

*2008 Annual Report*  
*Discovery Well Cave Preserve*  
*Williamson and Travis Counties, Texas*



**2008 ANNUAL REPORT  
DISCOVERY WELL PRESERVE  
WILLIAMSON AND TRAVIS COUNTIES, TEXAS**

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## **FORWARD**

This report represents the fifth year of study of the Discovery Well Cave Preserve for Texas Department of Transportation (TxDOT). The management of the site was transferred to the City of Cedar Park in January 2008. The Texas Cave Conservancy (TCC) had been managing the City of Cedar Park cave preserves so they requested that the TCC manage this site as well. As a result, the management of the site transferred from PBS&J. to the TCC.

The TCC has structured this report in the style instituted by PBS&J in order to make study comparisons easier. In additions, the TCC has included some of the basic historical site information created by PBS&J. We thank them for this material. It will appear in brown wherever used within this report.

It should not be forgotten that this site was acquired by TxDOT as mitigation on a *Rhadine persephone* cave. Toward that end the inspections, monitoring, fire ant control activities and the protection of the critical habitat areas are all highly important activities for the protection of the species. The TCC conducts fire ant control activities throughout the entire year when fire ant mounds are encountered.

Mike Walsh

President - Texas Cave Conservancy



*Rhadine persephone*

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## **1. INTRODUCTION**

Discovery Well Preserve is a 106-acre tract located adjacent and southeast of existing Lime Creek Road in southern Williamson County and northern Travis County, Texas. It is located north of the extension of Anderson Mill Road. Figure 1 presents the location of the Discovery Well Preserve in relation to adjacent developments. A section of the Buttercup Creek subdivision bounds the northern edge of the preserve, and the Ranch at Cypress Creek subdivision is located along the eastern boundary. Another subdivision has been built to the south, across Anderson Mill Road. The Testudo Tube Cave Preserve is located along the north side of Discovery Well Preserve; Discovery Well Preserve surrounds Testudo Preserve on three sides.

The preserve was established to partially fulfill the reasonable and prudent measures recommended by the U.S. Fish and Wildlife Service (FWS) to mitigate for impacts to Tooth Cave ground beetles associated with the construction and operation of U.S. Highway 183 Alternate (US 183A). Tooth Cave ground beetle (*Rhadine persephone*), a federally listed endangered species, is currently known to occur in two of the caves in Discovery Well Preserve (Hunters Lane and Discovery Well caves). The value of this preserve tract is enhanced by its continuity with other preserved cave tracts to the north (Testudo Tube Cave Preserve and Buttercup Creek cave system) and west (Lime Creek Preserve). Because creation of habitat for endangered karst invertebrates is not possible, preservation of occupied caves and adequate buffer areas are critical to the protection of the species. Prior to commencing construction of the US 183A project, the Texas Department of Transportation (TxDOT) established a preserve management plan to detail long-term management and monitoring commitments at Discovery Well Preserve to gather data on existing conditions within the preserve, detect and prevent negative trends, and promote the biological integrity of the karst system (PBS&J, 2004a).

This document reports the results of the fifth year of management in accordance with the preserve management plan. Activities discussed in this report include the results of biological surveys, cave cricket surveys, cave temperature/humidity monitoring, fire ant management along with summaries of the regional vegetation and wildlife. Also, maintenance is addressed. An initial vegetation site assessment and habitat management recommendations were incorporated into a separate report submitted to the FWS in December 2004 (PBS&J, 2004b).

## **2. ENVIRONMENTAL SETTING**

### **2.1. REGIONAL VEGETATION**

Discovery Well Preserve is located at the boundary of the Cross Timbers and Prairies and the Edwards Plateau vegetational regions of Texas as delineated by Gould (1975). While the preserve is located near the boundary of these two regions, its vegetation more closely reflects that of the Edwards Plateau. The Edwards Plateau covers approximately 25.5 million acres in west-central Texas and is characterized by deeply dissected, hilly, stony topography with elevations ranging from 1,200 to 3,000 feet above mean sea level (msl). Annual precipitation in the Edwards Plateau ranges between 12 to 32 inches with an average of 240 frost-free days (Hatch et al., 1990).

The original vegetation community of the Edwards Plateau is believed to have been a grassland savannah with tree and brush species found mainly along rocky, sloping creeks and streamside bottomlands. Native plant successional patterns in the region have been influenced by overgrazing from wild and domestic ungulates and with the suppression of natural wildfires. Common woody species present include Texas live oak (*Quercus virginiana* var. *fusiformis*), shin oak (*Quercus sinuata* var. *breviloba*), post oak (*Quercus stellata*), honey mesquite (*Prosopis glandulosa*), and Ashe juniper (*Juniperus ashei*). Climax tallgrass prairie species such as big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), yellow indiagrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*), while still present in some areas of the region, have largely been replaced by xeric midgrass and shortgrass prairie species including side-oats grama (*Bouteloua curtipendula*), buffalograss (*Buchloe dactyloides*), and Texas grama (*Bouteloua rigidiseta*), along with many species of exotic grasses and forbs (Hatch et al., 1990). According to Hatch et al. (1990), common forb species present include Engelmann's daisy (*Engelmannia peristenia*), orange zexmenia (*Wedelia texana*), sunflowers (*Helianthus* spp.), western ragweed (*Ambrosia psilostachya*), and bitter sneezeweed (*Helenium amarum*). On overgrazed rangelands, bitterweed (*Hymenoxys odorata*), broadleaf milkweed (*Asclepias latifolia*), smallhead sneezeweed (*Helenium microcephalum*), broomweed (*Amphiachyris amoena*), and mealycup sage (*Salvia farinacea*) persist along with cacti such as tasajillo (*Opuntia leptocaulis*), and prickly pear (*Opuntia* spp.).

The Cross Timbers and Prairies Vegetation type, located generally east of the Edwards Plateau was once known for its prairie climax grasses interspersed with occasional trees. The tallgrass species, like those of the Edwards Plateau, originally included big bluestem, little bluestem and yellow indiagrass, as well as Canada wildrye (*Elymus canadensis*), switchgrass and other species such as side-oats grama, blue grama (*Bouteloua gracilis*), Texas wintergrass (*Nassella leucotricha*), and buffalograss (Hatch et al., 1990; Jones and Wipff, 2003). Forbs typically known in the region include asters (*Aster* spp.), gayfeathers (*Liatris* spp.), western ragweed, sagewort (*Artemisia* sp.), and numerous legume species. Woody tree and brush species include oaks (*Quercus* spp.), elms (*Ulmus* spp.), honey mesquite, and junipers (*Juniperus* spp.), and within bottomlands, pecan (*Carya illinoensis*) and hickories (*Carya* spp.). Approximately 75% of the region is used as range or pasture (Hatch et al., 1990). The existing vegetation

conditions of the site 440715/080044 2-2 are described in the Initial Site Assessment and Vegetation Management Plan (PBS&J, 2004b) for Discovery Well Preserve.

Specific vegetation descriptions of the preserve can be read in the 2006 annual report. Ashe juniper and native shrubs in the preserve area were cleared in the 1990s and more recently. The preserve now appears as a live oak savannah.

## *2.2. REGIONAL WILDLIFE*

The preserve is located along the Balcones Escarpment, which forms the boundary between the Texan and Balconian biotic provinces of Texas, as described by Blair (1950). Because of the preserve's proximity to this boundary, faunal communities and species characteristic of both regions may be represented.

The Texan Biotic Province is a region of transition between forest associations of the Austroriparian Biotic Province to the southeast, and grassland and shrubland associations of the Balconian and Kansan biotic provinces to the west. Within this region, southeasterly flowing rivers support riparian forests that allow the westward dispersal of eastern forest species, while a matrix of grasslands and shrublands provides for the eastward dispersal of western grassland and desert species. No mammal species are endemic to the Texan Biotic Province; however, at least 49 mammal species have been recorded there (Blair, 1950).

The Balconian Biotic Province closely coincides with the Edwards Plateau Vegetational Region, as described by Gould (1975). The faunal communities of the Balconian Biotic Province are a composite of communities typical of adjacent provinces, including the Austroriparian, Tamaulipan, Chihuahuan, and Kansan biotic provinces. As in the Texan Biotic Province, many species reach their respective eastern and western distribution limits in the Balconian. In the eastern and southern portions of the province, the dissection of limestone bedrock by rivers and streams has created a rugged topography, where karst environments, such as springs and cave systems, are common. No mammal species are endemic to the Balconian Biotic Province; however, at least 57 mammal species have been recorded there (Blair, 1950).

According to Reddell (1967), very little is known with respect to the diversity, abundance, and distribution of mammal species in Texas caves. Aside from bats, only a few mammal species have been recorded from Texas caves and some of those are considered accidental visitors. Terrestrial mammal species of potential occurrence within the preserve are presented in Table 1.

Caves provide shelter, food, and water sources for several species of trogloneic mammals (e.g., opossums, raccoons, mice, and rats). Trogloneics are those species that regularly inhabit caves for refuge, but generally return to the surface to feed, while troglobites, terrestrial species unable to live outside the cave environment, are permanent cave dwellers. Mammals also play a key role in the karst ecosystem, providing nutrient and energy input (e.g., feces, nesting materials, carcasses), and functioning as predators



of insects and other cave fauna. However, when local populations of mammal species reach higher 440715/080044 2-3densities, they may become a threat to the local cave fauna, particularly endangered, threatened, and rare endemic invertebrate species. Domestic and feral mammals, such as dogs, cats, and nonnative rodents, may also adversely affect native faunal communities.

TABLE 1

TERRESTRIAL MAMMAL SPECIES OF POTENTIAL OCCURRENCE<sup>1</sup> AT DISCOVERY WELL PRESERVE

Common Name <sup>2</sup>	Scientific Name <sup>2</sup>
Virginia opossum	<i>Didelphis virginiana</i>
Nine-banded armadillo	<i>Dasypus novemcinctus</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Eastern fox squirrel	<i>Sciurus niger</i>
Texas mouse	<i>Peromyscus attwateri</i>
Deer mouse	<i>Peromyscus maniculatus</i>
White-ankled mouse	<i>Peromyscus pectoralis</i>
Eastern woodrat	<i>Neotoma floridana</i>
North American porcupine	<i>Erethizon dorsatum</i>
Coyote	<i>Canis latrans</i>
Red fox	<i>Vulpes vulpes</i>
Common gray fox	<i>Urocyon cinereoargenteus</i>
Ringtail	<i>Bassariscus astutus</i>
Common raccoon	<i>Procyon lotor</i>
Eastern spotted skunk	<i>Spilogale putorius</i>
Striped skunk <i>Mephitis</i>	<i>mephitis</i>
Bobcat	<i>Lynx rufus</i>
Feral pig	<i>Sus scrofa</i>
White-tailed deer	<i>Odocoileus virginiana</i>

<sup>1</sup> According to documented county records (Schmidly, 2004).

<sup>2</sup> Nomenclature and taxonomic order follow Baker et al. (2003).

In general, signs of mammal scats, tracks, dens, and carcasses were noted. The mammals and/or mammal signs noted included white-tailed deer (*Odocoileus virginiana*), the nine-banded armadillo (*Dasypus novemcinctus*), Virginia opossum (*Didelphis virginiana*), common raccoon (*Procyon lotor*), and mice (*Peromyscus* spp.).

### *2.3. SITE CONDITIONS*

The preserve drains easterly toward Buttercup Creek, which joins with South Brushy Creek, and drains into the San Gabriel River. An ephemeral upper tributary of Buttercup Creek drains the northeastern portion of the preserve. Elevations on the preserve range from 960 to 1,010 feet above msl, based on the U.S. Geological Survey Jollyville 7.5-minute quadrangle.

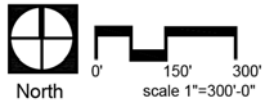
Soils on the preserve are derived from the Denton Eckrant-Doss Soil Association, a group of soils with very shallow to moderately deep, calcareous clayey, stony soils formed in fractured limestone among uplands, as presented in the Williamson County soil survey (Soil Conservation Service [SCS, now the Natural Resources Conservation Service (NRCS)], 1983). The mapping unit for this area is Eckrant extremely stony clay, 0–3% slope. It typically consists of extremely stony, very dark gray clay to a depth of 11 inches and is underlain by an indurated limestone material with a rocky surface layer covering around 25% (SCS, 1983). Within the Travis County portion of the preserve, the soils are identified as Tarrant and Speck soils, 0–2% slopes (SCS, 1974). These soils are described similar to the Eckrant extremely stony clay soils.

### *2.4. LAND MANAGEMENT*

The site is characterized as a live oak savannah. The property, previously represented by the typical juniper/live oak vegetation community prevalent in the region, was cleared of juniper and shrubs in the mid to late 1990s. There is no evidence of livestock use in recent years and little evidence of browse pressure. A fire occurred on a portion of the property in late 2003, and minor damage to the vegetation is in evidence only from the charring of bark on some of the trees. Generally, the herbaceous ground cover is dense, except in areas where rocky outcrops, stony areas, and caves are situated. Within the preserve an old farm road follows along the eastern, northern, and western perimeter. Locked access gates are located on the southeastern corner at Anderson Mill Road and on the northwestern side along Lime Creek Road.

The extension of Anderson Mill Road occurs along the southern boundary of the preserve connecting to Lime Creek Road. South of the extended Anderson Mill Road is a newly developed subdivision.

In April and December, 2006, PBS&J personnel removed Ashe juniper seedlings and saplings within an approximate 200- to 250-foot radius around Discovery Well Cave, Hunters Lane Cave, Grassy Grove Sink, Hole-in-the-Draw Cave, Persimmon Well Cave, Uncorked Cave, and Jumbled Rocks Cave. The trees ranged in size from seedlings to saplings approximately 5 feet tall. The cut Ashe juniper were left in place. Greater than 1,000 seedlings/saplings were cut with an average height of 2 feet. Without regular removal of the Ashe juniper saplings, this species will reestablish as the predominant cover.



LEGEND	
KEY	ITEM
Park Amenity	
1	Parking Area
2	Two-way Entry with Vehicle Gate
3	Right-in, Right Out with Vehicle Gate
4	Temporary Parking Area
5	Information Kiosk
6	Bathrooms
7	Picnic Areas
8	6' Metal Wicket Fence
9	Vehicle Gate
10	Species Cave Enclosed with Fence
A	Uncorked Cave
B	Hunters Lane Cave
C	Discovery Well
11	Bike Rack Area
12	Bus Parking
13	Decorative Entry Fence
14	5' Perimeter 4"x4" Bulwark Fence With mammal hole 100' o.c.
15	Maintenance Vehicle Entry Gate
16	6' Concrete path
17	Cricket Foraging Area of Sp. Cave
18	Cricket Foraging Area of Cave
D	Lime Creek Cave
E	Persimmon Wall Cave
F	Jumble Rocks Cave
G	Zig Zag Cave
H	Grassy Grove Sink
I	Hole in the Draw
J	Under Three Oaks Cave

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**THE CITY OF CEDAR PARK**  
**CURT RANDA**  
 The Department of Parks & Recreation Director

Discovery Well Preserve  
 City of Cedar Park  
 (Under Development)

THE RANCH AT  
 CYPRESS CREEK

### **3. CAVE TEMPERATURE/HUMIDITY DATA MONITORING**

#### ***3.1. METHODOLOGY***

In May of 2004, HOBO Pro Temp/RH data monitors were installed in Discovery Well and Big Oak caves. These waterproof data monitors are temperature and RH sensors with 32 degrees Fahrenheit (°F) to 122°F operating environment and humidity readings with ±3% accuracy. The monitors were programmed to sample at 8-minute intervals with collection of data scheduled quarterly. Minor modifications at each cave were required to install the devices. The modifications, installation of monitors, and field operations of data retrieval and downloading were performed by PBS&J Geologist (and cave specialist) Mike Warton. The discussion of the monitor placement in the caves was presented in the 2004 annual report (PBS&J, 2004a).

New units were ordered in the spring of 2007, as old units continued to malfunction. In spite of new units and regular battery changes, data was irretrievable. Battery longevity tends to be a major detrimental factor in the data retrieval; however, battery replacement continues at each quarter review. The sampling frequency of each monitor will be set every 2 hours rather than every hour in order to help preserve the batteries' longevity and still maintain an efficient sampling record. The intervals for monitoring the units has been returned to quarterly rather than the previous biannual monitoring, due to continued equipment malfunction and the need to check the units frequently. The February 28–April 19 data collection was lost at both caves during new monitoring unit replacement. At Big Oak Cave, the data was also not retrievable during mid-July to late October (the unit was shipped to the manufacturer and even they were unsuccessful in retrieving the data).

#### ***3.2. DATA RESULTS***

The seasonal surface temperatures are reflected in the corresponding increases and decreases in the cave temperatures. The cave temperatures reflected in data retrieved from the first four months of 2008 show that on January 20 the low of 58.04 was reached. The high from the first four months was reached on April 27. The high on that day was 65.42. The average for the four months was 61.73.

The cave temperatures reflected in the data retrieved from the second four months of 2008 show that on May 6 the low of 64.91 was reached. The high from the second four months of 2008 was reached on August 31. The high on that day was 69.36. The average for the second four months was 67.14.

The cave temperatures reflected in the data retrieved from the third four months of 2008 show that on September 5 the low of 64.91 was reached. The high from the second four months of 2008 was reached on September 31. The high on that day was 69.36. The average for the second four months was 67.14.

The average temperature in the cave was around 66 degrees. The Texas Cave Conservancy has replaced the unit in the cave in order to get a more accurate record of the cave readings.

## **4. CAVE CRICKET SURVEYS**

Surveys for cave cricket populations were conducted to determine the relative abundance of cave crickets within each cave and to determine the approximate radius of the foraging area adjacent to each cave entrance. The caves surveyed include Discovery Well Cave, Uncorked Cave, Persimmon Well Cave, and Hunters Lane Cave.

Cave crickets (*Ceuthophilus* spp.) provide energy and nutrient input (e.g., eggs, feces, nymphs, and exoskeletons) to the karst ecosystem and function as scavengers and as predators of other invertebrate species. Cave crickets are troglomenes (cave-dwelling animals that leave the cave on a regular basis to feed) and are typically found in caves during daylight hours, where they seek shelter and lay eggs. They emerge from caves after sunset to forage on the surface adjacent to cave entrances. The radius of the foraging area surrounding a cave entrance may extend 50 to 100 meters (Taylor et al., 2005).

### ***4.1. METHODOLOGY***

Because cave crickets tend to hide within inaccessible areas of caves and occasionally migrate to different areas of a cave during the day or during a single survey event (particularly when disturbed by a surveyor), cave crickets must be counted at night as they emerge from the cave entrance. The methodology used during these surveys is consistent with FWS protocol, which requires that each cave be monitored for a period of two hours, beginning at sunset. Surveys should be conducted in the vicinity of caves containing federally listed invertebrate species (i.e., Discovery Well Cave), and potential habitat caves (Hunters Lane Cave, Persimmon Well Cave, and Uncorked Cave) at the same time of year (within 30 days) during the spring and/or fall when temperatures are between 40°F and 100°F and when RH is greater than 80% at the time of the survey.

Surveys were conducted from watch stations located near each cave entrance. TCC survey personnel assumed positions at the watch stations prior to sunset. The survey period at each cave commenced when the first cricket emerged from the cave entrance and then continued for 2 hours. An assessment of the relative age of each cricket was made as it exited the upper ledge of the cave entrance. Crickets were subdivided into two age categories based on relative size: adult and juvenile. The cricket number was recorded using hand-held counters.

Data recorded during surveys include the number and relative age of crickets observed, surface air temperature, RH, recent weather events in the previous week (e.g., rain, unusual temperatures, severe weather), and current weather trends (e.g., drought). Surface air temperature and humidity measurements were recorded during the fall survey using a thermometer /hygrometer (Amprobe™ Model THWD-2).

The survey methodology was altered slightly during the 2005 survey and continued during 2006 and 2007 surveys. A film of red mylar (plastic) was placed over the end of the flashlight to reduce the abrupt glare, which often causes the crickets to retreat back into the cave opening. Although it is difficult to determine if this change in

the lighting had a measured effect, survey participants felt this addition to the methodology was less intrusive to the invertebrates, as they were less likely to retreat. Phase 1 (baseline) cave cricket surveys were conducted once during the spring and once during the fall in 2004. During Phase 2, cave cricket surveys are performed twice per year (once per season, spring and fall), 2005 through 2007. During Phase 3, biological surveys for cave crickets will occur biannually once every 3 years, unless FWS approves less frequent surveying. Cave cricket surveys performed during Phases 2 and 3 will be compared to the baseline (Phase 1) data. In 2007, the third year of Phase 2, cave cricket surveys were conducted once in the spring and once in the fall, as with the previous 3 years. The spring survey was conducted on May 23, 2007, and the fall survey occurred on November 12, 2007.

#### 4.2. TCC CRICKET SURVEYS

The TCC conducted the four Spring Cricket surveys and the four Fall Cricket surveys using two workers, TCC President, Mike Walsh & Bill Thomas. Each survey took around three hours. The methods were the same as had been conducted in the previous years. Overall, the numbers seemed lower than those conducted on previous surveys at the Wilcox Cave Preserve. Harvestmen, mice, millipedes and harvestmen were observed coming out of the caves. In both the spring cricket count and in the fall cricket count, the weather was clear.



TABLE 2  
DISCOVERY WELL PRESERVE  
RESULTS OF SPRING CAVE CRICKET SURVEY  
SPRING - 2008

FEATURE	DATE	TIME	# ADULTS	# JUVENILES	FORAGING RADIUS
Hunter's Lane	4/22/08	8.00 P.M.	38	53	7 meters
Persimmon Well	4/23/08	8.10 P.M.	68	37	4 meters
Uncorked Cave	4/24/08	8.00 P.M.	14	16	5 meters
Discovery Well	4/25/08	8.15 P.M.	22	25	5 meters
Total			142	131	

TABLE 3  
DISCOVERY WELL PRESERVE  
RESULTS OF FALL CAVE CRICKET SURVEY  
FALL- 2008

FEATURE	DATE	TIME	# ADULTS	#JUVENILES	FORAGING RADIUS
Hunter's Lane	10/26/08	8.40 P.M.	14	43	4 meters
Persimmon Well	10/27/08	8.35 P.M.	23	12	6 meters
Uncorked Cave	10/28/08	8.30 P.M.	13	22	4 meters
Discovery Well	10/29/08	8.35 P.M.	9	9	2 meters
Total			59	86	

TABLE 4  
DISCOVERY WELL PRESERVE  
SUMMARY OF CAVE CRICKET SURVEY RESULTS: 2004-2008

	ADULT									
	SPRING					FALL				
	2008	2007	2006	2005	2004	2008	2007	2006	2005	2004
Hunters Lane Cave	38	40	23	28	12	14	2	0	6	11
Persimmon Well	68	17	27	192	17	23	2	36	1	6
Uncorked Cave	14	7	11	14	25	13	1	4	0	1
Discovery Well	22	12	13	45	13	9	0	9	0	2
Total	142	76	74	279	67	59	5	49	7	20

	JUVENILE									
	SPRING					FALL				
	2008	2007	2006	2005	2004	2008	2007	2006	2005	2004
Hunters Lane Cave	53	48	63	135	35	43	26	27	35	43
Persimmon Well	37	15	40	54	40	12	15	17	1	50
Uncorked Cave	16	4	3	10	1	22	9	37	4	39
Discovery Well	25	23	30	64	51	9	0	12	25	21
Total	131	90	136	263	127	86	50	93	65	153

## **5. BIOLOGICAL SURVEY**

### **5.1. METHODOLOGY**

Monitoring in caves for endangered invertebrates involves delineating zones within each cave and establishing set sampling stations. All vertebrates and invertebrates, alive or dead, including all troglobites, troglonexes, and accidental species were identified and quantified (approximations are made for very abundant species). Survey data includes microhabitat descriptions, including temperature and humidity. Caves where biological surveys were conducted include Discovery Well Cave, Hunters Lane Cave, Uncorked Cave, and Persimmon Well Cave.

In 2005, after excavation of Jumbled Rocks Cave and biological sampling of the cave, it was determined by James Reddell that the accessible part of the cave (above the area of periodic flooding) does not appear to contain habitat for the cave-adapted species. Therefore, no biological survey was conducted in 2006 or 2007 in this cave. The surveys for species identification in the four caves on the preserve were conducted by permitted karst biologists James Reddell, Marcelino Reyes, and Mike Warton.

#### ***Biological Monitoring of the Discovery Well Cave Preserve***

On April 19, 2008 Bill Larson & Jeanette Larson conducted biological monitoring in four caves in the Discovery Well Cave Preserve. This included: Discovery Well Cave, Hunter's Lane Cave, Persimmon Well Cave and Uncorked Cave. No *Rhadine persephone* were observed during the monitoring. The caves were extremely wet. The CO<sub>2</sub> levels in the caves were low. No fire ants were observed. A list of the cave species observed follows this section. The gate and the locks were lubricated using ***Fluid Film***, a non solvent penetrate & lubricant with a wool based formulation (lanolin).

On September 6, 2008 Dr. Tom Illiff & his University of Texas A & M biospeology students conducted biological monitoring in four caves in the Discovery Well Cave Preserve. This included: Discovery Well Cave, Hunter's Lane Cave, Persimmon Well Cave and Uncorked Cave. No *Rhadine pereophone* were observed during the monitoring. The caves wet. The CO<sub>2</sub> levels in the caves were low. No fire ants were observed. A list of the cave species observed follows this section. The gate and the locks were lubricated using ***Fluid Film***, a non solvent penetrant & lubricant with a wool based formulation (lanolin). The TCC has found this to be an excellent substitute for WD 40 or other lubricants.





## 5.2. RESULTS

No endangered species were encountered on this property in 2007. In 2005, the Tooth Cave ground beetle was collected in Hunters Lane Cave. This species was also found in the Discovery Well Cave in 2002 (Reddell, 2002). Lists of species found in the caves are included in Appendix C. Reddell reports that the caves were all extremely wet occasionally with drips or standing water in places, thus were too wet to be biologically productive. The 2007 spring and summer months were above average for rainfall events, by fall the rainfall had stopped. During 2006 the caves were extremely dry.

### *Spring 2007*

A biological survey was conducted in four of the caves on the Discovery Well Karst Preserve: Discovery Well Cave, Hunters Lane Cave, Uncorked Cave, and Persimmon Well Cave. No endangered species were observed. Species collected or observed within these caves in May 2007 included pill bugs (*Armadillidium vulgare*), centipedes (Lithobiomorpha), millipedes (*Cambala speobia* and *Speodesmus* sp.), subterranean silverfish (*Texoreddellia* sp.), springtails (Collembola), flies (Diptera), crane flies (Tipulidae), cave crickets (*Ceuthophilus secretus*), spiders (Araneae), gulf coast toad (*Bufo nebulifer*), and chirping cliff frog (*Syrrophus marnockii*).

Outside surface temperatures ranged from 82°F to 86°F. Internal cave temperature for Discovery Well Cave was 76.6°F; Hunters Lane Cave was 74.6°F; Persimmon Well Cave was 69°F; and Uncorked Cave was 73.7°F.

### *Fall 2007*

The biological sampling for the fall was conducted on September 30, 2007. Only two caves, Discovery Well and Persimmon Well, were sampled due to high carbon dioxide levels in the other two caves. Internal cave RH for these two caves was 89% and 96% for Discovery Well and Persimmon Well, respectively. Internal cave temperatures averaged 74°F. Surface temperatures ranged from 76–81°F with RH 71–89%. Species collected or observed within the caves in September included millipedes (*Cambala speobia*), pillbugs cave crickets, springtails, subterranean silverfish, flies, ants (Formicidae), ground beetles (Tachyini), other beetles (Coleoptera), spiders (*Cicurina varians*, also others in Araneae), gulf coast toad, and snake (Colubridae). No federally listed invertebrates were detected.

### *Spring 2008*

The biological survey was conducted on April 19, 2008. It was conducted in four of the caves on the Discovery Well Preserve: Discovery Well Cave, Hunters Lane Cave, Uncorked Cave, and Persimmon Well Cave. No endangered species were observed. Species observed within these caves in April 2008 include; Toads, Ground Beetles, Pill bugs, Frogs, millipedes (*Cambala speobia* and *Speodesmus*, subterranean silverfish (*Texoreddellia* sp.), springtails (Collembola), flies (Diptera), crane flies (Tipulidae), cave crickets (*Ceuthophilus secretus*) and spiders (Araneae)

Outside surface temperatures ranged from 66.5°F to 72.1°F. Internal cave temperature for *Discovery Well Cave* was 67.5°F- Humidity 75.4%-*Hunters Lane Cave* was 66.5°F-Humidity 74.8%- *Persimmon Well Cave* was 70.3°F- Humidity 78.5% and *Uncorked Cave* was 72.1°F- Humidity 77.6%.

### ***Fall 2008***

The biological sampling for the fall was conducted on September 6, 2008. It was conducted in four of the caves on the Discovery Well Preserve: *Discovery Well Cave*, *Hunters Lane Cave*, *Uncorked Cave*, and *Persimmon Well Cave*. No endangered species were observed. Species observed within these caves in September 2008 include: Toads, Ground Beetles, Pill bugs, Frogs, harvestmen, scorpions, earthworm, millipedes (*Cambala speobia* and *Speodesmus*, subterranean silverfish (*Texoreddellia* sp.), springtails (Collembola), flies (Diptera), crane flies (Tipulidae), cave crickets (*Ceuthophilus secretus*) and spiders (Araneae).

Outside surface temperatures ranged from 85.5°F to 87.6°F. Internal cave temperature for *Discovery Well Cave* was 85.5°F- Humidity 97.4%-*Hunters Lane Cave* was 87.5°F-Humidity 96.5%- *Persimmon Well Cave* was 87.6°F- Humidity 96.7% and *Uncorked Cave* was 87.4°F- Humidity 97.4%.

## 6. MAMMAL SURVERY

The TCC is involved with the overall management of the Discovery Well Cave Preserve for the City of Cedar Park. The TCC will oversee the 2009 full mammal study. City of Austin Land Management Ranger Aubrey Deal requested access to the site for mammal studies. Working with Kelly Nesvacil, City of Austin Wildland Conservation District Biologist we were able to collect mammal information at the Discovery Well Cave Preserve site. There were three spotlight surveys done for the Cypress Creek Macro-site including the Discovery Well site.

August 4, 2008	August 18, 2008	September 4, 2008
One Buck One Spike Three Does	Four Bucks Seven Does One Great Horned Owl	Two Does One Undetermined Whitetail Doves

Kelly Nesvacil - City of Austin Biologist  
3635 RR 620 South  
Austin, Texas 78738  
512-802-8175



TABLE 5  
TERRESTRIAL MAMMAL SPECIES OBSERVED AT  
DISCOVERY WELL PRESERVE BY THE TCC STAFF

Common Name <sup>2</sup>	Scientific Name <sup>2</sup>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Texas mouse	<i>Peromyscus attwateri</i>
Common gray fox	<i>Urocyon cinereoargenteus</i>
Ringtail	<i>Bassariscus astutus</i>
Common raccoon	<i>Procyon lotor</i>
Striped skunk	<i>Mephitis mephitis</i>
White-tailed deer	<i>Odocoileus virginiana</i>

*In addition several feral cats have been observed entering the mammal access into the caves.*

## **7. FIRE ANT SURVEY AND TREATMENT**

### **7.1. METHODOLOGY**

Biannual fire ant treatment will continue on Discovery Well Preserve throughout 2007. Treatments may be conducted should they be necessary, if mounds are observed during monthly maintenance surveys. The TCC provides the fire ant treatment according to guidelines set forth by the U.S. Fish & Wildlife Department. Fire ant mounds were treated with non-chemical methods. Boiling water and surfactant are approved for use upon the fire ant mounds.

The yearly fluctuations in the number of mounds reflect the invasive nature of the species. The number of mounds typically increases during the most, warm spring months. The number of mounds around the cave entrances remains low, yet fire ant monitoring and treatment must continue to prevent detrimental effects to the cave invertebrates. Since the fire ant species is harmful to the food cycle, it is the policy of the TCC to treat all of the cave preserves under TCC management year round as the mounds are observed.



TABLE 6  
DISCOVERY WELL CAVE PRESERVE  
FIRE ANT SURVEY- 2008

Month	Number of mounds
January	7
February	5
March	23
April	14
May	22
June	21
July	13
August	7
September	15
October	10
November	9
December	6
Total	148 mounds

*In 2007, 125 fire ant mounds were treated in the critical habitat areas around the caves. In 2008, 148 fire ant mounds were treated in the critical habitat areas around the caves. In 2008, approximately 150 additional fire ant mounds were treated in other areas of the cave preserve.*

## **8. ACCESS RESTRICTION**

Due to the proximity of the preserve to suburban neighborhoods, TxDOT has committed in its preserve management plan (PBS&J, 2004a) to restrict access on Discovery Well Preserve. The current fence includes 3–5 strands of barbed wire on three sides and a wood privacy fence (adjacent to the Ranch at Cypress Creek subdivision). Two locked gates, one on Anderson Mill Road and the other on Lime Creek Road, limit access to Federal Highway Administration /TxDOT, or representatives and researchers. “No Trespassing” signs have been installed on the perimeter fence and near the caves. An aluminum gate was installed previously along the east corner to allow for access by Pedernales Electric Company to work on power line structures along their easement.

During March and April of 2004, PBS&J staff gated and locked the cave entrances to Discovery Well, Hunters Lane, Uncorked, and Hole-in-the-Draw caves.

The gates allow the passage of small- to medium sized vertebrates, while excluding human visitors. In spite of “No Trespassing” signs, there is obvious evidence of trespassers. The City of Cedar Park had the four remaining caves on the preserve gated in May and June (see Section 8 for description of City of Cedar Park’s involvement). Gating was completed at Persimmon Well Cave, Jumbled Rock Cave, Under 3 Oaks Cave, and Zig-Zag Cave. The city retains control of the surface rights through a lease agreement with TxDOT.

In 2008, the City of Cedar Park started limited use of the Discovery Well Cave Preserve. To facilitate this a wrought iron pedestrian gate was installed on the northeast corner. The April TCC CAVE DAY presented the public their first official view of the cave preserves. The TCC conducted guided tours of the preserve. The Master plan is moving through the approval process and it is a goal to start serious development sometime in 2010. The limited public access is proving to be a good gage on whether such visitation will create problems at the cave sites. The TCC has learned a good deal about dealing with day-to-day problem concerning endangered species cave when houses surround them.

The City of Cedar Park has extended their Cave Preserve Regulations to the Discovery Well Tract. We have included information in this report. We have found that public education equals public support. The City of Austin requested authorization to conduct a mammal study on the site. The mammal information is included in this report.

In 2005, the City of Cedar Park asked the TCC to write the new cave related regulations concerning the endangered species caves. The City Council adopted the regulations. The photo shows the cave regulations on a sign at the Cedar Elm Cave Preserve. These regulations also apply to the Discovery Well Cave Preserve.

## *City of Cedar Park Regulations*

The cave preserves have been established for the protection of the cave related endangered species. Activities permitted within the preserves are regulated by the U.S. Fish & Wildlife. The species protected is a small, cave adapted beetle designated as the *Rhadine persephone*. This beetle exists only in a small number of caves near Cedar Park, Texas. For their protection, cave gates have been installed on all caves within the cave preserve system. Each evening, cave crickets leave the caves to search for food. The areas around the caves are known as the critical habitat areas. It shall be unlawful for any person to damage the vegetation within the critical habitat areas. Extra care should be used in the areas near the caves where this sign is displayed. Please report harmful activities to the City of Cedar Park.



## Section 7.306 Cave Preserves

### **WARNING NO ENTRY!**

*NOTICE: This area is a habitat conservation and park preserve area for one or more ENDANGERED SPECIES or other species of concern pursuant to a Federal Endangered Species Act, Section 10 (A) incidental take permit issued by the Federal Department of the Interior. Anyone entering this area, depositing foreign material, committing vandalism or any other acts of mischief which may harm these Federally Protected Species may be criminally prosecuted under the penalty provisions of the Endangered Species Act..*

**Punishment of up to one year in prison and fines of up to \$20,000, per offense, may be levied against violators.**

It shall be unlawful for any person in a cave preserve area to:

1. Damage any of the vegetation within the critical habitat area or within the cave preserve.
2. Introduce any foreign material such as chemicals, sewage, petroleum products, pesticides, etc. into the caves, the critical habitat areas, or within the cave preserve.
3. Enter any area posted as "Closed to the Public."
4. Dump or otherwise dispose of trash, junk, garbage, refuse, unsightly matter, brush or other waste within the caves, the critical habitat area or the cave preserve.
5. Operate or use any type of motorized vehicle, including but not limited to, motorcycles, motorbikes mini-bikes, ATV's on any trail or surface area within the cave preserves. City of Cedar Park authorized maintenance or public safety vehicles may be permitted.
6. Enter the critical habitat areas outside the established trails.
7. Enter the caves without authorization.
8. Take, remove, or otherwise harm any species within the caves without a U.S. Fish & Wildlife permit issued for the purpose of scientific investigation.

**For Emergencies – Call 911**

## **9. MAINTENANCE**

Routine maintenance on the preserve was performed throughout the year beginning in January 2007. Routine maintenance included picking up blown-in trash, checking the fence, gate and lock, as well as checking cave entrances for any signs of unauthorized entry. Occasional cutting of young Ashe Juniper trees, especially around the cave features is conducted. Trash blowing in from adjacent subdivisions, along Anderson Mill Road and Lime Creek Road is common. The greatest amount of trash on the preserve is blown in or thrown from Anderson Mill Road.

At least a couple of trash bags of debris per month are removed from the preserve; there is also continual trash dumping from the adjacent Ranch at Cypress Creek subdivision. Evidence of regular use of the preserve by trespassers is common. Locals have been seen walking their dogs, and there is evidence of regular fence crossings in the rear portion of the preserve near the detention pond area. Although all of the caves have now been gated (as of June), there is occasional debris found near or blown into the caves.

As of January 1, 2008, the City of Cedar Park retained control of the surface rights of the preserve through a long-term lease agreement with TxDOT. TxDOT and the city executed a Memorandum of Agreement in January 2006, whereby TxDOT will retain any future mitigation credits that may become available. The city intends to use the Discovery Well Preserve tract as a low-impact recreation area, subject to the FWS approval.

The TCC has acquired a Polaris Ranger that we use to check the Discovery Well property. It allows us to check areas where there are no maintenance trails. Fire ant control is easier since we can carry water and a small boiler. This allows us to reach the fire ant mounds in otherwise hard to reach areas. The maintenance trails were designed and laid out working with the City of Cedar Park master plan for the Discovery Well Cave Preserve tract. We have found that since the new gate was installed in April of 2008 there has been no significant increase in trash on the property. We have even encountered visitors with bags picking up trash. The Discovery Well Cave Preserve now has more workers to protect this valuable cave preserve.





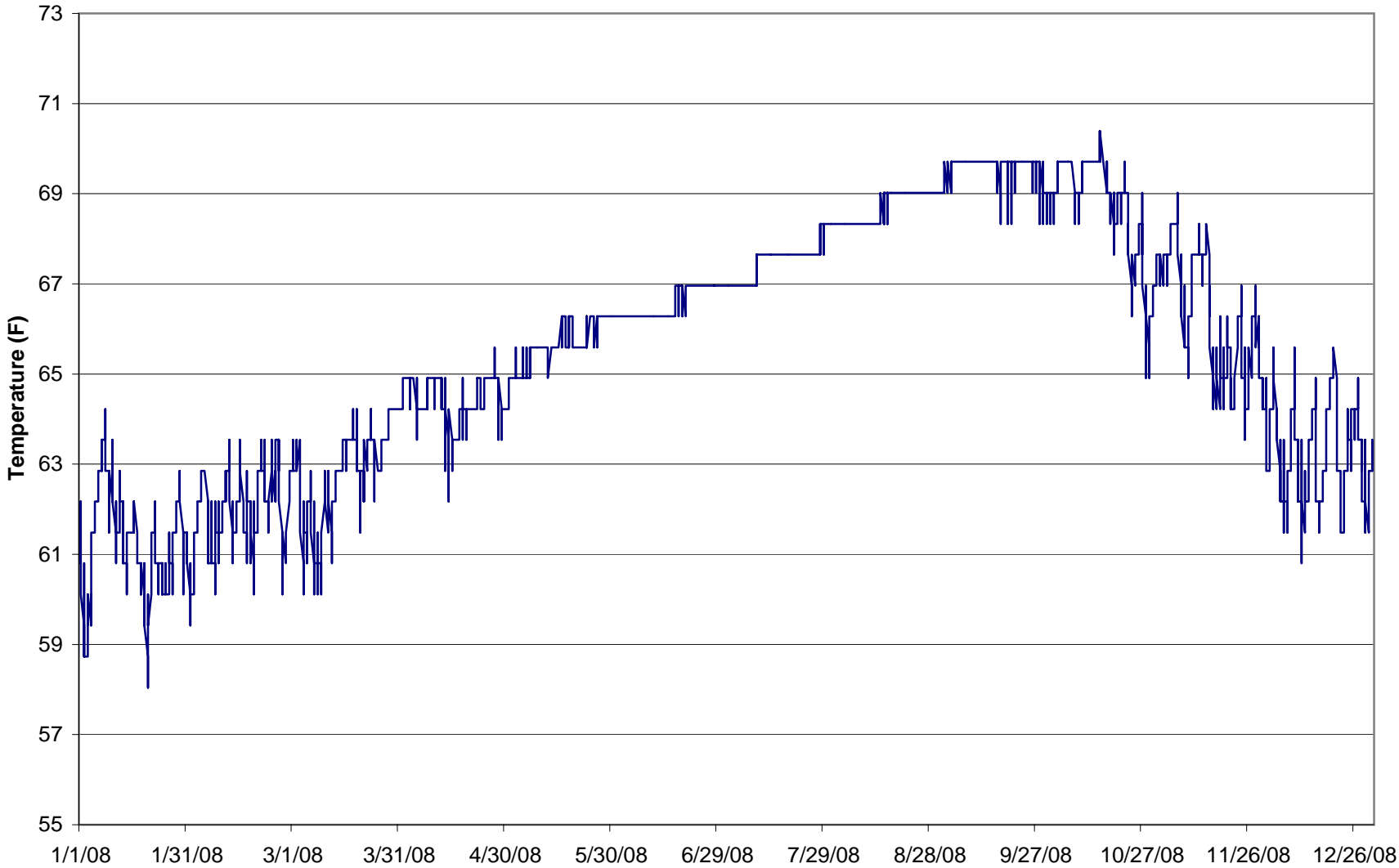
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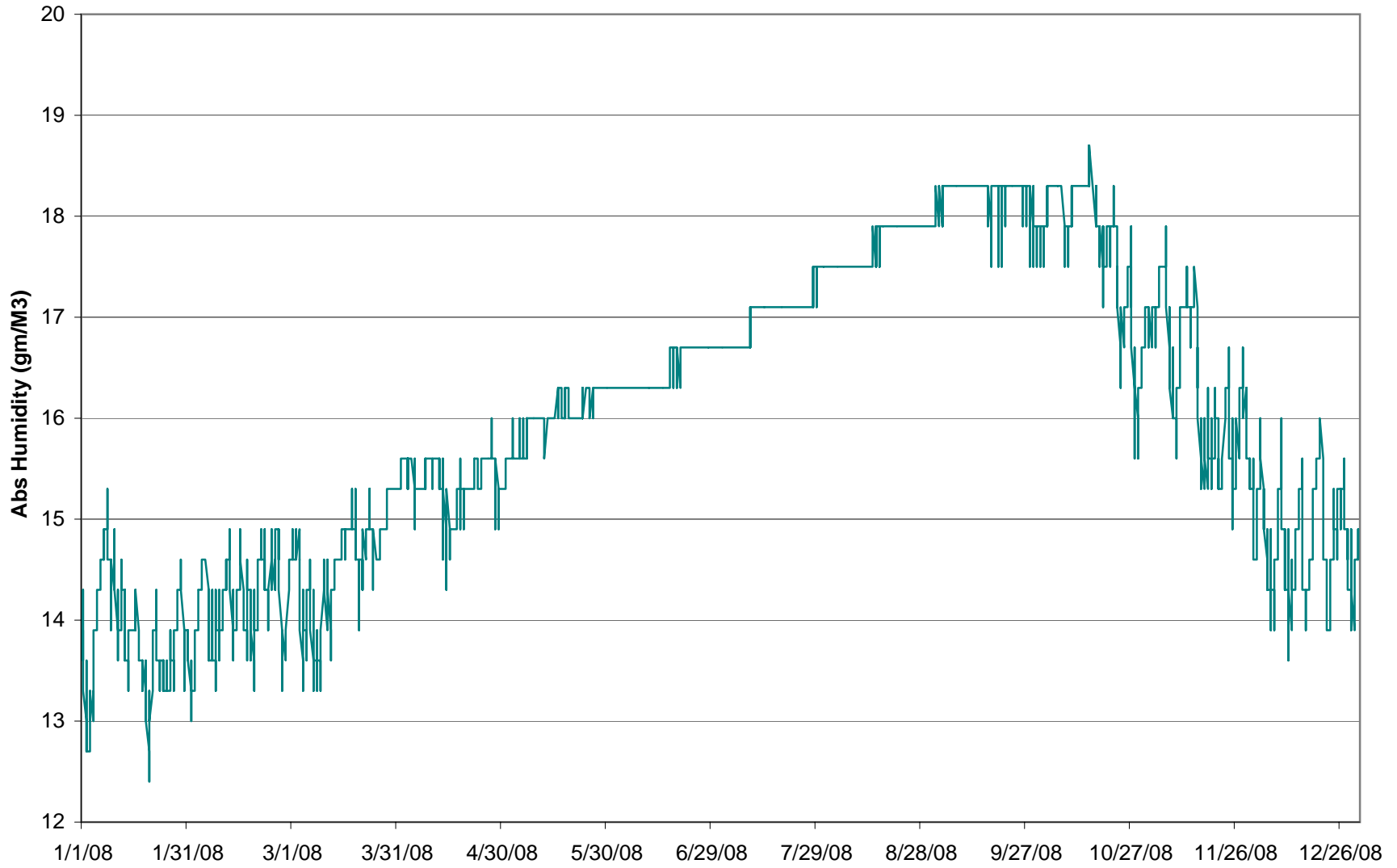
## Appendix A

### Cave Temperature/Humidity Data Monitoring

**Discovery Well**  
(S/N #732478)



**Discovery Well**  
(S/N #732478)



## Appendix B

### Biological Survey Results

***Discovery Well Cave Preserve Biological Survey- Spring 2008***

<b>Discovery Well Cave</b>			
Discovery Well Cave Preserve		Williamson County, Texas	
Date:	April 19, 2008		
Weather Conditions:	Clear	Gate:	OK
Chemicals or Sewage:	No	Lock	OK
Fire Ants:	No	Trash:	No
The cave was extremely wet. The CO2 levels were under 1%.			
Cave Temperature:	67.5F	Cave Humidity:	75.4%
<u>Species:</u>			
Cicurina	1		
Spider (surface)	1		
Millipedes	1		
Crickets Ceutophilus	3		
Toad	1		
Ground Beetle	3		
Pillbugs	1		
Springtails Collembola	1		
Flies Diptera undetermined	1		

<b>Hunter's Lane Cave</b>			
Discovery Well Cave Preserve		Williamson County, Texas	
Date:	April 19, 2008		
Weather Conditions:	Clear	Gate:	OK
Chemicals or Sewage:	No	Lock	OK
Fire Ants:	No	Trash:	No
The cave was dry. The CO2 levels were around 2.4%.			
Cave Temperature:	66.5F	Cave Humidity:	74.8%
<u>Species:</u>			
Cicurina	1		
Spider (surface)	1		
Millipedes	1		
Crickets Ceutophilus	1		
Pillbugs	3		
Springtails Collembola undetermined	6		

<b>Persimmon Well Cave</b>			
Discovery Well Cave Preserve		Williamson County, Texas	
Date:	April 19, 2008		
Weather Conditions:	Clear	Gate:	OK
Chemicals or Sewage:	No	Lock	OK
Fire Ants:	No	Trash:	No
The cave was extremely wet. The CO2 levels were under 1%.			
Cave Temperature:	70.3F	Cave Humidity:	78.5%
<u>Species:</u>			
Subterranean silverfish	1		
Spider (surface)	2		
Silverfish Texoredellia	1		
Crickets Ceutophilus	3		
Pillbugs	1		
Springtails Collembola undetermined	1		
Flies Diptera undetermined	5		

<b>Uncorked Cave</b>			
Discovery Well Cave Preserve		Williamson County, Texas	
Date:	April 19, 2008		
Weather Conditions:	Clear	Gate:	OK
Chemicals or Sewage:	No	Lock	OK
Fire Ants:	No	Trash:	No
The cave was extremely wet. The CO2 levels were under 1%.			
Cave Temperature:	72.1F	Cave Humidity:	77.6%
<u>Species:</u>			
Frog	1		
Cicurina	1		
Ground Beetle	1		
Crickets Ceutophilus	1		
Springtails Collembola undetermined	4		
Flies Diptera undetermined	1		

**Discovery Well Cave Preserve Biological Survey- Fall 2008**

<b>Discovery Well Cave</b>			
Discovery Well Cave Preserve		Williamson County, Texas	
Date:	Sept 6, 2008		
Weather Conditions:	Clear	Gate:	OK
Chemicals or Sewage:	No	Lock	OK
Fire Ants:	No	Trash:	No
The cave was extremely wet. The CO2 levels were under 1%.			
Cave Temperature:	85.5F	Cave Humidity:	97.4%
<u>Species:</u>			
Springtails Collembola	2		
Flies Diptera	3		
Spider (white)	1		
Spider	1		
Millepedes	1		
Cave crickets Ceutophilus	12		
Toads	1		
Ground beetles	1		
Beetles Coleoptera	1		
Scorpion	1		
Earthworm	1		

<b>Hunter's Lane Cave</b>			
Discovery Well Cave Preserve		Williamson County, Texas	
Date:	Sept 6, 2008		
Weather Conditions:	Clear	Gate:	OK
Chemicals or Sewage:	No	Lock	OK
Fire Ants:	No	Trash:	No
Cave Temperature:	87.2 F	Cave Humidity:	96.5%
<u>Species:</u>			
Cicurina	1		
Spider (surface)	1		
Millipedes	2		
Crickets Ceutophilus	4		
Harvestman	6		
Springtails Collembola undetermined	5		



<b>Persimmon Well Cave</b>			
Discovery Well Cave Preserve		Williamson County, Texas	
Date:	Sept 6, 2008		
Weather Conditions:	Clear	Gate:	OK
Chemicals or Sewage:	No	Lock	OK
Fire Ants:	No	Trash:	No
Cave Temperature:	87.6F	Cave Humidity:	96.7%
<u>Species:</u>			
Beetles Coleoptera	1		
Silverfish Texoredellia	1		
Crickets Ceutophilus	3		
Pillbugs	2		
Springtails Collembola undetermined	3		

<b>Uncorked Cave</b>			
Discovery Well Cave Preserve		Williamson County, Texas	
Date:	Sept 6, 2008		
Weather Conditions:	Clear	Gate:	OK
Chemicals or Sewage:	No	Lock	OK
Fire Ants:	No	Trash:	No
The cave was extremely wet. The CO2 levels were under 1%.			
Cave Temperature:	87.4	Cave Humidity:	97.4%
<u>Species:</u>			
Frog	1		
Millipedes	1		
Crickets Ceutophilus	6		
Flies Diptera undetermined	2		

Appendix C  
Maintenance Checklists

## ***Discovery Well Cave Preserve Check List***

Date **1/04/2008**

1. Check integrity of exterior fencing.  
*Damage-None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage-None*
4. Note maintenance performed (including removal of trash)  
**Cleaned up trash along road and back along fence.**
5. Additional notes

## *Discovery Well Cave Preserve Check List*

Date **1/22/2008**

1. Check integrity of exterior fencing.  
*Damage-None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- Trash along trail*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 7 mounds treated*
  - b. Note damage from wild hogs or other large mammals.  
*Damage-None*
4. Note maintenance performed (including removal of trash)  
**Removed trash behind houses**
5. Additional notes  
**Worked on new maintenance trails.**

## *Discovery Well Cave Preserve Check List*

Date **2/06/2008**

1. Check integrity of exterior fencing.  
*Damage-None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- **Bow& Arrow target (removed)***
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- **5 mounds treated***
  - b. Note damage from wild hogs or other large mammals.  
*Damage-None*
4. Note maintenance performed (including removal of trash)  
**See above**
5. Additional notes  
**Worked on new maintenance trails.**

## *Discovery Well Cave Preserve Check List*

Date **2/21/2008**

1. Check integrity of exterior fencing.  
*Damage-None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage-None*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**The metal barrier along the road was knocked down.**

## *Discovery Well Cave Preserve Check List*

Date **3/04/2008**

1. Check integrity of exterior fencing.  
*Damage-None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 15 mounds treated.*
  - b. Note damage from wild hogs or other large mammals.  
*Damage-None*
4. Note maintenance performed (including removal of trash)  
**Moved rocks along trail.**
5. Additional notes

## *Discovery Well Cave Preserve Check List*

Date **3/18/2008**

1. Check integrity of exterior fencing.  
*Damage-None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- New gate installed. Will check for problems*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 8 mounds treated.*
  - b. Note damage from wild hogs or other large mammals.  
*Damage-None*
4. Note maintenance performed (including removal of trash)  
**Cut young growth cedar. Picked up trash.**
5. Additional notes  
**New gate installed near the rear of the preserve. This should cut down fence damage from crossing.**



## *Discovery Well Cave Preserve Check List*

Date **3/21/2008**

1. Check integrity of exterior fencing.  
*Damage- Metal rails still down on Anderson.*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- New gate has not caused problems.*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage-None*
4. Note maintenance performed (including removal of trash)  
**Some trash along trails**
5. Additional notes  
**Checked HOBO**

## *Discovery Well Cave Preserve* *Check List*

Date **4/19/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage-None*
4. Note maintenance performed (including removal of trash)  
**Worked on the maintenance trails.**
5. Additional notes  
**Conducted Spring biological monitoring, checked HOBO.**

## *Discovery Well Cave Preserve Check List*

Date **4/22/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- New gate shows no sign of problems.*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 14 mounds treated.*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- Deer appears to have disturbed some areas.*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**Conducted the first of four nights cricket studies.**

## *Discovery Well Cave Preserve* *Check List*

Date **4/23/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering-None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**Conducted the second of four nights cricket studies.**

## *Discovery Well Cave Preserve Check List*

Date **4/24/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- Large rocks on top of Persimmon Cave gate.*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**Conducted the third of four nights cricket studies.**

## *Discovery Well Cave Preserve Check List*

Date **4/25/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**Conducted the last of four nights cricket studies.**

## *Discovery Well Cave Preserve Check List*

Date **5/06/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 12 mounds treated.*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes

## *Discovery Well Cave Preserve Check List*

Date **5/23/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- Front gate found unlocked.*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 10 mounds treated.*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes



## ***Discovery Well Cave Preserve Check List***

Date **6/10/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 21 mounds treated.*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes

## *Discovery Well Cave Preserve Check List*

Date **7/16/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 6 mounds treated.*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes

## ***Discovery Well Cave Preserve Check List***

Date **7/30/2008**

1. Check integrity of exterior fencing.  
*Damage- **None***
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- **None***
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- **None***
2. Check each cave for signs of unauthorized entry.  
*Entry-**None***
  - a. Check the gates for evidence of tampering.  
*Tampering- **None***
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-**None***
3. Observe the area for evidence of destructive animal use.  
*Destruction-**None***
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- **7 mounds treated.***
  - b. Note damage from wild hogs or other large mammals.  
*Damage- **None***
4. Note maintenance performed (including removal of trash)
5. Additional notes

## ***Discovery Well Cave Preserve Check List***

Date **8/12/2008**

1. Check integrity of exterior fencing.  
*Damage- **None***
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- **None***
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- **None***
2. Check each cave for signs of unauthorized entry.  
*Entry-**None***
  - a. Check the gates for evidence of tampering.  
*Tampering- **None***
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-**None***
3. Observe the area for evidence of destructive animal use.  
*Destruction-**None***
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- **7 mounds treated.***
  - b. Note damage from wild hogs or other large mammals.  
*Damage- **None***
4. Note maintenance performed (including removal of trash)
5. Additional notes

## *Discovery Well Cave Preserve Check List*

Date **10/6/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- Uncorked Cave gate shows sign of attempted entry.*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 15 mounds treated.*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**Biological study, checked HOBO.**

## *Discovery Well Cave Preserve Check List*

Date **10/26/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 10 mounds treated.*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**The first of four nights cricket studies.**

## ***Discovery Well Cave Preserve Check List***

Date **10/27/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- Tire tracks across part of preserve, driver unknown, no real damage.*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**The second of four nights cricket studies.**

## ***Discovery Well Cave Preserve Check List***

Date **10/28/2008**

1. Check integrity of exterior fencing.  
*Damage- Metal posts still down on Anderson, reported to City.*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**The third of four nights cricket studies.**



## *Discovery Well Cave Preserve Check List*

Date **10/29/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- Fence cut along northwest corner.*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction-None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- None*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes  
**The last of four nights cricket studies.**

## *Discovery Well Cave Preserve* *Check List*

Date **11/19/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- Large rocks on top of gate at Zig- Zag Cave*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction- Some evidence of deer activity*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 9 mounds treated*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)  
**Trash near rear gate (removed).**
5. Additional notes  
**Checked HOBO.**

## *Discovery Well Cave Preserve* *Check List*

Date **11/24/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction- Some evidence of deer activity*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 4 mounds treated*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)  
**Worked on new maintenance trails, cut grass & limbs.**
5. Additional notes

## *Discovery Well Cave Preserve Check List*

Date **12/09/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
*Tampering- None*
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction- None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- 6 mounds treated*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes

## ***Discovery Well Cave Preserve Check List***

Date **12/10/2008**

1. Check integrity of exterior fencing.  
*Damage- **None***
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- **None***
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- **None***
2. Check each cave for signs of unauthorized entry.  
*Entry-**None***
  - a. Check the gates for evidence of tampering.  
*Tampering- **None***
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-**None***
3. Observe the area for evidence of destructive animal use.  
*Destruction- **None***
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- **5 mounds treated***
  - b. Note damage from wild hogs or other large mammals.  
*Damage- **None***
4. Note maintenance performed (including removal of trash)
5. Additional notes

## *Discovery Well Cave Preserve Check List*

Date **12/22/2008**

1. Check integrity of exterior fencing.  
*Damage- None*
  - a. Indicate damage to exterior fence/gate/lock.  
*Damage- None*
  - b. Describe evidence of unauthorized entry into preserve.  
*Entry- None*
2. Check each cave for signs of unauthorized entry.  
*Entry-None*
  - a. Check the gates for evidence of tampering.  
**Northeast rear gate found open, replaced lock.**
  - b. Describe evidence of unauthorized entry into caves.  
*Entry-None*
3. Observe the area for evidence of destructive animal use.  
*Destruction- None*
  - a. Record presence of fire ant mounds in preserve, especially near caves.  
*Fire ant mounds- none*
  - b. Note damage from wild hogs or other large mammals.  
*Damage- None*
4. Note maintenance performed (including removal of trash)
5. Additional notes