National Park Service
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Natural Resource Stewardship and Science

Landbird Monitoring in the Northern Colorado Plateau Network

2012 Field Season

Natural Resource Technical Report NPS/NCPN/NRTR—2013/765

ON THE COVER

Clockwise from top: Zion National Park, by Chris White (used with permission); American wigeons (©Robert Shantz); black-chinned hummingbird (©Robert Shantz).

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June 2013

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

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Please cite this publication as:

McLaren, M. F., and J. A. Blakesley. 2013. Landbird monitoring in the Northern Colorado Plateau Network: 2012 field season. Natural Resource Technical Report NPS/NCPN/NRTR—2013/765. National Park Service, Fort Collins, Colorado.

NPS 960/121303, June 2013

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Executive Summary

In 2012, the Rocky Mountain Bird Observatory (RMBO), in cooperation with the National Park Service, completed its eighth 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 parks of the Northern Colorado Plateau Network (NCPN). 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. The program is also consistent with goals emphasized by the U.S. North American Bird Conservation Initiative Monitoring Subcommittee (2007).

In 2012, RMBO biologists surveyed 45 transects twice within 11 NCPN units. Fifteen transects were located in each of three habitats of interest: low-elevation riparian, pinyon-juniper, and sage shrubland. To increase sample size, we surveyed all transects twice during the breeding season. In addition to the habitat-based surveys, we conducted four point counts and four area searches twice at Pipe Spring National Monument using a modified monitoring design.

In 2012, we completed 100% of the assigned habitat-based surveys between May 5 and July 4. We recorded a total of 9,411 birds of 124 species. We detected 3,021 birds of 82 species in low-elevation riparian, 2,862 birds of 76 species in pinyon-juniper, and 3,528 birds of 94 species in sage shrubland habitats. We recorded two new species (American wigeon and northern pintail), both at Fossil Butte National Monument.

At Pipe Spring National Monument, we detected a total of 328 birds of 31 species. We detected 86 birds of 18 species during point counts and 242 birds and 13 additional species during nocturnal and diurnal area searches.

We estimated densities of 58 species in at least one habitat. In 2012, we were able to estimate densities of four species for which we were not able to provide estimates in previous years, due to the increased number of detections over all years. The data yielded robust density estimates (coefficient of variation <50%) for 37 species in at least one habitat in 2012. We recorded 42 bird species that are of conservation or management concern throughout the NCPN and estimated densities for 24 of these species.

We estimated population trends for the 24 species of conservation or management concern for which we estimated densities. Separate analyses were performed for each habitat. Significant trends were evident for 10 species. Seven species exhibited declines in population density, one species exhibited an increase, and two species exhibited an increase in population density in early years, followed by a decrease in later years. 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.

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

ADC	Avian Data Center
AIC	Akaike's Information Criterion
AICc	Akaike's Information Criterion corrected
AOU	American Ornithologists' Union
BCR	Bird Conservation Region
CI	confidence interval
CV	coefficient of variation
GPS	global positioning system
LR	low-elevation riparian
M	meters
NABCI	U.S. North American Bird Conservation Initiative
NAD	North American Datum
NCPN	Northern Colorado Plateau Network
NM	national monument
NP	national park
NPS	National Park Service
NRA	national recreation area
PIF	Partners in Flight
PISP	Pipe Spring National Monument
PJ	pinyon-juniper
RMBO	Rocky Mountain Bird Observatory
SA	sage shrubland
UTM	Universal Transverse Mercator

Acknowledgements

The National Park Service funded this project through a cooperative agreement with the Rocky Mountain Bird Observatory. This report fulfills requirements in Rocky Mountain Bird Observatory's contracts with the National Park Service, Northern Colorado Plateau Network agreement number P11AT10625/RMBCP-17.

We thank Dusty Perkins of the National Park Service for logistical assistance before, during, and after the field season. We thank the superintendents, resource managers, and biologists in the individual parks for providing us with research permits, allowing access into the backcountry of the parks, and assisting with logistics. We thank Aneth Wight for creating maps of the park units with survey locations. Thank you to our 2012 crew of field biologists—Glenn Giroir, Carl Ingwell, and Kathy Brodhead—who spent many weeks in the field, sometimes under difficult conditions. We thank Michael Getzy for his work on the RMBO database and data entry and management system and RMBO staff for their careful review of this report.

1 Introduction

1.1 Program history

In 2012, the Rocky Mountain Bird Observatory (RMBO), in cooperation with the National Park Service (NPS), completed the eighth 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.

In addition to monitoring landbird populations, this program also supports the NCPN's efforts to develop long-term natural resource monitoring plans for its park units. Modeled after our Colorado habitat-based monitoring program (Leukering et al. 2000), the NCPN program is consistent with goals emphasized by the U.S. North American Bird Conservation Initiative Committee (USNABCIMS 2007). We also sampled Pipe Spring National Monument (PISP), Arizona, for the fourth year using a modified monitoring design.

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 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 at regional and continental levels, and the loss, fragmentation, and degradation of native habitats, highlight the need for extensive and rigorous landbird monitoring programs (Rich et al. 2004; USNABCIC 2009). Population monitoring helps to achieve the intent of legislation such as the Migratory Bird Treaty Act (1918), National Environmental Policy Act (1969), Endangered Species Act (1973), National Forest Management Act (1976) and various state laws (Manley 1993; Sauer 1993).

1.3 Monitoring objectives

The NCPN/RMBO program uses the Partners in Flight (PIF) plan (Rich et. al. 2004) as a guideline 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 that could provide consistent scientific evaluations of conservation status across all bird 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.

The NCPN/RMBO 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. After establishing this monitoring framework, we anticipate these data will prompt additional research to determine possible reasons for observed changes and enable better-informed management decisions.

RMBO maintains a high-quality online database of raw and summarized data that is accessible to collaborators and the public. We will use these data to generate decision support tools, such as population estimate models, to help guide conservation efforts and provide a better measure of conservation success.

2 Methods

2.1 Study area

In 2005, the NPS selected three habitats in which to implement landbird monitoring in the NCPN: 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 and are associated with park management questions. During the spring and summer of 2005, RMBO staff established 45 transect locations (15 in each habitat, Figures 2-1, 2-2, 2-3; figures start on page 6). In 2009, we added four point-count locations and four area inventories at Pipe Spring National Monument (Figure 2-4).

2.1.1 Low-elevation riparian

Low-elevation riparian habitat comprises mostly scattered 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, is an exotic species that has invaded much of the LR habitat of the western United States. While the NPS is working to eradicate tamarisk in many of its park units, it is still fairly common in this habitat type.

2.1.2 Pinyon-juniper

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

2.1.3 Sage shrubland

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

2.1.4 Pipe Spring National Monument

There are four point-count stations in a mixture of pinyon-juniper, low-elevation riparian, and semidesert shrubland habitats at Pipe Spring National Monument (NM). Semidesert shrubland habitats are dry landscapes that contain shrubs but lack a co-dominant grass component. Dominant shrubs may include sagebrush, greasewood, barberry, and saltbush. The ground cover layer is typically dominated by bare ground and rock, with limited forbs and grasses present.

2.2 Field personnel

RMBO field staff in 2012 consisted of three experienced biologists with excellent aural and visual bird-identification skills. All three had surveyed for RMBO in past years. The field staff completed a seven-day training program at the beginning of the season to ensure full understanding of the field protocol.

2.3 Site selection

The NPS and RMBO selected survey sites during the winter of 2005. For PJ and SA habitats, we used GIS and the Southwest Regional Re-GAP Analysis Project (Lowry et al. 2005) to randomly select sites from a pool of habitat "stands" that were large enough to accommodate transects. We excluded areas with >50% slope from the list of potential sites to ensure that selected stands could be accessed safely 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. We have surveyed these same locations every season since 2005.

Point-count and area-search locations at Pipe Spring NM were placed in each distinct habitat represented in the monument as pre-

viously described, with locations spaced at least 250 m apart. Area-search start locations were selected in order to efficiently cover all areas of the park.

2.4 Sampling design

We sampled landbird populations in each habitat following the protocol established by Leukering (rev. 2005) and modified by Hanni and others (2011). We surveyed all transects between one-half hour before sunrise and five hours after sunrise. We conducted up to 15 five-minute point counts at stations located at 250-m intervals along each transect. To increase our sample size, we surveyed each of the 45 transect locations twice during the summer; each visit was on a separate day. At each point, we recorded all birds detected during the five-minute point count. For every bird detected during a point count, we recorded species, sex, horizontal distance from the observer, the minute we detected each bird, type of detection (e.g., call, song, or visual), and if the bird was believed to be a migrant.

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 immediately 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 (e.g., flocks or pairs of conspecific birds together in close proximity) to be part of a "cluster," rather than separate independent observations.

At the start and end of each transect, we recorded time, temperature, percent cloud cover, and precipitation type, and estimated the Beaufort scale wind-speed category. We navigated between points using handheld global positioning system (GPS) units. All GPS data were recorded in Universal Transverse Mercator (UTM) North American Datum 1983 (NAD 83). At each point, we recorded GPS accuracy, start time, and habitat information (within a 50-m radius). For habitat information, we recorded structural stage as well as types, relative abundance, percent coverage, and mean height of trees, shrubs, and groundcover. Additional information recorded included 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.

At Pipe Spring NM, the point-count portion of surveys used the protocol described above. Beginning in 2011, we conducted two area searches at each of four locations within the park each year. We conducted six diurnal area searches upon completion of the point counts, and two nocturnal area searches beginning at dusk. During area searches, the observer continuously walked throughout the monument, tallying all individual birds heard and seen and recording information about any breeding or flocking behavior.

2.5 Data analysis

2.5.1 Distance 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, all of which are reasonably well-met by the protocol associated with this program (Hanni et al. 2012): (1) all birds at and near the sampling location (distance = 0) are detected; (2) distances of birds are measured accurately; and (3) birds do not move in response to the observer's presence. 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 (e.g., for birds, size, color, movement, volume of song or call, and frequency of call), the surrounding environment (e.g., density of vegetation), and observer ability.

We used the analysis software Distance 6.0 (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 immediately surrounding landscape and birds detected between points from analyses. We fit a half-normal key function, uniform function, and 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 (AIC) corrected for small sample size (AICc) and model-selection theory to select the most parsimonious detection function for each species (Burnham and Anderson 2002). We estimated variance in Distance using bootstrapping of transects within strata rather than using empirical estimates, which 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 (AOU) Checklist of North American Birds, Seventh Edition (AOU 2007).

2.5.2 Trend detection

We modeled observed trends in populations of all species of conservation concern (Appendix B) in each habitat using data from all years (2005–2012). We used weighted regression and Information-Theoretic model selection (Burnham and Anderson 2002). For each species, we modeled four different functions using Proc REG in program SAS (SAS Institute 2007): no trend (intercept only model), linear trend, quadratic trend, and log-linear (pseudo-threshold) trend. We used AICc to select the most parsimonious trend for each species (Burnham and Anderson 2002). Input data were density estimates and their coefficients of variation (CV; CV = the standard error of an estimate divided by the estimate), with the inverse of the CV used as a variable weight (giving more weight to more precise estimates). Note that in 2011, the Utah Division of Wildlife updated its sensitive species list. Species selected for trend analyses are based on this updated list.

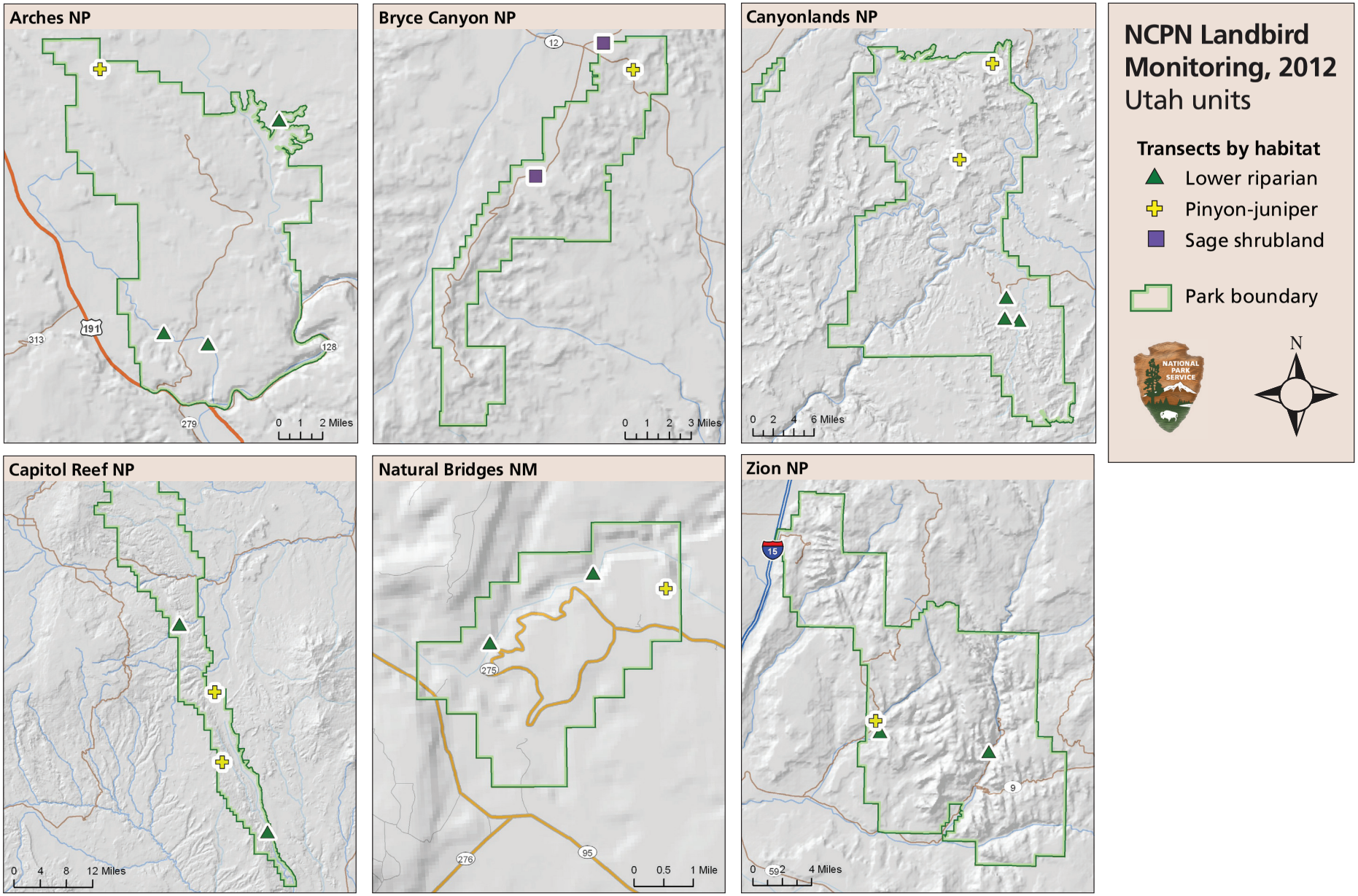


Figure 2-1. Transect locations by habitat, Utah units.

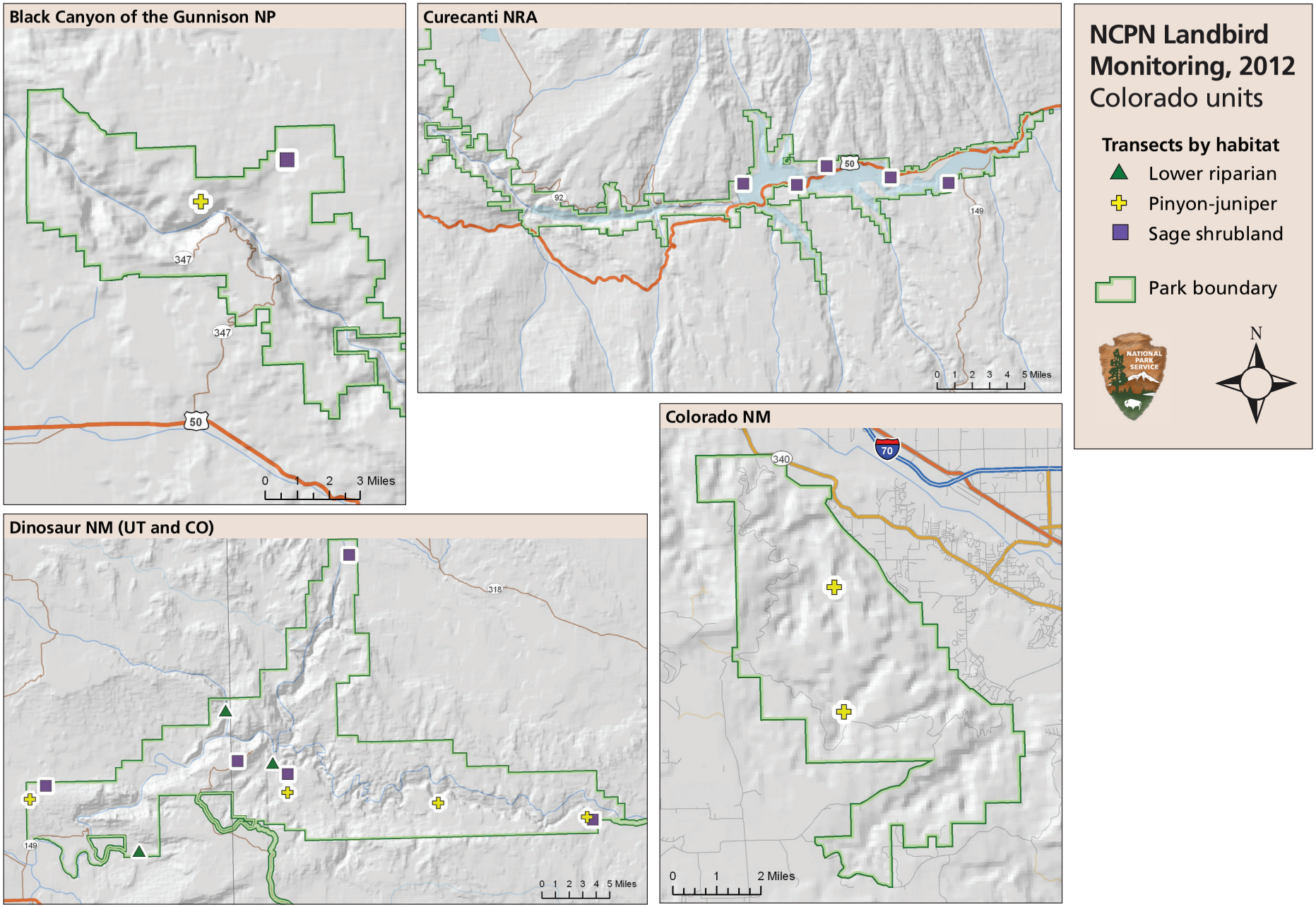


Figure 2-2. Transect locations by habitat, Colorado units.

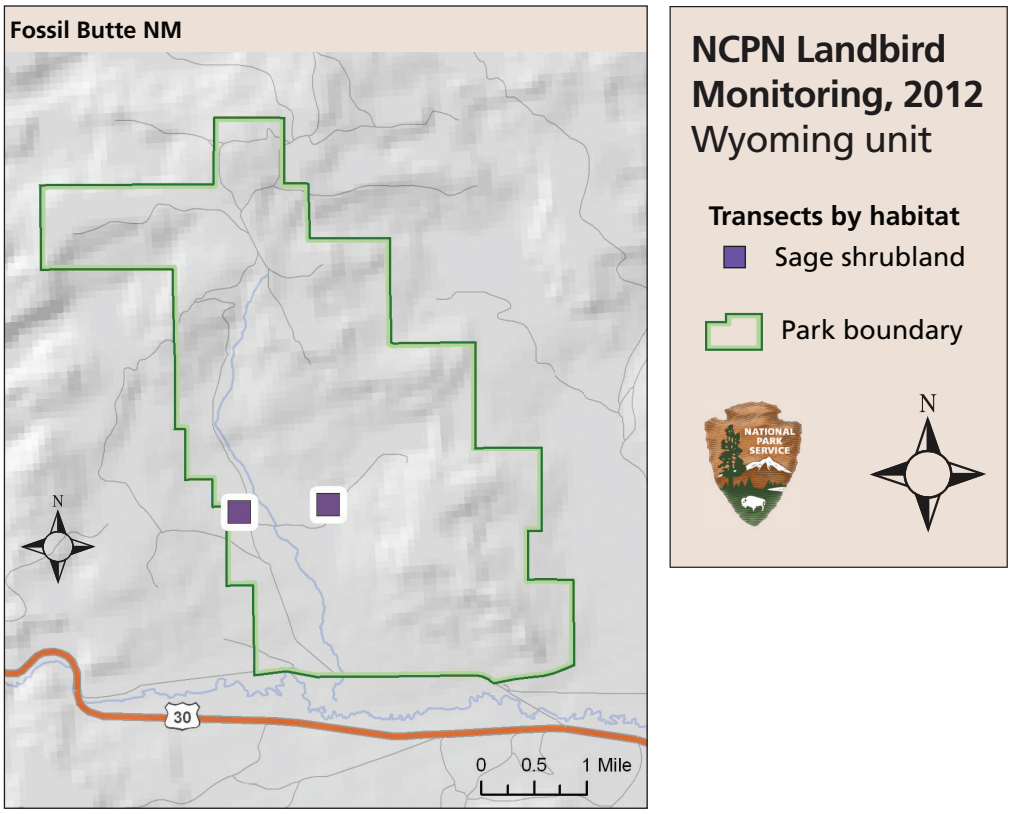


Figure 2-3. Transect locations, Fossil Butte National Monument.

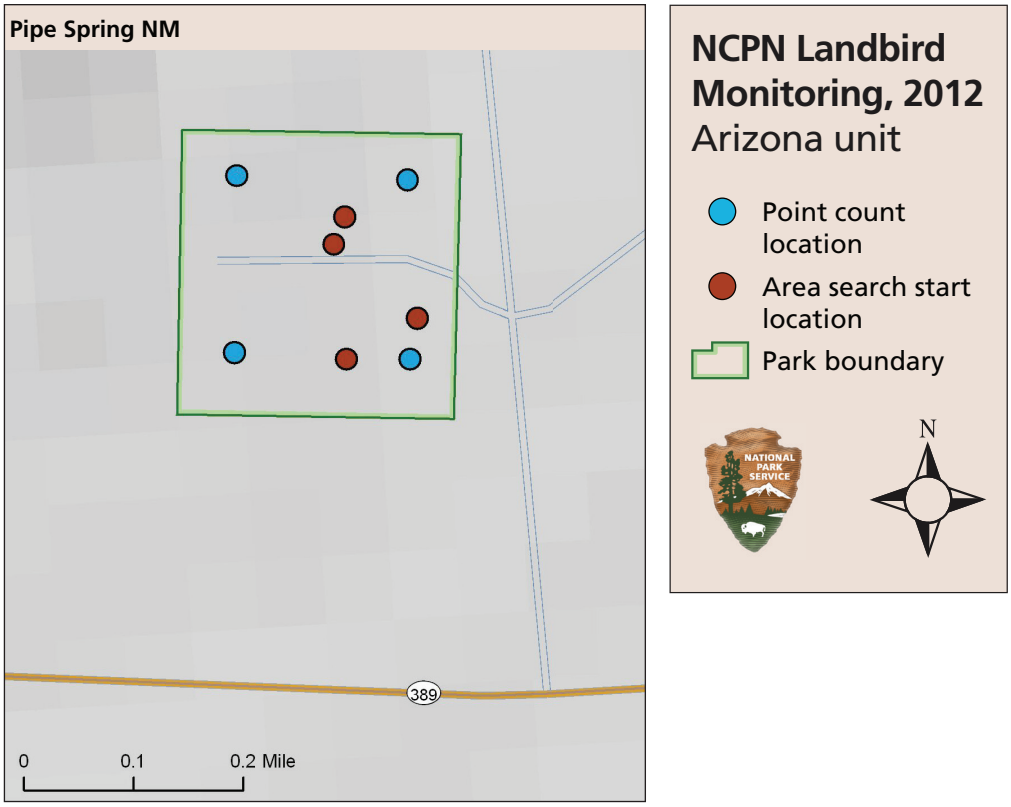


Figure 2-4. Point-count and area-inventory locations, Pipe Spring National Monument.

3 Results

In 2012, the eighth year of RMBO landbird monitoring in the NCPN, we conducted 1,237 point counts along 45 transects (all transect locations were surveyed twice) in three habitat types between May 5 and July 4 (Table 3-1). Ninety-two percent of all point-count locations were surveyed in 2012 (1,237 out of 1,350). Reasons why points were not surveyed included unsuitable weather (52 points), poor GPS reception along the canyons of the low-elevation riparian transects (23 points), running out of time (e.g., more than 5 hours after sunrise or decreased bird activity; 27 points), and rivers that could not be safely crossed or created too much background noise to conduct the survey (11 points).

We recorded 9,411 birds of 124 species during habitat-based point counts (Table 3-2, Appendix A). We detected 3,021 birds of 82 species in low-elevation riparian, 2,862 birds of 76 species in pinyon-juniper, and 3,528 birds of 94 species in sage shrubland habitat. Two new species, American wigeon and northern pintail, were recorded at Fossil Butte National Monument on May 22.

We detected 328 birds of 31 species during surveys in Pipe Spring National Monument. We detected 86 birds of 18 species during point counts and 242 birds and 13 additional species during the nocturnal and diurnal area searches of the monument. Four species (American kestrel, black-headed grosbeak, hairy woodpecker, and warbling vireo) were new to RMBO surveys but not new species for the park.

We estimated densities of 58 species in at least one habitat in 2012. Those 58 species represented 48% of species detected on transects in the NCPN during 2012 and 95% of birds observed on transects during 2012. The habitat-stratified data yielded robust density estimates (CV <50%) for 37 species in at least one habitat in 2012.

Table 3-1. Bird sampling periods and effort in each habitat in the Northern Colorado Plateau Network, 2012.

Habitat	Dates sampled	# transects*	# point counts
Low-elevation riparian	May 5–June 30	15	371
Pinyon-juniper	May 7–June 29	15	422
Sage shrubland	May 14–July 4	15	444
All habitats	**May 5–July 4**	**45**	**1,237**

*Technicians surveyed all transect locations twice.

Table 3-2. Bird totals and averages by habitat in the Northern Colorado Plateau Network, 2012.

Habitat	# birds detected	Avg. # birds per transect	# species detected	Avg. # species per transect
Low-elevation riparian	3,021	101	82	21
Pinyon-juniper	2,862	95	76	20
Sage shrubland	3,528	118	94	22
All habitats	**9,411**	**105**	**124**	**21**

RMBO recorded 42 bird species that are of conservation and management concern (priority species) throughout the NCPN (Appendix B). We estimated densities of 24 of these species.

3.1 Density estimates

3.1.1 Low-elevation riparian

We surveyed all 15 LR transects two times each in 2012. We estimated densities of 39 species, of which 14 were priority species, from 2005 to 2012. The 2012 data yielded robust density estimates (CV <50%) for 22 species and a moderately robust estimate (CV=50–75%) for 11 additional species (Table 3-3). These 33 species represented 40% of all species detected and 89% of all individuals detected in LR habitat.

The following 10 species had the highest estimated densities of species recorded in LR in 2012 (listed in order from highest to lowest):

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

The following 30 species had higher estimated densities in LR than in the other two habitats sampled in 2012 (listed in order from highest to lowest):

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

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN low-elevation riparian habitat, 2005–2012.

Species	Year	D	LCL	UCL	%CV	n
American robin	2005	6.08	2.00	11.87	50	14
	2006	6.19	2.38	11.30	47	15
	2007	7.78	3.24	13.78	41	19
	2008	9.13	4.07	15.43	38	23
	2009	--	--	--	--	4
	2010	5.39	0.37	11.91	67	12
	2011	--	--	--	--	4
	2012	5.16	1.07	11.56	63	10
Ash-throated flycatcher	2005	14.63	9.87	19.49	20	152
	2006	22.37	16.45	28.36	16	235
	2007	19.45	14.18	24.89	17	204
	2008	17.90	12.61	23.19	19	191
	2009	15.74	11.18	20.49	18	132
	2010	20.74	14.17	27.88	20	187
	2011	20.70	14.22	27.45	20	199
	2012	19.77	14.31	25.41	17	166
Bewick's wren	**2005**	**6.97**	**2.69**	**12.05**	**42**	**44**
	2006	**15.73**	**7.12**	**24.61**	**35**	**100**
	2007	**8.65**	**2.96**	**15.01**	**43**	**56**
	2008	**8.72**	**3.43**	**14.91**	**41**	**57**
	2009	**15.47**	**7.07**	**24.73**	**35**	**85**
	2010	**3.69**	**1.52**	**6.23**	**38**	**20**
	2011	**2.40**	**0.88**	**4.07**	**40**	**14**
	2012	**10.04**	**4.14**	**16.08**	**37**	**54**
Black phoebe	2005	4.98	0.00	12.33	80	10
	2006	4.70	0.37	11.97	81	10
	2007	8.76	0.64	23.27	83	18
	2008	--	--	--	--	9
	2009	9.51	0.00	19.75	62	19
	2010	--	--	--	--	2
	2011	--	--	--	--	2
	2012	5.81	1.30	12.24	62	10
Black-chinned hummingbird	2005	138.83	68.53	226.52	36	28
	2006	167.43	80.11	280.28	38	35
	2007	100.24	50.28	164.43	36	22
	2008	106.38	54.55	169.12	34	23
	2009	123.19	56.81	214.34	38	23
	2010	74.27	36.97	124.46	37	14
	2011	90.05	44.85	150.11	36	18
	2012	137.23	68.31	228.99	36	23

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN low-elevation riparian habitat, 2005–2012, cont.

Species	Year	D	LCL	UCL	%CV	n
Black-headed grosbeak	2005	3.42	0.37	8.25	81	11
	2006	6.50	3.13	10.47	36	22
	2007	3.62	1.12	6.90	48	12
	2008	4.91	2.05	8.12	38	17
	2009	6.16	0.89	12.54	60	17
	2010	--	--	--	--	9
	2011	3.89	1.55	6.69	41	12
	2012	5.62	2.69	8.91	34	16
Black-throated gray warbler	**2005**	**6.74**	**2.93**	**11.41**	**40**	**38**
	2006	**13.13**	**7.56**	**19.97**	**29**	**76**
	2007	**9.43**	**6.14**	**13.20**	**23**	**54**
	2008	**18.55**	**8.54**	**31.10**	**37**	**106**
	2009	**9.48**	**3.01**	**18.95**	**52**	**45**
	2010	**10.44**	**5.90**	**15.73**	**29**	**52**
	2011	**13.76**	**7.25**	**22.05**	**34**	**70**
	2012	**10.15**	**4.82**	**16.23**	**34**	**48**
Black-throated sparrow	2005	5.68	1.49	10.40	48	43
	2006	6.38	2.55	10.97	40	49
	2007	7.58	1.72	16.07	61	58
	2008	8.69	3.05	15.53	43	66
	2009	20.25	7.16	38.38	49	130
	2010	8.53	3.00	14.94	42	56
	2011	12.08	4.92	20.73	41	85
	2012	11.93	4.43	20.01	40	77
Blue-gray gnatcatcher	2005	48.75	35.32	63.39	18	103
	2006	64.43	42.56	88.06	22	142
	2007	48.88	34.18	65.99	19	109
	2008	56.66	34.82	81.01	25	127
	2009	128.53	89.14	168.80	19	223
	2010	83.46	59.75	109.05	18	162
	2011	88.31	67.32	110.15	15	180
	2012	52.53	33.70	71.04	22	90
Brown-headed cowbird	2005	--	--	--	--	7
	2006	11.28	5.09	19.72	42	24
	2007	7.81	2.38	14.95	51	17
	2008	6.45	2.36	11.68	44	14
	2009	8.06	2.07	16.80	58	15
	2010	--	--	--	--	5
	2011	10.03	3.12	18.73	49	20
	2012	13.71	1.35	30.55	69	25

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN low-elevation riparian habitat, 2005–2012, cont.

Species	Year	D	LCL	UCL	%CV	n
Bullock's oriole	2005	--	--	--	--	3
	2006	9.09	4.82	14.34	33	22
	2007	6.57	1.79	12.43	52	16
	2008	--	--	--	--	9
	2009	6.01	0.92	13.72	67	12
	2010	--	--	--	--	9
	2011	--	--	--	--	9
	2012	--	--	--	--	8
Bushtit	2005	21.31	10.93	35.92	35	17
	2006	66.81	40.61	98.33	28	55
	2007	13.49	4.67	24.91	48	11
	2008	--	--	--	--	5
	2009	19.97	7.74	35.05	41	14
	2010	--	--	--	--	0
	2011	--	--	--	--	0
	2012	--	--	--	--	2
Canyon wren	**2005**	**1.81**	**0.86**	**3.04**	**37**	**30**
	2006	**3.83**	**1.98**	**6.08**	**32**	**63**
	2007	**2.21**	**0.93**	**3.63**	**38**	**37**
	2008	**1.66**	**0.39**	**3.45**	**57**	**27**
	2009	**1.64**	**0.59**	**3.06**	**46**	**23**
	2010	**--**	**--**	**--**	**--**	**1**
	2011	**--**	**--**	**--**	**--**	**9**
	2012	**0.85**	**0.25**	**1.66**	**51**	**12**
Chipping sparrow	2005	--	--	--	--	5
	2006	--	--	--	--	6
	2007	17.08	7.34	28.70	39	27
	2008	16.52	7.04	28.17	39	26
	2009	16.32	5.12	30.56	48	22
	2010	19.84	8.93	33.21	37	27
	2011	10.71	4.25	18.57	41	16
	2012	13.75	5.69	23.96	41	18
Common raven	2005	2.60	1.39	3.94	30	16
	2006	1.77	0.53	3.53	53	11
	2007	2.20	0.94	3.67	38	14
	2008	5.80	2.69	9.73	39	36
	2009	--	--	--	--	7
	2010	4.62	1.78	8.38	45	25
	2011	2.25	1.18	3.57	32	13
	2012	--	--	--	--	6

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN low-elevation riparian habitat, 2005–2012, cont.

Species	Year	D	LCL	UCL	%CV	n
Common yellowthroat	2005	--	--	--	--	9
	2006	13.51	3.21	26.99	56	19
	2007	13.84	0.63	31.54	68	19
	2008	--	--	--	--	4
	2009	15.27	1.90	34.56	69	18
	2010	7.84	0.00	19.47	80	10
	2011	--	--	--	--	9
	2012	--	--	--	--	9
Gray vireo	**2005**	**0.92**	**0.41**	**1.53**	**37**	**17**
	2006	**1.98**	**0.77**	**3.57**	**42**	**36**
	2007	**0.98**	**0.28**	**1.86**	**49**	**18**
	2008	**1.19**	**0.50**	**1.94**	**37**	**22**
	2009	**2.06**	**0.92**	**3.42**	**37**	**33**
	2010	**--**	**--**	**--**	**--**	**4**
	2011	**--**	**--**	**--**	**--**	**8**
	2012	**--**	**--**	**--**	**--**	**9**
House finch	2005	16.43	10.55	22.70	22	104
	2006	24.36	17.42	32.12	19	174
	2007	25.55	17.21	34.28	21	185
	2008	25.27	17.68	33.99	20	185
	2009	28.51	15.18	44.78	33	161
	2010	16.53	10.64	22.38	21	104
	2011	19.30	13.95	24.35	16	117
	2012	14.45	9.24	19.98	23	77
House wren	2005	9.87	2.73	19.54	55	41
	2006	10.15	0.82	20.55	58	43
	2007	7.64	1.05	15.94	58	33
	2008	11.27	1.38	23.12	58	48
	2009	10.39	1.18	21.44	58	38
	2010	7.54	0.00	20.93	93	27
	2011	12.11	1.66	24.36	57	48
	2012	9.97	2.47	20.14	54	35
Juniper titmouse	**2005**	**8.52**	**3.34**	**14.74**	**42**	**28**
	2006	**7.14**	**3.28**	**11.70**	**37**	**24**
	2007	**9.94**	**5.64**	**15.05**	**30**	**38**
	2008	**10.54**	**5.23**	**16.60**	**34**	**39**
	2009	**10.27**	**2.63**	**18.96**	**49**	**28**
	2010	**5.26**	**1.96**	**8.88**	**40**	**17**
	2011	**5.31**	**2.38**	**8.58**	**37**	**19**
	2012	**--**	**--**	**--**	**--**	**9**

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN low-elevation riparian habitat, 2005–2012, cont.

Species	Year	D	LCL	UCL	%CV	n
Lazuli bunting	**2005**	**53.31**	**19.69**	**97.88**	**43**	**151**
	2006	**49.24**	**19.19**	**88.34**	**43**	**132**
	2007	**55.03**	**26.56**	**90.82**	**35**	**159**
	2008	**52.21**	**16.51**	**100.61**	**50**	**148**
	2009	**60.19**	**7.67**	**131.67**	**65**	**149**
	2010	**58.87**	**23.50**	**110.21**	**48**	**144**
	2011	**38.94**	**21.17**	**59.45**	**30**	**101**
	2012	**38.41**	**16.19**	**65.55**	**41**	**87**
Lesser goldfinch	2005	10.61	4.09	19.34	45	24
	2006	20.10	10.34	31.72	33	46
	2007	36.91	19.97	59.40	33	91
	2008	25.82	9.93	50.43	50	54
	2009	36.02	15.50	59.87	39	75
	2010	13.22	5.62	23.61	42	31
	2011	15.70	8.18	26.23	35	33
	2012	18.10	6.55	34.05	47	35
Lucy's warbler	2005	--	--	--	--	1
	2006	--	--	--	--	0
	2007	--	--	--	--	8
	2008	5.78	1.18	11.11	54	17
	2009	9.25	2.07	20.44	60	22
	2010	--	--	--	--	3
	2011	4.60	1.71	7.91	43	12
	2012	9.15	2.91	17.64	54	21
Mourning dove	2005	9.77	4.87	15.99	35	73
	2006	16.54	10.61	23.20	24	114
	2007	19.04	11.94	28.14	26	140
	2008	11.30	4.87	19.53	39	91
	2009	5.36	2.98	8.13	30	35
	2010	15.45	8.93	22.65	27	96
	2011	11.21	6.04	17.45	31	73
	2012	7.90	4.55	11.96	29	43
Plumbeous vireo	**2005**	**11.07**	**6.87**	**17.33**	**29**	**52**
	2006	**17.91**	**10.34**	**28.63**	**32**	**85**
	2007	**13.20**	**7.41**	**20.99**	**31**	**63**
	2008	**10.01**	**6.66**	**15.56**	**26**	**48**
	2009	**16.62**	**9.97**	**26.28**	**30**	**67**
	2010	**17.86**	**10.73**	**26.99**	**29**	**74**
	2011	**8.27**	**5.28**	**12.32**	**27**	**36**
	2012	**8.46**	**4.57**	**13.39**	**33**	**33**

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN low-elevation riparian habitat, 2005–2012, cont.

Species	Year	D	LCL	UCL	%CV	n
Rock wren	**2005**	**5.09**	**3.08**	**7.52**	**27**	**75**
	2006	**6.83**	**4.15**	**9.69**	**25**	**104**
	2007	**8.99**	**5.84**	**12.20**	**22**	**135**
	2008	**5.36**	**2.99**	**8.37**	**32**	**80**
	2009	**7.46**	**4.98**	**10.51**	**22**	**93**
	2010	**4.41**	**2.72**	**6.35**	**25**	**57**
	2011	**7.05**	**4.55**	**10.14**	**24**	**97**
	2012	**3.17**	**1.23**	**5.42**	**39**	**38**
Say's phoebe	**2005**	**3.32**	**2.11**	**4.69**	**23**	**41**
	2006	**5.03**	**2.90**	**7.95**	**31**	**61**
	2007	**2.94**	**1.86**	**4.23**	**25**	**37**
	2008	**4.08**	**2.06**	**6.70**	**36**	**51**
	2009	**5.06**	**2.23**	**8.98**	**41**	**51**
	2010	**2.40**	**1.07**	**4.00**	**38**	**25**
	2011	**5.45**	**2.99**	**8.29**	**30**	**64**
	2012	**2.68**	**1.50**	**4.00**	**30**	**26**
Song sparrow	2005	22.22	4.08	51.30	66	44
	2006	24.96	6.80	49.78	53	53
	2007	20.70	4.75	41.64	55	45
	2008	16.39	5.75	30.16	45	36
	2009	13.57	0.84	30.83	70	25
	2010	--	--	--	--	7
	2011	12.80	2.38	26.76	61	25
	2012	12.83	2.36	29.27	64	22
Spotted towhee	2005	44.50	29.13	64.26	24	212
	2006	103.41	70.74	137.95	20	402
	2007	59.01	37.20	86.00	25	262
	2008	43.18	28.11	58.76	22	197
	2009	89.55	63.47	116.99	19	289
	2010	71.61	47.79	99.46	22	278
	2011	51.65	37.53	66.24	17	290
	2012	92.93	67.68	119.36	17	283
Violet-green swallow	**2005**	**60.50**	**40.26**	**84.97**	**22**	**63**
	2006	**204.91**	**118.59**	**296.07**	**27**	**144**
	2007	**104.50**	**65.31**	**153.33**	**26**	**85**
	2008	**158.94**	**84.79**	**252.76**	**34**	**81**
	2009	**135.38**	**80.78**	**196.69**	**26**	**103**
	2010	**63.65**	**36.50**	**97.01**	**29**	**55**
	2011	**35.38**	**16.94**	**56.36**	**35**	**27**
	2012	**133.41**	**65.43**	**223.65**	**37**	**74**

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN low-elevation riparian habitat, 2005–2012, cont.

Species	Year	D	LCL	UCL	%CV	n
Virginia's warbler	**2005**	**7.43**	**3.02**	**12.74**	**40**	**25**
	2006	**12.74**	**2.95**	**26.20**	**56**	**41**
	2007	**9.17**	**4.27**	**14.61**	**34**	**31**
	2008	**18.42**	**10.57**	**28.03**	**29**	**64**
	2009	**--**	**--**	**--**	**--**	**2**
	2010	**8.71**	**3.90**	**14.13**	**36**	**26**
	2011	**4.57**	**2.01**	**7.75**	**39**	**14**
	2012	**11.69**	**1.86**	**23.67**	**56**	**34**
Warbling vireo	**2005**	**5.16**	**1.72**	**9.76**	**55**	**19**
	2006	**10.97**	**4.53**	**20.75**	**48**	**40**
	2007	**6.96**	**2.45**	**12.81**	**46**	**27**
	2008	**8.18**	**4.62**	**12.55**	**31**	**31**
	2009	**6.02**	**2.21**	**11.56**	**50**	**19**
	2010	**6.36**	**0.00**	**17.01**	**88**	**21**
	2011	**4.14**	**1.44**	**7.78**	**49**	**14**
	2012	**6.06**	**1.66**	**12.17**	**58**	**19**
Western scrub-jay	2005	3.27	1.68	5.46	35	18
	2006	4.54	1.94	8.15	42	25
	2007	3.83	1.72	6.43	39	22
	2008	3.95	0.96	8.54	61	22
	2009	2.26	0.43	4.65	60	11
	2010	2.93	1.02	5.74	52	14
	2011	3.85	1.75	6.70	41	20
	2012	3.30	1.56	6.05	43	15
Western tanager	2005	--	--	--	--	7
	2006	5.26	2.61	9.67	41	20
	2007	--	--	--	--	7
	2008	2.77	0.75	5.86	56	11
	2009	--	--	--	--	3
	2010	4.75	1.92	10.08	56	15
	2011	--	--	--	--	9
	2012	3.37	1.47	6.51	45	11
Western wood-pewee	2005	3.86	1.81	6.27	37	27
	2006	4.65	1.92	7.99	42	33
	2007	4.84	1.41	9.04	48	34
	2008	4.48	1.11	9.36	61	31
	2009	4.71	1.58	8.96	48	28
	2010	2.20	0.32	4.60	59	14
	2011	2.44	0.99	4.32	43	16
	2012	3.25	0.95	6.13	51	19

Table 3-3. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN low-elevation riparian habitat, 2005–2012, cont.

Species	Year	D	LCL	UCL	%CV	n
White-throated swift	**2005**	**30.57**	**17.96**	**43.72**	**27**	**103**
	2006	**51.20**	**28.22**	**76.11**	**29**	**127**
	2007	**63.15**	**35.62**	**90.29**	**26**	**190**
	2008	**35.70**	**18.19**	**56.60**	**33**	**86**
	2009	**15.27**	**7.50**	**24.81**	**34**	**73**
	2010	**11.34**	**4.45**	**19.77**	**42**	**50**
	2011	**15.35**	**6.78**	**25.06**	**37**	**46**
	2012	**13.63**	**4.79**	**24.58**	**43**	**42**
Yellow warbler	2005	82.69	30.19	146.74	45	121
	2006	85.90	31.29	154.16	42	121
	2007	47.00	8.18	86.38	49	96
	2008	94.59	32.56	174.92	46	126
	2009	163.16	51.96	286.63	45	206
	2010	77.19	32.69	128.79	38	161
	2011	53.95	22.30	86.89	37	109
	2012	111.06	37.47	193.58	43	153
Yellow-breasted chat	2005	8.39	1.09	22.76	83	37
	2006	9.38	1.99	21.21	66	48
	2007	7.57	0.79	19.79	82	40
	2008	5.96	1.79	11.14	49	30
	2009	10.06	4.06	17.54	42	42
	2010	10.29	3.71	19.15	46	45
	2011	9.24	2.64	18.18	53	42
	2012	11.57	2.52	25.24	64	47
Yellow-rumped warbler	2005	--	--	--	--	4
	2006	--	--	--	--	2
	2007	--	--	--	--	3
	2008	--	--	--	--	8
	2009	--	--	--	--	3
	2010	31.12	14.40	49.20	34	43
	2011	18.76	6.64	35.93	48	26
	2012	8.97	3.25	16.46	46	12

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

3.1.2 Pinyon-juniper

We surveyed all 15 PJ transects two times each in 2012. We estimated densities of 39 species, 17 of which were priority species, from 2005 to 2012. The 2012 data yielded robust density estimates (CV <50%) for 15 species and a moderately robust estimate (CV=50–75%) for 12 additional species (Table 3-4). Those 27 species represented 36% of all species and 81% of all individuals detected in PJ habitat.

The following 10 species had the highest estimated densities of all species recorded in PJ in 2012 (listed in order from highest to lowest):

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

The following 15 species had higher estimated densities in PJ compared to the other two habitats sampled in 2012 (listed in order from highest to lowest):

1. Blue-gray gnatcatcher
2. Black-throated gray warbler
3. Chipping sparrow
4. Juniper titmouse
5. Gray flycatcher
6. Bushtit
7. House finch
8. Black-throated sparrow
9. Gray vireo
10. Dusky flycatcher
11. Mountain chickadee
12. White-breasted nuthatch
13. Hermit thrush
14. Pinyon jay

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN pinyon-juniper habitat, 2005–2012.

Common name	Year	D	LCL	UCL	%CV	n
American robin	2005	1.80	0.87	2.91	35	26
	2006	2.70	1.02	5.19	49	37
	2007	2.63	0.55	6.40	70	35
	2008	1.81	0.23	4.28	75	25
	2009	1.11	0.00	2.65	75	14
	2010	0.85	0.08	1.77	63	12
	2011	2.68	1.18	4.69	41	33
	2012	0.96	0.33	1.78	47	13
Ash-throated Flycatcher	2005	11.37	7.45	16.92	29	121
	2006	14.97	7.93	22.61	30	125
	2007	8.93	5.70	12.69	24	117
	2008	12.84	6.99	21.22	37	116
	2009	11.37	6.38	16.73	43	104
	2010	5.66	3.75	7.91	22	82
	2011	4.90	3.50	6.49	18	83
	2012	4.58	2.81	6.69	26	75
Bewick's wren	**2005**	**18.00**	**13.06**	**22.79**	**16**	**134**
	2006	**18.35**	**10.15**	**27.51**	**28**	**134**
	2007	**14.96**	**7.37**	**22.91**	**31**	**112**
	2008	**14.05**	**6.66**	**22.98**	**36**	**100**
	2009	**11.86**	**7.60**	**16.46**	**23**	**79**
	2010	**3.06**	**1.27**	**5.05**	**39**	**22**
	2011	**4.01**	**2.02**	**6.23**	**33**	**26**
	2012	**7.79**	**4.00**	**11.88**	**32**	**55**
Black-headed grosbeak	2005	--	--	--	--	4
	2006	0.76	0.00	1.82	76	12
	2007	0.89	0.00	2.31	90	15
	2008	--	--	--	--	7
	2009	0.80	0.06	1.90	77	12
	2010	--	--	--	--	7
	2011	1.06	0.42	1.73	37	15
	2012	0.83	0.04	1.82	67	13
Black-throated gray warbler	**2005**	**98.30**	**48.03**	**152.88**	**34**	**240**
	2006	**97.74**	**66.16**	**131.42**	**20**	**314**
	2007	**94.97**	**64.04**	**131.21**	**22**	**305**
	2008	**67.27**	**45.09**	**91.84**	**21**	**301**
	2009	**114.75**	**73.25**	**173.36**	**27**	**313**
	2010	**53.00**	**38.68**	**69.78**	**18**	**236**
	2011	**46.67**	**31.24**	**62.38**	**21**	**262**
	2012	**63.24**	**36.08**	**96.46**	**29**	**239**

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN pinyon-juniper habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Black-throated sparrow	**2005**	**6.12**	**2.63**	**10.39**	**39**	**40**
	2006	**10.00**	**3.64**	**17.92**	**44**	**66**
	2007	**14.32**	**4.70**	**27.42**	**50**	**93**
	2008	**11.08**	**2.60**	**23.03**	**61**	**69**
	2009	**12.50**	**5.51**	**20.77**	**37**	**76**
	2010	**9.91**	**5.05**	**15.48**	**33**	**62**
	2011	**10.19**	**4.14**	**16.67**	**38**	**59**
	2012	**13.85**	**7.64**	**21.51**	**31**	**85**
Blue-gray gnatcatcher	2005	77.61	53.63	108.78	22	125
	2006	58.54	32.75	89.19	30	92
	2007	80.73	56.00	112.33	21	125
	2008	67.07	41.45	98.54	26	98
	2009	158.55	124.99	198.07	14	215
	2010	89.84	62.10	122.21	20	136
	2011	97.78	77.13	123.61	14	134
	2012	89.07	66.78	114.11	16	128
Brown-headed cowbird	2005	4.61	1.59	8.15	44	15
	2006	4.06	1.16	8.05	53	12
	2007	5.15	1.47	10.48	54	15
	2008	3.52	0.82	7.33	56	10
	2009	5.98	2.48	10.29	40	17
	2010	--	--	--	--	7
	2011	--	--	--	--	7
	2012	6.28	2.74	11.06	41	18
Bushtit	2005	83.23	40.43	137.88	38	32
	2006	65.19	39.49	98.97	28	25
	2007	35.76	15.29	61.71	40	14
	2008	--	--	--	--	7
	2009	99.27	50.36	154.79	32	36
	2010	--	--	--	--	0
	2011	--	--	--	--	1
	2012	--	--	--	--	7
Canyon wren	**2005**	**0.38**	**0.13**	**0.84**	**63**	**15**
	2006	**0.55**	**0.07**	**1.23**	**63**	**22**
	2007	**0.65**	**0.12**	**1.54**	**69**	**24**
	2008	**--**	**--**	**--**	**--**	**5**
	2009	**0.40**	**0.04**	**0.87**	**64**	**15**
	2010	**--**	**--**	**--**	**--**	**3**
	2011	**--**	**--**	**--**	**--**	**6**
	2012	**--**	**--**	**--**	**--**	**4**

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN pinyon-juniper habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Chipping sparrow	2005	20.44	11.63	30.66	29	70
	2006	15.67	9.45	23.17	27	53
	2007	23.08	12.75	35.01	30	75
	2008	28.15	16.73	41.72	28	88
	2009	49.31	22.43	81.65	37	134
	2010	29.74	17.38	46.08	30	92
	2011	34.55	24.02	46.49	21	102
	2012	30.79	14.93	48.79	34	94
Common raven	2005	0.78	0.43	1.18	71	35
	2006	0.33	0.16	0.52	70	19
	2007	1.17	0.66	1.77	52	68
	2008	0.72	0.37	1.15	75	38
	2009	--	--	--	--	27
	2010	1.21	0.63	1.90	72	66
	2011	1.29	0.69	1.93	80	59
	2012	0.40	0.19	0.66	79	20
Dusky flycatcher	**2005**	**--**	**--**	**--**	**--**	**9**
	2006	**11.55**	**2.27**	**23.61**	**56**	**34**
	2007	**9.39**	**1.44**	**19.07**	**58**	**28**
	2008	**15.39**	**2.15**	**39.32**	**79**	**38**
	2009	**4.97**	**0.00**	**11.70**	**74**	**13**
	2010	**5.06**	**0.00**	**12.04**	**73**	**15**
	2011	**4.64**	**0.84**	**9.35**	**56**	**12**
	2012	**7.45**	**1.06**	**15.30**	**58**	**21**
Grace's warbler	**2005**	**--**	**--**	**--**	**--**	**6**
	2006	**1.91**	**0.00**	**5.33**	**98**	**12**
	2007	**2.99**	**0.00**	**8.57**	**101**	**19**
	2008	**--**	**--**	**--**	**--**	**8**
	2009	**3.35**	**0.00**	**10.50**	**105**	**17**
	2010	**1.88**	**0.00**	**5.81**	**104**	**11**
	2011	**2.96**	**0.00**	**7.92**	**93**	**17**
	2012	**1.98**	**0.00**	**5.75**	**94**	**11**
Gray flycatcher	2005	24.49	15.26	36.37	28	116
	2006	27.30	16.55	39.68	76	86
	2007	24.30	11.72	38.58	34	85
	2008	35.82	20.80	52.02	28	101
	2009	34.41	20.54	52.43	29	179
	2010	23.66	16.82	30.97	18	123
	2011	15.94	9.85	23.04	26	113
	2012	20.99	11.76	31.89	29	101

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN pinyon-juniper habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Gray vireo	**2005**	**6.07**	**3.65**	**8.97**	**27**	**67**
	2006	**5.32**	**2.41**	**9.24**	**39**	**59**
	2007	**6.28**	**3.21**	**9.72**	**32**	**70**
	2008	**8.32**	**4.39**	**13.25**	**32**	**86**
	2009	**12.10**	**8.69**	**15.98**	**19**	**125**
	2010	**10.03**	**6.56**	**14.11**	**23**	**108**
	2011	**8.23**	**4.82**	**12.09**	**27**	**81**
	2012	**9.69**	**5.85**	**13.45**	**24**	**102**
Green-tailed towhee	**2005**	**2.04**	**0.53**	**3.77**	**49**	**14**
	2006	**--**	**--**	**--**	**--**	**6**
	2007	**3.55**	**0.00**	**9.09**	**83**	**23**
	2008	**1.78**	**0.21**	**4.25**	**70**	**11**
	2009	**--**	**--**	**--**	**--**	**5**
	2010	**--**	**--**	**--**	**--**	**3**
	2011	**2.61**	**0.29**	**6.30**	**73**	**15**
	2012	**--**	**--**	**--**	**--**	**8**
Hermit thrush	2005	--	--	--	--	6
	2006	0.91	0.00	2.80	114	11
	2007	--	--	--	--	1
	2008	--	--	--	--	0
	2009	--	--	--	--	7
	2010	1.01	0.09	2.59	80	12
	2011	2.57	0.00	6.83	93	35
	2012	2.43	0.00	7.38	101	27
House finch	2005	14.39	8.73	21.26	26	94
	2006	8.88	4.39	14.40	35	69
	2007	18.74	10.79	28.18	29	146
	2008	16.53	9.73	24.31	27	128
	2009	18.90	9.83	29.30	31	136
	2010	13.17	8.57	19.04	25	101
	2011	21.73	14.52	30.02	21	148
	2012	17.36	10.15	25.27	27	113
Juniper titmouse	**2005**	**18.31**	**11.99**	**25.57**	**23**	**74**
	2006	**16.05**	**9.41**	**23.50**	**27**	**69**
	2007	**17.08**	**8.54**	**27.66**	**34**	**75**
	2008	**20.13**	**11.37**	**29.78**	**27**	**86**
	2009	**46.01**	**30.00**	**61.95**	**21**	**188**
	2010	**32.63**	**22.23**	**44.76**	**21**	**138**
	2011	**25.81**	**15.51**	**38.51**	**28**	**102**
	2012	**21.49**	**15.19**	**27.85**	**18**	**88**

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN pinyon-juniper habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Lark sparrow	2005	2.28	0.55	4.54	54	20
	2006	2.16	0.17	5.74	94	17
	2007	2.16	0.09	4.87	70	19
	2008	1.57	0.21	3.48	65	13
	2009	2.14	0.46	4.14	54	17
	2010	1.99	0.17	5.14	82	17
	2011	3.58	0.67	7.36	59	27
	2012	2.27	0.43	4.54	55	19
Mountain bluebird	**2005**	**9.79**	**2.55**	**20.22**	**55**	**63**
	2006	**4.80**	**0.78**	**11.90**	**82**	**31**
	2007	**5.47**	**1.18**	**11.81**	**62**	**36**
	2008	**5.58**	**1.40**	**11.40**	**57**	**34**
	2009	**5.50**	**0.73**	**13.39**	**76**	**33**
	2010	**6.43**	**1.40**	**14.54**	**65**	**40**
	2011	**4.48**	**0.76**	**9.82**	**65**	**26**
	2012	**4.90**	**1.17**	**9.42**	**53**	**30**
Mountain chickadee	2005	5.37	0.89	11.19	59	19
	2006	--	--	--	--	9
	2007	3.04	0.82	6.95	63	10
	2008	--	--	--	--	9
	2009	4.13	0.25	8.96	66	13
	2010	--	--	--	--	4
	2011	8.82	0.95	19.24	64	26
	2012	4.89	0.53	11.48	74	16
Mourning dove	2005	11.81	6.94	17.59	28	139
	2006	13.20	7.75	19.68	27	154
	2007	14.25	7.31	23.16	34	167
	2008	14.39	9.38	20.18	23	158
	2009	8.68	5.05	13.07	29	96
	2010	13.53	8.50	19.84	26	154
	2011	10.77	6.60	15.51	25	114
	2012	7.41	4.16	11.23	29	77
Northern flicker	2005	0.34	0.11	0.69	54	11
	2006	0.31	0.10	0.61	51	10
	2007	0.52	0.09	1.10	61	17
	2008	--	--	--	--	2
	2009	--	--	--	--	9
	2010	0.60	0.23	1.09	47	19
	2011	0.55	0.22	1.05	48	16
	2012	0.39	0.12	0.80	56	12

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN pinyon-juniper habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Pinyon jay	**2005**	**1.50**	**0.61**	**2.73**	**42**	**33**
	2006	**4.19**	**1.50**	**7.68**	**45**	**58**
	2007	**5.59**	**2.51**	**9.68**	**39**	**78**
	2008	**1.48**	**0.36**	**3.04**	**55**	**19**
	2009	**2.02**	**1.01**	**3.31**	**35**	**34**
	2010	**6.67**	**3.32**	**11.25**	**37**	**91**
	2011	**2.21**	**0.69**	**4.00**	**46**	**29**
	2012	**2.01**	**0.61**	**3.79**	**50**	**24**
Plumbeous vireo	**2005**	**6.76**	**3.12**	**11.29**	**37**	**62**
	2006	**4.93**	**2.13**	**8.50**	**40**	**45**
	2007	**4.82**	**2.28**	**7.91**	**35**	**44**
	2008	**4.99**	**2.28**	**8.16**	**37**	**43**
	2009	**4.98**	**1.08**	**9.95**	**56**	**42**
	2010	**9.46**	**4.86**	**14.90**	**32**	**83**
	2011	**9.40**	**5.83**	**13.29**	**25**	**76**
	2012	**3.62**	**0.42**	**7.67**	**59**	**31**
Rock wren	**2005**	**4.66**	**2.80**	**6.79**	**26**	**84**
	2006	**4.43**	**2.42**	**7.00**	**32**	**80**
	2007	**4.66**	**2.79**	**6.83**	**27**	**85**
	2008	**5.94**	**2.94**	**9.67**	**34**	**101**
	2009	**5.96**	**3.17**	**9.40**	**31**	**93**
	2010	**2.25**	**1.24**	**3.42**	**31**	**39**
	2011	**5.26**	**3.14**	**7.53**	**26**	**84**
	2012	**1.34**	**0.66**	**2.12**	**34**	**23**
Say's phoebe	**2005**	**1.69**	**0.96**	**2.54**	**29**	**28**
	2006	**--**	**--**	**--**	**--**	**9**
	2007	**--**	**--**	**--**	**--**	**8**
	2008	**0.71**	**0.35**	**1.14**	**34**	**11**
	2009	**0.92**	**0.47**	**1.40**	**32**	**14**
	2010	**1.19**	**0.38**	**2.22**	**48**	**19**
	2011	**1.16**	**0.43**	**2.01**	**42**	**17**
	2012	**--**	**--**	**--**	**--**	**6**
Spotted towhee	2005	17.42	9.44	26.24	30	80
	2006	15.48	6.36	26.88	40	69
	2007	23.98	9.90	41.48	40	109
	2008	10.54	3.90	18.27	42	46
	2009	23.90	10.12	38.72	37	97
	2010	16.87	7.12	27.20	37	72
	2011	28.80	12.74	47.67	38	112
	2012	24.40	9.73	41.96	42	102

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN pinyon-juniper habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Vesper sparrow	2005	--	--	--	--	9
	2006	1.35	0.00	3.60	84	15
	2007	1.29	0.00	3.22	84	14
	2008	--	--	--	--	6
	2009	1.49	0.08	4.19	95	13
	2010	1.82	0.00	4.43	80	20
	2011	2.35	0.00	7.03	99	24
	2012	2.21	0.00	5.49	76	23
Violet-green swallow	**2005**	**10.91**	**4.40**	**20.80**	**71**	**32**
	2006	**16.23**	**4.35**	**30.64**	**72**	**48**
	2007	**19.29**	**5.80**	**34.83**	**70**	**58**
	2008	**14.67**	**5.25**	**25.92**	**72**	**40**
	2009	**11.63**	**5.93**	**18.58**	**70**	**31**
	2010	**10.76**	**3.76**	**20.06**	**113**	**29**
	2011	**8.24**	**4.18**	**13.56**	**65**	**21**
	2012	**16.20**	**8.36**	**25.72**	**62**	**45**
Virginia's warbler	**2005**	**9.44**	**3.48**	**17.65**	**47**	**53**
	2006	**6.49**	**0.65**	**13.80**	**63**	**35**
	2007	**5.08**	**0.91**	**11.07**	**65**	**27**
	2008	**4.65**	**1.24**	**8.71**	**50**	**24**
	2009	**4.01**	**0.62**	**8.43**	**63**	**20**
	2010	**9.10**	**2.91**	**16.64**	**47**	**50**
	2011	**10.42**	**2.07**	**23.31**	**63**	**50**
	2012	**9.24**	**1.65**	**19.45**	**62**	**46**
Western meadowlark	2005	2.43	0.16	6.03	78	42
	2006	1.38	0.00	3.83	95	22
	2007	1.27	0.00	3.75	98	21
	2008	0.90	0.00	2.53	92	14
	2009	1.36	0.00	3.96	101	22
	2010	--	--	--	--	5
	2011	2.23	0.20	5.04	67	35
	2012	--	--	--	--	9
Western scrub-jay	2005	6.48	3.32	10.44	33	31
	2006	6.87	3.34	11.74	39	32
	2007	6.41	3.43	10.20	33	30
	2008	7.48	3.45	13.25	40	33
	2009	3.55	1.23	6.78	48	15
	2010	5.95	3.24	9.65	33	27
	2011	5.26	3.01	7.89	30	22
	2012	--	--	--	--	7

Table 3-4. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN pinyon-juniper habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Western tanager	2005	1.16	0.24	2.40	73	16
	2006	1.75	0.66	2.96	42	22
	2007	2.32	0.87	4.16	50	28
	2008	1.31	0.08	2.97	70	15
	2009	--	--	--	--	7
	2010	1.40	0.16	3.16	71	17
	2011	1.78	0.10	3.64	59	20
	2012	3.00	0.33	6.42	65	36
White-breasted nuthatch	2005	2.73	0.31	6.30	69	15
	2006	2.83	0.63	7.27	72	14
	2007	4.90	0.66	14.14	89	22
	2008	--	--	--	--	9
	2009	--	--	--	--	8
	2010	2.21	0.14	6.21	94	11
	2011	2.41	0.20	5.74	74	11
	2012	4.18	0.35	8.90	64	21
White-throated swift	**2005**	**14.69**	**6.07**	**24.92**	**39**	**64**
	2006	**20.38**	**5.20**	**38.04**	**49**	**82**
	2007	**20.93**	**11.94**	**31.74**	**29**	**94**
	2008	**18.98**	**7.11**	**34.47**	**43**	**66**
	2009	**7.93**	**4.13**	**12.48**	**32**	**35**
	2010	**6.06**	**2.16**	**10.78**	**44**	**25**
	2011	**8.35**	**2.79**	**15.54**	**97**	**27**
	2012	**13.01**	**5.92**	**22.30**	**39**	**51**
Yellow-rumped warbler	2005	1.72	0.00	4.48	86	11
	2006	4.04	0.00	10.81	84	27
	2007	1.83	0.00	5.41	96	11
	2008	2.50	0.00	7.15	94	15
	2009	--	--	--	--	1
	2010	--	--	--	--	8
	2011	4.41	1.79	7.75	43	24
	2012	--	--	--	--	7

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

3.1.2 Sage shrubland

We surveyed all 15 transects two times each in 2012. We estimated densities of 34 species, 17 of which were priority species, from 2005 to 2012. The 2012 data yielded robust density estimates (CV <50%) for 19 species and a moderately robust estimate (CV=50–75%) for nine additional species (Table 3-5). Those 28 species represented 30% of all species and 85% of all individuals detected in SA habitat.

The following 10 species had the highest estimated densities of all species recorded in SA in 2012 (listed in order from highest to lowest):

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

The following 13 species had higher estimated densities in SA compared to the other two habitats sampled in 2012 (listed in order from highest to lowest):

1. Brewer's sparrow
2. Green-tailed towhee
3. Vesper sparrow
4. Lark sparrow
5. Western meadowlark
6. Broad-tailed hummingbird
7. Mountain bluebird
8. American robin
9. Brewer's blackbird
10. Horned lark
11. Sage thrasher
12. Northern flicker
13. Black-billed magpie

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN sage shrubland habitat, 2005–2012.

Common name	Year	D	LCL	UCL	%CV	n
American robin	2005	2.28	1.16	3.75	34	36
	2006	4.21	1.99	7.51	40	70
	2007	2.98	1.35	5.35	45	50
	2008	2.22	1.10	3.57	36	34
	2009	1.83	0.69	3.28	45	27
	2010	2.82	1.36	4.83	39	46
	2011	3.54	1.78	5.82	36	58
	2012	3.66	1.97	6.07	34	61
Black-billed magpie	**2005**	**3.27**	**1.06**	**5.99**	**47**	**62**
	2006	**3.28**	**1.88**	**5.00**	**30**	**85**
	2007	**1.99**	**1.12**	**2.98**	**29**	**45**
	2008	**1.65**	**0.73**	**2.75**	**37**	**40**
	2009	**1.24**	**0.29**	**2.47**	**56**	**29**
	2010	**1.64**	**0.76**	**2.79**	**38**	**44**
	2011	**2.09**	**0.82**	**3.71**	**43**	**50**
	2012	**1.58**	**0.60**	**2.69**	**41**	**45**
Black-throated gray warbler	**2005**	**2.51**	**0.58**	**4.89**	**53**	**25**
	2006	**1.38**	**0.35**	**2.80**	**52**	**14**
	2007	**1.35**	**0.16**	**3.16**	**68**	**14**
	2008	**2.00**	**0.29**	**4.28**	**63**	**20**
	2009	**3.86**	**0.95**	**7.61**	**53**	**36**
	2010	**1.44**	**0.34**	**2.86**	**53**	**15**
	2011	**2.17**	**0.34**	**4.48**	**57**	**22**
	2012	**1.12**	**0.18**	**2.48**	**62**	**10**
Black-throated sparrow	**2005**	**1.05**	**0.18**	**2.32**	**68**	**10**
	2006	**2.94**	**0.84**	**5.43**	**47**	**29**
	2007	**1.89**	**0.35**	**3.68**	**54**	**18**
	2008	**--**	**--**	**--**	**--**	**3**
	2009	**2.55**	**0.00**	**6.16**	**84**	**23**
	2010	**--**	**--**	**--**	**--**	**8**
	2011	**--**	**--**	**--**	**--**	**7**
	2012	**3.53**	**0.29**	**7.73**	**70**	**32**
Blue-gray gnatcatcher	2005	9.76	3.60	18.01	46	27
	2006	5.56	2.65	9.49	37	16
	2007	4.07	1.20	7.66	49	11
	2008	14.93	8.26	24.33	33	40
	2009	13.91	4.82	26.51	48	34
	2010	14.72	7.47	24.94	36	41
	2011	10.82	5.07	18.07	38	30
	2012	13.19	4.96	26.05	48	33

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN sage shrubland habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Brewer's blackbird	2005	--	--	--	--	5
	2006	6.28	2.86	10.51	40	40
	2007	2.67	0.82	4.65	45	17
	2008	--	--	--	--	8
	2009	4.41	0.14	10.48	75	25
	2010	2.88	1.17	5.07	42	18
	2011	3.59	0.77	7.28	63	22
	2012	3.09	0.26	7.56	78	19
Brewer's sparrow	**2005**	**103.89**	**64.95**	**148.15**	**25**	**461**
	2006	**78.42**	**44.80**	**121.42**	**30**	**497**
	2007	**67.06**	**42.63**	**95.13**	**24**	**436**
	2008	**59.47**	**35.86**	**85.71**	**26**	**368**
	2009	**104.40**	**62.79**	**153.49**	**27**	**551**
	2010	**72.51**	**52.11**	**95.85**	**18**	**542**
	2011	**64.21**	**38.47**	**109.20**	**36**	**529**
	2012	**65.60**	**45.73**	**86.44**	**19**	**397**
Broad-tailed hummingbird	**2005**	**15.37**	**2.53**	**36.19**	**72**	**19**
	2006	**8.70**	**1.27**	**22.55**	**75**	**12**
	2007	**10.01**	**1.72**	**24.11**	**72**	**15**
	2008	**21.13**	**3.98**	**56.90**	**80**	**23**
	2009	**12.01**	**0.95**	**33.59**	**87**	**13**
	2010	**--**	**--**	**--**	**--**	**9**
	2011	**--**	**--**	**--**	**--**	**4**
	2012	**7.64**	**2.30**	**16.29**	**59**	**10**
Brown-headed cowbird	2005	--	--	--	--	4
	2006	4.77	2.25	8.03	38	26
	2007	2.17	0.75	4.04	48	12
	2008	2.90	1.29	4.83	39	15
	2009	--	--	--	--	8
	2010	--	--	--	--	6
	2011	2.24	1.01	3.72	39	12
	2012	3.53	1.33	6.23	43	19
Chipping sparrow	2005	5.66	2.47	9.90	39	29
	2006	9.64	4.50	15.54	34	50
	2007	9.16	3.12	16.79	47	46
	2008	7.42	1.44	15.10	55	38
	2009	8.05	2.74	14.71	46	38
	2010	18.79	9.58	31.54	37	93
	2011	9.16	4.16	15.28	37	44
	2012	15.50	6.46	26.23	39	68

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN sage shrubland habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Common raven	2005	--	--	--	--	4
	2006	--	--	--	--	8
	2007	1.86	1.06	2.83	29	26
	2008	0.91	0.43	1.47	36	12
	2009	--	--	--	--	0
	2010	1.09	0.48	1.81	38	15
	2011	2.06	1.12	3.14	30	28
	2012	0.95	0.26	1.81	51	13
Dusky flycatcher	**2005**	**3.18**	**0.61**	**7.34**	**68**	**30**
	2006	**5.61**	**1.58**	**10.25**	**47**	**53**
	2007	**5.94**	**1.58**	**11.75**	**53**	**55**
	2008	**7.88**	**1.95**	**14.94**	**49**	**68**
	2009	**8.78**	**1.75**	**18.05**	**57**	**74**
	2010	**7.17**	**2.83**	**12.81**	**42**	**67**
	2011	**7.30**	**3.38**	**11.48**	**34**	**67**
	2012	**6.04**	**2.51**	**10.14**	**39**	**55**
Gray flycatcher	2005	2.43	1.08	4.13	40	22
	2006	--	--	--	--	8
	2007	--	--	--	--	6
	2008	1.39	0.00	3.82	91	12
	2009	2.91	0.75	6.33	60	23
	2010	2.22	0.71	4.04	47	21
	2011	2.28	0.64	4.41	52	20
	2012	--	--	--	--	7
Green-tailed towhee	**2005**	**29.20**	**14.17**	**47.05**	**29**	**279**
	2006	**40.76**	**17.24**	**72.68**	**35**	**401**
	2007	**29.70**	**12.53**	**52.96**	**37**	**293**
	2008	**25.65**	**11.76**	**43.67**	**31**	**236**
	2009	**28.94**	**10.57**	**50.80**	**36**	**251**
	2010	**19.43**	**9.38**	**32.08**	**30**	**189**
	2011	**30.28**	**13.44**	**51.74**	**33**	**292**
	2012	**48.58**	**23.53**	**79.94**	**30**	**467**
Horned lark	2005	2.62	0.80	4.99	49	27
	2006	3.12	1.26	5.29	41	31
	2007	3.64	1.28	6.40	43	38
	2008	1.92	0.23	4.37	73	18
	2009	4.67	1.55	8.76	48	42
	2010	2.84	0.94	5.20	47	29
	2011	2.80	0.75	5.14	48	28
	2012	2.26	0.54	4.34	51	22

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN sage shrubland habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
House finch	2005	--	--	--	--	3
	2006	4.74	2.54	7.45	31	52
	2007	2.62	0.84	5.35	54	29
	2008	2.77	1.43	4.41	33	31
	2009	4.54	0.77	9.95	64	44
	2010	1.71	0.90	2.78	33	19
	2011	1.70	0.79	2.83	37	18
	2012	3.16	1.74	4.98	31	35
Lark sparrow	2005	8.73	2.77	16.00	46	83
	2006	9.22	3.58	15.95	40	91
	2007	6.15	1.91	11.54	50	61
	2008	2.56	0.66	5.26	56	24
	2009	12.59	2.39	24.64	54	111
	2010	7.41	2.83	12.85	41	72
	2011	9.95	3.33	17.14	42	97
	2012	11.37	4.75	19.63	40	109
Lazuli bunting	**2005**	**--**	**--**	**--**	**--**	**8**
	2006	**--**	**--**	**--**	**--**	**6**
	2007	**--**	**--**	**--**	**--**	**5**
	2008	**--**	**--**	**--**	**--**	**0**
	2009	**8.61**	**0.69**	**20.37**	**73**	**74**
	2010	**4.62**	**1.38**	**8.34**	**46**	**43**
	2011	**2.17**	**0.36**	**4.36**	**57**	**20**
	2012	**2.61**	**0.74**	**5.11**	**52**	**24**
Mountain bluebird	**2005**	**5.76**	**3.14**	**8.81**	**30**	**59**
	2006	**7.13**	**4.61**	**10.20**	**24**	**77**
	2007	**7.38**	**4.06**	**11.43**	**31**	**80**
	2008	**6.75**	**4.53**	**9.30**	**21**	**65**
	2009	**6.53**	**2.79**	**11.60**	**42**	**53**
	2010	**7.07**	**4.69**	**9.64**	**22**	**75**
	2011	**7.48**	**4.12**	**11.27**	**29**	**62**
	2012	**6.36**	**3.58**	**9.99**	**31**	**68**
Mourning dove	2005	2.38	1.06	3.88	36	55
	2006	4.26	2.78	5.97	23	101
	2007	2.58	1.11	4.52	41	63
	2008	3.05	1.08	5.67	45	69
	2009	3.06	1.30	5.21	41	61
	2010	3.67	1.49	6.37	39	89
	2011	2.41	1.42	3.54	27	56
	2012	1.77	0.85	2.89	35	41

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN sage shrubland habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Northern flicker	2005	0.87	0.46	1.40	33	14
	2006	1.43	0.75	2.32	34	24
	2007	0.85	0.38	1.50	40	14
	2008	--	--	--	--	6
	2009	1.10	0.35	2.06	48	16
	2010	1.49	0.89	2.22	28	24
	2011	1.54	0.86	2.39	30	25
	2012	1.85	0.87	3.15	37	31
Pinyon jay	**2005**	**0.31**	**0.00**	**0.83**	**93**	**12**
	2006	**--**	**--**	**--**	**--**	**9**
	2007	**--**	**--**	**--**	**--**	**5**
	2008	**0.33**	**0.04**	**0.81**	**76**	**13**
	2009	**--**	**--**	**--**	**--**	**3**
	2010	**0.49**	**0.04**	**1.25**	**79**	**18**
	2011	**--**	**--**	**--**	**--**	**7**
	2012	**0.62**	**0.04**	**1.65**	**88**	**24**
Rock wren	**2005**	**3.54**	**2.01**	**5.28**	**28**	**83**
	2006	**6.41**	**3.51**	**10.25**	**32**	**152**
	2007	**2.99**	**1.21**	**5.44**	**44**	**71**
	2008	**3.71**	**1.82**	**5.89**	**34**	**83**
	2009	**3.21**	**1.40**	**5.22**	**36**	**68**
	2010	**2.62**	**1.32**	**4.20**	**34**	**62**
	2011	**5.33**	**2.86**	**8.35**	**31**	**122**
	2012	**2.35**	**1.20**	**3.64**	**32**	**54**
Sage sparrow	**2005**	**2.71**	**0.27**	**6.42**	**72**	**29**
	2006	**2.24**	**0.09**	**5.27**	**73**	**24**
	2007	**2.72**	**0.00**	**6.34**	**72**	**29**
	2008	**1.94**	**0.00**	**5.59**	**100**	**19**
	2009	**2.30**	**0.09**	**5.37**	**73**	**22**
	2010	**--**	**--**	**--**	**--**	**3**
	2011	**1.56**	**0.20**	**3.40**	**65**	**17**
	2012	**--**	**--**	**--**	**--**	**9**
Sage thrasher	**2005**	**2.95**	**1.01**	**5.29**	**45**	**71**
	2006	**2.79**	**0.93**	**5.05**	**44**	**70**
	2007	**2.64**	**1.02**	**4.47**	**41**	**67**
	2008	**5.60**	**2.17**	**9.55**	**41**	**131**
	2009	**4.77**	**1.54**	**8.51**	**45**	**108**
	2010	**5.65**	**1.96**	**10.85**	**49**	**138**
	2011	**4.69**	**1.46**	**8.17**	**44**	**118**
	2012	**2.18**	**0.62**	**4.00**	**48**	**54**

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN sage shrubland habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Say's phoebe	**2005**	**0.70**	**0.25**	**1.29**	**45**	**10**
	2006	**0.93**	**0.47**	**1.46**	**33**	**14**
	2007	**--**	**--**	**--**	**--**	**7**
	2008	**1.05**	**0.21**	**2.38**	**65**	**15**
	2009	**1.15**	**0.23**	**2.62**	**66**	**15**
	2010	**1.28**	**0.37**	**2.43**	**49**	**19**
	2011	**2.10**	**0.98**	**3.48**	**37**	**31**
	2012	**0.77**	**0.23**	**1.56**	**53**	**11**
Spotted towhee	2005	5.95	2.26	10.94	45	55
	2006	6.31	2.85	10.65	37	61
	2007	5.25	2.47	8.68	36	50
	2008	7.56	3.45	12.37	37	68
	2009	4.82	1.65	8.92	45	41
	2010	8.06	3.46	13.86	39	75
	2011	9.99	4.71	15.65	34	95
	2012	7.57	3.60	12.27	35	70
Vesper sparrow	2005	29.28	17.23	41.46	24	267
	2006	22.91	14.11	32.76	25	359
	2007	39.68	21.61	66.01	36	404
	2008	51.69	22.67	107.22	55	368
	2009	50.16	28.88	75.12	29	412
	2010	47.14	34.03	61.37	18	478
	2011	35.20	25.08	46.01	18	503
	2012	43.74	31.36	56.64	18	497
Violet-green swallow	**2005**	**4.93**	**2.07**	**8.53**	**41**	**14**
	2006	**7.99**	**2.70**	**14.66**	**46**	**26**
	2007	**3.66**	**1.46**	**6.30**	**40**	**13**
	2008	**5.84**	**2.28**	**10.11**	**40**	**13**
	2009	**5.89**	**1.79**	**10.77**	**48**	**19**
	2010	**4.39**	**1.80**	**7.24**	**41**	**15**
	2011	**33.47**	**8.02**	**69.15**	**58**	**22**
	2012	**11.90**	**5.34**	**20.15**	**38**	**35**
Virginia's warbler	**2005**	**1.65**	**0.40**	**3.27**	**54**	**23**
	2006	**2.14**	**0.60**	**3.92**	**47**	**30**
	2007	**1.26**	**0.00**	**3.59**	**99**	**17**
	2008	**3.18**	**0.30**	**7.25**	**65**	**40**
	2009	**1.76**	**0.30**	**3.85**	**64**	**21**
	2010	**1.85**	**0.25**	**3.74**	**58**	**25**
	2011	**1.53**	**0.34**	**2.95**	**52**	**21**
	2012	**0.87**	**0.08**	**1.99**	**68**	**12**

Table 3-5. Estimated densities per km² (D), lower and upper 95% confidence limits (LCL, UCL) on D, percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding birds in NCPN sage shrubland habitat, 2005–2012, cont.

Common name	Year	D	LCL	UCL	%CV	n
Warbling vireo	**2005**	**1.46**	**0.29**	**3.21**	**61**	**17**
	2006	**0.82**	**0.17**	**1.59**	**54**	**10**
	2007	**1.79**	**0.09**	**3.74**	**62**	**22**
	2008	**--**	**--**	**--**	**--**	**2**
	2009	**--**	**--**	**--**	**--**	**3**
	2010	**--**	**--**	**--**	**--**	**9**
	2011	**1.36**	**0.22**	**2.82**	**59**	**16**
	2012	**1.00**	**0.24**	**2.11**	**62**	**12**
Western meadowlark	2005	5.75	2.47	9.66	38	112
	2006	6.47	3.47	9.86	30	131
	2007	5.73	2.40	9.91	41	114
	2008	7.95	3.07	13.77	42	150
	2009	8.91	3.15	15.37	41	159
	2010	6.41	3.04	10.42	34	127
	2011	9.93	4.98	15.94	34	198
	2012	7.91	4.46	11.96	30	156
Western tanager	2005	0.53	0.03	1.23	71	13
	2006	0.64	0.03	1.80	98	15
	2007	0.91	0.07	2.14	71	23
	2008	0.78	0.00	1.83	76	19
	2009	0.77	0.09	1.73	69	18
	2010	0.52	0.06	1.20	71	13
	2011	--	--	--	--	4
	2012	--	--	--	--	8
Yellow-rumped warbler	2005	--	--	--	--	9
	2006	2.07	0.00	4.53	66	20
	2007	1.51	0.24	3.10	57	14
	2008	1.38	0.34	2.68	52	12
	2009	--	--	--	--	7
	2010	--	--	--	--	3
	2011	1.48	0.22	3.15	60	13
	2012	1.48	0.00	3.62	76	13

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

3.1.3 Pipe Spring National Monument

We detected a total of 328 birds of 31 species in Pipe Spring NM in 2012 (Appendix A). To date, we have detected 987 birds of 60 species. In 2012, we recorded four species that had not been recorded by RMBO in previous years: American kestrel, black-headed grosbeak, hairy woodpecker, and warbling vireo.

3.2 Trend estimates

Ten of 24 species of conservation or management concern showed evidence of population trends from 2005 through 2012, including one species in two habitats (canyon wren; Table 3-6, Figure 3-1). Seven of eight species with linear or log-linear trends exhibited population declines; in contrast, the gray vireo exhibited a log-linear increase in population density. Two species exhibited an increase in population density in early years, followed by a decrease in later years. The remaining 14 priority species showed no evidence of population trend; for these species, the intercept-only model was the lowest AICc (best approximating) model.

Table 3-6. Best approximating models of population trend for priority avian species in the NCPN, 2005–2012, including estimated regression coefficients their standard errors (SE).

Species	Habitat	Model	β_0 (SE)	β_1 (SE)	β_2 (SE)
Bewick's wren	PJ	Linear	29.33 (3.41)	-2.06 (0.40)	
Black-billed magpie	SA	Log-linear	6.41 (1.42)	-2.04 (0.67)	
Black-throated gray warbler	PJ	Linear	142.72 (27.74)	-7.54 (3.11)	
Canyon wren	LR	Linear	4.64 (1.12)	-0.34 (0.13)	
Canyon wren	PJ	Linear	0.86 (0.23)	-0.06 (0.03)	
Dusky flycatcher	SA	Quadratic	-14.86 (3.53)	4.89 (0.84)	-0.26 (0.05)
Gray vireo	PJ	Log-linear	-3.04 (5.23)	5.47 (2.42)	
Juniper titmouse	LR	Quadratic	-9.84 (8.48)	5.19 (2.05)	-0.35 (0.12)
Mountain bluebird	PJ	Log-linear	14.24 (3.68)	-3.91 (1.72)	
Sage sparrow	SA	Linear	4.21 (0.81)	-0.28 (0.09)	
White-throated swift	LR	Linear	78.09 (21.18)	-5.56 (2.48)	

β_0 is the intercept; β_1 is the slope coefficient for year in linear models and for the natural log of year in log-linear ("pseudo-threshold") models; β_2 is the coefficient for year-squared in quadratic models.

Habitats: LR=low-elevation riparian; PJ=pinyon-juniper; SA=sage shrubland.

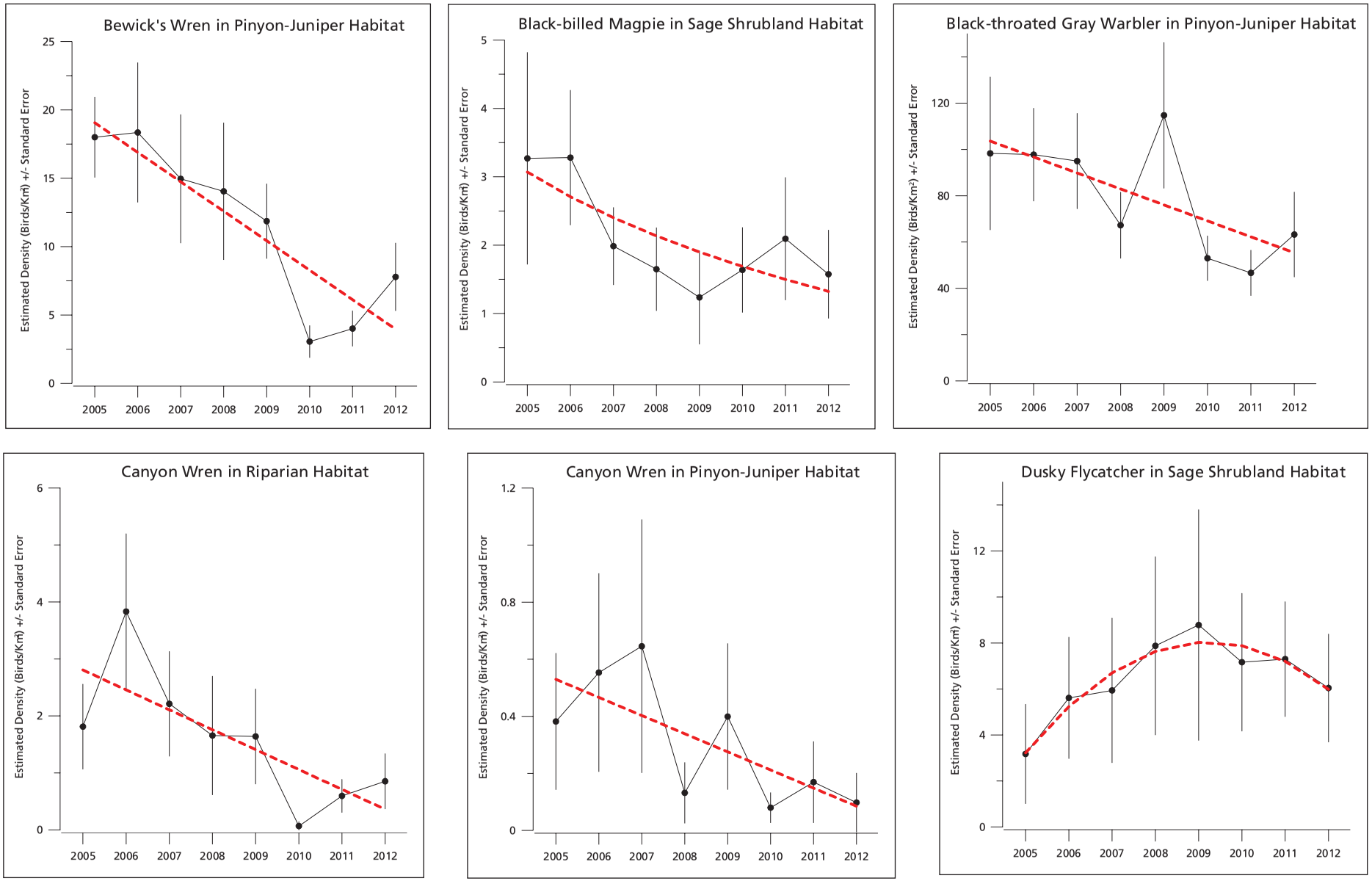
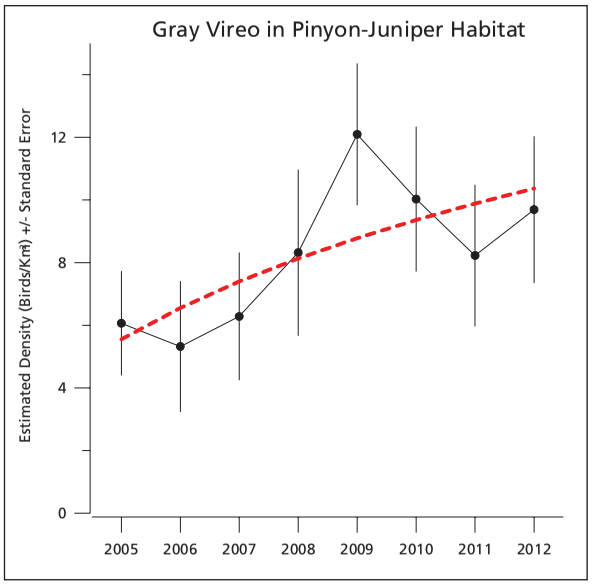
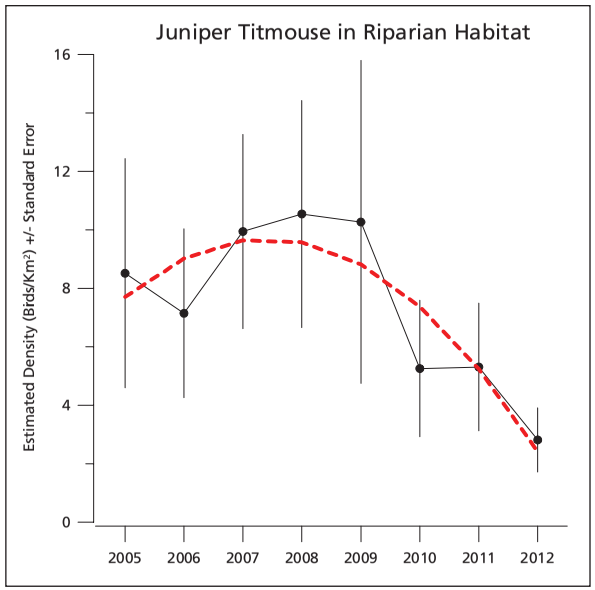
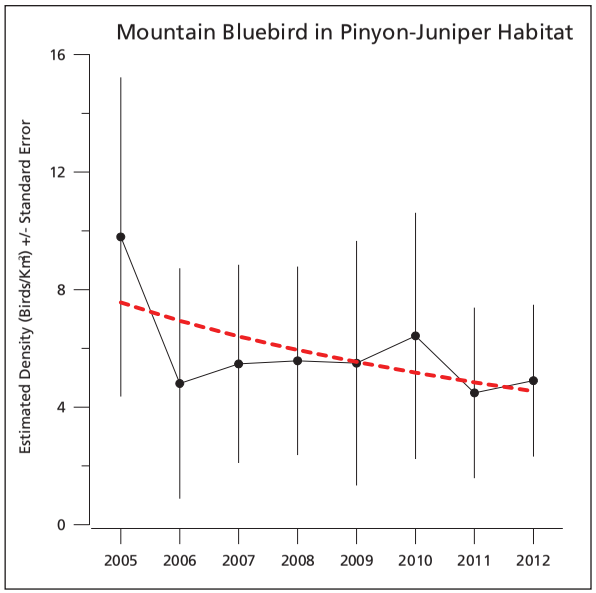
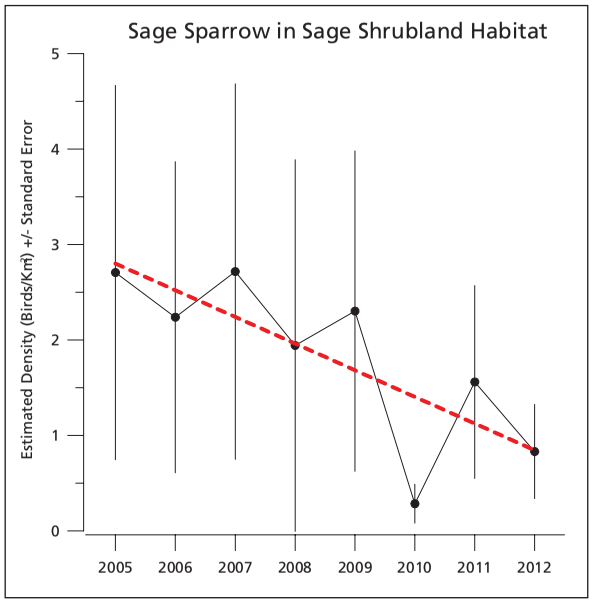


Figure 3-1. Estimated densities and population trends of ten avian species of conservation concern in the Northern Colorado Plateau Network, 2005–2012. Error bars represent standard errors of density estimates. Dashed lines represent the best estimate of observed population trend based on model selection.









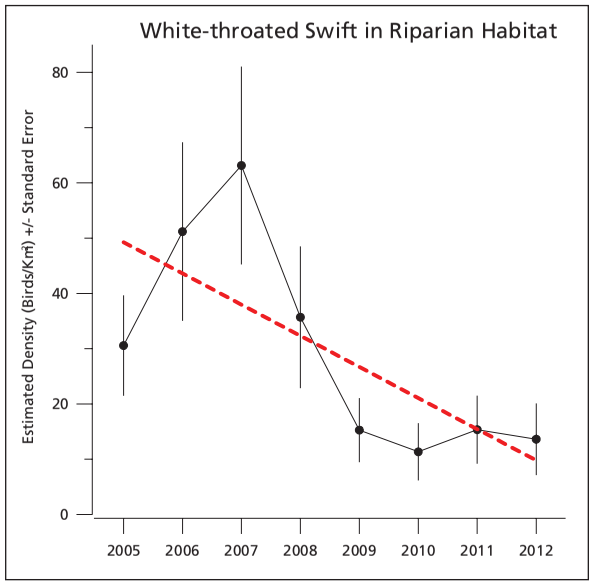


Figure 3-1, cont. Estimated densities and population trends of ten avian species in the Northern Colorado Plateau Network, 2005–2012. Error bars represent standard errors of density estimates. Dashed lines represent the best estimate of observed population trend based on model selection.

4 Discussion

The NCPN's project objective is to determine the population status and trends of breeding landbird species in low-elevation riparian, pinyon-juniper, and sage shrubland habitats.

The density estimates presented in this report for 2005–2012 replace the estimates provided in the reports for 2005–2011. For most species, each year of additional data will improve our ability to accurately estimate densities of the species that occupy the NCPN. Sample sizes (n) reported in the tables indicate the number of detections used in analyses, after truncation. In 2012, for the first time, we present density estimates for Lucy's warbler in LR, black-headed grosbeak and northern flicker in PJ, and pinyon jay in SA habitat.

For the third year, we present landbird population trend results for several species of conservation concern in the NCPN. We detected significant population trends for 10 species of concern in at least one habitat. One species showed significant trends in two habitats. Several species that exhibited trends in 2005–2011 no longer exhibited trends with an additional year of data (2005–2012). Other species that did not exhibit trends through 2011 did exhibit trends through 2012. Notably, 7 of 8 unidirectional trends indicated that sensitive species have declined from 2005 through 2012. Only one species showed a steady increase during the same time interval (see Table 3-6). 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.

In 2007, the U.S. North American Bird Conservation Initiative (NABCI) monitoring subcommittee outlined recommendations for improving monitoring programs (USNABCIMS 2007). The first recommendation was that bird-monitoring programs should integrate an adaptive-management approach into the monitoring process to incorporate management and conservation priorities. We hope that trends identified in this early warning program will lead to increased research and projects that explore species population declines in the network. The second recommendation was that landbird monitoring be coordinated among organizations and across spatial scales to make monitoring more efficient and effective.

RMBO continues to work with a variety of federal, state, and local agencies throughout 13 states. We monitor landbirds through a spatially balanced study design using Bird Conservation Regions (BCRs) as our sampling frame, which enables us to post-stratify survey data from the BCR framework by habitat and compare it to the NCPN results presented here. In 2013, we will be surveying in portions of BCR 16 in Utah for the first time. This will allow comparison between BCR-based surveys and NCPN surveys in Utah. In future years, we hope to expand our monitoring effort in the Utah portions of BCR 9 and BCR 16. Comparisons of densities in these areas may guide the NPS in making key management decisions and help the agency to assess the effectiveness of past and existing management practices.

RMBO's Avian Data Center (ADC) meets a third NABCI recommendation by providing decision support tools, such as distribution maps, species counts, monitoring reports, and species information to land managers and the public. In 2013, RMBO will release an updated version of the ADC. This will include species accounts of the 42 priority species (Appendix B) we detected during counts in 2012, as well as information on other species found in NCPN parks. In addition, RMBO is a partner of the Avian Knowledge Network, whose goals are to (1) compile bird monitoring data from various contributor organizations and organize them into one format and (2) make these data available to land managers, scientists, and the public for decisionmaking, research, and educational purposes.

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Appendix A: All bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2012, and yearly species totals for 2005–2012.

	# of individuals observed per habitat, 2012				# of individuals observed per year and total (all habitats), 2005–2012								
Species	LR	PJ	SA	PISP	2005	2006	2007	2008	2009*	2010*	2011*	2012	Total
American crow					12	1	2	4	2	2			23
American dipper	**3**				**1**	**1**	**1**	**2**	**1**			**3**	**9**
American goldfinch	18				14	5	9	7	9	35	13	18	110
American kestrel	6	3	10		10	10	11	9	10	13	20	19	102
American robin	16	15	71		104	156	144	131	66	101	142	102	946
American wigeon			4									4	4
Ash-throated flycatcher	230	131	19	4	302	415	360	358	466	378	378	380	3,037
Bank swallow							2	1		1			4
Barn swallow		3	3		1	2	3	1	2		4	6	19
Belted kingfisher							1						1
Bewick's wren	**70**	**61**	**3**	**4**	**240**	**307**	**197**	**205**	**222**	**51**	**50**	**134**	**1,406**
Black phoebe	26			2	12	16	30	13	35	6	7	26	145
Black-billed magpie			**75**		**109**	**122**	**63**	**54**	**54**	**74**	**105**	**75**	**656**
Black-capped chickadee	4				1	5	4		2	1	4	4	21
Black-chinned hummingbird	41	23	2	2	51	68	53	53	105	53	71	66	520
Black-chinned sparrow					**9**	**6**	**4**		**14**	**4**	**3**		**40**
Black-headed grosbeak	23	13	23		27	54	37	37	46	34	42	59	336
Black-throated gray warbler	**62**	**353**	**20**		**397**	**552**	**458**	**567**	**647**	**425**	**507**	**435**	**3,988**
Black-throated sparrow	**92**	**104**	**44**	**10**	**114**	**178**	**194**	**151**	**335**	**172**	**226**	**240**	**1,610**
Blue grosbeak	24		4		14	32	6	6	31	3	8	28	128
Blue-gray gnatcatcher	108	148	46	1	347	307	296	337	557	427	441	302	3,014
Blue-winged teal					1								1
Bobolink											**1**		**1**
Brewer's blackbird			31		10	56	29	10	38	42	41	31	257
Brewer's sparrow	**5**		**471**		**599**	**641**	**600**	**538**	**722**	**663**	**686**	**476**	**4,925**
Broad-tailed hummingbird	**6**	**8**	**17**		**68**	**30**	**48**	**76**	**29**	**78**	**25**	**31**	**385**
Brown creeper											1		1
Brown-headed cowbird	46	23	30		55	83	51	47	65	24	93	99	517
Bullock's oriole	14		8	3	7	35	19	13	15	27	24	22	162
Bushtit	4	25			190	140	53	30	95	11	1	29	549

Appendix A: All bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2012, and yearly species totals for 2005–2012, cont.

	# of individuals observed per habitat, 2012				# of individuals observed per year and total (all habitats), 2005–2012								
Species	**LR**	**PJ**	**SA**	**PISP**	**2005**	**2006**	**2007**	**2008**	**2009***	**2010***	**2011***	**2012**	**Total**
California gull			1		13	3						1	17
Canada goose	3	12	23		36	26	149	117	75	54	59	38	554
Canyon wren	**19**	**6**	**1**		**52**	**105**	**70**	**37**	**57**	**7**	**18**	**26**	**372**
Cassin's finch		**8**	**4**		**4**	**39**	**14**	**14**	**2**	**4**	**18**	**12**	**107**
Cassin's kingbird		6		7		2			1			6	9
Cedar waxwing							3	1	1				5
Chipping sparrow	39	118	95		156	155	196	218	287	286	289	252	1,839
Chukar		3				5	7		2	3		3	20
Clark's nutcracker	**1**	**14**	**2**		**65**	**29**	**26**	**17**	**34**	**7**	**10**	**17**	**205**
Cliff swallow		7	11		189	66	49	87		7	104	18	520
Common merganser	6				6	6	10	4	1			6	33
Common nighthawk		**7**	**3**		**2**	**2**	**1**	**2**	**6**	**17**	**3**	**10**	**43**
Common poorwill			1		1	1	1			2		1	6
Common raven	32	46	32	8	141	158	199	171	145	193	211	110	1,328
Common yellowthroat	27		3		13	30	29	9	34	17	23	30	185
Cooper's hawk	10	4			17	17	14	5	8	15	10	14	100
Cordilleran flycatcher	**2**				**4**	**1**	**2**	**3**	**3**	**3**	**1**	**2**	**19**
Dark-eyed junco		2			40	19	47	35	4	3	8	2	158
Downy woodpecker	3				5	11	3	8	14	1	8	3	53
Dusky flycatcher	**2**	**26**	**63**		**51**	**111**	**99**	**136**	**108**	**98**	**100**	**91**	**794**
Dusky grouse					**1**		**1**						**2**
Eared grebe									1				1
Eastern kingbird											2		2
Eurasian collared-dove				8			1				2		3
European starling			8	12	15	21	11	17		36	14	8	122
Evening grosbeak			2				1				2	2	5
Ferruginous hawk										**1**			**1**
Gadwall					2	1	4				3		10
Gambel's quail		6		1	9	15		1				6	31
Golden eagle	**1**	**3**	**3**		**8**	**10**	**4**	**6**	**1**			**7**	**36**

Appendix A: All bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2012, and yearly species totals for 2005–2012, cont.

	# of individuals observed per habitat, 2012				# of individuals observed per year and total (all habitats), 2005–2012								
Species	LR	PJ	SA	PISP	2005	2006	2007	2008	2009*	2010*	2011*	2012	Total
Grace's warbler		**13**	**10**		**15**	**31**	**40**	**31**	**26**	**19**	**33**	**23**	**218**
Gray flycatcher	2	113	12		160	116	108	142	265	227	158	127	1303
Gray vireo	**10**	**139**	**6**		**137**	**128**	**104**	**150**	**251**	**163**	**121**	**155**	**1,209**
Great blue heron	2				10	3	3	3	1	6	3	2	31
Great horned owl	1				3			1		1		1	6
Greater sage-grouse			**5**		**19**	**2**	**1**					**5**	**27**
Green-tailed towhee	**5**	**9**	**512**		**350**	**463**	**364**	**302**	**330**	**220**	**385**	**526**	**2,940**
Green-winged Teal						1							1
Hairy woodpecker	17	10	3		13	21	22	17	28	21	20	30	172
Hammond's flycatcher							**9**	**9**	**21**		**1**		**40**
Hermit thrush	1	27			15	21	2		24	14	46	28	150
Horned lark			23		31	41	43	23	50	32	29	23	272
House finch	120	198	55	5	286	363	446	429	569	328	396	373	3,190
House sparrow				3									0
House wren	39	14	14		59	62	39	55	61	48	88	67	479
Indigo bunting	6					1			6			6	13
Juniper titmouse	**15**	**105**	**5**		**147**	**120**	**138**	**159**	**271**	**198**	**154**	**125**	**1,312**
Killdeer			2		4	3	2	3	5	1		2	20
Lark bunting											**2**		**2**
Lark sparrow	4	20	135		140	157	104	51	181	150	159	159	1,101
Lazuli bunting	**116**	**12**	**28**		**183**	**157**	**226**	**190**	**284**	**253**	**190**	**156**	**1,639**
Lesser goldfinch	43	11	1		47	77	120	87	186	50	63	55	685
Lincoln's sparrow					1			2	1				4
Loggerhead shrike		**1**	**1**		**3**	**1**		**1**		**5**		**2**	**12**
Long-eared owl						2							2
Lucy's warbler	42				1		11	20	46	7	24	42	151
Macgillivray's warbler	3				3	9	3	4	7	11		3	40
Mallard			5		2	16	3	17	5	4	9	5	61
Mountain bluebird		**46**	**85**		**160**	**138**	**179**	**116**	**145**	**151**	**156**	**131**	**1,176**
Mountain chickadee	1	19	5		34	22	25	14	26	8	36	25	190

Appendix A: All bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2012, and yearly species totals for 2005–2012, cont.

	# of individuals observed per habitat, 2012				# of individuals observed per year and total (all habitats), 2005–2012								
Species	LR	PJ	SA	PISP	2005	2006	2007	2008	2009*	2010*	2011*	2012	Total
Mourning dove	61	109	49		426	573	520	402	282	437	332	219	3,191
Northern flicker	8	13	42		50	57	58	22	50	73	64	63	437
Northern goshawk								1					1
Northern harrier	4		3		2	4	5	6	2	9	2	7	37
Northern mockingbird	5	24	5			25	11	17	22	24	21	34	154
Northern pintail			4									4	4
Northern rough-winged swallow	6		1		7	7	6	8	19	5	12	7	71
Northern shoveler							4						4
Olive-sided flycatcher					16	4	4	2	18		2		46
Orange-crowned warbler	1	1	1		2	2	2	2		2	3	3	16
Osprey					1			1			1		3
Peregrine falcon		1	1		5	5	7	10	1	7	5	2	42
Phainopepla		5							3			5	8
Pine siskin		6	6		4	22	4	17	16	18	69	12	162
Pinyon jay	7	74	72		122	177	229	74	97	327	112	153	1,291
Plumbeous vireo	38	35	11		147	165	139	131	150	216	158	84	1,190
Prairie falcon					2			2	1	1	3		9
Pygmy nuthatch		7	5		13	10	23	7	10	9	26	12	110
Red crossbill		9			1	23	11		23	6	3	9	76
Red-breasted nuthatch											1		1
Red-naped sapsucker					11	5	7	1	2	1	5		32
Red-tailed hawk	1					2		1	2			1	6
Red-winged blackbird	1	3	6		12	17	11	9	12	5	8	10	84
Ring-billed gull			11			4	1	2	1	1	8	11	28
Rock pigeon							2						2
Rock wren		6			2	5	3			3	3	6	22
Ruby-crowned kinglet	63	36	64		315	403	349	303	417	254	366	163	2,570
Sage sparrow	1	6	1		4	4	3	9	11	10	7	8	56
Sage thrasher			12		43	33	31	21	41	10	18	12	209

Appendix A: All bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2012, and yearly species totals for 2005–2012, cont.

	# of individuals observed per habitat, 2012				# of individuals observed per year and total (all habitats), 2005–2012								
Species	**LR**	**PJ**	**SA**	**PISP**	**2005**	**2006**	**2007**	**2008**	**2009***	**2010***	**2011***	**2012**	**Total**
Sandhill crane			60		93	95	88	156	128	150	131	60	901
Savannah sparrow			1			1		2	1			1	5
Say's phoebe			**2**			**1**	**1**					**2**	**4**
Scott's oriole	35	13	17	3	102	98	63	94	116	89	125	65	752
Sharp-shinned hawk	5	3					1	5	6			8	20
Short-eared owl						**1**	1	2					**4**
Song sparrow						4			1				5
Spotted sandpiper	27		2		62	76	69	62	39	10	45	29	392
Spotted towhee	324	121	92		1	2	7		3	8			21
Steller's jay					432	610	500	405	541	548	619	537	4,192
Summer tanager			2		5	5	16	9	5	9	3	2	54
Swainson's thrush									1				1
Townsend's solitaire		**4**	**8**		**5**	**6**	**13**	**6**	**19**	**12**	**12**	**12**	**85**
Tree swallow			1		3	40	28	102	5	2	88	1	269
Turkey vulture	18	5	8		25	30	29	9	19	24	22	31	189
Veery						**1**							**1**
Vesper sparrow		24	547		381	495	489	472	483	609	675	571	4,175
Violet-green swallow	**333**	**77**	**56**	**5**	**283**	**514**	**546**	**429**	**414**	**295**	**366**	**466**	**3,313**
Virginia's warbler	**38**	**59**	**13**		**122**	**109**	**102**	**161**	**46**	**123**	**100**	**110**	**873**
Warbling vireo	**25**	**7**	**13**		**44**	**58**	**67**	**51**	**39**	**32**	**35**	**45**	**371**
Western bluebird	**5**	**6**	**6**		**17**	**19**	**20**	**18**	**29**	**9**	**22**	**17**	**151**
Western grebe						1					2		3
Western kingbird	1	13	3	3	2	5	2	6	24	11	4	17	71
Western meadowlark		28	239		229	239	182	213	282	227	312	267	1,951
Western screech-owl					1								1
Western scrub-jay	22	24	12		117	90	80	85	59	86	78	58	653
Western tanager	13	39	9		45	69	72	59	45	57	41	61	449
Western wood-pewee	22	3	5		40	44	64	44	56	28	25	30	331
White-breasted nuthatch	2	26	6		27	28	30	17	23	27	24	34	210
White-crowned sparrow	13					6	4	16	2	3	3	13	47

Appendix A: All bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2012, and yearly species totals for 2005–2012, cont.

	# of individuals observed per habitat, 2012				# of individuals observed per year and total (all habitats), 2005–2012								
Species	**LR**	**PJ**	**SA**	**PISP**	**2005**	**2006**	**2007**	**2008**	**2009***	**2010***	**2011***	**2012**	**Total**
White-faced ibis					1								1
White-throated swift	**179**	**152**	**44**	**5**	**573**	**676**	**815**	**514**	**348**	**295**	**389**	**375**	**3,985**
Wild turkey	13				6	14	2	7	17	10	11	13	80
Williamson's sapsucker			**2**		**1**		**1**	**1**				**2**	**5**
Willow flycatcher	**3**				**1**	**3**	**3**		**1**			**3**	**11**
Wilson's warbler	2					4		3	3	6	1	2	19
Yellow warbler	267		16		158	175	155	182	292	255	191	283	1,691
Yellow-billed cuckoo						**1**							**1**
Yellow-breasted chat	86		14		52	58	54	49	72	89	63	100	537
Yellow-rumped warbler	22	8	16		26	66	32	51	15	75	101	46	412
Total	**3,021**	**2,862**	**3,528**	**86**	**9,387**	**11,201**	**10,574**	**9,642**	**11,455**	**9,803**	**10,568**	**9,411**	**82,041**

*Totals shown for these years have been corrected (relative to those shown in previous reports).

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

Appendix B. Priority species observed on transects in the Northern Colorado Plateau Network, 2005–2012, with conservation and management designations and species totals per habitat.

Common name	Management designations						Number of individuals observed per habitat, 2005–2012			
	UDWR[1]	USFWS[2]			Partners in Flight[3]					
		BCR 10	BCR 16	Region 6	BCR 10	BCR 16	LR	PJ	SA	PISP
American dipper					RS		9			
Bewick's wren				BCC			529	848	29	9
Black-billed magpie						RS	4	20	632	
Black-chinned sparrow						CC	18	21	1	
Black-throated gray warbler						RC	624	3,146	218	4
Black-throated sparrow						RC	740	701	169	73
Bobolink	WSC						1			
Brewer's sparrow		BCC	BCC		CC,RC	CC,RC	34	78	4,813	2
Broad-tailed hummingbird						RS	103	110	172	
Canyon wren						RC	258	109	5	2
Cassin's finch		BCC	BCC	BCC	RC,CS,RS	RC	8	63	36	
Clark's nutcracker					CS,RS	CS,RS	34	80	91	
Common nighthawk						RC	2	33	8	
Cordilleran flycatcher						RS	15	4		
Dusky flycatcher					CS,RS		33	221	540	
Dusky grouse					CC,RC	CC			2	
Ferruginous hawk	WSC	BCC	BCC	BCC	RC	RC			1	
Golden eagle			BCC	BCC		RC	4	16	16	
Grace's warbler			BCC			CC,RC	3	124	91	
Gray vireo			BCC	BCC		CC,RC,RS	182	970	57	3
Greater sage-grouse	FCS				CC,RC,CS,RS	CC,RC			27	
Green-tailed towhee						CS,RS	27	100	2,813	
Hammond's flycatcher					RS		1	34	5	
Juniper titmouse			BCC			RC,RS	255	1,017	40	8
Lark bunting					RC		2			
Lazuli bunting					RS		1,343	80	216	
Loggerhead shrike		BCC		BCC	RC	RC	1	6	5	
Mountain bluebird						RC,CS,RS	57	410	709	
Northern goshawk	CAS				RC,RS				1	

Appendix B. Priority species observed on transects in the Northern Colorado Plateau Network, 2005–2012, with conservation and management designations and species totals per habitat, cont.

Common name	Management designations						Number of individuals observed per habitat, 2005–2012			
	UDWR[1]	USFWS[2]			Partners in Flight[3]					
		BCR 10	BCR 16	Region 6	BCR 10	BCR 16	LR	PJ	SA	PISP
Northern harrier					RC		10		27	
Olive-sided flycatcher		BCC			CC,RC	CC	1	10	35	
Peregrine falcon		BCC	BCC	BCC			24	14	4	3
Pine siskin						RC,RS	55	60	47	2
Pinyon jay			BCC	BCC	CC	CC,RC,CS,RS	66	921	304	
Plumbeous vireo						RS	555	530	105	
Prairie falcon			BCC	BCC		RC	4		5	
Pygmy nuthatch						RC		55	55	
Red crossbill					RS			33	43	
Red-naped sapsucker					CS,RS		5		1	
Rock wren						RS	892	832	846	15
Sage sparrow		BCC		BCC		RC	3		206	
Sage thrasher		BCC		BCC				1	900	1
Say's phoebe						RS	443	154	155	18
Short-eared owl	WSC			BCC	CC				5	
Townsend's solitaire					RS		5	49	31	
Veery			BCC						1	
Violet-green swallow						RS	2,310	573	430	12
Virginia's warbler						CC,RC,RS	303	368	202	
Warbling vireo						RS	238	32	101	
Western bluebird						RS	41	40	70	
White-throated swift					CC	CC,RS	2,435	1,265	285	20
Williamson's sapsucker		BCC			CS,RS	CS,RS		1	4	
Willow flycatcher	FES	BCC	BCC	BCC	CC,RS	CC,RC	10	1		
Yellow-billed cuckoo	FCS	BCC	BCC				1			

Habitats: LR=low-elevation riparian; PJ=pinyon-juniper; SA=sage shrubland; PISP=Pipe Spring National Monument.

[1] UDWR=Utah Division of Wildlife Resources; FCS=Federal Candidate Species; FTS=Federally Threatened Species; FES=Federally Endangered Species; CAS=Conservation Agreement Species; WSC=Wildlife Species of Concern, Utah Sensitive Species List (2011)

[2] 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 for Region 6 (Mountain-Prairie Region) (U.S. Fish and Wildlife Service 2008).

[3] BCR10=Bird Conservation Region 10, BCR 16=Bird Conservation Region 16, CC=Continental Concern Species, RC=Regional Concern Species, CS=Continental Stewardship Species, RS = Regional Stewardship Species (Partners in Flight 2005).

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NPS 960/121303, June 2013

National Park Service
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