



Landbird Monitoring in the Northern Colorado Plateau Network

2014 Field Season

Natural Resource Report NPS/NCPN/NRR—2015/974



ON THE COVER

Black phoebe, common yellowthroat, gray catbird. All photos by Bill Schmoker, used with permission.

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Executive Summary

In 2014, the Rocky Mountain Bird Observatory (RMBO), in cooperation with its partner, the National Park Service, completed its tenth year of a habitat-based landbird monitoring program in the Northern Colorado Plateau Inventory and Monitoring Network. This program is designed to provide rigorous population trend data for most diurnal, regularly occurring breeding landbird species throughout the Northern Colorado Plateau Network. This population information is useful for land managers and supports the National Park Service's goal of long-term monitoring of biological indicators for network parks.

In 2014, RMBO biologists surveyed 45 survey locations in 11 national park units. Fifteen transects were located in each of the three habitats of interest: low-elevation riparian, pinyon-juniper, and sage shrubland. In 2014, each location was surveyed once (in previous years, each location was surveyed twice). The decrease in sampling effort resulted in the detection of fewer species and individuals when compared to past years. We do not expect the decrease in effort to significantly impact density estimates; however, a decrease in number of detections for a species in a given year due to decreased effort may impact the percent coefficient of variation (%CV) for that species. In addition to the habitat-based surveys, we conducted four point counts and four area searches at Pipe Spring National Monument, using a modified monitoring design.

In 2014, we completed all assigned habitat-based surveys between May 12 and July 16. We recorded a total of 5,001 birds of 109 species. We detected 1,620 birds of 66 species in low-elevation riparian; 1,421 birds of 68 species in pinyon-juniper; and 1,960 birds of 78 species in sage shrubland habitats. We also recorded three species that had not been detected as part of this monitoring program in previous years: gray catbird and white-throated sparrow were recorded at Arches National Park, and a common loon was recorded at Curecanti National Recreation Area.

With each year of additional data, RMBO is able to provide more precise estimates for more species in each habitat. This year, we estimated densities of 61 species in at least one habitat and the data yielded robust density estimates ($CV < 50\%$) for 39 species in at least one habitat. We recorded 48 bird species that are of conservation or management concern throughout the Northern Colorado Plateau Network and estimated densities for 29 of these species.

In addition to the habitat-based surveys, we completed all surveys in Pipe Spring National Monument, with four point counts and four area searches completed. We detected a total of 91 birds of 29 species during surveys at the monument. We detected 40 birds of 19 species during point counts and 51 birds and 10 additional species during nocturnal and diurnal area searches. Five species (gray flycatcher, green-tailed towhee, house wren, MacGillivray's warbler and pinyon jay) were detected for the first time on this project (but were not new species for the park).

Author Information

ROCKY MOUNTAIN BIRD OBSERVATORY (RMBO)

Mission: To conserve birds and their habitats

Vision: Native bird populations are sustained in healthy ecosystems

Core Values

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

RMBO accomplishes its mission by:

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

Acronyms

BCR	bird conservation region
CV	coefficient of variation
D	density
IMBCR	Integrated Monitoring in Bird Conservation Regions
LCL	lower confidence limit
LR	low-elevation riparian
n	number of independent detections used in analyses
NABCI	U.S. North American Bird Conservation initiative
NCPN	Northern Colorado Plateau Network
NPS	National Park Service
NRA	National Recreation Area
PIF	Partners in Flight
PISP	Pipe Spring National Monument
PJ	pinyon-juniper
NM	national monument
NP	national park
RMBO	Rocky Mountain Bird Observatory
SA	sage shrubland
UCL	upper confidence limit

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1 Introduction

1.1 Program history

In 2014, the Rocky Mountain Bird Observatory (RMBO), in cooperation with its partner, the National Park Service (NPS), completed the tenth year of a habitat-based landbird monitoring program in the Northern Colorado Plateau Inventory and Monitoring Network (NCPN). This program is designed to provide rigorous population trend data on most diurnal, regularly occurring breeding landbird species in 11 national parks in Colorado, Utah, and Wyoming. Modeled after our Colorado habitat-based monitoring program (Leukering 2005), the NCPN program is consistent with goals emphasized by the U.S. North American Bird Conservation Initiative (NABCI) Monitoring Subcommittee in 2007. Using a modified monitoring design, we also sampled Pipe Spring National Monument (NM), in Arizona, for the sixth year.

1.2 Reasons for monitoring

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

The apparent, large-scale declines of avian populations and the loss, fragmentation, and degradation of native habitats highlight the need for extensive and rigorous landbird monitoring programs (Rich et al. 2004; U.S. NABCI 2009). Population monitoring helps achieve the intent of legislation such as the Migratory Bird Treaty Act (1918), National Environmental Policy Act (1969), En-

dangered Species Act (1973), National Forest Management Act (1976), and various state laws (Manley 1993; Sauer 1993).

1.3 Monitoring objectives

This program uses the Partners in Flight (PIF) Plan (Rich et al. 2004) as a template for bird conservation. PIF is a partnership of federal and state agencies, industry, non-governmental organizations, and many others, with the goal of conserving North American birds. In 1991, PIF began developing a formal species-assessment process to provide consistent scientific evaluations of conservation status for all landbird species in North America and identify the most important focus areas for the conservation of each species. This process applies quantitative rule sets to data on population size, distribution, trends, threats, and regional abundance of birds to rank species in terms of biological vulnerability and regional status. The process results in global and regional conservation assessments of each bird species that can be used to objectively assign regional and continental conservation priorities among birds.

This landbird monitoring program is designed to provide population status and trend information for regularly occurring breeding landbird species within low-elevation riparian, pinyon-juniper, and sage shrubland habitats. Initially, the goal is to provide early warning information for all monitored species through a habitat-based approach to data collection. We anticipate these data will prompt additional research to determine possible reasons for observed changes and enable better-informed management decisions.

RMBO maintains an online database of raw and summarized data that is accessible to collaborators and the public. These data can be used to generate decision support tools, such as population estimate models, to help guide conservation efforts and provide a better measure of conservation success. The database can be accessed via the Rocky Mountain Avian Data Center website at <http://rmbo.org/v3/avian/ExploretheData.aspx>.

2 Methods

2.1 Study area

In 2005, the NPS selected three habitats in which to implement NCPN landbird monitoring: low-elevation riparian (LR), pinyon-juniper (PJ), and sage shrubland (SA). A panel of NPS resource managers selected these habitats because they represent distinct bird communities. Monitoring bird populations in each of these habitats will lead to a better understanding of how management techniques affect bird populations. During the spring and summer of 2005, RMBO staff established 45 transect locations (15 in each habitat, Figures 2-1 to 2-3). In 2009, we added four point-count locations at Pipe Spring NM and in 2011, we began conducting area inventories at Pipe Spring NM, with the goal of providing more information regarding species presence within the park (Figure 2-4).

2.2 Habitats

2.2.1 Low-elevation riparian

Low-elevation riparian (LR) habitat comprises mostly isolated stands of Fremont cottonwood (*Populus fremontii*) and boxelder (*Acer negundo*) along perennial streams, sometimes within deeply cut canyons. Tamarisk (*Tamarix* spp.), also known as saltcedar, an exotic species that has invaded much of the LR habitat of the western United States, is also present in this habitat. While the NPS is working to eradicate tamarisk in many of its park units, it is still fairly common in some areas.

2.2.2 Pinyon-juniper

Pinyon-juniper (PJ) habitat typically occurs at elevations just above 1,500 m in the study area. PJ is present on most of the ridges and mesas, and is the most abundant habitat in the NCPN. Pinyon pine (*Pinus edulis*) and juniper species (*Juniperus* spp.) are dominant in this habitat. The relative abundance and composition of these species can vary significantly, and PJ habitat sometimes contains a significant sage component.

2.2.3 Sage shrubland

The sagebrush shrubland (SA) community is

also common on the Colorado Plateau. The stands of sage surveyed in the NCPN are generally narrow “fingers” of pure sage, and point-count stations are often near forests. The most common species of sagebrush in NCPN units are big sagebrush (*Artemisia tridentata*) and mountain sagebrush (*Artemisia frigida*).

2.2.4 Habitats at Pipe Spring NM

There are four point-count stations in a mixture of pinyon-juniper, low-elevation riparian, and semidesert shrubland habitats at Pipe Spring NM. Semidesert shrubland habitat is a dry landscape containing shrubs but lacking a co-dominant grass component. Dominant shrubs may include greasewood (*Sarcobatus* spp.), barberry (*Berberis* spp.), and saltbush (*Atriplex* spp.). If sagebrush is present, it is not the dominant shrub or is co-dominant with another species. The ground cover layer is typically dominated by bare ground and rock, with limited forbs and grasses present.

2.3 Sampling design

The NPS and RMBO selected survey sites during the winter of 2005. For PJ and SA habitats, GIS and the Southwest Regional REGAP Analysis Project were used to randomly select sites from a pool of habitat “stands” large enough to accommodate transects (Lowry et al. 2005). We excluded areas with >50% slope from the list of potential sites to ensure that selected stands could be safely accessed on foot.

For LR survey sites, we limited our options to crossable streams, excluding the Colorado, Green, Gunnison, and Virgin rivers. Due to the limited amount of riparian habitat, we manually selected survey locations. RMBO staff ground-proofed riparian stands and established transects in 2005. While ground-proofing, we found that a few of the stands did not fit the selection criteria. In these cases, we chose replacement stands following the same protocol. The same locations have been surveyed every year since 2005.

Point-count and area-search locations at Pipe Spring NM were placed in each distinct habitat represented in the monument as previously described, with attention paid to spacing the locations at least 250 m apart.

Area-search start locations were selected in order to efficiently cover all areas of the monument. We have conducted the Pipe Spring NM point counts every year since 2009, and area searches every year since 2011.

2.4 Sampling methods

RMBO field biologists with excellent aural and visual bird-identification skills conducted field work in 2014. Prior to conducting surveys, technicians completed an intensive, seven-day training program to ensure full understanding of field protocols, review bird and plant identification, and practice distance estimation in a variety of habitats.

We sampled landbird populations in each habitat following the protocol modified by Hanni and others (2012). We surveyed all transects between one half-hour before and five hours after sunrise. We conducted up to 15 five-minute point counts at 250-m intervals along each transect. At each point, we recorded all birds detected during the five-minute point count. For every bird detected, we recorded species, sex, horizontal distance from the observer, minute, type of detection (e.g., call, song, visual), whether the bird was thought to be a migrant, and whether or not the observer was able to visually identify the individual.

Observers measured horizontal distances to each bird using laser rangefinders. When it was not possible to measure the distance to a bird, observers estimated distance by measuring to some nearby object. Observers also recorded birds flying over, but not using the immediate surrounding landscape. For distribution mapping purposes, observers recorded the presence of all rare or difficult-to-detect species encountered while traveling between points (e.g., woodpeckers, owls, raptors). We considered all non-independent detections of birds as part of a cluster rather than as separate independent observations (i.e., flocks or pairs of conspecific birds in close proximity to each other). Observers recorded the number of birds detected within each cluster along with a letter code to distinguish between multiple clusters.

At the start and end of each transect, we recorded time, temperature, percent cloud cover, precipitation type, and estimated wind speed using the Beaufort scale. We navigated

between points using hand-held Global Positioning System (GPS) units. All GPS data were recorded using Universal Transverse Mercator coordinates projected in North American Datum 1983. At each point, we recorded GPS accuracy, start time, and habitat information (within a 50-m radius of the point), including structural stage as well as the types, relative abundance, percent coverage, and mean height of trees, shrubs, and groundcover. Additionally, we recorded the number of snags and the presence or absence of a midstory, cliff/rock, prairie dog towns, prairie dogs, tamarisk, and tamarisk beetle. We recorded these data prior to beginning each point count.

For more detailed information about survey methods and vegetation data collection protocols, refer to RMBO's Northern Colorado Plateau Network Point Transect Protocol on the Rocky Mountain Avian Data Center website at <http://rmbo.org/v3/avian/DataCollection.aspx>. Links to past and current protocols and data sheets are also available there.

At Pipe Spring NM, the point-count surveys used the methods described above. Additionally, we conducted three diurnal area searches and one nocturnal area search, beginning at dusk. During area searches, the observer continuously walked throughout the monument, tallying all individual birds heard or seen and recording information about any breeding or flocking behavior. Each diurnal area search has a specific start location and covers one of the following areas within the park: visitor center, riparian corridors, or horse corrals. The nocturnal area search is intended to cover the entire park.

2.5 Data analysis

Distance sampling theory was developed to account for the decreasing probability of detecting an object of interest (e.g., a bird) with increasing distance from the observer to the object (Buckland et al. 2001). Distance analysis relies on three critical assumptions: (1) All birds at and near the sampling location (distance = 0) are detected, (2) distances to birds are measured accurately, and (3) birds do not move in response to the observer's presence. These assumptions are reasonably well met following the RMBO protocol (Hanni et al. 2012).

We used the analysis software, Distance 6.2 (Thomas et al. 2010), to estimate detection probabilities using our point-count data. Analysis of distance data is accomplished by fitting a detection function to the distribution of recorded distances. The distribution of distances can be a function of characteristics of the object being recorded (e.g., a bird's size, color, movement, volume or frequency of song), the sampling landscape (e.g., density of vegetation), and observer ability.

We estimated densities of species for which we obtained at least 80 independent detections within a habitat across all years. We excluded birds flying over and not using the immediate surrounding landscape, migrant birds, juvenile birds, and birds detected between points from analyses. We fit a half normal key function, uniform function, hazard rate key function with cosine series

expansions, and a hazard rate key function with simple polynomial series expansion to the distribution of distances for each species (Buckland et al. 2001). We used Akaike's Information Criterion corrected (AICc) for small sample size and model selection theory to select the most parsimonious detection function for each species (Burnham and Anderson 2002). We estimated variance in program Distance using bootstrapping of transects within strata rather than using empirical estimates. Empirical methods tend to underestimate variance from small sample sizes.

Unless otherwise specified, all bird species names listed in this report are from the American Ornithologists' Union Check-list of North American Birds, Seventh Edition (2007).

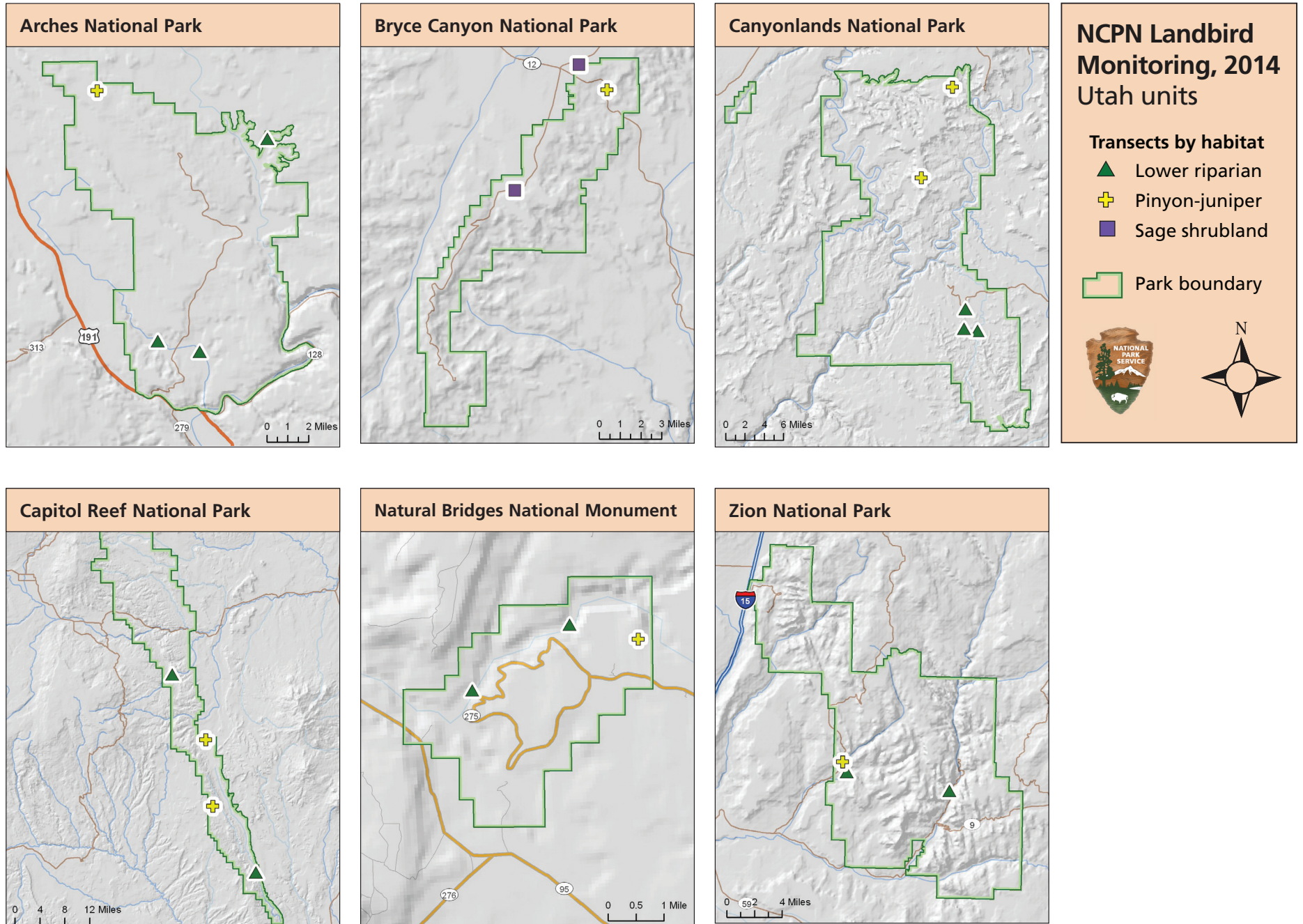


Figure 2-1. Transect locations by habitat, Utah units.

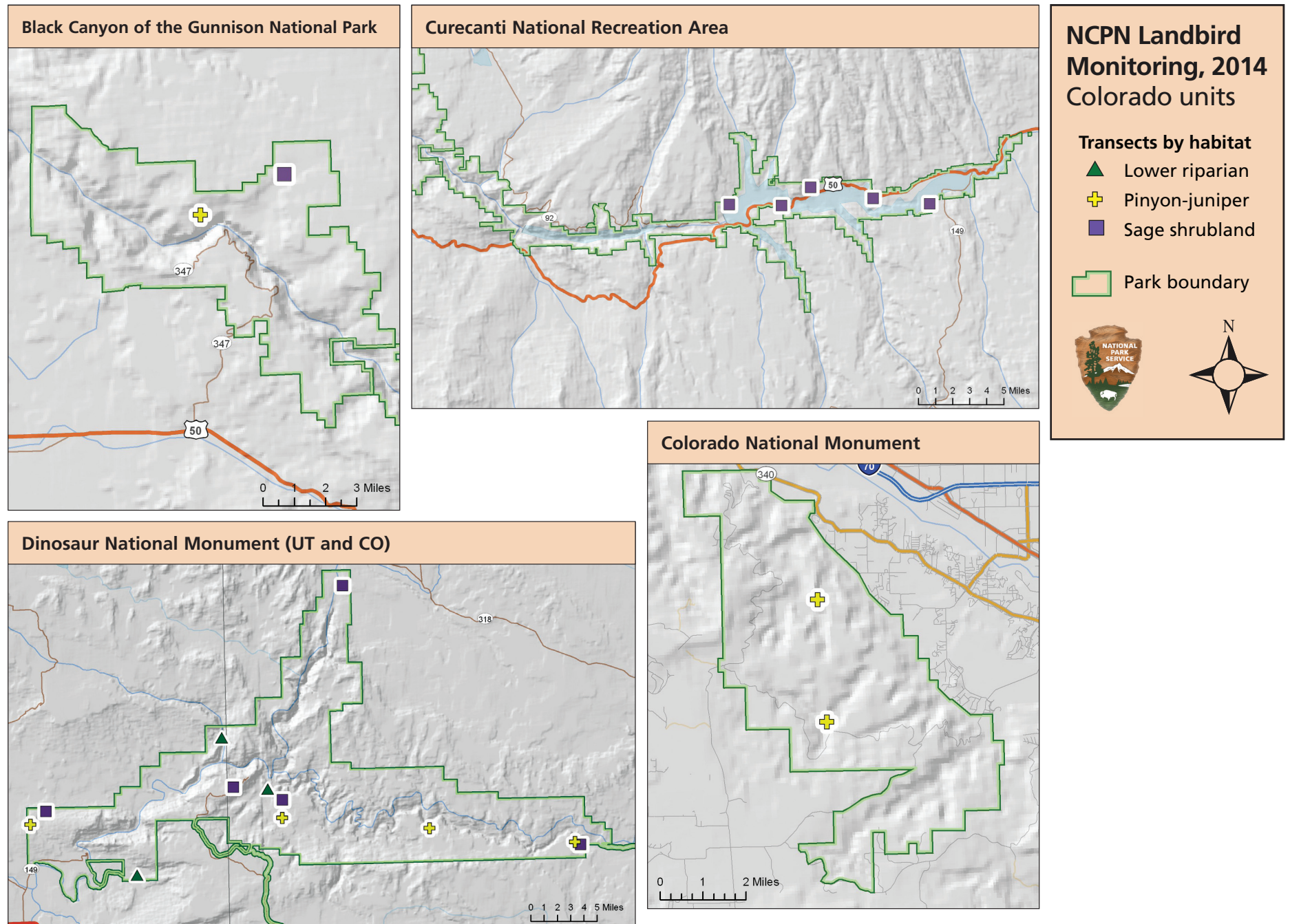


Figure 2-2. Transect locations by habitat, Colorado units.

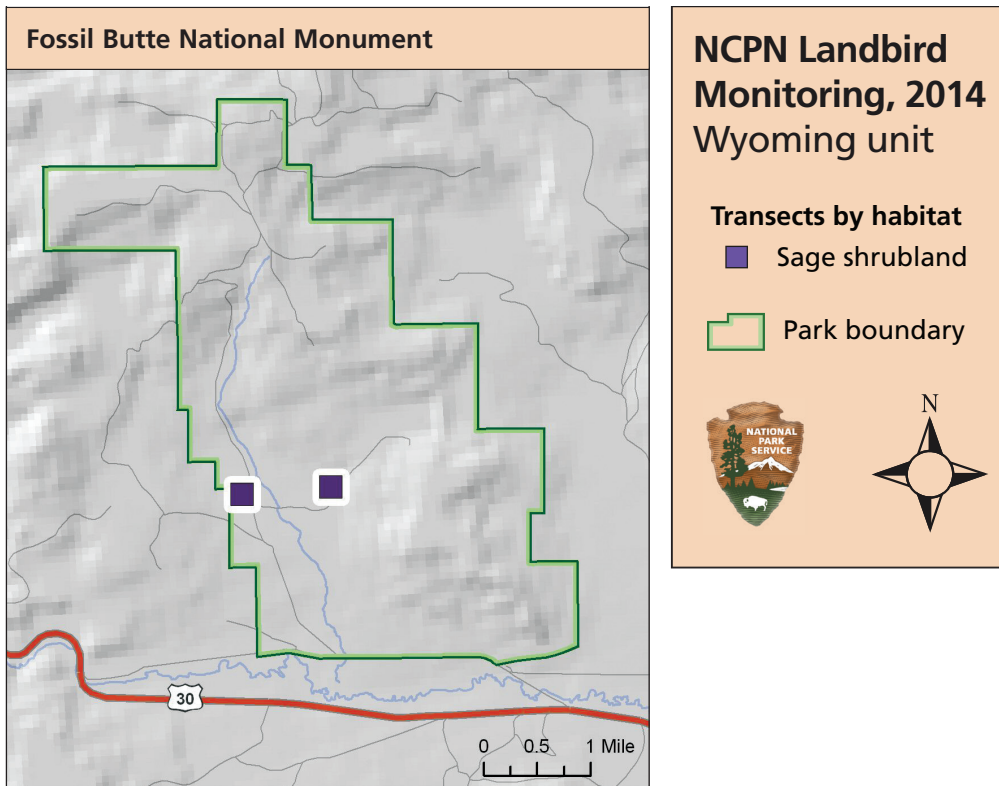


Figure 2-3. Transect locations, Fossil Butte National Monument.

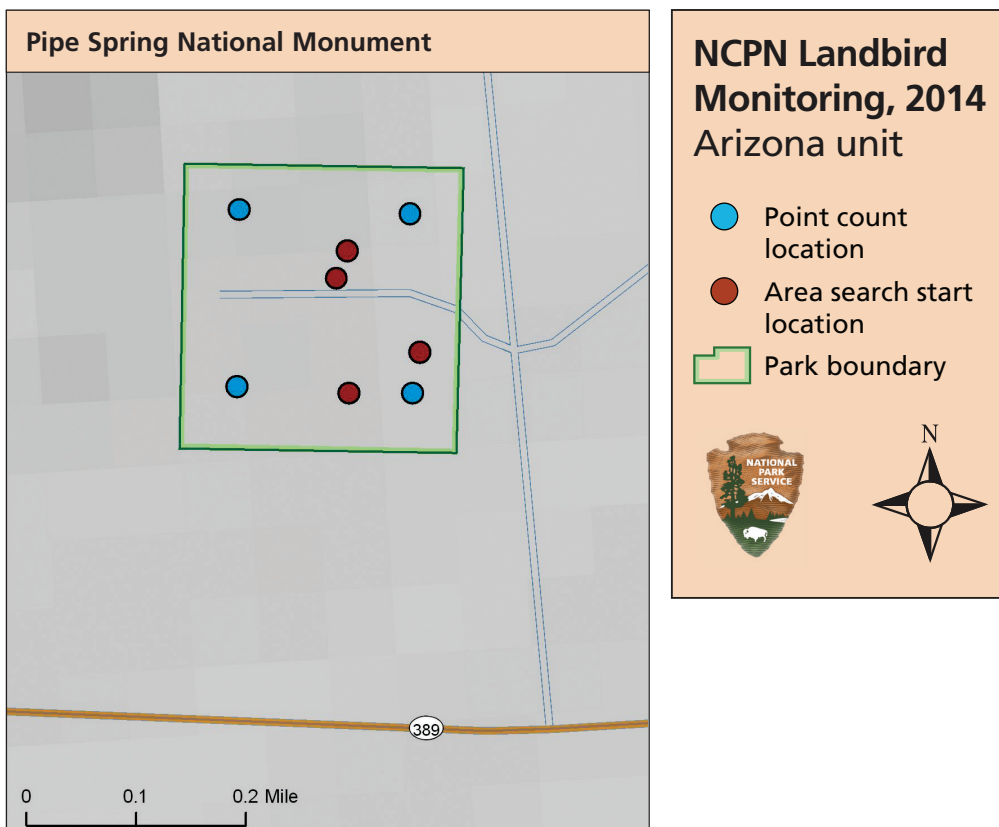


Figure 2-4. Point-count and area-search locations, Pipe Spring National Monument.

3 Results

3.1 Habitat-based surveys

In 2014, the tenth year of RMBO landbird monitoring in the NCPN, we conducted 526 point counts along 45 transects in three habitat types between May 12 and July 16 (Table 3-1). Seventy-eight percent of all point-count locations were surveyed in 2014 (526 out of 675). In 2014, the survey effort was reduced and each location was surveyed once, rather than twice as in past years. This change in protocol resulted in a decreased number of points available for sampling in 2014, when compared to previous years. Reasons that points were not surveyed included unsuitable weather (84 points), running out of time or decreased bird activity (21 points), inability to hear well enough to detect birds due to background noise (15 points), poor GPS reception (7 points), and inability to safely navigate to the point due to terrain and/or vegetation (6 points). (Another 16 points were not surveyed for a variety of other reasons.)

We recorded 5,001 birds of 109 species during habitat-based point counts (Table 3-2, Appendix A). We detected 1,620 birds of 66 species in low-elevation riparian, 1,421 birds of 68 species in pinyon-juniper, and 1,960 birds of 78 species in sage shrubland. In 2014, we recorded three species that had not been recorded by RMBO in previous years during habitat-based surveys: gray catbird and white-throated sparrow were recorded at Arches National Park, and a common loon was recorded at Curecanti National Recreation Area. Gray catbird is not currently on the species list for Arches National Park, and should be added. White-throated sparrow and common loon are currently defined as

Table 3-1. Bird sampling periods and effort by habitat, Northern Colorado Plateau Network, 2014.

Habitat	Dates sampled	# transects	# point counts
Low-elevation riparian	May 19–July 11	15	153
Pinyon-juniper	May 20–July 13	15	167
Sage shrubland	May 20–July 16	15	206
All habitats	May 19–July 16	45	526

Table 3-2. Bird totals and averages by habitat, Northern Colorado Plateau Network, 2014.

Habitat	Birds		Species	
	# detected	Avg. # per transect	# detected	Avg. # per transect
Low-elevation riparian	1,620	108	66	22
Pinyon-juniper	1,421	95	68	19
Sage shrubland	1,960	131	78	22
All habitats	5,001	111	109	21

occasional in Arches National Park and Curecanti National Recreation Area, respectively.

In 2014, we estimated densities of 61 species in at least one habitat. These 61 species represent 56% of species, and 95% of birds detected on transects in the NCPN during 2014. The habitat-stratified data yielded robust density estimates (Coefficient of Variation, CV <50%) for 39 species in at least one habitat in 2014.

In 2014, RMBO recorded 48 species of conservation and management concern (priority species) throughout the NCPN (Appendix B). We estimated densities for 29 of these priority species.

3.1.1 Density estimates

3.1.1.1 Low-elevation riparian

We surveyed all 15 LR transects one time in 2014. We estimated densities of 42 species, 16 of which were priority species, from 2005 to 2014. The data yielded robust density estimates (CV <50%) for 21 species and a moderately robust estimate (CV 50–75%) for 16 additional species (Table 3-3) in 2014. These 37 species represent 55% of all species detected and 92% of all individuals detected in LR habitat.

The following 10 species had the highest estimated densities in LR in 2014 (listed in order from highest to lowest density):

1. Violet-green swallow
2. Yellow warbler
3. Lazuli bunting
4. Blue-gray gnatcatcher
5. Spotted towhee
6. Broad-tailed hummingbird
7. Black-chinned hummingbird
8. Lesser goldfinch
9. Ash-throated flycatcher
10. House finch

The following 31 species had higher estimated densities in LR than in the other two habitats sampled in 2014 (listed in order from highest to lowest density):

1. Violet-green swallow
2. Yellow warbler
3. Lazuli bunting
4. Spotted towhee
5. Broad-tailed hummingbird
6. Black-chinned hummingbird
7. Lesser goldfinch
8. Ash-throated flycatcher
9. House finch
10. Mourning dove
11. Song sparrow
12. White-throated swift
13. Warbling vireo
14. Blue grosbeak
15. House wren
16. Black-headed grosbeak
17. American robin
18. Western scrub-jay
19. Plumbeous vireo
20. Black phoebe
21. Common yellowthroat
22. Western wood-pewee
23. Yellow-breasted chat
24. Lucy's warbler
25. Bewick's wren
26. Yellow-rumped warbler
27. Say's phoebe
28. Common raven
29. Bullock's oriole
30. Northern flicker
31. Canyon wren

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014.

Species	Year	D	LCL	UCL	%CV	n
American robin	2005	4.55	1.76	8.25	45	16
	2006	7.07	2.90	12.42	42	25
	2007	7.11	2.66	12.71	43	26
	2008	8.30	2.93	14.60	42	31
	2009	1.67	0.33	3.44	59	5
	2010	5.32	0.74	11.36	61	17
	2011	4.17	1.13	7.93	51	14
	2012	4.14	0.98	8.47	58	12
	2013	7.77	2.67	14.26	46	20
	2014	10.05	2.66	20.49	57	12
Ash-throated flycatcher	2005	20.29	14.07	26.58	19	152
	2006	20.01	14.11	26.73	20	235
	2007	20.82	13.38	30.49	25	204
	2008	32.03	19.80	48.56	27	191
	2009	15.36	7.20	26.38	39	132
	2010	24.71	15.76	34.57	23	187
	2011	11.05	7.18	15.98	25	199
	2012	15.64	10.62	21.12	21	166
	2013	14.90	9.77	20.65	22	145
	2014	36.26	22.44	53.46	27	82
Bewick's wren	2005	6.93	2.71	11.87	41	44
	2006	15.57	7.84	24.61	33	100
	2007	8.74	2.98	15.89	44	56
	2008	8.76	3.42	14.63	40	57
	2009	15.01	6.36	24.90	37	85
	2010	3.61	1.35	6.20	41	20
	2011	2.39	0.95	4.03	40	14
	2012	9.89	4.09	16.21	38	54
	2013	4.07	1.83	6.71	37	19
	2014	5.31	1.66	9.68	44	12
Black phoebe	2005	4.84	1.06	22.10	105	10
	2006	4.00	1.17	13.59	79	10
	2007	7.88	2.58	24.07	71	19
	2008	3.93	1.24	12.47	74	9
	2009	9.29	2.83	30.52	76	20
	2010	0.91	0.30	2.73	69	2
	2011	0.87	0.22	3.41	91	2
	2012	4.77	1.86	12.21	58	10
	2013	4.89	1.18	20.30	96	9
	2014	8.10	2.74	23.89	68	7

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Black-chinned hummingbird	2005	116.41	65.84	181.02	31	28
	2006	142.79	74.41	231.94	35	35
	2007	89.53	48.04	138.26	31	22
	2008	90.79	51.51	138.76	30	23
	2009	108.74	53.60	178.98	35	23
	2010	65.91	36.78	103.44	31	14
	2011	80.26	41.78	130.38	34	18
	2012	110.94	55.01	183.33	36	23
	2013	118.50	61.35	189.55	33	22
	2014	81.97	27.38	152.12	46	7
Black-headed grosbeak	2005	3.51	0.39	8.48	75	11
	2006	6.88	3.21	11.18	35	22
	2007	3.76	1.16	7.04	48	12
	2008	5.19	2.16	9.08	41	17
	2009	6.15	1.04	13.31	60	17
	2010	3.25	0.69	7.09	63	9
	2011	4.09	1.59	7.13	41	12
	2012	5.88	2.74	9.44	36	16
	2013	4.32	1.01	9.05	59	10
	2014	10.17	3.47	18.97	47	11
Black-throated gray warbler	2005	6.85	3.12	11.29	39	38
	2006	14.31	8.36	21.79	29	81
	2007	9.84	6.21	14.37	25	55
	2008	20.64	10.03	34.66	37	116
	2009	10.42	3.28	19.99	53	48
	2010	11.46	6.46	17.39	29	55
	2011	15.32	8.29	23.89	33	77
	2012	10.85	5.22	17.53	35	50
	2013	6.12	1.98	11.38	46	25
	2014	10.56	2.46	22.36	62	19
Black-throated sparrow	2005	5.83	2.48	13.68	52	46
	2006	6.51	3.16	13.44	43	51
	2007	7.40	2.77	19.73	60	61
	2008	8.11	3.74	17.57	46	67
	2009	21.15	10.25	43.65	43	134
	2010	8.26	4.10	16.63	42	56
	2011	12.28	5.94	25.37	43	91
	2012	12.48	6.79	22.94	36	77
	2013	7.35	3.65	14.80	42	43
	2014	1.07	0.36	3.19	69	3

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Blue grosbeak	2005	4.36	1.13	8.58	54	12
	2006	8.03	2.65	14.39	46	23
	2007	1.03	0.00	2.55	83	3
	2008	1.50	0.27	3.30	66	4
	2009	4.98	1.50	9.69	50	12
	2010	0.83	0.00	1.80	65	2
	2011	1.90	0.32	4.22	65	5
	2012	2.93	0.31	6.87	70	7
	2013	9.10	2.14	19.03	59	18
	2014	13.78	3.10	27.89	56	13
Blue-gray gnatcatcher	2005	49.28	36.57	66.42	17	103
	2006	65.42	44.72	95.71	22	140
	2007	49.56	35.29	69.60	20	109
	2008	57.60	37.81	87.76	24	126
	2009	130.18	97.04	174.63	17	222
	2010	84.47	64.50	110.64	16	160
	2011	90.05	68.94	117.61	15	178
	2012	53.36	37.96	75.03	20	90
	2013	78.89	57.06	109.06	19	122
	2014	94.71	72.72	123.37	15	69
Broad-tailed hummingbird	2005	29.28	13.01	56.43	45	25
	2006	2.37	0.00	5.55	73	2
	2007	3.23	0.00	8.28	84	3
	2008	9.01	2.32	18.98	58	8
	2009	5.51	0.00	15.11	94	4
	2010	31.57	14.20	60.90	44	24
	2011	4.90	0.94	11.04	64	4
	2012	8.34	1.26	19.69	67	6
	2013	9.42	2.19	19.18	59	6
	2014	85.17	27.33	199.16	63	24
Brown-headed cowbird	2005	3.42	1.04	6.87	54	7
	2006	10.92	4.75	18.65	39	23
	2007	7.52	2.54	14.30	51	16
	2008	6.51	2.73	11.73	42	14
	2009	7.30	1.98	15.46	57	13
	2010	2.71	0.46	5.75	59	5
	2011	8.88	2.50	16.93	51	18
	2012	13.24	1.93	29.01	67	24
	2013	6.99	1.83	13.29	51	11
	2014	2.71	0.00	6.00	68	2

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Bullock's oriole	2005	1.05	0.29	2.08	55	3
	2006	8.03	4.42	12.06	30	22
	2007	5.53	1.67	10.87	50	16
	2008	3.24	0.77	6.50	55	9
	2009	5.22	0.73	11.77	68	12
	2010	3.55	1.07	6.26	45	9
	2011	3.64	0.70	7.49	59	9
	2012	3.66	1.19	6.79	48	8
	2013	0.55	0.00	1.58	96	1
	2014	2.15	0.00	4.74	65	2
Bushtit	2005	17.30	9.49	26.94	31	17
	2006	52.46	32.04	75.29	26	53
	2007	10.87	3.44	19.51	46	11
	2008	4.88	0.93	9.90	57	5
	2009	15.74	6.27	26.76	39	14
	2010	--	--	--	--	0
	2011	--	--	--	--	0
	2012	2.43	0.00	5.64	71	2
	2013	8.20	0.00	22.07	88	6
	2014	--	--	--	--	0
Canyon wren	2005	1.63	0.84	2.60	33	31
	2006	3.44	1.88	5.22	31	65
	2007	1.93	0.90	3.21	38	38
	2008	1.42	0.36	2.97	56	27
	2009	1.45	0.49	2.63	45	24
	2010	0.06	0.00	0.17	99	1
	2011	0.52	0.20	0.91	44	9
	2012	0.81	0.30	1.51	49	13
	2013	0.92	0.23	1.80	55	13
	2014	1.23	0.28	2.47	56	8
Chipping sparrow	2005	3.29	0.62	6.43	54	5
	2006	3.94	0.78	7.82	54	6
	2007	17.06	7.38	30.42	43	27
	2008	16.86	7.73	28.66	40	26
	2009	16.49	5.33	31.32	48	22
	2010	20.39	8.37	35.95	44	27
	2011	11.38	4.62	19.49	41	16
	2012	14.32	6.15	24.69	41	18
	2013	3.43	0.00	8.27	76	4
	2014	3.88	0.00	8.94	75	2

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Common raven	2005	2.45	1.27	3.77	31	16
	2006	1.71	0.51	3.40	54	11
	2007	2.09	0.90	3.51	38	14
	2008	5.52	2.59	9.61	40	36
	2009	1.22	0.39	2.29	49	7
	2010	4.34	1.37	8.11	46	25
	2011	2.11	1.08	3.31	33	13
	2012	1.12	0.23	2.30	57	6
	2013	3.60	1.62	5.91	37	17
	2014	2.67	0.74	5.01	49	6
Common yellowthroat	2005	6.69	1.90	13.24	52	9
	2006	14.32	3.36	28.46	55	19
	2007	14.17	0.60	33.26	71	19
	2008	2.84	0.00	8.39	103	4
	2009	15.73	2.49	36.13	67	18
	2010	7.83	0.00	19.91	81	10
	2011	6.96	0.00	14.93	63	9
	2012	7.76	0.77	17.66	68	9
	2013	7.57	0.00	22.26	93	7
	2014	8.00	0.00	19.70	77	4
Gray vireo	2005	0.93	0.47	1.84	40	17
	2006	1.90	0.97	3.72	40	35
	2007	0.91	0.40	2.09	50	17
	2008	1.12	0.59	2.15	39	21
	2009	2.08	1.08	4.01	39	33
	2010	0.25	0.09	0.69	64	4
	2011	0.47	0.22	1.02	46	8
	2012	0.58	0.29	1.16	41	9
	2013	1.40	0.71	2.78	41	19
	2014	--	--	--	--	0
House finch	2005	20.25	13.01	28.10	22	104
	2006	30.13	21.12	40.04	20	174
	2007	31.09	20.62	42.31	21	185
	2008	31.35	21.39	41.57	20	185
	2009	34.68	17.69	55.30	34	161
	2010	20.17	12.71	28.33	23	104
	2011	23.63	15.97	30.86	19	117
	2012	17.61	11.25	24.29	23	77
	2013	18.70	12.46	26.08	23	74
	2014	33.16	20.86	46.27	24	49

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
House wren	2005	9.52	3.05	19.11	52	41
	2006	9.23	0.92	18.72	58	43
	2007	6.86	1.01	14.08	58	32
	2008	10.42	1.34	20.42	58	48
	2009	9.44	0.99	18.90	58	38
	2010	6.88	0.00	19.01	89	27
	2011	11.38	1.51	23.62	59	46
	2012	9.16	2.23	18.22	53	35
	2013	11.31	1.22	24.61	64	35
	2014	12.02	2.33	26.12	62	18
Juniper titmouse	2005	7.88	3.03	13.39	41	28
	2006	6.81	3.31	10.48	33	24
	2007	10.72	5.89	16.04	28	38
	2008	10.92	5.41	16.98	32	39
	2009	9.35	2.62	16.82	46	28
	2010	5.50	1.94	9.61	42	17
	2011	5.75	2.58	9.21	36	19
	2012	3.01	1.39	4.83	35	9
	2013	4.14	1.54	7.61	44	11
	2014	5.82	0.00	15.65	84	7
Lazuli bunting	2005	63.77	32.45	125.32	40	154
	2006	56.92	25.60	126.54	48	138
	2007	49.16	26.70	90.51	36	165
	2008	61.05	28.54	130.61	46	153
	2009	60.31	24.21	150.25	56	155
	2010	54.78	27.70	108.34	41	148
	2011	18.84	10.51	33.77	35	108
	2012	26.60	13.13	53.89	42	94
	2013	42.38	19.90	90.25	46	86
	2014	116.79	64.33	212.04	35	77
Lesser goldfinch	2005	11.13	4.00	20.51	46	22
	2006	23.00	12.63	36.40	32	45
	2007	41.45	23.64	63.37	30	88
	2008	26.15	9.78	50.05	49	49
	2009	39.34	16.87	64.82	37	70
	2010	15.59	6.31	26.70	40	30
	2011	16.69	8.56	26.77	34	30
	2012	19.84	7.91	35.65	44	33
	2013	19.70	11.41	29.70	29	33
	2014	47.70	25.14	73.80	32	18

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Lucy's warbler	2005	0.31	0.00	0.91	99	1
	2006	--	--	--	--	0
	2007	2.43	0.00	6.13	86	8
	2008	4.36	0.87	8.60	53	15
	2009	8.00	2.22	15.73	52	22
	2010	1.03	0.00	2.39	73	3
	2011	3.95	1.60	6.74	40	12
	2012	7.79	2.55	14.10	45	21
	2013	9.00	2.19	17.51	52	22
	2014	5.33	0.90	10.69	56	6
Mourning dove	2005	9.94	4.85	16.40	35	73
	2006	16.72	10.68	24.17	24	114
	2007	19.33	12.30	27.78	25	140
	2008	11.34	4.74	18.98	39	91
	2009	5.56	3.09	8.50	30	35
	2010	15.36	8.68	22.09	26	96
	2011	11.03	5.73	17.60	33	73
	2012	8.10	4.58	12.26	29	43
	2013	11.49	5.41	19.14	37	50
	2014	25.07	12.59	39.96	34	54
Northern flicker	2005	0.59	0.26	1.03	42	9
	2006	0.88	0.33	1.50	42	14
	2007	1.38	0.57	2.60	47	22
	2008	0.51	0.06	1.20	68	8
	2009	0.32	0.06	0.77	71	4
	2010	0.36	0.06	0.79	66	5
	2011	0.54	0.18	0.95	44	8
	2012	0.56	0.18	1.13	55	7
	2013	0.44	0.08	0.93	61	5
	2014	2.04	0.98	3.63	40	11
Plumbeous vireo	2005	10.85	6.70	15.41	35	52
	2006	17.80	9.73	26.49	36	85
	2007	13.12	7.44	19.62	33	63
	2008	9.71	6.30	13.48	28	48
	2009	16.43	9.64	25.13	31	67
	2010	17.45	10.25	25.50	31	74
	2011	8.12	5.14	11.43	32	36
	2012	8.32	4.28	12.73	37	33
	2013	10.01	4.22	17.09	47	36
	2014	8.51	3.58	14.70	54	13

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Rock wren	2005	4.75	2.75	7.25	28	75
	2006	6.56	3.99	9.93	28	105
	2007	8.42	5.45	11.68	23	137
	2008	4.94	2.62	7.91	33	80
	2009	6.84	4.47	9.79	24	94
	2010	4.13	2.51	6.03	25	58
	2011	6.78	4.20	9.69	25	102
	2012	2.88	1.34	4.92	40	38
	2013	4.79	2.47	7.43	31	53
	2014	4.87	2.59	7.65	31	27
Say's phoebe	2005	3.33	2.17	4.73	24	41
	2006	4.99	2.85	7.76	30	61
	2007	2.94	1.83	4.09	24	37
	2008	4.11	2.10	6.43	33	51
	2009	4.99	2.27	8.58	39	51
	2010	2.43	1.14	4.11	38	25
	2011	5.57	2.91	8.29	29	64
	2012	2.70	1.47	4.07	30	26
	2013	3.52	1.83	5.30	30	32
	2014	3.14	1.29	5.27	38	13
Song sparrow	2005	18.50	4.65	39.97	59	44
	2006	20.81	5.36	38.34	48	53
	2007	17.01	4.11	31.90	50	45
	2008	13.80	4.77	24.48	44	36
	2009	11.61	0.83	25.61	63	25
	2010	3.33	0.00	8.96	95	7
	2011	10.43	1.72	21.12	57	25
	2012	10.23	2.10	21.73	61	22
	2013	6.93	0.98	14.36	61	13
	2014	22.55	6.26	44.18	52	20
Spotted towhee	2005	43.31	31.97	58.69	18	214
	2006	107.72	81.85	141.77	16	404
	2007	57.01	40.70	79.85	20	265
	2008	43.45	32.05	58.91	18	200
	2009	87.60	64.65	118.71	18	293
	2010	67.28	47.08	96.15	22	278
	2011	50.37	34.03	74.55	24	292
	2012	92.35	69.72	122.33	16	289
	2013	90.45	61.72	132.56	23	330
	2014	86.74	66.09	113.82	16	135

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Violet-green swallow	2005	56.53	39.25	74.09	19	68
	2006	178.14	109.34	250.71	24	156
	2007	99.92	63.42	146.90	26	93
	2008	135.36	81.23	200.52	27	86
	2009	122.31	77.21	173.82	24	112
	2010	58.30	36.86	82.54	24	63
	2011	35.88	21.47	52.63	27	33
	2012	120.53	67.41	187.12	31	87
	2013	115.74	75.05	160.45	23	81
	2014	185.78	81.41	314.25	38	37
Virginia's warbler	2005	7.01	3.06	11.41	37	25
	2006	11.77	2.98	24.21	56	41
	2007	8.60	4.09	13.86	35	31
	2008	17.86	10.11	26.59	29	64
	2009	0.67	0.00	1.87	97	2
	2010	8.29	3.83	13.57	36	26
	2011	4.35	1.91	7.29	38	14
	2012	11.21	1.80	22.74	55	34
	2013	5.30	1.62	9.96	48	14
	2014	6.47	1.84	11.88	45	8
Warbling vireo	2005	4.75	1.90	8.59	44	19
	2006	9.92	4.40	17.77	42	40
	2007	6.57	2.35	11.90	45	27
	2008	7.52	4.39	10.75	26	31
	2009	5.52	2.23	9.60	43	19
	2010	6.01	0.00	15.92	89	21
	2011	3.72	1.30	6.96	47	14
	2012	5.37	1.40	9.93	49	19
	2013	6.78	2.36	12.81	48	20
	2014	14.24	6.68	24.58	38	20
Western scrub-jay	2005	4.04	1.94	6.67	36	15
	2006	6.41	2.74	11.17	41	24
	2007	5.48	2.09	9.97	44	21
	2008	5.42	1.16	11.34	61	20
	2009	3.14	0.55	6.50	59	10
	2010	4.00	1.38	7.63	49	13
	2011	5.02	1.99	8.79	41	18
	2012	4.49	1.92	7.98	43	14
	2013	5.91	2.28	10.75	44	16
	2014	8.52	3.03	16.62	49	11

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Western tanager	2005	2.00	0.42	4.25	60	7
	2006	5.23	2.85	8.15	34	19
	2007	1.91	0.27	4.19	63	7
	2008	3.03	0.95	5.88	49	11
	2009	0.96	0.27	2.07	60	3
	2010	4.22	1.69	8.15	51	13
	2011	2.38	0.66	4.54	50	8
	2012	3.20	1.53	5.83	40	10
	2013	1.15	0.00	2.63	69	3
	2014	1.62	0.00	4.78	102	2
Western wood-pewee	2005	4.19	1.97	6.89	38	27
	2006	5.11	1.80	9.09	46	33
	2007	5.34	1.72	9.95	49	34
	2008	4.73	1.17	9.40	58	31
	2009	4.90	1.61	9.27	51	28
	2010	2.39	0.37	4.91	58	14
	2011	2.76	1.22	4.70	40	16
	2012	3.46	0.90	6.51	51	19
	2013	4.74	1.52	8.94	51	22
	2014	7.25	3.61	11.92	36	16
White-throated swift	2005	32.18	18.58	48.09	29	107
	2006	51.68	28.60	79.23	29	131
	2007	64.97	36.84	95.56	27	191
	2008	37.89	18.89	62.90	36	89
	2009	16.68	7.63	27.02	35	79
	2010	11.90	4.41	22.18	45	53
	2011	17.53	7.24	29.15	37	50
	2012	15.67	6.70	26.26	39	47
	2013	18.61	6.66	32.76	44	35
	2014	18.52	7.93	29.65	36	19
Yellow-breasted chat	2005	6.15	0.89	16.11	83	37
	2006	7.75	1.51	17.59	69	51
	2007	6.36	0.82	15.28	75	42
	2008	4.93	1.55	9.11	48	32
	2009	7.77	3.26	13.46	41	43
	2010	8.89	3.50	15.86	43	50
	2011	7.55	1.97	14.87	56	45
	2012	10.53	2.75	21.61	58	56
	2013	11.54	3.02	22.71	54	55
	2014	6.94	0.77	15.29	66	16

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in low-elevation riparian habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Yellow-rumped warbler	2005	1.22	0.41	3.64	69	2
	2006	1.21	0.41	3.58	69	2
	2007	1.79	0.55	5.81	76	3
	2008	4.75	1.45	15.63	77	8
	2009	1.40	0.33	5.98	99	2
	2010	28.18	15.89	49.98	34	41
	2011	16.38	7.54	35.61	47	25
	2012	7.93	3.00	20.92	60	11
	2013	0.82	0.23	2.99	85	1
	2014	5.24	1.66	16.57	73	3
Yellow warbler	2005	60.12	25.86	139.81	41	131
	2006	60.94	25.12	147.82	43	135
	2007	50.32	19.93	127.08	45	113
	2008	63.54	27.71	145.71	40	142
	2009	121.76	53.33	277.99	40	220
	2010	95.10	46.70	193.63	34	179
	2011	63.71	26.18	155.06	43	127
	2012	98.09	43.69	220.23	39	172
	2013	80.35	36.02	179.23	39	130
	2014	118.93	63.42	223.03	30	81

Dashes indicate the sample size was insufficient for estimating density. Priority species are bolded.

3.1.1.2 Pinyon-juniper

We surveyed all 15 PJ transects one time in 2014. We estimated densities of 41 species, 22 of which were priority species, from 2005 to 2014. The 2014 data yielded robust density estimates (CV <50%) for 18 species and a moderately robust estimate (CV 50–75%) for nine additional species (Table 3-4). These 27 species represent 40% of all species and 82% of all individuals detected in PJ habitat.

The following ten species had the highest estimated densities in PJ in 2014 (listed in order from highest to lowest density):

1. Blue-gray gnatcatcher
2. Black-throated gray warbler
3. Juniper titmouse
4. Spotted towhee
5. Chipping sparrow
6. Bushtit
7. Gray flycatcher
8. House finch
9. Virginia's warbler
10. Violet-green swallow

The following 15 species had higher estimated densities in PJ compared to the other two habitats sampled in 2014 (listed in order from highest to lowest density):

1. Blue-gray gnatcatcher
2. Black-throated gray warbler
3. Juniper titmouse
4. Chipping sparrow
5. Bushtit
6. Gray flycatcher
7. Virginia's warbler
8. Gray vireo
9. Mountain chickadee
10. Black-throated sparrow
11. Pinyon jay
12. Western tanager
13. White-breasted nuthatch
14. Hermit thrush
15. Grace's warbler

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in pinyon-juniper habitat, Northern Colorado Plateau Network, 2005–2014.

Species	Year	D	LCL	UCL	%CV	n
American robin	2005	1.95	0.88	3.30	38	27
	2006	2.81	1.11	5.34	50	37
	2007	2.80	0.58	6.74	72	36
	2008	2.05	0.23	4.91	75	25
	2009	1.19	0.00	2.88	73	14
	2010	0.93	0.07	2.11	68	12
	2011	2.90	1.18	5.21	43	33
	2012	1.05	0.36	1.97	48	13
	2013	1.67	0.43	3.45	58	17
	2014	3.22	1.25	5.84	44	16
Ash-throated flycatcher	2005	9.14	6.80	11.80	17	122
	2006	9.96	6.75	13.42	20	130
	2007	9.50	5.95	13.13	23	125
	2008	9.70	6.21	13.52	23	120
	2009	9.48	6.28	12.58	20	109
	2010	6.75	4.74	9.05	19	87
	2011	7.63	5.74	9.84	17	89
	2012	6.36	4.16	8.67	21	76
	2013	8.72	5.81	12.02	22	86
	2014	12.52	8.73	17.24	21	62
Bewick's wren	2005	18.44	13.29	25.60	19	136
	2006	18.33	11.42	29.41	28	134
	2007	15.54	9.09	26.57	32	115
	2008	14.78	7.99	27.36	36	102
	2009	12.06	7.83	18.57	25	79
	2010	3.06	1.53	6.13	41	22
	2011	4.01	2.17	7.40	36	26
	2012	7.84	4.51	13.62	33	55
	2013	3.39	1.73	6.65	40	19
	2014	4.32	1.56	11.99	63	12
Black-chinned hummingbird	2005	30.05	8.71	57.85	52	9
	2006	40.90	9.81	82.45	55	12
	2007	43.23	8.07	87.87	57	13
	2008	10.19	0.00	23.80	75	3
	2009	57.90	31.07	99.56	36	16
	2010	45.14	9.55	91.74	56	13
	2011	15.12	5.55	27.96	48	4
	2012	36.39	14.02	76.87	54	10
	2013	21.80	7.18	42.11	49	5
	2014	8.80	0.00	27.68	110	1
Black-headed grosbeak	2005	0.37	0.00	0.99	84	4
	2006	1.08	0.00	2.64	78	12
	2007	1.25	0.00	3.39	91	15
	2008	0.66	0.00	1.69	84	7
	2009	1.09	0.09	2.74	80	12
	2010	0.63	0.00	1.81	99	7
	2011	1.52	0.64	2.44	36	15
	2012	1.24	0.10	2.62	63	13
	2013	1.57	0.10	3.32	66	13
	2014	1.41	0.00	3.63	85	6

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in pinyon-juniper habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Black-throated gray warbler	2005	103.28	53.92	197.81	41	264
	2006	82.14	58.91	114.54	20	346
	2007	87.11	60.35	125.74	22	319
	2008	56.65	41.47	77.41	18	338
	2009	100.23	69.82	143.88	22	348
	2010	49.21	35.36	68.47	20	259
	2011	41.03	31.00	54.30	16	294
	2012	60.66	42.12	87.38	22	269
	2013	38.87	24.03	62.86	29	117
	2014	42.65	26.06	69.82	30	89
Black-throated sparrow	2005	6.51	2.95	11.14	40	40
	2006	10.89	4.00	19.13	43	66
	2007	15.21	5.06	28.30	48	93
	2008	12.19	2.73	26.29	60	69
	2009	13.55	6.50	22.12	35	76
	2010	10.52	5.37	16.47	32	62
	2011	11.35	4.83	18.76	38	59
	2012	15.05	7.98	23.40	31	85
	2013	12.81	5.48	21.98	39	57
	2014	6.24	1.71	11.20	47	14
Blue-gray gnatcatcher	2005	69.93	48.76	95.17	21	128
	2006	50.74	29.79	75.61	27	93
	2007	69.82	48.32	94.64	20	127
	2008	59.37	36.18	88.06	27	99
	2009	138.23	108.41	174.74	14	220
	2010	79.00	54.94	105.95	20	140
	2011	87.87	68.91	108.15	14	141
	2012	77.56	57.44	99.68	17	131
	2013	81.54	53.72	113.49	22	114
	2014	138.28	102.86	176.98	16	91
Brown-headed cowbird	2005	4.76	1.92	8.08	40	15
	2006	3.95	1.15	7.71	50	12
	2007	4.94	1.46	9.69	53	15
	2008	3.42	0.83	6.73	56	10
	2009	5.85	2.41	9.95	39	17
	2010	2.31	0.00	6.27	90	7
	2011	2.61	0.65	5.10	56	7
	2012	6.05	2.75	10.51	40	18
	2013	5.05	1.12	10.54	58	12
	2014	1.81	0.00	5.23	99	2
Bushtit	2005	79.56	41.30	124.27	33	33
	2006	64.15	40.50	94.43	26	26
	2007	34.62	14.78	61.15	40	14
	2008	17.96	3.97	37.84	61	7
	2009	95.64	54.38	147.35	30	36
	2010	--	--	--	--	0
	2011	2.83	0.00	8.26	99	1
	2012	20.23	7.86	36.55	43	8
	2013	16.33	6.39	29.29	44	5
	2014	26.12	5.71	52.07	56	4

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in pinyon-juniper habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Canyon wren	2005	0.38	0.13	0.84	58	15
	2006	0.56	0.11	1.20	61	22
	2007	0.64	0.17	1.46	65	24
	2008	0.14	0.00	0.37	87	5
	2009	0.39	0.03	0.88	67	15
	2010	0.08	0.02	0.18	61	3
	2011	0.18	0.00	0.48	86	6
	2012	0.10	0.00	0.30	107	4
	2013	0.13	0.00	0.40	108	4
	2014	0.36	0.00	0.94	81	5
Chipping sparrow	2005	20.03	11.56	29.58	28	70
	2006	15.67	9.39	23.72	28	53
	2007	22.68	12.61	34.96	31	75
	2008	27.62	16.13	40.56	27	88
	2009	48.46	20.04	80.04	38	134
	2010	29.56	16.94	46.01	31	92
	2011	34.42	23.39	45.83	20	102
	2012	30.30	15.20	49.19	34	94
	2013	13.61	5.17	23.85	42	34
	2014	26.47	12.74	42.15	33	32
Common raven	2005	0.67	0.38	0.99	27	35
	2006	0.29	0.15	0.44	32	19
	2007	1.04	0.61	1.52	27	68
	2008	0.61	0.34	0.93	29	38
	2009	0.36	0.14	0.63	74	27
	2010	1.02	0.57	1.57	29	66
	2011	1.08	0.64	1.60	26	59
	2012	0.34	0.17	0.54	34	20
	2013	0.84	0.32	1.54	45	35
	2014	1.16	0.60	1.82	34	28
Dusky flycatcher	2005	2.58	0.79	8.45	76	12
	2006	7.65	3.16	18.52	54	35
	2007	6.09	2.21	16.79	63	28
	2008	9.33	3.29	26.50	65	40
	2009	3.31	1.10	9.97	69	14
	2010	3.59	1.11	11.57	75	16
	2011	3.23	1.19	8.77	62	13
	2012	5.97	2.55	13.94	51	26
	2013	7.18	2.36	21.82	70	25
	2014	6.96	2.28	21.23	70	12
Grace's warbler	2005	0.67	0.00	1.91	98	6
	2006	1.38	0.00	3.88	100	12
	2007	2.38	0.00	6.71	99	19
	2008	1.07	0.00	3.16	102	8
	2009	2.49	0.00	7.89	107	17
	2010	1.36	0.00	3.54	99	11
	2011	2.17	0.00	5.70	93	17
	2012	1.49	0.00	4.19	92	11
	2013	0.49	0.00	1.34	96	3
	2014	0.54	0.00	1.65	106	2

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in pinyon-juniper habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Gray flycatcher	2005	22.66	16.02	29.51	18	116
	2006	17.43	11.15	24.63	24	86
	2007	17.04	8.55	26.02	31	85
	2008	22.11	12.39	33.96	30	100
	2009	38.86	25.38	55.75	23	179
	2010	25.11	18.95	32.50	16	123
	2011	25.74	17.51	35.05	21	113
	2012	21.29	12.96	30.12	25	101
	2013	13.15	8.28	17.96	23	49
	2014	24.37	15.05	34.01	24	47
Gray vireo	2005	7.33	4.58	10.43	25	76
	2006	6.26	2.97	9.98	36	64
	2007	7.08	3.79	10.95	30	74
	2008	9.39	5.03	14.11	30	91
	2009	14.25	10.60	18.04	16	137
	2010	10.97	6.76	15.10	23	112
	2011	10.01	5.86	14.55	27	92
	2012	10.97	6.99	15.23	24	109
	2013	16.29	9.11	24.80	30	128
	2014	12.57	7.40	18.49	27	49
Green-tailed towhee	2005	2.11	0.79	3.82	44	15
	2006	0.89	0.00	2.28	79	6
	2007	3.61	0.00	9.65	89	26
	2008	1.72	0.22	3.93	72	11
	2009	0.78	0.00	2.01	84	5
	2010	0.46	0.12	0.92	57	3
	2011	2.45	0.24	5.74	74	15
	2012	1.31	0.12	3.30	78	8
	2013	1.34	0.17	2.90	64	7
	2014	0.77	0.00	2.15	93	2
Hermit thrush	2005	0.35	0.08	1.52	101	7
	2006	0.56	0.13	2.39	99	11
	2007	0.05	0.01	0.22	100	1
	2008	--	--	--	--	0
	2009	0.44	0.11	1.73	92	8
	2010	0.62	0.20	1.95	72	12
	2011	2.07	0.40	10.79	119	36
	2012	1.44	0.35	5.85	94	27
	2013	0.07	0.01	0.45	150	1
	2014	1.21	0.37	3.92	75	9
House finch	2005	14.28	8.87	20.69	26	94
	2006	8.81	4.15	14.40	35	69
	2007	18.33	10.77	26.17	26	146
	2008	16.61	9.85	25.25	28	128
	2009	19.19	9.77	29.39	32	136
	2010	13.01	8.10	18.46	24	101
	2011	21.79	14.11	29.50	21	148
	2012	17.28	11.21	24.92	24	113
	2013	18.77	10.39	27.24	27	108
	2014	24.20	13.31	37.64	31	59

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in pinyon-juniper habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Juniper titmouse	2005	18.58	12.45	25.54	22	74
	2006	16.12	9.65	23.22	26	68
	2007	17.69	9.00	27.98	34	75
	2008	20.62	12.13	29.46	26	85
	2009	47.50	32.32	63.97	21	186
	2010	32.84	21.72	44.91	22	138
	2011	26.49	15.20	39.60	28	99
	2012	21.75	15.48	28.88	19	86
	2013	26.16	16.00	37.57	25	78
	2014	31.92	19.97	46.05	25	40
Lark sparrow	2005	2.54	0.65	5.07	54	20
	2006	2.34	0.13	6.35	94	17
	2007	2.17	0.15	4.68	67	16
	2008	1.69	0.27	3.49	62	13
	2009	2.40	0.55	4.85	59	17
	2010	2.20	0.19	5.67	82	17
	2011	3.92	0.73	8.13	60	27
	2012	2.50	0.60	4.94	53	19
	2013	3.98	0.54	8.96	66	24
	2014	4.01	0.00	9.56	75	12
Lazuli bunting	2005	0.62	0.00	1.93	105	3
	2006	0.23	0.00	0.70	105	1
	2007	3.19	0.00	9.70	110	14
	2008	3.46	0.00	8.85	84	14
	2009	4.18	0.00	9.52	70	19
	2010	0.68	0.00	1.57	73	3
	2011	1.62	0.00	4.55	100	6
	2012	2.11	0.23	4.69	69	8
	2013	1.06	0.00	2.77	83	3
	2014	9.17	0.00	26.95	100	15
Mountain bluebird	2005	10.13	2.49	21.27	59	61
	2006	5.14	0.83	13.17	77	31
	2007	5.63	1.16	11.84	62	36
	2008	5.79	1.28	11.79	56	33
	2009	5.76	0.85	13.53	74	32
	2010	6.78	1.87	14.83	61	39
	2011	4.48	0.67	9.91	66	25
	2012	4.98	1.27	9.84	52	29
	2013	8.37	0.83	21.10	79	37
	2014	4.51	0.00	11.79	90	10
Mountain chickadee	2005	4.76	0.70	9.35	58	19
	2006	2.37	0.65	4.50	49	9
	2007	2.58	0.76	5.03	52	10
	2008	2.61	0.24	6.30	73	9
	2009	3.55	0.26	8.08	66	13
	2010	1.04	0.00	2.95	97	4
	2011	7.70	0.90	16.95	65	26
	2012	4.60	0.47	11.31	74	16
	2013	4.39	0.00	9.33	66	13
	2014	8.91	0.70	20.41	66	13

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in pinyon-juniper habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Mourning dove	2005	11.60	6.99	17.48	27	141
	2006	12.46	7.33	18.34	28	154
	2007	13.93	7.04	23.05	34	171
	2008	13.92	9.02	19.32	24	162
	2009	8.49	4.70	12.63	28	98
	2010	12.86	8.35	18.26	24	156
	2011	10.34	6.17	14.36	25	116
	2012	7.12	3.93	10.63	29	79
	2013	14.91	9.77	21.00	23	125
	2014	13.61	8.73	18.82	22	62
Northern flicker	2005	0.38	0.10	0.84	63	11
	2006	0.33	0.10	0.74	61	10
	2007	0.55	0.09	1.25	68	17
	2008	0.07	0.00	0.20	90	2
	2009	0.30	0.03	0.72	73	9
	2010	0.64	0.20	1.37	58	19
	2011	0.60	0.20	1.23	59	16
	2012	0.38	0.10	0.88	61	11
	2013	0.72	0.03	2.22	109	14
	2014	0.63	0.22	1.34	59	7
Pinyon jay	2005	2.73	1.13	4.77	42	38
	2006	4.57	2.02	7.80	38	64
	2007	6.52	3.37	9.76	30	90
	2008	1.75	0.75	2.85	38	22
	2009	3.19	1.68	4.94	31	41
	2010	7.19	3.64	11.47	33	96
	2011	2.76	0.84	5.19	50	33
	2012	2.09	1.03	3.26	33	27
	2013	3.88	1.59	7.14	44	41
	2014	3.49	1.72	5.47	33	18
Plumbeous vireo	2005	6.95	3.67	13.14	38	63
	2006	5.26	2.66	10.43	41	47
	2007	5.35	2.86	10.01	37	48
	2008	5.14	2.70	9.78	38	43
	2009	5.10	2.06	12.62	55	42
	2010	9.76	5.38	17.71	35	85
	2011	9.92	6.20	15.88	28	78
	2012	3.76	1.48	9.54	57	32
	2013	3.24	1.26	8.31	58	22
	2014	5.94	2.75	12.85	46	19
Rock wren	2005	4.66	2.81	6.75	26	85
	2006	4.70	2.67	7.10	30	86
	2007	4.79	2.87	7.10	27	87
	2008	6.12	3.26	9.54	32	102
	2009	6.31	3.38	9.70	31	99
	2010	2.62	1.35	4.13	32	46
	2011	5.49	3.42	7.87	26	88
	2012	1.49	0.72	2.40	34	26
	2013	4.41	2.10	6.94	33	59
	2014	2.72	1.60	4.09	28	17

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in pinyon-juniper habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Say's phoebe	2005	1.83	1.17	2.88	26	28
	2006	0.58	0.25	1.34	51	9
	2007	0.51	0.17	1.58	71	8
	2008	0.75	0.42	1.34	34	11
	2009	0.97	0.57	1.66	31	14
	2010	1.25	0.57	2.75	47	19
	2011	1.24	0.62	2.47	41	17
	2012	0.40	0.19	0.87	46	6
	2013	0.76	0.30	1.93	57	9
	2014	0.51	0.17	1.50	68	3
Spotted towhee	2005	14.19	7.78	20.93	29	82
	2006	12.03	4.99	20.23	38	69
	2007	19.77	8.34	33.76	39	113
	2008	8.76	3.41	15.29	41	47
	2009	19.17	8.88	31.86	37	99
	2010	13.68	5.98	22.83	37	74
	2011	23.61	11.18	38.92	36	115
	2012	19.85	8.49	33.39	38	104
	2013	22.78	9.52	37.32	37	99
	2014	27.99	11.35	45.90	38	61
Vesper sparrow	2005	0.54	0.00	1.41	85	9
	2006	0.96	0.00	2.29	79	15
	2007	0.97	0.00	2.49	84	15
	2008	0.40	0.00	1.04	85	6
	2009	0.96	0.06	2.51	91	13
	2010	1.31	0.00	3.39	81	20
	2011	1.70	0.00	5.09	102	25
	2012	1.48	0.00	3.43	74	23
	2013	1.94	0.00	5.24	94	26
	2014	0.95	0.00	2.75	98	6
Violet-green swallow	2005	10.74	4.71	18.34	38	32
	2006	16.21	4.57	29.69	49	48
	2007	19.52	5.74	37.15	49	58
	2008	14.28	5.86	24.86	41	40
	2009	11.45	6.10	17.30	29	31
	2010	10.30	4.00	18.20	45	29
	2011	8.13	4.51	12.44	30	21
	2012	15.95	9.45	23.85	28	45
	2013	10.61	4.39	19.55	44	24
	2014	13.98	4.79	25.95	48	15
Virginia's warbler	2005	10.31	3.96	18.81	45	53
	2006	6.84	0.72	14.92	66	35
	2007	5.51	0.93	11.53	63	27
	2008	5.09	1.32	10.00	52	24
	2009	4.41	0.74	9.05	60	20
	2010	10.65	3.28	19.44	47	48
	2011	11.44	2.26	24.58	65	50
	2012	10.08	1.80	22.44	65	46
	2013	5.99	0.99	11.74	56	22
	2014	16.66	0.00	42.21	86	31

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in pinyon-juniper habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Western meadowlark	2005	2.07	0.61	7.01	79	40
	2006	1.05	0.24	4.52	100	20
	2007	1.10	0.30	4.07	86	21
	2008	0.79	0.20	3.15	93	14
	2009	0.97	0.18	5.07	120	17
	2010	0.22	0.07	0.71	76	4
	2011	2.03	0.64	6.40	73	34
	2012	0.44	0.13	1.52	80	8
	2013	0.55	0.09	3.49	141	8
	2014	0.42	0.08	2.33	126	3
Western scrub-jay	2005	6.67	3.51	10.27	31	28
	2006	7.84	3.54	13.23	38	32
	2007	7.07	3.59	11.21	34	29
	2008	8.64	3.75	14.87	40	33
	2009	4.08	1.37	7.90	48	15
	2010	6.64	3.50	10.95	36	26
	2011	5.19	2.97	7.92	29	19
	2012	1.81	0.67	3.28	45	7
	2013	5.27	2.07	10.01	47	16
	2014	7.26	3.44	12.09	38	11
Western tanager	2005	1.19	0.28	2.35	55	16
	2006	1.76	0.76	2.96	39	23
	2007	2.23	0.65	4.10	47	29
	2008	1.37	0.08	3.26	74	17
	2009	0.63	0.08	1.30	60	8
	2010	1.38	0.13	3.29	73	17
	2011	1.74	0.18	3.54	59	20
	2012	3.06	0.33	6.25	59	38
	2013	1.38	0.00	2.95	66	13
	2014	3.12	0.00	8.75	97	15
White-breasted nuthatch	2005	2.67	0.34	5.60	67	15
	2006	2.74	0.71	6.05	65	14
	2007	4.56	0.71	12.86	84	22
	2008	1.86	0.18	4.31	75	9
	2009	1.63	0.17	3.82	72	8
	2010	2.31	0.16	5.91	89	12
	2011	2.40	0.19	5.24	67	11
	2012	4.20	0.27	9.38	68	21
	2013	3.31	0.55	7.70	68	13
	2014	2.90	0.41	7.02	78	6
White-throated swift	2005	13.51	5.89	23.05	40	72
	2006	16.36	5.71	30.26	46	84
	2007	18.30	9.64	28.20	32	97
	2008	14.05	5.54	23.90	42	67
	2009	7.92	4.00	13.04	35	38
	2010	5.15	2.32	9.01	41	26
	2011	6.63	3.46	10.91	35	30
	2012	11.15	5.55	17.91	34	55
	2013	7.38	2.66	14.49	49	28
	2014	9.52	0.45	21.22	68	19

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in pinyon-juniper habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Yellow-rumped warbler	2005	1.89	0.48	7.43	91	11
	2006	4.47	1.14	17.56	91	26
	2007	1.91	0.45	8.22	99	11
	2008	2.43	0.56	10.49	99	13
	2009	0.19	0.04	0.80	98	1
	2010	1.43	0.66	3.14	47	8
	2011	4.68	2.33	9.43	42	24
	2012	1.28	0.42	3.94	71	7
	2013	0.69	0.23	2.05	69	3
	2014	0.93	0.19	4.52	112	2

Dashes indicate the sample size was insufficient for estimating density. Priority species are bolded.

3.1.1.3 Sage shrubland

We surveyed all 15 SA transects once in 2014. We estimated densities of 41 species, 24 of which were priority species, from 2005 to 2014. The 2014 data yielded robust density estimates (CV <50%) for 19 species and a moderately robust estimate (CV 50–75%) for 15 additional species (Table 3-5). These 34 species represent 44% of all species and 95% of all individuals detected in SA habitat.

The following ten species had the highest estimated densities in SA in 2014 (listed in order from highest to lowest density):

1. Brewer's sparrow
2. Green-tailed towhee
3. Vesper sparrow
4. Cliff swallow
5. Broad-tailed hummingbird
6. Violet-green swallow
7. Lark sparrow
8. Blue-gray gnatcatcher
9. Dusky flycatcher
10. Spotted towhee

The following 15 species had higher estimated densities in SA compared to the other two habitats sampled in 2014 (listed in order from highest to lowest density):

1. Brewer's sparrow
2. Green-tailed towhee
3. Vesper sparrow
4. Cliff swallow
5. Lark sparrow
6. Dusky flycatcher
7. Mountain bluebird
8. Brown-headed cowbird
9. Western meadowlark
10. Rock wren
11. Horned lark
12. Black-billed magpie
13. Sage thrasher
14. Sage sparrow
15. Brewer's blackbird

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in sage shrubland habitat, Northern Colorado Plateau Network, 2005–2014.

Species	Year	D	LCL	UCL	%CV	n
American robin	2005	2.18	1.09	3.43	32	36
	2006	4.01	1.91	7.07	41	70
	2007	2.84	1.28	4.91	43	50
	2008	2.09	1.01	3.34	34	34
	2009	1.71	0.66	2.97	42	27
	2010	2.73	1.32	4.43	36	46
	2011	3.34	1.53	5.33	34	58
	2012	3.48	1.99	5.06	30	61
	2013	2.90	1.79	4.09	25	45
	2014	4.88	3.22	6.60	22	40
Ash-throated flycatcher	2005	0.89	0.22	1.73	55	12
	2006	0.68	0.18	1.40	58	9
	2007	1.11	0.14	2.59	77	14
	2008	0.82	0.15	1.70	59	10
	2009	0.18	0.00	0.55	107	2
	2010	0.82	0.20	1.60	58	11
	2011	0.79	0.20	1.58	55	10
	2012	0.75	0.17	1.46	56	10
	2013	1.27	0.08	2.79	69	15
	2014	1.33	0.14	2.91	67	8
Black-billed magpie	2005	2.47	0.92	4.48	47	64
	2006	2.66	1.53	3.93	28	93
	2007	1.53	0.81	2.31	30	49
	2008	1.32	0.57	2.18	38	45
	2009	0.94	0.29	1.80	52	31
	2010	1.36	0.65	2.32	37	51
	2011	1.79	0.71	3.09	42	60
	2012	1.37	0.56	2.26	38	54
	2013	1.73	0.92	2.69	32	45
	2014	3.77	2.02	5.77	30	50
Black-throated gray warbler	2005	2.66	0.70	5.17	52	25
	2006	1.33	0.26	2.75	56	13
	2007	1.42	0.08	3.28	71	13
	2008	1.92	0.30	3.96	61	18
	2009	3.73	0.82	7.14	52	33
	2010	1.58	0.41	2.99	51	15
	2011	2.33	0.36	4.70	56	22
	2012	1.06	0.19	2.33	62	10
	2013	0.11	0.00	0.34	106	1
	2014	--	--	--	--	0
Black-throated sparrow	2005	0.74	0.14	1.80	71	9
	2006	2.26	0.67	4.17	47	29
	2007	1.40	0.25	2.76	56	18
	2008	0.26	0.00	0.62	78	3
	2009	1.92	0.00	5.24	90	23
	2010	0.58	0.07	1.26	63	7
	2011	0.59	0.13	1.17	57	7
	2012	2.83	0.25	6.96	72	31
	2013	1.63	0.34	3.31	57	18
	2014	1.59	0.29	3.50	64	9

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in sage shrubland habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Blue-gray gnatcatcher	2005	9.22	3.60	16.43	45	29
	2006	5.34	2.75	8.55	34	17
	2007	3.80	1.31	6.79	46	12
	2008	13.90	8.05	21.09	29	41
	2009	13.12	4.92	24.14	46	36
	2010	14.18	7.77	21.56	31	44
	2011	10.07	4.52	16.50	37	32
	2012	10.97	4.42	19.91	44	35
	2013	12.17	5.70	19.34	35	34
	2014	10.86	4.65	18.57	40	16
Brewer's blackbird	2005	0.80	0.16	1.63	57	5
	2006	6.20	2.70	10.63	41	40
	2007	2.57	0.74	4.68	47	17
	2008	1.31	0.00	3.83	100	8
	2009	4.44	0.15	10.64	75	26
	2010	3.14	1.33	5.32	39	20
	2011	3.58	0.71	7.57	63	22
	2012	3.00	0.28	7.41	74	19
	2013	5.72	1.01	13.94	72	32
	2014	1.03	0.26	2.09	57	3
Brewer's sparrow	2005	104.06	66.29	146.34	24	461
	2006	77.78	43.97	119.81	31	497
	2007	67.77	42.53	98.74	25	436
	2008	59.62	35.48	84.49	26	368
	2009	104.31	61.38	150.96	26	551
	2010	73.65	53.54	96.27	18	542
	2011	62.48	38.12	108.22	35	529
	2012	65.10	46.48	85.01	18	397
	2013	109.87	69.51	157.79	24	471
	2014	143.09	79.80	208.72	28	287
Broad-tailed hummingbird	2005	7.70	1.29	16.12	59	22
	2006	6.60	1.68	13.69	55	21
	2007	7.13	1.14	17.29	70	22
	2008	11.72	3.00	25.52	59	28
	2009	5.18	0.75	12.12	69	13
	2010	3.87	1.43	6.96	42	11
	2011	2.16	0.78	3.98	46	6
	2012	4.40	2.04	7.09	36	13
	2013	15.58	3.41	30.68	53	40
	2014	22.49	4.26	47.14	61	30
Brown-headed cowbird	2005	0.84	0.28	1.61	50	5
	2006	4.22	2.12	7.16	37	26
	2007	1.98	0.68	3.80	47	12
	2008	2.67	1.15	4.42	38	15
	2009	1.47	0.32	3.06	58	8
	2010	1.01	0.16	2.08	59	6
	2011	2.15	0.84	3.62	40	13
	2012	3.11	1.25	5.65	43	19
	2013	2.50	0.40	5.83	70	14
	2014	5.66	2.18	9.81	41	16

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in sage shrubland habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Chipping sparrow	2005	5.05	2.38	8.16	36	31
	2006	8.12	3.90	12.74	34	52
	2007	7.51	2.81	13.89	46	47
	2008	7.23	1.35	13.88	52	43
	2009	7.03	2.58	12.24	42	39
	2010	15.27	8.16	24.76	33	94
	2011	8.10	3.62	13.25	36	50
	2012	11.48	5.15	18.75	35	72
	2013	7.70	3.00	13.30	42	43
	2014	9.25	4.13	15.46	37	27
Cliff swallow	2005	11.40	4.68	27.78	55	19
	2006	11.18	5.27	23.71	45	24
	2007	4.24	1.69	10.63	57	8
	2008	1.85	0.09	39.19	136	3
	2009	--	--	--	--	0
	2010	1.18	0.49	2.82	53	3
	2011	23.12	8.65	61.84	63	11
	2012	2.73	1.12	6.67	54	7
	2013	10.02	3.65	27.50	63	20
	2014	22.73	9.04	57.14	57	13
Common raven	2005	0.26	0.06	0.52	57	4
	2006	0.63	0.25	1.05	40	10
	2007	1.64	0.90	2.49	30	26
	2008	0.80	0.37	1.29	36	12
	2009	--	--	--	--	0
	2010	0.97	0.40	1.68	38	15
	2011	1.81	1.00	2.72	29	28
	2012	0.83	0.24	1.57	50	13
	2013	0.42	0.14	0.77	45	6
	2014	0.80	0.21	1.58	52	6
Dusky flycatcher	2005	2.98	1.04	8.51	66	30
	2006	5.16	2.23	11.95	51	53
	2007	5.45	2.34	12.70	51	55
	2008	7.09	3.15	15.94	49	68
	2009	8.08	3.47	18.80	51	74
	2010	6.65	3.25	13.63	43	67
	2011	6.75	3.58	12.69	38	67
	2012	5.42	2.79	10.55	40	55
	2013	11.00	4.82	25.11	50	100
	2014	10.84	4.82	24.41	49	51
Grace's warbler	2005	0.51	0.00	1.13	70	6
	2006	0.97	0.00	2.34	75	12
	2007	1.12	0.00	2.73	73	14
	2008	1.08	0.00	2.58	74	12
	2009	0.46	0.00	1.32	94	5
	2010	0.50	0.00	1.26	84	6
	2011	1.31	0.00	3.07	71	15
	2012	0.65	0.00	1.37	66	8
	2013	0.51	0.00	1.20	75	6
	2014	0.52	0.00	1.18	68	3

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in sage shrubland habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Gray flycatcher	2005	2.15	1.07	4.36	43	23
	2006	0.73	0.26	2.05	65	8
	2007	0.64	0.17	2.44	89	7
	2008	1.18	0.29	4.80	95	12
	2009	2.37	0.79	7.07	70	23
	2010	2.15	0.90	5.17	54	23
	2011	1.99	0.76	5.23	61	21
	2012	0.65	0.23	1.86	66	7
	2013	0.42	0.10	1.73	98	3
	2014	1.20	0.47	3.11	60	6
Green-tailed towhee	2005	33.96	18.51	51.87	30	279
	2006	48.34	23.33	80.26	36	401
	2007	35.39	18.74	56.21	33	293
	2008	30.05	15.78	45.87	32	236
	2009	33.41	15.34	54.74	36	251
	2010	22.65	12.69	34.39	30	189
	2011	36.12	18.64	55.18	31	292
	2012	56.42	31.01	84.76	30	467
	2013	51.39	26.24	79.66	31	380
	2014	64.77	31.84	101.82	33	253
Horned lark	2005	2.80	0.81	5.15	51	27
	2006	3.15	1.34	5.33	40	31
	2007	3.85	1.28	6.97	45	38
	2008	2.07	0.28	4.69	72	18
	2009	4.80	1.42	8.93	47	42
	2010	3.01	0.95	5.53	47	29
	2011	3.01	0.75	5.46	48	28
	2012	2.24	0.46	4.49	55	22
	2013	1.49	0.00	3.60	80	13
	2014	3.86	0.67	8.55	66	16
House finch	2005	0.31	0.08	0.62	54	3
	2006	5.17	2.85	7.80	30	52
	2007	2.96	0.98	5.75	51	29
	2008	3.28	1.67	5.11	32	31
	2009	4.99	0.86	10.97	66	44
	2010	1.96	1.00	3.05	32	19
	2011	1.85	0.82	2.99	35	18
	2012	3.60	1.99	5.47	29	35
	2013	2.37	1.08	3.94	36	21
	2014	3.74	1.66	6.41	39	17
House wren	2005	0.74	0.00	1.70	72	12
	2006	0.46	0.06	1.00	61	8
	2007	--	--	--	--	0
	2008	0.26	0.07	0.46	45	4
	2009	0.61	0.12	1.26	58	9
	2010	0.70	0.00	1.56	68	11
	2011	1.18	0.33	2.14	47	19
	2012	0.64	0.00	1.39	67	11
	2013	1.99	0.50	4.36	62	29
	2014	1.05	0.26	2.01	52	8

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in sage shrubland habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Lark sparrow	2005	9.26	3.05	16.91	46	83
	2006	9.85	3.65	16.58	39	91
	2007	6.64	1.84	12.47	49	61
	2008	2.80	0.66	5.39	52	24
	2009	13.23	2.54	26.00	54	111
	2010	8.02	2.63	13.89	42	72
	2011	10.58	3.67	18.23	42	97
	2012	12.21	5.47	20.03	38	109
	2013	12.63	3.04	25.03	55	101
	2014	14.43	5.17	26.20	44	59
Lazuli bunting	2005	0.86	0.11	1.94	67	7
	2006	0.59	0.12	1.15	55	5
	2007	0.49	0.00	1.18	78	4
	2008	--	--	--	--	0
	2009	9.76	1.20	22.51	68	73
	2010	4.56	1.15	8.53	48	38
	2011	2.38	0.46	4.67	54	20
	2012	3.08	0.94	6.31	55	24
	2013	1.24	0.24	2.56	59	9
	2014	0.53	0.00	1.57	100	2
Mountain bluebird	2005	5.81	3.28	8.77	28	61
	2006	7.17	4.79	9.92	22	80
	2007	7.36	3.92	11.32	31	81
	2008	6.61	4.46	8.96	21	65
	2009	6.66	3.02	11.51	40	53
	2010	7.06	4.78	9.69	21	75
	2011	7.42	4.24	11.45	29	62
	2012	6.41	3.65	10.17	31	68
	2013	7.17	3.74	10.72	30	66
	2014	10.37	6.74	14.73	23	45
Mourning dove	2005	2.37	1.15	3.76	35	55
	2006	4.20	2.65	5.82	23	101
	2007	2.60	1.11	4.37	39	63
	2008	3.02	1.22	5.35	44	69
	2009	3.00	1.23	5.19	41	61
	2010	3.71	1.51	6.30	38	89
	2011	2.37	1.42	3.43	27	56
	2012	1.72	0.88	2.68	32	41
	2013	5.45	3.67	7.51	22	104
	2014	4.19	2.08	7.06	35	45
Northern flicker	2005	0.93	0.47	1.50	34	14
	2006	1.57	0.79	2.54	34	24
	2007	0.92	0.40	1.56	39	14
	2008	0.41	0.12	0.74	47	6
	2009	1.18	0.38	2.18	49	16
	2010	1.60	0.91	2.47	30	24
	2011	1.66	0.92	2.59	31	25
	2012	1.98	0.95	3.26	37	31
	2013	1.26	0.67	1.95	31	17
	2014	0.86	0.12	1.89	63	6

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in sage shrubland habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Pinyon jay	2005	0.28	0.00	0.75	97	12
	2006	0.21	0.02	0.51	77	9
	2007	0.12	0.00	0.35	89	6
	2008	0.30	0.03	0.72	74	13
	2009	0.09	0.00	0.24	86	4
	2010	0.43	0.03	1.07	78	19
	2011	0.16	0.00	0.50	106	7
	2012	0.56	0.04	1.51	85	24
	2013	0.15	0.02	0.35	75	6
	2014	0.10	0.00	0.23	77	2
Plumbeous vireo	2005	0.75	0.15	1.58	57	11
	2006	0.62	0.21	1.14	47	9
	2007	0.42	0.06	1.02	72	6
	2008	0.14	0.00	0.34	71	2
	2009	1.24	0.15	2.79	68	16
	2010	1.44	0.35	3.12	62	20
	2011	0.57	0.19	1.06	47	8
	2012	0.60	0.12	1.20	55	9
	2013	1.39	0.38	2.60	48	18
	2014	1.47	0.45	2.75	48	10
Rock wren	2005	3.35	1.94	5.03	28	78
	2006	6.11	3.42	9.27	29	147
	2007	3.06	1.23	5.54	44	71
	2008	3.68	1.79	5.88	34	83
	2009	2.95	1.32	4.80	35	64
	2010	2.49	1.26	3.95	34	60
	2011	5.22	2.76	8.20	33	121
	2012	2.31	1.24	3.51	30	54
	2013	5.34	2.06	9.42	43	108
	2014	5.00	2.15	8.44	38	54
Sage sparrow	2005	2.55	0.27	6.05	68	29
	2006	2.13	0.09	4.99	73	24
	2007	2.52	0.00	6.01	73	29
	2008	1.84	0.00	5.24	91	19
	2009	2.15	0.10	5.08	71	22
	2010	0.26	0.00	0.56	67	3
	2011	1.49	0.19	3.17	64	17
	2012	0.78	0.17	1.55	54	9
	2013	0.29	0.08	0.59	54	3
	2014	1.70	0.00	4.14	77	9
Sage thrasher	2005	2.58	1.17	5.69	48	77
	2006	2.47	1.11	5.46	48	74
	2007	2.40	1.17	4.91	43	74
	2008	5.04	2.52	10.11	41	144
	2009	4.23	2.15	8.32	40	116
	2010	4.64	2.32	9.26	41	140
	2011	4.16	1.91	9.06	47	124
	2012	1.91	0.81	4.49	52	58
	2013	3.12	1.61	6.06	40	85
	2014	2.34	1.20	4.57	40	33

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in sage shrubland habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Say's phoebe	2005	0.67	0.24	1.21	46	10
	2006	0.91	0.48	1.49	34	14
	2007	0.47	0.16	0.89	46	7
	2008	1.04	0.20	2.38	71	15
	2009	1.09	0.23	2.24	59	15
	2010	1.30	0.38	2.40	50	19
	2011	2.06	1.02	3.42	36	31
	2012	0.76	0.26	1.46	50	11
	2013	1.30	0.55	2.28	41	18
	2014	0.99	0.26	2.00	55	7
Spotted towhee	2005	5.13	2.50	10.56	43	55
	2006	5.48	3.02	9.93	35	61
	2007	4.49	2.44	8.26	36	50
	2008	6.54	3.52	12.18	37	68
	2009	4.13	1.94	8.79	45	41
	2010	6.97	3.75	12.94	37	75
	2011	8.75	4.62	16.57	38	95
	2012	6.46	3.71	11.26	33	70
	2013	9.45	4.92	18.15	39	93
	2014	10.79	4.93	23.63	47	55
Vesper sparrow	2005	28.21	19.42	40.98	22	267
	2006	23.23	16.25	33.21	21	359
	2007	39.80	26.69	59.36	24	404
	2008	45.24	28.44	71.95	27	368
	2009	49.78	31.52	78.64	27	412
	2010	47.32	33.63	66.59	20	478
	2011	34.59	25.50	46.93	18	503
	2012	42.55	30.47	59.43	19	497
	2013	38.33	27.26	53.89	20	357
	2014	37.94	26.71	53.89	21	192
Violet-green swallow	2005	5.75	2.32	10.77	58	14
	2006	10.39	3.30	22.85	66	26
	2007	5.25	2.02	9.83	58	13
	2008	5.48	2.16	10.36	52	13
	2009	8.01	2.54	16.39	62	19
	2010	6.20	2.70	11.24	58	15
	2011	9.19	3.76	17.18	60	22
	2012	14.42	5.73	27.86	63	35
	2013	17.14	6.32	29.88	52	39
	2014	14.78	5.68	27.22	50	17
Virginia's warbler	2005	1.34	0.32	2.62	53	23
	2006	1.71	0.49	3.10	47	30
	2007	1.02	0.00	2.72	94	17
	2008	2.50	0.22	5.42	67	40
	2009	1.35	0.24	2.93	64	21
	2010	1.52	0.22	3.09	58	25
	2011	1.25	0.31	2.48	54	21
	2012	0.69	0.06	1.52	68	12
	2013	1.63	0.48	2.91	45	25
	2014	2.38	0.23	4.94	61	18

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in sage shrubland habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Warbling vireo	2005	1.22	0.15	2.76	68	17
	2006	0.71	0.15	1.41	54	10
	2007	1.52	0.06	3.48	69	22
	2008	0.15	0.00	0.46	101	2
	2009	0.23	0.00	0.54	71	3
	2010	0.65	0.14	1.30	54	9
	2011	1.18	0.18	2.41	58	16
	2012	0.88	0.22	1.84	59	12
	2013	0.73	0.15	1.58	60	9
	2014	1.65	0.63	2.76	39	11
Western meadowlark	2005	5.26	2.74	10.10	39	128
	2006	6.07	3.61	10.19	30	153
	2007	5.04	2.61	9.74	39	127
	2008	7.14	3.57	14.27	41	168
	2009	8.55	4.22	17.31	42	189
	2010	5.59	3.13	9.96	34	138
	2011	9.11	5.04	16.48	35	222
	2012	7.40	4.60	11.90	28	180
	2013	5.16	2.47	10.76	44	110
	2014	5.03	2.36	10.68	45	57
Western tanager	2005	0.59	0.03	1.28	150	13
	2006	0.80	0.03	1.90	263	15
	2007	0.90	0.08	2.01	76	23
	2008	1.06	0.00	2.45	276	19
	2009	0.80	0.09	1.69	87	18
	2010	0.60	0.07	1.37	116	13
	2011	0.19	0.03	0.37	177	4
	2012	0.36	0.00	0.77	165	8
	2013	0.98	0.03	2.03	178	19
	2014	0.20	0.00	0.42	186	2
White-throated swift	2005	1.35	0.00	3.84	101	4
	2006	3.54	1.09	8.30	68	11
	2007	3.68	1.21	7.21	55	12
	2008	5.47	0.54	16.06	108	14
	2009	2.07	0.25	4.94	71	6
	2010	3.50	1.13	7.65	61	11
	2011	--	--	--	--	0
	2012	6.03	1.43	13.02	62	20
	2013	1.73	0.33	4.00	70	5
	2014	1.32	0.00	3.98	114	2
Yellow warbler	2005	0.64	0.00	1.59	80	7
	2006	0.83	0.29	1.65	52	9
	2007	0.18	0.00	0.43	77	2
	2008	0.10	0.00	0.27	100	1
	2009	0.52	0.00	1.68	135	4
	2010	0.76	0.08	1.75	67	8
	2011	0.82	0.18	1.68	60	9
	2012	1.25	0.46	2.53	55	13
	2013	1.66	0.26	3.67	67	16
	2014	2.54	0.46	6.01	71	13

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits on D (LCL, UCL), percent coefficient of variation of estimates (% CV), and number of independent detections used in analyses (n) of breeding birds in sage shrubland habitat, Northern Colorado Plateau Network, 2005–2014, cont.

Species	Year	D	LCL	UCL	%CV	n
Yellow-rumped warbler	2005	1.14	0.10	2.39	60	9
	2006	2.37	0.00	5.10	65	19
	2007	1.50	0.24	3.08	58	12
	2008	1.35	0.26	2.80	59	11
	2009	0.98	0.11	2.22	70	7
	2010	0.37	0.00	1.09	102	3
	2011	1.58	0.23	3.36	61	13
	2012	1.65	0.00	3.92	74	13
	2013	2.42	0.92	4.37	45	17
	2014	0.20	0.00	0.68	125	1

Dashes indicate the sample size was insufficient for estimating density. Priority species are bolded.

3.2 Pipe Spring National Monument

We detected a total of 91 birds of 29 species in Pipe Spring NM in 2014 (Appendix A). We detected 40 birds of 19 species during point counts and 51 birds and 10 additional species during the nocturnal and diurnal area searches of the monument.

Since 2009, we have detected 1,462 birds of 63 species on the monument (Table 3-6). In 2014, we recorded five species that had not been recorded by RMBO in previous years at the monument: gray flycatcher, green-tailed towhee, house wren, MacGillivray's warbler, and pinyon jay. All five species are known to occur in the monument.

Table 3-6. Number of individuals observed by survey method and year, Pipe Spring National Monument.

Species	Number of individuals observed, 2009–2013*		Number of individuals observed, 2014		Total
	Point count	Area search	Point count	Area search	
American kestrel	4	8	-	1	13
American robin	3	-	-	-	3
Ash-throated flycatcher	21	13	3	1	38
Barn swallow	2	-	-	-	2
Bewick's wren	11	21	-	2	34
Black phoebe	6	14	-	1	21
Black-chinned hummingbird	2	-	-	-	2
Black-crowned night-heron	1	11	-	-	12
Black-headed grosbeak	4	1	2	3	10
Black-throated gray warbler	4	1	-	-	5
Black-throated sparrow	82	32	3	5	122
Blue grosbeak	4	4	-	-	8
Blue-gray gnatcatcher	2	1	2	-	5
Brewer's sparrow	2	-	-	-	2
Broad-tailed hummingbird	-	1	-	1	2
Brown-headed cowbird	14	14	-	2	30
Bullock's oriole	23	17	1	3	44
Canyon wren	2	-	-	-	2
Cassin's kingbird	47	27	5	6	85
Cliff swallow	-	1	-	-	1
Common poorwill	-	1	-	2	3
Common raven	31	13	3	3	50
Cooper's hawk	-	1	1	-	2
Downy woodpecker	1	-	-	-	1
Eurasian collared-dove	41	70	2	4	117
European starling	21	73	-	-	94
Gambel's quail	36	27	2	2	67
Gray flycatcher	-	-	1	1	2
Gray vireo	3	-	-	-	3
Great horned owl	-	1	-	-	1
Green-tailed towhee	-	-	1	-	1
Hairy woodpecker	-	1	-	-	1
House finch	83	67	4	5	159
House sparrow	8	52	-	-	60
House wren	-	-	1	-	1

Table 3-6. Number of individuals observed by survey method and year, Pipe Spring National Monument, cont.

Species	Number of individuals observed, 2009–2013*		Number of individuals observed, 2014		Total
	Point count	Area search	Point count	Area search	
Juniper titmouse	6	1	-	-	7
Lark sparrow	1	21	-	-	22
Lazuli bunting	-	5	-	1	6
Lesser goldfinch	10	8	-	-	18
MacGillivray's warbler	-	-	1	-	1
Mallard	-	1	-	-	1
Mallard (domestic)	-	8	-	2	10
Mourning dove	17	7	-	-	24
Northern mockingbird	27	4	-	-	31
Northern rough-winged swallow	9	1	-	2	12
Peregrine falcon	5	-	-	-	5
Pine siskin	2	24	-	-	26
Pinyon jay	-	-	1	-	1
Red-tailed hawk	-	1	-	-	1
Red-winged blackbird	1	-	-	-	1
Rock wren	18	1	-	-	19
Sage thrasher	1	-	-	-	1
Say's phoebe	17	15	2	-	34
Spotted towhee	6	-	-	-	6
Summer tanager	1	-	-	-	1
Violet-green swallow	13	43	-	-	56
Warbling vireo	-	3	-	-	3
Western kingbird	31	22	-	-	53
Western scrub-jay	2	5	-	1	8
Western tanager	1	4	1	-	6
White-crowned sparrow	10	27	-	-	37
White-throated swift	20	3	-	-	23
Yellow warbler	6	30	4	3	43
Yellow-rumped warbler	1	2	-	-	3
Total	663	708	40	51	1,462

*RMBO did not begin conducting area searches in PISP until 2011.

Priority species are bolded.

4 Discussion

The objective of NCPN landbird monitoring is to determine the population status and trends of breeding landbird species in low-elevation riparian, pinyon-juniper, and sage shrubland habitats in NCPN parks. In this report, we provide statistically rigorous density estimates for 2005–2014. For most species, each year of additional data will improve our ability to accurately estimate densities of the species that occupy the NCPN. With each year of additional data, RMBO is also able to provide density estimates for more species in each habitat. This year, we present density estimates for lazuli bunting in pinyon-juniper habitat and yellow warbler in sage shrubland habitat for the first time. The density estimates presented in this report replace the estimates provided in the 2005–2013 reports.

In 2014, a bug was discovered in the Distance (versions 6.0 and 6.1) program that caused an error in variance estimates for point transects. We used these versions of the program from 2009 through 2013. The bug has been fixed in version 6.2, which was used for analyses this year. The bug did not directly affect density estimates, but did affect the percent coefficient of variation (%CV) for density estimates. Because we rerun all years of data every year, %CVs presented in this report are correct for all years, and should be used to replace all estimates in previous reports.

It should be noted that while NCPN surveys are located within low-elevation riparian, pinyon-juniper, and sage shrubland habitats, each habitat includes components of other habitat types found within the NCPN. For example, the sage shrubland stratum includes components of cliff-rock, pinyon-juniper, Gambel oak, and other semidesert habitats. This accounts for the detection of some species that may seem out of place in a given habitat.

We provide density estimates for all species with more than 80 detections in a stratum, regardless of which habitat the birds may have been in when recorded. For example, we provide density estimates for Grace's warbler in sage shrubland, even though this species does not regularly occur in this habitat. All Grace's warblers detected during surveys in sage shrubland were recorded on two surveys located within thin strips of sagebrush surrounded by ponderosa pine forests. The Grace's warblers detected on these surveys were most likely located in the surrounding ponderosa

pine habitat and not within the narrow strips of sagebrush. We present these estimates because we believe it is useful for park managers to have this information, regardless of the habitat in which the species was detected.

From 2005 through 2013, we surveyed each transect location twice to increase the sample size. In 2014, the protocol was changed and each site was surveyed only once. This resulted in a decrease in the number of possible surveys from 92 to 46, and a decrease in the total number of individual points from 1,358 to 679. We estimate densities of species for which we obtain at least 80 independent detections within a habitat across all years. Therefore, the decrease in survey effort will not have an impact on the number of species for which we produce density estimates. However, a decrease in number of detections for a species in a given year due to decreased effort may impact the %CV for that species.

For the second consecutive year, we did not conduct trend analyses. Trend analyses were conducted from 2010 to 2012 for species of conservation or management concern for which we estimated densities. Separate analyses were performed for each habitat. We recommend conducting trend analyses again in 2016 or 2017. As additional years of data accumulate, trend analysis will become less sensitive to short-term fluctuations in population density and long-term trends underlying annual fluctuations will be revealed. Long-term monitoring will continue to be necessary for interpreting population status and trends for avian species of the NCPN.

From 1998 to 2007, RMBO, in conjunction with its partners, conducted landbird monitoring using a sampling design based on vegetation strata. The program, Monitoring Colorado's Birds, was one of the first attempts in the nation to develop and implement a statewide all-bird monitoring plan. The current NCPN monitoring effort was developed in 2005, and used the same sampling design as Monitoring Colorado's Birds, focusing on three primary habitats.

In 2008, RMBO and its partners designed a broad-scale monitoring program entitled Integrated Monitoring in Bird Conservation Regions (IMBCR) (Blakesley and Hanni 2009). RMBO developed this monitoring program to better address the recommendations of the NABCI monitoring subcommittee. The IMBCR program continues to grow, adding new partners and expanding its

geographic range. The NCPN may want to re-evaluate the feasibility and benefits of switching to the IMBCR design in future years, particularly as more surveys are completed within Utah using the IMBCR design. In 2014, we conducted surveys on four surveys in the Utah portion of the Manti-La Sal National Forest and were able to present population estimates for the entire forest for the first time. In 2015, the Intermountain Bird Observatory will expand this effort and conduct 50 surveys on the Manti-La Sal National Forest in Utah as part of the IMBCR program.

The IMBCR design better meets the goals of the NABCI monitoring subcommittee and provides several benefits when compared to the habitat-based sampling design:

1. The spatially balanced study design is more statistically rigorous,
2. Data are analyzed at a variety of spatial scales, allowing local population trends to be directly compared to regional trends, and
3. Strata are based on fixed attributes, allowing the relation of changes in bird populations to changes on the landscape through time since.

In 2014, we surveyed three NCPN transects as part of the IMBCR program. In larger parks, such as Dinosaur NM and Canyonlands NP, the NCPN can adopt this design in sage shrubland and pinyon-juniper ecotypes. Low-elevation riparian will require special consideration, as a 16-point grid may not adequately sample this habitat. In 2013, RMBO used a modified design to monitor bird populations along the Colorado and Dolores rivers, in eastern Utah. This modified design partitioned the 1-km² grid cells into four 0.25-km² quadrants containing four points each. We selected all grid cells that contained a minimum of two points within riparian vegetation in at least one quadrant (Birek et al. 2014). The NCPN may be able to use a similar design to sample riparian areas within national park units. In smaller parks, or parks with substantial amounts of inaccessible terrain, comparable alternative designs will be required. Transitioning NCPN monitoring to a grid-based design would allow the network to compare density estimates of species on their lands to those on surrounding landscapes surveyed by RMBO and its partners.

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Appendices

Appendix A. List of all bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2014, and yearly species totals from 2005 to 2014.

Species	# of individuals observed per habitat, 2014				# of individuals observed per year and total (all point-count surveys), 2005–2014										
	LR	PJ	SA	PISP*	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
American crow	-	-	-	-	12	1	2	4	2	2	-	-	4	-	27
American dipper	1	-	-	-	1	1	1	2	1	-	-	3	-	1	10
American goldfinch	-	-	-	-	14	5	9	7	9	35	13	18	4	-	114
American kestrel	3	2	7	-	10	10	11	9	10	13	20	19	14	12	128
American pipit	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
American robin	15	18	45	-	104	156	144	131	68	101	143	102	121	78	1,148
American wigeon	-	-	-	-	-	-	-	-	-	-	-	4	3	-	7
Ash-throated flycatcher	86	67	10	3	302	415	360	358	468	390	380	384	340	166	3,563
Bank swallow	-	-	-	-	-	-	2	1	-	1	-	-	-	-	4
Barn swallow	-	-	10	-	1	2	3	1	2	-	6	6	11	10	42
Belted kingfisher	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Bewick's wren	16	20	1	-	240	307	197	205	227	51	50	138	50	37	1,502
Black phoebe	11	-	-	-	12	16	30	13	35	9	7	28	13	11	174
Black-billed magpie	-	-	78	-	109	122	63	54	54	74	105	75	112	78	846
Black-capped chickadee	-	4	-	-	1	5	4	-	2	1	4	4	-	4	25
Black-chinned hummingbird	7	2	-	-	51	68	53	53	105	53	71	68	34	9	565
Black-chinned sparrow	-	-	-	-	9	6	4	-	14	4	3	-	1	-	41
Black-crowned night-heron	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Black-headed grosbeak	12	6	8	2	27	54	37	37	46	38	42	59	29	28	397
Black-throated gray warbler	27	105	-	-	397	552	458	567	647	425	511	435	185	132	4,309
Black-throated sparrow	16	30	10	3	114	178	194	151	367	190	238	250	161	59	1,902
Blue grosbeak	14	-	-	-	14	32	6	6	35	3	8	28	43	14	189
Blue-gray gnatcatcher	73	101	17	2	347	307	296	337	557	428	441	303	330	193	3,539
Blue-winged teal	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Bobolink	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Brewer's blackbird	-	-	8	-	10	56	29	10	38	42	41	31	49	8	314
Brewer's sparrow	-	4	334	-	599	641	600	538	722	664	687	476	540	338	5,805
Broad-tailed hummingbird	26	14	30	-	68	30	48	76	29	78	25	31	53	70	508
Brown creeper	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1

Appendix A. List of all bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2014, and yearly species totals from 2005 to 2014, cont.

Species	# of individuals observed per habitat, 2014				# of individuals observed per year and total (all point-count surveys), 2005–2014										
	LR	PJ	SA	PISP*	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Brown-headed cowbird	4	8	20		55	83	51	47	69	31	96	99	55	32	618
Bullock's oriole	3	-	2	1	7	35	19	13	22	34	27	25	9	6	197
Bushtit	-	15	-	-	190	140	53	30	95	11	1	29	70	15	634
California gull	-	-	-	-	13	3	-	-	-	-	-	1	-	-	17
Canada Goose	-	-	2	-	36	26	149	117	75	54	59	38	24	2	580
Canyon wren	12	5	-	-	52	105	70	37	59	7	18	26	17	17	408
Cassin's finch	-	2	3	-	4	39	14	14	2	4	18	12	16	5	128
Cassin's kingbird	-	4	-	5	-	2	-	-	25	-	6	13	17	9	72
Cedar waxwing	-	-	-	-	-	-	3	1	1	-	-	-	-	-	5
Chipping sparrow	12	58	36	-	156	155	196	218	287	286	289	252	110	106	2,055
Chukar	-	8	-	-	-	5	7	-	2	3	-	3	1	8	29
Clark's nutcracker	-	4	-	-	65	29	26	17	34	7	10	17	118	4	327
Cliff swallow	21	-	33	-	189	66	49	87	-	7	104	18	55	54	629
Common loon	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1
Common merganser	-	-	2	-	6	6	10	4	1	-	-	6	5	2	40
Common nighthawk	-	-	-	-	2	2	1	2	6	17	3	10	5	-	48
Common poorwill	-	-	-	-	1	1	1	-	-	2	-	1	-	-	6
Common raven	20	36	42	3	141	158	199	171	155	202	215	118	162	101	1,622
Common yellowthroat	8	-	-	-	13	30	29	9	34	17	23	30	21	8	214
Cooper's hawk	1	3	-	1	17	17	14	5	8	15	10	14	7	5	112
Cordilleran flycatcher	-	-	-	-	4	1	2	3	3	3	1	2	-	-	19
Dark-eyed Junco	-	5	-	-	40	19	47	35	4	3	8	2	6	5	169
Downy woodpecker	-	-	-	-	5	11	3	8	15	1	8	3	-	-	54
Dusky flycatcher	2	15	54	-	51	111	99	136	108	98	100	91	130	71	995
Dusky grouse	-	-	-	-	1	-	1	-	-	-	-	-	-	-	2
Eared grebe	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Eastern kingbird	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Eurasian collared-dove	-	-	-	2	-	-	1	-	-	19	4	8	12	2	46
European starling	-	-	-	-	15	21	11	17	-	37	22	20	1	-	144
Evening grosbeak	-	-	-	-	-	-	1	-	-	-	2	2	2	-	7
Ferruginous hawk	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1

Appendix A. List of all bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2014, and yearly species totals from 2005 to 2014, cont.

Species	# of individuals observed per habitat, 2014				# of individuals observed per year and total (all point-count surveys), 2005–2014										
	LR	PJ	SA	PISP*	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Gadwall	-	-	4	-	2	1	4	-	-	-	3	-	3	4	17
Gambel's quail	-	4	-	2	9	15	-	1	7	15	8	7	12	6	80
Golden eagle	-	-	4	-	8	10	4	6	1	-	-	7	-	4	40
Grace's warbler	-	2	4	-	15	31	40	31	26	19	33	23	11	6	235
Gray catbird	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Gray flycatcher	1	55	6	1	160	116	108	142	265	227	158	127	60	63	1,426
Gray vireo	-	53	-	-	137	128	104	150	254	163	121	155	182	53	1,447
Great blue heron	-	-	-	-	10	3	3	3	1	6	3	2	1	-	32
Great horned owl	-	-	1	-	3	-	-	1	-	1	-	1	-	1	7
Greater roadrunner	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Greater sage-grouse	-	-	4	-	19	2	1	-	-	-	-	5	-	4	31
Green-tailed towhee	1	3	260	1	350	463	364	302	330	220	385	526	414	265	3,619
Green-winged teal	-	-	-	-	-	1	-	-	-	-	-	-	2	-	3
Hairy woodpecker	2	-	-	-	13	21	22	17	28	21	20	30	23	2	197
Hammond's flycatcher	-	-	-	-	-	-	9	9	21	-	1	-	-	-	40
Hermit thrush	-	9	-	-	15	21	2	-	24	14	46	28	5	9	164
Horned lark	-	-	19	-	31	41	43	23	50	32	29	23	17	19	308
House finch	80	87	25	4	286	363	446	429	577	376	407	378	317	196	3,775
House sparrow	-	-	-	-	-	-	-	-	-	1	2	3	5	-	11
House wren	19	2	10	1	59	62	39	55	61	48	88	67	81	32	592
Indigo bunting	-	-	-	-	-	1	-	-	6	-	-	6	5	-	18
Juniper titmouse	9	55	-	-	147	120	138	159	277	198	154	125	129	64	1,511
Killdeer	-	-	1	-	4	3	2	3	5	1	-	2	5	1	26
Lark bunting	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Lark sparrow	15	15	67	-	140	157	104	51	181	151	159	159	187	97	1,386
Lazuli bunting	89	16	3	-	183	157	226	190	284	253	190	156	128	108	1,875
Lesser goldfinch	51	21	-	-	47	77	120	87	191	50	68	55	50	72	817
Lesser scaup	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
Lincoln's sparrow	-	-	-	-	1	-	-	2	1	-	-	-	1	-	5
Loggerhead shrike	-	-	-	-	3	1	-	1	-	5	-	2	3	-	15
Long-eared owl	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2

Appendix A. List of all bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2014, and yearly species totals from 2005 to 2014, cont.

Species	# of individuals observed per habitat, 2014				# of individuals observed per year and total (all point-count surveys), 2005–2014										
	LR	PJ	SA	PISP*	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Lucy's warbler	6	-	-	-	1	-	11	20	46	7	24	42	32	6	189
MacGillivray's warbler	-	-	5	1	3	9	3	4	7	11	-	3	2	6	48
Mallard	2	-	2	-	2	16	3	17	5	4	9	5	13	4	78
Marsh wren	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Mountain bluebird	1	18	77	-	160	138	179	116	145	151	156	131	142	96	1,414
Mountain chickadee	-	17	3	-	34	22	25	14	26	8	36	25	18	20	228
Mourning dove	79	85	53	-	426	573	520	402	283	441	344	219	513	217	3,938
Northern flicker	11	7	14	-	50	57	58	22	50	73	64	63	59	32	528
Northern goshawk	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Northern harrier	-	1	-	-	2	4	5	6	2	9	2	7	-	1	38
Northern mockingbird	-	4	-	-	-	25	11	17	38	32	23	34	15	4	199
Northern pintail	-	-	-	-	-	-	-	-	-	-	-	4	-	-	4
Northern rough-winged swallow	16	-	-	-	7	7	6	8	26	7	12	7	8	16	104
Northern shoveler	-	-	3	-	-	-	4	-	-	-	-	-	-	3	7
Olive-sided flycatcher	-	-	-	-	16	4	4	2	18	-	2	-	-	-	46
Orange-crowned warbler	4	-	2	-	2	2	2	2	-	2	3	3	3	6	25
Osprey	-	-	-	-	1	-	-	1	-	-	1	-	-	-	3
Peregrine falcon	-	3	1	-	5	5	7	10	3	8	5	2	12	4	61
Phainopepla	4	-	-	-	-	-	-	-	3	-	-	5	3	4	15
Pine siskin	2	-	1	-	4	22	4	17	16	18	71	12	34	3	201
Pinyon jay	3	51	2	1	122	177	229	74	97	327	112	153	144	57	1,492
Plumbeous vireo	17	21	10	-	147	165	139	131	150	216	158	84	88	48	1,326
Prairie falcon	-	-	3	-	2	-	-	2	1	1	3	-	1	3	13
Pygmy nuthatch	-	9	5	-	13	10	23	7	10	9	26	12	13	14	137
Red crossbill	-	-	-	-	1	23	11	-	23	6	3	9	11	-	87
Red-breasted nuthatch	-	-	-	-	11	5	7	1	2	1	5	-	9	-	41
Red-naped sapsucker	-	-	-	-	-	2	-	1	2	-	-	1	-	-	6
Red-tailed hawk	-	1	3	-	12	17	11	9	12	5	8	10	8	4	96
Red-winged blackbird	-	-	1	-	-	4	1	2	1	2	8	11	17	1	47
Ring-billed gull	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
Rock pigeon	-	-	-	-	2	5	3	-	-	3	3	6	-	-	22

Appendix A. List of all bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2014, and yearly species totals from 2005 to 2014, cont.

Species	# of individuals observed per habitat, 2014				# of individuals observed per year and total (all point-count surveys), 2005–2014										
	LR	PJ	SA	PISP*	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Rock wren	41	27	57	-	315	403	349	303	425	257	369	163	259	125	2,968
Ruby-crowned kinglet	-	3	-	-	4	4	3	9	11	10	7	8	2	3	61
Ruddy duck	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
Sage sparrow	-	-	10	-	43	33	31	21	41	10	18	12	9	10	228
Sage thrasher	-	1	37	-	93	95	88	156	128	150	132	60	100	38	1,040
Sandhill crane	-	-	-	-	-	1	-	2	1	-	-	1	-	-	5
Savannah sparrow	-	-	-	-	-	1	1	-	-	-	-	2	-	-	4
Say's phoebe	14	3	10	2	102	98	63	94	124	91	129	68	73	29	871
Scott's oriole	2	2	-	-	-	-	1	5	6	-	-	8	6	4	30
Sharp-shinned hawk	-	-	-	-	-	1	1	2	-	-	-	-	-	-	4
Short-eared owl	-	-	-	-	-	4	-	-	1	-	-	-	-	-	5
Song sparrow	29	-	2	-	62	76	69	62	39	10	45	29	20	31	443
Spotted sandpiper	3	-	1	-	1	2	7	-	3	8	-	-	2	4	27
Spotted towhee	183	78	62	-	432	610	500	405	541	548	624	537	626	323	5,146
Steller's jay	-	-	9	-	5	5	16	9	5	9	3	2	14	9	77
Summer tanager	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Swainson's thrush	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Townsend's solitaire	-	-	2	-	5	6	13	6	19	12	12	12	9	2	96
Tree swallow	-	1	3	-	3	40	28	102	5	2	88	1	4	4	277
Turkey vulture	1	8	2	-	25	30	29	9	19	24	22	31	12	11	212
Veery	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Vesper sparrow	1	8	228	-	381	495	489	472	483	609	675	571	446	237	4,858
Violet-green swallow	211	45	38	-	283	514	546	429	415	299	368	471	371	294	3,990
Virginia's warbler	9	34	19	-	122	109	102	161	46	123	100	110	72	62	1,007
Warbling vireo	23	12	13	-	44	58	67	51	39	32	35	45	43	48	462
Western bluebird	2	1	5	-	17	19	20	18	29	9	22	17	31	8	190
Western grebe	-	-	2	-	-	1	-	-	-	-	2	-	10	2	15
Western kingbird	7	-	3	-	2	5	2	6	28	23	12	20	23	10	131
Western meadowlark	-	5	61	-	229	239	182	213	282	227	312	267	184	66	2,201
Western screech-owl	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Western scrub-jay	20	20	6	-	117	90	80	85	59	88	78	58	81	46	782

Appendix A. List of all bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2014, and yearly species totals from 2005 to 2014, cont.

Species	# of individuals observed per habitat, 2014				# of individuals observed per year and total (all point-count surveys), 2005–2014										
	LR	PJ	SA	PISP*	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Western tanager	2	15	2	1	45	69	72	59	45	58	41	61	40	20	510
Western wood-pewee	16	1	9	-	40	44	64	44	56	28	25	30	37	26	394
White-breasted nuthatch	-	7	4	-	27	28	30	17	23	27	24	34	28	11	249
White-crowned sparrow	-	-	-	-	-	6	4	16	2	3	13	13	5	-	62
White-faced ibis	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
White-throated sparrow	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1
White-throated swift	90	72	8	-	573	676	815	514	363	295	389	380	225	170	4,400
Wild turkey	15	-	-	-	6	14	2	7	17	10	11	13	4	15	99
Williamson's sapsucker	-	-	-	-	1	-	1	1	-	-	-	2	1	-	6
Willow flycatcher	-	-	-	-	1	3	3	-	1	-	-	3	-	-	11
Wilson's warbler	4	-	-	-	-	4	-	3	3	6	1	2	-	4	23
Yellow warbler	111	1	16	4	158	175	155	182	292	259	193	283	191	132	2,020
Yellow-billed cuckoo	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Yellow-breasted chat	27	-	4	-	52	58	54	49	72	89	63	100	101	31	669
Yellow-rumped warbler	5	2	1	-	26	66	32	51	15	75	102	46	22	8	443
Total	1,620	1,421	1,960	40	9,387	11,201	10,574	9,642	11,640	9,994	10,693	9,497	8,785	5,041	96,454

*PISP Species numbers include point count data only.

Habitats: LR=Low-elevation Riparian; PJ=Pinyon-Juniper; SA=Sage Shrubland; PISP=Pipe Spring National Monument. Priority species are bolded.

Appendix B. All bird species observed during surveys in the Northern Colorado Plateau Network from 2005 to 2014, with species totals by park unit.

Species	Park unit												Total
	ARCH	BLCA	BRCA	CANY	CARE	COLM	CURE	DINO	FOBU	NABR	PISP	ZION	
American crow	1	1	3	3	-	7	8	2	-	1	-	1	27
American dipper	-	-	-	-	-	-	-	4	-	-	-	6	10
American goldfinch	23	3	1	11	4	1	2	63	1	1	-	4	114
American kestrel	11	2	31	4	1	1	31	35	8	-	4	-	128
American pipit	-	-	-	-	-	-	1	-	-	-	-	-	1
American robin	17	72	180	4	54	26	200	485	35	7	3	65	1,148
American wigeon	-	-	-	-	-	-	-	-	7	-	-	-	7
Ash-throated flycatcher	690	6	44	875	370	238	5	586	-	482	24	243	3,563
Bank swallow	-	-	-	-	-	-	2	1	-	-	-	1	4
Barn swallow	2	-	1	1	-	-	22	6	7	-	2	1	42
Belted kingfisher	-	-	-	-	-	-	-	-	-	-	-	1	1
Bewick's wren	149	20	3	456	277	182	3	156	-	162	11	83	1,502
Black phoebe	1	-	-	-	-	-	-	-	-	41	6	126	174
Black-billed magpie	-	204	8	-	1	-	256	202	175	-	-	-	846
Black-capped chickadee	10	4	5	-	-	-	-	-	-	4	-	2	25
Black-chinned hummingbird	62	6	8	149	52	68	7	74	-	54	2	83	565
Black-chinned sparrow	-	-	1	-	-	-	-	-	-	-	-	40	41
Black-crowned night-heron	-	-	-	-	-	-	-	-	-	-	1	-	1
Black-headed grosbeak	23	109	14	19	24	9	45	56	-	20	6	72	397
Black-throated gray warbler	142	295	77	551	601	359	-	1,679	-	466	4	135	4,309
Black-throated sparrow	338	-	-	456	553	47	9	323	-	14	85	77	1,902
Blue grosbeak	96	1	-	40	17	1	-	11	-	3	4	16	189
Blue-gray gnatcatcher	491	145	105	728	338	257	71	815	1	332	4	252	3,539
Blue-winged teal	-	-	-	-	-	-	-	-	1	-	-	-	1
Bobolink	-	-	-	-	-	-	-	1	-	-	-	-	1
Brewer's blackbird	1	-	14	-	-	4	84	27	180	-	-	4	314
Brewer's sparrow	10	586	179	20	37	3	2,320	1,435	1,211	-	2	2	5,805
Broad-tailed hummingbird	17	44	11	28	46	34	197	80	1	22	-	28	508
Brown creeper	-	-	1	-	-	-	-	-	-	-	-	-	1
Brown-headed cowbird	10	49	56	82	30	22	109	215	1	-	14	30	618
Bullock's oriole	59	-	1	21	5	-	15	60	-	4	24	8	197

Appendix B. All bird species observed during surveys in the Northern Colorado Plateau Network from 2005 to 2014, with species totals by park unit, cont.

Species	Park unit												Total
	ARCH	BLCA	BRCA	CANY	CARE	COLM	CURE	DINO	FOBU	NABR	PISP	ZION	
Bushtit	94	29	2	185	78	73	-	81	-	62	-	30	634
California gull	-	-	-	-	-	-	17	-	-	-	-	-	17
Canada goose	-	-	17	-	1	-	110	450	-	-	-	2	580
Canyon wren	33	3	1	39	34	54	-	50	-	103	2	89	408
Cassin's finch	1	29	48	11	1	2	9	24	-	1	-	2	128
Cassin's kingbird	-	-	-	3	-	-	-	-	-	-	52	17	72
Cedar waxwing	-	-	3	1	-	-	-	1	-	-	-	-	5
Chipping sparrow	45	105	273	56	153	122	80	1,051	1	29	-	140	2,055
Chukar	-	-	-	2	3	8	-	10	-	-	-	6	29
Clark's nutcracker	-	21	135	32	18	2	1	106	9	3	-	-	327
Cliff swallow	32	-	21	14	-	4	465	50	34	7	-	2	629
Common loon	-	-	-	-	-	-	1	-	-	-	-	-	1
Common merganser	-	-	-	-	-	-	22	4	-	-	-	14	40
Common nighthawk	1	1	-	1	18	2	3	20	-	2	-	-	48
Common poorwill	1	1	1	1	-	-	-	2	-	-	-	-	6
Common raven	183	34	63	120	85	121	197	582	29	142	34	32	1,622
Common yellowthroat	5	-	1	170	-	-	-	29	-	6	-	3	214
Cooper's hawk	32	7	1	15	8	6	3	37	-	1	1	1	112
Cordilleran flycatcher	1	2	1	7	2	-	-	1	-	4	-	1	19
Dark-eyed junco	1	6	108	4	30	3	-	2	-	8	-	7	169
Downy woodpecker	-	-	7	8	3	-	-	6	-	3	1	26	54
Dusky flycatcher	13	141	142	10	15	7	632	20	-	10	-	5	995
Dusky grouse	-	-	1	-	-	-	-	1	-	-	-	-	2
Eared grebe	-	-	-	-	-	-	1	-	-	-	-	-	1
Eastern kingbird	-	-	-	-	-	-	-	2	-	-	-	-	2
Eurasian collared-dove	-	-	-	-	2	1	-	-	-	-	43	-	46
European starling	30	-	-	-	-	-	15	76	2	-	21	-	144
Evening grosbeak	1	5	1	-	-	-	-	-	-	-	-	-	7
Ferruginous hawk	-	-	-	-	-	-	-	-	1	-	-	-	1
Gadwall	-	-	-	-	-	-	7	4	6	-	-	-	17
Gambel's quail	-	-	2	1	-	1	-	-	-	2	38	36	80
Golden eagle	2	3	1	-	6	6	12	7	1	-	-	2	40

Appendix B. All bird species observed during surveys in the Northern Colorado Plateau Network from 2005 to 2014, with species totals by park unit, cont.

Species	Park unit												Total
	ARCH	BLCA	BRCA	CANY	CARE	COLM	CURE	DINO	FOBU	NABR	PISP	ZION	
Grace's warbler	-	-	231	-	-	1	-	-	-	3	-	-	235
Gray catbird	1	-	-	-	-	-	-	-	-	-	-	-	1
Gray flycatcher	40	100	30	97	218	117	17	702	-	79	1	25	1,426
Gray vireo	184	-	3	242	221	272	3	299	-	91	3	129	1,447
Great blue heron	1	-	-	-	-	-	26	4	-	-	-	1	32
Great horned owl	-	-	-	3	1	-	1	2	-	-	-	-	7
Greater roadrunner	-	-	-	-	-	-	-	-	-	-	-	1	1
Greater sage-grouse	-	-	-	-	-	-	-	4	27	-	-	-	31
Green-tailed towhee	6	866	168	16	2	5	1,900	506	146	2	1	1	3,619
Green-winged teal	-	-	-	-	-	-	-	-	3	-	-	-	3
Hairy woodpecker	3	12	31	49	12	3	-	41	-	30	-	16	197
Hammond's flycatcher	-	-	18	1	14	-	-	7	-	-	-	-	40
Hermit thrush	1	136	16	4	1	1	1	2	-	2	-	-	164
Horned lark	6	10	15	-	-	-	87	23	167	-	-	-	308
House finch	483	21	97	859	527	578	139	565	5	258	87	156	3,775
House sparrow	-	-	-	-	-	-	3	-	-	-	8	-	11
House wren	10	42	3	2	3	1	96	203	2	8	1	221	592
Indigo bunting	4	-	-	1	2	-	1	-	-	-	-	10	18
Juniper titmouse	82	7	7	400	286	187	1	275	-	200	6	60	1,511
Killdeer	-	-	-	1	-	-	3	-	22	-	-	-	26
Lark bunting	-	-	-	-	-	-	-	2	-	-	-	-	2
Lark sparrow	28	1	8	42	15	-	24	1,239	4	-	1	24	1,386
Lazuli bunting	251	-	-	41	67	67	12	1,279	-	13	-	145	1,875
Lesser goldfinch	125	-	14	77	70	44	1	126	-	70	10	280	817
Lesser scaup	-	-	-	-	-	-	2	-	-	-	-	-	2
Lincoln's sparrow	-	-	-	-	-	2	-	3	-	-	-	-	5
Loggerhead shrike	3	-	-	-	1	-	2	7	2	-	-	-	15
Long-eared owl	1	-	-	1	-	-	-	-	-	-	-	-	2
Lucy's warbler	29	-	-	115	39	-	-	-	-	1	-	5	189
MacGillivray's warbler	6	4	-	9	-	4	17	1	-	6	1	-	48
Mallard	6	2	1	-	-	-	24	20	7	1	-	17	78
Marsh wren	-	-	-	-	-	-	1	-	-	-	-	-	1

Appendix B. All bird species observed during surveys in the Northern Colorado Plateau Network from 2005 to 2014, with species totals by park unit, cont.

Species	Park unit												Total
	ARCH	BLCA	BRCA	CANY	CARE	COLM	CURE	DINO	FOBU	NABR	PISP	ZION	
Mountain bluebird	14	92	285	7	28	9	266	666	39	7	-	1	1,414
Mountain chickadee	1	71	95	-	5	3	-	43	-	10	-	-	228
Mourning dove	586	117	118	358	344	448	173	1,469	48	89	17	171	3,938
Northern flicker	24	46	105	13	20	15	101	138	47	13	-	6	528
Northern goshawk	-	-	1	-	-	-	-	-	-	-	-	-	1
Northern harrier	1	-	1	-	-	-	5	14	17	-	-	-	38
Northern mockingbird	42	3	7	4	30	-	27	13	-	-	27	46	199
Northern pintail	-	-	-	-	-	-	-	-	4	-	-	-	4
Northern rough-winged swallow	4	-	-	-	6	1	8	19	-	-	9	57	104
Northern shoveler	-	-	-	-	-	-	2	5	-	-	-	-	7
Olive-sided flycatcher	-	4	36	-	4	1	-	-	-	-	-	1	46
Orange-crowned warbler	5	2	3	1	1	-	6	2	-	-	-	5	25
Osprey	-	-	-	-	-	1	1	1	-	-	-	-	3
Peregrine falcon	1	-	1	1	1	16	6	7	-	22	5	1	61
Phainopepla	-	-	-	-	-	-	-	-	-	-	-	15	15
Pine siskin	27	28	72	32	10	1	5	11	1	5	2	7	201
Pinyon jay	55	2	75	279	264	266	-	513	1	31	1	5	1,492
Plumbeous vireo	55	156	203	131	94	97	53	246	-	173	-	118	1,326
Prairie falcon	2	-	1	2	-	-	6	-	2	-	-	-	13
Pygmy nuthatch	-	-	137	-	-	-	-	-	-	-	-	-	137
Red crossbill	-	6	78	-	-	-	-	-	-	2	-	1	87
Red-breasted nuthatch	2	9	22	1	1	2	-	4	-	-	-	-	41
Red-naped sapsucker	-	1	-	3	-	-	-	1	-	-	-	1	6
Red-tailed hawk	8	4	15	7	1	9	13	30	4	3	-	2	96
Red-winged blackbird	-	-	-	-	-	-	6	29	11	-	1	-	47
Ring-billed gull	-	-	-	-	-	-	2	-	-	-	-	-	2
Rock pigeon	-	-	-	-	-	21	-	1	-	-	-	-	22
Rock wren	259	6	23	266	293	172	594	997	70	187	18	83	2,968
Ruby-crowned kinglet	4	29	11	2	1	7	-	3	-	4	-	-	61
Ruddy duck	-	-	-	-	-	-	2	-	-	-	-	-	2
Sage sparrow	-	-	-	1	-	-	13	214	-	-	-	-	228
Sage thrasher	1	9	39	-	-	-	562	44	384	-	1	-	1,040

Appendix B. All bird species observed during surveys in the Northern Colorado Plateau Network from 2005 to 2014, with species totals by park unit, cont.

Species	Park unit												Total
	ARCH	BLCA	BRCA	CANY	CARE	COLM	CURE	DINO	FOBU	NABR	PISP	ZION	
Sandhill crane	-	-	-	-	-	-	-	-	5	-	-	-	5
Savannah sparrow	-	-	-	-	-	-	-	1	3	-	-	-	4
Say's phoebe	172	15	19	123	103	27	74	253	5	42	19	19	871
Scott's oriole	5	-	-	-	13	-	-	1	-	-	-	11	30
Sharp-shinned hawk	-	-	-	-	1	-	2	1	-	-	-	-	4
Short-eared owl	-	-	-	-	-	-	-	4	1	-	-	-	5
Song sparrow	11	-	-	14	8	4	18	224	4	-	-	160	443
Spotted sandpiper	-	-	-	5	3	-	1	12	-	-	-	6	27
Spotted towhee	525	309	182	854	230	247	106	1,689	-	665	6	333	5,146
Steller's jay	-	2	65	-	-	-	8	1	-	-	-	1	77
Summer tanager	-	-	-	-	-	-	-	-	-	-	1	-	1
Swainson's thrush	-	1	-	-	-	-	-	-	-	-	-	-	1
Townsend's solitaire	-	7	64	-	5	-	8	9	-	3	-	-	96
Tree swallow	49	2	12	31	8	4	105	20	15	4	-	27	277
Turkey vulture	11	5	5	20	-	44	20	51	-	48	-	8	212
Veery	-	-	1	-	-	-	-	-	-	-	-	-	1
Vesper sparrow	1	679	836	1	1	-	856	1,326	1,158	-	-	-	4,858
Violet-green swallow	941	58	145	690	196	199	351	622	34	477	13	264	3,990
Virginia's warbler	34	237	95	82	21	108	203	63	-	146	-	18	1,007
Warbling vireo	43	6	26	21	11	27	97	97	-	6	-	128	462
Western bluebird	1	2	121	32	-	1	-	13	2	1	-	17	190
Western grebe	-	-	-	-	-	-	13	2	-	-	-	-	15
Western kingbird	14	-	9	6	11	-	6	22	-	-	31	32	131
Western meadowlark	33	20	325	-	-	-	127	1,091	579	-	-	26	2,201
Western screech-owl	-	-	-	1	-	-	-	-	-	-	-	-	1
Western scrub-jay	73	66	6	181	65	71	17	154	1	83	2	63	782
Western tanager	22	79	226	20	26	4	4	57	-	35	2	35	510
Western wood-pewee	17	3	78	66	17	1	21	10	-	25	-	156	394
White-breasted nuthatch	-	46	131	2	1	9	1	43	-	11	-	5	249
White-crowned sparrow	12	1	-	16	-	-	16	5	2	-	10	-	62
White-faced ibis	-	-	-	-	-	-	1	-	-	-	-	-	1
White-throated sparrow	1	-	-	-	-	-	-	-	-	-	-	-	1

Appendix B. All bird species observed during surveys in the Northern Colorado Plateau Network from 2005 to 2014, with species totals by park unit, cont.

Species	Park unit												Total
	ARCH	BLCA	BRCA	CANY	CARE	COLM	CURE	DINO	FOBU	NABR	PISP	ZION	
White-throated swift	1,085	294	27	373	261	627	110	433	-	759	20	411	4,400
Wild turkey	5	3	2	-	2	-	-	7	-	-	-	80	99
Williamson's sapsucker	-	-	6	-	-	-	-	-	-	-	-	-	6
Willow flycatcher	1	-	-	9	-	1	-	-	-	-	-	-	11
Wilson's warbler	9	-	-	7	-	-	-	5	-	1	-	1	23
Yellow warbler	48	-	1	100	21	3	70	1,162	-	71	10	534	2,020
Yellow-billed cuckoo	1	-	-	-	-	-	-	-	-	-	-	-	1
Yellow-breasted chat	53	-	-	63	18	-	-	499	-	1	-	35	669
Yellow-rumped warbler	52	11	201	45	38	4	10	47	-	10	1	24	443
Total	8,208	5,566	6,125	9,958	6,509	5,403	11,419	26,636	4,533	5,694	703	5,700	96,454

ARCH=Arches National Park, BLCA=Black Canyon of the Gunnison National Park, BRCA=Bryce Canyon National Park, CANY=Canyonlands National Park, CARE=Capitol Reef National Park, COLM=Colorado National Monument, CURE=Curecanti National Recreation Area, DINO=Dinosaur National Monument, FOBU=Fossil Butte National Monument, NABR=Natural Bridges National Monument, PISP=Pipe Spring National Monument, ZION=Zion National Park

Priority species are bolded.

Appendix C. Priority species observed on transects in the Northern Colorado Plateau Network from 2005 to 2014, with conservation and management designations and species totals per habitat.

Common name	Management designations						Total number of individual observed per habitat, 2005–2014 ⁵				
	State agencies		USFWS ³			Partners in Flight ⁴					
	CPW ¹	UDWR ²	BCR10	BCR16	Reg 6	PIF BCR10	PIF BCR16	LR	PJ	SA	PISP ⁶
American dipper	-	-	-	-	-	UCS,RS	-	10	-	-	-
American kestrel	-	-	-	-	-	RC	-	19	12	93	13
Bank swallow	-	-	-	-	-	CBSD	CBSD	1	1	2	-
Belted kingfisher	-	-	-	-	-	CBSD	CBSD	1	-	-	-
Bewick’s wren	-	-	-	-	BCC	-	-	572	888	31	34
Black-billed magpie	-	-	-	-	-	-	UCS	7	21	818	-
Black-chinned sparrow	-	-	-	-	-	-	UCC,CBSD	19	21	1	-
Black-throated gray warbler	-	-	-	-	-	-	RC	683	3,403	219	5
Bobolink	Tier II	WSC			-	UCC,CBSD	-	1	-	-	-
Brewer’s sparrow	Tier II	-	BCC	BCC	-	RC,CBSD	RC,CBSD	36	83	5,684	2
Broad-tailed hummingbird	-	-	-	-	-	-	UCS,RS	135	128	245	2
Cassin’s finch	Tier II	-	BCC	BCC	BCC	UCS,UCC,RC,RS,CBSD	UCC,RC,CBSD	8	73	47	-
Chipping sparrow	-	-	-	-	-	UCS,RC,RS	-	295	1,114	646	-
Clark’s nutcracker	-	-	-	-	-	UCS,RS	UCS,RC,RS	46	131	150	-
Common nighthawk	-	-	-	-	-	CBSD	RC,CBSD	2	36	10	-
Common poorwill	-	-	-	-	-	-	RC	1	3	2	3
Cooper’s hawk	-	-	-	-	-	-	UCS,RS	76	25	10	2
Cordilleran flycatcher	-	-	-	-	-	-	UCS,RS	15	4	-	-
Dusky flycatcher	-	-	-	-	-	UCS	-	35	261	699	-
Dusky grouse	-	-	-	-	-	UCS,RS	UCS,RS	-	-	2	-
Evening grosbeak	-	-	-	-	-	RC	-	1	2	4	-
Ferruginous hawk	Tier II,SC	WSC	BCC	BCC	BCC	RC	RC	-	-	1	-
Golden eagle	Tier I	-	-	BCC	BCC	-	RC	4	16	20	-
Grace’s warbler	Tier II	-	-	BCC	-	-	UCS,RS	3	129	103	-
Gray vireo	Tier II	-	-	BCC	BCC	-	UCC,UCS,RC,RS	205	1,172	67	3
Greater sage-grouse	Tier I,SC	FCS	-	-	-	UCC,UCS,TNC,RC,RS	TNC,UCC,RC	-	-	31	-

Appendix C. Priority species observed on transects in the Northern Colorado Plateau Network from 2005 to 2014, with conservation and management designations and species totals per habitat, cont.

Common name	Management designations							Total number of individual observed per habitat, 2005–2014 ⁵			
	State agencies		USFWS ³			Partners in Flight ⁴		LR	PJ	SA	PISP ⁶
	CPW ¹	UDWR ²	BCR10	BCR16	Reg 6	PIF BCR10	PIF BCR16				
Green-tailed towhee	-	-	-	-	-	-	UCS,RS	28	110	3,480	1
Hammond's flycatcher	-	-	-	-	-	UCS	-	1	34	5	-
Horned lark	-	-	-	-	-	CBSD	CBSD	-	6	302	-
Juniper titmouse	Tier II	-	-	BCC	-	-	UCS,RS	278	1,176	51	8
Lark bunting	Tier II	-	-	-	-	CBSD	-	2	-	-	-
Lazuli bunting	Tier II	-	-	-	-	UCS	UCS,RC,RS	1,542	101	232	6
Loggerhead shrike	Tier II	-	BCC	-	BCC	CBSD	RC,CBSD	1	6	8	-
MacGillivray's warbler	-	-	-	-	-	UCS	-	21	8	18	1
Mountain bluebird	-	-	-	-	-	UCS	UCS,RC,RS	59	490	865	-
Mountain chickadee	-	-	-	-	-	UCS	-	15	171	42	-
Northern flicker	-	-	-	-	-	UCS,CBSD	UCS,RS,CBSD	97	132	299	-
Northern goshawk	Tier II	CAS	-	-	-	UCS,RS	-	-	-	1	-
Northern harrier	Tier II	-	-	-	-	-	-	10	1	27	-
Olive-sided flycatcher	Tier II	-	BCC	-	-	TNC,UCC,RC	TNC,UCC,RC	1	10	35	-
Peregrine falcon	Tier II,SC	-	BCC	BCC	BCC	-	-	29	19	8	5
Pine siskin	-	-	-	-	-	UCS,RS,CBSD	UCS,RS,CBSD	58	69	72	25
Pinyon jay	Tier II	-	-	BCC	BCC	TNC,UCC,RC	TNC,UCC,RC,UCS,RS	70	1,105	316	1
Plumbeous vireo	-	-	-	-	-	-	UCS,RS	615	575	136	-
Prairie falcon	Tier II	-	-	BCC	BCC	-	RC	4	-	9	-
Pygmy nuthatch	-	-	-	-	-	-	UCS,RS	-	72	65	-
Red-breasted nuthatch	-	-	-	-	-	UCS	-	1	22	18	-
Red-naped sapsucker	-	-	-	-	-	UCS,RC	-	5	-	1	-
Rock wren	-	-	-	-	-	CBSD	UCS,RS,CBSD	998	926	1,026	19
Ruby-crowned kinglet	-	-	-	-	-	UCS	-	11	40	10	-

Appendix C. Priority species observed on transects in the Northern Colorado Plateau Network from 2005 to 2014, with conservation and management designations and species totals per habitat, cont.

Common name	Management designations							Total number of individual observed per habitat, 2005–2014 ⁵			
	State agencies		USFWS ³			Partners in Flight ⁴					
	CPW ¹	UDWR ²	BCR10	BCR16	Reg 6	PIF BCR10	PIF BCR16	LR	PJ	SA	PISP ⁶
Sage sparrow	Tier II	-	BCC	-	BCC	RC	RC	3	-	225	-
Sage thrasher	-	-	BCC	-	BCC	-	-	-	2	1,037	1
Sandhill crane	Tier I,SC	-	-	-	-	-	-	-	-	5	-
Say's phoebe	-	-	-	-	-	-	UCS	498	168	186	35
Short-eared owl	Tier II	WSC	-	-	BCC	RC,CBSD	-	-	-	5	-
Swainson's thrush	-	-	-	-	-	UCS	-	-	1	-	-
Townsend's solitaire	-	-	-	-	-	UCS,RS	-	5	57	34	-
Tree swallow	-	-	-	-	-	UCS	-	121	23	133	-
Veery	Tier II	-	-	BCC	-	-	-	-	-	1	-
Vesper sparrow	-	-	-	-	-	RC	-	7	194	4,657	-
Violet-green swallow	-	-	-	-	-	-	UCS	2,793	655	529	56
Virginia's warbler	Tier II	-	-	-	-	-	UCC,UCS,RS	329	428	250	-
Warbling vireo	-	-	-	-	-	UCS	UCS	287	51	124	3
White-faced ibis	Tier II	-	-	-	-	-	-	-	-	1	-
Williamson's sapsucker	-	-	BCC	-	-	UCS,RS	UCS,RS	-	1	5	-
Willow flycatcher	Tier I, FES,SE	FES	BCC	BCC	BCC	UCS,RS	-	10	1	-	-
Wilson's warbler	-	-	-	-	-	CBSD	CBSD	23	-	-	-
Yellow-billed cuckoo	Tier I,SC	FCS	BCC	BCC	-	-	-	1	-	-	-

¹ CPW=Colorado Parks and Wildlife, FES=Federally Endangered Species, SC=State Special Concern, SE=State Endangered (Colorado Parks and Wildlife 2008)

² UDWR=Utah Division of Wildlife Resources, FCS=Federal Candidate Species, FES=Federally Endangered Species, CAS=Conservation Agreement Species, WSC=Wildlife Species of Concern (Utah Division of Wildlife Resources 2011)

³ USFWS=U.S. Fish and Wildlife Service, BCR10=Bird Conservation Region 10 (Northern Rockies), BCR 16=Bird Conservation Region 16 (Southern Rockies/Colorado Plateau), BCC=Bird of Conservation Concern (USFWS 2008)

⁴ Partners In Flight, BCR10=Bird Conservation Region 10, BCR 16=Bird Conservation Region 16, CBSD=Common Bird in Steep Decline, RC=Regional Concern Species, RS=Regional Stewardship Species, TNC=Tri-National Concern Species, UCC=U.S.-Canada Concern Species, UCS=U.S.-Canada Stewardship Species (Partners in Flight 2012)

⁵ LR=low-elevation riparian, PJ=pinyon-juniper, SA=sage shrubland

⁶ PISP=Pipe Spring National Monument. Numbers for PISP include point-count data only.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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