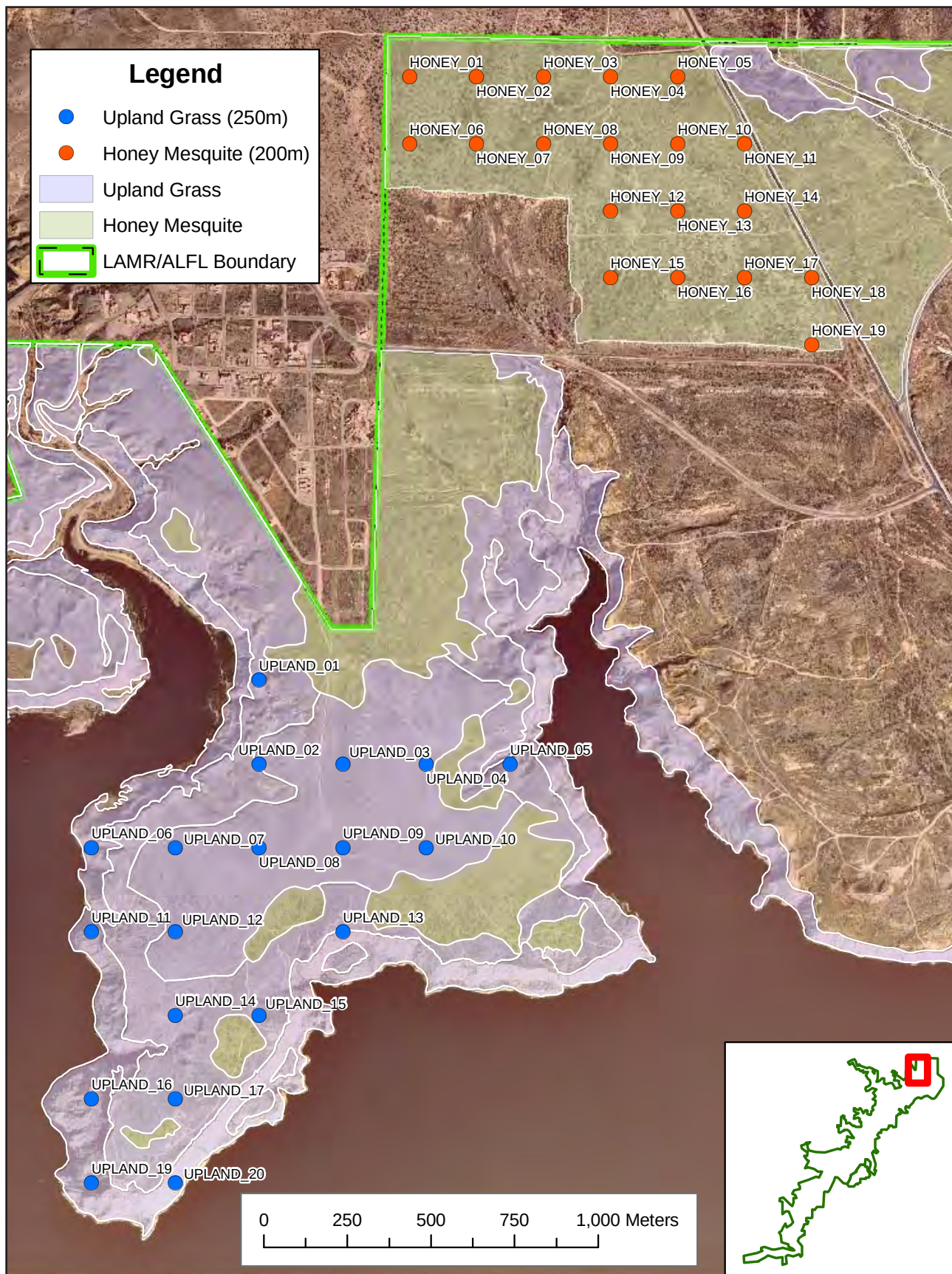


Figure 3.6.1-2. Point locations sampled at Lake Meredith NRA, Upland Grass/Honey Mesquite, 2010.

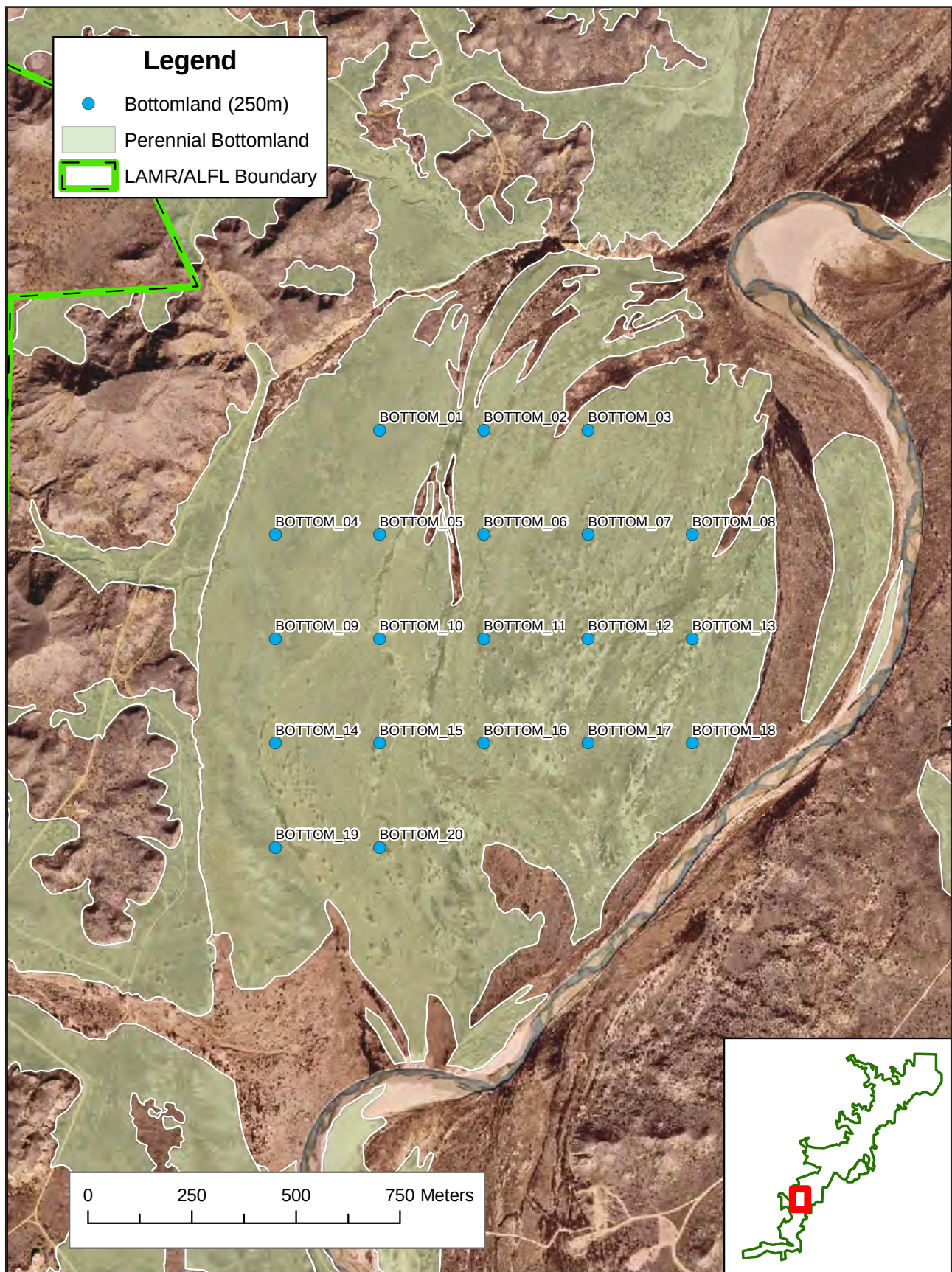


Figure 3.6.1-3. Point locations sampled at Lake Meredith NRA, Perennial Bottomland, 2010.

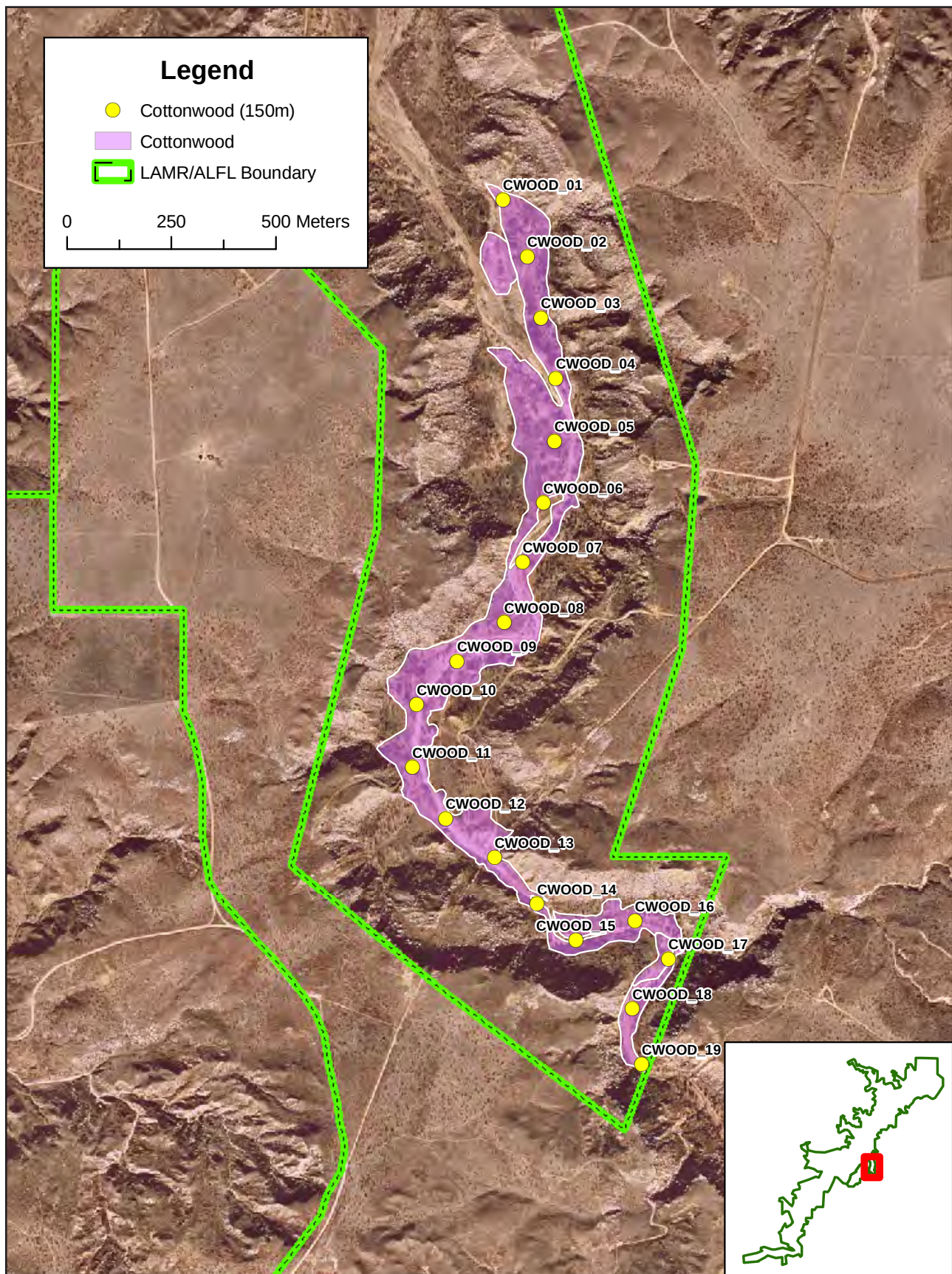


Figure 3.6.1-4. Point locations sampled at Lake Meredith NRA, Cottonwood, 2010.

Table 3.6.2. Number of birds detected of each species in each habitat class, Lake Meredith NRA, 2010

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Red-winged blackbird	2	91	93	10%
Cassin's sparrow	87	0	87	9%
Mourning dove	11	65	76	8%
Western kingbird	33	31	64	7%
Northern mockingbird	34	21	55	6%
Northern bobwhite	36	5	41	4%
Northern cardinal	8	32	40	4%
Eastern meadowlark	--	36	36	4%
Dickcissel	--	33	33	3%
Painted bunting	19	13	32	3%
Red-headed woodpecker	--	26	26	3%
Rock wren	7	18	25	3%
Scissor-tailed flycatcher	5	19	24	2%
Turkey vulture	12	12	24	2%
Northern flicker	--	21	21	2%
Mississippi kite	1	20	21	2%
Bullock's oriole	3	18	21	2%
Bewick's wren	4	16	20	2%
Common grackle	3	12	15	2%
Western wood-pewee	1	12	13	1%
Chipping sparrow	7	4	11	1%
Ring-necked pheasant	--	10	10	1%
Blue grosbeak	4	5	9	1%
Field sparrow	--	9	9	1%
Lark bunting	9	0	9	1%
Lark sparrow	8	0	8	1%
Blue jay	--	7	7	1%
Common yellowthroat	--	7	7	1%
Red-bellied woodpecker	--	7	7	1%
American kestrel	1	6	7	1%
Brown-headed cowbird	1	6	7	1%
Rufous-crowned sparrow	2	5	7	1%
Ash-throated flycatcher	--	6	6	1%
Orchard oriole	--	6	6	1%
Red-tailed hawk	--	6	6	1%
Killdeer	4	1	5	1%
Eastern kingbird	--	4	4	0%
Barn swallow	4	0	4	0%
Loggerhead shrike	4	0	4	0%
Vesper sparrow	4	0	4	0%
Cooper's hawk	--	3	3	0%

Table 3.6.2. Number of birds detected of each species in each habitat class, Lake Meredith NRA, 2010, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Cliff swallow	1	2	3	0%
Ladder-backed woodpecker	3	0	3	0%
Greater roadrunner	--	2	2	0%
Song sparrow	--	2	2	0%
Summer tanager	--	2	2	0%
Yellow-billed cuckoo	--	2	2	0%
Western meadowlark	2	0	2	0%
Cactus wren	--	1	1	0%
Canyon wren	--	1	1	0%
Eurasian collared-dove	--	1	1	0%
Gray-cheeked thrush	--	1	1	0%
Great blue heron	--	1	1	0%
Olive-sided flycatcher	--	1	1	0%
Rose-breasted grosbeak	--	1	1	0%
Spotted towhee	--	1	1	0%
Yellow warbler	--	1	1	0%
Common nighthawk	1	0	1	0%
Grasshopper sparrow	1	0	1	0%
Great horned owl	1	0	1	0%
<i>Unidentified bird</i>	12	8	20	2%
<i>Unidentified sparrow</i>	8	0	8	1%
<i>Unidentified oriole</i>	--	4	4	0%
<i>Unidentified hawk</i>	2	1	3	0%
<i>Unidentified woodpecker</i>	--	2	2	0%
<i>Unidentified swallow</i>	1	0	1	0%
Total	347	626	973	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 2010 sampling

During April of 2010, we sampled two transects at Lyndon B. Johnson NHP (Figure 3.7.1-1, -2, -3). One transect was in riparian habitat (bottomland grassland) with 17 survey points. One was in grassland (upland grassland) habitat with six survey points (Table 3.7.1). Each point was surveyed three times for a total sample of 69 samples at Lyndon B. Johnson NHP.

3.7.2 Results and discussion

During 2010, 463 birds of 31 species were counted at Lyndon B. Johnson NHP (Table 3.7.2). Northern cardinal was the most commonly counted species (24%). Black-crested titmouse (22%), cliff swallow (6%), Bewick's wren (6%), and scissor-tailed flycatcher (5%) were also common. Three new species were recorded on the ranch transect: an ash-throated flycatcher, Eurasian collared-dove, and a flyover of three black-bellied whistling-duck along the Pedernales River.

Prominent species worth noting include cliff swallow at the ranch riparian transect and mourning dove at both transects. Several interesting detections included an eastern phoebe nest with nestlings in the guard booth along the road at the ranch transect, a suspected Carolina wren nest in



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The first confirmed observation of an ash-throated flycatcher (*Myiarchus cinerascens*) at Lyndon B. Johnson NHP was recorded in 2010.

the Buckner Barn at the restoration transect, and Bullock's and orchard oriole at the ranch. Carolina wren and Carolina chickadee were found at both transects and seemed to be more common than in 2009.

Table 3.7.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Lyndon B. Johnson NHP, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
RANCH	Riparian	Bottomland grassland	17	3	4/27/2010	4/29/2010	4/30/2010
RESTORATION	Grassland	Upland grassland	6	3	4/27/2010	4/29/2010	4/30/2010

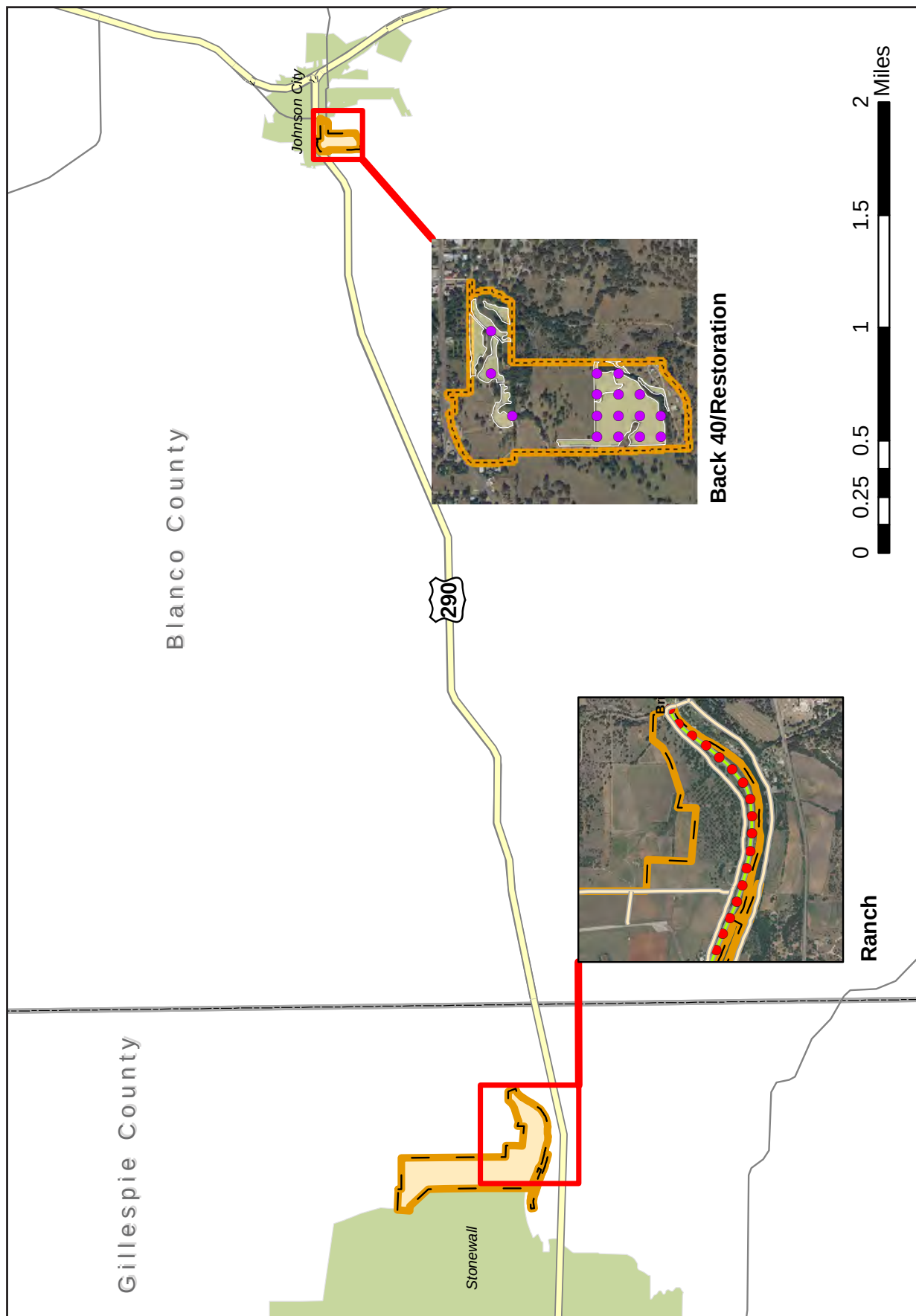


Figure 3.7.1-1. Bird sampling areas at Lyndon B. Johnson NHP, 2010.

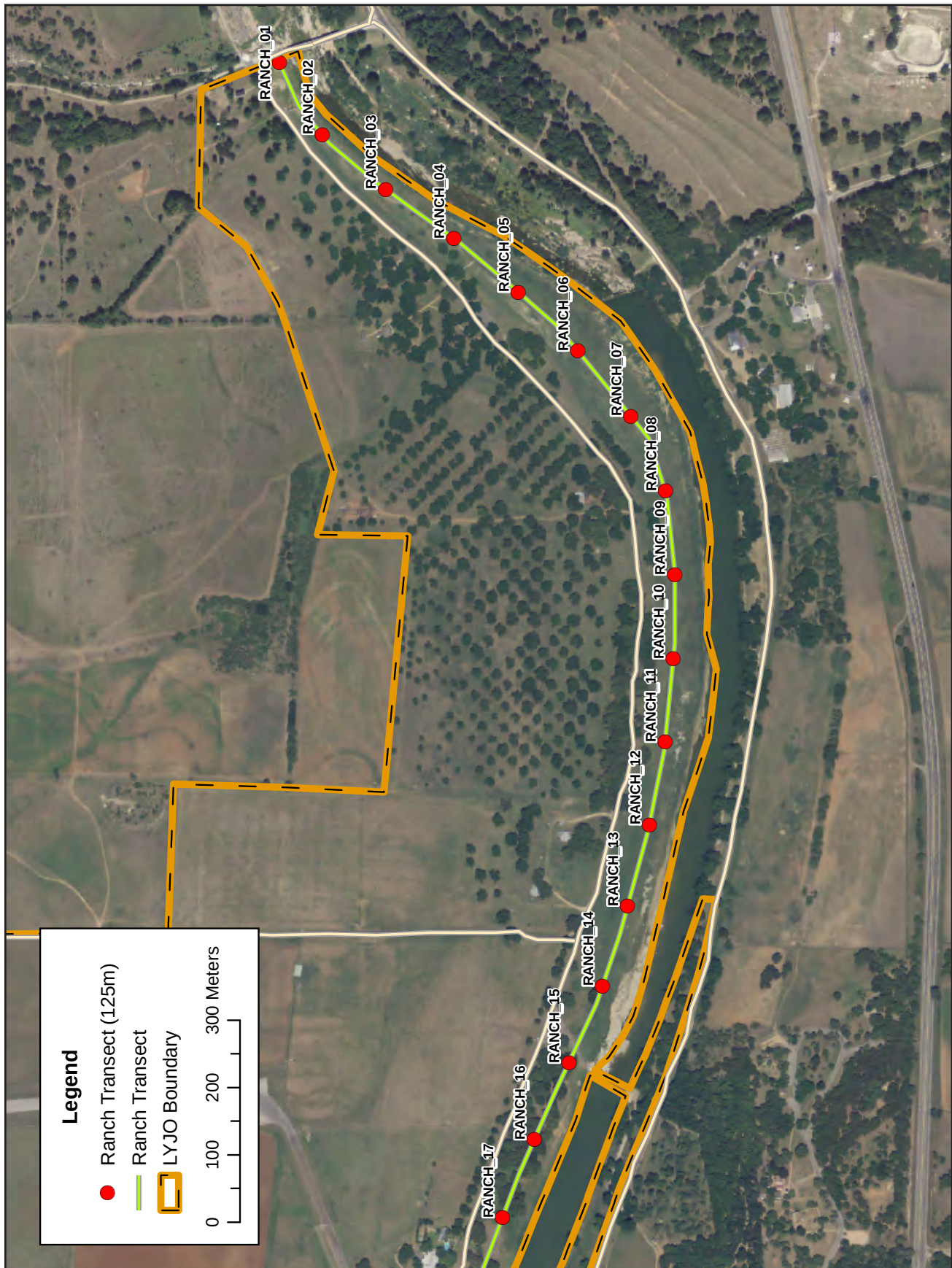


Figure 3.7.1-2. Point locations sampled at Lyndon B. Johnson NHP, Ranch, 2010.

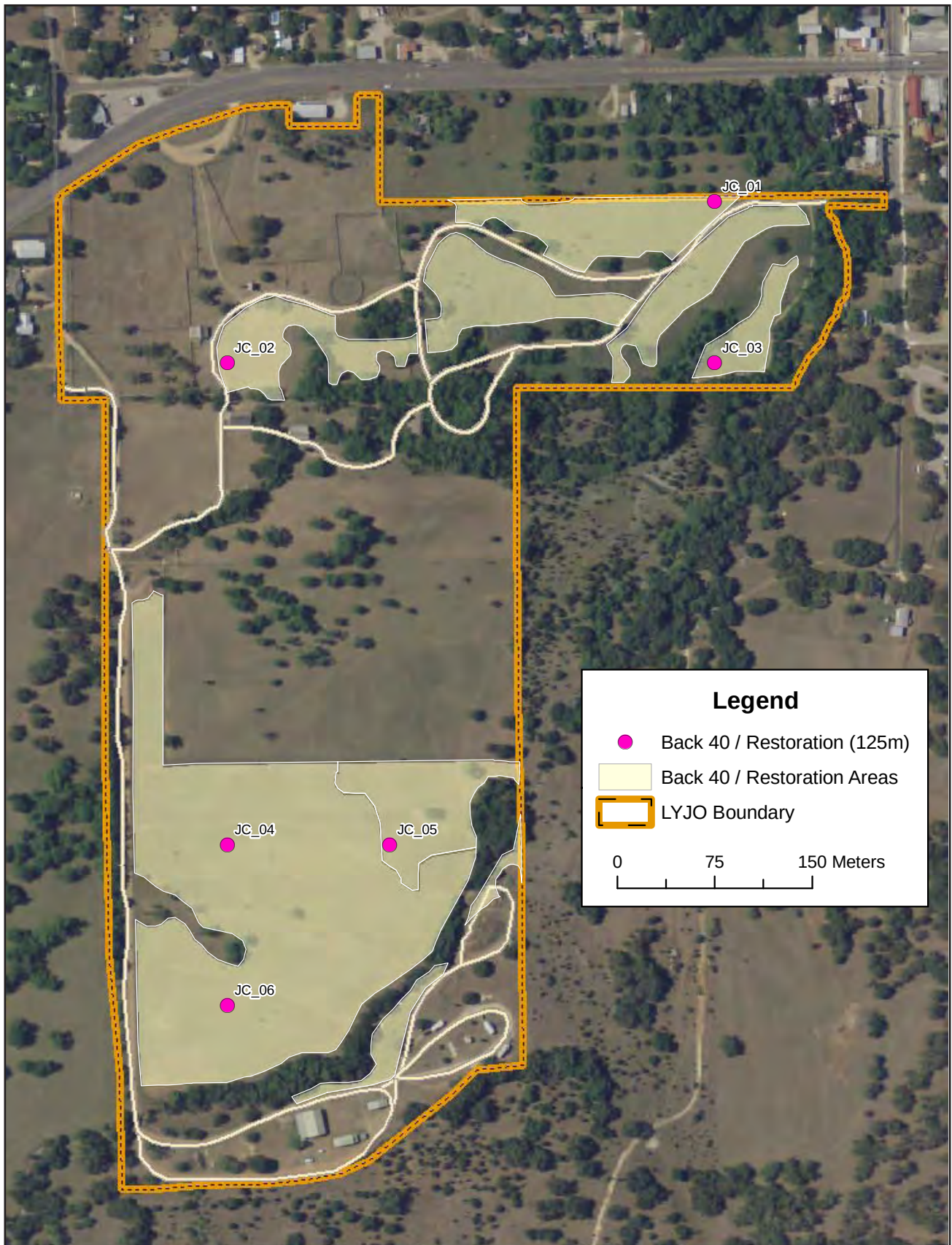


Figure 3.7.1-3. Point locations sampled at Lyndon B. Johnson NHP, Back 40/Restoration, 2010.

Table 3.7.2. Number of birds detected of each species in each habitat class, Lyndon B. Johnson NHP, 2010

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Northern cardinal	91	19	110	24%
Black-crested titmouse	76	24	100	22%
Cliff swallow	28	--	28	6%
Bewick's wren	24	2	26	6%
Scissor-tailed flycatcher	15	10	25	5%
Mourning dove	12	8	20	4%
Summer tanager	9	--	9	2%
Eastern phoebe	7	--	7	2%
Carolina wren	6	6	12	3%
Bullock's oriole	6	--	6	1%
Carolina chickadee	6	--	6	1%
Orchard oriole	6	--	6	1%
Turkey vulture	5	3	8	2%
Western kingbird	5	--	5	1%
Wild turkey	5	--	5	1%
Black vulture	4	3	7	2%
Brown-headed cowbird	4	--	4	1%
Great blue heron	4	--	4	1%
Barn swallow	3	3	6	1%
Great crested flycatcher	3	--	3	1%
American robin	2	--	2	0%
Ladder-backed woodpecker	2	--	2	0%
Red-tailed hawk	2	--	2	0%
Northern mockingbird	1	15	16	3%
Blue jay	1	5	6	1%
Ash-throated flycatcher	1	--	1	0%
Eurasian collared-dove	1	--	1	0%
Hairy woodpecker	1	--	1	0%
Lesser goldfinch	1	--	1	0%
White-winged dove	--	4	4	1%
Great-tailed grackle	--	2	2	0%
<i>Unidentified bird</i>	6	7	13	3%
<i>Unidentified swallow</i>	2	1	3	1%
<i>Unidentified woodpecker</i>	2	--	2	0%
<i>Unidentified sparrow</i>	--	10	10	2%
Total	341	122	463	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 2010 sampling

During June of 2010, we sampled six transects at Pecos NHP (Figures 3.8.1). Four transects were in the grassland habitat class (shortgrass prairie) with 6 to 18 survey points each. Two transects were in the riparian habitat class (cottonwood bottom) with 16 and 18 survey points each (Table 3.8.1). Each point was surveyed three times for a total sample of 270 survey points at Pecos NHP.



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Cassin's kingbird (*Tyrannus vociferans*) was the most commonly counted species at Pecos NHP in 2010.

3.8.2 Results and discussion

During 2010, 1,513 birds of 63 species were counted at Pecos NHP (Table 3.8.2). Species counted in the highest numbers were Cassin's kingbird (15%), American crow (6%), lark sparrow (6%), spotted towhee (5%), and common raven (4%). Other prominent species were chipping sparrow, juniper titmouse, mourning dove, northern

rough-winged swallow, turkey vulture, northern mockingbird, and western scrub-jay. New species for Pecos NHP were one gray vireo and a black-billed magpie detected at the Glorieta transect, and a Cassin's sparrow detected at Unit 3.

Pecos had the second highest species diversity of the SOPN with 63 species detected.

Table 3.8.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Pecos NHP, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
GLORIETA	Riparian	Cottonwood bottom	18	3	6/10/2010	6/11/2010	6/13/2010
PECOS	Riparian	Cottonwood bottom	16	3	6/13/2010	6/14/2010	6/15/2010
UNIT 3	Grassland	Shortgrass prairie	18	3	6/10/2010	6/11/2010	6/12/2010
UNIT 6	Grassland	Shortgrass prairie	18	3	6/16/2010	6/18/2010	6/19/2010
UNIT 17	Grassland	Shortgrass prairie	14	3	6/8/2010	6/9/2010	6/12/2010
UNIT 19	Grassland	Shortgrass prairie	6	3	6/8/2010	6/9/2010	6/12/2010

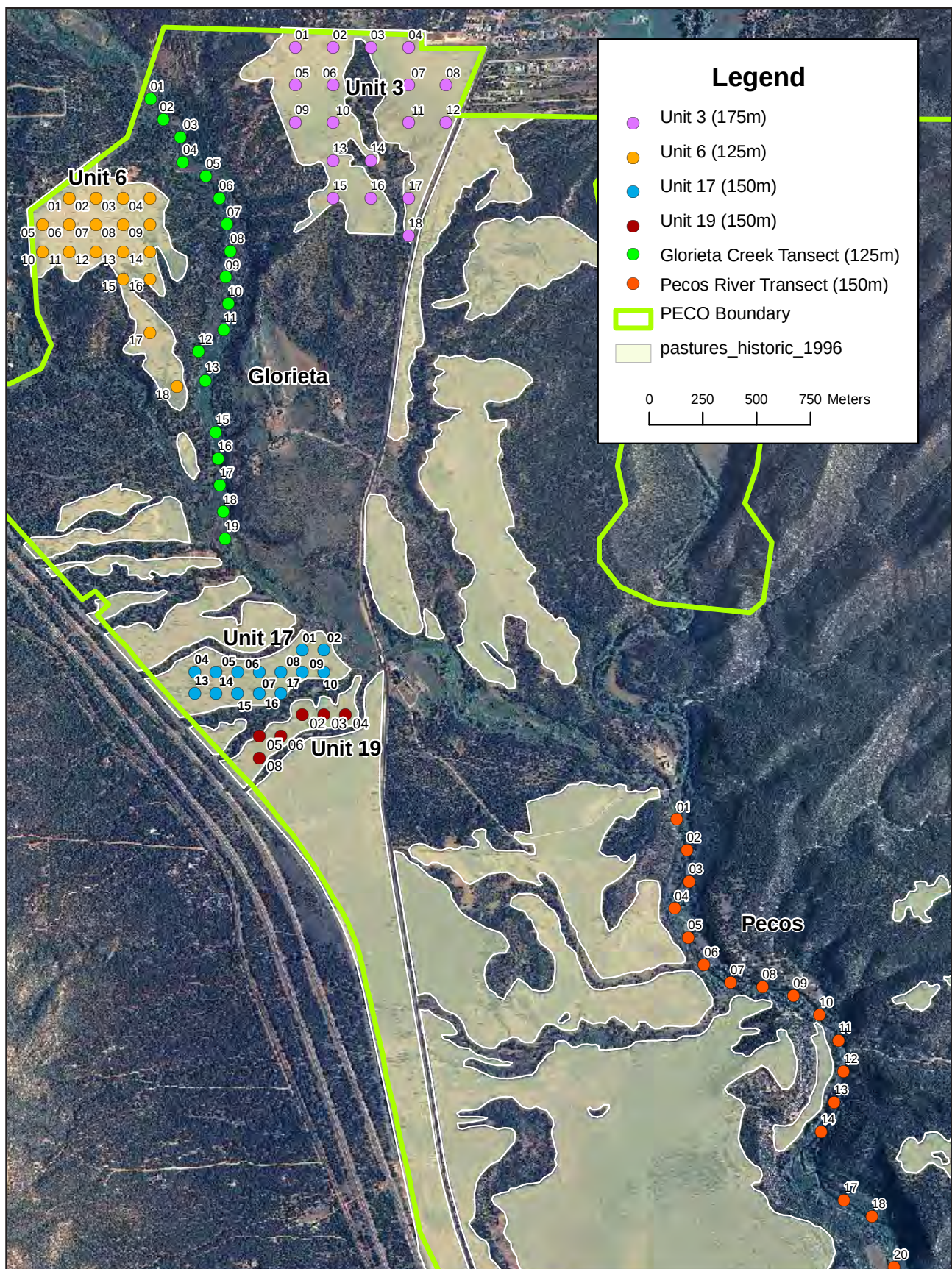


Figure 3.8.1. Point locations sampled at Pecos NHP, 2010.

Table 3.8.2. Number of birds detected of each species in each habitat class, Pecos NHP, 2010

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Cassin's kingbird	190	44	234	15%
American crow	53	36	89	6%
Lark sparrow	81	3	84	6%
Spotted towhee	9	72	81	5%
Common raven	41	20	61	4%
Northern rough-winged swallow	13	43	56	4%
Western scrub-jay	11	39	50	3%
Turkey vulture	37	11	48	3%
Violet-green swallow	--	47	47	3%
Chipping sparrow	46	--	46	3%
Juniper titmouse	28	16	44	3%
Northern mockingbird	39	1	40	3%
Mourning dove	21	15	36	2%
Black-headed grosbeak	5	30	35	2%
Red-winged blackbird	1	29	30	2%
Western meadowlark	23	6	29	2%
Western wood-pewee	12	11	23	2%
Canada goose	--	22	22	1%
Yellow warbler	--	21	21	1%
Hepatic tanager	18	3	21	1%
Plumbeous vireo	10	10	20	1%
Western kingbird	12	6	18	1%
American robin	4	13	17	1%
Cliff swallow	15	1	16	1%
Western bluebird	11	4	15	1%
Common yellowthroat	--	12	12	1%
Say's phoebe	1	10	11	1%
Barn swallow	7	4	11	1%
Vesper sparrow	10	1	11	1%
Mountain chickadee	--	9	9	1%
Common nighthawk	5	3	8	1%
Mallard	--	7	7	0%
Yellow-breasted chat	1	6	7	0%
Ash-throated flycatcher	4	2	6	0%
Black phoebe	--	5	5	0%
Western tanager	1	4	5	0%
Northern flicker	2	3	5	0%
Pinyon jay	1	3	4	0%
Brown-headed cowbird	3	1	4	0%
White-breasted nuthatch	3	1	4	0%
White-winged dove	4	--	4	0%

Table 3.8.2. Number of birds detected of each species in each habitat class, Pecos NHP, 2010, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
House wren	3	--	3	0%
Lesser goldfinch	3	--	3	0%
Black-throated gray warbler	--	2	2	0%
Rock wren	--	2	2	0%
Song sparrow	--	2	2	0%
Cooper's hawk	1	1	2	0%
Mountain bluebird	1	1	2	0%
Brewer's blackbird	2	--	2	0%
House finch	2	--	2	0%
Pine siskin	2	--	2	0%
Black-billed magpie	--	1	1	0%
Canyon towhee	--	1	1	0%
Dark-eyed junco	--	1	1	0%
Gray flycatcher	--	1	1	0%
Gray vireo	--	1	1	0%
Great blue heron	--	1	1	0%
Green-tailed towhee	--	1	1	0%
Yellow-rumped warbler	--	1	1	0%
Bullock's oriole	1	--	1	0%
Cassin's sparrow	1	--	1	0%
Eurasian collared-dove	1	--	1	0%
Red-tailed hawk	1	--	1	0%
<i>Unidentified bird</i>	31	36	67	4%
<i>Unidentified blackbird</i>	3	31	34	2%
<i>Unidentified sparrow</i>	23	6	29	2%
<i>Unidentified swallow</i>	12	14	26	2%
<i>Unidentified flycatcher</i>	3	6	9	1%
<i>Unidentified hummingbird</i>	2	5	7	0%
<i>Unidentified empidonax</i>	3	1	4	0%
<i>Unidentified kingbird</i>	2	1	3	0%
<i>Unidentified dove</i>	2	--	2	0%
<i>Unidentified warbler</i>	--	1	1	0%
<i>Unidentified woodpecker</i>	1	--	1	0%
Total	822	691	1,513	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 2010 sampling

During June of 2010, we sampled three transects at Sand Creek Massacre NHS (Figure 3.9.1). Two transects were in grassland (shortgrass prairie) habitat with 20 survey points each. One transect was in riparian habitat (cottonwood bottom) with 16 survey points each (Table 3.9.1). Each point was surveyed three times for a total sample of 168 survey points at Sand Creek Massacre NHS.

3.9.2 Results and discussion

During 2010, 1,938 birds of 38 species were counted at Sand Creek Massacre NHS (Table 3.9.2). The mourning dove and western meadowlark were the most commonly counted species

(21% each). Western kingbird (12%), Cassin's sparrow (9%), and grasshopper sparrow (7%) were also common. One new species was detected in 2010: turkey vulture.

Large numbers of western meadowlark, Cassin's sparrow, and grasshopper sparrow were noted throughout the park with most detections in the sand sage grassland. Notable bird species found in the riparian cottonwood included the mourning dove, the most commonly detected species on the park, many western kingbird, and three species of orioles: Baltimore, Bullock's, and orchard. Other interesting birds detected included two lark bunting, warbling vireo, western wood-pewee, yellow-billed cuckoo, and one eastern bluebird. Burrowing owl and mountain plover—detected in the 2009 survey—were notably absent in 2010.

Table 3.9.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Sand Creek Massacre NHS, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
COTTONWOOD	Riparian	Cottonwood bottom	16	3	6/25/2010	6/27/2010	6/28/2010
UPLAND GRASS	Grassland	Shortgrass prairie	20	3	6/25/2010	6/26/2010	6/29/2010
UPLAND SAGE	Grassland	Shortgrass prairie	20	3	6/25/2010	6/27/2010	6/29/2010



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Western wood-pewees (*Contopus sordidulus*) were observed at Sand Creek Massacre NHS in 2010.

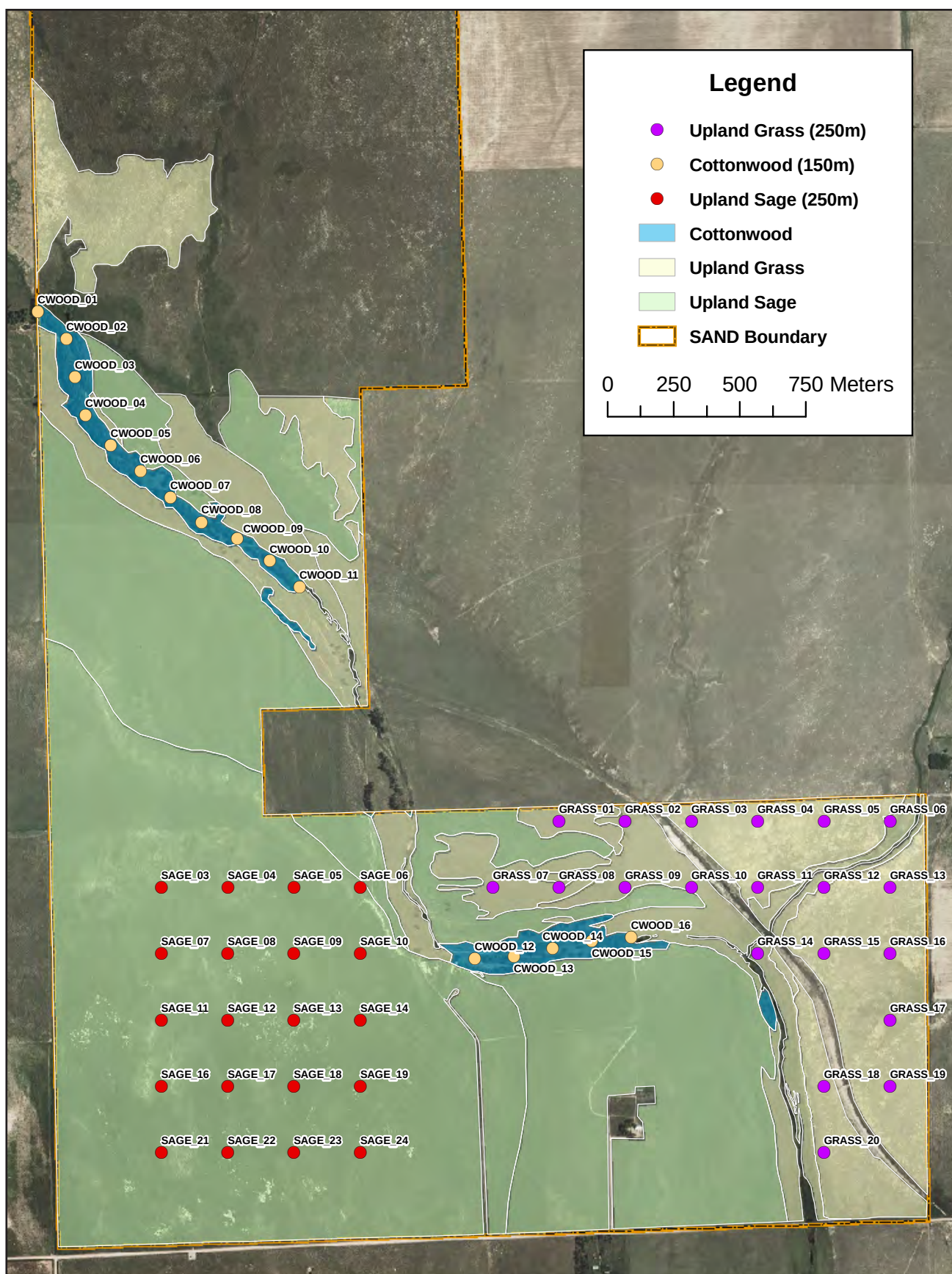


Figure 3.9.1. Point locations sampled at Sand Creek Massacre NHS, 2010.

Table 3.9.2. Number of birds detected of each species in each habitat class, Sand Creek Massacre NHS, 2010

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
Mourning dove	173	238	411	21%
Western meadowlark	391	8	399	21%
Western kingbird	57	185	242	12%
Cassin's sparrow	174	1	175	9%
Grasshopper sparrow	137	2	139	7%
Horned lark	116	--	116	6%
Bullock's oriole	22	32	54	3%
Lark sparrow	42	--	42	2%
Ring-necked pheasant	35	6	41	2%
Red-winged blackbird	35	4	39	2%
Northern mockingbird	17	17	34	2%
Red-headed woodpecker	2	24	26	1%
Killdeer	19	5	24	1%
Yellow warbler	3	20	23	1%
Barn swallow	14	1	15	1%
Brown-headed cowbird	--	14	14	1%
House wren	4	10	14	1%
Common nighthawk	7	6	13	1%
Eastern kingbird	5	7	12	1%
Common grackle	7	5	12	1%
Dickcissel	11	1	12	1%
Western wood-pewee	--	10	10	1%
Orchard oriole	3	3	6	0%
Northern flicker	4	2	6	0%
American kestrel	4	1	5	0%
Blue grosbeak	4	1	5	0%
Yellow-billed cuckoo	1	3	4	0%
Blue jay	--	3	3	0%
Warbling vireo	--	3	3	0%
Baltimore oriole	1	2	3	0%
Turkey vulture	3	--	3	0%
Great horned owl	1	1	2	0%
Lark bunting	2	--	2	0%
American goldfinch	--	1	1	0%
Eastern bluebird	--	1	1	0%
Mallard	1	--	1	0%
Red-tailed hawk	1	--	1	0%
Swainson's hawk	1	--	1	0%
<i>Unidentified bird</i>	<i>1</i>	<i>9</i>	<i>10</i>	<i>1%</i>
<i>Unidentified sparrow</i>	<i>6</i>	<i>1</i>	<i>7</i>	<i>0%</i>
<i>Unidentified woodpecker</i>	<i>--</i>	<i>4</i>	<i>4</i>	<i>0%</i>

Table 3.9.2. Number of birds detected of each species in each habitat class, Sand Creek Massacre NHS, 2010, cont.

Species	Habitat class		# of birds detected	
	Grassland	Riparian	Total	% of total
<i>Unidentified oriole</i>	--	2	2	0%
<i>Unidentified flycatcher</i>	--	1	1	0%
Total	1,304	634	1,938	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 2010 sampling

During May of 2010, we sampled two transects at Washita Battlefield NHS (Figure 3.10.1). Both transects were in grassland habitat (bottomland grassland and upland grassland) with 18 and 19 survey points each (Table 3.10.1). Each point was surveyed three times for a total sample of 111 survey points at Washita Battlefield NHS.

3.10.2 Results and discussion

During 2010, 1,382 birds of 55 species were counted at Washita Battlefield NHS (Table 3.10.2). Eastern meadowlark was the most commonly counted species (11%). Approximately two-thirds of the eastern meadowlark detections were at the upland transect. Brown-headed cowbird (9%), northern cardinal (7%), dickcissel (6%), red-winged blackbird (6%), and northern bobwhite (6%) were also common.

Thirteen new species for Washita Battlefield NHS were found during surveys: chipping sparrow, clay-colored sparrow, common yellowthroat, Cooper's hawk, eastern kingbird, great-tailed grackle, house wren, Lincoln's sparrow, ruby-throated hummingbird, tree swallow, and yellow-headed blackbird, with lark bunting and yellow-rumped warbler passing through the Washita Battlefield NHS on migration.

The occurrence of a nice mix of grassland and savannah/woodland bird species on Washita



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Blue grosbeaks (*Passerina caerulea*) were confirmed for the first time at Washita Battlefield NHS in 2010.

Battlefield NHS is a reflection of the diverse habitat. Most notable interesting birds were Carolina chickadee, painted bunting and three species of wrens: Bewick's, Carolina, and house. Nine species of sparrows were detected including Cassin's, field, lark, and grasshopper. Five additional species of sparrow passed through on migration and were new species for Washita Battlefield NHS: chipping, clay-colored, Lincoln's, savannah, and white-crowned. Though detected in 2009, barred owl, common nighthawk, pileated woodpecker, and yellow-billed cuckoo were notably absent in 2010.

Table 3.10.1. Habitat type, number of survey points, and sampling dates for each transect or grid at Washita Battlefield NHS, 2010

Transect/Grid	Habitat class	Habitat type	Survey points	# visits	Visit 1	Visit 2	Visit 3
RESTORATION	Grassland	Bottomland grassland	18	3	5/4/2010	5/6/2010	5/10/2010
UPLAND	Grassland	Upland grassland	19	3	5/4/2010	5/8/2010	5/10/2010

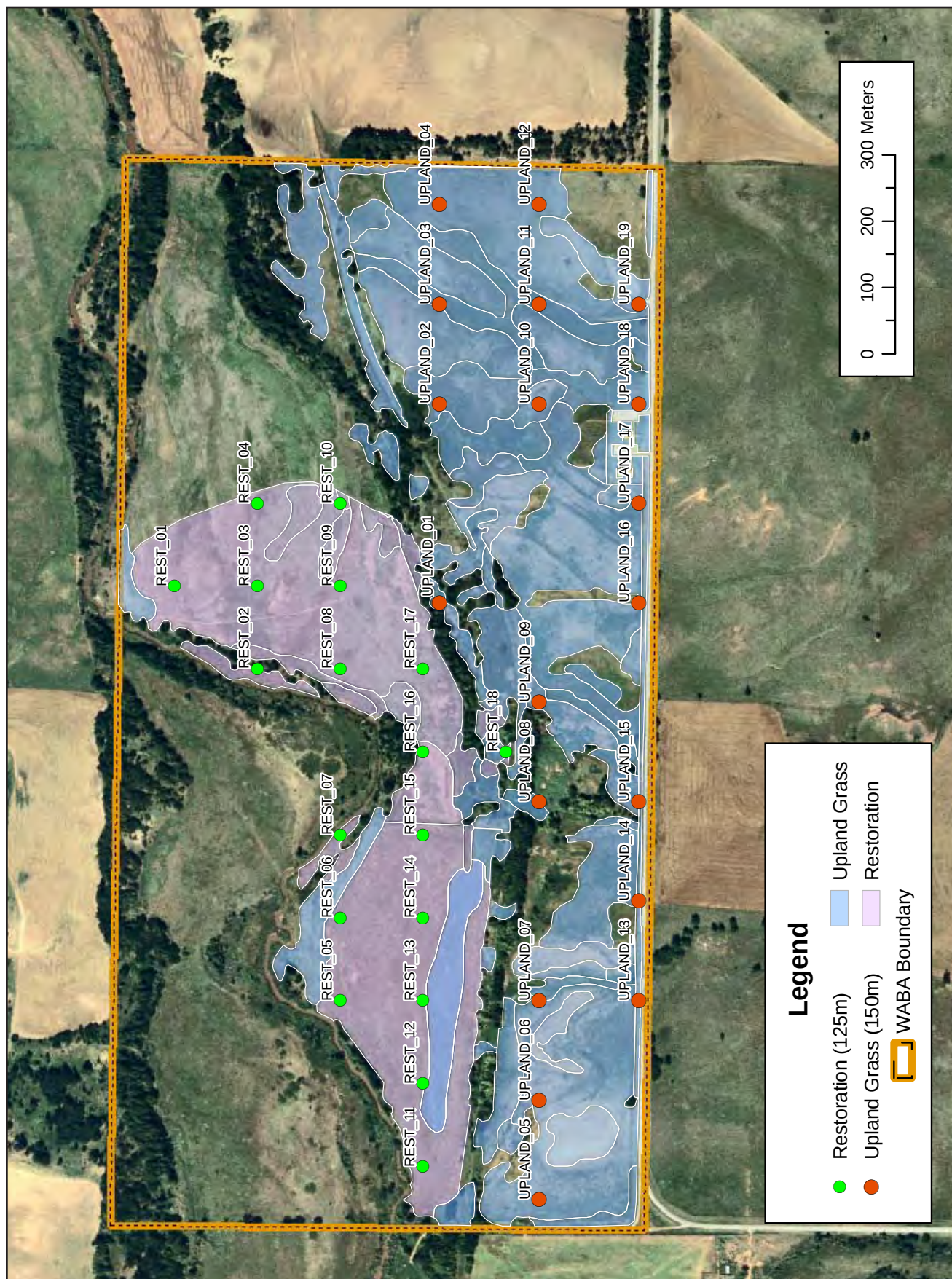


Figure 3.10.1. Point locations sampled at Washita Battlefield NHS, 2010.

Table 3.10.2. Number of birds detected of each species in each habitat class, Washita Battlefield NHS, 2010

Species	# of birds detected	
	Total (grassland habitat)	% of total
Eastern meadowlark	157	11%
Brown-headed cowbird	118	9%
Northern cardinal	103	7%
Dickcissel	86	6%
Red-winged blackbird	85	6%
Northern bobwhite	81	6%
Mourning dove	71	5%
Clay-colored sparrow	57	4%
Field sparrow	54	4%
Barn swallow	50	4%
Lark sparrow	48	3%
American goldfinch	43	3%
Grasshopper sparrow	39	3%
Painted bunting	35	3%
Bewick's wren	28	2%
Scissor-tailed flycatcher	22	2%
White-crowned sparrow	22	2%
American crow	21	2%
Carolina wren	20	1%
Carolina chickadee	19	1%
Turkey vulture	17	1%
Red-bellied woodpecker	16	1%
Western kingbird	16	1%
House wren	14	1%
Northern mockingbird	13	1%
Cliff swallow	11	1%
Great crested flycatcher	11	1%
Wild turkey	10	1%
Blue-gray gnatcatcher	8	1%
Downy woodpecker	7	1%
Eastern bluebird	7	1%
Yellow-rumped warbler	5	0%
Blue jay	4	0%
Ruby-throated hummingbird	4	0%
Savannah sparrow	4	0%
Swainson's hawk	4	0%
Cassin's sparrow	3	0%
Common grackle	3	0%
Cooper's hawk	3	0%
Killdeer	3	0%
Tree swallow	3	0%

Species	# of birds detected	
	Total (grassland habitat)	% of total
Blue grosbeak	2	0%
Canada goose	2	0%
Chipping sparrow	2	0%
Great blue heron	2	0%
Hairy woodpecker	2	0%
Red-tailed hawk	2	0%
Common yellowthroat	1	0%
Eastern kingbird	1	0%
Great horned owl	1	0%
Great-tailed grackle	1	0%
Lark bunting	1	0%
Lincoln's sparrow	1	0%
Mississippi kite	1	0%
Yellow-headed blackbird	1	0%
<i>Unidentified bird</i>	16	1%
<i>Unidentified sparrow</i>	9	1%
<i>Unidentified blackbird</i>	6	0%
<i>Unidentified swallow</i>	4	0%
<i>Unidentified woodpecker</i>	2	0%
Total	1,382	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.

3.11 Changes to the Protocol

3.11.1 *Field methods*

We adopted a few changes to the protocol from last year: we added a third site visit and changed our approach to recording detections while walking from one sample point to the next. We limited the species we record while walking from one sample point to the next to a small list of noteworthy species, as these detections provide little advantage to our overall analysis.

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.
- 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 non-breeding, 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, D. Angell, K. Beaupré, W. L. Halvorson, and R. E. Bennetts. In review. *Landbird monitoring protocol for the Sonoran Desert, Southern Plains, and Chihuahuan Desert Networks*. Version 1.00. Natural Resource Report NPS/SODN/NRTR-2010/00X. National Park Service, Fort Collins, Colorado.
- Powell, B. F., A. D. Flesch, T. Mau-Crimmins, D. Angell, K. Beaupré, 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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