

2007 BREEDING BIRD SURVEYS AT SEVEN RIPARIAN SITES IN THE  
BUREAU OF LAND MANAGEMENT, ALBUQUERQUE RESOURCE AREA



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## EXECUTIVE SUMMARY

Riparian corridors provide important habitat for breeding birds in arid regions of the western United States. Between 1996 and 2001, the Bureau of Land Management (BLM), Albuquerque Field Office, established annual breeding bird surveys at seven riparian sites in Cibola and Sandoval Counties, New Mexico. We continued point count surveys in 2007 to evaluate how local conditions might affect avian abundance and species richness. Although our power to detect meaningful population differences is limited by the small size of the sites, a pattern of relatively low detection rates and species richness at Senorito Creek and Wilson Canyon during the last seven years indicates that these sites support fewer birds, particularly riparian obligate and dependent species. These sites lack the diverse native vegetation that typifies Bluewater Canyon, Rinconada Canyon, and Rito Leche. Senorito Creek and Wilson Canyon contain exotic vegetation, like Lost Valley and San Ysidro, but they lack the dense vegetation structure that typifies the latter two sites. Dense vegetation at Lost Valley and San Ysidro, albeit exotic, might be important to support populations of certain riparian species, such as Willow Flycatcher (*Empidonax traillii*), which has been observed in some years. Our results indicate that benefits of management efforts at Senorito Creek and Wilson Canyon have not been realized for birds. We encourage BLM to improve restoration efforts at Senorito Creek and Wilson Canyon, while maintaining vegetation structure at the other sites. Continued monitoring will help BLM evaluate temporal changes in bird populations as restoration efforts progress.

## INTRODUCTION

Riparian corridors provide important habitat for breeding birds in arid regions of the western United States (Knopf and Samson 1994). Although western riparian areas occupy less than one percent of the landscape, many support more breeding bird species than surrounding upland habitats (Knopf et al. 1988, Gates and Giffen 1991, Powell and Steidl 2000). Some species, such as the federally endangered Southwestern Willow Flycatcher (*Empidonax traillii extimus*) depend on high quality riparian habitat for their continued existence (Sedgwick 2000). Because riparian areas provide breeding habitat for a variety of avian species, including riparian obligate or dependent species, it is important to maintain or improve them to the best possible condition.

Management of riparian areas for birds is influenced by numerous competing land uses and environmental concerns. Grazing, recreation, drought, water diversion, urban development, and invasion of exotic vegetation might affect breeding bird populations in riparian areas by changing habitat quality or disrupting breeding activities (Szaro 1980, Knopf et al. 1988, Krueper 1993, Rich 2002). For example, riparian areas dominated by exotic vegetation (e.g., salt cedar, *Tamarix* spp.) often support fewer bird species than native riparian areas (Ellis 1995, Anderson et al. 1977, Cohan et al. 1978). Southwestern Willow Flycatcher is strongly associated with the presence of water (Sedgwick 2000); therefore, lack of precipitation, or diversion of water away from a site, could impact abundance and distribution of this species, and others. Monitoring sites representing a variety of vegetation types and conditions can provide information on how multiple factors affect bird populations, including riparian species and other bird species of conservation interest.

The Bureau of Land Management (BLM), Albuquerque Field Office, established annual breeding bird surveys at seven riparian sites in Cibola and Sandoval Counties, in central New Mexico. In 1996, we began conducting annual point count surveys at three of the sites (Rito Leche, Seniorito Creek, and San Ysidro). We began monitoring the other four sites (Wilson Canyon, Bluewater Canyon, Lost Valley and Rinconada Canyon) between 1997 and 2001. These sites vary in water flow, vegetation type (i.e., native or exotic), and vegetation structure (e.g., density). Because these sites are small, containing only 5-12 survey points each, point count surveys provide little power for comparing abundance among sites or determining meaningful temporal changes. By supplementing a measure of abundance (i.e., detection rates) with species richness data, especially riparian indicators, we can improve our ability to evaluate site quality. For example, the appearance of Southwestern Willow Flycatcher at a site could indicate an improvement in conditions for riparian birds; the loss of one or more key riparian species at a site could indicate deteriorating conditions. Here, we report detection rates and species richness at the seven sites in 2007, and identify patterns in the data during the last seven years from 2001 through 2007. Information on detection rates and species richness, especially for riparian species, can improve BLM's understanding of how local riparian conditions affect bird populations on the lands they manage in central New Mexico.

## STUDY AREA

We conducted surveys at Bluewater and Rinconada Canyons in Cibola County, New Mexico, and at Lost Valley, Rito Leche, San Ysidro, Seniorito Creek, and Wilson Canyon in Sandoval County, New Mexico (Fig. 1). We qualitatively categorize the

vegetation and hydrologic conditions at each site below in Table 1, followed by a description of each site.

Table 1. Descriptive summary of vegetation and water flow conditions at seven Bureau of Land Management riparian sites in Cibola and Sandoval Counties, New Mexico.

Site (Year Started)	Vegetation		Water Flow		
	Type	Density	2005	2006	2007
Bluewater Canyon (1998)	Native	Medium	High	Medium	Medium
Lost Valley (1998)	Exotic	High	Medium	Low	Medium
Rinconada Canyon (2001)	Native	Medium	Medium	Low	Low
Rito Leche (1996)	Native	Medium	Medium	Low	Low
San Ysidro (1996)	Exotic	High	Medium	Low	Low
Senorito Creek (1996)	Exotic	Low	Medium	Low	Low
Wilson Canyon (1998)	Exotic	Low	Medium	Low	Low

### Bluewater Canyon

We surveyed 12 points along approximately 4 km of Bluewater Creek, northwest of Grants, New Mexico, and just south of Interstate 40 (Fig. 1). The creek flows through a narrow, steep-walled canyon and is lined with native vegetation. Riparian vegetation is dominated by coyote willow (*Salix exigua*), narrowleaf cottonwood (*Populus angustifolia*), cliffrose (*Cowania mexicana*), candelabra cholla (*Opuntia imbricata*), rubber rabbitbrush (*Chrysothamnus nauseosus*) and juniper (*Juniperus* spp.). Willow patches are dense in places, but relatively narrow ( $\leq 25$  m wide). Beavers (*Castor canadensis*) have reduced the number of standing cottonwoods. Although there are some annual and seasonal fluctuations, water flow in the creek through Bluewater Canyon is more consistent than at the other six sites. Water flow was relatively high in 2001 and 2005; flow was moderate in other years, including 2007.



Bluewater contained a mix of native vegetation in a narrow canyon.

### Lost Valley

Lost Valley included 10 survey points in two separate sections covering approximately 2.5 km of the Rio Puerco, near San Luis, New Mexico (Fig. 1). The first seven survey points were located in the northern section, and the last three points were located in the southern section, about 2 km southwest of section one. Points were originally established in 1998 along the riverbank at the bottom of the Lost Valley canyon. Because high water flow or deep mud hindered access in some years, we relocated the survey points to the top of the canyon adjacent to riparian vegetation in 2001. We surveyed from the top of the canyon from 2001-2007. Riparian vegetation at Lost Valley is mostly exotic, including dense stands of salt cedar and Russian olive



(*Elaeagnus angustifolia*), as well as patches of Fremont cottonwood (*P. fremonti*), and willow (*Salix* spp.). Water levels in the Rio Puerco fluctuate greatly, particularly within monitoring seasons. In most years, including 2007, water was present during at least part of the avian breeding season, with a reduction in flow as the season advanced. In 2002 and 2004, the Rio Puerco was completely dry during the entire monitoring season.

### Rinconada Canyon

Rinconada Canyon included five survey points along approximately 1 km of Rinconada Creek, about 5 km northwest of Acomita, New Mexico (Fig. 1). Management boundaries prevented the establishment of more than five points. Like Bluewater Canyon, Rinconada Canyon contains mostly native vegetation with at least some water flow during most years. A portion of the creek is typically dry with subterranean flow. Unlike all other sites, vegetation at Rinconada Canyon was dominated by alder (*Alnus* spp.), with adjacent upland habitat consisting of ponderosa pine (*Pinus ponderosa*), pinyon pine (*P. edulis*), and juniper.

### Rito Leche

Rito Leche included five survey points, along approximately 1 km of the Rito Leche, about 1.5 km east of Cuba, New Mexico (Fig. 1). Management boundaries prevented the establishment of more than five points. Rito Leche contained mostly native riparian vegetation, including willow, cottonwood, and New Mexico locust (*Robinia neomexicana*); surrounding upland was dominated by sage (*Artemisia* spp.) and four-winged saltbush (*Atriplex canescens*). The site contained a broad-leaved cattail (*Typha*

*latifolia*) marsh in the uppermost section of the stream. Beavers have reduced the number of live trees at the site. Water flows at this site during most years.

### San Ysidro

San Ysidro included seven survey points along approximately 1.5 km of the Rio Salado, about 1 km before it empties into the Jemez River, near San Ysidro, New Mexico (Fig. 1). San Ysidro contains a substantial amount of exotic vegetation. Half of the survey route runs along the Perea Nature Trail, which is dominated by Russian olive and salt cedar. The western portion of the survey area is situated in a marsh dominated by bulrush and Russian olive. Beavers have created dams in the upstream portions of the creek in at least three locations, altering water flow into the marsh. Although there is usually moderate water flow during the spring, this is followed by reduced flow in the Rio Salado and little saturated soil in the marsh by the time surveys are conducted in June. After a year of relatively high water in 2005, water flow was greatly reduced in the following seasons. The site was unusually dry throughout the 2007 monitoring season.

### Seniorito Creek

Seniorito Creek included 10 survey points along approximately 2.5 km of Seniorito Creek, immediately east of the confluence with the Rio Puerco, south of Cuba, New Mexico (Fig. 1). The creek flows through a steep arroyo, similar to nearby Rito Leche. Seniorito Creek contained mostly exotic salt cedar; however, much of the salt cedar was killed after an herbicide treatment was applied in 1998. As a result, relatively little live riparian vegetation remains at Seniorito Creek. The surrounding upland habitat is

dominated by greasewood (*Sarcobatus vermiculatus*). In most years, there is little or no water at the site.

### Wilson Canyon

This site included 10 survey points along approximately 2 km of the Rio Puerco, about 10 km south of Cuba, New Mexico (Fig. 1). Wilson Canyon contains mostly exotic vegetation, including salt cedar and Russian olive. Willows and cottonwoods also are present, and some replanting has occurred. Two elk exclosures have allowed vegetation to regenerate along the riverbank. However, at least one of the exclosures has not been maintained in recent years. Upland vegetation adjacent to the river consists primarily of greasewood. As with other sites along the Rio Puerco (Rito Leche, Senorito Creek, and Lost Valley), water flow has been reduced since the relatively wet year in 2005.

## METHODS

We conducted point count surveys (see Bibby et al. 2000) at each of the seven sites (59 points) twice in June (a total of 12 survey mornings). We surveyed Rito Leche and Wilson Canyon during the same mornings because of their close proximity and the small size of Rito Leche. Consecutive surveys at a site were separated by at least two weeks. For example, we surveyed at Bluewater Canyon on 8 and 27 June 2007.

We established most survey points at 250 m intervals along the riparian corridors of each site. Some of the points at Lost Valley, San Ysidro, and Wilson Canyon were set at closer intervals. We visited the same points for every survey at a site. Points were marked with flagging tape, described in printed directions, and assigned Universal

Transverse Mercator (UTM) coordinates (North American Datum 27), to assist with relocation (Appendix 1).

A surveyor, experienced with avian identification by sight and sound, hiked to each point and recorded all birds seen or heard for five minutes while standing at the point. Observers recorded birds at all distances and noted separately any birds flying overhead. Observers began each survey within a half-hour after sunrise and concluded within four hours. We used three or four observers per year. We used the same observer for all surveys at San Ysidro from 2002-2007. Another observer conducted all surveys at Senorito Creek, Rito Leche, and Wilson Canyon from 2003-2007. One observer conducted surveys at the remaining sites (Bluewater Canyon, Lost Valley, and Rinconada Canyon), but the observer responsible for these three sites was different each year.

We used detection rates as a measure of avian abundance. We calculated detection rates for each survey point (i.e., point detection rates) by adding the number of birds observed at a point during a given year and dividing by the number of surveys conducted at the point (usually two). For measuring detection rates, we used birds at any distance but did not include flyovers. We also excluded Cliff Swallows (*Petrochelidon pyrrhonota*), because unpredictable flocks of 100 or more birds skewed the data. These flocks were almost always associated with canyon walls along the riparian corridor. We calculated annual detection rates for each site by adding the point detection rates in a given year and dividing by the number of points at a site. We present detection rates as birds per point with 95% confidence intervals. Some points were close enough to others to allow individual birds to be observed at multiple points. Because observations at these points were not necessarily independent, we removed from the detection rate calculations

all points closer than 200 m from neighboring points. As a result, we calculated point detection rates for only 5 of the 10 Lost Valley points, 4 of the 7 San Ysidro points, and 5 of the 10 Wilson Canyon points. We used all points at the remaining four sites.

We determined detection rates and species richness for riparian species, based on classifications provided by the Bureau of Land Management (1998). BLM identified species that might be indicators of riparian habitat condition. They defined riparian obligates as species for which >90% of their abundance occurs within riparian habitat during the breeding season, or which place >90% of their nests in riparian vegetation (Bureau of Land Management 1998). BLM defined riparian dependents as species for which 60-90% of their abundance occurs in riparian habitat during the breeding season, or which place 60-90% of their nests in riparian vegetation (Bureau of Land Management 1998). For example, they list Willow Flycatcher as a riparian obligate, and suggest that this species will not likely occur in an area if riparian vegetation is in poor ecological condition. Alternatively, they list Blue Grosbeak (*Guiraca caerulea*) as a riparian dependent, and suggest that this species might occur if riparian vegetation is seriously degraded, but that populations would be reduced. We calculated detection rates for riparian species in the same way that we calculated rates for all species; however, for riparian species, we only included observations of riparian obligates and dependents. We list all riparian obligates and dependents encountered from 2001-2007 (Appendix 2), and determine which sites had relatively high or low riparian species richness in 2007. We provide a cumulative list of species observed during point counts in 2007 (Appendix 3), as well as during all years of monitoring (Appendix 4).

## RESULTS

### Detection Rates

In 2007, we recorded comparable detection rates among sites (Fig. 2), but as in most years since 2001, detection rates at Senorito Creek ( $5.2$  birds/point  $\pm 0.7$ ) and Wilson Canyon ( $4.2 \pm 1.9$ ) were lower than at the other sites (range of 6.1-9.8). We observed no obvious temporal trends in detection rates at any site in the seven years from 2001-2007, although there was a drop this year at Lost Valley, where the detection rate matched that site's previous low in 2005.

Detection rates for riparian species were higher at Bluewater Canyon ( $2.3 \pm 0.7$ ), Lost Valley ( $2.7 \pm 1.3$ ), and San Ysidro ( $2.5 \pm 1.6$ ) than at the other four sites (range 0.6-1.2) in 2007 (Fig. 3). In most years from 2001-2007, Senorito Creek and Wilson Canyon riparian detection rates ranked among the lowest. Lost Valley was also among the lowest in 2006, but an increase in Yellow-breasted Chats (from 3 to 22) and Blue Grosbeaks (from 2 to 11) resulted in a marked increase in riparian detection rates for that site in 2007. The riparian detection rate at Wilson Canyon increased in 2007 with a local increase in Blue Grosbeak observations (from 7 to 14), but this site's riparian detection rate again ranked among the lowest.

### Species Richness

We recorded the greatest number of species at Bluewater Canyon (N=33), Rinconada Canyon (N=24), and Lost Valley (N=23) (Table 2, next page). Bluewater Canyon and Rinconada Canyon ranked highest in total species richness from 2001-2007. We observed 63 bird species in 2007 (Appendix 3), a total similar to previous years

(Table 2). Species new to our cumulative list in 2007 included Black-crowned Night-Heron (*Nycticorax nycticorax*, San Ysidro), Eurasian Collared-Dove (*Streptopelia decaocto*, Wilson Canyon), Great Horned Owl (*Bubo virginianus*, Bluewater Canyon), and Mountain Bluebird (*Sialia currucoides*, Rinconada Canyon).

Table 2. Number of species observed during point count surveys at seven Bureau of Land Management riparian sites in central New Mexico from 2001-2007.

Site	2001	2002	2003	2004	2005	2006	2007	Total
Bluewater Canyon	26	27	24	24	23	27	33	58
Lost Valley	27	20	23	22	23	21	23	40
Rinconada Canyon	26	23	28	30	27	26	24	62
Rito Leche	23	26	16	18	16	17	17	41
San Ysidro	20	25	23	22	22	26	17	48
Senorito Creek	20	21	18	16	16	20	18	43
Wilson Canyon	26	17	24	13	18	24	17	41
Total – All Sites	67	65	69	64	67	63	63	109

In addition to having relatively low detection rates, riparian species richness at Senorito Creek and Wilson Canyon was also among the lowest in 2007, and from 2001-2007 (Table 3). Our total number of riparian species per year has gradually decreased from a high of 18 in 2001 to a low of 13 in 2007.

Table 3. Number of riparian obligate and dependent species observed during point count surveys at seven Bureau of Land Management sites in central New Mexico from 2001-2007. A list of riparian species for all sites combined is provided in Appendix 2.

Site	2001	2002	2003	2004	2005	2006	2007	Total
Bluewater Canyon	8	7	7	7	4	9	8	18
Lost Valley	7	5	8	7	7	5	6	12
Rinconada Canyon	5	5	4	8	4	3	2	15
Rito Leche	6	3	4	3	4	2	5	9
San Ysidro	6	6	5	9	7	9	6	14
Senorito Creek	3	3	2	2	4	3	3	8
Wilson Canyon	5	3	3	3	1	4	3	7
Total – All Sites	18	17	17	15	15	14	13	25

## DISCUSSION

A pattern of relatively low detection rates and species richness, especially for riparian species, indicates that Senorito Creek and Wilson Canyon lack certain features that favor populations of riparian birds. Numerous features could favor bird populations (Peterjohn et al. 1995), including the presence of native vegetation, consistent water flow, and dense vegetation structure. Although each of the seven sites offers different features, Bluewater Canyon, Lost Valley, Rinconada Canyon, Rito Leche, and San Ysidro offer particularly important features for maintaining riparian bird populations.

An important feature of Bluewater Canyon and Rinconada Canyon is the presence of native vegetation. Researchers have suggested that riparian areas with native vegetation support more birds than riparian areas with exotic vegetation (e.g., Anderson et al. 1977, Cohan et al. 1978, Ellis 1995). Detection rates at Bluewater Canyon are perhaps regulated by the habitat and the terrain; the narrow line of vegetation between the sheer canyon walls resulted in a small sampling area at each point, relative to other sites. Detection rates might be further limited at Bluewater Canyon by the difficulty detecting subtle vocalizations over the sound of swift, flowing water. Nevertheless, the presence of native riparian vegetation and consistent flowing water appear to provide an oasis for a rich assemblage of birds, as indicated by our species richness totals. Rinconada Canyon contains less water than Bluewater Canyon, but the Rinconada Canyon terrain allowed increased detections of birds in a diverse upland-riparian ecotone, resulting in consistently high detection rates and species richness.

Lost Valley and San Ysidro contain substantial exotic vegetation and inconsistent water flow, yet detection rates and species richness (especially for riparian species) have



been comparable to the sites with native vegetation. The redeeming features of Lost Valley and San Ysidro might be the large size of habitat patches and the high density of the vegetation (Powell and Steidl 2000, 2002). Exotic riparian vegetation is suitable for some species, because it simulates the dense structure of native vegetation (Fleishman et al. 2003). Perhaps because of the dense vegetation, we observed a small number of Willow Flycatchers during some years at Lost Valley and San Ysidro. Restoring water flow into the marsh at San Ysidro and excluding cattle from riparian vegetation at both San Ysidro and Lost Valley might improve the potential of these sites to host Willow Flycatchers, including the federally endangered subspecies.

Like Lost Valley and San Ysidro, Seniorito Creek and Wilson Canyon lack native vegetation and consistent water flow; however, Seniorito Creek and Wilson Canyon also lack dense vegetation structure. Riparian restoration projects have been attempted at both sites, but our observations indicate that benefits to the avian community have not been realized. In fact, there is little or no evidence of any progress at these sites in recent years. Riparian restoration projects that kill or remove exotic vegetation probably will not improve avian abundance and species richness until that vegetation structure is replaced. Where exotic vegetation has been controlled at Seniorito Creek and Wilson Canyon, detection rates and species richness might remain low until native vegetation replaces the structure of the treated vegetation. We encourage BLM to be mindful of apparently low avian abundance and species richness at Seniorito Creek and Wilson Canyon, and not abandon efforts to improve the quality of those sites.

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Figure 1. Location of Bureau of Land Management breeding bird survey sites in Cibola and Sandoval Counties, New Mexico in 2007.

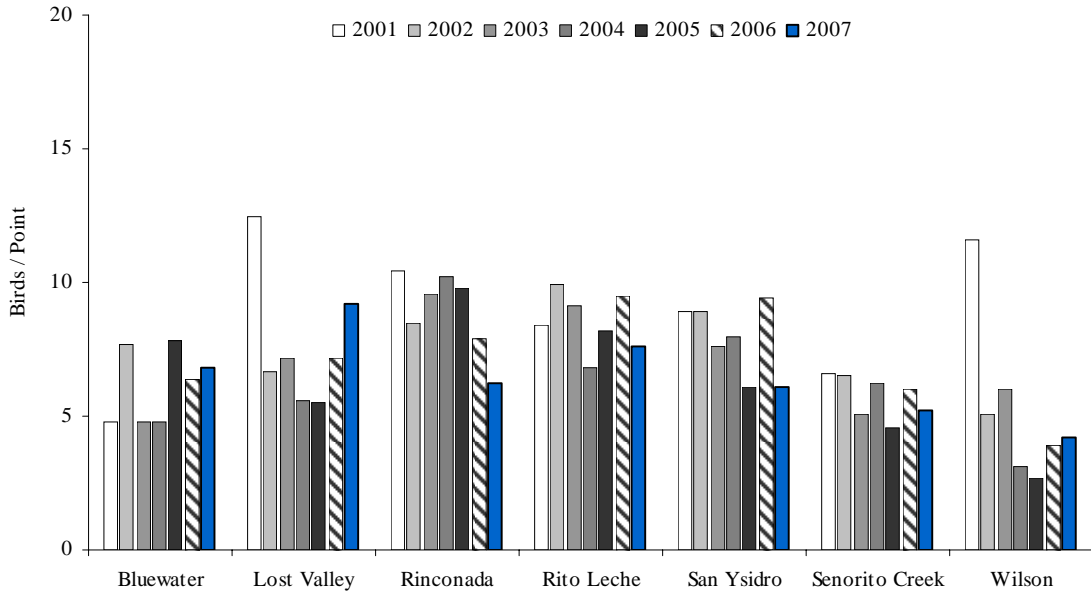


Figure 2. Annual detection rates (birds/point) for breeding bird point count surveys at seven Bureau of Land Management sites in Cibola and Sandoval Counties, New Mexico from 2001-2007.

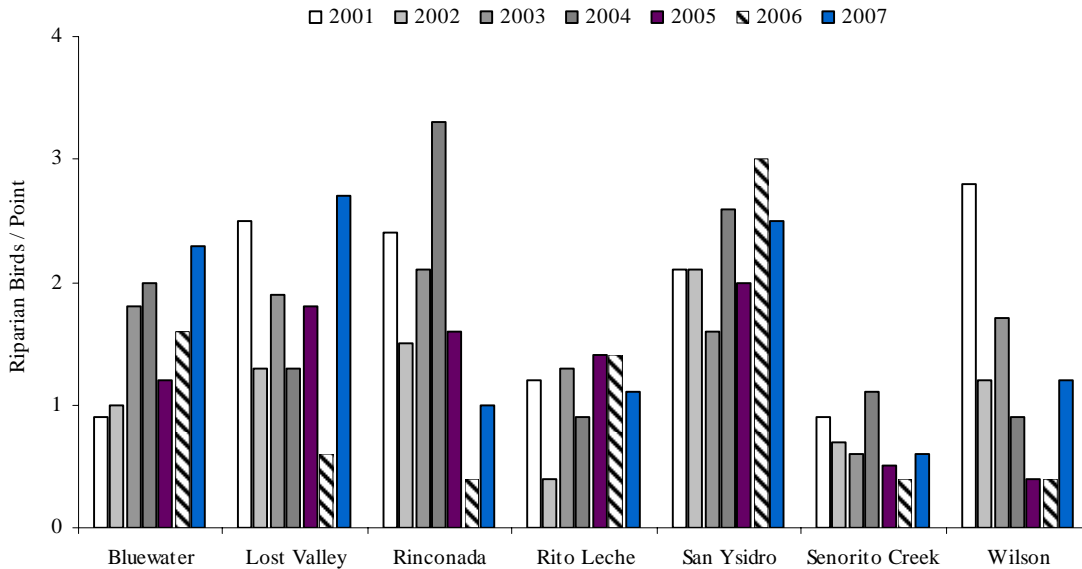


Figure 3. Annual detection rates (riparian birds/point) for riparian obligate and dependent species at seven Bureau of Land Management sites in Cibola and Sandoval Counties, New Mexico from 2001-2007.

Appendix 1. Universal Transverse Mercator coordinates (North American Datum 27) of 59 point count surveys at Bluewater Canyon (BC), Lost Valley (LV), Rinconada Canyon (RC), Rito Leche (RL), San Ysidro (SY), Senorito Creek (SE), and Wilson Canyon (WC), New Mexico from 2001-2007.

Site	Point	Easting	Northing	Site	Point	Easting	Northing
BC	1	770561	3909401	RL	4	325145	3987244
BC	2	770355	3909552	RL	5	324880	3987280
BC	3	770199	3909666	SY	1	338507	3934934
BC	4	770296	3909808	SY	2	338414	3935040
BC	5	770054	3909861	SY	3	338139	3935100
BC	6	769971	3910102	SY	4	337998	3935086
BC	7	769732	3910048	SY	5	337856	3935069
BC	8	769534	3909932	SY	6	337805	3935072
BC	9	769348	3909999	SY	7	337959	3935216
BC	10	769130	3909881	SE	1	322769	3979364
BC	11	768874	3909906	SE	2	322448	3979255
BC	12	768637	3909929	SE	3	322202	3978869
LV	1	313666	3948905	SE	4	322091	3978675
LV	2	313619	3948830	SE	5	322105	3978313
LV	3	313564	3948724	SE	6	321885	3978229
LV	4	313469	3948683	SE	7	321728	3978039
LV	5	313467	3948558	SE	8	321644	3977643
LV	6	313473	3948421	SE	9	321440	3977472
LV	7	313469	3948284	SE	10	321299	3977271
LV	9	310952	3946194	WC	1	321816	3972337
LV	10	311088	3946276	WC	2	321683	3972479
LV	11	310850	3946018	WC	3	321671	3972658
RC	1	257786	3893063	WC	4	321683	3972788
RC	2	257807	3893306	WC	5	321656	3972889
RC	3	257964	3893560	WC	6	321714	3972921
RC	4	258095	3893710	WC	7	321776	3972988
RC	5	258198	3893932	WC	8	321754	3973086
RL	1	325598	3987691	WC	9	321735	3973179
RL	2	325433	3987428	WC	10	321706	3973305
RL	3	325344	3987317				

Appendix 2. List of 25 riparian obligate or dependent species, as determined by the Bureau of Land Management (1998), observed during point count surveys at seven riparian sites in the Albuquerque, New Mexico Resource Area from 2001-2007.

BLM Riparian Species	2001	2002	2003	2004	2005	2006	2007
Bank Swallow	5	-	-	-	-	-	-
Black-chinned Hummingbird	5	1	3	3	-	10	2
Bewick's Wren	1	7	2	2	4	6	13
Black-headed Grosbeak	1	6	11	18	8	5	16
Blue Grosbeak	88	36	73	51	40	40	52
Bullock's Oriole	18	9	5	8	10	5	1
Cooper's Hawk	1	2	-	-	1	-	-
Common Yellowthroat	4	2	5	2	3	2	2
Cordilleran Flycatcher	3	5	5	4	-	8	6
Gray Catbird	-	-	2	-	2	-	-
House Wren	1	-	-	-	-	-	-
Indigo Bunting	-	-	1	-	1	-	-
Lazuli Bunting	7	-	-	2	2	3	14
Lesser Goldfinch	14	11	20	23	5	10	22
Lewis's Woodpecker	3	1	3	-	-	1	1
MacGillivray's Warbler	-	1	2	-	-	-	-
Red-naped Sapsucker	-	1	-	1	-	-	-
Song Sparrow	1	-	1	6	-	-	-
Summer Tanager	-	2	-	-	-	-	-
Warbling Vireo	5	-	4	-	7	-	1
Western Wood-Pewee	17	16	21	28	28	18	23
Willow Flycatcher	-	2	-	-	4	3	-
Wilson's Warbler	3	2	1	1	1	-	-
Yellow Warbler	-	-	-	3	-	1	-
Yellow-breasted Chat	43	18	30	41	38	23	48
Number of Individuals	220	122	189	193	154	135	201
Number of Riparian Species	18	17	17	15	15	14	13



Appendix 3. List of 63 bird species (in taxonomic order, American Birding Association, Checklist 6.7) observed in 2007 during point count surveys at Bluewater Canyon (BC), Lost Valley (LV), Rinconada Canyon (RC), Rito Leche (RL), San Ysidro (SY), Seniorito Creek (SE), and Wilson Canyon (WC), New Mexico. We include the number of each species observed at any distance from survey points. We indicate 13 riparian obligates or dependents, as determined by the Bureau of Land Management (1998), in **bold font**.

Species	BC	LV	RC	RL	SY	SE	WC	Total
Mallard	7	-	-	-	-	-	-	7
Gambel's Quail	-	-	-	-	1	-	-	1
Black-crowned Night-Heron	-	-	-	-	1	-	-	1
Red-tailed Hawk	4	-	-	-	-	-	-	4
American Kestrel	-	-	-	-	3	-	-	3
Peregrine Falcon	-	-	1	-	-	-	-	1
Eurasian Collared-Dove	-	-	-	-	-	-	1	1
Mourning Dove	2	26	2	4	2	1	3	40
Great Horned Owl	1	-	-	-	-	-	-	1
White-throated Swift	2	-	-	-	-	-	-	2
<b>Black-chinned Hummingbird</b>	-	-	-	-	<b>2</b>	-	-	<b>2</b>
<b>Lewis's Woodpecker</b>	-	-	-	<b>1</b>	-	-	-	<b>1</b>
Ladder-backed Woodpecker	-	-	1	-	-	-	-	1
Hairy Woodpecker	1	-	1	-	-	-	-	2
Northern Flicker	1	-	-	4	-	1	2	8
<b>Western Wood-Pewee</b>	<b>15</b>	<b>2</b>	<b>6</b>	-	-	-	-	<b>23</b>
Gray Flycatcher	1	-	3	-	-	-	-	4
<b>Cordilleran Flycatcher</b>	<b>6</b>	-	-	-	-	-	-	<b>6</b>
Black Phoebe	4	-	1	-	-	-	-	5
Say's Phoebe	1	10	-	-	-	-	-	11
Ash-throated Flycatcher	4	6	4	-	10	-	-	24
Cassin's Kingbird	-	3	2	-	-	-	6	11
Western Kingbird	3	3	-	-	-	-	-	6
Plumbeous Vireo	3	-	5	-	-	-	-	8
<b>Warbling Vireo</b>	<b>1</b>	-	-	-	-	-	-	<b>1</b>
Western Scrub-Jay	1	5	-	-	1	1	-	8
Pinyon Jay	6	-	5	1	-	2	-	14
Common Raven	4	7	2	2	3	1	1	20
Horned Lark	-	-	-	-	-	1	-	1
Northern Rough-winged Swallow	-	-	-	3	-	-	-	3
Cliff Swallow	98	-	-	-	-	1	7	106
Juniper Titmouse	-	-	3	-	-	-	-	3
Bushtit	-	-	3	-	-	-	-	3
Rock Wren	29	20	1	-	-	14	6	70
Canyon Wren	19	-	-	-	-	-	-	19
<b>Bewick's Wren</b>	-	<b>13</b>	-	-	-	-	-	<b>13</b>
Blue-gray Gnatcatcher	2	-	2	-	-	-	-	4
Mountain Bluebird	-	-	1	-	-	-	-	1

Species	BC	LV	RC	RL	SY	SE	WC	Total
Northern Mockingbird	-	2	-	-	1	2	-	5
Virginia's Warbler	-	1	1	-	-	-	-	2
Yellow-rumped Warbler	-	-	2	-	-	-	-	2
<b>Common Yellowthroat</b>	-	-	-	-	<b>2</b>	-	-	<b>2</b>
<b>Yellow-breasted Chat</b>	<b>7</b>	<b>22</b>	-	<b>1</b>	<b>14</b>	<b>1</b>	<b>3</b>	<b>48</b>
Hepatic Tanager	-	-	1	-	-	-	-	1
Western Tanager	1	-	4	-	-	-	-	5
Green-tailed Towhee	-	-	-	6	-	10	4	20
Spotted Towhee	5	24	1	1	-	4	8	43
Chipping Sparrow	1	4	6	-	-	-	-	11
Brewer's Sparrow	-	-	-	5	-	10	13	28
Vesper Sparrow	-	-	-	4	-	5	-	9
Lark Sparrow	-	7	-	-	-	-	-	7
Black-throated Sparrow	-	7	-	-	-	-	-	7
<b>Black-headed Grosbeak</b>	<b>1</b>	<b>11</b>	<b>4</b>	-	-	-	-	<b>16</b>
<b>Blue Grosbeak</b>	<b>3</b>	<b>11</b>	-	<b>4</b>	<b>13</b>	<b>7</b>	<b>14</b>	<b>52</b>
<b>Lazuli Bunting</b>	<b>4</b>	<b>2</b>	-	<b>4</b>	<b>1</b>	<b>3</b>	-	<b>14</b>
Red-winged Blackbird	-	-	-	1	2	-	-	3
Western Meadowlark	-	10	-	13	6	37	11	77
Brewer's Blackbird	-	-	-	21	-	-	-	21
Brown-headed Cowbird	-	2	-	-	8	-	5	15
<b>Bullock's Oriole</b>	-	-	-	<b>1</b>	-	-	-	<b>1</b>
Scott's Oriole	2	-	-	-	-	-	-	2
House Finch	5	2	-	-	-	-	-	7
<b>Lesser Goldfinch</b>	<b>18</b>	-	-	-	<b>3</b>	-	<b>1</b>	<b>22</b>

Appendix 4. List of 121 bird species (in taxonomic order, American Birding Association, Checklist 6.7) observed from 1996-2007 during point count surveys at Bluewater Canyon (BC), Lost Valley (LV), Rinconada Canyon (RC), Rito Leche (RL), San Ysidro (SY), Senorito Creek (SE), and Wilson Canyon (WC), New Mexico. We include the number of each species observed at any distance from survey points.

Species	BC	LV	RC	RL	SY	SE	WC	Total
Mallard	13	-	-	4	17	-	2	36
Blue-winged Teal	-	-	-	-	2	-	-	2
Cinnamon Teal	-	-	-	-	2	-	-	2
Scaled Quail	-	-	-	-	3	-	-	3
Gambel's Quail	-	-	-	-	1	1	1	3
Great Blue Heron	-	-	-	-	1	-	-	1
Green Heron	-	-	-	-	1	-	-	1
Black-crowned Night-Heron	-	-	-	-	1	-	-	1
Turkey Vulture	7	-	-	8	-	2	1	18
Northern Harrier	-	-	-	-	1	-	-	1
Cooper's Hawk	2	-	1	-	1	-	-	4
Red-tailed Hawk	10	-	1	1	-	-	-	12
American Kestrel	5	21	2	18	24	4	7	81
Peregrine Falcon	-	-	2	-	-	-	-	2
Virginia Rail	-	-	-	1	4	-	-	5
Killdeer	-	-	-	-	6	2	10	18
Spotted Sandpiper	-	-	-	-	-	-	1	1
Eurasian Collared-Dove	-	-	-	-	-	-	1	1
White-winged Dove	-	-	-	-	2	-	-	2
Mourning Dove	54	81	31	54	45	15	38	318
Greater Roadrunner	-	1	-	-	1	-	-	2
Great Horned Owl	1	-	-	-	2	-	-	3
Common Nighthawk	-	-	-	1	-	2	1	4
White-throated Swift	124	7	7	-	4	-	1	143
Black-chinned Hummingbird	10	-	2	-	16	-	1	29
Broad-tailed Hummingbird	6	-	2	6	-	3	2	19
Lewis's Woodpecker	-	-	1	32	-	-	-	33
Acorn Woodpecker	-	-	4	-	-	-	-	4
Red-naped Sapsucker	-	-	2	-	-	-	-	2
Ladder-backed Woodpecker	12	-	2	-	-	1	-	15
Hairy Woodpecker	1	-	5	-	-	-	-	6
Northern Flicker	2	6	2	40	-	17	35	102
Olive-sided Flycatcher	-	-	1	-	-	-	-	1
Western Wood-Pewee	104	15	45	3	6	1	2	176
Willow Flycatcher	-	2	-	-	8	-	1	11
Gray Flycatcher	1	-	8	-	-	-	1	10
Dusky Flycatcher	-	-	1	-	-	-	-	1
Cordilleran Flycatcher	38	-	1	-	1	-	-	40
Black Phoebe	27	-	3	-	-	-	-	30

Species	BC	LV	RC	RL	SY	SE	WC	Total
Say's Phoebe	6	32	-	18	5	15	7	83
Ash-throated Flycatcher	32	73	30	5	73	19	15	247
Cassin's Kingbird	6	22	29	2	22	3	12	96
Western Kingbird	5	17	-	2	2	-	-	26
Eastern Kingbird	-	-	-	-	1	-	-	1
Loggerhead Shrike	-	-	-	-	-	1	-	1
Plumbeous Vireo	28	-	39	-	-	-	1	68
Warbling Vireo	2	7	9	-	-	-	-	18
Steller's Jay	-	-	2	-	-	-	-	2
Western Scrub-Jay	5	69	13	3	24	8	7	129
Pinyon Jay	117	4	22	4	1	13	19	180
Black-billed Magpie	-	-	-	2	-	-	-	2
American Crow	-	27	-	34	45	-	-	106
Common Raven	25	53	6	28	11	35	19	177
Horned Lark	-	2	-	1	-	16	-	19
Purple Martin	-	-	-	-	-	-	1	1
Violet-green Swallow	75	11	29	6	17	13	9	160
Northern Rough-winged Swallow	-	33	-	34	3	25	37	132
Bank Swallow	-	1	-	-	-	5	1	7
Cliff Swallow	1381	22	9	2	139	35	463	2051
Barn Swallow	-	-	-	5	-	5	8	18
Mountain Chickadee	-	-	2	-	-	-	2	4
Juniper Titmouse	9	-	16	-	-	-	-	25
Bushtit	70	-	10	-	4	-	-	84
Red-breasted Nuthatch	-	-	1	-	-	-	-	1
White-breasted Nuthatch	-	-	-	2	-	-	-	2
Rock Wren	100	94	17	2	1	30	21	265
Canyon Wren	80	-	7	-	-	-	-	87
Bewick's Wren	1	32	1	2	-	2	6	44
House Wren	1	-	-	-	-	-	-	1
Marsh Wren	-	-	-	-	1	-	-	1
Blue-gray Gnatcatcher	3	-	2	-	2	-	-	7
Western Bluebird	-	3	8	3	2	2	-	18
Mountain Bluebird	-	2	1	1	-	6	10	20
American Robin	14	-	7	-	1	5	24	51
Gray Catbird	2	-	-	-	2	-	-	4
Northern Mockingbird	9	70	12	4	64	78	35	272
Sage Thrasher	-	-	-	-	-	6	-	6
Curve-billed Thrasher	-	-	-	-	1	-	-	1
European Starling	-	-	-	32	3	-	1	36
Virginia's Warbler	4	1	11	1	-	-	-	17
Yellow Warbler	3	-	2	-	2	-	-	7
Chestnut-sided Warbler	1	-	-	-	-	-	-	1
Yellow-rumped Warbler	7	-	6	1	-	-	-	14

Species	BC	LV	RC	RL	SY	SE	WC	Total
Black-throated Gray Warbler	-	-	7	-	-	-	-	7
Grace's Warbler	-	-	4	-	-	-	-	4
MacGillivray's Warbler	2	-	2	-	-	-	-	4
Common Yellowthroat	-	4	-	1	40	1	3	49
Wilson's Warbler	2	4	-	1	2	-	-	9
Yellow-breasted Chat	35	64	1	8	147	47	60	362
Hepatic Tanager	5	-	9	-	-	-	-	14
Summer Tanager	-	1	2	-	-	-	-	3
Western Tanager	13	-	44	-	-	-	-	57
Green-tailed Towhee	-	-	-	64	-	92	66	222
Spotted Towhee	7	199	17	4	8	18	83	336
Canyon Towhee	4	4	-	-	-	-	1	9
Cassin's Sparrow	-	1	-	-	-	6	-	7
Rufous-crowned Sparrow	-	-	3	-	-	-	-	3
Chipping Sparrow	3	6	40	-	-	-	1	50
Brewer's Sparrow	-	-	-	48	-	180	108	336
Vesper Sparrow	-	-	-	42	-	95	22	159
Lark Sparrow	2	36	-	3	5	19	12	77
Black-throated Sparrow	-	7	-	2	-	6	2	17
Sage Sparrow	-	-	-	-	-	3	2	5
Song Sparrow	-	1	-	30	-	-	1	32
Lincoln Sparrow	1	-	-	-	-	-	-	1
Dark-eyed Junco	-	-	2	-	-	-	-	2
Black-headed Grosbeak	18	20	34	-	10	1	-	83
Blue Grosbeak	31	100	1	46	159	92	146	575
Lazuli Bunting	7	7	-	9	10	3	1	37
Indigo Bunting	5	-	-	-	-	1	-	6
Red-winged Blackbird	-	-	-	148	130	66	88	432
Western Meadowlark	1	153	-	162	92	456	126	990
Brewer's Blackbird	-	-	-	173	1	20	28	222
Common Grackle	-	-	-	1	-	-	-	1
Brown-headed Cowbird	24	35	12	12	83	16	32	214
Orchard Oriole	-	-	-	-	-	-	1	1
Bullock's Oriole	2	89	-	21	6	2	5	125
Scott's Oriole	2	-	1	-	-	-	-	3
House Finch	94	73	6	2	43	6	51	275
Pine Siskin	-	1	-	11	-	1	-	13
Lesser Goldfinch	56	14	19	9	49	7	13	167