

The background of the cover is a photograph of a desert landscape. In the foreground, there is a field of tall, dry, yellowish grass. Behind the grass, there are several green trees and shrubs. In the distance, there are brown, rocky mountains under a clear blue sky. The top right corner of the image is partially obscured by the branches of a tree with green leaves.

**BIOLOGICAL  
RECONNAISSANCE  
OF**

**SANDS RANCH**

**Prepared By**

**EPG, INC,  
330 East 13th Street  
Tucson, Arizona 85701**

**Prepared For**

**Arizona Land and Water Trust  
1915 East Camino Miraval  
Tucson, Arizona 85718**

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## TABLE OF CONTENTS

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Introduction.....	1
Methodology.....	4
Regional Context .....	4
Existing Environment .....	7
Mammals .....	16
Birds.....	21
Amphibians and Reptiles .....	28
Invertebrates.....	34
Priority Vulnerable Species and Special Elements .....	35
Mammals .....	36
Birds.....	40
Amphibians and Reptiles .....	43
Plants.....	45
Special Elements.....	46
Existing Disturbance/Evidence of Human Activity.....	48
Management Challenges.....	52
Conclusions and Recommendations .....	53
Literature Cited and References.....	55

## APPENDICES

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- Appendix A. Photos Taken During October 22-23, 2008 Field Reconnaissance of Sands Ranch
- Appendix B. Plants Observed on Sands Ranch during the October 22-23, 2008 Field Reconnaissance
- Appendix C. Wildlife Plants Observed on Sands Ranch during the October 22-23, 2008 Field Reconnaissance
- Appendix D. Arizona Game and Fish Department's On-line Environmental Review Tool

## LIST OF TABLES

---

1	Mammalian Species That Could Potentially be Present on Sands Ranch .....	17
2	Bird Species Likely to be Present on Sands Ranch .....	23
3	Amphibian and Reptiles Species Likely to be Present on Sands Ranch .....	30
4	Priority Vulnerable Species with Modeled High or Moderate Habitat and Priority Conservation Area (PCA) Status .....	35

## LIST OF FIGURES

---

1	Sands Ranch Location Map .....	3
---	--------------------------------	---

## LIST OF PHOTOGRAPHS

---

1.	Looking east towards the Mustang Mountains .....	8
2.	Looking north along Granite Peak Road on the south end of the Ranch .....	8
3.	Looking east across the head of a draw to the Whetstone Mountains .....	8
4.	Looking east across Semidesert Grassland to the Whetstone Mountains .....	9
5.	Six species of insects feeding on rabbitbrush .....	9
6.	Close up of sandpaper bush ( <i>Mortonia scabrella</i> ) .....	10
7.	Viscid acacia ( <i>Acacia neovernicosa</i> ) .....	10
8.	Looking easterly up Bear Spring Canyon .....	11
9.	Looking downstream from road in the southwest edge of Section 26 .....	11
10.	Looking upstream along a tributary to the Babocomari River .....	12
11.	Looking northwest to the Boulder Tank .....	12
12.	Blacktail Spring in a small tributary to Bear Spring Canyon .....	13
13.	Naturally occurring pond in Bear Spring Canyon .....	13
14.	Close up of Emory oak ( <i>Quercus emoryi</i> ) .....	14

**LIST OF PHOTOGRAPHS (Continued)**

---

15. Close up of Arizona white oak ( <i>Quercus arizonica</i> ).....	14
16. Close up of juniper species ( <i>Juniperus</i> sp.).....	14
17. Alligator juniper ( <i>Juniperus deppeana</i> ) .....	14
18. Close up of lemonade berry ( <i>Rhus trilobata</i> ).....	15
19. Looking southwesterly to the Santa Rita Mountains.....	15
20. Unnamed mine shaft northwest of Ramsey Well.....	16
21. Silhouette of Say’s Phoebe ( <i>Sayornis saya</i> ).....	21
22. Sharp-shinned Hawk ( <i>Accipiter striatus</i> ) sitting on a utility pole.....	22
23. Suitable habitat for Montezuma Quail at Goat Well.....	22
24. Looking east towards hills on north side of Goat Well.....	22
25. Camouflaged Montezuma Quail female with chicks.....	23
26. Naturally occurring pond in Bear Spring Canyon.....	29
27. Mud turtle observed swimming in the pond just northwest of Blacktail Spring.....	29
28. California Sister ( <i>Adelpha bredowii</i> ).....	34
29. Paniculate agaves growing in abundance.....	38
30. Looking east to the Whetstone Mountains showing oak-mesquite thicket.....	42
31. Limestone ridgeline.....	48
32. Old abandoned vehicles at Ramsey Well.....	49
33. Headcutting and erosion observed northwest of Sands Camp.....	49
34. Disturbance caused by construction of the tank and presence of livestock.....	50
35. Headcutting and erosion of north-south trending road.....	51
36. Sonoran Whipsnake found dead on road.....	51

## INTRODUCTION

The mission of the Arizona Land and Water Trust is to protect Southern Arizona's landscapes and wildlife habitats by acquiring and managing these sensitive lands. In addition to acting as land steward, they support programs that carry out their stated mission and goals. They work with landowners, municipalities, and other organizations to protect sensitive resources through acquisition and donation. One such program is Pima County's Sonoran Desert Conservation Plan (SDCP). The goal of the SDCP as stated by the Science Technical Advisory Team (STAT) is:

- To ensure the long-term survival of the full spectrum of plants and animals that are indigenous to Pima County through maintaining or improving the habitat conditions and ecosystem functions necessary for their survival

In moving to accomplish this goal, Pima County has developed an ecosystem-based Conservation Lands System (CLS) (Pima County 2002a), which identifies those areas in Pima County that must be preserved or minimally encroached in order to achieve the stated goal of the SDCP. The CLS identifies Important Riparian Areas, as "extremely important elements in the CLS and every effort should be made to protect, restore, and enhance the structure and functions of these areas, including hydrological, geomorphic, and biological functions." Urban development guidelines recommend that 95 percent of the natural resources of Important Riparian Areas be retained, including all riparian linkage areas and all washes with a discharge value of 250 cubic feet per second or larger regardless of whether such wash is located within or outside the biological reserve boundaries."

In addition to important riparian areas, the CLS also identifies Biological Core, Scientific Research Management, and Multiple Use or Recovery Management Areas. Biological Core Areas are defined as "areas of very high biological importance distinguished by high potential habitat for five or more priority vulnerable species, special elements, and other unique biological features." Development guidelines in Biological Core Areas recommend retention of 80 percent of biological resources and land use should achieve actual conservation of the species that occupy the landscape.

Scientific Research Areas include the Santa Rita Experimental Range and the Desert Laboratory at Tumamoc Hill. Land uses in these areas focus on balancing conservation, restoration, and enhancement of natural communities in support of scientific research on environmental and natural processes. There are no development guidelines for Scientific Research Areas.

The CLS also identifies Multiple Use Management Areas as areas with "high potential habitat for three or more Priority Vulnerable Species and special elements." Special elements include caves, perennial streams, cottonwood-willow forests, and other unique biological features. Land use and management goals within Multiple Use Management Areas focus on balancing conservation, restoration, and enhancement of natural communities with other uses that are compatible with the maintenance of biological values. Land uses appropriate for these areas must be consistent with maintaining open space, natural vegetation, and wildlife habitat values (Pima County 2004). Urban development guidelines within Multiple Use Management Areas suggest maintenance of 60 to 75 percent of the biological resources.

This report provides a brief biological evaluation of Sand's Ranch (Parcel #s 306-34-0400, 306-34-020A and B) located at the southwest end of the Whetstone Mountains bordering the western boundary of the Coronado National Forest, just north of Highway 82 in the extreme southeast portion of Pima County (Figure 1.). Legal description includes Township 19 South, Range 18

East, portions of Section 3, 10-11, 14-15, 23, and 25-26 of the APACHE PEAK 7.5 Minute USGS Quadrangle; portions of Sections 25-27, and 34-36 of the MUSTANG MTNS 7.5 Minute Quadrangle, and a portion of Section 33 and all of 34 of the ELGIN 7.5 Minute USGS Quadrangle. Elevations range from 4,975 feet above mean sea level (amsl) in the flatter, more open terrain in the southernmost section of the Ranch up to 5,785 feet amsl at the top of a small hill, which is part of the southern end of the Whetstone Mountains.

Insert Figure 1

## METHODOLOGY

A biological survey of Sands Ranch was conducted on October 22-23, 2008 by EPG senior biologist Barb Garrison and subcontractor Robert Spicer.

Initial reconnaissance consisted of driving existing access roads around the periphery of, and within, the parcels, stopping at high points, wash bottoms, and other points of interest to examine and describe landforms, soils, drainage patterns, vegetation patterns, and disturbances. After completion of the initial drive-through of the parcels, the biological survey was continued on foot, examining and noting biological resources in greater detail. Photographs were taken, and plants, animals, and animal sign (including tracks, bones, burrows, feathers, and scat) were identified and recorded in field notes. Some plant parts were retained for later identification. Notes were made on ecological characteristics and habitat components such as vegetation, plant abundance and spacing, soils, topographic features, and land surface disturbances. No attempts were made to capture animals for identification.

Landforms, soils, vegetation, and wildlife are greatly influenced by geological, climatological, and ecological history and processes occurring over long periods of time. The following descriptions provide a brief overview of significant landscape influences both past and present, and describes current conditions of the Ranch, as it was during the field visit. It is necessarily only a “snapshot” in time because environmental and ecological conditions, plant and animal locations, abundance, and activities change with the seasons and from year to year.

## REGIONAL CONTEXT

### Topography and Landforms

The Ranch is located in the Basin and Range Physiographic Province, and Mexican Highland Section as mapped and described by Hunt (1978), and Whetstone Mountains Physiographic Area as mapped by Trapp (1996). Physiographic provinces and their subdivisions are natural regions with distinctive landforms that are the surface expression of their geologic history and structure. They usually also have distinctive patterns of climate, vegetation, soils, water, other resources, and often of the people and cultures that occupy them.

The Basin and Range Province, which occupies the southwestern interior of North America, extends from southern Oregon and Idaho, across the Great Basin, Mojave, Sonoran, and Chihuahuan deserts into Mexico, New Mexico, and west Texas. It is characterized by relatively narrow, north/south trending mountain ranges separated by broad gently sloping valleys. The mountain ranges, often called Sky Islands, are typically islands of diverse habitats and biological communities rising above the expansive desertscrub or grassland communities of the valleys.

The Mexican Highland Section is located in the southeastern part of the Basin and Range Physiographic Province. It differs from the rest of the province to the west in that the valleys and mountain ranges are generally several thousand feet higher in elevation. In some instances, the ranges consist of high, rounded mountain masses (i.e., Santa Catalina, Rincon, and Pinaleno mountains) in contrast to the lower, longer, and narrower ranges of much of the rest of the province. These high rounded mountains are massive granitic domes formed, in part, prior to the other mountains and valleys of the surrounding landscape (Nations and Stump 1996). They began as large masses of molten rock deep within the earth's crust. As they solidified, the extreme temperatures and pressures to which they were exposed caused them to be

metamorphosed into granite. Over time they were forced upward into the upper crust and the surface where they eventually became large domes of solid rock now called metamorphic core complexes.

Landforms and soils of the Basin and Range Province are primarily the result of regional geologic processes that occurred 8 to 18 million years ago. These processes, associated with the collision of an oceanic crustal plate with the North American continental plate, caused the earth's crust to be pulled apart from east to west creating large blocks of crust separated by faults. Some blocks settled, forming basins, while others maintained their positions or were uplifted slightly (Nations and Stump 1996).

The most conspicuous results of these processes are the landscapes we now see, the north/south trending basins (e.g., Sonoita Basin and San Pedro River Valley) bordered by relatively long, narrow mountain ranges (Santa Rita and Galiuro mountains), as well as the massive, rounded granitic domes described above. As blocks of the earth's crust subsided, most basins resulting from this process eventually filled with thousands of feet of materials eroded from nearby mountain ranges. As these basins filled with alluvial deposits, runoff that previously collected within them eventually overflowed. The overflow from most basins began wearing away the barriers between basins 8 or 9 million years ago, and eventually carved out the Gila River drainage, of which the Santa Cruz and San Pedro river systems are major tributaries (Scarborough 1989; Nations and Stump 1996).

The Ranch is located on the eastern margin of the Sonoita Basin, one of the fault block basins described above. The basin is bounded on the north by the Rincon Mountains, on the east by the Whetstone and Mustang Mountains, on the south by the Canelo Hills, and on the west by the Empire and Santa Rita Mountains. The basin consists of alluvial materials eroded from nearby mountains and deposited during the period since the initiation of the Basin and Range disturbance. The uppermost portions of the basin fill overlap and hide from view, both the faults bounding the basins and the gently sloping bedrock pediments along the fringes of the mountain ranges (Menges and Pearthree 1989). Deposition continued until sometime within the last few million years and has resulted in over 4,800 feet of deposits in the southern part of the Sonoita Basin (Richard et al. 2000). Beginning about that same time and continuing to the present, deposition in the basin was replaced by erosion and dissection as Cienega Creek to the north, the Babocomari River to the southeast, and Sonoita Creek to the southwest gradually began head cutting into the basin deposits (Menges and Pearthree 1989).

The resulting land surface consists of a rolling topography of low ridges and draws. Most of the Sonoita Basin and adjacent mountains drain northward into Cienega Creek while the southwestern part of the basin drains into Sonoita Creek. Cienega Creek flows north into Pantano Wash, which drains into the Rillito and ultimately, into the Santa Cruz River. Sonoita Creek flows southwesterly into the north-flowing Santa Cruz River. Washes in the vicinity of the Mustang Mountains, in the extreme southeastern part of the basin, drain southeasterly into the Rain Valley and southerly into the Babocomari River, which flows easterly into the San Pedro River. Both the Santa Cruz and San Pedro Rivers drain northward into the Gila River.

The Ranch is situated at elevations between 4,800 and 5,785 feet above sea level (amsl) on the undulating plain just west of the Whetstone Mountains that rise to elevations of 7,200-7,700 feet. This range sits astride the divide between the Santa Cruz River and the San Pedro River watersheds. Most of the plain occupied by Sands Ranch slopes to the west and northwest draining into Cienega Creek through several tributaries that head up on the west-facing slopes of the Whetstone Mountains. The northern part of the Ranch has the greatest relief with long ridges and

rounded hills up to about 5,000 feet dissected by canyons (e.g. Bear Spring and Shellenberger canyons) 200-300 feet deep. The central and southwestern part of the Ranch consists of rolling hills between elevations of 4,800 and 5,400 feet sloping gently (2-5%) to the west with a relief of about 25 feet between crests of ridges and bottoms of draws. The central part drains westerly into Cienega Creek. The southwestern part is drained by washes that flow southerly into the Babocomari River. The southeastern part of the Ranch consists of two hills that rise to just over 5,500 and 5,700 feet from an undulating plain at 4,925-5,100 feet. These hills are drained by washes that flow south and southeasterly into Rain Valley, which flows southeasterly into the Babocomari River.

## Soils

Soils of the Ranch are classified as thermic semiarid soils, which means, they have average annual soil temperatures of 59° to 72° F at a depth of 20 inches or at the soil-bedrock interface in shallow soils. The difference between mean summer and mean winter soil temperatures at this depth is greater than 9° F. Soil temperatures have an important influence on both plant growth and soil development. Soils on the Ranch are located in a region that receives 10 to 16 inches of precipitation per year, most of which occurs during winter storms (Hendricks 1985). The frost-free period in the area is 180 to 230 days per year (Cochran and Richardson 2003).

The soils on the Ranch and in the vicinity are very diverse, consisting of 17 detailed soil map units (containing more than 30 different kinds of soils) as mapped and described by Cochran and Richardson (2003). The diversity of these soils reflects the diversity of source materials and land forms in the area and is also reflected in the diversity of vegetation and wildlife they support. These soils have developed in materials eroded from adjacent mountains and deposited by streams the last million years or so. The deposition of these materials formed terraces that have been dissected into an undulating plain during the same period. The dissection reflects the gradual headward erosion by tributaries of Cienega Creek and the somewhat slower headward erosion of tributaries of the Babocomari River.

On the Ranch, older soils are generally on fan terraces and hillslopes closer to the Whetstone Mountains. They have developed in materials that have been stabilized longer than soils farther away from the mountains. Such soils are shallow to moderately deep to bedrock (or pediment) or other restricting layer with the surface layer often containing thin flat fragments of sedimentary or schist rock six or more inches long. They typically have better developed clay and/or silica or calcium carbonate horizons, the result of leaching of clay and calcium carbonate from the uppermost soil layer. The oldest soils usually have the best developed layers to the point that they are plugged (cemented), very hard, and essentially impermeable. Such layers of calcium carbonate are called caliche. The older soils usually began developing in materials that stabilized more than 25,000 years ago. Soils that began developing on intermediate fan terraces and hillslopes, between about 25,000 and 4,000 years ago, show clay or calcium carbonate horizons; however, they are not usually cemented or impermeable.

Fan terraces typically consist of a stepwise sequence of incised terraces with the oldest closest to the mountains and the youngest overlooking the floodplain of the axial or main stream that drains the basin. Soils of the lower fan terraces and terraces paralleling streams that have been developing in soil stabilized for about 4,000 or fewer years are gravelly to sandy loams and have less horizon development and little if any development of clay or calcium carbonate horizon.

Most soils on floodplains of washes have formed during the last several thousand years. They are usually deep, well drained sandy loams with little horizon development. They usually have dark

thick surface layers reflecting the organic matter deposited by flood flows. Soils on the bars formed by water or flood flow have no horizon development and neither does the riverwash in the channels themselves. The riverwash is usually reworked during every flood and seldom supports any but the most ephemeral vegetation.

### Climate

The Ranch is located in a region that gets about 15 inches/year of precipitation. This varies from year to year and ranges from less than 6 to over 20 inches/year. Snow provides a small amount of the annual precipitation averaging about 5 inches annually. Snow can be expected each month from November through April with monthly averages from 0.4 inches to 1.3 inches and maximums from 4 to over 15 inches in a single month. Most (60–70 %) precipitation occurs during the summer rainy season from July through September. Most of the rest occurs during the winter rainy season from December through March. January temperatures average in the low 40°s F while July temperatures average in the 70°s F. The high potential evapotranspiration compared to the low actual evapotranspiration suggests a year around soil moisture deficit; however, it is probably offset by relatively low daily temperatures which reduce evaporation and the high proportion of summer rainfall. Both would allow somewhat higher amounts of soil moisture during winter and late summer. The frost-free season is 160 to 240 days/year. The above information is from Sellers and Hill (1974), Sellers et al. (1985), Hendricks (1985), and Cochran and Richardson (2003).

## **EXISTING ENVIRONMENT**

### Vegetation and Range

The Brown, Lowe, and Pase System for classification and description of North American biotic communities (Brown 1982c) is used to identify and classify biotic communities in the vicinity of the Ranch. Scientific and common names of plants follow Lehr (1978). With elevations ranging from 4,800 to 5,785 feet asml, the Ranch is located in the Semidesert Grassland with elements of Chihuahuan Desertscrub biomes as mapped by Brown and Lowe (1983) and described by Brown (1982a,b) (Photos 1-3). Semidesert Grassland is dependent primarily on summer rains, which arrive just before the growing season. It is closely tied to Chihuahuan and Sonoran Desertscrub, but is found, elevationally, above both. The biome is a distinctive combination of primarily warm season grasses and perennial shrubs.

In contrast, the Plains and Great Basin Grassland biome consists primarily of cold season grasses, forbs, and low shrubs (Brown 1982b). However, near the southern part of the Ranch is a zone where the biomes come together: The southern margin of Semidesert Grassland in the Sonoita Basin meets the northern margins of Plains and Great Basin Grassland, as mapped by Brown and Lowe (1983). Since these two biomes happen to share a number of plant species, especially at these elevations, distinguishing the two biomes on the ground is difficult. There is usually a wide ecotonal area where the two overlap. Depending on various environmental characteristics such as soil texture, slope exposure, land use history, and elevation, biological communities may support various mixtures of species from both biomes. Large expanses of grass with few shrubs showing above the grass are most likely dominated by species from Plains Grassland communities. However, in some locations, identification may be more difficult due to the grassland being dominated by the introduced exotic grass, Lehmann lovegrass (*Eragrostis lehmanniana*).



**Photo 1.**  
Looking east towards the Mustang Mountains. Soaptree yucca is in the foreground.



**Photo 2.**  
Looking north along Granite Peak Road on the south end of the Ranch.



**Photo 3.**  
Looking east across the head of a draw to the Whetstone Mountains. One-seed juniper and Emory Oak are in the background and Palmer's agave is in the foreground.

Originally, Semidesert Grassland was dominated by perennial bunch grasses, but due to a number of factors, including, long-term livestock grazing, interspecies competition, changes in climate, and suppression of natural grassland fires, the bunch grasses were eventually reduced or replaced by sod-forming grasses and woody plants (Hendricks 1985). The area now consists of degraded communities of the biome (Photo 4).



**Photo 4.**

Looking east across Semidesert Grassland to the Whetstone Mountains showing invasion of woody plants (velvet mesquite in foreground) and exotics such as Russian thistle and feather fingergrass.

This is shown by the relative abundance of invasive woody shrubs such as burroweed (*Isocoma tenuisecta*), rabbitbrush (*Chrysothamnus nauseosus*)(Photo 5) and broom snakeweed (*Gutierrezia sarothrae*), the relatively low numbers of species and individuals of the more palatable native perennial grasses, such as bush muhly (*Muhlenbergia porteri*) growing in the open. Many more native perennial grasses are growing among shrubs or cacti, where they are more protected from livestock grazing.



**Photo 5.**

At least six species of insects feeding on rabbitbrush (*Chrysothamnus nauseosus*)

An abundance of native grass species were observed during the field review of October 22-23, 2008. They included, three-awn s(*Aristida* sp.), six-weeks needle grama (*Bouteloua aristidoides*), side-oats grama (*B. curtipendula*), slender grama (*B. repens*), Rothrock grama (*B. rothrockii*), tanglehead (*Heteropogon contortus*), sprangletop (*Leptochloa* sp.), wolf-tail (*Lycurus phleoides*), bush muhly, tobosa (*Pleuraphis mutica*), plains bristlegrass (*Setaria macrostachya*), sacaton (*Sporobolus wrightii*), cotton-top (*Trichachne californica*), and the exotic annual fingergrass (*Chloris virgata*). Another exotic, Lehmannn lovegrass (*Eragrostis lehmanniana*) is also quite common in the area.

The Chihuahuan Desert covers most of north-central Mexico. Its occurrence in southeastern Arizona, especially in portions of Cochise County, was mapped by Brown and Lowe (1983) as Chihuahuan Desertscrub, but according to Hendricks (1985), this area may more accurately represent a transition between the Sonoran Desert and the Chihuahuan Desert. Sandpaper bush (*Mortonia scabrella*)(Photo 6) and viscid acacia (*Acacia neovernicosa*)(Photo 7) are characteristic Chihuahuan desert shrubs and are important species in this biome found uncommonly in the northern portions of the Ranch. These species frequently grow on limestone, or in complex community mixtures with mariola (*Parthenium incanum*), ocotillo (*Fouquieria splendens*), shrubby senna (*Senna wislizenii*), and desert zinnia (*Zinnia acerosa*) (Hendricks 1985).



**Photo 6.**

Close up of sandpaper bush (*Mortonia scabrella*), a characteristic plant of the Chihuahuan Desert, growing on limestone ridges in Semidesert Grassland in the vicinity of Ramsey Well.



**Photo 7.**

Viscid acacia (*Acacia neovernicosa*), a characteristic plant of the Chihuahuan Desert, growing on limestone ridges.

In addition to the upland biomes described above, wetland biomes may occupy narrow strips along many of the margins and bottoms of ravines, washes, and rivers that traverse the uplands. Wetland biomes are composed of species or growth forms different from those of adjacent uplands and require more moisture than is provided by precipitation alone. Ponds and stock tanks also provide conditions for the growth of aquatic vegetation. These are the Sonoran Riparian Scrubland Biome along the margins of washes and around ponds and sometimes stock tanks (Minckley and Brown 1982c) (Photos 8 and 9), and the Sonoran Interior Strand Biome along the sandy/gravelly wash bottoms (Minckley and Brown 1982b)(Photo 10).



**Photo 8.**

Looking easterly up Bear Spring Canyon. Shallow ponds are formed by seepage from between two layers of sedimentary rocks and scouring by last summer's storms. Mexican pinyon, whitethorn, amole, and Lehmann lovegrass is on the south-facing slope. Alligator juniper, Emory oak, and the grasses, bluestem and deergrass are on the north-facing slope.



**Photo 9.**

Looking downstream from the road in the southwest edge of Section 26, dominated with Emory Oak.



**Photo 10.**

Looking upstream along a tributary to the Babocomari River. Plants of the Sonoran Interior Strand along the sandy/gravelly wash bottom include spiderling and ground spurge.

On Sands Ranch, there are several stock tanks (Photo 11), springs (Photo 12), and naturally occurring ponds (Photo 13) that provide crucial refuge and habitat for mud turtles and potentially for other amphibian, reptile, and fish species, some of which occur exclusively at such sites.



**Photo 11.**

Looking northwest to the Boulder Tank, a manmade livestock tank in the southwest corner of Section 23. Dark areas on mountains are oak communities of the Madrean Evergreen Woodland Biome. Trees in the background are velvet mesquite, shrubs surrounding the pond are seep willow, and the grasses are Bermuda grass, feather fingergrass, and strangletop.



**Photo 12.**  
Blacktail Spring in a small tributary to Bear Spring Canyon. Grasses are deergrass.



**Photo 13.**  
Naturally occurring pond in Bear Spring Canyon. Pond appears to be floored by bedrock hidden under streambanks and sand.

Throughout the Ranch, but especially in the northern sections, washes and canyons traverse the grassed uplands. Riparian corridors parallel these watercourses supporting a denser growth of shrubs and tree species, many of which also occur in the uplands. In many of these situations, especially at higher elevations closest to the Whetstone Mountains, the plants are part of stringers of the Madrean Evergreen Woodland Biome, communities of which are characteristic of north-facing slopes and the middle elevations of this mountain range. The plants include trees such as Emory oak, or bellota (*Quercus emoryi*)(Photo 14), Arizona white oak (*Quercus arizonica*)(Photo 15), juniper (*Juniperus* sp.)(Photo 16), alligator juniper (*Juniperus deppeana*)(Photo 17), and velvet ash (*Fraxinus velutina*) as well as shrubs such as lemonade berry (*Rhus trilobata*)(Photo 18), mountain mahogany (*Cercocarpus* sp.), Kearny sumac (*Rhus kearneyi*), and wait-a-minute

bush (*Mimosa biuncifera*), and the grasses, sacaton (*Sporobolus wrightii*) and deergrass (*Muhlenbergia rigens*).



**Photo 14.**  
Close up of Emory oak (*Quercus emoryi*)



**Photo 15.**  
Closeup of Arizona white oak (*Quercus arizonica*)



**Photo 16.**  
Close up of juniper species (*Juniperus* sp.)



**Photo 17.**  
Alligator juniper (*Juniperus deppeana*) growing in a draw with Emory and Arizona white oaks



**Photo 18.**  
Close up view of lemonade berry (*Rhus trilobata*) growing in a draw

While the trees mentioned above are common in many places in most drainages, they (except velvet ash and desert willow) are also found on north-facing slopes at higher elevations with one-seed juniper (*Juniperus monosperma*) and mountain mahogany and a variety of grasses (Photo 19).



**Photo 19.**  
Looking southwesterly to the Santa Rita Mountains. Trees are oaks (*Quercus* sp.) growing with one-seed juniper (*Juniperus monosperma*) in Madreaan Evergreen Woodland on a north-facing slope. Palmer's agave and Lehmann lovegrass with scattered bunch grasses are growing in Semidesert Grassland on a south-facing slope. Cassin's Sparrow and Say's Phoebe were observed on the south-facing slope.

At these same higher elevations, south-facing slopes often support dense stands of Palmer's agave (*Agave palmeri*) with fairy duster (*Calliandra eriophylla*) and native perennial grasses including three-awns (*Aristida* sp.) sprucetop grama (*Bouteloua chondrosioides*), side oats grama, and cane beardgrass (*Bothriochloa barbinodis*).

The northern part of the Ranch, in addition to having the greatest relief on the Ranch, also has several areas of limestone ridges overlain by shallow soils. These ridges support a high density of

shrubs and the majority of the Chihuahuan Desert elements such as sandpaper bush (*Mortonia scabrella*), desert sumac (*Rhus microphylla*), and mariola (*Parthenium incanum*), as well as creosotebush (*Larrea tridentata*), ocotillo (*Fouquieria splendens*), banana yucca (*Yucca baccata*), velvet mesquite (*Prosopis velutina*), and scattered grasses.

The central and southwestern part of the Ranch consists of long wide ridges covered with grasses separated by shallow draws or wide washes. Many of these grasslands are almost pure stands of the South African exotic Lehmann lovegrass (*Eragrostis lehmanniana*). In other areas, the Lehmann lovegrass is interspersed with groups of perennial three-awns and/or low shrubby individuals of velvet mesquite. Along roadsides, some fencelines, inside the protective cover of prickly pear, agave, or clumps of wait-a-minute bush (*Mimosa biuncifera*), and occasionally even amongst the Lehmann lovegrass, are scattered individuals of native perennials such as cane beardgrass, plains lovegrass (*Eragrostis intermedia*), plains bristlegrass (*Setaria macrostachya*), and Rothrock grama. Upper elevations along the eastern side of the Ranch include one-seed juniper, shrubs like fairy duster, leaf succulents like Palmer's agave and banana yucca, cacti like rainbow cactus (*Echinocereus pectinatus*), and staghorn cholla (*Opuntia versicolor*) scattered throughout.

### Mammals

Sixty mammals have potential of occurring on the Ranch including, bats (12 species), rodents (29 species), lagomorphs (4 species), carnivores (11 Species), and ungulates (3 species). Mammals with the highest probability of occurring on the Ranch include six rodents, two lagomorphs, two carnivores, one bat, and two ungulates. Mammals observed during the field reconnaissance on 22-23 October 2008 included, desert cottontail (*Sylvilagus audubonii*) and rock squirrel (*Spermophilus variegates*). A house, probably built by a white-throated woodrat (*Neotoma albigula*), was observed at the base of an oak tree. Tracks of collared peccary (*Tayassu[=Pecari] tajacu*), deer (*Odocoileus* sp.), raccoon (*Procyon lotor*), and of predators such as bobcat, mountain lion, and coyote (*Canis latrans*) were observed. The mine located just northwest of Ramsey Well contains suitable roosting habitat for some bat species (Photo 20). See Table 1. below for a list of mammals and their probability of occurring on the Ranch.



**Photo 20.**

Unnamed mine shaft (sloping at 45° from surface) located northwest of Ramsey Well. The dark item in the left foreground is a daypack left by illegal aliens.

<b>TABLE 1.</b>			
<b>MAMMALIAN SPECIES THAT OCCUR, OR COULD POTENTIALLY BE PRESENT ON SANDS RANCH</b>			
<b>Common Name</b>	<b>Scientific Name</b>	<b>Habitat</b>	<b>Probability of Presence</b>
American Free-tailed Bat	<i>Tadarida brasiliensis</i>	Caves and mines, sometimes old buildings or bridges, of Desertscrub and foothills of some higher mountains.	L
Antelope Jack Rabbit	<i>Lepus alleni</i>	Desertscrub and semidesert grassland, often in areas of dense mesquite and limited grass ground cover.	H
Arizona Cotton Rat	<i>Sigmodon arizonae</i>	Sometimes occurs in desert areas, usually characterized by mesquite and tumbleweeds with a small amount of grass. Other less arid places include canals and banks of small streams weeds and brush	L
Badger	<i>Taxidea taxus</i>	Flats and alluvial fans adjacent to desert mountains, open desert, throughout most of Arizona.	M
Bailey's Pocket Mouse	<i>Perognathus baileyi</i>	Flats and adjacent slopes of deserts south of the Mogollon Rim.	L
Banner-tailed Kangaroo Rat	<i>Dipodomys spectabilis</i>	Prefers grassy areas, often between 3,500 and 4,000 feet elevation with catclaw, mesquite, and <i>Opuntia</i> species.	M
Big Free-tailed Bat	<i>Nyctinomops macrotis</i>	Variety of habitats: ponderosa pine, piñon-juniper, Douglas-fir, and Sonoran Desertscrub, roost on rocky cliffs with crevices and fissures.	L
Black Bear	<i>Ursus americanus</i>	Mountain ranges from Semidesert Grassland to conifer forest. Documented from the Whetstone Mountains.	L
Black-tailed Jack Rabbit	<i>Lepus californicus</i>	Open country, from deserts to open scrub forests, found in mesquite, sagebrush, Desertscrub, into open piñon-juniper, grazed lands and croplands.	M
Bobcat**	<i>Felis rufus</i>	Broken country with cliffs and rock outcrops interspersed with open grassland, woods, or desert, from base to tops of most desert ranges in mesquite woods.	H
Botta's Pocket Gopher	<i>Thomomys bottae</i>	Underground burrows in nearly every habitat in Arizona as long as sufficient tuberous roots and plant material are available and soil is suitable for digging tunnels.	H
Brush Mouse	<i>Peromyscus boylii</i>	Areas of heavy brush and rocks among oaks and junipers and along washes.	H
Cactus Mouse	<i>Peromyscus eremicus</i>	Desert-among cacti, creosote bush, wood piles, rocks and rocky slopes, chaparral, and sandy flats.	L
California Myotis	<i>Myotis californicus</i>	Roost in crevices and cracks of canyon walls, sometimes in caves or mine shafts, forages over Desertscrub to the oaks and along lower edge of the conifers.	M
Cave Myotis	<i>Myotis velifer</i>	Inhabit mine shafts, tunnels, caves (usually near entrance), even under bridges, in desert	L

<b>TABLE 1.</b>			
<b>MAMMALIAN SPECIES THAT OCCUR, OR COULD POTENTIALLY BE PRESENT ON SANDS RANCH</b>			
<b>Common Name</b>	<b>Scientific Name</b>	<b>Habitat</b>	<b>Probability of Presence</b>
		areas of creosote bush, palo verde, brittlebush, and cacti, never more than a few miles from water source – tanks, canals, or creeks.	
Collared Peccary**	<i>Tayassu tajacu</i>	Desertscrub that is fairly thick and tall, especially in thickets along creeks and old steam beds within Desertscrub, retreat in caves, mine shafts, or crevices on rocky slopes, 2000-6500 ft.	H
Coyote**	<i>Canis latrans</i>	Every habitat in Arizona, broken country interrupted by rocks, brush, clumps of piñon-juniper or other vegetation.	H
Desert Cottontail**	<i>Sylvilagus audubonii</i>	Desertscrub, including Great Basin Desertscrub and plains- desert grasslands, may be found as high as junipers, in mountains in southeastern Arizona- may be found as high as oak belt.	H
Desert Pocket Mouse	<i>Perognathus penicillatus</i>	Sandy open deserts in variety of habitats but almost always where vegetation is sparse.	H
Desert Shrew	<i>Notiosorex crawfordi</i>	Any arid habitat with ample cover – dead agave plants, under piles of lumber, etc., in oak belt, among junipers, Desertscrub, and riparian.	M
Eastern Cottontail	<i>Sylvilagus floridanus</i>	Interior Chaparral, juniper-pinyon, oak woodland, and oak-pine communities. In southeast Arizona, often found among oaks with mesquite and grass.	M
Fringed Myotis	<i>Myotis thysanodes</i>	Found from chaparral to ponderosa pine, but most commonly in oak woodland, forage out into variety of other habitats.	L
Fulvous Cotton Rat	<i>Sigmodon fulviventor</i>	In Arizona, found in weedy places in the encinal and Mexican oak-pine woodland in the Huachuca Mountains	L
Fulvous Harvest Mouse	<i>Rathrodontomys fulvescens</i>	Found on grassy slopes and alluvial fans, usually where there are scattered oaks or other deciduous trees. In some places, they are closely associated with Yellow-nosed Cotton Rat.	L
Gray Fox	<i>Urocyon cinereoargenteus</i>	Open Desertscrub, chaparral, and oak or piñon-juniper woodland, sometimes in ponderosa pine or Douglas-fir.	L
Harris' Antelope Squirrel	<i>Ammospermophilus harrisi</i>	Saltbush-creosote bush-bursage deserts of western and southern Arizona, usually with rocky soil or rocky slopes.	L
Hispid Pocket Mouse	<i>Perognathus hispidus</i>	Found in desert grasslands where the grasses are moderately high and dense but not especially thick, and possibly in a mixture of yucca, ocotillo, mesquite, prickly pear, or agave.	H

<b>TABLE 1.</b>			
<b>MAMMALIAN SPECIES THAT OCCUR, OR COULD POTENTIALLY BE PRESENT ON SANDS RANCH</b>			
<b>Common Name</b>	<b>Scientific Name</b>	<b>Habitat</b>	<b>Probability of Presence</b>
Hoary Bat	<i>Lasiurus cinereus</i>	Found in xeric areas usually near or among trees in riparian areas.	L
Hog-nosed Skunk	<i>Conepatus mesoleucus</i>	A variety of habitats from desert grassland upslope into coniferous forest.	L
Hooded Skunk	<i>Mephitis macroura</i>	Poorly known, most specimens are from Arizona Upland Subdivision and grasslands. Seem to prefer rocky slopes, arroyos, and cliff bases, and riparian areas consisting of large washes and rivers.	M
Kit Fox	<i>Vulpes macrotis</i>	Low desert where soils are friable, suitable for constructing burrows.	L
Merriam's Kangaroo Rat	<i>Dipodomys merriami</i>	Sonoran and Chihuahuan Desertscrub, closely associated with mesquite, creosote bush, and cacti, sandy soil, avoids desert pavement or soil with many rocks, presence of grass is essential.	L-M
Merriam's Mouse	<i>Peromyscus merriami</i>	Heavy forest-like stands of mesquite, mesquite and saltbush bottoms.	L
Mountain Lion**	<i>Puma concolor</i>	A wide variety of habitats and elevation in the presence of suitable prey.	M
Mule Deer**	<i>Odocoileus hemionus</i>	Present in a variety of habitats– chaparral, desert washes and foothills, riparian woodlands.	H
Northern Grasshopper Mouse	<i>Onychomys leucoster</i>	Plains and desert grassland on sandy soil with sparse vegetation.	L
Northern Pygmy Mouse	<i>Baiomys taylori</i>	Found in plains and desert grassland vegetative communities. They have limited distribution in Arizona	L
Ord's Kangaroo Rat	<i>Dipomys ordii</i>	Mesquite, cacti, and grasses of central and southern Arizona, alluvial fans of southeastern part, pinyon-juniper of the northern part, and sandy soils and sagebrush of northwestern part.	M
Pallid Bat	<i>Antrozous pallidus</i>	Desertscrub in attics of houses, roofs of barns and sheds, old mine tunnels, crevices in cliffs, undersides of bridges and many other shelters.	M
Pocketed Free-tailed Bat	<i>Nyctinomops femorosaccus</i>	Rocky cliffs and slopes of southern deserts in Arizona, uses man-made shelters such as under roofing tiles on buildings.	L
Porcupine	<i>Erethizon dorsatum</i>	Mostly in wooded areas including mesquite and riparian cottonwood, but also occurs in grassland. Sometimes feeds on prickly pear fruit. Dens in rocky areas including mine shafts.	L
Raccoon**	<i>Procyon lotor</i>	May be in many different habitats but usually near water.	M
Rock Pocket Mouse	<i>Chaetodipus intermedius</i>	Common in dry rocky terrain	L
Rock	<i>Spermophilus</i>	In or among rocks, either on slopes, canyon	M

<b>TABLE 1.</b>			
<b>MAMMALIAN SPECIES THAT OCCUR, OR COULD POTENTIALLY BE PRESENT ON SANDS RANCH</b>			
<b>Common Name</b>	<b>Scientific Name</b>	<b>Habitat</b>	<b>Probability of Presence</b>
Squirrel**	<i>variegatus</i>	walls, or rock piles in wide variety of habitats, 1,600-11,000 feet.	
Round-tailed Ground Squirrel	<i>Spermophilus tereticaudus</i>	Creosote bush and saltbush desert with fine, deep soils in which extensive burrows are constructed.	M
Silky Pocket Mouse	<i>Perognathus flavus</i>	In southern Arizona, mostly occurs in plains and desert grassland areas including mesquite, grasses, and Russian thistle up to Mexican pine-oak woodland.	H
Southern Grasshopper Mouse	<i>Onychomys torridus</i>	Desertscrub in southern and western Arizona, to some extent in plains and desert grasslands in southeastern quarter, mesquite, cacti, and friable soil.	H
Southern Pocket Gopher	<i>Thomomys umbrinus</i>	Occurs in oak belt of southeastern Arizona in soil that is rocky and shallow	L
Spotted Ground Squirrel	<i>Spermophilus pilosoma</i>	Occur in a variety of habitats in Arizona from desert to mountain meadow conditions. In southern Arizona, associated with mesquite and acacia.	L
Spotted Skunk	<i>Spilogale putorius</i>	Poorly known, most specimens are from Arizona Upper Subdivision habitats, rocky areas	L
Striped Skunk	<i>Mephitis mephitis</i>	Occupies similar habitat as that of Hooded Skunk	M
Underwood's Mastiff Bat	<i>Eumops underwoodii</i>	Washes and open water bodies associated with mesquites and desert scrub vegetation.	L
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	Cool grassy meadows to dry tumbleweed and cocklebur fields, from weedy patches in coniferous forests to flats with cacti, mesquite, or sagebrush	M
Western Mastiff Bat	<i>Eumops perotis</i>	Roost in crevices and shallow caves on the sides of cliffs and rock walls.	L
Western Pipistrelle	<i>Pipistrellus hesperus</i>	Hunt along canyons, stream beds, and water holes from Desertscrub to pine forests, but never far from rocky canyon walls, cliffs, or rocky outcrops where they roost in narrow 1-inch vertical crevices	H
White-footed Mouse	<i>Peromyscus leucopus</i>	Live in a variety of habitats, but usually in thick grass or clumps of tamarisk	L
White-tailed Deer	<i>Odocoileus virginianus</i>	Oaks, oak-juniper-pinyon, and other woodlands from desertscrub to conifer forests.	M
White-throated Wood Rat**	<i>Neotoma albigula</i>	Variety of habitats – usually below conifer belt, in piñon-juniper, extensive cholla or prickly pear.	H
Yellow-nosed Cotton Rat	<i>Sigmodon ochrognathus</i>	Among oaks with sacahuista, agave, and yucca on grassy, rocky slopes.	M

TABLE 1.			
MAMMALIAN SPECIES THAT OCCUR, OR COULD POTENTIALLY BE PRESENT ON SANDS RANCH			
Common Name	Scientific Name	Habitat	Probability of Presence
Source: Hoffmeister 1986			
Probability of presence: P = Present H = High M = Moderate L = Low			
Note: Some species marked as present are based on presence of burrows, tracks, or scat.			

## Birds

At least 97 species of birds have potential of occurring on the Ranch as residents, summer breeders, or as transients, migrants, and incidentals. Twenty species of birds were observed on the Ranch during the field reconnaissance on 22-23 October 2008. In grasslands, these included a Cactus Wren (*Campylorhynchus brunneicapillus*) nest, Cassin's Sparrow (*Aimophila cassinii*), Common Raven (*Corvus corax*), Greater Roadrunner (*Geococcyx californicus*), Horned Lark (*Eremophila alpestris*), Mourning Dove (*Zenaida macroura*), Rufous-winged Sparrow (*Aimophila carpalis*), Sage Thrasher (*Oreoscoptes montanus*), Sandhill Crane (*Grus Canadensis*)(in neighboring Clyne Ranch), Say's Phoebe (*Sayornis saya*)(Photo 21), Sharp-shinned Hawk (*Accipiter striatus*)(Photo 22), Northern Harrier (*Circus cyaneus*), Montezuma Quail (*Cyrtonyx montezumae*)(Photos 23-24), and White-winged Dove (*Zenaida asiatica*). During the field reconnaissance of the neighboring Clyne Ranch in early October, we observed a female Montezuma Quail and her chicks foraging in the tall, dense grass about one-half mile north of Boulder Tank (Photo 25.). During the 22-23 October field surveys, a second large covey of Montezuma Quail was observed at Goat Well.

Along washes and canyons, we observed Canyon Wren (*Catherpes mexicanus*), Gambel's Quail (*Callipepla gambelii*), Golden-crowned Kinglet (*Regulus satrapa*), Phainopepla (*Phainopepla nitens*), a towhee (*Piplo* sp.), and White-crowned Sparrow (*Zonotrichia leucophrys*).



**Photo 21.**

Silhouette of Say's Phoebe on shrubby velvet mesquite in Semidesert Grasslands. Palmer's agave is scattered with Lehmann lovegrass and native bunch grasses.



**Photo 22.**  
Sharp-shinned Hawk sitting on a utility pole near Highway 82 and Granite Peak Road.



**Photo 23.**  
Suitable habitat for Montezuma Quail habitat at Goat Well. Trees are velvet mesquite, and the grasses are alkali sacaton, sprangletop, and bluestem. Other plants include, Russian thistle and burrowed.



**Photo 24.**  
Looking east towards hills on north side of Goat Well



**Photo 25.**  
Well camouflaged Montezuma Quail-Adult female with  
7 chicks observed foraging in tall bluestem grass.

See Table 2. below for a list of birds and their probability of occurring on the Ranch.

<b>TABLE 2.</b>			
<b>BIRD SPECIES THAT OCCUR, OR ARE LIKELY TO BE PRESENT ON SANDS RANCH</b>			
<b>Common Name</b>	<b>Scientific Name</b>	<b>Habitat</b>	<b>Probability of Presence/Status</b>
Allen’s Hummingbird	<i>Selasphorus sasin</i>	Chaparral, open oak woodland, riparian, woodland, residential areas in winter	R/M,T
American Kestrel	<i>Falco sparverius</i>	Open and partly open country with scattered trees	U/S
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	Variety of open habitats usually near water. Nests in cliffs	R/S
Anna’s Hummingbird	<i>Calypte anna</i>	Common winter resident and transient in towns, desert scrub, and riparian woodland in the lowlands.	C/T
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	Desert scrub, piñon-juniper, and riparian habitats	R/S
Baird’s Sparrow	<i>Ammodramus bairdii</i>	Winters in open grasslands	R/W,T
Barn Owl	<i>Tyto alba</i>	Open or partially open habitat, nests in mines, caves, embankments, structures, and hollow trees	U/R
Barn Swallow	<i>Hirundo rustica</i>	Open environments frequently near water. Nests in sheltered areas in buildings, under bridges, or in caves	R/S
Bewick’s Wren	<i>Thryomanes bewickii</i>	Brushy areas, thickets and scrub in open country	R/R
Bendire’s Thrasher	<i>Toxostoma bendirei</i>	In desert primarily in areas with	R/W

**TABLE 2.**  
**BIRD SPECIES THAT OCCUR, OR ARE LIKELY TO BE PRESENT ON**  
**SANDS RANCH**

Common Name	Scientific Name	Habitat	Probability of Presence/Status
		tall open vegetation	
Bewick's Wren	<i>Thryomanes bewickii</i>	Brush areas, thickets, and scrub in open country, riparian woodland, and chaparral	U/R
Black Phoebe	<i>Sayornis nigricans</i>	Usually along streams or lake margins in open to wooded country	R/R
Black Vulture	<i>Coragyps atratus</i>	Resident from southern Arizona nearly everywhere except in heavily forested regions and open plains	R/S
Black-chinned Hummingbird	<i>Archilochus alexandri</i>	Arid open woodland, scrub, and desert washes	U/S
Black-tailed Gnatcatcher	<i>Polioptila melanura</i>	Arid lowland scrub, particularly along xeroriparian washes	R/R
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	Shrubland, brushy undergrowth, piñon-juniper	R/T
Black-throated Sparrow	<i>Amphispiza bilineata</i>	Desert scrub, thorny brush, mesquite, and juniper	U/R
Blue Grosbeak	<i>Passerina caerulea</i>	Riparian thickets, brushy or weedy areas	R/S
Botteri's Sparrow	<i>Aimophila botterii</i>	Grasslands	C/S
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	Shrubby and brushy areas (especially near water), riparian woodland. Winters in pastures and fields	C/W,T
Brewer's Sparrow	<i>Spizella breweri</i>	Brushy scrublands, open desert and grasslands	C/W,T
Broad-billed Hummingbird	<i>Cynanthus latirostris</i>	Winters occasionally in southern Arizona in wooded desert canyons and washes	R/S
Bronzed Cowbird	<i>Molothrus aeneus</i>	Second growth scrub, and brushy areas in open country	C/S
Brown-crested Flycatcher	<i>Myiarchus tyrannulus</i>	Common in saguaro desert and river groves.	R/S
Brown-headed Cowbird	<i>Molothrus ater</i>	Woodland, forest, and forest edge; also open situations and scrub during winter and migration	C/T
Buff-collared Nightjar	<i>Caprimulgus ridgwayi</i>	Resident form southern Arizona in various habitats including arid lowland scrub	R/S
Cactus Wren**	<i>Campylorhynchus brunneicapillus</i>	Arid lowland scrub and low hillsides, often among cactus	R/R
Canyon Towhee**	<i>Pipilo fuscus</i>	Brushlands, arid scrub, mesquite and riparian thickets	U/R
Canyon Wren**	<i>Catherpes mexicanus</i>	Rocky areas including near vertical cliffs and other rock features, often near water.	C/R
Cassin's Finch	<i>Carpodacus cassinii</i>	Open coniferous forest; in	R/W,T

**TABLE 2.**  
**BIRD SPECIES THAT OCCUR, OR ARE LIKELY TO BE PRESENT ON**  
**SANDS RANCH**

Common Name	Scientific Name	Habitat	Probability of Presence/Status
		migration and winter also in deciduous woodland, second growth, scrub, brushy areas, and partly open environments with scattered trees	
Cassin's Kingbird	<i>Tyrannus vociferans</i>	Winters in scrub, riparian woodland, pinyon-juniper, dry savanna	U/W
Cassin's Sparrow**	<i>Aimophila cassinii</i>	Arid lowland scrub	U/S
Chipping Sparrow	<i>Spizella passerina</i>	In migration and winter in variety of open woodland, and brushy and shrubby habitats	U/W,T
Common Ground-dove	<i>Columbina passerina</i>	Arid lowland scrub	U/S
Common Poorwill	<i>Phalaenoptilus nuttallii</i>	Semi-arid and arid habitats among scrub, brush, or in open prairie	U/S
Common Raven**	<i>Corvus corax</i>	Variety of habitats, but often in mountains or hilly areas	U/R
Cooper's Hawk	<i>Accipiter cooperii</i>	Mature forest or broken woodlands, riparian forest, and in more open country	R/S
Costa's Hummingbird	<i>Calypte costae</i>	Desert and semi-desert, brushy foothills and along washes	C/W
Crissal Thrasher	<i>Toxostoma crissale</i>	Riparian thickets arid scrublands	R/R
Curve-billed Thrasher	<i>Toxostoma curvirostre</i>	Arid lowland scrub, usually among dense vegetation, but also in desert grassland with few cacti	U/R
Eastern Meadowlark	<i>Sturnella magna</i>	Resident in southern Arizona in grassland, savanna, open fields, pastures, and cultivated lands	U/R
European Starling	<i>Sturnus vulgaris</i>	Cavity nester in a wide variety of habitats at lower elevations	U/R
Ferruginous Hawk	<i>Buteo regalis</i>	Open country, primarily fry prairie, plains, sagebrush, badlands	U/W,R
Gambel's Quail**	<i>Callipepla gambelii</i>	Deserts with brush or low trees including xeroriparian habitat	C/R
Gila Woodpecker	<i>Melanerpes uropygialis</i>	Arid lowland scrub and cactus deserts	U/R
Golden-crowned Kinglet**	<i>Regulus satrapa</i>	Usually among conifers. Irregular migrant and winter visitor to a variety of lowland habitats	R/T
Golden Eagle	<i>Aquila chrysaetos</i>	Open country, desert and barren areas, especially in hilly terrain	U/W
Gray Vireo	<i>Vireo vicinior</i>	Oak-juniper, piñon-juniper, and also desert and arid scrub	R/T
Great Horned Owl	<i>Bubo virginianus</i>	A variety of forested habitats, brushy hillsides, and semi-desert	U/R
Greater Roadrunner**	<i>Geococcyx californianus</i>	Desert scrub and arid open areas with scattered vegetation	U/R

**TABLE 2.**  
**BIRD SPECIES THAT OCCUR, OR ARE LIKELY TO BE PRESENT ON**  
**SANDS RANCH**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Habitat</b>	<b>Probability of Presence/Status</b>
Hammond's Flycatcher	<i>Empidonax hammondi</i>	Riparian and other wooded areas during spring and fall migration	R/T
Harris's Hawk	<i>Parabuteo unicinctus</i>	Arid lowland or montane scrub	R/R
Hermit Thrush	<i>Catharus guttatus</i>	Winter visitor in riparian and brushy habitats	R/W
Horned Lark**	<i>Eremophila alpestris</i>	Common resident in grasslands and fallow agricultural fields; often abundant transient and winter resident, particularly in fields	U/R
House Finch	<i>Carpodacus mexicanus</i>	Scrub and brush in semi-arid lowlands and slopes	U/R
Killdeer	<i>Charadrius vociferous</i>	Present in a wide variety of habitats where vegetation is sparse, fields, meadows, and bare shores of ponds and streams	U/R
Ladder-backed Woodpecker	<i>Picoides scalaris</i>	Arid lowland scrub, mesquite, and cactus habitats	R/R
Lark Bunting	<i>Calamospiza melanocorys</i>	Often abundant transient and winter resident to open desert scrub, fallow and weedy fields, desert grasslands, and open ground	U/W,T
Lark Sparrow	<i>Chondestes grammacus</i>	Brushy Desertscrub and riparian edges	R/W,T
Lazuli Bunting	<i>Passerina amoena</i>	Found in variety of weedy and brushy habitats throughout the lowlands	R/M,T
Lesser Nighthawk	<i>Chordeiles acutipennis</i>	Desert, scrubland, and dry open country	R/S
Lincoln's Sparrow	<i>Melospiza lincolni</i>	Found in dense brush, weedy fields, riparian undergrowth, and towns	R/W,T
Lucy's Warbler	<i>Vermivora luciae</i>	Arid lowland scrub, primarily mesquite or mesquite-cottonwood along streams and washes	R/S
Merlin	<i>Falco columbarius</i>	Open to semi-open habitats, grasslands in winter	U/W,T
Montezuma Quail**	<i>Cyrtonyx montezumae</i>	Occurs in many different open woodland habitats but rely heavily on an understory of grasses and forbs.	P/R
Mourning Dove**	<i>Zenaida macroura</i>	Arid and desert habitats near water	C/R
Northern Cardinal	<i>Cardinalis cardinalis</i>	Scrub and riparian woodland, thickets and forest edges	R/R
Northern Harrier**	<i>Circus cyaneus</i>	Grasslands	C/W,T
Northern Mockingbird	<i>Mimus polyglottos</i>	Variety of open habitats from scattered brush and trees to scrub and thickets in semi-desert	U/R
Phainopepla**	<i>Phainopepla nitens</i>	Desert washes with mesquite,	U/W

**TABLE 2.**  
**BIRD SPECIES THAT OCCUR, OR ARE LIKELY TO BE PRESENT ON**  
**SANDS RANCH**

Common Name	Scientific Name	Habitat	Probability of Presence/Status
		juniper or oak, usually where mistletoe available	
Plumbeous Vireo	<i>Vireo plumbeus</i>	Pine forest down to piñon-juniper, and riparian woodland	U/T
Prairie Falcon	<i>Falco mexicanus</i>	Desertscrub and dry grasslands	U/S
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Present in a wide variety of open country with scattered trees	C/R
Rock Wren	<i>Salpinctes obsoletus</i>	Slopes and dry washes in scrub country	U/W
Rough-legged Hawk	<i>Buteo lagopus</i>	Very rare and irregular winter resident to grassland and agricultural areas, primarily in the Sulfur Springs Valley.	R/W
Rufous Hummingbird	<i>Selasphorus rufus</i>	Coniferous forest and brush hillsides, in lowlands in spring migration	U/M,T
Sage Thrasher**	<i>Oreoscoptes montanus</i>	Uncommon to rare transient and winter resident in sparse desert scrub and open juniper woodland.	R/W,T
Sandhill Crane**	<i>Grus canadensis</i>	Found at marshes, swampy edges of lakes and ponds, often foraging in adjacent grasslands and fields. In winter, migratory populations found primarily in agricultural fields and wet prairies.	R/T Reported by owner at pond
Say's Phoebe**	<i>Sayornis saya</i>	Arid scrub and desert, nests in structures and on cliffs	U/R
Scaled Quail	<i>Callipepla squamata</i>	Semidesert scrub and grasslands of mesas and bajadas above 3,000 feet.	U/R
Scott's Oriole	<i>Icterus parisorum</i>	Arid and semi-arid habitats. Summer resident in oak, oak-juniper, and hilly mesquite-yucca grassland.	U/R
Sharp-shinned Hawk**	<i>Accipiter striatus</i>	Summer resident of mature mixed forests. Transient or uncommon visitor elsewhere.	U/W
Sprague's Pipit	<i>Anthus spragueii</i>	Casual to rare transient and winter visitor in grassland and alfalfa fields	U/W,R
Turkey Vulture	<i>Cathartes aura</i>	Open country near wooded areas or cliffs suitable for nesting	U/S
Verdin	<i>Auriparus flaviceps</i>	Arid lowland scrub, mesquite, and thorny shrub habitat	R/R
Vesper Sparrow	<i>Pooecetes gramineus</i>	Dry shrublands, weedy pastures, fields and arid scrub	C/W,T
Western Kingbird	<i>Tyrannus verticalis</i>	Dry, open country with scattered trees	R/S
Western Meadowlark	<i>Sturnella neglecta</i>	Common transient and winter	U/W,T

TABLE 2.			
BIRD SPECIES THAT OCCUR, OR ARE LIKELY TO BE PRESENT ON SANDS RANCH			
Common Name	Scientific Name	Habitat	Probability of Presence/Status
		resident in fields, desert grassland, and open areas	
Western Screech Owl	<i>Otus kennicottii</i>	Sonoran riparian deciduous forest of cottonwood and willow, and Sonoran Desertscrub with saguaro and mesquite	R/S
White-winged Dove**	<i>Zenaida asiatica</i>	Found in a variety of habitats from Desertscrub, brushy grasslands, riparian woodlands, and urban and agricultural areas.	U/S
White-crowned Sparrow**	<i>Zonotrichia leucophrys</i>	Low trees and shrubs, thickets, and brushy desert areas	U/W
Wilson's Warbler	<i>Wilsonia pusilla</i>	Casual in winter in lowland riparian woodland	R/M,T
Yellow-breasted Chat	<i>Icteria virens</i>	Dense second-growth, riparian thickets, and brush.	R/S
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Open coniferous or mixed coniferous-deciduous forest, low scrub, or weedy fields	R/W,T
Yellow Warbler	<i>Dendroica petechia</i>	Mesquite and riparian woodlands	P/T
Zone-tailed Hawk	<i>Buteo albonotatus</i>	Often foraging over open country with Turkey Vulture	R/M
Probability of presence: P = Present A = Abundant C = Common U = Uncommon R = Rare Status: R = Resident S = Summer W = Winter visitor M= Migration spring and/or fall T = Transient Sources: Alsops, F.J. 2001; American Ornithologists' Union 1998; National Geographic Society 2006; Phillips, A.J. et al. 1964; and Tucson Audubon Society 2004			

### Amphibians and Reptiles

No amphibians were observed during the site visit, probably because they were already in hibernation for the winter. Few reptiles were observed for probably the same reason. However, we observed a Sonoran Whipsnake (*Masticophis bilineatus*) killed on a road and observed numerous small, fast-moving unidentified lizards, which were probably young of the year, still trying to get enough to eat to last them through winter hibernation. Permanent or semi-permanent water is present on the Ranch (Photo 26), so it is likely that amphibians may be present during the spring and summer months.



**Photo 26.**  
Rock pond in Bear Spring Canyon just northwest of Blacktail Spring.

A mud turtle (*Kinosternon* sp.) was observed on October 23, 2008, swimming in a natural rock pond located approximately 824 feet northwest of Blacktail Spring in Bear Spring Canyon (Photos 26-27). The turtle surfaced only briefly, so it was impossible to determine whether it was a Sonora Mud Turtle (*Kinosternon sonoriense*) or Yellow Mud Turtle (*K. flavescens*). The presence of a Yellow Mud Turtle at the pond may indicate a range extension for the species. Nonetheless, the presence of any mud turtle raises the possibility that other aquatic species, such as Chiricahua or Lowland Leopard Frogs, may be present as well. This observation is important to Pima County for several reasons. First, it indicates the presence of true wetland obligate species on the Ranch, secondly, it suggests other aquatic species (some special status) may be surviving in these small, but important ponds and springs, and thirdly, it represents one the goals of Arizona Land and Water Trust to preserve and protect these inconspicuous sensitive wetland habitats.



**Photo 27.**  
Mud Turtle observed swimming in the pond just northwest of Blacktail Spring

Table 3 below is a list of herptofauna and their probability of occurring on the Ranch. It is important to note that toads are highly dependent on the summer monsoon and are rarely observed above ground except following summer thunderstorms. This group of toads breeds in temporary rain pools and stock tanks, and remain sequestered in rodent burrows or dug into the soil for most of the year.

<b>TABLE 3</b>			
<b>AMPHIBIAN AND REPTILE SPECIES THAT OCCUR , OR ARE LIKELY TO BE PRESENT ON SANDS RANCH</b>			
<b>Common Name</b>	<b>Scientific Name</b>	<b>Habitat</b>	<b>Probability of Presence</b>
<b>AMPHIBIANS</b>			
Barking Frog	<i>Eleutherodactylus augusti</i>	Rocky areas, especially limestone, from creosotebush flats through dry yucca-covered hills and brushy woodland to ponderosa pine forests.	VL
Colorado River (=Sonoran Desert) Toad	<i>Bufo alvarius</i>	Ranges from arid mesquite-creosote bush lowlands and arid grasslands into the oak-sycamore-walnut groves in mountain canyons, often found near permanent water of springs, reservoirs, canals, and streams, but also frequents temporary pools.	H
Couch's Spadefoot (toad)	<i>Scaphiopus couchi</i>	Frequents shortgrass plains, mesquite savannah, creosote bush desert, thornforest, tropical deciduous forest, and other areas of low rainfall.	M
Great Plains Toad	<i>Bufo cognatus</i>	Typically found in grasslands but also found in creosotebush desert, mesquite woodland, and sagebrush plains. Breeds after summer rains in shallow temporary pools or quiet waters of streams, marshes, irrigation ditches, and flooded fields.	H
Red-spotted Toad	<i>Bufo punctatus</i>	Desert streams and oases, open grassland and scrubland, oak woodland, rocky canyons and arroyos, in crevices among rocks for shelter, breeds in rain pools, reservoirs, and temporary pools of intermittent streams.	H
Sonoran Green Toad	<i>Bufo retiformis</i>	Found in creosotebush flats, saguaro-paloverde, and mesquite grassland. Breeds after summer rains in rainwater sumps and wash bottoms bordered by fresh grass and scattered shrubs.	M
Woodhouse's Toad	<i>Bufo woodhousii</i>	Found in many habitats including grassland sagebrush flats, woods, desert streams, valleys, floodplains, and farms. Prefers sandy areas. Breeds in quiet waters of streams, marshes, ponds, and irrigation ditches during or soon after rains.	H

TABLE 3			
AMPHIBIAN AND REPTILE SPECIES THAT OCCUR , OR ARE LIKELY TO BE PRESENT ON SANDS RANCH			
Common Name	Scientific Name	Habitat	Probability of Presence
<b>REPTILES</b>			
Coachwhip	<i>Masticophis flagellum</i>	Frequents a variety of habitats including desert, prairie, scrubland, juniper-grassland, woodland, thornforest, and farmland. Generally avoids dense vegetation. Ground surface may be flat or hilly, sandy or rocky.	H
Common Kingsnake	<i>Lampropeltis getulus</i>	Frequents a great variety of habitats – coniferous forest, woodland, swampland, coastal marshes, river bottoms, farmland, prairie, chaparral, and desert. Often found in vicinity of rock outcrops and clumps of vegetation and under rotting logs, old lumber, and rocks.	L
Common Side-blotched Lizard	<i>Uta stansburiana</i>	Found in sand, rock, hardpan, or loam with grass, shrubs, and scattered trees. Often found along sandy washes where there are scattered rocks and low-growing bushes.	H
Desert Grassland Whiptail	<i>Cnemidophorus uniparevis</i>	Generally found on plains and gentle foothill slopes, occasionally in areas with scant cover of grasses and herbs but more commonly where mesquite and yucca are present.	M
Desert Spiny Lizard	<i>Sceloporus magister</i>	Inhabits arid and semi-arid regions on plains and lower slopes of mountains. Found in Joshua tree, creosote bush, and shadscale deserts, mesquite-yucca grassland, juniper and mesquite woodland, subtropical thornscrub, and along rivers grown to willows and cottonwoods.	H
Desert Tortoise	<i>Gopherus agassizii</i>	Rocky habitats of low hills in Sonoran Desertscrub habitat.	L
Gila Monster	<i>Heloderma suspectum</i>	Inhabits chiefly shrubby, grassy, and succulent desert; occasionally enters oak woodland. Found in canyon bottoms or arroyos with permanent or intermittent streams, where it digs burrows or uses those of other animals.	L-M
Glossy Snake	<i>Arizona elegans</i>	Occurs in a variety of habitats-light shrubby to barren desert, sagebrush flats, grassland, chaparral-covered slopes, and woodland. Generally prefers open areas. Ground is often sandy or loamy but some rocks may be present. Excellent burrower.	M
Gopher Snake	<i>Pituophis catenifer</i>	Lives in a variety of habitats, from the lowlands high into the mountains and from coast to coast. Frequents desert, prairie, brushland, woodland, open coniferous forest, and farmland. Especially common in grassland and open brushland in West. Soil conditions vary-sand, loam, rock, or hardpan.	H

TABLE 3			
AMPHIBIAN AND REPTILE SPECIES THAT OCCUR , OR ARE LIKELY TO BE PRESENT ON SANDS RANCH			
Common Name	Scientific Name	Habitat	Probability of Presence
Greater Earless Lizard	<i>Cophosaurus texanus</i>	Found at middle elevations where cactus, mesquite, ocotillo, creosote bush, and paloverde grow. Found in sandy, gravelly soils of flats, washes, and intermittent stream bottoms where plants are sparse and there are open areas for running. Occasionally found on rocky hillsides.	H
Ground Snake	<i>Sonora semiannulata</i>	Secretive snake of arid and semiarid regions, where the soil may be rocky, gravelly, or sandy and has some subsurface moisture. Frequents river bottoms, desert flats, sand hummocks, and rocky hillsides where there are pockets of loose soil. Vegetation may be scant as in creosote bush desert, but along Colorado River, this snake occurs among thickets of mesquite, arrowweed, and willows. Ranges from prairies through desert plant communities, thornscrub, piñon-juniper to the oak-pine zone.	M
Long-nosed Leopard Lizard	<i>Gambelia wislizenii</i>	Inhabits arid and semi-arid plains grown to bunch grass, alkali bush, sagebrush, creosote bush, or other scattered low plants. The ground may be hardpan, gravel, or sand. Rocks may or may not be present. This lizard avoids dense grass and brush, which interfere with running.	M
Long-nosed Snake	<i>Rhinocheilus lecontei</i>	Inhabitant of deserts, prairies, shrubland, and tropical habitats in Mexico.	H
Mojave Rattlesnake	<i>Crotalus scutulatus</i>	Chiefly inhabits upland desert and lower mountain slopes, but ranges to about sea level near the mouth of the Colorado River and to high elevations in the Sierra Madre Occidental. Habitats vary – barren desert, grassland, open juniper woodland, and scrubland. Seems to be common in areas of scrubby growth such as creosote bush and mesquite. Not common in broken rocky terrain or where vegetation is dense.	H
Night Snake	<i>Hypsiglena torquata</i>	Frequents a variety of habitats – grassland, chaparral, sagebrush flats, deserts, woodland, moist mountain meadows, thornscrub, and thornforest. Occurs in both rocky and sandy areas.	H
Ornate Tree Lizard	<i>Urosaurus ornatus</i>	A climbing lizard that spends much of its time in trees or on rocks. Frequents mesquite, oak, pine, juniper, alder, cottonwood, tamarisk, and eucalyptus, but can also occur in treeless areas. Ranges from desert to lower edge of the spruce-fir zone, frequently found near rivers.	M
Regal Horned Lizard	<i>Phrynosoma solare</i>	Frequents rocky and gravelly habitats of arid and semi-arid plains, hills, and lower slopes of	M

TABLE 3			
AMPHIBIAN AND REPTILE SPECIES THAT OCCUR , OR ARE LIKELY TO BE PRESENT ON SANDS RANCH			
Common Name	Scientific Name	Habitat	Probability of Presence
		mountains. Much of its range is in succulent plant habitat of upland desert. Plants present may include cactus, mesquite, and creosote bush. Seldom found on sandy flats.	
Ring-necked Snake	<i>Diadophis punctatus</i>	Moist areas in mountains, near springs and watercourses.	M
Sonoran or Arizona Coral Snake	<i>Micruroides euryxanthus</i>	Found in a variety of habitats including thornscrub, brushland, woodland, grassland, and often among rocks. Most abundant in rocky upland desert, especially along arroyos and river bottoms.	L
Sonora Mud Turtle	<i>Kinosternon sonoriense</i>	Oak and pinyon-juniper woodlands and conifer forests, in waters of intermittent streams, but primarily in streams. Occasionally in foothill grasslands and desert. Less aquatic than Yellow Mud Turtle, and less likely to be found in lowlands.	H- Unidentified mud turtle seen in pond in Bear Spring Canyon
Sonoran Spotted Whiptail	<i>Cnemidophorus sonorae</i>	Occurs primarily in upland habitats of oak woodland and oak grassland, and in streamside woodland, desert-grassland, desertscrub of paloverde and saguaro, and thornscrub.	L
Sonoran Whipsnake**	<i>Masticophis bilineatus</i>	Found in Arizona Upland Desertscrub foothills and mountains, Semidesert Grassland, Interior Chaparral, Madrean Evergreen Woodland, and Great Basin Conifer Woodland. Often found on sunny brushy slopes.	P
Western Banded Gecko	<i>Coleonyx variegatus</i>	Creosote bush flats and sagebrush desert to the piñon –juniper belt; catclaw-cedar-grama grass plant community to chaparral; often associated with rocks; occurs on barren dunes in some portions of its range.	L
Western Diamond-backed Rattlesnake	<i>Crotalus atrox</i>	Frequents a variety of habitats from the plains into the mountains – desert, grassland, shrubland, woodland, open pine forests, and rank growth of river bottoms. Ranges from sandy flats to rocky upland areas.	M
Western Lyre Snake	<i>Trimorphodon biscutatus</i>	Occurs mostly commonly in rocky areas, of lowlands, mesas, and lower mountain slopes, but also in rockless areas. Found in a variety of vegetative communities, including desert grasslands.	L
Yellow Mud Turtle	<i>Kinosternon flavescens</i>	Semi-arid grassland and open woodland in permanent and intermittent waters, especially ponds. More aquatic than Sonoran Mud Turtle and more likely to be found in the lowlands.	VL- Unidentified mud turtle seen in pond in Bear Spring Canyon

TABLE 3			
AMPHIBIAN AND REPTILE SPECIES THAT OCCUR , OR ARE LIKELY TO BE PRESENT ON SANDS RANCH			
Common Name	Scientific Name	Habitat	Probability of Presence
Zebra-tailed Lizard	<i>Callisaurus draconoides</i>	Frequents washes, desert pavement, and hardpan where growth is scant and there are open areas for running. Occasionally found in rocky arroyos and on windblown sand.	L
Source: Brennan and Holycross 2006; Degenhardt et al. 1996; Lowe, C.H. 1964, and Stebbins 2003 Probability of presence: P = Present H = High M = Moderate L = Low VL = Very Low			

### Invertebrates

During the site reconnaissance on 22-23 October 2008, a number of butterflies were observed on the Ranch, particularly near water sources, such as Boulder Tank, Blacktail Spring, and various other springs in Bear Canyon. A species typically found in oak woodlands, streams in the foothills and mountains is the California Sister (*Adelpha bredowii*) (Photo 28), a strikingly beautiful butterfly that was observed along the stream in Bear Canyon not far from the natural pond the mud turtle was seen in. Other invertebrates observed on the Ranch during the field reconnaissance of Clyne Ranch in early October included a wide variety of grasshoppers such as Band-winged, Lubber, and Rainbow Grasshoppers and other species of butterflies including, Orange Sulfur (*Colias eurytheme*) and Bordered Patch (*Chlosyne lacinia*). Many more invertebrate species have the potential of occurring in Semidesert Grasslands.



**Photo 28.**  
**California Sister (*Adelpha bredowii*)**

**PRIORITY VULNERABLE SPECIES**

As part of the SDCP planning process, Pima County, its Scientific Technical Advisory Team (STAT), and its principal consultant RECON identified a list of priority vulnerable species (PVS) in Pima County. The PVS list contains a total of 55 species; 9 mammals, 8 birds, 2 amphibians, 9 reptiles, 6 fish, 1 arthropod, 13 talus snails, and 7 plants (Pima County 2004b).

An important consideration for Pima County as it acquires lands to help meet the stated goal of the SDCP is the extent to which a particular parcel functions to provide resources needed in the life cycles of the PVS. However, it is not necessary for a PVS to be present on a parcel to be of value to the county. It may, for example, provide connectivity between two or more other areas within the CLS and, therefore, be of value in facilitating movement and gene flow between areas.

Habitat mapping for PVS is critical to assessing reserve design alternatives in terms of conservation goals. Habitat models for species were developed for the SDCP using GIS that summarized key environmental characteristics that were scored as potential habitat for each species. The species-specific habitat scores were compiled in a species-environmental matrix where each characteristic (i.e. mixed grass-scrub) of a variable (i.e. vegetation) was valued from low to high for each species. To add to the model, additional known location data was used to add to species descriptions and served as a starting point for species inventory and monitoring that would be part of the Adaptive Management Plan. During the development of habitat modeling, Pima County biologists were a part of the process by identifying key environmental variables describing habitat for a specific species and helping GIS analysts score environmental characteristics. (Pima County 2002c). Because the models are developed on a larger scale, field surveys often improve or refine them to include a more accurate picture of environmental conditions on the ground.

Table 4 below identifies 19 PVS with modeled habitat and their probability of occurrence on Sands Ranch. Only species with a moderate to high probability of occurrence are addressed in detail below.

<b>TABLE 4</b>		
<b>19 PRIORITY VULNERABLE SPECIES WITH MODERATE TO HIGH MODELED HABITAT AND THEIR POTENTIAL FOF OCCURRENCE ON SANDS RANCH</b>		
<b>Common Name</b>	<b>Scientific Name</b>	<b>Modeled Habitat/Probability of Presence</b>
<b>MAMMALS</b>		
Allen’s Big-eared Bat	<i>Idionycteris phyllotis</i>	H,M,L/M
Arizona Shrew	<i>Sorex arizonae</i>	H,M,L/L
California Leaf-nosed Bat	<i>Macrotus californicus</i>	H,M,L/M-H
Lesser Long-nosed Bat	<i>Leptonycteris curasoae yerbabuena</i>	H,M/H
Mexican Long-tongued Bat	<i>Choeronycteris mexicana</i>	H,M,L/H
Pale Townsend’s Big-eared Bat	<i>Plecotus townsendii pallescens</i>	H,M,L/H
Southern Yellow Bat	<i>Lasiurus xanthinus=ega</i>	H,M,L/L
Western Red Bat	<i>Lasiurus blossevillii</i>	H,M/L-M
<b>BIRDS</b>		
Abert’s Towhee	<i>Pipilo aberti</i>	M,L/M

Bell's Vireo	<i>Vireo bellii</i>	L,M/L
Rufous-winged Sparrow	<i>Aimophila carpalis</i>	No modeled habitat/P
Swainson's Hawk	<i>Buteo swainsoni</i>	H,M/H
Western Burrowing Owl	<i>Athene cunicularia hypugaea</i>	H,M,L/L-M
<b>AMPHIBIANS AND REPTILES</b>		
Chiricahua Leopard Frog	<i>Lithobates [=Rana] chiricahuensis</i>	H,M,L/H
Desert Box Turtle	<i>Terrapene ornata luteola</i>	H,M/M-H
Ground Snake	<i>Sonora semiannulata</i>	H,M/M
Lowland Leopard Frog	<i>Lithobates [=Rana] yavapaiensis</i>	L/M
<b>PLANTS</b>		
Huachuca Water Umbel	<i>Lilaeopsis scaffneriana</i> var. <i>recurva</i>	L-M/M
Needle-spined Pineapple Cactus	<i>(Echinomastus [=Sclerocactus] erectocentrus</i> var. <i>erectocentrus</i>	L-M/L

## MAMMALS

### Allen's Big-eared Bat (*Idionycteris phyllotis*)

This bat is a federal species of concern (Pima County 2004). The Ranch contains an equal mix of high and medium potential habitat, with high habitat being present in the hills and mountains rather than the open, flat topography. A mosaic of low habitat is present in the southern half of the Ranch. Two Priority 2 Conservation Areas are located to the northeast and west of the Ranch in the area of the Empire and Whetstone Mountains.

Allen's Big-eared Bat is found in areas of ponderosa pine, piñon-juniper, riparian woodlands, and desertscrub. It is commonly found in association with boulder piles, cliffs, rocky outcroppings, or lava flows. It is often netted over streams or ponds where it may be looking for insects or water. Mesquite, white thorn acacia, and agave are commonly found along water sources where this bat is netted. It roosts in mine tunnels, rock piles, and under exfoliating bark of conifer trees. Females form maternity colonies in early summer. Young are born in mid to late June and fledge by the end of July. The diet of this bat is predominantly insects, mainly moths, soldier beetles, dung beetles, leaf beetles, roaches, and flying ants, all taken in flight (Pima County 2004).

Allen's Big-eared Bat has not been captured in Pima County although it is suspected of being present (Pima County 2004). Two specimens labeled Allen's Big-eared Bat taken in the Tucson Mountains are housed in the University of Arizona mammalogy collections. Close examination of these two specimens revealed that they are both actually Pale Townsend's Big-eared Bat (*Plecotus townsendii pallescens*) (E.L. Smith, personal observation with Dr. Yar Petryszyn 2001). Because this species is often netted over ponds and streams, the location where this would be most likely includes Boulder Tank, McNalley Tank, or any one of the springs and ponds in Bear Spring Canyon. We rate the probability of its presence on the Ranch as moderate.

### Arizona Shrew (*Sorex arizoniae*)

The Arizona Shrew is considered a species of concern by the U.S. Fish & Wildlife Service (FWS), wildlife of special concern in Arizona by the Arizona Game and Fish Department (AGFD), and sensitive by U.S. Forest Service (USFS). It is also considered vulnerable status 2 by SDCP (Pima County 2004). The Ranch has a mixture of high and medium potential modeled

habitat with small patches of low. The high modeled habitat occurs in the higher elevation mountain canyons and hillsides.

All records of this species are from high mountain ranges. In Arizona, the shrew has been found in the Huachuca, Santa Rita, and Chiricahua mountains above 5,675 feet in elevation. The biology of this animal is largely unknown. It has only been captured during or after the peak of summer rains, which leads scientists to believe that the rains might trigger breeding and dispersal. If this species is similar to other shrews, it is a voracious predator during the active season, and it also has a dormant season. The diet consists mainly of arthropods, earthworms, and slugs (Pima County 2004). The Ranch reaches the highest elevation at 5,780 feet in the southeast corner of the Ranch in the foothills on the south end of the Whetstone Mountains. Since this represents such a small area within the elevational range of the species, we believe there is a low probability of this shrew being present on the Ranch.

### **California Leaf-nosed Bat (*Macrotus californicus*)**

The California Leaf-nosed Bat is considered a federal species of concern by the FWS and a wildlife species of special concern by the AGFD (AGFD 2008). It has a vulnerable status 2 listing in the SDCP (Pima County 2004). Patches of high modeled habitat are present in the southern sections of the Ranch while medium habitat occurs in the northern sections. There are no Priority Conservation Areas for this bat in the vicinity of the Ranch, the nearest being in the Tucson Mountains, located approximately 72 miles northwest of the Ranch.

The California Leaf-nosed Bat has an erect lanceolate nose-leaf. The ears are 1.16 to 1.52 inches (29.0-38.0 mm) long and joined together at the base. The tail extends past the uropatagium for 0.2 to 0.4 inch (5.0 to 10.0 mm). Its wingspan is approximately 13.5 inches (35 cm), and its fur is brown. Males establish leks in mines or caves, and females come to the leks in the fall to select a mate. Embryological development is delayed until March when it resumes normally. Females form maternity colonies and give birth during May and June (Pima County 2004).

In Arizona, these bats, which are active year-round, can survive temperatures from 48°F to 53°F for only a few hours (Hoffmeister 1986). They are found in caves, mines, and rock shelters in Sonoran Desertscrub. The main part of this bat's diet is comprised of large night-flying beetles, grasshoppers, and moths, which they take in flight, and insect larvae which they take off bushes or the ground (Hoffmeister 1986).

A well structured mine adit is present just northwest of Ramsey Well in Section 15 and could provide roosting habitat for the bat; therefore, we consider the potential for the presence of this species, during the warmer summer months on the Ranch to be moderate to high.

### **Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuena*)**

The Lesser Long-nosed Bat was federally listed as an endangered species on September 20, 1988 (USFWS 1988). At the time of listing, populations of this species were believed to be declining rapidly (BISON 2004), although there is some debate about the actual status and trends in the population (Cockrum and Petryszyn 1991). A recovery plan was published in May 1994 (USFWS 1994). The Lesser Long-nosed Bat is also listed as a wildlife species of special concern by the AGFD, as a sensitive species by the USFS, and has a vulnerable status 2 listing in the SDCP (Pima County 2004). The Ranch has high and medium potential habitat and is within a Priority 2 Conservation Area.

This species is migratory, wintering in Mexico and migrating north into Arizona for the summer and early fall. They normally roost and have maternity colonies in caves or in abandoned mine tunnels (Hoffmeister 1986). The Lesser Long-nosed Bat feeds primarily on pollen and nectar, of agaves, saguaro, and organ pipe cactus (*Stenocereus thurberi*), but they also feed on fruits and seeds of saguaros and organ pipes (Hoffmeister 1986). They serve as important pollinators and seed-dispersers for these species. Typical habitats for this species include Sonoran Desertscrub and Semidesert Grassland, lower edges of oak woodlands, and cottonwood and sycamore riparian areas. Specific habitat features include a good supply of suitable plant species for foraging and access to favorable roost sites (BISON 2004).

During the summer months, it is possible that Lesser Long-nosed Bats would forage within or in close proximity to the Ranch, particularly in areas where paniculate agaves occur more abundantly (Photo 29). We consider the probability of Lesser Long-nosed Bats using the Ranch to be high.



**Photo 29.**  
Paniculate agaves (Palmer's agave) growing in abundance

### **Mexican Long-tongued Bat (*Choeronycteris Mexicana*)**

This bat is considered a species of concern by UFWS and wildlife of special concern by AGFD (Pima County 2004). Modeled habitat for the Mexican Long-tongued Bat on Sands Ranch is a mix of high and medium, with small patches of low, and is within a Priority 2 Conservation Area.

These bats are found in canyons of mixed oak-conifer forests in mountain ranges surrounded by desert and also in Semidesert Grassland. Roost sites are usually near a water source and riparian vegetation. Caves, inactive mines, unoccupied buildings, and wide rock crevices are used as day and night roosts. Population groups usually have 15 or fewer individuals. They hang approximately 0.8 to 2.0 inches (2-5 cm) apart, commonly by one foot, so that they can rotate 360 degrees to observe intruders. These bats migrate to Mexico during the winter and they do not hibernate. During the summer, females are found at the northern extent of their range in southern Arizona, where they stay in nursery colonies. Young are born between mid to late June and early July. They can fly within 2 to 3 weeks (Pima County 2004). This species is a nectar and pollen feeder and probably also eats insects found in flowers. Paniculate agaves are a major source of food (Pima County 2001).

Sands Ranch is undoubtedly within the flight range of bats roosting all around the Santa Rita and Whetstone Mountains. Resources such as paniculate agaves are abundant throughout and oak-grasslands habitat is present in the upper elevations of the Ranch. The AGFD, HDMS has documented the species within five miles; therefore, we rate the probability of occurrence of this species on the Ranch to be high.

#### **Pale Townsend's Big-eared Bat (*Plecotus townsendii pallescens*)**

This bat is considered a species of concern by UFWS and wildlife of special concern in Arizona by AGFD. It is also considered vulnerable status 2 in SDCP (Pima County 2004). Sands Ranch is within a mixture of modeled high, medium, and low potential habitat within a Priority 1 Conservation Area.

The Pale Townsend's Big-eared Bat has been found through a range of elevations and vegetation communities including, Sonoran Desertscrub, Madrean Evergreen Woodland, and coniferous forests in Arizona (Pima County 2004). During the day they are usually in caves or mine tunnels, but at night they can be found in abandoned buildings. In the summer, pregnant females form nursery or maternity colonies separate from the males and in the winter, they hibernate (Hoffmeister 1986). These bats mate during October, but delayed implantation occurs, so young are born from late April to mid-July. Only one young is born per year. The Pale Townsend's Big-eared Bat's diet consists mostly of small moths that it catches in flight. It may also take insects off vegetation while in flight (Pima County 2004). We estimate the probability of this bat being present on the Ranch, especially as foraging individuals, to be high.

#### **Southern Yellow Bat (*Lasiurus xanthinus*=*L. ega*)**

The Southern Yellow Bat is considered wildlife of special concern in Arizona by AGFD and sensitive by the USFS. It is considered vulnerable status 2 in the SDCP (Pima County 2004). Modeled potential habitat on Sands Ranch is a mosaic of medium and low modeled habitat with no PCA; however Priority 2 Conservation Areas surround the Ranch in the Whetstone and Empire Mountains.

This bat is a tropical species that ranges from southern U.S. south to Uruguay and Argentina. It is known from urban settings in Arizona where it is found most commonly in association with the Washington fan palm (*Washingtonia filifera*) (Hoffmeister 1986). The pelage of this species is nearly identical to the color of dead palm fronds. It can also be found in deciduous trees in riparian areas. The Southern Yellow bat is insectivorous (Pima County 2004). There are very limited resources available for this species in both the upland and wetland habitats on the Ranch; therefore, we rate the probability of this species occurring to be low.

#### **Western Red Bat (*Lasiurus blossevillii*)**

The Western Red Bat is considered wildlife of special concern by AGFD and sensitive by USFS. It is considered vulnerable status 2 by SDCP (Pima County 2004). The Ranch is modeled mostly medium with a small northwest-southeast trending finger near Bear Spring Canyon and continues into the upper elevations of the Whetstone Mountains. The entire Ranch is within a Priority 2 Conservation Area.

This bat is known only from broadleaf riparian deciduous forests and woodlands in trees such as walnuts, sycamores, and cottonwoods at elevations from 2,400 to 7,200 feet. Red Bats roost singly or in limited family groups of female and progeny in thick vegetation. Roosting sometimes occurs in saguaro cavities and cave-like environments, although this bat is rarely recorded from caves and buildings. Western Red Bats have also been found in fruit orchid trees (Pima County 2001). This species is insectivorous, eating moths, flies, beetles, cicadas, ground-dwelling crickets, hemipterans, and hymenopterans. Mating occurs in August and October, but females store sperm until spring when fertilization occurs. Gestation is approximately 60 to 70 days, and 1 to 5 young are born from late May to mid-June. Lactation lasts for 5 to 6 weeks, and the young fledge between their third and fourth weeks (Pima County 2004). We rate the probability of this species occurring on the parcels to be low to moderate.

## BIRDS

### **Abert's Towhee (*Pipilo aberti*)**

The Abert's Towhee is protected under the Migratory Bird Treaty Act, has no state status, and has vulnerable status 1 in the SDCP (Pima County 2004). Most of the Ranch has no modeled habitat however, small fingers of medium habitat occur along some of the drainages, with no PCA, the nearest located along Cienega Creek, located a few miles to the west of the Ranch.

This towhee is a large sparrow with gray-brown upper parts. The breast, flanks, and belly are pinkish brown and the crissum is a dark rust color. There is black on the lores, malar region, chin, and extreme anterior forehead surrounding a pale bill. Males and females are identical. Abert's Towhee eats insects and seeds. Beetles and ants are consumed year-round, many caterpillars are consumed in the fall, winter, and spring, and grasshoppers and cicadas are important foods during the summer (Pima County 2004).

Habitat for this species includes Sonoran riparian deciduous woodland and riparian scrubland with a dense understory of shrubs. Permanent territories for mated pairs are generally 3.75 to 5 acres (1.5 to 2.0 ha). This species is monogamous, and pair bonds are life-long. In February to April the female constructs a cup nest in trees or shrubs 4 to 7 feet (1.6 to 2.2 m) from the ground. Second broods are common, and if a nest is unsuccessful, a pair may try up to 6 times to re-nest. Clutches are usually 1 to 5 pale blue eggs with dark mottles. The eggs are incubated for 14 days, and the young stay in the nest for 12 to 13 days. Fledglings remain with their parents for another 4 to 5 weeks (Pima County 2004).

Nest sites are located typically in shrubs approximately four to seven feet high often with southeast orientation. Dense understory of vegetation appears to be an important habitat component, especially areas adjacent to riparian scrubland. An unidentified towhee species was observed in Bear Spring Canyon. We rate the probability of this species on Sands Ranch to be moderate.

### **Bell's Vireo (*Vireo bellii*)**

Bell's Vireo is protected under the Migratory Bird Treaty Act (Pima County 2004), but has no SDCP vulnerable status designation in Pima County. The Ranch has similar modeled habitat as that of Abert's Towhee, except that medium instead of high modeled habitat was identified for the Bell's Vireo. A Priority 1 Conservation Area is present along Cienega Creek (Pima County 2004).

Bell's Vireo is 4.5 to 5.0 inches (115 to 125 mm) long and weighs 7 to 10 g. It has short rounded wings and a short straight bill. Plumage can vary from drab gray to green above and white to yellow below. It has a faint white eye ring and two pale wing bars. Bell's Vireo is almost entirely insectivorous during the breeding season, supplementing this with small quantities of fruit. The winter diet is unknown (Pima County 2004).

This species inhabits low, dense, shrubby vegetation in riparian areas, usually along lowland stream courses with willows, mesquite, and seepwillows. According to the Arizona Breeding Bird Atlas (Corman and Wise-Gervais 2005), the Bell's Vireo is commonly found in larger, heavily wooded desert washes with dense stands of paloverde, mesquite, and/or netleaf hackberry. Breeding usually occurs from April through July. Pairs are generally monogamous. Clutches of 3-5 eggs are incubated for 14 days by both parents. Fledglings leave the nest in 11 to 12 days. Pairs usually produce one brood per season, but second broods are not uncommon (Pima County 2004). Dense stands of trees occur along portions of the washes in Bear Spring Canyon and in small patches in the grasslands, but the areas appear to be too small and open to support Bell's Vireo. They are also not typically known to occupy oak and juniper thickets, so we rate the probability of this species occurring on the Ranch as low.

### **Rufous-winged Sparrow (*Aimophila carpalis*)**

The Rufous-winged Sparrow has no federal or state status (Pima County 2004). It was at one time thought to be extinct in the United States. Herbert Brown collected an individual bird at Tucson in 1886; thereafter, not a single Rufous-winged Sparrow was found in southern Arizona for a half-century. The birds reappeared in the mid-1930s and underwent an extraordinary range expansion in the mid-1950s. According to Phillips (1968), few species in southern Arizona have shown such drastic fluctuations in habitat and numbers. No habitat was modeled on the Ranch, and the closest PCA is west of the Santa Rita Mountains.

Rufous-winged Sparrows are typically found in flat or gently hilly Sonoran Desertscrub and Sinaloan Thornscrub with scattered spiny trees and shrubs. Grasses are essential habitat components, and mesquite, hackberry, cholla, and palo verde are usually present as well. Territories commonly encompass some wash habitat. These birds are also found at higher elevations in oak savannas. Diet during the breeding season consists of caterpillars, grasshoppers, and grass and weed seeds. Rufous-winged Sparrows are monogamous, and pairs maintain their territories year-round. Young usually leave the nest when they are 7 to 10 days old, but will stay with their parents for approximately 3 weeks or until a second brood hatches (Pima County 2004). The hilly grassland communities which are characteristic of portions of the Ranch are suitable habitat for the sparrow. During the field reconnaissance on October 22-23, 2008, Rufous-winged Sparrows were observed in proximity to Boulder Tank in Section 23 (Photo 30).



**Photo 30.**

Looking east to the Whetstone Mountains. Rufous-winged Sparrows were observed near this oak- mesquite thicket in Section 23.

### **Swainson's Hawk (*Buteo swainsoni*)**

Swainson's Hawk is considered a species of concern by the UFWs and is protected under the Migratory Bird Treaty Act (Pima County 2004). There is no SDCP vulnerable status designation for this species. Most of the Ranch is modeled as high, while medium habitat is present along the lower bajada on the southwestern end of the Whetstone Mountains. The entire Ranch is included in a Priority 1 Conservation Area (Pima County 2004).

These hawks nest in grassland, semidesert grassland, and savanna grassland, sometimes intermixed with open desert scrub habitats and forage in open plains, grasslands, and agricultural fields. Diet includes rodents, rabbits, and reptiles. Outside of the breeding season, the Swainson's Hawk is almost entirely insectivorous foraging throughout the pampas of Argentina. Bulky stick nests are constructed in saguaros, trees, yuccas, or on cliffs. Females generally lay two eggs, and incubation takes 28 to 35 days. Young fledge approximately 30 days after hatching. Both parents tend the young, which remain with them until migration. Usually one brood is reared per season (Pima County 2004).

The Swainson's Hawk is highly variable in coloration, but the underwing is consistently two-toned with the leading edge lighter than the trailing edge, and the throat and forehead have a white patch. The wings are pointed, and the tail is long. The sexes are similar in appearance, but males are 19 to 20 inches (48-51 cm), and females are slightly larger at 20 to 22 inches (51-56 cm). Wingspan is 47 to 57 inches (119 –144 cm) (Pima County 2004). They typically select trees or shrubs that range from eight to 18 feet in height in upland habitats with a strong grass component intermixed with mesquite, whitethorn, and yucca, and/or riparian woodland edges (Corman and Wise-Gervais 2005). Because of the presence of suitable habitat, we consider the potential for the Swainson's Hawk occurring on the Ranch to be high.

### **Western Burrowing Owl (*Athene cunicularia hypugaea*)**

The Western Burrowing Owl is listed as a federal species of concern, is considered a sensitive species by the Bureau of Land Management in Arizona, and has a vulnerable status 2 listing in the SDCP (Pima County 2004). Modeled potential habitat for this species on the Ranch is high in the southern sections, and low everywhere else with no PCAs.

Burrowing Owls inhabit open areas in deserts, grasslands, and agricultural and range lands. They use well-drained areas with gentle slopes and sparse vegetation, and may occupy areas near human habitation such as golf courses and airports (Terres 1980, Ehrlich et al. 1988, Dechant et al. 1999). Burrowing Owls often select burrows where surrounding vegetation is kept short by grazing, dry conditions, or burning (Hjertaas et al. 1995; Dechant et al. 1999). In Arizona, Burrowing Owls prefer grasslands, creosote bush/bursage Desertscrub communities, and agricultural lands (deVos 1998).

Burrowing Owls are semi-colonial and usually occupy burrows excavated by small mammals, often at the edges of active colonies of black-tailed prairie dogs (*Cynomys ludovicianus*) or Richardson's ground squirrels (*Spermophilus richardsonii*). In areas that lack colonial burrowing mammals, burrowing owls will use excavations made by other mammals such as badgers, woodchucks, skunks, foxes, armadillos, and coyotes. They may also use natural cavities in rocks. In addition to the nest burrow, these owls may also use several satellite burrows, which may serve as protection from predators and parasites (Dechant et al. 1999).

The habitat in the southern portion of the Ranch is characterized as mostly open grasslands with patches of trees and shrubs, which could conceivably support this species; however, no evidence of Burrowing Owls was observed during the site reconnaissance on 22-23 October 2008. Overall rodent populations and available burrows on the parcels appear to be low. A general paucity of burrowing animals may be a reflection of drought conditions in the area over the last several years. We rate the probability of this species being present on the Ranch as low to moderate.

## **AMPHIBIANS AND REPTILES**

### **Chiricahua Leopard Frog (*Lithobates [=Rana] chiricahuensis*)**

The Chiricahua Leopard Frog was listed by the USFWS as a threatened species in June 2002. It is listed as a wildlife species of special concern by the AGFD, listed endangered by the State of New Mexico, is a USFS sensitive species, and is accorded Vulnerable Status 1 by the SDCP. Modeled potential habitat for this species on the Ranch is a combination of high and low (Pima County 2004). The high modeled habitat is part of larger area included on the Coronado National Forest, on the east end of Bear Spring Canyon, while medium habitat includes two springs that were identified as special elements by Pima County. Cienega Creek, located west of the Ranch, is a Priority 1 Conservation Area for the species. According to AGFD Heritage Program, the Chiricahua Leopard Frog has been documented as occurring within five miles of the northern half of the Ranch (Appendix D).

The Chiricahua Leopard Frog is a habitat generalist, and occurs in a variety of natural and man-made aquatic habitats including main stream river reaches, intermittent creeks, seeps, stock tanks, wells, and thermal springs (AGFD 2001b; Degenhardt et al. 1996). The Chiricahua Leopard Frog is an alert and wary species. Adult frogs, like many ranids, consume a variety of insects and other arthropod species, and may take small vertebrate species such as fish, and other anuran

species (AGFD 2001; Degenhardt et al. 1996). The larvae feed on periphyton, algae, organic debris, and plant tissues (AGFD 2001b; Pima County 2001b).

The primary habitat type for this species is in aquatic environments in the oak or mixed oak and pine elevations from about 3,500 to 8,040 feet elevation in central and eastern Arizona, and down through chaparral, grasslands, and even desert to 1,219 feet (AGFD 2000b). The springs and ponds on the Ranch provide excellent habitat for the Chiricahua Leopard Frog, and the presence of a mud turtle in a naturally occurring pond in Bear Spring Canyon, northwest of Blacktail Spring, increases the probability that leopard frogs could be present as well. In order to confirm this, however, surveys would need to be conducted during the spring and summer months, when the species is more likely to be active. We consider the probability of this species being present on the Ranch to be high.

### **Desert Box Turtle (*Terrapene ornata luteola*)**

The Desert Box Turtle has no federal or state status, nor is it listed as a vulnerable status species in the SDCP. The Ranch has high and medium modeled habitat with a Priority 1 Conservation Area in the Cienega Creek watershed and Sonoita/Empire Ranch (Pima County 2004).

The Desert Box Turtle is one of two subspecies of western box turtle (*Terrapene ornata*) and the only one found in Arizona. The carapace (dorsal side of shell) is 4.0 to 5.75 inches in length, and the plastron has a single hinge in front and can be drawn tightly against the carapace. The carapace (ventral side of shell) is high and round and is typically marked with yellow or pale yellow radiating lines or a series of dots on a dark brown or black field (Pima County 2004a). Their diet consists of other animals such as insects, worms, eggs, and carrion, but they will also eat plant material consisting of cactus fruit, grasses, sprouts, and leaves. Breeding peaks in the spring and fall, producing two to 8 eggs that are generally laid between May and July (Pima County 2004; Stebbins 2003). The female can retain eggs for several weeks until conditions are right for nesting. The nests are typically shallow in well drained soils. They sometimes shelter in kangaroo rat burrows or they may create their own burrows. The box turtle can reach an amazing age of 30 years or more in areas where they are not threatened (Brennan and Holycross 2006). The most significant threats to the box turtle are illegal collecting and mortality due to vehicle collisions.

The Desert Box Turtle is found primarily in the flats or gently sloping bajadas within semidesert grasslands and desertscrub where soils are generally well drained and sandy (Pima County 2004). Activity peaks during the morning and is often stimulated by rainfall. Although box turtles are generally terrestrial animals, they are capable of swimming and can often be seen in or near shallow temporary pools. Potential suitable habitat for the Desert Box Turtle is scattered throughout the Ranch; Boulder and McNalley tanks seem especially attractive. Suitable habitat (e.g. Blacktail Spring) decreases in the northern sections of the Ranch because the relief is too great. Other upland habitats, where soil and vegetation conditions are suitable and food is available, may provide suitable habitat as well. We consider the potential for the presence of the Desert Box Turtle on the Ranch to be moderate to high.

### **Ground Snake (valley form) (*Sonora semiannulata*)**

The Ground Snake has no federal or state status; however, it is listed as vulnerable status 1 in the SDCP (Pima County 2004). All of the Ranch, except for small fingers on the east side and a patch in the southeast end, are high modeled habitat. The nearest PCA includes an area between

Avra Valley Road and the Pinal County line near the Town of Marana, located over a hundred miles north of the properties.

The Ground Snake attains approximately 18 inches (45 cm) in length. Dorsal color varies and can be brownish, orange, reddish, or gray. Patterns can be plain, cross-banded, longitudinally banded, or a combination of these. The Ground Snake eats spiders, scorpions, centipedes, and occasionally small lizards (Brennan and Holycross 2006). It may breed twice a year in spring to early summer and again in autumn. Usually 3 to 9 eggs are laid, and 3 to 7 young survive each reproductive effort (Pima County 2004).

Ground Snakes are found in desert grasslands, mesquite thickets, and in grassland up into encinal habitat. They occur in plains, valleys, and foothill habitats, but mostly near mountains with higher slopes and poorly drained soils. Vegetation can vary from sparse creosote bush desert to dense riparian communities, but drainageways, floodplains, streambeds, and terraces appear to be important in the model (Pima County 2004). It appears potential habitat for the Ground Snake on the Ranch includes areas where the soils are poorly drained and shallow. We consider the potential for the presence of the Ground Snake on the Ranch to be moderate.

#### **Lowland Leopard Frog (*Lithobates [=Rana] yavapaiensis*)**

The Lowland Leopard Frog is a vulnerable status 2 species in the SDCP (Pima County 2004). Low modeled habitat for this species is limited to two springs (e.g. Goat Well and Blacktail Spring) with no PCA; however, a Priority 2 Conservation Area is present just north of the Ranch. Documented occurrences for the Lowland Leopard Frog are located along Cienega Creek and part of the Whetstone Mountains. According to AGFD Heritage Program, the Lowland Leopard Frog has been documented as occurring within five miles of the northern half of the Ranch (Appendix D).

Lowland Leopard Frogs are generally found in permanent waters south and west of the Mogollon Rim, mostly below the 3,000-foot elevation. It usually occurs in small to medium-sized streams, but is also found in springs and stock ponds, and occasionally in larger rivers. Surrounding vegetation may include Sonoran Riparian Deciduous Forest and Woodland, Sonoran Desertscrub, Semidesert Grassland, or Madrean Evergreen Woodland. These frogs are often associated with deep pools associated with root masses of large riparian trees or along sandy banks with limited vegetative structure. Adult frogs eat small invertebrates and sometimes, small vertebrates. Larvae consume algae, plant tissue, organic debris, and probably small invertebrates (Pima County 2004). We rate the probability of Lowland Leopard Frogs present on Sands Ranch as moderate.

## PLANTS

#### **Huachuca Water Umbel (*Lilaeopsis schaffneriana* var. *recurva*)**

The Huachuca water umbel was listed by the USFWS as an endangered species in January 1997. It is Highly Safeguarded by the Arizona Native Plant Law, is a USFS sensitive species, and is accorded Vulnerable Status 1 by the SDCP. Modeled potential habitat for this species on the Ranch is high to medium, limited to two springs on the Ranch, with no PCA. However, a Priority 1 Conservation Area includes Cienega Creek, which is located just west of the Ranch. Most of the tributaries on the Ranch drain into Cienega Creek.

The Huachuca water umbel is an herbaceous, semi-aquatic perennial that grows from underground rhizomes, which run along the bottom of still ponds. The only population in Pima

County for which the Heritage Data Management System has records is in Empire Gulch, a tributary of Cienega Creek, which is managed by the BLM as part of the Las Cienegas Natural Conservation Area (Pima County 2004). The species may still be present in Cienega Creek or it could become established there in time. Another population has recently been discovered at Bingham Cienega in the San Pedro River watershed (Phil Jenkins, personal communication with E.L. Smith May 2001). We rate the probability of Huachuca water umbel on Sands Ranch to be moderate.

**Needle-spined Pineapple Cactus (*Echinomastus* [= *Sclerocactus*] *erectocentrus* var. *erectocentrus*)**

The needle-spined pineapple cactus is a former federal Category 2 candidate for listing among the threatened and endangered species of the United States. It is currently listed by the USFWS as a species of concern, is a Salvage Restricted species under the Arizona Native Plant Law, a USFS sensitive species, and has a Vulnerable Status 1 by the SDCP. Nearly two-thirds of the Ranch (southern portion) is modeled as medium habitat, while the north portion is modeled as low with no PCA (Pima County 2004).

As the name *erectocentrus* implies, this cactus has an erect central spine in each areole. The stems are ovoid to cylindroid and two to 15 inches tall and one to five inches in diameter. Flowers and fruits appear on new growth of the current season near the apex of the stem or branch (Pima County 2004). It has generally been found on alluvial fans and hills on southern and western exposures, generally from 3,000 to 4,600 feet in elevation. Substrates consist of alluvial soils with rock and gravel over sandstone conglomerate and limestone outcrops.

No needle-spined pineapple cactus was observed during the site reconnaissance on 22-23 October 2008, and was not included as a species that has been documented within five miles of the Ranch by AGFD, HDMS. The limestone ridgelines occur on the Ranch at approximately 5,100 feet elevation, which is nearly 500 feet higher than the upper elevational range of the species. We rate the probability of the species being present on Sands Ranch at low.

**SPECIAL ELEMENTS**

Special elements are landscape features that were used in reserve design for the SDCP. 21 special element targets have been selected by the STAT. All but one (low elevation valley floors) of these elements was utilized to help guide reserve design (Pima County 2002b). The STAT also assigned conservation goals to each special element:

- Constraint – STAT’s preference is to capture all occurrences of a feature in all reserve design alternatives regardless of size.
- Preference – STAT suggests capturing as many sites as possible, but in larger management units only.
- Restore and Manage – These goals are intended to show elements that have been so reduced over time that there is now a desire to restore them or to manage them against further loss.
- Accounting – This “goal” is applied to widespread conservation targets with the objective of keeping track of losses over time.

Special element constraints and preferences were utilized, in part, to define the biological core of the CLS. The following is a brief discussion of special elements present on Sands Ranch .

- Native Upland Grassland-Type A
- Oak Scrub/Grassland Ecotone
- Unincised Floodplain with Grass/Contributing Watershed
- Limestone Outcrops
- Springs

#### Native Upland Grassland-Type A

Grassland communities are threatened by development and livestock grazing, and because of the conversion of this element to desertscrub, fragmentation of this naturally extensive patch-type has resulted in targeting this element for conservation. The mixed grass-scrub community has a distribution that is relatively widespread among ecoregions. This series occurs between 3,500 to 4,900 feet in elevation on a variety of soils and consists of mixed stands of perennial bunch grasses and annual grasses of uniform stature with scattered shrubs and succulents. NRCS has identified two types of native grasslands within Pima County: Type A and B. Sands Ranch was identified as Type A grasslands, which are dominated by native grasses with a low percentage of shrub invasion.

#### Oak Scrub/Grassland Ecotone

The Oak Scrub/Grassland Ecotone contains a high level of plant and animal diversity, and usually occurs near the mountain fronts, an area of high topographic and geologic diversity. This conservation target should be preserved in large, unfragmented areas, serving to protect species diversity in the area, as well as providing a movement corridor for larger wildlife species such as bears and mountain lions (Pima County 2002b). The oak-grassland community is best represented in the northern half of the Ranch.

#### Unincised Grassland Floodplain/Contributing Watershed

According to STAT, very few grassland floodplains remain unincised in Pima County. Grassy floodplains store sediment and regulate flows to downstream watersheds, so it is important to conserve this target. To accomplish this, an attempt must be made to maintain and improve hydrological function of the entire watershed surrounding and contributing to unincised grassy floodplains. It would be difficult to maintain patches of this element if natural cover in the watershed around the patch is subjected to urbanization or overgrazing. Roadway development and attendant floodplain encroachments, channelization, and bank protection should be regarded as compromises to the likelihood of persistence. Maintaining a high degree of vegetative cover in the floodplain is important to hydrologic functioning, providing roughness to dissipate the energy of flood flows (Pima County 2002b). The southern two-thirds of the Ranch are within a contributing watershed.

#### Limestone Outcrops

Some plant communities contain indicator species which identify climates, soil conditions, and other factors that are favorable to listed and unlisted species in Pima County. One such conservation target is limestone outcrops. They are recognized as a special element because they

have the potential to support species with restricted distribution. Limestone outcrops are locally important locations of aquifer recharge due to their fractured and porous nature. Aquifers overlain by limestone outcrops are more easily contaminated because there is no soil to attenuate pollutant loadings, and the transit time to the aquifer is short (Pima County 2002b).

This element is distributed in small patches around the periphery of large mountain blocks. The Ranch was identified as having limestone outcrops in the hills in the southeast portion of the Ranch. However, we believe limestone outcrops also are present in the area north of Spring Water Canyon in Sections 14 and 15 (Photo 31).



**Photo 31.**

Limestone ridgeline dominated by ocotillo, agave, sandpaper bush, viscid acacia, and lehmann lovegrass.

### Springs

Springs are part of the perennial and intermittent streams element. Because they support a high number of species and are relatively rare throughout the county, STAT recommended these targets as a constraint, or 100 percent inclusion within the reserve design. Springs generally are located along linear stream courses, or are found in small, restricted patches. According to STAT, there are two springs identified on Sands Ranch, Blacktail Spring and Goat Well. Blacktail Spring is located in Bear Spring Canyon and exhibits all the characteristics of a perennial spring. Goat Well is located in Section 25 near the southern end of the Ranch. During the field reconnaissance on October 22-23, 2008, it was not immediately evident that this was a spring. Cottonwood Spring, located just southeast of Goat Well, is situated along the same drainage, and may exhibit more typical characteristics of a spring. A cattle tank and windmill were present at Goat Well, which suggests water was being tapped from an underground source. Surface water was not evident at this site, nor were any characteristic wetland plants seen.

### **EXISTING DISTURBANCE/EVIDENCE OF HUMAN ACTIVITY**

Human related disturbance on the Sands Ranch, although not great in many areas, appears to be primarily related to livestock ranching activities. These activities include the direct effects of grazing livestock, building and use of roads for access, and stock pond construction. These activities appear to have affected water drainage, the soil, the vegetation, and the wildlife. Another human-related activity causing a small amount of disturbance is the presence and movement through the ranch of illegal aliens. The main disturbance they cause is the litter

(plastic water bottles, daypacks, food wrappers, etc.) they leave behind as they move through. This was most noticeable in the vicinity of Ramsey Well. Also at this site, there were old abandoned vehicles being used for target practice (Photo 32).



**Photo 32.**  
Old abandoned vehicles being used for target practice at Ramsey Well

The direct effects of grazing livestock appear to include change in the species of grassland communities due to the selective preference of livestock for grazing certain grass species. In general, preference has been for the native perennial bunch grasses. In some places such as the more accessible gently sloping ridgelines, around stock tanks, around salt blocks, and in certain corners where fences have stopped the natural drift of grazing animals, the native perennial bunch grasses have been much reduced and occasionally eliminated along with most of the other ground vegetation. Such areas have also been trampled, pulverizing the topsoil. These areas are prime areas for subsequent erosion, loss of topsoil, and eventual head cutting by gullies of various sizes (Photos 33-34).



**Photo 33.**  
Headcutting and erosion observed northwest of Sands West Camp, probably caused by construction of this primitive cattle tank and lack of maintenance, that has allowed a breach in the dam to concentrate runoff and erode the breach more deeply resulting in headcutting upstream.



**Photo 34.**

Disturbance caused by construction of the tank and the concentration of livestock at this site. This has resulted in the invasion of the annual exotic, feather fingergrass and weeds such as Russian thistle, burrowed, and silverleaf nightshade (*Solanum elaeagnifolium*).

In areas not so severely affected, the balance of grass species appears to have shifted toward less palatable perennial species, annual species and in some cases facilitated invasion by undesirable shrubs such as burrowed, broom snake weed, velvet mesquite or silverleaf nightshade or the exotic annual feather fingergrass. In many such places there is still a seed bank for potential restoration since the original native perennials may often be found in the middle of prickly pear clumps or other spiny shrubs that protect them from grazing animals. Another disturbance resulting from livestock is erosion that starts where runoff is concentrated along trails especially as they cross saddles or move down a wash from where the wash heads up in a saddle. Still another is when they concentrate in undergrowth for shade or to chew their cud along a wash. This may break down banks and destroy undergrowth up to about four feet high, thus degrading or eliminating habitat for a number of birds (towhees, thrashers, wrens, etc.) and lizards that prefer such habitats for foraging, nesting, and cover.

At lower elevations on the ranch, there are expanses of almost pure stands of Lehmann lovegrass (*Eragrostis lehmanniana*) on some wide ridgetops. These suggest that the sites may have been partially denuded and were either intentionally seeded with Lehman lovegrass (a South African exotic) to try to prevent soil loss and increase productivity, or seeded in more or less naturally from nearby artificially seeded areas.

Some roads on the ranch are poorly located and constructed for preventing or controlling erosion (Photo 35). Some have had to be abandoned because they were built at right angles to the contours without erosion control ditches or humps (sometimes called "thank you m'ams") and thus concentrated runoff was so deeply eroded that it became impassable. The by-passes are seldom any better and will probably eventually erode away as well.

In a few places, levees up to 30 feet wide and 1,000 feet long have been constructed to halt erosion in gullies and to prevent future erosion. The largest of these appear to be working by spreading water effectively upstream; however, they will have to be watched and maintained. When they are not maintained, the smaller ones eventually are eroded away (especially after big

storm events) by floodwaters by moving around the ends or breaking through other parts of the levee.



**Photo 35.**

Headcutting and erosion of north-south trending dirt road, probably caused by improper design

In non rocky areas composed of fine-grained soils, head cutting of small gullies was noticed. Such head cutting may be the result of either a breached spreader dam, runoff concentration along a road or trail, runoff from a blown out trampled area, or something similar. There is evidence that some such places have started to heal in the past; however, such erosion needs to be watched carefully and not allowed to proceed, since it may eventually result in erosion moving upstream, sheet erosion, and/or topsoil loss.

Construction of stock ponds may have both desirable and undesirable effects. Possible desirable effects include water and vegetation that attract water birds and migrating birds, and possible habitat for amphibians (frogs, salamanders, and toads). Undesirable effects include concentration of livestock, resulting in elimination of adjacent ground vegetation and trampling, and breaching of the dam resulting in erosion downstream.

A disturbance related to the presence of access roads is the death of wildlife run over by vehicles. This most commonly happens to snakes, horned lizards, small mammals, and low flying birds and is typically the result of excessive vehicle speeds (Photo 36).



**Photo 36.**

Sonoran Whipsnake (*Masticophis bilineatus*) found dead on the dirt road during the field survey for the neighboring Clyne Ranch in early October 2008.

## MANAGEMENT CHALLENGES

Management challenges for Sands Ranch revolve primarily around three issues that address the disturbances discussed above: 1) The ecological goals for the Ranch, 2) livestock and grazing, and 3) public access including, vehicle, horseback, and foot traffic. The challenges include the following:

- 1) With regard to the ecological goals for the Ranch, the challenges include the following:
  - Determination of the kind and nature of future biological communities and their components desired on the properties;
  - determination of the kind and nature of existing biological communities;
  - determination of the ecological trend of existing communities;
  - estimation of the several probable trends in future climate;
  - identification of methods and techniques best suited to achieve community goals under the estimated climatic trends;
  - measurement of depth to, contour mapping of, and long term monitoring of water table (e.g. measure depth to water in existing wells);
  - identification, mapping, and development of management plans for ecologically sensitive biological communities, habitats (especially movement corridors, wetlands, including springs, seeps, and ponds, and limestone areas), and other sensitive areas including, drainageways, eroding parts of watersheds, roadways, and livestock and human trails (e.g. management plans should address repair, monitoring, and maintenance of water spreader and stock pond dams, and relocation and erosion proofing of roads);
  - identification, mapping, and development of management plans for federal and state designated noxious weeds, other invasive and nonnative species (including grasses such as, Lehmann and other non-native lovegrasses, Johnson grass, Bermuda grass, feather fingergrass), and invasive native plants such as, burrowed, broom snakeweed, etc.
  - development of short and long term ecological monitoring plans.
- 2) With regard to grazing issues, challenges include the following:
  - Whether grazing should be continued or not
  - If grazing is to be continued, there are two challenges:
    - Develop ecologically sound ranch and range management program using the best ecological data available including data gathered to meet other challenges noted in this report.

- Identify ranch type (cow/calf, steer, etc.), stocking rates, water sources, salt source location, pasture control, fence location, and herd movement actions to best achieve ecological goals.

3) With regard to access issues, challenges include the following:

- Determination of kinds of recreation (bird watching, four wheeling, horseback riding, hunting, camping, etc.) to be permitted;
- determination of seasons and numbers for recreational access best suited to achieving ecological goals; and
- identification of methods of effective access control (i.e. gates, cables, fences, patrolling, and enforcement, etc.)

## CONCLUSIONS/RECOMMENDATIONS

Sands Ranch is located in a desert grassland community that supports a species-rich assemblage of plants, vertebrates and invertebrates. In terms of numbers of species, this community supports more species than any other ecosystem. In Arizona, the only exception is Arizona Uplands Subdivision of Sonoran Desertscrub. As stated by McClaran and Van Devender (1995), “herbivorous vertebrates influence the structure, composition, relative abundance, and productivity of plant species in grassland communities. Burrowing vertebrates also affect the species composition of the animal community by providing safe underground shelter to a variety of other vertebrate and invertebrate species.” The importance of invertebrates in grassland ecosystems is not emphasized enough. Human disturbance in desert grasslands have resulted in large scale changes in wildlife populations and communities.

The Ranch would be a valuable acquisition because of its close proximity to other protected lands such as the Coronado National Forest, Clyne Ranch, Las Cienegas Natural Conservation Area, and its direct connection to ecologically significant riparian areas such as Cienega Creek, Babocomari River, and Sonoita Creek and crucial wildlife movement corridors, such as the drainage in Bear Spring Canyon, which connects the Whetstone Mountains to Cienega Creek, Empire Mountains, and the Santa Rita Mountains.

One Priority Vulnerable Species, the Rufous-winged Sparrow, was observed at several locations during the reconnaissance on 22-23 October, 2008, and there is the likelihood that at least 13 other species have a moderate to high probability of utilizing the Ranch. Even though Sands Ranch shows signs of degradation due to livestock grazing in most areas, it is nevertheless, extremely diverse in terms of the numbers of animal and plant species that could occur there. In addition to Rufous-winged Sparrow, a large covey of Montezuma Quail was observed on two occasions in the area of Goat Well. This is significant because this species is so secretive and difficult to find, that it becomes a challenge to census populations; making it nearly impossible to estimate the impacts that hunting, overgrazing, and urbanization may have on the species. It literally disappears in areas where overgrazing and invasion by non-native plants has degraded its habitat (Brown 1989).

A Sonora or Yellow Mud Turtle was observed in a naturally occurring pool in Bear Spring Canyon. This is significant because this species represents a wetland obligate species that is uncommon in desert communities, and may be a range extension if it is confirmed that the turtle was in fact, a Yellow Mud Turtle. The pools and springs may provide suitable habitat for other aquatic species, including special status species, like Lowland or Chiricahua Leopard Frog.

According to the Arizona Game and Fish Department's Heritage Data Management System, other special status species have been documented within five miles of the Ranch, including, Baird's Sparrow, Mexican Long-tongued Bat, Lesser Long-nosed Bat, Lowland Leopard Frog, Chiricahua Leopard Frog, Northern Mexican Gartersnake, Arizona Ridge-nosed Rattlesnake, Texas Horned Lizard, Mexican Spotted Owl, Gila topminnow, and crested coral root (Appendix D).

At a minimum, acquisition of this parcel will help assure the continued existence of four special elements in the county including native upland grasslands, oak scrub/grass ecotone, contributing watershed, and intermittent stream, and wetland communities. Sands Ranch would be one of the most important acquisitions that could be made by Arizona Land and Water Trust for several important reasons:

- It contains diverse soils, habitats, and biological communities, which includes upland habitats with a diverse Semidesert Grassland with Chihuahuan Desertscrub elements, grassland/oak elements from Madrean Evergreen Woodland along draws, washes, north-facing slopes, and Semidesert Grassland/Plains Grassland ecotonal communities.
- It contains wetland ecosystems and communities including a segment (however small) of an intermittent stream and a large stock pond, surrounded by natural vegetation that serves important ecological and hydrological functions.
- It contains a crucial wildlife movement corridor.
- The large acreage provides natural travel corridors and habitat connectivity for wildlife, especially in its relationship with nearby mountain ranges, grasslands, and riparian and riverine habitats and biological communities.
- It supports plant communities that contain sensitive species.
- It supports biological communities that have a moderate to high probability for the presence of nine Priority Vulnerable Species
- It supports five Special Elements

Sands Ranch contributes to meeting the goals of Arizona Land and Water Trust and Pima County's Sonoran Desert Conservation Plan, which is to ensure the long-term survival of the full spectrum of plants and animals indigenous to Pima County through maintaining or improving habitat conditions and ecosystem functions necessary for their survival. This goal is best achieved with parcels of land that are large enough to support representative examples of healthy, diverse biological communities that retain ecological function and habitat connectivity. Sands Ranch achieves that purpose.

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**APPENDIX A.**

**PHOTOS TAKEN DURING OCTOBER 22-23, 2008 FIELD RECONNAISSANCE OF  
SANDS RANCH**

**APPENDIX B.**

**PLANTS OBSERVED DURING OCTOBER 22-23, 2008 FIELD RECONNAISSANCE OF SANDS RANCH**

Plants observed on Sands Ranch properties during biological reconnaissance on October 22-23, 2008. (Common and scientific names based on Lehr 1978.) An asterisk preceding common name indicates a non native species.

## HILLS AND SLOPES

Amole, Shindagger (*Agave schottii*)  
Banana Yucca (*Yucca baccata*)  
Blue Grama (*Bouteloua gracilis*)  
Bluestem (*Schizachyrium* sp.)  
Boundary Ephedra (*Ephedra aspera*)  
Broom Snake Weed (*Gutierrezia sarothrae*)  
Brown-spined Prickly Pear (*Opuntia phaeacantha*)  
Bullgrass (*Muhlenbergia emersleyi*)  
Burroweed (*Isocoma tenuisecta*)  
Cane Beardgrass (*Bothriochloa barbinodis*)  
Cane Cholla (*Opuntia spinosior*)  
Canyon Grape (*Vitis arizonica*)  
Common Sunflower (*Helianthus* sp.)  
Cream Pincushion (*Mammillaria gummifera*)  
Deer Grass (*Muhlenbergia rigens*)  
Desert Sumac (*Rhus microphylla*)  
Engelmann Prickly Pear (*Opuntia engelmannii*)  
Eriophyllum (*Eriophyllum* sp.)  
Fairy Duster (*Calliandra eriophylla*)  
Fluff Grass (*Erioneuron pulchellum*)  
Gatuño, Velvet-Pod Mimosa (*Mimosa dysocarpa*)  
Hairy Grama (*Bouteloua hirsuta*)  
Joint-Fir (*Ephedra* sp.)  
\*Lehmann Lovegrass (*Eragrostis lehmanniana*)  
Long-leaved Joint-Fir (*Ephedra trifurca*)  
Lovegrass (*Eragrostis* sp.)  
Mountain Mahogany (*Cercocarpus* sp.)  
Muhly (*Muhlenbergia* sp.)  
Ocotillo (*Fouquieria splendens*)  
One-seed Juniper (*Juniperus monosperma*)  
Oreganillo (*Aloysia wrightii*)  
Palmer's Agave (*Agave palmeri*)  
Palmilla (*Yucca elata*)  
Prickly Pear (*Opuntia* sp.)  
Rainbow Cactus (*Echinocereus pectinatus*)  
Sacahuista, Beargrass (*Nolina microcarpa*)  
Sand Dropseed (*Sporobolus cryptandrus*)  
Side Oats Grama (*Bouteloua curtipendula*)  
Silverleaf Nightshade, Trompillo (*Solanum elaeagnifolium*)  
Slender Grama (*Bouteloua repens* [=*B. filiformis*])  
Sotol (*Dasyilirion wheeleri*)  
Sprangletop (*Leptochloa* sp.)  
Sprucetop Grama (*Bouteloua chondrosioides*)

## HILLS AND SLOPES (Continued)

Tangle Head (*Heteropogon contortus*)  
Tobosa Grass (*Hilaria mutica*)  
Velvet Mesquite (*Prosopis velutina*)  
White Thorn (*Acacia constricta*)  
Wolf-Tail (*Lycurus phleoides*)

## DISTURBED GROUND (Eroded, trampled, scraped, and roadsides)

Common Cocklebur (*Xanthium strumarium*)  
Desert Broom (*Baccharis sarothroides*)  
\*Feather Fingergrass (*Chloris virgata*)  
\*Johnson Grass (*Sorghum halapense*)  
Palmer's Amaranth (*Amaranthus palmeri*)  
\*Russian Thistle (*Salsola iberica*)  
Silverleaf Nightshade, Trompillo (*Solanum elaeagnifolium*)  
Slimleaf Bursage (*Ambrosia confertiflora*)  
Thistle (*Cirsium* sp.)

## WIDE RIDGETOPS

Alkali Sacaton (*Sporobolus airoides*)  
Banana Yucca (*Yucca baccata*)  
Blue Grama (*Bouteloua gracilis*)  
Brown-spined Prickly Pear (*Opuntia phaeacantha*)  
Cane Cholla (*Opuntia spinosior*)  
Curly Mesquite (*Hilaria belangeri*)  
Desert Holly (*Acourtia nana*)  
Engelmann Prickly Pear (*Opuntia engelmannii*)  
Fairy Duster (*Calliandra eriophylla*)  
Feather Fingergrass (*Chloris virgata*)  
Hairy Grama (*Bouteloua hirsuta*)  
\*Johnson Grass (*Sorghum halapense*)  
Joint-Fir (*Ephedra* sp.)  
\*Lehmann Lovegrass (*Eragrostis lehmanniana*)  
Mearns Sumac (*Rhus choriophylla*)  
One-seed Juniper (*Juniperus monosperma*)  
Ocotillo (*Fouquieria splendens*)  
Palmer's Agave (*Agave palmeri*)  
Palmilla (*Yucca elata*)  
Plains Lovegrass (*Eragrostis intermedia*)  
\*Russian Thistle (*Salsola iberica*)  
Sacahuista, Beargrass (*Nolina microcarpa*)  
Sand Dropseed (*Sporobolus cryptandrus*)  
Sandpaper Bush (*Mortonia scabrella*)  
Santa Rita Three-Awn (*Aristida glabrata*)  
Side Oats Grama (*Bouteloua curtipendula*)

## WIDE RIDGETOPS (Continued)

Slimleaf Bursage (*Ambrosia confertiflora*)  
Sotol (*Dasyilirion wheeleri*)  
Sprangletop (*Leptochloa* sp.)  
Sprucetop Grama (*Bouteloua chondrosioides*)  
Tangle Head (*Heteropogon contortus*)  
Three-Awn (*Aristida* spp.), perennials  
Velvet Mesquite (*Prosopis velutina*)  
Wait-a-Minute (*Mimosa biuncifera*)  
White Thorn (*Acacia constricta*)  
Wolf-Tail (*Lycurus phleoides*)

## ALONG DRAWS, WASHES, AND CANYONS

Alkali Sacaton (*Sporobolus airoides*)  
Alligator Juniper (*Juniperus deppeana*)  
Amole, Shindagger (*Agave schottii*)  
Arizona White Oak (*Quercus arizonica*)  
Banana Yucca (*Yucca baccata*)  
Blazing Star (*Mentzelia* sp.)  
Brown-spined Prickly Pear (*Opuntia phaecantha*)  
Burroweed (*Isocoma tenuisecta*)  
Cane Beardgrass (*Bothriochloa barbinodis*)  
Cane Cholla (*Opuntia spinosior*)  
Cliff Rose (*Cowania mexicana*)  
Cream Pincushion (*Mammillaria gummifera*)  
Deer Grass (*Muhlenbergia rigens*)  
Desert Broom (*Baccharis sarothroides*)  
Desert Holly (*Acourtia nana*)  
Desert Sumac (*Rhus microphylla*)  
Desert Willow (*Chilopsis linearis*)  
Emory Oak, Bellota (*Quercus emoryi*)  
Engelmann Prickly Pear (*Opuntia engelmannii*)  
Graham Mimosa (*Mimosa grahamii*)  
Hedgehog Cactus (*Echinocereus* sp.)  
Kearny Sumac (*Rhus kearneyi*)  
\*Lehmann Lovegrass (*Eragrostis lehmanniana*)  
Lemonade Berry (*Rhus trilobata*)  
Mariola (*Parthenium incanum*)  
Mearns Sumac (*Rhus choriophylla*)  
Mexican Pinyon (*Pinus cembroides*)  
Mistletoe in oaks and juniper (*Phoradendron* sp.)  
Mountain Mahogany (*Cercocarpus* sp.)  
One-seed Juniper (*Juniperus monosperma*)  
Oreganillo (*Aloysia wrightii*)  
Palmer's Agave (*Agave palmeri*)  
Parry Agave (*Agave parryi*)  
Plains Bristlegrass (*Setaria macrostachya*)

## ALONG DRAWS, WASHES, AND CANYONS (Continued)

Rabbitbrush (*Chrysothamnus* sp.)  
Sacahuista, Beargrass (*Nolina microcarpa*)  
Sacaton (*Sporobolus wrightii*)  
Side Oats Grama (*Bouteloua curtipendula*)  
Silk Tassel (*Garrya* sp.)  
Slender Grama (*Bouteloua repens* [= *B. filiformis*])  
Slimleaf Bursage (*Ambrosia confertiflora*)  
Sotol (*Dasyilirion wheeleri*)  
Sprangletop (*Leptochloa* sp.)  
Spiderling (*Boerhaavia* sp.)  
Tangle Head (*Heteropogon contortus*)  
Three-Awn (*Aristida* sp.), perennial  
Tobosa Grass (*Hilaria mutica*)  
Velvet Ash (*Fraxinus velutina*)  
Velvet Mesquite (*Prosopis velutina*)  
Wait-a-Minute (*Mimosa biuncifera*)  
White Thorn (*Acacia constricta*)  
Wolf-Tail (*Lycurus phleoides*)

## AROUND CATTLE TANKS, STOCK PONDS, AND WELLS

Alkali Sacaton (*Sporobolus airoides*)  
Banana Yucca (*Yucca baccata*)  
\*Bermuda Grass (*Cynodon dactylon*)  
Bluestem (*Schizachyrium* sp.)  
Brown-spined Prickly Pear (*Opuntia phaeacantha*)  
Burweed (*Isocoma tenuisecta*)Cane Cholla (*Opuntia spinosior*)  
Chihuahuan White Thorn (*Acacia neovernicosa*)  
Common Cocklebur (*Xanthium strumarium*)  
Common Sunflower (*Helianthus* sp.)  
Cream Pincushion (*Mammillaria gummifera*)  
Desert Holly (*Acourtia nana*)  
Desert Sumac (*Rhus microphylla*)  
Desert Zinnia (*Zinnia acerosa*)  
Engelmann Prickly Pear (*Opuntia engelmannii*)  
\*Feather Fingergrass (*Chloris virgata*)  
Flat Sedge (*Cyperus* sp.)  
\*Johnson Grass (*Sorghum halapense*)  
Lehmann Lovegrass (*Eragrostis lehmanniana*)  
One-seed Juniper (*Juniperus monosperma*)  
Palmilla (*Yucca elata*)  
Panic Grass (*Panicum* sp.)  
Plains Bristlegrass (*Setaria macrostachya*)  
Prickly Pear (*Opuntia* sp.)  
Rabbit Brush (*Chrysothamnus* sp.)  
\*Russian Thistle (*Salsola iberica*)  
Sacahuista, Beargrass (*Nolina microcarpa*)  
Sedge (*Carex* sp.)

## AROUND CATTLE TANKS, STOCK PONDS, AND WELLS (Continued)

Seep Willow (*Baccharis salicifolia*)  
Silverleaf Nightshade, Trompillo (*Solanum elaeagnifolium*)  
Smartweed (*Polygonum* sp.)  
Sotol (*Dasyllirion wheeleri*)  
Sprangletop (*Leptochloa* sp.)  
Thistle (*Cirsium* sp.)  
Three-Awn (*Aristida* sp.)  
Tobosa Grass (*Hilaria mutica*)  
Velvet Mesquite (*Prosopis velutina*)  
Vine Mesquite (*Panicum obtusum*)  
Wait-a-Minute (*Mimosa biuncifera*)  
Western Soapberry (*Sapindus saponaria*)  
Silverleaf Nightshade, Trompillo (*Solanum elaeagnifolium*)  
White Thorn (*Acacia constricta*)  
Wild Buckwheat (*Eriogonum* sp.), annual  
Willow (*Salix* sp.)

**APPENDIX C.**

**WILDLIFE OBSERVED DURING OCTOBER 22-23, 2008 FIELD RECONNAISSANCE  
SANDS RANCH**

**Birds** (Common and scientific names based on 1998 AOU Checklist of North American Birds and the 42nd (2000) and 43rd (2002) supplements as listed in Sibley 2003)

Cassin's Sparrow (*Aimophila cassinii*)  
Cactus Wren (*Campylorhynchus brunneicapillus*), nest  
Canyon Wren (*Catherpes mexicanus*)  
Common Raven (*Corvus corax*)  
Gambel's Quail (*Callipepla gambelii*)  
Greater Roadrunner (*Geococcyx californianus*)  
Horned Lark (*Eremophila alpestris*)  
Golden-crowned Kinglet (*Regulus satrapa*)  
Montezuma Quail (*Cyrtonyx montezumae*)  
Mourning Dove (*Zenaida macroura*)  
Northern Harrier (*Circus cyaneus*)  
Phainopepla (*Phainopepla nitens*)  
Rufous-winged Sparrow (*Aimophila carpalis*)  
Sage Thrasher (*Oreoscoptes montanus*)  
Sandhill Crane (*Grus canadensis*), reported winter visitor to stock tanks on nearby Clyne Ranch  
Say's Phoebe (*Sayornis saya*)  
Sharp-shinned Hawk (*Accipiter striatus*)  
Towhee (*Pipilo* sp.)  
White-crowned Sparrow (*Zonotrichia leucophrys*)  
White-winged Dove (*Zenaida asiatica*)

**Amphibians**

None seen

**Reptiles** (Common and scientific names based on Stebbins 2003)

Mud Turtle (*Kinosternon* sp. )  
Sonoran Whipsnake (*Masticophis bilineatus*)  
Unidentified lizards

**Mammals**

Desert Cottontail (*Sylvilagus audubonii*)  
Bobcat (*Lynx rufus*), tracks  
Coyote (*Canis latrans*), tracks, scat  
Collared Peccary (*Tayassu [= Pecari] tajacu*), tracks  
Deer (*Odocoileus* sp.), tracks  
Mountain Lion (*Puma [=Felis] concolor* ) tracks along wash bottom in Bear Spring Canyon  
Raccoon (*Procyon lotor*), tracks  
Rock Squirrel (*Spermophilus variegatus* )  
Woodrat (*Neotoma* sp.), house, probably white-throated woodrat (*Neotoma albigula*)

**Invertebrates**

Band-winged Grasshopper (Family Acrididae, Short-horned Grasshoppers)  
California Sister (*Adelpha bredowii*)  
Katydid (Family Tettigoniidae, Long-horned Grasshoppers)-On Clyne Ranch  
Lubber Grasshopper (Family Acrididae, Short-horned Grasshoppers)-On Clyne Ranch

## **Invertebrates (Continued)**

Mesquite Twig Girdler (*Oncideres rhodosticta*, long-horned Beetle Family, Cerambycidae))

? Rainbow Grasshopper (Family Acrididae, Short-horned Grasshoppers)-On Clyne Ranch

Tarantula Hawk (Family Pompilidae, Spider Wasps)-On Clyne Ranch

**APPENDIX D.**

**ARIZONA GAME AND FISH DEPARTMENT'S HERITAGE DATA MANAGEMENT  
SYSTEM**

**ONLINE ENVIRONMENTAL TOOL**