Monitoring Birds of the National Park Service, Northern Colorado Plateau Network (NCPN): 2010 Field Season Report

March 2011

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ROCKY MOUNTAIN BIRD OBSERVATORY

***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.*

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***Cover Photo**:* Yampa River (Dinosaur NM), Pinyon Jay (Colorado NM), Ash-throated Flycatcher (Colorado NM), by Greg Joder. Used with permission.

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EXECUTIVE SUMMARY

In 2010, the Rocky Mountain Bird Observatory, in cooperation with its partner, the National Park Service, completed its sixth year of a habitat-based landbird monitoring program. This program is designed to provide rigorous population trend data on most diurnal, regularly occurring breeding landbird species throughout the Northern Colorado Plateau Inventory and Monitoring Network. This information is useful for land managers and supports the National Park Service's goal of developing long-term monitoring of biological indicators in all park units. The program, *Monitoring Birds of the National Park Service, Northern Colorado Plateau Network,* is consistent with goals emphasized by the U.S. North American Bird Conservation Initiative Committee (US North American Bird Conservation Initiative Monitoring Subcommittee 2007)

We surveyed 45 transects within 11 National Park units. We placed 15 transects in each of the 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. We also conducted 10 points during the second year of a modified monitoring design at Pipe Springs National Monument.

This year we surveyed 100% of the assigned transects with 94 transect visits completed between 8 May and 13 July. We recorded 9,413 birds of 113 species. We detected 2,882 birds of 83 species in Low-Elevation Riparian, 2,987 birds of 80 species in Pinyon-Juniper, and 3,347 birds of 85 species in Sage Shrubland. We detected a total of 197 birds of 29 species in Pipe Springs National Monument. We recorded one new species (pink-sided Dark-eyed Junco) at Colorado National Monument that we previously noted as probably present and two new species (Black Phoebe and Eurasian-collared Dove) at Pipe Spring National Monument.

We pooled the 2005-2010 data to generate density estimates for species with sufficient data. This year we calculated density estimates for 60 species in at least one habitat. The data yielded robust density estimates (Coefficient of Variation, CV < 50%) for 41 species in 2010. We should be able to reach our target of detecting a population change of at least 3% within 30 years for these species. RMBO recorded 41 bird species that are of conservation and management concern throughout NCPN. We calculated density estimates for 25 of these species.

With the NCPN program in its six year, we also conducted trend analyses for these 25 species. Each analysis was conducted separately for each habitat. We detected significant trends for six species, four of which had positive trend detection and two of which had negative trend detection. Populations appear to be stable (no trend detected) for most species of conservation concern within NCPN, however Bewick's Wren in pinyon-juniper habitat and Black-billed Magpie in sagebrush habitat appear to be experiencing significant declines, warranting further investigation. The trend was not significant for Bewick's wren in low-elevation riparian habitat, although the density estimate in 2010 was the lowest estimated for the 6 years of this program. Long-term monitoring will continue to be necessary for interpreting population status and trends for avian species of NCPN.

In December of 2010, RMBO and NCPN met to discuss how to improve statistical design and review the current design to make sure it is meeting NCPN's desired objectives. A spatially balanced study design is more statistically rigorous and would allow us to analyze data at a variety of spatial scales. In 2010 we surveyed three transects within NCPN (part of the Monitoring the Birds of Colorado program) utilizing this study design. In larger parks such as

Dinosaur and Canyonlands, NCPN can adopt this design in Sagebrush and Pinyon-Juniper habitats.

ACKNOWLEDGEMENTS

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We thank Dustin 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 us access into the backcountry of the parks, and assisting with logistics. Thank you to our 2010 crew of field biologists: Glenn Giroir, Carl Ingwell and Greg Joder who spent many weeks in the field, sometimes under difficult conditions, conducting transects and collecting data. We thank Chandman Sambuu for his work on the RMBO database and data entry and management system, Jennifer Blakesley for providing her expertise in statistical analysis, Nick Vanlanen for conducting the trend analyses in program SAS and RMBO staff for their careful review of this report.

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INTRODUCTION

Program History

In 2010, Rocky Mountain Bird Observatory (RMBO), in cooperation with its partner, the National Park Service (NPS), completed its sixth year of a habitat-based landbird monitoring program. We designed this program to provide rigorous population trend data on most diurnal, regularly occurring breeding landbird species in 11 National Parks in three states (CO, WY, UT) in the Northern Colorado Plateau Inventory and Monitoring Network (NCPN). We also conducted a second year of a modified monitoring design at Pipe Spring National Monument (PISP), AZ. In addition to monitoring landbird populations, this program generates information useful for managing birds such as annual density estimates, habitat associations and spatial distribution. It 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), *Monitoring Birds of the National Park Service, Northern Colorado Plateau Network,* is consistent with goals emphasized by the U.S. North American Bird Conservation Initiative (NABCI) Committee (U.S. NABCI Monitoring Subcommittee 2007).

Reasons for Monitoring

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

The apparent large-scale declines of avian populations and the loss, fragmentation and degradation of native habitats highlight the need for extensive and rigorous landbird monitoring programs (Rich et al. 2004, US North American Bird Conservation Initiative Committee 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), the National Forest Management Act (1976) and various state laws (Manley 1993, Sauer 1993).

Monitoring Objectives

This 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 complex biological data on the population size, distribution, population trend, threats, and regional abundance of individual bird species to generate simple numerical scores that rank each species in terms of its 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.

We designed our landbird monitoring programs to provide population status and trend information for regularly-occurring breeding landbird species within sagebrush, pinion-juniper, and low-elevation riparian habitats. Initially, we expect to collect data to provide "early-warning"

information for all species we can monitor through a habitat-based approach. After establishing this monitoring framework, we anticipate that this data will lead to more questions and research areas to determine the possible reasons for any observed and to enable better informed management decisions. Herein we discuss the initial "early-warning" monitoring framework, and the monitoring goals and progress.

The specific objective of NCPN's monitoring program is to determine the status and trends in breeding-bird species' density in sagebrush, pinyon-juniper, and riparian habitats. With this information, to provide long-term status and trend estimates for landbirds in the above habitats, we have established a target of an 80% probability of detecting a minimum rate of population change of 3.0% per year in 30 years, with a Type I error rate of 10%. We maintain a high quality online database that is accessible to collaborators as well as the public in the form of raw and summarized data. We will use these data to generate decision support tools such as population estimate models that help guide conservation efforts and provide a better measure of conservation success.

METHODS

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 avifaunal communities and because of the management questions associated with each. During the spring and summer of 2005, RMBO staff established 45 transects in these habitats (15 in each, see figures 1-3). In 2009, we added four point counts and area inventories at Pipe Springs National Monument (Figure 4).

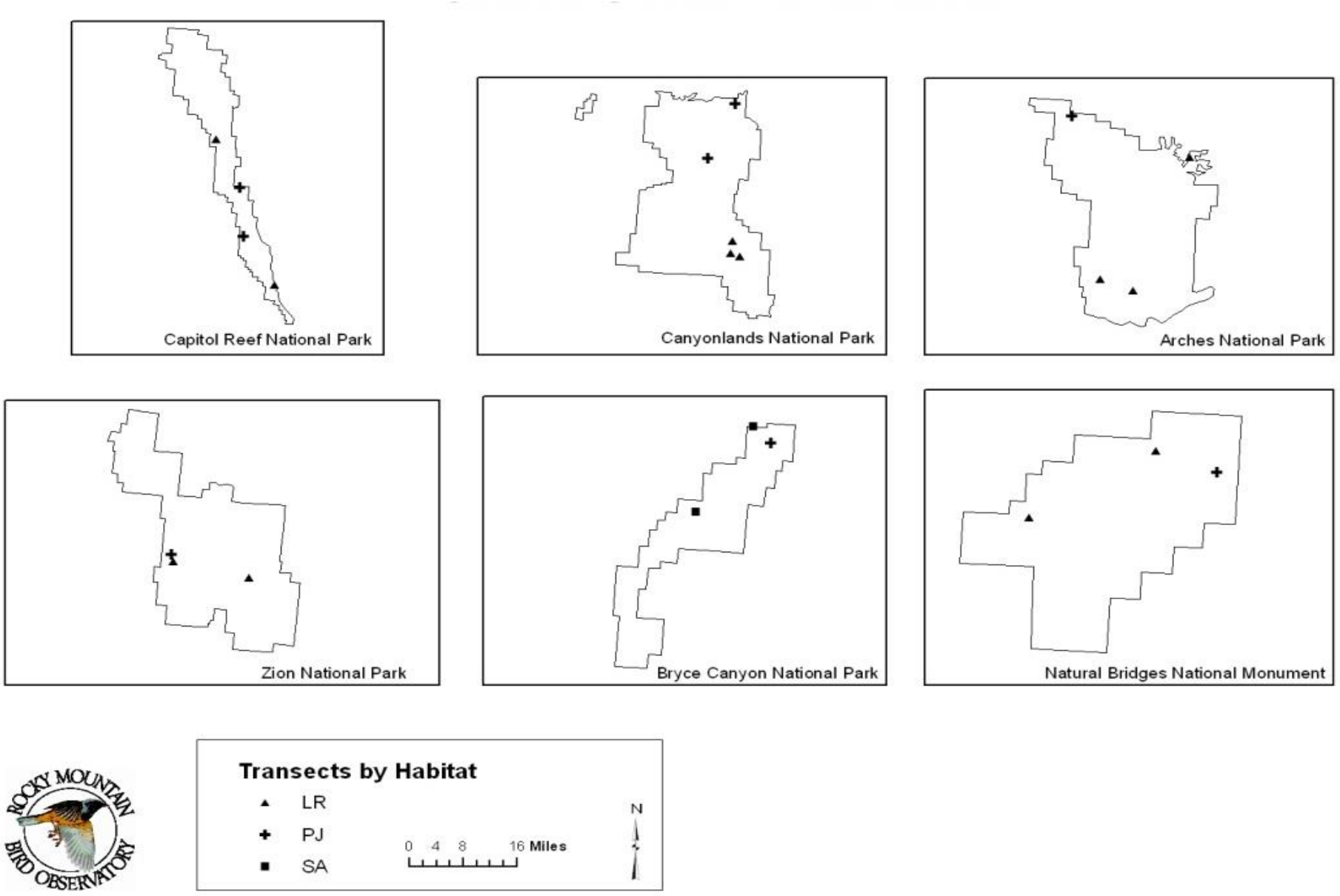

Figure 1. Utah transect locations by habitat within the Northern Colorado Plateau Network.

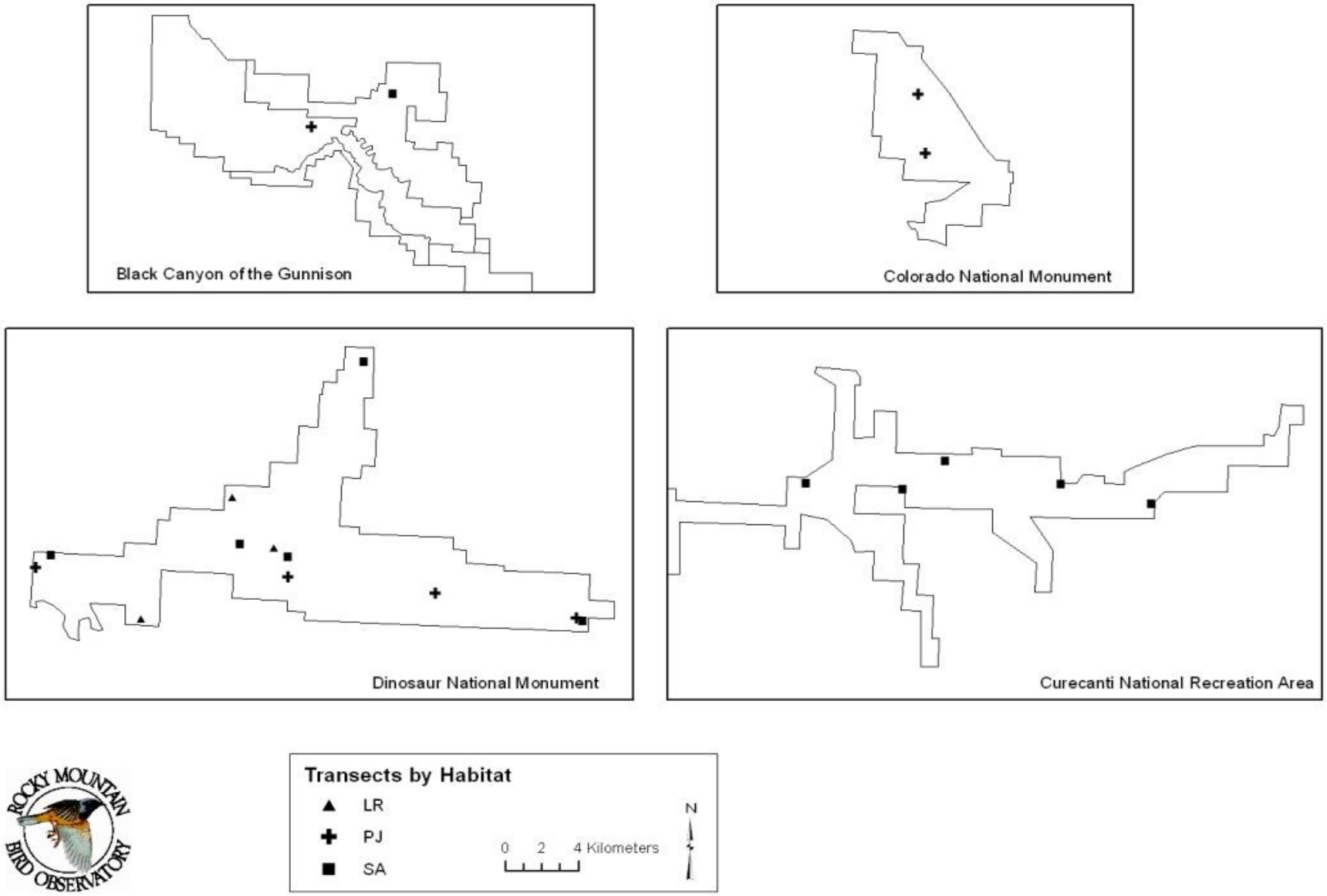

Figure 2. Colorado transect locations by habitat within the Northern Colorado Plateau Network.

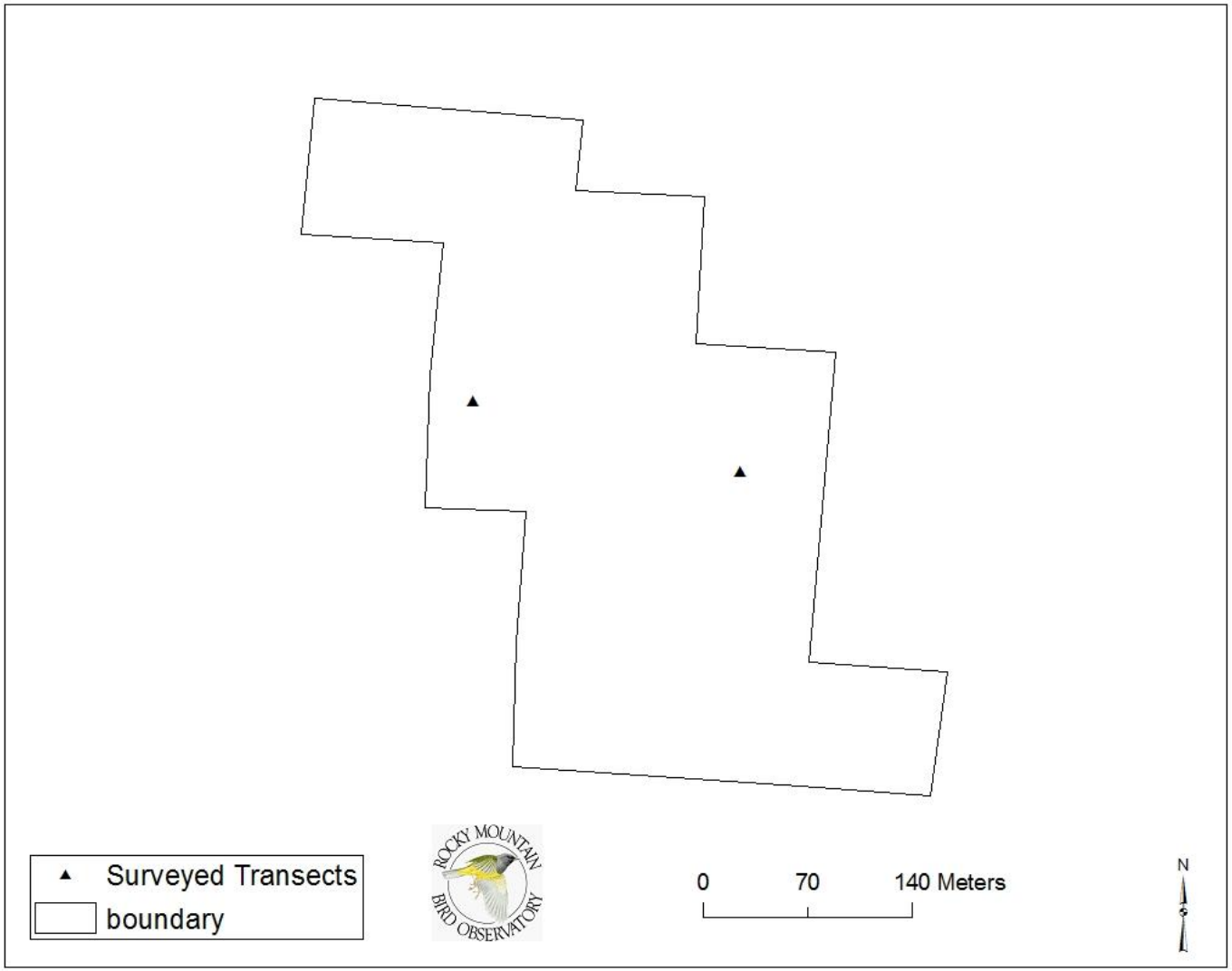

Figure 3. Fossil Butte (Wyoming) National Monument transect locations within the Northern Colorado Plateau Network.

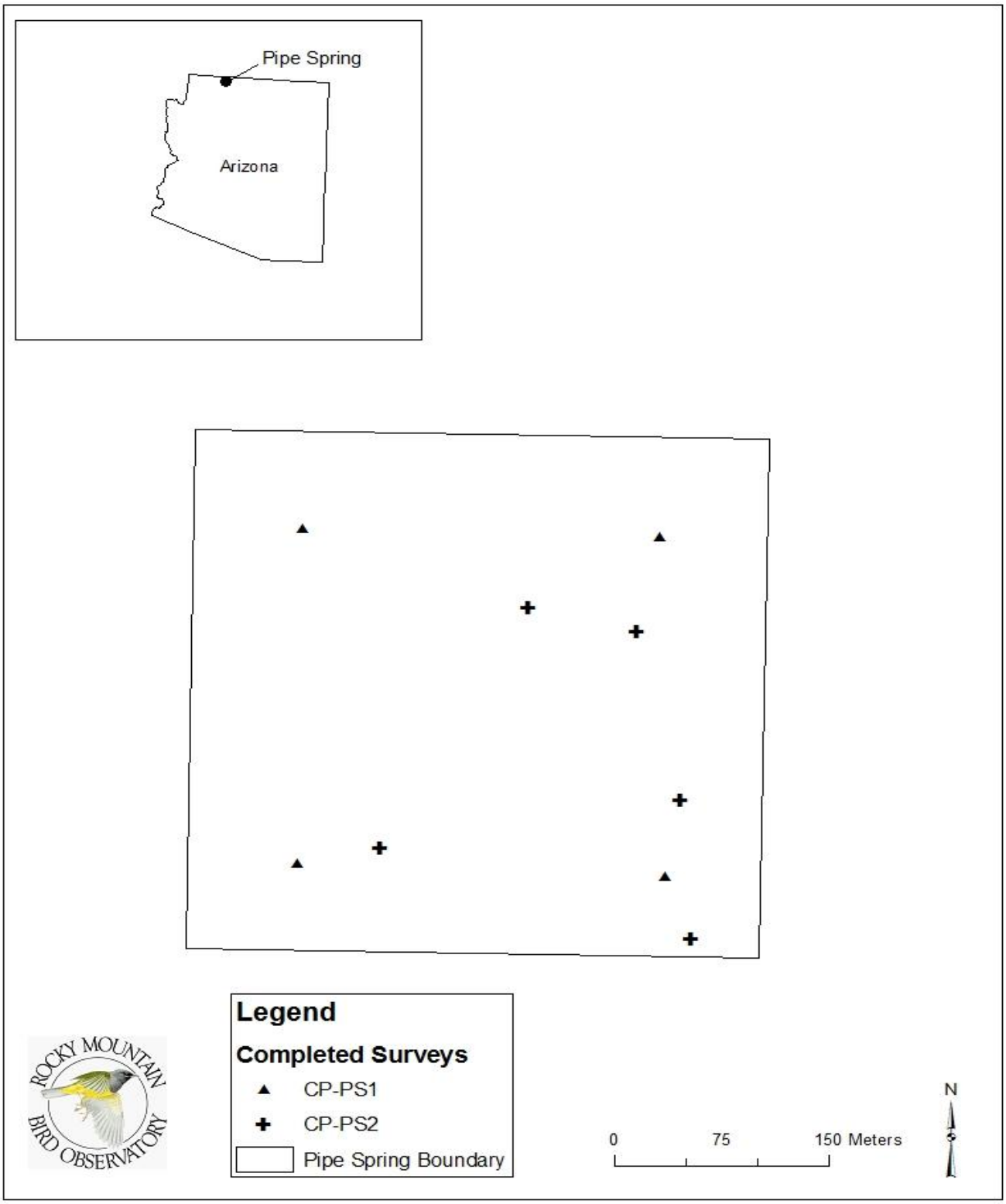

Figure 4. Pipe Springs National Monument (Arizona) survey locations within Colorado Plateau Network.

Low-Elevation Riparian (LR)
This 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 low-elevation riparian 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.

Pinyon-Juniper (PJ)
Pinyon-Juniper typically lies just above semidesert shrubland habitat in elevation. It covers most of the ridges and mesas and is the most extensive habitat in the NCPN. The two main components of this habitat – pinyon pine (*Pinus edulis*) and juniper (*Juniperus* spp.) – vary in composition.

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

Pipe Springs National Monument (PISP)
One observer spent two days conducting surveys at two locations on PISP. Due to the small size of this monument (40 acres), four point count stations were visited in a mixture of pinyon-juniper, low-elevation riparian and semidesert shrubland habitats. The observer then visited the main visitor area, conducting a 1,200 meter transect, with five point count stations (figure 4). Second visits were made 28 days later. Most management actions take place near this area and the monument is interested in seeing how the bird community changes here over time.

Field Personnel
The RMBO field staff in 2010 consisted of three experienced biologists with excellent aural and visual bird-identification skills. Two had previously surveyed NCPN sites. Each biologist completed a one-week training program at the beginning of the season to ensure full understanding of the field protocol.

Site Selection
The NPS and RMBO selected survey sites during the winter of 2005. For Pinyon-Juniper and Sage Shrubland habitat, we used GIS and the Southwest Regional Re-GAP Analysis Project (http://fws-nmcfwru.nmsu.edu/SWREGAP/factsheet.htm) to randomly select the sites from a pool of habitat "stands" that were large enough to accommodate transects consisting of 15 point-count stations spaced 250m apart. We excluded areas with >50% slope from the list of potential sites to ensure that selected stands could be accessed safely on foot. For Low-Elevation Riparian survey sites, we limited our options to wadeable streams, excluded the Colorado, Green, Gunnison, and Virgin rivers. Since there is a limited amount of riparian habitat, we manually selected survey location for this habitat. RMBO staff "ground-proofed" the selected stands during the early spring of 2005, and established transects during the field season. In the few cases where the originally-selected stands were unacceptable, we chose replacement stands in the same manner as the original stands. We established all transect locations during the 2005 field season and have surveyed these same locations every season.

Sampling Design
We sampled landbird populations in each habitat selected for monitoring following the protocol established by Leukering (Revised 2005.) and modified by Hanni et al (2009). We surveyed all

transects between ½-hour before sunrise and 11 AM. We conducted 15 five-minute point counts at stations located at 250-m intervals along each transect. In order to increase our sample size, we surveyed each of the 45 transects two times during the summer; each visit on a separate day. At each point, we recorded all birds detected during the five-minute survey. For every bird detected during the five minute period, we recorded species, sex, horizontal distance from the observer, the minute we detected each bird, and type of detection (e.g. call, song or visual). Observers measured radial distances to each bird using laser rangefinders. When it was not possible to measure distance to a bird, observers estimated distance by measuring to some nearby object. Observers also recorded birds flying over but not using the immediate surrounding landscape. For distribution mapping purposes, observers recorded the presence of all low density species they detected when traveling between point-count locations. Low density species are those rare or difficult to detect species (e.g., woodpeckers, owls, raptors) which we generally record in low numbers.

We considered all non-independent detections of birds, i.e., flocks or pairs of conspecific birds together in close proximity, as part of a 'cluster' rather than as separate independent observations. Observers recorded clusters by recording the number of birds detected within the cluster along with a letter code to keep track of each distinct cluster.

At the start and end of each transect, we recorded time, temperature in degrees Fahrenheit, percent cloud cover, precipitation type, and wind speed using the Beaufort scale. We measured distances between points using hand-held Global Positioning System (GPS) units. We recorded all GPS data in Universal Transverse Mercator (UTM) North American Datum 1983 (NAD 83). At each point, we recorded UTM coordinates, vegetation data (within a 50 meter radius), and distance from a road (if within 100 meters). For vegetation data, we recorded the habitat's structural stage as well as types, relative abundance, percent coverage, and mean height of trees, shrubs, and groundcover. If there was a distinct tree sub-canopy present, we recorded the species of trees. We recorded these data prior to beginning each point count.

Data Analysis

Distance Analysis

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 (for birds e.g., their size, color, movement, volume or frequency of song), the sampling landscape (e.g., density of vegetation), and observer ability. Because the detection function is unique to each species in each habitat, Distance analysis avoids some serious problems inherent in traditional analyses of point-count data (e.g., unquantifiable differences in detectability among habitats, species, and years). Distance analysis relies on three assumptions, all of which are reasonably well met by this program: 1) all birds at the point (distance=0) are detected, 2) distances of birds close to the point are measured accurately, and 3) birds do not move in response to the observer's presence.

We estimated densities of species for which we obtained at least 60 independent detections across years, within a sampled habitat. We excluded birds flying over but not using the immediate surrounding landscape and birds detected between points from analyses. We fit the following functions to the distribution of distances for each species: Half normal key function with cosine series expansion, Uniform function with cosine series expansion, Hazard rate key function with cosine series expansion, and Hazard rate key function with simple polynomial

series expansion (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 program Distance using bootstrapping of transects within strata rather than using empirical estimates. Empirical methods tend to underestimate variance from small sample sizes.

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

Trend Detection

We modeled observed trends in populations of all species of conservation concern (Appendix B) in each habitat using data from all years (2005-2010). We used weighted regression and Information-Theoretic model selection (Burnham and Anderson 2002). For each species four different functions were modeled 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 Akaike's Information Criterion (AIC) corrected for small sample size (AICc) to select the most parsimonious trend for each species (Burnham and Anderson 2002). Input data were density estimates and their variances, with the inverse of the variance used as a variable weight (giving more weight to more precise estimates). Confidence limits of the beta estimate (β_{trend}) were used to determine significance of the trend.

RESULTS

In 2010, our sixth year of landbird monitoring in the NCPN, we conducted 1,262 point counts along 45 transects (we surveyed all transects twice) in three habitats between 8 May and 13 July, 2010 (Table 1).

Table 1. Bird sampling periods and effort in each habitat in the Northern Colorado Plateau Network, 2010.

Habitat	Dates Sampled	# Transects*	# Point Counts
Low-Elevation Riparian	11 May - 13 July	15	389
Pinyon-Juniper	08 May - 12 July	15	432
Sage Shrubland	21 May - 9 July	15	441
All habitats	**08 May – 13 July**	**45**	**1,262**

*Technicians surveyed all transects twice.

We recorded 9,413 birds of 113 species (Table 2, Appendix A). We detected 2,882 birds of 83 species in Low-Elevation Riparian, 2,987 birds of 80 species in Pinyon-Juniper, and 3,347 birds of 85 species in Sage Shrubland. We detected a total of 197 birds of 29 species in Pipe Springs National Monument. We recorded one new species, the Dark-eyed Junco subspecies Pink-sided (*Junco hyemalis*), at Colorado National Monument that we previously noted as probably present and two new species, Black Phoebe (*Sayornis nigricans*) and Eurasian Collared-dove (*Streptopelia decaocto*) at Pipe Spring National Monument that had not previously been reported for the park.

This year we calculated density estimates for 60 species in at least one habitat. The habitat-stratified data yielded robust density estimates (CV < 50%) for 41 species. These 41 species

represent 36% of species detected on transects in the NCPN during 2010 and 89% of birds observed on transects.

RMBO recorded 41 bird species that are of conservation and management concern throughout NCPN (Appendix B). We calculated density estimates for 25 of these species.

Table 2. Bird totals and averages by habitat in the Northern Colorado Plateau Network, 2010.

Habitat	# Birds Detected	Avg. # Birds per Transect	# Species Detected	Avg. # Species per Transect
Low-Elevation Riparian	2,882	96	83	28
Pinyon-Juniper	2,987	100	80	26
Sage Shrubland	3,347	112	85	26
All habitats	**9,413**	**100**	**113**	**27**

Low-Elevation Riparian (LR)
We surveyed all 15 transects in LR twice this year. We calculated density estimates for 38 species, 14 of which are priority species. The pooled 2005-2010 data yielded robust density estimates (Coefficient of Variation, CV < 50%) for 22 species and a moderately robust estimate (CV = 50-75%) for three additional species (Table 3). We should be able to reach our target of detecting population changes of at least 3% within 30 years for these 22 species, which represent 27% of species detected and 80% of birds detected in LR.

The following 10 species had the highest estimated densities of species recorded in LR in 2010 (listed in order from highest to lowest density)

1. Black-chinned Hummingbird
2. Yellow Warbler
3. Blue-gray Gnatcatcher
4. Violet-green Swallow
5. Spotted Towhee
6. Lazuli Bunting
7. Ash-throated Flycatcher
8. House Finch
9. Plumbeous Vireo
10. Chipping Sparrow

The following 17 species had higher estimated densities in LR compared to the other 2 habitats sampled in 2010 (listed in order from highest to lowest density):

1. Black-chinned Hummingbird
2. Yellow Warbler
3 Violet-green Swallow
4. Spotted Towhee
5. Lazuli Bunting
6. Ash-throated Flycatcher
7. Plumbeous Vireo
8. Black-throated Sparrow
9. Lesser Goldfinch
10. White-throated Swift
11. Yellow-breasted Chat
12. American Robin
13. Western Tanager
14. Common Yellowthroat
15. Rock Wren
16. Warbling Vireo
17. Western Wood-Pewee

Table 3. Estimated densities per km^2 (D), lower and upper 90% confidence limits on D (LCL,UCL), percent coefficient of variation of estimates (% CV), and sample sizes (n) of breeding birds in Low-Elevation Riparian habitat in the Northern Colorado Plateau Network, 2005-2010. Dashes indicate the sample size was insufficient for estimating density. Priority species are bolded.

Species	Year	D	LCL	UCL	% CV	n
American Robin	2005	7.03	1.57	31.49	113	16
	2006	10.40	2.60	41.57	101	26
	2007	12.78	3.42	47.79	94	34
	2008	15.82	3.87	64.59	103	40
	2009	---	---	---	---	6
	2010	7.67	1.98	29.69	97	20
Ash-throated Flycatcher	2005	19.63	14.43	26.69	19	147
	2006	19.62	14.07	27.37	20	223
	2007	20.61	13.97	30.42	24	196
	2008	31.77	19.76	51.07	29	190
	2009	15.35	9.12	25.83	32	123
	2010	24.70	17.27	35.34	22	180
Black-chinned Hummingbird	2005	271.21	137.06	536.67	35	18
	2006	291.73	162.41	524.02	30	20
	2007	172.22	91.51	324.09	33	12
	2008	156.52	84.58	289.65	32	11
	2009	243.58	129.65	457.64	33	14
	2010	180.81	98.33	332.47	31	11
Bewick's Wren	2005	6.87	3.66	12.90	40	47
	2006	14.77	8.49	25.69	34	108
	2007	8.07	4.15	15.69	42	58
	2008	8.93	4.74	16.81	40	68
	2009	15.19	8.71	26.49	35	93
	2010	3.06	1.58	5.93	42	19
Blue-gray Gnatcatcher	2005	54.40	39.06	75.77	20	103
	2006	72.38	49.01	106.91	24	141
	2007	53.98	38.11	76.47	21	108
	2008	62.86	39.45	100.18	29	125
	2009	140.98	98.36	202.06	22	218
	2010	90.17	64.10	126.84	21	159
Brown-headed Cowbird	2005	---	---	---	---	7
	2006	11.84	6.10	22.98	41	24
	2007	8.10	3.41	19.27	56	16
	2008	6.72	3.37	13.40	43	14
	2009	9.59	2.61	35.25	92	14
	2010	---	---	---	---	5
Black-headed Grosbeak	2005	2.97	2.45	3.61	12	11

Species	Year	D	LCL	UCL	% CV	n
Black-headed Grosbeak (cont.)	2006	6.43	5.30	7.81	12	24
	2007	3.44	2.83	4.17	12	13
	2008	4.75	3.91	5.76	12	18
	2009	5.30	4.35	6.45	12	17
	2010	---	---	---	---	9
Blue Grosbeak	2005	3.53	1.38	9.03	61	13
	2006	6.08	2.64	13.99	53	25
	2007	---	---	---	---	3
	2008	---	---	---	---	5
	2009	4.22	1.87	9.52	52	14
	2010	---	---	---	---	2
Black Phoebe	2005	---	---	---	---	5
	2006	3.49	1.16	10.55	74	11
	2007	7.70	2.12	28.01	91	21
	2008	3.62	1.22	10.71	73	11
	2009	7.92	3.15	19.92	60	24
	2010	---	---	---	---	2
Black-throated Sparrow	2005	3.91	1.68	9.08	54	48
	2006	7.21	4.15	12.55	34	51
	2007	8.34	3.29	21.13	60	61
	2008	10.12	5.40	18.96	39	67
	2009	28.33	13.78	58.26	44	139
	2010	16.13	8.02	32.45	44	59
Black-throated Gray Warbler	2005	7.07	3.75	13.32	40	38
	2006	14.88	9.37	23.63	29	77
	2007	10.01	6.59	15.20	26	55
	2008	21.06	11.53	38.48	38	112
	2009	11.06	5.01	24.39	51	49
	2010	11.26	7.00	18.11	29	55
Bullock's Oriole	2005	---	---	---	---	3
	2006	6.96	4.09	11.83	33	22
	2007	5.00	2.19	11.45	53	16
	2008	---	---	---	---	9
	2009	4.58	1.55	13.55	73	11
	2010	---	---	---	---	9
Bushtit	2005	23.62	12.24	45.56	40	14
	2006	44.98	28.93	69.94	27	56
	2007	6.27	3.11	12.61	44	11
	2008	---	---	---	---	5
	2009	10.45	5.44	20.08	41	15
	2010	---	---	---	---	0
Canyon Wren	2005	1.32	0.77	2.27	33	28

Species	Year	D	LCL	UCL	% CV	n
Canyon Wren (cont.)	2006	3.28	2.04	5.27	29	68
	2007	1.71	0.97	3.04	36	38
	2008	1.33	0.57	3.11	55	28
	2009	1.36	0.68	2.69	43	25
	2010	---	---	---	---	1
Chipping Sparrow	2005	---	---	---	---	6
	2006	---	---	---	---	8
	2007	16.07	8.22	31.40	42	29
	2008	15.61	8.02	30.38	42	28
	2009	19.95	9.56	41.64	47	25
	2010	17.37	8.41	35.88	46	28
Common Raven	2005	2.62	1.45	4.72	37	14
	2006	1.73	0.78	3.80	50	12
	2007	2.33	1.16	4.67	44	14
	2008	5.26	2.77	10.01	40	36
	2009	---	---	---	---	7
	2010	4.57	2.30	9.07	43	27
Common Yellowthroat	2005	5.40	2.61	11.14	46	10
	2006	11.48	4.56	28.92	60	20
	2007	12.45	4.21	36.79	73	22
	2008	---	---	---	---	5
	2009	14.40	5.02	41.31	70	23
	2010	6.25	1.97	19.82	79	11
Gray Vireo	2005	0.89	0.47	1.69	40	16
	2006	1.99	0.98	4.05	45	36
	2007	0.93	0.42	2.05	51	18
	2008	1.46	0.81	2.64	37	27
	2009	2.16	1.26	3.72	34	35
	2010	---	---	---	---	4
House Finch	2005	18.43	16.16	21.02	8	112
	2006	26.54	23.50	29.96	7	177
	2007	27.48	24.18	31.22	8	189
	2008	27.67	24.46	31.29	7	189
	2009	30.52	26.44	35.24	9	160
	2010	18.44	16.18	21.02	8	111
House Wren	2005	9.75	4.21	22.58	54	40
	2006	9.77	4.02	23.76	58	42
	2007	7.02	2.86	17.25	59	30
	2008	11.02	4.38	27.78	61	47
	2009	11.36	4.81	26.82	56	39
	2010	7.43	2.06	26.82	91	27
Juniper Titmouse	2005	8.70	4.37	17.35	44	28

Species	Year	D	LCL	UCL	% CV	n
Juniper Titmouse (Cont.)	2006	7.41	4.00	13.72	38	24
	2007	10.71	6.62	17.31	30	39
	2008	11.12	6.49	19.05	34	39
	2009	10.51	4.88	22.65	49	28
	2010	5.16	2.58	10.32	44	16
Lazuli Bunting	2005	40.67	19.41	85.20	46	116
	2006	48.82	23.92	99.66	43	140
	2007	59.19	33.26	105.33	35	172
	2008	54.72	25.81	116.02	46	157
	2009	65.24	23.50	181.14	64	155
	2010	59.80	28.43	125.75	45	154
Lesser Goldfinch	2005	11.86	5.91	23.77	44	24
	2006	22.38	13.02	38.47	34	45
	2007	41.81	25.32	69.03	31	93
	2008	27.62	13.21	57.74	47	54
	2009	38.76	21.20	70.86	38	76
	2010	14.55	7.68	27.54	40	31
Mourning Dove	2005	9.76	5.50	17.31	36	74
	2006	16.49	11.23	24.22	24	116
	2007	19.36	12.81	29.26	25	146
	2008	11.29	6.11	20.86	39	96
	2009	5.78	3.56	9.38	30	38
	2010	15.15	9.73	23.59	27	100
Plumbeous Vireo	2005	11.21	7.64	16.43	24	52
	2006	18.20	11.68	28.36	27	85
	2007	13.54	8.95	20.48	25	63
	2008	10.06	7.14	14.18	21	48
	2009	16.93	10.97	26.13	27	67
	2010	17.44	11.51	26.41	25	74
Rock Wren	2005	6.15	3.95	9.58	27	75
	2006	8.62	5.76	12.91	24	106
	2007	11.19	8.08	15.50	19	140
	2008	6.50	3.98	10.59	30	82
	2009	9.79	6.87	13.94	21	102
	2010	5.71	3.78	8.63	25	63
Say's Phoebe	2005	3.56	2.39	5.29	24	41
	2006	5.53	3.33	9.17	31	62
	2007	3.28	2.20	4.90	25	38
	2008	4.74	2.60	8.62	38	52
	2009	5.97	3.23	11.02	38	55
	2010	2.79	1.60	4.87	35	29
Song Sparrow	2005	19.50	7.91	48.07	59	49

Species	Year	D	LCL	UCL	% CV	n
Song Sparrow (Cont.)	2006	20.94	9.84	44.55	48	62
	2007	17.15	7.51	39.20	53	51
	2008	16.92	8.96	31.97	40	50
	2009	13.70	5.02	37.35	67	30
	2010	---	---	---	---	8
Spotted Towhee	2005	42.72	30.07	60.70	21	226
	2006	100.21	70.38	142.67	21	413
	2007	57.85	38.90	86.02	24	274
	2008	46.27	30.50	70.17	26	208
	2009	88.72	61.61	127.77	21	310
	2010	74.34	50.24	110.00	23	282
Violet-green Swallow	2005	60.98	42.44	87.61	22	99
	2006	181.01	118.51	276.46	26	216
	2007	116.78	78.97	172.70	24	142
	2008	150.67	90.07	252.05	32	121
	2009	135.17	93.59	195.21	23	159
	2010	80.06	48.85	131.22	31	98
Virginia's Warbler	2005	9.15	5.17	16.21	36	32
	2006	12.14	4.84	30.47	60	41
	2007	9.76	5.53	17.25	35	34
	2008	19.18	11.98	30.71	29	69
	2009	---	---	---	---	2
	2010	8.45	4.50	15.87	40	26
Warbling Vireo	2005	4.30	2.08	8.91	46	19
	2006	8.93	4.53	17.61	43	41
	2007	5.95	2.98	11.91	44	28
	2008	6.50	4.13	10.21	28	31
	2009	5.45	2.69	11.03	44	20
	2010	5.07	1.42	18.10	89	22
Western Scrub-Jay	2005	4.11	2.17	7.76	40	19
	2006	4.63	2.39	8.98	42	30
	2007	4.15	2.13	8.05	42	23
	2008	4.07	1.58	10.50	62	26
	2009	2.84	1.31	6.15	49	16
	2010	3.05	1.39	6.67	50	16
Western Tanager	2005	---	---	---	---	8
	2006	6.08	3.39	10.91	36	20
	2007	---	---	---	---	7
	2008	3.26	1.46	7.27	51	11
	2009	---	---	---	---	3
	2010	6.55	2.55	16.79	61	15
Western Wood-Pewee	2005	3.94	2.22	7.01	36	27

Species	Year	D	LCL	UCL	% CV	n
Western Wood-Pewee (Cont.)	2006	4.99	2.53	9.83	43	34
	2007	4.90	2.21	10.84	51	34
	2008	4.93	2.01	12.12	59	32
	2009	5.05	2.36	10.78	48	29
	2010	2.35	0.94	5.90	60	15
White-throated Swift	2005	34.28	21.89	53.66	28	118
	2006	61.75	38.82	98.23	29	155
	2007	70.03	43.68	112.26	29	197
	2008	42.48	25.51	70.72	32	92
	2009	17.99	10.68	30.30	32	87
	2010	13.10	6.53	26.28	44	57
Yellow-breasted Chat	2005	7.65	2.26	25.96	85	37
	2006	9.14	3.58	23.35	62	51
	2007	7.30	2.51	21.24	72	42
	2008	6.11	2.83	13.18	49	33
	2009	9.55	4.98	18.31	41	42
	2010	10.28	5.18	20.41	43	50
Yellow Warbler	2005	66.60	33.73	131.49	43	121
	2006	66.89	33.91	131.94	43	121
	2007	49.50	23.31	105.13	48	96
	2008	67.94	36.02	128.15	40	126
	2009	134.57	66.40	272.73	44	207
	2010	99.86	54.69	182.34	37	161

Trend Detection

Black-throated Sparrow (β_{trend}=3.57; 95% CI= 0.56, 6.59) and Lazuli Bunting (β_{trend}=29.53; 95% CI= 12.97, 46.08) both show evidence of significant positive population change over the last six years since the beta estimate is within the confidence limits. The best approximating model for Black-throated Sparrow was the linear trend (Figure 5). The best model for Lazuli Bunting was the log-linear trend (Figure 6). The best model for all other species of concern with density estimates in LR habitat was the intercept-only (constant) model.

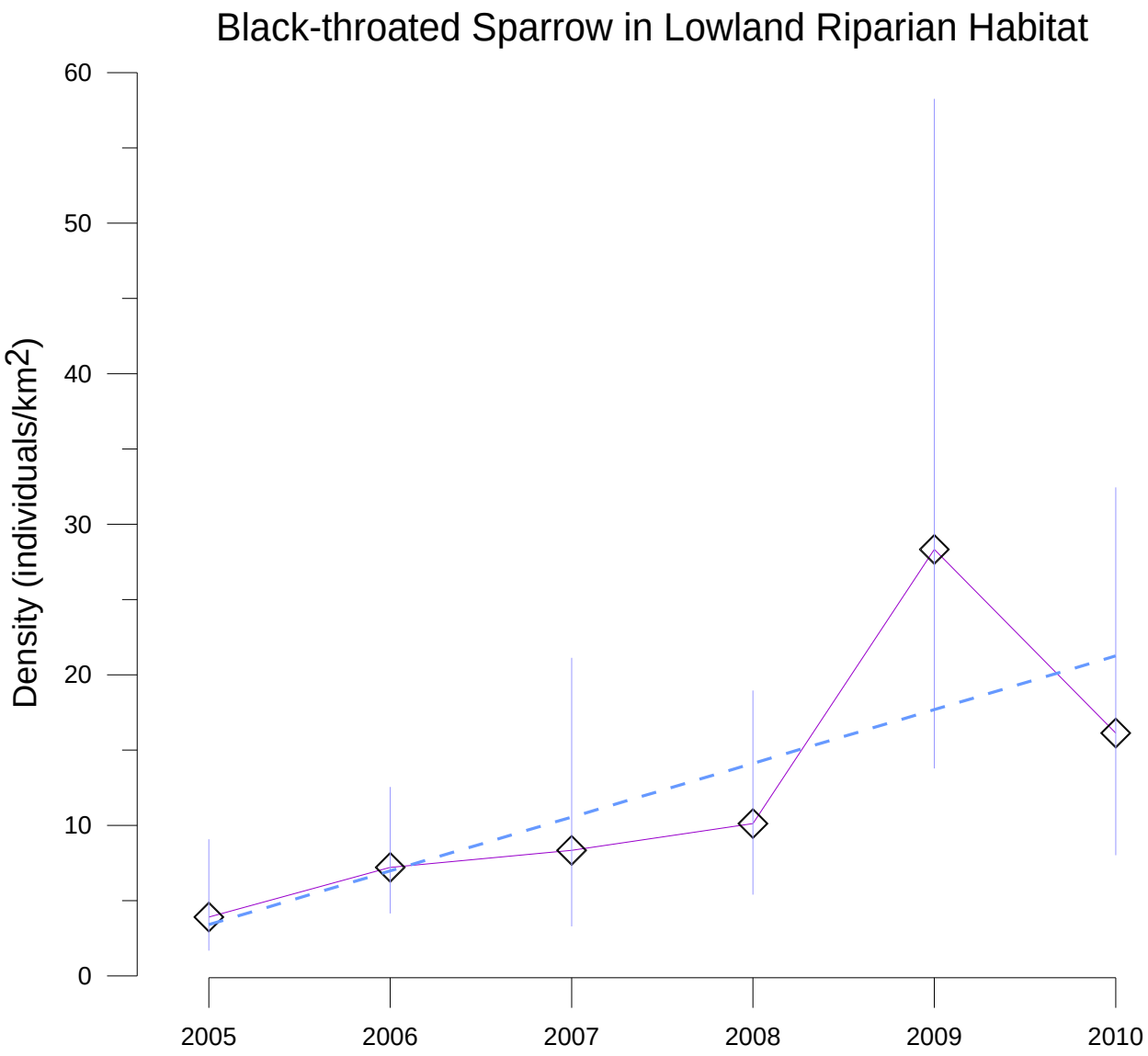

Figure 5. Estimated densities and population trend of Black-throated Sparrow in Lowland Riparian habitat within the Northern Colorado Plateau Network, 2005-2010. Error bars represent 90% confidence intervals. The dashed line represents the best estimate of observed population trend for the NCPN data.

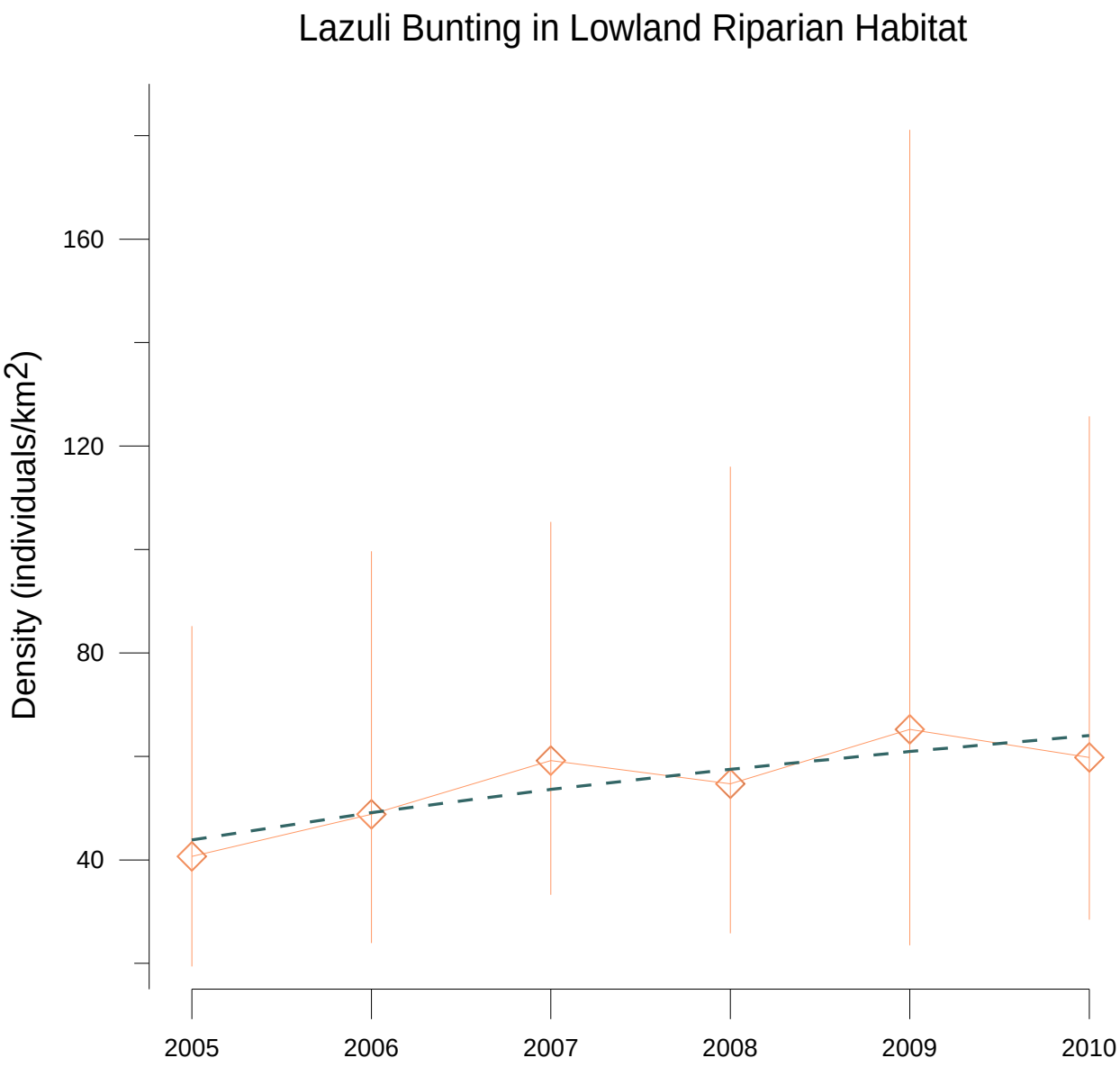

Figure 6. Estimated densities and population trend of Lazuli Bunting in Lowland Riparian habitat within the Northern Colorado Plateau Network, 2005-2010. Error bars represent 90% confidence intervals. The dashed line represents the best estimate of observed population trend for the NCPN data.

Pinyon Juniper (PJ)

We surveyed all 15 transects in PJ twice this year. We calculated density estimates for 37 species, 18 of which are priority species. The pooled 2005-2010 data yielded robust density estimates (CV < 50%) for 20 species and a moderately robust estimate (CV = 50-75%) for 5 additional species (Table 4). We should be able to reach our target of detecting population changes of at least 3% within 30 years for these 20 species, which represent 25% of species and 80% of individuals detected in PJ.

The following 10 species had the highest estimated densities of all species recorded in PJ in 2010 (listed in order from highest to lowest density):

1. Blue-gray Gnatcatcher
2. Black-throated Gray Warbler
3. Juniper Titmouse
4. Chipping Sparrow
5. Gray Flycatcher
6. Western Scrub Jay
7. Mourning Dove
8. Spotted Towhee
9. House Finch
10. Gray Vireo

The following 15 species had higher estimated densities in PJ compared to the other 2 habitats sampled in 2010 (listed in order from highest to lowest density):

1. Blue-gray Gnatcatcher
2. Black-throated Gray Warbler
3. Juniper Titmouse
4. Chipping Sparrow
5. Gray Flycatcher
6. Western Scrub-Jay
7. House Finch
8. Gray Vireo
9. Virginia's Warbler
10. Mountain Bluebird
11. Pinyon Jay
12. Dusky Flycatcher
13. White-breasted Nuthatch
14. Bewick's Wren

Table 4. Estimated densities per km^2 (D), lower and upper 90% confidence limits on D (LCL,UCL), percent coefficient of variation of estimates (% CV), and sample sizes (n) of breeding birds in Pinyon-Juniper habitat in the Northern Colorado Plateau Network, 2005-2010. Dashes indicate the sample size was insufficient for estimating density. Priority species are bolded.

Species	Year	D	LCL	UCL	% CV	n
American Robin	2005	1.92	1.10	3.35	35	30
	2006	2.48	1.26	4.88	43	39
	2007	2.62	1.00	6.87	63	39
	2008	1.75	0.59	5.21	74	26
	2009	1.05	0.36	3.08	72	15
	2010	0.87	0.35	2.17	60	14
Ash-throated Flycatcher	2005	11.49	8.45	15.62	19	119
	2006	11.33	7.77	16.54	23	115
	2007	11.05	7.45	16.38	24	114
	2008	11.95	7.97	17.92	25	113
	2009	11.39	8.10	16.03	21	102
	2010	7.92	5.74	10.93	20	78
Bewick's Wren	2005	20.11	15.30	26.42	16	147

Species	Year	D	LCL	UCL	% CV	n
Bewick's Wren (Cont.)	2006	20.11	12.45	32.47	29	148
	2007	16.38	9.64	27.84	32	121
	2008	16.09	8.84	29.29	36	112
	2009	12.19	8.24	18.06	24	82
	2010	3.37	1.68	6.78	44	25
Blue-gray Gnatcatcher	2005	109.51	74.04	161.96	24	127
	2006	81.98	47.30	142.09	34	93
	2007	111.31	76.01	163.01	23	127
	2008	94.70	59.45	150.85	29	99
	2009	219.94	160.70	301.04	19	228
	2010	128.32	83.55	197.07	27	139
Brown-headed Cowbird	2005	4.47	2.15	9.29	46	18
	2006	4.01	1.70	9.42	55	14
	2007	4.71	1.83	12.07	62	17
	2008	3.10	1.22	7.87	61	11
	2009	5.56	2.99	10.33	39	18
	2010	---	---	---	---	7
Brewer's Sparrow	2005	---	---	---	---	7
	2006	---	---	---	---	6
	2007	2.75	1.01	7.48	66	19
	2008	2.40	0.74	7.79	81	15
	2009	1.64	0.73	3.70	51	10
	2010	---	---	---	---	5
Black-throated Sparrow	2005	5.01	2.75	9.13	38	41
	2006	8.82	4.76	16.33	39	69
	2007	11.60	5.63	23.86	45	94
	2008	9.15	3.56	23.50	60	69
	2009	10.98	6.23	19.36	35	78
	2010	8.04	4.84	13.34	31	63
Black-throated Gray Warbler	2005	65.85	47.66	90.98	19	298
	2006	87.34	64.36	118.52	18	397
	2007	78.83	57.12	108.79	19	356
	2008	87.72	65.91	116.75	17	372
	2009	99.60	76.24	130.11	16	416
	2010	65.62	47.52	90.61	19	290
Bushtit	2005	86.22	50.89	146.08	33	40
	2006	57.94	34.65	96.89	32	31
	2007	---	---	---	---	15
	2008	---	---	---	---	8
	2009	77.59	45.08	133.54	34	44
	2010	---	---	---	---	1
Canyon Wren	2005	0.39	0.15	1.02	62	15

Species	Year	D	LCL	UCL	% CV	n
Canyon Wren (Cont.)	2006	0.56	0.22	1.46	62	22
	2007	0.64	0.22	1.81	70	24
	2008	---	---	---	---	5
	2009	0.41	0.15	1.13	67	16
	2010	---	---	---	---	3
Chipping Sparrow	2005	20.64	12.81	33.25	30	56
	2006	17.71	11.19	28.01	28	46
	2007	26.23	15.04	45.74	35	67
	2008	29.96	19.12	46.94	28	73
	2009	64.05	34.83	117.77	37	133
	2010	35.90	20.73	62.15	34	86
Common Raven	2005	0.75	0.40	1.39	37	14
	2006	0.50	0.26	0.98	42	11
	2007	1.59	1.06	2.40	25	36
	2008	0.99	0.53	1.87	40	20
	2009	---	---	---	---	4
	2010	0.88	0.55	1.40	29	18
Dusky Flycatcher	2005	3.92	1.28	11.96	76	12
	2006	12.13	5.30	27.74	53	35
	2007	9.33	3.85	22.62	57	28
	2008	15.83	5.10	49.14	76	40
	2009	4.93	1.61	15.15	76	14
	2010	5.56	1.85	16.72	75	16
Gray Flycatcher	2005	27.52	20.74	36.51	17	114
	2006	21.16	14.27	31.39	24	86
	2007	20.28	11.80	34.86	34	84
	2008	26.23	16.23	42.38	30	101
	2009	48.17	33.64	68.99	22	177
	2010	30.92	23.88	40.04	16	123
Gray Vireo	2005	6.57	4.27	10.12	27	76
	2006	5.47	2.92	10.26	40	63
	2007	6.29	3.95	10.01	29	74
	2008	8.30	5.11	13.49	30	91
	2009	12.58	9.75	16.24	16	136
	2010	9.96	6.99	14.20	22	113
Grace's Warbler	2005	---	---	---	---	6
	2006	1.80	0.46	7.03	98	14
	2007	2.94	0.73	11.83	100	20
	2008	1.57	0.39	6.30	100	10
	2009	3.07	0.74	12.76	104	19
	2010	1.77	0.46	6.87	97	11
Green-tailed Towhee	2005	1.57	0.77	3.19	44	15

Species	Year	D	LCL	UCL	% CV	n
Green-tailed Towhee (Cont.)	2006	---	---	---	---	6
	2007	3.21	0.88	11.75	91	30
	2008	1.39	0.47	4.11	73	12
	2009	---	---	---	---	8
	2010	---	---	---	---	3
House Finch	2005	14.86	9.78	22.60	26	105
	2006	9.45	5.31	16.82	36	76
	2007	19.08	11.95	30.45	29	159
	2008	16.97	10.82	26.63	28	135
	2009	19.10	11.53	31.62	31	147
	2010	13.20	9.02	19.33	23	108
Juniper Titmouse	2005	21.48	14.35	32.16	25	78
	2006	18.56	11.63	29.62	29	71
	2007	19.69	11.47	33.81	34	78
	2008	23.30	14.08	38.56	31	87
	2009	53.63	37.73	76.25	21	196
	2010	36.99	25.16	54.37	24	138
Lark Sparrow	2005	2.45	1.03	5.84	56	20
	2006	2.37	0.56	10.02	106	17
	2007	1.97	0.66	5.87	74	19
	2008	1.53	0.56	4.15	66	14
	2009	2.07	0.85	5.03	58	19
	2010	1.98	0.60	6.61	82	19
Mountain Bluebird	2005	13.47	2.64	68.75	129	63
	2006	8.12	1.14	57.76	176	33
	2007	8.85	1.86	42.21	120	38
	2008	7.65	2.07	28.28	93	34
	2009	11.27	3.47	36.64	82	42
	2010	8.38	3.05	23.02	67	40
Mountain Chickadee	2005	5.54	2.16	14.24	61	19
	2006	---	---	---	---	9
	2007	3.31	1.20	9.13	67	11
	2008	---	---	---	---	9
	2009	4.20	1.52	11.58	67	13
	2010	---	---	---	---	5
Mourning Dove	2005	14.37	8.84	23.37	30	143
	2006	15.93	10.03	25.30	29	154
	2007	18.15	10.23	32.20	36	171
	2008	17.54	11.74	26.21	25	162
	2009	10.53	6.53	16.98	30	98
	2010	16.12	10.74	24.19	25	156
Pinyon Jay	2005	2.03	1.04	3.95	42	46

Species	Year	D	LCL	UCL	% CV	n
Pinyon Jay (Cont.)	2006	4.45	2.19	9.05	45	78
	2007	6.20	3.43	11.19	37	102
	2008	1.66	0.63	4.36	62	25
	2009	2.51	1.32	4.80	41	54
	2010	7.07	3.88	12.88	38	116
Plumbeous Vireo	2005	7.11	4.04	12.53	35	62
	2006	5.12	2.76	9.49	39	44
	2007	5.07	2.91	8.81	35	44
	2008	5.27	2.90	9.59	38	43
	2009	5.18	2.13	12.61	58	42
	2010	9.72	5.77	16.38	32	83
Rock Wren	2005	4.88	3.20	7.45	26	82
	2006	4.50	2.86	7.10	28	77
	2007	4.81	3.18	7.29	26	81
	2008	6.27	3.70	10.65	33	96
	2009	6.46	3.85	10.83	32	94
	2010	2.34	1.41	3.88	31	38
Say's Phoebe	2005	1.72	1.05	2.80	30	29
	2006	---	---	---	---	9
	2007	---	---	---	---	8
	2008	0.70	0.39	1.25	36	11
	2009	0.91	0.54	1.55	33	14
	2010	1.18	0.56	2.50	47	19
Spotted Towhee	2005	15.94	10.03	25.31	29	99
	2006	13.68	7.27	25.75	40	81
	2007	21.66	11.82	39.66	38	130
	2008	10.06	5.86	17.26	34	57
	2009	20.78	11.66	37.03	36	116
	2010	15.53	8.87	27.19	35	91
Vesper's Sparrow	2005	---	---	---	---	9
	2006	1.26	0.40	3.97	78	16
	2007	1.26	0.37	4.30	85	15
	2008	---	---	---	---	8
	2009	2.00	0.52	7.61	96	21
	2010	2.01	0.70	5.78	71	25
Violet-green Swallow	2005	10.24	4.82	21.72	40	34
	2006	14.08	6.29	31.48	43	50
	2007	16.81	7.15	39.50	46	59
	2008	19.62	8.82	43.63	42	44
	2009	12.54	6.13	25.64	38	35
	2010	8.57	3.65	20.10	45	29
Virginia's Warbler	2005	8.57	4.05	18.14	48	53

Species	Year	D	LCL	UCL	% CV	n
Virginia's Warbler (Cont.)	2006	5.63	2.09	15.18	65	35
	2007	5.73	2.33	14.11	58	36
	2008	4.12	1.91	8.89	49	24
	2009	3.82	1.55	9.42	59	22
	2010	9.45	4.51	19.79	47	56
White-breasted Nuthatch	2005	4.05	1.36	12.02	73	16
	2006	5.09	1.59	16.29	80	19
	2007	7.17	1.87	27.52	96	22
	2008	3.00	0.91	9.83	82	11
	2009	2.95	0.97	9.00	75	11
	2010	3.96	0.94	16.64	105	14
Western Meadowlark	2005	2.53	0.82	7.79	77	42
	2006	1.29	0.33	5.11	100	22
	2007	1.59	0.33	7.68	121	21
	2008	0.89	0.26	3.06	86	14
	2009	1.76	0.46	6.75	97	28
	2010	---	---	---	---	5
Western Shrub Jay	2005	12.83	3.62	45.49	89	32
	2006	23.65	7.01	79.80	85	32
	2007	20.55	6.56	64.35	78	30
	2008	23.91	7.68	74.43	78	33
	2009	---	---	---	---	15
	2010	20.47	6.10	68.72	84	27
Western Tanager	2005	1.55	0.67	3.57	54	17
	2006	2.36	1.27	4.38	39	25
	2007	2.91	1.32	6.43	51	30
	2008	1.78	0.59	5.32	74	17
	2009	---	---	---	---	8
	2010	1.72	0.57	5.24	75	17
White-throated Swift	2005	14.75	8.63	25.20	33	90
	2006	17.99	8.54	37.91	48	95
	2007	21.60	13.41	34.81	30	113
	2008	16.23	8.01	32.90	45	73
	2009	8.56	5.22	14.06	31	48
	2010	6.43	3.34	12.37	40	33
Yellow-rumped Warbler	2005	1.52	0.43	5.31	87	11
	2006	3.77	1.11	12.79	84	29
	2007	1.69	0.37	7.74	114	11
	2008	2.31	0.62	8.68	94	15
	2009	---	---	---	---	1
	2010	---	---	---	---	8

Trend Detection

Bewick's Wren was the only species in Pinyon-Juniper habitat to show evidence of significant population change over the last six years (β_{trend}=-2.68; 95% CI= -3.85, -1.52) with a decreasing linear trend (Figure 7). The best approximating model for all other species of concern with density estimates in PJ habitat was the intercept-only (constant) model.

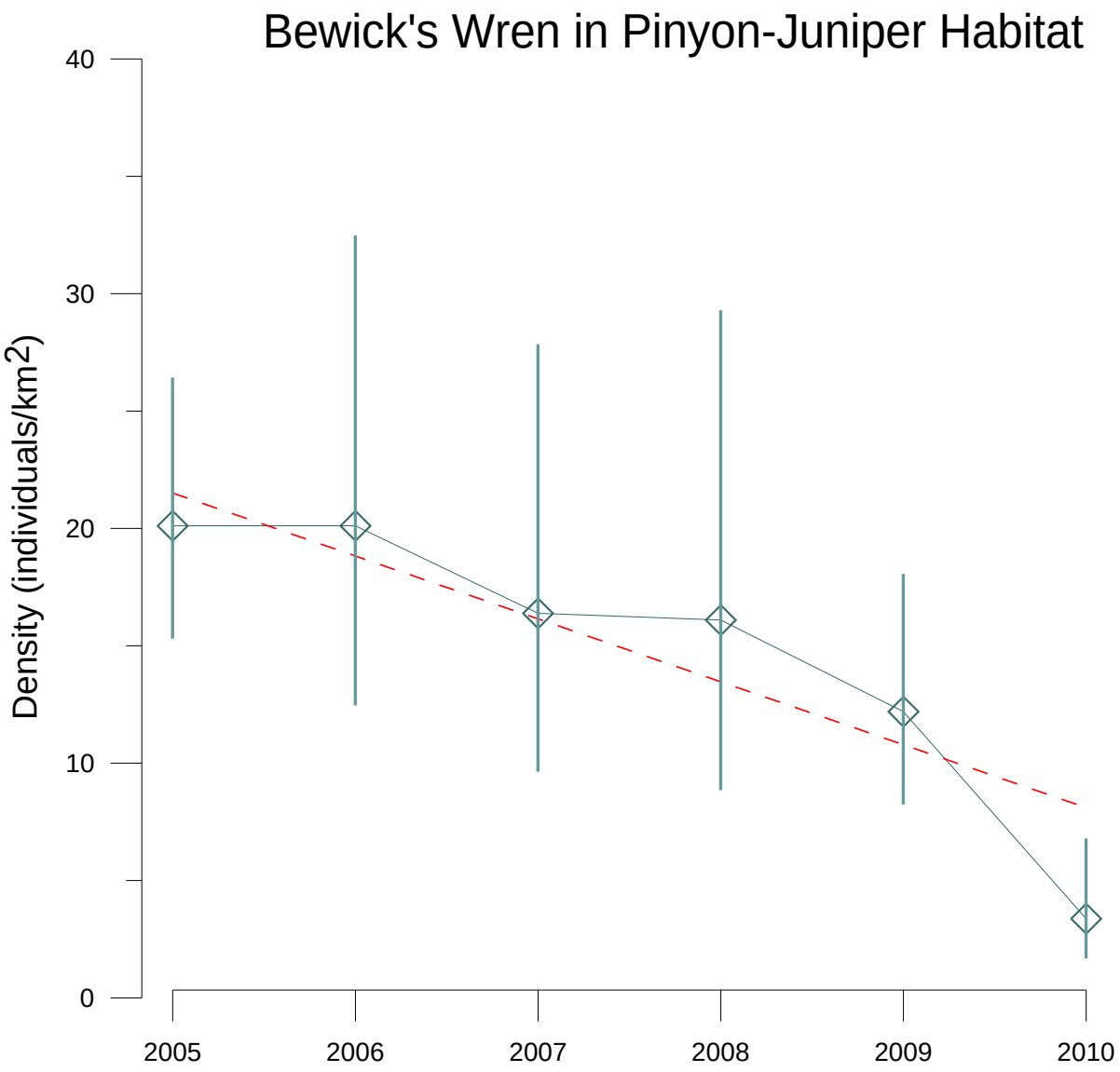

Figure 7. Estimated densities and population trend of Bewick's Wren in Pinyon-Juniper habitat within the Northern Colorado Plateau Network, 2005-2010. Error bars represent 90% confidence intervals. The dashed line represents the best estimate of observed population trend for the NCPN data.

Sage Shrubland (SA)

We surveyed all 15 transects in SA twice this year. We calculated density estimates for 34 species, 16 of which are priority species. The pooled 2005-2010 data yielded robust density estimates (Coefficient of Variation, CV < 50%) for 22 species and a moderately robust estimate (CV = 50-75%) for 6 additional species (Table 5). We should be able to reach our target of detecting a

population change of at least 3% within 30 years for these 22 species, which represent 26% of species and 84% of individuals detected in SA.

The following 10 species had the highest estimated densities of all species recorded in SA in 2010 (listed in order from highest to lowest density):

1. Brewer's Sparrow
2. Vesper Sparrow
3. Green-tailed Towhee
4. Chipping Sparrow
5. Blue-gray Gnatcatcher
6. Spotted Towhee
7. Lark Sparrow
8 Dusky Flycatcher
9. Mountain Bluebird
10. Lazuli Bunting

The following 10 species had higher estimated densities in SA compared to the other 2 habitats sampled in 2010 (listed in order from highest to lowest density):

1. Brewer's Sparrow
2. Vesper Sparrow
3. Green-tailed Towhee
4. Lark Sparrow
5. Sage Thrasher
6. Western Meadowlark
7. Horned Lark
8. Brewer's Blackbird
9. Black-billed Magpie
10. Northern Flicker

Table 5. Estimated densities per km^2 (D), lower and upper 90% confidence limits on D (LCL,UCL), percent coefficient of variation of estimates (% CV), and sample sizes (n) of breeding birds in sage shrubland habitat in the Northern Colorado Plateau Network, 2005-2010. Dashes indicate the sample size was insufficient for estimating density. Priority species are bolded.

Species	**Year**	**D**	**LCL**	**UCL**	**% CV**	**n**
American Robin	2005	2.51	1.37	4.60	38	39
	2006	4.70	2.27	9.75	46	79
	2007	3.28	1.58	6.82	47	54
	2008	2.42	1.33	4.39	37	36
	2009	1.88	0.92	3.84	45	28
	2010	2.87	1.47	5.60	42	46
Ash-throated Flycatcher	2005	1.03	0.42	2.50	57	16
	2006	0.64	0.24	1.71	65	10
	2007	1.02	0.30	3.46	84	14
	2008	0.80	0.29	2.16	66	12
	2009	---	---	---	---	7
	2010	0.82	0.31	2.14	63	12
Black-billed Magpie	2005	3.08	1.45	6.53	48	69
	2006	3.33	2.23	4.96	25	95
	2007	1.86	1.15	3.01	30	49
	2008	1.58	0.88	2.83	36	45
	2009	1.23	0.56	2.73	51	31
	2010	1.68	0.91	3.09	38	52
Blue-gray Gnatcatcher	2005	9.93	4.63	21.29	49	31

Species	Year	D	LCL	UCL	% CV	n
Blue-gray Gnatcatcher (Cont.)	2006	5.53	2.94	10.41	40	18
	2007	3.90	1.78	8.55	50	12
	2008	14.70	8.89	24.31	31	44
	2009	13.69	6.82	27.47	44	38
	2010	14.74	8.09	26.87	38	47
Brown-headed Cowbird	2005	---	---	---	---	4
	2006	4.98	2.63	9.45	40	26
	2007	2.11	1.01	4.41	47	12
	2008	2.72	1.43	5.19	40	14
	2009	---	---	---	---	8
	2010	---	---	---	---	6
Brewer's Blackbird	2005	---	---	---	---	5
	2006	5.88	2.86	12.11	46	42
	2007	2.92	1.30	6.56	50	19
	2008	---	---	---	---	8
	2009	4.34	1.41	13.33	75	26
	2010	2.73	1.40	5.32	41	19
Brewer's Sparrow	2005	74.44	51.13	108.37	22	426
	2006	77.02	53.55	110.78	21	450
	2007	66.67	48.27	92.09	19	390
	2008	62.36	46.41	83.80	17	340
	2009	96.12	65.50	141.04	22	503
	2010	86.68	62.34	120.52	19	495
Broad-tailed Hummingbird	2005	18.20	6.73	49.22	66	18
	2006	10.59	3.80	29.49	68	11
	2007	12.95	4.86	34.51	64	14
	2008	27.30	8.90	83.78	76	23
	2009	15.49	4.85	49.45	79	13
	2010	---	---	---	---	8
Black-throated Sparrow	2005	0.63	0.24	1.66	64	10
	2006	1.86	0.90	3.84	46	32
	2007	1.19	0.50	2.85	56	19
	2008	---	---	---	---	3
	2009	1.95	0.59	6.40	82	28
	2010	---	---	---	---	8
Black-throated Gray Warbler	2005	2.34	0.98	5.60	57	28
	2006	1.70	0.71	4.07	57	21
	2007	1.23	0.41	3.64	74	15
	2008	2.26	0.85	6.05	65	29
	2009	4.05	1.59	10.28	61	47
	2010	1.41	0.59	3.40	57	17
Chipping Sparrow	2005	5.69	3.07	10.55	39	31

Species	Year	D	LCL	UCL	% CV	n
Chipping Sparrow (Cont.)	2006	9.24	5.37	15.88	34	53
	2007	8.85	4.08	19.22	50	47
	2008	7.85	3.42	18.02	54	44
	2009	7.70	3.90	15.21	43	41
	2010	17.79	10.04	31.53	36	94
Common Raven	2005	0.21	0.11	0.41	43	11
	2006	0.74	0.44	1.26	33	29
	2007	1.00	0.60	1.66	32	50
	2008	0.63	0.36	1.11	35	31
	2009	0.54	0.27	1.07	43	24
	2010	0.83	0.48	1.45	34	41
Dusky Flycatcher	2005	3.35	1.22	9.22	68	30
	2006	5.89	2.82	12.31	47	55
	2007	6.14	2.69	14.02	53	57
	2008	8.12	3.78	17.44	49	69
	2009	8.94	3.81	20.98	55	75
	2010	7.27	3.69	14.32	43	68
Gray Flycatcher	2005	2.12	1.15	3.91	38	24
	2006	---	---	---	---	8
	2007	---	---	---	---	7
	2008	1.28	0.39	4.14	81	14
	2009	2.54	1.02	6.35	60	25
	2010	1.91	0.97	3.79	43	23
Green-tailed Towhee	2005	30.88	19.14	49.81	28	306
	2006	43.67	25.07	76.05	33	440
	2007	30.71	17.65	53.44	33	315
	2008	27.65	16.86	45.34	29	269
	2009	33.01	18.47	59.01	35	297
	2010	20.16	12.04	33.75	31	202
House Finch	2005	---	---	---	---	4
	2006	4.52	2.71	7.53	32	59
	2007	2.55	1.07	6.10	57	34
	2008	2.76	1.57	4.84	35	34
	2009	4.29	1.58	11.59	66	49
	2010	1.54	0.84	2.82	38	20
Horned Lark	2005	2.76	1.26	6.05	50	27
	2006	3.55	1.82	6.95	42	31
	2007	3.94	1.97	7.88	44	38
	2008	2.30	0.82	6.44	69	19
	2009	5.23	2.51	10.87	47	44
	2010	3.02	1.44	6.33	47	29
Lark Sparrow	2005	9.15	4.32	19.35	48	85

Species	Year	D	LCL	UCL	% CV	n
Lark Sparrow (Cont.)	2006	10.13	5.45	18.85	39	97
	2007	6.36	3.04	13.31	47	63
	2008	2.56	1.09	6.00	55	24
	2009	13.39	5.54	32.33	56	118
	2010	8.41	4.19	16.87	44	72
Lazuli Bunting	2005	---	---	---	---	6
	2006	---	---	---	---	6
	2007	---	---	---	---	5
	2008	---	---	---	---	0
	2009	10.99	3.69	32.69	72	73
	2010	5.54	2.55	12.05	50	43
Mountain Bluebird	2005	6.21	3.94	9.78	28	63
	2006	7.66	5.41	10.85	21	83
	2007	7.80	4.52	13.49	34	80
	2008	6.82	4.76	9.77	22	66
	2009	7.02	3.76	13.08	39	60
	2010	7.24	5.04	10.40	22	77
Mourning Dove	2005	2.41	1.32	4.39	38	56
	2006	4.88	3.28	7.26	24	117
	2007	2.73	1.46	5.10	39	66
	2008	3.13	1.52	6.44	46	70
	2009	3.39	1.77	6.48	41	68
	2010	4.06	2.18	7.56	39	97
Northern Flicker	2005	0.97	0.54	1.74	36	15
	2006	1.52	0.79	2.92	41	24
	2007	0.90	0.44	1.82	45	14
	2008	---	---	---	---	9
	2009	1.52	0.74	3.13	46	21
	2010	1.62	0.94	2.79	34	24
Rock Wren	2005	3.90	2.50	6.09	28	86
	2006	7.16	4.26	12.05	32	163
	2007	3.35	1.62	6.96	46	74
	2008	4.17	2.39	7.25	35	88
	2009	3.55	2.05	6.14	34	71
	2010	3.03	1.74	5.27	35	66
Sage Sparrow	2005	2.98	1.14	7.82	64	36
	2006	2.34	0.85	6.45	68	25
	2007	2.72	0.94	7.86	71	31
	2008	1.80	0.47	6.89	96	20
	2009	2.95	1.01	8.62	72	27
	2010	---	---	---	---	4
Sage Thrasher	2005	3.27	1.61	6.66	44	76

Species	Year	D	LCL	UCL	% CV	n
Sage Thrasher (Cont.)	2006	3.01	1.44	6.28	46	70
	2007	3.02	1.54	5.90	42	71
	2008	6.07	2.99	12.33	43	135
	2009	5.22	2.42	11.26	47	110
	2010	6.25	2.80	13.93	49	140
Say's Phoebe	2005	0.80	0.37	1.74	49	12
	2006	0.90	0.52	1.56	34	15
	2007	---	---	---	---	8
	2008	0.99	0.38	2.56	62	15
	2009	1.29	0.50	3.36	62	17
	2010	1.19	0.52	2.72	53	19
Spotted Towhee	2005	6.71	3.31	13.60	45	59
	2006	6.97	3.92	12.40	36	64
	2007	5.63	2.98	10.64	40	51
	2008	8.47	4.45	16.11	40	71
	2009	5.45	2.82	10.54	42	43
	2010	8.66	4.75	15.80	38	77
Vesper's Sparrow	2005	26.18	18.60	36.84	20	303
	2006	35.40	25.83	48.51	18	419
	2007	36.52	26.25	50.79	19	430
	2008	36.38	23.72	55.81	25	397
	2009	42.00	26.49	66.59	27	441
	2010	43.04	31.05	59.67	19	499
Violet-green Swallow	2005	6.20	2.67	14.40	44	18
	2006	9.47	3.57	25.09	52	26
	2007	---	---	---	---	15
	2008	12.18	1.17	126.70	170	15
	2009	6.66	2.59	17.14	51	22
	2010	5.02	2.09	12.07	44	16
Virginia's Warbler	2005	1.41	0.63	3.18	52	23
	2006	1.74	0.80	3.76	49	30
	2007	1.09	0.27	4.40	102	17
	2008	2.62	0.90	7.60	72	40
	2009	1.45	0.54	3.89	66	21
	2010	1.55	0.61	3.90	61	25
Warbling Vireo	2005	1.36	0.48	3.84	68	18
	2006	0.72	0.30	1.71	56	10
	2007	1.40	0.53	3.69	63	21
	2008	---	---	---	---	2
	2009	---	---	---	---	3
	2010	---	---	---	---	9
Western Meadowlark	2005	5.23	2.86	9.56	37	133

Species	Year	D	LCL	UCL	% CV	n
Western Meadowlark (Cont.)	2006	5.92	3.72	9.42	28	159
	2007	4.99	2.62	9.50	40	130
	2008	6.92	3.45	13.87	43	169
	2009	8.30	4.14	16.62	42	196
	2010	5.71	3.20	10.21	36	148
Western Tanager	2005	0.46	0.16	1.33	72	13
	2006	0.63	0.18	2.13	85	17
	2007	0.85	0.29	2.44	71	25
	2008	0.68	0.21	2.16	79	19
	2009	0.77	0.26	2.29	73	20
	2010	0.50	0.17	1.47	71	13
Yellow-rumped Warbler	2005	---	---	---	---	9
	2006	1.60	0.55	4.63	71	22
	2007	1.02	0.39	2.66	63	14
	2008	1.04	0.45	2.36	53	13
	2009	---	---	---	---	8
	2010	---	---	---	---	3

Trend Detection

Black-billed Magpie shows evidence of significant decreasing population change over the last six years since the beta estimate is within the confidence limits (β_{trend}=-3.10; 95% CI= -5.01, -1.12). The best approximating model for Black-billed Magpie was the log-linear trend (Figure 8). Contrastingly, Dusky Flycatchers show evidence of significant increasing population change (β_{trend}=6.18; 95% CI= 2.29, 10.08). The best model for Dusky Flycatcher was the log-linear trend (Figure 9). Sage Thrasher also show significant increasing population change (β_{trend}=0.71; 95% CI= 0.26, 1.15). The best model for Sage Thrasher was the linear trend (Figure 10). The best model for all other species of concern with density estimates in SA habitat was the intercept-only (constant) model.

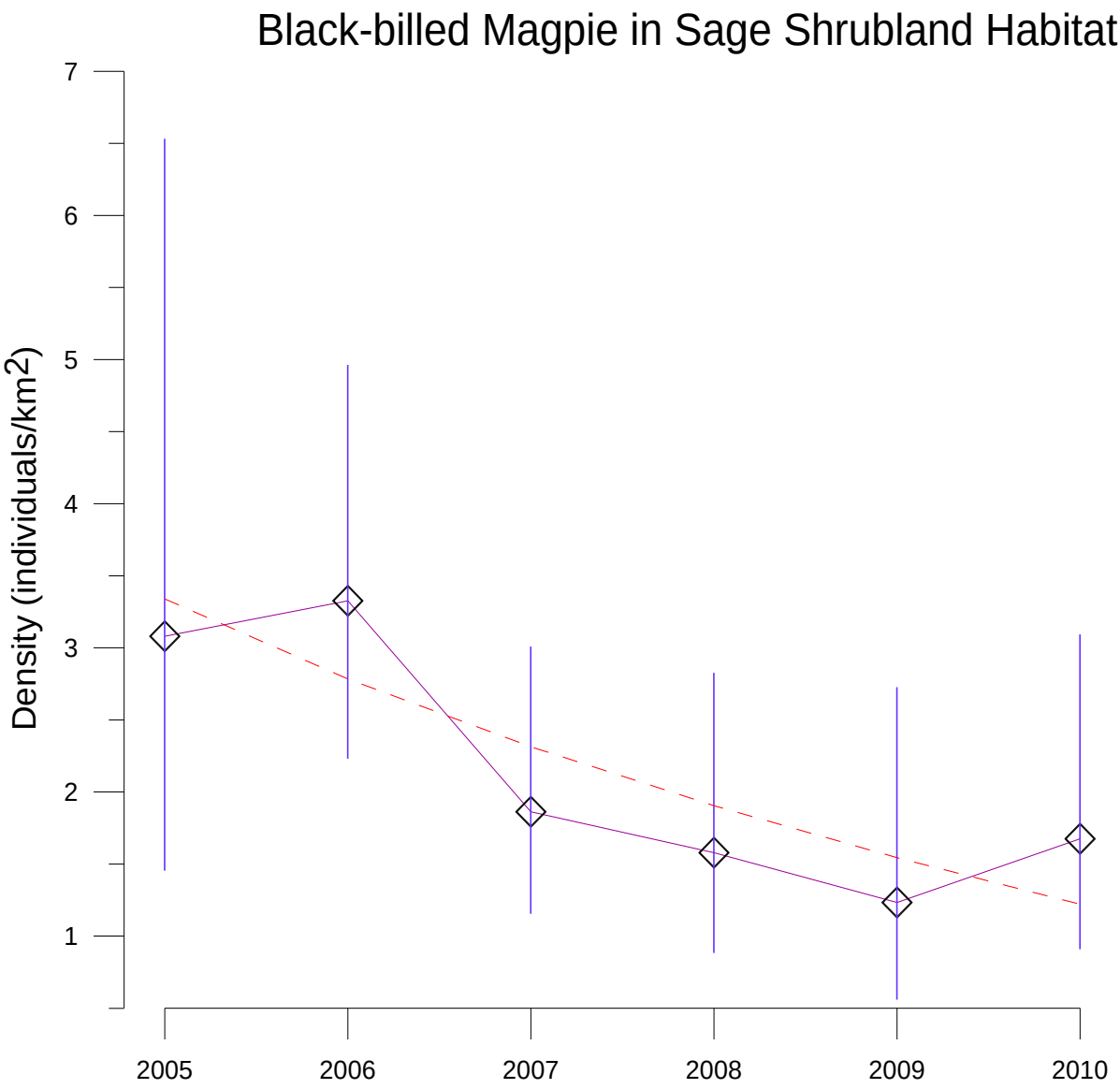

Figure 8. Estimated densities and population trend of Black-billed Magpie in Sage Shrubland habitat within the Northern Colorado Plateau Network, 2005-2010. Error bars represent 90% confidence intervals. The dashed line represents the best estimate of observed population trend for the NCPN data.

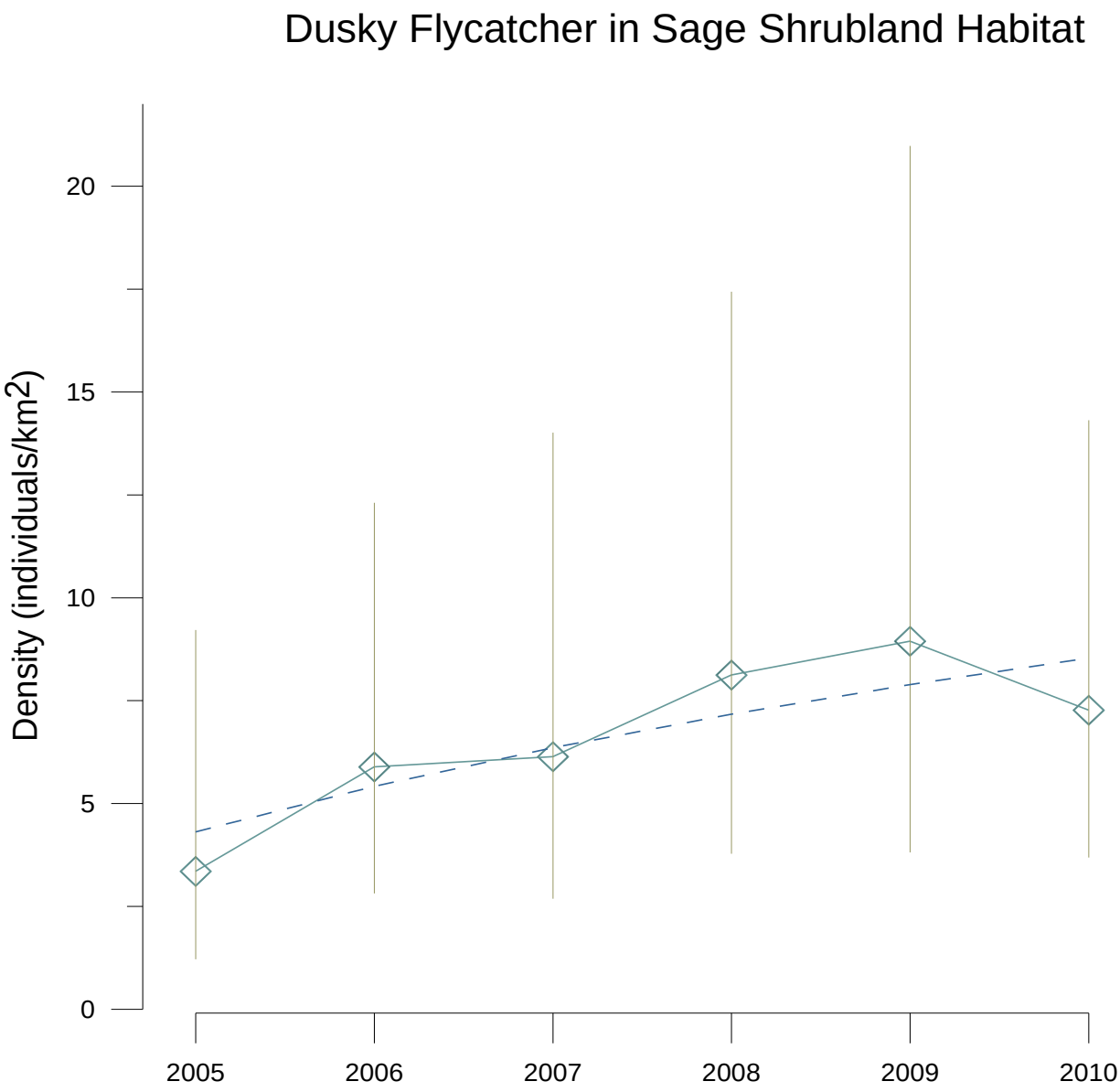

Figure 9. Estimated densities and population trend of Dusky Flycatchers in Sage Shrubland habitat within the Northern Colorado Plateau Network, 2005-2010. Error bars represent 90% confidence intervals. The dashed line represents the best estimate of observed population trend for the NCPN data.

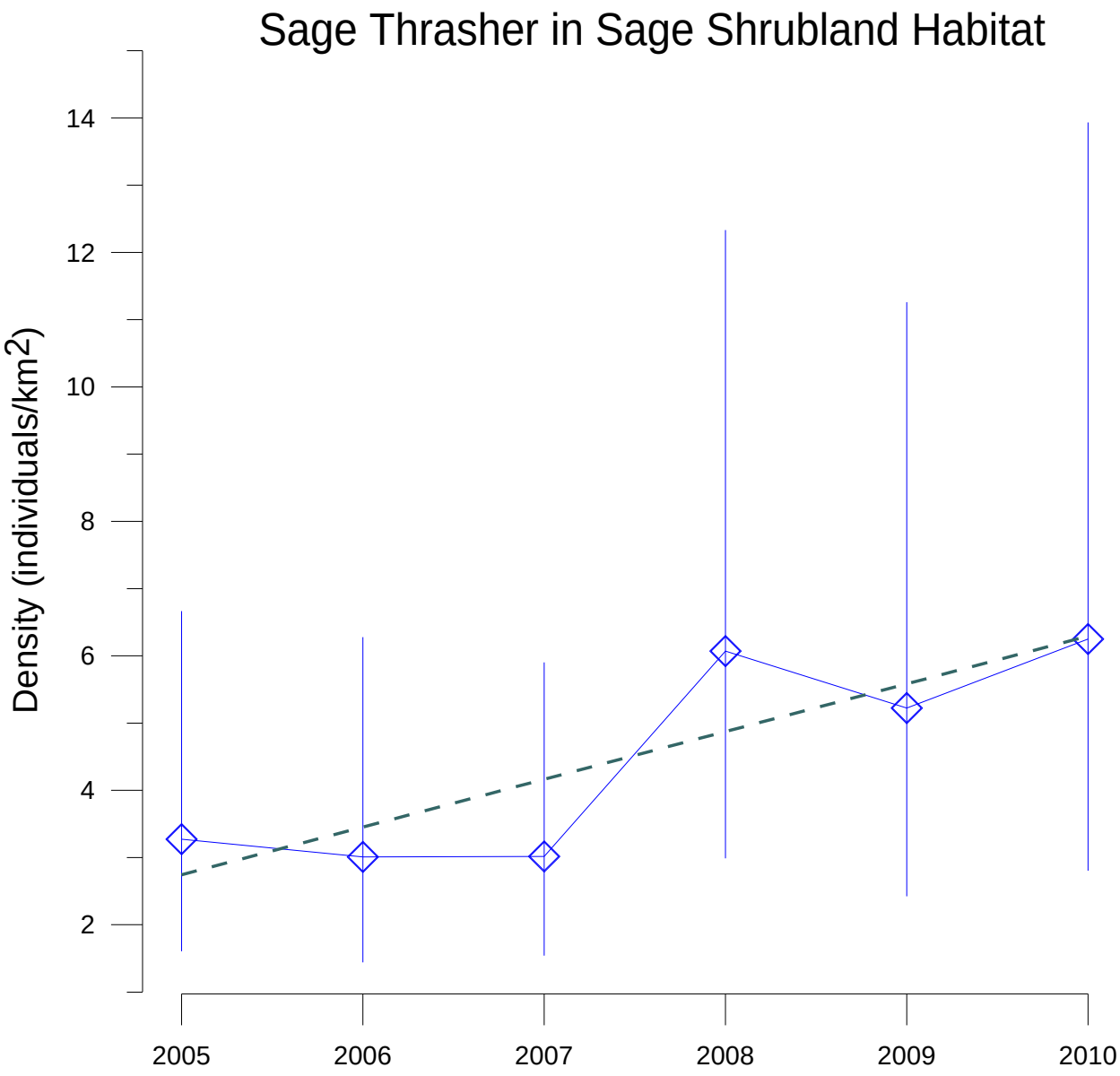

Figure 10. Estimated densities and population trend of Sage Thrashers in Sage Shrubland habitat within the Northern Colorado Plateau Network, 2005-2010. Error bars represent 90% confidence intervals. The dashed line represents the best estimate of observed population trend for the NCPN data.

Pipe Springs National Monument (PISP)

We detected a total of 197 birds of 29 species in PISP in 2010 (Appendix A). To date, 38 species have been detected, totaling 335 individuals. Eurasian Collared-Dove (EUCD), Gambel's Quail, House Sparrow and Red-winged Blackbird were detected only in 2010.

DISCUSSION AND RECOMMENDATIONS

In Tables 3-5, we give density estimates for all years' data (2005-2010). We did this for two reasons: 1) to provide a comparison of the six years' density estimates, and more importantly, 2) to provide more statistically rigorous estimates for 2005 – 2009. For most species, each year of additional data will improve our ability to accurately estimate densities of the species that occupy the NCPN. Please note that the density estimates presented in this report replace the estimates provided in the 2005 – 2009 reports. Sample sizes (n) reported in the tables indicate the number of individuals used in analyses, after truncation, not the number of individual birds actually detected. The number of species with robust CV's was lower than other years because overall the number of individual birds detected was lower in 2010. We require a minimum sample size of 10 each year in order to calculate density estimates for that year.

The National Park Service's project objective is to determine the population status and trends of breeding landbird species in Low-Elevation Riparian, Pinyon-Juniper, and Sage Shrubland. For the first time, we present landbird population trend results for several species of conservation concern in NCPN. These preliminary results indicate that many sensitive species appear to have stable populations within certain habitats of NCPN. We suggest paying close attention to the six species with notable decreasing and increasing population trends in future years of monitoring. Bewick's Wren (BEWR) and Black-billed Magpie (BBMA) appear to be experiencing declines. Potential explanations of BEWR declines may be loss of suitable nesting habitat (cavities) and competition with other cavity nesters. Additional investigation of BEWR populations is recommended as we document over a 50 percent decline in the last 6 years. Observed declines in BBMA may be related to the effects of the West Nile Virus. Christmas Bird Count numbers for BBMA have been particularly low in recent years (Beason, personal communication). Long-term monitoring will continue to be necessary for interpreting population status and trends for avian species of NCPN.

We have noticed that for some species the densities are substantially higher than those presented in published literature. This problem seems to occur for bird species that we consistently detect at close distances (or bird species that are difficult to detect at far distances). These are typically species that do not sing loudly or produce sounds that are not detectable from a distance (i.e., Blue-gray Gnatcatcher or Black-chinned Hummingbird). Black-chinned Hummingbird is one of these species for which we are presenting density estimates that are substantially higher than reported in published literature. Baltosser and Russell (2000) reports density estimates for the Black-chinned Hummingbird ranging from 17.5 to 82.5 birds/$km^{2.}$ In this report we present density estimates for Black-chinned Hummingbird in low-elevation riparian habitat ranging from 156.5 in 2008 to 291.7 birds/km^2 in 2006. This is one facet of distance sampling that RMBO intends to investigate in the future and develop a correction factor to adjust the estimates.

In 2007, the North American Bird Conservation Initiative monitoring subcommittee outlined recommendations for improving monitoring programs (NABCI 2007). First, monitoring programs should integrate an adaptive management approach into the monitoring process to incorporate management and conservation priorities. This goal is not practical for the goals and scope of the NCPN monitoring program; however we hope that trends identified in this early-warning program will lead to increased research and projects on species experiencing declines. The second recommendation is to coordinate landbird monitoring among organizations and across spatial scales to make monitoring more efficient and effective. RMBO coordinates with a variety of Federal, State, and local agencies throughout 12 different states in an effort to monitor

landbird populations across a broad region using a spatially-balanced study design. Monitoring at different spatial scales is important in understanding population trends (NABCI 2007), and the NABCI report recommends using Bird Conservation Regions (BCRs) as a starting point for integrated landbird monitoring. We are now conducting monitoring at the BCR scale throughout Colorado and Wyoming using a spatially balanced study design. In future years, it is likely the state of Utah (BCRs 9 and 16) will be included as well.

In December of 2010, RMBO and NCPN met to discuss how to improve statistical design and review the current design to make sure it is meeting NCPN's desired objectives. The spatially balanced study design is more statistically rigorous and would allow us to analyze data at a variety of spatial scales. In 2010 we surveyed three transects within NCPN (part of the Monitoring the Birds of Colorado program) utilizing this study design. In larger parks such as Dinosaur and Canyonlands, NCPN can adopt this design in Sagebrush and Pinyon-Juniper ecotypes. Low-Elevation Riparian will require special consideration, as a 16-point grid will not adequately sample this habitat. In smaller parks, or parks with substantial inaccessible terrain, alternative designs that are comparable will be required. Transitioning NCPN monitoring to a grid based design would allow the network to compare density estimates of species on their lands to those on surrounding landscapes surveyed by RMBO. We can do this by post-stratifying the grid based transects by primary habitat type and comparing the density estimates. Comparisons of densities may guide the Park Service in making key management decisions and help to assess the effectiveness of past and existing management practices.

Also in line with NABCI recommendations is RMBO's online database (http://www.rmbo.org/public/monitoring), where land managers, as well as the general public, can view distribution maps, species counts by project, past monitoring reports, and species accounts. In addition, RMBO is a partner of the Avian Knowledge Network (AKN) whose goal is to 1) compile bird monitoring data from various contributor organizations and organize them into one format and 2) make this data available to land managers, scientists, and the public for decision-making, research, and educational purposes.

We detected several new species, including Eurasian Collared-Doves at Pipe Springs NM. The only other detection of EUCD in NCPN was in 2007. This was a single individual in lowland riparian habitat within Capitol Reef NP. Special attention should be paid to EUCD as they continue to expand their range and population sizes increase (Temple 1992, Hengeveld 1993). Because Eurasian Collared-Doves may compete with Mourning Doves, careful attention should also be paid to Mourning Dove populations as well (Romagosa and McEneaney 1999). It is difficult to ascertain how many additional years we will need to obtain density estimates for common species at PISP, but due to the small sample size, likely 5-7 years will be needed. In addition to the four point count visits at PISP, area searches will be conducted in 2011 to detect additional species, including nocturnal landbirds, and record breeding observations.

In 2010, we recorded 41 priority species according to the Utah Department of Wildlife Resources (UDWR), the U.S. Fish and Wildlife Service (USFWS), and Partners In Flight (PIF) (Appendix B). We provide this information online in the species account section of our Avian Data Center website. We provide information on life history, distribution, density estimates, and graphical representations of density estimates for all species detected. We are currently updating species accounts and will provide the website link once it becomes available.

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APPENDIX A

List of all bird species observed during surveys in the Northern Colorado Plateau Network, with species totals by habitat for 2010, and yearly species totals from 2005-2010. Habitats: LR=Low-Elevation Riparian; PJ=Pinyon-Juniper; SA=Sage Shrubland; PISP=Pipe Springs National Monument. Priority species are bolded.

	# of individuals observed per habitat, 2010				# of individuals observed per year and total (all habitats), 2005-2010						
Species	**LR**	**PJ**	**SA**	**PISP**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
American Crow			2		10	1	2	4	2	2	21
American Dipper					1	1	1	2	1		6
American Goldfinch	27	4	3		10	4	9	7	8	34	72
American Kestrel	2		11		10	10	11	9	9	13	62
American Robin	28	17	55		100	154	144	129	64	100	691
Ash-throated Flycatcher	222	130	19	13	300	412	357	357	442	384	2,252
Bank Swallow	1						2	1		1	4
Barn Swallow					1	2	3	1	2		9
Belted Kingfisher							1				1
Bewick's Wren	20	28	2		237	306	197	205	219	50	1,214
Black Phoebe	6			4	10	15	28	12	32	10	107
Black-billed Magpie		5	69		77	108	53	52	52	74	416
Black-capped Chickadee	1				1	4	4		2	1	12
Black-chinned Hummingbird	23	22	8		50	67	52	52	104	53	378
Black-chinned Sparrow		4			9	6	4		12	4	35
Black-headed Grosbeak	17	7	10	4	27	54	37	37	46	38	239
Black-throated Gray Warbler	61	341	18		393	551	455	566	627	420	3,012
Black-throated Sparrow	74	83	10	16	113	171	193	151	334	183	1,145
Blue Grosbeak	3				14	32	6	6	35	3	96
Blue-gray Gnatcatcher	190	174	59	1	340	302	291	332	493	424	2,182
Blue-winged Teal					1						1
Brewer's Blackbird	2	3	24		10	48	23	10	30	29	150
Brewer's Sparrow	6	6	639	1	584	635	593	535	710	652	3,709

	# of individuals observed per habitat, 2010				# of individuals observed per year and total (all habitats), 2005-2010						
Species	**LR**	**PJ**	**SA**	**PISP**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
Broad-tailed Hummingbird	28	35	15		68	30	46	75	29	78	326
Brown-headed Cowbird	8	7	8	4	39	70	50	47	56	27	289
Bullock's Oriole	19	6	1	8	7	30	19	13	20	34	123
Bushtit		11			67	93	33	24	61	11	289
California Gull					3	3					6
Canada Goose	3		5		6	6	20	9	5	8	54
Canyon Wren	4	3			52	103	70	36	58	7	326
Cassin's Finch		3	1		4	38	14	13	2	4	75
Cassin's Kingbird						1			19		20
Cedar Waxwing							1	1	1		3
Chipping Sparrow	40	119	113		153	152	186	213	245	272	1,221
Chukar	1	2				3	3		2	3	11
Clark's Nutcracker		5	2		16	24	26	17	24	7	114
Cliff Swallow			5		50	36	15	6		5	112
Common Merganser					1	2	7	4	1		15
Common Nighthawk	1	11	2		2	1	1	2	6	14	26
Common Poorwill		1	1		1	1	1			2	5
Common Raven	50	85	48	9	116	134	176	135	131	192	884
Common Yellowthroat	15		1		13	30	27	9	31	16	126
Cooper's Hawk	10	5			15	17	14	5	8	15	74
Cordilleran Flycatcher	3				4	1	2	3	3	3	16
Dark-eyed Junco		2	1		38	18	45	35	4	3	37
Downy Woodpecker	1				5	11	3	7	15	1	42
Dusky Flycatcher	2	21	75		51	111	98	136	108	98	602
Dusky Grouse					1		1				2
Eared Grebe									1		1
Eurasian Collared-Dove				19			1			19	20
European Starling	1		6	1	9	16	8	10		8	51
Evening Grosbeak							1				1

	# of individuals observed per habitat, 2010				# of individuals observed per year and total (all habitats), 2005-2010						
Species	**LR**	**PJ**	**SA**	**PISP**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
Ferruginous Hawk			1							1	1
Gadwall					1	1	3				5
Gambel's Quail				15	9	15		1	7	15	47
Golden Eagle					7	10	4	6	1		28
Grace's Warbler		12	7		15	31	39	31	26	19	161
Gray Flycatcher	40	158	29		160	116	108	142	256	227	1,009
Gray Vireo	7	148	9		136	128	104	150	252	164	934
Great Blue Heron			6		9	3	3	3	1	6	25
Great Horned Owl		1			2			1		1	4
Greater Sage-Grouse					7	2	1				10
Green-tailed Towhee	4	3	213		346	462	364	302	330	220	2,024
Green-winged Teal						1					1
Hairy Woodpecker	8	9	4		13	21	21	16	26	21	118
Hammond's Flycatcher							9	9	19		37
Hermit Thrush	1	12	1		15	21	2		24	14	76
Horned Lark			32		31	39	43	23	47	32	215
House Finch	149	141	25	42	234	336	423	416	506	357	2,272
House Sparrow				1						1	1
House Wren	30	6	12		59	61	39	55	57	48	319
Indigo Bunting						1			6		7
Juniper Titmouse	18	166	6	2	130	112	135	156	251	192	976
Killdeer			1		4	3	2	2	5	1	17
Lark Sparrow	8	20	101	1	131	146	101	50	168	130	726
Lazuli Bunting	189	3	55		183	155	223	186	275	247	1,269
Lesser Goldfinch	36	13		1	38	67	106	75	159	50	495
Lincoln's Sparrow					1			2	1		4
Loggerhead Shrike		2	2		3	1		1		4	9
Long-eared Owl						2					2
Lucy's Warbler	7				1		11	20	39	7	78

	# of individuals observed per habitat, 2010				# of individuals observed per year and total (all habitats), 2005-2010						
Species	**LR**	**PJ**	**SA**	**PISP**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
MacGillivray's Warbler	1	1	9		3	9	3	4	7	11	37
Mallard	2				2	15	2	11	3	2	35
Mountain Bluebird	3	48	93		149	134	157	111	109	144	804
Mountain Chickadee		6	2		34	22	24	14	25	8	127
Mourning Dove	121	197	104	6	411	536	499	393	270	428	2,537
Northern Flicker	7	24	41		48	57	58	22	50	72	268
Northern Goshawk								1			1
Northern Harrier	2		6		2	4	5	6	2	8	27
Northern Mockingbird		19	5	8		25	11	17	37	32	122
Northern Rough-winged Swallow	2		3	3	6	6	2	6	16	8	44
Northern Shoveler							2				2
Olive-sided Flycatcher					16	4	4	2	18		44
Orange-crowned Warbler	1	1			2	2	2	2		2	10
Osprey					1			1			2
Peregrine Falcon	2	4		1	4	5	7	10	3	7	36
Phainopepla									3		3
Pine Siskin	4	11	3		4	15	4	15	15	18	71
Pinyon Jay	1	141	21		75	106	123	50	79	163	596
Plumbeous Vireo	88	106	22		147	165	138	131	148	216	945
Prairie Falcon	1				2			2	1	1	6
Pygmy Nuthatch		4	3		10	7	12	5	10	7	51
Red Crossbill		2	4		1	11	4		19	6	41
Red-breasted Nuthatch		1			11	5	7	1	2	1	27
Red-naped Sapsucker						2		1	2		5
Red-tailed Hawk	1	2	2		12	17	10	9	12	5	65
Red-winged Blackbird	1			1		4	1	1	1	2	9
Ring-billed Gull							2				2
Rock Pigeon		2			2	5	3			2	12
Rock Wren	97	78	77	4	315	403	348	303	417	256	2,042

	# of individuals observed per habitat, 2010				# of individuals observed per year and total (all habitats), 2005-2010						
Species	**LR**	**PJ**	**SA**	**PISP**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
Ruby-crowned Kinglet	7	3			4	4	3	9	11	10	41
Sage Sparrow			10		43	32	31	21	37	10	174
Sage Thrasher			150		92	93	88	155	128	150	706
Sandhill Crane						1		1	1		3
Savannah Sparrow						1	1				2
Say's Phoebe	42	25	21	3	101	97	63	95	121	91	568
Scott's Oriole							1	5	6		12
Sharp-shinned Hawk						1	1	1			3
Short-eared Owl						3			1		4
Song Sparrow	8	1	1		60	75	69	61	33	10	308
Spotted Sandpiper	4		4		1	2	7		3	8	21
Spotted Towhee	337	111	95		428	609	499	405	528	543	3,012
Steller's Jay		1	8		5	5	16	9	5	9	49
Summer Tanager									1		1
Swainson's Thrush									1		1
Townsend's Solitaire		8	4		5	6	12	6	18	12	59
Tree Swallow			2		3	20	20	25	2	2	72
Turkey Vulture	5	10	3		19	23	16	8	18	18	102
Veery						1					1
Vesper Sparrow	3	31	565		379	492	484	473	477	599	2,904
Violet-green Swallow	124	34	21	4	194	320	265	204	276	183	1,442
Virginia's Warbler	32	61	27		121	109	102	154	46	120	652
Warbling Vireo	22	1	9		44	58	61	51	37	32	283
Western Bluebird	1	5	3		15	14	15	17	22	9	92
Western Grebe						1					1
Western Kingbird	3	3	5	13	2	4	1	6	24	24	61
Western Meadowlark	7	21	199		227	239	182	213	276	227	1,364
Western Screech-Owl					1						1
Western Scrub-Jay	20	51	8	1	86	87	71	78	55	80	457

	# of individuals observed per habitat, 2010				# of individuals observed per year and total (all habitats), 2005-2010						
Species	**LR**	**PJ**	**SA**	**PISP**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
Western Tanager	19	17	17	2	44	69	72	59	45	55	344
Western Wood-Pewee	17		11		40	44	64	42	56	28	274
White-breasted Nuthatch	2	22	3		27	27	30	17	22	27	150
White-crowned Sparrow	3					6	4	7	2	3	25
White-faced Ibis					1						1
White-throated Swift	103	64	16		271	286	376	200	236	183	1,552
Wild Turkey	6				2	7	1	4	7	6	27
Williamson's Sapsucker					1		1	1			3
Willow Flycatcher					1	3	3		1		8
Wilson's Warbler	6					4		3	3	6	16
Yellow Warbler	238	1	8	5	157	175	155	181	273	252	1,193
Yellow-billed Cuckoo						1					1
Yellow-breasted Chat	78	1	10		52	57	54	48	72	89	372
Yellow-rumped Warbler	57	9	3		26	65	32	49	14	69	324

APPENDIX B

Priority species observed on transects in the Northern Colorado Plateau Network from 2005-2010, with conservation and management designations and species totals per habitat. Habitats: LR=Low-Elevation Riparian; PJ=Pinyon-Juniper; SA=Sage Shrubland; PISP=Pipe Springs National Monument.

	Species Management Designation						Number of individuals observed per habitat, 2005-2010			
		USFWS[2]			Partners In Flight[3]					
Species	UDWR[1]	BCR 10	BCR 16	Region 6	BCR 10	BCR 16	LR	PJ	SA	PISP
American Dipper					RS		6			
Bewick's Wren				BCC			437	746	26	5
Black-billed Magpie						RS	4	11	401	
Black-chinned Sparrow						CC	16	18	1	
Black-throated Gray Warbler	Tier III					RC	458	2379	175	
Black-throated Sparrow						RC	500	488	116	41
Brewer's Sparrow	Tier III	X	X		CC,RC	CC,RC	23	69	3616	1
Broad-tailed Hummingbird	Tier III					RS	84	98	144	
Canyon Wren						RC	224	96	4	2
Cassin's Finch		X	X	BCC	RC,CS,RS	RC	5	43	27	
Clark's Nutcracker					CS,RS	CS,RS	2	52	60	
Common Nighthawk						RC	2	21	3	
Cordilleran Flycatcher						RS	13	3		
Dusky Flycatcher					CS,RS		28	175	399	
Dusky Grouse					CC,RC	CC			2	
Ferruginous Hawk	Tier II	X	X	BCC	RC	RC			1	
Gambel's Quail	Tier III						1	22	2	22
Golden Eagle			X	BCC		RC	3	12	13	
Grace's Warbler			X			CC,RC	3	93	65	

	Species Management Designation						Number of individuals observed per habitat, 2005-2010			
		USFWS[2]			Partners In Flight[3]					
Species	UDWR[1]	BCR 10	BCR 16	Region 6	BCR 10	BCR 16	LR	PJ	SA	PISP
Gray Vireo	Tier III		X	BCC		CC,RC,RS	162	721	48	3
Greater Sage-Grouse	Tier II				CC,RC,CS,RS	CC,RC			10	
Green-tailed Towhee						CS,RS	21	74	1929	
Hammond's Flycatcher					RS			32	5	
Juniper Titmouse			X			RC,RS	195	741	33	7
Lazuli Bunting					RS		1049	57	163	
Loggerhead Shrike		X		BCC	RC	RC	1	4	4	
Lucy's Warbler	Tier III						78			
Mountain Bluebird						RC,CS,RS	37	279	488	
Northern Goshawk	Tier I				RC,RS				1	
Northern Harrier					RC		5		22	
Olive-sided Flycatcher		X			CC,RC	CC	1	8	35	
Osprey	Tier III							1	1	
Peregrine Falcon	Tier III	X		BCC			20	10	3	3
Pine Siskin						RC,RS	27	20	24	
Pinyon Jay			X	BCC	CC	CC,RC,CS,RS	16	506	74	
Plumbeous Vireo						RS	457	404	84	
Prairie Falcon				BCC		RC	2		4	
Pygmy Nuthatch						RC		24	27	
Red Crossbill					RS			10	31	
Red-naped Sapsucker					CS,RS		4		1	
Rock Wren						RS	693	697	641	11
Sage Sparrow	Tier III	X		BCC		RC	3		171	
Sage Thrasher	Tier III	X		BCC				1	705	
Say's Phoebe						RS	332	121	104	11

	Species Management Designation						Number of individuals observed per habitat, 2005-2010			
		USFWS[2]			Partners In Flight[3]					
Species	UDWR[1]	BCR 10	BCR 16	Region 6	BCR 10	BCR 16	LR	PJ	SA	PISP
Short-eared Owl	Tier II			BCC	CC				4	
Townsend's Solitaire					RS		3	37	19	
Veery			X						1	
Violet-green Swallow						RS	976	312	149	5
Virginia's Warbler	Tier III					CC,RC,RS	236	249	167	
Warbling Vireo						RS	196	16	71	
Western Bluebird						RS	20	28	44	
White-throated Swift					CC	CC,RS	871	582	92	7
Williamson's Sapsucker	Tier III	X			CS,RS	CS,RS		1	2	
Willow Flycatcher	Tier I	X	X	BCC	CC,RS	CC,RC	7	1		
Yellow-billed Cuckoo	Tier I	X	X				1			

[1] UDWR=Utah Division of Wildlife Resources, Tier X= Utah Comprehensive Wildlife Conservation Strategy Tier X Species of Greatest Conservation Need (Utah Division of Wildlife Reources 2005)

[2] USFWS=United States 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] Partners In Flight, 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).