BIRD SURVEY AND OCCURRENCE RECORD COMPILATION

RESOLUTION COPPER MINING

Prepared for:

Resolution Copper Mining

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EXECUTIVE SUMMARY

WestLand Resources, Inc. (WestLand) was retained by Resolution Copper Mining, LLC (RCM) to conduct bird surveys within the Resolution Study Area (Study Area) near Superior, Pinal County, Arizona. The Study Area encompasses the Apache Leap escarpment, Queen Creek Canyon, Oak Flat, Rancho Rio Creek, Devils Canyon, and Mineral Creek.

The primary purpose of the surveys was to establish baseline information about bird species in the Study Area. Data were collected during the winter season of 2008 and during the breeding season in 2008 and 2009. In addition, surveys for raptors were conducted in 2003, 2004, 2008 and 2011, and a species-specific tape call-back survey for the western yellow-billed cuckoo (*Coccyzus americanus* spp. *occidentalis*) in 2011. The goals of this report are: 1) to provide a summary of the avian surveys conducted in 2008 and 2009, and 2) to assemble a list of avian species that have been reported in the Study Area, compiled from other surveys and sources as well as from WestLand's data.

Key Points:

A total of 172 bird species have been detected by WestLand and others within the Study Area, including 135 species during summer, 94 species during winter, 92 species during spring, and 72 species during fall.

No avian species that are federally listed as threatened or endangered under the Endangered Species Act have been documented within the Study Area.

Of the species detected by WestLand surveys or reported by others to occur in the Study Area, four are on the Audubon Society's Red List, nine are on the Audubon Society's Yellow List, one is a candidate for federal listing under the Endangered Species Act, and 25 are considered migratory birds of conservation concern by the Tonto National Forest (TNF).

1. INTRODUCTION AND PURPOSE

Resolution Copper Mining LLC (RCM) is currently conducting pre-feasibility studies for the development of a copper mine and associated facilities near Superior, Pinal County, Arizona (***Figure 1***). WestLand Resources, Inc. (WestLand) has been conducting various baseline biological surveys to support planning and anticipated permitting efforts. As part of this effort, WestLand conducted bird surveys in the Resolution Study Area (Study Area). The Study Area encompasses the Apache Leap escarpment, Queen Creek Canyon, Oak Flat, Rancho Rio Creek, Hackberry Creek, Devils Canyon, and Mineral Creek (***Figure 2***). Mineral Creek is not shown on ***Figure 2***, but it is the destination for water flowing through Devils Canyon.

The Study Area is situated in foothills of the Pinal Mountains immediately east of Superior (***Figure 1***). The major biotic communities in the Study Area include Interior Chaparral, Madrean Evergreen Woodland, the Arizona Upland Subdivision of Sonoran Desertscrub (Arizona Upland Desertscrub), and Interior Riparian Deciduous Forest (Brown 1994) (***Figure 2***). Arizona Upland Desertscrub occurs west of Apache Leap and on the slopes overlooking Devils Canyon. Scrub oak-dominated chaparral predominates in the boulder outcrops just east of Apache Leap, while manzanita-dominated chaparral is more common along the eastern margins of the Study Area, including Oak Flat. Madrean Evergreen Woodland is present in narrow bands scattered throughout Oak Flat and is also associated with reservoirs and ponds within Oak Flat. Riparian vegetation within the Study Area is restricted to a few pockets, and is often found in contact with Madrean Evergreen Woodland vegetation. Interior Riparian Deciduous Forest within the Study Area is primarily located in Devils Canyon and Mineral Creek with additional patches of riparian vegetation located along Queen Creek and Rancho Rio Creek, as well as at the margins of several ponds and stock tanks scattered throughout Oak Flat within areas otherwise characterized as Interior Chaparral.

The geographical areas considered in this analysis include Apache Leap, Oak Flat, Devils Canyon and Mineral Creek (***Figure 2***). Oak Flat has been referred to as Oak Flat/East Plant in some other reports in the Appendices. The Apache Leap geographical area is roughly bordered on the east by the crest of the Apache Leap, to the south by FR 282, to the west by SR 177, and to the north by Queen Creek. Survey areas on Apache Leap were accessed from the Cross Canyon road. The Oak Flat geographical area includes the Oak Flat Campground, Queen Creek, and its immediate vicinity. The Devils Canyon geographical area includes Devils Canyon proper and its tributaries, Rancho Rio Creek and Hackberry Creek. Most Devils Canyon survey areas were accessed by foot trails. The portion of Mineral Creek included in the Study Area extends from stream mile 9.8 to 11.9, measured from the confluence with Gila River.

The primary purpose of our surveys was to establish baseline information about bird populations in the Study Area. Data were collected during the winter season of 2008 and during the breeding seasons in 2008 and 2009. In addition, surveys were conducted for raptors in 2003, 2004, 2008, and 2011, and a species-specific tape call-back survey for the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) was conducted in 2011. The goals of this report are 1) to provide a summary of our avian surveys conducted between 2003 and 2011, and 2) to assemble a list of avian species known or reported to occur in the Study Area based on WestLand's survey data as well as other sources and records.

2. PREVIOUS SURVEYS, STUDIES AND LISTS USED

WestLand has conducted baseline avian studies in the Study Area since 2003. These studies include extensive avian censuses in 2008 and 2009. Additionally, surveys were conducted for raptors in 2003, 2004, 2008, and 2011. In 2011, species-specific tape call-back surveys for cuckoos were conducted in Devils Canyon and Mineral Creek. The methods used in each of these surveys are presented in their respective reports (***Appendix 1 - 4***).

To produce an extensive list of avian species that have been reported to occur in the Study Area, the WestLand site-specific surveys were augmented with data from other sources. The Maricopa Audubon Society supported studies of the avian community in Queen Creek Canyon in 2006, at Oak Flat in 2006 and 2007, and in Rancho Rio Creek and Devils Canyon during the breeding seasons of 2007, 2009, and 2011 (***Appendix 5*** **and** ***6***), and Tice Supplee, Director of Bird Conservation, Audubon Arizona, provided survey records for these areas (***Appendix 7***). These reports provide detailed information on survey methodology for two of the surveys conducted in Rancho Rio Creek and Devils Canyon. Both surveys focused on the areas of Devils Canyon characterized by considerable surface water and associated riparian vegetation and consisted of one and two days of survey, respectively. Additional sources of bird species data for the Study Area sources include: surveys conducted by the Maricopa Audubon Society, the Christmas Bird Count (CBC) (***Appendix 8***), eBird (***Appendix 9***), and Avian Sites (***Appendix 10***). Bird species are listed in taxonomic order according to the Check-list of North America Birds (America Ornithologists' Union [AOU] 2012).

The Christmas Bird Count (CBC) is a long-term citizen's science project administered by the National Audubon Society that seeks to document population trends in bird populations throughout North America and parts of Central and South America (Audubon 2012a). Over a period of three weeks in the early winter, volunteers survey over 2,000 locations for the occurrence and numbers of avian species present. These data are then used to document changes in species composition and infer long-term population trends. CBC data (2004-2010) were obtained from the Maricopa Audubon Society for the area surrounding Superior, AZ, including Oak Flat and areas just west of Apache Leap (personal communication from Cynthia Donald, Sponsor Compiler for Superior Christmas Bird Count Circle, Maricopa Audubon Society, ***Appendix 8***). These data consist of observations from a circular survey area 15 mi in diameter that was centered west of Superior, AZ, and north of the Boyce Thompson Arboretum. Data were utilized from a portion of this circle that includes Oak Flat, areas west of the Apache Leap escarpment, and a small portion of the town of Superior.

A citizen's science project (eBird 2012) is managed by the Cornell Lab of Ornithology and the National Audubon Society that compiles avian checklists from volunteers who provide information regarding the species present at locations across North America. Checklists specific to Oak Flat are available through eBird. These data from the past 25 years were used to provide information on the occurrence and richness of avian species at Oak Flat. However, the specific biotic communities associated with these data could not be identified, as the precise locations of these observations are not provided by eBird (***Appendix 9***).

Avian Sites (2012), a website created and maintained by an avid birder, has a page dedicated to Oak Flat Campground where sightings of avian species have been documented by month since November 1999

(***Appendix 10***). Similar to data from eBird, these data were used to compile an extensive list of avian species that occur in the Study Area.

There are limitations with data from citizen science projects in that data are a collection of individual checklists from volunteer observers, there is no standardization of spatial or temporal sampling effort, and there is no control for differences associated with observer skill and ability. Thus, these data were used to provide an extensive list of the species that occur in the Study Area, but they only allow a qualitative comparison to surveys conducted by WestLand.

These data sources were first combined into a list of all avian species observed in the Study Area (***Table 1***). Because avian species vary in their breeding and migratory phenology, the data were not categorized into breeding, migratory and wintering periods. Rather, the data were organized according to calendar months: winter (December - February), spring (March - April), summer (May - September) and fall (October - November) periods to illustrate the seasonal changes in avian communities within the Study Area. To facilitate discussion of WestLand's data, all data collected during the 2008 breeding season survey have been included in the summer partition.

3. COMPILED BIRD LIST FOR RESOLUTION COPPER STUDY AREA

The combination of data sources outlined above provided an extensive list of 172 avian species that have been observed in the Study Area (***Table 1***). A total of 94 species were detected during the winter months, 92 during spring, 135 during summer, and 72 during fall. Of the species detected, four are on the Audubon's Red List, nine on the Audubon's Yellow List, 25 are considered migratory species of management concern by the Tonto National Forest (TNF) (***Table 2***), and one, the yellow-billed cuckoo, is a candidate for listing under the Endangered Species Act (ESA). A willow flycatcher (*Empidonax traillii*) was observed at Oak Flat on 30 September 2011 (***Appendix 9***), but based on the known timing of fall migration of subspecies of willow flycatcher through the southwest (Yong and Finch 1997) it is unlikely that this individual was the endangered southwestern subspecies (*Empidonax traillii extimus*). No other federally listed species was detected in the Study Area. The results of each data source are briefly described below.

3.1. DESCRIPTION OF RESULTS FROM EACH DATA SOURCE

3.1.1. WestLand Avian Studies

During the winter of 2008, 56 bird species were detected, and species richness varied among biotic communities. The numbers of species detected in a particular biotic community ranged from 49 in Interior Riparian Deciduous Forest to 23 in Arizona Upland Desertscrub (***Table 3a***).

Species richness during the 2008 summer surveys was relatively high in all biotic communities that were surveyed. Ninety-two bird species were detected during counts, and four additional species were observed during periods not associated with counts. The numbers of species detected in particular biotic communities ranged from 28 species in Arizona Upland Desertscrub to 79 species in Interior Riparian Deciduous Forest (***Table 3b***).

Fifty-two bird species were detected in the Study Area during counts in the 2009 summer surveys. An additional 19 species were observed outside of counts during this survey period. Because survey efforts in 2009 focused on the Interior Chaparral biotic community, the total number of species detected was lower than numbers during the 2008 breeding season, when a greater variety of biotic communities were surveyed. The total number of species detected in each biotic community in 2009 ranged from 24 species in the Madrean Evergreen Woodland to 51 species in Interior Chaparral (***Table 3c***). Almost all of the species detected occurred in Interior Chaparral, which is likely an artifact of the sampling design. Seven times as many points were surveyed in Interior Chaparral than in Madrean Evergreen Woodland. Sampling effort was not equal across biotic communities because the number of points established in each community reflected the approximate relative extent of each biotic community present at Oak Flat.

During raptor-specific and cuckoo surveys, a total of 17 avian species were detected in the Study Area. Sixteen raptor species were observed, including four species of owls, during raptor surveys in 2003, 2004, 2008, and 2011 (WestLand 2012). Additionally, western yellow-billed cuckoos were detected at Mineral Creek during the 2011 cuckoo survey (WestLand 2011). In total, these surveys located five avian species in the Study Area not identified in the 2008 or 2009 avian censuses.

3.1.2. Other Data Sources

Data from eBird indicates that a total of 145 avian species have been detected at Oak Flat Campground over the past 25 years. Sixty-six species have been detected during the winter, 51 during spring, 89 species during the summer, and 44 during the fall (***Table 1***). According to the Avian Sites website for Oak Flat, 118 species have been detected at Oak Flat, 56 during winter, 73 during spring, 84 during summer and 58 during fall (***Table 1***). The pattern of detections is similar to those from eBird. More species are present during summer than during the winter, spring and fall. Audubon Society surveys at Oak Flat detected a total of 53 species, all of which were detected during the summer (***Table 1***). In Devils Canyon, Audubon Society surveys detected a total of 75 species during the summer. All of these detections were associated with Interior Riparian Deciduous Forest, as the sole focus of these studies was in the riparian areas along Devils Canyon and Rancho Rio Creek (***Appendix 5 and 6***), Tice Supplee, (personal communication). A total of 74 species have been detected in Oak Flat and below Apache Leap, near Superior, AZ, during Christmas Bird Counts (***Table 1***). Species encountered changed from year to year, and the numbers of species detected differed from year to year, ranging from 38 to 51 species (***Appendix 10***).

3.2. COMPARISON OF TOTALS

3.2.1. Seasonal Periods

Using the combined list compiled by this study, the summer had the highest species richness (135 species) of any seasonal period, and included 78 percent of the 172 species detected in the Study Area (***Table 1***). A total of 94 species were detected during the winter, suggesting that the Study Area is utilized by more species as breeding habitat than as wintering habitat (***Table 1***). During the spring and fall, the combination of data sources identified a total of 92 and 72 species at the Study Area, respectively. Only six percent of all the species detected in the Study Area were observed only during the spring or fall. These species are migrants that pass through this area without stopping for breeding or wintering.

3.2.2. Biotic Communities

WestLand surveys of the Study Area in 2008 and 2009 sampled bird species among different habitat associations. A total of 38 species were detected in Arizona Upland Desertscrub, 64 species in Madrean Evergreen Woodland, 69 species in Interior Chaparral, and 103 species in Interior Riparian Deciduous Forest during all seasons combined (***Table 3d***). Audubon Society surveys in Devils Canyon are the only additional data source that can be associated with a biotic community, as these surveys were focused on Interior Riparian Deciduous Forest in the canyon. Combined, the Audubon Society surveys in Devils Canyon detected a total of 75 species, providing further evidence that species richness in Interior deciduous forest is higher than in any other biotic community in the Study Area.

4. DISCUSSION

Avian surveys conducted by WestLand and other data sources provide baseline information on the avian communities that occur in the Study Area, including species richness in the biotic communities present in the Study Area, and seasonal patterns of species occurrence. A total of 172 bird species have been detected within the Study Area. The majority of these species (135) have been reported during the summer months, and many are present during the winter and spring (94 and 92 species, respectively). The fewest species were detected during the fall months (72 species) (***Table 1***). From the available data that can be associated with biotic communities, Interior Riparian Deciduous Forest supports the highest species richness of the biotic communities present in the Study Area (***Table 3d***).

Information regarding breeding biology in avian species is desirable, as knowledge of reproductive effort and success is fundamental towards understanding the population dynamics and ecology of birds. As such, much of our survey efforts, as well as those from the Audubon Society, have focused on the identification of avian species present in the Study Area during the summer, when many species breed. WestLand's surveys during the summer sampled a diverse selection of biotic communities in the Study Area, providing both site-information and habitat-specific data on avian assemblages during this season. In general, Interior Chaparral and Interior Riparian Deciduous Forest supported higher species richness during the summer months than other biotic communities in the Study Area (***Tables 3b, 3c***).

The compilation of data sources indicate that no species that are listed as threatened or endangered under the ESA are known from or reported to occur in the Study Area. A willow flycatcher was detected in the Study Area on September, 30, 2011, as indicated by eBird data, but it is unlikely that this individual was the endangered southwestern subspecies (*Empidonax traillii extimus*) (SWFL). SWFL migrate south through the arid southwest from breeding grounds to wintering grounds early August through early September, before many other willow flycatcher subspecies (Yong and Finch 1997). Thus, given the late date of the observation in 2011 and the difficulty in identifying SWFL in the field without hearing breeding calls, it is unlikely that SWFL have been detected in the Study Area. The western yellow-billed cuckoo, candidate species for federal listing, was detected along Mineral Creek in 2011.

The list provided by this summary indicates that of the avian species present in the Study Area, four species are on the Audubon Society's Red List, nine are on the Audubon's Yellow List and 25 are considered migratory birds of conservation concern by Tonto National Forest (***Table 2***). The Audubon Society considers species on the Red List to be, "declining rapidly and/or have very small populations or limited ranges, and face major conservation threats" (Audubon 2012b). According to the Audubon Society, Yellow List species are those that are declining or rare.

5. REFERENCES

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TABLES

Table 1. Summary of bird species occurrence data compiled from all sources. American Ornithologist Union. 2012. Check-list of North American Birds. Accessed July 31, 2012. http://www.aou.org/checklist/north/Shaded cells in the Mineral Creek column indicate species for which no surveys have been conducted. WestLand spring data for Below Apache Leap, Oak Flat, and Devils Canyon as well as fall data for Devils Canyon represent incidental observations. Key: W = Winter (Dec. – Feb.), Sp = Spring (Mar. – Apr.), Su = Summer (May – Sep.), F = Fall (Oct. – Nov.)

Source	All Sources				WestLand											eBird				Audubon Society		Avian Sites				Christmas Bird Count
Area	**Study Area**				**Below Apache Leap**			**Oak Flat**			**Devils Canyon**				**Mineral Creek**	**Oak Flat**				**Oak Flat**	**Devils Canyon**	**Oak Flat**				**Oak Flat and Below Apache Leap**
Season	**W**	**Sp**	**Su**	**F**	**W**	**Sp**	**Su**	**W**	**Sp**	**Su**	**W**	**Sp**	**Su**	**F**	**Su**	**W**	**Sp**	**Su**	**F**	**Su**	**Su**	**W**	**Sp**	**Su**	**F**	**W**
Total Species	**94**	**92**	**135**	**72**	**24**	**5**	**31**	**50**	**7**	**88**	**32**	**6**	**70**	**2**	**10**	**66**	**51**	**89**	**44**	**53**	**75**	**56**	**73**	**84**	**58**	**74**
Mallard *Anas platyrhynchos*	✓	✓	✓	✓				✓								✓	✓		✓		✓	✓	✓			✓
Green-winged Teal *Anas crecca*	✓							✓																		
Canvasback *Aythya valisineria*	✓							✓																		
Redhead *Aythya americana*	✓							✓								✓										
Ring-necked Duck *Aythya collaris*	✓							✓								✓										
Lesser Scaup *Aythya affinis*	✓															✓										✓
Gambel's Quail *Callipepla gambelii*	✓	✓	✓	✓	✓		✓	✓		✓			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pied-billed Grebe *Podilymbus podiceps*				✓															✓							
Double-crested Cormorant *Phalacrocorax auratus*			✓							✓																
Great Blue Heron *Ardea herodias*			✓							✓											✓					
Turkey Vulture *Cathartes aura*	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓		✓	✓	✓	✓	✓		✓	✓	✓	
Northern Harrier *Circus cyaneus*	✓															✓										
Sharp-shinned Hawk *Accipiter striatus*	✓	✓		✓					✓							✓	✓								✓	✓
Cooper's Hawk *Accipiter cooperii*	✓	✓	✓	✓					✓	✓			✓	✓	✓	✓		✓	✓		✓	✓	✓		✓	✓
Northern Goshawk *Accipiter gentilis*			✓															✓								
Common Black-hawk *Buteogallus anthracinus*		✓	✓						✓	✓		✓	✓		✓						✓					
Gray Hawk *Buteo nitidus*			✓							✓																
Swainson's Hawk *Buteo swainsoni*			✓							✓																
Zone-tailed Hawk *Buteo albonotatus*		✓	✓			✓	✓		✓	✓		✓	✓		✓		✓	✓		✓	✓		✓	✓		
Red-tailed Hawk *Buteo jamaicensis*	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓	✓	✓		✓	✓	✓	✓		✓		✓
Golden Eagle *Aquila chrysaetos*	✓	✓	✓									✓			✓											✓
American Kestrel *Falco sparverius*	✓	✓	✓						✓	✓						✓		✓								✓

Table 1. Continued

Table 1. Summary of bird species occurrence data compiled from all sources. American Ornithologist Union. 2012. Check-list of North American Birds. Accessed July 31, 2012. http://www.aou.org/checklist/north/Shaded cells in the Mineral Creek column indicate species for which no surveys have been conducted. WestLand spring data for Below Apache Leap, Oak Flat, and Devils Canyon as well as fall data for Devils Canyon represent incidental observations. Key: W = Winter (Dec. – Feb.), Sp = Spring (Mar. – Apr.), Su = Summer (May – Sep.), F = Fall (Oct. – Nov.)

Source	All Sources				WestLand											eBird				Audubon Society		Avian Sites				Christmas Bird Count
Area	Study Area				Below Apache Leap			Oak Flat			Devils Canyon				Mineral Creek	Oak Flat				Oak Flat	Devils Canyon	Oak Flat				Oak Flat and Below Apache Leap
Season	W	Sp	Su	F	W	Sp	Su	W	Sp	Su	W	Sp	Su	F	Su	W	Sp	Su	F	Su	Su	W	Sp	Su	F	W
Peregrine Falcon *Falco peregrinus*		✓	✓				✓			✓		✓	✓					✓			✓			✓		
Prairie Falcon *Falco mexicanus*				✓										✓											✓	
Killdeer *Charadrius vociferous*		✓															✓									
Spotted Sandpiper *Actitis macularius*			✓															✓								
Wilson's Snipe *Gallinago delicata*	✓							✓			✓					✓										✓
Rock Pigeon *Columba livia*	✓			✓												✓			✓							✓
Eurasian Collared Dove *Streptopellia decaocto*	✓	✓	✓							✓						✓	✓	✓						✓		✓
White-winged Dove *Zenaida asiatica*		✓	✓				✓			✓			✓				✓	✓		✓	✓		✓	✓		
Mourning Dove *Zenaida macroura*	✓	✓	✓	✓			✓			✓			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inca Dove *Columbina inca*	✓															✓										✓
Western Yellow-billed Cuckoo *Coccyzus americanus occidentalis*			✓												✓											
Greater Roadrunner *Geococcyx californianus*	✓	✓	✓	✓				✓		✓								✓					✓	✓	✓	✓
Western Screech-owl *Megascops kennicottii*	✓	✓	✓					✓		✓					✓						✓		✓			
Great Horned Owl *Bubo virginianus*		✓	✓			✓	✓		✓	✓			✓		✓											
Northern Pygmy-Owl *Glaucidium gnoma*			✓							✓																
Elf Owl *Micrathene whitneyi*		✓	✓			✓									✓						✓					
Lesser Nighthawk *Chordeiles acutipennis*			✓															✓								
Common Poorwill *Phalaenoptilus nuttallii*			✓															✓								
Vaux's Swift *Chaetura vauxi*			✓															✓								
White-throated Swift *Aeronautes saxatalis*			✓				✓			✓			✓							✓	✓					
Broad-billed Hummingbird *Cynanthus latirostris*			✓															✓			✓					
Black-chinned Hummingbird *Archilochus alexandri*	✓		✓					✓		✓			✓					✓			✓			✓		

Table 1. Continued

Table 1. Summary of bird species occurrence data compiled from all sources. American Ornithologist Union. 2012. Check-list of North American Birds. Accessed July 31, 2012. http://www.aou.org/checklist/north/Shaded cells in the Mineral Creek column indicate species for which no surveys have been conducted. WestLand spring data for Below Apache Leap, Oak Flat, and Devils Canyon as well as fall data for Devils Canyon represent incidental observations. Key: W = Winter (Dec. – Feb.), Sp = Spring (Mar. – Apr.), Su = Summer (May – Sep.), F = Fall (Oct. – Nov.)

Source	All Sources				WestLand											eBird				Audubon Society		Avian Sites				Christmas Bird Count
Area	Study Area				Below Apache Leap			Oak Flat			Devils Canyon				Mineral Creek	Oak Flat				Oak Flat	Devils Canyon	Oak Flat				Oak Flat and Below Apache Leap
Season	W	Sp	Su	F	W	Sp	Su	W	Sp	Su	W	Sp	Su	F	Su	W	Sp	Su	F	Su	Su	W	Sp	Su	F	W
Anna's Hummingbird *Calypte anna*	✓	✓	✓	✓	✓			✓		✓	✓		✓			✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Costa's Hummingbird *Calypte costae*		✓	✓				✓										✓			✓	✓					
Broad-tailed Hummingbird *Selasphorus platycercus*		✓	✓															✓					✓	✓		
Rufous Hummingbird *Selasphorus rufus*			✓										✓													
Belted Kingfisher *Megaceryle alcyon*			✓										✓													
Lewis's Woodpecker *Melanerpes lewis*	✓	✓		✓												✓			✓			✓	✓		✓	✓
Acorn Woodpecker *Melanerpes formicivorus*	✓	✓		✓																		✓	✓		✓	
Gila Woodpecker *Melanerpes uropygialis*	✓	✓	✓	✓	✓						✓		✓			✓		✓	✓		✓	✓	✓		✓	✓
Williamson's Sapsucker *Sphyrapicus thyroideus*	✓															✓										
Yellow-bellied Sapsucker *Sphyrapicus varius*	✓																									✓
Red-naped Sapsucker *Sphyrapicus nuchalis*	✓			✓				✓			✓					✓			✓			✓			✓	✓
Red-breasted Sapsucker *Sphyrapicus ruber*	✓															✓						✓				
Ladder-backed Woodpecker *Picoides scalaris*	✓		✓	✓	✓			✓		✓	✓		✓			✓		✓		✓	✓	✓		✓	✓	✓
Northern Flicker *Colaptes auratus*	✓	✓	✓	✓	✓			✓		✓	✓		✓			✓	✓	✓	✓			✓			✓	✓
Gilded Flicker *Colaptes chrysoides*	✓		✓																		✓	✓				✓
Greater Pewee *Contopus pertinax*			✓										✓													
Western Wood-Pewee *Contopus sordidulus*			✓							✓			✓								✓			✓		
Willow Flycatcher *Empidonax traillii*			✓															✓								
Hammond's Flycatcher *Empidonax hammondii*			✓	✓															✓					✓		
Gray Flycatcher *Empidonax wrightii*		✓	✓							✓			✓				✓	✓		✓				✓		
Dusky Flycatcher *Empidonax oberholseri*		✓	✓															✓					✓	✓		
Cordilleran Flycatcher *Empidonax occidentalis*			✓															✓								

Table 1. Continued

Table 1. Summary of bird species occurrence data compiled from all sources. American Ornithologist Union. 2012. Check-list of North American Birds. Accessed July 31, 2012. http://www.aou.org/checklist/north/Shaded cells in the Mineral Creek column indicate species for which no surveys have been conducted. WestLand spring data for Below Apache Leap, Oak Flat, and Devils Canyon as well as fall data for Devils Canyon represent incidental observations. Key: W = Winter (Dec. – Feb.), Sp = Spring (Mar. – Apr.), Su = Summer (May – Sep.), F = Fall (Oct. – Nov.)

Source	All Sources				WestLand											eBird				Audubon Society		Avian Sites				Christmas Bird Count
Area	Study Area				Below Apache Leap			Oak Flat			Devils Canyon				Mineral Creek	Oak Flat				Oak Flat	Devils Canyon	Oak Flat				Oak Flat and Below Apache Leap
Season	W	Sp	Su	F	W	Sp	Su	W	Sp	Su	W	Sp	Su	F	Su	W	Sp	Su	F	Su	Su	W	Sp	Su	F	W
Black Phoebe *Sayornis nigricans*	✓	✓	✓	✓				✓		✓			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Say's Phoebe *Sayornis saya*	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓			✓		✓	✓	✓	✓	✓	✓
Vermilion Flycatcher *Pyrocephalus rubinus*		✓	✓														✓	✓		✓			✓	✓		
Dusky-capped Flycatcher *Myiarchus tuberculifer*			✓																		✓					
Ash-throated Flycatcher *Myiarchus cinerascens*		✓	✓	✓			✓			✓			✓				✓	✓		✓	✓		✓	✓	✓	
Brown-crested Flycatcher *Myiarchus tyrannulus*		✓	✓							✓			✓					✓			✓		✓	✓		
Cassin's Kingbird *Tyrannus vociferans*		✓	✓							✓			✓				✓	✓		✓	✓		✓	✓		
Western Kingbird *Tyrannus verticalis*		✓	✓							✓			✓				✓	✓						✓		
Loggerhead Shrike *Lanius ludovicianus*	✓		✓				✓	✓										✓						✓		✓
Bell's Vireo *Vireo bellii*		✓	✓							✓			✓				✓	✓		✓	✓		✓	✓		
Gray Vireo *Vireo vicinior*		✓	✓							✓			✓				✓	✓		✓	✓		✓	✓		
Plumbeous Vireo *Vireo plumbeus*			✓							✓			✓					✓		✓				✓		
Cassin's Vireo *Vireo cassinii*			✓	✓																				✓	✓	
Hutton's Vireo *Vireo huttoni*	✓	✓	✓							✓			✓					✓			✓	✓	✓	✓		✓
Warbling Vireo *Vireo gilvus*		✓	✓							✓			✓					✓			✓		✓	✓		
Steller's Jay *Cyanocitta stelleri*	✓	✓		✓																		✓	✓		✓	
Western Scrub-Jay *Aphelocoma californica*	✓	✓	✓	✓				✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mexican Jay *Aphelocoma wollweberi*	✓		✓													✓								✓		
Chihuahuan Raven *Corvus cryptoleucus*			✓																		✓					
Common Raven *Corvus corax*	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Purple Martin *Progne subis*			✓										✓													
Violet-green Swallow *Tachycineta thalassina*			✓							✓			✓					✓		✓	✓			✓		

Table 1. Continued

Table 1. Summary of bird species occurrence data compiled from all sources. American Ornithologist Union. 2012. Check-list of North American Birds. Accessed July 31, 2012. http://www.aou.org/checklist/north/Shaded cells in the Mineral Creek column indicate species for which no surveys have been conducted. WestLand spring data for Below Apache Leap, Oak Flat, and Devils Canyon as well as fall data for Devils Canyon represent incidental observations. Key: W = Winter (Dec. – Feb.), Sp = Spring (Mar. – Apr.), Su = Summer (May – Sep.), F = Fall (Oct. – Nov.)

Source	All Sources				WestLand											eBird				Audubon Society		Avian Sites				Christmas Bird Count
Area	Study Area				Below Apache Leap			Oak Flat			Devils Canyon				Mineral Creek	Oak Flat				Oak Flat	Devils Canyon	Oak Flat				Oak Flat and Below Apache Leap
Season	W	Sp	Su	F	W	Sp	Su	W	Sp	Su	W	Sp	Su	F	Su	W	Sp	Su	F	Su	Su	W	Sp	Su	F	W
Northern Rough-winged Swallow *Stelgidopteryx serripennis*			✓							✓								✓						✓		
Bridled Titmouse *Baeolophus wollweberi*	✓	✓	✓	✓				✓		✓	✓		✓			✓			✓	✓	✓	✓	✓		✓	✓
Juniper Titmouse *Baeolophus ridgwayi*	✓	✓	✓	✓						✓						✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Verdin *Auriparus flaviceps*	✓	✓	✓	✓	✓			✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bushtit *Psaltriparus minimus*	✓	✓	✓	✓				✓		✓			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
White-breasted Nuthatch *Sitta carolinensis*	✓	✓		✓													✓					✓			✓	✓
Brown Creeper *Certhia americana*	✓			✓																		✓			✓	✓
Cactus Wren *Campylorhynchus brunneicapillus*	✓		✓	✓	✓		✓	✓		✓			✓			✓			✓	✓	✓	✓				✓
Rock Wren *Salpinctes obsoletus*	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓			✓	✓	✓	✓	✓	✓	✓	✓
Canyon Wren *Catherpes mexicanus*	✓		✓	✓	✓		✓	✓		✓	✓		✓			✓		✓	✓	✓	✓			✓		✓
Bewick's Wren *Thryomanes bewickii*	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
House Wren *Troglodytes aedon*	✓		✓	✓												✓			✓					✓	✓	✓
Blue-gray Gnatcatcher *Polioptila caerulea*	✓	✓	✓				✓			✓			✓			✓	✓	✓		✓	✓			✓		✓
Black-tailed Gnatcatcher *Polioptila melanura*	✓		✓		✓		✓	✓		✓			✓					✓		✓	✓					✓
Ruby-crowned Kinglet *Regulus calendula*	✓	✓	✓	✓				✓			✓					✓	✓		✓		✓	✓	✓		✓	✓
Western Bluebird *Sialia mexicana*	✓	✓		✓	✓			✓			✓					✓	✓					✓	✓		✓	✓
Townsend's Solitaire *Myadestes townsendi*	✓							✓			✓															✓
Hermit Thrush *Catharus guttatus*	✓	✓		✓				✓								✓			✓			✓	✓		✓	✓
American Robin *Turdus migratorius*	✓	✓	✓	✓				✓			✓					✓	✓		✓			✓	✓	✓	✓	✓
Northern Mockingbird *Mimus polyglottos*	✓	✓	✓		✓		✓	✓		✓			✓			✓		✓		✓	✓		✓	✓		✓
Brown Thrasher *Toxostoma rufum*	✓																									✓
Curve-billed Thrasher *Toxostoma curvirostre*	✓		✓	✓	✓		✓	✓		✓						✓			✓	✓						✓

Table 1. Continued

Table 1. Summary of bird species occurrence data compiled from all sources. American Ornithologist Union. 2012. Check-list of North American Birds. Accessed July 31, 2012. http://www.aou.org/checklist/north/Shaded cells in the Mineral Creek column indicate species for which no surveys have been conducted. WestLand spring data for Below Apache Leap, Oak Flat, and Devils Canyon as well as fall data for Devils Canyon represent incidental observations. Key: W = Winter (Dec. – Feb.), Sp = Spring (Mar. – Apr.), Su = Summer (May – Sep.), F = Fall (Oct. – Nov.)

Source	All Sources				WestLand											eBird				Audubon Society		Avian Sites				Christmas Bird Count
Area	Study Area				Below Apache Leap			Oak Flat			Devils Canyon				Mineral Creek	Oak Flat				Oak Flat	Devils Canyon	Oak Flat				Oak Flat and Below Apache Leap
Season	W	Sp	Su	F	W	Sp	Su	W	Sp	Su	W	Sp	Su	F	Su	W	Sp	Su	F	Su	Su	W	Sp	Su	F	W
Crissal Thrasher *Toxostoma crissale*	✓	✓	✓	✓				✓		✓						✓		✓			✓	✓	✓	✓	✓	✓
European Starling *Sturnus vulgaris*			✓															✓								
Cedar Waxwing *Bombycilla cedrorum*	✓																					✓				
Phainopepla *Phainopepla nitens*	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓		✓	✓	✓	✓	✓	✓	✓		✓
Orange-crowned Warbler *Vermivora celata*		✓	✓	✓						✓								✓					✓	✓	✓	
Lucy's Warbler *Vermivora luciae*		✓	✓							✓			✓				✓	✓			✓		✓	✓		
Virginia's Warbler *Vermivora virginiae*		✓	✓							✓							✓	✓		✓	✓		✓			
MacGillivray's Warbler *Oporornis tolmiei*			✓	✓						✓								✓						✓	✓	
Yellow Warbler *Dendroica petechia*		✓	✓							✓			✓					✓		✓	✓		✓	✓		
Yellow-rumped Warbler *Dendroica coronata*	✓	✓	✓	✓				✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Black-throated Gray Warbler *Setophaga nigrescens*		✓	✓														✓	✓		✓	✓		✓	✓		
Townsend's Warbler *Dendroica townsendii*			✓	✓									✓					✓			✓			✓	✓	
Wilson's Warbler *Wilsonia pusilla*		✓	✓	✓						✓			✓					✓			✓		✓	✓	✓	
Painted Redstart *Myioborus pictus*			✓															✓								
Yellow-breasted Chat *Icteria virens*			✓							✓								✓			✓			✓		
Green-tailed Towhee *Pipilo chlorurus*	✓	✓	✓	✓			✓	✓		✓			✓			✓		✓	✓		✓	✓	✓	✓	✓	✓
Spotted Towhee *Pipilo maculatus*	✓	✓	✓	✓				✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rufous-crowned Sparrow *Aimophila ruficeps*	✓	✓	✓		✓		✓	✓		✓	✓		✓				✓	✓		✓	✓	✓		✓		✓
Canyon Towhee *Melozone fuscus*	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Abert's Towhee *Melozone aberti*	✓	✓	✓							✓	✓					✓		✓			✓	✓	✓			✓
Chipping Sparrow *Spizella passerina*	✓	✓	✓	✓						✓						✓	✓	✓	✓			✓	✓	✓	✓	✓
Brewer's Sparrow *Spizella breweri*	✓	✓	✓	✓						✓								✓				✓	✓	✓	✓	✓

Table 1. Continued

Table 1. Summary of bird species occurrence data compiled from all sources. American Ornithologist Union. 2012. Check-list of North American Birds. Accessed July 31, 2012. http://www.aou.org/checklist/north/Shaded cells in the Mineral Creek column indicate species for which no surveys have been conducted. WestLand spring data for Below Apache Leap, Oak Flat, and Devils Canyon as well as fall data for Devils Canyon represent incidental observations. Key: W = Winter (Dec. – Feb.), Sp = Spring (Mar. – Apr.), Su = Summer (May – Sep.), F = Fall (Oct. – Nov.)

Source	All Sources				WestLand											eBird				Audubon Society		Avian Sites				Christmas Bird Count
Area	Study Area				Below Apache Leap			Oak Flat			Devils Canyon				Mineral Creek	Oak Flat				Oak Flat	Devils Canyon	Oak Flat				Oak Flat and Below Apache Leap
Season	W	Sp	Su	F	W	Sp	Su	W	Sp	Su	W	Sp	Su	F	Su	W	Sp	Su	F	Su	Su	W	Sp	Su	F	W
Black-chinned Sparrow *Spizella atrogularis*	✓	✓	✓				✓			✓			✓			✓	✓	✓		✓	✓		✓	✓		✓
Vesper Sparrow *Pooecetes gramineus*	✓	✓	✓	✓													✓	✓	✓			✓	✓	✓		
Lark Sparrow *Chondestes grammacus*	✓	✓	✓							✓							✓	✓		✓		✓	✓	✓		
Black-throated Sparrow *Amphispiza bilineata*	✓	✓	✓	✓	✓		✓	✓		✓			✓			✓		✓	✓	✓			✓	✓		✓
Savannah Sparrow *Passerculus sandwichensis*			✓																					✓		
Grasshopper Sparrow *Ammodramus savannarum*				✓																					✓	
Fox Sparrow *Passerella iliaca*	✓	✓														✓						✓	✓			✓
Song Sparrow *Melospiza melodia*	✓	✓	✓					✓			✓					✓					✓		✓			
Lincoln's Sparrow *Melospiza lincolnii*	✓	✓	✓	✓												✓		✓				✓	✓		✓	✓
White-throated Sparrow *Zonotrichia albicollis*	✓			✓																					✓	✓
White-crowned Sparrow *Zonotrichia leucophrys*	✓	✓	✓	✓				✓		✓	✓					✓	✓	✓	✓			✓	✓	✓	✓	✓
Golden-crowned Sparrow *Zonotrichia atricapilla*	✓																									✓
Dark-eyed Junco *Junco hyemalis*	✓	✓	✓	✓				✓		✓	✓		✓			✓	✓		✓			✓	✓		✓	✓
Hepatic Tanager *Piranga flava*			✓							✓										✓						
Summer Tanager *Piranga rubra*			✓							✓			✓							✓	✓			✓		
Western Tanager *Piranga ludoviciana*			✓							✓			✓					✓			✓			✓		
Northern Cardinal *Cardinalis cardinalis*	✓	✓	✓	✓				✓		✓	✓		✓			✓	✓	✓	✓		✓	✓	✓	✓		✓
Pyrrhuloxia *Cardinalis sinuatus*	✓															✓										✓
Black-headed Grosbeak *Pheucticus melanocephalus*		✓	✓	✓						✓			✓				✓	✓		✓	✓			✓	✓	
Blue Grosbeak *Passerina caerulea*			✓							✓								✓						✓		
Lazuli Bunting *Passerina amoena*		✓	✓															✓					✓	✓		
Indigo Bunting *Passerina cyanea*			✓	✓																	✓				✓	

Table 1. Continued

Table 1. Summary of bird species occurrence data compiled from all sources. American Ornithologist Union. 2012. Check-list of North American Birds. Accessed July 31, 2012. http://www.aou.org/checklist/north/Shaded cells in the Mineral Creek column indicate species for which no surveys have been conducted. WestLand spring data for Below Apache Leap, Oak Flat, and Devils Canyon as well as fall data for Devils Canyon represent incidental observations. Key: W = Winter (Dec. – Feb.), Sp = Spring (Mar. – Apr.), Su = Summer (May – Sep.), F = Fall (Oct. – Nov.)

Source	All Sources				WestLand											eBird				Audubon Society		Avian Sites				Christmas Bird Count
Area	Study Area				Below Apache Leap			Oak Flat			Devils Canyon				Mineral Creek	Oak Flat				Oak Flat	Devils Canyon	Oak Flat				Oak Flat and Below Apache Leap
Season	W	Sp	Su	F	W	Sp	Su	W	Sp	Su	W	Sp	Su	F	Su	W	Sp	Su	F	Su	Su	W	Sp	Su	F	W
Dickcissel *Spiza americana*				✓																					✓	
Red-winged Blackbird *Agelaius phoeniceus*	✓		✓					✓		✓																
Eastern Meadowlark *Sturnella magna*	✓	✓	✓	✓																		✓	✓	✓	✓	
Western Meadowlark *Sturnella neglecta*		✓															✓									
Brewer's Blackbird *Euphagus cyanocephalus*		✓	✓	✓														✓					✓		✓	
Great-tailed Grackle *Quiscalus mexicanus*		✓	✓																				✓	✓		
Bronzed Cowbird *Molothrus aeneus*		✓	✓							✓													✓			
Brown-headed Cowbird *Molothrus ater*		✓	✓				✓			✓			✓				✓	✓		✓	✓		✓	✓		
Hooded Oriole *Icterus cucullatus*			✓							✓			✓					✓		✓	✓			✓		
Bullock's Oriole *Icterus bullocki*		✓	✓										✓					✓		✓	✓		✓	✓		
Scott's Oriole *Icterus parisorum*			✓				✓			✓			✓					✓		✓	✓			✓		
Cassin's Finch *Carpodacus cassinii*	✓		✓										✓													✓
House Finch *Carpodacus mexicanus*	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pine Siskin *Carduelis pinus*	✓		✓	✓							✓					✓						✓		✓	✓	
Lesser Goldfinch *Carduelis psaltria*	✓	✓	✓	✓	✓			✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lawrence's Goldfinch *Spinus lawrencei*				✓															✓							
American Goldfinch *Carduelis tristis*	✓			✓							✓					✓						✓			✓	✓
House Sparrow *Passer domesticus*	✓															✓										✓

Table 2. Audubon WatchList and Tonto National Forest Migratory Bird Species of Concern Observed in the Study Area. Bird species are listed according to the Check-list of North American Birds (AOU 2012).

Common Name	Scientific Name	Audubon Red List	Audubon Yellow List	Tonto National Forest Migratory Bird Species of Concern
	Total	**4**	**9**	**25**
Northern Goshawk	*Accipiter gentilis*			✓
Common Black-hawk	*Buteogallus anthracinus*			✓
Swainson's Hawk	*Buteo swainsoni*		✓	✓
Golden Eagle	*Aquila chrysaetos*			✓
Peregrine Falcon	*Falco peregrinus*			✓
Prairie Falcon	*Falco mexicanus*			✓
Yellow-billed Cuckoo	*Coccyzus americanus*			✓
Elf Owl	*Micrathene whitneyi*		✓	✓
Costa's Hummingbird	*Calypte costae*		✓	✓
Lewis's Woodpecker	*Melanerpes lewis*	✓		✓
Gila Woodpecker	*Melanerpes uropygialis*			✓
Williamson's Sapsucker	*Sphyrapicus thyroideus*		✓	
Red-naped Sapsucker	*Sphyrapicus nuchalis*			✓
Gilded Flicker	*Colaptes chrysoides*	✓		✓
Gray Flycatcher	*Empidonax wrightii*			✓
Cordilleran Flycatcher	*Empidonax occidentalis*			✓
Bell's Vireo	*Vireo bellii*	✓		✓
Gray Vireo	*Vireo vicinior*		✓	✓
Purple Martin	*Progne subis*			✓
Juniper Titmouse	*Baeolophus ridgwayi*			✓
Phainopepla	*Phainopepla nitens*			✓
Lucy's Warbler	*Vermivora luciae*		✓	✓
Virginia's Warbler	*Vermivora virginiae*		✓	
Yellow Warbler	*Dendroica petechia*			✓
Black-throated Gray Warbler	*Setophaga nigrescens*			✓
Canyon Towhee	*Melozone fuscus*			✓
Abert's Towhee	*Melozone aberti*		✓	
Brewer's Sparrow	*Spizella breweri*		✓	
Black-chinned Sparrow	*Spizella atrogularis*	✓		✓

Table 3a. Species Observed in WestLand 2008 Winter Bird Census by Biotic Community. Bird species are listed according to the Check-list of North American Birds (AOU 2012).

Common Name	Scientific Name	Arizona Upland	Madrean Evergreen Woodland	Interior Chaparral	Interior Riparian Deciduous Forest
Total = 56 Species		**23**	**25**	**31**	**49**
Mallard	*Anas platyrhynchos*				✓
Green-winged Teal	*Anas crecca*				✓
Canvasback	*Aythya valisineria*				✓
Redhead	*Aythya americana*				✓
Ring-necked Duck	*Aythya collaris*				✓
Gambel's Quail	*Callipepla gambelii*	✓	✓	✓	✓
Cooper's Hawk	*Accipiter cooperii*				✓
Red-tailed Hawk	*Buteo jamaicensis*	✓		✓	✓
Prairie Falcon	*Falco mexicanus*				✓
Wilson's Snipe	*Gallinago delicata*				✓
Greater Roadrunner	*Geococcyx californianus*			✓	✓
Western Screech-owl	*Megascops kennicottii*		✓		
Black-chinned Hummingbird	*Archilochus alexandri*		✓		
Anna's Hummingbird	*Calypte anna*	✓		✓	✓
Gila Woodpecker	*Melanerpes uropygialis*	✓			✓
Red-naped Sapsucker	*Sphyrapicus nuchalis*		✓		✓
Ladder-backed Woodpecker	*Picoides scalaris*	✓	✓	✓	✓
Northern Flicker	*Colaptes auratus*	✓	✓	✓	✓
Say's Phoebe	*Sayornis saya*	✓		✓	✓
Black Phoebe	*Sayornis nigricans*				✓
Loggerhead Shrike	*Lanius ludovicianus*				✓
Western Scrub-Jay	*Aphelocoma californica*		✓	✓	✓
Common Raven	*Corvus corax*	✓	✓	✓	✓
Bridled Titmouse	*Baeolophus wollweberi*		✓	✓	✓
Verdin	*Auriparus flaviceps*	✓	✓	✓	✓
Bushtit	*Psaltriparus minimus*			✓	
Cactus Wren	*Campylorhynchus brunneicapillus*	✓			✓
Rock Wren	*Salpinctes obsoletus*	✓	✓	✓	✓
Canyon Wren	*Catherpes mexicanus*	✓	✓	✓	✓
Bewick's Wren	*Thryomanes bewickii*	✓	✓	✓	✓
Ruby-crowned Kinglet	*Regulus calendula*		✓	✓	✓
Black-tailed Gnatcatcher	*Polioptila melanura*	✓		✓	
Western Bluebird	*Sialia mexicana*	✓	✓	✓	✓
Townsend's Solitaire	*Myadestes townsendi*			✓	✓
Hermit Thrush	*Catharus guttatus*				✓
American Robin	*Turdus migratorius*		✓		✓
Northern Mockingbird	*Mimus polyglottos*	✓	✓	✓	

Table 3a. Continued

Common Name	Scientific Name	Arizona Upland	Madrean Evergreen Woodland	Interior Chaparral	Interior Riparian Deciduous Forest
Curve-billed Thrasher	*Toxostoma curvirostre*	✓		✓	✓
Crissal Thrasher	*Toxostoma crissale*		✓	✓	
Phainopepla	*Phainopepla nitens*	✓	✓	✓	✓
Yellow-rumped Warbler	*Dendroica coronata*				✓
Green-tailed Towhee	*Pipilo chlorurus*				✓
Spotted Towhee	*Pipilo maculatus*		✓	✓	✓
Rufous-crowned Sparrow	*Aimophila ruficeps*	✓	✓	✓	✓
Canyon Towhee	*Melozone fuscus*	✓	✓	✓	✓
Abert's Towhee	*Melozone aberti*				✓
Black-throated Sparrow	*Amphispiza bilineata*	✓		✓	
Song Sparrow	*Melospiza melodia*				✓
White-crowned Sparrow	*Zonotrichia leucophrys*		✓	✓	✓
Dark-eyed Junco	*Junco hyemalis*		✓	✓	✓
Northern Cardinal	*Cardinalis cardinalis*				✓
Red-winged Blackbird	*Agelaius phoeniceus*				✓
House Finch	*Carpodacus mexicanus*	✓	✓	✓	✓
Pine Siskin	*Carduelis pinus*				✓
Lesser Goldfinch	*Carduelis psaltria*	✓		✓	✓
American Goldfinch	*Carduelis tristis*				✓

Table 3b. Species Observed in WestLand 2008 Breeding Bird Census by Biotic Community. Bird species are listed according to the Check-list of North American Birds (AOU 2012).

Common Name	Scientific Name	Arizona Upland	Madrean Evergreen Woodland	Interior Chaparral	Interior Riparian Deciduous Forest
Total - 92 Species		**28**	**50**	**47**	**79**
Gambel's Quail	*Callipepla gambelii*	✓	✓	✓	✓
Turkey Vulture	*Cathartes aura*	✓	✓	✓	✓
Cooper's Hawk	*Accipiter cooperii*				✓
Common Black-hawk	*Buteogallus anthracinus*				✓
Gray Hawk	*Buteo nitidus*		✓		
Swainson's Hawk	*Buteo swainsoni*		✓		
Zone-tailed Hawk	*Buteo albonotatus*		✓		✓
Red-tailed Hawk	*Buteo jamaicensis*				✓
Peregrine Falcon	*Falco peregrinus*	✓			✓
Eurasian Collared Dove	*Streptopelia decaocto*				✓
White-winged Dove	*Zenaida asiatica*	✓	✓	✓	✓
Mourning Dove	*Zenaida macroura*	✓	✓	✓	✓
Greater Roadrunner	*Geococcyx californianus*		✓	✓	
Great Horned Owl	*Bubo virginianus*				✓
Northern Pygmy-Owl	*Glaucidium gnoma*		✓		
White-throated Swift	*Aeronautes saxatalis*	✓			✓
Black-chinned Hummingbird	*Archilochus alexandri*			✓	✓
Anna's Hummingbird	*Calypte anna*		✓	✓	✓
Costa's Hummingbird	*Calypte costae*	✓			
Rufous Hummingbird	*Selasphorus rufus*				✓
Belted Kingfisher	*Megaceryle alcyon*				✓
Gila Woodpecker	*Melanerpes uropygialis*				✓
Ladder-backed Woodpecker	*Picoides scalaris*		✓	✓	✓
Northern Flicker	*Colaptes auratus*				✓
Greater Pewee	*Contopus pertinax*				✓
Western Wood-Pewee	*Contopus sordidulus*				✓
Gray Flycatcher	*Empidonax wrightii*		✓		✓
Empidonax flycatcher	*Empidonax* sp.			✓	✓
Say's Phoebe	*Sayornis saya*	✓	✓		✓
Black Phoebe	*Sayornis nigricans*			✓	✓
Ash-throated Flycatcher	*Myiarchus cinerascens*	✓	✓	✓	✓
Brown-crested Flycatcher	*Myiarchus tyrannulus*			✓	✓
Cassin's Kingbird	*Tyrannus vociferans*		✓	✓	✓
Western Kingbird	*Tyrannus verticalis*			✓	✓
Loggerhead Shrike	*Lanius ludovicianus*	✓			
Bell's Vireo	*Vireo bellii*		✓	✓	✓
Gray Vireo	*Vireo vicinior*		✓	✓	✓
Plumbeous Vireo	*Vireo plumbeus*		✓		✓
Hutton's Vireo	*Vireo huttoni*				✓
Warbling Vireo	*Vireo gilvus*			✓	✓

Table 3b. Continued

Common Name	Scientific Name	Arizona Upland	Madrean Evergreen Woodland	Interior Chaparral	Interior Riparian Deciduous Forest
Western Scrub-Jay	*Aphelocoma californica*		✓	✓	✓
Common Raven	*Corvus corax*	✓	✓	✓	✓
Purple Martin	*Progne subis*				✓
Violet-green Swallow	*Tachycineta thalassina*		✓		✓
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*				✓
Bridled Titmouse	*Baeolophus wollweberi*		✓	✓	✓
Juniper Titmouse	*Baeolophus ridgwayi*		✓		
Verdin	*Auriparus flaviceps*		✓	✓	✓
Bushtit	*Psaltriparus minimus*		✓	✓	✓
Cactus Wren	*Campylorhynchus brunneicapillus*	✓			✓
Rock Wren	*Salpinctes obsoletus*	✓	✓	✓	✓
Canyon Wren	*Catherpes mexicanus*	✓	✓	✓	✓
Bewick's Wren	*Thryomanes bewickii*	✓	✓	✓	✓
Blue-gray Gnatcatcher	*Polioptila caerulea*	✓	✓		✓
Black-tailed Gnatcatcher	*Polioptila melanura*	✓	✓	✓	✓
Northern Mockingbird	*Mimus polyglottos*	✓	✓	✓	✓
Curve-billed Thrasher	*Toxostoma curvirostre*	✓		✓	
Crissal Thrasher	*Toxostoma crissale*		✓	✓	✓
Phainopepla	*Phainopepla nitens*	✓	✓	✓	✓
Orange-crowned Warbler	*Vermivora celata*		✓	✓	
Virginia's Warbler	*Vermivora virginiae*		✓		✓
Lucy's Warbler	*Vermivora luciae*		✓		✓
Yellow Warbler	*Dendroica petechia*				✓
Townsend's Warbler	*Dendroica townsendii*				✓
Yellow-rumped Warbler	*Dendroica coronata*		✓		✓
Wilson's Warbler	*Wilsonia pusilla*		✓		✓
Yellow-breasted Chat	*Icteria virens*				✓
Hepatic Tanager	*Piranga flava*			✓	
Summer Tanager	*Piranga rubra*		✓		✓
Western Tanager	*Piranga ludoviciana*		✓	✓	✓
Green-tailed Towhee	*Pipilo chlorurus*	✓		✓	✓
Spotted Towhee	*Pipilo maculatus*		✓	✓	✓
Rufous-crowned Sparrow	*Aimophila ruficeps*	✓	✓	✓	✓
Canyon Towhee	*Melozone fuscus*	✓	✓	✓	✓
Abert's Towhee	*Melozone aberti*		✓		
Chipping Sparrow	*Spizella passerina*		✓		✓
Brewer's Sparrow	*Spizella breweri*			✓	
Black-chinned Sparrow	*Spizella atrogularis*	✓	✓	✓	✓
Lark Sparrow	*Chondestes grammacus*			✓	✓
Black-throated Sparrow	*Amphispiza bilineata*	✓		✓	✓

Table 3b. Continued

Common Name	Scientific Name	Arizona Upland	Madrean Evergreen Woodland	Interior Chaparral	Interior Riparian Deciduous Forest
White-crowned Sparrow	*Zonotrichia leucophrys*		✓	✓	
Dark-eyed Junco	*Junco hyemalis*			✓	✓
Northern Cardinal	*Cardinalis cardinalis*				✓
Black-headed Grosbeak	*Pheucticus melanocephalus*				✓
Red-winged Blackbird	*Agelaius phoeniceus*				✓
Brown-headed Cowbird	*Molothrus ater*	✓	✓	✓	✓
Hooded Oriole	*Icterus cucullatus*				✓
Bullock's Oriole	*Icterus bullocki*				✓
Scott's Oriole	*Icterus parisorum*	✓		✓	✓
Cassin's Finch	*Carpodacus cassinii*				✓
House Finch	*Carpodacus mexicanus*	✓	✓	✓	✓
Lesser Goldfinch	*Carduelis psaltria*		✓	✓	✓

Table 3c. Species Observed in WestLand 2009 Breeding Bird Census by Biotic Community. Bird species are listed according to the Check-list of North American Birds (AOU 2012).

Common Name	Scientific Name	Madrean Evergreen Woodland	Interior Chaparral
	Total	**24**	**51**
Double-crested Cormorant	*Phalacrocorax auratus*		✓
Great Blue Heron	*Ardea herodias*		✓
Turkey Vulture	*Cathartes aura*	✓	✓
Cooper's Hawk	*Accipiter cooperii*		
Zone-tailed Hawk	*Buteo albonotatus*		✓
Red-tailed Hawk	*Buteo jamaicensis*	✓	✓
American Kestrel	*Falco sparverius*		✓
Gambel's Quail	*Callipepla gambelii*	✓	✓
White-winged Dove	*Zenaida asiatica*	✓	✓
Mourning Dove	*Zenaida macroura*	✓	✓
Greater Roadrunner	*Geococcyx californianus*		✓
White-throated Swift	*Aeronautes saxatalis*		✓
Black-chinned Hummingbird	*Archilochus alexandri*		✓
Anna's Hummingbird	*Calypte anna*		✓
Ladder-backed Woodpecker	*Picoides scalaris*	✓	✓
Gray Flycatcher	*Empidonax wrightii*		✓
Empidonax flycatcher	*Empidonax* sp.		✓
Ash-throated Flycatcher	*Myiarchus cinerascens*	✓	✓
Gray Vireo	*Vireo vicinior*	✓	✓
Plumbeous Vireo	*Vireo plumbeus*	✓	✓
Hutton's Vireo	*Vireo huttoni*		✓
Western Scrub-Jay	*Aphelocoma californica*		✓
Common Raven	*Corvus corax*	✓	✓
Violet-green Swallow	*Tachycineta thalassina*		✓
Juniper Titmouse	*Baeolophus ridgwayi*		✓
Verdin	*Auriparus flaviceps*	✓	✓
Bushtit	*Psaltriparus minimus*	✓	✓
Cactus Wren	*Campylorhynchus brunneicapillus*		✓
Rock Wren	*Salpinctes obsoletus*	✓	✓
Canyon Wren	*Catherpes mexicanus*	✓	✓
Bewick's Wren	*Thryomanes bewickii*	✓	✓
Black-tailed Gnatcatcher	*Polioptila melanura*		✓
Northern Mockingbird	*Mimus polyglottos*	✓	✓
Crissal Thrasher	*Toxostoma crissale*	✓	✓
Phainopepla	*Phainopepla nitens*		✓
Lucy's Warbler	*Vermivora luciae*		✓
MacGillivray's Warbler	*Oporornis tolmiei*		✓
Western Tanager	*Piranga ludoviciana*		✓
Green-tailed Towhee	*Pipilo chlorurus*		✓
Spotted Towhee	*Pipilo maculatus*	✓	✓
Rufous-crowned Sparrow	*Aimophila ruficeps*	✓	✓

Table 3c. Continued

Common Name	Scientific Name	Madrean Evergreen Woodland	Interior Chaparral
Canyon Towhee	*Melozone fuscus*		✓
Black-chinned Sparrow	*Spizella atrogularis*	✓	✓
Black-throated Sparrow	*Amphispiza bilineata*	✓	✓
Black-headed Grosbeak	*Pheucticus melanocephalus*	✓	✓
Blue Grosbeak	*Passerina caerulea*	✓	
Bronzed Cowbird	*Molothrus aeneus*		✓
Brown-headed Cowbird	*Molothrus ater*		✓
Hooded Oriole	*Icterus cucullatus*		✓
Scott's Oriole	*Icterus parisorum*	✓	✓
House Finch	*Carpodacus mexicanus*		✓
Lesser Goldfinch	*Carduelis psaltria*		✓

Table 3d. Species Observed in all WestLand Surveys by Biotic Community. Results are combined for all seasons. Bird species are listed according to the Check-list of North American Birds (AOU 2012).

Common Name	Scientific Name	Arizona Upland	Madrean Evergreen Woodland	Interior Chaparral	Interior Riparian Deciduous Forest
Total -118 species		**38**	**64**	**69**	**103**
Mallard	*Anas platyrhynchos*				✓
Green-winged Teal	*Anas crecca*				✓
Canvasback	*Aythya valisineria*				✓
Redhead	*Aythya americana*				✓
Ring-necked Duck	*Aythya collaris*				✓
Gambel's Quail	*Callipepla gambelii*	✓	✓	✓	✓
Double-crested Cormorant	*Phalacrocorax auratus*			✓	
Great Blue Heron	*Ardea herodias*			✓	
Turkey Vulture	*Cathartes aura*	✓	✓	✓	✓
Sharp-shinned Hawk	*Accipiter striatus*			✓	
Cooper's Hawk	*Accipiter cooperii*		✓	✓	✓
Common Black-hawk	*Buteogallus anthracinus*		✓		✓
Gray Hawk	*Buteo nitidus*		✓		
Swainson's Hawk	*Buteo swainsoni*		✓		
Zone-tailed Hawk	*Buteo albonotatus*		✓		✓
Red-tailed Hawk	*Buteo jamaicensis*	✓		✓	✓
Golden Eagle	*Aquila chrysaetos*				✓
American Kestrel	*Falco sparverius*				✓
Peregrine Falcon	*Falco peregrinus*	✓			✓
Prairie Falcon	*Falco mexicanus*				✓
Wilson's Snipe	*Gallinago delicata*				✓
Eurasian Collared Dove	*Streptopelia decaocto*				✓
White-winged Dove	*Zenaida asiatica*	✓	✓	✓	✓
Mourning Dove	*Zenaida macroura*	✓	✓	✓	✓
Yellow-billed Cuckoo	*Coccyzus americanus*				✓
Greater Roadrunner	*Geococcyx californianus*		✓	✓	✓
Western Screech-owl	*Megascops kennicottii*		✓		✓
Great Horned Owl	*Bubo virginianus*	✓		✓	✓
Northern Pygmy-Owl	*Glaucidium gnoma*		✓		
Elf Owl	*Micrathene whitneyi*	✓			✓
White-throated Swift	*Aeronautes saxatalis*	✓		✓	✓
Black-chinned Hummingbird	*Archilochus alexandri*		✓	✓	✓
Anna's Hummingbird	*Calypte anna*	✓	✓	✓	✓
Costa's Hummingbird	*Calypte costae*	✓			
Rufous Hummingbird	*Selasphorus rufus*				✓
Belted Kingfisher	*Megaceryle alcyon*				✓
Gila Woodpecker	*Melanerpes uropygialis*	✓			✓
Red-naped Sapsucker	*Sphyrapicus nuchalis*		✓		✓
Ladder-backed Woodpecker	*Picoides scalaris*	✓	✓	✓	✓
Northern Flicker	*Colaptes auratus*	✓	✓	✓	✓

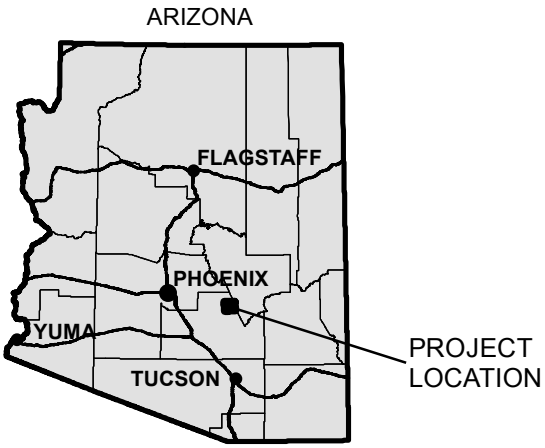
Table 3d. Continued

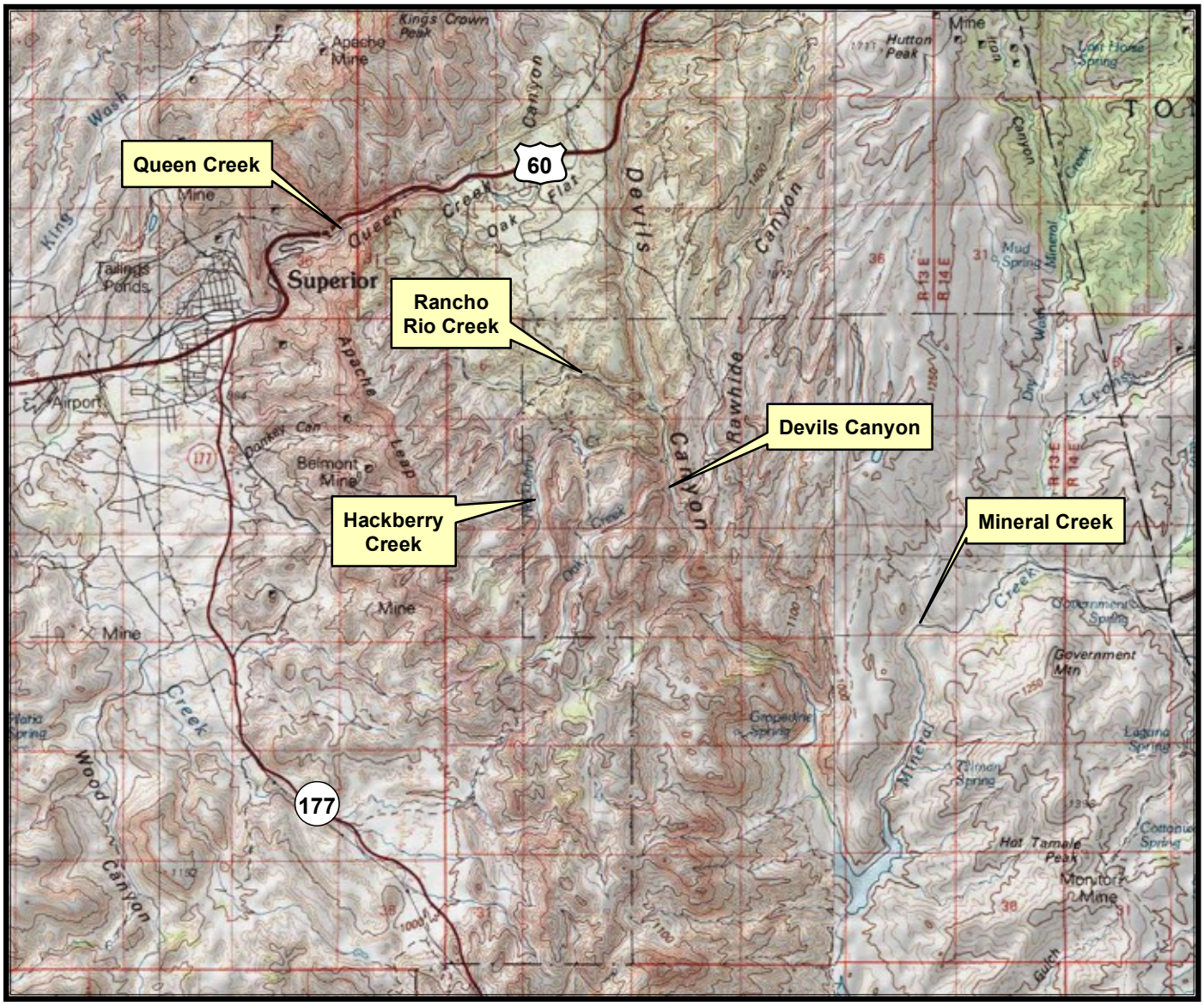
Common Name	Scientific Name	Arizona Upland	Madrean Evergreen Woodland	Interior Chaparral	Interior Riparian Deciduous Forest
Greater Pewee	*Contopus pertinax*				✓
Western Wood-Pewee	*Contopus sordidulus*				✓
Gray Flycatcher	*Empidonax wrightii*		✓	✓	✓
Black Phoebe	*Sayornis nigricans*			✓	✓
Say's Phoebe	*Sayornis saya*	✓	✓	✓	✓
Ash-throated Flycatcher	*Myiarchus cinerascens*	✓	✓	✓	✓
Brown-crested Flycatcher	*Myiarchus tyrannulus*			✓	✓
Cassin's Kingbird	*Tyrannus vociferans*		✓	✓	✓
Western Kingbird	*Tyrannus verticalis*			✓	✓
Loggerhead Shrike	*Lanius ludovicianus*	✓			✓
Bell's Vireo	*Vireo bellii*		✓	✓	✓
Gray Vireo	*Vireo vicinior*		✓	✓	✓
Plumbeous Vireo	*Vireo plumbeus*		✓	✓	✓
Hutton's Vireo	*Vireo huttoni*			✓	✓
Warbling Vireo	*Vireo gilvus*			✓	✓
Western Scrub-Jay	*Aphelocoma californica*		✓	✓	✓
Common Raven	*Corvus corax*	✓	✓	✓	✓
Purple Martin	*Progne subis*				✓
Violet-green Swallow	*Tachycineta thalassina*		✓	✓	✓
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*				✓
Bridled Titmouse	*Baeolophus wollweberi*		✓	✓	✓
Juniper Titmouse	*Baeolophus ridgwayi*		✓	✓	
Verdin	*Auriparus flaviceps*	✓	✓	✓	✓
Bushtit	*Psaltriparus minimus*		✓	✓	✓
Cactus Wren	*Campylorhynchus brunneicapillus*	✓		✓	✓
Rock Wren	*Salpinctes obsoletus*	✓	✓	✓	✓
Canyon Wren	*Catherpes mexicanus*	✓	✓	✓	✓
Bewick's Wren	*Thryomanes bewickii*	✓	✓	✓	✓
Blue-gray Gnatcatcher	*Polioptila caerulea*	✓	✓		✓
Black-tailed Gnatcatcher	*Polioptila melanura*	✓	✓	✓	✓
Ruby-crowned Kinglet	*Regulus calendula*		✓	✓	✓
Western Bluebird	*Sialia mexicana*	✓	✓	✓	✓
Townsend's Solitaire	*Myadestes townsendi*			✓	✓
Hermit Thrush	*Catharus guttatus*				✓
American Robin	*Turdus migratorius*		✓		✓
Northern Mockingbird	*Mimus polyglottos*	✓	✓	✓	✓
Curve-billed Thrasher	*Toxostoma curvirostre*	✓		✓	✓
Crissal Thrasher	*Toxostoma crissale*		✓	✓	✓
Phainopepla	*Phainopepla nitens*	✓	✓	✓	✓
Orange-crowned Warbler	*Vermivora celata*		✓	✓	

Table 3d. Continued

Common Name	Scientific Name	Arizona Upland	Madrean Evergreen Woodland	Interior Chaparral	Interior Riparian Deciduous Forest
Lucy's Warbler	*Vermivora luciae*		✓	✓	✓
Virginia's Warbler	*Vermivora virginiae*		✓		✓
MacGillivray's Warbler	*Oporornis tolmiei*			✓	
Yellow Warbler	*Dendroica petechia*				✓
Yellow-rumped Warbler	*Dendroica coronata*		✓		✓
Townsend's Warbler	*Dendroica townsendii*				✓
Wilson's Warbler	*Wilsonia pusilla*		✓		✓
Yellow-breasted Chat	*Icteria virens*				✓
Green-tailed Towhee	*Pipilo chlorurus*	✓		✓	✓
Spotted Towhee	*Pipilo maculatus*		✓	✓	✓
Rufous-crowned Sparrow	*Aimophila ruficeps*	✓	✓	✓	✓
Canyon Towhee	*Melozone fuscus*	✓	✓	✓	✓
Abert's Towhee	*Melozone aberti*		✓		
Chipping Sparrow	*Spizella passerina*		✓		✓
Brewer's Sparrow	*Spizella breweri*			✓	
Black-chinned Sparrow	*Spizella atrogularis*	✓	✓	✓	✓
Lark Sparrow	*Chondestes grammacus*			✓	✓
Black-throated Sparrow	*Amphispiza bilineata*	✓	✓	✓	✓
Song Sparrow	*Melospiza melodia*				✓
White-crowned Sparrow	*Zonotrichia leucophrys*		✓	✓	✓
Dark-eyed Junco	*Junco hyemalis*		✓	✓	✓
Hepatic Tanager	*Piranga flava*			✓	
Summer Tanager	*Piranga rubra*		✓		✓
Western Tanager	*Piranga ludoviciana*		✓	✓	✓
Northern Cardinal	*Cardinalis cardinalis*				✓
Black-headed Grosbeak	*Pheucticus melanocephalus*		✓	✓	✓
Blue Grosbeak	*Passerina caerulea*		✓		
Red-winged Blackbird	*Agelaius phoeniceus*				✓
Bronzed Cowbird	*Molothrus aeneus*			✓	
Brown-headed Cowbird	*Molothrus ater*	✓	✓	✓	✓
Hooded Oriole	*Icterus cucullatus*			✓	✓
Bullock's Oriole	*Icterus bullocki*				✓
Scott's Oriole	*Icterus parisorum*	✓	✓	✓	✓
Cassin's Finch	*Carpodacus cassinii*				✓
House Finch	*Carpodacus mexicanus*	✓	✓	✓	✓
Pine Siskin	*Carduelis pinus*				✓
Lesser Goldfinch	*Carduelis psaltria*	✓	✓	✓	✓
American Goldfinch	*Carduelis tristis*				✓

FIGURES





Pinal County, Arizona,
Superior, Pinal Ranch, Teapot Mntn,
& Hot Tomale Peak USGS 7.5' Quadrangles

N

0 8,000 16,000 Feet

WestLand Resources, Inc.
Engineering and Environmental Consultants

RESOLUTION COPPER MINING
Bird Survey and Occurence Record Compilation

VICINITY MAP

Figure 1

Path: M:\Projects\807.40\2008_2009_Bird_Surveys\Fig2_Biotic_Bird_Survey_Locations_revised.mxd

Queen Creek

DEVILS CANYON

Devils Canyon

OAK FLAT/EAST PLANT

APACHE LEAP

Rancho Rio Creek

Hackberry Creek

Mineral Creek

N

0 2,000 4,000 Feet

Pinal County, Arizona, 1:24000 USGS 7.5' Quadrangle Base Maps

WestLand Resources, Inc.
Engineering and Environmental Consultants

Location of 2009 Bird Survey Points

Location of 2008 Bird Survey Points

Drainage

Arizona Upland Subdivision of Sonoran Desertscrub

Madrean Evergreen Woodland

Interior Chaparral

Interior Riparian Deciduous Forest

Data Source: WestLand Resources-multiple field trips compared with Google Earth Imagery to determine biotic communities. Based on Biotic Communities of the Southwest - Brown & Lowe (August 1980) classifications.

RESOLUTION COPPER MINING

Bird Survey and Occurence Record Compilation

BIOTIC COMMUNITIES MAP
AND BIRD SURVEY LOCATIONS
Figure 2

APPENDIX 1

BASELINE BIOLOGY AND LAND USE REPORT (EXCERPT), WESTLAND RESOURCES, INC. MARCH 2004

BASELINE BIOLOGY
AND LAND USE REPORT

Prepared for:

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MARCH 2004
Job No. 807.03

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4.0 GENERAL WILDLIFE

As described in Section 3, two broad habitat types occur within the Resolution Parcel boundaries – Interior Chaparral (east of Apache Leap and the dominant biotic community in the project area) and Sonoran Desertscrub (west of Apache Leap). Brown (1994) provides an abbreviated list of the types of species expected to be found in Interior Chaparral (Table 4-1).

Table 4-1. Wildlife occurring in the Interior Chaparral habitat type (Brown 1994).

Common Name	Scientific Name	Common Name	Scientific Name
Mammals			
Cliff chipmunk	*Eutamias dorsalis*	Rock mouse	*Peromyscus difficilis*
White-throated woodrat	*Neotoma albigula*	White-footed mouse	*Peromyscus leucopus*
Mule deer	*Odocoileus hemionus*	Brush mouse	*Peromyscus boylii*
Eastern cottontail	*Sylvilagus floridanus holzeri*		
Birds			
Canyon wren	*Catherpes mexicanus*	Brown towhee	*Pipilo fuscus*
Rufous-sided towhee	*Pipilo erythrophthalmus*	Bushtit	*Psaltriparus minimus*
Crissal thrasher	*Toxostoma dorsale*	Black-chinned sparrow	*Spizella atrogularis*
Rufous-crowned sparrow	*Aimophila ruficeps*	Scrub jay	*Aphelocoma coerulescens*
Amphibians and Reptiles			
Glossy snake	*Arizona elegans*	Desert striped whipsnake	*Masticophis taeniatus*
Western rattlesnake	*Crotalus viridis*	Western fence lizard	*Sceloporus occidentalis*
Arizona alligator lizard	*Gerrhonotus kingi*	Eastern fence lizard	*S. undulatus*
Night snake	*Hypsiglena torquata*	Western blackhead snake	*Tantilla planiceps*
Sonora mountain kingsnake	*Lampropeltis pyromelana*	Sonoran lyre snake	*Trimorphodon biscutatus lambda*
Southwestern blind snake	*Leptotyphlops humilis*	Texas lyre snake	*Trimorphodon biscutatus vilkinsoni*
Sonora whipsnake	*Masticophis bilineatus*	Side-blotched lizard	*Uta stansburiana*
Arizona night lizard	*Xantusia arizonae*		

This species list does not provide a comprehensive species list for the project area. Given the wide variety of factors influencing wildlife species composition within a particular habitat type (e.g. habitat transitions, availability of water, etc.), additional analysis (including a literature review; field reconnaissance; and obtaining information from state and federal agencies, and local organizations) was utilized to determine those species with the potential to occur within the project area.

4.1. METHODS AND MAPPING CONVENTIONS

4.1.1. Mammals

Efforts to identify mammal species potentially occurring within the Resolution Parcel included:

1) review of relevant literature, 2) anecdotal observation during field reconnaissance, and 3) written and verbal correspondence with state and federal agencies, and local organizations. No species-specific mammal surveys were conducted for this assessment.

The following were contacted for information regarding potential mammal species within the Parcel: Arizona Game and Fish Department (AGFD); US Forest Service (USFS); US Fish & Wildlife Service (USFWS); and Boyce Thompson Arboretum. The AGFD provided harvest and survey data for various game species within relevant game management units. Additional harvest and survey data was provided by Ms. Amber Munig of AGFD on April 23, 2003 (Appendix B).

Additional information sources included an online search of the USFWS Fire Effects Information System (FEIS) database, a USFS general species account for Tonto National Forest, and a checklist of species provided by Boyce Thompson Arboretum, located approximately 11 km (6 miles) west of the Parcel. Finally, two bat survey reports completed by Bat Conservation International (BCI 1996 and 1997) within abandoned underground mine workings near Superior, Arizona were reviewed.

4.1.2. Reptiles and Amphibians

4.1.2.1. Amphibian Survey Methods

Amphibian surveys, in general, involved visual observation at surface water sources, capture, and in-hand identification. Focused field surveys for amphibians were scheduled to coincide with the active season for ranid frogs, which occurs from April through October, and/or during wet periods after spring runoff or rainfall, when ranid frogs are more visible (Sredl 1997).

In order to maximize the survey effort, surveys for amphibian species were conducted when water temperatures reached 14^{o}C or above, when the amphibians would be most active. Surveys for Chiricahua leopard frog and lowland leopard frog followed the General Visual Encounter Survey Method (VEM) protocol developed by the U.S. Fish and Wildlife Service (USFWS 2003b). The Chiracahua Leopard Frog VEM Form was used in collecting locality data, site and visit conditions, and herpetofauna observations for all known surface water features on the Resolution Parcel (Figure 7).

4.1.2.2. Reptile Survey Methods

Similar to amphibian surveys, surveys for reptiles involved visual observation and identification, and were completed in conjunction with other biological and resource surveys conducted as part of the baseline biological inventory. These surveys typically consisted of relatively wide-ranging walking transects through a variety of habitat types and geologic features. Reptile surveys were also conducted while traveling during field reconnaissance for other biological surveys. Reptiles are routinely observed “sunning” on rocks or open ground during early morning hours and moving across roads at night. Nighttime observation of roadways were used to supplement the walking transects and observations during other biological surveys.

4.1.3. Birds

4.1.3.1. Raptor Survey Methods

The Parcel was surveyed for the presence of raptors on May 22 and 23, 2003 during the known raptor nesting/breeding season, with particular focus on areas containing appropriate nesting substrates such as cliff faces, rock outcrops, utility poles, and large trees. Survey methodology included linear transects, variable transects, and cliff surveys, all of which are described briefly below.

In general, linear transects are utilized in order to sample large areas in a relatively short period of time (Cooperrider et.al. 1986). Linear transects were conducted along Queen Creek and two tributary drainages near the western portion of Oak Flat. These narrow canyon bottoms contain riparian groves of sycamore, velvet ash, and Emory oaks that provide potential nest trees for raptors (Figure 9). Surveyors proceeded slowly on foot along transects, scanning the treetops with binoculars for evidence of raptors or their nests.

Variable transects were conducted in larger areas containing groves of cottonwoods, oaks, and other trees as well as in areas where steep topography and rock outcrops provided potential nest sites. Observers conducting variable transects moved through the survey areas in a meandering fashion, scanning all appropriate nest substrates with binoculars.

Cliff surveys were conducted on the face of Apache Leap from four fixed points located at intervals along the length of the cliff. Surveyors scanned the cliff face with the aid of binoculars and spotting scopes for a period of two hours. Observations took place during the early morning hours from ½ hour before sunrise until four hours after sunrise for three of the survey points. Surveys at the fourth fixed point were conducted in the late afternoon. Evidence of raptor habitation, including stick nests, whitewash, and observations of raptors themselves, was recorded on data forms. If raptors were present, behavioral observations were used to determine breeding status. Specific indicators of breeding activities include (Postupalsky 1974):

- Presence of a nest or eyrie[1]
- Young in nest
- Adult in nest in incubation posture
- Mating behavior
- Prey deliveries
- Nest maintenance
- Adult near nest

[1] The eyries of cliff nesting raptors can consist of a stick nest, scrape, ledge, or cavity.

4.1.3.2. Other Bird Survey Methods

With the exception of raptors, no species-specific surveys were conducted for birds in the Parcel. However, during general biological investigation work on the Parcel, WestLand biologists noted birds that were observed and/or heard within or near the Parcel.

4.2. RESULTS

4.2.1. Mammals

Mammals identified within the Parcel, either through direct observation or identification of scat or tracks, are listed in Table 4-2.

Table 4-2. Mammal species observed within the Parcel.

Common Name	Scientific Name
Black-tailed jack rabbit	*Lepus californicus eremicus*
Desert cottontail	*Sylvilagus audubonii*
Rock squirrel	*Spermophilus variegatus*
White-throated wood rat	*Neotoma albigula albigula*
Black bear	*Ursus americanus*
Raccoon	*Procyon lotor*
Ringtail	*Bassariscus astutus arizonensis*
Coyote	*Canis latrans*
Gray fox	*Urocyon cinereoargenteus*
White-tailed deer	*Odocoileus virginianus couesi*

Because most of the mammal species which occur in Arizona are nocturnal or crepuscular, they are difficult to observe directly through field investigation. Based on the review of agency provided information and published literature, including review of spatial distribution and habitat requirements of Arizona mammal species, it was determined that the following species also have the potential to occur within the Parcel (Table 4-3).

Table 4-3. Mammal species that have potential to occur on the Parcel.

Common Name	Scientific Name	Common Name	Scientific Name
Desert shrew	*Notiosorex crawfordi crawfordi*	Porcupine	*Erethizon dorsatum*
California leaf-nosed Bat	*Macrotus californicus*	Mexican wood rat	*Neotoma mexicana*
Cave myotis	*Myotis velifer*	Harris' antelope squirrel	*Ammospermophilus harrisii*
California myotis	*Myotis californicus californicus*	Arizona pocket mouse	*Perognathus amplus amplus*
Western pipistrelle	*Pipistrellus hespurus hespurus*	Rock pocket mouse	*Perognathus intermedius intermedius*
Townsend's (or Western) big-eared bat	*Plecotus townsendii*	Merriam's kangaroo rat	*Dipodomys merriami merriami*
Mexican free-tailed bat	*Tadarida brasiliensis mexicana*	Brush mouse	*Peromyscus boylii rowleyi*
Western mastiff bat	*Eumops perotis*	Western harvest mouse	*Reithrodontomys megalotis*
Yuma myotis	*Myotis yumanensis*	Stephen's wood rat	*Neotoma stephensi*
Fringed myotis	*Myotis thysanodes thysanodes*	Deer mouse	*Peromyscus maniculatus sonoriensis*
Small-footed myotis	*Myotis ciliolabrum*	Porcupine	*Erethizon dorsatum*
Big brown bat	*Eptesicus fuscus*	Spotted skunk	*Spilogale putorius leucoparia*
Pallid bat	*Antrozous pallidus*	Striped skunk	*Mephitis mephitis*
Pocketed free-tailed bat	*Nyctinomus femorosaccus*	Hog-nosed skunk	*Conepatus mesoleucus venaticus*
Hoary bat	*Lasiurus cinereus*	Hooded skunk	*Mephitis macroura milleri*
Cliff chipmunk	*Eutamias dorsalis dorsalis*	Mountain lion	*Felis concolor*
Baileys' pocket mouse	*Perognathus baileyi baileyi*	Bobcat	*Felis rufus*
Desert pocket mouse	*Perognathus penicillatus pricei*	Kit fox	*Vulpes macrotis macrotis*
Cactus mouse	*Peromyscus eremicus eremicus*	Javelina	*Tayassu tajacu*
Southern grasshopper mouse	*Onychomys torridus*	Mule deer	*Odocoileus hemionus*

Particular attention was given to bat species, given the migratory habits of most bat species and the associated winter and summer ranges (Hoffmeister 1986). The BCI reports (BCI 1996 and 1997) identified four bat species near the Parcel during systematic surveys of abandoned mines in and near the Parcel. These include: the western big-eared bat (*Corynorhinus [Plecotus] townsendii*), big brown bat (*Eptesicus fuscus*), western pipistrelle (*Pipistrellus*

hesperus [hesperus]), and fringed myotis (*Myotis yumanensis*).

During field reconnaissance, unidentified bats were observed utilizing the Oak Flat Reservoir, feeding on mosquitoes or other small flying insects over the water's surface.

The Parcel is located within Game Management Units 24A and 24B, as designated by AGFD. Although the Parcel lies predominately within Unit 24A, due to irregular boundary designations, Unit 24B is more representative of the habitat type and species composition found within the Parcel. Game species data for Unit 24B, provided by AGFD. Note that the data provided below is for the entirety of Unit 24B, which comprises approximately 225,000 hectares (550,000 acres). The Parcel, as described previously, is approximately 1,225 hectares (3,025 acres) in size, or approximately 0.6 percent the size of Game Management Unit 24B.

- Black bear numbers tend to be low within the Unit and bear harvest was two (2) individuals for the 2002-2003 hunting season.
- Javelina occur throughout most of the Unit, with herd sizes averaging nine animals. Javelina harvest was 167 individuals for the 2002-2003 hunting season; survey for javelina during this period identified 83 animals.
- Mule deer are found throughout most of the Unit in areas that are generally below 4,500 feet in elevation. There has been a decline in mule deer numbers over the past ten years presumably due to inconsistent rainfall patterns. Mule deer harvest within the Unit was 73 individuals for the 2002-2003 hunting season; survey for mule deer during this period identified 147 animals.
- White-tailed deer may be found throughout most of the Unit, generally within brushier habitats above 3,500 feet in elevation. Habitat within the Parcel, particularly in the chaparral east of Apache Leap is consistent with that known to support white-tailed deer. White-tailed deer harvest within the Unit was 104 individuals for the 2002-2003 hunting season; survey for white-tailed deer during this period identified 66 animals.
- While mountain lion was not identified in the Hunting Report as a species found within the Unit, the lion harvest data identified five individuals taken for the 2002-2003 hunting season.

4.2.2. Reptiles and Amphibians

4.2.2.1. Amphibians Results

Within the Resolution Parcel, amphibian survey areas included portions of Queen Creek and several of its tributaries, as well as several scattered reservoirs, ponds, and stock tanks (Figure 7). Ranid frog survey of the Resolution Parcel occurred on April 16, May 14, 15, and 16; May 30 and 31; and June 9 and 10, 2003.

It should be noted that there are no confirmed perennial water sources within the Parcel. Queen Creek is an intermittent stream within the Parcel reach, and the remaining drainages are all ephemeral. All of the reservoirs, ponds, and stock tanks within the Parcel appear to be ephemeral as well, with the possible exception of the Oak Flat Reservoir. Additional discussion of surface water features within the project area is provided in Section 3.2.4.2 of this report.

At the time of field visits, the drainages within the Resolution Parcel contained isolated pools of water within tinajas. The stock tanks and small tinajas that maintained surface water through June were the features where most amphibian individuals were observed. Canyon tree frogs (larvae and adults) and a red spotted toad were noted within only one ephemeral drainage on the Parcel (Drainage L).

While no amphibians were noted within the reach of Queen Creek in the Parcel, tadpoles (including canyon tree frog larvae) were noted within the stream just west of the Parcel boundary. It is anticipated that amphibians occur within all reaches of Queen Creek where sufficient surface water or moisture is present.

Table 4-4 provides a list of amphibians that were noted during field reconnaissance of the Parcel.

Table 4-4. Amphibians noted during field reconnaissance of the Parcel.

Common Name	Scientific Name
Canyon tree frog	*Hyla arenicolor*
Tiger salamander	*Ambystoma tigrinum*
Red spotted toad	*Bufo punctatus*

Photo 4-1 shows an adult canyon tree frog.

Photo 4-1

Canyon tree frog larvae were also noted within Queen Creek just west of the Parcel boundary (Photo 4-2).

Photo 4-2

In general, canyon tree frogs were noted in areas that contained pools set in water-polished bedrock providing relatively safe haven from predators. No canyon tree frogs were observed within water features where tiger salamander larvae were present, presumably due to the fact that tiger salamander larvae predate upon amphibian egg masses and larvae.

Tiger salamander larvae were noted within the Drill Road Stock Pond and Oak Flat Reservoir. Different larval stages of tiger salamander were noted on April 16 (Photo 4-3), May 15 and 16, and May 30.

Photo 4-3

4.2.2.2. Reptiles Results

As described above, the Interior Chaparral habitat biotic community dominates the Resolution Parcel and the reptile relationships within chaparral are generally ill-defined (Brown 1994). Essentially, every habitat type within the Resolution Parcel can be utilized by reptiles, and the presence of the rock and boulder formations on the parcel provide numerous opportunities for reptile shelter.

Table 4-5 provides a list of reptiles that were noted during field reconnaissance of the Resolution Parcel.

Table 4-5. Reptiles noted during field reconnaissance of the Resolution Site.

Common Name	Scientific Name
Collared lizard	*Crotaphytus collaris*
Greater earless lizard	*Holbrookia texana*
Zebra-tailed lizard	*Callisaurus draconoides*
Desert spiny lizard	*Sceloporus magister*
Tree lizard	*Urosaurus sp.*
Side-blotched lizard	*Uta stansburiana*
Regal horned lizard	*Phrynosoma solare*
Western whiptail	*Cnemidophorus tigris*
Black-necked garter snake	*Thamnophis cyrtopsis*
Gopher snake	*Pituophis melanoleucus*
Western diamondback rattlesnake	*Crotalus atrox*
Tiger rattlesnake	*Crotalus tigris*

Photo 4-4 shows an adult breeding male collared lizard sunning.

Photo 4-4

Photo 4-5 shows a tree lizard sunning.

Photo 4-5

4.2.3. Birds

4.2.3.1. Raptor Results

Three active raptor nests were observed on the Parcel during the field survey. On May 22, 2003 a Cooper's hawk (*Accipiter cooperii*) nest was found in an Emory Oak located immediately downgradient of Dry Reservoir, near the Oak Flat Campground (Figure 9).

An adult male Cooper's hawk was observed low in the nest in an incubation or brooding posture, indicating that the nest contained either eggs or small fledglings. The presence of two fledglings was confirmed on a subsequent field visit completed on June 10, 2003.

On May 23, 2003 an active American peregrine falcon (*Falco pereginus anatum*) was detected

on the face of Apache Leap (Figure 9) (Photo 4-6).

Photo 4-6

The adult peregrine was observed moving from perch to perch along the cliff face while at least two fledglings could be heard vocalizing from the vicinity of a large vertical fissure on the cliff face. At the end of the observation period, there was a series of strident vocalizations from the young indicating a prey delivery.

A single active Zone-tailed hawk (*Buteo albonotatus*) nest was observed in Queen Creek during riparian survey. Young from this nest were observed to have successfully fledged (being fully feathered and perched on branches well outside the nest) during 2003. In addition, two other active Zone-tailed hawk nests were observed in proximity to the Parcel in 2003 – one on Queen Creek downgradient of the Parcel and one within Devils Canyon.

Also observed adjacent to the Parcel were common blackhawks (*Buteogallus anthracinus*) within Devils Canyon. Individual blackhawks were observed on two separate occasions in June 2003; no nests or nesting behaviors were noted during these observations.

Numerous turkey vultures (*Cathartes aura*) were observed soaring along Apache Leap and throughout the Parcel in general. There is a well known turkey vulture communal roost located at the Boyce Thompson Arboretum where up to 100 individuals congregate nightly (Glinski 1998).

4.2.3.2. Other Bird Results

There are four different groups of bird species that are anticipated to occur or potentially occur on the Parcel: (1) resident birds, (2) riparian birds, (3) spring and fall migratory birds, and (4) occasional visitors. Anticipated species from each group are identified in Table 4-6.

Table 4-6. Bird species observed or anticipated to occur on the Parcel.

Group	Common Name	Scientific Name
Resident		
Chaparral	Rock wren	*Salpinctes obsoletus*
	Canyon wren	*Catherpes mexicanus*
	Rufous-crowned sparrow	*Aimophila ruficeps*
	Spotted (rufous-sided) towhee	*Pipilo maculatus*
	Canyon towhee	*Pipilo fuscus*
	Gambel's quail	*Callipepla gambelii*
	Morning dove	*Zenaida macroura*
	White-winged dove[1]	*Zenaida asiatica*
	Lesser nighthawk	*Chordeiles acutipennis*
Sonoran Desertscrub[2]	Verdin	*Auriparus flaviceps*
	Curve-billed thrasher	*Toxostoma curvirostre*

Table 4-6. Bird species observed or anticipated to occur on the Parcel.

Group	Common Name	Scientific Name
	Mockingbird	*Mimus polyglottos*
	Cactus wren	*Campylorhynchus brunneicapillus*
	Cardinal	*Cardinalis cardinalis*
	Phainopepla	*Phainopepla nitens*
	Gila woodpecker	*Melanerpes uropygialis*
	Greater roadrunner	*Geococcyx californianus*
Riparian	Black phoebe	*Sayornis nigricans*
	Lesser goldfinch	*Carduelis psaltria*
	Great blue heron	*Ardea herodias*
	Warblers[1]	Family Parulidae
	Flycatchers	Family Tyrannidae
	Bullock's oriole	*Icterus bullockii*
	Hooded oriole	*Icterus cucullatus*
	Violet-green swallows[1]	*Tachycineta thalassina*
	Cliff swallow[1]	*Petrochelidon pyrrhonota*
Spring and Fall Migrants	Migrant warblers, hummingbirds, flycatchers, buntings	
Occasional Visitors	Steller's jay	*Cyanocitta cristata*
	Mexican jay	*Aphelocoma ultramarina*
	Raven	*Corvus cryptoleucus*
	Acorn woodpecker	*Melanerpes formicivorus*
	Brown-headed cowbirds	*Molothrus ater*
	Bridled titmouse	*Baeolophus wollweberi*
	Oak titmouse	*Baeolophus inornatus*
	Blue-gray gnatcatcher	*Polioptila caerulea*
	Bewick's wren	*Thryomanes bewickii*
	Dark-eyed junco	*Junco hyemalis*
	Robin	*Turdus migratorius*
	Western bluebird	*Sialia mexicana*

[1]Occurring in summer.
[2]May be found within chaparral east of the Leap as well.

As described in Section 3.2.2, the Parcel is not an extraordinarily productive area (in terms of grass seeds, other herbaceous seeds, nuts, berries, and presumably insects) and the recent drought further depresses productivity. In addition, the wet areas are relatively open; more bird species would be anticipated to occur in these areas if stands of cattail, bulrush, etc. were found there.

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APPENDIX 2

2004 RAPTOR SURVEY FEDERAL PARCEL, PINAL COUNTY, ARIZONA, WESTLAND RESOURCES, INC. DECEMBER 2004

2004 RAPTOR SURVEY
Federal Parcel, Pinal County, Arizona

Prepared for:

Resolution Copper Company

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Prepared by:

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DECEMBER 2004
Job No. 807.09

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WestLand Resources, Inc. (WestLand) was retained by Resolution Copper Company (Resolution) to conduct a survey for raptors on the approximately 1,224-hectare (3,025-acre) Federal Parcel (the Parcel). The Parcel is in the Tonto National Forest, east of the town of Superior, Pinal County, Arizona.

Resolution proposes to obtain the Parcel by way of a land exchange. In support of this effort, WestLand has been conducting baseline resource investigations on the Parcel. The purpose of this survey was to determine which raptor species could be confirmed on the Parcel.

The environmental conditions found on the Parcel provide a diverse habitat that supports a sufficient prey base for raptors. Small mammals, birds, and an assortment of reptiles were observed living or foraging throughout the site, particularly within the boulder-strewn areas of the Parcel. The various surface water features identified by WestLand (2003) provide adequate water for both raptors and their prey.

In 2003, WestLand identified three active raptor-breeding territories on the Parcel. Two of these breeding areas were again occupied in 2004 with peregrine falcons (*Falco peregrinus anatum*) and zone-tailed hawks (*Buteo albonotatus*). The cliff face at Apache Leap and the forested canyon bottom of Queen Creek provide ideal nesting habitat for raptors. Two oak groves located at Oak Flat Campground and Dry Reservoir also provide potential suitable habitat; however, excessive human disturbance may preclude successful occupancy of these areas by nesting raptors. The balance of the property generally lacks suitable nesting substrates.

1. INTRODUCTION AND BACKGROUND

1.1 STATEMENT OF PURPOSE

WestLand Resources, Inc. (WestLand) was retained by Resolution Copper Company (Resolution) to conduct a survey for raptors on the approximately 1,224-hectare (3,025-acre) Federal Parcel (the Parcel). The Parcel is in the Tonto National Forest, east of the town of Superior, Pinal County, Arizona. The parcel occupies a portion of Section 36, Township 1 South, Range 12 East; portions of Sections 1 and 2, Township 2 South, Range 12 East; portions of Sections 28, 29, 30, 31, and 32, and Section 33, Township 1 South, Range 13 East; and a portion of Section 6, Township 2 South, Range 13 East (Figure 1). The Parcel is currently public land, managed by the US Forest Service.

Resolution proposes to obtain the Parcel by way of a land exchange. In support of this effort, WestLand has been conducting baseline resource investigations on the Parcel. The purpose of this survey was to monitor existing locations of raptors in accordance with established survey protocols and procedures.

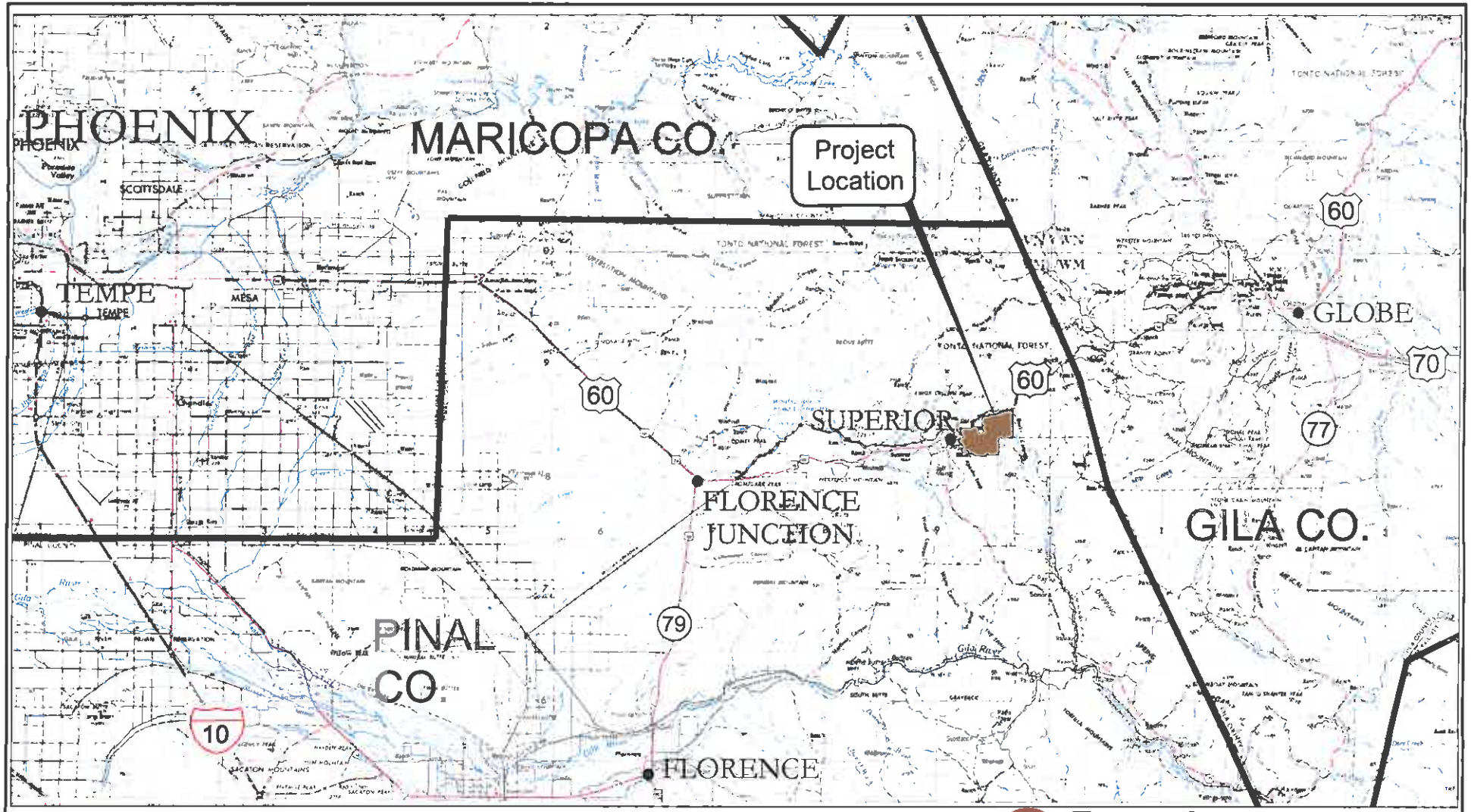
1.2 SITE DESCRIPTION

The Parcel is located in the Pinal Mountains within the Central Highlands Province, a transition zone between the Colorado Plateau and the Basin and Range Provinces. Elevation within the Parcel varies from approximately 900 to 1,500 meters (3,000 to 5,000 feet) above mean sea level.

Over 90 percent of the area of the Parcel is covered by the Apache Leap tuff, the youngest consolidated geologic formation, which forms the cap of the Apache Leap escarpment on the western portion of the Parcel. Underlying units are volcanic and sedimentary rocks exposed at the foot of the Apache Leap escarpment. A late Tertiary/early Quaternary weakly consolidated gravel and conglomerate unit overlies the Apache Leap tuff in a small area on the eastern portion of the Parcel.

The soils associated with the Apache Leap tuff are classified as Lithic Torriorthents (Brown, 1994), and were formed as a residuum weathered from the tuff. These soils are shallow, gravelly, and strongly sloping to very steep soils and, consequently, are well drained.

The Parcel is dominated by plant species associated with Interior Chaparral (east of Apache Leap) and Sonoran Desertscrub biotic communities (west of Apache Leap), as described by Brown (1994). Relatively isolated patches of xeroriparian and mesoriparian vegetation are located throughout the Parcel around stock tanks and in association with ephemeral drainages, Rancho Rio Creek, and Queen Creek.



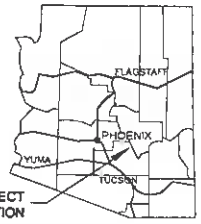
Pinal County, Arizona
Mesa 1:250,000 USGS Map

0 6.5 13 KM

Approx. Scale 1" = 13 KILOMETERS

N

ARIZONA



PROJECT LOCATION

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Engineering and Environmental Consultants
2343 E. Broadway Blvd. Suite 202
Tucson, AZ 85719 (520) 206-9585

Resolution Copper Company

2004 RAPTOR SURVEY, FEDERAL PARCEL

VICINITY MAP
Figure 1

m:\projects\807.09\2004 RAPTOR SURVEY\FIG 1 VICINITY-REGIONAL.DWG 6-01-04

The Apache Leap escarpment provides the best habitat for nesting raptors on the Parcel. High cliffs, canyon walls, and pinnacles are located on both sides of Apache Leap and provide raptors with opportunities for hunting, perching, and nesting. The craggy, competent walls of the Apache Leap escarpment provide stable, shaded areas and protected recesses that are highly suitable for nest sites.

The vegetation structure that occurs on the Parcel provides a diverse habitat that supports a sufficient prey base for raptors. Small mammals, birds, and an assortment of reptiles were observed living or foraging throughout the site, particularly within the boulder-strewn areas of the Parcel. The various surface water features identified by WestLand (2003a and 2003b) provide adequate water for both raptors and their prey. The riparian vegetation within Queen Creek Canyon provides suitable nesting substrates (large sycamore trees, etc.) as well. Opportunities for nesting elsewhere on the Parcel appear limited. Large trees on the Parcel that provide suitable potential raptor nesting habitat are limited to the canyon bottoms and two large oak groves located at Oak Flat Campground and Dry Reservoir. However, excessive human disturbance, particularly at Oak Flat campground, may limit use of these two oak groves by raptors.

Elsewhere on the Parcel there are few, if any, suitable nesting substrates available. Initially, WestLand believed that the numerous rock outcrops, boulder fields, tall spires (or "hoodoos"), and stacked rock "totem" formations that dominate the landscape on the Parcel provided abundant nesting opportunities for raptors. However, WestLand field personnel who conducted intensive surveys for Arizona hedgehog cactus throughout the Parcel report that nearly all of the numerous boulders and rock formations that dominate the site could potentially be accessible to mammalian predators and, therefore, are unsuitable as raptor nesting habitat.

1.3 Summary of Previous Surveys Conducted in the Parcel Vicinity

WestLand prepared a *Baseline Biology and Land Use Report* (2003a) and a *Biological Assessment and Evaluation* (2003b) describing biological resources affiliated the Parcel. The initial biological baseline work included an inventory of nesting raptors on the Parcel. Three active raptor nests were observed on the Parcel during the 2003 field survey. A Cooper's hawk (*Accipiter cooperii*) nest was recorded within an Emory oak located immediately down gradient of Dry Reservoir, near the Oak Flat Campground. An active American peregrine falcon (*Falco pereginus anatum*) was detected on the face of Apache Leap. A single active zone-tailed hawk (*Buteo albonotatus*) nest was observed near the Parcel boundary in Queen Creek Canyon. Although no nest site was located, great horned owls (*Bubo virginianus*) were observed on the Parcel in the vicinity of Apache Leap Pond. The locations of the three active raptor nests and the great horned owl activity center located on the Parcel are depicted in Figure 2. In addition, two other active zone-tailed hawk nests were observed in proximity to the Parcel in 2003: one on Queen Creek down gradient (northwest) of the Parcel and one within Devils Canyon (east of the Parcel).

Zone-Tailed Hawk Nest Active 2003-2004

Zone-Tailed Hawk Nest Active 2003, 2004 Status Unknown

Cooper's Hawk Nest Active 2003

Peregrine Eyrie-Active 2003-2004 (Approx. Location)

Great Horned Owl 2003 (Approx. Location)

APACHE LEAP STOCK POND

Scenic Drive

0 300 600 M

Scale 1" = 600 Meters

LEGEND

- Fixed Point Cliff Survey
- Project Boundary
- Private In-holding Boundary
- Linear Transect Survey
- Lines represent field of view
- Variable Transect Survey

Pinal County, Arizona
Superior 7.5' USGS Map

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Resolution Copper Company

2004 RAPTOR SURVEY, FEDERAL PARCEL

RAPTOR INVENTORY MAP

Figure 2

1.4 DESCRIPTION, STATUS, RANGE, AND HABITAT

Four raptor species were identified on-site during the 2003 surveys (summarized in Section 1.3). The following paragraphs provide brief species accounts for these birds. All raptor species are afforded protection under the Migratory Bird Treaty Act (MBTA). The MBTA prohibits the "take" of migratory birds. The regulatory definition of *take*, as defined by 50 CFR 10.12, means to *pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.*

1.4.1 American Peregrine Falcon

The peregrine falcon is a raven-sized bird, weighing just over 900 grams (2 pounds), with pointed wings with a span of approximately 1 meter (3 ft). The plumage of adult peregrines is variable in color and pattern. Most birds are dark blue-grey or brownish on the back with dark brown to black barring and streaking on a buffy breast (Glinski, 1998).

In Arizona, peregrines occur statewide during the migration season as well as in suitable habitat statewide as resident breeders and winter visitors. This species may be found at elevational ranges from 122 to 2,750 meters (400 to 9,000 ft.) (Glinski, 1998). Peregrine falcons live mostly along mountain ranges and river valleys. The presence of cliffs is essential, and open expanses are preferred. Plant communities surrounding breeding cliffs in Arizona are extremely variable and range from Sonoran and Mohave Desertscrub through mixed conifer forest (Glinski, 1998).

On August 25, 1999, the American peregrine falcon, formerly an endangered species, was delisted from the federal list of endangered species. The American peregrine falcon was designated as "Delisted Taxon, Recovered, Being Monitored in the Entire Range."

1.4.2 Cooper's Hawk

The Cooper's hawk is a medium-sized woodland raptor with a very long tail and relatively short, rounded wings. Mature males are a uniform blue-gray in the crown and upperparts and have rich rufous transverse barring underneath. Adult females are basically brown above with barring similar to that of males underneath (Glinski, 1998).

Cooper's hawks appear year round throughout the entire state of Arizona. Cooper's hawks usually breed in woodland and forest habitats ranging from well-developed mesquite bosques and cottonwood-willow riparian forest to spruce-fir forests at the highest available peaks. The species is also known to commonly breed in urban areas (Glinski, 1998).

The Cooper's hawk has never been federally listed as threatened or endangered, nor is it a species of special concern in the state of Arizona.

1.4.3. Zone-Tailed Hawk

The zone-tailed hawk has long, slender wings. The body is almost entirely black above and below; the cere is yellow and there is a nearly naked patch of pale skin between the bill and the eyes. The tail has bands of dusky white that alternate with gray (Glinski, 1998).

Zone-tail hawks in Arizona breed mostly over the southern two-thirds of the state and rarely winter in the state. Those that do winter in Arizona do so in lower desert areas. This hawk is found in habitats from low deserts to high conifer forests. The species is commonly seen foraging over fairly open, rocky and brushy slopes of mountains and foothills. Nests can be found in a variety of habitats from palo verde trees to Douglas firs (Glinski, 1998).

This hawk has never been federally listed as threatened or endangered, nor is it a species of special concern in the state of Arizona.

1.4.4. Great Horned Owl

The great horned owl is Arizona's largest owl with a wingspan of 1.3 to 1.4 meters (52 to 56 in). This owl has a large, heavy body, striking eyes and conspicuous ear tufts. Adults are generally grayish with undertones of buff on the wings and tail. The breast is uniformly covered with horizontal dark barring and a bib, or throat patch ranging from white to orange. The legs and feet of this owl are large and fully feathered (Glinski, 1998).

The great horned owl is common in most of Arizona. This species is common in high-elevation forests, along cool riparian canyon streams and in dry creosote bush flats of the desert lowlands (Glinski, 1998).

This owl has never been federally listed as threatened or endangered, nor is it a species of special concern in the state of Arizona.

2. METHODS

The raptor survey conducted in 2004 included both a general survey of the Parcel and ongoing monitoring of the sites known to contain raptor nests in 2003. Incidental observations of raptors were also recorded by WestLand during the course of other field activities. The general raptor survey was conducted according to the methodology outlined in the *Baseline Biology and Land Use Report* (WestLand, 2003a). This included repeating the linear transects, variable transects, and cliff surveys. A detailed description of these methods is contained in the WestLand 2003a report and is not repeated here. WestLand conducted the surveys on May 19 and 20, 2004. The transect locations are depicted on Figure 2.

3. RESULTS AND DISCUSSION

3.1 GENERAL FINDINGS

The 2004 field surveys identified two active raptor-breeding territories on the Parcel. These included a peregrine falcon eyrie located on the face of Apache Leap as well as an active zone-tailed hawk nest located in a sycamore tree in Queen Creek Canyon (Figure 2). Both of these territories were also active in 2003. The Cooper's hawk nest identified in 2003 was unoccupied this year. The great horned owls noted in 2003 were not observed during the 2004 inventory. However, no focused effort was made to find these nocturnal birds. Numerous turkey vultures (*Cathartes aura*) were observed soaring along Apache Leap and throughout the Parcel in general[1]. Also observed on the site was a single red-tailed hawk.

The first 2004 monitoring visit of the 2003 Cooper's hawk nest site occurred on March 17, 2004. The nest site and its vicinity were examined for signs of current occupancy. Although the nest was still present, there was no evidence of recent activity: no Cooper's hawks were observed, no signs of recent nest maintenance were observed, and no Cooper's hawk feathers, prey remains, or whitewash was noted beneath the nest. The entire canyon bottom in the nest vicinity was searched for the possible presence of an alternate nest. This search failed to detect any signs of Cooper's hawks or their nests. The reason(s) for the absence Cooper's hawks in this territory in 2004 are unknown. However, WestLand field personnel noted a high degree of human disturbance throughout the canyon bottom that forms the core of this breeding territory. There is a well-used campsite with a large fire ring directly below the nest tree. The canyon bottom is covered with human and dog foot prints. Moderate amounts of trash were also noted. At the time of WestLand's field observations, there were three groups of people present in the canyon. It is possible that the human activity disturbed the Cooper's hawks enough for them to disperse from the area.

Monitoring of the peregrine falcon eyrie located on the face of Apache Leap was conducted on March 17 and 18, 2004. The cliff face was observed in the afternoon of March 17 and during the morning of March 18. No peregrines were observed. This species is migratory, and some pairs do not return to their nest areas until mid-March. It is possible that the pair of birds observed in 2003 had not yet arrived from their wintering grounds.

On April 20, 2004, WestLand field personnel conducting surveys for Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*) atop Apache Leap observed a pair of peregrine falcons displaying territorial defense and courtship behavior in the immediate vicinity of the eyrie. The following description from the field crew details:

[1] There is a well known turkey vulture communal roost located at the nearby Boyce Thompson Arboretum where up to 100 individuals congregate nightly (Glinski 1998).

The male was conspicuous both in plumage and behavior. The female was overall browner and originally thought to have been a juvenile bird. She may have been younger or retained some juvenile coloration. The male was first noticed aggressively pursuing a red-tailed hawk (Buteo jamaicensis, from south to north along the Apache Leap crest. After the red-tailed hawk was chased to over a mile away, the female joined the male. Both birds seemed to vocalize wildly overhead with a series of calls including an almost constant kak kak kak kak. These calls were mixed with whining wails and multiple prolonged series of kaaak kaaak kaaak kaaak calls. The birds displayed wild acrobatic flights that brought them very close together and finally locked talons plummeting towards the ground and screaming an almost constant series of vocalizations. The pair tumbled with locked talons nearly to the ground and separated less than 30 meters from the surface whereby they flew over the crest of the Apache leap to the west and were not seen again.

It should be noted that in 2003, Michael Cross and John Ginter noted an active eyrie along the west face of the Apache leap formation just west of where these observations were made.

A second monitoring visit of the peregrine eyrie occurred on May 19 and 20, 2004. No peregrines were observed during this visit, but fresh whitewash was noted on the same perches that the male peregrine was observed upon in 2003. The timing of this visit coincided with the probable incubation period. Peregrine falcons are especially cryptic during this phase in the breeding cycle; therefore, the lack of peregrine observations at this time is not unusual (Rich Glinski, personal communication; Michael Cross, personal observation). Because courtship behavior was observed near the nesting cliff and evidence of recent activity was noted on subsequent visits, WestLand suspects that this site was occupied during the 2004 breeding season.

On May 20, 2004, WestLand located an active zone-tailed hawk nest in a sycamore tree within Queen Creek Canyon, immediately adjacent to Highway 60. An incubating female zone-tailed hawk occupied the nest. When the nest was approached to determine its activity status, the female became agitated and vocalized at the observer. To prevent possible disruption of breeding behavior, the observer quickly left the area. This nest was located in the same area where zone-tailed hawks were detected in 2003.

4. CONCLUSIONS

The Parcel supports several species of breeding raptors. The initial baseline inventory (2003) and ongoing monitoring of the site has documented occupied breeding territories of zone-tailed hawks, Cooper's hawks, and peregrine falcons. Great horned owls were observed on-site in 2003. The area also supports large concentrations of turkey vultures. During the 2004 survey, two active raptor-breeding territories were observed on the Parcel: a peregrine falcon eyrie and a zone-tailed hawk nest. Ideal nesting habitat for raptors occurs along the face of Apache Leap, along Queen Creek, and within two oak groves near Oak Flat Campground and Dry Reservoir. Recreation pressures may limit the use of these two oak groves by nesting raptors.

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APPENDIX 3

RAPTOR SURVEY & 2008 BIRD CENSUS RESOLUTION COPPER MINE STUDY AREA, WESTLAND RESOURCES, INC. MARCH 2009

RAPTOR SURVEY AND 2008 BIRD CENSUS

RESOLUTION COPPER MINE STUDY AREA

Prepared for:

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Prepared by:

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March 2009
Job No. 807.16

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EXECUTIVE SUMMARY

WestLand Resources, Inc. (WestLand) was retained by Resolution Copper Mining, LLC (RCM) to conduct bird surveys in the vicinity of RCM's holdings (collectively referred to as Resolution) near Superior, Arizona (the Study Area). The purpose of the census was to establish baseline information about bird populations at Resolution. This report provides an inventory of the birds observed as well as a discussion of results from the data collection efforts. These data are used to identify bird densities and biotic community associations and provide information about avian usage of the Study Area. Also included are the results of several years of raptor surveys that WestLand has conducted as part of the multi-year baseline study effort.

The Study Area for the bird census and raptor survey is located on private land, lands administered by the Arizona State Land Department, and on lands administered by the US Forest Service (the Tonto National Forest [TNF]). The bird census Study Area consists of locations and selected sites of biological interest in the immediate vicinity of Resolution. Fifty locations were surveyed throughout the areas of biological interest in the Study Area. Sites of biological interest included in this study are Devils Canyon (a spatially intermittent drainage defining the east extent of the Study Area, respectively), Queen Creek and Rancho Rio Creek (ephemeral drainages defining the north and south extent of the Study Area), several ponds scattered about the Study Area, and the talus slopes of Apache Leap (defining the west extent of the Study Area). The raptor survey Study Area includes selected locations in Devils Canyon, along Queen Creek, at Oak Flat Campground, and on the cliff face of Apache Leap.

RAPTOR SURVEYS

Pursuant to conducting ongoing baseline resource investigations in the vicinity of Resolution, WestLand conducted surveys for nesting raptors in 2003, 2004, and 2008. The purposes of these surveys were to locate raptor nesting territories and to monitor existing locations of raptors in the Study Area.

The Study Area supports several species of breeding raptors. The initial baseline inventory (2003) and ongoing monitoring of the Study Area have documented occupied breeding territories of zone-tailed hawks, Cooper's hawks, and peregrine falcons. Great horned owls were observed on site in 2003 and western screech-owls were observed in 2008. Many turkey vultures were also observed within the Study Area. During the 2008 survey, two active raptor-breeding territories were observed in the Study Area: a peregrine falcon eyrie and a zone-tailed hawk nest. Ideal nesting habitat for raptors is found along the face of Apache Leap and along Queen Creek. Recreation pressures may limit the use of two oak groves near Oak Flat Campground and Dry Reservoir by nesting raptors.

BIRD CENSUS

The avian species reportedly expected in each biotic community are based on Brown (1994), the *Arizona Breeding Bird Atlas* (ABBA) published by the Arizona Game and Fish Department (Corman and Wise-Gervais 2005), the Three Bar Game Management Area survey effort (Szaro 1981), and the

Maricopa Audubon Society Devils Canyon survey effort (Jacobs and Flesch 2007). WestLand observed more avian species within each biotic community than were expected by Brown or recorded by the ABBA (2005), Szaro (1981), or Jacobs and Flesch (2007). The increased number of species documented by WestLand is attributed to the increased survey effort. No species were expected but not found by WestLand.

The 2008 winter and breeding bird surveys covered 50 points grouped into nine different biotic community types. The diversity of birds encountered during winter survey was relatively high. Fifty-four bird species were recorded during the winter survey point counts, and two additional species were observed opportunistically within the Study Area during winter survey efforts. The winter densities of birds across the site were relatively low in all biotic communities, with densities ranging from 1.2 birds per hectare in the Interior Chaparral-scrub oak series to 11.3 birds per hectare in the Interior Chaparral-manzanita series. The weighted average density across all biotic community types is only 6.8 birds per hectare during the winter survey.

The density and diversity of birds observed during the breeding survey were much higher than in the winter survey in all biotic communities. Ninety-two (92) species were observed in the Study Area during breeding surveys. Species diversity ranged from lows of 28 species in the Arizona Uplands subdivision of the Sonoran Desertscrub biotic community and Interior Chaparral-scrub oak series to a high of 44 species in the Madrean Evergreen Woodlands. Bird densities ranged from a low of 9.7 birds per hectare in the Interior Chaparral-scrub oak series to a high of 44.1 birds per hectare in the Interior Riparian Deciduous Forest alder grove in Devils Canyon. The weighted average density across all biotic community types in during breeding survey was 23.3 birds per hectare.

Observations within 3-minute, 2-minute, and 5-minute segments of the total time at each survey point showed the expected pattern of numerous species and individuals observed during the first segment, and relatively few species and individuals added during the final 5 minutes. Similar patterns were obtained in the winter and breeding surveys. From these results, we conclude that 10 minutes is an appropriate time period for the surveys. A shorter time is likely to miss species and individuals, and a longer time is not likely to provide a return in observations proportional to the additional effort.

An analysis of the winter survey data for the possible effect of time of day on the surveys shows that time of day does not appear to be significant for surveying birds in the winter, although there may be somewhat more activity as the day becomes slightly warmer. During the breeding survey, our data indicate significant positive correlations with time of day for both numbers of species and numbers of individuals. This result is contrary to our expectation of decreasing activity during the day, but it also provides justification for surveying during the full 4-hour period after sunrise.

In conjunction with our bird surveys, we collected vegetation data at each of the 50 survey points, and the data were summarized for each biotic community type. We evaluated possible correlations between bird species diversity and total bird density and the vegetation characteristics of total tree density, total tree

canopy cover, and shrub cover. While there were some indications of positive and negative relationships, none of these correlations were statistically significant.

KEY FINDINGS

RAPTOR SURVEYS

- Three breeding raptor species were identified on site during the 2003, 2004, and 2008 surveys. Two additional species were observed in 2008 as compared to previous years, but breeding was unconfirmed.
- The initial baseline inventory (2003) and ongoing monitoring of the Study Area have documented occupied breeding territories of zone-tailed hawks, Cooper's hawks, and peregrine falcons. Great horned owls were observed on site in 2003 and western screech-owls were observed in 2008. The area also supports large concentrations of turkey vultures. (A known turkey vulture communal roosting area is located west of the study area at the Boyce Thompson Arboretum.)
- During the 2008 survey, two active raptor-breeding territories were observed in the Study Area: a peregrine falcon eyrie and a zone-tailed hawk nest.
- Ideal nesting habitat for raptors is found along the face of Apache Leap and along Devils Canyon and Queen Creek. Recreation pressures may limit the use of two oak groves near Oak Flat Campground and Dry Reservoir by nesting raptors.
- The Cooper's hawk nest identified in 2003 was unoccupied in 2008. The great horned owls noted in 2003 were not observed during the 2008 inventory. A western screech-owl was heard vocalizing at Oak Flat Campground on the night of May 8, 2008. Numerous turkey vultures were observed in flight along Apache Leap and throughout the Study Area.
- During the course of conducting biological studies in Devils Canyon, WestLand observed several species of raptors. Four of the species—peregrine falcon, common black-hawk, zone-tailed hawk, and Cooper's hawk—have also been observed in the Study Area outside of Devils Canyon. One additional species, the prairie falcon, was also observed in Devils Canyon.

BIRD CENSUS

Species Diversity

- Fifty-six bird species were observed on or adjacent to the Study Area during the winter surveys. During the breeding survey, 92 species were observed on or near the Study Area.
- Seven species were observed in the winter survey in the Interior Chaparral-scrub oak series, and eight species were observed in the Interior Riparian Deciduous Forest of Rancho Rio Creek. Twenty-six species were observed in the Interior Chaparral-manzanita series and 28 species at the Interior Riparian Deciduous Forest at the ponds. The average number of species per biotic community in the winter survey was 16.7.
- The number of species observed in each biotic community tended to increase with each winter survey as migratory birds arrived when temperatures rose. The number of new species observed tended to decrease with later winter survey sets.

- The numbers of breeding survey species observed in the different biotic communities ranged from a low of 28 species in the Interior Chaparral-scrub oak series and Arizona Upland Subdivision of Sonoran Desertscrub to highs of 42 species in the Interior Riparian Deciduous Forest of Devils Canyon and 44 species in the Interior Chaparral-manzanita series. The average number of species per biotic community in the breeding survey was 36.0.
- The number of species observed in a biotic community in the breeding survey tended to increase with each survey event. The number of new species decreased with later survey sets, with the exception of the last survey in the Interior Riparian Deciduous Forest alder grove of Devils Canyon.
- Many more species were observed in each biotic community during the breeding survey than in the winter survey.

Bird Species Densities

- Winter densities range from a low of about 1.2 birds per hectare in the Interior Chaparral-scrub oak series to a high of 11.3 birds per hectare in the Interior Chaparral-manzanita series. A weighted average of all biotic community types gives a density of 6.8 birds per hectare for the winter survey.
- Winter survey bird density values are all very low, indicating that wintering birds are sparsely distributed in the Study Area and surrounding land. There were several points during each survey set at which no birds were observed, and at many points only a few individuals or species were recorded.
- Total breeding survey densities range from a low of about 9.7 birds per hectare in the Interior Chaparral-scrub oak series to a high of 44.1 birds per hectare in the Interior Riparian Deciduous Forest alder grove in Devils Canyon. The Interior Chaparral-manzanita series had a relatively high density at about 34.6 birds per hectare. A weighted average of all biotic communities gives a density of 23.3 birds per hectare during the breeding survey.
- These breeding survey bird densities are all higher than the winter survey densities and the difference between maximum and minimum bird densities among biotic communities was lower in the breeding survey than in the winter survey.

Survey Set Time Segments

- Observations within 3-minute, 2-minute, and 5-minute segments of the total time at each survey point showed the expected pattern of numerous species and individuals observed during the first segment, and relatively few species and individuals added during the final 5 minutes. Similar patterns were obtained in the winter and breeding surveys.

- Between 70 and 75 percent of species and individuals were observed during the first 5 minutes of a count, and the last 5 minutes added only 25 to 30 percent of species and individuals. Most biotic community types also showed this pattern.
- Surveyors concluded that 10 minutes is an appropriate time period for the surveys. A shorter time is likely to miss species and individuals, and a longer time is not likely to provide a return in observations proportional to the additional effort.

Vegetation Data at Bird Survey Points

- The average tree density in the biotic communities range from lows of 70.7 trees per hectare in the Interior Riparian Deciduous Forest and 94.5 trees per hectare in the Interior Chaparral-scrub oak series, to a high of 403.4 trees per hectare in the Interior Riparian Deciduous Forest in Devils Canyon. The maximum-to-minimum ratio for tree density is 5.7, indicating a wide range in densities.
- The average tree canopy cover ranged from lows of 436 square meters per hectare in the Interior Chaparral-scrub oak series and 880 square meters per hectare in the Interior Chaparral-manzanita series to a high of 16,240 square meters per hectare in the Interior Riparian Deciduous Forest in Devils Canyon.
- Twenty-three species of trees were recorded at least once as the closest tree in a quarter. Many of these tree species were only recorded in a single biotic community, and no tree species were recorded in all biotic communities.
- The average cover of shrub species ranged from a low of 15 percent at the pond sites to a high of 42 percent in the Interior Chaparral-scrub oak series.
- Average herbaceous ground cover was generally very low in almost all biotic community types, ranging from a low of 1 percent in the Interior Chaparral-manzanita series to a high of 24 percent in the Interior Riparian Deciduous Forest pond sites community.

Bird-Vegetation Correlations

- Possible correlations were evaluated between bird species diversity and total bird density and vegetation characteristics. No statistically significant correlations were noted.
- However, based on limited data, the area of highest tree density and cover (Interior Riparian Deciduous Forest biotic community in the alder grove of Devils Canyon) and the area with the highest shrub cover (Interior Chaparral - scrub oak series) exhibited the greatest bird densities.

1.0 INTRODUCTION

WestLand Resources, Inc. (WestLand) was retained by Resolution Copper Mining, LLC (RCM) to conduct bird surveys in the vicinity of RCM's holdings (collectively referred to as Resolution in this report) near Superior, Arizona (the Study Area; Figure 1). The purpose of the census was to establish baseline information about bird populations at Resolution. This report provides an inventory of the birds observed and various statistical evaluations. These data are used to identify bird densities and biotic community associations and provide information about avian usage of the Study Area. Also included are the results of several years of raptor surveys that WestLand has conducted as part of the multi-year baseline study effort.

A description of the Study Area and a summary of previous bird surveys conducted in or near the Study Area are provided in the following paragraphs. A brief comparison of WestLand's results with expected species lists is also provided. Subsequent sections describe the raptor surveys and the bird census survey method, discuss the survey results, and offer a summary and conclusions about the census.

1.1 STUDY AREA DESCRIPTION

The Study Area for the raptor survey and bird census is located on private land, on lands administered by the Arizona State Land Department, and on lands administered by the US Forest Service (the Tonto National Forest [TNF]). The bird census was conducted at locations and selected sites of biological interest in the immediate vicinity of Resolution. Sites of biological interest included in this study include Devils Canyon (a spatially intermittent drainage defining the east extent of the Study Area), Queen Creek and Rancho Rio Creek (ephemeral drainages defining the north and south extent of the Study Area, respectively), several ponds scattered about the Study Area, and the talus slopes of Apache Leap (defining the west extent of the Study Area). The raptor survey was conducted at selected locations in Devils Canyon, along Queen Creek, at Oak Flat Campground, and on the cliff face of Apache Leap.

The Study Area is situated in the Pinal Mountains immediately east of Superior. The lowest elevation in the area is 3,100 feet (950 meters) near Queen Creek. The highest elevation is 4,820 feet (1,470 meters) at a high point on Apache Leap, overlooking the town of Superior. The western edge of the Study Area is generally very steep, with the cliffs of the Apache Leap formation rising abruptly above Superior. East of Apache Leap, there are parallel ridges trending toward the northeast. The northeastern portion of the Study Area is known as Oak Flat and is relatively level when compared with other parts of the Study Area.

The Study Area topography also defines surface water drainage patterns. Apache Leap forms a drainage divide near the western edge of the Study Area. West of this divide, very steep headwaters of ephemeral channels drain west toward Superior and Queen Creek. East of the divide, ephemeral channels with shallower gradients drain to the northeast. The divide east of Apache Leap separates the channels draining north through Oak Flat to Queen Creek from those draining east through Rancho Rio Creek to Devils Canyon and is much less visually obvious.

The major biotic communities in the Study Area include Interior Chaparral, Madrean Evergreen Woodland, the Arizona Uplands Subdivision of Sonoran Desertscrub, and Interior Riparian Deciduous Forest, as described by Brown (1994). The following paragraphs summarize vegetation characteristics of these biotic communities; Figure 2 depicts the extent of these communities within the Study Area as mapped by Brown and Lowe (1980) and refined by WestLand based on field studies and aerial image analysis. The study area is inclusive of Oak Flat Campground. Recreational activities in the area include camping, off-roading, climbing, etc.

Interior Chaparral

Interior Chaparral is a vegetation community found in relatively arid regions, with low, often dense scrub consisting primarily of evergreen shrubs (Corman and Wise-Gervais 2005). Most chaparral shrubs have dense, compact crowns and small, evergreen sclerophyllous leaves. They tend to be deeply rooted and some species, such as the scrub oak (*Quercus turbinella*), have extensive superficial and tap root systems. Most of these plant species sprout readily from root crowns and will regenerate quickly after fire events. Notable exceptions to this phenomenon include desert ceanothus (*Ceanothus greggii*) and pointleaf manzanita (*Arctostaphylos pungens*). These fire-adapted species produce prolific seed crops that may remain dormant in the soil for decades, only germinating after fire (Brown 1994).

Interior Chaparral exists largely in Arizona and within small areas in New Mexico, Texas, and northern Mexico. In Arizona, this biotic community occurs discontinuously in a diagonal band from the extreme northwest corner of the state to central Arizona below the Mogollon Rim. This vegetation is present across mid-elevation (approximately 3,500 to 6,500 feet [1,050 to 2,000 meters]) foothills, mountain slopes, and canyons. Interior Chaparral is prevalent in the region which includes the Study Area. To the southeast, disjunct and isolated chaparral communities extend into the drier mountains of southeastern Arizona, as well as portions of southern New Mexico, west Texas, and northern Mexico (Brown 1994).

Scrub oak is the most widespread species within Arizona Interior Chaparral communities and is commonly the dominant species. Although it sometimes occurs in nearly pure stands, it usually is found in association with shrubs such as mountain mahogany (*Cercocarpus* spp.), skunkbush (*Rhus trilobata*), silktassel (*Garrya wrightii*), and desert ceanothus. At higher elevations with increased moisture, this biotic community may be dominated by pointleaf manzanita, or a mixture of sclerophyllous shrubs with no single species attaining dominance. In the rugged mountains below the Mogollon Rim, Interior Chaparral generally transitions upslope to Madrean Evergreen Woodlands and downslope to Sonoran Desertscrub and/or Semi-Desert Grasslands.

Interior Chaparral is the dominant vegetation community in the upland portions of Study Area above Apache Leap (Figure 2). Due to high shrub cover, thin to absent soil, and low annual precipitation, this biotic community has a characteristically low density of herbaceous cover. As is typical of the Interior Chaparral biotic community in central Arizona, vegetation in the central portion of the Study Area is dominated by scrub oak and/or pointleaf manzanita. Catclaw mimosa (*Mimosa acerosa*) is also very common. Scrub oak-dominated chaparral predominates in the boulder outcrops just east of Apache Leap,

while manzanita-dominated chaparral is more common along the eastern margins of the Study Area just west of Devils Canyon. We have subdivided the Interior Chaparral biotic community into scrub oak series and manzanita series for the purposes of this study.

Madrean Evergreen Woodland

Madrean Evergreen Woodlands occur in areas characterized by relatively mild winters and wet summers. As its name suggests, this biotic community is centered within the Sierra Madre mountain range in Mexico, reaching its northern-most distribution in Arizona, New Mexico, and Trans-Pecos Texas. At its lower elevations, the woodlands are typically open with widely dispersed trees. The trees in these lower elevations typically consist of evergreen oaks or combinations of oaks, alligator-bark and one-seed junipers (*Juniperus deppeana* and *J. monosperma*), and pinyon pines (*Pinus edulis*) in various proportions. This association has been commonly described as encinal.[1] Higher up the mountain gradient, encinal woodlands transition into a Mexican oak-pine association with oak species typical of higher elevations as well as one or more Madrean pine species such as Apache pine (*P. englemannii*), Chihuahuan pine (*P. leiophylla*), Arizona pine (*P. ponderosa* var. *arizonica*), and others (Brown 1994).

In the mountainous regions below the Mogollon Rim in central Arizona, such as the Chiricahua, Santa Rita, Baboquivari, Tumacacori, Huachuca, Catalina, and Pinal Mountains, the dominant oaks within the encinal zone include emory oaks (*Quercus emoryi),* Arizona white oak, *(Q. arizonica*), and, south of the Gila River, Mexican blue oak (*Q. oblongifolia*). At the northern limits of this biotic community, Madrean Evergreen Woodlands occur within and/or above drier Interior Chaparral biotic community, as well as below and along drainages within Great Basin conifer woodlands.

This study focuses on the oak (or encinal) woodland series of the Madrean Evergreen Woodland biotic community. Within the Study Area, Madrean Evergreen Woodland encinal woodlands are present in narrow bands along drainages, but are distinguished from riparian vegetation, as described below (Figure 2). Two oak species, Arizona white oak and Emory oak, dominate the canopy layer. Although large alligator-bark junipers are likely to have been here in the past (B. Schmalzel [WestLand], pers. obs.), a history of fire suppression and active clearing in the area has favored fire-intolerant tree species such as one-seed juniper, which are now common. Understory layers in this region generally include chaparral-associated species, such as pointleaf manzanita, catclaw mimosa, scrub oak, and skunkbush.

Arizona Upland Subdivision of Sonoran Desertscrub

The Sonoran Desertscrub biotic community is in a large, arid region centered at the head of the Gulf of California and encompasses the western half of the Mexican state of Sonora, Mexico's Baja Peninsula, southeastern California, and central and southwestern Arizona. Brown (1994) recognizes five subdivisions within this biotic community, including the Arizona Upland subdivision. This subdivision extends from the vicinity of Topock, Arizona, southeast to central Arizona near Phoenix, then south to

[1] The term "encinal" is a Spanish term derived from *encino* (meaning oaks) and *al* (place of) and is used to describe evergreen woodlands composed wholly or partially of oaks (Brown 1994).

north-central Sonora, Mexico. The majority of this subdivision occurs on slopes, broken ground, and multi-dissected sloping plains (e.g., uplands). This landscape receives the most precipitation and is the most verdant of all the North American desert communities. There are three recognized "series" within this subdivision: the jojoba-mixed scrub, creosote bush-mixed scrub, and paloverde-cacti-mixed scrub series. The latter series is the most extensive within the subdivision, and the vegetation within the western portion of the Study Area is consistent with this series.

Columnar cacti such as saguaros (*Carnegiea gigantea*) and shrubby trees such as foothill palo verde (*Parkinsonia microphylla*) are prime indicator species within this biotic community (Phillips and Comus 2000). This vegetation most often takes on the appearance of a scrubland or low woodland of leguminous trees with intervening spaces containing one to several layers of scrubs and perennial succulents. Typical trees include blue palo verde (*Parkinsonia florida*), foothill palo verde, mesquites (*Prosopis* spp.), and acacias (*Acacia* spp.). As stated above, foothill palo verde trees are the characteristic leguminous tree in the Arizona Upland subdivision. However, at the northern, upper, and eastern limits of this community it may be accompanied or replaced by crucifixion thorn (*Canotia holacantha*). In addition to saguaros, the following cacti are representative of this subdivision: buckhorn cholla (*Opuntia acanthocarpa*), cane cholla (*O. spinosior*), staghorn cholla (*O. versicolor*), chain fruit cholla (*O. fulgida*), teddy bear cholla (*O. bigelovi*), Christmas cactus (*O. leptocaulis*), fish-hook barrel cactus (*Ferocactus wislizenii*), and prickly pear (*O. phaeacantha*). Additional representative plants include ocotillo (*Fouquieria splendens*), creosote bush (*Larrea tridentata*), and triangle-leaf bursage (*Ambrosia deltoidea*).

The portions of the Study Area west and south of the Apache Leap escarpment are classified as the Arizona Upland subdivision of Sonoran Desertscrub (Figure 2).

Interior Riparian Deciduous Forest

Interior Riparian Deciduous Forests represent an unusual situation where high altitude species penetrate downslope among tropical and subtropical forms (Brown 1994). This community exists along perennial or seasonally intermittent streams and may be divided into two major vegetation series: cottonwood-willow and mixed broadleaf. These riparian series, in particular the mixed broadleaf, represent relict communities of formerly widespread, early Tertiary mixed mesophytic (moist) forest. This riparian community is adapted to this ancient climate and has retreated to pockets where this climatic condition persists. The riparian community within the Study Area is consistent with the mixed broadleaf series.

The mixed broadleaf series occurs in association with rubble bottomed, perennial or near-perennial streams. In Arizona below the Mogollon Rim, arboreal constituents are frequently an admixture of stands of riparian species forming gallery forests of the interior riparian "big six" species: Arizona sycamore (*Platanus wrightii*), Arizona alder (*Alnus oblongifolia*), Goodding and Bonpland willows (*Salix gooddingii, S. bonplandiana*), Arizona black walnut (*Juglans major*), velvet ash (*Fraxinus veluntina*), and Fremont cottonwood (*Populus fremontii*). Other noted species include western soapberry (*Sapindus saponaria* var. *drummondii*), Texas mulberry (*Morus microphylla*), netleaf hackberry (*Celtis laevigata*),

and Mexican elder (*Sambucus mexicana*). Arizona cyprus (*Cupressus arizonica*) and various oaks (*Quercus* spp.) are sometimes present. Understory species include bracken fern (*Pteridium aquilinum*), smooth sumac (*Rhus glabra*), poison ivy (*Toxicodendron rydbergii*), and canyon grape (*Vitis arizonica*).

Riparian vegetation within the study area is restricted to a few pockets, as described above, and is often found in contact with Madrean Evergreen Woodland vegetation. The most significant area of Interior Riparian Deciduous Forest within the Study Area is located within the depths of Devils Canyon. Riparian vegetation here is dominated by stands of Arizona alder, scattered sycamore, and velvet ash. Some of these stands form gallery forests that attain heights of 60 feet (18 meters) or more. The understory is dominated by button willow (*Cephalanthus occidentalis*). Other trees include Goodding willow and Arizona white oak. In the lower reaches of Devils Canyon, alders give way to stands of Goodding willow and a few scattered cottonwoods. Additional patches of riparian vegetation are located along Queen Creek and Rancho Rio Creek, as well as at the margins of several ponds and stock tanks scattered throughout the Study Area within locations otherwise characterized as Interior Chaparral.

For the purposes of this study, the Interior Riparian Deciduous Forest biotic community has been subdivided into the following categories:

- Alder Grove
- Devils Canyon
- Queen Creek
- Rancho Rio Creek
- Ponds

The Devils Canyon category includes the aforementioned sycamore, ash, willow, and cottonwood species, and is distinguished from the alder grove category, which is also present in Devils Canyon.

1.2 PREVIOUS SURVEYS WITHIN AND IN THE VICINITY OF THE STUDY AREA

Biotic Communities: Southwestern United States and Northwestern Mexico (Brown 1994) catalogs and defines by biological community the eco-region centered on Arizona, New Mexico, Sonora, Chihuahua, and Baja California Norte, plus portions of adjacent California, Nevada, Utah, Colorado, Texas, Coahuila, Sinaloa, and Baja California Sur. This book is arranged by climatic formations with chapters devoted to each biome as well as descriptions of zonal subdivisions. The biotic communities described above are based upon Brown's categorization. The climate, physiognomy, distribution, representative plant species, and characteristic vertebrates (including birds) are described for each biotic community. The information presented within this work is a compilation of both historical accounts of early explorers, hunter-naturalists, collectors, and early conservationists as well as works from numerous historical and modern biogeographers, biological surveyors, researchers, and scientists throughout the arid southwest. WestLand reviewed Brown's lists of avian species expected in the biotic communities within the Study Area, as described below.

In 2005, the Arizona Game and Fish Department (AGFD) published the *Arizona Breeding Bird Atlas* (ABBA; Corman and Wise-Gervais 2005). This publication was the culmination of 7 years of surveys completed statewide from 1993 to 2000. The primary goal of the ABBA was to provide a "snapshot" for each of Arizona's breeding bird species at the end of the 20th century. The ABBA survey coverage was based upon 7.5-minute topographic maps provided by the US Geologic Survey (USGS). Where possible, one survey was conducted within each quadrangle (quad) throughout Arizona. Because of the extensive area involved, each quad was divided into six sectors. One sector from each of these was randomly selected as a "priority block." These priority blocks were intensively surveyed for the presence of breeding birds. WestLand has reviewed the ABBA records from the Superior quad, which contains the Study Area, as well as the records of the Pinal Ranch quad, which is located adjacent to the east of the Study Area.

The following paragraphs summarize the avian species reportedly expected in each biotic community, based upon Brown (1994), the ABBA (2005), the Three Bar Game Management Area[2] survey effort (Szaro 1981), and the Maricopa Audubon Society Devils Canyon survey effort (Jacobs and Flesch 2007). Additional species identified by WestLand are also listed; detailed accounts of WestLand's observations of bird populations are provided in Section 3.2. WestLand observed more avian species within each biotic community than were expected by Brown or recorded by the ABBA (2005), Szaro (1981), or Jacobs and Flesch (2007). The increased number of species documented by WestLand is likely due to the increased survey effort. No species were expected but not found by WestLand.

Avian Species of the Interior Chaparral Biotic Community

According to Brown (1994), typical breeding birds of the Interior Chaparral biotic community consist of general scrub-adapted species such as the western scrub jay (*Aphelocoma californica*), bushtit (*Psaltriparus minimus*), canyon wren (*Catherpes mexicanus*), crissal thrasher (*Toxostoma crissale*), spotted towhee (*Pipilo maculatus*), canyon towhee (*Pipilo fuscus*), rufous-crowned sparrow (*Aimophila ruficeps*), and black-chinned sparrow (*Spizella atrogularis*). Researchers conducting bird inventories within chaparral communities at the Three Bar Game Management Area recorded most of the above-mentioned species as well as Gambel's quail (*Callipepla gambelii*), white-winged dove (*Zenaida asiatica*), common poorwill (*Phalaenoptilus nuttallii*), black-chinned hummingbird (*Archilochus alexandri*), Mexican jay (*Aphelocoma ultramarina*), bridled titmouse (*Baeolophus wollweberi*), Bewick's wren (*Thryomanes bewickii*), Scott's oriole (*Icterus parisorum),* hooded oriole (*Icterus cucullatus,)* and northern cardinal (*Cardinalis cardinalis*) (Szaro 1981).

The ABBA identified the following 26 avian species within Interior Chaparral in the areas mapped by the Superior and Pinal Ranch USGS 7.5 minute series quadrangles: ash-throated flycatcher (*Myiarchus cinerascens*), common poorwill, common nighthawk (*Chordeiles minor*), white-throated swift (*Aeronautes saxatalis*), western scrub-jay, Gambel's quail, juniper titmouse (*Baeolophus ridgwayi*),

[2] The Three Bar Game Management Area is located on the TNF west of Roosevelt Lake, approximately 35 miles northwest of the Study Area.

bushtit, cactus wren (*Campylorhynchus brunneicapillus*), rock wren (*Salpinctus osoletus*), canyon wren, blue-gray gnatcatcher (*Polioptila caerulea*), Townsend's solitaire (*Myadestes townsendi*), northern mockingbird (*Mimus polyglottos*), crissal thrasher, black-chinned sparrow, white-crowned sparrow (*Zonotrichia leucophrys*), rufous-crowned sparrow, northern cardinal, white-winged dove, mourning dove (*Zenaida macroura*), Scott's oriole, Virginia's warbler (*Vermivora virginiae*), spotted towhee, house finch (*Carpodacus mexicanus*), and canyon towhee.

WestLand observed the following 13 species in addition to those listed in the ABBA for the Superior and Pinal Ranch quads and by Szaro (1981) at the Three Bar Game Management Area: turkey vulture (*Cathartes aura*), greater roadrunner (*Geococcyx californianus*), black-chinned hummingbird, Anna's hummingbird (*Calypte anna*), unidentified hummingbird sp., ladder-backed woodpecker (*Picoides scalaris*), empidonax flycatcher (*Empidonax* sp.), black phoebe (*Sayornis nigricans*), lark sparrow (*Chondestes grammacus*), black-throated sparrow (*Amphispiza bilineata*), dark-eyed junco (*Junco hyemalis*), brown-headed cowbird (*Molothrus ater*), and lesser goldfinch (*Carduelis psaltria*).

Avian Species of the Madrean Evergreen Woodland Biotic Community

The Madrean Evergreen Woodland biotic community supports a rich assortment of bird species. According to Brown (1994), common species within this biotic community include Montezuma quail (*Cyrtonyx montezumae*), Arizona woodpecker (*Picoides arizonae*), acorn woodpecker (*Melanerpes formicivorus*), buff-breasted flycatcher (*Empidonax fulvifrons*), Mexican jay, bridled titmouse, western bluebird (*Sialia mexicana*), Hutton's vireo (*Vireo huttoni*), bushtit, and black-throated gray warbler (*Dendroica nigrescens*) (Brown 1994).

The ABBA recorded the following 18 avian species within the Madrean Evergreen Woodland biotic community near the Study Area: turkey vulture, western scrub-jay, acorn woodpecker, dusky-capped flycatcher (*Myiarchus tuberculifer*), Hutton's vireo, juniper titmouse, ruby-crowned kinglet (*Regulus calendula*), bushtit, Bewick's wren, Townsend's solitaire, phainopepla (*Phainopepla nitens*), yellow-rumped warbler (*Dendroica coronata*), black-throated gray warbler, black-headed grosbeak (*Pheucticus melanocephalus*), bridled titmouse, hepatic tanager (*Piranga flava*), and Scott's oriole.

WestLand recorded the following additional 16 species that were not included in the ABBA for this area: gray hawk (*Buteo nitidus*), Swainson's hawk (*Buteo swainsoni*), zone-tailed hawk (*Buteo albonotatus*), white-winged dove, mourning dove, greater roadrunner, northern pygmy-owl (*Glaucidium gnoma*), Anna's hummingbird, unidentified hummingbird sp., ladder-backed woodpecker, gray flycatcher (*Empidonax wrightii*), Say's phoebe (*Sayornis saya*), ash-throated flycatcher, white-crowned sparrow, brown-headed cowbird, house finch, and lesser goldfinch.

Avian Species of the Arizona Upland Subdivision of Sonoran Desertscrub Biotic Community

The paloverde-cacti-mixed scrub series of the Arizona Upland subdivision of the Sonoran Desertscrub biotic community is particularly noted for its aviafauna. Some of its best known birds are in fact tropical

thornscrub species that achieve their northernmost distribution in this analogous habitat. Characteristic birds include the Harris' hawk (*Parabuteo unicinctus*), white-winged dove, Inca dove (*Columbina inca*), elf owl (*Micrathene whitneyi*), and pyrrhuloxia (*Cardinalis sinuatus*). Even the ''cactus woodpeckers" such as the Gila woodpecker (*Melanerpes uropygialis*), gilded flicker (*Colaptes chrysoides*), and ladder-backed woodpecker are quite widespread and not nearly as dependant upon saguaros as is widely assumed. Other desert birds typical of this community include the curve-billed thrasher (*Toxostoma curvirostre*), cactus wren, Gambel's quail, greater roadrunner, Costa's hummingbird (*Calypte costae*), verdin (*Auriparus flaviceps*), black-tailed gnatcatcher (*Polioptila melanura*), and mourning dove.

The ABBA recorded the following 20 avian species within the Arizona Upland subdivision of Sonoran Desertscrub biotic community near the Study Area: golden eagle (*Aquila chrysaetos*), American kestrel (*Falco sparverius*), Gambel's quail, greater roadrunner, Costa's hummingbird, Gila woodpecker, ladder-backed woodpecker, verdin, northern cardinal, black-tailed gnatcatcher, brown-crested flycatcher (*Myiarchus tyrannulus*), American robin (*Turdus migratorius*), northern mockingbird, crissal thrasher, cactus wren, phainopepla, Lucy's warbler (*Vermivora luciae*), yellow warbler (*Dendroica petechia*), black-throated sparrow, and rufous-crowned sparrow.

WestLand recorded 11 additional species that were not included in the ABBA for this area: turkey vulture, peregrine falcon (*Falco peregrinus anatum*), white-winged dove, mourning dove, white-throated swift, unidentified hummingbird sp., Say's phoebe, ash-throated flycatcher, brown-headed cowbird, Scott's oriole, and house finch.

Avian Species of the Interior Riparian Deciduous Forest Biotic Community

A number of nesting birds are obligate to either the riparian deciduous trees, associated cliffs, or the streams themselves. One of the best known of these riparian obligates is the common black-hawk (*Buteogallus anthracinus*). According to Brown (1994), other examples of these riparian obligates include the summer tanager (*Piranga rubra*), zone-tailed hawk, white-tailed kite (*Elanus leucurus*), yellow warbler, yellow-billed cuckoo (*Coccyzus americanus*), Bullock's oriole (*Icterus bullocki*), violet-crowned hummingbird, Lucifer hummingbird (*Calothorax lucifer*), blue-throated hummingbird (*Lampornis clemenciae*), elegant trogon (*Trogon elegans*), and cliff swallow (*Petrochelidon pyrrhonota*).

The ABBA recorded the following 50 avian species within Interior Riparian Deciduous Forest near the Study Area: turkey vulture, Cooper's hawk (*Accipiter cooperi*), zone-tailed hawk, Gambel's quail, white winged dove, mourning dove, common poorwill, Anna's hummingbird, black-chinned hummingbird, acorn woodpecker, Gila woodpecker, ladder-backed woodpecker, hairy woodpecker (*Picoides villosus*), western wood-pewee (*Contopus sordidulus*), ash-throated flycatcher, Cassin's kingbird (*Tyrannus vociferans*), western kingbird (*Tyrannus verticalis*), gray vireo (*Vireo vicinior*), plumbeous vireo (*Vireo plumbeus*), Hutton's vireo, western scrub-jay, bushtit, violet-green swallow, bridled titmouse, Bewick's wren, canyon wren, house wren (*Troglodytes aedon*), American robin, ruby-crowned kinglet, blue-gray gnatcatcher, phainopepla, Virginia's warbler, yellow warbler, yellow-rumped warbler, painted redstart (*Myioborus pictus*), hepatic tanager, summer tanager, green-tailed towhee (*Piplio chlorurus*),

black-headed grosbeak, brown-headed cowbird, hooded oriole, Scott's oriole, house finch, lesser goldfinch, Hammond's flycatcher (*Epidomax hammondii*), Lincoln's sparrow (*Melospiza lincolnii*), white crowned sparrow, brown-crested flycatcher, Bell's vireo (*Vireo bellii*), Lucy's warbler, and northern cardinal.

During the summer of 2007, the Maricopa Audubon Society commissioned a vegetation and wildlife survey of Devils Canyon (Jacobs and Flesch 2007). The authors observed 43 bird species within the Interior Riparian Deciduous Forest along Devils Canyon. The study identified 15 birds that were not included in the ABBA census. These are mallard (*Anas platyrhynchos*), great blue heron (*Ardea herodias*), peregrine falcon, common black-hawk, red-tailed hawk (*Buteo jamaicensis*), gilded flicker, black phoebe, common raven, verdin, cactus wren, northern mockingbird, crissal trasher, spotted towhee, canyon towhee, and rufous-crowned sparrow.

In addition to the species recorded by the ABBA and Jacobs and Flesch (2007), WestLand observed the following 21 species within this biotic community: great horned owl (*Bubo virginianus*), Eurasian collared dove (*Streptopelia decaocto*), white-throated swift, northern rough-winged swallow (*Stelgidopterix serripennis*), rufous hummingbird (*Selasphorus rufus*), unidentified hummingbird sp., belted kingfisher (*Megaceryle alcyon*), crissal thrasher, greater pewee (*Contopus pertinax*), gray flycatcher, empidonax flycatcher, Say's phoebe, black-throated sparrow, Virginia's warbler, yellow-breasted chat (*Icteria virens*), dark-eyed junco, chipping sparrow (*Spizella passerina*), Bullock's oriole, Cassin's finch (*Carpodacus cassinii*), lark sparrow, and red-winged blackbird (*Agelaius phoeniceus*).

2.0 RAPTOR SURVEY

2.1 INTRODUCTION AND BACKGROUND

Pursuant to conducting ongoing baseline resource investigations in the vicinity of Resolution, WestLand conducted surveys for nesting raptors in 2003, 2004, and 2008. The purposes of these surveys were to locate raptor nesting territories and to monitor existing locations of raptors in accordance with established survey protocols and procedures.

The vegetation structure in the raptor survey area provides a diverse habitat that supports a sufficient prey base for raptors. Small mammals, birds, and an assortment of reptiles were observed living or foraging throughout the area, particularly in the boulder-strewn areas. The surface water features in the Study Area provide adequate water for both raptors and their prey. Riparian vegetation within Queen Creek Canyon provides suitable nesting substrates (e.g., large sycamore trees) as well. The vertical cliff faces of Apache Leap and Devils Canyon provide substantial nesting substrates as well. The west cliffs of Apache Leap extend for approximately 6 miles (10 kilometers) in a north-south direction and face west. This cliff attains a maximum height of approximately 600 feet (180 meters). Significant cliff faces also occur intermittently along both sides of Devils Canyon from its confluence with Rancho Rio Creek downstream for approximately 6 miles and attain a maximum height of approximately 400 feet (120 meters). Opportunities for nesting elsewhere in the Study Area appear limited. The large trees suitable for raptor nesting are limited to the canyon bottoms and two oak groves at Oak Flat Campground and Dry Reservoir. However, excessive human disturbance and activity levels, particularly at Oak Flat Campground, may limit the use of these two oak groves by raptors.

Elsewhere in the Study Area, few if any, suitable nesting substrates are available. Initially, the numerous rock outcrops, boulder fields, tall spires (or "hoodoos"), and stacked rock "totem" formations that dominate the landscape appeared to provide abundant nesting opportunities for raptors. However, WestLand field personnel who conducted intensive surveys for Arizona hedgehog cactus throughout the area reported that nearly all of these boulders and rock formations are potentially accessible to mammalian predators and, therefore, unsuitable as raptor nesting habitat.

2.2 SUMMARY OF RAPTOR SURVEY

WestLand prepared a *Baseline Biology and Land Use Report* (2003a) and a *Biological Assessment and Evaluation* (2003b) describing the Study Area's overall biological resources. Three active raptor nests were observed during the 2003 field survey. A Cooper's hawk nest was recorded within an Emory oak located immediately downgradient of Dry Reservoir, near Oak Flat Campground. An active peregrine falcon eyrie was detected on the face of Apache Leap. A single, active zone-tailed hawk nest was observed in Queen Creek Canyon. Although no nest sites were located, great horned owls were observed in the vicinity of Apache Leap Pond. In addition, two active zone-tailed hawk nests were observed in the vicinity in 2003: one on Queen Creek downgradient (to the northwest) and one within Devils Canyon (to the east).

In 2004, WestLand repeated the raptor surveys in the Study Area (WestLand 2004). These surveys verified the continued occupancy of the peregrine falcon eyrie on Apache Leap as well as a single zone-tailed hawk nest at Queen Creek. The Cooper's hawk nest observed near Dry Reservoir in 2003 was vacant in 2004.

Raptor surveys were repeated in 2008. The 2008 survey documented the continued occupancy of the peregrine eyrie on Apache Leap as well as the zone-tailed hawk breeding area in Queen Creek. A western screech-owl (*Megascops kennicottii*) activity center was noted in the vicinity of Oak Flat Campground in 2008. Although no nest was observed, a pair of these small owls was repeatedly observed, both visually and aurally, during the course of the breeding survey. It is WestLand's opinion that this activity center represents an active breeding territory. The locations of the active raptor nests and the great horned owl and western screech-owl activity centers are depicted in Figure 3.

2.3 RAPTOR SPECIES DESCRIPTION, STATUS, RANGE, AND HABITAT

Three breeding raptor species were identified on site during the 2003, 2004, and 2008 surveys. Two additional species were observed but breeding was unconfirmed. Finally, two more species were observed opportunistically in 2008. The following paragraphs provide brief species accounts for these seven species. All raptor species are afforded protection under the Migratory Bird Treaty Act, which prohibits the "take" of migratory birds. The regulatory definition of "take," as provided in 50 CFR 10.12, means to "pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect."

American Peregrine Falcon

The adult peregrine falcon is a 14- to 18-inch (bird weighing approximately between 1 and 2 pounds, with pointed wings that have a span of approximately 39- to 46-inches (AGFD 2002). The peregrine falcon is sexually dimorphic with female birds being larger than males. The plumage of adult peregrines is variable in color and pattern. Most birds are dark blue-grey or brownish on the back with dark brown to black barring and streaking on a buffy breast (Glinski 1998).

In Arizona, peregrines occur statewide during the migration season and also as resident breeders and winter visitors in suitable habitat. This species may be found at elevations ranging from 400 to 9,000 feet (122 to 2,750 meters) (Glinski 1998). Peregrine falcons live mostly along mountain ranges and river valleys. Peregrine falcons require cliffs for nesting and perching and often utilize open expanses for foraging. Plant communities surrounding breeding cliffs in Arizona are extremely variable and range from Sonoran and Mohave Desertscrub through mixed conifer forest (Glinski 1998).

On August 25, 1999, the peregrine falcon, formerly an endangered species, was removed from the federal list of endangered species and designated as "Delisted Taxon, Recovered, being monitored in the entire range." The peregrine falcon is considered a sensitive species by the US Forest Service.

Zone-Tailed Hawk

The zone-tailed hawk has long, slender wings. The body is almost entirely black above and below. The cere is yellow and there is a nearly naked patch of pale skin between the bill and the eyes. The tail has bands of dusky white that alternate with gray (Glinski 1998).

Zone-tailed hawks in Arizona breed mostly over the southern two thirds of the state and rarely winter in the state. Those that do winter in Arizona are found in lower-elevation desert areas. This hawk is found in habitats from low deserts to high conifer forests. The species is commonly seen foraging over fairly open rocky and brushy slopes of mountains and foothills. Nests can be found in a variety of trees, from palo verde trees to Douglas-firs (*Pseudotsuga menziesii*) (Glinski 1998).

This hawk has never been federally listed as threatened or endangered, nor is it a species of special concern in the state of Arizona.

Cooper's Hawk

The Cooper's hawk is a medium-sized woodland raptor with a very long tail and relatively short, rounded wings. Mature males are a uniform blue-gray in the crown and upper parts and have rich rufous transverse barring underneath. Adult females are basically brown above with barring similar to that of males underneath (Glinski 1998).

Cooper's hawks may be present year round throughout the entire state of Arizona. Cooper's hawks usually breed in woodland and forest habitats ranging from well-developed mesquite bosques and cottonwood-willow riparian forest to spruce-fir forests at the highest available peaks. The species is also known to commonly breed in urban areas (Glinski, 1998).

The Cooper's hawk has never been federally listed as threatened or endangered, nor is it a species of special concern in the state of Arizona.

Western Screech-Owl

The western screech-owl is a small, stocky, cryptically colored bird with a large head, a short body, and long wings. Like many small owls, the western screech-owl has conspicuous "ear tufts," feathers that sprout vertically from behind the eyes. These tufts are typically erect only during the day; at night, the bird's head appears round (Glinski 1998).

This species ranges from south-central Mexico northward across the western half of North America to southeastern Alaska. In Arizona, western screech-owls are common over most of the lower elevation deserts in the southern half of the state. They are uncommon in northwestern Arizona and rare in the northeastern part of the state.

The diet of the western screech-owl includes rodents, small birds, lizards, scorpions, grasshoppers, and crickets. Nests are located within cavities found in trees, large cacti, hollow stumps, and crevasses in rocks or buildings. Where available, saguaros appear to be the favorite nest substrate.

This owl has never been federally listed as threatened or endangered, nor is it a species of special concern in the state of Arizona.

Great Horned Owl

The great horned owl is Arizona's largest owl, with a wingspan of 52 to 56 inches (1.3 to 1.4 meters). This owl has a large, heavy body, large eyes and conspicuous ear tufts. Adults are generally grayish with undertones of buff on the wings and tail. The breast is uniformly covered with horizontal dark barring and a bib, or throat patch ranging from white to orange. The legs and feet of this owl are large and fully feathered (Glinski 1998).

The great horned owl is common in most of Arizona, including high-elevation forests, cool riparian canyon streams, and dry creosote bush flats of the desert lowlands (Glinski 1998).

This owl has never been federally listed as threatened or endangered, nor is it a species of special concern in the state of Arizona.

Common Black-hawk

This medium- to large-sized hawk has broad, rounded wings in flight. Adults are uniformly black in color except for a white band on the short, broad tail (Glinski 1998).

The common black-hawk is widespread in Mexico and reaches the northern limit of its range in Arizona. It is widely, but sparsely, distributed in the canyons below the Mogollon Rim (Glinski 1998).

These large raptors are obligate nesters in relatively undisturbed, mature riparian gallery forests comprised of Arizona sycamore, Fremont cottonwood, Arizona alder, Arizona cypress, and Arizona black walnut (Corman and Wise-Gervais 2005).

Black-hawks are migratory in Arizona, arriving in their breeding areas in March or April and returning south in October. They exhibit high site fidelity, returning to the same small breeding territories year after year (AGFD 2005). Hunting is primarily from low perches near the ground, such as low branches, downed trees, roots, and emergent boulders (AGFD 2005). They will also walk on sandbars, mudflats, and shallow riffles in search of crustaceans or stranded fish. They feed primarily on crabs (outside of Arizona), amphibians, fish, reptiles, and crayfish (AGFD 2005). The riparian zone present in portions of Devils Canyon provides suitable habitat for this hawk.

The common black-hawk is a Wildlife Species of Special Concern in Arizona, as well as a US Forest Service sensitive species.

Prairie Falcon

The prairie falcon is a large, powerful falcon with pointed wings. The coloration is brownish above and whitish below. They have a conspicuous dark "mustache" accented by white behind the eye. A true desert falcon, this bird differs from the similar peregrine falcon in that it nests on lower cliffs and in areas that are more open and arid than those preferred by peregrines (Glinski 1998). However, habitat partitioning between these two related species is not absolute, and they often occur together in the same canyons or, in some cases, the same cliff face (Glinski 1998).

The breeding range of this species is limited to western North America, from southern British Columbia, Alberta, and Saskatchewan south to central Mexico (Glinski 1998). The range is bounded on the west by the Pacific Ocean and extends eastward to eastern New Mexico and Colorado. In Arizona, breeding sites are found throughout the state in appropriate habitats (Glinski 1998).

Unlike peregrine falcons, which prey primarily on birds, prairie falcons prey mainly on ground-dwelling rodents (Glinski 1998). However, in the Arizona desert, they also take large numbers of birds as well as reptilian prey (Glinski 1998). The numerous cliff faces and arid habitats associated with Devils Canyon provide suitable habitat for this falcon.

This species is not listed as threatened or endangered under the Endangered Species Act and is not a US Forest Service sensitive species.

2.4 RAPTOR SURVEY METHODS

Raptor survey methodology included linear transects, variable transects, and cliff surveys, all of which are described briefly below.

In general, linear transects are utilized in order to sample large areas in a relatively short period of time (Cooperrider et al. 1986). Linear transects were conducted along Queen Creek and two tributary drainages near the western portion of Oak Flat (Figure 3). These narrow canyon bottoms contain groves of sycamore, velvet ash, and Emory oaks that provide potential nest trees for raptors. Surveyors proceeded slowly on foot along transects, scanning the treetops with binoculars for evidence of raptors or their nests.

Variable transects were conducted in larger areas containing groves of cottonwoods, oaks, and other trees as well as in areas where steep topography and rock outcrops provided potential nest sites (Figure 3). Observers conducting variable transects moved through the survey areas in a meandering fashion, scanning all appropriate nest substrates with binoculars.

Cliff surveys were conducted on the face of Apache Leap from four fixed points located at intervals along the length of the cliff (Figure 3). Surveyors scanned the cliff face with the aid of binoculars and spotting scopes for a period of 2 hours. Observations took place during the early morning hours from one-half hour before sunrise until 4 hours after sunrise for three of the survey points. Surveys at the southernmost fixed point were conducted in the late afternoon. Evidence of raptor habitation (including stick nests,

whitewash, and visual observations of raptors) was recorded on data forms. If raptors were present, behavioral observations were made to determine breeding status. Specific indicators of breeding activities include (Postupalsky 1974):

- Presence of a nest or eyrie[4]
- Young in nest
- Adult in nest in incubation posture
- Mating behavior
- Prey deliveries
- Nest maintenance
- Adult near nest

The Study Area was first surveyed for the presence of raptors on May 22 and 23, 2003, during the known raptor nesting/breeding season, with particular focus on areas containing appropriate nesting substrates such as cliff faces, rock outcrops, utility poles, and large trees. WestLand conducted the 2004 surveys on May 19 and 20, 2004. The 2008 raptor surveys were conducted on May 8, 9, and 20, 2008. The raptor surveys conducted in 2004 and 2008 included both a general survey and ongoing monitoring of previously identified raptor nests. Opportunistic observations of raptors were also recorded by WestLand field personnel during the course of other field activities. These observations were not conducted by survey protocol and are, therefore, separately described in Section 2.6.

2.5 RAPTOR SURVEY RESULTS AND DISCUSSION

The 2008 raptor surveys identified two active raptor breeding territories in the area: a peregrine falcon eyrie on the face of Apache Leap and an active zone-tailed hawk nest in a sycamore tree in Queen Creek Canyon (Figure 3). Both of these territories were also active in 2003 and 2004. The Cooper's hawk nest identified in 2003 was unoccupied in 2008. The great horned owls noted in 2003 were not observed during the 2008 inventory. However, no focused effort was made to find these nocturnal birds. A western screech-owl was heard vocalizing at Oak Flat Campground on the night of May 8, 2008. Numerous turkey vultures were observed soaring along Apache Leap and throughout the area.[5]

The peregrine falcon eyrie on the face of Apache Leap was monitored on May 8, 2008. The cliff face was observed in the afternoon from approximately 3:30 p.m. through 7:30 p.m. No activity was recorded until 7:05 p.m. when the female was heard vocalizing. At 7:06 p.m., a male peregrine falcon came into view and flew back and forth in front of the cliff face carrying a small bird. He was subsequently joined in flight by the female, and an aerial prey exchange was observed when the female approached the male from beneath, inverted, and took the prey from his talons. The female then proceeded to a cliffside perch to feed while the male presumably entered the eyrie. The nest likely contained eggs that had not yet

[4] The eyries of cliff nesting raptors can consist of a stick nest, scrape, ledge, or cavity.
[5] A well-known turkey vulture communal roost is located at the nearby Boyce Thompson Arboretum, where up to 100 individuals congregate nightly (Glinski, 1998).

hatched, as no prey was delivered to the nest. At approximately 7:20 p.m., the female joined the male at the nest and observations were terminated.

The 2003 Cooper's hawk nest site near Dry Reservoir was visited on May 9, 2008. The nest site and its vicinity near the Oak Flat Campground were examined for signs of current occupancy. Although the nest was still present, there was no evidence of recent activity. No Cooper's hawks were observed, no signs of recent nest maintenance were observed, and no Cooper's hawk feathers, prey remains, or whitewash was noted beneath the nest. The nest vicinity was searched for the possible presence of an alternate nest. This search did not detect any signs of Cooper's hawks or their nests. The reasons for the absence of Cooper's hawks in this territory in 2008 are unknown. However, as was the case in 2004, WestLand field personnel noted a high degree of human disturbance throughout the canyon bottom that forms the core of this breeding territory. In addition, there is a well-used campsite with a large fire ring directly below the nest tree. It appears that repeated fires have scorched large branches of the nest tree, which are dying and falling down. The canyon bottom is covered with human and dog footprints and moderate amounts of trash were also noted. Surveyors surmised that the human activity may have disturbed the Cooper's hawks enough for them to abandon the nest site.

On May 20, 2008, WestLand field personnel located an active zone-tailed hawk nest in a sycamore tree within Queen Creek Canyon, immediately adjacent to US Highway 60. An incubating female zone-tailed hawk occupied the nest. When the nest was approached to determine its activity status, the female became agitated and vocalized at the observer. To prevent possible disruption of breeding behavior, the observer quickly left the area. This nest was located in the same area where zone-tailed hawks were detected in 2003 and 2004.

2.6 OPPORTUNISTIC RAPTOR OBSERVATIONS IN DEVILS CANYON

During the course of conducting numerous ongoing biological studies in Devils Canyon, WestLand observed several species of raptors. These raptor observations are summarized below. The locations of these observations are depicted in Figure 4. Four of the species—peregrine falcon, common black-hawk, zone-tailed hawk, and Cooper's hawk—have also been observed in the Study Area outside of Devils Canyon. One additional species, the prairie falcon, was observed in Devils Canyon.

WestLand located a probable peregrine falcon breeding area near the confluence of Devils Canyon and Hackberry Creek. The first observation occurred on March 25, 2008, at 1:14 p.m., when a peregrine falcon was seen overhead. On April 3, 2008, at 11:35 a.m., a single peregrine falcon was observed vocalizing and landing twice upon a deep ledge on the cliffs across from the confluence of Hackberry Creek and Devils Canyon. At 12:24 p.m., a pair of peregrines was observed together at the same area of the cliff. The male then returned to the same ledge used at 11:35 a.m., vocalized, and flew off to join the female on a nearby ledge. After copulation, the male left the area for a few minutes while the female remained at the ledge. At 12:40 p.m., the male returned to the original ledge, vocalized, and flew away. The female left the area at this point and the male visited the original ledge and vocalized before both

birds left the area at 12:45 p.m. This behavior is strongly indicative of an active breeding territory/nest site and it is likely that this cliff face contains an active peregrine eyrie.[6]

An active zone-tailed hawk breeding area was detected in Devils Canyon just upstream of the mouth of Hackberry Canyon. On March 28, 2008, at 9:30 a.m., a zone-tailed hawk was observed vocalizing from an alder tree with a large stick nest. Later that day, at 12:24 p.m., a pair of zone-tailed hawks was observed copulating in a nearby sycamore tree. During the course of WestLand's studies, these birds were frequently observed throughout the stretch of Devils Canyon near the mouths of Rancho Rio, Hackberry, and Oak Creek Canyons. A second zone-tailed hawk activity center was observed at Pipe Springs on May 8 and 9, 2008, where an adult and sub-adult were observed in the vegetated area associated with the springs. There is possibly another breeding area at this location.

On April 24 and 25, 2008, a black-hawk was observed calling softly from a nest in an ash tree while another soared overhead. This bird was observed repeatedly returning to the nest for short periods of time, possibly feeding an incubating female. On June 12, 2008, a second black-hawk breeding area was located in a Fremont cottonwood that contained a large raptor nest in its top. A black-hawk was observed periodically circling the tree and vocalizing during the day.

Cooper's hawks were observed on two occasions in Devils Canyon. One was observed near the mouth of Rancho Rio Creek in November 2007. On April 25, 2008, at 9:55 a.m., a Cooper's hawk was observed flying away from the creek just 65 feet (20 meters) from the black-hawk nest in the ash tree described above. WestLand did not observe any signs of breeding activity.

In November 2007, a prairie falcon was observed upstream from Grapevine Spring. On May 9, 2008, a female falcon was heard vocalizing repeatedly from a cliff face in a manner consistent with an incubating or brooding female "hunger screaming" in order to elicit prey delivery from the attendant male. Although no prairie falcons were visually observed, this is strongly indicative of an occupied breeding area.

2.7 RAPTOR SURVEY CONCLUSIONS

The Study Area supports several species of breeding raptors. The initial baseline inventory (2003) and ongoing monitoring of the Study Area have documented occupied breeding territories of zone-tailed hawks, Cooper's hawks, and peregrine falcons. Great horned owls were observed on site in 2003 and western screech-owls were observed in 2008. The area also supports large concentrations of turkey vultures. During the 2008 survey, two active raptor-breeding territories were observed in the Study Area: a peregrine falcon eyrie and a zone-tailed hawk nest. Ideal nesting habitat for raptors is found along the face of Apache Leap and along Queen Creek. Recreation pressures may limit the use of two oak groves near Oak Flat Campground and Dry Reservoir by nesting raptors.

[6] Rich Glinski, Arizona Game & Fish Department (retired), personal communication to author, July 24, 2008.

3.0 BIRD CENSUS

3.1 BIRD CENSUS SURVEY METHOD

The variable circular-plot method (VCPM) for estimating bird populations was determined to be the survey protocol most appropriate to census birds in the Study Area. An explanation of sampling methods and justification for the technique are provided in Appendix A. The following paragraphs summarize the specific application of this method to the Study Area.

The first stage of this procedure was to identify the biotic communities available in the Study Area and to locate representative points within those communities that would be used for surveying. Upon analysis after-the-fact, it is believed that the upland survey points represent the best opportunity for observing birds, and do not reflect general conditions in the uplands. Initial site visits were made in November and December 2007 to identify points within the biotic community types described in Section 1.1. Fifty points were located (Figure 2) and marked with numbered aluminum tags.

Interior Chaparral biotic community survey locations include five points generally dominated by manzanita, sited on flatter terrain in the northeastern corner of the Study Area, and five points dominated by scrub oak, located on steeper slopes east of Apache Leap. Six survey points on the west side of Apache Leap are located within the Sonoran Desertscrub, Arizona Upland Subdivision biotic community, but these points also include elements of semidesert grassland.[7] The eight survey points in the Madrean Evergreen Woodland biotic community are primarily in the vicinity of the Oak Flat campground. Six Interior Riparian Deciduous Forest biotic community survey points are in the alder grove in Devils Canyon, and 15 other riparian points are located elsewhere along Devils Canyon, Queen Creek, and Rancho Rio Creek. Five riparian points are adjacent to ponds near Oak Flat. This array of points is thus divided into nine distinct biotic community groups. At each survey point location the exact center point was chosen to be the closest tree or shrub species (Table 1). A complete list of these points, with UTM coordinates, is provided in Table 1.

The array of points could be surveyed in 3 days by two teams of observers. Each point was counted 3 times during the winter survey, with survey sets about 3 weeks apart. Each point was surveyed another three times during the breeding survey, with survey sets about 4 weeks apart to cover more of the season. To ensure the greatest reliability in our surveys, we had highly experienced observers leading each team in the field, and we kept the same teams throughout the survey. Each survey group had two people for safety and efficiency.

[7] Brown (1994) describes semidesert grassland as a perennial grass-scrub dominated landscape positioned between lower elevation desert-scrub and higher elevation evergreen woodlands, chaparral, or plains grasslands. This community adjoins and largely surrounds the Chihuahuan desert, and is largely a *Chihuahuan semidesert grassland.* Extensive areas of this grassland are found in the Mexican States of Chihuahua, western Coahuila, and northeastern Sonora extending southwards on the Mexican Plateau to just northeast of Mexico City. In the United States this community occurs in Trans-Pecos Texas, southern New Mexico, and southeast Arizona.

In applying the VCPM to the Study Area, we used 5-meter increments of radius out to 30 meters from the central point, and 10-meter increments from 30 to 100 meters. Birds observed at distances greater than 100 meters from the survey point were recorded but were generally beyond calculated detection limits for density estimates. Survey points were at least 150 meters apart, and frequently more than 200 meters apart, to minimize the possibility of re-counting of individual birds. Because the activity level of birds may decrease during the middle part of the day, census times were restricted to the first 4 hours after sunrise. This restriction is more critical in summer than in winter. For each point we counted for a 10-minute period during each cycle of surveying. The 10-minute period is a commonly used bird survey duration and it facilitates comparison to other VCPM studies. Also, Dettmers et al. (1999) found that 10-minute point count durations provided adequate data for modeling bird-biotic community relations. In order to better understand the rates of detection of birds at each census point, we noted the number of individual birds detected during a first 3-minute period, a second 2-minute period, and a third 5-minute period. We analyzed the data in a manner similar to Dettmers et al. (1999).

The VCPM is particularly useful in estimating densities for a wide variety of bird species. Because different species are detectable at different distances from the observer and the ability of the observer to detect particular species differs among biotic communities, detection distances are determined for each species in each biotic community and the observations from all points and the species observed at those points within that biotic community are combined. The detection distance is normally the distance at which the incremental density of a species in the next greater radial range is less than half of the incremental density in the lower range. Incremental densities are calculated by dividing the number of observations within a concentric ring by the area of that ring. For example, the incremental area of the ring between 30 and 40 meters from the central point would be the area of a 40-meter radius circle minus the area of a 30-meter radius circle.

Because incremental areas increase geometrically with the distance from the central point, minor errors in distance estimates for birds close to the point can bias the density estimate (Verner 1985). Similar biases can result if birds are attracted to or repelled from the observer (Gibbons, et al. 1996). However, the accuracy of detection limits and densities will improve with a greater number of observations. Another potential bias in this method may occur if uncommon birds happen to be observed close to the point. With too few observations to determine a reliable detection limit, very high densities for uncommon species based on one or two close observations could be calculated. To reduce the effects of this potential bias, a minimum detection limit of 20 meters was assumed for uncommon species observed close to the census point.

Once a detection limit has been determined for a species in a biotic community, a density estimate may be calculated based on pooled data from all points within that biotic community. The total number of individuals observed is divided by the area of a circle with a radius of the detection limit. This result is then divided by the total number of counts within that biotic community during the survey. The total number of counts for a biotic community is equal to the number of census points within that biotic community multiplied by the number of survey sets for each point.

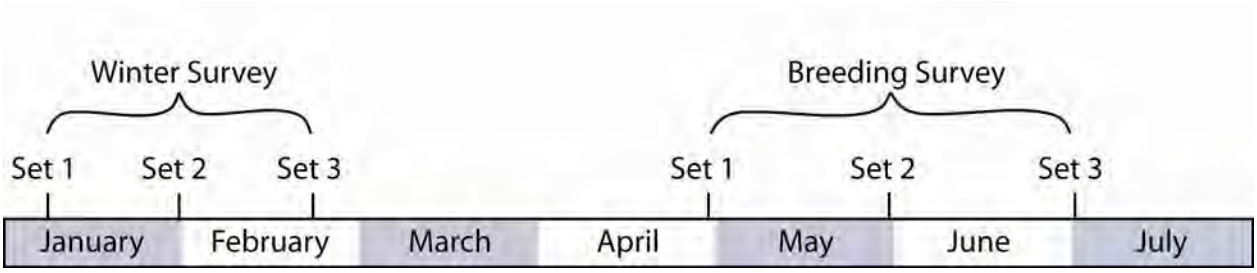
In addition to the bird species densities calculated at each census point, basic vegetation and physical data were collected at each point. These data include:

- Densities and sizes of each tree species
- Canopy cover of each tree species
- Estimated percent cover of the dominant shrub species
- Total herbaceous ground cover
- Underlying geology
- Proximity to surface water
- Other plant species observed on the site

The data collection procedure was a modification of the standard point-centered quarter sampling method. Instead of using points along a transect, we used all survey points within a biotic community to obtain average vegetation characteristics for the community. Tree densities and canopy cover are based on measurements of the closest tree in each quadrant. With bird density data and vegetation data at each survey point, the vegetative characteristics that are most important to the bird species richness and density could possibly be identified. In addition, when foraging behavior was seen, the events were recorded, including species of bird, type of foraging, and species of plant. Nesting observations were also recorded.

3.2 BIRD CENSUS RESULTS AND DISCUSSION

Two cycles of three sets of bird surveys were completed during the winter and the breeding surveys of 2008, as depicted graphically below.



The first winter survey set was January 8, 9, and 10; the second set was January 29, 30, and 31; the final winter survey set was February 19, 20, 21, and 22.[8] The first breeding survey set was April 28, 29, and 30; the second set was May 27, 28, and 29; the final breeding survey set was June 30, and July 1 and 2.

[8] By chance, each of these survey sets followed a significant storm event, producing exceptional amounts of runoff in all channels. In particular, Devils Canyon and Queen Creek were flowing heavily during these sets, making auditory detections of birds more difficult.

The following sections discuss the results of our analyses of:

- Bird species diversity
- Bird species densities
- Time Interval Analysis of survey set time segments
- Effects of time of day
- Vegetation data
- Bird-vegetation correlations

Bird Species Diversity

Fifty-six bird species were observed on or adjacent to the Study Area during the winter surveys, as listed in Table 2a. During the breeding survey, 92 species were observed on or near the Study Area, as listed in Table 2b. The order of species in these tables follows the taxonomy of the American Ornithologists Union (AOU 2008).

During our winter survey, 54 bird species were recorded with distance estimates. Two other species were opportunistically observed in the Study Area during this effort. As noted above, the data from all survey points in specific biotic communities were combined to determine detection limits for each species in each biotic community.

During our breeding survey, 87 bird species were recorded with distance estimates. Five other species were observed in the vicinity but were not recorded at any points during a survey set. Again, the data from all survey points in specific biotic communities were combined to determine detection limits for each species in each biotic community. As in the winter survey, most breeding survey density estimates are based on relatively few observations, although the total number of observations is much higher in the breeding survey. Only 60 of 324 breeding density estimates (18.5 percent) are based on 10 or more observations within a biotic community type.

The numbers of winter survey species observed in the different biotic communities covered a broad range. On the low end, seven species were observed in the Interior Chaparral-scrub oak series and eight species were observed in the Interior Riparian Deciduous Forest of Rancho Rio Creek. On the high end, 26 species were observed in the Interior Chaparral-manzanita series and 28 species at the Interior Riparian Deciduous Forest at the ponds. The average number of species per biotic community in the winter survey was 16.7. As expected, the number of species observed in each biotic community tended to increase with each winter survey as migratory birds arrived when temperatures increased. Also as expected, the number of new species observed tended to decrease with later winter survey sets (although there were some exceptions for certain communities). These data are presented numerically in Table 3a and graphically in Figure 5a. The pattern is generally similar in each biotic community, although the total numbers of species differs.

The numbers of breeding survey species observed in the different biotic communities ranged from a low of 28 species in the Interior Chaparral-scrub oak series and Arizona Upland Subdivision of Sonoran Desertscrub to highs of 42 species in the Interior Riparian Deciduous Forest of Devils Canyon and 44 species in the Interior Chaparral-manzanita series. The average number of species per biotic community in the breeding survey was 36.0. Similar to the pattern observed during the winter, the number of species observed in a biotic community tended to increase with each survey event. Also as expected, the number of new species decreased with later survey sets, with the exception of the last survey in the Interior Riparian Deciduous Forest alder grove of Devils Canyon. These data are presented numerically in Table 3b and graphically in Figure 5b.

One obvious contrast between winter and breeding surveys is that many more species were observed in each biotic community during the breeding survey than in the winter survey. The minimum number of species per biotic community in the breeding survey was the same as the maximum number of species per biotic community in the winter survey. However, the difference between maximum and minimum numbers of species among biotic communities was much lower in the breeding survey. In winter the ratio of maximum to minimum number of species was 4.0, while in the breeding survey the maximum to minimum ratio was only 1.6.

Figures 6a and 6b show the percentage of bird species detected in each biotic community for each of the three survey sets in the winter and breeding surveys, respectively. In order to combine these winter survey results to generate a trend for the entire area, the data were normalized by converting to a percent of the total for each biotic community and then averaged. The results of this operation are shown in Figure 6c. The general pattern for the winter survey in this figure indicates that roughly 50 percent of the species were observed during the first survey set, another 30 percent were added in the second survey set, and the last survey set only added about 20 percent of the species. The breeding survey data general pattern is similar to that for the winter, except the curve is initially steeper, and it flattens more in the last survey set. Nearly 65 percent of the species were observed during the first breeding survey set, another 25 percent were added in the second survey set, and the last survey set only added about 10 percent of the species.

Bird Species Densities

The detection limits mentioned above were used to calculate densities for each species in each biotic community. These densities provide for reasonable statistical comparisons among biotic communities. Detection limits and densities that are based on very few observations are only approximate. Because birds were relatively sparse in most biotic communities in the Study Area during winter, only 17 out of 150 density estimates (11.3 percent) are based on 10 or more observations within a biotic community.

Total winter survey bird densities in the biotic communities within the Study Area (Table 3a) range from a low of about 1.2 birds per hectare in the Interior Chaparral-scrub oak series to a high of 11.3 birds per hectare in the Interior Chaparral-manzanita series. There is no obvious reason for the large difference in bird density between the scrub oak and manzanita Interior Chaparral points. Within this range, the three

Interior Riparian Deciduous Forest areas (alder grove in Devils Canyon, Devils Canyon, and the ponds) also had relatively high bird densities of between 8 and 9 birds per hectare. A weighted average of all biotic community types gives a density of 6.8 birds per hectare for the winter survey.

Despite this order-of-magnitude range, these winter survey bird density values are all very low, indicating that wintering birds are sparsely distributed in the Study Area and surrounding land. This result is consistent with our impressions during data collection that there were very few birds present. There were several points during each survey set at which no birds were observed, and at many points only a few individuals or species were recorded.

Total breeding survey bird densities in these biotic communities range (Table 3b) from a low of about 9.7 birds per hectare in the Interior Chaparral-scrub oak series to a high of 44.1 birds per hectare in the Interior Riparian Deciduous Forest alder grove in Devils Canyon. The Interior Chaparral-manzanita series also had a relatively high density at about 34.6 birds per hectare. A weighted average of all biotic communities gives a density of 23.3 birds per hectare during the breeding survey.

These breeding survey bird densities are all higher than the winter survey densities, and the minimum breeding survey bird density is comparable to the maximum winter survey bird density. In a pattern similar to the species diversity, the difference between maximum and minimum bird densities among biotic communities was lower in the breeding survey than in the winter survey. In winter, the ratio of maximum to minimum bird densities was 9.6, while in the breeding survey the maximum to minimum ratio was only 4.5.

Time Interval Analysis of Survey Sets

The survey data were also analyzed based on observations within different time segments in each survey set. Observations were recorded separately for the first 3 minutes, the next 2 minutes, and the final 5 minutes of the total 10-minute survey at each point. Surveyors hypothesized that most species and individuals would be seen during the 3-minute and 2-minute intervals, and that fewer new species and individuals would be added during the final 5-minute interval. The data collected during our winter surveys generally support this hypothesis, although there are variations among the different biotic communities. Time interval analyses for each biotic community type during the winter and breeding surveys, by species and by individual birds, are presented in Figures 7a and 7b through 15a and 15b.

These graphs show that most biotic communities have a similar pattern in winter, with many species and individuals observed during the first 5 minutes of a survey, and fewer species and individuals added later in the survey. These patterns are similar to the results for numbers of species and individual birds recorded during the three survey sets. Two notable exceptions are the Interior Chaparral-scrub oak series and Madrean Evergreen Woodland biotic communities. In both, the relationships between species, individuals, and time are nearly linear. In the scrub oak series, the linear relationships may be an artifact of the limited data set (i.e., few data points) for this biotic community. The Interior Chaparral-scrub oak series had the fewest total species and the lowest total density of birds of any of the biotic communities

surveyed. In contrast, the Madrean Evergreen Woodlands biotic community had a relatively high number of species and an average total bird density, and there is no obvious reason for the linear relationships.

In general, the patterns for breeding survey data are very similar to those based on the winter survey data. For the Interior Chaparral-manzanita series and Interior Riparian Deciduous Forest along Queen Creek, the shapes of the curves are almost identical. The Interior Chaparral-scrub oak series and Madrean Evergreen Woodlands breeding survey results were not as linear as the winter survey results, but they were generally more linear than the breeding results in other biotic community types. The similarity in patterns is interesting because the breeding survey results are based on many more species and individuals than the winter survey results.

The time interval data were combined for all survey points for the winter and breeding surveys, by species and individuals, as depicted in Figures 16a and 16b. The curves for species and individuals are not as pronounced as expected, probably because of the influence of the Madrean Evergreen Woodlands and Interior Chaparral-scrub oak series exceptions noted above. When these data are converted to percentages and replotted (Figures 17a and 17b), the same pattern as noted for species is present. For the winter surveys, these curves make it clear that between 70 and 75 percent of the species and individuals are recorded within the first 5 minutes of a survey, and 25 to 30 percent were recorded during the last 5 minutes. Even though the breeding survey plots are based on many more species and individual observations, the shapes of the curves are nearly identical between winter and breeding survey. During the breeding survey, about 70 percent of species and individuals were recorded during the first 5 minutes at a point, and only about 30 percent were recorded during the final 5 minutes. In several of the biotic communities, over 80 percent of species and/or individuals were recorded during the first 5 minutes. In the Interior Riparian Deciduous Forest along Rancho Rio Creek, 100 percent of the species were recorded in the first 5 minutes, but this biotic community type is very low in species diversity.

These results show a point of diminishing returns on survey time expenditures for both winter and breeding surveys. Most information is captured within the first 5 minutes, but enough species and individuals are added during the final 5 minutes to conclude that the final 5 minutes spent surveying are worthwhile. Longer survey periods are not likely to provide enough additional information to justify the time expenditure.

Effects of Time of Day

Our survey protocol includes the implicit assumption that bird activity will decrease in the middle part of the day, leading to a potential bias in density data. While this expected decrease in activity is likely because of high daytime temperatures during the summer, it seems less likely to occur during the winter. To test this assumption, we analyzed the numbers of species and individuals recorded during each 10-minute survey period, based on the time after sunrise that the survey period started. The data were separated into half-hour time intervals beginning with the time of sunrise, and the bird counts were averaged during those time intervals. Using time-after-sunrise eliminates any potential bias from

increasing day lengths and the start time at each survey point was varied so that no one survey point was surveyed during the same time after sunrise.

Results of this analysis, based on 150 survey periods (three sets of survey at 50 survey points) during winter and breeding survey, are shown numerically in Tables 5a and 5b, respectively. Figures 18a and 18b show these data graphically for species and individuals, respectively, but excluding statistical outliers described below.

For the winter survey (Table 5a), these data show a slight positive trend, indicating that both species and numbers of individuals are increasing with time of day, and not decreasing as was expected for breeding survey data. The correlation coefficients (r) for these relationships are 0.6561 for species and 0.5670 for individuals. Neither of these correlations is statistically significant at the $p = 0.05$ level. These results may be somewhat misleading, because the eighth and ninth time intervals have only one count each, thus not allowing any averaging of data. All other time intervals had at least 11 counts that were averaged. By chance, the count during the ninth time interval happened to have one of the highest number of species recorded on any count, and it also had a high number of individuals. These values are obvious outliers, and using the Dixon test, both of these values can be statistically rejected with a probable error of less than 0.01 (Sokal and Rohlf 1981). When these points are deleted, the remaining 148 counts in seven time intervals are plotted in Figures 18a and 18b for species and individuals, respectively. These data still show a very slight positive trend, but much less than with the outliers ($r = 0.5969$ for species and 0.1802 for individuals). Neither of these correlations is statistically significant at the $p = 0.05$ level (Rohlf and Sokal 1981).

The breeding survey results based on time of day for 150 point counts are shown numerically in Table 5b. For the species relationship, $r = 0.9358$, which is statistically significant at the $p = 0.01$ level; for the numbers of individuals, $r = 0.7803$, which is statistically significant at the $p = 0.05$ level. These results are a little surprising, in that they contradict our assumption of reduced bird activity later in the day. Activity may still decrease in the hottest part of the day, but the 4-hour period after sunrise is apparently not a long enough time to detect the anticipated decrease.

Vegetation Data at Bird Survey Points

The vegetation density and cover data for the 50 bird survey points are summarized by biotic community type in Table 6. The average tree density in these biotic communities ranged from lows of 70.7 trees per hectare in the Interior Riparian Deciduous Forest along Rancho Rio Creek and 94.5 trees per hectare in the Interior Chaparral-scrub oak series, to a high of 403.4 trees per hectare in the Interior Riparian Deciduous Forest alder grove in Devils Canyon. The maximum-to-minimum ratio for tree density is 5.7, indicating a wide range in densities.

The average tree canopy cover ranged from lows of 436 square meters per hectare (1 hectare = 10,000 square meters) in the Interior Chaparral-scrub oak series and 880 square meters per hectare in the Interior Chaparral-manzanita series to a high of 16,240 square meters per hectare in the Interior Riparian

Deciduous Forest alder grove in Devils Canyon. The maximum to minimum ratio for tree canopy cover is 37.2, indicating a very wide range in canopy cover. The two Interior Chaparral biotic community series were expected to have low tree canopy cover because they are predominantly shrub communities, and the trees are widely spaced and generally have low stature. The Interior Riparian Deciduous Forest alder grove has a high density of large-stature trees, and a calculated canopy cover greater than 10,000 square meters per hectare indicates an overlapping, closed canopy with multiple layers.

Twenty-three species of trees were recorded at least once as the closest tree in a bird survey point quarter (Table 7). Many of these tree species were only recorded in a single biotic community, and no tree species were recorded in all biotic communities. Emory oak and netleaf hackberry were found in the greatest numbers of biotic communities. Six other tree species, including four exotics, were recorded within 30 meters of at least one survey point. These species were Arizona cypress, alligator-bark juniper, Mexican paloverde (*Parkinsonia aculeata*), white mulberry (*Morus alba*), southern catalpa (*Catalpa bignonioides*), and tamarisk (*Tamarix* sp.).

The average cover of shrub species ranged from a low of 15 percent at the pond sites to a high of 42 percent in the Interior Chaparral-scrub oak series. Manzanita series cover was also relatively high, at 31 percent. High cover of shrubs is expected in chaparral communities, consistent with the observed low tree canopy cover. Thirty-six different shrub species were among the five most common shrubs for at least one of the survey points, as listed in Table 6. At least 19 other shrub species and several cactus species were recorded within 10 meters of at least one survey point. We did not attempt to compile a comprehensive plant species list for the Study Area, but we did record other common species observed within a 30-meter radius of each bird survey point. Over 180 plant species were recorded in this effort, as listed in Table 8.

Average herbaceous ground cover was generally very low in almost all biotic community types, ranging from a low of 1 percent in the Interior Chaparral-manzanita series to a high of 24 percent in the Interior Riparian Deciduous Forest pond sites community. Low herbaceous cover is expected in a semi-arid environment, and it is often dependent on the extent of recent rainfall events. Most of our vegetation measurements were completed prior to the onset of the summer monsoon season. The ponds had relatively high herbaceous cover because many areas that were underwater in the winter were dry and covered with herbaceous plants by late spring when our breeding survey began.

Bird-Vegetation Correlations

Winter and breeding survey data for bird species diversity and total tree density for all biotic community types are shown in Figure 19, and correlation coefficients (r) were calculated for these data. Neither the winter survey ($r = 0.0762$) nor the breeding survey ($r = 0.3851$) showed a significant correlation between species diversity and tree density.

Winter and breeding survey data for total bird density and total tree density across all biotic community types are shown in Figure 20. There was no significant correlation for the winter survey ($r = 0.3162$). The

breeding survey data suggest a positive correlation between bird density and tree density, but the relationship was not statistically significant ($r = 0.6421$, $p>0.05$) (Rohlf and Sokal 1981). This relationship is strongly influenced by the results from the Interior Riparian Deciduous Forest alder grove in Devils Canyon, which had high bird density and very high tree density.

Winter and breeding survey data for bird species diversity and total tree canopy cover for all biotic community types are shown in Figure 21. Neither the winter survey ($r = -0.0675$) nor the breeding survey ($r = 0.4572$) showed a significant correlation between species diversity and tree canopy cover. Winter and breeding survey data for total bird density and total tree canopy cover for all biotic community types are shown in Figure 22. There was no significant correlation for the winter survey ($r = 0.3014$). The breeding survey data suggest a positive correlation between bird density and tree canopy cover, but the relationship was not statistically significant ($r = 0.6428$, $p>0.05$). In each of these plots, the Interior Riparian Deciduous Forest alder grove appears to be an outlier because of its very high canopy cover.

Winter and breeding survey data for bird species diversity and shrub cover (on a percentage basis) for all biotic community types are shown in Figure 23. Both the winter survey data ($r = -0.4221$) and the breeding survey data ($r = -0.5568$) indicate a negative relationship between species diversity and shrub cover, but these trends are not statistically significant. Winter and breeding survey data for total bird density and shrub cover (on a percentage basis) for all biotic community types are shown in Figure 24. These data also indicate a negative relationship for the winter survey ($r = -0.5095$) and the breeding survey ($r = -0.1979$). However, each of these relationships is influenced by the Interior Chaparral-scrub oak series, which had relatively high shrub cover and very low bird species diversity and total bird density.

3.3 BIRD CENSUS SUMMARY AND CONCLUSIONS

The 2008 winter and breeding surveys using the VCPM has been successfully completed at the Study Area. These surveys covered 50 points grouped into nine different biotic community types. The winter survey results show that the diversity of birds encountered during this survey was relatively high. Fifty-four bird species were recorded during the winter survey point counts, and two other species were observed at other times on the site. The diversity of birds within a biotic community ranged from seven species in the Interior Chaparral-scrub oak series to a high of 28 species at the Interior Riparian Deciduous Forest surrounding the ponds. The winter densities of birds across the site were relatively low in all biotic communities, with densities ranging from 1.2 birds per hectare in the scrub oak chaparral to 11.3 birds per hectare in the Interior Chaparral-manzanita series. The weighted average density across all biotic community types is only 6.8 birds per hectare during the winter survey.

The density and diversity of birds in the breeding survey were much higher than in the winter survey in all biotic communities. Ninety-two (92) species were observed during breeding surveys. Species diversity ranged from lows of 28 species in the Arizona Uplands subdivision of the Sonoran Desertscrub biotic community and Interior Chaparral-scrub oak series to a high of 44 species in the Madrean Evergreen Woodlands. Bird densities ranged from a low of 9.7 birds per hectare in the Interior Chaparral-scrub oak

series to a high of 44.1 birds per hectare in the Interior Riparian Deciduous Forest alder grove in Devils Canyon. The weighted average density across all biotic community types in the breeding survey was 23.3 birds per hectare.

Observations within 3-minute, 2-minute, and 5-minute segments of the total time at each survey point showed the expected pattern of numerous species and individuals observed during the first segment, and relatively few species and individuals added during the final 5 minutes. Similar patterns were obtained in the winter and breeding surveys. Between 70 and 75 percent of species and individuals were observed during the first 5 minutes of a count, and the last 5 minutes added only 25 to 30 percent of species and individuals. Most biotic community types also showed this pattern, although the Interior Chaparral-scrub oak series and Madrean Evergreen Woodlands biotic communities showed nearly linear relationships of species and individuals with time. From these results, we conclude that 10 minutes is an appropriate time period for the surveys. A shorter time is likely to miss species and individuals, and a longer time is not likely to provide a return in observations proportional to the additional effort.

An analysis of the winter survey data for the possible effect of time of day on the surveys shows a slight positive trend for both species and numbers of individuals with the elapsed time after sunrise. However, these correlations are not statistically significant. From these results, we can conclude that time of day does not appear to be significant for surveying birds in the winter, although there may be somewhat more activity as the day becomes slightly warmer. During the breeding survey, our data indicate significant positive correlations with time of day for both numbers of species and numbers of individuals. This result is contrary to our expectation of decreasing activity during the day, but it also provides justification for using the full 4-hour period after sunrise.

In conjunction with our bird surveys, we collected vegetation data at each of the 50 survey points, and the data were summarized for each biotic community type. Tree densities in these biotic communities ranged from 70.7 trees per hectare in the Interior Riparian Deciduous Forest along Rancho Rio to 403.4 trees per hectare in the Interior Riparian Deciduous Forest alder grove along Devils Canyon. Tree canopy cover ranged from 436 square meters per hectare in the scrub oak series to 16,240 square meters per hectare in the Interior Riparian Deciduous Forest alder grove. Shrub cover was highest in the Interior Chaparral biotic community, with a cover of 42 percent in the scrub oak series and 31 percent in the manzanita series. The Interior Riparian Deciduous Forest vegetation around the ponds had the lowest shrub cover at 15 percent, but they had the highest herbaceous cover at 24 percent. Herbaceous cover was very low in most other biotic communities, but it was about 15 percent in the Madrean Evergreen Woodlands.

We evaluated possible correlations between bird species diversity and total bird density and the vegetation characteristics of total tree density, total tree canopy cover, and shrub cover. While there were some indications of positive and negative relationships, none of these correlations were statistically significant. In each case, these relationships were heavily influenced by either the alder grove Interior Riparian Deciduous Forest biotic community, which had very high tree density and tree canopy cover, or the scrub oak Interior Chaparral, which had very high shrub cover.

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TABLES

Table 1. Locations of Resolution Bird Survey Points. UTM coordinates, Region 12S, NAD27

Survey Point	Tag Number	Tagged Tree or Shrub Species*	Easting (m)	Northing (m)	Approximate Elevation (ft)
Arizona Upland					
A-1	1	VACA	492336	3682803	3,560
A-2	2	PRVE	492466	3682894	3,670
A-3	3	PAMI	492303	3682984	3,720
A-4	4	CAHO	492130	3682968	3,650
A-5	5	CAHO	492422	3683066	3,780
A-6	6	ACGR	492585	3683081	3,870
Chaparral-Manzanita					
CM-1	7	ARPU	496552	3685093	4,070
CM-2	8	ARPU	496456	3685686	4,110
CM-3	9	JUMO	496520	3685537	4,090
CM-4	10	QUEM	496673	3685419	4,110
CM-5	11	QUEM	496521	3685265	4,070
Chaparral-Scrub Oak					
CS-1	12	QUTU	494504	3684299	3,940
CS-2	13	CEMO	494440	3683668	4,020
CS-3	14	PIMO	494452	3683392	4,080
CS-4	15	CEMO	494456	3682928	4,120
CS-5	16	JUMO	494488	3682745	4,100
Devils Canyon					
D-1	17	PLWR	497052	3687132	3,990
D-2	18	PLWR	496978	3686933	3,985
D-3	19	PLWR	496957	3686780	3,950
D-4	51	PLWR	496952	3684635	3,800
D-5	21	PLWR	496942	3684408	3,780
D-6	22	PLWR	496952	3684213	3,770
D-7	23	ALOB	497444	3682078	3,600
D-8	24	ALOB	497466	3681879	3,580
D-9	25	ALOB	497452	3681676	3,560
D-10	26	ALOB	497506	3681477	3,540
D-11	27	ALOB	497529	3681276	3,530
D-12	28	ALOB	497550	3681082	3,510
Oak Woodland					
O-1	29	QUEM	495694	3685582	3,950
O-2	30	QUEM	495613	3685398	3,945
O-3	31	QUEM	495483	3685237	3,940
O-4	32	QUEM	495271	3685184	3,920
O-5	33	QUEM	495759	3684675	3,980
O-6	34	QUEM	495479	3684621	3,970
O-7	35	QUEM	494503	3684813	3,830
O-8	36	QUEM	494369	3684882	3,820
Ponds					
P-1	37	QUEM	494947	3685352	3,940
P-2	38	SAGO	495054	3685303	3,940
P-3	39	SAGO	495065	3684520	3,940
P-4	40	SAGO	494524	3684007	3,970
P-5	41	PRVE	496250	3681604	3,890

Table 1. Locations of Resolution Bird Survey Points. UTM coordinates, Region 12S, NAD27

Survey Point	Tag Number	Tagged Tree or Shrub Species*	Easting (m)	Northing (m)	Approximate Elevation (ft)
Queen Creek					
Q-1	42	QUEM	494604	3685661	3,850
Q-2	43	POFR	494512	3685561	3,840
Q-3	44	PLWR	494332	3685400	3,800
Q-4	45	POFR	494143	3685374	3,760
Q-5	46	PLWR	494019	3685411	3,720
Q-6	47	JUMA	493831	3685414	3,680
Rancho Rio Creek					
R-1	48	CEPA	495904	3682615	3,920
R-2	49	QUEM	496012	3682832	3,910
R-3	50	PIMO	496153	3682659	3,900

*Tree and Shrub Species:

ACGR = *Acacia greggii* – Catclaw Acacia
ALOB = *Alnus oblongifolia* – Arizona Alder
ARPU = *Arctostaphylos pungens* – Point-leaf Manzanita
CAHO = *Canotia holocantha* – Crucifixion Thorn
CELA = *Celtis laevigata* var. *reticulata* –Netleaf Hackberry
CEPA = *Celtis pallida* – Desert Hackberry
CEMO = *Cercocarpus montanus* – Mountain Mahogany
JUMA = *Juglans major* – Arizona Black Walnut
JUMO = *Juniperus monosperma* – One-seed Juniper
PAMI = *Parkinsonia microphylla* – Foothill Paloverde
PIMO = *Pinus monophylla* – Singleleaf Pinyon
PLWR = *Platanus wrightii* – Arizona Sycamore
POFR = *Populus fremontii* – Fremont Cottonwood
PRVE = *Prosopis velutina* – Velvet Mesquite
QUEM = *Quercus emoryi* – Emory Oak
QUTU = *Quercus turbinella* – Scrub Oak
SAGO = *Salix gooddingii* – Goodding Willow
VACA = *Vauquelinia californica* – Arizona Rosewood

Table 2a. Composite List of Bird Species Observed in Each Biotic Community During the Winter Survey

Scientific Name	Common Name	Biotic Community				
		AZ Up	Oaks	Chap	Rip	Ponds
Anas platyrhynchos	Mallard					✓
Anas crecca	Green-winged Teal					✓
Aythya valisineria	Canvasback					✓
Aythya americana	Redhead					✓
Aythya collaris	Ring-necked Duck					✓
Callipepla gambelii	Gambel's Quail	✓	✓	✓		✓
Buteo jamaicensis	Red-tailed Hawk	✓		✓		✓
Gallinago gallinago	Common Snipe				✓	✓
Geococcyx californianus	Greater Roadrunner			✓		✓
Megascops kennicottii	Western Screech-owl		✓			
Archilochus alexandri	Black-chinned Hummingbird		✓			
Calypte anna	Anna's Hummingbird	✓		✓	✓	
Melanerpes uropygialis	Gila Woodpecker	✓			✓	
Sphyrapicus nuchalis	Red-naped Sapsucker		✓		✓	
Picoides scalaris	Ladder-backed Woodpecker	✓	✓	✓	✓	
Colaptes auratus	Northern Flicker	✓	✓	✓	✓	✓
Sayornis saya	Say's Phoebe	✓		✓	✓	✓
Sayornis nigricans	Black Phoebe					✓
Lanius ludovicianus	Loggerhead Shrike					✓
Aphelocoma californica	Western Scrub-Jay		✓	✓	✓	✓
Corvus corax	Common Raven	✓	✓	✓	✓	
Baeolophus wollweberi	Bridled Titmouse		✓	✓	✓	
Auriparus flaviceps	Verdin	✓	✓	✓	✓	
Psaltriparus minimus	Bushtit			✓		
Campylorhynchus brunneicapillus	Cactus Wren	✓				✓
Salpinctes obsoletus	Rock Wren	✓	✓	✓	✓	✓
Catherpes mexicanus	Canyon Wren	✓	✓	✓	✓	✓
Thryomanes bewickii	Bewick's Wren	✓	✓	✓	✓	✓
Regulus calendula	Ruby-crowned Kinglet		✓	✓	✓	✓
Polioptila melanura	Black-tailed Gnatcatcher	✓		✓		
Sialia mexicana	Western Bluebird	✓	✓	✓	✓	
Myadestes townsendi	Townsend's Solitaire			✓	✓	
Catharus guttatus	Hermit Thrush					✓
Turdus migratorius	American Robin		✓		✓	✓
Mimus polyglottos	Northern Mockingbird	✓	✓	✓		
Toxostoma curvirostre	Curve-billed Thrasher	✓		✓		✓
Toxostoma crissale	Crissal Thrasher		✓	✓		
Phainopepla nitens	Phainopepla	✓	✓	✓	✓	
Dendroica coronata	Yellow-rumped Warbler				✓	✓
Pipilo chlorurus	Green-tailed Towhee					✓
Pipilo maculatus	Spotted Towhee		✓	✓	✓	✓
Pipilo fuscus	Canyon Towhee	✓	✓	✓	✓	
Pipilo aberti	Abert's Towhee				✓	
Aimophila ruficeps	Rufous-crowned Sparrow	✓	✓	✓	✓	
Amphispiza bilineata	Black-throated Sparrow	✓		✓		
Melospiza melodia	Song Sparrow				✓	✓
Zonotrichia leucophrys	White-crowned Sparrow		✓	✓	✓	✓
Junco hyemalis	Dark-eyed Junco		✓	✓	✓	✓

Table 2a. Composite List of Bird Species Observed in Each Biotic Community During the Winter Survey

Scientific Name	Common Name	Biotic Community				
		AZ Up	Oaks	Chap	Rip	Ponds
Cardinalis cardinalis	Northern Cardinal				✓	✓
Agelaius phoeniceus	Red-winged Blackbird					✓
Carpodacus mexicanus	House Finch	✓	✓	✓	✓	
Carduelis pinus	Pine Siskin				✓	
Carduelis psaltria	Lesser Goldfinch	✓		✓	✓	
Carduelis tristis	American Goldfinch				✓	

Table 2b. Composite List of Bird Species Observed in Each Biotic Community During the Breeding Survey

Scientific Name	Common Name	Biotic Community				
		AZ Up	Oaks	Chap	Rip	Ponds
Callipepla gambelii	Gambel's Quail	✓	✓	✓	✓	✓
Cathartes aura	Turkey Vulture	✓	✓	✓	✓	✓
Buteogallus anthracinus	Common Black-hawk				✓	
Buteo nitidus	Gray Hawk		✓			
Buteo swainsoni	Swainson's Hawk		✓			
Buteo albonotatus	Zone-tailed Hawk		✓		✓	
Buteo jamaicensis	Red-tailed Hawk				✓	
Falco peregrinus	Peregrine Falcon	✓			✓	
Streptopellia decaocto	Eurasian Collared Dove					✓
Zenaida asiatica	White-winged Dove	✓	✓	✓	✓	✓
Zenaida macroura	Mourning Dove	✓	✓	✓	✓	✓
Geococcyx californianus	Greater Roadrunner		✓	✓		
Bubo virginianus	Great Horned Owl				✓	
Glaucidium gnoma	Northern Pygmy-Owl		✓			
Aeronautes saxatalis	White-throated Swift	✓			✓	
Archilochus alexandri	Black-chinned Hummingbird			✓	✓	
Calypte anna	Anna's Hummingbird		✓	✓	✓	✓
Calypte costae	Costa's Hummingbird	✓				
Selasphorus rufus	Rufous Hummingbird				✓	
	Humingbird sp.	✓	✓	✓	✓	
Megaceryle alcyon	Belted Kingfisher				✓	
Melanerpes uropygialis	Gila Woodpecker				✓	
Picoides scalaris	Ladder-backed Woodpecker		✓	✓	✓	✓
Colaptes auratus	Northern Flicker				✓	✓
Contopus pertinax	Greater Pewee				✓	
Contopus sordidulus	Western Wood-Pewee				✓	
Empidonax wrightii	Gray Flycatcher		✓		✓	
Empidonax sp.	*Empidonax* flycatcher			✓	✓	
Sayornis saya	Say's Phoebe	✓	✓		✓	
Sayornis nigricans	Black Phoebe			✓	✓	✓
Myiarchus cinerascens	Ash-throated Flycatcher	✓	✓	✓	✓	✓
Myiarchus tyrannulus	Brown-crested Flycatcher			✓	✓	✓
Tyrannus vociferans	Cassin's Kingbird		✓	✓	✓	✓
Tyrannus verticalis	Western Kingbird			✓	✓	✓
Lanius ludovicianus	Loggerhead Shrike	✓				
Vireo bellii	Bell's Vireo		✓	✓	✓	✓
Vireo vicinior	Gray Vireo		✓	✓	✓	

Table 2b. Composite List of Bird Species Observed in Each Biotic Community During the Breeding Survey

Scientific Name	Common Name	Biotic Community				
		AZ Up	Oaks	Chap	Rip	Ponds
Vireo plumbeus	Plumbeous Vireo		✓		✓	✓
Vireo huttoni	Hutton's Vireo				✓	
Vireo gilvus	Warbling Vireo			✓	✓	
Aphelocoma californica	Western Scrub-Jay		✓	✓	✓	
Corvus corax	Common Raven	✓	✓	✓	✓	✓
Progne subis	Purple Martin				✓	
Tachycineta thalassina	Violet-green Swallow		✓		✓	✓
Stelgidopteryx serripennis	Northern Rough-winged Swallow					✓
Baeolophus wollweberi	Bridled Titmouse		✓	✓	✓	
Baeolophus ridgwayi	Juniper Titmouse		✓			
Auriparus flaviceps	Verdin		✓	✓	✓	
Psaltriparus minimus	Bushtit		✓	✓	✓	✓
Campylorhynchus brunneicapillus	Cactus Wren	✓			✓	✓
Salpinctes obsoletus	Rock Wren	✓	✓	✓	✓	✓
Catherpes mexicanus	Canyon Wren	✓	✓	✓	✓	✓
Thryomanes bewickii	Bewick's Wren	✓	✓	✓	✓	✓
Polioptila caerulea	Blue-gray Gnatcatcher	✓	✓		✓	
Polioptila melanura	Black-tailed Gnatcatcher	✓	✓	✓	✓	
Mimus polyglottos	Northern Mockingbird	✓	✓	✓	✓	✓
Toxostoma curvirostre	Curve-billed Thrasher	✓		✓		
Toxostoma crissale	Crissal Thrasher		✓	✓		✓
Phainopepla nitens	Phainopepla	✓	✓	✓	✓	✓
Vermivora celata	Orange-crowned Warbler		✓	✓		
Vermivora virginiae	Virginia's Warbler		✓			✓
Vermivora luciae	Lucy's Warbler		✓		✓	✓
Dendroica petechia	Yellow Warbler				✓	✓
Dendroica townsendii	Townsend's Warbler				✓	
Dendroica coronata	Yellow-rumped Warbler		✓		✓	✓
Wilsonia pusilla	Wilson's Warbler		✓		✓	
Icteria virens	Yellow-breasted Chat					✓
Piranga flava	Hepatic Tanager			✓		
Piranga rubra	Summer Tanager		✓		✓	✓
Piranga ludoviciana	Western Tanager		✓	✓	✓	✓
Pipilo chlorurus	Green-tailed Towhee	✓		✓	✓	
Pipilo maculatus	Spotted Towhee		✓	✓	✓	✓
Pipilo fuscus	Canyon Towhee	✓	✓	✓	✓	✓
Pipilo aberti	Abert's Towhee		✓			
Aimophila ruficeps	Rufous-crowned Sparrow	✓	✓	✓	✓	
Spizella passerina	Chipping Sparrow		✓			✓
Spizella breweri	Brewer's Sparrow			✓		
Spizella atrogularis	Black-chinned Sparrow	✓	✓	✓	✓	
Chondestes grammacus	Lark Sparrow			✓		✓
Amphispiza bilineata	Black-throated Sparrow	✓		✓	✓	
Zonotrichia leucophrys	White-crowned Sparrow		✓	✓		
Junco hyemalis	Dark-eyed Junco			✓	✓	
Cardinalis cardinalis	Northern Cardinal				✓	✓
Pheucticus melanocephalus	Black-headed Grosbeak				✓	
Agelaius phoeniceus	Red-winged Blackbird					✓

Table 2b. Composite List of Bird Species Observed in Each Biotic Community During the Breeding Survey

Scientific Name	Common Name	Biotic Community				
		AZ Up	Oaks	Chap	Rip	Ponds
Molothrus ater	Brown-headed Cowbird	✓	✓	✓	✓	✓
Icterus cucullatus	Hooded Oriole				✓	✓
Icterus bullocki	Bullock's Oriole				✓	
Icterus parisorum	Scott's Oriole	✓		✓	✓	
Carpodacus cassinii	Cassin's Finch				✓	
Carpodacus mexicanus	House Finch	✓	✓	✓	✓	
Carduelis psaltria	Lesser Goldfinch		✓	✓	✓	

Table 3a. Winter Survey Densities of Birds Recorded During Variable Circular Plot Surveys in Each Biotic Community

Scientific Name	Common Name	Winter Bird Densities (birds/hectare) per Biotic Community								
		AZ Upland	Alders (Devils Canyon)	Chaparral (Scrub Oak)	Chaparral (Manzanita)	Oak Woodlands	Riparian (Queen Creek)	Riparian (Devils Canyon)	Riparian (Rancho Rio)	Ponds
	Number of Replicate Points	**6**	**6**	**5**	**5**	**8**	**6**	**6**	**3**	**5**
Anas platyrhynchos	Mallard									0.227
Anas crecca	Green-winged Teal									0.509
Aythya valisineria	Canvasback									
Aythya americana	Redhead									1.061
Aythya collaris	Ring-necked Duck									1.194
Callipepla gambelii	Gambel's Quail	0.071				0.094				0.314
Buteo jamaicensis	Red-tailed Hawk	0.197								0.042
Gallinago gallinago	Common Snipe									0.236
Geococcyx californianus	Greater Roadrunner									
Megascops kennicottii	Western Screech-owl									
Archilochus alexandri	Black-chinned Hummingbird					0.212				
Calypte anna	Anna's Hummingbird	0.111	0.884		0.472			0.884		
Melanerpes uropygialis	Gila Woodpecker	0.283	0.393							
Sphyrapicus nuchalis	Red-naped Sapsucker					0.332				
Picoides scalaris	Ladder-backed Woodpecker				0.043	0.147		0.393		
Colaptes auratus	Northern Flicker	0.087	0.393		0.679	0.332		0.566	0.221	0.679
Sayornis saya	Say's Phoebe	0.111			0.043				0.221	0.042
Sayornis nigricans	Black Phoebe									0.398
Lanius ludovicianus	Loggerhead Shrike									0.033
Aphelocoma californica	Western Scrub-Jay			0.085	0.472	0.225	0.111	0.796	0.221	0.398
Corvus corax	Common Raven	0.037			0.015	0.083	0.098	0.035		
Baeolophus wollweberi	Bridled Titmouse		1.698		0.943	0.663		0.885		
Auriparus flaviceps	Verdin				0.236	0.147		0.442		

Table 3a. Winter Survey Densities of Birds Recorded During Variable Circular Plot Surveys in Each Biotic Community

Scientific Name	Common Name	Winter Bird Densities (birds/hectare) per Biotic Community								
		AZ Upland	Alders (Devils Canyon)	Chaparral (Scrub Oak)	Chaparral (Manzanita)	Oak Woodlands	Riparian (Queen Creek)	Riparian (Devils Canyon)	Riparian (Rancho Rio)	Ponds
Psaltriparus minimus	Bushtit				0.236					
Campylorhynchus brunneicapillus	Cactus Wren	0.778								0.133
Salpinctes obsoletus	Rock Wren	0.590	0.393	0.531	0.265	0.147	0.393		0.283	0.340
Catherpes mexicanus	Canyon Wren	0.175	2.555	0.105	0.099	0.332	0.442	0.786		0.052
Thryomanes bewickii	Bewick's Wren	0.442		0.066	1.062	0.332	0.393	0.393		0.059
Regulus calendula	Ruby-crowned Kinglet				0.531	0.737		0.442		0.531
Polioptila melanura	Black-tailed Gnatcatcher	0.197		0.033	0.043					
Sialia mexicana	Western Bluebird	0.061	0.590		0.663	0.295		0.037		
Myadestes townsendi	Townsend's Solitaire			0.015						
Catharus guttatus	Hermit Thrush									0.043
Turdus migratorius	American Robin						0.197			0.118
Mimus polyglottos	Northern Mockingbird	0.049			0.133	0.027				
Toxostoma curvirostre	Curve-billed Thrasher	0.786			0.340					0.236
Toxostoma crissale	Crissal Thrasher				0.236	0.106				
Phainopepla nitens	Phainopepla	0.197			0.137	0.037		0.018		
Dendroica coronata	Yellow-rumped Warbler		0.197							0.118
Pipilo chlorurus	Green-tailed Towhee									0.059
Pipilo maculatus	Spotted Towhee		0.283	0.340	1.061	0.912		0.885	1.769	0.531
Pipilo fuscus	Canyon Towhee	0.849	0.197		0.424	0.553	0.590	1.327	1.769	
Pipilo aberti	Abert's Towhee								0.250	
Aimophila ruficeps	Rufous-crowned Sparrow	0.849			0.021					
Amphispiza bilineata	Black-throated Sparrow									
Melospiza melodia	Song Sparrow		0.283							0.085

Table 3a. Winter Survey Densities of Birds Recorded During Variable Circular Plot Surveys in Each Biotic Community

Scientific Name	Common Name	Winter Bird Densities (birds/hectare) per Biotic Community								
		AZ Upland	Alders (Devils Canyon)	Chaparral (Scrub Oak)	Chaparral (Manzanita)	Oak Woodlands	Riparian (Queen Creek)	Riparian (Devils Canyon)	Riparian (Rancho Rio)	Ponds
Zonotrichia leucophrys	White-crowned Sparrow				1.358	0.037				0.354
Junco hyemalis	Dark-eyed Junco		0.442		1.042	0.637	0.393	0.283	0.663	0.693
Cardinalis cardinalis	Northern Cardinal						0.442			0.118
Agelaius phoeniceus	Red-winged Blackbird									0.085
Carpodacus mexicanus	House Finch	0.221			0.663			0.283		
Carduelis pinus	Pine Siskin		0.098							
Carduelis psaltria	Lesser Goldfinch		0.307		0.087		0.197			
Carduelis tristis	American Goldfinch						1.327			
	Total Bird Density	6.091	8.713	1.175	11.304	6.387	4.583	8.455	5.397	8.688
	Total Number of Species	19	14	7	26	21	11	16	8	28

Table 3b. Breeding Survey Densities of Birds Recorded During Variable Circular Plot Surveys in Each Biotic Community

Scientific Name	Common Name	Breeding Bird Densities (birds/hectare) per Biotic Community								
		AZ Upland	Alders (Devils Canyon)	Chaparral (Scrub Oak)	Chaparral (Manzanita)	Oak Woodlands	Riparian (Queen Creek)	Riparian (Devils Canyon)	Riparian (Rancho Rio)	Ponds
	Number of Replicate Points	**6**	**6**	**5**	**5**	**8**	**6**	**6**	**3**	**5**
Callipepla gambelii	Gambel's Quail	0	0	0.531	0.679	0.207	0.221	0	1.572	0.472
Cathartes aura	Turkey Vulture	0.028	0.063	0.042	0.021	0.066	0.111	0.035	0.035	0.085
Buteogallus anthracinus	Common Black-hawk	0	0.885	0	0	0	0	0	0	0
Buteo swainsoni	Swainson's Hawk	0	0	0	0	0.006	0	0	0	0
Buteo albonotatus	Zone-tailed Hawk	0	0.197	0	0	0.013	0.035	0	0	0
Buteo jamaicensis	Red-tailed Hawk	0	0.016	0	0	0	0	0.018	0	0
Falco peregrinus	Peregrine Falcon	0.016	0.008	0	0	0	0	0	0	0
Streptopellia decaocto	Eurasian Collared Dove	0	0	0	0	0	0	0	0	0.133
Zenaida asiatica	White-winged Dove	0	2.751	0.099	0	0.256	0.553	0.774	0.221	0.236
Zenaida macroura	Mourning Dove	0.495	2.264	0.173	3.141	0.394	0.088	0.982	1.572	0.707
Geococcyx californianus	Greater Roadrunner	0	0	0.026	0	0.332	0	0	0	0
Aeronautes saxatalis	White-throated Swift	0.283	0.093	0	0	0	0.283	0	0	0
Archilochus alexandri	Black-chinned Hummingbird	0	0	0.531	0	0	0.442	0	1.769	0
Calypte anna	Anna's Hummingbird	0	0	1.019	0	1.474	0.071	0.442	1.769	1.358
Calypte costae	Costa's Hummingbird	0.442	0	0	0	0	0	0	0	0
	Humingbird sp.	1.327	0.442	0	0.340	0.663	0	0.442	0	0
Melanerpes uropygialis	Gila Woodpecker	0	0.141	0	0	0	0	0	0	0
Picoides scalaris	Ladder-backed Woodpecker	0	1.327	0	0	0.295	0	0.295	0.196	0.085
Colaptes auratus	Northern Flicker	0	0.393	0	0	0	0	0	0	0.059
Contopus pertinax	Greater Pewee	0	0.036	0	0	0	0	0	0	0

Table 3b. Breeding Survey Densities of Birds Recorded During Variable Circular Plot Surveys in Each Biotic Community

Scientific Name	Common Name	Breeding Bird Densities (birds/hectare) per Biotic Community								
		AZ Upland	Alders (Devils Canyon)	Chaparral (Scrub Oak)	Chaparral (Manzanita)	Oak Woodlands	Riparian (Queen Creek)	Riparian (Devils Canyon)	Riparian (Rancho Rio)	Ponds
Contopus sordidulus	**Western Wood-Pewee**	**0**	**0**	**0**	**0**	**0**	**0.111**	**0.221**	**0**	**0**
Empidonax wrightii	Gray Flycatcher	0	0	0	0	0	0.071	0	0.393	0
Empidonax sp.	*Empidonax* flycatcher	0	0.885	0	0	0	0	0	0	0
Sayornis saya	Say's Phoebe	0.442	0	0	0	0	0	0	0	0.295
Sayornis nigricans	Black Phoebe	0	0	0	0.340	0	0.442	0.111	2.264	0
Myiarchus cinerascens	Ash-throated Flycatcher	0.786	0.283	0.099	1.358	0.663	0.098	0.983	0.884	0.531
Myiarchus tyrannulus	Brown-crested Flycatcher	0	3.341	0.085	0	0	0.774	0.253	0.393	0.236
Tyrannus vociferans	Cassin's Kingbird	0	0.049	0.043	0.531	0.228	0.794	0.393	0.196	0.288
Tyrannus verticalis	Western Kingbird	0	0	0	0	0	0	0	0	0.042
Lanius ludovicianus	Loggerhead Shrike	0.283	0	0	0	0	0	0	0	0
Vireo bellii	Bell's Vireo	0	2.830	0.131	0	0.663	0.283	0.995	1.965	1.061
Vireo vicinior	Gray Vireo	0.786	0.221	0	1.698	0.332	0.036	0.849	0.283	0
Vireo plumbeus	Plumbeous Vireo	0	0	0	0	0.124	0	0.442	0	0.099
Vireo huttoni	Hutton's Vireo	0	0.283	0	0	0	0	0	0	0
Vireo gilvus	Warbling Vireo	0	0	0	0.531	0	0	0.283	0	0
Aphelocoma californica	Western Scrub-Jay	0	0	0.087	0.133	0.249	0.144	0.071	0.566	0
Corvus corax	Common Raven	0.197	0.124	0	0.009	0.093	0.062	0.141	0.055	0.021
Progne subis	Purple Martin	0	0	0	0	0	0.049	0	0	0
Tachycineta thalassina	Violet-green Swallow	0	0.197	0	0	0.027	0	0.008	1.769	0.398
Stelgidopteryx serripennis	Northern Rough-winged Swallow	0	0	0	0	0	0	0	0	0.236
Baeolophus wollweberi	Bridled Titmouse	0	0.442	0	0.663	0.425	0	0.885	0	0
Baeolophus ridgwayi	Juniper Titmouse	0	0	0	0	0.415	0	0	0	0
Auriparus flaviceps	Verdin	0	0	0.059	0.943	0.083	0	1.132	0.786	0
Psaltriparus minimus	Bushtit	0	0	2.717	0	0.663	0.212	0	0.786	2.123
Campylorhynchus	Cactus Wren	1.179	0	0	0	0	0	0	0	0.066

Table 3b. Breeding Survey Densities of Birds Recorded During Variable Circular Plot Surveys in Each Biotic Community

Scientific Name	Common Name	Breeding Bird Densities (birds/hectare) per Biotic Community								
		AZ Upland	Alders (Devils Canyon)	Chaparral (Scrub Oak)	Chaparral (Manzanita)	Oak Woodlands	Riparian (Queen Creek)	Riparian (Devils Canyon)	Riparian (Rancho Rio)	Ponds
brunneicapillus										
Salpinctes obsoletus	Rock Wren	2.654	0	0.663	0.531	0.292	0.049	0.083	0.442	0.118
Catherpes mexicanus	Canyon Wren	0.371	0.415	0.796	0.531	0.425	0.442	1.132	0.131	0.133
Thryomanes bewickii	Bewick's Wren	0.393	0.786	0.531	0.133	0.798	1.769	1.376	1.547	0.398
Polioptila caerulea	Blue-gray Gnatcatcher	0.071	0	0	0	0.849	0	0.111	0.885	0
Polioptila melanura	Black-tailed Gnatcatcher	0.885	0	0	0.340	0.663	0	0.885	0	0
Mimus polyglottos	Northern Mockingbird	0.774	0.197	0.026	0.087	0.189	0.022	0	0.393	0.085
Toxostoma curvirostre	Curve-billed Thrasher	0.566	0	0	0.236	0	0	0	0	0
Toxostoma crissale	Crissal Thrasher	0	0	0	0.472	0.074	0	0	0	0.133
Phainopepla nitens	Phainopepla	0.590	0.141	0.059	0.059	0.159	0.442	1.376	0.166	0.236
Vermivora celata	Orange-crowned Warbler	0	0	0.531	0	0	0	0	0	0
Vermivora virginiae	Virginia's Warbler	0	0	0	0	0	0	0	0	0.340
Vermivora luciae	Lucy's Warbler	0	0.590	0	0	0.249	0.197	0.663	0	0.085
Dendroica petechia	Yellow Warbler	0	11.943	0	0	0	1.415	0.849	1.769	0.531
Dendroica townsendii	Townsend's Warbler	0	0	0	0	0	0	0	0.221	0
Dendroica coronata	Yellow-rumped Warbler	0	0	0	0	0.494	0	0	0	0
Wilsonia pusilla	Wilson's Warbler	0	0	0	0	0.663	0	0.283	0	0.697
Icteria virens	Yellow-breasted Chat	0	0	0	0	0	0	0	0	0.059
Piranga flava	Hepatic Tanager	0	0	0.033	0	0	0	0	0	0
Piranga rubra	Summer Tanager	0	2.212	0	0	0.425	1.327	2.654	0	0.340
Piranga ludoviciana	Western Tanager	0	0	0	0.236	0.037	0	0	0	0.033
Pipilo chlorurus	Green-tailed Towhee	0.049	0	0	0.943	0	0	0	0	0
Pipilo maculatus	Spotted Towhee	0	1.965	0.255	1.592	0.479	0	1.376	0.442	0.087
Pipilo fuscus	Canyon Towhee	1.769	0.196	0.236	0.509	0.174	0	0.028	0.196	0.059
Pipilo aberti	Abert's Towhee	0	0	0	2.123	0.212	0	0	0	0

Table 3b. Breeding Survey Densities of Birds Recorded During Variable Circular Plot Surveys in Each Biotic Community

Scientific Name	Common Name	Breeding Bird Densities (birds/hectare) per Biotic Community								
		AZ Upland	Alders (Devils Canyon)	Chaparral (Scrub Oak)	Chaparral (Manzanita)	Oak Woodlands	Riparian (Queen Creek)	Riparian (Devils Canyon)	Riparian (Rancho Rio)	Ponds
Aimophila ruficeps	Rufous-crowned Sparrow	0.138	0	0.472	0	0.037	0	0.442	0	0
Spizella passerina	Chipping Sparrow	0	0	0	0	0.249	0	0	0	1.326
Spizella breweri	Brewer's Sparrow	0	0	0	1.887	0	0	0	0	0
Spizella atrogularis	Black-chinned Sparrow	0.786	0.022	0.170	3.185	0	0	0	0.141	0
Chondestes grammacus	Lark Sparrow	0	0	0	0.403	0	0	0	0	0.354
Amphispiza bilineata	Black-throated Sparrow	8.207	0	0	3.537	0	0	0.036	0	0
Zonotrichia leucophrys	White-crowned Sparrow	0	0	0	1.062	0.295	0	0	0	0
Junco hyemalis	Dark-eyed Junco	0	0	0	2.123	0	0	0	0	0
Cardinalis cardinalis	Northern Cardinal	0	0.566	0	0	0	0	0.197	0	0.236
Pheucticus melanocephalus	Black-headed Grosbeak	0	0.442	0	0	0	0	0	0	0
Agelaius phoeniceus	Red-winged Blackbird	0	0	0	0	0	0	0	0	0.099
Molothrus ater	Brown-headed Cowbird	0.885	0	0.217	0.340	0.108	0	1.965	0.491	1.179
Icterus cucullatus	Hooded Oriole	0	3.391	0	0	0	0.590	0.442	0	0
Icterus bullocki	Bullock's Oriole	0	0	0	0	0	0.197	0.442	0	0
Icterus parisorum	Scott's Oriole	1.179	0.036	0.052	0.472	0	0.393	0.221	0.141	0
Carpodacus cassinii	Cassin's Finch	0	1.327	0	0	0	0	0	0	0
Carpodacus mexicanus	House Finch	1.105	1.132	0.043	2.388	1.061	0.637	0.361	0.361	0
Carduelis psaltria	Lesser Goldfinch	0	1.415	0	1.019	0.332	1.327	1.769	0.566	0
Total density		26.686	44.047	9.726	34.595	15.935	13.687	26.446	25.005	15.059
Total number of species		28	40	28	36	44	33	42	33	40

Table 4a. Numbers of Species Observed in Each Biotic Community by Survey Period During the Winter Survey

	Survey Set 1		Survey Set 2		Survey Set 3	
	New Species	**Total Species**	**New Species**	**Total Species**	**New Species**	**Total Species**
Alders - Devils Canyon	4	**4**	5	**9**	5	**14**
Arizona Upland	14	**14**	2	**16**	3	**19**
Chaparral - Manzanita	13	**13**	8	**21**	5	**26**
Chaparral – Scrub Oak	4	**4**	1	**5**	2	**7**
Oak Woodland	16	**16**	1	**17**	4	**21**
Riparian - Devils Canyon	8	**8**	3	**11**	5	**16**
Riparian – Queen Creek	5	**5**	4	**9**	2	**11**
Riparian – Rancho Rio	3	**3**	5	**8**	0	**8**
Ponds	16	**16**	7	**23**	5	**28**

Table 4b. Numbers of Species Observed in Each Biotic Community by Survey Period During the Breeding Survey

	Survey Set 1		Survey Set 2		Survey Set 3	
	New Species	**Total Species**	**New Species**	**Total Species**	**New Species**	**Total Species**
Alders - Devils Canyon	30	**30**	4	**34**	6	**40**
Arizona Upland	22	**22**	4	**26**	2	**28**
Chaparral - Manzanita	28	**28**	8	**36**	0	**36**
Chaparral – Scrub Oak	13	**13**	12	**25**	3	**28**
Oak Woodland	30	**30**	8	**38**	6	**44**
Riparian - Devils Canyon	30	**30**	9	**39**	3	**42**
Riparian – Queen Creek	19	**19**	10	**29**	4	**33**
Riparian – Rancho Rio	27	**27**	6	**33**	0	**33**
Ponds	25	**25**	11	**36**	4	**40**

Table 5a. Time of Day Analysis – Winter Survey

Time Interval	Time After Sunrise (min)	Number of Survey Periods Per Time Interval	Average Number of Bird Species	Average Number of Individuals
1	0-29	30	2.0741	4.0000
2	30-59	24	2.5417	3.7917
3	60-89	23	2.8696	4.7826
4	90-119	23	2.9130	4.5217
5	120-149	21	3.0000	6.8095
6	150-179	16	2.4375	4.3750
7	180-209	11	2.4545	3.4545
8	210-239	1	4.0000	5.0000
9	240-269	1	9.0000	13.0000
	Total	**150**		

Table 5b. Time of Day Analysis – Breeding Survey

Time Interval	Time After Sunrise (min)	Number of Survey Periods Per Time Interval	Average Number of Bird Species	Average Number of Individuals
1	0-29	26	7.4800	12.4400
2	30-59	24	8.2083	12.6667
3	60-89	27	7.2593	10.9259
4	90-119	20	8.6000	12.2500
5	120-149	23	8.6522	12.7391
6	150-179	14	9.4286	13.3571
7	180-209	11	9.7273	14.4545
8	210-239	5	10.6000	14.8000
	Total	**150**		

Table 6. Vegetation Measurements at 50 Bird Survey Points

	Biotic Community								
	Oaks	**Upper Devils Canyon**	**Alder Grove**	**Queen Creek**	**Rancho Rio**	**Chaparral-Scrub Oak**	**Chaparral-Manzanita**	**Ponds**	**Arizona Upland**
Number of Points	8	6	6	6	3	5	5	5	6
Average density, trees/hectare	236.7	173.9	403.4	154.6	70.7	94.5	142.6	105.6	214.1
Average tree canopy cover, m^2/ha	4,069	3,786	16,240	2,596	1,063	436	880	2,266	1,121
Average shrub cover, %	26	24	20	20	28	42	31	15	27
Average herbaceous cover, %	15	2	2	2	6	2	1	24	3
Average elevation, ft amsl	3,920	3,880	3,550	3,780	3,910	4,050	4,090	3,940	3,710

Table 7. Tree and Shrub Species Density per Biotic Community Based on Modified Point-Centered Quarter Sampling Method

Tree and Shrub Species		**Vegetation Density (tree or shrub/hectare) per Biotic Community**								
Scientific Name	**Common Name**	**Oaks**	**Upper Devils Canyon**	**Alder Grove**	**Queen Creek**	**Rancho Rio**	**Chaparral-Scrub Oak**	**Chaparral-Manzanita**	**Ponds**	**Arizona Upland**
Tree Species										
Acacia greggii	Catclaw Acacia									26.7
Alnus oblongifolia	Arizona Alder			268.9						
Arctostaphylos pungens	Point-leaf Manzanita							28.5		
Canotia holacantha	Crown-of-thorns									80.3
Ceanothus greggii	Buckbrush						4.8			
Celtis laevigata	Netleaf Hackberry		29.0		54.1	45.0	4.8		5.4	
Cercocarpus montanus	Mountain Mahogany						52.5			
Fraxinus velutina	Velvet Ash		14.5	100.8						
Juglans major	Arizona Black Walnut				23.2					
Juniperus monosperma	One-seed Juniper		7.2				4.7	14.3		
Juniperus osteosperma	Utah Juniper					6.4				
Parkinsonia microphylla	Foothill Paloverde									44.6
Pinus monophylla	Single-leaf Pinyon		7.2		7.7	6.4	9.6			

Table 7. Tree and Shrub Species Density per Biotic Community Based on Modified Point-Centered Quarter Sampling Method

Tree and Shrub Species		Vegetation Density (tree or shrub/hectare) per Biotic Community								
Scientific Name	**Common Name**	**Oaks**	**Upper Devils Canyon**	**Alder Grove**	**Queen Creek**	**Rancho Rio**	**Chaparral-Scrub Oak**	**Chaparral-Manzanita**	**Ponds**	**Arizona Upland**
Platanus wrightii	Arizona Sycamore		65.2	16.8						
Populus fremontii	Fremont Cottonwood				15.5					
Prosopis velutina	Velvet Mesquite				15.5				21.8	44.6
Prunus emarginata	Bitter Cherry		7.2							
Quercus emoryi	Emory Oak	236.7	36.2		38.7		19.1	78.4	27.2	
Quercus griseus	Gray Oak		7.2	16.8						
Quercus turbinella	Scrub Oak							21.4		
Rhus ovata	Sugar Sumac									8.9
Salix gooddingii	Goodding Willow					6.4			49.1	
Vauquelinia californica	Arizona Rosewood									8.9
Shrub Species										
Agave chrysantha	Golden-flowered Agave							<1		
Aloysia wrightii	Wright's Beebrush									1
Ambrosia psilostachya	Western Ragweed	<1								
Amorpha fruticosa	False Indigo-bush				2					
Arctostaphylos pungens	Point-leaf Manzanita	15	6		1	10	7	9	6	
Baccharis sarathroides	Desert Broom	1	5		1				<1	
Calliandra eriophylla	Fairy Duster									6
Cephalanthus occidentalis	Buttonbush		2	9						
Celtis laevigata	Netleaf Hackberry		<1		<1		<1			
Cercocarpus montanus	Mountain Mahogany	<1	1		<1		2			
Crossosoma bigelovii	Ragged Rockflower						1			
Dalea formosa	Feather Dalea									1
Dasylirion wheeleri	Sotol		<1				<1	1		
Dodonaea viscosa	Hopbush			1	<1		1		<1	

Table 7. Tree and Shrub Species Density per Biotic Community Based on Modified Point-Centered Quarter Sampling Method

Tree and Shrub Species		Vegetation Density (tree or shrub/hectare) per Biotic Community								
Scientific Name	**Common Name**	**Oaks**	**Upper Devils Canyon**	**Alder Grove**	**Queen Creek**	**Rancho Rio**	**Chaparral-Scrub Oak**	**Chaparral-Manzanita**	**Ponds**	**Arizona Upland**
Encelia farinosa	Brittlebush									1
Ephedra trifurca	Longleaf Ephedra									1
Ericameria laricifolia	Turpentine Bush						2	1	<1	
Eriogonum fasciculatum	Flattop Buckwheat									<1
Fallugia paradoxa	Apache Plume	<1								
Fendlera rupicola	Cliff Fendlerbush									<1
Garrya wrightii	Wright's Silktassel	<1							1	
Gutierrezia sarothrae	Snakeweed	<1								4
Mahonia haematocarpa	Red Barberry		2	1		<1				
Mimosa aculeaticarpa	Catclaw mimosa	1	2	<1	2	5	1	7	1	
Nolina microcarpa	Beargrass	<1					<1	2		
Parthenium incanum	Mariola									6
Prunus virginiana	Chokecherry	<1								
Quercus turbinella	Scrub Oak	7	4	<1	9	19	26	10	5	
Rhamnus californica	California Buckthorn				<1					
Rhamnus crocea	Hollyleaf Buckthorn	<1	<1					<1		
Rhus trilobata	Skunkbush	1	1	1	1	4			1	
Simmondsia chinensis	Jojoba				<1					10
Sporobolus wrightii	Sacaton								1	
Tamarix sp.	Tamarisk								<1	
Toxicodendron rydbergii	Poison Ivy			8						
Vitis arizonica	Canyon Grape		1		3	3				

Table 8. Plant Species Recorded within 30 Meters of Survey Points

Scientific Name	Common Name
Acacia angustissima	White-ball Acacia
Acacia greggii	Catclaw Acacia
Acourtia wrightii	Perezia
Agave chrysantha	Golden-flowered Agave
Agave sp.	Agave
Allionia incarnata	Trailing Four-O'Clock
Alnus oblongifolia	Arizona Alder
Aloysia wrightii	Wright's Beebrush
Amaranthus sp.	Amaranth
Ambrosia psilostachya	Western Ragweed
Amorpha fruticosa	False Indigo-bush
Anisacantha thurberi	Chuparosa
Aquilegia chrysantha	Yellow Columbine
Arctostaphylos pungens	Point-leaf Manzanita
Aristida ternipes	Spidergrass
Aristida sp.	Threeawn
Artemisia ludoviciana	White Sagebrush
Artemisia sp.	Sagebrush
Asclepias linaria	Pine-needle Milkweed
Astrolepis sinuata	Wavy Cloak Fern
Baccharis salicifolia	Seepwillow
Baccharis sarathroides	Desert Broom
Baileya multiradiata	Desert Marigold
Bebbia juncea	Chuckwalla's Delight
Bothriochloa barbinodis	Cane Beardgrass
Bothriochloa laguroides	Silver Beardgrass
Bouteloua curtipendula	Side-oats Grama
Bouteloua gracilis	Blue Grama
Brickellia sp.	Brickellbush
Bromus rubens	Red Brome
Bromus tectorum	Cheatgrass
Bromus sp.	Brome
Calandrinia ciliata	Red Maids
Calliandra eriophylla	Fairy Duster
Canotia holacantha	Crown-of-thorns
Carex sp.	Sedge
Carnegiea gigantea	Saguaro
Catalpa bignonioides	Southern Catalpa
Ceanothus greggii	Buckbrush
Celtis laevigata	Netleaf Hackberry
Celtis pallida	Desert Hackberry
Cephalanthus occidentalis	Buttonbush
Cercocarpus montanus	Mountain Mahogany
Chamaesyce albomarginata	Rattlesnake-weed
Cheilanthes lindheimeri	Lindheimer's Lip Fern
Chenopodium album	Lambs-quarters
Chilopsis linearis	Desert-willow
Cirsium vulgare	Bull Thistle
Claytonia perfoliata	Miner's Lettuce
Clematis sp.	Virgin's Bower
Conyza canadensis	Canada Horseweed

Table 8. Plant Species Recorded within 30 Meters of Survey Points

Scientific Name	Common Name
Crossosoma bigelovii	Ragged Rockflower
Cryptantha sp.	Cryptantha
Cupressus arizonica	Arizona Cypress
Cuscuta indecora	Dodder
Cynodon dactylon	Bermudagrass
Cyperus sp.	Flatsedge
Cystopteris fragilis	Brittle Bladder Fern
Dalea formosa	Feather Dalea
Dasylirion wheeleri	Sotol
Datura wrightii	Sacred Datura
Daucus pusillus	American Carrot
Digitaria californica	Arizona Cottontop
Digitaria sanguinalis	Crabgrass
Dodonaea viscosa	Hopbush
Dyssodia porophylloides	San Felipe Dyssodia
Echinocereus fendleri	Fendler's Hedgehog
Echinodereus coccineus var. *arizicus*	Arizona Hedgehog
Eleocharis sp.	Spikerush
Elymus elymoides	Bottlebrush Squirreltail
Encelia farinosa	Brittlebush
Ephedra trifurca	Longleaf Ephedra
Eragrostis intermedia	Plains Lovegrass
Eriastrum diffusum	Miniature Woolstar
Eriastrum sp.	Woolstar
Ericameria laricifolia	Turpentine Bush
Erigeron divergens	Spreading Fleabane
Erigeron sp.	Daisy
Eriogonum fasciculatum	Flattop Buckwheat
Erodium cicutarium	Filaree
Fallugia paradoxa	Apache Plume
Fendlera rupicola	Cliff Fendlerbush
Ferocactus cylindraceus	California Barrel Cactus
Ferocactus wislizenii	Fishhook Barrel Cactus
Fouquieria splendens	Ocotillo
Fraxinus velutina	Velvet Ash
Gallium sp.	Bedstraw
Garrya wrightii	Wright's Silktassel
Gaurra coccinea	Scarlet Gaura
Gutierrezia sarothrae	Snakeweed
Helianthus annuus	Common Sunflower
Helianthus petiolaris	Prairie Sunflower
Heteropogon contortus	Tanglehead
Heterotheca subaxillaris	Camphor-weed
Isocoma tenuisecta	Burroweed
Juglans major	Arizona Black Walnut
Juncus mexicanus	Mexican Rush
Juncus sp.	Rush
Juniperus deppeana	Alligator-bark Juniper
Juniperus monosperma	One-seed Juniper
Juniperus osteosperma	Utah Juniper
Lesquerella gordoni	Bladderpod Mustard

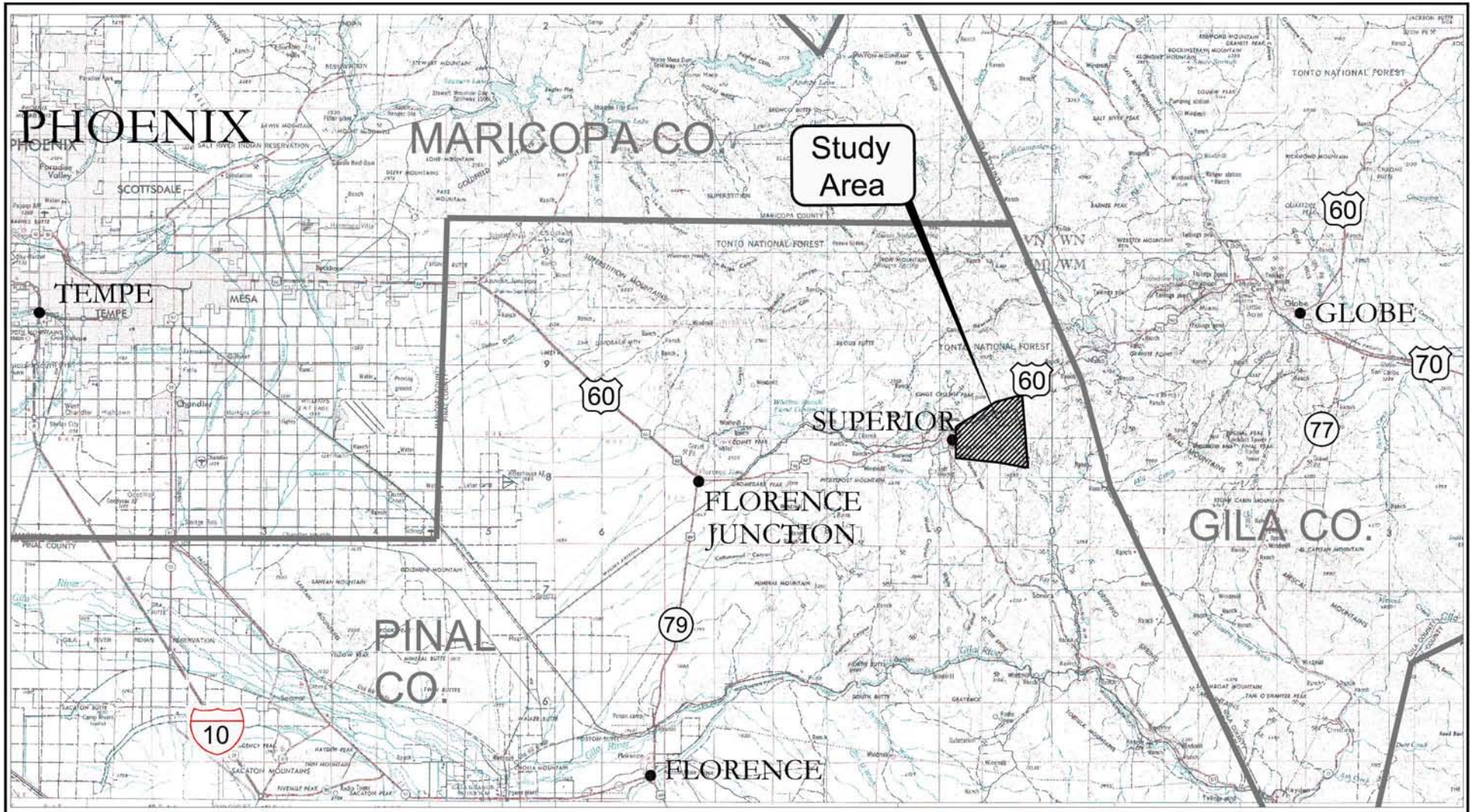
Table 8. Plant Species Recorded within 30 Meters of Survey Points

Scientific Name	Common Name
Nuttallanthus texana	Texas Toadflax
Lonicera albiflora	White Honeysuckle
Lonicera interrupta	Chaparral Honeysuckle
Lotus rigidus	Wiry Lotus
Lycium sp.	Wolfberry
Mahonia haematocarpa	Red Barberry
Marubium vulgare	Horehound
Melampodium leucanthum	Blackfoot Daisy
Melilotus alba	White Sweet-clover
Melilotus officinalis	Yellow Sweet-clover
Mentzelia sp.	Stick-leaf
Mimosa aculeaticarpa	Catclaw mimosa
Mimulus guttatus	Yellow Monkeyflower
Morus alba	White Mulberry
Muhlenbergia emersleyi	Bullgrass
Muhlenbergia sp.	Deergrass
Nassella viridula	Green Needlegrass
Nicotiana glauca	Tree Tobacco
Nolina microcarpa	Beargrass
Opuntia acanthocarpa	Buckhorn Cholla
Opuntia engelmannii	Engelmann Prickly-pear
Opuntia spinosior	Cane Cholla
Orthocarpus purpurascens	Owl-clover
Parkinsonia aculeata	Mexican Paloverde
Parkinsonia microphylla	Foothill Paloverde
Parthenium incanum	Mariola
Parthenocissus inserta	Virginia Creeper
Pellaea truncata	Spiny Cliff Brake
Penstemon pseudospectabilis	Desert Penstemon
Penstemon sp.	Penstemon
Phorodendron coryae	Cory's Mistletoe
Pinus monophylla	Single-leaf Pinyon
Plantago patagonica	Woolly Plantain
Platanus wrightii	Arizona Sycamore
Polygonum aviculare	Protrate Knotweed
Polypogon monspeliensis	Rabbit's-foot Grass
Populus fremontii	Fremont Cottonwood
Prosopis velutina	Velvet Mesquite
Prunus emarginata	Bitter Cherry
Prunus virginiana	Chokecherry
Psilostrophe cooperi	Cooper's Paperflower
Quercus emoryi	Emory Oak
Quercus griseus	Gray Oak
Quercus turbinella	Scrub Oak
Rhamnus bettulaefolia	Birchleaf Buckthorn
Rhamnus californica	California Buckthorn
Rhamnus crocea	Hollyleaf Buckthorn
Rhus ovata	Sugar Sumac
Rhus trilobata	Skunkbush
Rubus sp.	Raspberry
Rumex crispus	Curly Dock

Table 8. Plant Species Recorded within 30 Meters of Survey Points

Scientific Name	Common Name
Rumex sp.	Dock
Salix gooddingii	Goodding Willow
Salsola tragus	Russian Thistle
Sambucus nigra	Mexican Elderberry
Senecio flaccidus	Threadleaf Groundsel
Setaria sp.	Bristlegrass
Simmondsia chinensis	Jojoba
Sonchus oleraceus	Common Sowthistle
Sorghum halepense	Johnson Grass
Sphaeralcea ambigua	Desert Globemallow
Sphaeralcea sp.	Globemallow
Sporobolus wrightii	Sacaton
Stephanomeria sp.	Wirelettuce
Tamarix sp.	Tamarisk
Tiquilia canescens	Shrubby Coldenia
Toxicodendron rydbergii	Western Poison Ivy
Tragopogon sp.	Salsify
Tribulus terrestris	Puncture-vine
Typha domingensis	Southern Cattail
Vauquelinia californica	Arizona Rosewood
Verbascum thapsus	Common Mullein
Verbena macdougallii	MacDougal Verbena
Verbena sp.	Verbena
Vitis arizonica	Canyon Grape
Xanthium strumarium	Common Cocklebur
Yucca baccata	Banana Yucca
Yucca elata	Soaptree Yucca
Zauschneria californica	Hummingbird Trumpet
Zinnia acerosa	Wild Zinnia

FIGURES



Pinal County, Arizona
Mesa 1:250,000 USGS Map

N
W E
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0 4 8

Approx. Scale 1 inch = 8 miles

Resolution Copper Mining

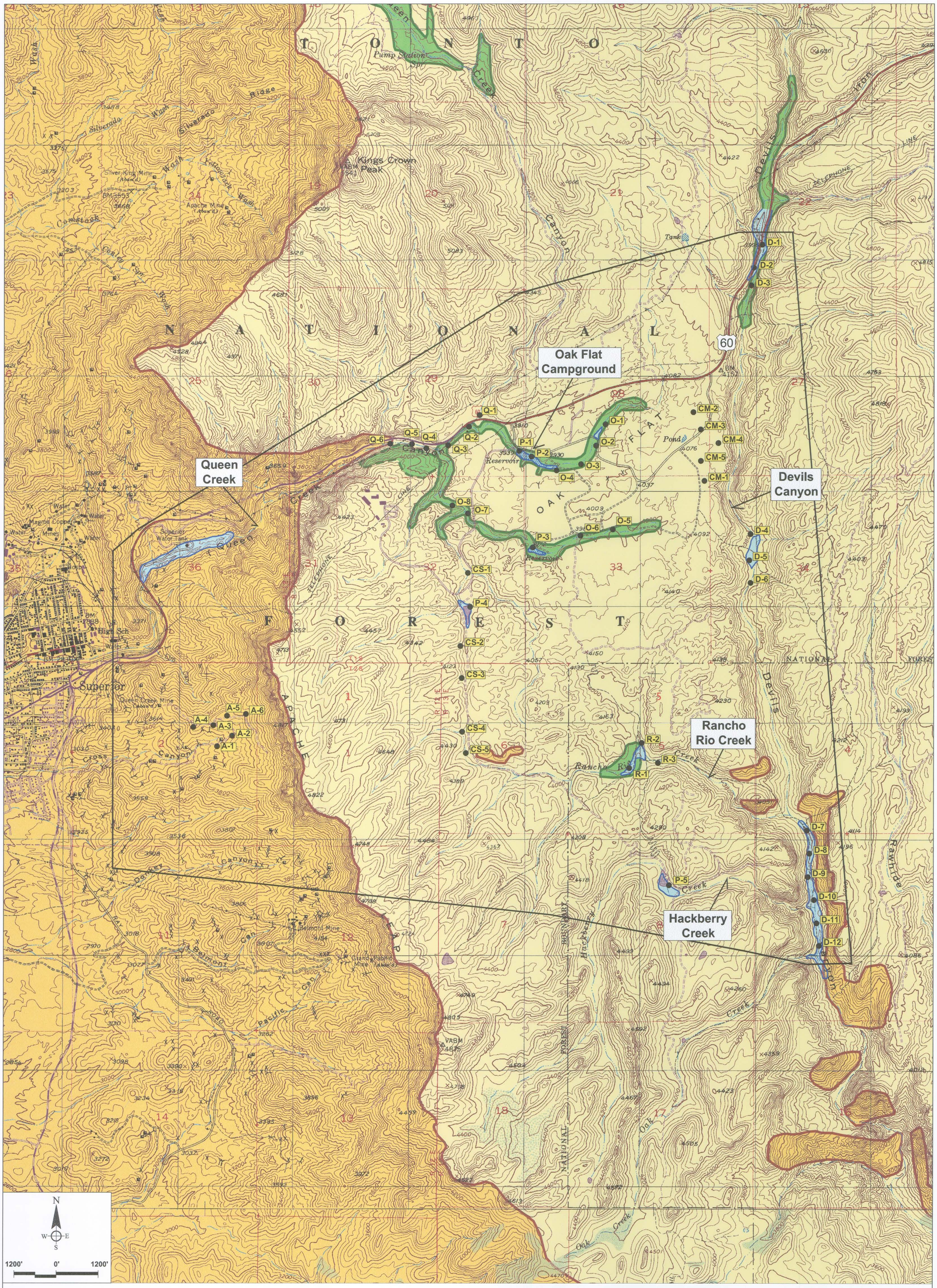
RAPTOR SURVEY AND 2008 BIRD CENSUS

Vicinity Map

Figure 1

WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

DWG FullPath: M:\projects\807.16\Bird Survey Report 11-19-2008\Fig1 RS-vicinity-REGIONAL.dwg



LEGEND

- Study Area
- Arizona Upland Subdivision of Sonoran Desertscrub
- Madrean Evergreen Woodland
- Interior Chaparral
- Interior Riparian Deciduous Forest

Data Source: WestLand Resources-multiple field trips compared with Google Earth imagery to determine biotic communities. Based on Biotic Communities of the Southwest - Brown & Lowe (August 1980) classifications.

● A-1 Location of Bird Survey Points & Biotic Community ID Number

ID Number Prefix	Biotic Community Type
A	Sonoran Desertscrub - Arizona Upland Subdivision
CM	Interior Chaparral - Manzanita Series
CS	Interior Chaparral - Scrub Oak Series
O	Madrean Evergreen Woodland - Oak Woodland
D[1]	Interior Riparian Deciduous Forest - Devils Canyon
P	Interior Riparian Deciduous Forest - Ponds
Q	Interior Riparian Deciduous Forest - Queen Creek
R	Interior Riparian Deciduous Forest - Rancho Rio Creek

1 - Points D7 - D12 = Interior Riparian Deciduous Forest - Devils Canyon Alders

Pinal County, Arizona
Superior, Pinal Ranch & Teapot Mountain
7.5' USGS Quadrangles

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RAPTOR SURVEY AND 2008 BIRD CENSUS

Biotic Communities Map and Bird Survey Locations

Figure 2

M:\projects\807.16\Bird Survey Report 11-19-2008\Fig2 Combined Bio Comm-Rip Veg & 2008 Bird Census.dwg

Zone-Tailed Hawk Nest
Active 2003, 2004 & 2008

Zone-Tailed Hawk Nest
Active 2003, 2004 Status Unknown

Cooper's Hawk Nest
Active 2003

Western Screech Owl
2008

Peregrine Falcon Eyrie
Active 2003, 2004 & 2008

Great Horned Owl
2003

Scenic Drive

N
W E
S

0' 1000' 2000'

Scale 1 inch = 2000 feet

LEGEND

- *Study Area Boundary
- Fixed Point Cliff Survey
- Field of View from Fixed Points
- Approximate Location of Observed Raptors
- Linear Transect Survey
- Variable Transect Survey

* Study Area Extends Outside of the Area Depicted on this Figure

Pinal County, Arizona
Superior 7.5' USGS Map

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RAPTOR SURVEY AND 2008 BIRD CENSUS

Raptor Survey Locations

Figure 3

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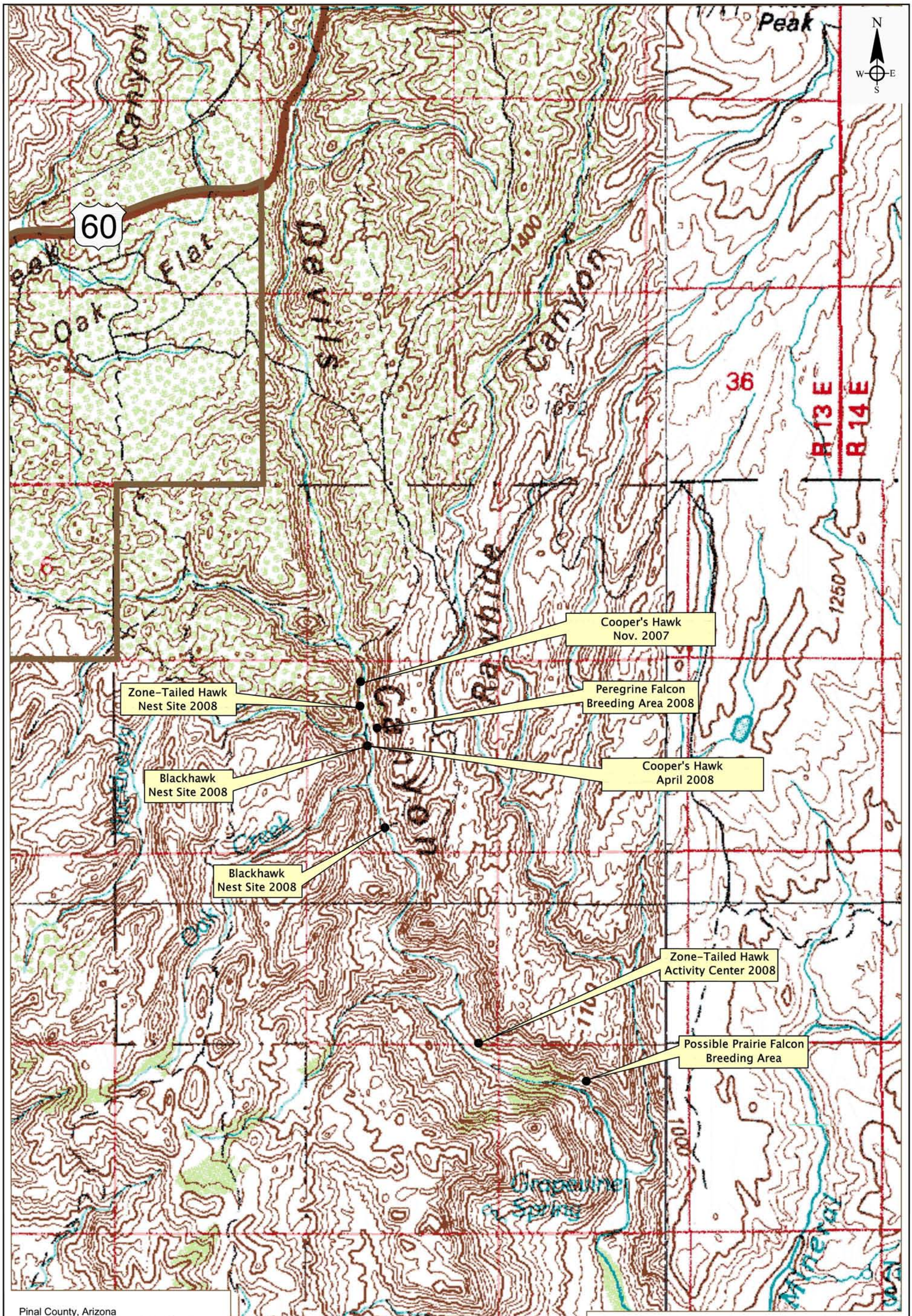
Tucson, Az 85712 (520) 206-9585

DWG FullPath: M:\projects\807.16\Bird Survey Report 11-19-2008\Fig3 rs--raptor-inventory-map.dwg



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RAPTOR SURVEY AND 2008 BIRD CENSUS

Opportunistic Raptor Observations in Devils Canyon

Figure 4

DWG FullPath: M:\projects\807.16\Bird Survey Report 11-19-2008\Fig4-devils canyon.dwg

Figure 5a
Number of Bird Species by Biotic Community - Winter Survey

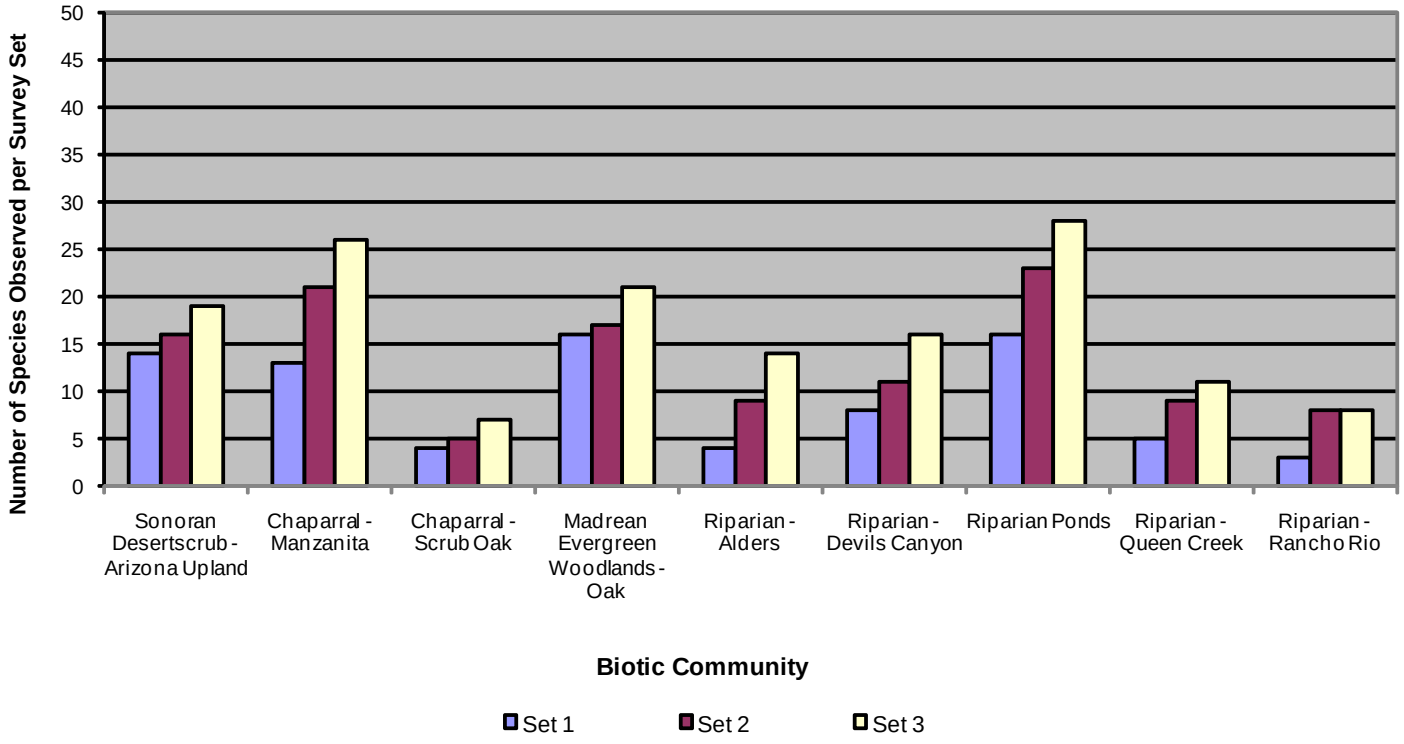


Figure 5b
Number of Bird Species by Biotic Community - Breeding Survey

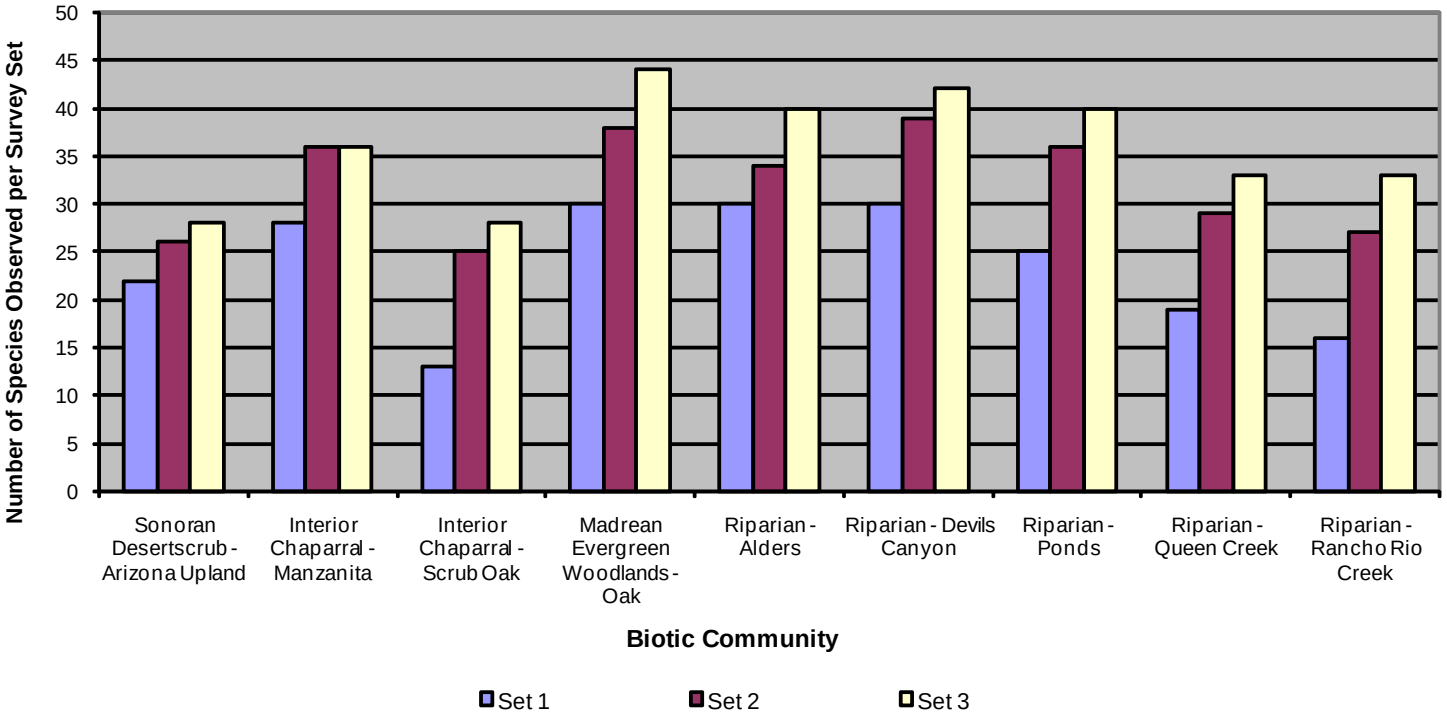


Figure 6a
Percent of Bird Species Detected in Each
Biotic Community by Survey Set - Winter Survey

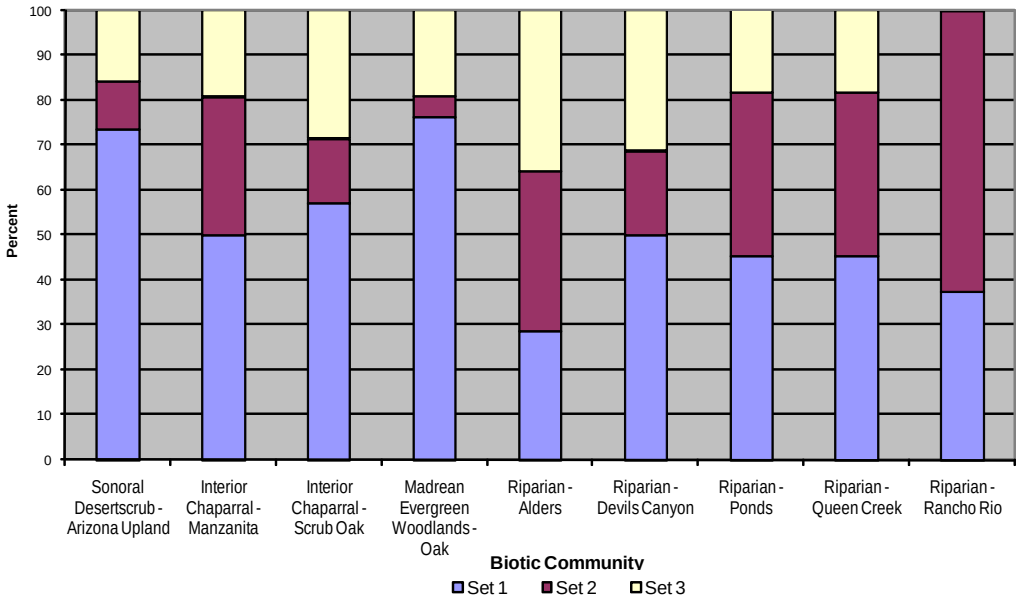


Figure 6b
Percent of Bird Species Detected in Each Biotic Community by Survey Set -
Breeding Survey

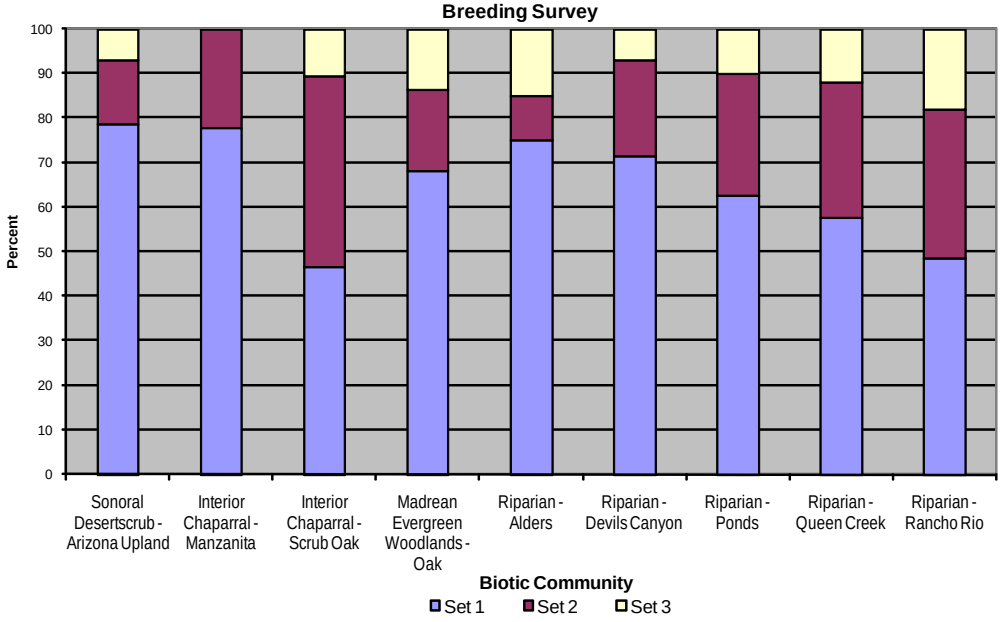


Figure 6c
Percent of Bird Species Detected by Survey Set
Normalized & Averaged

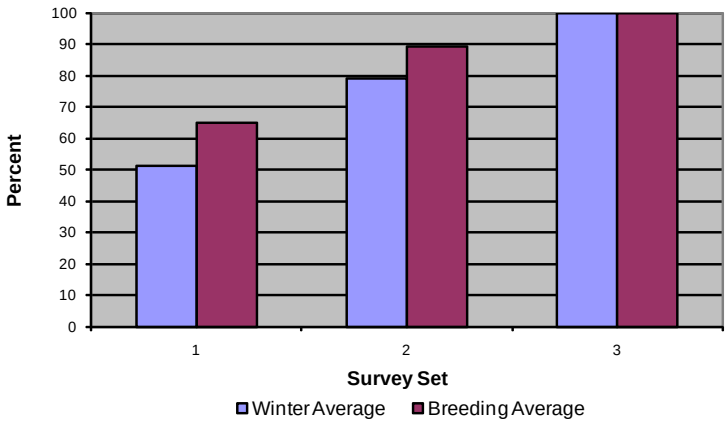


Figure 7a.
Time interval analysis for bird species in the Sonoran Desertscrub - Arizona Upland biotic community during the winter and breeding surveys

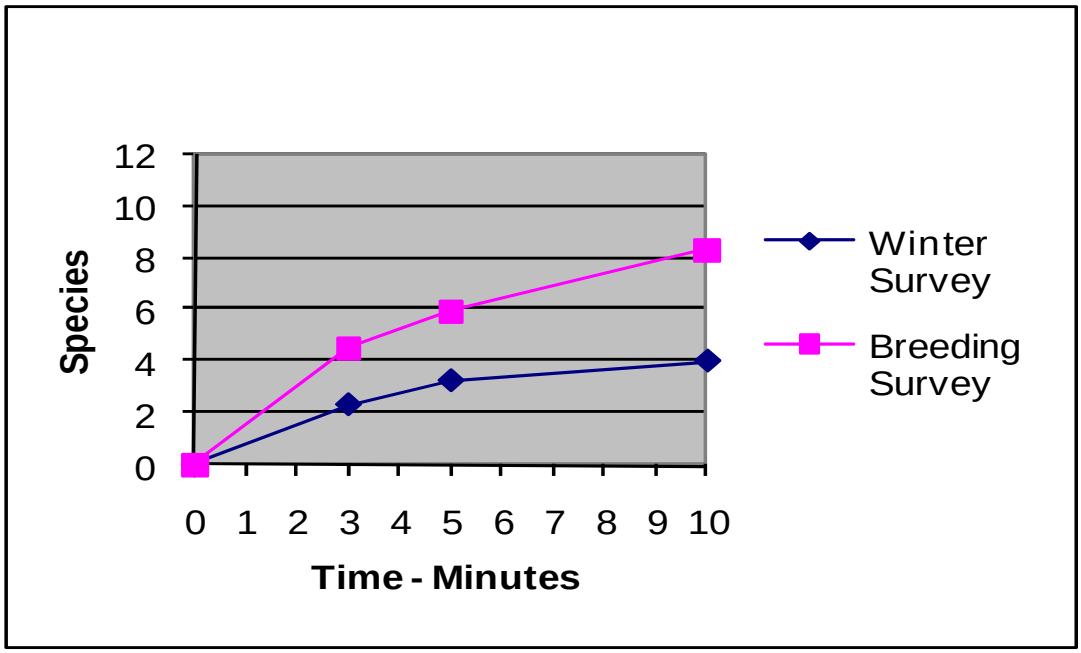


Figure 7b.
Time interval analysis for individuals in the Sonoran Desertscrub - Arizona Upland biotic community during the winter and breeding surveys

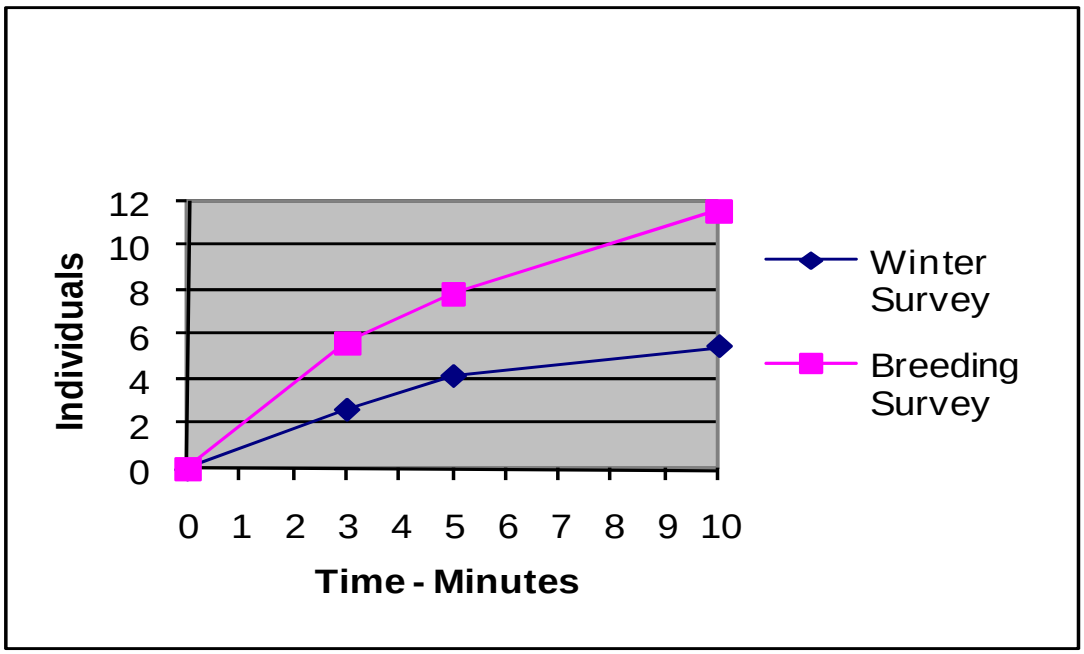


Figure 8a.
Time interval analysis for bird species in the Interior Chaparral - Manzanita biotic community during the winter and breeding surveys

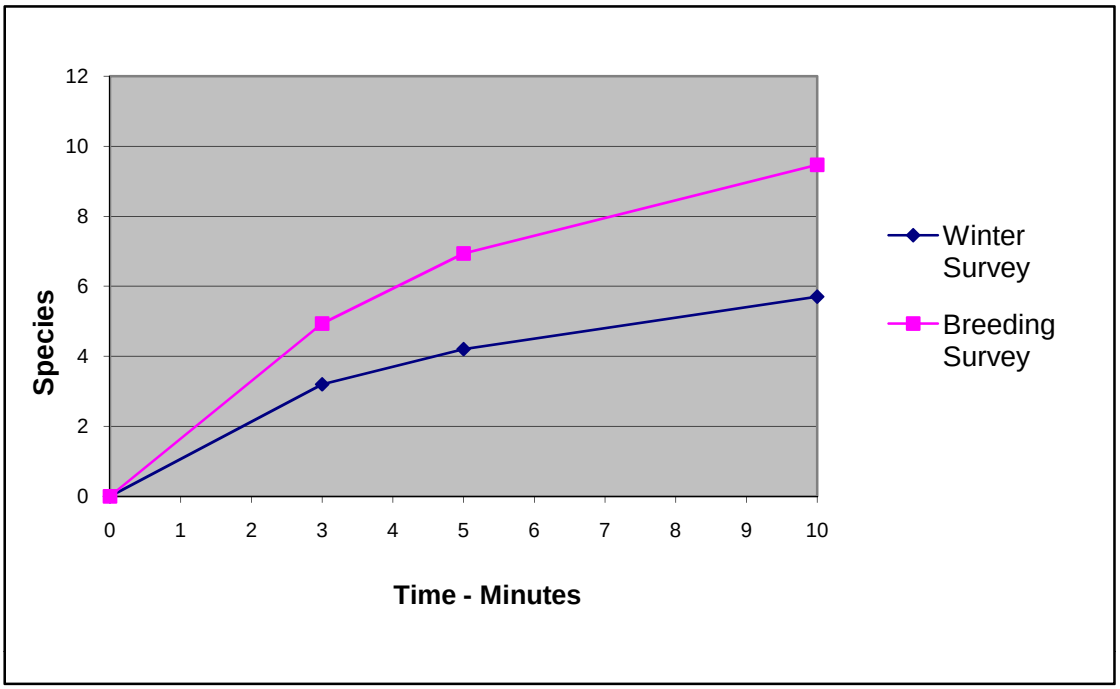


Figure 8b.
Time interval analysis for individuals in the Interior Chaparral - Manzanita biotic community during the winter and breeding surveys

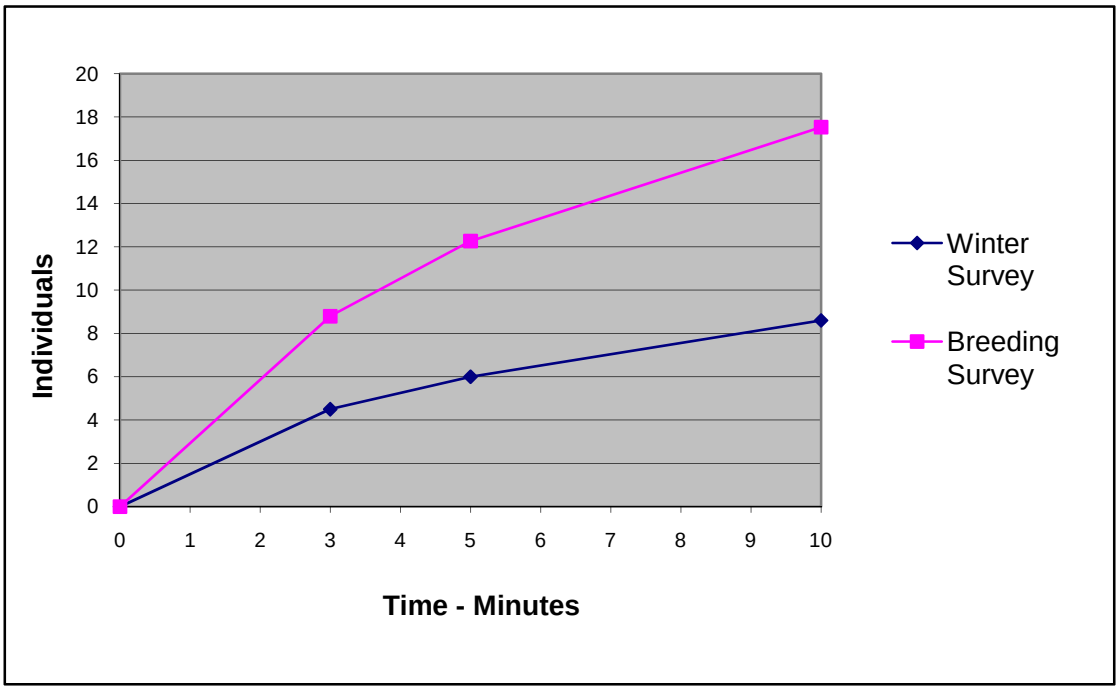


Figure 9a.
Time interval analysis for bird species in the Interior Chaparral - Scrub Oak biotic community during the winter and breeding surveys

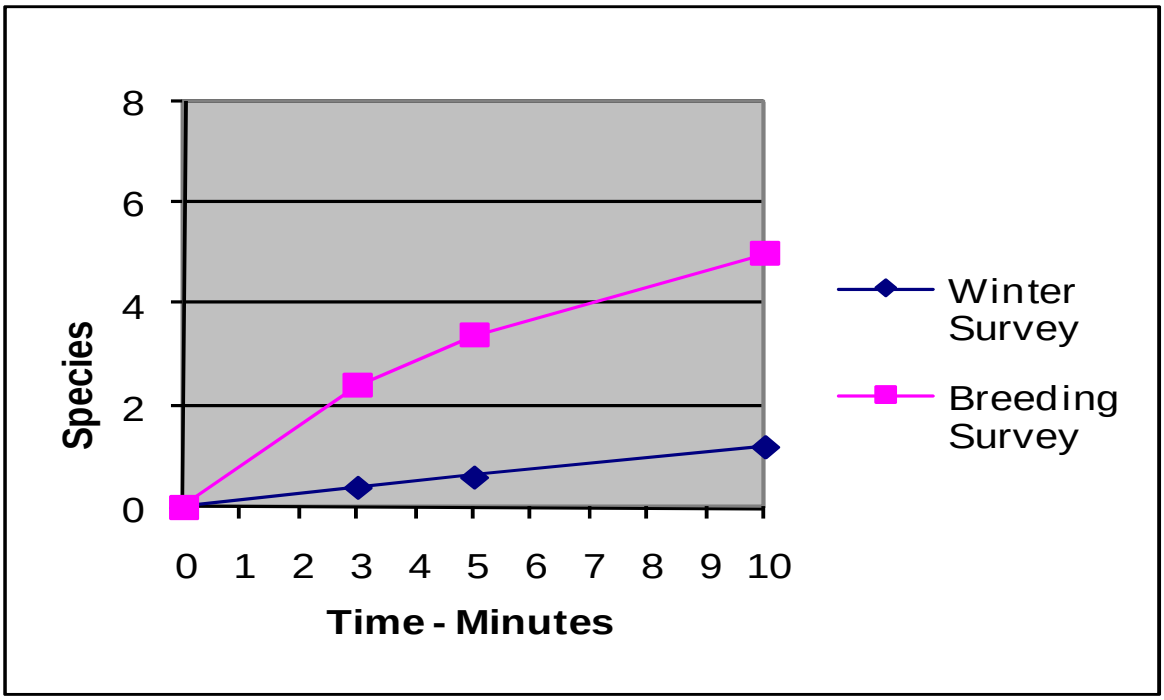


Figure 9b.
Time interval analysis for individuals in the Interior Chaparral - Scrub Oak biotic community during the winter and breeding surveys

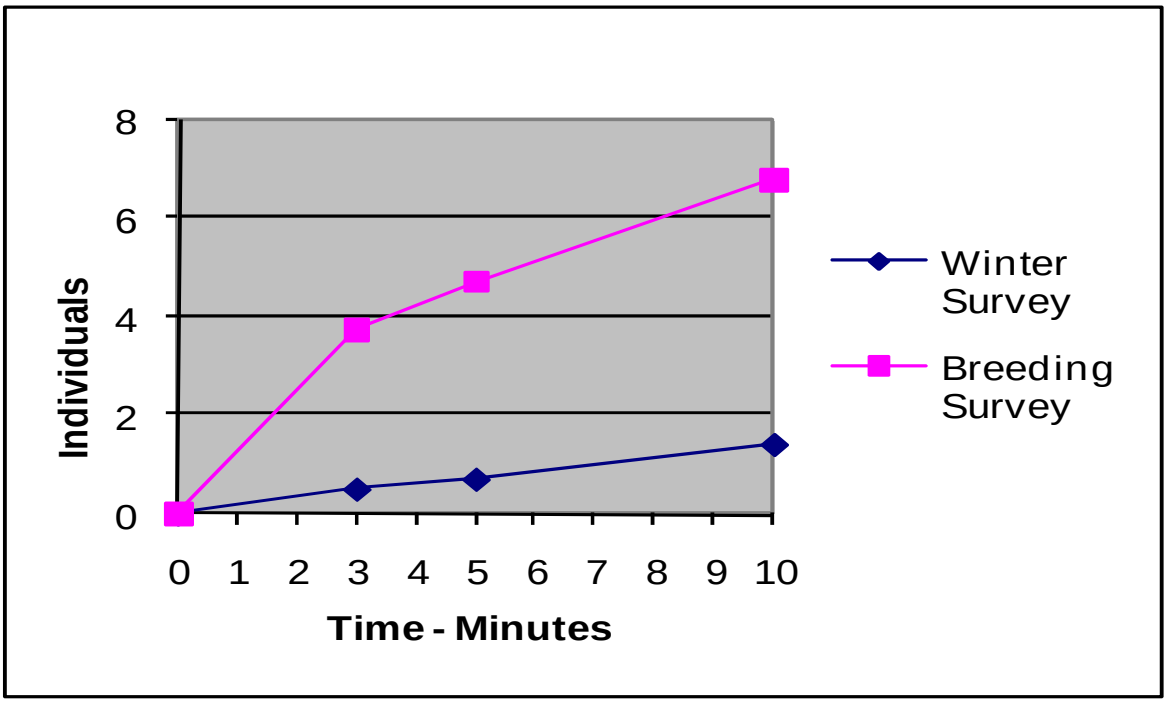


Figure 10a.
Time interval analysis for bird species in the Madrean Evergreen Woodland - Oak biotic community during the winter and breeding surveys

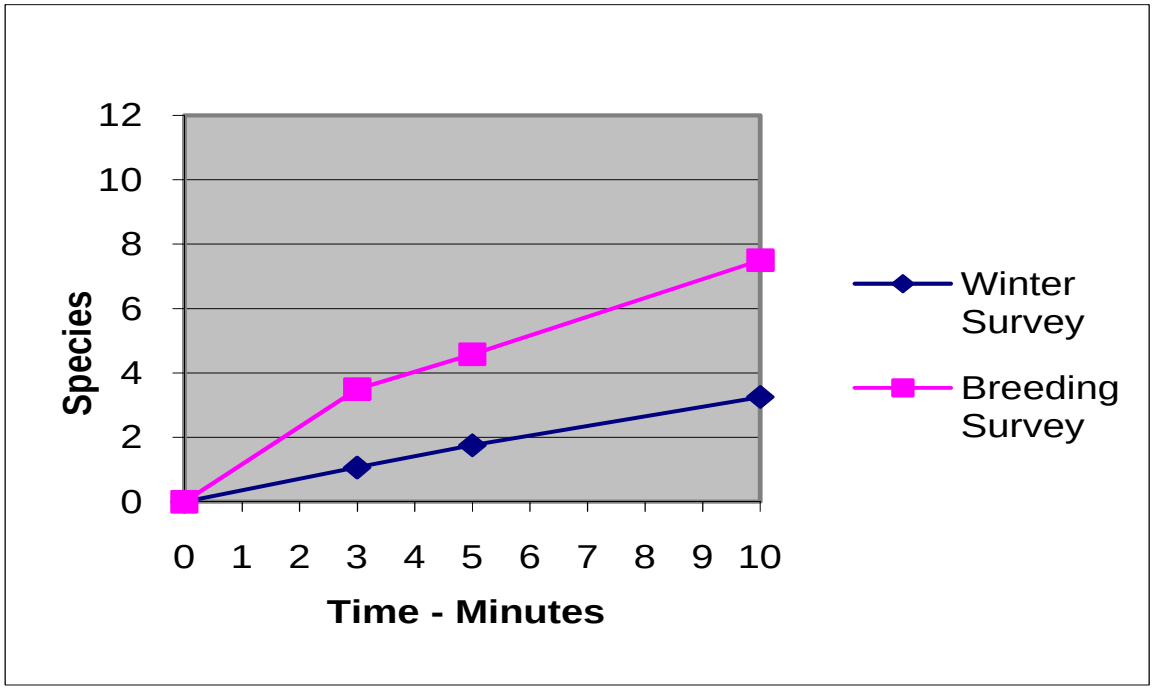


Figure 10b.
Time interval analysis for individuals in the Madrean Evergreen Woodlands - Oak biotic community during the winter and breeding surveys

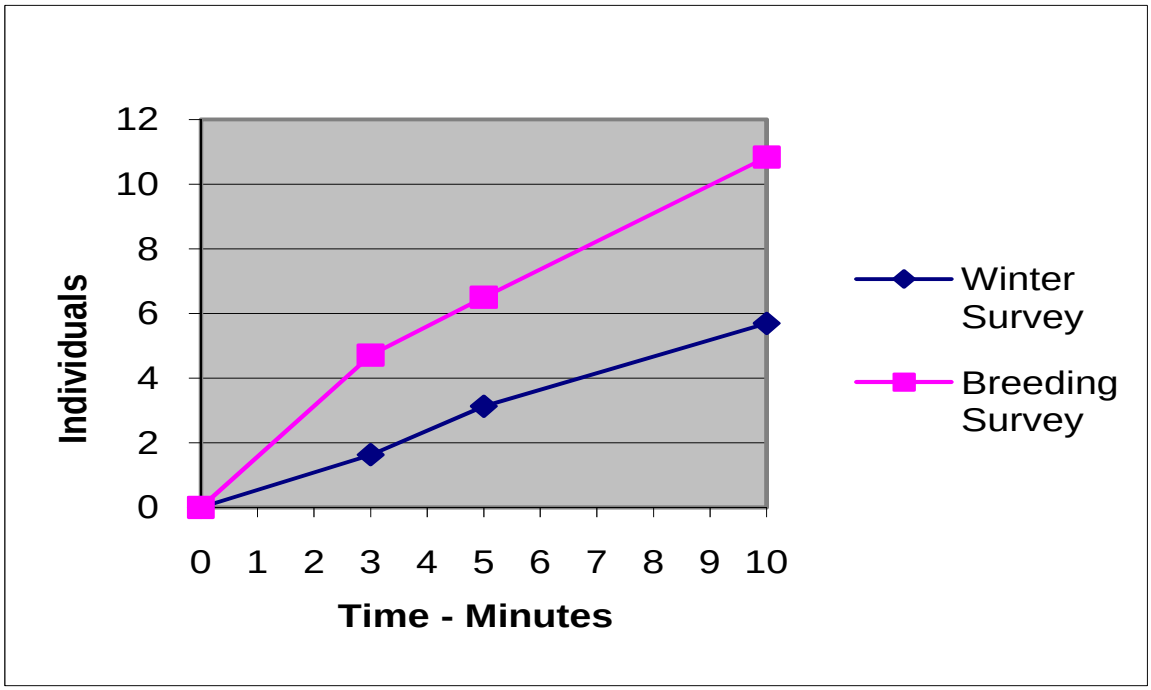


Figure 11a. Time interval analysis for bird species in the Interior Riparian Deciduous Forest Alder biotic community in Devils Canyon during the winter and breeding surveys

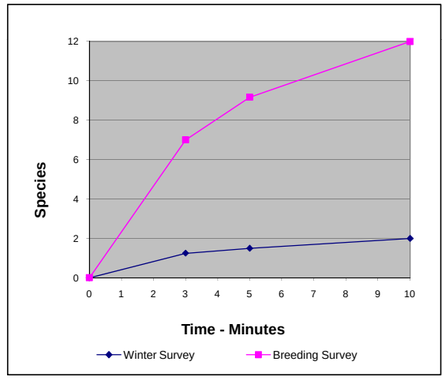


Figure 12a. Time interval analysis for bird species in the Interior Riparian Deciduous Forest - Devils Canyon biotic community during the winter and breeding surveys

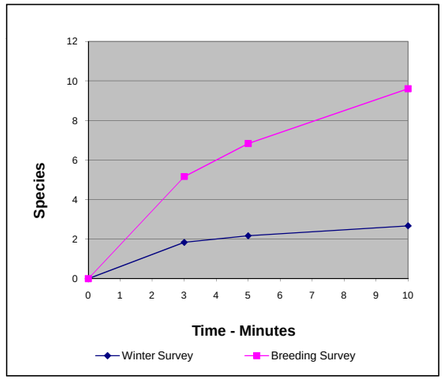


Figure 13a. Time interval analysis for bird species in the Interior Riparian Deciduous Forest - Queen Creek biotic community during the winter and breeding surveys

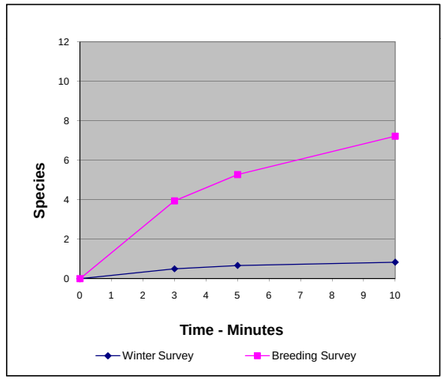


Figure 14a. Time interval analysis for bird species in the Interior Riparian Deciduous Forest - Rancho Rio Creek biotic community during the winter and breeding surveys

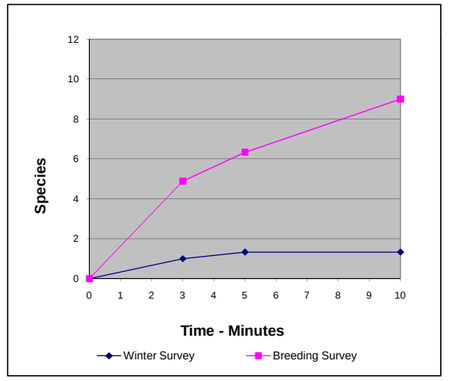


Figure 15a. Time interval analysis for bird species in the Interior Riparian Deciduous Forest - Ponds biotic community during the winter and breeding surveys

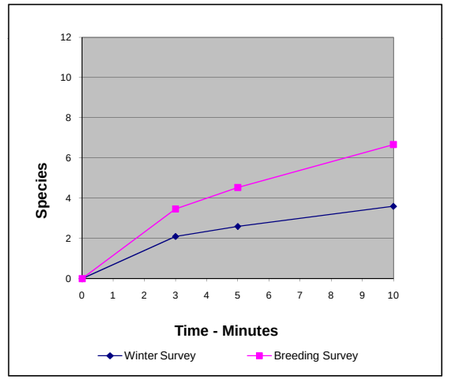


Figure 11b. Time interval analysis for individuals in the Interior Riparian Deciduous Forest Alder biotic community in Devils Canyon during the winter and breeding surveys

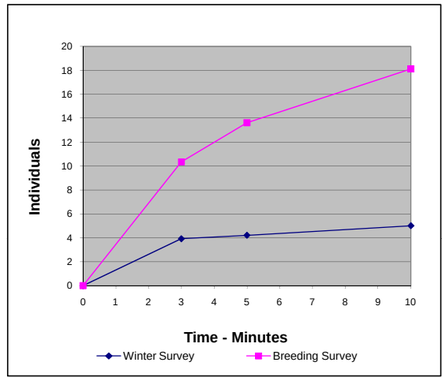


Figure 12b. Time interval analysis for individuals in the Interior Riparian Deciduous Forest - Devils Canyon biotic community during the winter and breeding surveys

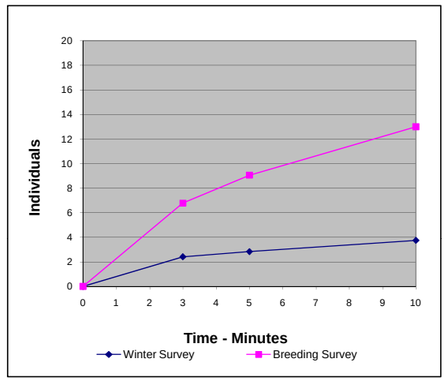


Figure 13b. Time interval analysis for individuals in the Interior Riparian Deciduous Forest - Queen Creek biotic community during the winter and breeding surveys

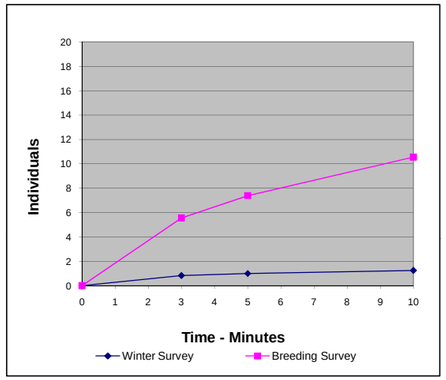


Figure 14b. Time interval analysis for individuals in the Interior Riparian Deciduous Forest - Rancho Rio Creek biotic community during the winter and breeding surveys

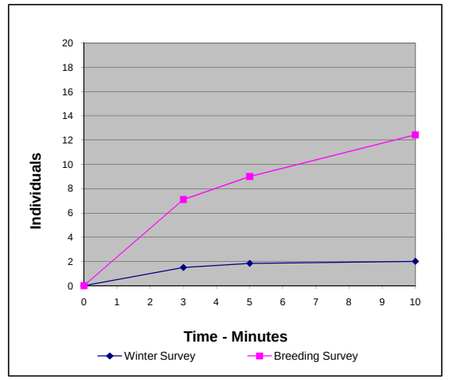


Figure 15b. Time interval analysis for individuals in the Interior Riparian Deciduous Forest - Ponds biotic community during the winter and breeding surveys

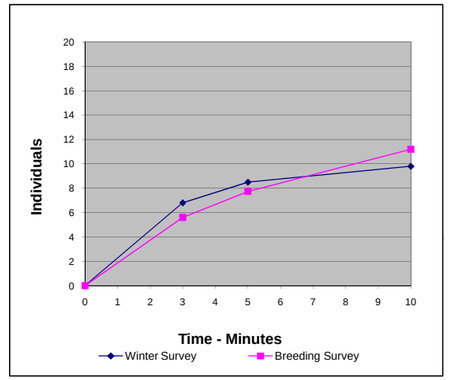


Figure 16a
Time interval analysis for bird species for all biotic communities during winter and breeding surveys

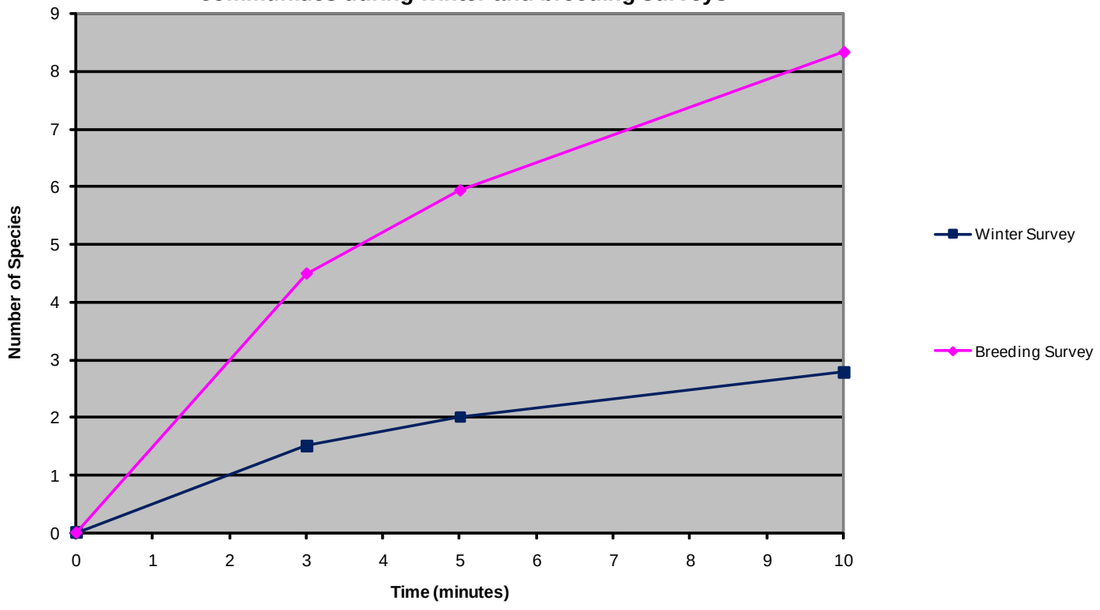


Figure 16b
Time interval analysis for individuals for all biotic communities during winter and breeding surveys

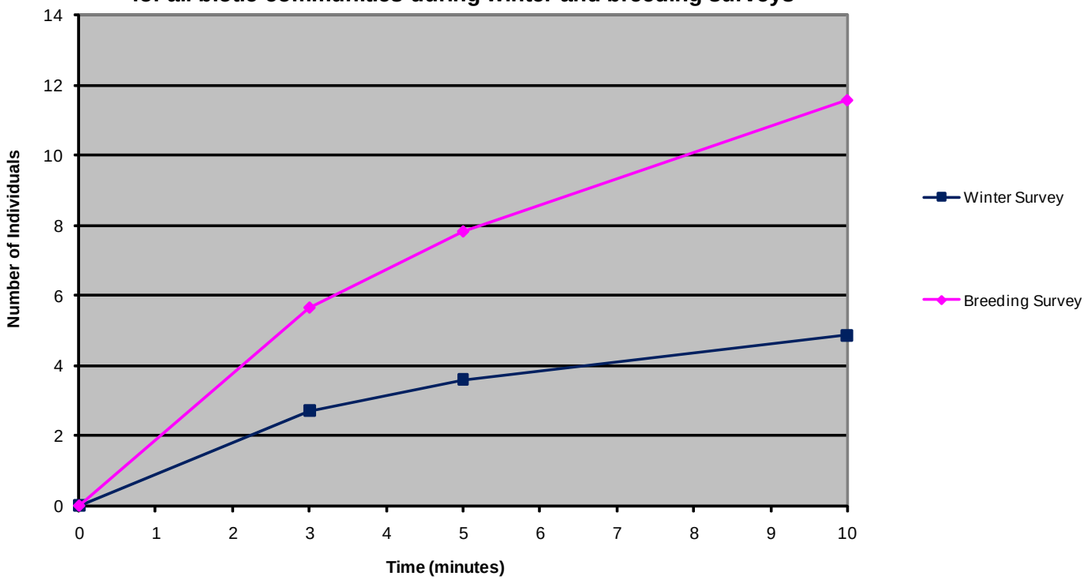


Figure 17a
Time interval analysis for bird species for all biotic communities (%)

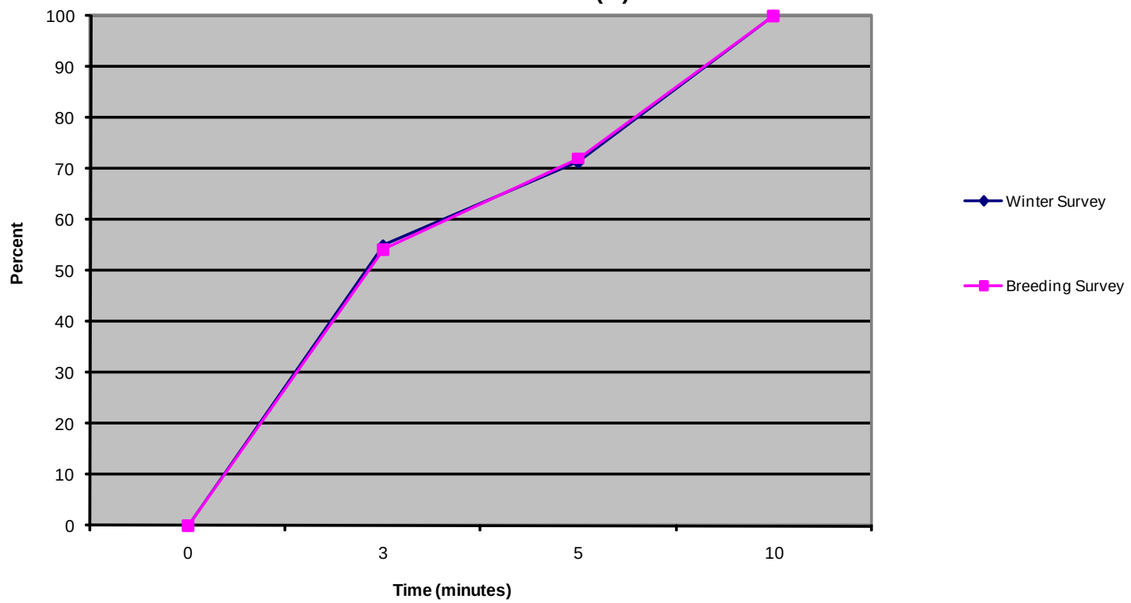


Figure 17b
Time interval analysis for individuals for all bioitic communities (%)

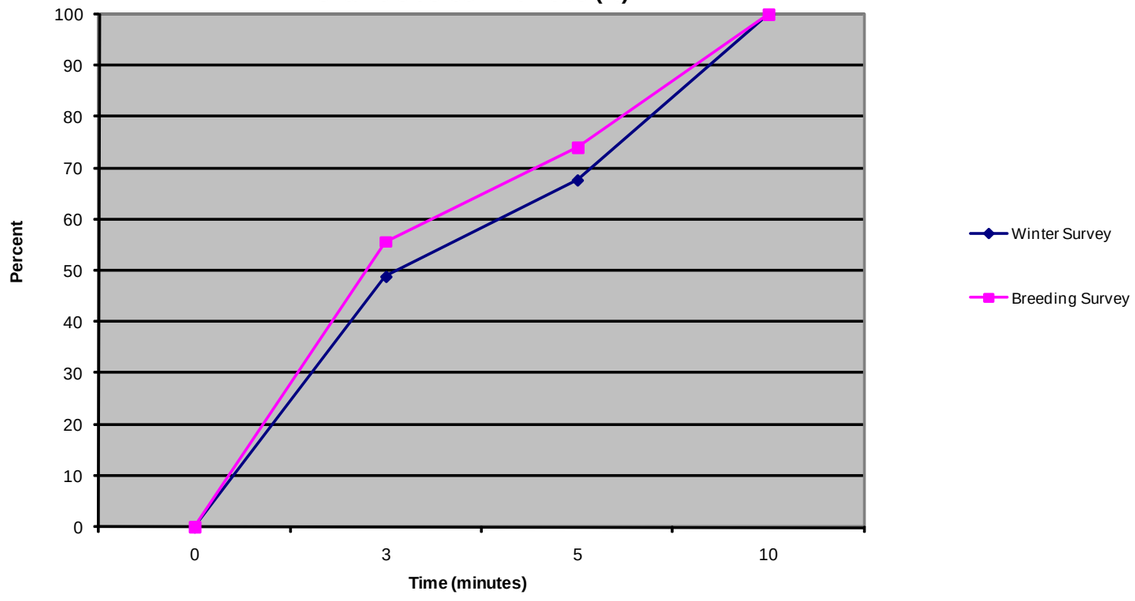


Figure 18a.
Time of day analysis for bird species during the winter* and breeding surveys

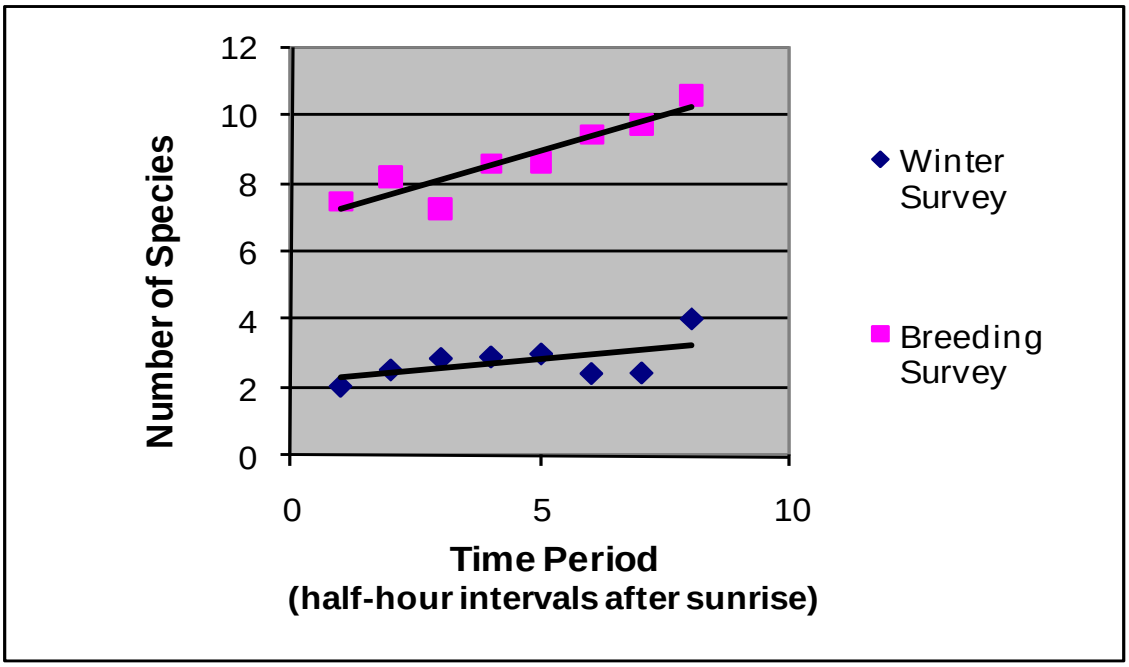
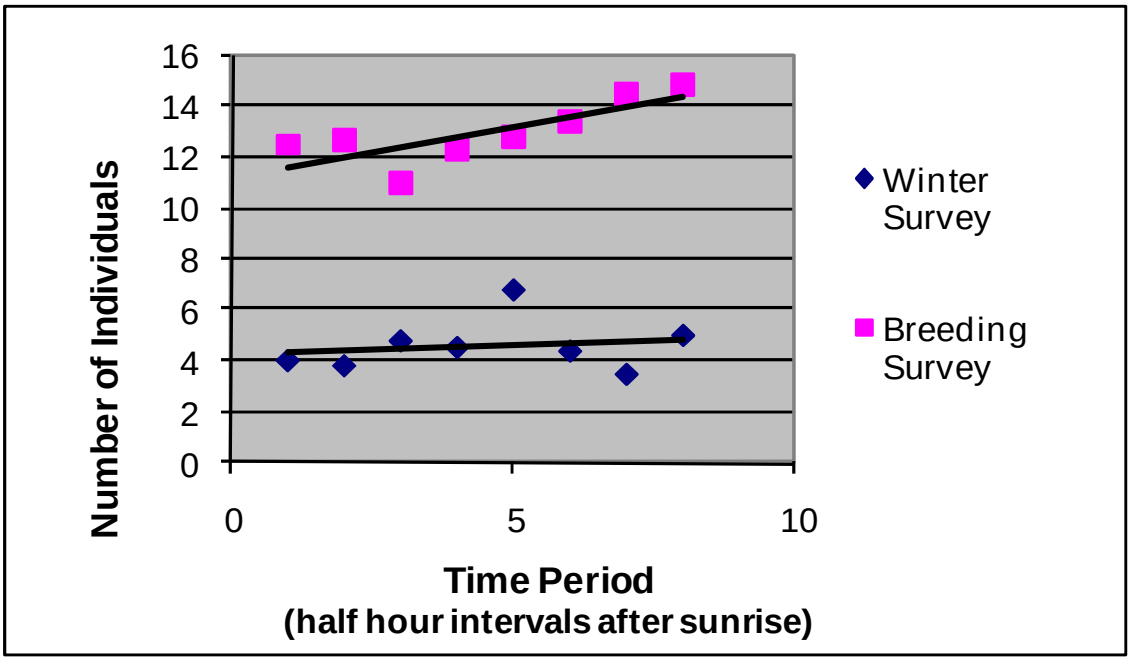


Figure 18b.
Time of day analysis for individuals during the winter* and breeding surveys



*Outliers have been excluded from the winter season for this graphic.

Figure 19.
Relationships between bird species diversities and total tree densities in the winter and breeding surveys

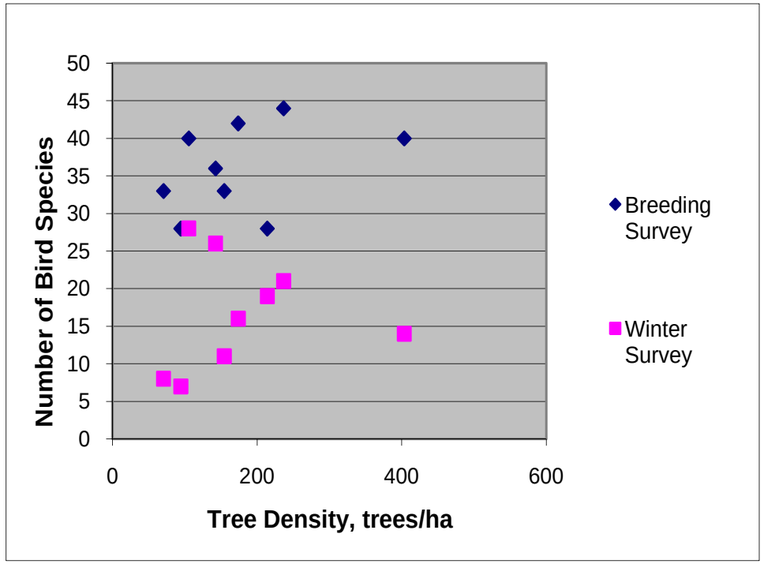


Figure 20.
Relationships between total bird densities and total tree densities in the winter and breeding surveys

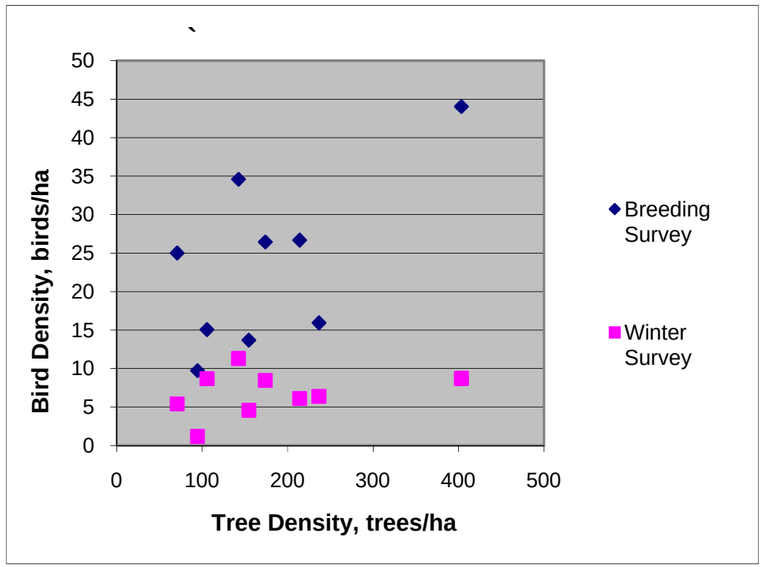


Figure 21.
Relationships between bird species diversities and total tree canopy cover in the winter and breeding surveys

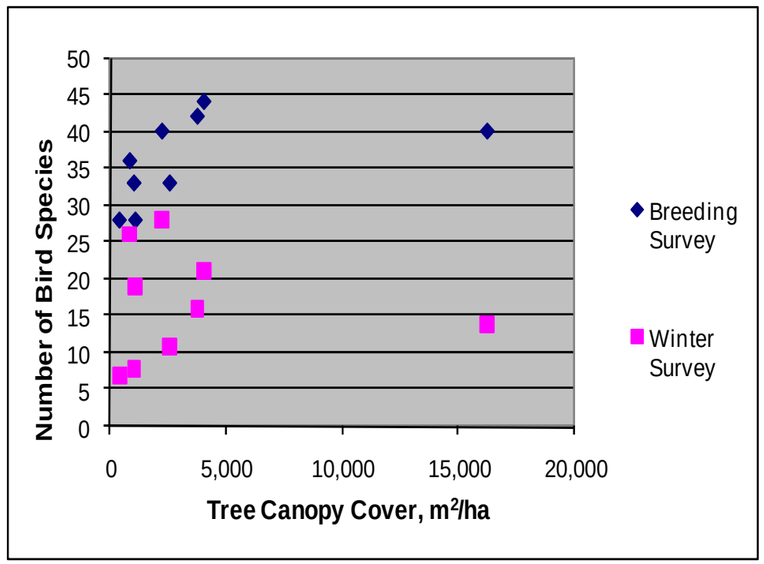


Figure 22.
Relationships between total bird densities and total tree canopy cover in the winter and breeding surveys

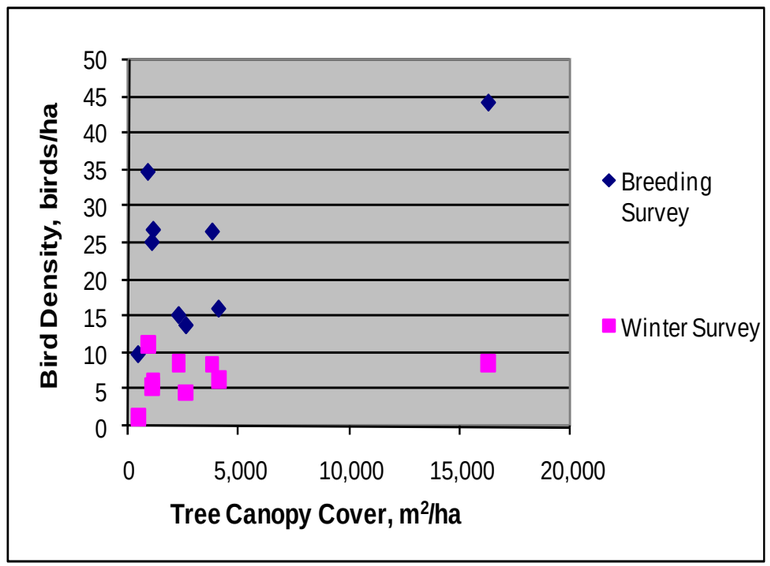


Figure 23.
Relationships between bird species diversities and percent shrub cover in the winter and breeding surveys

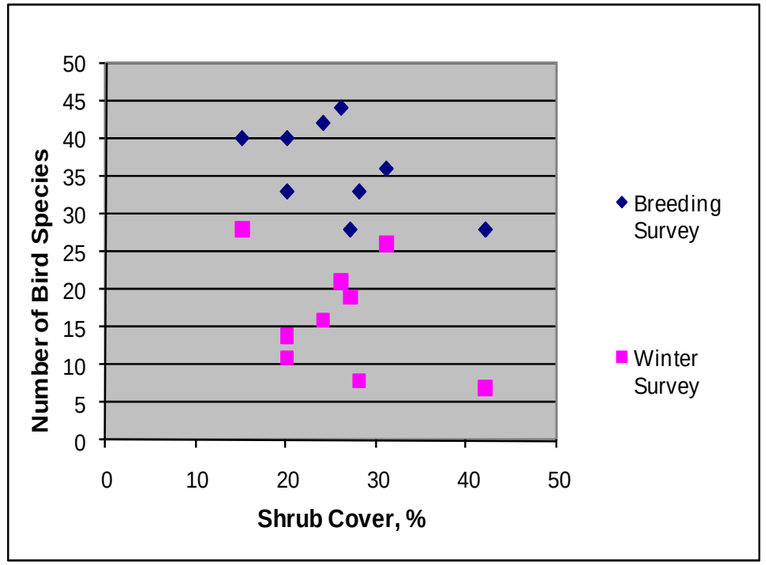
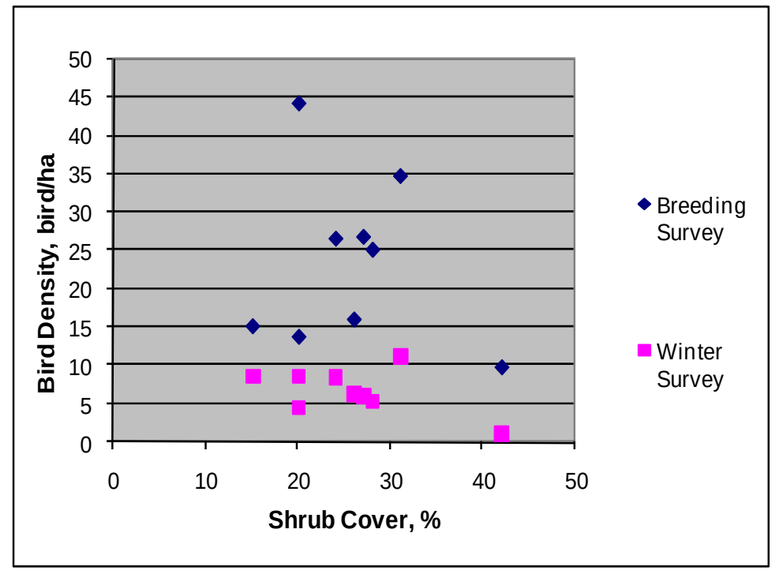


Figure 24.
Relationships between total bird densities and percent shrub cover in the winter and breeding surveys



APPENDIX A

SAMPLING METHOD JUSTIFICATION

APPENDIX A
SAMPLING METHOD JUSTIFICATION

Determining accurate bird population densities is a difficult problem. Many techniques for estimating bird populations have been reviewed by Ralph and Scott (1981). Each technique is designed for specific circumstances and has certain limitations, and no single method can be applied to all situations. For all methods the observer must be able to identify birds that are encountered quickly and accurately, and determine accurately the distance at which the bird is heard or seen. When bird densities are reported, there is an implicit assumption that the birds have been correctly identified and the distances recorded from point-to-bird are accurate.

Two general categories of procedures for population estimates include spot-mapping and individual counting techniques. The spot-mapping method maps breeding territories by plotting the locations of singing males within a designated area. This method is not particularly suitable for the Resolution Study Area because it requires large areas (at least 10 hectares) of homogeneous biotic community to get reasonable density estimates (Szaro and Jakle 1982), and areas of this size are not available for several of the biotic communities present within the Study Area. In addition, this method is unsuitable for winter surveys when most birds are not defending territories.

Within the category of individual count methods, two general approaches are transects and point counts. Emlen (1971) first proposed a method for converting transect counts to densities, with subsequent modifications (Emlen 1977; Emlen 1984). All variants of the transect method require a large area of homogeneous landscape to allow a transect length of 1.0 to 1.5 km (Szaro and Jakle 1982).

The variable circular-plot method (VCPM) is a point count census procedure based on observations from single points (Reynolds, et al. 1980). Reynolds et al. suggested a number of reasons why VCPM would be the preferred survey method over that of Emlen's transect counts in complex vegetation types and rugged terrain, factors relevant to the uplands and canyons of the Study Area. Rugged terrain greatly reduces the attention of the observer on a transect, such that many birds may be missed. The VCPM is particularly appropriate for sites with small patches of biotic communities that lack large, homogeneous stands. In addition, this method may be used for wintering or migratory birds, as well as for breeding birds. Szaro and Jakle (1982) compared the VCPM with spot-mapping methods in selected biotic communities near Superior, Arizona. They found virtually no difference in density estimates between the methods, but they recommended the VCPM for censuring sites with small biotic community islands. The VCPM was also used in summer and winter seasons in a study comparing riparian and upland biotic communities in the Huachuca Mountains (Strong 1987; Strong and Bock 1990). Since 1980, VCPM has been utilized by a large number of ornithologists in estimating bird populations.[1] Some of these studies using VCPM have provided long-term population trends of rare bird species (Johnson et al. 2006) and explored the effect of catastrophic events on avian communities (Knopf and Sedgwick 1987), the alteration of biotic community by logging at different scales (Leupin et al. 2004, Vergara and Schlatter 2006), and the effect of local

[1] By July 2007, Science Citation identifies 238 published, peer-reviewed articles that have cited Reynolds et al. (1980). Most of these articles are using the VCPM as their methodology in assessing bird densities.

human disturbance and alteration on avian communities (e.g., Blakesley and Reese 1988). Since Reynolds et al. (1980), statistical approaches for analyzing data collected using the VCPM have been further refined (ex. Buckland 1987, Quang 1993, Davis et al. 2000, Farnsworth et al. 2002, Alldredge et al. 2007). Dettmers et al. (1999) provided an empirical comparison of point count duration and repeat visits on the data obtained using VCPM. Jiménez (2000) looked at the effect of size of plot, duration of plot, and number of plots, when each was varied one at a time, on species richness and overall density in a Chilean rainforest. Wilson et al. (2000) found that with line transects, they detected more species, more individuals, and more birds per unit time of Nearctic-Neotropical migrants in a Mississippi bottomland hardwood forests, than with the VCPM. [However, Wilson's bottomland forests are easier to traverse than our Study Area; VCPM would remain preferred under our conditions.]

Using the VCPM is appropriate for bird survey in the Resolution Study Area because the riparian biotic communities in this area are distributed in long, narrow strips along canyon bottoms surrounded by upland vegetation, and the encinal woodlands are present in patches that are interspersed with chaparral and along drainage bottoms. In addition, using the VCPM will provide comparable results for wintering and breeding birds. For these reasons, we believe that the VCPM is the most appropriate census technique to collect data on baseline bird population densities within the Study Area.

Using the VCPM, an observer stands at a central point and counts the number of birds seen or heard within a specified time period. To improve the quality of the density estimates, each point is counted multiple times during a season. During each counting period, a distance from the central point is estimated for each individual bird. For each species, observations are grouped in concentric rings based on the radial distance from the central point. An incremental density may be calculated for each ring based on the number of birds observed and the area within that ring. A detection limit is defined for each species at the distance at which the next larger ring has an incremental density less than 50 percent of that in the next smaller ring. Different species have different detection limits because their size or behavior makes them more or less obvious to the observer. To obtain a more reliable estimate of species' detection limits, observations from replicate plots in a single biotic community type may be combined, and the resulting detection limit would be used for each plot within that biotic community type. The final density estimate for a species within a biotic community type is based on the total number of individuals at distances less than or equal to the detection limit divided by the circular area that extends to the detection limit and divided by the number of observation periods in that biotic community.

APPENDIX 4

2009 Bird Census Resolution Copper Mine Study Area, WestLand Resources, Inc. September 2010

2009 BIRD CENSUS

RESOLUTION COPPER MINE STUDY AREA

Prepared for:

Resolution Copper Company

102 Magma Heights
Superior, Arizona 85273

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SEPTEMBER 2010
Project No. 807.28

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KEY FINDINGS

BIRD CENSUS

Species Diversity

- Twenty-five new survey points were established during 2009 to cover portions of the Resolution Parcel that were not surveyed during 2008. These points were located in the following habitat types: 15 points in manzanita chaparral, 7 points in scrub oak chaparral, and 3 points in Emory oak woodland.
- Fifty-three bird species were recorded on census plots, and additional 19 species were observed on or near the Study Area.
- Total numbers of species among these habitats were: 24 species in the Emory oak woodlands, 36 species in the scrub oak chaparral, and 47 species in the manzanita chaparral.
- Although absolute numbers of species differed among the three habitat types, these differences may be explained by the different numbers of survey points in each habitat type.

Bird Species Densities

- Total bird densities range from a low of 9.9 birds per hectare in the manzanita chaparral, to 14.2 birds per hectare in the scrub oak chaparral and 14.5 birds per hectare in the Emory oak woodlands

Survey Set Time Segments

- Observations within 3-minute, 2-minute, and 5-minute segments of the total time at each survey point showed the expected pattern of numerous species and individuals observed during the first two time segments (5 minutes total), and relatively few species and individuals added during the final 5 minutes
- From 70-75 % of species and individuals were observed during the first 5 minutes of a count, and the last 5 minutes added 25-30 % of species and individuals. This pattern is consistent across all habitat types and is similar to the patterns observed in 2008. The fact that attenuation of bird species and individuals was not maximized suggests that longer observation periods should be used in future surveys.

1.0 INTRODUCTION

WestLand Resources, Inc. (WestLand) was retained by Resolution Copper Mining, LLC (RCM) to conduct bird surveys in the vicinity of RCM's holdings (collectively referred to as Resolution in this report) near Superior, Arizona. Details of the Study Area are presented in Figure 1. The purpose of these surveys was to establish baseline information about bird populations at Resolution. This report provides an inventory of the birds observed during 2009, various analyses of these data by habitat type, and where appropriate, comparisons to similar data collected in 2008.

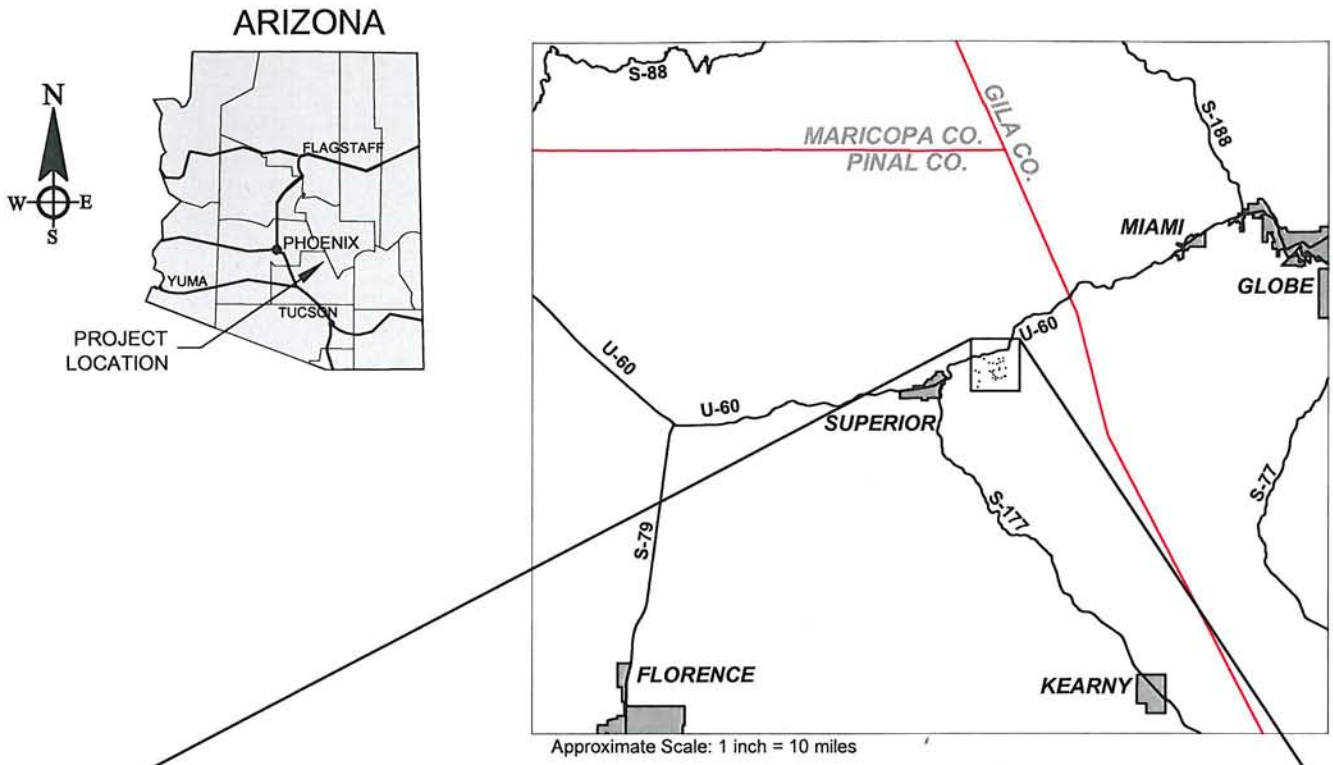
A description of the Study Area and a summary of previous bird surveys conducted in or near the Study Area were provided in the annual report for the 2008 bird surveys.

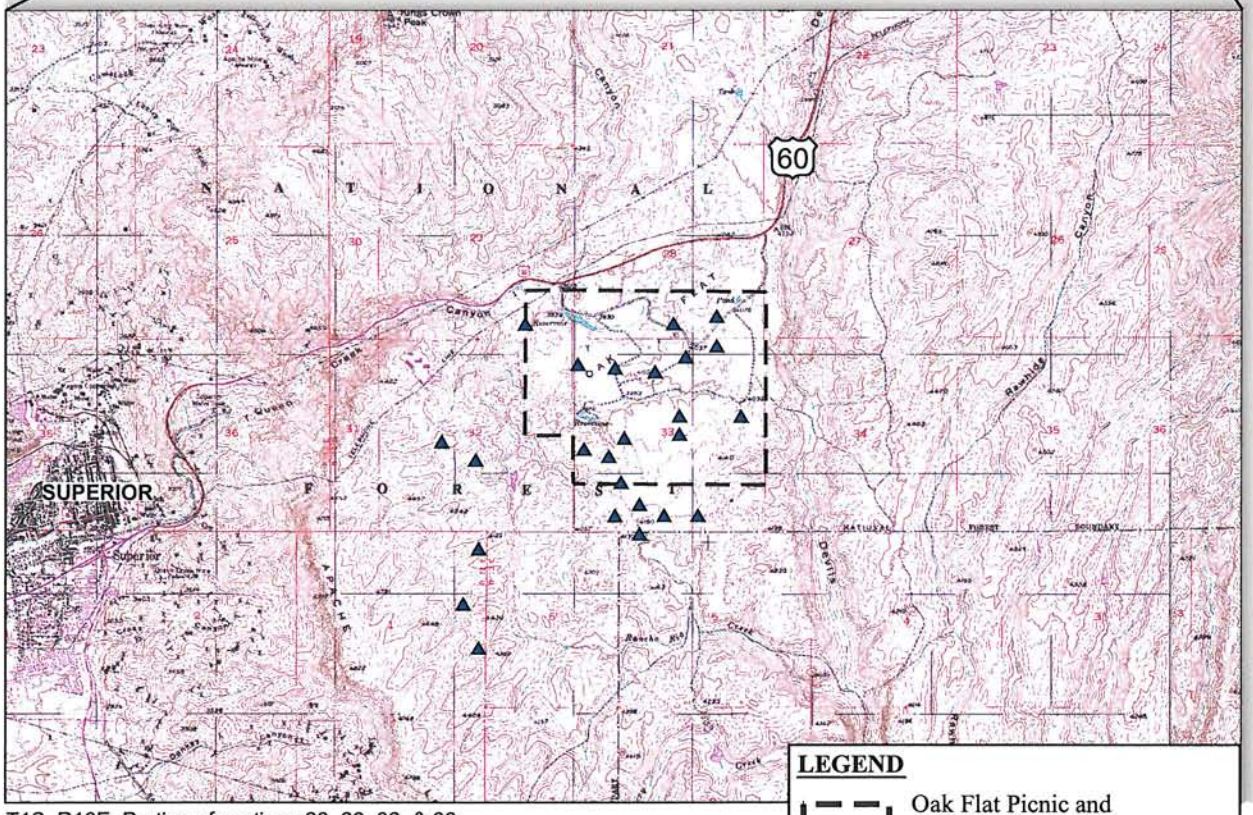
2.0 BIRD CENSUS

2.1 BIRD CENSUS SURVEY METHOD

Twenty–five points were sampled during the 2009 breeding season. Fewer census points were selected in 2009 compared to 2008 and none of the census points were common to both years. This was done to provide a more detailed survey of interior chaparral habitat, which is the most extensive habitat type in the vicinity of Oak Flat and which was sparsely sampled in 2008. Approximate locations of potential survey points were selected using Google Earth and topographic maps of the site. Locations were finalized during our first survey period in May, 2009. All of the new points were in upland areas (Figure 2). GPS coordinates (NAD-27 and NAD-83) for all of the new points are provided in Table 1. Fifteen of the new points were in manzanita chaparral, 7 points were in scrub oak chaparral, and 3 were in Emory oak woodland (Figure 2). No additional data were collected on vegetation during 2009.

The array of points could be surveyed in three days by one team of observers. Each point was counted three times during the breeding survey, with survey dates separated by about two weeks. The first survey period was May 26, 27 and 28; the second period was June 8, 9, and 10; and the final survey period was June 25, 26, 27. To ensure the greatest reliability in our density estimates, we used the same two highly-experienced observers throughout the survey. Both observers worked together to survey each point. Sets of 8-9 points were censused on three consecutive days. The groups of points were chosen because of proximity to each other, but the observers would reverse the order in which points were censused to reduce the potentially confounding effect of time of day.





T1S, R13E, Portion of sections 28, 29, 32, & 33,
T2S, R12E, Portion of section 1, T2S, R13E, Portion of section 5,
Pinal County, Arizona, Superior 7.5' USGS Quadrangle

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RESOLUTION COPPER MINNING
Baseline Studies

2009 Bird Survey Area
Vicinity Map
Figure 1

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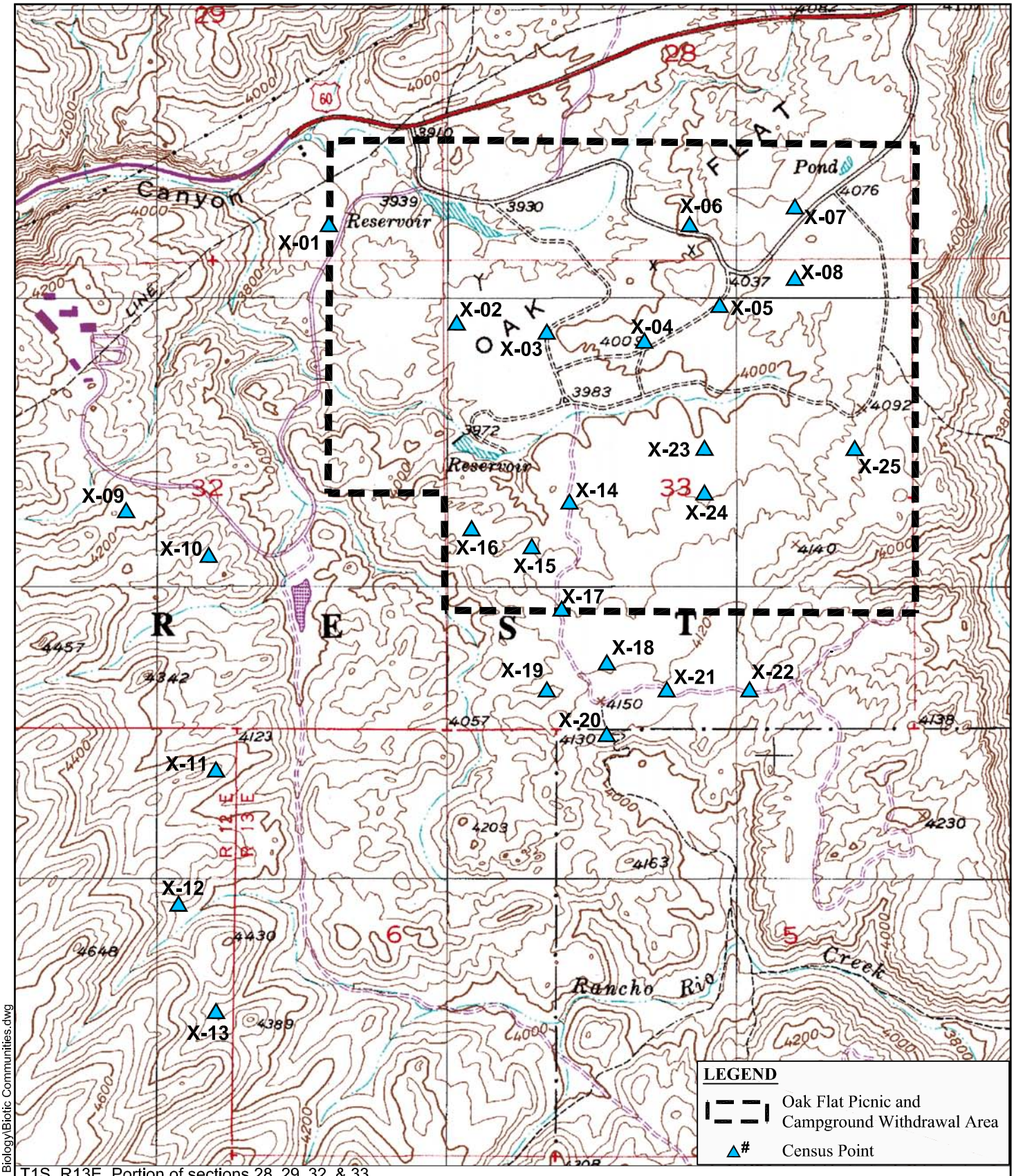

T1S, R13E, Portion of sections 28, 29, 32, & 33,
T2S, R12E, Portion of section 1, T2S, R13E, Portion of section 5,
Pinal County, Arizona, Superior 7.5' USGS Quadrangle

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RESOLUTION COPPER MINNING
Baseline Studies

Location of Bird Surveys
During 2009 Breeding Season
Figure 2

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The variable circular-plot method (VCPM) was used for estimating bird populations (Verner 1985, Gibbons et al. 1996). This procedure was also utilized as in 2008. From the chosen central point of each location 5-meter increments of radius out to 30 meters from the central point, and 10-meter increments from 30 to 100 meters were approximated visually. Birds observed at distances greater than 100 meters from the survey point were recorded but were generally beyond calculated detection limits for density estimates. Birds at distances greater than 200 meters were not recorded. Survey points were at least 200 meters apart to minimize the possibility of repeat counting of individual birds. Because the activity level of birds may decrease during the middle part of the day, census times were restricted to the first five hours after sunrise. This restriction is more critical in summer than in winter. For each point birds were counted for a 10-minute period during each cycle of surveying and their approximate distances from the center point were recorded. In order to better understand the rates of detection of birds at each census point, we noted the number of individual birds detected during a first 3-minute period, a second 2-minute period, and a third 5-minute period. We analyzed the data in a manner similar to Dettmers et al. (1999).

The VCPM can be used to estimate densities for a wide variety of bird species. Because different species are detectable at different distances from the observer and the ability of the observer to detect particular species differs among biotic communities, detection distances are determined for each species in each biotic community and the observations from all points and the species observed at those points within that biotic community are combined. The detection distance is normally the distance at which the incremental density of a species in the next greater radial range is less than half of the incremental density in the lower range. Incremental densities are calculated by dividing the number of observations within a concentric ring by the area of that ring. For example, the incremental area of the ring between 30 and 40 meters from the central point would be the area of a 40-meter radius circle minus the area of a 30-meter radius circle.

Because incremental areas increase geometrically with the distance from the central point, minor errors in distance estimates for birds close to the point can bias the density estimate (Verner 1985). Similar biases can result if birds are attracted to or repelled from the observer (Gibbons et al. 1996). However, the accuracy of detection limits and densities will improve with a greater number of observations. Another potential bias in this method may occur if uncommon birds happen to be observed close to the point. With too few observations to determine a reliable detection limit, very high densities for uncommon species based on one or two close observations may be calculated. To reduce the effects of this potential bias, a minimum detection limit of 20 meters was assumed for uncommon species observed close to the census point.

Once a detection limit has been determined for a species in a biotic community, a density estimate may be calculated based on pooled data from all points within that biotic community. The total number of individuals observed is divided by the area of a circle with a radius of the detection limit. This result is then divided by the total number of counts within that biotic community during the survey. The total number of counts for a biotic community is equal to the number of census points within that biotic community multiplied by the number of times each point was censused (25 points x 3 dates = 75).

2.2 BIRD CENSUS RESULTS AND DISCUSSION

Bird Species Diversity

During the 2009 breeding survey, 53 bird species were recorded with distance estimates (Table 2). Nineteen other species (Table 3) were observed in the Resolution vicinity but were not recorded at any points during the breeding survey. The species names and their sequence in these tables follow the taxonomy of the American Ornithologists Union (AOU 2009). The data from all survey points in specific biotic communities were combined to determine detection limits for each species in each biotic community. As in the 2008 surveys, most breeding survey density estimates are based on relatively few observations. Only 32 of 112 breeding density estimates (28.6 %) are based on ten or more observations within a biotic community type. This means that estimated densities can either under or over estimate actual densities. These densities are best viewed as an approximation of relative density of the different bird species observed during the study.

The numbers of species observed in the different biotic communities ranged from a low of 24 species in the Emory oak sites to a high of 47 species in the manzanita sites. The sites in scrub oak chaparral were intermediate with 36 species. Unidentified hummingbirds were not counted as a separate species because they were almost certain to be either black-chinned or Annas' hummingbirds. The average number of species per habitat in 2009 was 35.7.

The total number of bird species observed in each biotic community increased with new observations in each of the three survey sets. The total number of species is the simplest measure of species diversity. These results are illustrated graphically in Figure 3. The general pattern for each community is a large number of species observed during the first survey period, with relatively fewer new species added in subsequent survey periods. Roughly two-thirds of the species were observed during the first breeding survey set in each habitat type. The last survey period added about 10 % of the species in the Emory oak and scrub oak communities, but it added about 20 % in the manzanita chaparral. Thus, the number of species per habitat was attenuating, but these results suggest that additional, relatively uncommon species could be added with additional survey effort.

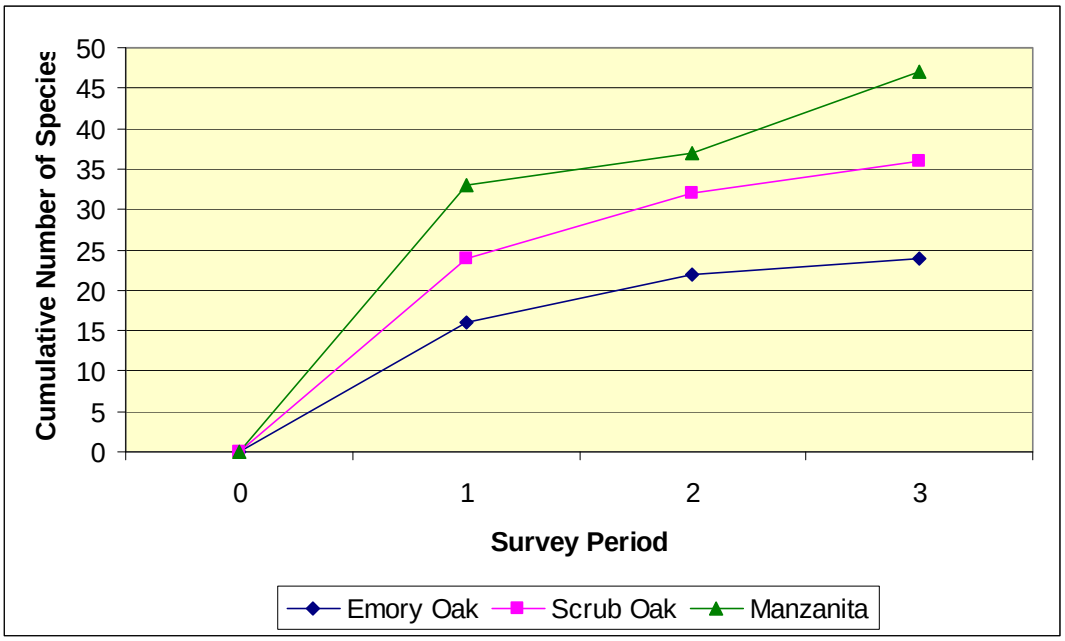

Figure 3. Cumulative numbers of species observed in the habitat types covered during the 2009 breeding season.

The total number of species in each habitat appears to be dependent on the number of survey points. When the data from Figure 3 are plotted based on the number of census points within a habitat, all values appear to fall on or near a smooth curve, as shown in Figure 4. The curve does not reach an asymptote, which would suggest saturation of sampling effort and would indicate a maximum number of species. Again these data suggest that additional sampling effect would detect uncommon species.

Bird Species Densities

The detection limits described above were used to calculate densities for each species in each biotic community. These densities provide for reasonable comparisons among biotic communities. Detection limits and densities that are based on very few observations are only approximate. Because many bird species are infrequently observed, only 32 out of 107 density estimates (29.9%) are based on 10 or more observations within a biotic community (Table 2). Not surprisingly, the Emory oak community, which had the fewest points and the least census time, had the fewest species with reliable detection limits. In contrast, both the scrub oak and the manzanita communities had reliable estimates for about 30 % of the observed species (Table 2).

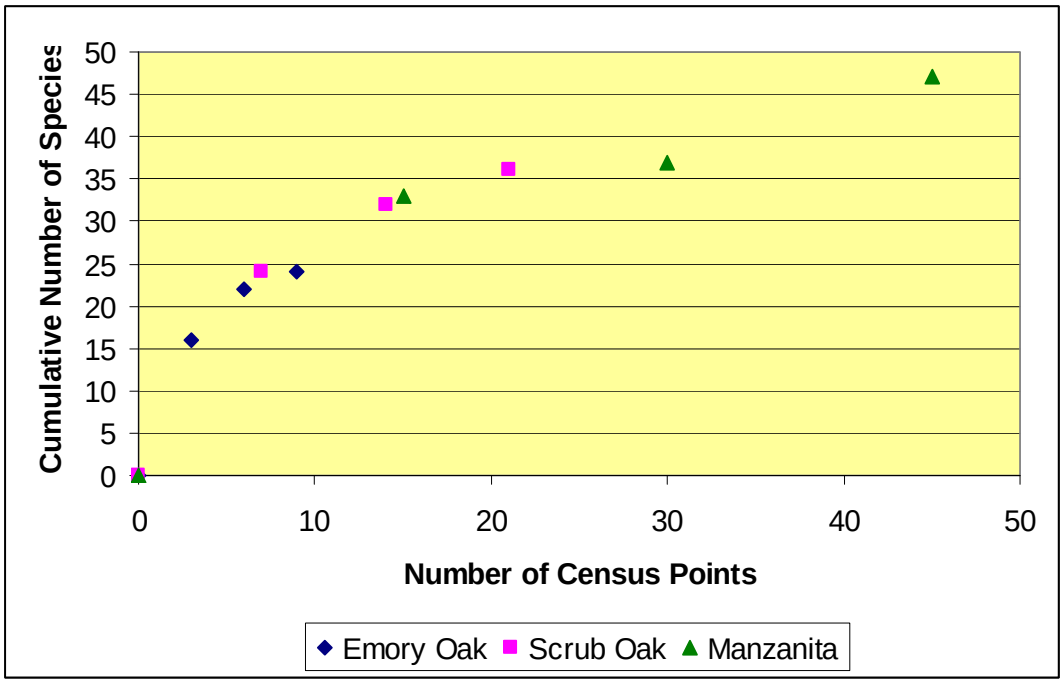

Figure 4. Cumulative numbers of species observed in the habitat types covered during the 2009 breeding season, based on number of censuses in each habitat type.

Total breeding survey bird densities in these communities range from a low of about 9.9 birds per hectare in the manzanita community to highs of 14.2 and 14.5 birds per hectare in the scrub oak and Emory oak communities, respectively. A weighted average of all survey points gives a density of 11.6 birds per hectare during the breeding survey.

Time Interval Analysis of Survey Sets

We attempted to determine the efficiency of the sampling protocol by analyzing the accumulation of species observed in sites during subsets of the 10 minute observation period at each sample point. The survey data were also analyzed based on observations within different time segments in each survey set. Observations were recorded separately for the first 3 minutes, the next 2 minutes, and the final 5 minutes of the total 10-minute survey at each point. Surveyors hypothesized that most species and individuals would be seen during the 3-minute and 2-minute intervals, and that fewer new species and individuals would be added during the final 5-minute interval.

The data collected during the 2009 breeding season generally support this hypothesis, and the results are very similar for all three habitat types. Time interval analyses for species and individuals are presented in Figures 5 and 6, respectively. These figures show that about half of the species and individuals are observed during the first 3 minutes of a census, and about two-thirds are observed during the first 5 minutes. This trend was identical for each of the habitats and did not seem to be affected by number of sample points per habitat. These graphs do not reach an asymptote which indicates that additional time censusing each point would likely result in more species and individuals being recorded.

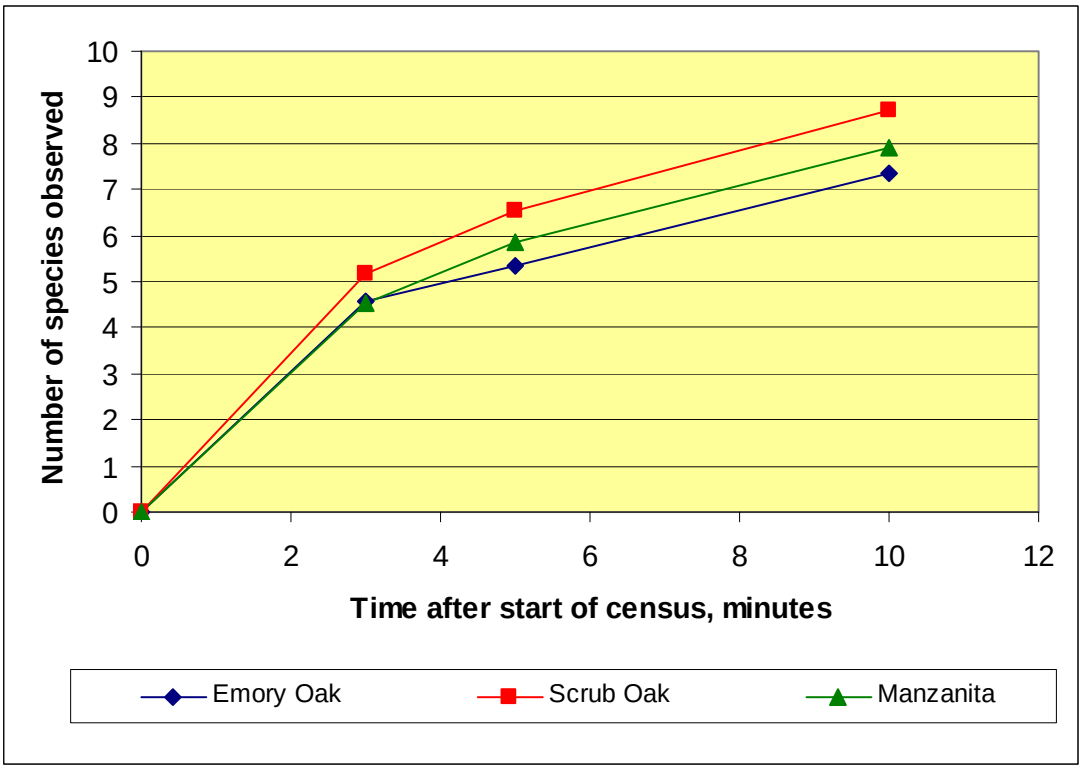

Figure 5. Cumulative numbers of species based on time segments after the beginning of a census count at a point, averaged over all points in a habitat type.

Effects of Time of Day

Our survey protocol includes the implicit assumption that bird activity will decrease in the middle part of the day, leading to a potential bias in density data. This expected decrease in activity is likely because of high daytime temperatures during the summer. To test this assumption, we analyzed the numbers of species and individuals recorded during each 10-minute survey period, based on the time after sunrise that the survey period started. The data were grouped into half-hour time intervals beginning with the time of sunrise, and the bird counts were averaged during those time intervals. Using time-after-sunrise eliminates any potential bias from increasing day lengths later in the season.

Results of this analysis, based on 75 survey periods are shown numerically in Table 5. Figures 7 and 8 show these data graphically for species and individuals, respectively. Correlation coefficients (r) for the species and individuals are 0.263 and 0.443, respectively. Neither of these correlations is statistically significant, indicating that there is no trend for bird species or numbers to decrease during our census periods. This indicates a lack of bias in censuses occurring earlier or later in the morning and further suggests that longer census times in the mornings would be possible in the future.

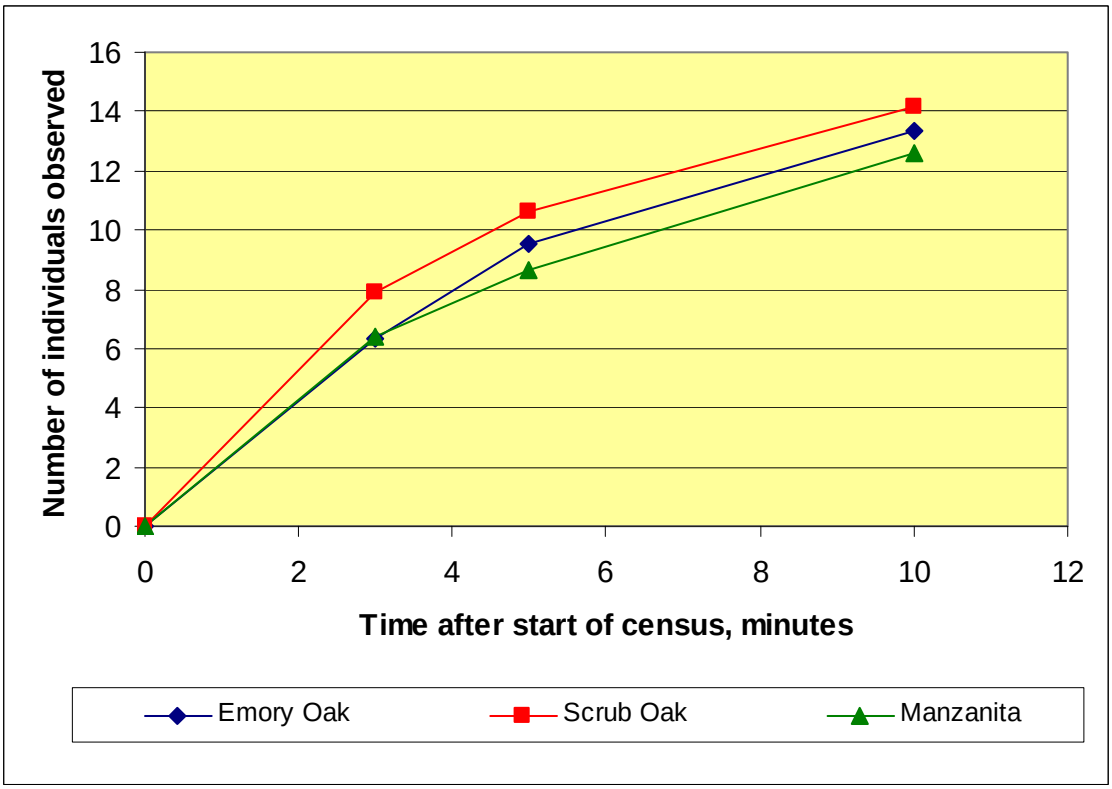

Figure 6. Cumulative numbers of individuals based on time segments after the beginning of a census count at a point, averaged over all points in a habitat type.

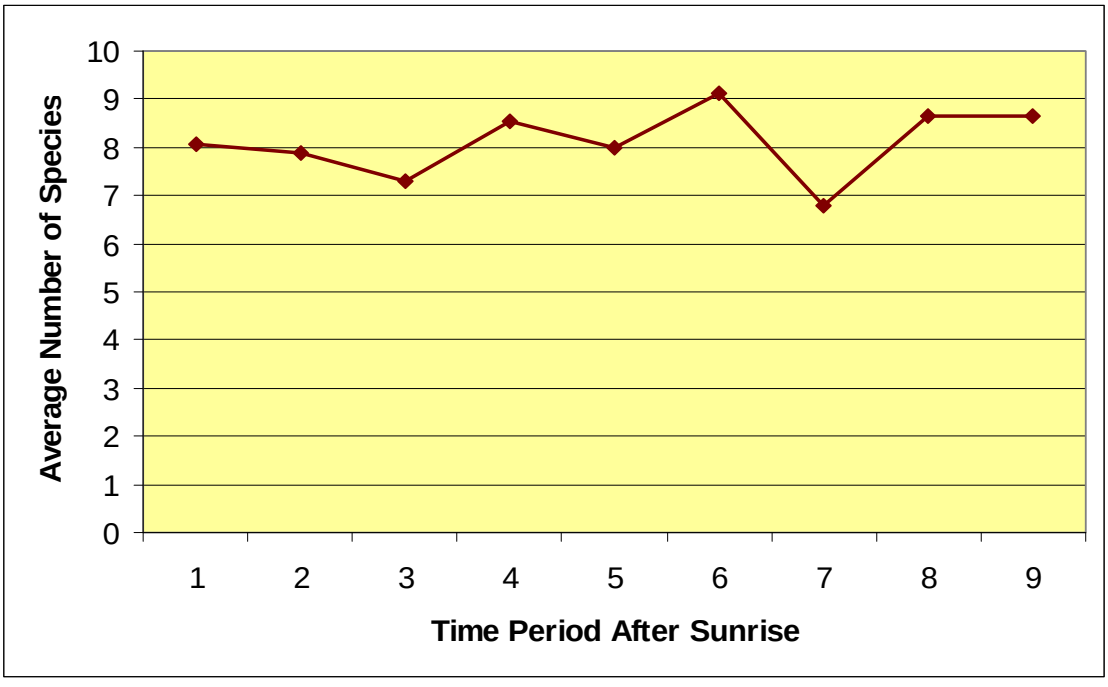

Figure 7. Time of day effect on numbers of species observed. Each time period represents a 30 minute interval.

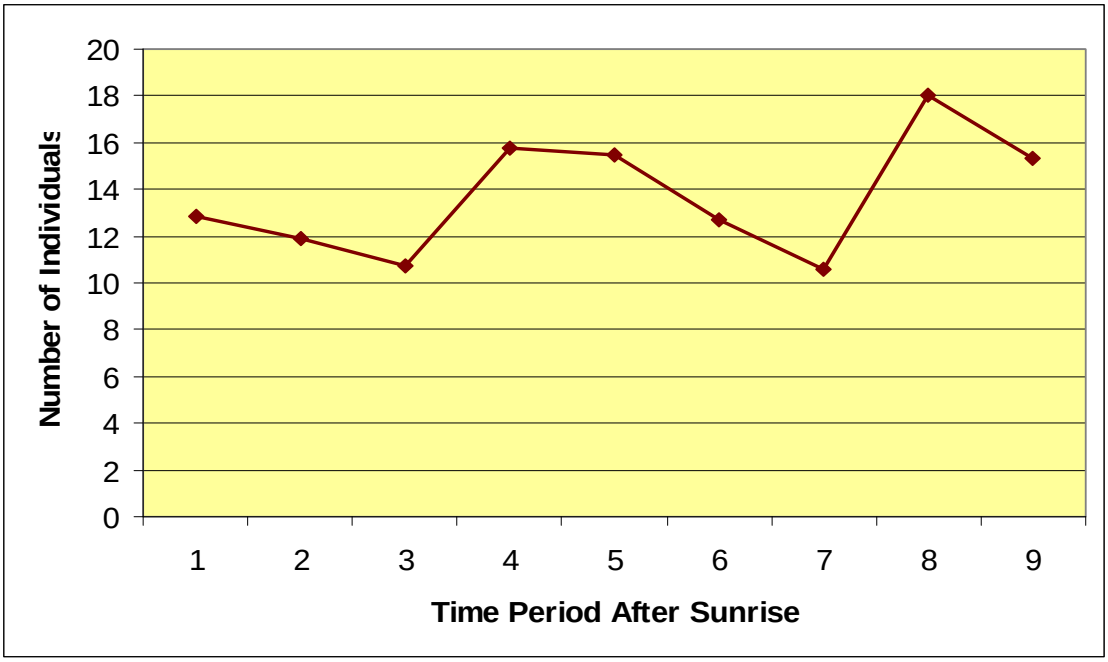

Figure 8. Time of day effect on numbers of individual birds observed. Each time period represents a 30 minute interval.

2.3 BIRD CENSUS SUMMARY AND CONCLUSIONS

The 2009 breeding season survey using the VCPM has been successfully completed at the Study Area. These surveys covered 25 points distributed among three different habitat types. Fifty-three (53) bird species were recorded at these survey points, and another 19 species were observed elsewhere on the Resolution site. Forty-seven species were recorded in the manzanita habitat, 36 species were recorded in the scrub oak habitat, and 24 species were recorded in the Emory oak habitat. These differences in species diversity are likely to be the result of different numbers of census points in these habitat types and not to intrinsic differences in suitability of these for birds in general. Overall bird densities ranged from 9.9 birds per hectare in the manzanita community to 14.5 birds per hectare in the Emory oak community. The weighted average of all survey points is 11.6 birds per hectare.

The 10-minute sample period was broken into 3-minute, 2-minute, and 5-minute segments for data collection. Each of the habitats showed similar patterns, with about half of the species and individuals recorded in the first 3 minutes, and about two-thirds of species and individuals were recorded in the first 5 minutes. The rates at which new species and individuals are observed at a point decreased with time but suggest that some rarer species would be discovered if census times per site were extended.

The survey results were sorted by starting time and broken into groups based on half-hour intervals after sunrise. The results of this analysis showed that time of day had no effect on the numbers of species and individuals observed.

This project has successfully extended our survey of breeding birds to the most common habitat types at the Resolution site and has added more species of birds to the list of birds recorded in 2008. While this survey was effective in detecting common and uncommon species at the sample sites, our analysis has suggested that additional species may be detected with further sampling.

3.0 REFERENCES

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Verner, J. 1985. Assessment of counting techniques. Pp. 247-302 *in* Johnson, R. F., ed. Current Ornithology, Vol. 2. Plenum Press, New York.

Table 1. New points selected for bird surveys during the 2009 breeding season.

2009 Bird Survey Points	UTM, NAD-27[1]		UTM, NAD-83[2]		Habitat Type
	Easting	Northing	Easting	Northing	
X-01	494574	3685258	494511	3685456	Emory Oak Woodland
X-02	495038	3684912	494975	3685110	Manzanita Chaparral
X-03	495345	3684880	495282	3685078	Scrub Oak Chaparral
X-04	495682	3684853	495619	3685051	Manzanita Chaparral
X-05	495967	3684943	495904	3685141	Scrub Oak Chaparral
X-06	495866	3685249	495803	3685447	Manzanita Chaparral
X-07	496182	3685299	496119	3685497	Manzanita Chaparral
X-08	496225	3685085	496162	3685283	Manzanita Chaparral
X-09	493850	3684249	493787	3684447	Manzanita Chaparral
X-10	494049	3684083	493986	3684281	Manzanita Chaparral
X-11	494315	3683290	494252	3683488	Manzanita Chaparral
X-12	494072	3682845	494009	3683043	Scrub Oak Chaparral
X-13	494238	3682545	494175	3682743	Scrub Oak Chaparral
X-14	495418	3684360	495355	3684558	Manzanita Chaparral
X-15	495278	3684129	495215	3684327	Manzanita Chaparral
X-16	495055	3684155	494992	3684353	Manzanita Chaparral
X-17	495331	3683960	495268	3684158	Manzanita Chaparral
X-18	495556	3683738	495493	3683936	Scrub Oak Chaparral
X-19	495373	3683615	495310	3683813	Emory Oak Woodland
X-20	495534	3683479	495471	3683677	Scrub Oak Chaparral
X-21	495758	3683635	495695	3683833	Manzanita Chaparral
X-22	496065	3683647	496002	3683845	Manzanita Chaparral
X-23	495893	3684477	495830	3684675	Emory Oak Woodland
X-24	495917	3684272	495854	3684470	Manzanita Chaparral
X-25	496466	3684481	496403	3684679	Scrub Oak Chaparral

[1]- Universal Transverse Mercator/North American Datum 1927
[2]- Universal Transverse Mercator/North American Datum 1983

Emory Oak – *Quercus emoryi*

Scrub Oak – *Quercus turbinella*

Manzanita – *Arctostaphylos pungens*

Table 2. Densities of bird species observed in habitats on the Resolution Parcel during the breeding season, 2009. Densities expressed as individuals/hectare.

Scientific Name	Common Name	Habitats		
		Emory Oak Woodland	Scrub Oak Chaparral	Manzanita Chaparral
Phalacrocorax auratus	Double-crested Cormorant			0.004
Ardea herodias	Great Blue Heron			0.019
Cathartes aura	Turkey Vulture	0.094	0.015	0.007
Buteo albonotatus	Zone-tailed Hawk			0.002
Buteo jamaicensis	Red-tailed Hawk	0.039	0.015	0.004
Falco sparverius	American Kestrel			0.044
Callipepla gambelii	Gambel's Quail	0.141	0.182	0.384
Zenaida asiatica	White-winged Dove	0.289	0.030	0.044
Zenaida macroura	Mourning Dove	0.035	0.071	0.020
Geococcyx californianus	Greater Roadrunner			0.079
Aeronautes saxatalis	White-throated Swift			0.011
Archilochus alexandri	Black-chinned Hummingbird		0.379	0.531
Calypte anna	Anna's Hummingbird		1.517	0.453
	Hummingbird sp.		0.379	1.415
Picoides scalaris	Ladder-backed Woodpecker	0.144	0.056	0.022
Empidonax wrightii	Gray Flycatcher			0.028
Empidonax sp.	*Empidonax* flycatcher		0.168	
Myiarchus cinerascens	Ash-throated Flycatcher	0.718	0.521	0.491
Vireo vicinior	Gray Vireo	0.982	0.464	0.454
Vireo plumbeus	Plumbeous Vireo	0.786	0.047	0.043
Vireo huttoni	Hutton's Vireo			0.177
Aphelocoma californica	Western Scrub-Jay		0.084	0.035
Corvus corax	Common Raven	0.491	0.019	0.028
Tachycineta thalassina	Violet-green Swallow			0.021
Baeolophus ridgwayi	Juniper Titmouse			0.442
Auriparus flaviceps	Verdin	0.424	0.758	0.113
Psaltriparus minimus	Bushtit	5.502	1.137	1.651
Campylorhynchus brunneicapillus	Cactus Wren		0.166	
Salpinctes obsoletus	Rock Wren	0.166	0.545	0.233
Catherpes mexicanus	Canyon Wren	0.166	0.243	0.183
Thryomanes bewickii	Bewick's Wren	1.179	0.568	0.511
Polioptila melanura	Black-tailed Gnatcatcher		0.379	0.028
Mimus polyglottos	Northern Mockingbird	0.283	0.062	0.057
Toxostoma crissale	Crissal Thrasher	0.055	0.168	0.055
Phainopepla nitens	Phainopepla		0.047	0.044
Vermivora luciae	Lucy's Warbler			0.177
Oporornis tolmiei	MacGillivray's Warbler			0.044
Piranga ludoviciana	Western Tanager			0.020
Pipilo chlorurus	Green-tailed Towhee		0.061	0.028
Pipilo maculatus	Spotted Towhee	0.884	0.557	0.431
Pipilo fuscus	Canyon Towhee		0.364	0.130
Aimophila ruficeps	Rufous-crowned Sparrow	0.885	0.547	0.079
Spizella atrogularis	Black-chinned Sparrow	0.442	2.527	0.685
Amphispiza bilineata	Black-throated Sparrow	0.566	0.663	0.287
Pheucticus	Black-headed Grosbeak	0.044	0.061	0.017

Scientific Name	Common Name	Habitats		
		Emory Oak Woodland	**Scrub Oak Chaparral**	**Manzanita Chaparral**
melanocephalus				
Passerina caerulea	Blue Grosbeak	0.141		
Molothrus aeneus	Bronzed Cowbird		0.379	0.177
Molothrus ater	Brown-headed Cowbird			0.029
Icterus cucullatus	Hooded Oriole		0.047	
Icterus parisorum	Scott's Oriole	0.055	0.124	0.078
Carpodacus mexicanus	House Finch		0.853	0.014
Carduelis psaltria	Lesser Goldfinch		0.015	0.035
	Total Density	**14.511**	**14.218**	**9.864**
	Total Species	**24**	**36**	**47**
	Estimates based on 10 or more individuals	**5**	**12**	**15**

Table 3. Bird species observed elsewhere on the Resolution Parcel during the breeding season, 2009, but not recorded at any of the survey points.

Scientific Name	Common Name
Accipiter cooperii	Cooper's Hawk
Buteogallus anthracinus	Common Black Hawk
Falco peregrinus	Peregrine Falcon
Streptopellia decaocto	Eurasian Collared Dove
Bubo virginianus	Great Horned Owl
Contopus sordidulus	Western Wood-Pewee
Sayornis nigricans	Black Phoebe
Myiarchus tyrannulus	Brown-crested Flycatcher
Tyrannus vociferans	Cassin's Kingbird
Vireo bellii	Bell's Vireo
Vireo gilvus	Warbling Vireo
Stelgidopteryx serripennis	Northern Rough-winged Swallow
Baeolophus wollweberi	Bridled Titmouse
Vermivora virginiae	Virginia's Warbler
Dendroica petechia	Yellow Warbler
Piranga rubra	Summer Tanager
Pipilo aberti	Abert's Towhee
Chondestes grammacus	Lark Sparrow
Cardinalis cardinalis	Northern Cardinal

Table 4. Year to year comparison of results for 2008 and 2009 breeding seasons.

Community	Variable	2009	2008
Emory Oak Woodland	Number of Census Points	3	8
	Number of Species	24	44
	Total Density	14.5	15.9
Scrub Oak Chaparral	Number of Census Points	7	5
	Number of Species	36	28
	Total Density	14.2	9.7
Manzanita Chaparral	Number of Census Points	15	5
	Number of Species	47	36
	Total Density	9.9	34.6

Table 5. Average numbers of species and individuals based on time after sunrise.

Time Interval	Time After Sunrise (min)	Number of Survey Periods Per Time Interval	Average Number of Bird Species	Average Number of Individuals
1	0-29	13	8.1	12.9
2	30-59	9	7.9	11.9
3	60-89	10	7.3	10.7
4	90-119	9	8.6	15.8
5	120-149	9	8.0	15.4
6	150-179	9	9.1	12.7
7	180-209	9	6.8	10.6
8	210-239	3	8.7	18.0
9	240-269	3	8.7	15.3
	TOTAL	**75**		

APPENDIX 5

VEGETATION AND WILDLIFE SURVEY OF DEVIL'S CANYON, TONTO NATIONAL FOREST, JACOBS AND FLESCH, JULY 21, 2007

Vegetation and Wildlife Survey of Devil's Canyon, Tonto National Forest

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July 21, 2007

Introduction: Devil's Canyon is located in Pinal County Arizona a few miles east of Superior in the Globe Ranger District of the Tonto National Forest. The area is extremely rugged with deep canyons, rocky ridges, and uplands dominated by large boulders and towering spires. Pyroclastic welded tuft is the most common substrate throughout the area and creates beautiful cliffs, arches, and towers.

On 9 July 2007, we surveyed vegetation and wildlife in and around Devil's Canyon. Our objectives were to (1) assess occupancy of sensitive or special status species, (2) determine whether habitat was present for sensitive or special status species, and (3) document all species of woody or succulent plants and all species of vertebrates we encountered. We chose to survey a stretch of Devil's Canyon that had a wide range of environmental diversity. Specifically, we focused on an area that had the most surface water and associated riparian vegetation that we determined from aerial photographs and then ground-truthed in the field. This stretch was south of State Route 60 between Rancho Rio Canyon to a point approximately 2 miles south (Figure 1). We dropped into Devil's Canyon at an elevation of 3,600 feet and ended our survey at just below 3,380 feet where it narrows to a slot canyon with pools and drops, becoming impassable without ropes. This area is in Township 2 South, Range 13 East, mainly in Sections 9 and 16 on the Superior USGS quadrangle (Figure 1).

We surveyed between 4:30 and 15:30 hours. To survey birds, we walked slowly and identified all birds that we detected by sight or sound. We attempted augment detections by periodically whistling a Pygmy-owl call as we walked and by playing recorded territorial vocalizations of the Yellow-billed Cuckoo in areas that supported potential habitat. Observations of birds and plants include those observed from the entire hike including areas in Rancho Rio Canyon and Hackberry Creek (Figure 1).

Vegetation: Riparian vegetation was dominated by large stands of Arizona Alder (*Alnus oblongifolia*) (Figure 2), scattered Sycamore (*Platanus wrightii*) and Velvet Ash (*Fraxinus velutina*) that exceeded heights of 60 feet in places and an understory dominated by Button Willow (*Cephalanthus occidentalis* var. *angustifolius*) (Figure 3). Other common trees included Goodding Willow (*Salix gooddingii*) and Arizona White Oak (*Quercus arizonica*). Arizona Alder became less common in the lower portion of canyon that was dominated by Gooding Willow and a few scattered Cottonwoods (*Populus fremontii*). We noted several Bonpland Willow (*Salix bonplandiana*) in the lower canyon near the northern end of their global distribution. The Mexican Blue Oak (*Quercus oblongifolia*) is at the northern end of its global distribution and this population is very small and isolated (Figure 6).

Upland vegetation was dominated by interior chaparral in which Scrub Live-oak (*Quercus turbinella*), Pointleaf Manzanita (*Arctostophylous pringlei*), Hop Bush (*Dodonaea viscosa*), Birchleaf Mountain Mahogony (*Cercocarpus betuloides*), Jojoba (*Simmondsia chinensis*), Wait-a-minute Bush (*Mimosa biuncifera*), cholla (*Opuntia* sp.) and agave (*Agave* sp.). Vegetation composition throughout uplands was also significantly influenced by Sonoran Desert elements as evidenced by the presence of Saguaros (*Carnegiea gigantea*), which are fairly common on rocky east- and south-facing slopes throughout the area (Figure 4).

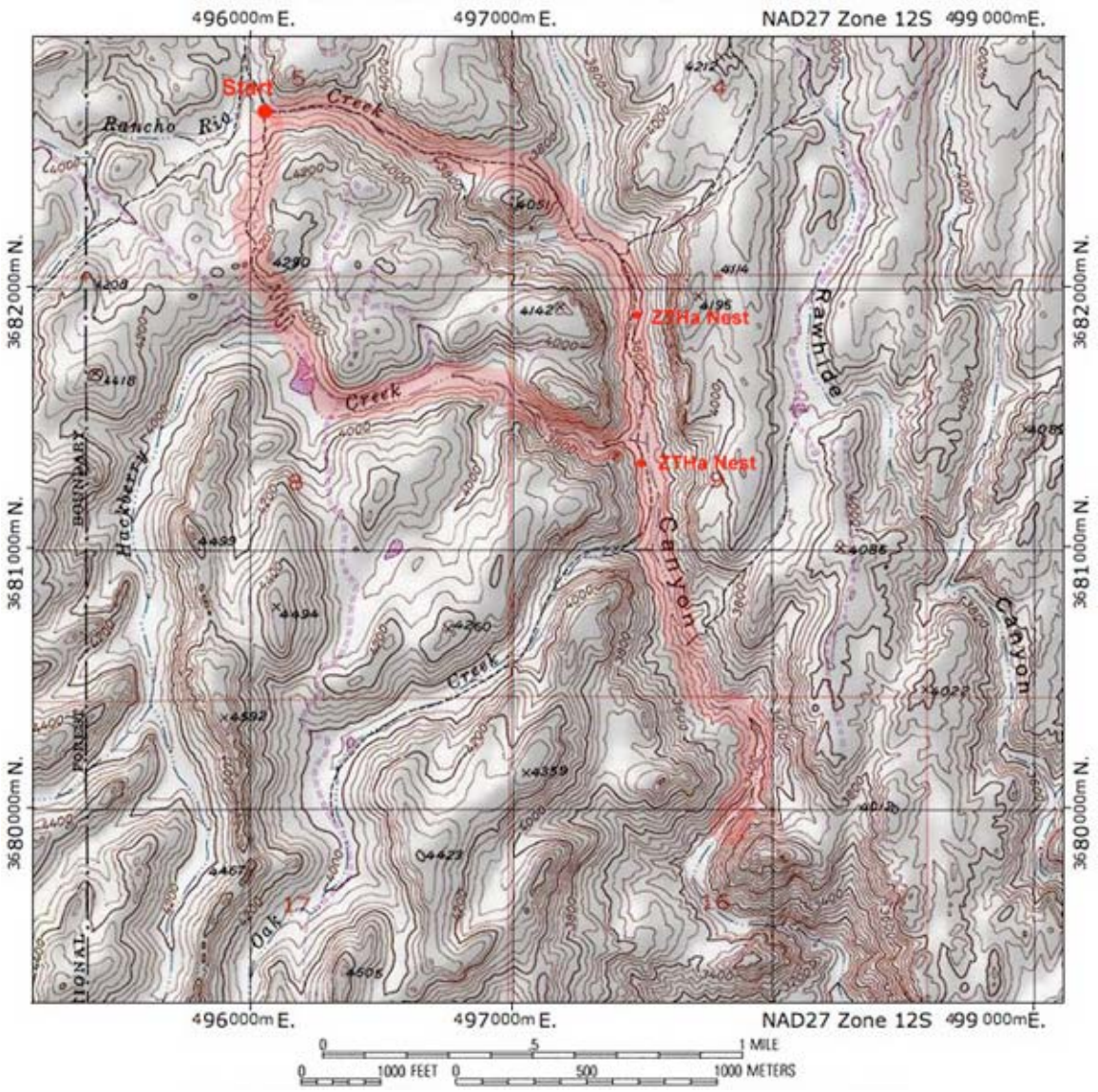

Figure 1: Map of Devil's Canyon and surrounding region that we surveyed for birds and plants on 9 July 2007. Survey route is indicated in red.

Non-native plants were limited to a few species. Tamarisk (*Tamarix ramosissima*) was absent from the canyon, but several small Northern Catalpa (*Catalpa speciosa*) trees were naturalized yet seemed unlikely to spread. Bermuda Grass (*Cynodon dactylon*) has established itself in a few habitable areas on exposed silty terraces above the creek bottom. Water was present and flowing throughout much of the canyon (Figure 5).

Birds: We detected 43 species during surveys (Table 1). Of note were 2 pairs of Zone-tailed Hawks that were nesting only 580 meters apart in the upper section of the canyon (Figure 1). These are the closest neighboring nests we have observed in either Arizona or Sonora; the upper nest contained 2 young whereas the lower nest contained one young. We also observed 1 adult

Common Black Hawk near a recently used nest as evidenced by presence of feathers and scat below the nest. The nest was in an Arizona Alder <200 meters from upper Zone-tailed Hawk nest. This adult called vigorously near the nest suggesting the presence of a recently fledged young, which typically leave the nest in the first or second week of July. We also observed another calling adult Common Black Hawk with and a nearby recently fledged young near lower end of survey (Figure 1).

A Peregrine Falcon was observed flying near shear vertical cliffs just below Rancho Rio Canyon and is presumed to have nested in the area. Evidence of nesting was provided by abundant whitewash in areas where Peregrines typically perch and the presence of several deep horizontal ledges and fishers in the cliff face. This is excellent habitat for Peregrines that typically use nesting cliffs near areas where food is abundant such as that above lush riparian area as in Devil's Canyon.

Riparian-obligate Yellow Warblers and Summer Tanagers were common throughout Devil's Canyon. Yellow Warblers were feeding young.

We did not detect Yellow-billed Cuckoos or Southwestern Willow Flycatcher along this stretch of Devil's Canyon. Although lush, vegetation structure and composition were likely not suitable for Southwest Willow Flycatchers due to limited dense vegetation volume between 1.5 and 5 meters above ground. In Arizona, Cuckoos typically prefer lower elevation riparian areas that support Mesquite, Cottonwood, and Willow and may also require larger patches of riparian vegetation with more understory cover than that observed in Devil's Canyon. Although we have observed cuckoos in other more montane riparian areas similar to that in Devil's Canyon, they are much less common in these areas and may not occur at a given locale every year.

General Wildlife: Black Bear seemed to be very common throughout the area based on an abundance of sign that included approximately 20 piles of scat, several sets of fresh tracks, and 3 areas where we noted signposting on trees. Bear scat in the area was composed almost entirely of Manzanita berries. Non-native Sunfish (*Lepomis cyanellus*) and Crayfish (*Cambarellus sp.*) are well established in the Devil's Canyon and have likely had negative impacts on native aquatic species such as fish and frogs. We did not observe Bullfrogs (*Rana catesbeiana*). We observed several Canyon Treefrogs (*Hyla arenicolor*) along the main canyon. Other reptiles observed included Plateau Lizard (*Sceloporous tristichus*), Greater Earless Lizard (*Cophosaurus texanus*), Clark's Spiny Lizard (*Sceloporus clarkii*), Western Whiptail (*Aspidoscelis tigris* ssp. *punctilinealis*), and an unknown Spotted Whiptail (*Aspidoscelis* sp.).

Special Status Species: We used three methods to evaluate the potential for special status species in the area. First, on 22 July 2007, we access the AGFD Environmental On-line Review Tool (http://www.azgfd.gov/hgis/) to obtain records of special status species within 5 miles of the area we surveyed. Second we consulted the most current listing of threatened, endangered, proposed, and candidate species in Pinal County that we obtained from the USFWS internet website that was last updated 25 July 2006. (http://www.fws.gov/southwest/es/arizona/Documents/CountyLists/Pinal.pdf). Third, we evaluated the area on the ground with respect to the habitat requirements of species noted in these searches.

Table 3 lists special status species that may occur in the area and Appendix A lists all special status species or designated Critical Habitat known to occur within 5 miles of the survey area as noted by AGFD Environmental On-line Review Tool. Arizona Hedgehog Cactus (*Echinocereus triglochidiatus var. arizonicus*), a federally listed endangered plant, occurs in the area. The Arizona Hedgehog Cactus has been documented in the area of Oak Flat campground by the Arizona Game and Fish Department (AZGF 200X) and almost certainly occurs in Devil's Canyon and surrounding area. Special status species that are aquatic [e.g. Gila Chub (*Gila intermedia*) will require additional surveys to determine status yet the presence of non-native Sunfish and Crayfish suggest that existing habitat has been degraded. Critical Habitat has been designated for Gila Chub within 5 miles of the survey area (Appendix A). We discussed the potential for occurrence of Yellow-billed Cuckoo and Southwestern Willow Flycatcher above (see Birds). Common Black Hawk, that we found to have recently nested along the canyon, are listed as sensitive by the USFS. There is some limited potential for occurrence of Mexican Spotted Owls (*Strix occidentalis lucida*) in the canyon; Critical Habitat has been designated for this subspecies within 5 miles (Appendix A).

Conclusion: Devil's Canyon is an impressive place. The surrounding countryside has stunning scenery and tremendous recreational values. The canyon itself supports well-developed riparian vegetation that is lush and provides a permanent source of water for wildlife. Devil's Canyon is an interesting transition zone that is influenced by Sonoran Desert, interior chaparral, as well as Madrean vegetation communities and vegetation association that is somewhat unique in Arizona.

Figure 2: Typical Arizona Alder dominated riparian vegetation in the upper portion of Devil's Canyon.

Figure 3: Button Willow (*Cephalanthus occidentalis* var. *angustifolius*) was common in Devil's Canyon.

Figure 4: Typical upland vegetation in Devil's Canyon survey area.

Figure 5: Surface water was present throughout much of Devil's Canyon.

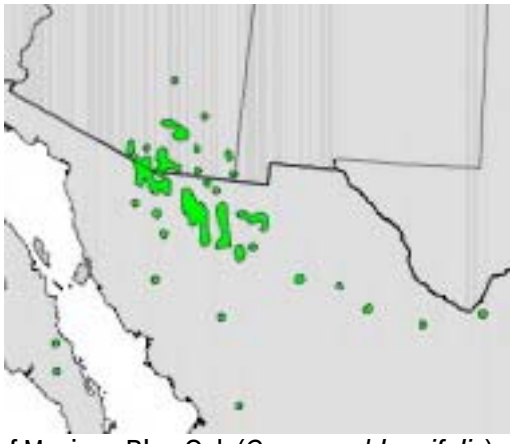
Figure 6: Global Distribution of Mexican Blue Oak (*Quercus oblongifolia*). Map (cropped) by USGS, Earth Surface Processes Team.

Table 1: Birds observed during surveys in Devil's Canyon 9 July 2007.

Common Name	Number Observed	Breeding Status and Notes
Mallard	10	Stock pond in Hackberry Canyon
Great Blue Heron	3	
Turkey Vulture	12	
Common Black Hawk	2ad, 1yg	1 recently occupied nest in Alder
Zone-tailed Hawk	3ad,3yg	Occupied nest w 2 young at 0497409x3681905 in velvet ash Occupied nest w 1 young at 0497485x3681371 in velvet ash
Red-tailed Hawk	2	Pair
Peregrine Falcon	1	0497464x3682123, Likely nest area near individual
White-winged Dove	30	
Mourning Dove	1	
Black-chinned Hummingbird	1	1st year male
Gila Woodpecker	2	
Ladder-backed Woodpecker	10	
Flicker	1	Heard, not confirmed to species, likely gilded
Black Phoebe	2	1 fledged young
Ash-throated Flycatcher	5	Paired
Cassin's Kingbird	2	Paired
Bell's Vireo	15	Singing
Gray Vireo	2	Singing
Hutton's Vireo	5	Singing, feeding young cowbird
Common Raven	10	
Violet-green Swallow	5	
Bridled Titmouse	12	
Verdin	2	
Cactus Wren	4	
Rock Wren	Common	
Canyon Wren	Common	
Bewick's Wren	Common	
Blue-gray Gnatcatcher	3	Family group
Northern Mockingbird	1	
Crissal Thrasher	2	Singing
Phainopepla	150+	Feeding young, likely mass migration
Lucy's Warbler	1	Possible migrant
Yellow Warbler	20-25	Singing, 2 ad feeding young
Summer Tanager	15	Paired
Spotted Towhee	1	
Canyon Towhee	2	
Rufous-crowned Sparrow	12	
Northern Cardinal	10	Family group w 3 young
Black-headed Grosbeak	2	Paired
Brown-headed Cowbird	10	1 young being fed by HoOr, 1 young being fed by hutton's vireo
Hooded Oriole	20	Nest building, feeding young, feeding young brown-headed cowbird
House Finch	10	
Lesser Goldfinch	5	

Table 2: Perennial woody and succulent plants observed in Devil's Canyon 9 July 2007.

Family	Genus	Species	Common Name
Acanthaceae			
	Anisacanthus		
		thurberi	Desert Honeysuckle, Chuparosa
Anacardiaceae			
	Rhus		
		toxicodendron	Poison Ivy
		trilobata	Lemonade Berry, Squawbush
Asclepiadaceae			
	Asclepias		
		linaria	Pine-needle Milkweed
Asteraceae			
	Baccharis		
		sarothroides	Desert Broom
	Ericameria		
		laricifolia	Turpentine Bush
Berberidaceae			
	Berberis		
		freemontii or haematocarpa	Unidentified Barberry
Bignoniaceae			
	Catalpa		
		speciosa	Non-native Catalpa
Cactaceae			
	Carnegiea		
		gigantea	Saguaro
	Cylindropuntia		
		versicolor	Staghorn Cholla
	Ferocactus		
		emoryi	Barrel Cactus
	Opuntia		
		2 unknown species	Prickly Pear
Caprifoliaceae			
	Lonicera		
		arizonica	Arizona Honeysuckle
Crossosomataceae			
	Crossosoma		
		bigelovii	Ragged Rockflower
Cupressaceae			
	Juniperus		
		osteosperma	Utah Juniper
Ericaceae			
	Arctostaphylos		
		pungens	Pointleaf Manzanita
Fabaceae			

	Acacia		
		greggii	Catclaw
	Amorpha		
		fruticosa var. occidentalis	False indigo Bush
	Mimisa		
		biuncifera	Wait-a-minute Bush
	Prosopis		
		velutina	Velvet Mesquite
Fagaceae			
	Quercus		
		arizonica	Arizona White Oak
		emoryi	Emory Oak
		oblongifolia	Mexican Blue Oak
		turbinella	Scrub Live-oak
Juglandaceae			
	Juglans		
		major	Arizona Black Walnut
Liliaceae			
	Agave		
		palmeri	Palmer's Agave
	Dasylirion		
		wheeleri	Sotol
	Nolina		
		microcarpa	Beargrass
	Yucca		
		arizonica	Arizona Yucca
Oleaceae			
	Fraxinus		
		velutina	Velvet Ash
		cuspidata var. macropetala	Fragrant Ash (likely)
Pinaceae			
	Pinus		
		edulis	Pinyon Pine (see note at bottom)
Platanaceae			
	Platanus		
		wrightii	Arizona sycamore
Poaceae			
	Muhlenbergia		
		dumosa	Bamboo Muhly
Rhamnaceae:			
	Ceanothus		
		greggii	Desert Ceanothus
	Rhamnus		
		californica	California Buckthorn
		crocea	Hollyleaf Buckthorn
	Zizyphus		
		obtusifolia	Greythorn

	Sageretia		
		wrightii	Sageretia
Rosaceae			
	Prunus		
		virginiana	Wild Cherry
Salicaceae			
	Populus		
		fremontii	Fremont Cottonwood.
	Salix		
		bonplandiana	Bonpland Willow
		gooddingii	Goodding Willow
Sapindaceae			
	Dodonaea		
		viscosa	Hop Bush
Simmondsiaceae			
	Simmondsia		
		chinensis	Jojoba
Ulmaceae			
	Celtis		
		reticulata	Netleaf Hackberry
Verbenaceae			
	Aloysia		
		wrightii	Bee Brush, Oregonillo
Vitaceae			
	Parthenocissus		
		vitacea	Virginia Creeper
	Vitis		
		arizonica	Arizona Grape
NOTE: Pinyon Pine sample was all single needle (unlike edulis entered above), but Single-leaf Pinon (*Pinus monophylla*) is known only from the Northwestern portion of AZ.			

Table 3: Special status species that have potential to occur in survey area (Pinal County). E=federally-listed endangered, T=federally-listed threatened, C=candidate for federal listing, DL=delisted, AZ=protected by Arizona state law.

Species	Status	Distribution/Habitat Characteristics	Potential Occurrence in Project Area
Arizona Hedgehog *(Echinocereus triglochidiatus var. arizonicus)*	E, AZ	Occurs in ecotone between interior chapparal and Madrean evergreen woodland. Pinal and Gila counties only.	Habitat exists within the survey area. Additional survey required to determine status. Species occurs within 5 miles of area (Appendix A)
Acuna Cactus *(Echinomastus erectocentrus var. acunensis)*	C	Well-drained knolls and ridges in Sonoran desertscrub. Three know localities in Pima County and 1 in Pinal County.	Unlikely, but possible in larger region. Population near Florence, AZ.
Mexican Spotted Owl *(Strix occidentalis lucida)*	T, AZ	Commonly found in mixed conifer woodland at higher elevation. Can also nest in lower elevation canyons with well-developed riparian habitat. Known to use cliff ledges for nesting in some localities.	Although commonly found higher in elevation, is known to nest in lower elevation canyons with well-developed riparian vegetation and cliffs. Possibility of occurrence in Devil's Canyon. Sufficient riparian woodland as well as suitable cliffs for nesting. USFS may have surveyed this area previously and should be consulted for data. Designated Critical Habitat exists within 5 miles (Appendix A).
Cactus Ferruginous Pygmy-owl *(Glaucidium brasilianum cactorum)*	DL	Mature Cottonwood/Willow forest, mesquite woodland, Sonoran desertscrub, and semidesert grasslands with well-developed vertical vegetation cover and matures Saguaros with cavities.	Little habitat. Range no longer reaches this part of Arizona. This area is very unlikely to support species except perhaps during dispersal. No longer listed.
Bald Eagle *(Haliaeetus leucocephalus)*	DL	Needs large rivers, lakes, or reservoirs with abundant prey.	Little habitat in Devil's Canyon. Creek is too narrow.
Southwestern Willow Flycatcher *(Empidonax traillii extimus)*	E	Cottonwood/Willow and Tamarisk vegetation communities along rivers and streams.	Vegetation structure and composition likely not suitable due to limited vegetation volume between 1.5 and 5 meters above ground.
Western Yellow-billed Cuckoo *(Coccyzus americanus)*	C	Large stands of riparian and/or Mesquite woodland.	Cuckoos are typically found in lower elevation riparian areas that support Mesquite, Cottonwood, and Willow. Although we have observed Cuckoos in other more montane riparian areas similar to Devil's Canyon, they are much less common in these areas. Cuckoo may occur in this area some years.

Lesser Long-nosed Bat *(Leptonycteris curasoae yerbabuenae)*	E	Desert Scrub Habitat with agave and columnar cacti present as food plants.	Habitat present in Devil's Canyon but may not occur in area because it is at edge of range. Roosting areas and food sources are present in area.
Gila Chub *(Gila intermedia)*	E	Pools, springs, cienegas, and streams. 2,000 – 5,500 ft.	Additional surveys required to determine status. Designated Critical Habitat exists within 5 miles (Appendix A).
Gila Topminnow *(Poeciliopsis occidentalis occidentalis)*	E	Small streams, springs, and cienegas with vegetated shallows. <4,500 ft.	Additional surveys required to determine status.
Loach Minnow *(Tiaroga cobitis)*	T	Swift, shallow water with cobble and gravel. Recurrent flooding and natural hydrograph important. <8,000 ft.	Additional surveys required to determine status.

Appendix A: Results of Environmental On-line Review Tool.

Arizona's On-line Environmental Review Tool
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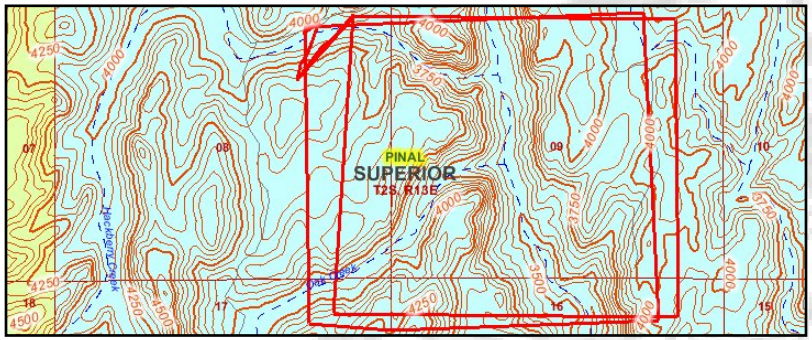
Project Name: Devils
Date: 7/22/2007 12:09:28 AM

Project Location



Project Name: Devils
Submitted By: AA Flesch
On behalf of: ACOE
Project Search ID: 20070722003421
Date: 7/22/2007 12:09:17 AM
Project Category: Mining,Other minerals (copper, limestone, cinders, shale, salt)
Project Coordinates (UTM Zone 12-NAD 83): 497423.847, 3681157.494 meter
Project Length: 13922.788 meter
County: PINAL
USGS 7.5 Minute Quadrangle ID: 1361
Quadrangle Name: SUPERIOR
Project locality is currently being scoped

Location Accuracy Disclaimer

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Receipt is solely responsible for the project location and thus the correctness of the Project Review Receipt content.

The Department appreciates the opportunity to provide in-depth comments and project review when additional information or environmental documentation becomes available.

Special Status Species Occurrences/Critical Habitat/Tribal Lands within 5 miles of Project Vicinity:

Name	Common Name	ESA	USFS	BLM	State
Agosia chrysogaster chrysogaster	Gila Longfin Dace	SC		S	
Bat Colony					
Buteogallus anthracinus	Common Black-Hawk		S		WSC
CH for Gila intermedia	Designated Critical Habitat for Gila chub				
CH for Strix occidentalis lucida	Designated Critical Habitat for Mexican spotted owl				
Chionactis occipitalis klauberi	Tucson Shovel-nosed Snake			S	
Echinocereus triglochidiatus var. arizonicus	Arizona Hedgehog Cactus	LE	S		HS
Falco peregrinus anatum	American Peregrine Falcon	SC	S		WSC
Gila robusta	Roundtail Chub	SC	S		WSC
Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	SC			WSC
Macrotus californicus	California Leaf-nosed Bat	SC			WSC
Myotis ciliolabrum	Western Small-footed Myotis	SC		S	
Myotis velifer	Cave Myotis	SC		S	
Myotis yumanensis	Yuma Myotis	SC			
Nyctinomops femorosaccus	Pocketed Free-tailed Bat			S	
Rana yavapaiensis	Lowland Leopard Frog	SC	S		WSC

 APPLICATION INITIALS: _____

Please review the entire receipt for project type recommendations and/or species or location information and retain a copy for future reference. If any of the information you provided did not accurately reflect this project, or if project plans change, another review should be conducted, as this determination may not be valid.

Arizona's On-line Environmental Review Tool:

1. This On-line Environmental Review Tool inquiry has generated recommendations regarding the potential impacts of your project on Special Status Species (SSS) and other wildlife of Arizona. SSS include all U.S. Fish and Wildlife Service federally listed, U.S. Bureau of Land Management sensitive, U.S. Forest Service sensitive, and Arizona Game and Fish Department (Department) recognized species of concern.
2. These recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation). These recommendations are preliminary in scope, designed to provide early considerations for all species of wildlife, pertinent to the project type you entered.
3. This receipt, generated by the automated On-line Environmental Review Tool does not constitute an official project review by Department biologists and planners. Further coordination may be necessary as appropriate under the National Environmental Policy Act (NEPA) and/or the Endangered Species Act (ESA).

The U.S. Fish and Wildlife Service (USFWS) has regulatory authority over all federally listed species under the ESA. Contact USFWS Ecological Services Offices: http://arizonaes.fws.gov/.

Phoenix Main Office
2321 W. Royal Palm Road, Suite 103
Phoenix, AZ 85021
Phone 602-242-0210
Fax 602-242-2513

Tucson Sub-Office
201 North Bonita, Suite 141
Tucson, AZ 85745
Phone 520-670-6144
Fax 520-670-6154

Flagstaff Sub-Office
323 N. Leroux Street, Suite 101
Flagstaff, AZ 86001
Phone 928-226-0614
Fax 928-226-1099

Disclaimer:

1. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area.
2. The Department's Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there.
3. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HDMS data contains information about species occurrences that have actually been reported to the Department.

Arizona Game and Fish Department Mission

To conserve, enhance, and restore Arizona's diverse wildlife resources and habitats through aggressive protection and

 APPLICATION INITIALS: _____

management programs, and to provide wildlife resources and safe watercraft and off-highway vehicle recreation for the enjoyment, appreciation, and use by present and future generations.

Project Category: Mining,Other minerals (copper, limestone, cinders, shale, salt)

Project Type Recommendations:

Based on the project type entered; coordination with the Environmental Protection Agency may be required http://www.epa.gov/

During the planning stages of your project, please consider the local or regional needs of wildlife in regards to movement, connectivity, and access to habitat needs. Loss of this permeability prevents wildlife from accessing resources, finding mates, reduces gene flow, prevents wildlife from re-colonizing areas where local extirpations may have occurred, and ultimately prevents wildlife from contributing to ecosystem functions, such as pollination, seed dispersal, control of prey numbers, and resistance to invasive species. In many cases, streams and washes provide natural movement corridors for wildlife and should be maintained in their natural state. Uplands also support a large diversity of species, and should be contained within important wildlife movement corridors. In addition, maintaining biodiversity and ecosystem functions can be facilitated through improving designs of structures, fences, roadways, and culverts to promote passage for a variety of wildlife.

Minimization and mitigation of impacts to wildlife and fish species due to changes in water quality, quantity, chemistry, temperature, and alteration to flow regimes (timing, magnitude, duration, and frequency of floods) should be evaluated. Minimize impacts to springs, in-stream flow, and consider irrigation improvements to decrease water use. If dredging is a project component, consider timing of the project in order to minimize impacts to spawning fish and other aquatic species (including spawning seasons), and to reduce spread of exotic invasive species. We recommend early direct coordination with Project Evaluation Program for projects that could impact water resources, wetlands, streams, springs, and/or riparian habitats.

The Department recommends that wildlife surveys are conducted to determine if noise-sensitive species occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

Project Location and/or Species recommendations:

HDMS records indicate that one or more listed, proposed, or candidate species or Critical Habitat (Designated or Proposed) have been documented in the vicinity of your project (refer to page 1 of the receipt). Please contact:
Ecological Services Office
US Fish and Wildlife Service

2321 W. Royal Palm Rd.
Phoenix, AZ 85021-4951
Phone: 602-242-0210
Fax: 602-242-2513

HDMS records indicate that Sonoran desert tortoise have been documented within the vicinity of your project area (refer to the species list on page 1 of the receipt). Please review the Tortoise Handling Guidelines found on the Environmental Review Home Page.

http://www.azgfd.gov/hgis/guidelines.azpx

,

Recommendations Disclaimer:

1. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project.
2. These recommendations are proposed actions or guidelines to be considered during **preliminary project development**.
3. Additional site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. The Department is interested in the conservation of all fish and wildlife resources, including those Special Status Species listed on this receipt, and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
6. **Further coordination requires the submittal of this Environmental Review Receipt with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map).**
7. Upon receiving information by AZGFD, please allow 30 days for completion of project reviews. Mail requests to:

Project Evaluation Program, Habitat Branch
Arizona Game and Fish Department
2221 West Greenway Road
Phoenix, Arizona 85023-4312

Phone Number: (602) 789-3600
Fax Number: (602) 789-3928

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1. This Environmental Review and project planning website was developed and intended for the purpose of screening projects for potential impacts on resources of special concern. By indicating your agreement to the terms of use for this website, you warrant that you will not use this website for any other purpose.
2. Unauthorized attempts to upload information or change information on this website are strictly prohibited and may be punishable under the Computer Fraud and Abuse Act of 1986 and/or the National Information Infrastructure Protection Act .
3. The Department reserves the right at any time, without notice, to enhance, modify, alter, or suspend the website and to terminate or restrict your access to the website.
4. This Environmental Review is based on the project study area that was entered. The review must be redone if the project study area, location, or the type of project changes. If additional information becomes available, this review may need to be reconsidered.

Security:

The Environmental Review and project planning web application operates on a complex State computer system. This system is monitored to ensure proper operation, to verify the functioning of applicable security features, and for other like purposes. Anyone using

 APPLICATION INITIALS: _____

this system expressly consents to such monitoring and is advised that if such monitoring reveals possible evidence of criminal activity, system personnel may provide the evidence of such monitoring to law enforcement officials. Unauthorized attempts to upload or change information; to defeat or circumvent security measures; or to utilize this system for other than its intended purposes are prohibited.

This website maintains a record of each environmental review search result as well as all contact information. This information is maintained for internal tracking purposes. Information collected in this application will not be shared outside of the purposes of the Department.

If the Environmental Review Receipt and supporting material are not mailed to the Department or other appropriate agencies within six (6) months of the Project Review Receipt date, the receipt is considered to be null and void, and a new review must be initiated.

Agency/organization:_____

Contact Name: _____

Address: _____

City, State, Zip: _____

Phone: _____

E-mail: _____

Print this Environmental Review Receipt using your Internet browser's print function and keep it for your records. Further coordination requires the submittal of this Environmental Review Receipt with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map).

Please provide point of contact information regarding this Environmental Review.

Application or organization responsible for project implementation

 APPLICATION INITIALS: _____

APPENDIX 6

VEGETATION AND WILDLIFE SURVEY OF DEVIL'S CANYON, TONTO NATIONAL FOREST, JACOBS, MAY 2009

Vegetation and Wildlife Survey of Devil's Canyon, Tonto National Forest

Prepared by:
Sky Jacobs
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Prepared for:
Bob Witzeman
Maricopa Audubon Society
P.O. Box 15451
Phoenix, AZ 85060

May 2009

Rancho Rio Creek, tributary of Devil's Canyon

Introduction

Devil's Canyon is located in Pinal County Arizona approximately 6 km east of the town of Superior in the Globe Ranger District of the Tonto National Forest. The area is generally rugged with deep canyons and is defined by its complex rock formations. Portions of Devil's Canyon have stretches of large and dense riparian growth that support a high diversity of breeding birds and other wildlife.

Aaron Flesch and I previously surveyed the area in early July 2007 (2007 report). This report is from a re-survey of woody plants and vertebrates in the same area done in May 2009.

Methods

I chose this stretch of Devil's Canyon because it has the most surface water and associated riparian vegetation. I started the survey in a side canyon called Rancho Rio Creek (UTM coordinates: 0495969x3682877) and traveled downstream until it converged with Devil's Canyon at an elevation of 1,100m (3,600ft) and ended the survey at around 1,036m (3,400ft) where it begins to narrow to a slot canyon with drops and plunge-pools, becoming impassable without ropes. Riparian vegetation also dramatically declines in this area due to a lack of deep soils. This survey was conducted in Township 2 South, Range 13 East, mainly in Sections 9 and 16 on the Superior USGS quadrangle (figure 1).

On May 10-11 2009, I surveyed woody and succulent vegetation and wildlife in and around Devil's Canyon. I started my survey at around 3pm on the 10th, surveying till dark and from 5am on the 11th till around 3pm. To survey birds, I walked slowly and identified all birds that I could detect by sight or sound. I attempted to augment detections by periodically whistling a pygmy-owl call or by "pshhh"ing birds from hiding places. Observations of birds and plants include those observed from the entire hike including areas in Rancho Rio Canyon.

My objective was to document all species of woody or succulent plants and vertebrates that I encountered and could identify (2) assess occupancy of sensitive or special status species, (3) determine whether habitat was present for sensitive or special status species.

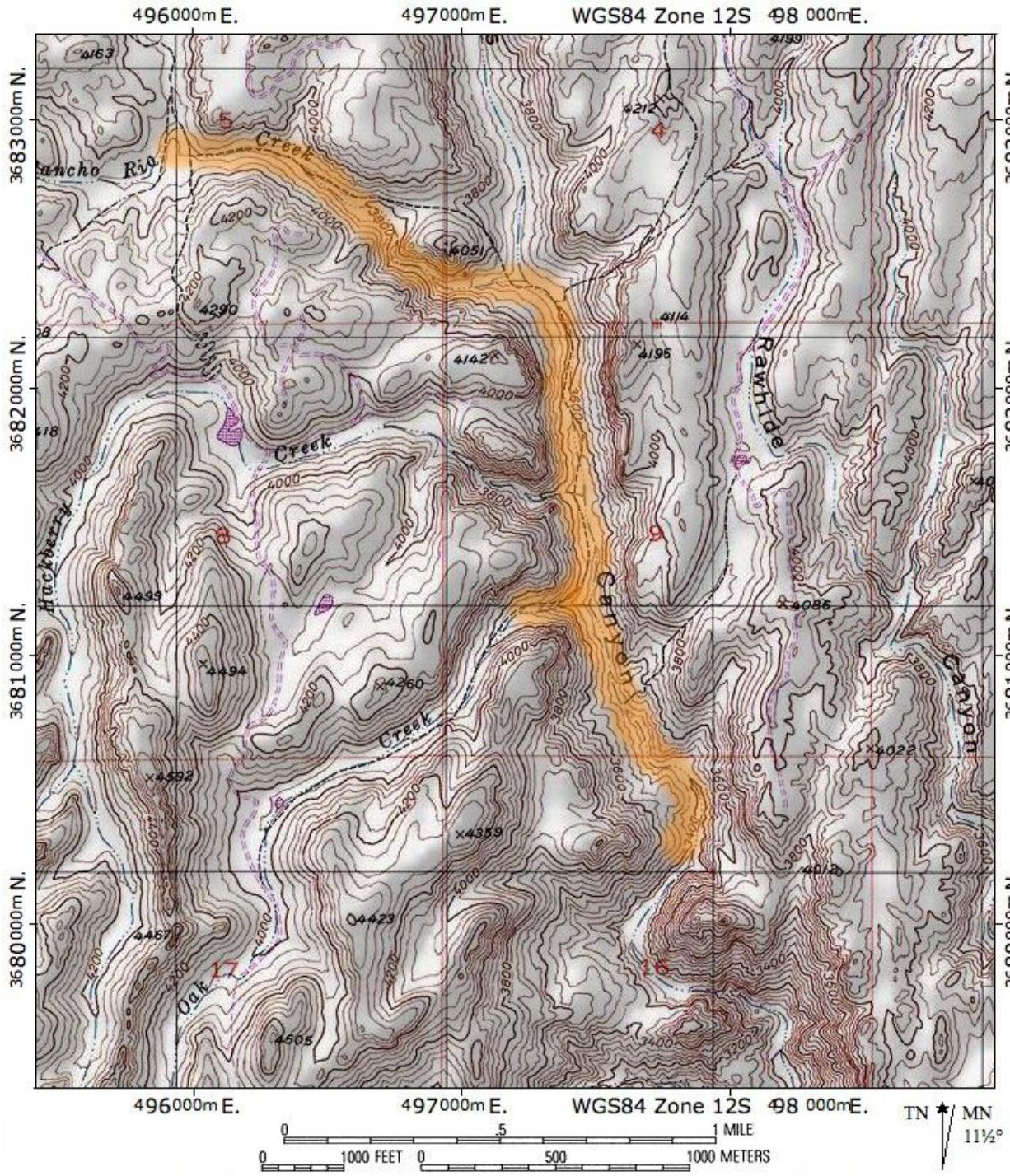


Figure 1: Map of Devil's Canyon and surrounding region. Survey route is indicated in orange.

Flora

The area in and around Devil's Canyon has a diverse assemblage of vegetation (table 1). Rugged topography, abundant surface water, and steep elevation gradients produce an array of microclimates that help increase diversity. The area is primarily a mixing zone of upper Sonoran Desert and interior chaparral, with some influences from the Madrean vegetation community. In Devil's Canyon Oak (*Quercus*), Juniper (*Juniperus*), and Piñon Pine (*Pinus*) grow near Saguaros (*Carnegiea gigantea*) and Desert Hackberry (*Celtis pallida*).

The stretch of Devil's Canyon that I surveyed had riparian vegetation that was dominated by stands of Arizona Alder (*Alnus oblongifolia*) with scattered Sycamore (*Platanus wrightii*) and Velvet Ash (*Fraxinus velutina*). In many areas heights of riparian trees reached 20m (70ft) or more with near complete canopy cover. Other common trees included Goodding Willow (*Salix gooddingii*) and Arizona White Oak (*Quercus arizonica*). Arizona Alder became less common in the lower portion of canyon, which is more often dominated by Gooding Willow and Cottonwood (*Populus fremontii*).

Understory in this stretch was generally dominated by Button Willow (*Cephalanthus occidentalis* var. *angustifolius*) and Poison Ivy (*Rhus toxicodendron*), among a variety of other shrubs. Due to thick over-story and rocky substrates, understory cover was not particularly dense.

I noted several species that were near the edge of their distribution in this area. Bonpland Willow (*Salix bonplandiana*), Mexican Blue Oak (*Quercus oblongifolia*), and Arizona Rosewood (*Vauquelinia californica ssp. Californica*) were all near the northern extent of their distribution (figures 2-4). Although debate over species designation continues (*edulis* or *monophylla)*, Single-leaf Piñon (*Pinus monophylla var. fallax*) was near its southern limit here (figure 5) (Ecology and Biogeography of Pinus, David M. Richardson - Cambridge University Press, 2000).

Upland vegetation was dominated by interior chaparral including Scrub Live-oak (*Quercus turbinella*), Pointleaf Manzanita (*Arctostophylous pringlei*), Hop Bush (*Dodonaea viscosa*), Birchleaf Mountain Mahogony (*Cercocarpus betuloides*), Jojoba (*Simmondsia chinensis*), Wait-a-minute Bush (*Mimosa biuncifera*), cholla (*Opuntia* sp.) and agave (*Agave* sp.). Vegetation composition throughout the uplands is significantly influenced by Sonoran Desert elements as evidenced by the presence of Saguaros (*Carnegiea gigantea*), which are fairly common on rocky east- and south-facing slopes throughout the area.

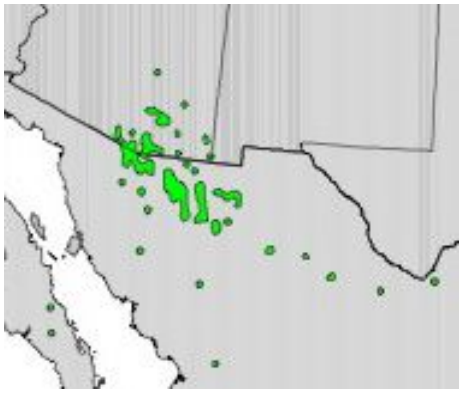


Figure 2: Blue Oak (*Quercus oblongifolia*).

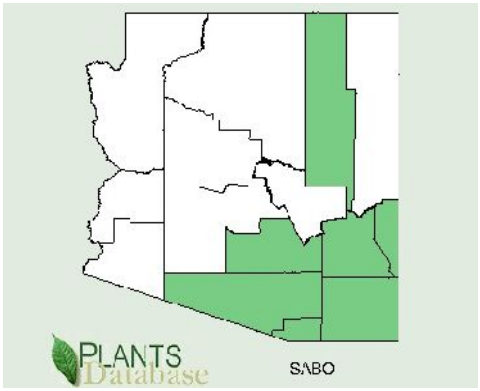


Figure 3: Bonpland Willow (*Salix bonplandiana*

Figure 4: Arizona Rosewood, *Vauquelinia californica ssp. Californica*

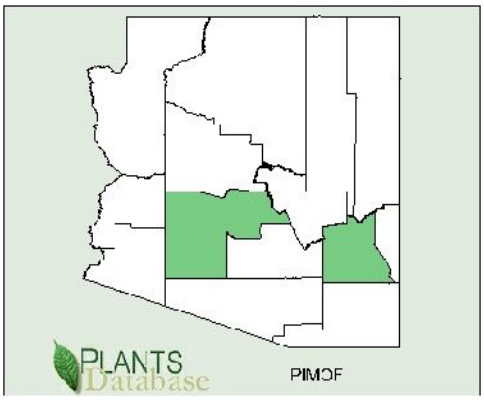


Figure 5: Single-leaf Piñon, *Pinus monophylla var. fallax*

Fauna

Birds: I detected 52 species of birds (table 2) during my approximately16 hours of survey time. Most of the species I presumed to be breeding in the area.

A pair of Zone-tailed Hawk was occupying a nest near the mouth of Hackberry Creek. In 2007 two pair of Zone-tailed Hawks occupied this stretch of Devil's Canyon and were nesting amazingly close to each other at only 580m. There appears to be only one pair in the survey area in 2009.

I observed a pair Common Black Hawks nesting in an Arizona Alder (UTM coordinates: 0497409x3681705). Nearby sign indicated that this pair had been feeding on non-native crayfish (*Cambarellus sp.*). Common Black Hawks are generally obligated to productive riparian areas feeding predominately on fish and frogs. Common Black Hawks are a state threatened species in Texas and Arizona. There is an estimated population of 220-250 pairs in Arizona, New Mexico and Texas (from a literature summary by Public Employees for Environmental Responsibility).

I observed a pair of Peregrine Falcons perched together on rock spires (figure 7 and 8, UTM coordinates: 0497428x3681725). This pair was almost certainly nesting nearby and seemed to favor an area on the east side of Devil's Canyon across from the mouth of Oak Creek Canyon. Devil's Canyon provides excellent habitat for Peregrine Falcons, which typically nest on cliffs near areas where food is abundant, such as the lush riparian areas in found in this canyon. Peregrine Falcons are a delisted federally endangered species and currently considered a threatened species in Arizona (Fish and Wildlife Service: Threatened and Endangered Species by county: Pinal County).

Riparian-obligate Yellow Warblers and Summer Tanagers are common throughout this stretch of Devil's Canyon (figure 9 and 10). Yellow Warblers were feeding young and Summer Tanagers were paired.

Other Wildlife: Black Bear sign was seen in the 2007 and 2009 surveys. No other large mammals were seen in the area during surveys.

Non-native Green Sunfish (*Lepomis cyanellus*) and Crayfish (*Cambarellus sp.*) were common and well established in the Devil's Canyon and have likely had negative impacts on native aquatic species. Lowland Leopard Frogs (*Rana yavapaiensis*) and native fish species were not detected on my survey. Habitat was present for these native aquatic species, but they may have been displaced non-natives.

Bullfrogs (*Rana catesbeiana*) were not evident in Devil's Canyon and possibly can't survive frequent and severe flooding. There were only a few large stagnant ponds, which are the Bullfrogs preferred habitat.

Canyon Treefrogs (*Hyla arenicolor*) were doing quite well in this canyon. I noted dozens of Canyon Treefrogs calling simultaneously during the evening of May 10th, making sleep difficult for several hours after dark. Tadpoles of this species were also common in Rancho Rio and Oak Creek side canyons.

Other reptiles observed included Plateau Lizard (*Sceloporus tristichus*), Greater Earless Lizard (*Cophosaurus texanus*), Clark's Spiny Lizard (*Sceloporus clarkii*), Western Whiptail (*Aspidoscelis tigris* ssp. *punctilinealis*), the very common Ornate Tree Lizard (*Urosaurus ornatus*), and an unknown Spotted Whiptail (possibly *Aspidoscelis flagellicauda)*.

Special Status Species

I accessed the AGFD Environmental On-line Review Tool to obtain records of special status species within 5 miles of the survey area. I also consulted the most current listing of threatened, endangered, proposed, and candidate species in Pinal County from the USFWS website (link) updated January 8, 2009. Third, I evaluated the survey area for species' habitat requirements noted in these searches.

Table 3 lists special status species that may occur in the area and Appendix A lists all special status species or designated Critical Habitat known to occur within 5 miles of the survey area as

noted by AGFD Environmental On-line Review Tool.

I did not detect Yellow-billed Cuckoos or Southwestern Willow Flycatcher along this stretch of Devil's Canyon. Cuckoos generally appear from migration in mid-June, later than my survey dates of May 10-11th, limiting potential for detection. Southwestern Willow Flycatchers also generally start appearing around May 15th, several days after my survey dates.

Although lush, vegetation structure and composition are likely not suitable for Southwest Willow Flycatchers due to limited dense vegetation volume between 1.5 and 5m above the ground. In Arizona, Yellow-billed Cuckoos typically prefer lower elevation riparian areas that support mesquite, cottonwood, and willow and may also require larger patches of riparian vegetation with more understory cover than observed in Devil's Canyon. Although cuckoos do occur in montane riparian areas similar to that in Devil's Canyon, they are much less common in these areas and may not occur at a given locale every year.

Peregrine Falcons, seen and likely nesting in Devil's Canyon in both 2007 and 2009, were delisted from the ESA, but are currently considered an Arizona threatened species (Fish and Wildlife Service: Threatened and Endangered Species by county: Pinal County).

Common Black Hawks, found nesting during both 2007 and 2009 surveys, are listed as sensitive by the USFS as well as a threatened species by the state of Arizona (Arizona Game and Fish Department, 2005, Black Hawk).

There is potential for occurrence of Mexican Spotted Owls (*Strix occidentalis lucida*) in the canyon; Critical Habitat has been designated for this subspecies within 5 miles (appendix A).

The Federally endangered Gila Chub (*Gila intermedia*) is currently known from the Mineral Creek drainage, a tributary that converges with Devil's Canyon approximately 5km below my survey area (Arizona Game and Fish Department, 2005, *Gila intermedia*). Additional fish-specific surveys would be needed to determine whether these fish occur in Devil's Canyon despite the presence of non-native Green Sunfish and Crayfish. Critical Habitat has been designated for Gila Chub within 5 miles of the survey area (appendix A).

Other special status native fish species that are likely extirpated from the area include Loach Minnow (*Tiaroga cobitis*), Spikedace (*Media Fulgida*), Roundtail Chub (*Gila Robusta*), and Gila Topminnow *(Poeciliopsis occidentalis occidentalis)*.

The Mexican Gartersnake (*Thamnophis eques megalops*) has likely been extirpated from the region (Petition to list the Mexican Garter Snake, page 15).

Arizona Hedgehog Cactus (*Echinocereus triglochidiatus var. arizonicus*) is a federally listed species under the Endangered Species Act. This cactus has a very limited distribution, which is confined to areas just to the north and northeast of my survey area (figure 6). I did not find individuals of this

hedgehog during my survey. It is documented approximately 3km north of my survey area near the highway 60 bridge across Devil's Canyon (Arizona Game and Fish map). More surveys could potentially locate individuals closer to my survey area. This species is primarily found at elevations of 1,150 to 1,600m (3,770ft to 5,249ft), slightly higher than my survey area.

Useful documents related to *Echinocereus triglochidiatus var. arizonicus* in Devil's Canyon area:

- U.S. Fish and Wildlife Service species overview
- U.S. Fish and Wildlife Service recovery plan for Arizona hedgehog cactus
- Arizona Game and Fish species overview
- Arizona Game and Fish distribution map
- Biological Opinion, May 2008 (State Highway 60 road construction work)

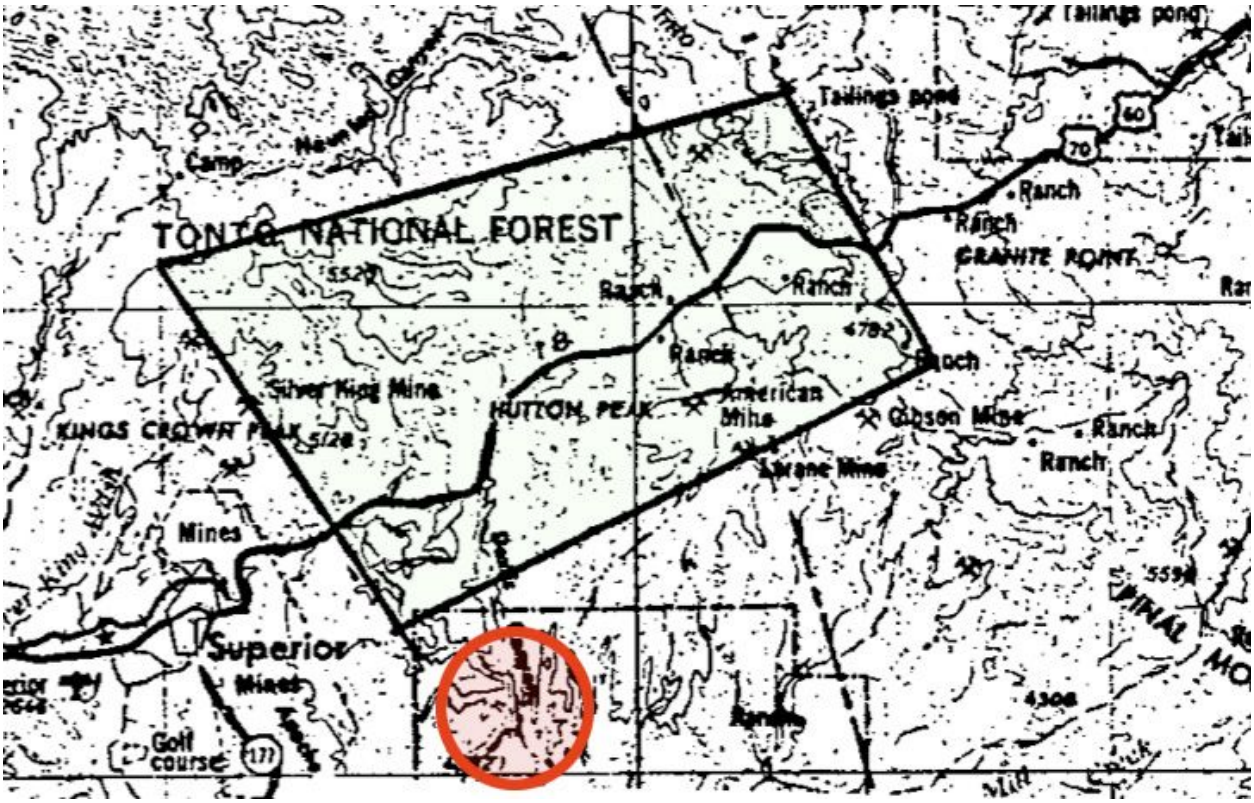


Figure 6: Range of Echinocereus triglochidiatus var. arizonicus as delineated April 1982 (Devil's Canyon survey area indicated in red) – Fish and Wildlife Draft Recovery Plan, 1984

Conclusion

Devil's Canyon is an interesting transition zone between vegetation communities with influences from the Sonoran Desert, interior chaparral, and Madrean woodlands. This association of vegetation communities is somewhat unique in Arizona.

Cattle appear to be limited to the stretch above Rancho Rio Creek in Devil's Canyon, enhancing the health of the riparian area below. Human impacts beyond non-native species are currently

minimal in the survey area.

The countryside in the vicinity of Devil's Canyon has stunning scenery rivaling some of the best in Arizona and the nation.

Devil's Canyon is an important riparian resource in the region that supports a high diversity of plant and animal life. Well functioning riparian ecosystems are rare and threatened in Arizona and those that remain should be protected.

Table 1: Plant species identified in Devil's Canyon Survey (2007 and 2009)
Note: Survey focused only on woody perennial plants. Survey efforts were not exhaustive; this list represents a partial record of plants in the area.

Family	Genus	Species	Common Name
Acanthaceae	Anisacanthus	thurberi	Desert Honeysuckle, Chuparosa
Anacardiaceae	Rhus	rydbergii	Western Poison Ivy
Anacardiaceae	Rhus	trilobata	Lemonade Berry, Squawbush
Asclepiadaceae	Asclepias	linaria	Pine-needle Milkweed
Asteraceae	Baccharis	sarothroides	Desert Broom
Asteraceae	Ericameria	laricifolia	Turpentine Bush
Berberidaceae	Berberis	haematocarpa	Bloodberry Barberry
Betulaceae	Alnus	oblongifolia	Arizona Alder
Bignoniaceae	Catalpa	speciosa	Non-native Catalpa
Cactaceae	Carnegiea	gigantea	Saguaro
Cactaceae	Cylindropuntia	versicolor	Staghorn Cholla
Cactaceae	Ferocactus	emoryi	Barrel Cactus
Cactaceae	Opuntia	2 unknown species	Prickly Pear
Caprifoliaceae	Lonicera	arizonica	Arizona Honeysuckle
Crossosomataceae	Crossosoma	bigelovii	Ragged Rockflower
Cupressaceae	Juniperus	coahuilensis	One-seed Juniper
Cupressaceae	Cupressus	arizonica ssp. Arizonica	Arizona Cypress
Ericaceae	Arctostaphylos	pungens	Pointleaf Manzanita
Fabaceae	Acasia	angustissima var. suffrutescens?	Prairie Acacia
Fabaceae	Acasia	greggii	Catclaw Acasia
Fabaceae	Amorpha	fruticosa var. occidentalis	False indigo Bush
Fabaceae	Mimisa	biuncifera	Wait-a-minute Bush
Fabaceae	Prosopis	velutina	Velvet Mesquite
Fagaceae	Quercus	arizonica	Arizona White Oak
Fagaceae	Quercus	emoryi	Emory Oak
Fagaceae	Quercus	oblongifolia	Mexican Blue Oak
Fagaceae	Quercus	turbinella	Scrub Live-oak
Garryaceae	Garrya	wrightii	Wright's silktassel
Juglandaceae	Juglans	major	Arizona Black Walnut
Liliaceae	Agave	palmeri	Palmer's Agave
Liliaceae	Dasylirion	wheeleri	Sotol
Liliaceae	Nolina	microcarpa	Beargrass
Liliaceae	Yucca	arizonica	Arizona Yucca
Oleaceae	Fraxinus	velutina	Velvet Ash

Oleaceae	Fraxinus	cuspidata var. macropetala	Fragrant Ash???
Pinaceae	Pinus	monophylla var. fallax	Single-leaf Pinyon Pine
Platanaceae	Platanus	wrightii	Arizona sycamore
Poaceae	Muhlenbergia	dumosa	Bamboo Muhly
Ranunculaceae	Aquilegia	chrysantha	Golden Columbine
Rhamnaceae	Ceanothus	greggii	Desert Ceanothus
Rhamnaceae	Rhamnus	californica	California Buckthorn
Rhamnaceae	Rhamnus	ilicifolia	Hollyleaf Buckthorn
Rhamnaceae	Zizyphus	obtusifolia	Greythorn
Rhamnaceae	Sageretia	wrightii	Sageretia
Rosaceae	Prunus	virginiana	Wild Cherry
Rosaceae	Vauquelinia	californica ssp. californica	Arizona Rosewood (0497498x3681393)
Salicaceae	Populus	fremontii	Fremont Cottonwood.
Salicaceae	Salix	bonplandiana	Bonpland Willow
Salicaceae	Salix	gooddingii	Goodding Willow
Sapindaceae	Dodonaea	viscosa	Hop Bush
Solanaceae	Lycium	andersonii?	Wolfberry
Simmondsiaceae	Simmondsia	chinensis	Jojoba
Ulmaceae	Celtis	reticulata	Netleaf Hackberry
Ulmaceae	Celtis	pallida	Desert Hackberry
Verbenaceae	Aloysia	wrightii	Bee Brush, Oregonillo
Vitaceae	Parthenocissus	vitacea	Virginia Creeper
Vitaceae	Vitis	arizonica	Arizona Grape

Table 2: All birds observed by sight or sound. May 10-11, 2009 Devil's Canyon survey.

Code	Common Name	Latin Name	Family	Order	Notes
GAQU	Gambel's quail	*Callipepla gambelii*	Odontophoridae	Galliformes	Common
TUVU	turkey vulture	*Cathartes aura*	Cathartidae	Ciconiiformes	Abundant
COHA	Cooper's hawk	*Accipiter cooperii*	Accipitridae	Falconiformes	Calling and agitated in same area both afternoons - likely nesting.
CBHA	common black-hawk	*Buteogallus anthracinus*	Accipitridae	Falconiformes	Paried, nesting. Sign they are eating crayfish. (***APIF**)
ZTHA	zone-tailed hawk	*Buteo albonotatus*	Accipitridae	Falconiformes	Paired, nesting. Seems to be only one pair in survey area this year.
PEFA	peregrine falcon	*Falco peregrinus*	Falconidae	Falconiformes	Paired, likely nesting. See photos.
WWDO	white-winged dove	*Zenaida asiatica*	Columbidae	Columbiformes	Common
MODO	mourning dove	*Zenaida macroura*	Columbidae	Columbiformes	Common
WESO	western screech-owl	*Megascops kennicottii*	Strigidae	Strigiformes	Called just after dark.
ELOW	elf owl	*Micrathene whitneyi*	Strigidae	Strigiformes	Several calling at dusk.
WTSW	white-throated swift	*Aeronautes saxatalis*	Apodidae	Apodiformes	
ANHU	Anna's hummingbird	*Calypte anna*	Trochilidae	Apodiformes	Nesting - female on nest.
COHU	Costa's hummingbird	*Calypte costae*	Trochilidae	Apodiformes	Abundant. Males displaying.
GIWO	Gila woodpecker	*Melanerpes uropygialis*	Picidae	Piciformes	Common
LBWO	ladder-backed	*Picoides scalaris*	Picidae	Piciformes	

	woodpecker				
GIFL	gilded flicker	*Colaptes chrysoides*	Picidae	Piciformes	
UNEM	unknown empid	*Empidonax sp.*	Tyrannidae	Passeriformes	
BLPH	black phoebe	*Sayornis nigricans*	Tyrannidae	Passeriformes	Common
ATFL	ash-throated flycatcher	*Myiarchus cinerascens*	Tyrannidae	Passeriformes	Paired
CAKI	Cassin's kingbird	*Tyrannus vociferans*	Tyrannidae	Passeriformes	Family group
BEVI	Bell's vireo	*Vireo bellii*	Vireonidae	Passeriformes	Common. Singing.
WAVI	warbling vireo	*Vireo gilvus*	Vireonidae	Passeriformes	
CHRA	Chihuahuan raven	*Corvus cryptoleucus*	Corvidae	Passeriformes	
VGSW	violet-green swallow	*Tachycineta thalassina*	Hirundinidae	Passeriformes	Common. Likely group nesting area.
BRTI	bridled titmouse	*Baeolophus wollweberi*	Paridae	Passeriformes	
VERD	verdin	*Auriparus flaviceps*	Remizidae	Passeriformes	
BUSH	bushtit	*Psaltriparus minimus*	Aegithalidae	Passeriformes	
CACW	cactus wren	*Campylorhynchus brunneicapillus*	Troglodytidae	Passeriformes	
ROWR	rock wren	*Salpinctes obsoletus*	Troglodytidae	Passeriformes	
CANW	canyon wren	*Catherpes mexicanus*	Troglodytidae	Passeriformes	Abundant. Young exploring and learning to sing.
BEWR	Bewick's wren	*Thryomanes bewickii*	Troglodytidae	Passeriformes	Common
BTGN	black-tailed gnatcatcher	*Polioptila melanura*	Sylviidae	Passeriformes	
NOMO	northern mockingbird	*Mimus polyglottos*	Mimidae	Passeriformes	
PHAI	phainopepla	*Phainopepla nitens*	Ptilogonatidae	Passeriformes	Common
VIWA	Virginia's warbler	*Vermivora virginiae*	Parulidae	Passeriformes	1 individual (***APIF**)
LUWA	Lucy's warbler	*Vermivora luciae*	Parulidae	Passeriformes	Common
YWAR	yellow warbler	*Dendroica petechia*	Parulidae	Passeriformes	Common. Singing.
AUWA	Audubon's warbler	*Dendroica coronata auduboni*	Parulidae	Passeriformes	Several individuals
TOWA	Townsend's warbler	*Dendroica townsendi*	Parulidae	Passeriformes	Several individuals
WIWA	Wilson's warbler	*Wilsonia pusilla*	Parulidae	Passeriformes	Several individuals
SUTA	summer tanager	*Piranga rubra*	Thraupidae	Passeriformes	Common. Paired. Carrying nesting materials.
WETA	western tanager	*Piranga ludoviciana*	Thraupidae	Passeriformes	Several individuals
GTTO	green-tailed towhee	*Pipilo chlorurus*	Emberizidae	Passeriformes	
CANT	canyon towhee	*Pipilo fuscus*	Emberizidae	Passeriformes	Common
BCSP	black-chinned sparrow	*Spizella atrogularis*	Emberizidae	Passeriformes	Common. Paired. (***APIF**)
SOSP	song sparrow	*Melospiza melodia*	Emberizidae	Passeriformes	Singing
NOCA	northern cardinal	*Cardinalis cardinalis*	Cardinalidae	Passeriformes	Common
BHGR	black-headed grosbeak	*Pheucticus melanocephalus*	Cardinalidae	Passeriformes	
HOOR	hooded oriole	*Icterus cucullatus*	Icteridae	Passeriformes	Common. Family Groups.
HOFI	house finch	*Carpodacus mexicanus*	Fringillidae	Passeriformes	
LEGO	lesser goldfinch	*Carduelis psaltria*	Fringillidae	Passeriformes	Common

* **APIF** = Arizona Partners in Flight Bird Conservation Plan priority species

Figure 7: This pair of Peregrine Falcons seemed at home in this part of Devil's Canyon

Figure 8: Peregrine Falcon flying overhead

Figure 9: Yellow Warbler

Figure 10: Female Summer Tanager

Table 3: Special status species that have potential to occur in survey area (Pinal County). E=federally-listed endangered, T=federally-listed threatened, C=candidate for federal listing, DL=delisted, AZ=protected by Arizona state law.

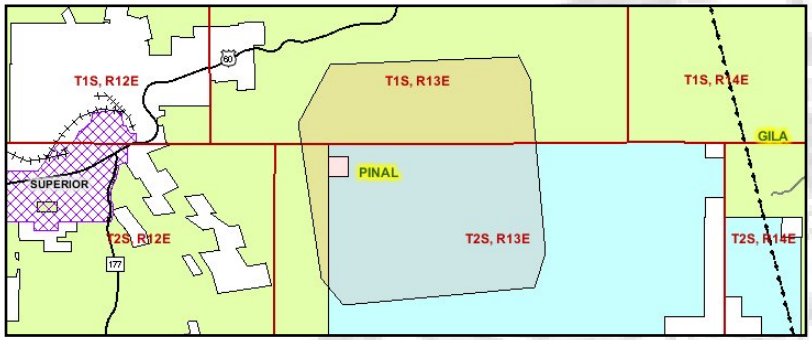
Species	Status	Distribution/Habitat Characteristics	Potential Occurrence in Project Area
Arizona Hedgehog *(Echinocereus triglochidiatus var. arizonicus)*	E, AZ	Occurs in ecotone between interior chapparal and Madrean evergreen woodland. Pinal and Gila counties only.	Habitat exists within the survey area. Additional surveys required to determine status in immediate area. Species occurs within 3 km of area.
Acuna Cactus *(Echinomastus erectocentrus var. acunensis)*	C	Well-drained knolls and ridges in Sonoran desertscrub. Three know localities in Pima County and 1 in Pinal County.	Unlikely, but possible in larger region. Population near Florence, AZ.
Mexican Spotted Owl *(Strix occidentalis lucida)*	T, AZ	Commonly found in mixed conifer woodland at higher elevation. Can also nest in lower elevation canyons with well-developed riparian habitat. Known to use cliff ledges for nesting in some localities.	Although commonly found higher in elevation, is known to nest in lower elevation canyons with well-developed riparian vegetation and cliffs. Possibility of occurrence in Devil's Canyon. Sufficient riparian woodland as well as suitable cliffs for nesting. USFS may have surveyed this area previously and should be consulted for data. Designated Critical Habitat exists within 5 miles (Appendix A).
Cactus Ferruginous Pygmy-owl *(Glaucidium brasilianum cactorum)*	DL	Mature cottonwood/willow forest, mesquite woodland, Sonoran desertscrub, and semidesert grasslands with well-developed vertical vegetation cover and mature saguaros with cavities.	Little habitat. Range no longer reaches this part of Arizona. This area is very unlikely to support species except perhaps during dispersal. No longer listed.
Bald Eagle *(Haliaeetus leucocephalus)*	DL	Needs large rivers, lakes, or reservoirs with abundant prey.	Little habitat in Devil's Canyon. Creek is too small.
Southwestern Willow Flycatcher *(Empidonax traillii extimus)*	E	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	Vegetation structure and composition likely not suitable due to limited vegetation volume between 1.5 and 5m above ground.
Western Yellow-billed Cuckoo *(Coccyzus americanus)*	C	Large stands of riparian and/or mesquite woodland.	Cuckoos are typically found in lower elevation riparian areas that support Mesquite, Cottonwood, and Willow. Although we have observed cuckoos in other more montane riparian areas similar to Devil's Canyon, they are much less common in these areas. Cuckoo may occur in this area some years.

Lesser Long-nosed Bat *(Leptonycteris curasoae yerbabuenae)*	E	Desert Scrub Habitat with agave and columnar cacti present as food plants.	Habitat present in Devil's Canyon but may not occur in area because it is at edge of range. Roosting areas and food sources are present in area.
Gila Chub *(Gila intermedia)*	E	Pools, springs, cienegas, and streams. 2,000 – 5,500 ft.	Additional surveys required to determine status. Designated Critical Habitat exists within 5 miles (Appendix A).
Gila Topminnow *(Poeciliopsis occidentalis occidentalis)*	E	Small streams, springs, and cienegas with vegetated shallows. <4,500 ft.	Likely extirpated from area. Additional surveys required to determine status.
Loach Minnow *(Tiaroga cobitis)*	T	Swift, shallow water with cobble and gravel. Recurrent flooding and natural hydrograph important. <8,000 ft.	Likely extirpated from area. Additional surveys required to determine status.
Northern Mexican Gartersnake (*Thamnophis eques*)	C	Large-river riparian woodlands and forests, streamside gallery forests. Strongly associated with the presence of a native prey including leopard frogs and native fish.	Likely extirpated from area. Additional surveys required to determine status.

Appendix A: Results of Environmental On-line Review Tool.

Arizona's On-line Environmental Review Tool
Search ID: 20090524008896
Project Name: Devils Canyon
Date: 5/24/2009 6:38:43 PM

Project Location



Project Name: Devils Canyon
Submitted By: Sky Jacobs
On behalf of: OTHER
Project Search ID: 20090524008896
Date: 5/24/2009 6:38:37 PM
Project Category: Mining,Other mineral extraction (copper, limestone, cinders, shale, salt)
Project Coordinates (UTM Zone 12-NAD 83): 497243.671, 3683012.739 meter
Project Area: 5359.869 acres
Project Perimeter: 17792.212 meter
County: PINAL
USGS 7.5 Minute Quadrangle ID: 1361
Quadrangle Name: SUPERIOR
Project locality is currently being scoped

Location Accuracy Disclaimer

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Receipt is solely responsible for the project location and thus the correctness of the Project Review Receipt content.

The Department appreciates the opportunity to provide in-depth comments and project review when additional information or environmental documentation becomes available.

Special Status Species Occurrences/Critical Habitat/Tribal Lands within 5 miles of Project Vicinity:

Name	Common Name	ESA	USFS	BLM	State
Agosia chrysogaster chrysogaster	Gila Longfin Dace	SC		S	
Bat Colony					
Buteogallus anthracinus	Common Black-Hawk		S	S	WSC
CH for Gila intermedia	Designated Critical Habitat for Gila chub				
CH for Strix occidentalis lucida	Designated Critical Habitat for Mexican spotted owl				
Chionactis occipitalis klauberi	Tucson Shovel-nosed Snake			S	
Echinocereus triglochidiatus var. arizonicus	Arizona Hedgehog Cactus	LE	S		HS
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S	WSC
Gila robusta	Roundtail Chub	SC	S	S	WSC
Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	SC		S	WSC
Lithobates yavapaiensis	Lowland Leopard Frog	SC	S	S	WSC
Myotis ciliolabrum	Western Small-footed Myotis	SC			

 APPLICATION INITIALS: _____

APPENDIX 7

AUDUBON SOCIETY SURVEY DATA

Queen Creek and Oak Flat Survey August 2006

	POINT INFORMATION															NUMBER				BEHAVIOR						
Date	Route Code	Point Number	Primary Habitat	Secondary Habitat	Other Habitat	Observers	Start	End	Species	Subspp	A/V	Count	Estimate?	Distance Zone	Incidental?	Male	Female	Juvenile	Subadult	on snag	singing	calling	territorial	Time Block	Comments
08/01/06	OF	5	OJ	CH		TDM	0735	0740	BEWR		A	1		3							1			3	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	HOFI		A	2		2								1		3	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	CAKI		A	1		2								1		3	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	LEGO		V	2		1								1		3	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	CORA		V	1		3										3	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	TUVU		V	1		3										3	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	MODO		V	1		3										3	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	WWDO		V	1		1										3	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	BLPH		V	1		1				1						3	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	HOFI		V	1		1				1						5	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	PHAI		V	1		1		1						1		5	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	MODO		V	1		3								1		5	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	PHAI		A	1		3										5	
08/01/06	OF	5	OJ	CH		TDM	0735	0740	HOFI		V	2		1										5	
08/01/06	OF	4	CH			TDM	0726	0731	BEWR		A	1		3						1				3	
08/01/06	OF	4	CH			TDM	0726	0731	BEWR		A	1		3						1				3	
08/01/06	OF	4	CH			TDM	0726	0731	SPTO		A	1		3						1				3	
08/01/06	OF	4	CH			TDM	0726	0731	VERD		V	1		1										3	
08/01/06	OF	4	CH			TDM	0726	0731	BEWR		A	1		3						1				5	
08/01/06	OF	4	CH			TDM	0726	0731	PHAI		V	1		2								1		5	
08/01/06	OF	3	CH			TDM	0719	0724	SPTO		A	1		2						1				3	
08/01/06	OF	3	CH			TDM	0719	0724	VERD		A	1		1								1		3	
08/01/06	OF	3	CH			TDM	0719	0724	CANW		A	1		3						1				3	
08/01/06	OF	3	CH			TDM	0719	0724	HOFI		A	1		2								1		3	
08/01/06	OF	3	CH			TDM	0719	0724	BUSH		A	1		1								1		3	
08/01/06	OF	3	CH			TDM	0719	0724	HOFI		A	1		2								1		3	
08/01/06	OF	3	CH			TDM	0719	0724	CANW		A	1		3						1				3	
08/01/06	OF	3	CH			TDM	0719	0724	BUSH		A	1		1								1		3	
08/01/06	OF	3	CH			TDM	0719	0724	ROWR		A	1		1								1		3	
08/01/06	OF	3	CH			TDM	0719	0724	WWDO		V	1		3										3	
08/01/06	OF	3	CH			TDM	0719	0724	BGGN		A	1		2								1		5	
08/01/06	OF	3	CH			TDM	0719	0724	CANW		V	1		1										5	
08/01/06	OF	3	CH			TDM	0719	0724	SPTO		A	1		3						1				5	
08/01/06	OF	3	CH			TDM	0719	0724	BEWR		A	1		2						1				5	
08/01/06	OF	2	CH			TDM	0711	0716	ANHU		V	1		1										3	
08/01/06	OF	2	CH			TDM	0711	0716	ROWR		A	1		3								1		3	
08/01/06	OF	2	CH			TDM	0711	0716	SPTO		A	1		3						1				3	
08/01/06	OF	2	CH			TDM	0711	0716	PHAI		V	1		3			1							3	
08/01/06	OF	2	CH			TDM	0711	0716	BEWR		A	1		2						1				3	
08/01/06	OF	2	CH			TDM	0711	0716	PHAI		V	1		2		1								3	
08/01/06	OF	2	CH			TDM	0711	0716	BUOR		V	1		2								1		3	
08/01/06	OF	2	CH			TDM	0711	0716	PHAI		V	2		3				1						5	PART OF A FAMILY GROUP
08/01/06	OF	2	CH			TDM	0711	0716	PHAI		V	1		3		1								5	
08/01/06	OF	1	CH			TDM	0704	0709	BEWR		A	1		3								1		3	
08/01/06	OF	1	CH			TDM	0704	0709	SPTO		A	1		3								1		3	
08/01/06	OF	1	CH			TDM	0704	0709	ROWR		A	1		2								1		3	
08/01/06	OF	1	CH			TDM	0704	0709	SPTO		A	1		2						1				3	
08/01/06	OF	1	CH			TDM	0704	0709	CANW		A	1		3						1				3	
08/01/06	OF	1	CH			TDM	0704	0709	SPTO		A	1		2						1				3	
08/01/06	OF	1	CH			TDM	0704	0709	CORA		A	1		3								1		3	
08/01/06	OF	1	CH			TDM	0704	0709	CAKI		A	1		3								1		5	
08/01/06	OF	1	CH			TDM	0704	0709	PHAI		V	2		3		1	1						1	5	
08/01/06	FM	1	OJ	CH		TDM	0611	0616	SUTA		A	1		2								1		3	
08/01/06	FM	1	OJ	CH		TDM	0611	0616	SPTO		A	1		2						1				3	
08/01/06	FM	1	OJ	CH		TDM	0611	0616	BEWR		A	1		3						1				3	
08/01/06	FM	1	OJ	CH		TDM	0611	0616	BEWR		A	1		3						1				3	
08/01/06	FM	1	OJ	CH		TDM	0611	0616	GRVI		A	1		3						1				3	
08/01/06	FM	1	OJ	CH		TDM	0611	0616	HOOR		A	1		3								1		3	
08/01/06	FM	1	OJ	CH		TDM	0611	0616	SPTO		A	1		2						1				3	
08/01/06	FM	1	OJ	CH		TDM	0611	0616	ANHU		A	1		1								1		3	
08/01/06	FM	1	OJ	CH		TDM	0611	0616	ANHU		A	1		2										5	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	BEWR		A	1		1								1		3	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	SPTO		A	1		3						1				3	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	WESJ		A	1		3								1		3	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	SPTO		A	1		3						1				3	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	CAKI		A	1		3								1		3	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	BEWR		A	1		1						1				3	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	PHAI		V	1		3										3	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	LBWO		A	1		3								1		3	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	GRVI		A	1		2						1				3	
08/01/06	FM	2	OJ	CH		TDM	0624	0629	RCSP		A	1		3						1				5	

Queen Creek and Oak Flat Survey August 2006

	POINT INFORMATION														NUMBER				BEHAVIOR					
Date	Route Code	Point Number	Primary Habitat	Secondary Habitat	Other Habitat	Observers	Start	End	Species	Subspp	A/V	Count	Estimate?	Distance Zone	Incidental?	Male	Female	Juvenile	Subadult	on snag	singing	calling	territorial	Time Block	Comments
08/01/06	FM	2	OJ	CH		TDM	0624	0629	JUTI		A	1		3							1			5	
08/01/06	FM	3	CH	OJ		TDM	0632	0637	SPTO		A	1		2							1			3	
08/01/06	FM	3	CH	OJ		TDM	0632	0637	CAKI		V	2		3										3	
08/01/06	FM	3	CH	OJ		TDM	0632	0637	SPTO		A	2		2							1			3	
08/01/06	FM	3	CH	OJ		TDM	0632	0637	BUSH		V	1		1							1			3	
08/01/06	FM	3	CH	OJ		TDM	0632	0637	BRTI		V	1		1										3	
08/01/06	FM	3	CH	OJ		TDM	0632	0637	LBWO		A	1		3								1		5	
08/01/06	FM	3	CH	OJ		TDM	0632	0637	RCSP		A	1		2							1			5	
08/01/06	FM	3	CH	OJ		TDM	0632	0637	BEWR		A	1		2								1		5	
08/01/06	FM	3	CH	OJ		TDM	0632	0637	RCSP		A	1		3							1			5	
08/01/06	FM	4	CH	OJ		TDM	0640	0645	RCSP		A	1		2							1			3	
08/01/06	FM	4	CH	OJ		TDM	0640	0645	RCSP		A	1		2							1			3	
08/01/06	FM	4	CH	OJ		TDM	0640	0645	CANW		A	1		3							1			3	
08/01/06	FM	4	CH	OJ		TDM	0640	0645	SPTO		A	1		3								1		3	
08/01/06	FM	4	CH	OJ		TDM	0640	0645	CANT		A	1		2								1		3	
08/01/06	FM	5	OJ	CH		TDM	0649	0654	RTHA		V	1		F3										3	
08/01/06	FM	5	OJ	CH		TDM	0649	0654	PHAI		V	2		F1		1	1							5	
08/01/06	FM	5	OJ	CH		TDM	0649	0654	ANHU		V	1		1										5	

Queen Creek and Oak Flat Survey May 2006

	POINT INFORMATION															NUMBER				BEHAVIOR					
Date	Route Code	Point Number	Primary Habitat	Secondary Habitat	Other Habitat	Observers	Start	End	Species	Subspp	A/V	Count	Estimate?	Distance Zone	Incidental?	Male	Female	Juvenile	Subadult	on snag	singing	calling	territorial	Time Block	Comments
05/16/06	FM	5	OJ	CH		TDM	0614	0619	MODO		A	1		1							1			3	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	BEWR		V	2		1							1			3	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	CANW		A	2		1							1			3	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	BEVI		A	2		1							1			3	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	ATFL		A	2		1								1		3	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	BGGN		A	1		1							1			3	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	SUTA		A	1		1							1			3	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	GRVI		A	1		1							1			3	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	VERD		A	1		1								1		3	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	HOOR		V	1		1		1								5	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	BHGR		V	1		1										5	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	BUSH		A	1		1							1			5	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	SCOR		A	1		2							1			5	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	LEGO		V	1		1										5	
05/16/06	FM	5	OJ	CH		TDM	0614	0619	TUVU		V	1		F2										5	
05/16/06	FM	1	OJ	CH		TDM	0529	0534	BEWR		V	3		1							1			3	
05/16/06	FM	1	OJ	CH		TDM	0529	0534	ATFL		A	2		1								1		3	
05/16/06	FM	1	OJ	CH		TDM	0529	0534	BTYW		A	1		1							1			3	
05/16/06	FM	1	OJ	CH		TDM	0529	0534	PLVI		A	1		1							1			3	
05/16/06	FM	1	OJ	CH		TDM	0529	0534	SUTA		V	1		2		1					1			5	
05/16/06	FM	1	OJ	CH		TDM	0529	0534	BRTI		A	1		3							1			5	
05/16/06	FM	2	OJ	CH		TDM	0544	0549	BEWR		A	2		1							1			3	
05/16/06	FM	2	OJ	CH		TDM	0544	0549	MODO		V	1		2							1			3	
05/16/06	FM	2	OJ	CH		TDM	0544	0549	GAQU		A	2		2							1			3	
05/16/06	FM	2	OJ	CH		TDM	0544	0549	ATFL		V	2		1							1			3	
05/16/06	FM	2	OJ	CH		TDM	0544	0549	JUTI		A	1		1							1			3	
05/16/06	FM	2	OJ	CH		TDM	0544	0549	SUTA		A	1		1							1			3	
05/16/06	FM	2	OJ	CH		TDM	0544	0549	BTYW		A	1		2							1			3	
05/16/06	FM	2	OJ	CH		TDM	0544	0549	BUSH		A	2		1								1		5	
05/16/06	FM	2	OJ	CH		TDM	0544	0549	ANHU		A	1		1								1		5	
05/16/06	FM	3	CH	OJ		TDM	0553	0558	ATFL		A	1		1								1		3	
05/16/06	FM	3	CH	OJ		TDM	0553	0558	SPTO		A	1		1							1			3	
05/16/06	FM	3	CH	OJ		TDM	0553	0558	SUTA		A	1		1								1		3	
05/16/06	FM	3	CH	OJ		TDM	0553	0558	GRVI		A	2		2							1			3	
05/16/06	FM	3	CH	OJ		TDM	0553	0558	BGGN		V	1		1								1		3	
05/16/06	FM	3	CH	OJ		TDM	0553	0558	BEWR		A	1		1							1			5	
05/16/06	FM	3	CH	OJ		TDM	0553	0558	MODO		V	2		2							1			5	
05/16/06	FM	3	CH	OJ		TDM	0553	0558	CAKI		A	2		2							1			5	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	BUSH		A	3		1								1		3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	BEWR		A	1		1							1			3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	ATFL		A	2		1								1		3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	BCSP		A	1		1							1			3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	PHAI		V	1		1										3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	HOFI		A	1		1							1			3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	MODO		V	3		1										3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	SPTO		A	1		1							1			3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	CANW		A	1		3							1			3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	BHCO		A	1		1								1		3	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	CAKI		A	1		2								1		5	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	UNHU		V	1		1										5	
05/16/06	FM	4	CH	OJ		TDM	0605	0610	HETA		V	1		1			1							5	
05/16/06	HC	1	DS	OG		TDM	0802	0807	BEVI		A	2		1							1			3	
05/16/06	HC	1	DS	OG		TDM	0802	0807	CACW		A	2		1							1			3	
05/16/06	HC	1	DS	OG		TDM	0802	0807	GAQU		V	2		1										3	
05/16/06	HC	1	DS	OG		TDM	0802	0807	ANHU		V	2		1										3	
05/16/06	HC	1	DS	OG		TDM	0802	0807	WWDO		A	1		2							1			3	
05/16/06	HC	1	DS	OG		TDM	0802	0807	BGGN		V	1		1								1		3	
05/16/06	HC	1	DS	OG		TDM	0802	0807	GAQU		A	1		2								1		3	
05/16/06	HC	1	DS	OG		TDM	0802	0807	CBTH		A	1		1							1			3	
05/16/06	HC	1	DS	OG		TDM	0802	0807	HOOR		V	1		1										5	
05/16/06	HC	1	DS	OG		TDM	0802	0807	CANT		V	1		1										5	
05/16/06	HC	1	DS	OG		TDM	0802	0807	BGGN		A	1		2								1		5	
05/16/06	HC	2	DS	GR		TDM	0812	0817	GAQU		A	2		1								1		3	
05/16/06	HC	2	DS	GR		TDM	0812	0817	ATFL		A	1		1								1		3	
05/16/06	HC	2	DS	GR		TDM	0812	0817	NOMO		A	1		2							1			3	
05/16/06	HC	2	DS	GR		TDM	0812	0817	COHU		V	1		1			1			1				3	

Queen Creek and Oak Flat Survey May 2006

	POINT INFORMATION															NUMBER				BEHAVIOR					
Date	Route Code	Point Number	Primary Habitat	Secondary Habitat	Other Habitat	Observers	Start	End	Species	Subspp	A/V	Count	Estimate?	Distance Zone	Incidental?	Male	Female	Juvenile	Subadult	on snag	singing	calling	territorial	Time Block	Comments
05/16/06	HC	2	DS	GR		TDM	0812	0817	SCOR		V	1		1							1			3	
05/16/06	HC	2	DS	GR		TDM	0812	0817	CBTH		A	1		2							1			5	
05/16/06	HC	2	DS	GR		TDM	0812	0817	CACW		A	1		3							1			5	
05/16/06	HC	2	DS	GR		TDM	0812	0817	CACW		A	1		3							1			5	
05/16/06	HC	2	DS	GR		TDM	0812	0817	BHCO		V	1		1										5	
05/16/06	HC	2	DS	GR		TDM	0812	0817	MODO		V	1		F1										5	
05/16/06	HC	2	DS	GR		TDM	0812	0817	PHAI		V	1		3										5	
05/16/06	HC	2	DS	GR		TDM	0812	0817	ROWR		V	1		2										5	
05/16/06	HC	2	DS	GR		TDM	0812	0817	GRVI		A	1		2							1			5	
05/16/06	HC	3	DS			TDM	0823	0828	SCOR		A	1		1							1			3	
05/16/06	HC	3	DS			TDM	0823	0828	GRVI		A	1		2							1			3	
05/16/06	HC	3	DS			TDM	0823	0828	HOFI		A	2		2							1			3	
05/16/06	HC	3	DS			TDM	0823	0828	ATFL		A	2		2								1		3	
05/16/06	HC	3	DS			TDM	0823	0828	NOMO		A	1		2							1			3	
05/16/06	HC	3	DS			TDM	0823	0828	HOFI		V	1		F2										3	
05/16/06	HC	3	DS			TDM	0823	0828	BEVI		A	1		2							1			5	
05/16/06	HC	3	DS			TDM	0823	0828	BTSP		V	1		2										5	
05/16/06	HC	4	DS			TDM	0834	0839	BTGN		A	1		1							1	1		3	
05/16/06	HC	4	DS			TDM	0834	0839	PHAI		V	1		1								1		3	
05/16/06	HC	4	DS			TDM	0834	0839	BEVI		A	1		1							1			3	
05/16/06	HC	4	DS			TDM	0834	0839	BTSP		V	3		1							1			3	
05/16/06	HC	4	DS			TDM	0834	0839	NOMO		A	1		2							1			3	
05/16/06	HC	4	DS			TDM	0834	0839	CANT		V	2		1								1		3	
05/16/06	HC	4	DS			TDM	0834	0839	CACW		A	1		2							1			5	
05/16/06	HC	4	DS			TDM	0834	0839	ATFL		A	1		2								1		5	
05/16/06	HC	4	DS			TDM	0834	0839	WWDO		A	1		2							1			5	
05/16/06	HC	5	DS			TDM	0844	0849	NOMO		A	3		2							1			3	
05/16/06	HC	5	DS			TDM	0844	0849	WWDO		V	2		2							1			3	
05/16/06	HC	5	DS			TDM	0844	0849	BTSP		A	2		1							1			3	
05/16/06	HC	5	DS			TDM	0844	0849	NOMO		A	1		1							1			3	
05/16/06	HC	5	DS			TDM	0844	0849	CANT		V	1		1										5	
05/16/06	OF	1	CH			TDM	0627	0632	NOMO		A	1		1		1					1			3	
05/16/06	OF	1	CH			TDM	0627	0632	BEWR		A	1		3		1					1			3	
05/16/06	OF	1	CH			TDM	0627	0632	GRFL		A	1		2								1		3	
05/16/06	OF	1	CH			TDM	0627	0632	ATFL		A	1		3							1			5	
05/16/06	OF	1	CH			TDM	0627	0632	SCOR		A	1		1							1			5	
05/16/06	OF	1	CH			TDM	0627	0632	BEWR		A	1		1							1			5	
05/16/06	OF	1	CH			TDM	0627	0632	GRVI		A	1		3							1			5	
05/16/06	OF	1	CH			TDM	0627	0632	BEWR		A	1		2							1			5	
05/16/06	OF	1	CH			TDM	0627	0632	VGSW		A	2		F1										5	
05/16/06	OF	2	CH			TDM	0634	0639	ZTHA		A	1		F1										3	
05/16/06	OF	2	CH			TDM	0634	0639	VGSW		V	5		F1										3	
05/16/06	OF	2	CH			TDM	0634	0639	BEWR		A	1		2							1			3	
05/16/06	OF	2	CH			TDM	0634	0639	CANW		A	1		2							1			3	
05/16/06	OF	2	CH			TDM	0634	0639	CORA		A	1		F1										3	
05/16/06	OF	2	CH			TDM	0634	0639	ANHU		V	1		1										3	
05/16/06	OF	2	CH			TDM	0634	0639	WTSW		V	1		F2										3	
05/16/06	OF	2	CH			TDM	0634	0639	VGSW		V	4		F1										5	
05/16/06	OF	3	CH			TDM	0645	0650	ATFL		V	1		2										3	
05/16/06	OF	3	CH			TDM	0645	0650	SPTO		A	1		1							1			3	
05/16/06	OF	3	CH			TDM	0645	0650	BEWR		A	2		1							1			3	
05/16/06	OF	3	CH			TDM	0645	0650	BUSH		A	2		1								1		3	
05/16/06	OF	3	CH			TDM	0645	0650	GRVI		A	1		2							1			3	
05/16/06	OF	3	CH			TDM	0645	0650	SPTO		A	1		2							1			3	
05/16/06	OF	3	CH			TDM	0645	0650	BGGN		A	1		1								1		5	
05/16/06	OF	3	CH			TDM	0645	0650	WWDO		V	1		2										5	
05/16/06	OF	4	CH			TDM	0653	0658	BEWR		A	1		3							1			3	LOTS OF CARS
05/16/06	OF	4	CH			TDM	0653	0658	ATFL		V	2		2									1	3	LOTS OF CARS
05/16/06	OF	4	CH			TDM	0653	0658	BHCO		V	1		1										3	LOTS OF CARS
05/16/06	OF	4	CH			TDM	0653	0658	MODO		V	7		F1										3	LOTS OF CARS
05/16/06	OF	4	CH			TDM	0653	0658	SPTO		A	1		3							1			3	LOTS OF CARS
05/16/06	OF	4	CH			TDM	0653	0658	LEGO		V	1		2								1		3	LOTS OF CARS
05/16/06	OF	4	CH			TDM	0653	0658	TUVU		V	1		F1										5	LOTS OF CARS
05/16/06	OF	4	CH			TDM	0653	0658	BCSP		A	1		2							1			5	LOTS OF CARS
05/16/06	OF	5	OJ	CH		TDM	0701	0706	BEWR		V	3		1										3	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	MODO		A	1		2							1			3	

Queen Creek and Oak Flat Survey May 2006

	POINT INFORMATION								NUMBER				BEHAVIOR					
Date	Route Code	Point Number	Primary Habitat	Secondary Habitat	Other Habitat	Observers	Start	End	Species	Subspp	A/V	Count	Estimate?	Distance Zone	Incidental?	Male	Female	Juvenile	Subadult	on snag	singing	calling	territorial	Time Block	Comments
05/16/06	OF	5	OJ	CH		TDM	0701	0706	SPTO		A	1		2							1			3	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	BHCO		V	1		1								1		3	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	TUVU		V	4		1										3	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	GAQU		A	3		1								1		3	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	YRWA	AUWA	V	3		1								1		3	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	WWDO		A	1		2						1				3	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	ATFL		A	1		1								1		3	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	HETA		V	1		2										3	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	BUSH		A	2		1								1		5	
05/16/06	OF	5	OJ	CH		TDM	0701	0706	VIWA		A	1		1						1				5	

Devils' Canyon Survey Bird List
June 22-23, 2007 Surveyors: C. Wise, A. Biegel

Route: We accessed Devil's Canyon from Rio Rico Canyon (near Oak Flat Campground), and walked south in the canyon to the Asarco mine at Ray. We found the route to be about as difficult as expected: brushy, boulder-filled and hot. Significant waterfall pour-offs occur mid canyon; we navigated around these to the west. Bear sign is plentiful throughout the canyon and we observed one small bear near mid-canyon. We also observed mountain lion tracks near the lake at Indian Gardens.

We called Yellow-billed Cuckoos at two locations that provided what appeared to be adequate cuckoo habitat. We had no response.

Many thanks to the Resolution Copper staff, for the use of the satellite phone, and to Asarco Ray personnel for providing transportation from Indian Gardens (and ice cold water!).

Birds (51 species)
Grey Vireo
Phainopepla
House Finch
Turkey Vulture
Ladder-backed Woodpecker
Black Phoebe
Say's Phoebe
Gila Woodpecker
Bell's Vireo
Canyon Wren
Ash-throated Flycatcher
Violet-green Swallow
Black-chinned Hummingbird
Common Raven
Black-chinned Sparrow
Abert's Towhee
Crissal Thrasher
Lucy's Warbler
Virginia's Warbler
Black-throated Gray Warbler
Common Black Hawk (4 pair)
Scott's Oriole
Lesser Goldfinch
Costa's Hummingbird
Brown-crested Flycatcher
Gambel's Quail
Black-headed Grosbeak
Summer Tanager
Bewick's Wren
Yellow Warbler
White-winged Dove
Bridled Titmouse
Dusky-capped Flycatcher
Mourning Dove
Cassin's Kingbird
Blue-gray Gnatcatcher
Great Blue Heron
White-throated Swift
Elf Owl
Yellow-breasted Chat
Northern Cardinal
Hutton's Vireo
Rufous-crowned Sparrow
Bullock's Oriole
Hooded Oriole
Zone-tailed Hawk
Gilded Flicker
Cactus Wren
Song Sparrow
Mallard
Verdin

Oak Flat Data collected in 2006 and 2007 by Audubon Arizona

Methodology: five point count stations surveyed for 5 minutes each.

OAK FLAT	08/01/06	05/08/2007
Cassins Kingbird	2	1
Least Goldfinch	2	
Common Raven	2	1
Turkey Vulture	1	3
Mourning Dove	2	7
White wing Dove	2	1
Black Phoebe	1	
Phainopepla	10	1
House Finch	5	
Verdin	2	
Bewick's Wren	9	9
Spotted Towhee	7	12
Canyon Wren	4	1
Bushtit	2	
Rock Wren	3	
Bluegray Gnatcatcher	1	1
Annas Hummer	1	
Bullocks Oriole	1	
Blkchinned Sparrow		7
Ashthroat Flycatcher		10
Virginia's Warbler		10
Scott's Oriole		2
Bell's Vireo		1
Yellow Warbler		1
Grey Vireo		1
Hepatic Tanager		1
Blkthrt Gry Warbler		3
Grey Flycatcher		2
N. Mockingbird		1
Lark Sparrow		8
Gambel's Quail		2
Canyon Towhee		1
Vermillion Flycatcher		1
Bridled Titmouse		3

AREA SEARCH SURVEY **Survey Location_____ Devil's Canyon** **Date 5/6 & 6/3/2011**

Plot name/no.:_16 Hectare AGFD Riparian Plot ***Primary habitat:**_____ Riparian ***Secondary habitat:**_ Chaparral

*Primary Obs.(s) (Include Recorder if obs. also. Use 3 initials):*_____ **Cathy Wise and Steve Prager**

SPECIES CODE OR COMMON NAME	TOTAL COUNT (all birds)	Est.? ✓	Supp.? ✓ (FO 's)	male (# of)	female (# of)	Nest Seen? ✓	Territorial Pair? ✓	
Costa's Hummingbird	2			1	1			
Canyon Wren	13			10		X	X	
Lesser Goldfinch	6							
Ruby-crowned Kinglet	1							
Bell's Vireo	15					X	X	
Cactus Wren	4							
Common Black Hawk	1							
Rock Wren	1							
Ash-throated Flycatcher	3							
Gila Woodpecker	3							
Summer Tanager	12			6	3		X	
Bewick's Wren	8			4		X	X	
Yellow Warbler	21			15		X	X	
White-wing dove	9							
Rufous-crowned Sparrow	2							
Brown-crested Flycatcher	8					X	X	
House Finch	6			3	1			
Lucy's Warbler	4					X		
Verdin	2							
Northern Cardinal	12			6	2	X		
Hooded Oriole	8			5	1			
Red-tailed Hawk	1							
Phainopepla	1				1			

AREA SEARCH SURVEY **Survey Location_____ Devil's Canyon** **Date 5/6 & 6/3/2011**

Plot name/no.:_16 Hectare AGFD Riparian Plot ***Primary habitat:**_____ Riparian ***Secondary habitat:**_ Chaparral

*Primary Obs.(s) (Include Recorder if obs. also. Use 3 initials):*_____ **Cathy Wise and Steve Prager**

SPECIES CODE OR COMMON NAME	TOTAL COUNT (all birds)	Est.? ✓	Supp.? ✓ (FO 's)	male (# of)	female (# of)	Nest Seen? ✓	Territorial Pair? ✓	Comments
Ladder-back Woodpecker	5							
Blue-gray Gnatcatcher	4			1	1		X	
Black Phoebe	2							
Zone-tailed Hawk	1							
Black-headed Grosbeak	3			1	2			
Cassin's Kingbird				1	1		X	
Western Wood Pewee	2							
Hutton's Vireo	1							
Common Raven	1							
Turkey Vulture	1							
Elf Owl	1							
Indigo Bunting	1			1				
Western Scrub Jay	1							
Broad-billed Hummingbird	1			1				

APPENDIX 8

AUDUBON 2011
CBC DATA
AREA 4

Superior CBC
December 26, 2009

SPECIES	2004	2005	2006	2007	2008	2009	2010	Totals
Snow Goose								0
Mallard		1			11			12
Green-winged Teal								0
American Wigeon								0
Ring-necked Duck								0
Lesser Scaup					12			12
Bufflehead								0
Hooded Merganser								0
Ruddy Duck								0
Wild Turkey								0
Gambel's Quail	54	70	24	29	4	12	31	224
Pied-billed Grebe								0
Green Heron								0
Great Blue Heron								0
Turkey Vulture								0
Black Vulture								0
Northern Harrier								0
Golden Eagle						1		1
Sharp-shinned Hawk			2					2
Cooper's Hawk	3	1	3				4	11
Harris's Hawk								0
Zone-tailed Hawk								0
Red-tailed Hawk	3	2	2	9	2	3	6	27
Rough-legged Hawk								0
Ferruginous Hawk								0
American Kestrel				2	1	4	2	9
Merlin								0
Prairie Falcon								0
Peregrine Falcon								0
Sora								0
American Coot								0
Killdeer								0
Greater Yellowlegs								0
Spotted Sandpiper								0
Least Sandpiper								0
Wilson's Snipe		1	2		1		1	5
Rock Pigeon		42	6	100	26	9	60	243
Mourning Dove	8				2			10
Eurasian Collared-Dove					5	1	9	15
White-winged Dove								0
Common Ground Dove								0
Inca Dove					3			3
Greater Roadrunner				1				1
Barn Owl								0
Great Horned Owl								0
Western Screech-Owl								0
White-throated Swift								0
Broad-billed Hummingbird								0
Black-chinned Hummingbird								0
Costa's Hummingbird								0
Anna's Hummingbird	3	3	4		1	1	7	19
Belted Kingfisher								0
Lewis's Woodpecker	1		1					2
Gila Woodpecker	6	5	5	16	2	2	8	44
Northern Flicker (red-shafted)	14	6	8	22	6	3	7	66
Gilded Flicker		3	1	4		2	1	11
Williamson's Sapsucker								0

Superior CBC
December 26, 2009

SPECIES	2004	2005	2006	2007	2008	2009	2010	Totals
Yellow-bellied Sapucker				1				1
Red-naped Sapsucker	1	5	3	7	2	2	4	24
Ladder-backed Woodpecker	7	4	1	8	2	5	5	32
Hairy Woodpecker								0
Hammond's Flycatcher								0
Gray Flycatcher								0
Western-type Flycatcher sp.								0
Black Phoebe	4	1	2	2	2	1	8	20
Say's Phoebe	3	2	3		4	1	10	23
Vermilion Flycatcher								0
Ash-throated Flycatcher								0
Loggerhead Shrike		1					1	2
Bell's Vireo								0
Hutton's Vireo	2		1					3
Plumbeous Vireo								0
Cassin's Vireo								0
Steller's Jay								0
Western Scrub-Jay	11	8	12	46	7	11	12	107
Mexican Jay								0
Common Raven	5	4	21	11	8	5	13	67
No. Rough-winged Swallow								0
Bridled Titmouse	6	1	4	4	12	10		37
Juniper Titmouse		5	1	3	4	5	2	20
Mountain Chickadee								0
Verdin	13	16	4	58	18	14	18	141
Bushtit		23	6	215	125	35	40	444
Brown Creeper	1					1		2
White-breasted Nuthatch				5				5
Red-breasted Nuthatch								0
House Wren					1		1	2
Winter Wren								0
Bewick's Wren	1	9	1	3	4	4	12	34
Cactus Wren		13	4	6	5	11	12	51
Rock Wren	15	24	9	7	5	9	20	89
Canyon Wren	2	2	1	8	4	7	2	26
Marsh Wren								0
Golden-crowned Kinglet								0
Ruby-crowned Kinglet	14	16	9	40	20	9	28	136
Blue-gray Gnatcatcher		2		2	1		1	6
Black-tailed Gnatcatcher	1	3		14		1	3	22
Western Bluebird	15	38	13	12	8	12	2	100
Mountain Bluebird								0
Townsend's Solitaire						3		3
Wood Thrush								0
Hermit Thrush	2	2	2	1		1		8
Varied Thrush								0
American Robin				1	1			2
Rufous-backed Robin								0
Northern Mockingbird		2	9	15	13	5	11	55
Brown Thrasher				1				1
Bendire's Thrasher								0
Curve-billed Thrasher		8	6	24	3	7	10	58
Crissal Thrasher	12	15	11	12		11	14	75
European Starling								0
American Pipit								0
Cedar Waxwing								0
Phainopepla	1	10	10	25	8	20	19	93

Superior CBC
December 26, 2009

SPECIES	2004	2005	2006	2007	2008	2009	2010	Totals
Orange-crowned Warbler								0
Chestnut-sided Warbler								0
Yellow-rumped Warbler	1	1	7	8	10		2	29
Black-throated Gray Warbler								0
Common Yellowthroat								0
Painted Redstart								0
Summer Tanager								0
Western Tanager								0
Green-tailed Towhee		9	1	5			1	16
Canyon Towhee	5	17	6	80	17	33	23	181
Abert's Towhee	2	2	1	2		3	1	11
Spotted Towhee	49	28	83	42	13	13	36	264
Rufous-crowned Sparrow		2	1	3	3	1	6	16
Chipping Sparrow					1		18	19
Brewer's Sparrow		1						1
Lark Sparrow								0
Black-chinned Sparrow			10		6		4	20
Black-throated Sparrow		32	3	25	125	54	72	311
Fox Sparrow			4	3				7
Lincoln's Sparrow			2					2
Song Sparrow								0
Vesper Sparrow								0
White-throated Sparrow	1							1
White-crowned Sparrow	124	115	374	65	100	47	356	1,181
Golden-crowned Sparrow	1							1
Dark-eyed Junco	152	50	350	68	44	30	174	868
Northern Cardinal	1	9	15	4	6	7	22	64
Pyrrhuloxia			1		1			2
Western Meadowlark								0
Red-winged Blackbird								0
Great-tailed Grackle								0
Brewer's Blackbird								0
Brown-headed Cowbird								0
Cassin's Finch		1						1
House Finch	19	22	27	16	180	7	107	378
Red Crossbill								0
Pine Siskin								0
American Goldfinch				10				10
Lesser Goldfinch	2	1	35		6		4	48
Lawrence's Goldfinch								0
House Sparrow				50	125	39	353	567
								0
								0
								0
Duck sp.								0
Accipiter sp.						1		1
Buteo sp.								0
Falcon sp.								0
Salvin's Hummingbird								0
Hummingbird sp.								0
Flicker sp.							1	1
Woodpecker sp.								0
Flycatcher sp.								0
Jay sp.								0
Gnatcatcher sp.								0
								0
								0

Superior CBC
December 26, 2009

SPECIES	2004	2005	2006	2007	2008	2009	2010	Totals
								0
TOTAL BIRDS OBSERVED	565	638	1,111	1,095	970	463	1,564	6,406
TOTAL SPECIES OBSERVED	38	48	49	48	51	44	49	74

APPENDIX 9

eBird 2011
Oak Flat
Campground
Data

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Jan				Feb				Mar	
Sample Size:	6	3	2	4	2	5	0	0	0	2
Mallard	0.17	-	0.50	-	-	-	-	-	-	-
Redhead	-	-	-	-	-	0.40	-	-	-	-
Ring-necked Duck	-	-	-	-	-	0.20	-	-	-	-
Lesser Scaup	-	-	-	-	-	-	-	-	-	-
Gambel's Quail	0.33	0.33	0.50	0.25	0.50	0.20	-	-	-	-
Pied-billed Grebe	-	-	-	-	-	-	-	-	-	-
Turkey Vulture	-	-	-	-	-	-	-	-	-	0.50
Northern Harrier	0.17	-	-	-	-	-	-	-	-	-
Sharp-shinned Hawk	-	-	-	0.25	0.50	-	-	-	-	-
Cooper's Hawk	0.17	-	-	-	-	-	-	-	-	-
Northern Goshawk	-	-	-	-	-	-	-	-	-	-
Zone-tailed Hawk	-	-	-	-	-	-	-	-	-	-
Red-tailed Hawk	-	-	-	-	-	-	-	-	-	0.50
American Kestrel	-	-	-	-	-	-	-	-	-	-
Peregrine Falcon	-	-	-	-	-	-	-	-	-	-
Prairie Falcon	-	-	-	-	-	-	-	-	-	-
Killdeer	-	-	-	-	-	-	-	-	-	-
Spotted Sandpiper	-	-	-	-	-	-	-	-	-	-
Wilson's Snipe	0.17	-	-	-	-	-	-	-	-	-
Rock Pigeon	0.17	-	-	-	-	-	-	-	-	-
Eurasian Collared-Dove	-	-	-	-	-	-	-	-	-	-
White-winged Dove	-	-	-	-	-	-	-	-	-	-
Mourning Dove	0.33	-	-	-	-	0.20	-	-	-	-
Inca Dove	-	-	-	-	-	-	-	-	-	-
Greater Roadrunner	-	-	-	-	-	-	-	-	-	-
Western Screech-Owl	-	-	-	-	-	-	-	-	-	-
Lesser Nighthawk	-	-	-	-	-	-	-	-	-	-
Common Poorwill	-	-	-	-	-	-	-	-	-	-
Vaux's Swift	-	-	-	-	-	-	-	-	-	-
Black-chinned Hummingbird	-	-	-	-	-	-	-	-	-	-
Anna's Hummingbird	-	-	0.50	0.25	-	0.40	-	-	-	1.00
Costa's Hummingbird	-	-	-	-	-	-	-	-	-	-
Broad-tailed Hummingbird	-	-	-	-	-	-	-	-	-	-
Broad-billed Hummingbird	-	-	-	-	-	-	-	-	-	-
hummingbird sp.	-	-	-	-	-	-	-	-	-	-
Lewis's Woodpecker	0.33	-	-	-	-	-	-	-	-	-
Acorn Woodpecker	-	-	-	-	-	-	-	-	-	-
Gila Woodpecker	-	-	-	0.25	1.00	-	-	-	-	-
Williamson's Sapsucker	0.17	-	-	-	-	-	-	-	-	-
Red-naped Sapsucker	0.17	-	0.50	0.25	0.50	0.20	-	-	-	-
Red-breasted Sapsucker	0.17	-	0.50	-	-	-	-	-	-	-
Ladder-backed Woodpecker	0.17	0.33	-	-	-	0.20	-	-	-	-
Northern Flicker	0.50	-	1.00	0.25	1.00	0.40	-	-	-	0.50

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

			Apr				May			
Sample Size:	0	3	3	1	1	0	3	0	2	1
Mallard	-	-	0.33	-	-	-	-	-	-	-
Redhead	-	-	-	-	-	-	-	-	-	-
Ring-necked Duck	-	-	-	-	-	-	-	-	-	-
Lesser Scaup	-	-	-	-	-	-	-	-	-	-
Gambel's Quail	-	-	-	1.00	1.00	-	0.67	-	-	-
Pied-billed Grebe	-	-	-	-	-	-	-	-	-	-
Turkey Vulture	-	0.67	1.00	1.00	1.00	-	0.67	-	0.50	1.00
Northern Harrier	-	-	-	-	-	-	-	-	-	-
Sharp-shinned Hawk	-	0.33	-	-	-	-	-	-	-	-
Cooper's Hawk	-	-	-	-	-	-	0.33	-	-	-
Northern Goshawk	-	-	-	-	-	-	-	-	-	-
Zone-tailed Hawk	-	-	0.33	-	-	-	-	-	-	-
Red-tailed Hawk	-	0.33	0.33	-	-	-	-	-	-	-
American Kestrel	-	-	-	-	-	-	-	-	-	-
Peregrine Falcon	-	-	-	-	-	-	-	-	-	-
Prairie Falcon	-	-	-	-	-	-	-	-	-	-
Killdeer	-	-	-	1.00	-	-	-	-	-	-
Spotted Sandpiper	-	-	-	-	-	-	-	-	-	-
Wilson's Snipe	-	-	-	-	-	-	-	-	-	-
Rock Pigeon	-	-	-	-	-	-	-	-	-	-
Eurasian Collared-Dove	-	0.33	-	-	-	-	-	-	0.50	-
White-winged Dove	-	-	-	-	1.00	-	0.33	-	-	-
Mourning Dove	-	0.67	0.67	1.00	1.00	-	1.00	-	0.50	1.00
Inca Dove	-	-	-	-	-	-	-	-	-	-
Greater Roadrunner	-	-	-	-	-	-	0.33	-	-	-
Western Screech-Owl	-	-	-	-	-	-	-	-	-	-
Lesser Nighthawk	-	-	-	-	-	-	-	-	-	-
Common Poorwill	-	-	-	-	-	-	-	-	-	-
Vaux's Swift	-	-	-	-	-	-	-	-	-	-
Black-chinned Hummingbird	-	-	-	-	-	-	0.33	-	-	-
Anna's Hummingbird	-	0.67	0.33	-	1.00	-	0.33	-	-	-
Costa's Hummingbird	-	-	0.33	-	-	-	-	-	-	-
Broad-tailed Hummingbird	-	-	-	-	-	-	-	-	-	-
Broad-billed Hummingbird	-	-	-	-	-	-	-	-	-	-
hummingbird sp.	-	-	-	-	-	-	-	-	-	-
Lewis's Woodpecker	-	-	-	-	-	-	-	-	-	-
Acorn Woodpecker	-	-	-	-	-	-	-	-	-	-
Gila Woodpecker	-	-	-	-	-	-	-	-	-	-
Williamson's Sapsucker	-	-	-	-	-	-	-	-	-	-
Red-naped Sapsucker	-	-	-	-	-	-	-	-	-	-
Red-breasted Sapsucker	-	-	-	-	-	-	-	-	-	-
Ladder-backed Woodpecker	-	-	-	-	-	-	0.33	-	0.50	-
Northern Flicker	-	-	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Jun				Jul				Aug	
Sample Size:	0	4	1	0	0	0	1	3	0	0
Mallard	-	-	-	-	-	-	-	-	-	-
Redhead	-	-	-	-	-	-	-	-	-	-
Ring-necked Duck	-	-	-	-	-	-	-	-	-	-
Lesser Scaup	-	-	-	-	-	-	-	-	-	-
Gambel's Quail	-	0.50	-	-	-	-	-	-	-	-
Pied-billed Grebe	-	-	-	-	-	-	-	-	-	-
Turkey Vulture	-	1.00	1.00	-	-	-	-	0.67	-	-
Northern Harrier	-	-	-	-	-	-	-	-	-	-
Sharp-shinned Hawk	-	-	-	-	-	-	-	-	-	-
Cooper's Hawk	-	-	-	-	-	-	-	-	-	-
Northern Goshawk	-	-	-	-	-	-	-	-	-	-
Zone-tailed Hawk	-	-	-	-	-	-	-	-	-	-
Red-tailed Hawk	-	-	-	-	-	-	-	-	-	-
American Kestrel	-	-	-	-	-	-	-	-	-	-
Peregrine Falcon	-	-	-	-	-	-	-	-	-	-
Prairie Falcon	-	-	-	-	-	-	-	-	-	-
Killdeer	-	-	-	-	-	-	-	-	-	-
Spotted Sandpiper	-	-	-	-	-	-	-	-	-	-
Wilson's Snipe	-	-	-	-	-	-	-	-	-	-
Rock Pigeon	-	-	-	-	-	-	-	-	-	-
Eurasian Collared-Dove	-	-	-	-	-	-	-	-	-	-
White-winged Dove	-	-	-	-	-	-	-	-	-	-
Mourning Dove	-	0.75	-	-	-	-	1.00	0.33	-	-
Inca Dove	-	-	-	-	-	-	-	-	-	-
Greater Roadrunner	-	-	-	-	-	-	-	-	-	-
Western Screech-Owl	-	-	-	-	-	-	-	-	-	-
Lesser Nighthawk	-	-	-	-	-	-	-	-	-	-
Common Poorwill	-	-	-	-	-	-	-	-	-	-
Vaux's Swift	-	-	-	-	-	-	-	-	-	-
Black-chinned Hummingbird	-	0.25	-	-	-	-	-	-	-	-
Anna's Hummingbird	-	-	-	-	-	-	-	-	-	-
Costa's Hummingbird	-	-	-	-	-	-	-	-	-	-
Broad-tailed Hummingbird	-	-	-	-	-	-	-	-	-	-
Broad-billed Hummingbird	-	0.25	-	-	-	-	-	-	-	-
hummingbird sp.	-	0.50	-	-	-	-	-	-	-	-
Lewis's Woodpecker	-	-	-	-	-	-	-	-	-	-
Acorn Woodpecker	-	-	-	-	-	-	-	-	-	-
Gila Woodpecker	-	-	-	-	-	-	-	-	-	-
Williamson's Sapsucker	-	-	-	-	-	-	-	-	-	-
Red-naped Sapsucker	-	-	-	-	-	-	-	-	-	-
Red-breasted Sapsucker	-	-	-	-	-	-	-	-	-	-
Ladder-backed Woodpecker	-	-	-	-	-	-	-	-	-	-
Northern Flicker	-	-	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

			Sep				Oct			
Sample Size:	0	1	3	0	1	2	0	2	0	2
Mallard	-	-	-	-	-	-	-	0.50	-	-
Redhead	-	-	-	-	-	-	-	-	-	-
Ring-necked Duck	-	-	-	-	-	-	-	-	-	-
Lesser Scaup	-	-	-	-	-	-	-	-	-	-
Gambel's Quail	-	1.00	-	-	-	0.50	-	-	-	0.50
Pied-billed Grebe	-	-	-	-	-	-	-	0.50	-	-
Turkey Vulture	-	1.00	0.33	-	1.00	-	-	0.50	-	-
Northern Harrier	-	-	-	-	-	-	-	-	-	-
Sharp-shinned Hawk	-	-	-	-	-	-	-	-	-	-
Cooper's Hawk	-	-	-	-	-	-	-	-	-	0.50
Northern Goshawk	-	-	-	-	-	-	-	-	-	-
Zone-tailed Hawk	-	-	0.33	-	-	-	-	-	-	-
Red-tailed Hawk	-	-	-	-	-	-	-	-	-	-
American Kestrel	-	-	-	-	-	0.50	-	-	-	-
Peregrine Falcon	-	-	0.33	-	-	-	-	-	-	-
Prairie Falcon	-	-	-	-	-	-	-	-	-	-
Killdeer	-	-	-	-	-	-	-	-	-	-
Spotted Sandpiper	-	-	-	-	-	-	-	-	-	-
Wilson's Snipe	-	-	-	-	-	-	-	-	-	-
Rock Pigeon	-	-	-	-	-	-	-	-	-	0.50
Eurasian Collared-Dove	-	-	0.33	-	-	-	-	-	-	-
White-winged Dove	-	-	-	-	-	-	-	-	-	-
Mourning Dove	-	1.00	0.33	-	1.00	0.50	-	0.50	-	-
Inca Dove	-	-	-	-	-	-	-	-	-	-
Greater Roadrunner	-	-	-	-	-	-	-	-	-	-
Western Screech-Owl	-	-	-	-	-	-	-	-	-	-
Lesser Nighthawk	-	-	-	-	-	-	-	-	-	-
Common Poorwill	-	-	-	-	-	-	-	-	-	-
Vaux's Swift	-	-	-	-	-	0.50	-	-	-	-
Black-chinned Hummingbird	-	-	-	-	-	-	-	-	-	-
Anna's Hummingbird	-	-	-	-	-	-	-	-	-	-
Costa's Hummingbird	-	-	-	-	-	-	-	-	-	-
Broad-tailed Hummingbird	-	-	-	-	1.00	-	-	-	-	-
Broad-billed Hummingbird	-	-	-	-	-	-	-	-	-	-
hummingbird sp.	-	-	-	-	-	-	-	-	-	-
Lewis's Woodpecker	-	-	-	-	-	-	-	-	-	-
Acorn Woodpecker	-	-	-	-	-	-	-	-	-	-
Gila Woodpecker	-	1.00	-	-	-	-	-	1.00	-	0.50
Williamson's Sapsucker	-	-	-	-	-	-	-	-	-	-
Red-naped Sapsucker	-	-	-	-	-	1.00	-	-	-	1.00
Red-breasted Sapsucker	-	-	-	-	-	-	-	-	-	-
Ladder-backed Woodpecker	-	1.00	-	-	-	0.50	-	-	-	-
Northern Flicker	-	-	-	-	1.00	-	-	0.50	-	1.00

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Nov				Dec			
Sample Size:	1	2	0	1	3	0	0	3
Mallard	-	-	-	-	-	-	-	0.33
Redhead	-	-	-	-	-	-	-	-
Ring-necked Duck	-	-	-	-	-	-	-	-
Lesser Scaup	-	-	-	-	-	-	-	0.33
Gambel's Quail	1.00	0.50	-	-	-	-	-	0.67
Pied-billed Grebe	-	0.50	-	-	-	-	-	-
Turkey Vulture	-	-	-	-	-	-	-	-
Northern Harrier	-	-	-	-	-	-	-	-
Sharp-shinned Hawk	-	-	-	-	-	-	-	-
Cooper's Hawk	-	-	-	-	-	-	-	-
Northern Goshawk	-	-	-	-	-	-	-	-
Zone-tailed Hawk	-	-	-	-	-	-	-	-
Red-tailed Hawk	1.00	-	-	-	-	-	-	0.33
American Kestrel	-	-	-	-	-	-	-	0.33
Peregrine Falcon	-	-	-	-	-	-	-	-
Prairie Falcon	-	-	-	-	-	-	-	-
Killdeer	-	-	-	-	-	-	-	-
Spotted Sandpiper	-	-	-	-	-	-	-	-
Wilson's Snipe	-	-	-	-	-	-	-	0.33
Rock Pigeon	-	-	-	-	-	-	-	0.33
Eurasian Collared-Dove	-	-	-	-	-	-	-	0.33
White-winged Dove	-	-	-	-	-	-	-	-
Mourning Dove	1.00	0.50	-	-	0.33	-	-	0.33
Inca Dove	-	-	-	-	-	-	-	0.33
Greater Roadrunner	-	-	-	-	-	-	-	-
Western Screech-Owl	-	-	-	-	-	-	-	-
Lesser Nighthawk	-	-	-	-	-	-	-	-
Common Poorwill	-	-	-	-	-	-	-	-
Vaux's Swift	-	-	-	-	-	-	-	-
Black-chinned Hummingbird	-	-	-	-	-	-	-	-
Anna's Hummingbird	-	-	-	-	-	-	-	0.67
Costa's Hummingbird	-	-	-	-	-	-	-	-
Broad-tailed Hummingbird	-	-	-	-	-	-	-	-
Broad-billed Hummingbird	-	-	-	-	-	-	-	-
hummingbird sp.	-	-	-	-	-	-	-	-
Lewis's Woodpecker	-	0.50	-	1.00	-	-	-	0.33
Acorn Woodpecker	-	-	-	-	-	-	-	-
Gila Woodpecker	-	-	-	1.00	0.33	-	-	1.00
Williamson's Sapsucker	-	-	-	-	-	-	-	-
Red-naped Sapsucker	-	0.50	-	-	-	-	-	0.67
Red-breasted Sapsucker	-	-	-	-	-	-	-	-
Ladder-backed Woodpecker	-	-	-	-	-	-	-	0.33
Northern Flicker	-	1.00	-	1.00	0.33	-	-	1.00

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Jan				Feb				Mar	
Sample Size:	6	3	2	4	2	5	0	0	0	2
Gilded Flicker	-	-	-	-	-	-	-	-	-	-
Western Wood-Pewee	-	-	-	-	-	-	-	-	-	-
Willow Flycatcher	-	-	-	-	-	-	-	-	-	-
Hammond's Flycatcher	-	-	-	-	-	-	-	-	-	-
Gray Flycatcher	-	-	-	-	-	-	-	-	-	-
Dusky Flycatcher	-	-	-	-	-	-	-	-	-	-
Pacific-slope Flycatcher	-	-	-	-	-	-	-	-	-	-
Cordilleran Flycatcher	-	-	-	-	-	-	-	-	-	-
Pacific-slope/Cordilleran Flycatcher (Western)	-	-	-	-	-	-	-	-	-	-
Empidonax sp.	-	-	-	-	-	-	-	-	-	-
Black Phoebe	0.33	-	0.50	-	-	0.60	-	-	-	0.50
Say's Phoebe	0.33	0.67	0.50	-	0.50	0.60	-	-	-	-
Vermilion Flycatcher	-	-	-	-	-	-	-	-	-	-
Ash-throated Flycatcher	-	-	-	-	-	-	-	-	-	-
Brown-crested Flycatcher	-	-	-	-	-	-	-	-	-	-
Cassin's Kingbird	-	-	-	-	-	-	-	-	-	-
Western Kingbird	-	-	-	-	-	-	-	-	-	-
Loggerhead Shrike	-	-	-	-	-	-	-	-	-	-
Bell's Vireo	-	-	-	-	-	-	-	-	-	-
Gray Vireo	-	-	-	-	-	-	-	-	-	-
Plumbeous Vireo	-	-	-	-	-	-	-	-	-	-
Cassin's Vireo	-	-	-	-	-	-	-	-	-	-
Hutton's Vireo	-	-	-	-	-	-	-	-	-	-
Warbling Vireo	-	-	-	-	-	-	-	-	-	-
Steller's Jay	-	-	-	-	-	-	-	-	-	-
Western Scrub-Jay	0.67	0.33	0.50	1.00	1.00	0.60	-	-	-	0.50
Mexican Jay	0.17	-	-	-	-	0.20	-	-	-	-
Common Raven	0.67	-	0.50	0.50	1.00	0.40	-	-	-	1.00
Northern Rough-winged Swallow	-	-	-	-	-	-	-	-	-	-
Violet-green Swallow	-	-	-	-	-	-	-	-	-	-
Bridled Titmouse	-	-	-	-	0.50	-	-	-	-	-
Juniper Titmouse	0.33	0.33	0.50	0.25	-	0.40	-	-	-	0.50
Verdin	0.33	-	-	-	-	0.40	-	-	-	-
Bushtit	0.17	-	-	-	-	0.40	-	-	-	0.50
White-breasted Nuthatch	-	-	-	-	-	-	-	-	-	-
Brown Creeper	-	-	-	-	-	-	-	-	-	-
Cactus Wren	-	-	-	-	-	-	-	-	-	-
Rock Wren	0.33	-	-	0.25	0.50	0.40	-	-	-	-
Canyon Wren	-	-	-	-	-	0.20	-	-	-	-
Bewick's Wren	0.33	-	-	0.25	1.00	1.00	-	-	-	1.00
House Wren	-	-	-	-	-	-	-	-	-	-
Blue-gray Gnatcatcher	-	-	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

			Apr				May			
Sample Size:	0	3	3	1	1	0	3	0	2	1
Gilded Flicker	-	-	-	-	-	-	-	-	-	-
Western Wood-Pewee	-	-	-	-	-	-	-	-	-	-
Willow Flycatcher	-	-	-	-	-	-	-	-	-	-
Hammond's Flycatcher	-	-	-	-	-	-	-	-	-	-
Gray Flycatcher	-	-	0.33	-	-	-	-	-	-	-
Dusky Flycatcher	-	-	-	-	-	-	-	-	-	-
Pacific-slope Flycatcher	-	-	-	-	-	-	-	-	-	-
Cordilleran Flycatcher	-	-	-	-	-	-	-	-	-	-
Pacific-slope/Cordilleran Flycatcher (Western)	-	-	-	-	-	-	-	-	-	-
Empidonax sp.	-	-	-	-	-	-	0.33	-	-	-
Black Phoebe	-	-	0.33	1.00	-	-	0.33	-	0.50	1.00
Say's Phoebe	-	-	-	-	-	-	-	-	-	-
Vermilion Flycatcher	-	-	1.00	1.00	-	-	0.67	-	0.50	1.00
Ash-throated Flycatcher	-	0.33	0.33	-	1.00	-	0.33	-	0.50	-
Brown-crested Flycatcher	-	-	-	-	-	-	-	-	0.50	-
Cassin's Kingbird	-	-	-	-	1.00	-	0.67	-	-	-
Western Kingbird	-	-	-	-	1.00	-	0.33	-	-	-
Loggerhead Shrike	-	-	-	-	-	-	0.33	-	-	-
Bell's Vireo	-	-	0.33	1.00	1.00	-	0.67	-	0.50	1.00
Gray Vireo	-	0.33	0.33	-	-	-	0.33	-	0.50	-
Plumbeous Vireo	-	-	-	-	-	-	-	-	-	-
Cassin's Vireo	-	-	-	-	-	-	-	-	-	-
Hutton's Vireo	-	-	-	-	-	-	-	-	-	-
Warbling Vireo	-	-	-	-	-	-	0.67	-	-	1.00
Steller's Jay	-	-	-	-	-	-	-	-	-	-
Western Scrub-Jay	-	1.00	-	-	-	-	-	-	-	-
Mexican Jay	-	-	-	-	-	-	-	-	-	-
Common Raven	-	1.00	0.33	1.00	1.00	-	1.00	-	0.50	1.00
Northern Rough-winged Swallow	-	-	-	-	-	-	0.33	-	-	-
Violet-green Swallow	-	-	-	-	-	-	-	-	-	-
Bridled Titmouse	-	-	-	-	-	-	-	-	-	-
Juniper Titmouse	-	0.33	-	1.00	1.00	-	-	-	1.00	1.00
Verdin	-	0.33	-	-	-	-	0.33	-	0.50	-
Bushtit	-	0.33	0.67	-	-	-	0.33	-	0.50	1.00
White-breasted Nuthatch	-	0.33	-	-	-	-	-	-	-	-
Brown Creeper	-	-	-	-	-	-	-	-	-	-
Cactus Wren	-	-	-	-	-	-	-	-	-	-
Rock Wren	-	-	-	-	-	-	-	-	-	-
Canyon Wren	-	-	-	-	-	-	-	-	-	-
Bewick's Wren	-	0.67	1.00	1.00	1.00	-	0.67	-	1.00	1.00
House Wren	-	-	-	-	-	-	-	-	-	-
Blue-gray Gnatcatcher	-	-	0.33	-	-	-	-	-	0.50	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Jun				Jul				Aug	
Sample Size:	0	4	1	0	0	0	1	3	0	0
Gilded Flicker	-	-	-	-	-	-	-	-	-	-
Western Wood-Pewee	-	-	-	-	-	-	-	-	-	-
Willow Flycatcher	-	-	-	-	-	-	-	-	-	-
Hammond's Flycatcher	-	-	-	-	-	-	-	-	-	-
Gray Flycatcher	-	-	-	-	-	-	-	-	-	-
Dusky Flycatcher	-	-	-	-	-	-	-	-	-	-
Pacific-slope Flycatcher	-	-	-	-	-	-	-	-	-	-
Cordilleran Flycatcher	-	-	-	-	-	-	-	-	-	-
Pacific-slope/Cordilleran Flycatcher (Western)	-	-	-	-	-	-	-	-	-	-
Empidonax sp.	-	0.25	-	-	-	-	-	-	-	-
Black Phoebe	-	-	-	-	-	-	-	-	-	-
Say's Phoebe	-	-	-	-	-	-	-	-	-	-
Vermilion Flycatcher	-	0.75	1.00	-	-	-	-	-	-	-
Ash-throated Flycatcher	-	0.75	-	-	-	-	-	0.33	-	-
Brown-crested Flycatcher	-	-	-	-	-	-	-	-	-	-
Cassin's Kingbird	-	0.50	-	-	-	-	-	-	-	-
Western Kingbird	-	-	-	-	-	-	1.00	-	-	-
Loggerhead Shrike	-	-	-	-	-	-	-	-	-	-
Bell's Vireo	-	0.50	-	-	-	-	-	0.33	-	-
Gray Vireo	-	0.50	1.00	-	-	-	-	-	-	-
Plumbeous Vireo	-	-	-	-	-	-	-	-	-	-
Cassin's Vireo	-	-	-	-	-	-	-	-	-	-
Hutton's Vireo	-	-	-	-	-	-	-	0.33	-	-
Warbling Vireo	-	-	-	-	-	-	-	-	-	-
Steller's Jay	-	-	-	-	-	-	-	-	-	-
Western Scrub-Jay	-	0.50	-	-	-	-	1.00	-	-	-
Mexican Jay	-	-	-	-	-	-	-	-	-	-
Common Raven	-	0.25	-	-	-	-	-	-	-	-
Northern Rough-winged Swallow	-	-	-	-	-	-	-	-	-	-
Violet-green Swallow	-	-	-	-	-	-	-	-	-	-
Bridled Titmouse	-	-	-	-	-	-	-	-	-	-
Juniper Titmouse	-	1.00	-	-	-	-	-	-	-	-
Verdin	-	0.50	1.00	-	-	-	-	-	-	-
Bushtit	-	0.50	1.00	-	-	-	-	-	-	-
White-breasted Nuthatch	-	-	-	-	-	-	-	-	-	-
Brown Creeper	-	-	-	-	-	-	-	-	-	-
Cactus Wren	-	-	-	-	-	-	-	-	-	-
Rock Wren	-	-	-	-	-	-	-	-	-	-
Canyon Wren	-	-	-	-	-	-	-	0.33	-	-
Bewick's Wren	-	1.00	1.00	-	-	-	-	0.33	-	-
House Wren	-	-	-	-	-	-	-	-	-	-
Blue-gray Gnatcatcher	-	0.25	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

			Sep				Oct			
Sample Size:	0	1	3	0	1	2	0	2	0	2
Gilded Flicker	-	-	-	-	-	-	-	-	-	-
Western Wood-Pewee	-	-	-	-	-	-	-	-	-	-
Willow Flycatcher	-	-	-	-	-	0.50	-	-	-	-
Hammond's Flycatcher	-	-	-	-	-	-	-	0.50	-	-
Gray Flycatcher	-	-	-	-	-	0.50	-	-	-	-
Dusky Flycatcher	-	-	0.33	-	-	-	-	-	-	-
Pacific-slope Flycatcher	-	-	-	-	-	-	-	-	-	-
Cordilleran Flycatcher	-	-	-	-	-	-	-	-	-	-
Pacific-slope/Cordilleran Flycatcher (Western)	-	-	-	-	1.00	-	-	-	-	-
Empidonax sp.	-	-	-	-	1.00	-	-	-	-	-
Black Phoebe	-	1.00	-	-	-	-	-	-	-	-
Say's Phoebe	-	-	-	-	-	-	-	0.50	-	-
Vermilion Flycatcher	-	1.00	0.33	-	-	-	-	-	-	-
Ash-throated Flycatcher	-	-	-	-	-	-	-	-	-	-
Brown-crested Flycatcher	-	-	-	-	-	-	-	-	-	-
Cassin's Kingbird	-	-	-	-	-	-	-	-	-	-
Western Kingbird	-	-	-	-	-	-	-	-	-	-
Loggerhead Shrike	-	-	-	-	-	-	-	-	-	-
Bell's Vireo	-	1.00	-	-	-	-	-	-	-	-
Gray Vireo	-	1.00	0.33	-	-	-	-	-	-	-
Plumbeous Vireo	-	-	-	-	-	-	-	-	-	-
Cassin's Vireo	-	-	-	-	-	-	-	-	-	-
Hutton's Vireo	-	-	-	-	-	-	-	-	-	-
Warbling Vireo	-	1.00	-	-	1.00	-	-	-	-	-
Steller's Jay	-	-	-	-	-	-	-	-	-	-
Western Scrub-Jay	-	1.00	0.67	-	1.00	0.50	-	-	-	1.00
Mexican Jay	-	-	-	-	-	-	-	-	-	-
Common Raven	-	1.00	-	-	-	0.50	-	0.50	-	0.50
Northern Rough-winged Swallow	-	-	-	-	-	-	-	-	-	-
Violet-green Swallow	-	1.00	-	-	-	-	-	-	-	-
Bridled Titmouse	-	-	-	-	-	-	-	-	-	-
Juniper Titmouse	-	-	0.33	-	-	-	-	-	-	-
Verdin	-	1.00	0.33	-	-	0.50	-	0.50	-	-
Bushtit	-	-	-	-	-	0.50	-	-	-	-
White-breasted Nuthatch	-	-	-	-	-	-	-	-	-	-
Brown Creeper	-	-	-	-	-	-	-	-	-	-
Cactus Wren	-	-	-	-	-	-	-	-	-	0.50
Rock Wren	-	-	-	-	-	-	-	-	-	0.50
Canyon Wren	-	-	-	-	-	-	-	-	-	0.50
Bewick's Wren	-	1.00	0.33	-	-	0.50	-	0.50	-	0.50
House Wren	-	-	-	-	-	-	-	-	-	0.50
Blue-gray Gnatcatcher	-	1.00	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Nov				Dec			
Sample Size:	1	2	0	1	3	0	0	3
Gilded Flicker	-	-	-	-	-	-	-	-
Western Wood-Pewee	-	-	-	-	-	-	-	-
Willow Flycatcher	-	-	-	-	-	-	-	-
Hammond's Flycatcher	-	-	-	-	-	-	-	-
Gray Flycatcher	-	-	-	-	-	-	-	-
Dusky Flycatcher	-	-	-	-	-	-	-	-
Pacific-slope Flycatcher	-	-	-	-	-	-	-	-
Cordilleran Flycatcher	-	-	-	-	-	-	-	-
Pacific-slope/Cordilleran Flycatcher (Western)	-	-	-	-	-	-	-	-
Empidonax sp.	-	-	-	-	-	-	-	-
Black Phoebe	-	0.50	-	-	-	-	-	0.67
Say's Phoebe	-	0.50	-	-	0.33	-	-	0.67
Vermilion Flycatcher	-	-	-	-	-	-	-	-
Ash-throated Flycatcher	-	-	-	-	-	-	-	-
Brown-crested Flycatcher	-	-	-	-	-	-	-	-
Cassin's Kingbird	-	-	-	-	-	-	-	-
Western Kingbird	-	-	-	-	-	-	-	-
Loggerhead Shrike	-	-	-	-	-	-	-	-
Bell's Vireo	-	-	-	-	-	-	-	-
Gray Vireo	-	-	-	-	-	-	-	-
Plumbeous Vireo	-	-	-	-	-	-	-	-
Cassin's Vireo	-	-	-	-	-	-	-	-
Hutton's Vireo	-	-	-	-	-	-	-	-
Warbling Vireo	-	-	-	-	-	-	-	-
Steller's Jay	-	-	-	-	-	-	-	-
Western Scrub-Jay	1.00	0.50	-	1.00	0.67	-	-	1.00
Mexican Jay	-	-	-	-	-	-	-	-
Common Raven	-	1.00	-	-	-	-	-	1.00
Northern Rough-winged Swallow	-	-	-	-	-	-	-	-
Violet-green Swallow	-	-	-	-	-	-	-	-
Bridled Titmouse	1.00	-	-	-	0.33	-	-	0.33
Juniper Titmouse	-	-	-	1.00	-	-	-	0.67
Verdin	-	-	-	1.00	-	-	-	1.00
Bushtit	1.00	-	-	-	-	-	-	0.33
White-breasted Nuthatch	-	-	-	-	-	-	-	-
Brown Creeper	-	-	-	-	-	-	-	-
Cactus Wren	-	-	-	-	-	-	-	0.33
Rock Wren	-	0.50	-	-	0.33	-	-	0.67
Canyon Wren	-	-	-	-	-	-	-	0.33
Bewick's Wren	-	0.50	-	1.00	-	-	-	0.33
House Wren	-	-	-	-	-	-	-	0.33
Blue-gray Gnatcatcher	-	-	-	-	-	-	-	0.33

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Jan				Feb				Mar	
Sample Size:	6	3	2	4	2	5	0	0	0	2
Black-tailed Gnatcatcher	-	-	-	-	-	-	-	-	-	-
Ruby-crowned Kinglet	0.83	0.67	0.50	0.25	0.50	0.60	-	-	-	0.50
Western Bluebird	-	-	-	-	-	0.40	-	-	-	0.50
Hermit Thrush	0.17	-	0.50	-	-	-	-	-	-	-
American Robin	-	-	0.50	0.25	-	0.20	-	-	-	-
Northern Mockingbird	0.17	-	-	-	-	0.20	-	-	-	-
Curve-billed Thrasher	-	-	-	-	-	-	-	-	-	-
Crissal Thrasher	0.17	-	0.50	0.25	0.50	-	-	-	-	-
European Starling	-	-	-	-	-	-	-	-	-	-
Cedar Waxwing	-	-	-	-	-	-	-	-	-	-
Phainopepla	-	-	-	-	-	0.20	-	-	-	-
Orange-crowned Warbler	-	-	-	-	-	-	-	-	-	-
Lucy's Warbler	-	-	-	-	-	-	-	-	-	-
Virginia's Warbler	-	-	-	-	-	-	-	-	-	-
MacGillivray's Warbler	-	-	-	-	-	-	-	-	-	-
Yellow Warbler	-	-	-	-	-	-	-	-	-	-
Yellow-rumped Warbler	0.17	0.33	-	0.25	-	0.60	-	-	-	-
Black-throated Gray Warbler	-	-	-	-	-	-	-	-	-	-
Townsend's Warbler	-	-	-	-	-	-	-	-	-	-
Wilson's Warbler	-	-	-	-	-	-	-	-	-	-
Painted Redstart	-	-	-	-	-	-	-	-	-	-
Yellow-breasted Chat	-	-	-	-	-	-	-	-	-	-
warbler sp.	-	-	-	-	-	-	-	-	-	-
Green-tailed Towhee	0.33	-	-	0.25	-	0.40	-	-	-	-
Spotted Towhee	0.83	1.00	1.00	0.50	1.00	0.40	-	-	-	0.50
Rufous-crowned Sparrow	-	-	-	-	-	-	-	-	-	-
Canyon Towhee	0.67	0.33	0.50	0.50	0.50	0.20	-	-	-	0.50
Abert's Towhee	0.50	-	-	-	-	-	-	-	-	-
Chipping Sparrow	0.17	-	-	0.25	-	0.20	-	-	-	-
Brewer's Sparrow	-	-	-	-	-	-	-	-	-	-
Black-chinned Sparrow	-	-	-	-	-	-	-	-	-	-
Vesper Sparrow	-	-	-	-	-	-	-	-	-	-
Lark Sparrow	-	-	-	-	-	-	-	-	-	-
Black-throated Sparrow	-	-	-	-	-	-	-	-	-	-
Savannah Sparrow	-	-	-	-	-	-	-	-	-	-
Fox Sparrow	0.50	-	-	0.25	-	-	-	-	-	-
Song Sparrow	0.17	-	0.50	0.25	-	-	-	-	-	-
Lincoln's Sparrow	-	-	-	0.25	-	-	-	-	-	-
White-throated Sparrow	-	-	-	-	-	-	-	-	-	-
White-crowned Sparrow	0.67	0.33	0.50	0.25	1.00	0.60	-	-	-	-
Dark-eyed Junco	0.67	0.67	0.50	1.00	1.00	0.60	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

			Apr				May			
Sample Size:	0	3	3	1	1	0	3	0	2	1
Black-tailed Gnatcatcher	-	-	-	-	-	-	-	-	-	-
Ruby-crowned Kinglet	-	0.67	1.00	1.00	-	-	-	-	-	-
Western Bluebird	-	-	-	-	-	-	-	-	-	-
Hermit Thrush	-	-	-	-	-	-	-	-	-	-
American Robin	-	0.67	0.67	-	-	-	-	-	-	-
Northern Mockingbird	-	-	-	-	-	-	-	-	-	-
Curve-billed Thrasher	-	-	-	-	-	-	-	-	-	-
Crissal Thrasher	-	-	-	-	-	-	-	-	-	1.00
European Starling	-	-	-	-	-	-	-	-	-	-
Cedar Waxwing	-	-	-	-	-	-	-	-	-	-
Phainopepla	-	-	-	-	-	-	-	-	-	-
Orange-crowned Warbler	-	-	-	-	-	-	0.33	-	-	-
Lucy's Warbler	-	1.00	-	1.00	1.00	-	0.33	-	0.50	1.00
Virginia's Warbler	-	-	-	-	1.00	-	0.33	-	-	-
MacGillivray's Warbler	-	-	-	-	-	-	-	-	-	-
Yellow Warbler	-	-	-	-	-	-	1.00	-	-	1.00
Yellow-rumped Warbler	-	0.67	0.67	-	-	-	0.67	-	-	-
Black-throated Gray Warbler	-	-	0.33	-	-	-	-	-	-	1.00
Townsend's Warbler	-	-	-	-	-	-	1.00	-	-	-
Wilson's Warbler	-	-	-	-	-	-	1.00	-	-	1.00
Painted Redstart	-	-	-	-	-	-	-	-	-	-
Yellow-breasted Chat	-	-	-	-	-	-	-	-	-	1.00
warbler sp.	-	-	-	-	-	-	-	-	0.50	-
Green-tailed Towhee	-	-	-	-	-	-	0.33	-	-	-
Spotted Towhee	-	0.67	0.33	-	-	-	0.67	-	1.00	1.00
Rufous-crowned Sparrow	-	0.33	-	-	-	-	0.33	-	-	-
Canyon Towhee	-	0.33	0.33	-	1.00	-	-	-	-	-
Abert's Towhee	-	-	-	-	-	-	0.33	-	-	1.00
Chipping Sparrow	-	0.33	-	-	-	-	0.67	-	-	-
Brewer's Sparrow	-	-	-	-	-	-	0.33	-	-	-
Black-chinned Sparrow	-	0.33	0.33	-	1.00	-	-	-	0.50	-
Vesper Sparrow	-	0.33	0.33	-	-	-	-	-	-	-
Lark Sparrow	-	-	0.33	1.00	1.00	-	1.00	-	0.50	1.00
Black-throated Sparrow	-	-	-	-	-	-	0.67	-	-	-
Savannah Sparrow	-	-	-	-	-	-	-	-	-	-
Fox Sparrow	-	-	-	-	-	-	-	-	-	-
Song Sparrow	-	-	-	-	-	-	-	-	-	-
Lincoln's Sparrow	-	-	-	-	-	-	-	-	-	-
White-throated Sparrow	-	-	-	-	-	-	-	-	-	-
White-crowned Sparrow	-	0.33	0.33	1.00	-	-	0.67	-	-	-
Dark-eyed Junco	-	0.67	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Jun				Jul				Aug	
Sample Size:	0	4	1	0	0	0	1	3	0	0
Black-tailed Gnatcatcher	-	0.25	-	-	-	-	-	-	-	-
Ruby-crowned Kinglet	-	-	-	-	-	-	-	-	-	-
Western Bluebird	-	-	-	-	-	-	-	-	-	-
Hermit Thrush	-	-	-	-	-	-	-	-	-	-
American Robin	-	-	-	-	-	-	-	-	-	-
Northern Mockingbird	-	-	-	-	-	-	1.00	-	-	-
Curve-billed Thrasher	-	-	-	-	-	-	-	-	-	-
Crissal Thrasher	-	0.50	-	-	-	-	-	-	-	-
European Starling	-	-	-	-	-	-	-	-	-	-
Cedar Waxwing	-	-	-	-	-	-	-	-	-	-
Phainopepla	-	0.75	1.00	-	-	-	-	0.33	-	-
Orange-crowned Warbler	-	-	-	-	-	-	-	-	-	-
Lucy's Warbler	-	0.25	-	-	-	-	-	-	-	-
Virginia's Warbler	-	-	-	-	-	-	-	-	-	-
MacGillivray's Warbler	-	-	-	-	-	-	-	-	-	-
Yellow Warbler	-	0.25	-	-	-	-	-	-	-	-
Yellow-rumped Warbler	-	-	-	-	-	-	-	-	-	-
Black-throated Gray Warbler	-	-	-	-	-	-	-	-	-	-
Townsend's Warbler	-	-	-	-	-	-	-	-	-	-
Wilson's Warbler	-	-	-	-	-	-	-	-	-	-
Painted Redstart	-	-	-	-	-	-	-	-	-	-
Yellow-breasted Chat	-	-	-	-	-	-	-	0.33	-	-
warbler sp.	-	-	-	-	-	-	-	-	-	-
Green-tailed Towhee	-	-	-	-	-	-	-	-	-	-
Spotted Towhee	-	0.50	-	-	-	-	-	-	-	-
Rufous-crowned Sparrow	-	-	-	-	-	-	-	-	-	-
Canyon Towhee	-	0.50	-	-	-	-	-	-	-	-
Abert's Towhee	-	0.50	-	-	-	-	-	-	-	-
Chipping Sparrow	-	-	-	-	-	-	-	-	-	-
Brewer's Sparrow	-	-	-	-	-	-	-	-	-	-
Black-chinned Sparrow	-	0.50	-	-	-	-	-	-	-	-
Vesper Sparrow	-	-	-	-	-	-	-	-	-	-
Lark Sparrow	-	-	-	-	-	-	-	-	-	-
Black-throated Sparrow	-	0.25	1.00	-	-	-	-	0.33	-	-
Savannah Sparrow	-	-	-	-	-	-	-	-	-	-
Fox Sparrow	-	-	-	-	-	-	-	-	-	-
Song Sparrow	-	-	-	-	-	-	-	-	-	-
Lincoln's Sparrow	-	-	-	-	-	-	-	-	-	-
White-throated Sparrow	-	-	-	-	-	-	-	-	-	-
White-crowned Sparrow	-	-	-	-	-	-	-	-	-	-
Dark-eyed Junco	-	-	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

			Sep				Oct			
Sample Size:	0	1	3	0	1	2	0	2	0	2
Black-tailed Gnatcatcher	-	-	-	-	-	-	-	-	-	-
Ruby-crowned Kinglet	-	-	-	-	-	-	-	1.00	-	-
Western Bluebird	-	-	-	-	-	-	-	-	-	-
Hermit Thrush	-	-	-	-	-	-	-	-	-	0.50
American Robin	-	-	-	-	-	-	-	-	-	0.50
Northern Mockingbird	-	-	-	-	-	-	-	-	-	-
Curve-billed Thrasher	-	-	-	-	-	-	-	-	-	1.00
Crissal Thrasher	-	-	-	-	1.00	-	-	-	-	-
European Starling	-	-	-	-	-	-	-	-	-	-
Cedar Waxwing	-	-	-	-	-	-	-	-	-	-
Phainopepla	-	1.00	-	-	-	-	-	0.50	-	-
Orange-crowned Warbler	-	-	0.33	-	-	-	-	-	-	-
Lucy's Warbler	-	-	-	-	-	-	-	-	-	-
Virginia's Warbler	-	-	-	-	-	-	-	-	-	-
MacGillivray's Warbler	-	1.00	-	-	1.00	-	-	-	-	-
Yellow Warbler	-	1.00	0.33	-	-	-	-	-	-	-
Yellow-rumped Warbler	-	-	-	-	-	-	-	0.50	-	-
Black-throated Gray Warbler	-	1.00	-	-	-	-	-	-	-	-
Townsend's Warbler	-	-	0.33	-	-	-	-	-	-	-
Wilson's Warbler	-	1.00	-	-	1.00	-	-	-	-	-
Painted Redstart	-	-	0.33	-	-	-	-	-	-	-
Yellow-breasted Chat	-	-	-	-	-	-	-	-	-	-
warbler sp.	-	-	-	-	-	-	-	-	-	-
Green-tailed Towhee	-	-	-	-	1.00	0.50	-	0.50	-	-
Spotted Towhee	-	1.00	-	-	-	-	-	0.50	-	1.00
Rufous-crowned Sparrow	-	-	-	-	-	-	-	-	-	-
Canyon Towhee	-	1.00	0.67	-	-	-	-	-	-	1.00
Abert's Towhee	-	1.00	-	-	1.00	0.50	-	-	-	-
Chipping Sparrow	-	-	-	-	1.00	-	-	0.50	-	-
Brewer's Sparrow	-	-	0.33	-	1.00	0.50	-	-	-	-
Black-chinned Sparrow	-	-	-	-	1.00	-	-	-	-	-
Vesper Sparrow	-	-	-	-	1.00	0.50	-	0.50	-	-
Lark Sparrow	-	1.00	0.33	-	1.00	-	-	-	-	-
Black-throated Sparrow	-	-	0.67	-	-	-	-	-	-	-
Savannah Sparrow	-	-	-	-	-	-	-	-	-	-
Fox Sparrow	-	-	-	-	-	-	-	-	-	-
Song Sparrow	-	-	-	-	-	-	-	-	-	-
Lincoln's Sparrow	-	-	-	-	1.00	-	-	-	-	-
White-throated Sparrow	-	-	-	-	-	-	-	-	-	-
White-crowned Sparrow	-	-	-	-	-	1.00	-	0.50	-	1.00
Dark-eyed Junco	-	-	-	-	-	-	-	-	-	1.00

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Nov				Dec			
Sample Size:	1	2	0	1	3	0	0	3
Black-tailed Gnatcatcher	-	-	-	-	-	-	-	-
Ruby-crowned Kinglet	1.00	0.50	-	-	1.00	-	-	0.67
Western Bluebird	-	-	-	-	0.33	-	-	0.33
Hermit Thrush	-	-	-	-	-	-	-	-
American Robin	-	-	-	-	-	-	-	0.33
Northern Mockingbird	-	-	-	-	0.33	-	-	1.00
Curve-billed Thrasher	-	-	-	-	0.33	-	-	0.33
Crissal Thrasher	-	-	-	-	0.33	-	-	0.67
European Starling	-	-	-	-	-	-	-	-
Cedar Waxwing	-	-	-	-	-	-	-	-
Phainopepla	1.00	0.50	-	-	0.33	-	-	0.67
Orange-crowned Warbler	-	-	-	-	-	-	-	-
Lucy's Warbler	-	-	-	-	-	-	-	-
Virginia's Warbler	-	-	-	-	-	-	-	-
MacGillivray's Warbler	-	-	-	-	-	-	-	-
Yellow Warbler	-	-	-	-	-	-	-	-
Yellow-rumped Warbler	-	0.50	-	-	0.33	-	-	1.00
Black-throated Gray Warbler	-	-	-	-	-	-	-	-
Townsend's Warbler	-	-	-	-	-	-	-	-
Wilson's Warbler	-	-	-	-	-	-	-	-
Painted Redstart	-	-	-	-	-	-	-	-
Yellow-breasted Chat	-	-	-	-	-	-	-	-
warbler sp.	-	-	-	-	-	-	-	-
Green-tailed Towhee	-	-	-	-	0.33	-	-	0.33
Spotted Towhee	-	0.50	-	1.00	0.67	-	-	1.00
Rufous-crowned Sparrow	-	-	-	-	-	-	-	-
Canyon Towhee	1.00	0.50	-	-	1.00	-	-	0.67
Abert's Towhee	-	-	-	-	-	-	-	0.33
Chipping Sparrow	-	-	-	-	0.33	-	-	0.33
Brewer's Sparrow	-	-	-	-	-	-	-	-
Black-chinned Sparrow	-	-	-	-	-	-	-	0.33
Vesper Sparrow	-	-	-	-	-	-	-	-
Lark Sparrow	-	-	-	-	-	-	-	-
Black-throated Sparrow	-	0.50	-	-	-	-	-	0.33
Savannah Sparrow	-	-	-	-	-	-	-	-
Fox Sparrow	-	-	-	-	-	-	-	0.33
Song Sparrow	-	-	-	-	-	-	-	-
Lincoln's Sparrow	-	-	-	-	-	-	-	-
White-throated Sparrow	-	-	-	-	-	-	-	-
White-crowned Sparrow	-	1.00	-	1.00	0.33	-	-	1.00
Dark-eyed Junco	1.00	1.00	-	1.00	0.67	-	-	1.00

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Jan				Feb				Mar	
Sample Size:	6	3	2	4	2	5	0	0	0	2
Summer Tanager	-	-	-	-	-	-	-	-	-	-
Western Tanager	-	-	-	-	-	-	-	-	-	-
Northern Cardinal	0.33	-	-	0.25	1.00	0.20	-	-	-	-
Pyrrhuloxia	0.17	-	-	-	-	-	-	-	-	-
Black-headed Grosbeak	-	-	-	-	-	-	-	-	-	-
Blue Grosbeak	-	-	-	-	-	-	-	-	-	-
Lazuli Bunting	-	-	-	-	-	-	-	-	-	-
Indigo Bunting	-	-	-	-	-	-	-	-	-	-
Dickcissel	-	-	-	-	-	-	-	-	-	-
Eastern Meadowlark	-	-	-	-	-	-	-	-	-	-
Western Meadowlark	-	-	-	-	-	-	-	-	-	-
Brewer's Blackbird	-	-	-	-	-	-	-	-	-	-
Great-tailed Grackle	-	-	-	-	-	-	-	-	-	-
Bronzed Cowbird	-	-	-	-	-	-	-	-	-	-
Brown-headed Cowbird	-	-	-	-	-	-	-	-	-	-
Hooded Oriole	-	-	-	-	-	-	-	-	-	-
Bullock's Oriole	-	-	-	-	-	-	-	-	-	-
Scott's Oriole	-	-	-	-	-	-	-	-	-	-
House Finch	0.33	-	-	0.25	1.00	0.40	-	-	-	0.50
Pine Siskin	-	-	-	0.25	0.50	-	-	-	-	-
Lesser Goldfinch	-	-	-	0.25	-	-	-	-	-	-
Lawrence's Goldfinch	-	-	-	-	-	-	-	-	-	-
American Goldfinch	-	-	-	-	-	-	-	-	-	-
House Sparrow	-	-	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

			Apr				May			
Sample Size:	0	3	3	1	1	0	3	0	2	1
Summer Tanager	-	-	-	-	-	-	-	-	-	-
Western Tanager	-	-	-	-	-	-	-	-	-	-
Northern Cardinal	-	-	0.33	-	-	-	0.67	-	-	-
Pyrrhuloxia	-	-	-	-	-	-	-	-	-	-
Black-headed Grosbeak	-	-	-	-	1.00	-	0.67	-	-	-
Blue Grosbeak	-	-	-	-	-	-	-	-	-	-
Lazuli Bunting	-	-	-	-	-	-	-	-	0.50	-
Indigo Bunting	-	-	-	-	-	-	-	-	-	-
Dickcissel	-	-	-	-	-	-	-	-	-	-
Eastern Meadowlark	-	-	-	-	-	-	-	-	-	-
Western Meadowlark	-	0.33	-	-	-	-	-	-	-	-
Brewer's Blackbird	-	-	-	-	-	-	-	-	-	-
Great-tailed Grackle	-	-	-	-	-	-	-	-	-	-
Bronzed Cowbird	-	-	-	-	-	-	-	-	-	-
Brown-headed Cowbird	-	-	-	-	1.00	-	-	-	1.00	-
Hooded Oriole	-	-	-	-	-	-	-	-	-	-
Bullock's Oriole	-	-	-	-	-	-	-	-	-	-
Scott's Oriole	-	-	-	-	-	-	-	-	-	-
House Finch	-	-	0.33	1.00	1.00	-	0.67	-	0.50	1.00
Pine Siskin	-	-	-	-	-	-	-	-	-	-
Lesser Goldfinch	-	0.33	0.33	-	-	-	1.00	-	-	-
Lawrence's Goldfinch	-	-	-	-	-	-	-	-	-	-
American Goldfinch	-	-	-	-	-	-	-	-	-	-
House Sparrow	-	-	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Jun				Jul				Aug	
Sample Size:	0	4	1	0	0	0	1	3	0	0
Summer Tanager	-	-	-	-	-	-	-	-	-	-
Western Tanager	-	0.25	-	-	-	-	-	-	-	-
Northern Cardinal	-	0.25	-	-	-	-	-	-	-	-
Pyrrhuloxia	-	-	-	-	-	-	-	-	-	-
Black-headed Grosbeak	-	-	-	-	-	-	-	-	-	-
Blue Grosbeak	-	0.50	-	-	-	-	-	-	-	-
Lazuli Bunting	-	-	-	-	-	-	-	-	-	-
Indigo Bunting	-	-	-	-	-	-	-	-	-	-
Dickcissel	-	-	-	-	-	-	-	-	-	-
Eastern Meadowlark	-	-	-	-	-	-	-	-	-	-
Western Meadowlark	-	-	-	-	-	-	-	-	-	-
Brewer's Blackbird	-	-	-	-	-	-	-	-	-	-
Great-tailed Grackle	-	-	-	-	-	-	-	-	-	-
Bronzed Cowbird	-	-	-	-	-	-	-	-	-	-
Brown-headed Cowbird	-	0.25	-	-	-	-	-	-	-	-
Hooded Oriole	-	-	-	-	-	-	-	-	-	-
Bullock's Oriole	-	-	-	-	-	-	-	-	-	-
Scott's Oriole	-	-	-	-	-	-	-	0.33	-	-
House Finch	-	0.25	-	-	-	-	1.00	0.33	-	-
Pine Siskin	-	-	-	-	-	-	-	-	-	-
Lesser Goldfinch	-	0.25	-	-	-	-	-	-	-	-
Lawrence's Goldfinch	-	-	-	-	-	-	-	-	-	-
American Goldfinch	-	-	-	-	-	-	-	-	-	-
House Sparrow	-	-	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

			Sep				Oct			
Sample Size:	0	1	3	0	1	2	0	2	0	2
Summer Tanager	-	-	-	-	-	-	-	-	-	-
Western Tanager	-	-	-	-	-	0.50	-	-	-	-
Northern Cardinal	-	-	-	-	-	-	-	0.50	-	0.50
Pyrrhuloxia	-	-	-	-	-	-	-	-	-	-
Black-headed Grosbeak	-	-	0.33	-	1.00	-	-	-	-	-
Blue Grosbeak	-	-	-	-	-	-	-	-	-	-
Lazuli Bunting	-	-	-	-	1.00	-	-	-	-	-
Indigo Bunting	-	-	-	-	-	-	-	-	-	-
Dickcissel	-	-	-	-	-	-	-	-	-	-
Eastern Meadowlark	-	-	-	-	-	-	-	-	-	-
Western Meadowlark	-	-	-	-	-	-	-	-	-	-
Brewer's Blackbird	-	-	-	-	-	0.50	-	-	-	-
Great-tailed Grackle	-	-	-	-	-	-	-	-	-	-
Bronzed Cowbird	-	-	-	-	-	-	-	-	-	-
Brown-headed Cowbird	-	-	-	-	-	-	-	-	-	-
Hooded Oriole	-	-	0.33	-	-	-	-	-	-	-
Bullock's Oriole	-	-	-	-	-	-	-	-	-	-
Scott's Oriole	-	-	-	-	-	-	-	-	-	-
House Finch	-	1.00	0.33	-	1.00	0.50	-	0.50	-	-
Pine Siskin	-	-	-	-	-	-	-	-	-	-
Lesser Goldfinch	-	1.00	0.33	-	1.00	1.00	-	1.00	-	0.50
Lawrence's Goldfinch	-	-	-	-	-	-	-	0.50	-	-
American Goldfinch	-	-	-	-	-	-	-	-	-	-
House Sparrow	-	-	-	-	-	-	-	-	-	-

eBird Oak Flat Campground Frequency of Observations

Number of taxa: 150

	Nov				Dec			
Sample Size:	1	2	0	1	3	0	0	3
Summer Tanager	-	-	-	-	-	-	-	-
Western Tanager	-	-	-	-	-	-	-	-
Northern Cardinal	-	0.50	-	1.00	0.33	-	-	1.00
Pyrrhuloxia	-	-	-	-	0.33	-	-	0.67
Black-headed Grosbeak	-	-	-	-	-	-	-	-
Blue Grosbeak	-	-	-	-	-	-	-	-
Lazuli Bunting	-	-	-	-	-	-	-	-
Indigo Bunting	-	-	-	-	-	-	-	-
Dickcissel	-	-	-	-	-	-	-	-
Eastern Meadowlark	-	-	-	-	-	-	-	-
Western Meadowlark	-	-	-	-	-	-	-	-
Brewer's Blackbird	-	-	-	-	-	-	-	-
Great-tailed Grackle	-	-	-	-	-	-	-	-
Bronzed Cowbird	-	-	-	-	-	-	-	-
Brown-headed Cowbird	-	-	-	-	-	-	-	-
Hooded Oriole	-	-	-	-	-	-	-	-
Bullock's Oriole	-	-	-	-	-	-	-	-
Scott's Oriole	-	-	-	-	-	-	-	-
House Finch	-	-	-	-	0.33	-	-	0.67
Pine Siskin	-	-	-	-	-	-	-	-
Lesser Goldfinch	-	-	-	-	0.33	-	-	0.67
Lawrence's Goldfinch	-	-	-	-	-	-	-	-
American Goldfinch	-	-	-	-	0.33	-	-	-
House Sparrow	-	-	-	-	-	-	-	0.33

APPENDIX 10

AVIAN SITES 2011
OAK FLAT
DATA

Number of Different Sightings each Month (Source: http://sites.google.com/site/aviansites/AvianSitesHome/AZsites/oakflats)

Oak Flats Campground

				Total Species Seen in each Month											
	118 Species	**28-Nov-99**	**13-Jul-11**	*50*	*29*	*43*	*64*	*76*	*16*	*23*	*27*	*30*	*56*	*25*	*26*
Views	**Bird**	**First**	**Last**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
3	Mallard	26-Mar-00	27-Feb-05		1	2									
17	Gambel's Quail	1-Jan-00	14-May-11	3	1	1	2	6		1			1		2
18	Turkey Vulture	26-Mar-00	13-Jul-11			2	4	6	1	2		2	1		
1	Sharp-shinned Hawk	22-Oct-00	--										1		
5	Cooper's Hawk	22-Oct-00	27-Jan-11	2			1						1		1
3	Zone-tailed Hawk	2-Apr-00	14-May-11				2	1							
2	Red-tailed Hawk	6-Jan-02	14-May-11	1				1							
1	Peregrine Falcon	12-Sep-04	--									1			
1	Prairie Falcon	8-Oct-00	--										1		
1	Eurasian Collared-Dove	12-Sep-04	--									1			
5	White-winged Dove	11-May-02	13-Jul-11				1	2		1	1				
19	Mourning Dove	28-Nov-99	13-Jul-11	2			3	5	1	2	1		1	2	2
3	Greater Roadrunner	12-Sep-04	15-Apr-07				1					1	1		
1	Western Screech-Owl	15-Apr-07	--				1								
1	Black-chinned Hummingbird	13-Jul-11	--							1					
13	Anna's Hummingbird	24-Jan-04	14-May-11	1	1	3	3	3				1	1		
4	Broad-tailed Hummingbird	26-Mar-00	14-May-11			1	1	2							
10	Lewis's Woodpecker	28-Nov-99	20-Jan-07	3	1	1	1						1	1	2
7	Acorn Woodpecker	28-Nov-99	22-Oct-00	2		1	1						2	1	
9	Gila Woodpecker	26-Mar-00	1-Jan-09	2	1	2							1	1	2
7	Red-naped Sapsucker	22-Oct-00	1-Jan-09	2									3		2
2	(+) Red-breasted Sapsucker	24-Jan-04	7-Feb-04	1	1										
8	Ladder-backed Woodpecker	28-Jan-00	14-May-11	4				2				1	1		
11	Northern Flicker	1-Jan-00	27-Jan-11	6	1								2	1	1
1	Gilded Flicker	28-Jan-00	--	1											
3	Western Wood-Pewee	11-May-02	14-May-11					2			1				
3	Hammond's Flycatcher	11-May-03	14-May-11					3							
7	Gray Flycatcher	11-May-02	14-May-11					4			1	2			
4	Dusky Flycatcher	8-May-04	14-May-11				1	3							
9	Black Phoebe	26-Mar-00	7-Oct-06			1	1	2			1		2	1	1
8	Say's Phoebe	8-Oct-00	7-Apr-07	1		1	1	1					3	1	
6	Vermilion Flycatcher	8-May-04	13-Jul-11				1	2	1	1	1				
12	Ash-throated Flycatcher	24-Mar-01	13-Jul-11			1	3	4	1	2			1		
8	Brown-crested Flycatcher	29-Apr-01	13-Jul-11				2	4	1	1					
8	Cassin's Kingbird	29-Apr-01	13-Jul-11				2	3		2	1				
2	Western Kingbird	7-May-05	14-May-11					2							
1	Loggerhead Shrike	14-May-11	--					1							
8	Bell's Vireo	11-May-02	13-Jul-11			1	1	3	1	1		1			
11	Gray Vireo	29-Apr-01	13-Jul-11				4	4		2	1				
1	Plumbeous Vireo	14-May-11	--					1							

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Oak Flats Campground

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Views	**Bird**	**First**	**Last**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
3	Cassin's Vireo	22-Oct-00	7-May-05					2					1		
4	Hutton's Vireo	27-Feb-05	13-Jul-11		1	1		1		1					
2	Warbling Vireo	28-Apr-11	14-May-11				1	1							
7	Steller's Jay	28-Nov-99	22-Oct-00	2		1	1						2	1	
33	Western Scrub-Jay	28-Nov-99	14-May-11	8	2	5	4	2			1	2	3	2	4
1	Mexican Jay	14-Sep-08	--									1			
21	Common Raven	28-Jan-00	14-May-11	5	2	3	2	2			2		3		2
3	Violet-green Swallow	11-May-02	14-May-11					3							
3	Northern Rough-winged Swallow	11-May-02	14-May-11					3							
9	Bridled Titmouse	1-Jan-00	8-Mar-11	2	1	3							2		1
35	Juniper Titmouse	28-Nov-99	13-Jul-11	8	2	5	4	6	1	1	2		1	3	2
20	Verdin	26-Mar-00	13-Jul-11	2	1	2	1	4	1	2	1	2	1	1	2
20	Bushtit	28-Nov-99	13-Jul-11	2	1	2	3	5	1	1	1		2	1	1
2	White-breasted Nuthatch	22-Oct-00	1-Jan-01	1									1		
2	Brown Creeper	8-Oct-00	17-Jan-05	1									1		
1	Cactus Wren	28-Jan-00	--	1											
10	Rock Wren	28-Jan-00	14-May-11	2	2	1	1	1			1		1		1
1	Canyon Wren	14-May-11	--					1							
29	Bewick's Wren	28-Jan-00	13-Jul-11	4	1	4	6	6	1	2	1		2		2
3	House Wren	21-Sep-02	3-Oct-04									2	1		
2	Blue-gray Gnatcatcher	18-Aug-01	14-May-11					1			1				
18	Ruby-crowned Kinglet	28-Jan-00	8-Mar-11	5	2	2	2						4	1	2
4	Western Bluebird	28-Nov-99	27-Feb-05		1	1							1	1	
4	Hermit Thrush	2-Apr-00	20-Jan-07	2			1						1		
4	American Robin	11-Mar-01	1-Jan-09	1		1		1						1	
5	Northern Mockingbird	11-May-02	14-May-11				3	2							
21	Crissal Thrasher	1-Jan-00	13-Jul-11	7	2	1	1	4		1	1		2		2
1	Cedar Waxwing	1-Jan-09	--	1											
10	Phainopepla	28-Jan-00	22-Jun-11	2	1		1	2	1		2	1			
4	Orange-crowned Warbler	26-Mar-00	28-Apr-11			1	1	1					1		
1	Virginia's Warbler	28-Apr-11	--				1								
16	Lucy's Warbler	24-Mar-01	13-Jul-11			3	4	6	1	2					
14	Yellow Warbler	29-Apr-01	13-Jul-11			1	3	6		2	1	1			
12	Yellow-rumped Warbler	26-Mar-00	14-May-11	2	2	2	1	3							2
6	Black-throated Gray Warbler	29-Apr-01	28-Apr-11				4	1			1				
3	Townsend's Warbler	11-May-02	14-May-11					2					1		
4	MacGillivray's Warbler	11-May-02	14-May-11					2				1	1		
8	Wilson's Warbler	11-May-02	14-May-11				1	5			1		1		
2	Yellow-breasted Chat	8-May-04	7-May-05					2							
14	Green-tailed Towhee	26-Mar-00	14-May-11	2		1	3	4				3	1		

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Views	**Bird**	**First**	**Last**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
35	Spotted Towhee	28-Nov-99	13-Jul-11	7	3	3	4	4	1	2	2	2	4	2	1
2	Rufous-crowned Sparrow	27-Feb-05	14-May-11		1			1							
25	Canyon Towhee	28-Jan-00	14-May-11	8	3	1	3	4			1	2	1	1	1
3	Abert's Towhee	28-Jan-00	1-Jan-09	2		1									
15	Chipping Sparrow	1-Jan-00	14-May-11	4			2	4				2	2	1	
7	Brewer's Sparrow	11-May-02	14-May-11	1			2	2				1	1		
6	Black-chinned Sparrow	29-Apr-01	14-May-11				3	3							
6	Vesper Sparrow	6-Jan-02	14-May-11	1			1	1				3			
12	Lark Sparrow	29-Apr-01	14-May-11		1		3	5			1	2			
5	Black-throated Sparrow	15-Apr-07	13-Jul-11				1	1	1	1		1			
1	Savannah Sparrow	14-Sep-08	--									1			
1	Grasshopper Sparrow	3-Oct-04	--										1		
3	Fox Sparrow	26-Mar-00	20-Jan-07	1		1									1
1	Song Sparrow	26-Mar-00	--			1									
7	Lincoln's Sparrow	1-Jan-00	20-Jan-07	3		1	1						2		
1	(+) White-throated Sparrow	28-Nov-99	--											1	
27	White-crowned Sparrow	28-Jan-00	14-May-11	8	3	1	2	5				1	3	1	3
51	Dark-eyed Junco	28-Nov-99	8-Mar-11	23	6	3	2						5	3	9
1	Summer Tanager	14-May-11	--					1							
3	Western Tanager	15-May-05	14-May-11					2			1				
12	Northern Cardinal	28-Jan-00	14-May-11	4	1	2	4	1							
4	Black-headed Grosbeak	12-Sep-04	14-May-11					2				1	1		
2	Blue Grosbeak	3-Oct-04	14-May-11					1					1		
3	Lazuli Bunting	12-Sep-04	14-May-11				1	1				1			
1	(+) Indigo Bunting	3-Oct-04	--										1		
1	(+) Dickcissel	3-Oct-04	--										1		
7	Eastern Meadowlark	28-Jan-00	21-Sep-02	2		1	1					1	1	1	
2	Brewer's Blackbird	3-Oct-04	24-Apr-05				1						1		
2	Great-tailed Grackle	24-Apr-05	14-May-11				1	1							
1	Bronzed Cowbird	29-Apr-01	--				1								
4	Brown-headed Cowbird	11-May-02	14-May-11				1	3							
3	Hooded Oriole	14-May-11	13-Jul-11					1	1	1					
3	Bullock's Oriole	11-May-02	14-May-11				1	2							
1	Scott's Oriole	14-May-11	--					1							
21	House Finch	28-Jan-00	13-Jul-11	5	1	1	1	4	1	1	1	2	1	1	2
4	Pine Siskin	28-Nov-99	14-May-11	1				1						1	1
12	Lesser Goldfinch	26-Mar-00	14-May-11	1		1	1	3			1	3	2		
4	(+) American Goldfinch	1-Jan-00	24-Nov-07	2									1	1	