Holloman Air Force Base Boles Wells Water System Annex

Bird Surveys

Final Report

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Introduction

The Boles Wells Water System Annex (BWWSA) consists of three well fields, the Boles Wells Well Field (BW) to the north, Douglas Well Field (DW) in the middle, and San Andres Well Field (SW) to the south. The well fields are 645, 1137 and 1019 ha, respectively (HAFB CES GIS data). The well fields contain 14 wells, which provide water for Holloman Air Force Base (HAFB). HAFB has the subsurface water rights and owns BW and part of DW, while the rest of the wellfields are owned by BLM.

DW and SW are on the bajada of the Sacramento Mountains, and BW is in the alluvial flat below the bajada. BW is in a more urbanized area than the other well fields, with houses nearby and a state highway and railroad on one side. The other well fields are relatively isolated from human impact. DW is in a rural area with very few houses, and SW is bordered by rangeland with no houses or highways nearby.

No systematic surveys or records of bird use in this area have previously been completed. The purpose of this study was to conduct migration and breeding bird surveys at the BWWSA.

Methods

We surveyed birds at each well field during spring and fall migrations and the summer breeding season. We established six permanent point transects in the BWWSA wellfields (Figure 1). Transects were located to maximize the habitat diversity and area sampled. Two transects were placed in similar habitats in each well field. Each transect has six or seven permanent points, 200 m apart. Each point is marked with a piece of rebar, about 1 m X 0.64 cm, painted orange on top and marked with an aluminum tag. Five transects have all points in a straight line; transect 6 at BW has four points in a straight line and two more placed to target saltcedar woodland and old orchard habitats.

We conducted linear point counts (Bibby et al. 2000) at each of six transects on the HAFB BWWSA, twice in 2001 and three times in 2002. One transect from each of three well fields was completed on three consecutive mornings. The second transect from each well field was surveyed a week or two later. This pattern was changed only once due to vehicle problems before transect 2 in the fall of 2001 (Table 1). Fall

migration surveys were spread over three weeks in order to sample a greater portion of the migration. Transects were always run in the same order, and two transects from the same well field were never run in the same week.

Table 1. Dates of transect point counts in 2001 and 2002.

Season	Transect 6 (BW)	Transect 1 (SW)	Transect 4 (DW)	Transect 5 (BW)	Transect 2 (SW)	Transect 3 (DW)
Summer	5/30/01	5/31/01	6/1/01	6/4/01	6/5/01	6/6/01
Fall	9/4/01	9/5/01	9/6/01	9/25/01	9/27/01	9/28/01
Spring	4/17/02	4/18/02	4/19/02	5/1/02	5/2/02	5/3/02
Summer	5/25/02	5/26/02	5/27/02	6/4/02	6/5/02	6/6/02
Fall	9/3/02	9/4/02	9/5/02	9/24/02	9/25/02	9/26/02

Point counts on the transects were always started early enough to survey during the dawn chorus, if there was one. At each point, we waited for three minutes before beginning the count, which lasted for five minutes. During this five-minute period, we recorded all birds (number and species) seen and heard, including birds flying over. We recorded estimated distances from the point (0-25, 25-50, 50-100, and over 100 m), except for flyovers, which were noted. The method of detection (visual, song, call, etc.) was also recorded.

The two SW transects (1 and 2) are the southernmost transects. They are situated in Creosote-Tarbush Shrublands (*Larrea tridentata*, *Flourensia cernua*), Creosote Sparse Shrubland, and Creosote/Bush Muhly Shrublands (*Muhlenbergia porteri*). These transects start on the low bajada, where the vegetation is mostly Creosote-Tarbush and Creosote Sparse Shrubland, and end near the mountains on the upper bajada, where the vegetation is Creosote/Bush Muhly (Neville and Neville 1997). The Creosote/Bush Muhly community is a tall, open shrubland dominated by creosotebush with bush muhly dominating underneath the shrub canopy (Muldavin et al. 2000).

The two transects in DW (3 and 4, Figure 1) are on the low bajada of the Sacramento Mountains in Creosotebush-Mariola Shrublands (*Parthenium incanum*), Creosote-Tarbush Shrublands, and Creosote Sparse Shrubland (Neville and Neville 1997). Creosote-Mariola Shrublands are creosotebush-dominated desert shrublands occurring on gravelly, alluvial fan piedmonts. Creosote-Tarbush and Creosote Sparse Shrublands occur on alluvial fan flats and have relatively low diversity, consisting almost

entirely of creosotebush (Muldavin et al. 2000). This area is hilly and rocky with a few large arroyos.

The two BW transects (5 and 6, Figure 1) are the northernmost transects and are primarily covered in Honey Mesquite Shrubland (*Prosopis glandulosa*), containing a smaller percentage of Honey Mesquite/Feather Fingergrass (*Chloris virgata*) Shrubland (Muldavin et al. 1997). Honey Mesquite Shrubland is an open or moderately closed shrubland. At BW, it occurs on alluvial flats. This type of shrubland is dominated by honey mesquite and includes fourwing saltbush (*Atriplex canescens*), tarbush, and lote bush (*Ziziphus obtusifolia*). Honey Mesquite/Feather Fingergrass is an open shrubland occurring in shallow swales and drainages. This shrubland is composed mostly of honey mesquite, with fourwing saltbush and tarbush. The understory of this shrubland is dominated by feather fingergrass, with scattered clumps of alkali sacaton (*Sporobolus airoides*). One of the outlying points on transect 6 is in the old orchard near the water tank, and the other is in Saltcedar Woodland. Saltcedar Woodland has an overstory dominated by saltcedar (*Tamarix ramosissima*) and an understory that may have alkali sacaton and saltgrass (*Distichlis spicata*). The old orchard has mature pear trees, apricot trees, pecan trees, a pomegranate tree, and other domestic plants, as well as a grassy area. BW is flat and fenced with barbed wire and contains areas of bare, fine soil and several small gullies eroding the surface.

Results

During all surveys, we detected 67 species (Table 2; scientific names in appendix), 38 species during spring migration, 43 species during summer (breeding) surveys, and 49 species during fall migration. Only 39 (58%) of the 67 species were seen in both years. Sixteen species were added in 2002, but 12 seen in 2001 were not seen in 2002.

In all surveys except fall 2002, BW had the highest number of species detected for all seasons and years, except Fall 2002 (Figure 2). There was no consistent pattern by year or season of bird species detection in the two other wellfields, DW and SW. The largest between-survey difference occurred in SW, which had 16 species in fall 2001, and 25 species in fall 2002. BW had more species during migrations than during the summer,

and DW had more species during spring and summer than fall. Transect 6 (DW) consistently had the highest or second-highest species richness (Table 2), probably because that transect contains the greatest variety of habitats and structures (mesquite, telephone poles, trees at nearby residential houses, the orchard, and saltcedar).

Particularly high numbers of individuals occurred at BW in the fall 2001, SW in summer 2001, and all three wellfields in summer 2002 (Figure 3). In general, the variation between years was relatively high, and no seasonal pattern of abundance was evident across all well fields.

Nine species showed evidence of breeding on the well fields. Black-throated Sparrow, Scott's Oriole, Cactus Wren (all three species at SW), and Northern Mockingbird (BW) were seen carrying nesting material. Blue Grosbeak, Bullock's Oriole, and Gambel's Quail had fledglings at BW. Black-tailed Gnatcatchers nested on DW, at the west end of transect 4. Swainson's Hawks nested near the west main gate road on BW.

Thirty-four of 67 (51%) of all species detected were residents, 22 (33%) were summer residents, four (6%) were winter residents, four (6%) were migrants, and two (3%) were occasional species. Twenty-eight of 43 (65%) species detected during breeding season were residents (Table 2).

Of those 67, only 39 (58%) were seen in both years. Sixteen species were added in 2002, but 12 seen in 2001 were not seen in 2002. Additional survey years would lengthen the species list and provide a more complete baseline for future monitoring.

Discussion

Patterns in Bird Detections

Number of detections and the particular transects on which a species was detected varied among years. Between-year variation was more apparent in the fall migration than in the breeding season. However, for the most part, if a species was present during a season in one year, it was also present in the other. A notable breeding season exception is Broad-tailed Hummingbird, which was not present in 2001 but was present on three transects in 2002. Exceptions to this pattern during fall migration were Western Tanager, not present in 2001 but seen on all six transects in 2002, and Crissal Thrasher, detected

on five transects in 2001 but none in 2002. The migration season differences probably reflect between-year variation in migration schedules.

Differences among transects and seasons in species and numbers of individuals could be caused by seasonal migration, local movement to different habitats, or changing detection levels. Most of the seasonal patterns seen in Table 2 correspond to range maps in a recent guidebook (Sibley 2000) and the HAFB bird checklist (Mesilla Valley Audubon Society, 1996). The HAFB bird checklist includes only very limited information on the BWWSA. Only seven species are noted to occur on BW. There seem to be no reliable local counts for the southern well fields.

Some expected species may have gone undetected because they move locally. They may be in the area, but not in the habitats surveyed. For instance, White-winged Dove, Mourning Dove, and Rock Dove are known to move between seasons to more- or less-urbanized areas (Mark Proctor, pers. comm.). Rock Doves were seen only in the fall at BW, but they are probably resident in the area. BW is close to some higher-density residential housing and other buildings, suitable habitat for Rock Doves. They may not have been seen there in the summer because they nest in more urbanized areas. Mourning Doves were in the bajada sites (DW and SW) as well as at BW during the summer. In the fall, however, they occurred in lower numbers at all the well fields. They may have come out of the bajada sites after nesting and moved to more urban areas.

Ladder-backed Woodpeckers are resident in the area but were only counted in low numbers on a few transects during the spring and summer. They were more abundant and widespread in the fall. Their nesting habitat may not be contained in the BWWSA. They are known to use a variety of desert habitats, but they use larger trees for nesting (Lowther 2001) and may have dispersed into the well fields after nesting.

Western Scrub-Jays were seen only once before the fall, although they are resident in the area. They nest in montane shrubland and were probably only counted when they dispersed off the nesting grounds into other habitats. In the fall, they were present at SW (transect 2) and both BW transects. These areas may have been more suitable than other transects because transect 2 is near a large canyon leading into an arroyo, and the BW site has large trees.

Discrepancies may either reflect true occurrence differences from published ranges, or they may reflect changes in detectability of a species between seasons. Mockingbirds, for example, are expected to be resident in the area, but they were only seen once in the entire fall survey, compared to 27 in the summer surveys. Their songs during breeding season carry a very long distance. Abundance measures are less reliable from point counts for species that are rare but highly detectable at great distances (Hutto et al. 1986).

Some of the differences between transects can probably be explained by the transect habitats. For instance, transect 2 had species such as Scaled Quail, White-throated Swift, Violet-green Swallow, Canyon Wren, and Rock Wren, that are typically associated with the cliffs and more mesic canyons of the mountains. Transect 2 is closer to the Sacramento Mountains than the other transects (Figure 1) and is very close to a large arroyo emerging from a large canyon in the mountains. Transects 5 and 6 at BW harbored more species typically found around buildings, such as Barn Swallow and Bewick's Wren, and the old orchard on transect 6 attracted Bullock's Orioles in the summer and fall.

Management Implications

New Mexico Partners in Flight (NMPIF) has ranked species by habitat according to their importance for conservation (NMPIF 2000). NMPIF scores are computed based on global abundance, global breeding distribution, global winter distribution, threats on the wintering grounds, New Mexico breeding distribution, threats to breeding in New Mexico, importance of New Mexico to breeding, and New Mexico breeding abundance. Birds that score highest on need for conservation are ranked as highest priority, priority, or high responsibility, in order of decreasing importance. Highest priority Chihuahuan Desert Shrub birds detected on the BWWSA were Gambel's Quail, Black-tailed Gnatcatcher, Crissal Thrasher, and Scott's Oriole. Priority species detected were Loggerhead Shrike and Verdin. High responsibility species on the BWWSA were Scaled Quail, Greater Roadrunner, Lesser Nighthawk, Black-chinned Hummingbird, Ladder-backed Woodpecker, Ash-throated Flycatcher, Cactus Wren, Rock Wren, Canyon Towhee, Black-throated Sparrow, and Pyrrhuloxia.

Crissal Thrasher is also on the Birds of Conservation Concern list compiled by the US Fish and Wildlife Service (USFWS 2002). This list was intended to stimulate proactive conservation and was compiled to identify birds that, without additional conservation action, are likely to become candidates for listing under the Endangered Species Act of 1973.

Many of these species breed and/or were detected in relatively large numbers on the BWWSA. Bird species richness on the BWWSA was not particularly high, but the well fields nonetheless provide important bird habitat for several high-priority species. Future monitoring of the BWWSA is needed to ensure the protection of this habitat.

Table 2. Total birds seen by species, season, and transect (1 through 6). Occurrence information is from Sibley 2000.

		Spring 2002						Summer 2001						Summer 2002						Fall 2001						Fall 2002						Occurrence
Transect		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	
Common Name	Total																															
Turkey Vulture	2				1								1																			summer
Sharp-shinned Hawk	1																				1											winter
Swainson's Hawk *	3																							1	2							summer
American Kestrel	1																								1							resident
Scaled Quail	7								2					4		1																resident
Gambel's Quail *^	93				1	11	13	2			1	4	21			3		7	18			1		2	3						6	resident
Killdeer	1						1																									resident
Rock Dove	25																							25								resident
Band-tailed Pigeon	5						5																									summer
White-winged Dove	28		1		1		4					1	2			1		1	2						11						4	resident
Mourning Dove	83	5	3	5	3	3	3		7	10	2	2	4		12	3	6		4					5		3			2		1	resident
Greater Roadrunner	3									1													1		1							resident
Lesser Nighthawk	43		2					10	2	6	8			4	3	4	3	1														summer
White-throated Swift^	1								1																							summer
Black-chinned Hummingbird	19	3	1	1				1				1	2										1		4	1		1	1		2	summer
Broad-tailed Hummingbird^	10			7												1		1	1													summer
Ladder-backed Woodpecker	19	1					1							1				1		3	2	1	1	2		1	2			1	2	resident
Say's Phoebe	3			2																							1					summer
Ash-throated Flycatcher	32	1	2		3	2		6	1		3	1		5	5	1	2															summer
Cassin's Kingbird	2																					2										summer
Western Kingbird	45		1	1			7				4		2	6	1		7	1	13												2	summer
Loggerhead Shrike	21					1		2												2	5	1				4	2		2	1	1	resident
Western Scrub-Jay	16						1														3			1	1				1	1	8	resident
American Crow	2						2																									occasional
Chihuahuan Raven	3			1					1																					1		resident
Common Raven	4	1								3																						resident
Violet-green Swallow	21						1		1								1														18	summer
Bank Swallow	1																					1										migrant
Barn Swallow	1																								1							summer
Mountain Chickadee	1																										1					resident
Verdin	61		1		2	6	2		2		5	7	2			2	3	3	4		1			3		1	5	7	4		1	resident
Cactus Wren *	130		7	2		5	6	11	3	3	1	3	4	8	4	5		5	6	21	4			3	8	6	5	1	1	2	6	resident
Rock Wren	22	1	2						1					4			1			1	3					3	3	3				resident
Canyon Wren	3														1												2					resident
Bewick's Wren^	16						8						1					1	1					3			1	1				resident
House Wren	3								1	2																						summer
Black-tailed Gnatcatcher *	84		1	4	5	2	1		7	2	1				2	2	9	1		1	4	6	10	4		3	3	1	13	1	1	resident
Northern Mockingbird *	62					1	3	6	3		1	11	6	2	5	3		10	10						1							resident

		Spring 2002						Summer 2001						Summer 2002						Fall 2001						Fall 2002						Occurrence
Sage Thrasher	3																												3		winter
Curve-billed Thrasher	2																												1	1	resident
Crissal Thrasher	19						1						1				2			3		2	2	5	3							resident
European Starling	2																		2													resident
Phainopepla	1																		1													occasional
Virginia's Warbler	1																					1										summer
Yellow-rumped Warbler	8				2	1							1								1							3				resident
Townsend's Warbler	1																											1				migrant
MacGillivray's Warbler	3																					1		1				1				summer
Common Yellowthroat	2																		1									1				summer
Wilson's Warbler	9																					1							7		1	migrant
Western Tanager	23																									3	5	6	3	2	4	summer
Green-tailed Towhee	12																				1	6		3			2					winter
Canyon Towhee	13		1																1	2		3					6					resident
Chipping Sparrow	20							3												1		2			10	2					2	resident
Brewer's Sparrow	21	1				6									1	1								3		2	4				3	migrant
Black-throated Sparrow *	273	7	14	18	16	10	1	13	16	12	12	8	1	11	7	20	15	9	4	12	7	12	7	7		8	7	4	9	6		resident
White-crowned Sparrow	1						1																									winter
Pyrrhuloxia	54			3	2		6	1	2		2	5	4	3	5	6	3	4	4						4							resident
Blue Grosbeak *	37											4	2					4	2						12	1			3	1	8	summer
Red-winged Blackbird	8												2																		6	resident
Western Meadowlark	1											1																				resident
Great-tailed Grackle	2						2																									resident
Brown-headed Cowbird	21				1						5	1			2		3	2	7													resident
Bullock's Oriole *	9			5									1						2						1							summer
Scott's Oriole *	115	4	12	4	1			18	9	7	5			12	12	11	7			3						3	6		1			summer
House Finch	226	2	4	8	9		5		7	3	3		2	19	12	8	14	5	8	15	4	5	37	21	3	6	1	4	3	9	9	resident
Lesser Goldfinch	6																							4						2		summer
House Sparrow	2												1						1													resident
Unidentified Bird	31	2		1	1	1	1		2				1		1			4			1			1	2		2	2	1	4	4	
Species per Transect		10	14	13	13	11	21	11	17	10	14	13	19	12	14	16	14	16	20	1	12	15	7	17	16	1	21	9	13	13	20	
Species per Season							37						35						30						37						36	

* denotes species seen with evidence of breeding (seen carrying nesting material, fecal sac, or with fledglings, etc.)

^ birds seen at BW, as listed on the Holloman checklist.

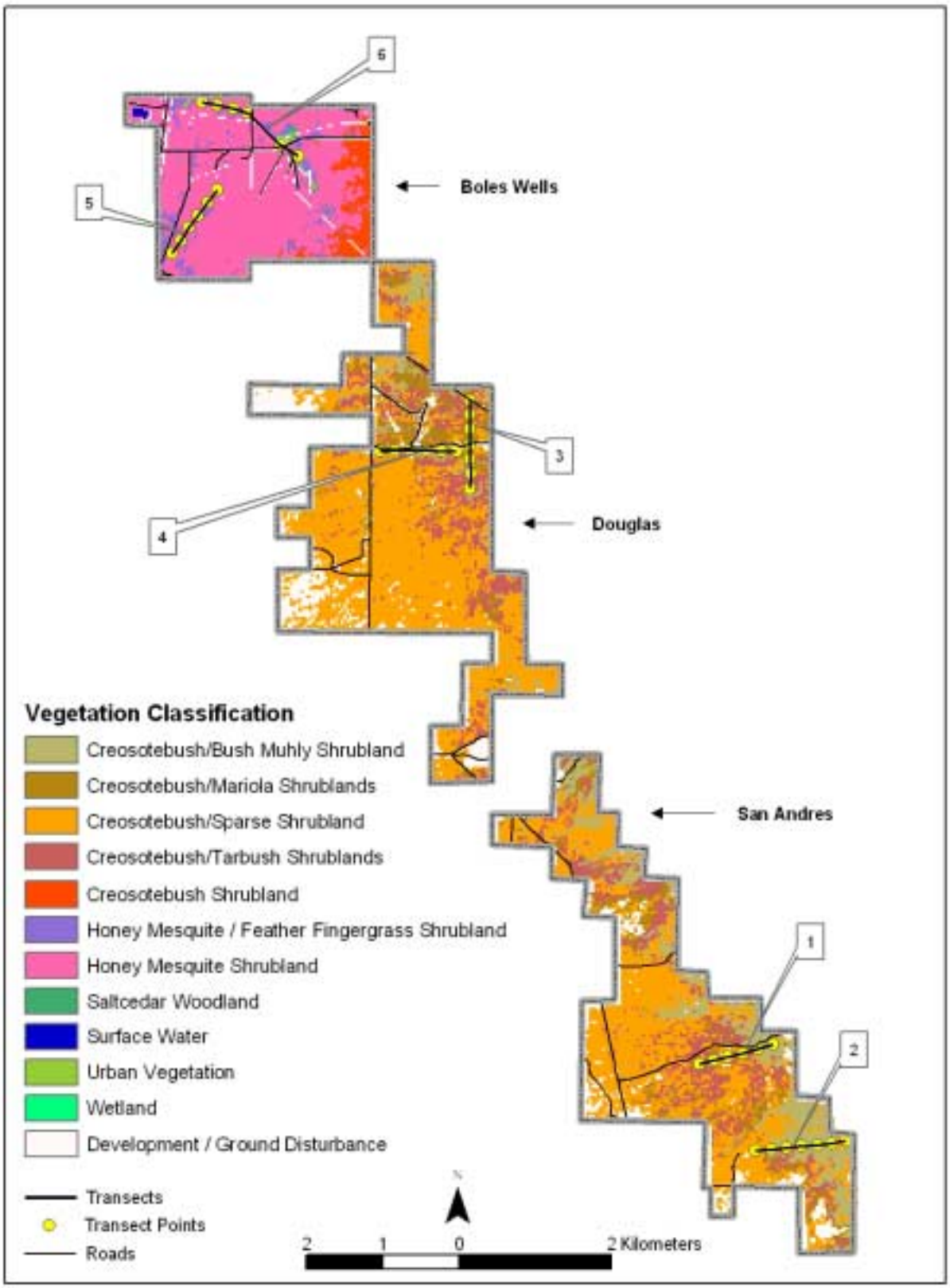

Figure 1. The Boles Wells Water System Annex well fields showing transects labeled (1- 6) and transect points (dots).

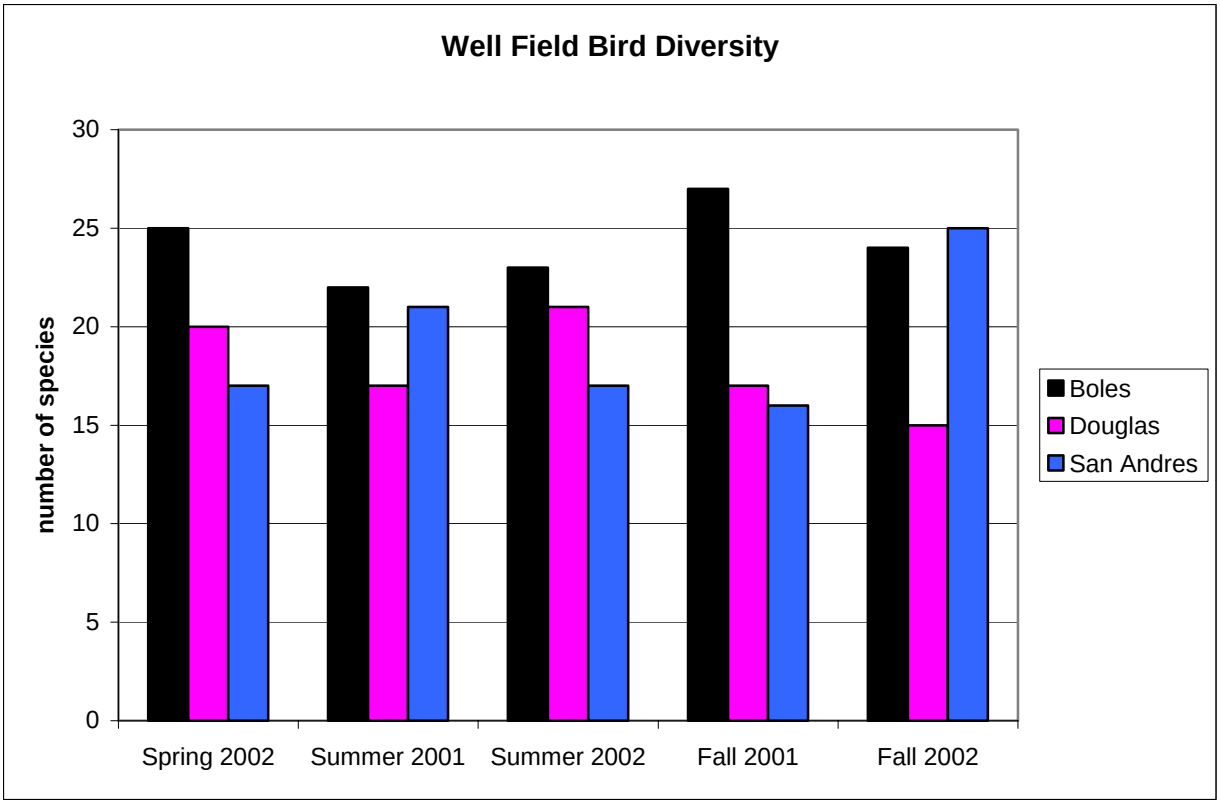

Figure 2. Number of species detected at each well field area by season and year.

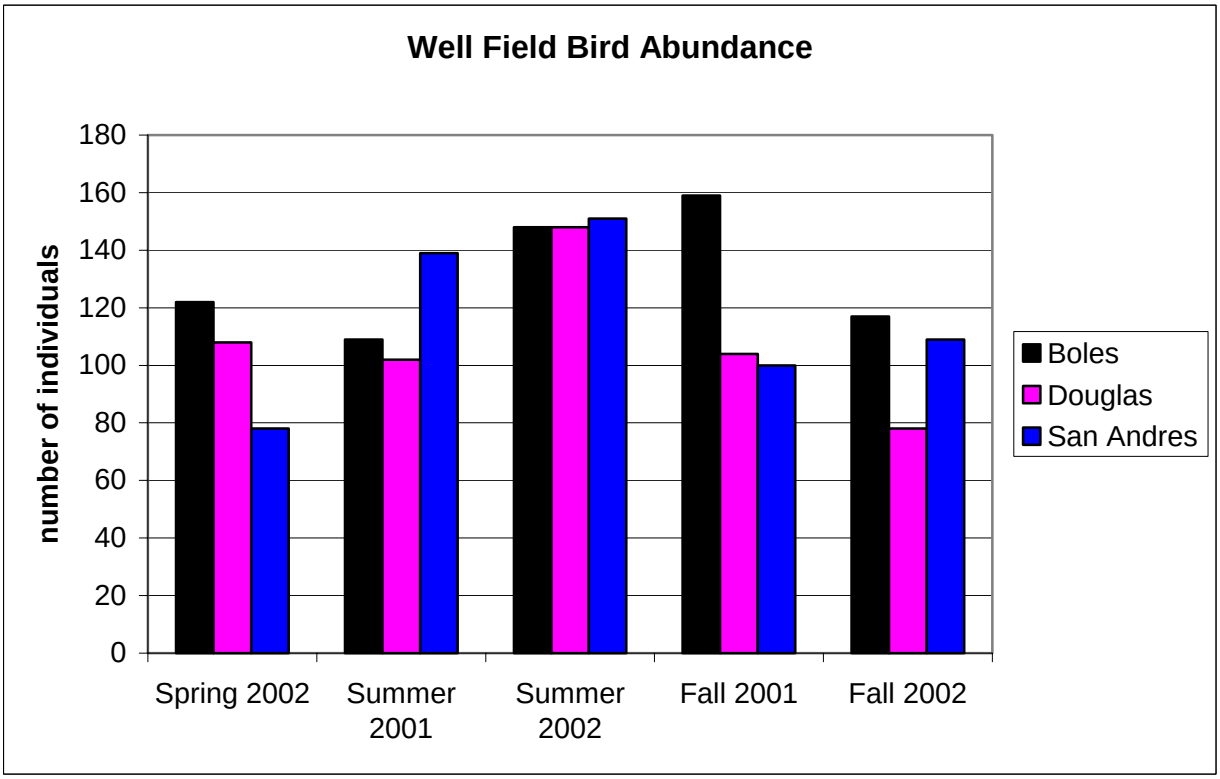

Figure 3. Total number of individuals detected at each well field by season and year.

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Appendix. Common and Scientific names of all birds detected during surveys, BWWSA.

Common Name	**Scientific Name**
Turkey Vulture	*Cathartes aura*
Sharp-shinned Hawk	*Accipiter striatus*
Swainson's Hawk	*Buteo swainsoni*
American Kestrel	*Falco sparverius*
Scaled Quail	*Callipepla squamata*
Gambel's Quail	*Callipepla gambelii*
Killdeer	*Charadrius vociferus*
Rock Dove	*Columba livia*
Band-tailed Pigeon	*Columba fasciata*
White-winged Dove	*Zenaida asiatica*
Mourning Dove	*Zenaida macroura*
Greater Roadrunner	*Geococcyx californianus*
Lesser Nighthawk	*Chordeiles acutipennis*
White-throated Swift	*Aeronautes saxatalis*
Black-chinned Hummingbird	*Archilochus alexandri*
Broad-tailed Hummingbird	*Selasphorus platycercus*
Ladder-backed Woodpecker	*Picoides scalaris*
Say's Phoebe	*Sayornis saya*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Cassin's Kingbird	*Tyrannus vociferans*
Western Kingbird	*Tyrannus verticalis*
Loggerhead Shrike	*Lanius ludovicianus*
Western Scrub-Jay	*Aphelocoma californica*
American Crow	*Corvus brachyrhynchos*
Chihuahuan Raven	*Corvus cryptoleucus*
Common Raven	*Corvus corax*
Violet-green Swallow	*Tachycineta thalassina*
Bank Swallow	*Riparia riparia*
Barn Swallow	*Hirundo rustica*
Mountain Chickadee	*Poecile gambeli*
Verdin	*Auriparus flaviceps*
Cactus Wren	*Campylorhynchus brunneicapillus*
Rock Wren	*Salpinctes obsoletus*
Canyon Wren	*Catherpes mexicanus*
Bewick's Wren	*Thryomanes bewickii*
House Wren	*Troglodytes aedon*
Black-tailed Gnatcatcher	*Polioptila melanura*
Northern Mockingbird	*Mimus polyglottos*
Sage Thrasher	*Oreoscoptes montanus*
Curve-billed Thrasher	*Toxostoma curvirostre*
Crissal Thrasher	*Toxostoma crissale*
European Starling	*Sturnus vulgaris*
Phainopepla	*Phainopepla nitens*
Virginia's Warbler	*Vermivora virginiae*
Yellow-rumped Warbler	*Dendroica coronata*
Townsend's Warbler	*Dendroica townsendi*
MacGillivray's Warbler	*Oporornis tolmiei*
Common Yellowthroat	*Geothlypis trichas*
Wilson's Warbler	*Wilsonia pusilla*
Western Tanager	*Piranga ludoviciana*
Green-tailed Towhee	*Pipilo chlorurus*
Canyon Towhee	*Pipilo fuscus*
Chipping Sparrow	*Spizella passerina*
Brewer's Sparrow	*Spizella breweri*
Black-throated Sparrow	*Amphispiza bilineata*
White-crowned Sparrow	*Zonotrichia leucophrys*
Pyrrhuloxia	*Cardinalis sinuatus*
Blue Grosbeak	*Guiraca caerulea*
Red-winged Blackbird	*Agelaius phoeniceus*
Western Meadowlark	*Sturnella neglecta*
Great-tailed Grackle	*Quiscalus mexicanus*
Brown-headed Cowbird	*Molothrus ater*
Bullock's Oriole	*Icterus bullockii*
Scott's Oriole	*Icterus parisorum*
House Finch	*Carpodacus mexicanus*
Lesser Goldfinch	*Carduelis psaltria*
House Sparrow	*Passer domesticus*