Collaboration Cave Excavation

Balcones Canyonlands National Wildlife Refuge
Rogers Tract

By Colin Strickland

Mark Sanders and Colin Strickland initially visited the Balcones Canyonlands National Wildlife Refuge (BCNWR) on May 11th 2018 to look at some karst features that James Reddell recommended that we investigate. Scott Rowin, BCNWR Biologist, took us to look at the most promising features, Unnamed Sinks 8 & 9. These two features are about 12 feet apart and are connected. Feature # 9 has since been named Collaboration Cave by Scott Rowin, due to the collaborative efforts made between the BCNWR, James Reddell, and City of Austin Balcones Canyonlands Preserve (COA BCP) staff for this project. The initial descriptions and species found in Unnamed Sinks 8 & 9 (Collaboration cave) are shown below.

11th May 2018

Unnamed Sink 8

Location: Easting: 0593853, Northing: 3384654 (Strickland GPS-2018)
Description: Solution feature 19 in. x 14 in. x 6 ft. deep (0.48 m x 0.36 m x 1.83 m deep). Floor composed of soil and leaf litter over loose rocks. Floor area 3 ft. x 2 ft. (0.91 m x 0.61 m). Dug a little by hand at one end and broke through to another void. Distance from first dirt floor to second was 7.5 ft (2.29 m).
Comments: CO^2 Level was 2921 ppm
Species List:
Leiobunum townsendii (harvestmen): 6
Gryllidae (field cricket): 1
Pseudosinella violenta (springtail): ~200
Liposcelididae (booklice): 1
Chilopoda (centipede): 1, (1 collected)
Heterocera (moth): 1
Hymenompera (wasp): 1
Incilius valliceps (gulf coast toad): 1
Tachys (ground beetle): 1, (1 collected)
Photos: (Figures 1-3)



Figure 1. Entrance to Feature 8



Figure 2. Looking down entrance



Figure 3. Small hole dug to lower level

Unnamed Sink 9 (Collaboration cave)

Location: Easting: 0593845, Northing: 3384658 (Strickland GPS-2018)
Description: Solution feature 14 in. x 29 in. x 25.5 ft. deep (0.36 m x 0.74 m x 7.77 m deep). At the bottom it bells out to 8 ft. x 4.5 ft. (2.44 m x 1.37 m). The floor is composed of loose rocks covered in leaf litter. There is crack filled with rocks that goes down at least 6 ft (1.83 m) at a bearing of 106 degrees. Should be excavated to determine the caves full extent.
Comments: CO^2 Level was 5.30 % (53,000 ppm)
Species List:
Ceuthophilus secretus (texas cave cricket): ~100 Adults, ~20 nymphs, (2 adults collected)
Plethodon albagula (western slimy salamander): 1 adult
Eleutherodactylus marnockii (cliff chirping frog): 2
Diplura: 1, (1 collected)
**Trichoniscidae* (family of troglobitic isopods) 1, (1 collected)
**Speodesmus* sp. (cave millipede): 1, (1 collected)
Eidmannella (genus of spiders in the Nesticidae family): 5, (2 collected)
Tachys (genus of ground beetles): 10, (2 collected)
Pseudosinella violenta (springtail): ~500, (~10 collected)
Chilopoda (centipede): 1, (1 collected)
Lycosidae (Wolf Spider): 1
Leiobunum townsendii (harvestmen): 1
Photos: (Figures 4-7)



Figure 4. Entrance to Feature 9



Figure 5. *Ceuthophilus secretus* about half way down



Figure 6. Looking up from bottom



Figure 7. Crack extending downward

Unnamed features 8 & 9 are now referred to together as Collaboration Cave, since they are both entrances into the same cave. Feature 8 was plugged at about 6ft deep by rocks and soil. Feature 9 was about 25.5ft deep plugged with rocks and soil. Both Features looked promising, but we decided to focus our attention on feature 9 since it was much deeper. The main challenge to working in this cave was the high CO2. On our first visit the CO2 meter read 5.30% CO2. To fix this problem we employed a venting technique developed by the COA Watershed Protection Department (WPD) Cave Team. A "Bouncy Castle" fan is fitted with tubing and powered by a generator to blow surface air into the cave and displace the CO2 (Figure 9). Venting is generally done for about 10min, and generally brings CO2 levels down to at or below 1.0% CO2. Venting is repeated as CO2 levels rise to uncomfortable levels. We took CO2 readings with two CO2 meters (figure 8). The one referred to as Mark's is known to be reliable, while Speodesmus was purchased used, and seems to read low. We were trying to see how far off it was, since at low CO2 levels it reads similar to Mark's, but at high levels it tends to read much lower. Figure 10 shows the venting data from our 6/20/2018 visit and is representative of what we generally experienced. The Speodesmus meter had an error part way through, which is why it drops to 0% CO2.



Figure 8. Speodesmus meter (Top), Mark's meter (Bottom)



Figure 9. Venting, June 4th 2018

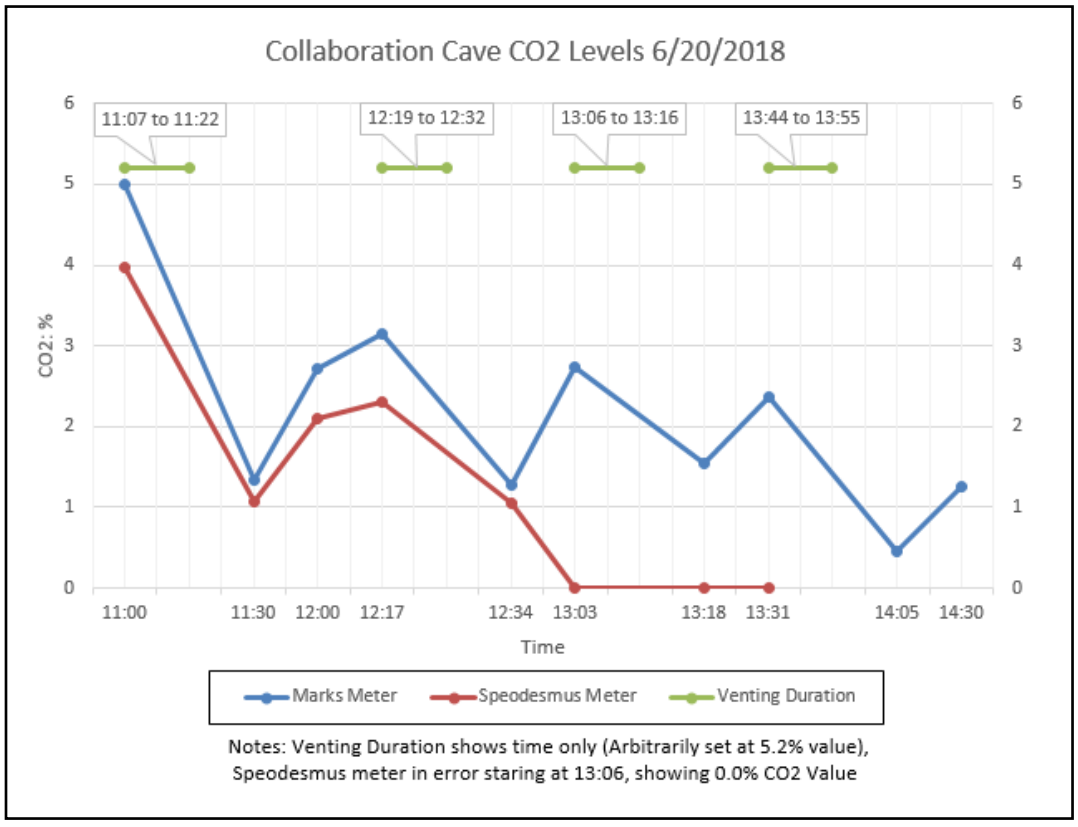


Figure 10. Venting at Collaboration Cave on 6/20/2018

We continued to work on excavating the cave on multiple occasions. The dates of these visits are shown in Table 1. We lowered the floor of what had been known as Feature 9 by slightly more than 10ft. All clean rock excavated from the cave was utilized as a protective berm, placed around the cave entrance to prevent future sediments from washing into the cave. Loose soil and sediment were evenly spread out away from the cave surface drainage basin. In an effort to reduce the threat of future red imported fire ant colonization, care was made not to pile too much soil in one area. The newly exposed passage extends approximately 20ft towards the plugged shaft of feature 8. There is a small cave stream flowing the length of this passage before dropping down a fissure. The stream is inhabited by stygobytic isopods (Genus: *Caecidotea*) and amphipods (Genus: *Stygobromus*) (Figure 11 & 12). We are continuing to excavate upstream. Once all promising leads have been exhausted, we will map the cave and then do a few more thorough faunal surveys.

Date	Work type
5/11/2018	Initial description & faunal survey
6/13/2018	Excavation
6/20/2018	Excavation
6/28/2018	Excavation
7/2/2018	Excavation
7/9/2018	Excavation
7/16/2018	Excavation
7/25/2018	Excavation
7/30/2018	Excavation
8/6/2018	Excavation
12/20/2018	Faunal survey & excavation

Table 1. Visits to Collaboration Cave



Figure 11: Stygobytic isopod (*Caecidotea*)



Figure 11. Stygobytic isopods (*Caecidotea*) and amphipods (*Stygobromus*) feeding on a drowned bark scorpion (*Centruroides vittatus*)