Balcones Canyonlands Preserve
Karst Monitoring and Management
FY 2011 Annual Report



Juvenile *Texella reyesi* in Beard Ranch Cave, Travis County.
Photo by Mark Sanders

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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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 2011 (FY11), 30,171 acres have been acquired for the Balcones Canyonlands Preserve (BCP). 45 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 10/01/10-9/30/11 (FY11). In FY11, 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 2).

A total of 45 of the BCCP caves are "protected" in some way, with 17 "unprotected". The 45 "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; ten protected 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. With the exception of the Four Points East Cluster, which is protected by a private 10(a) agreement, and some of the caves in the Four Points West Cluster, all other caves in the three cave clusters required to be protected by the permit are threatened by potential development near the caves (Tables 2 and 3).

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. These additional karst features are incorporated into TC and COA's shared biological monitoring program, as described in Section 6.0. As of FY11, ten endangered species karst features which were not listed on the original permit are being protected on BCP lands (six features on TC BCP; four features on COA BCP).

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 in 2004, 2005, 2008, 2009, and 2010 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	
Broken Arrow Cave	BCP Lime Cr. Prs./COA	Cedar Park			X 1996			
Cave Y	BCP Barton Creek Grblt/COA	Rollingwood					P 1996 delete P 2004 (Reddell)	
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 (Reddell)	X 2009 (Chandler)		X 1996
Hole-in-the-Road	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*
Japygid Cave	BCP Private 10(a)	Jollyville			X 1996	X 2005 (Reddell)		
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 (Reddell)		P 1996 X 2005 (Reddell)		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
M.W.A. Cave	BCP Private 10(a)	Jollyville	X 2005 (Reddell)		X 1996	X 2005 (Reddell)		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
North Root Cave	BCP Jollyville/TC	Jollyville Plateau			X 1996			
Rolling Rock Cave	BCP Lime Cr. Prs./COA, Sec.10(a)	Cedar Park			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*
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

Sources: BCCP Permit 1996, Elliott 1992, USFWS 1994, Reddell 2004, 2005, and 2010, HNTB 2005, Cokendolpher 2008, 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 2004 (Reddell) = confirmed by J. Reddell (pers com 2005)
X 2005 (Reddell) = was listed as confirmed in the HNTB summary of James 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)
Delete P 2005 (Reddell) = 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) = 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)

3.0 OWNERSHIP AND PROTECTION STATUS

Table 2 lists the status of the 62 caves/karst features listed in the BCCP permit with information on ownership, species status, and cave cluster.

Table 2. FY11 Ownership Status of the 62 BCCP caves/karst features (34 with ES and 28 caves with SOC) [1].

Cave Name	ES or SOC	Current tract/owner. On BCP Land or private	Cave Cluster
Adobe Springs Cave	SOC	BCP Lehmann/TNC	
Airmen's Cave	SOC	BCP Barton Creek/COA	
Amber Cave	ES	BCP Jollyville/TC	4 Points (West)
Armadillo Ranch Sink	SOC	Private	
Arrow Cave	SOC	BCP Slaughter Cr. Pk./COA	
Bandit Cave	ES	Private	
Beard Ranch Cave (Featherman's Cave)	ES	BCP Ivanhoe/COA	
Bee Creek Cave	ES	Private	
Blowing Sink Cave	SOC	BCP COA	
Broken Arrow Cave	ES	BCP Lime Creek Pres/COA	
Buda Boulder Spring	SOC	BCP Shoal Creek Grblt./COA	
Cave X	SOC	Private/COA Protection Agreement	
Cave Y[1]	SOC	BCP Barton Creek Grblt/COA	
Ceiling Slot Cave	SOC	Private	
Cold Cave	ES	Private	Northwood
Cotterell Cave	ES	BCP Stillhouse Hollow Preserve/COA	
Disbelievers Cave	ES	BCP Private 10(a)	4 Points (East)
District Park Cave	SOC	BCP Dick Nickols Park/COA	
Eluvial Cave	ES	BCP Private 10(a)	4 Points (East)
Flint Ridge Cave	SOC	Prop 2 Tabor tract /COA	
Fossil Cave	ES	BCP Schroeter Pk./COA	
Fossil Garden Cave	ES	Private	McNeil
Gallifer Cave	ES	BCP Jollyville/TC	4 Points (West)
Get Down Cave	SOC	Private/COA Protection Agreement	
Goat Cave	SOC	BCP Goat Cave Karst Preserve/COA	
Hole-in-the-Road Cave	ES	Private	Northwood
Ireland's Cave	SOC	Private Circle C/COA Protection Agreement	
Jack's Joint	SOC	Private	
Japygid Cave	ES	BCP Private 10(a)	4 Points (East)
Jest John Cave	ES	BCP Forest Ridge/COA	
Jester Estates Cave	ES	BCP Forest Ridge/COA	

Cave Name	ES or SOC	Current tract/owner. On BCP Land or private	Cave Cluster
Jollyville Plateau Cave.	ES	BCP Private 10(a)	4 Points (East)
Kretschmarr Cave	ES	BCP Jollyville/TC	4 Points (West)
Kretschmarr Double Pit	ES	BCP Jollyville/TC	4 Points (West)
Lamm Cave	ES	Private Section 7/COA Protection Agreement	
Little Bee Cr. Cave	ES	BCP Ullrich WTP/COA	
Lost Gold Cave	SOC	Private	
Lost Oasis Cave	SOC	Private TCMA	
M.W.A. Cave	ES	BCP Private 10(a)	4 Points (East)
Maple Run Cave	SOC	BCP Goat Cave Karst Preserve/COA	
McDonald Cave	ES	BCP Jollyville/TC	
McNeil Bat Cave	ES	Private	McNeil
Midnight Cave	SOC	BCP Slaughter Cr. Pk./COA	
Moss Pit	SOC	Private	
New Comanche Trail Cave	ES	BCP Lake Travis/TC	
No Rent Cave	ES	Private	McNeil
North Root Cave	ES	BCP Jollyville/TC	4 Points (West)
Pennie's Cave	SOC	Private	
Pickle Pit	SOC	BCP Private Sec. 7	
Pipeline Cave	SOC	Private	
Rolling Rock Cave	ES	BCP Lime Cr. Prs./COA	
Root Cave	ES	BCP Jollyville/TC	4 Points (West)
Slaughter Creek Cave	SOC	BCP Slaughter Creek Park/COA	
Spanish Wells Cave	SOC	Private	
Spider Cave	ES	BCP Park West/COA	
Stark's North Mine	SOC	Private	
Stovepipe Cave	ES	BCP Canyon Creek/ COA	
Talus Springs Cave	SOC	Private/ 10(a) permit	
Tardus Hole	ES	BCP Jollyville/TC	4 Points (West)
Tooth Cave	ES	BCP Jollyville/TC	4 Points (West)
Weldon Cave	ES	Private	McNeil
Whirlpool Cave	SOC	Private TCMA	

[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).

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.

Table 3. FY11 protection, monitoring and access status of the 62 BCCP karst features.

Cave Name	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Adobe Springs Cave		Protected on preserve	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring	none
Airmen's Cave	Gate has been breached by vandals	Protected on parkland	COA quarterly surface monitoring bi-annual cave cricket exit counts bi-annual species monitoring	Open to sign, beyond requires permit. However, since there's no gate, it's voluntary**
Amber Cave	Gated, 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		Private - Unknown		none
Arrow Cave	Gated	Protected in parkland (There are nearby homes immediately south of the cave entrance)	COA quarterly surface monitoring annual species monitoring	none
Bandit Cave	Gated	Protected by private ecologically concerned landowner		none
Beard Ranch Cave		Protected on preserve	COA quarterly surface monitoring annual faunal survey	none
Bee Creek Cave		Private- Unknown		none
Blowing Sink Cave	Gated	Protected on preserve	COA bi-monthly surface and annual species monitoring RIFA control	none
Broken Arrow Cave	Tract is fenced (8' game fence)	Protected on preserve	COA quarterly surface monitoring bi-annual cave cricket exit counts bi-annual species monitoring RIFA control	none
Buda Boulder Spring		Protected in parkland (close proximity to a hike and bike trail)	COA annual surface monitoring	none

Cave Name	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Cave X	Gated, fenced	Protected by landowner with 4.5 acre setback to protect cave footprint. Protected to some extent (not actively managed and the set back is inadequate).	Occasional species and surface monitoring by COA	
Cave Y	Gated	Protected in parkland	COA quarterly surface bi-annual species monitoring bi-annual cave cricket exit counts RIFA control	none
Ceiling Slot Cave		Private - Unknown		none
Cold Cave	Gated	Private - Unknown	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring	none
Cotterell Cave	Fenced and gated	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		Protected by 10a permit, hired ACI Consulting		none
District Park Cave	Gated after the 1st room.	Protected in parkland	COA quarterly surface monitoring bi-annual cave cricket exit counts bi-annual species monitoring RIFA control	1st room open, past the 1st room protected by gate, access by permit*
Eluvial Cave		Protected by 10a permit, hired ACI Consulting		none
Flint Ridge Cave	Gated	Protected on Water Quality Protection Land (drainage basin will be negatively impacted by the construction of a new highway).	COA quarterly surface monitoring bi-annual cave cricket exit counts bi-annual species monitoring RIFA control, Watershed Protection Dept.(WPD) monitors quantity and quality at surface	none
Fossil Cave	Access to features on site are protected by large rocks	Protected in parkland	Exact location of cave is unknown. COA quarterly surface monitoring	None

Cave Name	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Fossil Garden Cave		Private - Unknown		none
Gallifer Cave	Gated, 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	Gated, fenced	Protected with Protection Agreement - Inadequate setback from development.		Access to 1st room during karst day festival.
Goat Cave	Fenced	Protected on preserve	COA quarterly surface monitoring annual species monitoring RIFA control	access by permit*
Hole-in-the-Road		Private –Unknown. (very close to a major roadway)		none
Ireland's Cave	Fenced	Protected by landowner with 4.8 ac. setback, watershed problems with golf course, setback inadequate		none
Jack's Joint		Private - Unknown		none
Japygid Cave		Protected by 10a permit, hired ACI consulting		none
Jest John Cave		Protected on preserve	COA cave cricket exit count, bi-annual surface monitoring	none
Jester Estates Cave	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	Gated [1]	Protected by 10a permit, hired ACI Consulting		none
Kretschmarr Cave	Gated, 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	Fenced	Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Lamm Cave	Gated and fenced	COA negotiated setback (approximately 150')	Occasional surface and species monitoring by COA	none

Cave Name	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Little Bee Cr. Cave	Gated	Protected by COA AWU Dept	COA quarterly surface monitoring bi-annual cave cricket exit counts bi-annual species monitoring	none
Lost Gold Cave	Gated	Private - Unknown, new owner, may be development near cave entrance		none
Lost Oasis Cave	Gated and Fenced	Protected by TCMA	TCMA species and surface monitoring	controlled access**
M.W.A. Cave		Protected by 10a permit, hired ACI Consulting		
Maple Run Cave	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	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		Private – Unknown (close proximity to high school)	COA BCP staff performed one cave faunal survey	none
Midnight Cave	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		Private - Unknown		none
New Comanche Trail Cave	Fenced	Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
No Rent Cave		Private - Unknown		none
North Root Cave		Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none

Cave Name	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Pennie's Cave		Land owner closed entrance with fill material. WPD is potentially negotiating a setback including possible excavation of entrance		none
Pickle Pit	Gated	Private- Unknown	COA, Loomis staff, and USFWS conducted one cave faunal survey	none
Pipeline Cave	Metal frame [1]	WPD have negotiated a small setback from future platted development		none
Rolling Rock Cave	tract is fenced with a 8' game fence	Protected on preserve	COA quarterly surface and Annual species monitoring RIFA control	none
Root Cave		Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Slaughter Creek Cave	Gated	Protected on parkland (Nearby homes are immediately south of cave entrance)	COA quarterly surface and annual species monitoring RIFA control	none
Spanish Wells		Private- Unknown		none
Spider Cave	Fenced (ranch fence)	Protected on preserve	COA quarterly surface monitoring bi-annual cave cricket exit counts bi-annual species monitoring RIFA control	none
Stark's North Mine		Private - Unknown		none
Stovepipe Cave	Fenced (ranch Fence) preserve boundary	Protected on preserve	COA quarterly surface monitoring bi-annual cave cricket exit counts bi-annual species monitoring RIFA control	none
Talus Springs Cave	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

Cave Name	Gated/ Fenced	Protection Area Status /Adequate Preserve size	Species Monitoring Status	Public Access
Tardus Hole	Fenced	Protected on preserve	TC bi-annual surface monitoring; RIFA survey/control; annual species monitoring	none
Tooth Cave	Gated	Protected on preserve	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; RIFA survey/control; bi-annual species monitoring	none
Weldon Cave		Private - Unknown	TC bi-annual surface monitoring; bi-annual cave cricket exit counts; bi-annual species monitoring	None
Whirlpool Cave	Gated	Protected by TCMA	TCMA species and surface monitoring	controlled access**

[1] Needs gate repairs/improved gate

* Access by Permit - Permit may be issued by COA – Austin Water Utility or PARD staff.

** Controlled Access - Private cave owners control the access

*** Access by Permit- Permit may be issued by TCMA

4.0 ACCESS STATUS AND KARST EDUCATION

The BCCP Land Management Plan (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 karst land management plan. BCP partners strive to provide education opportunities through events such as BCP guided tours, youth education programs, an annual Cave Day Festival, public presentations, and in-cave field trips to professionals, caving enthusiasts, and the general public (see annual summary below). However, currently there 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 percent of the BCCP permit caves, which have been used for this purpose prior to the 1996 permit. BCCP permit cave Whirlpool Cave (privately-owned) likely has the highest traffic of all the 62 permit caves, previously reported as high as 1,000/year. It is assumed that traffic, particularly at the levels experienced in Whirlpool Cave, may impact the cave fauna. One exception is a non-BCCP permitted Wildflower Cave, used for education by COA Earth Camp after it was restored by cleaning out trash fill in 1997. Wildflower Cave is unsuitable for many cave tours due to its limited extent and small size, but is heavily utilized in 5th grade Earth Camp cave education (see Cave Education Summary below).

By developing non-BCCP permit caves as safe and accessible alternatives for adequately trained and responsible groups to use for guided education/recreation, the BCP can promote karst education while reducing BCCP-permit cave impacts. Non-BCCP permit education caves should draw traffic from BCCP permit caves and provide a greater range of experience. Initiatives are underway to increase the availability of non-permit education caves, roughly at a rate of a cave a year.

FY11 Access Status

In FY11, 131 visitors were issued access permits to COA BCP caves for educational/recreational/rescue training including: District Park Cave (15) and Goat Cave (116). In addition, TCMA issued access permits to 715 visitors at Whirlpool Cave for education/ rescue training. See Table 3 for access and gating status of all of the BCCP caves.

In 2011, WPD developed a memo of understanding with the University of Texas Lady Bird Johnson Wildflower Center to restore LaCrosse Cave (a non-BCCP permit cave) and make it safe for guided public education. Restoration on LaCrosse Cave commenced in December 2011 by COA WPD with assistance from Parks and Recreation rangers staff. Though not a BCP cave, LaCrosse Cave is being used to help with cave education. Use of non-BCP caves for education takes the pressure off of the desire to use BCP caves for this purpose.

FY11 Cave Education Summary

COA WPD Youth Education Programs

The City of Austin WPD conducts cave education through Earth Camp (a fifth grade water quality program), Clean Creek Camp (a summer parent/child water quality program) and Hydrofiles (a high school water quality program).

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 (a non-BCCP permit 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 biologists and hydrogeologists. Students also investigate a sinkhole and visit Barton Springs and Splash! to learn of the connection of the recharge zone to the discharge area. Earth Camp is coordinated by Susan Wall, a former classroom (certified) teacher with an MS in science education. In FY11, Earth Camp guided 1,590 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.

In Summer 2011, Parent/Child Clean Creek Camp brought 30 students and parents into Wildflower Cave. Clean Creek Camp is a partnership between the City of Austin 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 9-12.

Hydrofiles reaches aquatic science, earth science and environmental science 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 cave tours. In FY09 WPD stopped offering cave tours due to the lack of access to a suitable cave.

Austin Underground - Because of the difficulty of offering a high school cave immersion experience, in 2011 WPD educators created a virtual field trip using video of the Geology, Hydrogeology, Barton Springs Salamander and Threats/Solutions of the Edwards Aquifer. A high school curriculum was also developed consisting of four lessons extending the learning about each topic covered.

Texas Cave Management Association

In FY11, management of Whirlpool Cave was delegated to Matt Turner and Lost Oasis Cave to Ron Ralph, both of TCMA. Whirlpool Cave supports the BCP as the most suitable cave for lengthy recreation/education trips. In FY11, Whirlpool Cave hosted 715 individuals, generally from the entrance to the Travis County room. These groups included school field trips (such as Austin Community College and the Girls School of Austin), Austin Nature & Science Center camps, Scout groups, Austin Fire Dept. rescue practice, and recreational cave groups. The Barton Springs/Edwards Aquifer Conservation District awarded TCMA volunteers, Matt Turner and Heather Tucek, for their outstanding contribution to education about caves, cave ecosystems, and the Edwards Aquifer through immersion cave experiences in Whirlpool Cave.

Annual Cave Day Festival

The Cave Day Festival returned to the Village at Western Oaks Karst Preserve in March 2011, hosted by Barton Springs/Edwards Aquifer Conservation District and TCMA. COA WPD and TC/COA BCP staff each presented booths, and provided a variety of education materials on the BCP, karst ecosystems, aquifers, and Grow Green earth-wise gardening information. More information on the 2011 Cave Day Festival is shown at:
http://www.bseacd.org/events/austin-cave-festival/

SH45 SW and Flint Ridge Cave

On August 9, 2011, Willy Conrad (Austin Water Utility BCP), Nico Hauwert (COA WPD), and Gordon Derr (COA Transportation Dept.) participated on a panel discussion by Envision Texas to answer questions about the challenges of building SH45 SW. Its current right-of-way is 150 ft from the cave entrance of Flint Ridge Cave, one of the 62 BCCP permit caves. The ROW also bisects its surface catchment and overlies portions of the cave. Transportation specialists on the panel addressed transportation challenges that the highway is intended to address. A written statement on the challenges was produced by the three COA panelists. Envision Texas had previously voted this year not to show SH45 SW on a regional transportation plan. A panel discussion immediately following discussed future preferred growth centers in Travis County, which included Barton Creek Mall and the Four Points intersection (FM620 at FM2222). The Four Points area includes perhaps the largest cluster of endangered species caves on the BCCP permit.

Cave Skills Field Trip

A cave skills trip was provided in June 2011 to 18 staff of City of Austin, Travis County, and Texas Parks and Wildlife Dept. in Dunvegan Cave, a non-BCCP permit cave. This field trip was presented by Nico Hauwert (COA WPD hydrogeologist), Mark Sanders (COA BCP cave biologist), Todd Bayless (TC BCP cave biologist), Pete Binon (COA WPD safety specialist), Jessica Gordon (COA WPD education specialist), and David Papke (COA PARD ranger). The emphasis of the in-cave field trip was on cave safety, surface-subsurface interaction, cave ecosystems, and cave education. Concerns and precautions for bat populations were also discussed in preparation for expected arrival of white nose syndrome.

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 and 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 this karst analysis. 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 have identified 25 caves within Travis County managed through BCP partners that provide a more evenly distributed dataset across cave clusters and karst faunal 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 have been synchronized 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 have 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, 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.

City of Austin FY11 Biological Monitoring

During FY11, 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). Annual faunal surveys were also conducted in: Arrow Cave, Beard Ranch Cave, Blowing Sink, Goat Cave, McNeil Bat Cave, Pickle Pit, and Slaughter Creek Cave (EXHIBIT A).

Zara Environmental Inc. staff conducted faunal surveys in Bomb Shelter, CV-1, Lamm Cave, Merkin Hole, and Smurf Cave.

In FY11 COA, with the help of volunteers, conducted bi-annual cave cricket exit counts at the same 15 caves pre-selected for faunal surveys. COA staff also conducted one cave cricket exit count at Jest John cave. (EXHIBIT B).

COA contracted with Weston Solutions, Inc., which in turn subcontracted with Zara Environmental, Inc. for biological survey work within the BCP (Zara 2010; Appendix P14). The objective of the project was to update the scientific knowledge base of karst invertebrates and the species data contained in *The Caves of the Balcones Canyonlands Conservation Plan, Travis County, 1997* in accordance with recommendations of the BCP Land Management Plan (2007). The project focused on endangered species identification and mapping in caves and karst features managed under the BCCP, with particular emphasis on *Neoleptoneta myopica*, *Tartarocreagris texana*, and *Texamaurops reddelli*. The updates generated during this effort were intended to increase knowledge about the occurrence and distribution of these endangered karst invertebrates, and to assess the recovery of these fauna as part of a status review of Travis County karst species. Several new endangered species localities were discovered on City and Travis County BCP properties. *Neoleptoneta myopica* was confirmed from Cortana Cave and Jester Estates Cave. Newly excavated features also yielded confirmed listed species. *Texella reddelli* has been confirmed at Merkin Hole, and RI-1. *Texella reyesi* was confirmed at IV-3. Although most of these new endangered species localities are not within BCCP caves, the findings are significant since these karst features are located on BCP lands and thus will be monitored and protected. This contract was completed in FY11.

Travis County FY11 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 2010/ Spring 2011 or Winter 2011/ Summer 2011 (EXHIBIT A). Annual faunal surveys were also conducted in FY11 in five other TC-owned BCCP caves with federally listed species: Kretschmarr Cave, New Comanche Trail Cave, North Root Cave, Root Cave, and Tardus Hole (EXHIBIT A). TC staff also conducted annual faunal surveys at three additional BCCP listed caves: Ireland's Cave, Fossil Garden Cave, and Talus Springs Cave, and one additional TC-owned BCP cave with listed ES: Two Trunks Cave (EXHIBIT A). One significant finding during faunal surveys included the collection and subsequent confirmation by a taxonomic expert of a *Rhadine persephone* in Amber Cave, which represents a new locality for this listed species (Reddell, pers. com 2010; Texas Natural Science Center, Invertebrate Zoology Collection #72,741). A summary of federally listed endangered karst invertebrates detected during faunal surveys of TC managed caves by fiscal year is reported below (Table 4).

In FY11, 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 2010/ Spring 2011 or Winter 2011/ Summer 2011 (EXHIBIT B).

Red-imported fire ant (RIFA) surveys were performed in Fall 2010 and Spring 2011 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 50 m radius around cave entrances, and all mounds found during surveys were treated with boiling water as recommended by USFWS (2001). In FY11, a total of 132 RIFA mounds were treated in cave survey areas (Fall 2010 =58 mounds; Spring 2011 =74 mounds). Survey results and treatments for individual caves are documented in Table 5.

In addition to managing the karst features required in the BCCP permit, TC voluntarily managed other karst features located on BCP land in FY11, including Cactus Pit, Brew Pot Cave, Kretschmarr Sink, Smurf Cave, SAS Salamander Cave and karst features RI-1, F11 and F12. Also in FY11, TC created a formal BCP Cave Monitoring Safety Protocol which identifies training requirements, safety gear, pre-entry planning, and emergency procedures for TC BCP staff conducting cave surveys. All TC staff involved in cave monitoring attended a Cave Safety/ Single Rope Techniques Training course in August 2011

Table 4. Listed Endangered Species karst invertebrates found in TC-owned BCP caves and karst features by fiscal year.

Cave Name	2005	2007	2008	2009	2010	2011
Amber Cave	No listed species observed	No listed species observed	*Texamaurops reddelli* *T. texana*	***R. persephone* *Texamaurops reddelli*	*Texamaurops reddelli*	*R. persephone* *T. texana*
Feature F11**	Not yet owned by TC	Not yet owned by TC	**N. myopica*	No survey done	No listed species observed	No survey done
Feature F12**	Not yet owned by TC	Not yet owned by TC	**T. reyesi*	No survey done	No listed species observed	No survey done
Gallifer Cave	**N. myopica* *T. reyesi* ***Texamaurops reddelli* *R. persephone*	*N. myopica* *T. reyesi* *Texamaurops reddelli* *R. persephone*	*N. myopica* *T. reyesi* *Texamaurops reddelli* *R. persephone*	No survey done	*N. myopica* *T. reyesi* *R. persephone*	*N. myopica* *T. reyesi* *R. persephone*
Geode Cave**	Not yet owned by TC	Not yet owned by TC	**N. myopica* **T. reyesi* **R. persephone*	No survey done	*T. reyesi* *R. persephone*	*N. myopica* *T. reyesi*
Kretschmarr Cave	No listed species observed	*Texamaurops reddelli*	No listed species observed	No survey done	No listed species observed	*Texamaurops reddelli*
Kretschmarr Double Pit	No survey done	*T. texana*	No listed species observed	*T. texana*	No listed species observed	No survey done
McDonald Cave	*T. reyesi*	*T. reyesi*	*T. reyesi*	*T. reyesi*	*T. reyesi*	*T. reyesi*
New Comanche Trail Cave	Not yet owned by TC	Not yet owned by TC	*N. myopica*	No survey done	*T. reyesi*	*N. myopica*
North Root Cave	No survey done	No listed species observed	No listed species observed	No survey done	No listed species observed	No listed species observed
Feature RI-1**	Feature unknown	Feature unknown	Feature unknown	Feature unknown	**Texella reddelli*	No survey done
Root Cave	No survey done	***N. myopica*	No listed species observed	No survey done	No listed species observed	*N. myopica*
Tardus Hole Cave	No survey done	***Texamaurops reddelli*	No listed species observed	No survey done	No listed species observed	No listed species observed
Tight Pit**	No survey done	No survey done	No survey done	No survey done	**N. myopica*	No survey done
Tooth Cave	*T. reyesi* *Texamaurops reddelli*	*N. myopica* *T. reyesi* *Texamaurops reddelli* *R.. persephone*	*N. myopica* *T. reyesi* *R. persephone*	*N. myopica* *T. reyesi* *Texamaurops reddelli* *T. texana*	*N. myopica* *T. reyesi* *Texamaurops reddelli* *T. texana* *R. persephone*	*N. myopica* *T. reyesi* *R. persephone*
Two Trunks Cave**	No survey done	No listed species observed	No survey done	No survey done	No listed species observed	No listed species observed

* *new record (not previously observed in this location and not listed in BCCP EIS-HCP and 10a Permit, if BCCP cave)*

** *Karst features not listed in BCCP EIS-HCP and 10a Permit*

2011 Hydrogeologic Studies

Hydrogeologic studies are being prepared for several of the 62 BCP permit caves each year. These studies describe the local geological influences on cave development and groundwater flow, 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.

McNeil Cluster

Hydrogeological studies were completed on Dec. 10, 2010 for the McNeil Cave cluster caves of Fossil Garden, No Rent, Weldon, and McNeil Bat Cave This study gathered geological and bedding dip data from the surface outcrops, cave exposures, and three borings to examine bedding dip and stratigraphic controls on vadose flow to cave drips. New cave maps were drafted for three of the four caves that map drip locations and elevations. No direct tracing from the surface to cave drips was conducted for this study. After the completion of the report on May 10, 2011, the lower drips in McNeil Bat Cave was sampled to further characterize the source. The sample has not been analyzed by all of the labs at this time.

Blowing Sink/Goat/Maple Run Caves

A hydrogeological study for Blowing Sink, Goat, and Maple Run Caves is being conducted in 2011 and 2012 by COA WPD and Zara Environmental. Zara hydrogeologists are monitoring drip rates and tracing selected surface sites to help define subsurface catchment areas to drips and cave streams. The onset of drought in 2011 has delayed the commencement of soil tracer injection since the study relies on natural rain events.

In 2010, a tracer injected in Wildflower Cave by COA WPD (Nico Hauwert) was detected in dye receptors placed in the cave stream of Blowing Sink Cave (one mile east) and recovered by COA BCP staff (Mark Sanders) and TCMA volunteers (Heather Tucek, Devra Heyer, and Sandi Calhoun). This successful tracer recovery provides an important breakthrough for delineating source areas for Blowing Sink Cave.

Five sinkholes (Winter Woods, Wyoka, Williams Well, Sinky Dinky, and Brownlee) roughly overlying the subsurface extent of Blowing Sink Cave are experiencing sediment and erosion problems as flows breach temporary cave gate structures. This sediment and erosion problem is compounded with frequent trespassing and vandalism of this site. The WPD (project manager Nico Hauwert) is overseeing a project to fence the tract, conduct an engineering study, and

construct suitable sediment and erosion structures to replace the currently collapsing entrances. Funding for the project begins in FY13.

Jester Estates Cave

In FY11, COA WPD and BCP staff initiated a hydrogeologic study of Jester Estates Cave (APPENDIX P6). In 2008, staff observed heavy saturation on the surface and in the cave and signs of discharge from a swimming pool upslope of the cave entrance. Hydrogeologic data collected in FY11 included a new cave map, surface and cave stratigraphy, water-quality sampling of a floor pool, and mapping of the surface catchment area. A drip gauge was installed on November 22, 2011 to measure variation in drip rates.

Flint Ridge Cave

Flow monitoring of runoff into Flint Ridge Cave from its surface catchment area was continually monitored by flow stations maintained under Roger Glick, PE (COA WPD). Soil tracing conducted in 2007 was temporarily stopped after a drought dried the drips. As the study is incomplete, additional work is necessary before the results can be completely analyzed and a report completed. Additional funding sources are needed so the study can continue. No soil tracing was conducted in FY11, although it is hoped that the study can continue in 2012.

7.0 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, so 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 for caves known to have listed species that have been found on COA, TC, or other BCCP partner lands since the permit was issued. During FY2012, COA and TC will continue evaluating the adequacy of protection of 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 from the same cave. It is recommended that COA, TC, and USFWS initiate efforts to answer this question.

City and Travis County BCP staff met with James Reddell (TMM), Cyndee Watson (USWFS) and Jean Krejca (Zara Environmental) to strategize on how to determine to species level cave fauna found in BCP caves, with emphasis on determining SOC localities. Staff generated a list of species that need to be identified, primarily *Speodesmus* sp., and *Eidmannella* sp., and considered taxonomic experts that may be willing to perform the identifications. Also at this meeting, James Reddell was able to confirm the accuracy of *Tartarocreagris texana* as a locality for M.W.A. Cave and also confirmed *Texamaurops reddelli* for Japygid Cave and M.W.A Cave.

8.0 KARST MANAGEMENT ACTIVITIES

The BCP Land Management Plan outlined planned activities concerning the 62 BCCP karst features. Table 5 below includes a summary of activities completed in FY11.

Table 5. FY11 BCCP Karst 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 frequent 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. The City of Austin BCP drafted plans for a cave gate which will be installed within 18 feet of the entrance of the cave. The cave gate will not only protect the cave from ongoing vandalism, but also will serve to protect the public from future accidents involving un-trained access. 4. The UT Speleological Society takes beginner cavers into this cave, teaching beginners the proper caving etiquette to safely access caves with minimal impacts. 5. COA and Travis County staff removed trash and graffiti from the cave.
Amber Cave Travis County 1 .Performed frequent 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 Fall 2010 and four mounds in Spring 2011. 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

Table 5. FY11 BCCP Karst Monitoring and Management Activities.
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. 3. Inspected site for RIFA infestations. On all visits though fire ants 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 red imported fire ants 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 monthly and noticed that vandals had cut the gate. Staff repaired the gate, installed security cameras, repaired perimeter fence, added "no trespass" signs, and met with COA Parks and Recreation Dept. (PARD) Rangers in an effort to increase on site patrols. 2. Treated site for fire ants with boiling water. 3. Completed cave faunal survey (See EXHIBIT A). 4. Initiated a new 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 may be deeded to PARD. The 26 acre parcel is immediately south of blowing sink cave, and includes a new cave and well. If the property is transferred, we will also 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 WPD Engineer to determine the best method to accomplish this goal. 9. In an effort to better understand the hydrology of the cave, volunteers attempted a cave dive at the sump, unfortunately only a small amount of passageway was mapped due to tight constrictions.
Broken Arrow Cave City of Austin 1. Inspected quarterly with no sign of human visitation or vandalism. 2. Treated site for fire ants 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.

Table 5. FY11 BCCP Karst Monitoring and Management Activities.
Cave X Private 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 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. 4. Regents staff conduct periodic surface inspections of the cave including gate and lock maintenance. 5. The City of Austin's BCP staff worked on a proposal to take over sub-surface management duties.
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 fire ants 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 currently exploring the possibility of ownership and/or management of 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, staff noted that the fence was cut, 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 faunal surveys and 4 cave cricket exit counts (See EXHIBIT A and B).
Disbelievers Cave Private 10a Permit: PRT-808694
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 fire ants with boiling water.
Eluvial Cave Private 10a Permit: PRT-808694
Flint Ridge Cave City of Austin 1. Conducted 6 site visits and noted no signs of illegal trespass. 2. Treated site for fire ants with boiling water, as usual, staff treated numerous active mounds due to favorable habitat (opened up and disturbed). . 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.

Table 5. FY11 BCCP Karst Monitoring and Management Activities.
Fossil Cave City of Austin 1. Inspected quarterly and there was no new signs of vandalism 2. Inspected for RIFA infestations. On all visits though fire ants were observed within close proximity of the "suspected" cave (but not inside the cave).
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 frequent 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 Fall 2010 and five mounds in Spring 2011. 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. The annual Village of Western Oaks Karst Day was held in March 2011, providing a great opportunity to educate the public about the importance of karst ecosystems.
Goat Cave Karst Preserve 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 by vandals, many of the repairs were reported by our volunteer land steward and in some cases the volunteer made the needed repairs. 6. Initiated a new in-depth hydrological study to determine the potential impacts of a new road extension and realignment of Davis Lane. 7. AFD conducted 3 cave rescue training scenarios with an emphasis on cross training local cave volunteers. The idea is to get AFD staff aware of local cavers' abilities and what they can offer during a real cave rescue event.
Hole-in-the-Road Cave Private 1. WPD initiated a hydrological study in an attempt to determine potential negative impacts from a proposed new water line.
Ireland's Cave Private 1. A new subdivision; Somerset Estates has been built around the cave. 2. City of Austin WPD obtained 4. 819 acres critical environmental feature setback surrounding the cave. About 99% of the cave's natural catchment area is preserved. The entire 4.819 acres setback will be fenced with a combination of 6-ft wood and wrought fencing. Currently the cave entrance is blocked with large rocks. 3. TC is working with Muirfield Homeowner Association to acquire the tract containing the cave or develop a conservation easement agreement with the HOA. 4. TC/COA performed a surface inspection and noted signs of vandalism and trespass both to the cave entrance and inside the cave. 5. TC/COA conducted an annual cave faunal survey (see EXHIBIT A).

Table 5. FY11 BCCP Karst Monitoring and Management Activities.
Jack's Joint Cave Private
Japygid Cave Private 10a Permit: PRT-808694
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 though fire ants 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 on site visits with 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) initiated a hydrological study of this cave, including: remapping the cave interior, determined the surface drainage, and took water samples in an effort to determine if the cave is being negatively impacted by adjacent development. 3. Treated site twice for fire ants 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
Kretschmarr Cave Travis County 1 .Performed frequent 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 Fall 2010 and 17 mounds in Spring 2011. 4. Conducted annual cave faunal survey (see EXHIBIT A).
Kretschmarr Double Pit Travis County 1 .Performed frequent 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 2011.
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. 4. City and Zara staff conducted one cave faunal survey (See EXHIBIT A).

Table 5. FY11 BCCP Karst Monitoring and Management Activities.
Little Bee Creek Cave City of Austin 1. Conducted 2 site visits. 2. Conducted bi-annual cave faunal survey (See EXHIBIT A). 3. Conducted bi-annual cave cricket exit counts. (See EXHIBIT B).
Lost Oasis Cave TCMA 1. COA took GPS coordinates using a Trimble unit in an attempt to get a precise location which will enhance our ability to accurately assess the level of protection defined by multiple parameters assessed through GIS.
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). . With the help of volunteer stewards, conducted bi-monthly site inspections, removed trash from preserve area and reported on anything out of the ordinary. 3. Permitted access to this cave is allowed. 4. Treated site for RIFA with boiling water. 5. Initiated a new 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 frequent 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 one mound in Fall 2010 and two mounds in Spring 2011. 4. Conducted bi-annual cave faunal surveys (see EXHIBIT A). 5. Conducted bi-annual cave cricket exit surveys. (See EXHIBIT B).
McNeil Bat Cave Private 1. COA BCP staff conducted one cave faunal survey (See EXHIBIT A). 2. WPD completed a hydrological study in an attempt to determine potential negative impacts from a proposed new water line.
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).
M.W.A. Cave Private 10a Permit: PRT-808694 (see FWS files for status)
Moss Pit Cave Private
New Comanche Trail Cave Travis County 1 .Performed frequent 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 15 mounds in Fall 2010 and two mounds in Spring 2011. 4. Conducted annual cave faunal survey (see EXHIBIT A).

Table 5. FY11 BCCP Karst Monitoring and Management Activities.
No Rent Cave Private 1. WPD completed a hydrological study in an attempt to determine potential negative impacts from a proposed new water line. 3. COA took GPS coordinates using a Trimble unit in an attempt to get a precise location which will enhance our ability to accurately assess the level of protection defined by multiple parameters assessed through GIS. 4. BCP staff removed old trash from the cave.
North Root Cave Travis County 1 .Performed frequent 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 Fall 2010 and ten mounds in Spring 2011. 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.
Pickle Pit Cave Section 7 Permit 2-15-93-F-075 (1. Staff from Loomis, USFWS, and COA met on site, repaired the cave gate, installed a new lock, removed trash and conducted a cave faunal survey (See EXHIBIT A).
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 frequent 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 Fall 2010 and ten mounds in Spring 2011. 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, 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.

Table 5. FY11 BCCP Karst Monitoring and Management Activities.
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 Private
Stovepipe Cave 1. Conducted 6 site inspections, and continued to remove old trash from the preserve. 2. Repaired perimeter fence. 3. Surveyed the site for RIFA infestations and determined that no treatment was necessary. 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 50 m of cave. 4. Conducted annual cave faunal survey (see EXHIBIT A).
Tardus Hole Cave (Kretschmarr Fluted Sink) Travis County 1 .Performed frequent 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 Fall 2010 and one mound in Spring 2011. 4. Conducted annual cave faunal survey (see EXHIBIT A).
Tooth Cave Travis County 1 .Performed frequent 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 ten mounds in Fall 2010 and five mounds in Spring 2011. 4. Conducted bi-annual cave faunal surveys (see EXHIBIT A). 5. 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. 4. Staff noted a wild goat living in the cave as recently as February 2011,with droppings covering most of the upper portion of the cave. By August 2011, the goat had deceased, and conditions had improved inside 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. COA took GPS coordinates using a Trimble unit in an attempt to get a precise location which will enhance our ability to accurately assess the level of protection defined by multiple parameters assessed through GIS.

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EXHIBIT A:

KARST FAUNAL SURVEY REPORTS

FY11 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* (Blind)**	***Eidmannella rostrata***	***Eidmannella* sp.**	***Neoleptoneta* sp.**	***Speodesmus bicornourus***	***Speodesmus* sp.**	***Tartarocreagris infernalis***	***Texoreddellia texensis***	***Trichoniscidae* sp.**	**Other notable species detected**
Adobe Springs Cave	12/2/2010	TC																									*Brackenridgia* sp. (4)
Airmen's Cave	1/18/2011	COA							13											9							
Airmen's Cave	8/4/2011	COA							19											2		1					
Amber Cave	12/7/2010	TC		1							3												2		1		
Amber Cave	5/25/2011	TC			1						6												17				
Arrow Cave	9/8/2011	COA							16					1									2				
Beard Ranch Cave	1/25/2011	COA						4										1									
Blowing Sink Cave	10/14/2010	COA							1					6							1		3		1		*Eurycea* sp. (1)
Broken Arrow Cave	11/22/2010	COA																7					1				*Batrisodes* sp. (1) *Stygobromus* sp. (2)
Broken Arrow Cave	5/24/2011	COA																7					6				*Batrisodes* sp. (2) *Stygobromus* sp. (1)
Cave Y	1/21/2011	COA							5														1				*Texella grubbsi* (1) *Perimyotis subflavus* (1)
Cave Y	8/1/2011	COA							8														4		1		*Texella grubbsi* (5)
Cold Cave	2/23/2011	TC						3							1			8					33				*Batrisodes uncicornis* (4)
Cold Cave	8/31/2011	TC						4										2					44				*Batrisodes uncicornis* (1)
Cortana Cave	1/31/2011	COA	33					1												14							
Cortana Cave	8/18/2011	COA	30					3										2		5			3				
Cotterell Cave	1/28/2011	COA						2										51					1				*Tartarocreagris* sp. (1)
Cotterell Cave	8/3/2011	COA						15										56				4		5			
District Park Cave	11/18/2010	COA							16					1													
District Park Cave	5/23/2011	COA							21					2									1		1		
Flint Ridge Cave	11/23/2010	COA							39					1						11			57				*Texella mulaiki* (5)

			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* (Blind)**	***Eidmannella rostrata***	***Eidmannella* sp.**	***Neoleptoneta* sp.**	***Speodesmus bicornourus***	***Speodesmus* sp.**	***Tartarocreagris infernalis***	***Texoreddellia texensis***	***Trichoniscidae* sp.**	**Other notable species detected**
Flint Ridge Cave	5/31/2011	COA							22					1						2			30				
Fossil Garden Cave	5/10/2011	TC																									
Gallifer Cave	2/2/2011	TC	11	1				27		18													3				*Perimyotis subflavus* (3)
Gallifer Cave	8/18/2011	TC	3					19		30										1					1		*Batrisodes uncicornis* (4)
Geode Cave	2/2/2011	TC	17					6										2					1				
Geode Cave	8/3/2011	TC	2					1				2															
Goat Cave	8/30/2011	COA							4							4				3							*Texella mulaiki* (5)
Irelands Cave	2/10/2011	TC							6					3					1								
Jester Estates Cave	11/17/2010	COA	8				2											4		2			3				
Jester Estates Cave	5/24/2011	COA	11		1	6	4											6		1			3				
Kretschmarr Cave	12/2/2010	TC				1					7	1								2							
Little Bee Creek Cave	11/10/2010	COA					3		1														1				*Batrisodes* sp. (1)
Little Bee Creek Cave	5/31/2011	COA				1			4																		
Maple Run Cave	1/20/2011	COA							3														1				*Texella mulaiki* (1)
Maple Run Cave	8/30/2011	COA							5														1				*Anapistula* sp. (5) *Texella mulaiki* (1)
McDonald Cave	1/26/2011	TC						2			6							9	15			7		3		1	
McDonald Cave	8/10/2011	TC						4			6		9					22	8			11			1		
McNeil Bat Cave	11/12/2010	COA	7					15							19			6		3			3				*Brackenridgia* sp. (2)
Midnight Cave	1/27/2011	COA							44					7						~ 100			2				*Batrisodes* sp. (7) *Brackenridgia* sp. (2)
Midnight Cave	8/19/2011	COA							10											80			2		1	3	*Batrisodes* sp. (8)
New Comanche Trail Cave	2/1/2011	TC	13																								
North Root Cave	6/9/2011	TC																		2					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* (Blind)**	***Eidmannella rostrata***	***Eidmannella* sp.**	***Neoleptoneta* sp.**	***Speodesmus bicornourus***	***Speodesmus* sp.**	***Tartarocreagris infernalis***	***Texoreddellia texensis***	***Trichoniscidae* sp.**	**Other notable species detected**
Pond Party Pit	1/25/2011	COA						2												5	1		2				*Tartarocreagris* sp. (2)
Pond Party Pit	8/2/2011	COA						4												9			12	5		3	*Rhadine* sp. (3)
Rolling Rock Cave	11/22/2010	COA																1									*Perimyotis subflavus* (2)
Root Cave	6/9/2011	TC	1																						1		
Seibert Sink	1/21/2011	COA							2								1				3						
Seibert Sink	8/1/2011	COA							3								1			4	1		25				
Slaughter Creek Cave	9/8/2011	COA							11														20				
Spider Cave	11/17/2010	COA					1	1										10		1			2				
Spider Cave	5/24/2011	COA					6											18		1			1				
Stovepipe Cave	1/25/2011	COA		3		1		12					2					3		1			54			2	
Stovepipe Cave	8/2/2011	COA		2		1		16										2		4			48				
Sunset Valley Cave	9/7/2011	TC																							1		
Talus Spring Cave	9/8/2011	TC																									*Stygobromus* sp. (3)
Tardus Hole	12/16/2010	TC																									
Tooth Cave	12/7/2010	TC		4				41			10											2					*Perimyotis subflavus* (1)
Tooth Cave	5/25/2011	TC	2					59			11	2															
Two Trunks Cave	8/30/2011	TC																		3							
Weldon Cave	2/16/2011	TC						1			6				14					1							
Weldon Cave	8/16/2011	TC						1			1				12							3					

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

[2] Surveyors in FY11 include Amanda Aurora, Todd Bayless, John Chenowith, Renee Fields, Paul Fushille, Jason Hunt, Linda Laack, Rebekah McIntyre, Kelly Nasvacil, Bill Reiner, Mark Sanders, William Simper, and Chris Warren.

EXHIBIT B:

CAVE CRICKET EXIT COUNT DATA REPORTS

FY 11 COA/TC CAVE CRICKET EXIT COUNT DATA REPORTS

Surveyed Caves	Fall 2010 (November)				Winter 2011 (January/February)				Spring 2011 (May)				Summer 2011 (August/ September)			
	N:	J:	A:	TI:	N:	J:	A:	TI:	N:	J:	A:	TI:	N:	J:	A:	TI:
Adobe Springs Cave	5	1	3	9					2	62	201	265				
Airmen's Cave					142	30	6	178					134	18	3	155
Amber Cave	29	26	18	73					47	28	10	85				
Broken Arrow Cave	121	26	38	185					291	228	198	717				
Cave Y					241	11	1	253					289	517	323	1129
Cold Cave					1490	1321	56	2867					276	34	15	325
Cortana Cave					46	13	9	68					39	32	266	337
Cotterell Cave					374	67	23	464					196	48	14	258
District Park Cave	1360	342	164	1866					811	382	573	1766				
Flintridge Cave	1308	180	85	1573					251	40	67	358				
Gallifer Cave					1	1	0	2					2	26	39	67
Geode Cave					36	31	7	74					9	7	18	34
Jest John Cave													17	63	293	373
Jester Estates Cave	467	70	117	654					759	87	42	888				
Little Bee Creek Cave	15	2	0	17					0	0	14	14				
Maple Run Cave					631	278	104	1013					35	21	29	85
McDonald Cave					0	1	0	1					0	2	6	8
Midnight Cave					4384	359	46	4789					7910	2473	917	11300
Pond Party Pit					237	40	28	305					28	53	562	643
Seibert Sink					158	44	24	226					64	15	7	86
Spider Cave	35	8	6	49					58	34	92	184				
Stovepipe Cave					114	29	0	143					142	115	130	387
Tooth Cave	0	0	1	1					33	49	50	132				
Weldon Cave					244	501	159	904					126	31	168	325

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