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. AW BCP believes the best protection for adjacent and nearby preserves is a deeper understanding of the resources there, and it is grateful to TxDOT for supporting this research through funding support. TxDOT issued a **$390,655** mitigation fee to COA BCP in August 2018. As a prerequisite for hydrogeological studies expected in FY22, 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).
- In FY20 expenditures of $79,967 were made for contracting cave restoration and purchasing supplies related to this study. In FY21, a minimum of $101,182 was expended as detailed below, primarily for cave restoration. In late FY21, AW BCP also completed a master contract for cave restoration to facilitate this work.

The minimum total contracting and supply expenditures by AW BCP for this project to date is about **$229,000.** Some additional expenditures related to water-quality sampling and drip monitoring have not been compiled or reported since it has not yet been analyzed as part of a hydrogeological study.

Table 1. Some FY2021 Expenditures Related to FM2222 Bypass Assessment/Preserve Restoration

Cost	Task
$91,422	Cave restoration on Parke West, Cortaña, Sam Hamilton, Kent Butler, and Stovepipe BCP Preserves
$1,255	Archeological analysis on Stovepipe Karst Preserve
$8,505	Spring Assessments
$101,182	Total

In FY21, 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. These AW BCP preserves include Stovepipe (Canyon Creek), Parke West, Kent Butler, Sam Hamilton, and Cortaña preserves. Travis County Steiner Ranch Preserve was also examined for spring fauna. The caves where restoration was conducted include Mossy Elm, the phenomenal Persephone Caverns, Gaping Maw Cave, Caverns of Sweet Nora, Black-Cap Cave, Lost Ham Cave, Super Bowl Cave, Spun Funnel Cave, BAR Sink, Pin and Feather, and FDR Sink. A more detailed description of their restoration and findings are included in Appendix I BCP Karst Monitoring and Management.

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:

Multiple Stygobromus species have been collected in BCP springs, including *Stygobromus balconis* from Mixon's Manumit (Forest Ridge/Bull Creek Park); *Stygobromus russelli* from Squeaking Juniper (Steiner Ranch), Greenbriar (Cortana), and *Stygobromus bifurcatus* from Surprise Amphipool (Jester), Robin's Secret (Kent Butler), Sanders Sow (Kent Butler), Misnamed Spring (Kent Butler), and Mixon's Manumit (Forest Ridge/Bull Creek Park). Individuals from three springs (Squeaking juniper (Steiner Ranch), and Steiner Sanctuary (Steiner Rancher) were identified to the *Stygobromus tenuis* group because they were juveniles and/or too small to distinguish to species. This group includes *S. balconis*, *S. bifurfactus*, and *S. russelli*.

Two stygobitic isopods have been collected: *Lirceolus hardeni* and *Caecidotea reddelli*. *L. hardeni* has been collected from Greenbriar (Cortana). C. reddelli has been collected from Springs of Promise (Kent Butler), Robin's Secret (Kent Butler), Greenbriar (Cortana), Squeaking Juniper (Steiner Ranch), and Steiner Sanctuary (Steiner Ranch). A gravid female *Lirceolus hardeni* collected from Greenbriar Spring.

Phreatodrobia nugax was collected from Steiner Sanctuary and Squeaking Juniper springs (Travis County BCP Steiner Ranch tract), Greenbriar (COA BCP Cortaña tract). Eyeless flatworms were collected from Steiner Sanctuary (Travis County's Steiner Ranch tract). These specimens await further taxonomic scrutiny. *Hyalella azteca*, an eyed amphipod, was collected from Greenbriar spring on the Cortaña tract.

Other species of interest were collected at springs in addition to stygofauna. An epigean sucking millipede (order Siphonphorida) was collected in a drift net at Steiner Sanctuary Spring (Steiner Ranch).

All species reported are new occurrence records. *Caecidotea reddelli* is a species of concern protected by the Balcones Canyonlands Conservation Plan (BCP 2007a). *Stygobromus russelli* is identified as an additional species of concern by the BCCP and a species status of vulnerable (BCP 2007a, Hutchins 2017). *Stygobromus balconis*, is a Texas state species of greatest conservation need with a conservation status of imperiled (TPWD 2020, Hutchins 2017). The BCCP identifies *Stygobromus bifurcatus* as an additional species of concern and it has a conservation status of vulnerable (BCP 2007a, Hutchins 2017). The individuals identified to the *Stygobromus tenuis* group were juveniles and too small to distinguish to species. This group includes *S. balconis*, *S. bifurfactus*, and *S. russelli*. *Phreatodrobia nugax* has a conservation status of vulnerable (Hutchins 2017).

Sphalloplana mohri is a BCCP species of concern with a conservation status of vulnerable (BCP 2007a, Hutchins 2017). White, eyeless flatworms have been collected from Steiner Sanctuary spring and observed in Testudo Tube cave. White, eyeless flatworms are assumed to be *Sphalloplana mohri*, being that it is the only stygobitic flatworm species described in Texas, with the exception of *Dendrocoelopsis americana* reported from Rockwell County (B. Hutchins pers. comm.); however, there is not currently a taxonomic expert available to confirm the identities of these collections.

Numerous other non-stygobitic species of interest were collected at springs. The sucking millipede (order Siphonophorida) collected from a drift net in Steiner Sanctuary spring is a terrestrial species occasionally observed in caves of the north Austin, Texas area (M. Sanders pers. comm.). In addition, multiple troglobitic specimens were collected in springs, including trichoniscids and white, eyeless millipedes and springtails. The BCCP lists the Speodesmus N. S. as a species of concern; however, preliminary identification indicates that the millipedes collected appear to be of the *Cambala* genus (C. Strickland pers. comm. 2021). In addition, the BCCP lists Trichoniscinae N. S. as a species of concern. We await further taxonomic scrutiny of these troglobitic species collected by species experts.

In addition to the continuation of cave excavation spring monitoring in 2022, 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.