FM2222 Bypass Study Annual Update Report

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In February 2018, TxDOT and the USFWS agreed to allow COA BCP to use mitigation fees to conduct hydrogeological studies along FM 2222 and FM 620 in preparation of construction of a bypass road to alleviate traffic. TxDOT issued a $390,655 mitigation fee to COA BCP in August 2018. As a prerequisite for hydrogeological studies expected in FY21, BCP is locating springs, assessing the presence of salamanders and other subterranean life, and restoring previously filled caves and extending deeper portions of known caves in the area. A sufficiently deep portion of the caves must be excavated of fill to open drip areas that can be monitored and traced to, in order to delineate water source infiltration areas. The excavation also potentially restores new habitat, opens nutrient input connectivity, and allows monitoring of the caves. By monitoring the fauna and cave drips in newly opened passages and rooms, we can assess potential changes in humidity and ecosystem. In FY2018 AW BCP expended $1,782 in spring assessments related to this study. In FY2019, AW BCP expended a minimum of $46,069 for cave restoration on Cortana, Park West, and Stovepipe along with spring assessments related to this study (FY19 report Appendix T3). Table 1 shows the minimum FY20 expenditures of $79,967 for contracting cave restoration and purchasing supplies related to this study. The minimum total contracting and supply expenditures by AW BCP for this project is about $128,000.

Table 1. Some FY2020 Expenditures Related to FM2222 Bypass Assessment

Cost	**Task**
$2,960	Restore Spare Rib Cave on Park West Preserve
$42,000	Restore Wooden Derrick Cave and large sinkhole on Park West
$2,960	Restore Mossy Elm on Stovepipe Cave Preserve
$2,161	Cave restoration supplies
$29,886	Spring Assessments
$79,967	**Total** Minimum Contracting and Equipment Expenditures in FY2020

In 2020, AW BCP continued cave restoration and spring assessment on BCCP preserves near the FM 2222 bypass, as part of a study funded in part by TxDOT mitigation funds.

On July 11, 2020, contractor Rich Zarria opened a previously filled passage into Black-cap Cave on the Cortaña Preserve. The opened cave blew strong air, suggesting significant cave volume. A faunal survey was conducted on August 7, 2020 by permitted biologist Colin Strickland who found troglobitic species in the newly opened cave, including *Texella reyesi, Tashaneta myopica, and eyeless Eidmenella*

(Figures 1-3*)*. No drip areas were encountered in FY20, although additional cave passage is likely and will be further restored in FY21.



Figure 1. *Texella reyesi* in Black-cap Cave on 8/7/2020. Photo by Colin Strickland.



Figure 2. *Tayshaneta myoopica* in newly discovered Black-cap Cave on 8/7/2020. Photo by Colin Strickland.



Figure 3. *Eidmenella* sp. From Black Cap Cave on 8/7/2020. Photo by Colin Strickland.

Throughout FY2020, contractors from 4Caves excavated Wooden Derrick Cave and a large filled sinkhole on Park West. About 2,000 ft^3 of sediment was removed from Wooden Derrick Cave, and the pit continues into red clay rich sediment. A 6-inch diameter horizontal conduits trends northwest, otherwise the underlying clay ponds water up to a week after rain events. A sample of the clay was collected for age dating.

A large filled sinkhole temporarily identified as PWKD18 near Elm Sink and Spare Rib Cave The feature was initially identified in 2018 as a karst depression about 6 feet by 3 feet and 6 inches deep with several open aperture drains of about 1 inch in diameter. The sinkhole has been restored to dimensions of 50 feet by 25 feet and at least 15 feet deep. There is currently a very promising lead trending west, with an open aperture drain about 1 foot by 2 inches and fill material consisting of black dirt and rocks. About 4,000 $feet^3$ of sediment fill was manually removed and distributed across the nearby landscape.

In August 2020, Rich Zarria excavated a pit entrance to Spare Rib Cave on Park West Preserve to a depth of about 10 feet connecting to open bedding plane fissure and soil-filled leads. Over the year since its initial excavation, invertebrates are beginning to colonize this cave.

On Stovepipe Karst Preserve (Canyon Creek 3), Rich Zarria excavated Mossy Elm Cave entrance pit to a depth of 20 feet (Figure 4). In August 2020, stone tools were discovered by Rich in the excavated soil. The findings were reported to the Texas Historical Commission and work continued in FY21 as an archeological evaluation with goal of discovering an expected open horizontal passage.

Mossy Elm Cave has a similar pit entrance morphology to Stovepipe Cave, which is located about 400 feet southwest of Mossy Elm Cave. In 1990, Stovepipe Cave was excavated from a minor surface depression to a depth of 17.5 feet, where an open Habitat Hall passage was discovered as part of about 80 feet of horizontal cave passage. Stovepipe Cave remains one of the most significant endangered species ecosystems in Travis County. Justin Shaw of 4Caves installed a drip gauge in Stovepipe Cave on November 12th, 2020.



Figure 4. Mossy Elm Sink 2/5/2019 (Left), 3/21/2019 (Right), photos by Colin Strickland



Figure 5. Looking up the 20 feet deep pit into Mossy Elm on 12/15/2020. Photo by Nico Hauwert.

A report on assessment of AW BCP preserve springs for aquatic life in FY2020 is included in the appendices. Highlights from this assessment within the bypass area include: documentation of 5 springs on the Kent Butler tract and 34 springs on the Cortana and Steiner Ranch tracts. Among the springs sampled for invertebrates in fiscal year 2020, 3 were on Cortana and Steiner Ranch, resulting in the first known collection of groundwater fauna on these tracts. *Caecidotea reddelli*, collected from Squeaking Juniper and Steiner Sanctuary springs, is a species of concern protected by the Balcones Canyonlands Conservation Plan (BCP 2007a). *Stygobromus russelli*, collected from Greenbriar and Squeaking Juniper springs, is identified as an additional species of concern by the BCCP and is a critically imperiled state species of greatest conservation need (BCP 2007a, TPWD 2012). *Phreatodrobia nugax*, collected from Greenbriar, Squeaking Juniper, and Steiner Sanctuary springs, has a conservation status of vulnerable (Hutchins 2017).



Figure 6. *Caecidotea reddelli* at Chips Duet Spring, Bohls Tract, 12/9/2020, photo by Colin Strickland.



Figure 7. Cistern Spring, Franklin Tract, 10/8/2019, photo by Colin Strickland

After hydraulically significant karst features are carefully excavated and spring locations are mapped, AW BCP expects to inject organic tracers and monitor cave drips and springs to map subsurface catchment areas. This information can be used to define karst faunal areas where protection can be focused, as described in the 1994 endangered karst invertebrate recovery plan.