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**Evaluation of Pinyon Removal Effects Typical of a Wildland-Urban
Interface Fuels Reduction Project, Mono County, California:
Avian Monitoring Component at Rancheria Gulch, 2010.**



Western Wood-Pewee by Colin Woolley

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EXECUTIVE SUMMARY

In 2010, PRBO Conservation Science (PRBO) completed the sixth field season of avian studies associated with the Joint Fire Sciences Program funded study “Evaluation of Pinyon Removal Effects Typical of a Wildland-Urban Interface Fuels Reduction Project, Mono County, CA”. 2010 was the fourth post treatment season.

We determined avian use of the study plots during surveys conducted from May 12 through July 7, 2010. We ranked breeding status for 85 species encountered in the study area. Thirteen of these are listed on one or more species of concern lists. No new species were encountered in 2010. New confirmed breeders for 2010 are Cassin’s Vireo and Steller’s Jay.

Sixteen species held territories on the treatment plot and Green-tailed Towhee, Brewer’s Sparrow and Chipping Sparrow were the highest density breeders in 2010. New territories were held by Steller’s Jay. Twelve species held territories on the control plot. Green-tailed Towhee was also the highest density breeder on the control plot, followed by Blue-gray Gnatcatcher.

Point count surveys offered comparisons of bird detections across the entire study area. Green-tailed Towhee was the most abundant species detected by point counts during all six years followed by Brewer’s Sparrow, Spotted Towhee and Blue-gray Gnatcatcher. Pinyon-thinning treatments likely attracted Western Wood-Pewee and Mountain Bluebird, which were not present pre treatment.

There was very little change in species richness for pinyon, sage or generalist nesting species between pre treatment (2005 – 2006) and post treatment (2007- 2010) years. Species richness was highest for pinyon-breeding species throughout all six years of the study. Species diversity was also highest for pinyon-associated species in all six years of the study. Total abundance was highest for sagebrush nesters overall. Generalists were detected the least throughout all six years of the study.

INTRODUCTION

The spring and summer of 2010 was the sixth field season of avian studies associated with the Joint Fire Sciences Program funded study “Evaluation of Pinyon Removal Effects Typical of a Wildland-Urban Interface (WUI) Fuels Reduction Project Mono County, CA” (Removal Study; USDI 2005). Managers from the Bureau of Land Management, Bishop Field Office, California (BLM) and research scientists from the U.S. Geological Survey, Western Ecological Research Center (USGS) collaborated with PRBO Conservation Science (PRBO) to conduct the avian component of the Removal Study.

The primary objective of the bird monitoring component of the Removal Study is to investigate the effects of the mosaic of pinyon pine thinning treatments on sagebrush and pinyon woodland breeding birds. Pinyon thinning treatments were conducted in fall of 2006. Data collected in 2005 and 2006 describe bird use of the site during pre-treatment years, while data collected in 2007 - 2010 describe post-treatment bird use of the site. We used standardized survey methods to determine avian use of the study site, including bird species abundance, territorial density, nest survivorship and vegetation characteristics associated with nest sites and breeding bird abundance in 2005 - 2006. In 2007- 2010, due to changes in treatment design (e.g. treatment plot acreage was greatly reduced), we reduced effort and implemented methods to determine territorial density, bird indices of richness, diversity and abundance and associated vegetation characteristics (see below).

METHODS

Study Area

The study area was located at Rancheria Gulch, Mono County, California (38° 04' 03" N, -119° 06' 37" W, Figure 1). Located ca. 6 km north of Mono Lake and on the southern slopes of the Bodie Hills, this site was characterized by pinyon pine woodland with a few sporadic Utah juniper (*Juniperus osteosperma*). The woodland merged into sagebrush as elevation decreased. Dominant shrub species included mountain big sagebrush (*Artemisia tridentata*) and bitterbrush (*Purshia tridentata*). Herbaceous cover was primarily bottlebrush squirreltail (*Elymus elymoides*), needlegrass (*Achnatherum* spp.), and basin wildrye (*Leymus cinereus*).

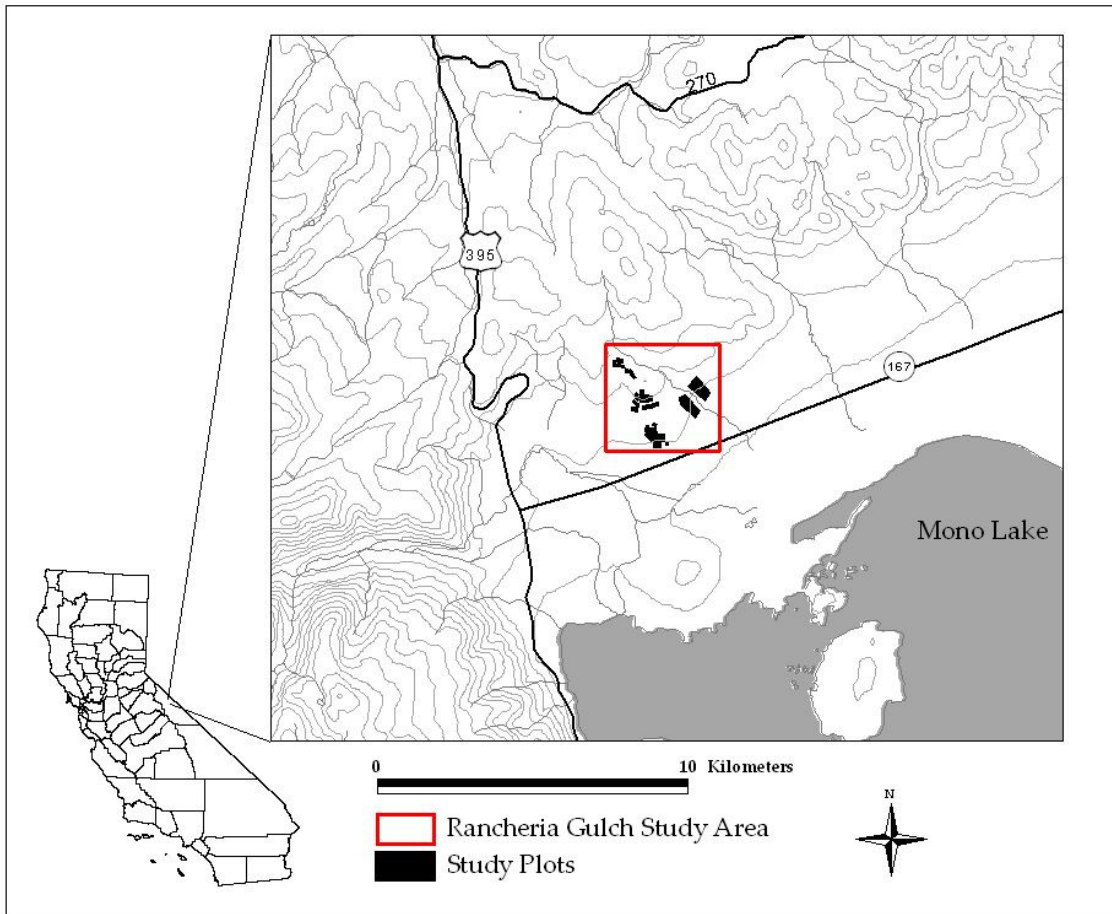
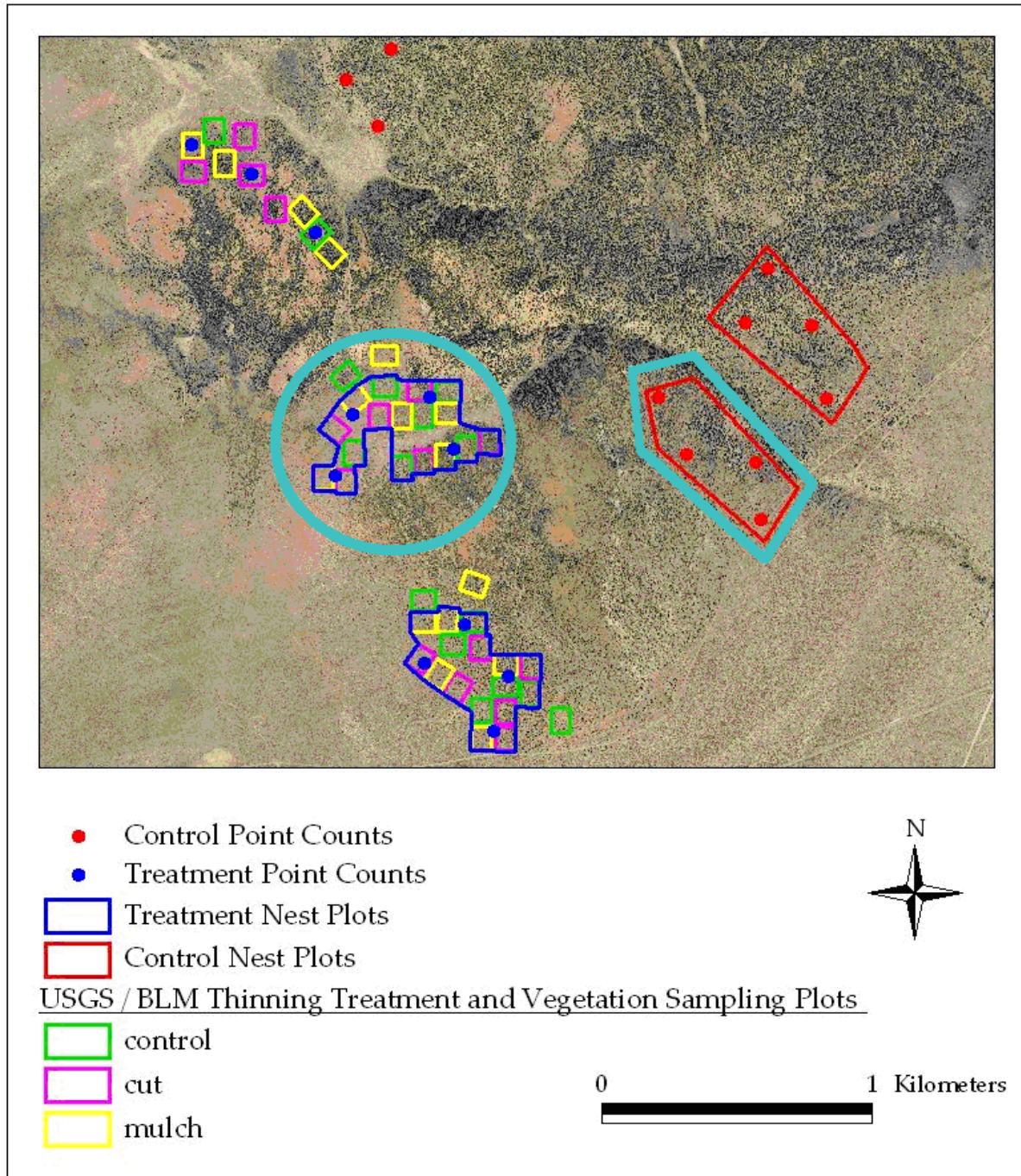


Figure 1. Rancheria Gulch study area, 2010.

Study Design

The Removal Study underwent several design changes up to the time of treatments in fall 2006. The bird monitoring component adjusted accordingly (see Wolley and Heath 2005 and Heath and Moss 2006 for history of study design changes). In 2007 - 2010, we focused on comparing measures of bird density, abundance and richness between treated and untreated areas and between pre and post treatment years via territory mapping on intensive monitoring plots and via point counts across the entire study area. These methods are described in detail below.

Figure 2. Study Plots at Rancheria Gulch, 2005 -2010. Detail of area delineated by red box in Figure 1. Treatment areas and nest searching plots represent initial study design. Of the three treatment clusters, only the north and central clusters were treated in fall 2006. The pale blue circle and polygon indicate intensive monitoring plots where we continued territory mapping in 2007 -2010. We conducted point counts at all mapped locations 2005 - 2010.



Intensive Monitoring Plots: Spot Mapping

In 2010 PRBO biologists conducted spot mapping at one treatment plot (RATB) and one control plot (RACA) (pale blue circle and polygon, Figure 2, Table 1). All spot mapping data presented in this report is derived from these two plots. Biologists mapped all territorial individuals during each visit to the plot, following guidelines discussed in Ralph et al. (1993) and International Bird Census Committee recommendations (Robbins 1970). At the end of the field season, daily spot maps were combined into single territory maps for each breeding species at each plot and number of territories per plot was determined. Locations of transient species were noted to document their presence on the plots.

Table 1. Spot mapping plot names, codes, size, number of census days, hours and range of census dates at Rancheria Gulch, 2010.

Plot	Plot Code	Plot size (ha)	Census Dates	Number of Censuses	Number of Census Hours
Rancheria Gulch Treatment B	RATB	25	May 12 – July 7	9	22
Rancheria Gulch Control A	RACA	25	May 10 – July 7	11	34
Totals				20	56

Entire Study Area: Point Counts

PRBO biologists, familiar with songs and calls of birds in the area, conducted all point count surveys. We surveyed one or two clusters of 3 -4 points per morning. Points were spaced at least 250 m from one another. We visited all points three times between June 1 and June 29 and spaced each visit at least 10 days apart (Table 2). Since treatments did not occur on RATA (as originally intended), it now represents a control; the code remains RATA.

Table 2. Point count cluster names, 4-letter code, number of points, and dates of censuses at Rancheria Gulch, 2010. Point Count locations in Appendix A.

Transect	Code	Number of Points	Visit 1	Visit 2	Visit 3
Treatment B	RATB	4	1 -Jun	11 -Jun	29 -Jun
Treatment Upper	RATU	3	1 -Jun	11 -Jun	28 -Jun
Total Treatment Points		7			
Control RATA	RATA	4	1 -Jun	11 -Jun	29 -Jun
Control A	RACA	4	1 -Jun	11 -Jun	29 -Jun
Control B	RACB	4	1 -Jun	11 -Jun	29 -Jun
Control Upper	RACU	3	1 -Jun	11 -Jun	28 -Jun
Total Control Points		15			

We conducted surveys from within 15 minutes after local sunrise until approximately 3 hours later, and did not conduct counts in excessively windy or rainy conditions. We conducted 5-minute Variable Circular Plot (VCP) point counts (See Ralph et al. 1993) and used a LEICA LRF 800 range finder to determine exact distances to each bird up to 300 m and then lumped everything over 300 m together. We recorded exact distances to all birds detected and type of initial detection (visual, song or call); also recording when an individual was heard singing sometime during the 5-minute count. We recorded any breeding observations (e.g. nest material or food carries, fledglings). Point count locations are presented in Appendix A.

Raw data are archived in the California Avian Data Center (www.prbo.org/cadc) under the project name "Rancheria Gulch".

Geographic Data

We collected location information at all nests and point count stations using a Garmin Global Positioning System (GPSmap 60Cx or Garmin II-Plus) receiver. Positions were recorded in UTM (Universal Transverse Mercator), NAD83 datum. All coordinates and estimated accuracy (figure of merit; FOM) were recorded. FOM of these points ranges from 0 to 10 meters. All maps are represented in UTM coordinates, Zone 11, NAD83 datum.

Data Summary and Statistical Analysis

We present three avian community metrics throughout the report: species richness, total bird abundance, and Shannon Weiner Diversity index. Using PointCnt 2.79 (Ballard 2004), we summarized by-point species richness, diversity and abundance for breeding species detected within 100 m during point counts at treatment plots (RATB & RATU, 7 points total) and control plots (RACA & RACU, 7 points total) summed over 3 visits. We did not include RACB or RATA in these summaries or analysis to keep the number of treatment points and control points equal. This sample size is very low and interferences are difficult to make based on seven treatment and seven control plots.

We excluded all non-breeding migrants. We further limited the breeding species to those that were best assessed with the point count protocol. Thus we removed non-territorial species, and species whose territories are typically so large that we could not assure independence of individual observations among points. Nocturnal species were also excluded. Excluded species included Common Raven, Clark's Nutcracker, and all nighthawks, swallows, swifts, ducks, and raptors.

To summarize bird numbers by habitat type, we categorized species as sagebrush, coniferous forest and generalist breeders (see Table 3). Categories were determined by site specific observations or published accounts specifying habitat use. We summarized mean bird species richness, diversity and abundance for each habitat grouping using all individuals of the assigned species detected within 100 m during point counts at treatment plots and control plots summed over 3 visits.

Table 3. Species categories used in habitat specific richness, diversity and abundance analysis.

Sagebrush	Coniferous Forest		Generalist
Gray Flycatcher Blue-gray Gnatcatcher* Loggerhead Shrike Sage Thrasher Green-tailed Towhee Spotted Towhee Brewer's Sparrow Vesper Sparrow Sage Sparrow <p style="text-align: center;">9 species</p>	Mourning Dove Northern Flicker Solitary Vireo Stellar's Jay Western Scrub Jay Pinyon Jay Mountain Chickadee Juniper Titmouse Bushtit	Red-breasted Nuthatch White-breasted Nuthatch Western Wood-Pewee Mountain Bluebird Black-throated Gray Warbler Western Tanager Chipping Sparrow Oregon Junco Black-headed Grosbeak Cassin's Finch <p style="text-align: center;">19 species</p>	House Wren Rock Wren Bewick's Wren American Robin Brown-headed Cowbird House Finch <p style="text-align: center;">7 Species</p>

*we found Blue-gray Gnatcatchers mostly using sagebrush in this study, therefore it is included as a sagebrush associated species

Breeding species richness: Number of breeding species.

Total abundance: Number of individuals of all breeding species combined.

Breeding species diversity: The transformed Shannon-Wiener index of biological diversity, denoted N_1 (MacArthur 1965, Krebs 1989). This index of diversity is usually highly correlated with bird species richness, but also takes the number of individuals of each species into account. Higher scores on the Shannon-Wiener index indicate higher species richness and more balanced numbers of individuals of each species added. Expressed mathematically:

$$N_1 = e^{H'} \text{ and } H' = \sum_{i=1}^{i=S} (p_i)(\ln p_i)(-1)$$

where S = total species richness and p_i is the proportion of the total numbers of individuals for each species (Nur et al. 1999).

All statistical calculations were performed using Stata 8.0 (Stata Corp. 2003).

Breeding Status

We determined breeding status for all species encountered on the study site from 2005 to 2010. We used observations recorded during and after project setup, all bird surveys and vegetation assessments. We ranked species by site following four criteria of the Riparian

Habitat Joint Venture breeding scale, modified from breeding bird atlas criteria (see <http://www.prbo.org/calpif/criteria.html>):

No evidence of breeding: Species not detected during breeding season, or species known not to breed within the general study area.

Possible breeding: Species encountered singing or acting territorial only once during the breeding season (in suitable habitat).

Probable breeding: Singing individual encountered on 2 or more different days of standardized censuses (at least one week apart); territorial behavior noted more than once at the same location; pair observed in courtship behavior.

Confirmed breeding: nest building; nesting material or fecal sack being carried by adult; dependent juveniles with adults; active territory observed on at least three days (at least one week apart); active nest observed.

RESULTS AND DISCUSSION

Bird species composition and breeding status

We documented and determined breeding status for a total of 85 species on the treatment and control plots combined (Appendix B). There were no new species detected in 2010. New confirmed breeders in 2010 were Cassin's Vireo and Steller's Jay.

Special status species

From 2005-2010 we detected 13 species that occur on one or more of the following lists: California Bird Species of Special Concern (BSSC, Shuford and Gardali 2008), United States Fish and Wildlife Service Birds of Concern (USFWS 2008), Audubon WatchList (Audubon 2007), The World Conservation Union Special Survival Commission Red List (IUCN 2008). We did not detect any state or federal threatened or endangered species (CDFG 2009, USFWS 2008), or any California BLM sensitive species (BLM 2006).

Table 4. Listed species detected at Rancheria Gulch 2005-2010. Scientific names listed in Appendix B. TL = species listed specifically for this time or location (r = rookery, n = nesting, c = colony, w = wintering, u =unspecified), IUCN= near threatened (NT), vulnerable (VU).

Common Name	TL	BSSC	USFWS 2008	Audubon Watchlist 2007	IUCN 2008
Mountain Quail	u			X	
Osprey	u				
Golden Eagle	u		X		X
Prairie Falcon	u		X		
California Gull	nc				X
Red-breasted Sapsucker		X			
Olive-sided Flycatcher	u	X	X	X	NT
Loggerhead Shrike	u	X	X		VU
Pinyon Jay	n			X	VU
Yellow Warbler					
Chipping Sparrow					X
Brewer's Sparrow			X	X	NT
Black-chinned Sparrow			X	X	
Sage Sparrow			X		

Breeding species territory density on intensive monitoring plots

In 2010, 16 and 12 species held territories on the intensively monitored treatment (RATB) and control (RACA) plots respectively (see Appendix C).

Treatment Plot

On the treatment plot Green-tailed Towhee (0.55/ha), Brewer's Sparrow (0.23/ha), Chipping Sparrow (0.16/ha), Spotted Towhee (0.11/ha) and Gray Flycatcher (0.11/ha) held the most territories per hectare in 2010. Total species density on the treatment plot in 2010 was 1.68/ha, an increase from 1.28/ha in 2009. New species holding a territory in 2010 on the treatment plot was Steller's Jay. Green-tailed Towhee territory density has increased since 2005 with the highest increase of all species since treatment (Figure 3). Brewer's Sparrows had the greatest decrease in territory density in 2007, the first year after treatment. Since then Brewer's Sparrow territories have steadily increased since 2007 and reached its highest density in 2010. Gray Flycatcher had low territory density overall but steadily increased since 2008. Spotted Towhee density fluctuated throughout the six years. All five species on the treatment plot showed higher territory density in 2010 than they did before treatment.

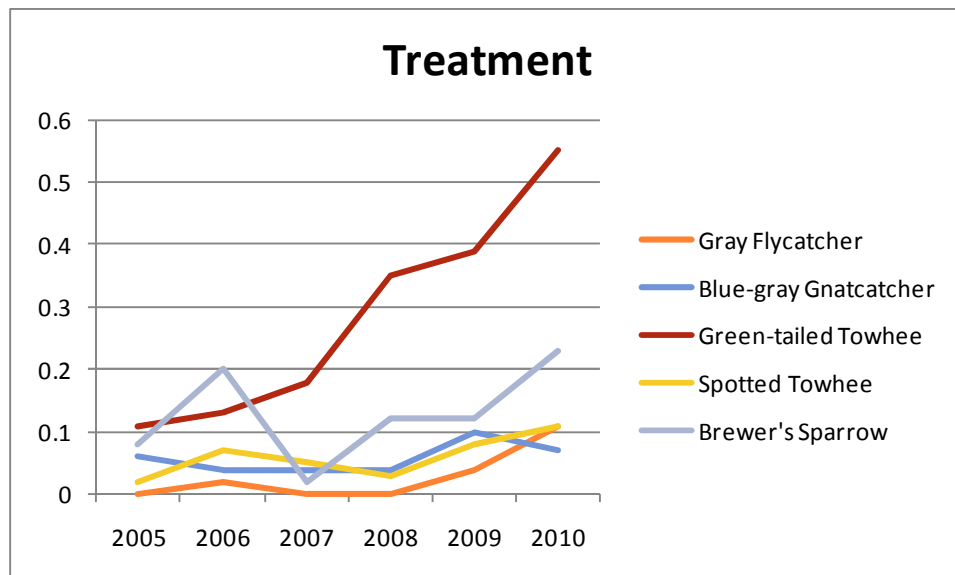


Figure 3. Territory density per hectare for five sagebrush breeding species on the treatment plot

Control Plot

On the control plot Green-tailed Towhee (0.21/ha), Blue-gray Gnatcatcher (0.13/ha), Spotted Towhee (0.08/ha), Brewer's Sparrow (0.08/ha) and Mountain Chickadee (0.08/ha) held

the most territories in 2010 (Figure 4). All species combined territory density was 0.82/ha on the control plot in 2010, less than half the density than on the treatment plot. New species holding territories in 2010 was Cassin's Vireo. Territory density for Gray Flycatcher was the most variable of all species, reaching a high of 0.3/ha in 2009 from a low of 0 individuals the previous year and then decreased to 0.1/ha in 2010. Green-tailed Towhee territory density showed a similar pattern with the highest density in 2009 followed by a drop in 2010. Blue-gray Gnatcatcher density also had the highest density in 2009. Brewer's Sparrow and Spotted Towhee do not show a spike in territory density in 2009. Overall, control plot territory density has increased throughout the study but at a lower magnitude than on the treatment plot. Territory density of Gray Flycatcher and Green-tailed Towhee may be influenced by similar factors considering their peak density values in 2009 followed by a decline in 2010.

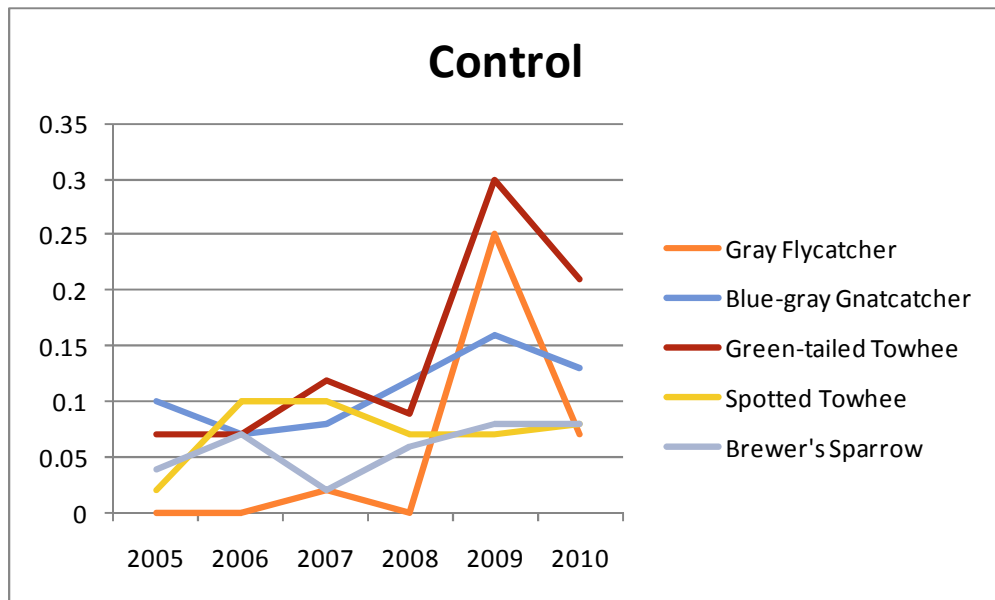


Figure 4. Territory density per hectare for five sagebrush breeding species on the control plot

Relative abundance across the entire study area

The most abundant sagebrush breeding species was Green-tailed Towhee in all years. Abundance of sagebrush breeding birds was higher overall during the years after treatment on control as well as treatment plots (Figure 5). This makes it more difficult to interpret the impact of treatment on sagebrush birds in addition to the already small sample size. Sage Thrasher, a

sagebrush obligate species, was not detected before treatment but was detected post-treatment. Brewer’s Sparrow and Spotted Towhee detections slightly decreased post treatment but did show a slight increase during the same time period on the control plot. Both species are sensitive to disturbances as discussed in previous reports. Blue-gray Gnatcatcher abundance has stayed constant on the treatment plot but increased on the control plot. Gray Flycatcher and Green-tailed Towhee shows the largest changes during pre treatment and post treatment years on both control and treatment plot. Sample size is too small to conjecture if pinyon thinning had an effect on their abundance since other patterns like, climate, migration costs and food availability can play just as big of a role in their abundance.

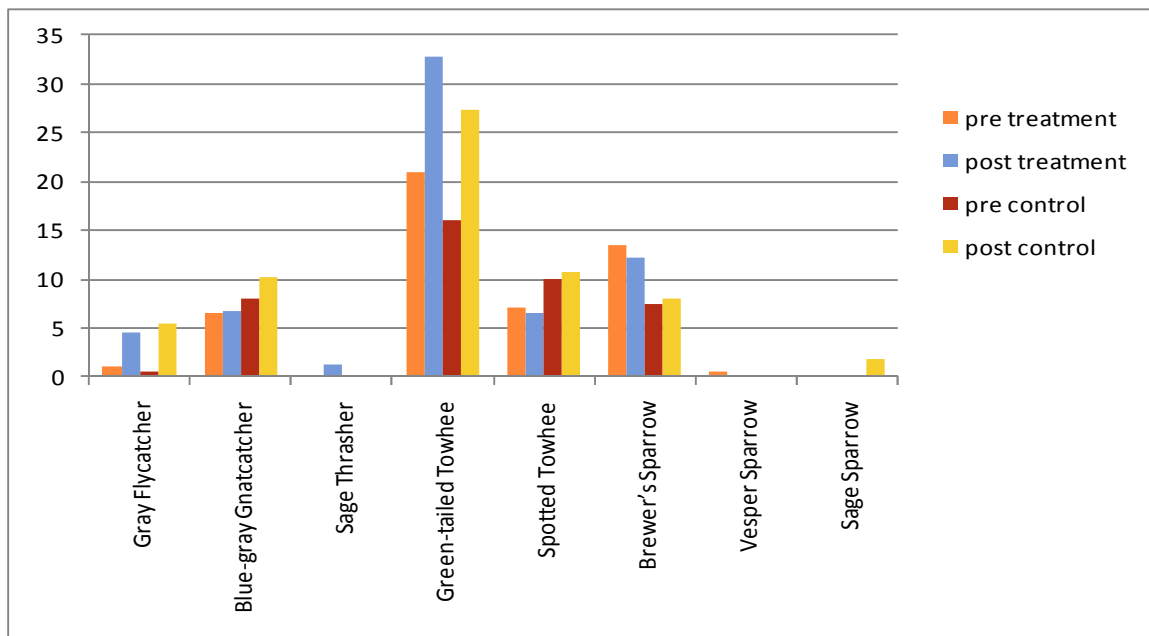


Figure 5. Total number of detections of sagebrush species within 100 m and summed over three visits at treatment (n = 7) and control (n = 7) point count stations adjusted for number of years pre and post treatment, at Rancheria Gulch, 2005-2010.

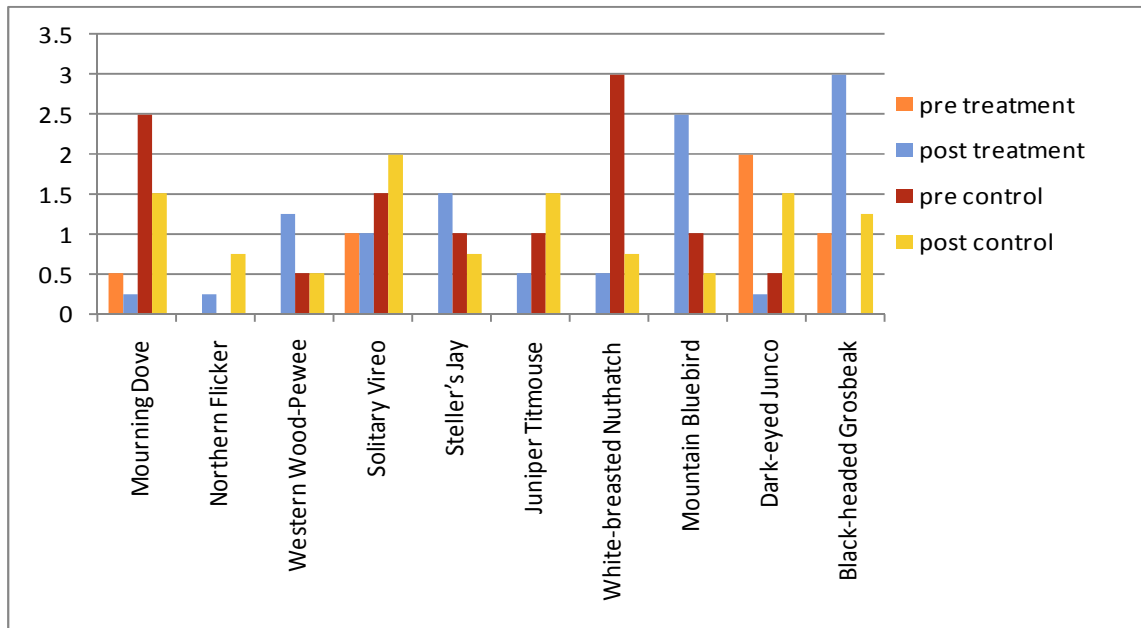


Figure 6. Total number of detections of Coniferous species within 100 m and summed over three visits at point count stations in treatment (n = 7) and control (n = 7) plots adjusted for number of years pre and post treatment, at Rancheria Gulch, 2005-2010.

Coniferous breeding birds in general showed a stronger treatment effect on their abundance totals (Figures 6 and 7). Western Wood-Pewee, Steller's Jay and Mountain Bluebird all showed strong increases post treatment on the treatment plot but not on the control plot during the same time period (Figure 6). Western Wood-Pewees are generally absent from dense forests and prefer habitats with dead trees or trees with dead limbs and habitat edges (Kilgore 1971, Ryser 1985) therefore we expect this species to increase after treatment. Mountain Bluebirds forage in open areas on the ground for bees and ants, which was not available pre treatment but became available post-treatment. In addition to the three species mentioned above, Northern Flicker, Juniper Titmouse and White-breasted Nuthatch were also not detected on the treatment plot prior to treatment. Only Northern Flicker was also absent pre treatment on the control plot. Black-headed Grosbeak abundance increased on both treatment and control plots in the time period post treatment.

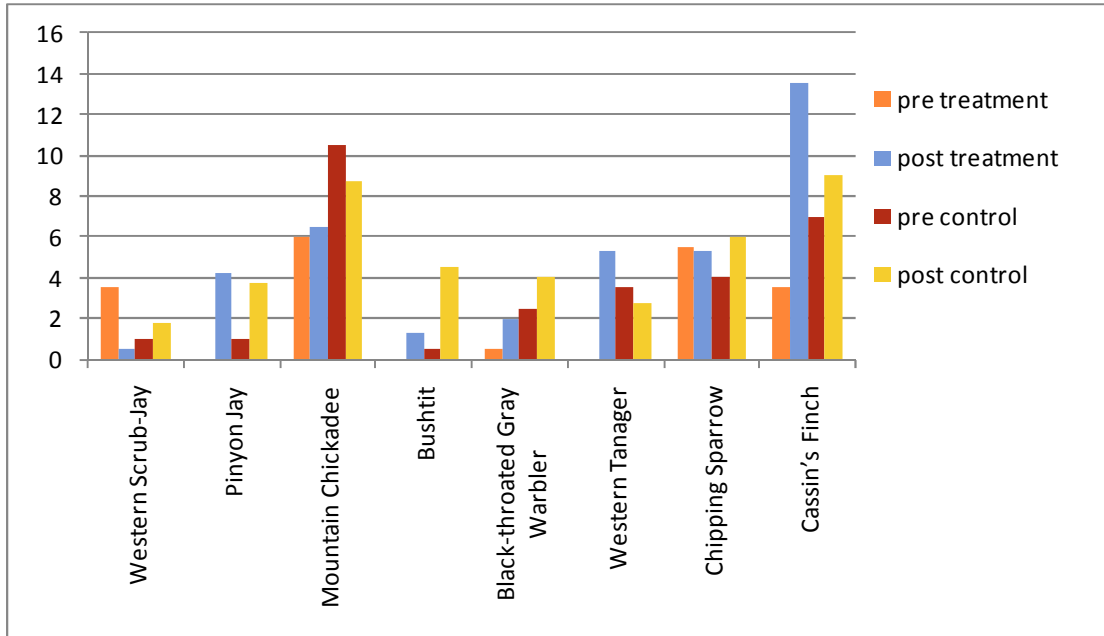


Figure 6. Total number of detections of Coniferous species within 100 m and summed over three visits at point count stations in treatment (n = 7) and control (n = 7) plots adjusted for number of years pre and post treatment, at Rancheria Gulch, 2005-2010.

Cassin's Finch was the most abundant species of conifer breeding bird post-treatment as well as the species with the biggest increase between pre and post treatment years (Figure 7). Cassin's Finch has been thought in the past to potentially be more abundant in small scale clear cuts and selectively logged areas (Burleigh 1921), which the treated plots on Rancheria Gulch resemble. Finches in general are seed eaters and an irruptive species and their numbers can vary greatly from year to year depending on their food source availability. Pinyon Jay, Bushtit and Western Tanager were not detected on the treatment plot pre treatment but all three are present post treatment. A study in Douglas-fir habitat in Northern California has also found Western Tanager abundance to increase after clear-cutting 4-6 ha plots (Hagar 1960). In addition, studies on the Plumas National Forest also show that Western Tanager respond positively to prescribed fire (Burnett et al 2009)

Species richness, diversity and abundance for pinyon, sage and generalist nesting species pre and post treatment at control and treatment sites

There was very little change in species richness for pinyon, sage or generalist nesting species between pre treatment (2005 – 2006) and post treatment (2007- 2010) years (Figure 8a & 8b). Species richness was highest for pinyon-breeding species throughout all six years of the study. Treatment plot species richness increased the first year after treatment for pinyon-breeding birds and decreased for sagebrush breeding birds.

Species diversity was also highest for pinyon-associated species in all six years of the study (Figure 8c & 8d). Diversity on the treatment plot for sagebrush-breeding species decreased the first year after treatment, which was not the case on the control site, but has since returned to pre treatment numbers. Pinyon-breeding bird diversity reached its highest point in 2009 on the treatment plot but was similar year to year on the control plot. Treatment did not seem to negatively affect species diversity and overall abundance was not reduced substantially.

Total abundance was highest for sagebrush nesters overall (Figure 8e & 8f). Generalists were detected the least throughout all six years of the study, but have increased on the treatment plot the third year after treatment. Pinyon-breeding bird abundance on the treatment plot have steadily increased since treatment, but fluctuated on the control site.

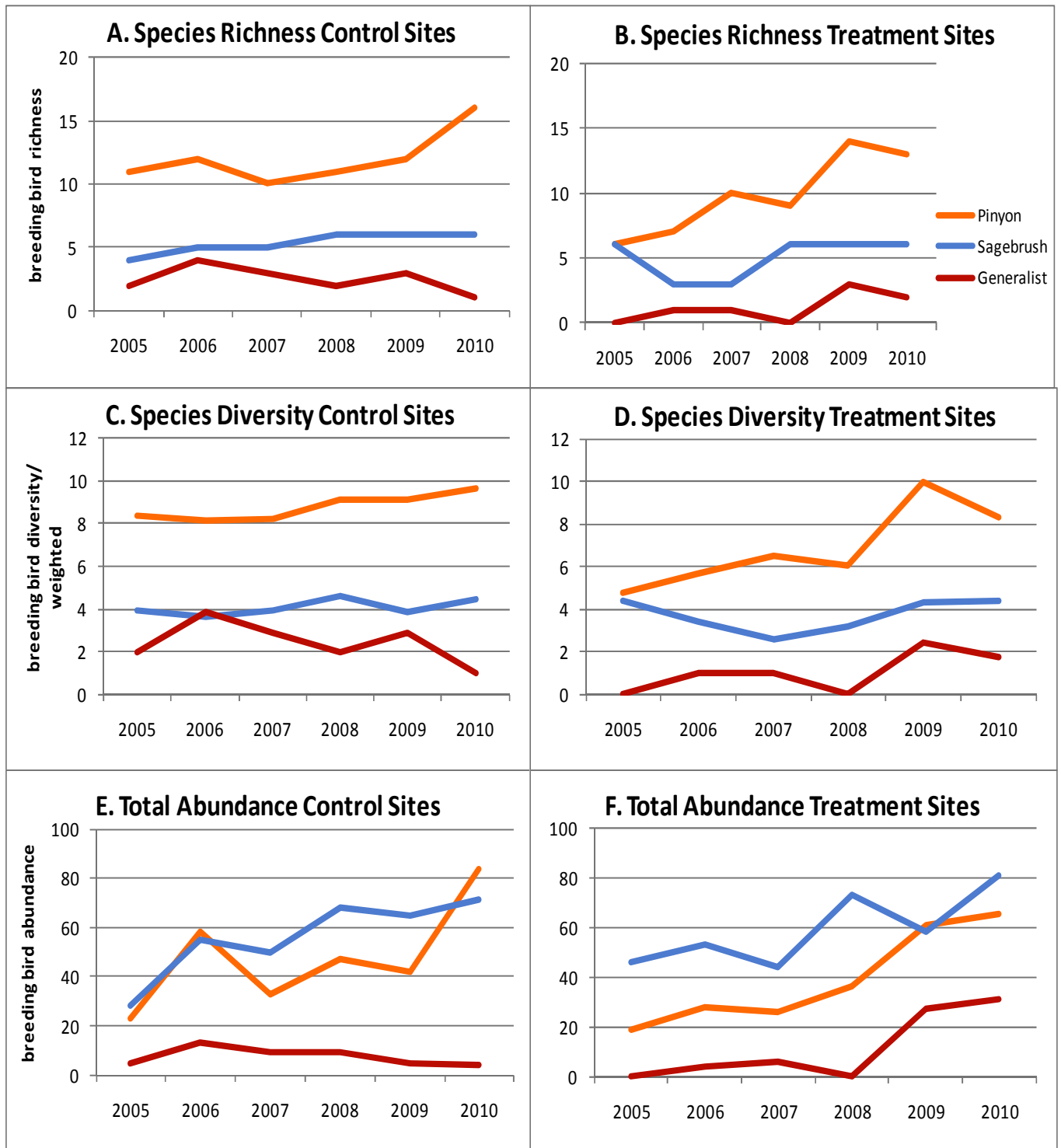


Figure 8. Breeding bird species richness, diversity and total abundance for pinyon, sagebrush and generalist nesting species. Based on 100 m 5-minute point counts, detections summed across 3 visits and 7 points each year, 2005 –2010.

Use of the study area by sagebrush obligate and pinyon associated species

While many species use sagebrush to some degree, four species are considered sagebrush obligates (Sage Thrasher, Sage Sparrow, Brewer's Sparrow, Greater Sage-grouse; Paige and Ritter 1999, CalPIF 2005). We only confirmed breeding status for Brewer's Sparrow on the treatment plots. However, Sage Thrashers were observed on the plots with fledglings and bred nearby in the sagebrush habitat south of the plots. Greater Sage-grouse were never detected on the plots. However, there was a female documented to be nesting ca. 1.5 km west of the treatment plots in 2005 (Barbaree (USGS), pers. comm.).

Juniper Titmouse, Black-throated Gray Warbler, Cassin's Vireo and Pinyon Jay are closely associated with pinyon woodlands in the Mono Basin (Gaines 1992). We found nests for all species. Gaines (1992) reported that Black-throated Gray Warblers "shun pure pinyon stands" and nest primarily in mixed pinyon and juniper groves. However our sites were almost pure pinyon stands.

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Appendix A. Point Count Locations, UTM Nad83, Zone 11, Rancheria Gulch, 2005-2010.

Garmin_ID	UTMe	UTMn
RACA01	315571.8	4216666
RACA02	315700.5	4216403
RACA03	316012.8	4216367
RACA04	316036.1	4216107
RACU01	314290.2	4217900
RACU02	314148.1	4218108
RACU03	314355.1	4218248
RATB01	314100.8	4216306
RATB02	314175.5	4216587
RATB03	314526.1	4216663
RATB04	314634.7	4216430
RATU02	313715.3	4217677
RATU03	314009.2	4217413
RATU01	313448.6	4217811

Appendix B. Breeding status for all species detected on study plots at Rancheria Gulch, 2005- 2010. Confirmed Breeding- 1; Possible Breeding- 2; Probable Breeding- 3; No Evidence of Breeding / Transient / Migrant- 0; Not Detected- ~.

Common Name	Latin Name	Breeding Evidence
Canada Goose	<i>Branta canadensis</i>	0
California Quail	<i>Callipepla californica</i>	0
Mountain Quail	<i>Oreortyx pictus</i>	0
American White Pelican	<i>Pelecanus erythrorhynchos</i>	0
Turkey Vulture	<i>Cathartes aura</i>	0
Osprey	<i>Pandion haliaetus</i>	0
Red-tailed Hawk	<i>Buteo jamaicensis</i>	0
Golden Eagle	<i>Aquila chrysaetos</i>	0
American Kestrel	<i>Falco sparverius</i>	0
Prairie Falcon	<i>Falco mexicanus</i>	0
California Gull	<i>Larus californicus</i>	0
Caspian Tern	<i>Hydroprogne caspia</i>	0
Mourning Dove	<i>Zenaida macroura</i>	1
Barn Owl	<i>Tyto alba</i>	0
Great Horned Owl	<i>Bubo virginianus</i>	0
Common Nighthawk	<i>Chordeiles minor</i>	1
Common Poorwill	<i>Phalaenoptilus nuttallii</i>	2
Anna's Hummingbird	<i>Calypte anna</i>	0
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	1
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	0
Hairy Woodpecker	<i>Picoides villosus</i>	0
Northern "Red-shafted" Flicker	<i>Colaptes auratus</i>	1
Olive-sided Flycatcher	<i>Contopus cooperi</i>	0
Western Wood-Pewee	<i>Contopus sordidulus</i>	0
Hammond's Flycatcher	<i>Empidonax hammondii</i>	0
Gray Flycatcher	<i>Empidonax wrightii</i>	1
Dusky Flycatcher	<i>Empidonax oberholseri</i>	0
Say's Phoebe	<i>Sayornis saya</i>	0
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	0
Loggerhead Shrike	<i>Lanius ludovicianus</i>	2
Plumbeous Vireo	<i>Vireo plumbeus</i>	1
Cassin's Vireo	<i>Vireo cassinii</i>	1
Warbling Vireo	<i>Vireo gilvus</i>	0
Steller's Jay	<i>Cyanocitta stelleri</i>	1
Western Scrub-Jay	<i>Aphelocoma californica</i>	2

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Appendix B continued. Breeding status for all species detected on study plots at Rancheria Gulch, 2005-2010. Confirmed Breeding- 1; Possible Breeding- 2; Probable Breeding- 3; No Evidence of Breeding / Transient / Migrant- 0; Not Detected- ~.

Common Name	Latin Name	Breeding Evidence
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>	1
Clark's Nutcracker	<i>Nucifraga columbiana</i>	0
American Magpie	<i>Pica hudsonia</i>	0
Common Raven	<i>Corvus corax</i>	0
Violet-green Swallow	<i>Tachycineta thalassina</i>	0
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	0
Barn Swallow	<i>Hirundo rustica</i>	0
Mountain Chickadee	<i>Poecile gambeli</i>	1
Juniper Titmouse	<i>Baeolophus ridgwayi</i>	1
Bushtit	<i>Psaltriparus minimus</i>	1
Red-breasted Nuthatch	<i>Sitta canadensis</i>	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	1
Rock Wren	<i>Salpinctes obsoletus</i>	1
Bewick's Wren	<i>Thryomanes bewickii</i>	1
House Wren	<i>Troglodytes aedon</i>	0
Ruby-crowned Kinglet	<i>Regulus calendula</i>	0
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	1
Mountain Bluebird	<i>Sialia currucoides</i>	1
Townsend's Solitaire	<i>Myadestes townsendi</i>	0
Swainson's Thrush	<i>Catharus ustulatus</i>	0
American Robin	<i>Turdus migratorius</i>	1
Sage Thrasher	<i>Oreoscoptes montanus</i>	0
Yellow Warbler	<i>Dendroica petechia</i>	0
Yellow-rumped Warbler	<i>Dendroica coronata</i>	0
Black-throated Gray Warbler	<i>Dendroica nigrecens</i>	1
Townsend's Warbler	<i>Dendroica townsendi</i>	0
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	0
Wilson's Warbler	<i>Wilsonia pusilla</i>	0
Western Tanager	<i>Piranga ludoviciana</i>	1
Green-tailed Towhee	<i>Pipilo chlorurus</i>	1
Spotted Towhee	<i>Pipilo maculatus</i>	1
Chipping Sparrow	<i>Spizella passerina</i>	1
Brewer's Sparrow	<i>Spizella breweri</i>	1
Black-chinned Sparrow	<i>Spizella atrogularis</i>	0

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Appendix B continued. Breeding status for all species detected on study plots at Rancheria Gulch, 2005- 2010. Confirmed Breeding- 1; Possible Breeding- 2; Probable Breeding- 3; No Evidence of Breeding / Transient / Migrant- 0; Not Detected- ~.

Common Name	Latin Name	Breeding Evidence
Vesper Sparrow	<i>Poocetes gramineus</i>	1
Black-throated Sparrow	<i>Amphispiza bilineata</i>	0
Sage Sparrow	<i>Amphispiza belli</i>	3
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	0
"Oregon" Dark-eyed Junco	<i>Junco hyemalis thurberi</i>	1
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	2
Lazuli Bunting	<i>Passerina amoena</i>	0
Western Meadowlark	<i>Sturnella neglecta</i>	0
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	0
Brown-headed Cowbird	<i>Molothrus ater</i>	1
Bullock's Oriole	<i>Icterus bullockii</i>	0
Cassin's Finch	<i>Carpodacus cassinii</i>	1
House Finch	<i>Carpodacus mexicanus</i>	3
Pine Siskin	<i>Carduelis pinus</i>	0
Lesser Goldfinch	<i>Carduelis psaltria</i>	1
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	0
Total species detected	All plots combined	85