# Balcones Canyonlands Preserve Karst Management
# 2002 Annual Report

**Travis County Natural Resources**
**and the City of Austin BCP - WWW**

**January 15, 2003**

## TABLE OF CONTENTS

**1.0 REGIONAL PERMIT**

**2.0 CAVE MANAGEMENT SUMMARY**

**3.0 KARST FEATURE STATUS**

**4.0 ACCESS STATUS AND KARST EDUCATION**

**5.0 MANAGEMENT COORDINATION**

**6.0 BIOLOGICAL MONITORING**

**7.0 KARST MANAGEMENT ACTIVITIES**

**8.0 RECOMMENDATIONS**

**9.0 LITERATURE CITED**

**ATTACHMENT A: KARST FAUNAL REPORTS:**
**CITY OF AUSTIN – 20 REPORTS**
**TEXAS CAVE MANAGEMENT ASSOCIATION – 3 REPORTS**
**ATTACHMENT B: REPORT BY TEXAS CAVE MANAGEMENT ASSOCIATION (TCMA)**
**ATTACHMENT C:**
**CITY OF AUSTIN- CAVE MYOTIS HABITAT ENHANCEMENT AT GOAT CAVE**

## 1.0 REGIONAL PERMIT

There are six species of endangered karst invertebrate and 25 karst species of concern covered by the Balcones Canyonlands Conservation Plan (BCCP) (the Regional Permit). If these 25 species of concern become listed as endangered in the future, no additional mitigation by the BCCP would become necessary to protect them if all of the karst protection outlined in the BCCP is fully implemented. Many of the species of concern may actually be as endangered, or more so than the currently listed species. Since these species are not formally listed, many of the Species of Concern (SOC) caves are severely threatened.

The Regional Permit requires protection of 35 endangered species caves and 27 caves additional caves that support species of concern that are not currently listed by the USFWS for a total of 62 karst features (60 caves, 1 mine and 1 karst spring).

The six species of endangered karst invertebrates in Travis County are:

Tooth Cave pseudoscorpion *Tartarocreagris texana*

Tooth Cave spider *Neoleptoneta myopica*

Tooth Cave ground beetle *Rhadine persephone*

Kretschmarr Cave mold beetle *Texamaurops reddelli*

Bee Creek Cave harvestman *Texella reddelli*

Bone Cave harvestman *Texella reyesi*

The 25 additional karst species of concern to be protected by the regional permit are:

**FLATWORMS**

*Sphalloplana mohri*

**OSTRACODS**

*Candona* sp. nr. *stagnalis*

**SPIDERS**

*Cicurina bandida* (#1)*

*Cicurina cueva* (#4)

*Cicurina ellioti* (#5)

*Cicurina reddelli* (#3)

*Cicurina reyesi* (#6)

*Cicurina travisae* (#7)

*Cicurina wartoni* (#9)

*Neoleptoneta concinna*

*Neoleptoneta devia*

*Eidmannella reclusa*

**MILLIPEDES**

*Speodesmus* N. S.

**PSEUDOSCORPIONS**

*Aphrastochthonius* N. S.

*Tartarocreagris comanche*

*Tartarocreagris reddelli*

*Tartarocreagris intermedia (#2)*

*Tartarocreagris* N. S. 3

**HARVESTMEN**

*Texella spinoperca* (#2)

**GROUND BEETLES**

*Rhadine s. subterranea*

*Rhadine s. mitchelli*

*Rhadine austinica*

**ISOPODS**

*Caecidotea reddelli*

*Trichoniscinae* N. S.

*Miktoniscus* N. S.

- Numbers #1-9 correspond to species listing in the Final HCP-EIS, Section 2-66.

## 2.0 CAVE MANAGEMENT SUMMARY

This annual report covers the fiscal year 10/01/01-9/30/02 and is referred to in this document as "2002". In 2002, the Balcones Canyonlands Conservation Plan (BCCP) partners continued efforts to determine and track cave status of the 62 karst features covered by the BCCP 10(a) permit. The permit holders continued efforts to acquire, protect, and monitor the karst species in the caves included in the Permit. Many of the caves designated here as "protected" with the status of "good" in the following table do not have large enough buffer areas around the caves to be adequately protected to meet the new requirements listed in *the U.S. Fish and Wildlife Service Draft Recommendations for Karst Preserve Design, March, 2001 Version,* including many caves that were considered "protected" under USFWS individual 10a permits in years past. The new USFWS preserve design directs that the protected area surrounding the cave must be 59-89 acres in size to capture the majority the plant and animal community elements in viable numbers needed to support the cave species. The terms "protected" and "good" listed in this document refer to caves with *some* amount of setback around the entrance and *some* amount of protection over the footprint of the cave and do not necessarily provide this large protected area acreage.

Of these 42 combined Endangered Species and species of concern caves that are shown as "protected" on the charts that follow:

- 20 are "protected" by the City of Austin through ownership or private landowner agreements
- 3 are "protected" by other BCP partners (Travis County and The Nature Conservancy)
- 9 are "protected" by individual USFWS Section 10(a) or Section 7 permits
- 7 are "protected" by Texas System of Natural Laboratories (TSNL)
- 3 are "protected" by Texas Cave Management Association (TCMA)

  42 total of "protected" BCCP caves (leaving 20 Private "unprotected" caves)

For the 35 caves containing Endangered Species (out of the 62 total BCCP caves)

- 22 are "protected" by BCCP partners, 10a, or section 7 permits, TSNL, or TCMA.
- 10 are "unprotected" and privately owned.

Caves on Balcones Canyonlands Preserve (BCP) land generally have adequate buffer areas and are receiving adequate protection, however some are too close to adjacent development or the protected areas are not large enough to adequately protect the caves under the new criteria. Cave X and Get Down Cave are being "protected" under cave management agreements between the landowner and the City of Austin. Though the cave management

agreements were finalized in 1999 and 2000, the implementation plans for these agreements are still being finalized. Though the TSNL caves have "protected" entrances, the areas around the caves are not large enough to adequately protect the footprint and drainage areas around the caves. The BCP has received reports that TSNL is not currently active in the Austin area and members have not been visiting, surveying and protecting these cave entrances on a regular basis.

Threats to Specific BCCP Caves

- The entrance to Pennie's Cave has been covered for several years and this cave may be considered lost (though the GPS location known and the cave could be reopened, the landowner has expressed that he is not interested in ever opening this cave entrance).
- The location of the entrance to Fossil Cave in the City of Austin's Schroeder Park is unknown. There are several likely locations in the park and at present there are no plans to dig at any of these locations to find the cave. Bill Elliott, the original collector, has been contacted and has no recollection of the exact location, and the park has changed greatly. Located in the park, the area continues to be protected. The exact cave entrance will need to be relocated or the cave replaced on the BCCP list.
- Caves in the McNeil Cluster (near Round Rock High School) are under threat of development and their status is unclear. The owner was approached in both 2000 and 2001 about selling this area and was not interested.
- A hydrogeological study was completed in May 2000 for Flint Ridge Cave relating to possible impacts from the proposed extension of SH 45. In 2002, Texas Department of Transportation temporarily withdrew this roadway from their future roadway construction plans. However, Travis County has already purchased the road right-of-way and it is likely that this roadway will eventually be constructed.
- Many "private" caves have not been surveyed or monitored in many years and their status is unknown. Though Get Down Cave and Cave X are currently "protected" by private landowner agreements with the City of Austin the BCCP partners need to put additional effort into creating more of these private agreements with other private cave owners. In general, threats to private caves continue, primarily due to development. Initially, the agreements have been problematic and additional pressure is needed to ensure that the terms of the agreements are met and actual cave management activities are carried out.

## 3.0 KARST FEATURE STATUS

The following table lists the names and status in 2002 of the 62 caves/karst features listed in the BCCP permit. The 35 endangered species caves are listed as ES and the 27 additional caves for species of concern are listed as SOC.

| Cave Name | ES or SOC | Current tract/owner. On BCP Land or private | Cave Cluster | 2002 Status |
|---|---|---|---|---|
| Adobe Springs Cave | SOC | BCP Lehmann/TNC | | Good |
| Airman's Cave | SOC | BCP Barton Creek/COA | | Good |
| Amber Cave | ES | BCP Jollyville/TC | 4 Points Cl (Parke) | Good, too close to roadway |
| Armadillo Ranch Sink | SOC | Private | | Unknown |
| Arrow Cave | SOC | BCP Slaughter Cr. Pk./COA | | Good |
| Bandit Cave | ES | Private | | Good, the owner is ecologically concerned |
| Beard Ranch Cave (Featherman's Cave) | ES | BCP Ivanhoe/COA | | Good |
| Bee Creek Cave | ES | Private | | Unknown |
| Blowing Sink Cave | SOC | BCP COA | | Good |
| Broken Arrow Cave | ES | BCP Lime Cr. Prs./COA | | Good |
| Buda Boulder Spg. | SOC | BCP Shoal Creek Grblt./COA | | Good |
| Cave X | SOC | Private/COA Protection Agreement | | Unknown, ?? New agreement not working smoothly yet |
| Cave Y | ES | BCP Barton Creek Grblt/COA | | Good |
| Ceiling Slot Cave | SOC | Private | | Unknown |
| Cold Cave | ES | Private | Northwood Cl. | Unknown |
| Cotterell Cave | ES | BCP Spicewood Spgs. Pk./COA | | Good |
| Disbelievers Cave | ES | BCP Private 10(a) | 4 Points Cl. (Perot) | Good |
| District Park Cave | SOC | BCP D.Nickols Pk./COA | | Good |
| Eluvial Cave | ES | BCP Private 10(a) | 4 Points Cl. (Perot) | Good |
| Flint Ridge Cave | SOC | Prop 2/COA | | Good |
| Fossil Cave | ES | BCP Schroeter Pk./COA | | Can't find entrance, area in park protected however, FWS thinks taken |
| Fossil Garden Cave | ES | Private | McNeil Cl. | Unknown |
| Gallifer Cave | ES | Private TSNL | 4 Points Cl (Parke) | Good |
| Get Down Cave | SOC | Private/COA Protection Agreement with TCMA | | Good, implementing agreement, COA/TCMA management agreement pending |
| Goat Cave | SOC | BCP Goat Cave Karst Preserve/COA | | Good |
| Hole-in-the-Road | ES | Private | Northwood Cl. | Unknown |
| Ireland's Cave | SOC | Private Circle C | | Poor, watershed probs., golf course new development, with a proposed grossly inadequatt setback |
| Jack's Joint | SOC | Private | | Unknown |
| Japygid Cave | ES | BCP Private 10(a) | 4 Points Cl. (Perot) | Good |
| Jest John Cave | ES | BCP Forest Ridge/COA | | Good |
| Jester Estates Cave | ES | Private (adj.COA Ivanhoe) | | Unknown |

| | | | | |
|---|---|---|---|---|
| Jollyville Plateau Cv. | ES | BCP Private 10(a) | 4 Points Cl. (Perot) | Good |
| Kretschmarr Cave | ES | Private TSNL | 4 Points Cl. (Parke) | Good |
| Kretschmarr Dble. Pit | ES | Private TSNL | 4 Points Cl. (Parke) | Good |
| Lamm Cave | ES | BCP Private Section 7 | | Entrance OK, FWS considers taken |
| Little Bee Cr. Cave | ES | BCP Ullrich WTP/COA | | Good |
| Lost Gold Cave | SOC | Private | | Unknown, new owner |
| Lost Oasis Cave | SOC | Private TCMA | | Good |
| M.W.A. Cave | ES | BCP Private 10(a) | 4 Points Cl. (Perot) | Good |
| Maple Run Cave | SOC | BCP Goat Cave Karst Preserve/COA | | Good |
| McDonald Cave | ES | BCP Jollyville/TC | | Good |
| McNeil Bat Cave | ES | Private | McNeil Cl. | Unknown |
| Midnight Cave | SOC | BCP Slaughter Cr. Pk./COA | | Good |
| Moss Pit | SOC | Private | | Unknown |
| New Comanche Tr. Cave | ES | Private | | Unknown |
| No Rent Cave | ES | Private | McNeil Cl. | Unknown |
| North Root Cave | ES | Private TSNL | 4 Points Cl (Parke) | Good |
| Pennie's Cave | SOC | Private | | Entrance covered, probably lost |
| Pickle Pit | SOC | BCP Private Sec. 7 | | Unknown |
| Pipeline Cave | SOC | Private | | Unknown |
| Rolling Rock Cave | ES | BCP Lime Cr. Prs./COA | | Good |
| Root Cave | ES | Private TSNL | 4 Points Cl (Parke) | Good |
| Slaughter Creek Cave | SOC | BCP Slaughter Cr.Pk./COA | | Good |
| Spanish Wells | SOC | Private | | Unknown |
| Spider Cave | ES | BCP Park West/COA | | Good |
| Stark's North Mine | SOC | Private | | Unknown |
| Stovepipe Cave | ES | BCP Private Sec. 7 | | Good |
| Talus Springs Cave | SOC | Private/ 10(a) permit, not monitored or actively protected, TC checks entrance | | Good/Unknown, only 50' setback from dev. entrance |
| Tardus Hole | ES | Private TSNL | 4 Points Cl (Parke) | Good |
| Tooth Cave | ES | Private TSNL | 4 Points Cl (Parke) | Good |
| Weldon Cave | ES | Private | McNeil Cl. | unknown |
| Whirlpool Cave | SOC | Private TCMA | | Good |

## 4.0 ACCESS STATUS AND KARST EDUCATION

In the fiscal year 10/01/01-9/30/02, the total number of visitors in the City of Austin's BCCP caves for educational/recreational/rescue training that were issued access permits were: District Park Cave (106), Maple Run Cave (279), Midnight Cave (16) (plus 3 aborted attempts to enter due to bad air and 1 gas monitor trip from the surface only), Whirlpool Cave (265), Goat Cave (342) and Get Down Cave (4). The City of Austin issued a Scientific/Research permit to Rob Jackson and Will Pockman for Cotterell Cave.

Whirlpool Cave (see Attachment B), which is owned and managed by the Texas Cave Management Association, was visited at least once a week during the late spring and summer of 2002 by one or more organizations and visited occasionally in the fall.
Austin caving organizations and volunteers continue to play key and vital roles in researching, protecting and educating the public about BCCP and other caves in the Austin area.

The following table lists caves that are currently gated, fenced and/or open to the public.

| Cave Name | ES or SOC | BCP Tract/owner | Gated/Fenced | Public Access |
|---|---|---|---|---|
| Amber Cave | ES | Pending TC (for 10(a) | Concrete/manhole cover [1] | |
| Airman's Cave | SOC | Barton Creek/COA | | open |
| Bandit Cave | ES | Private | Gated | |
| Cave X | SOC | Private w/ COA Agreement | Gated | |
| Cotterell | ES | Spicewood Sprgs. Pk./COA | Fenced | |
| District Park Cave | SOC | D.Nickols Pk./COA | Gated after the 1st room. | 1st room open, past the 1st room access by permit* |
| Gallifer Cave | ES | Private TSNL | Gated [1] | |
| Get Down Cave | SOC | Private | Gated | |
| Goat Cave | SOC | Karst Preserve/COA | Fenced, Gate removed | access by permit* |
| Jester Estates Cave | ES | Private, adj. COA Ivanhoe | Gated [1] | |
| Jollyville Plateau Cv. | ES | Private 10(a) | Gated [1] | |
| Kretschmarr Cave | ES | Private TSNL | Gated [1] and Fenced | |
| Lost Gold Cave | SOC | Private | Gated | |
| Lost Oasis Cave | SOC | Private TCMA | Gated and Fenced | controlled access** |
| Maple Run Cave | SOC | Karst Preserve/COA | Gated | access by permit* |
| Midnight | SOC | Slaughter Cr. Pk/COA | Fence was upgraded | access by permit* |
| Pickle Pit | SOC | Private | Gated | |
| Pipeline Cave | SOC | Private | Metal frame [1] | |
| Tooth Cave | ES | Private TSNL | Gate was repaired. | |
| Whirlpool Cave | SOC | Private TCMA | Gated | controlled access** |

* Access by Permit - Permit may be issued by COA - PARD staff.
** Controlled Access - Private cave owners control the access
1 Needs gate repairs/improved gate

## 6.0 MANAGEMENT COORDINATION

The City of Austin, Travis County and TCMA karst management staff met with USFWS to further clarify what defines adequate "protection" for the BCCP caves and assess caves listed here for their level of protection under the March 6, 2001 "U.S. Fish and Wildlife Service Draft Recommendations for Karst Preserve Design" which requires up to 99 acres surrounding a karst feature to protect it. Though the management guidelines provide for "Adaptative Management Techniques" to be used as more is learned, it was determined by the group that the BCP permit along with the BCP Land Management Plan requirements were adequate for BCP karst feature protection. This group also worked to standardize

monitoring and reporting procedures. A Karst Training Workshop for City, County and TCMA staff was held to discuss karst species, karst monitoring, and karst management activities.

## 7.0 BIOLOGICAL MONITORING

The City of Austin's BCCP staff performed species surveys for Airman's, Broken Arrow, Blowing Sink, Cotterell Cave, District Park, Beard Ranch Cave (Featherman's), Flint Ridge, Goat, Rolling Rock (Lime Creek Preserve), Maple Run and Midnight Caves (Attachment A. The City of Austin's BCP staff has now completed 5 years of biannual cave faunal surveys for Airman's, District Park, Goat and Maple Run caves and is preparing a research paper to analyze the results of these 5 years of faunal surveys.

Travis County's BCCP staff did surface monitoring of McDonald Cave and Amber Cave which were recently acquired by Travis County. No official biological surveys were conducted in 2002 as staff do not yet hold USFWS permits to do this work. Travis County staff began training activities to prepare staff to obtain the needed permits to do biological surveys in the future. These activities included several meetings with BCP partners and USFWS staff to learn about survey techniques, monitoring equipment, fire ant identification, and to coordinate similar monitoring methodology and forms for all BCP partners. In March, Travis County staff attended a conference on "Bat Gate design: A Technical Interactive Forum". Travis County staff regularly monitored the cave entrances and entered the caves on one occasion without doing any surveys.

The Texas Cave Management Association (TCMA) performed species surveys in Whirlpool and Get Down Caves (Attachment B). TCMA continued to provide valuable volunteer support activities to the BCCP and Central Texas cave protection efforts. They assisted with monitoring of access to City of Austin sensitive caves, participated in negotiations with developers to manage caves under City of Austin cave management agreements, visited caves on private land to assess potential threats, and assisted both BCCP partners in assessment and protection of BCP caves. The BCCP partners greatly appreciate the dedication and hard work of this group.

James Reddell reported that Texas System of Natural Laboratories (TSNL) did some visits to the surface and trimmed trees near some of their caves but did no other management nor perform any species surveys in 2002. Since the 7 caves managed by TSNL are some of the most important caves for endangered species protection, the BCCP partners are very concerned about the lack of active management and species surveys.

It is unknown if there were species surveys done in BCCP caves by the holders of Section 10a or Section 7 permits (to be reported to USFWS).

## 7.0 KARST MANAGEMENT ACTIVITIES

The BCP Land Management Plan outlined planned activities concerning the 62 BCCP karst features. The following table lists what was promised in the Plan and a summary of activities completed in 2002.

| BCP 1999 Approved Land Management Plan (Proposed Activities) | 2002 Management Activities or Comments |
|---|---|
| Adobe Springs Cave<br>1. May need gate, depending on access situation. The cave gate design should allow for the return of the bats | The Nature Conservancy<br>The last cave faunal survey was conducted in 1999. The entrance to the cave continues to be undisturbed and is protected on Preserve tract. |
| Airman's Cave<br>1. Conduct a study to assess caving use and trash accumulation in the cave to see if it is adversely affecting the cave fauna. This ongoing study should continue to monitor these factors and determine if there is a need for cave gating.<br>2. Continue biological observations and map the locations of the rare species in the cave.<br>3. Work with volunteers in the caving community to police themselves and other cave users who use Airman's Cave .<br>4. Continue doing ongoing cave cleanups and graffiti removal.<br>5. Conduct studies on caver use and monitor effects on cave fauna . | City of Austin<br>1. Completed annual cave faunal survey. (See Attachment)<br>2. To date, have not noticed any significant increase in litter and any new graffiti. It appears that the caving community are policing themselves and so far no cave gate is warranted. |
| Amber Cave<br>1. Control of red imported fire ants .<br>2. Should be effectively gated as soon as possible in a manner that restricts access, yet allows the free passage of air, water and cave life. The present gate does not prevent access to the cave. Once a gate is installed, it should be regularly inspected to minimize any unrestricted traffic which may breach it<br>3. Surface and subsurface drainage basins are contained within an area extending from Amber Cave 40 ft. north to Wilson Parke Ave, south for 100 ft., and east and west for 50 ft. The drainage basins delimit the cave's critical area, the zone of greatest direct impact to its ecosystem. The critical area should be left in its natural state.<br>4. The high density of caves and karst features to the east of Amber Cave deserve serious consideration for equal protection. These features do not directly drain into Amber cave, but hydrologically they are interlinked with it at a lower level. A very large volume of water and nutrients are taken underground in this locale which support the cave ecosystem. A study is needed to access this nutrient area and its importance to the cave fauna.<br>5. The critical area should be bermed if any neighboring development might drain its runoff into it.<br>6. Establish a cooperative management plan with the organization that maintains the right-or-way for Wilson Parke Ave. near the cave to implement suggested techniques to protect the cave through modifications in mowing and non-toxic management techniques to protect the cave. | Travis County<br>1. Acquired by Travis County in October 2001. This site was inspected frequently and no signs of vandalism were found to the cave entrance or in the cave (one person entered the cave once).<br>2. Installed fences, gate, and signs to protect this area from unauthorized access and dumping.<br>3. Worked with BCP partners to start training county staff on karst species management, worked with partners to develop unified survey protocol, did assessment of inadequate cave gate and started planning how to replace it.<br>4. Official karst monitoring will begin in 2003.<br>5. Neighboring development does not drain into this cave. The nearby roadway and nearby sewer line may have an effect on the cave and will need to be monitored. |
| Armadillo Ranch Sink<br>1. The entrance to the cave receives considerable run-off. The critical area should be bermed if any neighboring development | Private |

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| might drain its runoff into it.<br>2. May need a cave gate, depending on access situation . | |
| Arrow Cave<br>1. The cave will need a gate, as it is located within a few hundred feet of a new subdivision and its entrance has temporarily been filled with three feet of loose rocks to protect the cave .<br>2. The cave receives drainage from only a small area .<br>3. A faunal survey is needed .<br>4. Monitor and control fire ants.<br>5. Need a map of the cave interior and sinks nearby. | City of Austin<br>1. Two site inspections (fall and spring) were conducted<br>2. The entrance was inspected to make sure that no human access had occurred.<br>3. The site was also inspected for RiFA infestations. On both visits fire ant mounds were observed in close proximity of the cave entrance, however, ants did not appear to be entering the cave.<br><br>.TCMA reports that the construction around Arrow Cave has been completed and that it is ready for a gate. It remains covered with boards, rocks and leaves and the entrance was not disturbed. |
| Bandit Cave<br>1. Survey for fire ants .<br>2. Make landowner contact. | Private TCMA reports that several years ago sewer lines were constructed near Bandit Cave and as indicated by a TCMA survey, the lines did not encounter the cave, and no adverse effects have been noted. |
| Beard Ranch Cave (Featherman's Cave),<br>1. Obtain Chock Woodruff's cave map, description and information on biological collection.<br>2. Do a current thorough faunal survey to determine the endangered species status (specifically Texella sp)<br><br>3. Monitor and control fire ants.<br><br>Revised Management Needs (2001):<br>1. Map the cave. | City of Austin<br>1. The cave was inspected twice, Spring and Fall.<br>2. No evidence of vandalism was noted.<br>3. No red imported fire ants were found. A healthy population of native fire ants was found in close proximity to the cave.<br>4. BCP staff conducted a faunal survey and collected an individual *Texella* for species identification. (See attachment) The specimen was given to James Reddell to attempt to identify it based on morphology and 2 legs were given to Jean Krejca to identify the specimen based on DNA analysis.<br>5. Staff accurately mapped the location of this cave with a GPS unit. Obtained maps Woodruff put together for the Ivanhoe development showing CEF's such as caves and springs located on the property on 2' contour maps.<br>6. A current thorough faunal survey was completed to determine the endangered species status (specifically Texella sp). |
| Bee Creek Cave<br>1. The cave is partially protected by its isolation and bluff entrance. May need a cave gate, depending on the current access situation .<br>2. Need to confirm the location of the cave and do a biological assessment.<br>3. Make landowner contact. | Private |
| Blowing Sink Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. During and after development, the area around and some distance upslope should be protected by setbacks.<br>3. Add a cave gate that does not interfere with recharge.<br>4. Coordinate planning for runoff and drainage with the developer. To maintain the quantity of good-quality water entering the aquifer, consideration should be given to connecting Blowing Sink to the drainage channel leading from the area to the north. Topography indicates a major drainage channel will be somewhere near the cave. After development, even small rains will produce more run-off than can flow through, and much of this water will be of poor quality. A gate on the connecting channel could allow poor-quality water to by-pass the sink and good-quality water to be channeled into the Aquifer.<br>5. Provisions should be made for continued biologic studies.<br>6. Provisions should be made for continued hydrologic studies. Eileen's River originates from a large recharge area and would be an ideal place to monitor the effects of urbanization on water quality .<br>7. Investigate the possible connection of the newly found cave with this cave.<br><br>Revised Management Needs (2001):<br>1. Improve perimeter fence on preserve land to keep prevent illegal trespass. | City of Austin<br>1. This site was inspected 4 times and no signs of vandalism were found in the cave or to the cave entrance.<br>2. Fire ant mounds were present, (within 150' radius), but no activity at the cave entrance.<br>3. BCP completed a fall faunal survey and set two bait traps in the flowing stream. Staff installed the traps in the hope of attracting potential salamanders. (See attachment)<br>4. BCP staff with the help of TCMA located and took GPS readings on all caves and sinkholes located on this tract.<br>5. BCP staff had planned on conducting multiple faunal surveys due to the fact that this cave has never been thoroughly surveyed. Staff also planned on setting up a water quality monitoring device in the stream. This device would have measured water quality parameters prior to the opening of the Longhorn gasoline pipeline. Unfortunately, the cave is currently closed due to floods in November and December 2001. TCMA are currently working on excavating the collapsed passageways.<br>6. BCP staff along with Pard personnel met with the City of Austin's environmental inspector regarding contaminated water runoff from new construction directly west of the preserve. The inspector is working on the problem.<br>7. BCP staff noticed that the Longhorn pipeline crossing at Deer Lane and the Western boundary were left open, allowing illegal access into the preserve. Staff contacted Longhorn and requested that they close these access points, Longhorn complied.<br><br>The City of Austin successfully negotiated with Stratus |

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| | Development for setbacks around Blowing Sink. The City obtained a 300 foot setback due South of Blowing Sink and an additional 300 foot setback around Jody Lane Sink, which is south of Blowing Sink setback. To the Southeast of this area the City secured an additional setback around Structural Sink, thus protecting much of the drainage area flowing into Blowing Sink. |
| Broken Arrow Cave<br>1. Monitor and control fire ants.<br>2. Yearly faunal survey in Spring . | City of Austin<br>1. This cave was inspected 3 times and no sign of human visitation was found.<br>2. Fire ant activity was found near the cave entrance. Staff boiled all fire ant mounds found within a 300 foot radius of the cave.,<br>3. Staff accurately mapped the location of this cave with a GPS unit. |
| Buda Boulder Spring<br>1. Monitor water quality in this small spring which may be contaminated by sewage. There was heavy sewage pollution found there in 1992. Check into the source of the possible sewage contamination. A large transient camp immediately above the spring may be the source<br>2. Monitor the site to see if this spring still harbors the SOC.<br>3. Coordinate protection efforts between Shoal Creek Park managers, COA Water and Wastewater and PARD/Natural Resources Department about protection strategies. | City of Austin<br>1. BCP staff visited the site twice and noted no real negative impacts to the spring. Old abandoned transient camps were found nearby. BCP staff plan to remove the camp trash with the help of PARD personnel. BCP staff made a request to PARD to increase Park Police patrols in the area.<br>2. BCP staff collected one stygobitic isopod, "*Caecidotea reddelli* to be given to Jean Krejca (USFWS).<br>3. Sylvia Pope with the City of Austin's Watershed Protection Department informed BCP staff that PARD is planning on new trail work and a bridge near the spring. Sylvia's department is requesting a 50 foot setback from the spring. Upon learning about this, BCP made the same request to PARD staff.<br>4. WSPD staff have taken water quality samples at this spring, most recently on 1/7/99. (See attachment) the chemistry looks fairly typical for an urban setting according to David Johns, (WSPD geologist). |
| Cave X<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. Will need a cave gate or a fence that will not interfere with recharge.<br>3. Development in the area needs to be closely coordinated. The cave is an important recharge feature, with most of the recharge originating from another property. | City of Austin:<br>1. The City of Austin entered into a Private Landowner Agreement "Cave X, Management and Monitoring Plan, Covenants and Restrictions, (see attachment)", with the property owners (Regent's School) in Oct. 1999. The agreement sets aside a 4.5 acre area was set aside to protect the cave footprint. The USFWS was involved in the discussions on protection.<br>2. The cave entrance is gated and also has a fence for added protection.<br>3. There are still concerns about the implementation of Private Landowner Agreement which does not seem to be working yet. This site has had quite a lot of new development in close proximity of the cave.<br>4. BCP staff inspected the cave entrance during a rainfall event and noted a considerable amount of recharge entering the cave. Staff noted that the gate design did not interfere with recharge. The gate and fence appeared to be in good condition. |
| Cave Y<br>1. May need a cave gate, depending on the access situation. It is relatively isolated and thus unlikely to attract numerous visitors until the surrounding park land is opened (Russell (undated). The COA is routing the access trail away from this cave.<br>2. Do yearly faunal survey in Spring and also make collections for James Reddell to determine the status of probable Texella.<br>3. Monitor and control fire ants. | City of Austin<br>1. 4 site visits were conducted to this cave and there was no sign of human visitation or vandalism.<br>2. No red imported fire ant activity was observed at or near the cave entrance, however, there were fire ant mounds within a 150' radius of the cave. |
| Ceiling Slot Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. May need a cave gate, depending on the access situation | Private |
| Cold Cave<br>1. The surface and nonpoint drainage areas over the cave should be preserved in their natural state. This area should be considered the minimum for any preserve boundary that would be established and may need expansion<br>2. Any tunneling (as opposed to trenching) to place the proposed wastewater interceptor line should be done according to Veni and Associates recommendations<br>3. if any roads or facilities are built uphill of the drainage area, | Private |

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| impermeable berms should be placed along the uphill margins to prevent the entry of runoff or spilled materials<br>4. The cave should be gated<br>5. Follow additional recommendations outlined in the Veni and Associates hydrologic study. | |
| Cotterell Cave<br>1. There is a high fence around the cave area installed by the City of Austin in 1995. Continue to monitor the condition of the fence and control access to the cave.<br>2. Continue to work to control red imported fire ants.<br>3. Do a yearly faunal survey in Spring. | City of Austin<br>1. Monthly site inspections were conducted, and found no RIFA at or near the cave. Staff did note that local kids had cut the fence, entered the exclosure, and had thrown fire works into the cave. Staff responded by removing the fire work trash from the cave, repaired and increased the strength of the fence and increased the frequency of patrols. Staff reported the incident to USFWS and also notified PARD and requested additional Park Police patrols.<br>2. RIFA were treated with boiling water, the ants were located at the parking lot, approximately 300 feet from the cave.<br>3. Rob Jackson, professor at Duke and Will Pockman, professor at the University of New Mexico continued their permitted access on water uptake of certain species of trees. (See attachments)<br>4. Conducted 2 cave faunal surveys. (See attachment)<br>5. BCP staff with the help of PARD staff closed the parking lot to Spicewood Springs Preserve, thus greatly limiting gang activity and vandalism to the area. |
| Disbelievers Cave<br>1. May need a cave gate, depending on the access situation. | Private 10a Permit: PRT-808694<br>(see FWS files for status) |
| District Park Cave<br>Approved language:<br>1. On advice from James Reddell, this cave has an interior gate, blocking unpermitted access to the interior rooms, but not the first section of the cave. The cave has no true troglobitic species and few speleotherms due to heavy vandalism in 1996. The City of Austin-PARD has controlled access by a permit system since 1995. The COA should establish limits telling how many people can go into the first room and how often, and should also set limits for the number and frequency of visitation beyond the first room.<br>2. Continue semi-annual faunal survey in Spring and Fall and photomonitoring .<br>3. Work to control red imported fire ants<br>4. Survey the possible dangers and impacts of flooding on the cave. The cave receives considerable drainage after heavy rains<br><br>Revised Correct language (2001):<br>1. On advice from James Reddell, this cave has an interior gate. The open portion of this cave has no troglobitic species and few speleotherms. An interior gate protects the species of concern and delicate formations. The City of Austin-PARD has controlled access by a permit system since 1995.<br>4. Survey the possible dangers and impacts of flooding on the cave. The cave may receives considerable drainage after heavy rains because of a new nearby flood retention facility which put the cave entrance in the 25 year flood plain. | City of Austin<br>1. Completed annual faunal survey at this cave. (See attachment)<br>2. Conducted site surveys quarterly, and treated red imported fire ants with boiling water. No red imported fire ants were noted in the cave.<br>3. Permitted access to this cave was allowed. (See attachment) |
| Eluvial Cave<br>1. May need a cave gate, depending on the access situation | Private 10a Permit: PRT-808694<br>(see FWS files for status) |
| Flint Ridge Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs. This is a major recharge feature.<br>2. Needs protection such as a cave gate or fence that does not interfere with recharge<br>3. Because the cave is located near the extension of the Outer Loop and planned development, continue coordinating with the City of Austin, Barton Springs/Edwards Aquifer Conservation District and the Texas Department of Transportation. | City of Austin<br>1. BCP staff conducted a spring faunal survey. (See attachment)<br>2. BCP designed a cave gate. The gate will control access yet not interfere with recharge.<br>3. BCP staff conducted 2 site visits and noted no signs of illegal trespass and no fire ant activity inside the cave, however fire ant mounds were noted within a 150 foot radius of the cave entrance.<br>4. In December 2002 the COA (several Depts) and the BS/EACD began installing a flow and water-quality monitoring station to collect baseline information and monitor through the completion of Highway 45 to detect possible effects to the sinkhole, its inhabitants, and the underlying aquifer. Due to start by February 2003. |
| Fossil Cave | City of Austin |

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| 1. This cave was previously filled with large rocks, and should be dug out, resurveyed to determine what exactly is there. i and James Reddell believe that the current rocks in the entrance do allow for small mammal access and are appropriate. George Veni has questions about whether the cave should be opened and gated to allow for access for monitoring and other future research needs<br>2. Need to confirm the existence of endangered species<br>3. Monitor and control fire ants.<br>4. interior needs to be mapped.<br>5. Coordinate protection efforts between Schroeter Park managers and PARD/Natural Resources Department about cave protection strategies (Schroeter Park is a low impact, minimally maintained park, consisting of nature trails near the caves, and managed much like a preserve ). | 1. The site was inspected once and no signs of vandalism or access were found, (the rocks had not been removed) on what is believed might be the cave. The other nearby karst features were in the same condition.<br>2. No red imported fire ant activity was observed at the cave entrance, however, mounds were found within a 150' radius of the cave. |
| <u>Fossil Garden Cave</u><br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. Especially needs red imported fire ant control.<br>3. Needs a cave gate | Private |
| <u>Gallifer Cave</u><br>1. Needs red imported fire ant control.<br>2. improved gate needed<br>3. The area surrounding and atop the cave should be maintained in its natural condition.<br>4. The critical area should be bermed on the uphill side if any neighboring development might drain its runoff into it.<br>5. The Gallifer Cave gate should be regularly inspected to minimize any unrestricted traffic which may breach it. | TSNL |
| <u>Get Down Cave</u><br>1. Continue efforts to work with the developer to protect the entrance and the surrounding area as a park or preserve<br>2. Monitor the area during construction to prevent the dumping of construction material and other contaminants.<br>3. Monitor and control fire ants.<br>4. Continue to monitor the possible effects on the cave of the Longhorn Pipeline, a former crude oil line being converted to a gas line located in the drainage area 1500' away. An emergency response plan should be written (with TNRCC, the COA, BS/EACD) to plan to reduce the impact of a spill.<br>5. Reconstruct the gate to make the feature look more like a sinkhole.<br>6. Construct a perimeter fence around the proposed karst preserve.<br>7. The karst preserve should be managed with an emphasis on karst education. | TCMA /City of Austin<br>1. The City of Austin entered into a Private Landowner Agreement with Lumberman's investment Corporation in July 2000 and with TCMA to manage the cave. The agreement sets aside an area to protect this cave and several others. The USFWS was involved in the discussions on protection area needed.<br>2. The cave is gated and fenced.<br>3. The implementation of the Private Landowner Agreement in underway and seems to be working well.<br>4. An educational kiosk is being constructed. The committee put a lot of time and effort in drafting educational information for kiosks at the new preserve. This preserve will go a long way educating the public about caves, cave fauna and their importance, etc.<br><br>TCMA did a survey in Dec. 2002 access has been blocked on a temporary basis and found very high level of use by raccoons. They recommend that the raccoon hole be blocked for a while. |
| <u>Goat Cave Karst Preserve</u><br>1. The gate will be removed and a fence installed to allow for bat use. Following this, the cave will be monitored for bat use (the COA in consultation with Bat Conservation international) and the COA will take appropriate action if there are access problems<br>2. Do semi-annual faunal surveys and photo monitoring<br>3. Monitor and control fire ants. | City of Austin<br>1. Completed biannual faunal survey. (See Attachment)<br>2. Applied for and received a grant from Bat Conservation Intl' to remove the bat excluding gate and protect the cave with a "no climb" chainlink fence. The project was completed on3/1/02. (See Attachment)<br>Surveyed for and treated RIFA with boiling water.<br>3. Conducted 12 site inspections. Once the fence was installed trash was no longer thrown into the cave.<br>4Allow permitted access to this cave. (See Attachment)<br><br>5. This site was one of the stops for a cave gating conference sponsored by BCI showing different styles of cave gates. |
| <u>Hole-in-the-Road Cave</u><br>1. Follow the recommendations in the hydrogeologic study by Veni and Associates<br>2. The surface and nonpoint drainage areas over the cave should be preserved in their natural state. This area should be considered the minimum for any preserve boundary that would be established and may need expansion<br>3. Any tunneling (as opposed to trenching) to place the proposed wastewater interceptor line should be done according to Veni and | Private |

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| Associates recommendations<br>4. if any roads or facilities are built uphill of the drainage area, impermeable berms should be placed along the uphill margins to prevent the entry of runoff or spilled materials<br>5. Construction within a 100-m-radius o fthe caves may intersect related conduits and passages. Any such discoveries should be evaluated in consultation with USFWS1. The surface and nonpoint drainage areas over the cave should be preserved in their natural state. This area should be considered the minimum for any preserve boundary that would be established and may need expansion<br>6 Any tunneling (as opposed to trenching) to place the proposed wastewater interceptor line should be done according to Veni and Associates recommendations<br>7. If any roads or facilities are built uphill of the drainage area, impermeable berms should be placed along the uphill margins to prevent the entry of runoff or spilled materials<br>8. The cave should be gated | |
| Ireland's Cave<br>1. The cave is located on land planned for residential use adjoining a golf course. Meet with the developer to discuss possible protection measures<br>2. Needs a fence for protection and liability reasons<br>3. The cave receives considerable drainage and might qualify for TNRCC protection. Consult with TNRCC about this. Also the critical area should be bermed on the uphill side if any neighboring development might drain its runoff into it.<br>4. Educate researchers that this cave is a bad air cave (low $O_2$ ). Survey this during the winter months after a strong cold front<br>5. Survey to determine which bat species are using the cave. | Private |
| Jack's Joint Cave<br>1. May need a cave gate, depending on the access situation | Private |
| Japygid Cave<br>1. Needs red imported fire ant control.<br>2. May need a cave gate, depending on the access situation | Private 10a Permit: PRT-808694<br>(see FWS files for status) |
| Jest John Cave<br>1. Need up-to-date fauna list from J. Reddell.<br>2. Do a annual faunal survey in the Spring. Also do cricket counts when possible<br>3. Continue red imported fire ant control. | City of Austin<br>1. Conducted 2 site visits found and no signs of vandalism or human visitation.<br>2. No red imported fire ants were present at the cave entrance, however, there were mounds within a 150' radius of the cave entrance. |
| Jester Estates Cave<br>1. Biological inventory needed from J. Reddell.<br>2. Replace the gate which is currently unsatisfactory - having no mammal access hole and other design problems.<br>3. Need a map of the cave interior; the "Jester Cave" map by Warton probably is Jester Pit.<br>4. Check the actual size and configuration of the preserve area set aside around the cave (in relation to the subsurface profile) to determine how best to protect the cave from neighboring development. The critical area should be bermed on the uphill side if any neighboring development might drain its runoff into it.<br>5. Natural vegetation should remain undisturbed in the cave preserve area.<br>6. Contact the owner and discuss cave protection concerns of PARD/Natural Resources Department (the adjoining landowner). | Private |
| Jollyville Plateau Cave<br>1. Work to control the severe red imported fire ant infestation that was observed in July 1995.<br>2. Grid screens spaced over the entrance needs to be replaced by a proper gate | Private 10a Permit: PRT-808694<br>(see FWS files for status) |
| Kretschmarr Cave<br>1. Work to control the red imported fire ant infestation that was last treated in 1991<br>2. The critical area should be bermed on the uphill side if any neighboring development might drain its runoff into it.<br>3. The critical area is contained within the existing fence line | TSNL<br>TCMA reports the following needs: The cave gate and lock appear inoperative. A gap in the fence allows access. Need to coordinate with LCRA about any power line ROW clearing that might effect the caves since recent clearing around the caves was extensive. |

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| and it should be maintained in its natural state. The cuts in the fence should be repaired. A new cave gate has recently been installed.<br>4. The Kretschmarr Sink should be kept open at least enough to drain its surface sinkhole. if the cave is sealed the sinkhole may pond and prevent water from reaching the cave fauna (Veni and Associates 1988). The sink should not be gated because the fence and entrance sign is adequate liability protection. | |
| Kretschmarr Double Pit<br>1. Needs a cave gate<br>2. The critical area should be bermed on the uphill side if any neighboring development might drain its runoff into it. | TSNL |
| Lamm Cave<br>1. Monitor the required 150' setback distance as the surrounding area is developed.<br>2. The critical area should be bermed on the uphill side if any neighboring development might drain its runoff into it.<br>3. May need a cave gate, depending on the access situation | Section 7 Permit 2-15-93-F-075<br>(see USFWS files)<br>USFWS considers this cave "taken". |
| Little Bee Creek Cave<br>1. Protect the cave from visitors that build fires in the entrance (Russell (undated).<br>2. A gate across the entrance is not recommended, but one in the rear might be necessary . Because of the expense of building a conventional cave gate, perhaps large rocks could be used to partially block the entrance.<br>3. Construction for the expansion of the Ullrich Plant should avoid any activities that would cause harm to the cave or its species, such as erosion or run-off of contaminants.<br>4. A more thorough biological survey is needed<br>5. Periodically monitor the cave | City of Austin's Water and Waste Water Department<br><br>1. BCP staff conducted 2 site visits and noted no new vandalism or illegal activity.<br>2. BCP staff designed a cave gate to protect the cave from illegal access.<br>3. W&WW are planning on fencing the area, thus reducing the number of people accessing the area. |
| Lost Gold Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. Obtain the recently produced cave interior map.<br>3. Monitor and control fire ants.<br>4. The loose rocks around the entrance should be removed to prevent vandalism to the wildlife entrance hole (Sanders and Reddell 1998).<br>5. Remove all trash, especially batteries from the cave . | Private |
| Lost Oasis Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs. Reevaluate the need for a hydro study.<br>2. Continue biological survey and exploration to determine the full extent of the cave.<br>3. Try to obtain the existing map from Bill Russell or TCMA for addition to Travis County's BCP Caves File.<br>4. Monitor and control fire ants. | TCMA |
| Maple Run Cave<br>1. The BCCP 10(A) Permit requires that a hydrogeologic study be done to assist with management, including ecological conditions, use study, and management needs. This list of required caves is being reexamined and will require approval from USFWS to remove any caves from this list. i (1998) believes that a hydrogeologic study is not a high priority because most of the development near the cave has already occurred.<br>2. Frequently check cave gate and make needed repairs.<br>3. Work with Bill Russell to obtain a map of the cave . | City of Austin<br>1. Completed annual faunal survey. (See attachment)<br>2. Conducted 6 site visits, found no sign of unpermitted access, and on occasion, removed trash from the entrance.<br>3. Surveyed for red imported fire ants, foundnoactivity at the entrance, however, did note fire ant mounds within 150 feet radius of the cave.<br>4. Permitted access to this cave is allowed. (See Attachment)<br>5. TCMA reported that based on observation it doesn't appear that visits to the cave have negatively impacted the cave invertebrates. |
| McDonald Cave<br>1. Probably needs a bat gate or fence. The cave gate design should allow for the return of the bats | Travis County<br>1. There is no plan for a cave gate because there is currently no access pressure. Staff did frequent site visits and no signs of vandalism were found to the cave entrance or in the cave (staff entered the cave once).<br>3. Installed fences, gate, and signs to protect this tract from unauthorized access.<br>3. Worked with BCP partners to start training county staff on karst species management, worked with partners to develop |

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| | unified survey protocol.<br>4. Official karst monitoring will begin in 2003. |
| McNeil Bat Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. Needs a bat gate or fence if the colony is being disturbed, unless it's a maternity colony, in which case a gate might cause problems | Private |
| M.W.A. Cave<br>1. Fire ant assessment and control needed.<br>2. Check if the cave is gated. | Private 10a Permit: PRT-808694<br>(see FWS files for status) |
| Midnight Cave<br>1. Do hydrogeologic study to assist with management, including ecological conditions, use study, and management needs.<br>2. Continue trash removal following a drought because the trash is currently under water . .<br>3. May need to improve the fence and add signs, depending on the access situation .<br>4. May want to include an educational signs since it would reach a wide audience | City of Austin<br>1. Conducted 6 site visits, found no sign of unpermitted access, and on occasion, removed trash from the entrance.<br>2. Surveyed for RIFA, found no activity at the entrance, however did note mounds within a 150 foot radius of the cave.<br>3. Permitted access is allowed at the cave. (See attachment)<br>4. One spring faunal survey was completed. (See attachment)<br>5. BCP requested that PARD make several safety improvements to the fence surrounding the cave. PARD welders added additional height and pickets to prevent illegal access.<br>6. This site was one of the stops for a cave gating conference sponsored by BCI showing different styles of cave gates.<br>7. Due to high levels of CO2 in the cave, TCMA has begun monitoring the CO2 concentration in the cave and information will be included in next year's report. |
| Moss Pit Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. Need more detailed location information.<br>3. Survey and map the cave interior .<br>4. May need a cave gate, depending on access situation.<br>5. Monitor and control fire ants.<br>6. Monitor for bats. | Private |
| New Comanche Trail Cave<br>1. Need an updated faunal survey.<br>2. Monitor the effects of runoff from the roadway and the surrounding area.<br>3. Survey, monitor, and control RiFA. | Private<br>Owned by Joe Lucas who has been working to get a 10a permit. |
| No Rent Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. May need a cave gate, depending on access situation . | Private |
| North Root Cave<br>1. Need to treat for the red imported fire ant problem that was last treated in 1991. | TSNL |
| Pennie's Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. The entrance is filled. Need to find the entrance and reopen it .<br>3. Needs to be mapped.<br>4. May need a cave gate because of the amount of development planned nearby | Private<br>The entrance is filled with rock, gravel and graded over and the cave may be lost. City Watershed Protection staff is aware of the issue and will require setbacks for its protection if/when development plans are submitted to the COA. The BCCP may still want to consider replacing this cave on the BCP list or begin work on a private landowner agreement to uncover /protect it.<br><br>TCMA reported that Scott Heirs, COA Watershed Protection obtained accurate GPS coordinates to the filled cave entrance and the owner has clearly expressed no interest in the cave ever being opened. It is the hope of TCMA that the BCCP will replace this covered cave with Grassy Cove or some other cave in need of BCCP protection.(see TCMA report). |
| Pickle Pit Cave<br>1. Needs to be mapped. | Section 7 Permit 2-15-93-F-075<br>(see USFWS files) |

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| 2. Monitor and control fire ants. | |
| Pipeline Cave<br>Because local drainage does enter and pass through the cave, but without distinct surface channels, the area contributing recharge to the cave is difficult to determine. Pending a more definitive determination of the drainage area, sources of organic input to the cave, and the type of construction anticipated in the vicinity, the following should be done:<br>1. Establish setbacks extending at least upslope to the pipeline and the area around the cave should remain undeveloped so that organic material will continue to enter the cave.<br>2. Prevent upslope erosion into the cave .<br>3. Replace the grate with a cave gate.<br>4. Meet with the developer to discuss possible protection measures .<br>5. Remove trash after rain events<br>6. Continue to monitor any effects on the cave by the "Rancho" crude oil pipeline. This cave is very near and in the drainage of this pipeline | Private<br>TCMA had a meeting with the Stratus Development Group and has been assured that the cave will be set aside and that the previously planned large commercial development on that tract will likely be scaled down to accommodate the cave. |
| Rolling Rock Cave<br>(The cave was supposed to be protected as part of a 10(a) to be located on the Austin Simon tract. However, the actual location of the cave was determined to be on the adjoining COA Lime Creek Preserve tract. The City of Austin has taken over ownership of the Austin Simon tract.1The City of Austin manages Rolling Rock cave and has never received compensation from TPWF for this task.2. Do a annual faunal survey in the Spring .<br>3. Monitor and control fire ants. | City of Austin<br>1. This cave was inspected twice, and no sign of human visitation or vandalism was found.<br>2. Was inspected for red imported fire ants, none were present at or near the cave entrance, but did find several species of native ants. RIFA mounds were found within a 150' radius of the cave entrance.<br>3. Staff accurately mapped the location of this cave with a GPS unit.<br>4. One Fall faunal survey was completed (See attachment). |
| Root Cave<br>1. Need to treat for the red imported fire ant problem that was last treated in 1991.<br>2. May need a cave gate, depending on access situation . | TSNL |
| Slaughter Creek Cave<br>1. The cave will need a gate because of its obvious location near a subdivision .<br>2. Since the cave receives considerable drainage, monitor runoff from surrounding development.<br>3. Need a map of the cave interior .<br>4. A cave gate is being constructed for this cave .<br>5. Need a thorough biological survey .<br>6. Monitor and control fire ants. | City of Austin<br>1. Two site inspections (fall and spring) were conducted.<br>2. The entrance was inspected to make sure that no human access had occurred.<br>3. The site was also inspected for RIFA infestations. On both visits fire ant mounds were found in close proximity of the cave entrance, however, ants did not appear to be entering the cave.<br><br>TCMA reported the entrance still has no gate but is is covered by rocks to protect the cave from unwanted visitors. TCMA has visited this cave several times and found no problems. |
| Spanish Wells Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. Determine more precise location of the cave<br>3. Do faunal survey. | Private |
| Spider Cave<br>1. Need a map of the cave interior.<br>2. Monitor and control fire ants. | City of Austin<br>1. 2 site visits were conducted, and no sign of human access, or vandalism was found.<br>2. Surveyed for red imported fire ants, found no activity at or near cave entrance, but did find mounds within a 150' radius. |
| Stark's North Mine<br>1. Littered with junk and refuse left by neighborhood children and needs cleanup .<br>2. Needs a cave gate because it presents a potential safety hazard for neighborhood children. | Private<br>TCMA reports that they visited the mine and it appears undisturbed. TCMA was contacted about sewer line construction in the vicinity, and the engineer of the project was advised of the sensitivity of this locality. |
| Stovepipe Cave<br>1. Probably needs red imported fire ant control.<br>2. Developer or MUD has fenced the preserve with an inadequate 4 strand barbless wire fence. Check to see if the 55 acre karst preserve is being protected. Encourage them to place an adequate fence or cave gate to protect the cave.<br>3. Monitor the 10(a) holder's management of the cave that is | Section 7 Permit 2-15-93-F-075<br>(see USFWS files)<br><br>James Reddell did a biological study of cave fauna and initial monitoring found the cave in good shape. |

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| required by their permit. | |
| Talus Springs Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. Need a map of the cave interior.<br>3. May need a cave gate, depending on access situation . | Private<br>1. The 10a permit PRT 815447 mitigation requirement intended this cave to go to Travis County, however, the cave is located on private land just outside of the mitigation area. The developer Pulte Holmes has done nothing to donate the land and cave to Travis County.<br>2. Travis County staff regularly check the cave entrance. One vandalism event occurred in 2002 with the entrance vegetation cleared and objects scattered at the entrance that appeared to show signs of use by juveniles. The area was cleaned up, some fencing installed, no trespassing signs were posted, and the owner was informed of the problem. |
| Tardus Hole Cave (Kretschmarr Fluted Sink)<br>1. Obtain faunal list and endangered species list from Reddell.<br>3. May need a cave gate, depending on access situation . | TSNL |
| Tooth Cave<br>1. improved gate needed (remove expanded metal on gate, roughen interior or animal access hole) . The cave gate design should allow for the return of the bats.<br>2. The hydrologically critical area of Tooth-Russell Cave should be maintained in its natural state<br>4. The critical area should be bermed on the uphill side if any neighboring development might drain its runoff into it.<br>5. Need to treat for the red imported fire ant problem that was last treated in 1991 . | TSNL |
| Weldon Cave<br>1. Do hydrogeologic study to assist with management or acquisition, including ecological conditions, use study, and management needs.<br>2. Determine the location more precisely. The cave reportedly has its entrance in Travis County and terminal room in Williamson county .<br>3. May need a cave gate, depending on access situation . | Private |
| Whirlpool Cave<br>1. Do hydrogeologic study to assist with management, including ecological conditions, use study, and management needs.<br>2. Prior to the construction of the present gate, the cave received large amounts of floodwater, acting as a major recharge site. Changes in gate design should follow the recommendations of the hydrogeologic study. One possibilities might include constructing a recharge shaft in the creek bed near the entrance. Water flowing into the cave could be controlled so that only good quality water would be recharged .<br>3. Monitor the cave to evaluate the effect or non-effect of human visitation. Continue doing faunal surveys .<br>4. Monitor and control fire ants.<br>5. TCMA should complete the draft management plan which will include plans to monitor the effects on the cave of the development on the adjacent property, including utility trenches, a sewer line that crosses the property which may cause contamination and other excavations | TCMA<br>1. Conducted a biological survey in December 2002.<br>2. Controlled and monitored public access.<br>3. Planning to relocate the survey areas in 2003. |

## 8.0 RECOMMENDATIONS

In addition to the specific cave actions listed above, the following recommendations are to assist the BCCP permit holders to meet the obligations of the permit:

- Have regular meetings of the BCCP Karst Management group to work on various issues.
- BCCP partners should work with TSNL and TCMA to discuss possible options for protecting the TSNL caves. Determine if TSNL is an effective organization to protect the 7 TSNL caves. Coordinate with Nevenna Travis and James Reddell.
- BCCP partners should work with TCMA and USFWS to discuss replacing Pennie's Cave with another important cave for BCCP protection since it appears that this cave has been lost.
- BCCP partners should work to get the Cave X management plan operational. BCCP partners assist with discussions between Travis Country residents and Regent's School to clear up any controversy that will allow the cave management plan to go into effect.
- BCCP partners should decide what to do about Fossil Cave in Schroeder Park. Decide if the cave be relocated and monitored or replaced with another cave on the BCCP list. Coordinate any decision with the appropriate groups.
- BCCP partners should work on developing private landowner agreements to protect additional caves listed here as "private".
- BCCP partners should work with USFWS to determine the status of caves with individual 10a permits, and get copies of the annual karst reports required under their permitsContact and visit these 10a permit caves to assess their status. Encourage USFWS to enforce the details of these permits.

**SPECIAL THANKS**

TCMA continued to provide valuable volunteer support activities to the BCCP and Central Texas cave protection efforts. The BCCP partners greatly appreciate their dedication and hard work to protect the caves and karst species of this area.

## 8.0 LITERATURE CITED


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**ATTACHMENT A:**
**KARST FAUNAL REPORTS:**
**CITY OF AUSTIN (20)**
**TEXAS CAVE MANAGEMENT ASSOCIATION (3)**

## BALCONES CANYONLANDS PRESERVE--CAVE REPORT

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency:PARD |
| Date: 10/11/01 | No. of pages:3 |

Location: Airman's Cave Section No. 1

Time Started: 12:22 pm Time ended: 12:56 pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☒ Vandalism If so, ☒ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 19° C @ 11:50 am Outside: 20° C
Humidity Inside: 96% Outside: 96% @ 11:50 am

### FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Snails: *Gastropoda* | 1 | |
| Scorpion: *Vaejovis reddelli* | 1 | |
| Spiders: *Cicurina* | 23 | |
| Wall web | 4 | |
| Eidmannella pallida | 36 | |
| *Pseudoscorpion:*Tartarocreag.* | | |
| Harvestman: *Leiobunum town.* | | |
| **Texella spinoperca* | | |
| Millipedes: *Abacion texense* | 2 | |
| Cambala speobia | | |
| **Speodesmus bicornourus* | | |
| Springtails: *Pseudosinella sp.* | 18 | |
| Silverfish: *Texoreddellia sp.* | | |
| Cave crickets: *Ceuthophilus B* | 10 | |
| Ceuthophilus secretus | | |
| Ceuthophilus cunicularis | 1 | |
| *Ceuthophilus* nymphs | 27 | |
| *Groundbeetle: *Rhadine austin.* | | |
| Rove beetle: *Eustilicus condei* | | |
| Frog:*Syrrhophus guttialatus* | | |
| Plethodon albagula | | 1 found just outside of survey area. |
| Bat: *Pipistrellus subflavus* | 1 | |
| Raccoon: *Procyon lotor* | | |
| gnats | 13 | |

(*) signifies species of concern
See back for additional Field Notes and Comments? ☐ Section map attached? ☒
☐ Photographs taken? How many? _____ If so, attach to this report.
Not much trash was found and most trash found and removed from this cave was outside of our survey areas, and a fair amount found was old trash. However, we did find 2 new AA batteries. 2 old D cell batteries and 1 old lead tire weight was also removed along with other non-toxic trash. Old raccoon scat was found in this survey area.

## BALCONES CANYONLANDS PRESERVE--CAVE REPORT

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency:PARD |
| Date: 10/11/01 | No. of pages:3 |

Location: Airman's Cave  Section No. 2

Time Started: 1:30 pm  Time ended: 2:10 pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 19° C Outside: _____  Humidity Inside: 100% Outside: _____

## FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Snails: *Gastropoda* | | |
| Scorpion: *Vaejovis reddelli* | | |
| Spiders: *Cicurina* | 22 | |
| Wall web | 1 | |
| Eidmannella pallida | 23 | |
| *Pseudoscorpion*: Tartarocreag* | 2 | Another individual was observed inbetween sections 2 and 3 |
| Harvestman: *Leiobunum town.* | | |
| **Texella spinoperca* | | |
| Millipedes: *Abacion texense* | | |
| Cambala speobia | 3 | |
| **Speodesmus bicornourus* | 6 | |
| Springtails: *Pseudosinella sp.* | 15 | |
| Silverfish: *Texoreddellia sp.* | | |
| Cave crickets: *Ceuthophilus B* | 3 | |
| Ceuthophilus secretus | | |
| *Ceuthophilus cunicularis* | 5 | |
| *Ceuthophilus* nymphs | 45 | |
| *Groundbeetle: *Rhadine austin.* | 2 | |
| Rove beetle: *Eustilicus condei* | 7 | |
| Frog:*Syrrhophus guttialatus* | | |
| Plethodon albagula | | Observed 8 inbetween sections 1 and 2 |
| Bat: *Pipistrellus subflavus* | | Observed 1 inbetween sections 1 and 2 |
| Raccoon: *Procyon lotor* | | |
| gnats | 21 | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐

☐ Photographs taken? How many? _____ If so, attach to this report.

Fresh raccoon scat was observed inside this survey area.
For the first time, we found no *Texella spinoperca* at all in this cave.

**BALCONES CANYONLANDS PRESERVE--CAVE REPORT**

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency:PARD |
| Date: 10/11/01 | No. of pages:3 |

Location: Airman's Cave Section No. 3

Time Started: 3:01 pm Time ended: 3:31 pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 20.25° C Outside: Humidity Inside: 96% Outside:

## FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Snails: *Gastropoda* | | |
| Scorpion: *Vaejovis reddelli* | | |
| Spiders: *Cicurina* | 4 | |
| *Eidmannella pallida* | | |
| Wall web | | |
| *Pseudoscorpion*: Tartarocreag* | | |
| Harvestman: *Leiobunum town.* | | |
| **Texella spinoperca* | | |
| Millipedes: *Abacion texense* | | |
| Cambala speobia | | |
| **Speodesmus bicornourus* | 8 | |
| Springtails: *Pseudosinella sp.* | 5 | |
| Silverfish: *Texoreddellia sp.* | | |
| Cave crickets: *Ceuthophilus B* | | |
| Ceuthophilus secretus | | |
| *Ceuthophilus cunicularis* | | |
| *Ceuthophilus nymphs* | | |
| *Groundbeetle: *Rhadine austin.* | | |
| Rove beetle: *Eustilicus condei* | | |
| Frog:*Syrrhophus guttialatus* | | |
| Plethodon albagula | | |
| Bat: *Pipistrellus subflavus* | | |
| Raccoon: *Procyon lotor* | | |
| gnats | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐

☐ Photographs taken? How many? _____ If so, attach to this report.

Most fauna was observed around old raccoon scat. This section shows signs of a dramatic increase in human foot traffic. There is a well-beaten path through our survey area, much more so since last Spring.

## BALCONES CANYONLANDS PRESERVE--CAVE REPORT

| | |
|---|---|
| Name: Mark Sanders | Agency: COA |

| Date: 5/13/02 | No. of pages: 1 |
|---|---|

Location: Cotterell Cave GPS coordinates (NAD 1983)_____ Section No. Entire cave

Time Started: 9:10am Time ended: 10:45am Scientific permit # TE798920-0

Surface area observations: (gate condition, fire ants, vandalism) Nothing new, just old trash that I removed.

Survey area: ☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐graffiti

Temperature Inside: NA Outside: NA Humidity Inside: NA Outside: NA
Humidity was measured with a Psychrodyne analog psychrometer.

Weather conditions during the past week: (freeze, over 100 F, **drought**, flood)

Organic matter encountered in survey area: rotting wood, damp soil, not much of anything

Surface area moisture conditions: (dry, dripping, pools) Most of the cave was very dry with a few moist areas.

FAUNAL SURVEY

| Species | No. seen | Microhabitat for troglobites | Comments (if specimen was collected state where it was sent to) |
|---|---|---|---|
| Snails: *Gastropoda* | | | |
| Earthworms: *Haplotaxida* | | | |
| Scorpions: *Vaejovis reddelli* | 2 | | |
| **Tartarocreagris sp** | 2 | Under rock | |
| Spiders: wall web | 3 | | |
| *Cicurina sp.* | 11 | Under rocks | |
| *Neoleptoneta sp.* | | | |
| • *Texella reyesi* | 1 | Under rock in moist area | Collected for DNA analysis, given to Jean Krejca |
| **Cambala speobia** | 2 | On walls | |
| * *Speodesmus sp.* | 3 | All over | 2 distinct sizes, possibly 2 separate species. |
| Troglobitic centipede | 1 | Under rock | Attempted to collect it but it disappeared |
| Rove beetles: *Orus rubens* | | | |
| Springtails: *Collembola* | ~ 50 | | |
| Crickets*: Ceuthophilus secretus* | 12 | | |
| **Ceuthophilus sp. B** | | | |
| *Ceuthophilus cunicularis* | 2 | | |
| *Ceuthophilus nymphs* | 54 | | |
| Blow flies: *Calliphora* accident | | | |
| Fungus gnats | | | |
| *Plethodon albagula* | 4 | | |
| *Syrrhophus marnocki* | | | |
| *Bufo valliceps valliceps* | | | |

(*) signifies species of concern
(☼) signifies endangered species
See back for additional Field Notes and Comments? ☐ Section map attached? ☐

☐ Photographs taken? How many? _____ If so, attach to this report.

## BALCONES CANYONLANDS PRESERVE--CAVE REPORT

| Name: Mark Sanders and Carlo Abbruzzese | Agency: COA |
|---|---|
| Date: 10/05/01 | No. of pages: 2 |

Location: Blowing Sink tract GPS coordinates (NAD 1983)_____ Section No. Everything but the "Dark Side of the Moon Passage" (See map)
Time Started: 10:30am Time ended: 5:45pm Scientific permit # TE798920-0

Surface area observations: (gate condition, fire ants, vandalism) nothing out of the ordinary.

Survey area: ☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: NA Outside: NA Humidity Inside: NA Outside: NA
Humidity was measured with a Psychrodyne analog psychrometer.

Weather conditions during the past week: (freeze, over 100 F, drought, flood)

Organic matter encountered in survey area: leaf litter and woods materials

Surface area moisture conditions: (dry, dripping, pools) Everything including flowing streams

## FAUNAL SURVEY

| Species | No. seen | Microhabitat for troglobites | Comments (if specimen was collected state where it was sent to) |
|---|---|---|---|
| Snails: *Gastropoda* | 22 | | |
| Isopods: *Oniscoidea* | | | |
| Amphipods: **Stygobromus russelli* | ~ 75 | In pools | |
| Scorpions: *Vaejovis reddelli* | | | |
| Spiders: wall web | 12 | | |
| *Cicurina sp.* | 13 | Under rocks | |
| Surface spiders | 25 | | |
| * *Texella mulaiki* | | | |
| Millipedes: *Diplopoda* accident | 3 | | |
| **Cambala speobia** | 7 | On wall, under rocks | |
| * *Speodesmus sp.* | 5 | On wall, under rocks | |
| * *Rhadine austinica* | | | |
| Rove beetles: *Orus rubens* | 3 | | |
| **Texoreddellia texensis** | | | |
| Springtails: *Collembola* | ~100 | | |
| Crickets*: Ceuthophilus secretus* | 10 | | |
| **Ceuthophilus sp. B** | 60 | | |
| *Ceuthophilus cunicularis* | | | |
| *Ceuthophilus nymphs* | ~200 | | |
| Blow flies: *Calliphora* accident | | | |
| Fungus gnats | 5 | | |
| *Plethodon albagula* | 3 | | |
| *Syrrhophus marnocki* | | | |
| *Crotalus atrox* | | | |

(*) signifies species of concern
See back for additional Field Notes and Comments? ☐ Section map attached? ☒

☐ Photographs taken? How many? _____ If so, attach to this report.

**B A L C O N E S C A N Y O N L A N D S P R E S E R V E --C A V E R E P O R T**

Name: Mark Sanders Agency:PARD Date:10/02/01 No. of pages:1

Location: Broken Arrow cave Section No. portions of entire cave

Time Started: 4:30 pm Time ended: 5:15 pm

☒ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☒ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: ? Outside: ? Humidity Inside: ? Outside: ?

FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Spiders: wall web | 8 | |
| *cicurina* | 2 | |
| *Leiobunum townsendii* | ~1000 | |
| * *Rhadine persephone* | 0 | |
| Rove beetle | 3 | |
| **Speodesmus sp** | 4 | |
| *Cambala speobia* | ~30 | |
| Crickets: *Ceuthophilus secretus* | 4 | |
| *Ceuthophilus cunicularis*[2] | 5 | |
| *Ceuthophilus nymphs* | ~60 | |
| Aquatic amphipods | ~30 | |
| Aquatic isopods | ~30 | |
| **Collembola sp** | ~ 200 | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐

☐ Photographs taken? How many? _____ If so, attach to this report.

The main purpose of my visit was to inspect the cave for any potential problems. I did find fire ants within 5 feet of the cave entrance. The ants were observed exiting a foraging tunnel from a small hole in the bedrock. I could not find any mounds within a 100-foot radius of the cave.
The pool inside the cave appeared to be drying up.

## BALCONES CANYONLANDS PRESERVE--CAVE REPORT

| | |
|---|---|
| Name: Mark Sanders | Agency: COA |
| Date: 9/30/02 | No. of pages: 1 |

Location: Cotterell Cave GPS coordinates (NAD 1983)__Section No. entire cave

Time Started: 8:40am Time ended: 10:30am Scientific permit # TE798920-0

Surface area observations: (gate condition, fire ants, vandalism) Nothing new, just old trash that I removed.

Survey area: ☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 69° F Outside: NA Humidity Inside: 97% Outside: NA
Humidity was measured with a Psychrodyne analog psychrometer.

Weather conditions during the past week: (freeze, over 100 F, draught, flood) warm, dry

Organic matter encountered in survey area: rotting wood, not much of anything

Surface area moisture conditions: (dry, dripping, pools) portions are dry and others were moist

FAUNAL SURVEY

| Species | No. seen | Microhabitat for troglobites | Comments (if specimen was collected state where it was sent to) |
|---|---|---|---|
| Snails: *Gastropoda* | 5 | | |
| Earthworms: *Haplotaxida* | | | |
| Scorpions: *Vaejovis reddelli* | 1 | | |
| **Tartarocreagris sp** | 1 | Under rock | Collected for James Reddell to ID |
| Spiders: wall web | 2 | | |
| *Cicurina sp.* | 15 | Under rocks | |
| *Neoleptoneta sp.* | | | |
| • *Texella reyesi* | 2 | Under rocks in moist area | |
| Millipedes: *Diplopoda* accident | | | |
| **Cambala speobia** | 7 | Under rocks | |
| * *Speodesmus sp*. | 22 | All over | 2 distinct sizes, possibly 2 separate species. |
| Rove beetles: *Orus rubens* | | | |
| **Texoreddellia texensis** | | | |
| Springtails: *Collembola* | ~ 100 | | |
| Crickets*: Ceuthophilus secretus* | 20 | | |
| **Ceuthophilus sp. B** | | | |
| *Ceuthophilus cunicularis* | 7 | | |
| *Ceuthophilus nymphs* | ~200 | | |
| Blow flies: *Calliphora* accident | | | |
| Fungus gnats | | | |
| *Plethodon albagula* | 2 | | |
| *Syrrhophus marnocki* | | | |

(*) signifies species of concern
(☼) signifies endangered species

See back for additional Field Notes and Comments? ☐ Section map attached? ☐

☐ Photographs taken? How many? _____ If so, attach to this report.

**B A L C O N E S C A N Y O N L A N D S P R E S E R V E--C A V E R E P O R T**

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency: PARD |
| Date: 10/12/01 | No. of pages: 2 |

Location: District park cave  Section No. 1 (aquifer room)

Time Started: 11:22am  Time ended: 12:02am

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☒ Vandalism If so, ☐ trash ☒ speleothems ☐ gate ☐ graffiti

Temperature Inside: 21.5 °C Outside: 19 ° C @ 11am
Humidity Inside: 96% Outside: 98% @ 11am

## FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Spiders: *Cicurina sp* | 8 | |
| wall web | 3 | |
| Millipedes: *Cambala speobia* | | 3 just outside of survey area on fresh raccoon scat |
| * *Speodesmus sp.* | | |
| * *Texella mulaiki* | | |
| Springtails: *Collembolids* | 40 | Most near raccoon scat |
| Crickets: *Ceuthophilus sp. B* | 4 | |
| ***Ceuthophilus secretus*** | 3 | |
| *Ceuthophilus cunicularis* | 3 | Near fresh raccoon scat |
| *Ceuthophilus nymphs* | 35 | |
| *Texoreddellia texensis* | | |
| * *Rhadine austinica* | | |
| Rove beetles: *Aleocharinae sp.* | | 1 found just out of survey area on raccoon scat |
| gnats: sp. | 8 | |
| terrestial isopods | 1 | |
| raccoon (*Procyon lotor*) | | Fresh scat present |
| House flies | 10 | |
| House centipede | 1 | |
| "Accidental" surface beetle | 1 | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐
☐ Photographs taken? How many? _____ If so, attach to this report.

We found broken flagging in this section which we patched back together. The broken formation is a small stalagmite, which was probably accidentally kicked. Heavy recent rains on 10/10, 10/11 (approx.1.15" of rain) probably washed in flood debris against the cave gate. Someone had removed most debris and we believe used large amounts of toxic WD-40 to unfreeze and open the cave lock. The soil near the gate had a strong petroleum smell. We have always required that the lock be removed from the cave, cleaned outside, then put back in, and use a rag when the lock cannot be opened, the rag would catch most of the toxic chemicals. I will look into this matter, try to find out who did this and make sure that it does not happen again. We may further restrict access to this cave.

**B A L C O N E S  C A N Y O N L A N D S  P R E S E R V E--C A V E  R E P O R T**

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency:PARD |
| Date:10/12/01 | No. of pages: 2 |

Location: District park cave  Section No. 2 (aggie level)

Time Started: 12:20pm  Time ended: 1:12pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐graffiti

Temperature Inside: 19.5° C Outside: Humidity Inside: 99% Outside:

## FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Spiders: *Cicurina sp* | 2 | |
| *Neoleptoneta sp.* | 1 | |
| wall web | | |
| Millipedes*: Cambala speobia* | | |
| * *Speodesmus sp.* | 1 | |
| * *Texella mulaiki* | | |
| Springtails: *Collembolids* | 5 | |
| Crickets: *Ceuthophilus sp. B* | | |
| ***Ceuthophilus secretus*** | | |
| *Ceuthophilus cunicularis* | 2 | |
| *Ceuthophilus nymphs* | 1 | |
| *Texoreddellia texensis* | | |
| * *Rhadine austinica* | | |
| Rove beetles: *Aleocharinae sp.* | | |
| Snails: *Gastropoda* | | |
| gnats: sp. | 3 | |
| terrestial isopods | | |
| raccoon (*Procyon lotor*) | | |
| (accidental) mosquito | 1 | |
| | | |
| | | |
| | | |
| | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐

☐ Photographs taken? How many? _____ If so, attach to this report.

## BALCONES CANYONLANDS PRESERVE--CAVE REPORT

| | |
|---|---|
| Name: Mark Sanders, Carlo Abbruzzese | Agency: COA-WWW |
| Date: July 12, 2002 | No. of pages: 2 |

Location: Featherman's cave GPS coordinates (NAD 1983) _____ Section No. entire cave

Time Started: 2:20pm Time ended: 3:20pm Scientific permit # TE798920-0

Surface area observations: (gate condition, fire ants, vandalism) removed old trash

Survey area: ☒ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 72.5° F Outside: 91° F @ 2:15pm Humidity Inside: 93% Outside: 50%
Humidity was measured with a Psychrodyne analog psychrometer.

Weather conditions during the past week: (freeze, over 100 F, draught, flood) approximately 11" of rain the week prior.

Organic matter encountered in survey area: leaf litter, cricket scat, small amount of raccoon scat

Surface area moisture conditions: (dry, dripping, pools) floor was moist or damp, while the upper areas were dry

FAUNAL SURVEY

| Species | No. seen | Microhabitat for troglobites | Comments (if specimen was collected state where it was sent to) |
|---|---|---|---|
| Snails: *Gastropoda* | 2 | | |
| Earthworms: *Haplotaxida* | 10 | | |
| Isopods: *Oniscoidea* | ~200 | | |
| Scorpions: *Vaejovis reddelli* | 1 | | |
| Spiders: wall web | 4 | Pockets on wall | |
| *Cicurina sp.* | 6 | Under rocks | |
| mite | 1 | | |
| ✲*Texella sp* | 4 | On plastic, under rocks | One collected for J Reddell and J Krejca for ID |
| **Leiobunum townsendii** | ~500 | | |
| **Cambala speobia** | | | |
| * *Speodesmus sp.* | 2 | Under rocks | |
| centipede | 1 | Under rock | Possibly troglobitic, very small, was unable to collect it |
| **Triatoma sp** | 7 | | |
| Springtails: *Collembola* | 23 | | |
| Crickets*: Ceuthophilus secretus* | ~10,000 | | Much of the ceiling was covered with large adults, very rough estimate. |
| **Ceuthophilus sp. B** | | | |
| *Ceuthophilus cunicularis* | | | |
| *Ceuthophilus nymphs* | ~100 | | |
| Blow flies: *Calliphora* accident | | | |
| Fungus gnats | 7 | | |
| *Plethodon albagula* | 8 | | |
| *Syrrhophus marnocki* | 3 | | |

(*) signifies species of concern
(✲) signifies endangered species
Notes: I had left pieces of a plastic tarp inside the cave because I had noted in the past that I usually find *Texella* under the plastic. This visit only 1 of 4 *Texella* was found on the plastic. We removed the plastic at the end of the survey.

## BALCONES CANYONLANDS PRESERVE--CAVE REPORT

Personnel: Mark Sanders and Carlo Abbruzzese Agency: COA
Date: 5/22/02 No. of pages: 2

Location: Flint Ridge cave GPS coordinates (UTM): _____ Section No. entire cave

Time Started: 11:40am Time ended: 4:20 pm Scientific permit # _____

Surface area observations: ( gate condition, fire ants, vandalism, etc.) a small # of fire ants near the entrance

In survey area: ☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☒ light ☐ none

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti ☒ none

Faunal area temperature: 71.5 F Humidity: 95% Outside: 77.5 F @ 11:30am Humidity: 60%
Humidity was measured with a Psychrodyne analog psychrometer.

Weather conditions during the past week: ( freeze, over 100 F, draught, flood, etc.) draught

Organic matter encountered in survey area: decaying leaf litter and loose cobble is where most troglobites were found.

Faunal area moisture conditions: (dry, dripping, pools, etc.) portions of the cave were dripping, dry and pooled.

## FAUNAL SURVEY

| Species | No. seen | Microhabitat (Under rock, wall, floor, organic material, etc.) | Comments (if specimen was collected state where it was sent to) |
|---|---|---|---|
| *Gastropoda* | | | Only empty shells were found. |
| *Haplotaxida.* | 1 | | |
| Spiders: wall web | 9 | | |
| *Cicurina sp.* | 37 | Under rocks | |
| *Eidmannella sp.* | 2 | | |
| * *Texella mulaiki* | 4 | Wall, under rocks | |
| Cambala speobia speobia | 3 | floor | |
| * *Speodesmus sp.* | ~ 100 | Wall, under rocks, floor | 2 distinct sizes, probably 2 different species. |
| * *Rhadine austinica* | 10 | Floor, under rocks | |
| Rove beetles | 39 | | |
| Texoreddellia texensis | 7 | Under rocks, floor | |
| *Pseudosinella sp* | ~ 1000 | | |
| *Ceuthophilus secretus* | ~ 60 | | |
| *Ceuthophilus nymphs* | ~ 350 | | |
| *Diptera* | 1 | | |
| ***Aquatic Amphipods*** | ~ 200 | | One was collected one for James Reddell to ID |
| ***Undetermined insect larvae*** | 25 | Under rocks | One was collected for James Reddell to ID |
| Syrrhophus marnocki | 1 | | |
| Thamnophis cyrtopsis ocellatus | 1 | | Located at the entrance. |
| Anolis carolinensis carolinensis | 1 | | Located at the entrance. |
| Plethodon albagula | 3 | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☒

There were only a few fire ants observed in the cave located in the " balcony room". A small amount of trash was removed from the cave. Stream passage was still wet, but water level was lower than in past visits.

All troglobitic species were found throughout the cave (starting at the formation pit) with the exception of *Texella mulaiki,* which was found near the end of the cave, lower level of Cheese & Chocolate. As of now the cave is gated with a temporary wooden plug, which reduces the amount of organic material from entering the cave. In the near future the cave will be fitted with a new gate which will allow more organic material to enter the cave.

**B A L C O N E S  C A N Y O N L A N D S P R E S E R V E**
**C A V E  R E P O R T**

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency:PARD |
| Date: 10/12/01 | No. of pages: 2 |

Location: Goat Cave  Section No. 1 (landing zone)

Time Started: 2:45 pm  Time ended: 3:07 pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☒ Vandalism If so, ☒ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 21° C  Outside: 26° C @ 4:05 pm
Humidity Inside: 94%  Outside: 84% @ 4:05 pm

## FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Snails: *Gastropoda* | 35 | |
| Earthworms: *Haplotaxida* | | |
| Isopods: *Oniscoidea* | | |
| Scorpions: *Vaejovis reddelli* | | |
| Spiders: wall web | | |
| "Accidental" spider | 2 | |
| *Cicurina sp.* | | |
| *Neoleptoneta sp.* | | |
| * *Texella mulaiki* | | |
| Soft ticks | | |
| Mites | | |
| Millipedes: *Diplopoda* accident | | |
| **Cambala speobia** | | |
| * *Speodesmus sp.* | | |
| * *Rhadine austinica* | | |
| Rove beetles: *Orus rubens* | 1 | |
| **Texoreddellia texensis** | | |
| Springtails: *Collembola* | | |
| Crickets*: Ceuthophilus secretus* | | |
| **Ceuthophilus sp. B** | | |
| *Ceuthophilus cunicularis* | | |
| *Ceuthophilus nymphs* | | |
| mosquitoes | 3 | |
| Blow flies: *Calliphora* accident | | |
| Fungus gnats | 2 | |
| *Plethodon albagula* | 30 | Most with broken/short tails |
| *Syrrhophus marnocki* | | |
| *Bufo valliceps valliceps* | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐
☐ Photographs taken? How many? _____ If so, attach to this report.

**B A L C O N E S C A N Y O N L A N D S P R E S E R V E --C A V E R E P O R T**

Name: Mark Sanders and Carlo Abbruzzese Agency: PAR
Date: 10/12/01 No. of pages: 2

Location: Goat Cave Section No. 2 (alcove)

Time Started: 3:15 pm Time ended: 3:46 pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 21° C Outside: Humidity Inside: 95% Outside:

## FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Snails: *Gastropoda* | | |
| Earthworms: *Haplotaxida* | | |
| Isopods: *Oniscoidea* | | |
| Scorpions: *Vaejovis reddelli* | | |
| Spiders: wall web | | |
| *Cicurina sp.* | 4 | |
| *Neoleptoneta sp.* | | |
| * *Texella mulaiki* | 6 | |
| Soft ticks | | |
| Mites | | |
| Millipedes: *Diplopoda* accident | | |
| **Cambala speobia** | | |
| * *Speodesmus sp.* | | |
| * *Rhadine austinica* | | |
| Rove beetles: *Orus rubens* | | |
| **Texoreddellia texensis** | | |
| Springtails: *Collembola* | | |
| Crickets*: Ceuthophilus secretus* | 2 | |
| **Ceuthophilus sp. B** | | |
| *Ceuthophilus cunicularis* | | |
| *Ceuthophilus nymphs* | 5 | |
| Blow flies: *Calliphora* accident | | |
| Fungus gnats | | |
| *Plethodon albagula* | | |
| *Syrrhophus marnocki* | | |
| *Bufo valliceps valliceps* | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐

☐ Photographs taken? How many? _____ If so, attach to this report.

There are signs of human foot traffic in this survey area, mud on the floor.

**B A L C O N E S C A N Y O N L A N D S P R E S E R V E**
**C A V E R E P O R T**

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency: COA |
| Date: 4/19/02 | No. of pages: 2 |

Location: Goat Cave Section No. 1 (landing zone)

Time Started: 11:12 am Time ended: 11:33 am

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 67 ° F Outside: 77° F @ 10:45am
Humidity Inside: 95% Outside: 78% @ 10:45am

## FAUNAL SURVEY

| Species | No. seen | Microhabitat For SOC | Comments |
|---|---|---|---|
| Earthworms: *Haplotaxida* | 17 | | |
| Isopods: *Oniscoidea* | 6 | | |
| Spider "surface" | 1 | | |
| *Neoleptoneta sp.* | | | |
| * *Texella mulaiki* | | | |
| Caterpillar "accidental" | 2 | | |
| Millipedes: *Diplopoda* accident | | | |
| **Cambala speobia** | | | |
| * *Speodesmus sp.* | | | |
| * *Rhadine austinica* | | | |
| Rove beetles: *Orus rubens* | 1 | | |
| **Texoreddellia texensis** | | | |
| Springtails: *Collembola* | 2 | | |
| Crickets*: Ceuthophilus secretus* | | | |
| **Ceuthophilus sp. B** | | | |
| *Ceuthophilus cunicularis* | | | |
| *Ceuthophilus nymphs* | | | |
| Blow flies: *Calliphora* accident | 1 | | |
| Fungus gnats | 2 | | |
| *Plethodon albagula* | 26 | | |
| *Bufo valliceps valliceps* | 4 | | Rescued and released at Hideout Sink |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☒

This was the first time the cave was surveyed since the gate was removed. We found that more leaf litter appeared to filter in and that the landing zone appeared to be more compact than usual. The compactness may be due to too much permitted access.

## B A L C O N E S C A N Y O N L A N D S P R E S E R V E --C A V E R E P O R T

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency: COA |

| Date: 4/19/02 | No. of pages: 2 |
|---|---|

Location: Goat Cave Section No. 2 (alcove)

Time Started: 12:09pm Time ended: 12:45pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☒ Vandalism If so, ☐ trash ☒ speleothems ☐ gate ☒graffiti

Temperature Inside: 68° F Outside: Humidity Inside: 95% Outside:

## FAUNAL SURVEY

| Species | No. seen | Microhabitat For SOC | Comments |
|---|---|---|---|
| Snails: *Gastropoda* | | | |
| Earthworms: *Haplotaxida* | | | |
| Isopods: *Oniscoidea* | | | |
| Scorpions: *Vaejovis reddelli* | 3 | | |
| Spiders: wall web | | | |
| *Cicurina sp.* | 2 | Under rock | |
| *Neoleptoneta sp.* | | | |
| * *Texella mulaiki* | 1 | Under rock | |
| Soft ticks | | | |
| **Cambala speobia** | | | |
| * *Speodesmus sp.* | 1 | Wall | |
| * *Rhadine austinica* | | | |
| Springtails: *Collembola* | | | |
| Crickets*: Ceuthophilus secretus* | | | |
| **Ceuthophilus sp. B** | 5 | | |
| *Ceuthophilus cunicularis* | | | |
| *Ceuthophilus nymphs* | 33 | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☒

This was the first time the cave has been surveyed since the gate was removed and we spent approximately 10 minutes searching for bats within the cave, and found none.
This survey area was vandalized, someone etched their names and abbreviations and date into speleothems. We are investigating this matter, and are not allowing any permitted access into the cave until this matter is resolved. The vandalism was done on 11/17/01, a day that John Green, AFD and NCRC South Regional Coordinator led a permitted class on cave rescue inside this cave. John is cooperating with us and is waiting for TDH to fax him the class rooster. John had 22 pupils, the youngest was 25 years old and had 8 instructors all versed in proper cave etiquette.
*See photo of graffiti on back of this report.

## B A L C O N E S C A N Y O N L A N D S P R E S E R V E --C A V E R E P O R T

| Name: Mark Sanders and Carlo Abbruzzese | Agency: PARD |
|---|---|
| Date: 10/12/01 | No. of pages: 2 |

Location: Maple Run Cave Section No. 1

Time Started: 4:45 pm Time ended: 5:06 pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 21.5° C Outside: 26° C @ 4:25 pm
Humidity Inside: 96% Outside: 84% @ 4:25 pm

## FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Snails: *Gastropoda sp* | | |
| Scorpions: *Vaejovis reddelli* | 2 | |
| Spiders: *Cicurina sp.* | 2 | |
| wall web | | |
| **Texella mulaiki** | | |
| * Millipedes: *Speodesmus sp.* | | |
| **Cambala speobia** | | |
| "Accidental" surface millipede | 3 | |
| Springtails: *Pseudosinella sp.* | | |
| **Texoreddellia texensis** | | |
| Crickets*: Ceuthophilus sp. B* | 2 | |
| **Ceuthophilus secretus** | | |
| *Ceuthophilus cunicularis* | | |
| *Ceuthophilus* nymphs | 25 | |
| Mold beetle | | |
| * *Rhadine austinica* | | |
| Flies: *Diptera* | | |
| *Plethodon albagula* | 2 | |
| | | |
| | | |
| | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐

☐ Photographs taken? How many? _____ If so, attach to this report.

**B A L C O N E S C A N Y O N L A N D S P R E S E R V E --C A V E R E P O R T**

Name: Mark Sanders and Carlo Abbruzzese Agency: PARD
Date: 10/12/01 No. of pages:2

Location: Maple Run Cave Section No. 2

Time Started: 5:32 pm Time ended: 6:02 pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: 21.5° C Outside: Humidity Inside: 99% Outside:

## FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Snails: *Gastropoda sp* | | |
| Scorpions: *Vaejovis reddelli* | 1 | |
| Spiders: *Cicurina sp.* | 2 | |
| wall web | 2 | |
| **Texella mulaiki** | | |
| * Millipedes: *Speodesmus sp.* | | |
| **Cambala speobia** | | |
| "accidental" surface millipede | | Just outside of survey area. |
| Springtails: *Pseudosinella sp.* | | |
| **Texoreddellia texensis** | | |
| Crickets*: Ceuthophilus sp. B* | | |
| **Ceuthophilus secretus** | | |
| *Ceuthophilus cunicularis* | | |
| *Ceuthophilus* nymphs | | |
| Mold beetle | | |
| * *Rhadine austinica* | | |
| Flies: *Diptera* | | |
| *Plethodon albagula* | | |
| | | |
| | | |
| | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐

☐ Photographs taken? How many? _____ If so, attach to this report.

There was an odd odor in this room, much like a stink bug odor. We do know that a caver group was in this cave 2 days prior. There was a recent rain (1.15" rain on 10/10, 10/11)

## B A L C O N E S C A N Y O N L A N D S P R E S E R V E --C A V E R E P O R T

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency: COA |
| Date:4/19/02 | No. of pages:1 |

Location: Midnight Cave Section No. upper room

Time Started: 4pm Time ended: 4:54pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐graffiti

Temperature Inside: 67° F Outside: 80.5° F @3pm
Humidity Inside: 98% Outside: 64% @ 3pm

## FAUNAL SURVEY

| Species | No. seen | Microhabitat For SOC | Comments |
|---|---|---|---|
| Spiders: wall web | 1 | On wall | |
| *Cicurina* sp | 25 | Under rocks | |
| surface spiders | | | |
| ***Texella mulaiki** | 1 | Under rock | New species ? We did not collect it. |
| * *Speodesmus* N.S. | 12 | Most on ceiling | |
| ***Cambala speobia*** | ~ 1000 | Primarily floor | |
| surface millipede | | | |
| Troglobitic millipede | 1 | Under side of rock | New species? We attempted to collect it but lost it. |
| surface centipede | | | |
| * *Rhadine austinica* | 1 | floor | Just outside of survey area. |
| Crickets: *Ceuthophilus secretus* | | | |
| *Ceuthophilus* sp. B[1] | 80 | | |
| *Ceuthophilus cunicularis*[2] | 8 | | |
| *Ceuthophilus* nymphs | ~ 400 | | |
| terrestrial cricket | | | |
| ***Texoreddellia texensis*** | | | |
| *Trichoniscidae sp,* terrestial isopod | 7 | On floor | New species, collected 2 for James Reddell to ID. |
| *Gastropoda* sp. | 32 | | |
| springtails | ~ 200 | | |
| fungus gnats | | | |
| **Plethodon *albagula*** | | | |
| ***Bufo valliceps valliceps*** | | | |
| ***Elaphe gutatta emoryi*** | | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☒

No sign of human access in the room we surveyed since last survey.

## B A L C O N E S C A N Y O N L A N D S P R E S E R V E --C A V E R E P O R T

| | |
|---|---|
| Name: Mark Sanders and Carlo Abbruzzese | Agency:COA |
| Date:4/19/02 | No. of pages:1 |

Location: Midnight Cave Section No. lower area

Time Started: 5:28 pm Time ended: 5:38pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐graffiti

Temperature Inside: 67° F Outside: Humidity Inside: 95% Outside:

## FAUNAL SURVEY

| Species | No. seen | Microhabitat For SOC | Comments |
|---|---|---|---|
| Spiders: wall web | 1 | | |
| *Cicurina* sp | | | |
| surface spiders | 2 | | |
| * *Speodesmus* N.S. | | | |
| **Cambala speobia** | 2 | On wall | |
| surface millipede | 8 | | |
| surface centipede | | | |
| * *Rhadine austinica* | | | |
| rove beetle | | | |
| Crickets: *Ceuthophilus secretus* | | | |
| *Ceuthophilus* sp. B[1] | 81 | | |
| *Ceuthophilus cunicularis*[2] | 5 | | |
| **Ceuthophilus nymphs** | 62 | | |
| terrestrial cricket | | | |
| cockroach nymph | | | |
| **Texoreddellia texensis** | | | |
| terrestial isopod | 30 | | |
| snails | | | |
| springtails | | | |
| earth worms | | | |
| fungus gnats | | | |
| **Plethodon albagula** | 3 | | |
| **Bufo valliceps valliceps** | | | |
| *Elaphe gutatta emoryi* | | | |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐ Section map attached? ☐

Most of the lower area was under water; we surveyed the area above the water line, approximately 2x3-meter area. Even the dry area was extremely wet due to constant drip.

**B A L C O N E S  C A N Y O N L A N D S P R E S E R V E**
**C A V E  R E P O R T**

| | |
|---|---|
| Name: Mark Sanders | Agency:PARD |
| Date: 10/03/01 | No. of pages: |

Location: Rolling Rock Cave  Section No. portions of the cave

Time Started: 3:04pm  Time ended: 3:52pm

☐ *Solenopsis invicta* If so, ☐ heavy infestation ☐ moderate ☐ light

☐ Vandalism If so, ☐ trash ☐ speleothems ☐ gate ☐ graffiti

Temperature Inside: NA Outside: NA  Humidity Inside: NA Outside: NA

## FAUNAL SURVEY

| Species | No. seen | Comments |
|---|---|---|
| Spiders: wall web | 3 | |
| *cicurina* | 7 | |
| **Leiobunum townsendii** | ~300 | |
| **Rhadine subterranea** | 2 | |
| **Rhadine persephone** | | |
| Millipedes: *Speodesmus N.S.* | 3 | |
| **Cambala speobia** | 20 | |
| Crickets*: Ceuthophilus secretus* | | |
| *Ceuthophilus sp. B*[1] | 15 | |
| *Ceuthophilus* nymphs | 45 | |
| *Ceuthophilus cunicularis*[2] | 3 | |
| **Collembola sp** | ~ 200 | |
| ***Fungus gnats*** | 8 | |
| **Plethodon albagula** | 7 | |
| **Pheidole sp** | 8 | Found near the entrance |
| **Camponotus sp** | 12 | Found near entrance |

(*) signifies species of concern

See back for additional Field Notes and Comments? ☐  Section map attached? ☐

☐ Photographs taken? How many? _____  If so, attach to this report.

The purpose of my visit was to inspect the cave for any potential problems. Everything looks good, no problems found.

# TEXAS CAVE MANAGEMENT ASSOCIATION

Surveyor(s): __B. Russell, J. Jenkins_____ Date: _____Feb. 10, 2002_____

Surface Temperature: _50's_____ Surface Humidity: _high_____ Weather Conditions: __dry_____

Cave: ____**GET DOWN CAVE**_____ Survey Section: __A. Discovery Landing_____

Time Stated: _12:00 noon_____ Time Ended: _12:30pm_____

□ *Solenopsis invicta* (fire ant) Infestation: NO__x_ YES___ ☐ Heavy ☐ Moderate ☐Light

□ Vandalism: NO _x__ YES___ ☐ Gate ☐ Broken Speleothems ☐ Grafitti

Cave Temperature: _____°F ( C ) Cave Humidity: _____°F ( C )

**Air Flow: ☐ In x Out**

**FAUNAL SURVEY**

| SPECIES | COUNT | OBSERVATIONS |
|---|---|---|
| **Spiders:** Circurina | 1 | |
| Wall Web | | |
| **Harvestman**: L. townsendii | | |
| *Texella mulaiki | | |
| **Millipedes**: Cambala speobia | | |
| *Speodesmus sp. "small" | | |
| *Speodesmus sp. "large" | | |
| **Cave Crickets:** Ceuthophilus sp. B | | |
| Ceuthophilus secretus | 2 | |
| Ceuthophilus cunicularis | | |
| Ceuthophilus nymphs | | |
| **Springtails**: Collembola sp | | |
| **Silverfish:** Texoreddellia tex. | 1 | |
| **Beetles:** Coleoptera sp | | |
| *Rhadine austinica | | |
| **Flies:** Diptera | | |
| **Scorpion**: V. redelli | | |
| **Snails**: Gastropoda | | Empty snail shells |
| **Salamander**: Plethodon glutinosus | | |
| **Cliff Chirping Frog**: Syrrhophus marnocki | | |
| **Rattlesnakes**: Crotakus atrox | | |
| | | |

☐ Section Map of Survey Area attached

☐ Photographs taken? (please provide copies of photos with titles for this report)

* Use the back of the report for additional notes and comments.

# TEXAS CAVE MANAGEMENT ASSOCIATION

Surveyor(s): __B. Russell, J. Jenkins_____ Date: _____Feb. 10, 2002_____

Surface Temperature: _50's_____ Surface Humidity: _high_____ Weather Conditions: __dry_____

Cave: ___**GET DOWN CAVE**_____ Survey Section: _B. South end of Canon del Blanco Vista

Time Stated: _12:30 noon_____ Time Ended: _1:00pm_____

□ *Solenopsis invicta* (fire ant) Infestation: NO__x_ YES___ ☐ Heavy ☐ Moderate ☐Light

□ Vandalism: NO _x__ YES___ ☐ Gate ☐ Broken Speleothems ☐ Grafitti

Cave Temperature: _____°F ( C ) Cave Humidity: _____°F ( C )

**Air Flow: ☐ In x Out**

**FAUNAL SURVEY**

| SPECIES | COUNT | OBSERVATIONS |
|---|---|---|
| **Spiders:** Circurina | 3 | Rocks near bend in passage |
| Wall Web | | |
| **Harvestman**: L. townsendii | | |
| *Texella mulaiki | | |
| **Millipedes**: Cambala speobia | | |
| *Speodesmus sp. "small" | 2 | 1 on candle remnant, 1 nearby |
| *Speodesmus sp. "large" | | |
| **Cave Crickets:** Ceuthophilus sp. B | | |
| Ceuthophilus secretus | 6 | Along right canyon wall |
| Ceuthophilus cunicularis | 2 | Along right canyon wall |
| Ceuthophilus nymphs | 3 | Right canyon wall at base of wall |
| **Springtails**: Collembola sp | | |
| **Silverfish:** Texoreddellia tex. | 1 | |
| **Beetles:** Coleoptera sp | | |
| *Rhadine austinica | | |
| **Flies:** Diptera | | |
| **Scorpion**: V. redelli | | |
| **Snails**: Gastropoda | | Empty snail shells |
| **Salamander**: Plethodon glutinosus | | |
| **Cliff Chirping Frog**: Syrrhophus marnocki | | |
| **Rattlesnakes**: Crotakus atrox | | |

☐ Section Map of Survey Area attached

☐ Photographs taken? (please provide copies of photos with titles for this report)

* Use the back of the report for additional notes and comments.

# TEXAS CAVE MANAGEMENT ASSOCIATION

Surveyor(s): __B. Russell, J. Jenkins_____ Date: _____10/05/02_____

Surface Temperature:_____ Surface Humidity: _____ Weather Conditions:____partly cloudy, no major change_____

Cave: ____**WHIRLPOOL CAVE**_____ Survey Section:___A. Natural Bridge_____

Time Stated: __10a.m_____ Time Ended:___10:30am_____

☐ *Solenopsis invicta* (fire ant) Infestation: NO__x__ YES___ ☐ Heavy ☐ Moderate ☐Light

☐ Vandalism: NO_x___ YES___ ☐ Gate ☐ Broken Speleothems ☐ Grafitti

Cave Temperature: _____°F ( C ) Cave Humidity: _____°F ( C )

**Air Flow: ☐ In ☐ Out**

## FAUNAL SURVEY

| SPECIES | COUNT | OBSERVATIONS |
|---|---|---|
| **Amphipods:** Stygobromus sp. | | |
| **Isopods:** Trichoniscidae | | |
| **Spiders:** Circurina | | |
| Wall Web | | |
| **Harvestman**: L. townsendii | | |
| *Texella mulaiki | | |
| **Millipedes**: Cambala speobia | | |
| *Speodesmus sp. “small” | 1 | |
| *Speodesmus sp. “large” | | |
| Oxidus gracillis (hothouse millepede) | | |
| **Cave Crickets:** Ceuthophilus sp. B | | |
| Ceuthophilus secretus | 2 | Ceiling near natural bridge |
| Ceuthophilus cunicularis | | |
| Ceuthophilus nymphs | 3 | Ceiling near natural bridge |
| **Springtails**: Collembola sp | | |
| **Silverfish:** Texoreddellia tex. | 1 | On right side passage wall at natural bridge |
| **Beetles:** Coleoptera sp | | |
| *Rhadine austinica | | |
| **Flies:** Diptera | | |
| **Scorpion**: V. redelli | | |
| **Snails**: Gastropoda | | Numerous empty shells |
| **Salamander**: Plethodon glutinosus | | 2 among rocks at entrance of cave |
| **Cliff Chirping Frog**: Syrrhophus marnocki | | |
| **Rattlesnakes**: Crotakus atrox | | |

☐ Section Map of Survey Area attached ☐ Photographs taken? (please provide copies of photos with titles for this report)

* Use the back of the report for additional notes and comments.

## Attachment B:

# Texas Cave Management Association (TCMA)
# December 2002

### WHIRLPOOL CAVE

Whirlpool Cave is utilized primarily for educational/recreational activity by the City of Austin Nature Center and other outdoors and nature related organizations. Other uses include safety and fire rescue training, science monitoring for the TCMA and BCP and caver training by local Texas cave grottos. The cave is typically visited on a weekly basis by one or more organizations. In the fall new cavers receive training and experience in Whirlpool. Groups using the cave stay to the well-worn path and seldom if ever stray from the established route. Visits may take as little as 45 minutes or last for many hours, depending on the educational needs, age and background of the group touring the cave. Whirlpool received 982 registered visitors in 2002.

Bill Russell and Julie Jenkins, TCMA staff, performed a biological survey in October 2002. Year 2002 brought dry weather conditions early, the cave appears to have taken approximately two-three months to re-hydrate. We found this to be of interest and observed that during a wet period last year, the cave interior was wet and thus we assumed that recharge was taking place fairly rapidly. But, we now realize that this increased moisture was actually the result of rains earlier in the year. And that the cave was actually recharging at a much slower rate than had previously been thought. This has implications for understanding the recharge on the Edwards Aquifer, indicating that recharge is limited thru the Grainstone, a member of the Edwards Limestone, which is widely exposed at the surface in the Barton Springs segment of the Edwards Aquifer.

We realize based on our observations over the past two years alone that continued monitoring and study of our caves is vital to increasing our understanding of not only the cave life but especially how and where recharge to the Edwards Aquifer occurs.

This year, which began somewhat drier than last year seems to have brought about a return to more “normal” cave life activity. Observations of the routine cave critters increased over last year. Sightings increased for everything from the Rhadine beetles to the Slimy Salamanders. Last year there was a noticeable lack of Rhadine beetles, Our working hypothesis the time was that cave animals’ retreat into cracks and protected areas during adverse times. This is

supported by the large variations in numbers of caves adapted animals seen in many caves on closely spaced trips. During especially dry conditions, which is much more typical of our area of Central Texas, animals can be found hidden beneath rocks where moisture is trapped.

Pending further study based upon the moisture fluctuation of the cave, we continue to pursue our long-term plan, to re-establish the survey areas to new locations. Our current thinking is that one area will be entirely off the trail in a low area before the Travis County room, and the other survey area will be a part of the Travis County room. The new survey areas will have one traveled area, and one area well off the main route.

**LOST OASIS CAVE**

Lost Oasis Cave has received little to no interest from recreational groups or other organizations. The current entrance is particularly difficult to access and has been gated for almost a decade. Except for an annual check of the lock and/or to change the combination to the perimeter fence, this site is left completely undisturbed by humans. It will make an interesting study when we examine the current biology and attempt to assess where the energy input to the cave originates.

**GET DOWN CAVE**

Get Down Cave, along with the other caves in the Western Oaks Karst Preserve has greatly contributed to the public awareness of the nature and sensitivity of the karst. March of 2002 brought the grand opening of the Western Oaks Karst Preserve. Over 400 visitors spent the day touring and learning about the karst, the aquifer, cave and local biology, and the human impact inflicted upon nature. Visitors were not allowed beyond the entrance room in order to protect the Species of Concern found in the deeper recesses of the cave.

As noted in the past reports, there has been a considerable increase in raccoon droppings. A dead raccoon was observed at the end of faunal area B, but was too decomposed to remove. Observing and monitoring the affect of the additional input to the cave due to the carcass will be most interesting.

TCMA will continue to pursue working with USFWS to quantify the optimum level of droppings.

Lumberman's Investment Corporation is about to finish its build out and will be transferring ownership, but until the problems with the wet pond are resolved no entity wants ownership.

## CITY OF AUSTIN- GOAT CAVE KARST PRESERVE, DICK NICHOLS PARK, AND THE SLAUGHTER CREEK METROPOLITAN PARK

The TCMA does not "officially" manage any of the city owned caves, we do provide valuable volunteer support activities one such activity is monitoring access to these caves.

TCMA administered access permits for the following caves in 2002:

Maple Run Cave: 220
Goat Cave: 48
Midnight Cave: 3 aborted attempts to enter due to bad air and 1 gas monitor trip from the surface only
District Park: 98
Get Down: 4

Submitted by: Julie Jenkins and Bill Russell, TCMA

**ATTACHMENT C:**

CITY OF AUSTIN- CAVE MYOTIS HABITAT ENHANCEMENT AT GOAT CAVE

# CAVE MYOTIS HABITAT ENHANCEMENT AT GOAT CAVE



**Balcones Canyonlands Preserve**

The City of Austin

Wildlands Conservation Division

Water and Wastewater Utility

By Mark S. Sanders and Carlo M. Abbruzzese

June 2002

## CAVE MYOTIS HABITAT ENHANCEMENT AT GOAT CAVE

### Introduction

Central Texas is known for it's high biological diversity and endemism. Unfortunately, explosive growth in Austin, Texas is threatening this area's biodiversity including nine federally listed endangered species and numerous other rare species. Among these nine species are six endangered karst invertebrates and 25 karst species of concern (U.S. Department of the Interior, Fish and Wildlife Service,1996).

The City of Austin has the unique responsibility to protect these species through a regional 10 (a) 1 (b) permit under the Endangered Species Act, known as the Balcones Canyonlands Conservation Plan (BCCP) (U.S. Department of the Interior, Fish and Wildlife Service,1996).

Goat Cave is one of 63 Austin caves addressed by the Balcones Canyonlands Conservation Plan and contains several "Species of concern" listed in the Plan including a rare cave millipede; *Speodesmus sp.*, a spider; *Cicurina sp* and a harvestman, *Texella mulaiki* (Elliott 1997) (See Figures 1-3 for site location, cave map, and geologic cross section).

Goat Cave was once home to a maternity colony of approximately 30,000 Cave Myotis (*Myotis velifer incautus)*. Merlin Tuttle also discovered the locally rare Southeastern Bat *(Myotis austroriparius*) in this cave prior to gate installation (Elliott 1997). In the mid eighties, the area surrounding Goat Cave was dramatically changed from goat pasture to a residential subdivision. The owner of the property gated the cave entrance for safety reasons. Unfortunately, the gate excluded bats and failed to prevent vandalism.

Because bats are often keystone species and are important components to cave ecosystems, the Balcones Canyonlands Preserve is committed to protecting and enhancing bat habitat. Bat guano is an important source of nutrients for cave adapted species in an otherwise nutrient poor environment. (Reddell 1994). While *Myotis velifer incautus* is not uncommon, their numbers may be on the decline due to habitat loss (Kennedy, pers com).

In the late eighties, the cave and eight surrounding acres were donated to the City of Austin. Goat Cave Karst Preserve, as it is now known, continued to suffer vandalism. City staff continually removed debris from the Preserve in general and from Goat Cave specifically.

## Methodology

*City staff discussed the pros and cons of gates and fences with Bat Conservation International (BCI) staff and determined that a security fence was preferable. The following is a description of how that decision was made.*

### Bat gate considerations

A traditional bat gate was ruled out because the space between the bars on bat gates could allow small children to fall through. Another drawback was the potential for increased depredation allowed by the bat gate. This can be a particularly intense problem in urban preserves with large raccoon and feral cat populations (Kennedy, 2002). A third problem is ongoing vandalism, particularly trash (including fireworks) thrown into the cave through the gate. Loud fireworks can potentially permanently damage the sensitive hearing of roosting bats and may cause a bat colony to abandon the cave.

### Fence considerations

Drawbacks of a security fence included potential cave entry by people who can climb over or cut the fence, and the expense of repairing the fence. However, despite these drawbacks the security fence was deemed the best option because of the more serious bat gate associated problems mentioned above.

Type of fence

Staff looked into several fence options including ornamental iron. This option was rejected due to high cost. The only viable option was with the affordable no-climb chain-link fence. There were three options available with the no-climb chain-link fence, 3/8", ½" and 1" mesh size. Due to cost considerations the 1" mesh size was chosen. The smaller the mesh size, the more difficult it is to climb over, however, it was decided that the 1" size would suffice in this situation.

Security fence specifications

A total of 260 linear feet of eight foot tall, nine-gauge galvanized chain-link fence with climb-resistant one-inch mesh, and one four-foot access gate were installed around the cave. Both the layout and height of the fence were designed to prevent items, which could thrown over the fence, from entering the cave. There are only two areas where the cave entrance will be visible from outside the fence. This layout also minimized the cutting of live oaks and other trees. The security fence was also installed outside of the bat flight path (Kennedy 2002) (See Figure 4).

Budget

The winning bid was from a local fence company, Ace Fence Company, at $6,085.00. In early January, staff cleared vegetation in preparation for installation of the fence. Fence installation started in late January and was completed within ten working days. Prior to, during, and after fence installation, City staff and volunteers restored the natural character of the cave entrance.

Concrete Removal

Thirty ¾ ton pickup truck loads of concrete were removed from the cave entrance uncovering the natural surrounding limestone entrance. Concrete was removed, by use of a sixty-pound jackhammer with air compressor, using great care to not scar the underlying rock and to prevent debris and dust from entering the cave. The use of a wood frame plug, along with tarps both inside and outside of the cave kept most concrete dust and rubble from entering the cave. During the concrete extraction phase of this project the cave gate was removed by hand. For liability reasons, this task was completed after the fence was finished.

(See Figures 5-10)

The project was completed on March 1, 2002.

**Goat Cave Restoration Budget**

| **Project Phase** | **Volunteer Share** | **City of Austin Share** | **Bat Conservation International Share** | **TOTAL** |
|---|---|---|---|---|
| Entrance Restoration | $600.00 | $4,500.00 | $0.00 | $5,100.00 |
| Security Fence | $0.00 | $1,085.00 | $5,000.00 | $6,085.00 |
| **TOTAL** | $600.00 | $5,585.00 | $5,000.00 | **$11,000.00** |

## Discussion

The entrance to Goat Cave has been restored to a more natural state, which will allow for the recolonization of native bat species. The removal of the bat excluding gate and surrounding concrete slab has at least partially restored the natural nutrient input, air, and moisture flow into Goat Cave (U.S. Department of the Interior, Fish and Wildlife Service, 1994). Staff have already noticed an increase in the amount of leaf litter and other natural organic material entering the cave. Bat recolonization of Goat Cave will enhance the overall biology of the cave and will provide an important educational opportunity for Austin in regards to bat conservation.

Follow up surveys

City staff and volunteers will conduct monthly surveys for presence/absence of bats in Goat Cave for one year beginning April 2002. Subsequent surveys will occur quarterly. BCI staff will be immediately consulted if and when bats return to Goat Cave. The City of Austin will continue to rely on the advice of BCI staff and follow all recommendations in order to expedite the return of *Myotis velifer incautus*.

Depredation

Should bats return and suffer depredation, COA staff will trap and remove raccoons, feral cats and similar urban predators.

Vandalism patrol

Staff and volunteers will inspect the cave fence weekly. Any vandalism discovered will be repaired as soon as possible by City staff. If it is determined that vandals are

climbing over the security fence, City staff will install an additional three strands of wire on the top of the fence at a 45% angle from the fence.

Education

An educational sign will be installed within the cave fence. This sign will include information about why the cave was restored, who restored the cave, the cave's importance, facts on bats, cave map, and other interesting facts about Goat Cave. This sign will be completed by the end of 2002.

**Acknowledgments**

We would like to thank BCI for their expert advice and generous financial support. A special thanks is also given to Rene Barrera, and Otis Bradley for all of the time and effort they put into this project.

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Figure Five Pre-Restoration of Goat Cave



Figure Six Completed Restoration of Goat Cave



Figure Seven Concrete Removal




Figure Eight Completed Restoration of Goat Cave



Figure Nine Goat Cave Fence Installation




Figure Ten Completed Goat Cave Restoration

