Balcones Canyonlands Preserve
Karst Monitoring and Management
FY 2012 Annual Report



Todd Bayless and Paul Fushille descending into Krestchmarr Sink, Travis County.
Photo by Ron Phillips

Travis County
Department of Transportation and Natural Resources
Natural Resources and Environmental Quality Division
and
City of Austin BCP – Austin Water Utility (AWU)

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TABLE OF CONTENTS **PAGE**

1.0 REGIONAL PERMIT 1

2.0 CAVE MANAGEMENT SUMMARY 2

3.0 OWNERSHIP AND PROTECTION STATUS 7

4.0 ACCESS STATUS AND KARST EDUCATION 15

5.0 MANAGEMENT COORDINATION 19

6.0 BIOLOGICAL MONITORING 20

7.0 HYDROGEOLOGICAL STUDIES 23

8.0 RECOMMENDATIONS 25

9.0 KARST MANAGEMENT ACTIVITIES 26

10.0 LITERATURE CITED 35

TABLES:

TABLE 1: Endangered karst invertebrate locations in BCCP caves 3
TABLE 2: Endangered karst invertebrate locations in non BCCP-listed karst features 6
TABLE 3: Ownership, protection, monitoring and access status
of the 62 BCCP karst features 8
TABLE 4: FY12 BCCP karst feature monitoring and management activities 26

EXHIBIT A: KARST FAUNAL SURVEY REPORTS: 37
TRAVIS COUNTY (27 REPORTS)
CITY OF AUSTIN (39 REPORTS)

EXHIBIT B: CAVE CRICKET EXIT COUNT DATA REPORTS: 41
TRAVIS COUNTY (16 REPORTS)
CITY OF AUSTIN (35 REPORTS)

1.0 REGIONAL PERMIT

There are six species of endangered karst invertebrates (ES) and 25 karst species of concern (SOC) covered by the Balcones Canyonlands Conservation Plan (BCCP), a regional 10(a)1(B) permit issued by the U.S. Fish and Wildlife Service (USFWS) to the City of Austin (COA) and Travis County (TC) in May 1996 (USFWS, 1996a). If these 25 species of concern become listed as endangered in the future, no additional mitigation will be necessary to protect them, provided that all karst protection requirements, outlined in the BCCP, are fully implemented.

The Regional Permit requires protection of 35 endangered species caves and 27 additional caves that support SOC, for a total of 62 karst features (60 caves, one mine and one karst spring). Several of these karst features occur in clusters, identified in the Regional Permit as the Jollyville, McNeil, and Northwood cave clusters. As of Fiscal Year 2012 (FY12), 30,438 acres have been acquired for the Balcones Canyonlands Preserve (BCP). Forty-seven of the 62 BCCP karst features have some form of formal protection within these BCP tracts, which include properties owned and managed by COA, TC, and BCCP partners, as well as private mitigation lands.

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

Tooth Cave pseudoscorpion	*Tartarocreagris texana*	Kretschmarr Cave mold beetle	*Texamaurops reddelli*
Tooth Cave spider	*Neoleptoneta myopica*	Bee Creek Cave harvestman	*Texella reddelli*
Tooth Cave ground beetle	*Rhadine persephone*	Bone Cave harvestman	*Texella reyesi*

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

FLATWORMS	*Sphalloplana mohri*	**PSEUDOSCORPIONS**	*Aphrastochthonius* N. S.
OSTRACODS	*Candona* sp. Nr. *Stagnalis*		*Tartarocreagris comanche*
SPIDERS	*Cicurina bandida*		*Tartarocreagris reddelli*
	Cicurina cueva		*Tartarocreagris intermedia*
	Cicurina ellioti		*Tartarocreagris* N. S. 3
	Cicurina reddelli	**HARVESTMEN**	*Texella spinoperca*
	Cicurina reyesi	**GROUND BEETLES**	*Rhadine s. subterranea*
	Cicurina travisae		*Rhadine s. mitchelli*
	Cicurina wartoni		*Rhadine austinica*
	Neoleptoneta concinna	**ISOPODS**	*Caecidotea reddelli*
	Neoleptoneta devia		*Trichoniscinae* N. S.
	Eidmannella reclusa		*Miktoniscus* N. S.
MILLIPEDES	*Speodesmus* N. S.		

2.0 CAVE MANAGEMENT SUMMARY

This annual report covers the fiscal year 10/01/11-9/30/12 (FY12). In FY12, the BCCP partners continued efforts to determine and track the 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 (Tables 1 and 3).

A total of 47 of the BCCP caves are "protected" in some way, with 15 "unprotected". The 47 "protected" BCCP caves are currently managed as follows: 21 caves protected as part of the BCP on COA land; one protected on The Nature Conservancy (TNC) land; 12 protected as part of the BCP on TC land; two caves protected on Texas Cave Management Association (TCMA) land; seven caves protected as part of private Section 10(a) or Section 7 agreements with USFWS; and four caves that have protection agreements that include development setbacks from the cave entrance. Some of these "protected" caves only have protected entrances, but are threatened by surrounding development or planned development. Protection status of each of the 62 BCCP caves is detailed in Table 3 below.

In addition to protecting and monitoring caves covered by the BCCP permit, COA and TC also provide protection for other karst features found on the BCP containing ES and SOC. Some of these additional karst features are incorporated into TC and COA's shared biological monitoring program, as described in Section 6.0. As of FY12, ten endangered species karst features which were not listed on the original permit are being protected on BCP lands (six features on TC BCP; six features on COA BCP; Table 2).

To assist with analyzing the adequacy of the current preserve design for each karst feature, including the amount of surface and subsurface habitat needed to support these ecosystems, the COA and TC have been working together to maintain a comprehensive database for the 62 features and other features identified within the BCP since the regional permit was issued in 1996. The database also incorporates monitoring data and management issues for each karst feature. The karst database is discussed in more detail in Section 5.0.

Table 1**.** Endangered Karst Invertebrate Locations within BCCP caves of Travis County, Texas. This table was originally in the BCCP permit in 1996 and was revised to show new species location information from James Reddell (2004, 2005, 2010), HNTB (2005), Cokendolpher (pers com, 2008), USFWS (2009a,2009b), and Ledford (2010).

Cave Name	**Current Preserve Status**	**Karst Fauna Region**	**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*
Amber Cave	BCP Jollyville/ TC	Jollyville Plateau	X 1996		X 2010 (Reddell)	X 1996		
Bandit Cave	Private	Rollingwood					P 1996	
Beard Ranch Cave	BCP Ivanhoe/COA	Jollyville Plateau						X 1996
Bee Creek Cave	Private	Rollingwood					X 1996	
Beer Bottle Cave	Not required to be protected under BCCP	McNeil/Round Rock						X 1996
Broken Arrow Cave	BCP Lime Cr. Prs./COA	Cedar Park			X 1996			
Cave Y	BCP Barton Creek Grblt/COA	Rollingwood					P 1996 delete P (Reddell 2004)	
Cold Cave	Private	McNeil/Round Rock						X 1996
Cotterell Cave	BCP Spicewood Spgs. Pk./COA	Central Austin						X 1996
Disbelievers Cave	BCP Private 10(a)	Jollyville			X 1996			
Eluvial Cave	BCP Private 10(a)	Jollyville						X 1996
Fossil Cave	BCP Schroeter Pk./COA	McNeil/Round Rock						X 1996
Fossil Garden Cave	Private	McNeil/Round Rock						X 1996
Gallifer Cave	BCP Jollyville/TC	Jollyville Plateau		P 1996 X 2010 (Ledford)	P 1996 X 2005	X 2009 (Chandler)		X 1996

Cave Name	**Current Preserve Status**	**Karst Fauna Region**	**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*
Hole-in-the-Road	Private	McNeil/Round Rock						X 1996
Japygid Cave	BCP Private 10(a)	Jollyville			X 1996	P 1996 X 2005		
Jest John Cave	BCP Forest Ridge/COA	Jollyville Plateau					X 1996	
Jester Estates Cave	BCP Forest Ridge/COA	Jollyville Plateau	X 2008 (Cokendolpher)	X 2010 (Ledford)			X 1996	
Jollyville Plateau Cv.	BCP Private 10(a)	Jollyville			X 1996			X 1996
Kretschmarr Cave	BCP Jollyville/TC	Jollyville Plateau			X 1996	X 1996		
Kretschmarr Dble. Pit	BCP Jollyville/TC	Jollyville Plateau	P 1996 X 2005		P 1996 X 2005		P 1996	
Lamm Cave	Private Section 7	Jollyville Plateau			X 1996			
Little Bee Cr. Cave	BCP Ullrich WTP/COA	Rollingwood					X 1996	
McDonald Cave	BCP Jollyville/TC	Jollyville Plateau						X 1996
McNeil Bat Cave	Private	McNeil/Round Rock		X 2010 (Ledford)				X 1996
Millipede Cave	Not Protected under BCCP	McNeil/Round Rock						X 1996
M.W.A. Cave	BCP Private 10(a)	Jollyville	P 1996 X 2005		X 1996	P 1996 X 2005		X 1996
New Comanche Tr. Cave	BCP Lake Travis/TC	Jollyville Plateau		X 1996				X 1996
No Rent Cave	Private	McNeil/Round Rock						X 1996

Cave Name	Current Preserve Status	Karst Fauna Region	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*
North Root Cave	BCP Jollyville/TC	Jollyville Plateau			X 1996			
Puzzle Pits Cave	Not required to be protected under BCCP	Jollyville			X 1996			
Rolling Rock Cave	BCP Lime Cr. Prs./COA, Sec.10(a)	Cedar Park			X 1996			
Root Cave	BCP Jollyville/TC	Jollyville Plateau		X 2010 (Ledford)	X 1996			X 1996
Spider Cave	BCP Park West/COA	Jollyville Plateau			X 2004 (Reddell)		X 2004 (Reddell)	P 1996 delete P 2004 (Reddell)
Stovepipe Cave	BCP Canyon Creek/ COA	Jollyville Plateau	P 1996 delete P 2005 (Reddell) *	P 1996 delete P 2010 (Ledford)	X 1996	X 1996		P 1996 X 2009 (USFWS)
Tardus Hole	BCP Jollyville/TC	Jollyville Plateau			X 1996	X 2009 (Chandler)		
Tooth Cave	BCP Jollyville/TC	Jollyville Plateau	X 1996	X 1996	X 1996	X 1996		X 1996
Weldon Cave	Private	McNeil/Round Rock						X 1996
West Rim Cave	Not Protected under BCCP	Central Austin						X 1996

Sources: BCCP Permit 1996, Elliott 1992, USFWS 1994, Reddell 2004 and 2005, HNTB 2005, USFWS 2009a, 2009b, Ledford 2010
X 1996 = confirmed occurrence based on collected specimen, the designation in the 1996 BCCP permit
P 1996 = probable occurrence based on observation but not confirmed with collected specimen, the designation in 1996 BCCP permit
X 2005 = was listed as confirmed in the HNTB summary of James Reddell's data, 2005 report for USFWS
Tentative 2005 = was listed as tentative in the HNTB summary of Reddell's data, 2005 report for USFWS
Delete P 2004 (Reddell) = this species is no longer thought to occur in this cave (personal communication Reddell 2004)
* Reddell (pers com 2005) reported that *Tartarocreagris texana* does NOT occur in Stovepipe Cave. The species there is *Tartarocreagris altimana*, known only from that cave.
X 2008 = Cokendolpher (pers com 2008) confirmed that Jester Estates Cave is a new site for *Tartarocreagris texana*
X 2009 = USFWS - according to the 2009 5 year review on *Texella reyesi* the report lists *T. reyesi* as confirmed for Stovepipe Cave.
X 2009 (Chandler) = confirmed by D. Chandler, as reported in USFWS 5-year review (2009b).
X 2010 (Ledford) = confirmed by J. Ledford (pers com 2010)
Delete P 2010 (Ledford) = *Neoleptoneta* for stovepipe was confirmed as *N devia* (personal communication J. Ledford 2010)
X 2010 (Reddell) = confirmed by J. Reddell (pers com 2010)

Table 2. Non BCCP-listed Caves/karst features with Endangered Karst Invertebrates protected on the BCP of Travis County, Texas.

Cave/Karst Feature Name	Current Owner	Karst Fauna Region	Endangered karst invertebrates confirmed
Cortana Cave	COA	Jollyville Plateau	*Neoleptoneta myopica* *Texella reyesi*
Down Dip Sink	COA	Jollyville Plateau	*Rhadine persephone*
Garden Hoe Cave	COA	Jollyville Plateau	*Rhadine persephone*
Geode Cave	TC	Jollyville Plateau	*Neoleptoneta myopica* *Rhadine persephone* *Texella reyesi*
F-11	TC	Jollyville Plateau	*Neoleptoneta myopica*
F-12	TC	Jollyville Plateau	*Texella reyesi*
IV-3	COA	Jollyville Plateau	*Texella reyesi*
Merkin Hole	COA	Jollyville Plateau	*Texella reddelli*
Pond Party Pit	COA	Jollyville Plateau	*Texella reyesi*
RI-1	TC	Jollyville Plateau	*Texella reddelli*
Tight Pit Cave	TC	Jollyville Plateau	*Neoleptoneta myopica*
Two Trunks Cave	TC	Jollyville Plateau	*Rhadine persephone*

3.0 OWNERSHIP AND PROTECTION STATUS

Many karst features listed in the BCCP permit have adequate protection, based on the criteria outlined in USFWS's *Karst Preserve Design Recommendations* (USFWS 2011a). However, some caves listed in Table 3 as "protected" under individual USFWS Section 10(a) or Section 7 permits may not be adequately protected by these individuals as defined in USFWS (2011a). Efforts are being made by the BCCP Permit Holders to contact individuals of privately owned caves to assess their protection efforts and to assist them with protection where possible.

Though not a requirement of the BCCP permit, the updated USFWS karst preserve design recommendations direct that the protected area surrounding the cave should be at least 16–40 ha (40-99 acres) in size to capture the majority of plant and animal community elements needed to support the karst ecosystem, as well as protect the cave footprint and surface/subsurface drainage basins of the cave (USFWS 2011a). Some caves within the BCP meet or exceed these recommendations, while others do not, due to conditions that existed before the Permit was issued, such as pre-existing development in the form of subdivisions, roads, power lines, and septic lines that preclude complete protection of the recommended preserve areas. BCCP Permit Holders will continue to do what is reasonable to protect these features from pre-existing development and continue efforts to acquire and protect the karst features listed in the BCCP permit.

In FY12, TC acquired two BCCP-listed caves: Ireland's Cave and Stark's North Mine. A total of 4.8 acres were purchased to protect the entrance, natural catchment area, and cave cricket foraging area of Ireland's Cave, and 0.8 acres were acquired to protect the entrance to Stark's North Mine and a portion of its cave cricket foraging area. TC has commenced full management efforts for these cave tracts, with plans to install cave gates in FY13 for better protection against trespass and vandalism.

Table 3. FY12 Ownership, protection, monitoring and access status of the 62 BCCP caves/karst features (34 caves with ES and 27 caves with SOC) [1, 2].

Cave Name	ES or SOC	BCP or Private/ Current Owner	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Adobe Springs Cave	SOC	BCP/TNC		Protected on preserve	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring	none
Airmen's Cave	SOC	BCP/COA	Gated	Protected on parkland	COA twice weekly surface monitoring (volunteers check on gate); bi-annual cave cricket exit counts; bi-annual species monitoring	Access by permit
Amber Cave	ES	BCP/TC	Gated and fenced	Protected on preserve (very close to road and sewer line)	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; red-imported fire ant (RIFA) survey/ control; bi-annual species monitoring	none
Armadillo Ranch Sink	SOC	Private		Private - Unknown		none
Arrow Cave	SOC	BCP/COA	Gated	Protected in parkland (There are nearby homes immediately south of the cave entrance)	COA quarterly surface monitoring; annual species monitoring	none
Bandit Cave	ES	Private	Gated	Protected by private ecologically concerned landowner		none
Beard Ranch Cave	ES	BCP/COA		Protected on preserve	COA quarterly surface monitoring; annual faunal survey	none
Bee Creek Cave	ES	Private		Private- Unknown		none
Blowing Sink Cave	SOC	BCP/COA	Gated	Protected on preserve	COA semi-monthly surface and annual species monitoring; RIFA control	none

Cave Name	ES or SOC	BCP or Private/ Current Owner	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Broken Arrow Cave	ES	BCP/COA	Fenced	Protected on preserve	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring; RIFA control	none
Buda Boulder Spring	SOC	BCP/COA		Protected in parkland (close proximity to a hike and bike trail)	COA bi-annual surface monitoring; annual species monitoring	none
Cave X	SOC	Private/COA Protection Agreement	Gated and fenced	Protected by landowner with 4.5 acre setback to protect cave footprint. Protected to some extent (not actively managed and the setback is inadequate).	Occasional species and surface monitoring by COA. WPD (Watershed Protection Division) is currently negotiating with property owner to increase monitoring and management of the cave as part of an agreement to allow for on site construction of a berm to reduce flooding concerns	none
Cave Y[1]	SOC	BCP/COA	Gated	Protected in parkland	COA quarterly surface bi-annual species monitoring; bi-annual cave cricket exit counts; RIFA control	none
Ceiling Slot Cave	SOC	Private		Private - Unknown		none
Cold Cave	ES	Private	Gated	Private - Unknown	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring	none
Cotterell Cave	ES	BCP/COA	Gated and fenced	Protected in parkland. (There are nearby homes immediately east of the cave entrance)	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring; RIFA control	none
Disbelievers Cave	ES	BCP/Private Section 10(a)		Protected by 10a permit, hired Plateau Land & Wildlife Management		none

Cave Name	ES or SOC	BCP or Private/ Current Owner	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
District Park Cave	SOC	BCP/COA	Gated	Protected in parkland	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring; RIFA control	1st room open, past 1st room protected by gate, access by permit*
Eluvial Cave	ES	BCP/Private Section 10(a)		Protected by 10a permit, hired Plateau Land & Wildlife Management		none
Flint Ridge Cave	SOC	BCP/COA	Gated	Protected on Water Quality Protection Land (drainage basin will be negatively impacted by the construction of a proposed highway, if constructed.)	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring; RIFA control	none
Fossil Cave	ES	BCP/COA	Access protected by large rocks	Protected in parkland	Exact location of cave is unknown. COA quarterly surface monitoring	None
Fossil Garden Cave	ES	Private		Private - Unknown	Occasional COA and TC species Monitoring	none
Gallifer Cave	ES	BCP/TC	Gated and fenced	Protected on preserve	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; RIFA survey/control; bi-annual species monitoring	none
Get Down Cave	SOC	Private/COA Protection Agreement	Gated and fenced	Protected with Protection Agreement - Inadequate setback from development.	Zara Environmental Inc. contracted by WPD to conduct one faunal survey which included faunal surveys of other features located on the property.	Access to 1st room during karst day festival.
Goat Cave	SOC	BCP/COA	Fenced	Protected on preserve	COA quarterly surface monitoring; annual species monitoring; RIFA control	access by permit*
Hole-in-the-Road	ES	Private		Private –Unknown. (very close to a major roadway)	Occasional COA species monitoring	none

Cave Name	ES or SOC	BCP or Private/ Current Owner	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Ireland's Cave	SOC	BCP/ TC		Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Jack's Joint	SOC	Private		Private - Unknown		none
Japygid Cave	ES	BCP/Private Section 10(a)		Protected by 10a permit, hired Plateau Land & Wildlife Management		none
Jest John Cave	ES	BCP/COA		Protected on preserve	COA cave cricket exit count; bi-annual surface monitoring	none
Jester Estates Cave	ES	BCP/COA	Gated and fenced	Protected on preserve (3.2 acre preserve surrounded by homes).	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring; RIFA control	none
Jollyville Plateau Cave	ES	BCP/Private Section 10(a)		Protected by 10a permit, hired Plateau Land & Wildlife Management		none
Kretschmarr Cave	ES	BCP/TC	Gated and fenced	Protected on preserve. Close to roadway and in power line ROW.	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Kretschmarr Double Pit	ES	BCP/TC	Fenced	Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Lamm Cave	ES	BCP/Private Section 7	Gated and fenced	COA negotiated setback (approximately 150')	Occasional surface and species monitoring by COA	none
Little Bee Cr. Cave	ES	BCP/COA	Gated	Protected by COA AWU Dept.	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring	none

Cave Name	ES or SOC	BCP or Private/ Current Owner	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Lost Gold Cave	SOC	Private	Gated	Private – Unknown (new owner); may be development near cave entrance		none
Lost Oasis Cave	SOC	Private/TCMA	Gated and fenced	Protected by TCMA	Sporadic species and surface monitoring by TCMA	controlled access**
M.W.A. Cave	ES	BCP/Private Section 10(a)		Protected by 10a permit, hired Plateau Land & Wildlife Management		
Maple Run Cave	SOC	BCP/COA	Gated	Protected on preserve	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring; RIFA control	access by permit*
McDonald Cave	ES	BCP Jollyville/TC	Fenced	Protected on preserve	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; RIFA survey/control; bi-annual species monitoring	None
McNeil Bat Cave	ES	Private		Private – Unknown (close proximity to high school)	Occasional COA and TC species Monitoring	none
Midnight Cave	SOC	BCP/COA	Fenced	Protected on parkland (close proximity to soccer fields)	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring; RIFA control	access by permit*
Moss Pit	SOC	Private		Private - Unknown		none
New Comanche Trail Cave	ES	BCP/TC	Fenced	Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; Annual species monitoring	none
No Rent Cave	ES	Private		Private - Unknown		none

Cave Name	ES or SOC	BCP or Private/ Current Owner	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
North Root Cave	ES	BCP/TC		Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Pennie's Cave	SOC	Private		Landowner has filledentrance. WPD has negotiated to excavate the entrance and add a cave gate, as well as adding a 300 ft buffer around the cave.		none
Pickle Pit	SOC	BCP/Private Sec. 7	Gated	TC staff in early negotiations worked with property owner on a possible MOU or management agreement.	COA, Loomis staff, and USFWS conducted two cave faunal surveys.	none
Pipeline Cave	SOC	Private	Gated	WPD have negotiated a small setback from future platted development.		none
Rolling Rock Cave	ES	BCP/COA	Fenced	Protected on preserve	COA quarterly surface and annual species monitoring; RIFA control	none
Root Cave	ES	BCP/TC		Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Slaughter Creek Cave	SOC	BCP/COA	Gated	Protected on parkland (Nearby homes are immediately south of cave entrance)	COA quarterly surface and annual species monitoring; RIFA control	none
Spanish Wells	SOC	Private		Private- Unknown		none
Spider Cave	ES	BCP/COA	Fenced	Protected on preserve	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring; RIFA control	none

Cave Name	ES or SOC	BCP or Private/ Current Owner	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Stark's North Mine	SOC	BCP/TC		Protected on preserve	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; RIFA survey/control; bi-annual species monitoring	none
Stovepipe Cave	ES	BCP/ COA	Fenced	Protected on preserve	COA quarterly surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring; RIFA control	none
Talus Springs Cave[2]	N/A	BCP/Private Section 10(a)	Gated	Protected by Homeowners Association and TC, only has 50' setback from houses and is probably affected by uphill development.	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Tardus Hole	ES	BCP/TC	Fenced	Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Tooth Cave	ES	BCP/TC	Gated and Fenced	Protected on preserve	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; RIFA survey/control; bi-annual species monitoring	none
Weldon Cave	ES	Private		Private - Unknown	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring	None
Whirlpool Cave	SOC	Private/ TCMA	Gated	Protected by TCMA	TCMA conducts routine surface monitoring and occasional species surveys	controlled access**

[1]Cave Y was considered an ES cave *(Texella reddelli*) in the 1996 BCCP Permit, but has since been determined not to contain *Texella reddelli* (Reddell 2004).
[2] Talus Springs Cave has never been known to contain ES or SOC. This cave was placed on the BCCP permit because it contained the amphipod *Stygobromus birfurcatus*, origianally considered as a SOC candidate; however, *S. birfurcatus* was not included in the Permit's final list of 25 SOC karst species to be protected.
* Access by Permit - Permit may be issued by COA – Austin Water Utility or Austin Parks and Recreation Department (PARD) staff.
** Controlled Access - Private cave owners control the access.

4.0 ACCESS STATUS AND KARST EDUCATION

The *Balcones Canyonlands Preserve Land Management Plan: Tier II-A Chapter IX Karst Species Management* (2007) describes the need for public education as follows:

- "Public education is essential for the continued existence and recovery of karst invertebrates."

- "Public Education includes literature, curriculum, guided surface and subsurface tours that can be made available for the general public, agencies, and individuals interested in learning more about karst areas and their inhabitants."

- "A higher public awareness is an important step for the recovery of the endangered cave invertebrates and preservation of species of concern."

- "Need to control public access (cave gates) and monitor for impacts to species."

Public education on caves and cave ecosystems is recognized as vital for karst species preservation in the BCP Karst Land Management Plan (2007). Currently, most opportunities for children to enter caves and learn about cave ecosystems is through programs provided by the COA WPD and Austin Nature and Science Center summer camps. Wild cave tours in the Austin area for adults are not widely available, although many tours are conducted through TCMA and University of Texas Grotto. Overall there is more demand for cave education than can be met with existing programs.

One factor limiting cave education is a deficit of caves suitable for cave immersion, particularly considering the high demand and its effectiveness as both a teaching tool and management practice to support stewardship for cave ecosystems. Cave education/recreation primarily occurs in 10% of the BCCP-listed caves, which have been used for this purpose prior to the 1996 permit. Whirlpool Cave (privately-owned) likely has the highest traffic of all the 62 BCCP caves, exceeding 1,000 person trips per year. Although studies on human impacts to cave ecosystems are limited, it is assumed that high human traffic in a cave may negatively impact the cave fauna.

After Whirlpool Cave, the next most heavily-used cave is Wildflower Cave, a relatively small cave on the Lady Bird Johnson Wildflower Center. This cave is not listed as one of the 62 cave preserves on the BCCP. Wildflower Cave has been used for education by COA Earth Camp since 1997 after it was restored by cleaning out trash fill on March 6, 1994 and April 22, 1995. Wildflower Cave is unsuitable for many cave tours due to its (currently) limited extent and small size, but is heavily utilized in 5th grade Earth Camp cave education (see annual summary below).

Restoring Non-BCCP Caves for Education

Developing non-BCCP listed caves by making them safe and accessible for adequately trained groups to use in guided education/recreation is beneficial in promoting karst education while reducing BCCP-listed cave impacts. Non-BCCP education caves should draw traffic from BCCP-listed caves and provide a greater range of experience. In FY12, several steps were taken to increase the availability of non-BCCP-listed education caves:

La Crosse Cave at the University of Texas Lady Bird Johnson Wildflower Center was selected for a cave restoration project by COA WPD. LaCrosse Cave has strong potential for education use because of its potential for large, extensive cave passages, the historic support of the Wildflower Center for cave education, and the existing bathrooms and parking lots to facilitate groups. LaCrosse Cave is currently unused and like many local caves was filled in with ranching debris. On March 26, 27, 28 and April 2, 2012, Nico Hauwert and WPD Field Operations crews used a crane and two crews to remove an estimated 200 cubic feet of dirt, glass, and rock fill in the cave. After the excavation, it was observed that an additional roughly 800 cubic feet of fill remains in a 10 feet high room to be removed in future work. Restoration of this cave is expected to continue in FY13.



COA-WPD Field Operations crews restoring LaCrosse Cave for education in March 2012

The Village of Western Oaks Karst Preserve was developed in 1998 by Lumbermans (now Forestar Realty). This preserve contains one BCCP-listed cave (Get Down Cave), is the site of a locally cherished annual Cave Day festival, and contains a number of additional non-BCCP caves suitable for public education. Intended acquisition by COA has been delayed since 1998 due to disagreements on repairing a water-quality wet pond on the preserve. In 2012, COA WPD's acquisition of Village of Western Oaks Karst Preserve progressed through a draft agreement prepared by City attorney Mitzi Cotton that has been tentatively agreed upon by the developer Forestar Realty, the area homeowners association, and COA. While the final agreement is pending, a faunal survey (Zara Environmental) and archeological survey (TCMA) was conducted in caves on the preserve in FY12, and neighborhood concerns about vegetation management, wildfire risks, homeless shelters/crime, and pesticide overuse was proactively addressed to the extent possible prior to acquisition.

FY12 Access Status

In FY12, 146 visitors were issued access permits to COA BCCP caves for educational/recreational/rescue training including: Airmen's cave (60), District Park Cave (10), Goat Cave (17), Maple Run (17), and Midnight cave (42). In addition, TCMA issued access permits to 1,038 visitors at Whirlpool Cave for education/ rescue training. See Table 3 for access and gating status of all of the BCCP caves.

FY12 Cave Education Summary

Travis County BCP and COA BCP/WPD staff gave three presentations on karst biology to McNeil High School students and faculty in December 2011 and performed site visits at two ES caves (Millipede Cave and Millipede Annex Cave) on the school campus.

COA Youth Education Programs

COA WPD conducts cave education through Earth Camp and Earth School (fifth grade water quality programs), Clean Creek Camp (a summer parent/child water quality program), Hydrofiles (a high school water quality program), and Groundwater to the Gulf: Summer Institute (professional development for teachers). FY12 updates are detailed below:

Earth Camp is available to Title I (low socio-economic) schools in the Austin Independent School District (AISD). Students spend one school day at camp immersed in Wildflower Cave looking for clues that water travels through the cave into the Edwards Aquifer, which includes the discovery of cave biota and interactions with professional hydrogeologists. Students also

investigate a sinkhole and visit Barton Springs and Splash! exhibits to learn of the connection of the recharge zone to the discharge area. In FY12, Earth Camp guided 1,755 students into Wildflower Cave. Additionally, every fifth-grader in AISD is offered aquifer education through an Earth School hands-on classroom presentation using an Aquifer Model. The Barton Springs/Edwards Aquifer Conservation District and Lady Bird Johnson Wildflower Center are partners on Earth Camp. More details on these programs can be found online at: www.austintexas.gov/EarthCamp and www.austintexas.gov/department/earth-school.

In summer 2012, **Parent/Child Clean Creek Camp** brought 30 students and parents into Wildflower Cave and Whirlpool Cave. Clean Creek Camp is a partnership between the COA WPD and Keep Austin Beautiful. Activities focus on watersheds, the Edwards Aquifer, and citizen actions that improve water quality. Clean Creek Camp is offered in summer to parents and their children ages 9-14 (www.austintexas.gov/department/clean-creek-camp).

Hydrofiles reaches aquatic science and environmental science high school classes with a hands-on inquiry based investigation of Austin's water resources. Local field studies involve monitoring local creeks and caving into the Edwards Aquifer. Students learn about hydrogeology and cave biology through "Austin Underground" videos and cave tours led by WPD staff. In FY12, approximately 55 high school students were guided through Whirlpool Cave. (www.austintexas.gov/department/hydrofiles).

Austin Underground: Because of the difficulty of offering a high school cave immersion experience, a virtual field trip using video of the geology, hydrogeology, Barton Springs Salamander and threats/solutions of the Edwards Aquifer is offered. Each video has a lesson extending the learning about each topic covered (www.austintexas.gov/department/groundwater-awareness).

Groundwater to the Gulf: Summer Institute Groundwater to the Gulf is a collaboration among over a dozen local agencies to offer a 3-day, field trip-based institute for Central Texas teachers that emphasizes techniques for teaching water-based curricula to students in grades 4 through 8. WPD educators take teachers inside Wildflower Cave and give presentations at a sinkhole at the Lady Bird Johnson Wildflower Center and Barton Springs so teachers have the background knowledge to teach about the Edwards Aquifer in their classrooms. During the 2012 Institute, 45 teachers were reached. (www.keepaustinbeautiful.org/GroundwatertoGulf).

Austin Parks and Recreation

Austin Nature and Science Center (ANSC) offers summer camps and other programs year-round that educate children ages 3-16 on bats, reptiles, salamanders and other wildlife. The Nature Center offers cave tours through their camps as well as for families during special events. The Splash Exhibit in Zilker Park includes a simulated cave and indoor displays, movies, and activities regarding the Edwards Aquifer. (http://www.austintexas.gov/department/austin-nature-science-center).

Texas Cave Management Association

In FY12, 1,038 individuals participated in trips through Whirlpool Cave, generally as far as the Travis County Room. These groups included school field trips (such as Austin Community College and the Girls School of Austin, Not Your Ordinary School), Austin Nature and Science Center camps, scout groups, Austin Fire Dept. rescue practice, and recreational cave groups.

Annual Cave Day Festival

Typically the Barton Springs/Edwards Aquifer Conservation District and TCMA have organized an Annual Cave Day at Village of Western Oaks Karst Preserve, drawing an estimated 1,000 attendants. However, there was no Cave Day during FY12. Until the Village of Western Oaks Karst Preserve is transferred to the City of Austin, the caves cannot be adequately protected for cave tours. Also, the developer and neighborhood bear an unfair liability should an incident occur during cave tours. Therefore, it is hoped that the annual Cave Day Festival will be scheduled in FY13, after completion of the real estate transfer.

Cave Skills Field Trip

Cave skills trainings were provided in Whirlpool, Maple Run, Goat Cave, and District Park Caves for camp councilors of the Austin Nature and Science Center and Austin Parks and Recreation Dept. (PARD) rangers. The training included cave ecosystems, groundwater hydrogeology, cave safety, vertical descending and ascending techniques, and challenges in these specific caves. These target groups provide education for a large number of summer camp children and assist in stewardship of BCP caves.

5.0 MANAGEMENT COORDINATION AND OVERSIGHT

COA and TC determined that there was a need to create a master database on BCP karst faunal monitoring and management with the ability to analyze these data to determine current status and compliance with the regional permit, as well as determine future needs of the listed species. In 2009, Rob Clayton with WPD developed the Karst Database that houses all faunal survey data

from BCCP caves and provides much of the information needed for these karst analyses. This database is now available for use by BCP partners to enter survey data, and all available data have been entered to date. Though the intent is for this database to be a "shared" information source for all the BCP partners, there are still confidentiality challenges on how to establish this protocol. This database will focus on permit compliance, species status, and contribution to recovery.

Based on recommendations made in Dr. Weckerly's analyses of karst survey efforts on the BCP (Weckerly 2010), COA and TC have determined a need to modify and expand the BCP's cave monitoring program. In FY11, COA and TC identified 25 caves within Travis County managed through BCP partners that provide a more evenly distributed dataset across cave clusters and karst fauna regions (KFRs); this dataset includes both BCCP caves and other ES/SOC caves on the BCP. This new monitoring plan commenced in FY11, and the number and frequency of karst faunal surveys and cave cricket counts are nowsynchronized among managing partners to better accommodate comparisons and determine species trends. The goal of these changes to the cave monitoring program is to provide a clearer understanding of the species distribution and health of karst ecosystems across the BCP.

6.0 BIOLOGICAL MONITORING

Caves containing endangered and rare karst invertebrates on BCP properties are monitored to determine long term trends in populations of cave organisms and overall cave conditions. All COA- and TC-owned BCP caves with endangered species are surveyed annually. In addition, TC and COA incorporated the newly expanded monitoring plan in FY11, which includes the 25 Travis County caves selected to represent an evenly distributed dataset across cave clusters and KFRs. Caves included in this monitoring plan are surveyed bi-annually, occurring in Spring (May) and Fall (November) or Summer (August) and Winter (mid-January-mid February). Biomonitoring of the caves follow methodology and techniques supported by USFWS to provide results that can be compared between caves throughout the region for better study and analysis (USWFS 2011b).

Beyond USFWS recommendations, survey methodology also follows guidelines described in the *2007 Balcones Canyonlands Preserve Land Management Plan: Tier II-A Chapter IX Karst Species Management.* The protocol for research and monitoring cave fauna involves the use of one to four (depending on size of cave and logistics) predesignated, permanent survey zones per cave in which all living organisms encountered are identified and enumerated. Survey zones are either transects approximately 5 meters in length that span the width of the cave, or distinct units

of the cave such as a small room or an easily discernible section, so that the size and location of the survey area remains constant during the course of the study for trend comparison. For each survey zone, start and end time and the presence of trash or new vandalism are recorded. Relative humidity, temperature, nutrient input, dampness condition, and the presence of red-imported fire ants (RIFA) are also recorded both outside the cave and at each transect or zone. All data collected during cave surveys are entered into the BCP Karst Database.

Any unknown invertebrates during faunal surveys are collected and identified by a karst invertebrate specialist. In caves containing endangered species, collecting only occurs with a special collecting permit obtained by USFWS. All collected specimens are deposited within the Texas Memorial Museum or other reputable facility (USFWS 2011b). The date of deposition and collection number is also recorded (USFWS 2011b).

Land managers also monitor the entrances of caves containing endangered species at least once a year for anything that might harm the rare invertebrates including presence of toxic substances, unauthorized access by recreational cavers, and surface disturbances which might have erosive potential or cause changes in surface drainage patterns.

The overall health of caves is also monitored by performing semi-annual cave cricket exit counts. Cave cricket exit counts are done as crickets emerge from caves during good weather nights (i.e. not raining, warm etc.). The duration of the counts is timed for 2 hours starting just after sunset, to maintain consistency with all surveys done between managing partners. Current weather conditions, surface temperature, and relative humidity are documented for each survey. Crickets emerging are placed in one of three age classes: nymph (up to 5 mm), sub-adult/juvenile (5-12mm) and adult (>12mm). Number of individuals exiting the cave is counted in ten-minute intervals. Time of first cave cricket exit and any other vertebrates exiting the cave are also recorded.

In FY12, Dr. Weckerly published an article entitled “Cave Cricket Exit Counts: Environmental Influences and Duration of Surveys”, using cave cricket survey data collected at 11 BCCP caves and provided by COA/TC (Weckerly 2012). Analyses of data demonstrated that temperature, relative humidity, and cloud cover influenced counts, with temperature being the most influential factor (Weckerly 2012). Time of emergence was also analyzed demonstrating a peak in counts at 80-90 minutes after sunset, and that counts extending to two hours after sunset is a sufficient protocol standard for determining trends (Weckerly 2012). These findings are consistent with the existing standardized cave cricket exit count protocol followed by TC and COA at BCP caves.

In FY12, TC and COA BCP staff collaborated on a monitoring and collection protocol and reporting procedures for the Rasberry crazy ant (*Nylanderia* sp nr *pubens*), a newly discovered non-native species which could potentially adversely affect forest and karst ecosystems on the

BCP. Beginning in FY12, BCP staff have included monitoring for presence of the Rasberry crazy ant at all visits to cave sites.

City of Austin FY12 Biological Monitoring

During FY12, COA BCP staff conducted bi-annual monitoring on the following 15 pre-selected caves: Airmen's Cave, Broken Arrow Cave, Cave Y, Cortana Cave (non-BCCP cave), Cotterell Cave, District Park Cave, Flintridge Cave, Jester Estates Cave, Little Bee Creek Cave, Maple Run Cave, Midnight Cave, Pond Party Pit (non-BCCP cave), Seibert Sink (non-BCCP cave), Spider Cave, and Stovepipe Cave (EXHIBIT A). Faunal surveys in these caves, with permitted COA biologists were conducted in either Fall 2011/ Spring 2012 or Winter 2012/ Summer 2012. Annual faunal surveys were also conducted in Arrow Cave, Beard Ranch Cave, Blowing Sink, Rolling Rock Cave, and Slaughter Creek Cave; two faunal surveys were also conducted at Goat Cave and Pickle Pit (EXHIBIT A).

In FY12, COA with the help of volunteers conducted bi-annual cave cricket exit counts at the same 15 caves pre-selected for faunal surveys, with the addition of Testudo Tube (EXHIBIT B). COA staff also conducted one cave cricket exit count at Jest John cave. (EXHIBIT B).

Travis County FY12 Biological Monitoring

TC's BCP staff conducted bi-annual monitoring on the following eight pre-selected caves: Adobe Springs Cave, Amber Cave, Cold Cave, Gallifer Cave, Geode Cave (non-BCCP cave), McDonald Cave, Tooth Cave, and Weldon Cave. Faunal surveys in these eight caves, with permitted TC biologists, were conducted in either Fall 2011/ Spring 2012 or Winter 2012/ Summer 2012 (EXHIBIT A). Annual faunal surveys were also conducted in FY12 in six other TC-owned BCCP caves with federally listed species: Kretschmarr Cave, Kretschmarr Double Pit Cave, New Comanche Trail Cave, North Root Cave, Root Cave, and Tardus Hole (EXHIBIT A). TC staff also conducted annual faunal surveys at two additional BCCP listed caves: Ireland's Cave and Talus Springs Cave, and two additional TC-owned BCP caves with listed ES: Two Trunks Cave and Tight Pit Cave (EXHIBIT A).

In FY12, TC conducted bi-annual cave cricket exit counts at the same eight caves pre-selected for faunal surveys: Adobe Springs Cave, Amber Cave, Cold Cave, Gallifer Cave, Geode Cave, McDonald Cave, Tooth Cave, and Weldon Cave. Exit counts were conducted in either Fall 2011/ Spring 2012 or Winter 2012/ Summer 2012 (EXHIBIT B).

Red-imported fire ant (RIFA) surveys were performed in Fall 2011 and Spring 2012 on all ten TC-owned BCCP caves with federally listed species, as well as all other TC-owned caves with ES (Geode Cave, Tight Pit Cave, and Two Trunks Cave). RIFA mounds were surveyed within a 80 m radius around cave entrances, and all mounds found during surveys were treated with boiling water as recommended by USFWS (2011c). Of note in Fall 2011 was the total lack of RIFA activity in the cave survey areas. No mounds were found during surveys, probably due to the intense heat wave and persistent drought which occurred before and into this season. However, after a break in the drought the following winter, our Spring 2012 RIFA surveys revealed a resurgence of RIFA activity within the cave survey areas. In Spring of FY12, a total of 104 RIFA mounds were treated within these 80 m cave survey areas, with an additional 22 RIFA mounds treated in the vicinity of caves but outside of survey areas. Survey results and treatments for individual caves are documented in Table 4.

In addition to managing the karst features required in the BCCP permit, TC voluntarily managed other karst features located on BCP land in FY12, including Cactus Pit, Brew Pot Cave, Kretschmarr Sink, Kretschmarr Salamander Cave and karst features RI-1, F11 and F12. Site assessments and explorations were also conducted at Stark's North Mine Cave and a karst feature on the newly acquired Collins BCP Tract. Also in FY12, TC staff photographed, tree tagged and verified locations for 34 Travis County BCP karst features following standardized methods for improving protection efforts.

7.0 HYDROGEOLOGIC STUDIES

Hydrogeologic studies are being prepared for several of the 62 BCCP caves each year. These studies describe the local geological influences on cave development and groundwater flow, as well as the surface and subsurface catchments to the caves. Since water is critical to cave ecosystems and represents a surface-subsurface interaction, cave drips are mapped and characterized.

The understanding and protection of water sources to caves is vital for preserving cave life that relies on it. Water sources include surface catchment areas that direct runoff to the cave entrance, or subsurface catchment areas where overlying infiltration supports cave drips. Surface catchment area delineation generally involves a combination of field GPS delineation of catchment divides and drainages as well as surface contour coverages. Hydrogeological studies may involve direct tracing, water-quality characterization, drip rate monitoring, geological

mapping, cave survey mapping, and cave radio surveying. In FY12, a BCP access permit was provided to Nico Hauwert and other participants on hydrogeological studies of BCCP caves.

Flint Ridge Cave

A report on spill trace simulations using dye traces near SH45 SW and Mopac South was completed by Nico Hauwert, Ph.D., P.G. (Hauwert 2012a). This report is based on dye traces from four injection sites in 2007 and 2010. In 2007, all four injected traces initially arrived at Barton Springs within 2 to 4 days. While tracing on Bear Creek was not detected in Flint Ridge Cave's Drip Pit, an injection in Wildflower Cave in 2010 was detected in Eileens River cave stream of Blowing Sink Cave, which was roughly a mile east of Wildflower Cave. This report provides new information on water sources to Flint Ridge and Blowing Sink caves, but is not intended as complete hydrogeological study of those caves.

Flow monitoring of runoff into Flint Ridge Cave continued in 2012 by Roger Glick, P.E., Ph.D. and his hydrological monitoring team.

Goat Cave, Maple Run, and Blowing Sink Hydrogeological Study

A hydrogeological study of water source areas for Goat Cave, Maple Run Cave, and Blowing Sink Cave is being conducted by Nico Hauwert with Brian Cowan and other staff of Zara Environmental, LLC. The participation of Zara Environmental that involves intensive monitoring of cave drips and faunal surveys is funded by COA Public Works through a Davis Lane realignment project managed by George Jackson, P.E. The preliminary findings and steps being taken by the COA to preserve the cave drips is included in a report entitled "Summary of Initial Hydrogeologic Study Results, Evaluation of Impacts from Davis Lane, and Proposed Solutions to Protect Water Sources to Goat, Maple Run, and Blowing Sink Balcones Canyonland Preserve Caves" (Hauwert 2012b). The preliminary results found that perched groundwater south of Goat Cave is directed 3,000 ft south toward Blowing Sink Cave. Goat Cave and Maple Run Caves would not normally derive roadway runoff from Davis Lane except though a stormwater drainage to an unlined 1985 Maple Run Section 8 Water-Quality pond. Although the hydrogeological study by COA-WPD and Zara is awaiting a sufficient forecast rain for a final tracer injection, the preliminary results allowed changes to the roadway realignment plan that should improve water-quality to drips in the three caves. The footprints of Goat Cave and Maple Run Cave were also surveyed during this project.

The University of Texas Jackson School of Geosciences conducted a semester long field investigation of Maple Run Cave and the overlying Maple Run Section 8 pond in Fall 2012 as part of a geophysical survey class. The intention of the project was to compare geophysical

anomalies over the known extent of Maple Run Cave under the pond with other anomalies under other portions of the pond, in order to locate the position and depth of other potential unknown caves. A cave radio survey was performed, and UT is expected to produce a report on their findings.

District Park Cave

Annual pool draining of Dick Nichols Park pool into an adjacent unlined pond allowed the opportunity to test hydraulic connection 1,340 feet west to District Park Cave. This hydraulic test provides a data point for delineating the subsurface catchment area for District Park cave without having to inject tracers. The Aggie Level drip monitored in District Park Cave is estimated to be 35 feet lower than the pond base elevation. The tipping gauge bucket was active for 2.5 days after the dechlorinated pool water was poured into the adjacent pond, until a raccoon tipped the bucket. Based on this test it appears that the subsurface catchment area for District Park cave does not extend as far as 1,340 feet west, although a repeat test in FY13 and continued drip monitoring may verify the results and provide new information on water sources to the cave.

Jester Estates Cave

Drip monitoring of Jester Estates Cave continued in FY12 by COA-WPD. Drip monitoring showed fairly constant, persistent drip rate as surface conditions dried, suggesting a larger source area or water source than simply soil drainage over the cave footprint.

8.0 RECOMMENDATIONS

COA and TC should continue to attempt to contact the owners of each privately-owned BCCP cave in order to assess current faunal assemblages and negotiate protection of these caves. The precise location of some of these privately owned caves is currently unknown; therefore, the COA and TC should attempt to locate these caves in order to make a meaningful assessment. Additionally, there may be a need to substitute some of the privately owned caves listed on the BCCP permit that are unable to be located or protected. During FY13, COA and TC will continue evaluating the adequacy of protection for all of the 62 BCCP caves. If protection is not possible for one or more BCCP caves, USFWS will be consulted to evaluate whether any caves could potentially serve as a replacement.

Future research needs for the BCP should include an effort to determine what species of blind *Cicurina* occur in BCP caves north of the Colorado River. Currently there are several species listed for this area; in one case, two blind species are listed for the same cave. In addition to blind

Cicurina, there is a need to identify to species level *Speodesmus* sp., *Eidmannella* sp., and Trichoniscidae found in multiple BCCP caves to determine if these species are SOC. It is recommended that COA, TC, and USFWS initiate efforts to answer these questions.

9.0 KARST MANAGEMENT ACTIVITIES

The BCP Karst Land Management Plan (2007) outlines planned activities concerning the 62 BCCP karst features. Table 4 below includes a summary of monitoring and management activities for these features completed in FY12.

Table 4. FY12 BCCP Karst Feature Monitoring and Management Activities.
Adobe Springs Cave The Nature Conservancy 1. TC gained permission from TNC to perform bi-annual faunal surveys and cave cricket exit counts for the expanded BCP Cave Monitoring program. 2. TC performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 3. TC/COA conducted bi-annual cave faunal surveys (see EXHIBIT A). 4. TC conducted bi-annual cave cricket exit surveys. (See EXHIBIT B).
Airmen's Cave City of Austin 1. Conducted bi-annual cave faunal surveys (See EXHIBIT A). 2. Conducted bi-annual cave cricket exit counts. (SEE EXHIBIT B) 3. COA installed a cave gate within 18 feet of the entrance of the cave. The cave gate not only protects the cave from ongoing vandalism, but also serves to protect the public from future accidents involving un-trained access. Access is still allowed via permit and the COA and volunteers host an "open house day" once a month allowing the public access to the cave. 4. Volunteers monitor the cave gate twice weekly, and have helped COA staff make cave gate and sign repairs.
Amber Cave Travis County 1 .Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Maintained fencing and signage to protect this area from unauthorized access and dumping. 3. Surveyed site bi-annually for RIFA. Treated seven mounds in Spring 2012. 4. Conducted bi-annual cave faunal surveys (see EXHIBIT A). 5. Conducted bi-annual cave cricket exit surveys. (See EXHIBIT B).
Armadillo Ranch Sink Private
Arrow Cave City of Austin 1. Completed annual cave faunal survey (See EXHIBIT A). 2. Conducted quarterly site inspections. City staff continues to deal with ongoing dumping problems from the adjacent neighborhood. COA BCP staff met on site with COA Park Rangers in an effort to address these ongoing problems.

Table 4. FY12 BCCP Karst Feature Monitoring and Management Activities.
3. Inspected site for RIFA infestations. On all visits RIFA were observed within close proximity of the cave (but not inside the cave).
Bandit Cave Private
Beard Ranch Cave (Featherman's Cave), City of Austin 1. Completed annual cave faunal survey (See EXHIBIT A). 2. Conducted quarterly site inspections. 3. No RIFA were found. A healthy population of native fire ants was found in close proximity to the cave.
Bee Creek Cave Private
Blowing Sink Cave City of Austin 1. Inspected semimonthly, installed security cameras, repaired perimeter fence, added "no trespass" signs, and met with COA PARD Rangers and WPD staff in an effort to increase on site patrols. 2. Treated site for RIFA with boiling water. 3. Completed cave faunal survey (See EXHIBIT A). 4. Continued work on an in-depth hydrological study to determine the potential impacts of a new road extension and realignment of Davis Lane. 5. Met with PARD and WPD staff regarding land currently owned by AISD that will be deeded to PARD. The 26 acre parcel is immediately south of Blowing Sink Cave, and includes a new cave and well. When the property is transferred, COA will request that the current owner install a 6' chain link fence with 3 strands of barbed wire along the perimeter of the property, thus greatly improving security to the property. 7. COA staff removed invasive non-native vegetation from the preserve. 8. WPD staff (Nico Hauwert) initiated efforts to stabilize and secure several sinkholes located on the tract. Currently these features contribute large amounts of sediment into the aquifer and are also a potential safety liability. Nico met on site with a WPD Engineer to determine the best method to accomplish this goal.
Broken Arrow Cave City of Austin 1. Inspected quarterly with no sign of human visitation or vandalism. 2. Treated site for RIFA with boiling water. 3. Completed bi-annual faunal surveys (See EXHIBIT A). 4. Completed bi-annual cave cricket exit counts. (See EXHIBIT B).
Buda Boulder Spring City of Austin 1. Visited the site twice and noted no new negative impacts to the spring. 2. Searched for aquatic invertebrates in the spring, no SOC were observed.
Cave X Private 1. COA entered into a Private Landowner Agreement "Cave X, Management and Monitoring Plan, Covenants and Restrictions", with the property owners (Regent's School) in Oct. 1999. The agreement sets aside a 4.5 acre area to protect the cave footprint. The USFWS was involved in the discussions on protection. 2. The cave entrance is gated and also has a fence for added protection. 3. Regents staff conduct periodic surface inspections of the cave including gate and lock maintenance. 4. WPD is currently negotiating with the property owner to increase biological monitoring (twice yearly cave faunal and cave cricket exit count surveys) and management of the cave as part of an agreement to allow for on-site construction of a berm to reduce the area currently listed as within the 100 year flood plain.

Table 4. FY12 BCCP Karst Feature Monitoring and Management Activities.
Cave Y City of Austin 1. Visited this cave 6 times and noticed no signs of vandalism to the cave or cave gate. 2. Treated site for RIFA with boiling water. 3. Completed bi-annual cave faunal survey(See EXHIBIT A). 4. Completed bi-annual cave cricket exit counts. (See EXHIBIT B).
Ceiling Slot Cave Private
Cold Cave 1. TC is negotiating with the landowners concerning the possibility of purchase, conservation easement, or a management agreement for this 8 acre tract. 2. TC gained permission from landowner to perform bi-annual faunal surveys and cave cricket exit counts for the expanded BCP Cave Monitoring program. 3. TC performed surface inspections with no signs of vandalism to the cave entrance or in the cave. 4. TC conducted bi-annual cave faunal surveys (see EXHIBIT A). 5. TC conducted bi-annual cave cricket exit surveys. (See EXHIBIT B).
Cotterell Cave City of Austin 1. Conducted quarterly site inspections; COA staff noted that the exterior gate was cut (the actual cave gate was not breached), made repairs and met with COA PARD Rangers in an effort to increase site patrols. 2. RIFA were treated once with boiling water; most of the ants were located at the parking lot, approximately 300 feet from the cave. 3. Conducted bi-annual cave faunal surveys (see EXHIBIT A). 4. Conducted bi-annual cave cricket exit surveys. (See EXHIBIT B).
Disbelievers Cave Private 10a Permit: PRT-808694 1. WPD mapped relocated features on site and mapped new CEF's to see how close they are to the new proposed development to make certain that the applicant is in compliance with City code.
District Park Cave City of Austin 1. BCP staff conducted bi-annual cave faunal surveys (See EXHIBIT A). 2. BCP staff and volunteers conducted bi-annual cave cricket exit counts (See EXHIBIT B). 3. Conducted site surveys quarterly, other than trash at the entrance no new major problems noted.. 4. Permitted access to this cave was allowed. 5. BCP staff removed trash from the un-gated portion of the cave. 6. Treated site for RIFA with boiling water. 7. COA WPD Hydrogeologist initiated a hydrological study to determine the sub-surface drainage and to see if the adjacent developed area of the park could negatively impact the cave. 8. COA BCP staff initiated meetings with PARD staff to iron out a cave management agreement, which will provide future protection for this and other karst features located on the property.
Eluvial Cave Private 10a Permit: PRT-808694 1. WPD mapped relocated features on site and mapped new CEF's to see how close they are to the new proposed development to make certain that the applicant is in compliance with City code.

Table 4. FY12 BCCP Karst Feature Monitoring and Management Activities.
Flint Ridge Cave City of Austin 1. Conducted 6 site visits and noted no signs of illegal trespass. 2. Treated site for RIFA with boiling water; staff treated numerous active mounds due to favorable habitat (open and disturbed). 3. Conducted bi-annual cave faunal surveys (See EXHIBIT A). 4. BCP staff and volunteers conducted bi-annual cave cricket exit counts (See EXHIBIT B). 5. COA WPD continued to monitoring the storm water catchment area of Flint Ridge cave. 6. Nico Hauwert (WPD) completed a report on spill trace simulations using dye traces near SH45 SW and Mopac South, the report shows that water entering the cave quickly makes its way to Barton Springs. 7. COA BCP staff inspected cave drip stations, took a sample, timed it, and inspected the lower section of the cave for new passageways (last flood may have opened new passageways).
Fossil Cave City of Austin 1. Inspected quarterly and found no new signs of vandalism 2. Inspected for RIFA infestations on all visits. RIFA were observed within close proximity of the "suspected" cave 3. COA BCP staff initiated meetings with PARD staff to iron out a cave management agreement, which will provide future protection for this and other karst features located on the property.
Fossil Garden Cave Private 1. COA took GPS coordinates using a Trimble unit in an attempt to get the precise location which will enhance our ability to accurately assess the level of protection defined by multiple parameters assessed through GIS. 2. WPD initiated a hydrological study in an attempt to determine potential negative impacts from a proposed new water line. 3. TC staff conducted an annual cave faunal survey (EXHIBIT A).
Gallifer Cave Travis County 1. Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Maintained fencing and signage to protect this area from unauthorized access and dumping. 3. Surveyed site bi-annually for RIFA. Treated 18 mounds in Spring 2012. 4. Conducted bi-annual cave faunal surveys (see EXHIBIT A). 5. Conducted bi-annual cave cricket exit surveys. (See EXHIBIT B).
Get Down Cave TCMA 1. COA WPD is currently in negotiations with the developer and neighborhood association to take over ownership and management of this cave and property (includes several other significant karst features). 2. COA WPD staff contracted with Zara Environmental to conduct cave faunal surveys on all caves located on the preserve including Get Down cave.
Goat Cave City of Austin 1. Completed annual faunal survey (See EXHIBIT A). 2. Treated RIFA annually with boiling water. 3. With the help of volunteer stewards, conducted twice monthly site inspections, removed trash from preserve area and reported on anything out of the ordinary. 4. Allowed permitted access to this cave . 5. Continued to periodically repair the perimeter fence cuts and tagged signs by vandals, many of these incidents were reported by our volunteer land steward and in some cases the volunteer made the needed repairs. 6. COA WPD staff continued work on an in-depth hydrological study to determine the potential impacts of a new road extension and realignment of Davis Lane.

Table 4. FY12 BCCP Karst Feature Monitoring and Management Activities.
Hole-in-the-Road Cave Private
Ireland's Cave Travis County 1. TC acquired the 4.8 acre tract containing the cave from Muirfield Homeowner Association and began full management of the cave and surrounding property. 2. TC performed a surface inspection and noted no recent signs of vandalism and trespass to the cave entrance or inside the cave. 3. TC conducted an annual cave faunal survey (see EXHIBIT A).
Jack's Joint Cave Private
Japygid Cave Private 10a Permit: PRT-808694 1. WPD mapped relocated features on site and mapped new CEFs to ensure that proposed new development is in compliance with City code.
Jest John Cave City of Austin 1. Conducted 2 site visits found and no signs of vandalism or human visitation. 2. Inspected site for RIFA infestations. On all visits RIFA were observed within close proximity of the cave. 3. Conducted one cave cricket exist count. (See EXHIBIT B).
Jester Estates Cave City of Austin 1. BCP staff conducted 6 site visits and noted increased signs of illegally discharged pools, dumped brush and trash from neighbors. Also noted that some neighbors appear to be spraying herbicide (strips of dead and dying vegetation) and possibly insect poison baits (dead RIFA mounds) within the preserve. In response to this increased negative activity, BCP staff handed out a new revised door hanger which addressed these issues; staff also followed up with site visits to some of the home owners. This is a classic example of a poorly designed preserve with woefully inadequate setbacks. 2. WPD staff member (Nico Hauwert) and a volunteer continued work on an hydrological study of this cave which included: remapping the cave interior, determining the surface drainage, and taking water samples in an effort to determine if the cave is being negatively impacted by adjacent development. It appears that the cave subsurface drainage area is much larger than the 3.2 acre preserve. 3. Treated site twice for RIFA with boiling water. 4. Conducted bi-annual cave faunal surveys (See EXHIBIT A). 5. Conducted bi-annual cave cricket exit counts. (SEE EXHIBIT B). 6. BCP staff removed non-native invasive vegetation.
Jollyville Plateau Cave Private 10a Permit: PRT-808694 1. WPD mapped relocated features on site and mapped new CEFs to ensure that proposed new development is in compliance with City code.
Kretschmarr Cave Travis County 1. Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Conducted a trash clean-up around the cave site and surrounding area. 3. Maintained fencing and signage to protect this area from unauthorized access and dumping.

Table 4. FY12 BCCP Karst Feature Monitoring and Management Activities.
4. Surveyed site bi-annually for RIFA. Treated 15 mounds in Spring 2012. 5. Conducted annual cave faunal survey (see EXHIBIT A).
Kretschmarr Double Pit Travis County 1. Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Maintained fencing and signage to protect this area from unauthorized access and dumping. 3. Surveyed site bi-annually for RIFA. Treated four mounds in Spring 2012. 5. Conducted annual cave faunal survey (see EXHIBIT A).
Lamm Cave Section 7 Permit 2-15-93-F-075 (see USFWS files) 1. The City of Austin negotiated protective measures for this cave including a Land Management Plan for this cave. The cave has a setback size of approximately 4.13 acres. The radius of the setback varies from a minimum of 123 feet south of the cave to a maximum of 340 feet north of the cave. 2. The cave was gated and the preserve area was fenced following COA WPD and BCP staff recommendations and design. Once the cave gate was completed, BCP staff reviewed work, requested additional measures and eventually signed off on the completed gate. 3. No application of fertilizers, pesticides or herbicides will be allowed in the CEF area.
Little Bee Creek Cave City of Austin 1. Conducted two site visits. 2. Conducted bi-annual cave faunal survey (See EXHIBIT A). 3. Conducted bi-annual cave cricket exit counts. (See EXHIBIT B). 4. Discovered new vandalism (breached gate); repaired gate and made improvements to the existing gate and met on site with APD to initiate boat patrols.
Lost Oasis Cave TCMA
Lost Gold Cave Private
Maple Run Cave City of Austin 1. Conducted bi-annual cave faunal survey (See EXHIBIT A). 2. Conducted bi-annual cave cricket exit counts. (See EXHIBIT B). 3. With the help of volunteer stewards: conducted bi-monthly site inspections, removed trash from preserve area and reported on anything out of the ordinary. 4. Permitted access to this cave is allowed. 5. Treated site for RIFA with boiling water. 6. COA WPD staff continued work on an in-depth hydrological study to determine the potential impacts of a new road extension and realignment of Davis Lane.
McDonald Cave Travis County 1. Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Maintained fencing and signage to protect this area from unauthorized access and dumping. 3. Surveyed site bi-annually for RIFA. Treated two mounds in Spring 2012. 4. Conducted bi-annual cave faunal surveys (see EXHIBIT A). 5. Conducted bi-annual cave cricket exit surveys. (See EXHIBIT B).

Table 4. FY12 BCCP Karst Feature Monitoring and Management Activities.
McNeil Bat Cave Private
Midnight Cave City of Austin 1. Conducted quarterly site inspections (observed fence and sign vandalism, made repairs and met on site with COA PARD Rangers in an effort to increase on site patrols.. 2. Conducted bi-annual cave faunal surveys. (See EXHIBIT A). 3. Treated site for RIFA with boiling water. 4. Conducted bi-annual cave cricket exit counts. (See EXHIBIT B). 5. Volunteers initiated a new detailed survey map of the cave (on going). 6. Permitted access to this cave is allowed. 7. Witnessed nearby pesticide application, by Lone Star Soccer Assoc.staff, initiated contact with PARD staff to determine how to protect the cave from pesticides and fertilizers and still accommodate the needs for park users.
M.W.A. Cave Private 10a Permit: PRT-808694 (see FWS files for status) 1. WPD mapped relocated features on site and mapped new CEFs to ensure that proposed new development is in compliance with City code.
Moss Pit Cave Private
New Comanche Trail Cave Travis County 1. Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Maintained fencing and signage to protect this area from unauthorized access and dumping. 3. Surveyed site bi-annually for RIFA. Treated nine mounds in Spring 2012. 4. Conducted annual cave faunal survey (see EXHIBIT A).
No Rent Cave Private
North Root Cave Travis County 1. Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Maintained fencing and signage to protect this area from unauthorized access and dumping. 3. Surveyed site bi-annually for RIFA. Treated eight mounds in Spring 2012. 4. Conducted annual cave faunal survey (see EXHIBIT A).
Pennie's Cave Private 1 The entrance has been GPS located and dug-out to a depth of about five feet in 2008. 2. A new development plan is seeking approval for the site containing the cave. 3.The site plan calls for the cave entrance to be gated and boulders placed around the cave at the edge of a 300-ft buffer. 4.Additional excavation is needed to completely uncover the entrance and open the passage into cave; WPD is working with the land owner to protect the cave and re-establish the cave habitat. 5. The proposed Commercial Development has not started construction. The developer filed for an extension to their development permit November 2010 and construction on a turn lane into the start should be permitted within 180 days. Once construction activities start on Commercial Development, the cave entrance will be gated.

Table 4. FY12 BCCP Karst Feature Monitoring and Management Activities.
Pickle Pit Cave Section 7 Permit 2-15-93-F-075 1. Staff from Loomis, USFWS, and COA BCP and COA WPD staff met on site and conducted two cave faunal surveys (collected blind *Cicurina* to help with future species identification; also collected possible endangered species (*Texella* sp., and *Tartarocreagris* sp. (See EXHIBIT A). 2. COA WPD conducted surface and sub-surface drainage studies on this cave (including mapping the cave interior and cave drips). 3. TC staff initiated dialogue with the property owner regarding an MOU or MOA for future management.
Pipeline Cave Private 1. A 2004 agreement between COA and Stratus set aside a fenced buffer around Pipeline cave that varies from 100 feet to the east and up to 300 feet west of the cave and an additional setback of 300 feet to the north and west; 150 ft to east and south for the adjacent feature known as Confusion Sink. 2. Developer initiated construction on site, installed cave gate (including a gate on the nearby "confusion cave", silt fences were in place but no permanent fences delineating the preserve area was in place. COA BCP staff reported findings to WP staff.
Rolling Rock Cave City of Austin 1. Inspected quarterly, and no sign of human visitation or vandalism was found. 2. RIFA control. 3. Conducted one cave faunal survey. (See EXHIBIT A).
Root Cave Travis County 1. Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Maintained fencing and signage to protect this area from unauthorized access and dumping. 3. Surveyed site bi-annually for RIFA. Treated eight mounds in Spring 2012. 4. Conducted annual cave faunal survey (see EXHIBIT A).
Slaughter Creek Cave City of Austin 1. Conducted quarterly site inspections, observed signs of attempted vandalism (digging tools, fire, and trash), met on site with COA PARD Rangers in an effort to increase onsite patrols.. 2. Conducted one cave faunal survey. (See EXHIBIT A) 3. RIFA control.
Spanish Wells Cave Private (location unknown)
Spider Cave City of Austin 1. Conducted four site visits, and no sign of human access or vandalism was found. 2.Conducted bi-annual cave faunal surveys (See EXHIBIT A). 3. Conducted bi-annual cave cricket exit counts. (See EXHIBIT B). 4. Treated site for RIFA with boiling water.
Stark's North Mine Travis County 1. TC acquired this cave and 0.8 acres surrounding it in June 2012. The area surrounding the cave is all previously developed. 2. Performed surface inspections and detected signs of vandalism to the cave entrance and inside the cave. 3. Placed this cave on the list of 25 BCP caves to be monitored bi-annually starting in Fall 2012 (FY13).

Table 4. FY12 BCCP Karst Feature Monitoring and Management Activities.
Stovepipe Cave 1. Conducted 6 site inspections, and continued to remove old trash from the preserve. 2. Repaired perimeter fence. 3. Treated site for RIFA with boiling water. 4. Conducted bi-annual cave faunal surveys (See EXHIBIT A). 5. Conducted bi-annual cave cricket exit counts (See EXHIBIT B).
Talus Springs Cave Private 1. The USFWS 10a permit PRT 815447 mitigation requirement intended this cave to go to TC, however, the cave is located on private land just outside of the mitigation area. TC has continued requesting that the homeowners association donate the land to TC; Coordinated management with them. 2. Performed surface inspections with no signs of vandalism to the cave entrance or in the cave. 3. Inspected site for RIFA. No mounds found within 80 m of cave. 4. Conducted annual cave faunal survey (see EXHIBIT A).
Tardus Hole Cave Travis County 1. Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Maintained fencing and signage to protect this area from unauthorized access and dumping. 3. Surveyed site bi-annually for RIFA. Treated three mounds in Spring 2012. 4. Conducted annual cave faunal survey (see EXHIBIT A).
Tooth Cave Travis County 1. Performed periodic surface inspections with no signs of vandalism to the cave entrance or in the cave. 2. Maintained fencing and signage to protect this area from unauthorized access and dumping. 3. Conducted a trash clean-up around the cave site and surrounding area. 4. Installed new 8 ft game fencing around the tract containing this cave to prevent trespass. 4. Surveyed site bi-annually for RIFA. Treated 21 mounds in Spring 2012. 5. Conducted bi-annual cave faunal surveys (see EXHIBIT A). 6. Conducted bi-annual cave cricket exit surveys. (See EXHIBIT B).
Weldon Cave Private 1. WPD initiated a hydrological study in an attempt to determine potential negative impacts from a proposed new water line. 2. TC gained permission from landowner to perform bi-annual faunal surveys and cave cricket exit counts for the expanded BCP Cave Monitoring program. 3. TC performed surface inspections with no current signs of vandalism to the cave entrance or in the cave. 5. TC conducted bi-annual cave faunal surveys (see EXHIBIT A). 6. TC conducted bi-annual cave cricket exit surveys. (See EXHIBIT B).
Whirlpool Cave TCMA 1. TC is negotiating with TCMA concerning possible protection options such as a Conservation Eaement or Management Agreement. If successful with TCMA, TC will seek to acaquire two adjacent tracts which lie over the footprint of the cave.

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EXHIBIT A:

KARST FAUNAL SURVEY REPORTS

FY12 City of Austin/Travis County Karst Faunal Surveys[1, 2]

			Endangered Species						Species of Concern									Other Significant Troglobites									
Cave	**Survey Date**	**Managing Agency**	***Neoleptoneta myopica***	***Rhadine persephone***	***Tartarocreagris texana***	***Texamaurops reddelli***	***Texella reddelli***	***Texella reyesi***	***Cicurina bandida***	***Cicurina elliotti***	***Cicurina travisae***	***Eidmannella reclusa***	***Neoleptoneta devia***	***Rhadine austinica***	***Rhadine subterranea***	***Speodesmus* NS**	***Texella spinoperca***	***Cicurina* sp. (blind)**	***Eidmannella rostrata***	***Eidmannella* sp.**	***Neoleptoneta* sp.**	***Speodesmus bicornourus***	***Speodesmus* sp.**	***Tartarocreagris infernalis***	***Texoreddellia texensis***	***Trichoniscidae* sp.**	**Other notable species detected**
Adobe Springs Cave	11/21/2011	TC																									
Adobe Springs Cave	5/23/2012	TC																									
Airmen's Cave	1/31/2012	COA							12										8			1					
Airmen's Cave	8/8/2012	COA							23					1					3	3		1		1	1		
Amber Cave	11/3/2011	TC			1						4											17					
Amber Cave	5/31/2012	TC			3	1					14											28				*Batrisodes* sp. (1)
Arrow Cave	9/20/2012	COA							16					4								1				*Tartarocreagris* sp. (1)
Beard Ranch Cave	2/16/2012	COA						3																1		*Rhadine* sp. (1)
Blowing Sink Cave	2/23/2012	COA							3					1								2		1		*Eurycea* sp. (1)
Broken Arrow Cave	11/18/2011	COA																3				2				*Batrisodes* sp. (1)
Broken Arrow Cave	5/17/2012	COA																2				7				*Stygobromus russelli* (8)
Cave Y	2/1/2012	COA																1				3				*Texella grubbsi* (1) *Perimyotis subflavus* (1)
Cave Y	8/8/2012	COA							16													75		2		*Texella grubbsi* (14)
Cold Cave	2/8/2012	TC						8										8		1		18				*Batrisodes unicornis* (1)
Cold Cave	8/22/2012	TC						13										7				14				*Rhadine* sp. (1) *Batrisodes* sp. (1)
Cortana Cave	1/27/2012	COA	36					1										2		2		1				
Cortana Cave	8/5/2012	COA	25					3										7		4		4				
Cotterell Cave	2/3/2012	COA						6										18				9	1			
Cotterell Cave	8/3/2012	COA						17										37				38	2			*Anapistula* sp. (1)
District Park Cave	11/14/2011	COA							5					1								1				*Tayshaneta sandersi* (4) *Texella mulaiki* (4)
District Park Cave	5/16/2012	COA							25					1								3				*Tayshaneta sandersi* (2)
Flint Ridge Cave	11/29/2011	COA							35											2		36		8		*Texella mulaiki* (2) *Perimyotis subflavus* (1)

			Endangered Species						Species of Concern									Other Significant Troglobites									
Cave	**Survey Date**	**Managing Agency**	***Neoleptoneta myopica***	***Rhadine persephone***	***Tartarocreagris texana***	***Texamaurops reddelli***	***Texella reddelli***	***Texella reyesi***	***Cicurina bandida***	***Cicurina elliotti***	***Cicurina travisae***	***Eidmannella reclusa***	***Neoleptoneta devia***	***Rhadine austinica***	***Rhadine subterranea***	***Speodesmus NS***	***Texella spinoperca***	***Cicurina* sp. (blind)**	***Eidmannella rostrata***	***Eidmannella* sp.**	***Neoleptoneta* sp.**	***Speodesmus bicornourus***	***Speodesmus* sp.**	***Tartarocreagris infernalis***	***Texoreddellia texensis***	***Trichoniscidae* sp.**	**Other notable species detected**
Flint Ridge Cave	5/16/2012	COA							45					1									45				
Gallifer Cave	2/2/2012	TC	17	1				14		23										3			1				*Perimyotis subflavus* (6)
Gallifer Cave	7/31/2012	TC	1	10				17		44										3			5				*Tartarocreagris* sp. (1)
Geode Cave	2/13/2012	TC	9	7								1						2									
Geode Cave	8/14/2012	TC	8	1				1				9						6					2				*Batrisodes* sp. (1)
Goat Cave	2/29/2012	COA																									
Goat Cave	9/20/2012	COA							1											1			1				
Ireland's Cave	2/14/2012	TC							11					14					1								*Batrisodes unicornis* (1)
Jester Estates Cave	11/22/2011	COA	12		1		13											6					10				*Anapistula* sp. (5)
Jester Estates Cave	5/17/2012	COA	16				14											15					11			4	*Anapistula* sp. (1) *Rhadine* sp. (1)
Kretschmarr Cave	11/22/2011	TC		1							4									8		3					
Kretschmarr Double Pit	11/16/2011	TC																					1				
Kretschmarr Sink	11/21/2011	TC																					2				
Little Bee Creek Cave	11/29/2011	COA					2		1											1			4				
Little Bee Creek Cave	5/3/2012	COA					2		1														1				
Maple Run Cave	2/20/2012	COA																									*Anapistula* sp. (7)
Maple Run Cave	8/6/2012	COA							3					1									1				*Anapistula* sp. (8) *Texella mulaiki* (2)
McDonald Cave	2/9/2012	TC						3			11		5						4			2					
McDonald Cave	8/14/2012	TC						6			19		4						15			24		1			
Midnight Cave	2/10/2012	COA							18											14						1	*Batrisodes* sp. (1)
Midnight Cave	8/6/2012	COA							21					3						7			1				
New Comanche Trail Cave	2/13/2012	TC	5																								
North Root Cave	8/7/2012	TC																1									

			Endangered Species						Species of Concern									Other Significant Troglobites									
Cave	**Survey Date**	**Managing Agency**	***Neoleptoneta myopica***	***Rhadine persephone***	***Tartarocreagris texana***	***Texamaurops reddelli***	***Texella reddelli***	***Texella reyesi***	***Cicurina bandida***	***Cicurina elliotti***	***Cicurina travisae***	***Eidmannella reclusa***	***Neoleptoneta devia***	***Rhadine austinica***	***Rhadine subterranea***	***Speodesmus NS***	***Texella spinoperca***	***Cicurina* sp. (blind)**	***Eidmannella rostrata***	***Eidmannella* sp.**	***Neoleptoneta* sp.**	***Speodesmus bicornourus***	***Speodesmus* sp.**	***Tartarocreagris infernalis***	***Texoreddellia texensis***	***Trichoniscidae* sp.**	**Other notable species detected**
Pickle Pit	11/22/2011	COA																1									*Texella* sp. (2)
Pickle Pit	3/16/2012	COA						1										1		1					1		*Texella* sp. (1)
Pond Party Pit	2/16/2012	COA						8												3			14	3		2	*Rhadine* sp. (4)
Pond Party Pit	8/3/2012	COA						28												4			20	7			*Rhadine* sp. (1)
Rolling Rock Cave	11/18/2011	COA																								2	*Batrisodes* sp. (1) *Perimyotis subflavus* (3)
Root Cave	5/31/2012	TC									1																
Seibert Sink	2/1/2012	COA							1								1			7			2				
Seibert Sink	8/8/2012	COA							4								4			5			2				
Slaughter Creek Cave	9/20/2012	COA							28											1			13				*Batrisodes* sp. (1) *Texella mulaiki* (1)
Spider Cave	11/18/2011	COA					2											20		2							
Spider Cave	5/17/2012	COA		1			1											27					4				
Stovepipe Cave	2/16/2012	COA		1		4		15			2	1								1			109		2		*Tartarocreagris attenuata* (3)
Stovepipe Cave	8/3/2012	COA				5		26					1					2		2			73				
Talus Springs Cave	9/25/2012	TC																									
Tardus Hole	11/16/2011	TC																									
Tight Pit Cave	8/7/2012	TC	1																								
Tooth Cave	11/8/2011	TC	1			1		41			7																*Perimyotis subflavus* (1)
Tooth Cave	5/18/2012	TC	3			1		33			22	9											3		5		
Two Trunks Cave	8/7/2012	TC																12									
Weldon Cave	2/8/2012	TC									12				6					1							
Weldon Cave	8/22/2012	TC									5				24					2		2					

[1] All survey data and full species lists available by request through COA and TC

[2] Surveyors in FY12 include Amanda Aurora, Rachel Barlow, Todd Bayless, John Chenowith, Renee Fields, Paul Fushille, Jason Hunt, Clif Ladd, Jeanette Larsen, Bill Reiner, Rebekah Rylander, Mark Sanders, William Simper, and Chris Warren.

EXHIBIT B:

CAVE CRICKET EXIT COUNT DATA REPORTS

FY 12 COA/TC CAVE CRICKET EXIT COUNT DATA REPORTS

Surveyed Caves	Fall 2011 (November)				Winter 2012 (January/February)				Spring 2012 (May)				Summer 2012 (August)			
	N:	J:	A:	TI:	N:	J:	A:	TI:	N:	J:	A:	TI:	N:	J:	A:	TI:
Adobe Springs Cave	2	9	8	19					2	215	829	1046				
Airmen's Cave					467	83	20	570					147	42	9	198
Amber Cave	13	12	4	29					28	42	37	107				
Broken Arrow Cave	177	101	50	328					21	23	219	263				
Cave Y					71	16	26	113					521	571	74	1166
Cold Cave					341	103	5	449					4908	412	177	5497
Cortana Cave					13	7	12	32					51	30	22	103
Cotterell Cave					91	3	0	94					572	89	56	717
District Park Cave	202	34	49	285					93	71	141	305				
Flintridge Cave	17	18	18	53					139	43	31	213				
Gallifer Cave					25	72	0	97					2	6	1	9
Geode Cave					7	5	0	12					20	8	45	73
Jest John Cave													42	30	89	161
Jester Estates Cave	210	93	166	469					332	118	27	477				
Little Bee Creek Cave	0	0	0	0					0	0	2	2				
Maple Run Cave					135	24	7	166					252 1522 1542	39 19 42	43 16 19	334 1557 1603
McDonald Cave					0	7	1	8					0	3	7	10
Midnight Cave					3254	1040	548	4842					3240	1415	1237	5892
Pond Party Pit					146	15	10	171					160	85	94	339
Seibert Sink					82	25	18	125					21	8	3	32
Spider Cave	36	7	4	47					42	31	6	79				
Stovepipe Cave					83	16	2	101					257	149	148	554
Testudo Tube					60	227	75	362					23	6	55	84
Tooth Cave	5	0	0	5					7	14	2	23				
Weldon Cave					129	33	5	167					683	239	855	1777

N= nymphs; J= juveniles; A= adults; TI= total individuals.