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INVERTEBRATE RESEARCH IN SUPPORT OF THE BALCONES CANYONLANDS PRESERVE
Interim Report 2

Period of execution: July 01 – October 31, 2023

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Executive Summary

All scheduled research activities are progressing as planned and all relevant TCA-invaded sites are continuing to be studied. Following successful inoculations in 2020 and 2021, the TCA population at Pace Bend Park is declining with only small remnants of TCA remaining. TCA at Walnut Creek Park have shifted outside of the site boundaries but the spread of this population is being monitored. In August 2023, testing of inoculation efforts at McNeil Cave tract have indicated early signs of establishment of *M. nylanderiae* in this TCA population. In September 2023, no TCA was found at Emma Long Park after monitoring the spread of *M. nylanderiae* in this population since 2020, but additional monitoring is planned. The TCA population at Roy Guerrero has largely collapsed in the absence of *M. nylanderiae*. TCA populations located at the Collins Tract and Whirlpool Cave Tract of the BCP have collapsed below the level of detection.

Tawny crazy ant (TCA) population assessments

Background: In 2018, we began surveying the TCA population invading the Collins tract of the BCP and the Old Water Treatment Plant 4 Site. By Fall of 2022, TCA have been essentially eliminated from this area. Since 2018, additional areas of the BCP have been invaded and additional properties of importance for constraining TCA spread regionally have also become established. TCA continue to colonize sites in the Travis County area. These sites provide opportunities to accelerate our knowledge and better protect BCP sites. Some sites are also near BCP protected areas and thus the TCA in them present a direct risk of spread into areas of the BCP. All sites have the potential to be source populations for future BCP infestations.

At recently collapsed and some actively collapsing sites spring – summer pitfall trapping has been completed to assess whether TCA have actually disappeared from the sites and to gather baseline and early recovery data for suppressed native ant assemblages. Mapping and TCA detection sampling has also occurred and will continue into the fall. TCA population densities peak in the late summer and fall. Research activities at sites (Table 1) that retain dense TCA infestations will be conducted then.

Table 1: TCA Research sites 2023. Sites within the BCP or sites of special concern with active or recently collapsed TCA populations. Recently collapsed sites are sites where the TCA population declined below the level of detection within the past 2 years. Long-term collapsed are sites that previously held TCA populations that declined more than 2 years ago.

	Infected with *Mn*	**Uninfected with *Mn***
Active TCA Population	Pace Bend Park	McNeil Tract
	Walnut Creek Park	Roy Guerrero Park[1]
	Emma Long Park	
Recently Collapsed	Collins Tract	
Long-term Collapsed	Whirlpool Cave Tract	

[1]TCA have largely disappeared from R.G.P. absent Mn infection.

Ant assemblage assessment – Recently collapsed TCA sites

General Approach: Pitfall traps have been run at sites where TCA populations have recently collapsed or are in a rapid decline phase. These will help track the native ant recovery and inform of species with potential to recolonize the site. The species-specificity of *M. nylanderiae* will be further verified with molecular testing of native ant species from areas with *M. nylanderiae*-facilitated TCA decline. These areas, while TCA scarce, may be saturated with *M. nylanderiae* spores. In addition, bait transects have been run at these sites to assess the relative ecological dominance (fraction of available resources they capture) of the remaining ant taxa. Pitfall traps and baiting transect sampling will continue to be processed throughout the fall and winter of 2023.

Evaluation of TCA impacts on karst invertebrates

Background: Travis County Staff have added TCA density sampling into their existing survey methods for Weldon and No Rent Caves. UT Staff will process these samples in the winter of 2023.

Quantifying spread of the pathogen *M. nylanderiae* within TCA populations

Background: During the 2020 and 2021 field seasons we successfully established *M. nylanderiae* within the TCA infestation at Pace Bend Park. In May of 2023, we sampled transects radiating from known infected areas into uninfected areas at Pace Bend Park. This sampling regime will be repeated in the fall.

Inoculative releases of the microsporidian pathogen *Myrmecomorba nylanderiae*

Background: In spring of 2023, the McNeil Cave site is the only BCCP site that harbors a TCA population that is uninfected with the microsporidian, *M. nylanderiae*. Inoculations were first conducted in the summer of 2022. In April of 2023, establishment sampling was conducted, and all ants tested for infection by *M. nylanderiae*. We found no evidence of disease present in the TCA population at the site. In May of 2023, we conducted a follow-up inoculation. Inoculations were conducted with TCA nests collected from Emma Long Metropolitan Park.

Testing conducted for this inoculation effort in August 2023 has indicated that *M. nylanderiae* is beginning to establish itself at multiple inoculation stations within the McNeil Cave site. Establishment testing will continue into the fall of 2023.

Field Sampling Conducted at BCP and related sites in Travis County

Table 2: Field sampling efforts from July through October 2023. As all field work requires substantial back-end sample processing effort in the laboratory, the efforts to process the samples collected in the trips outlined below is ongoing.

Date	Site	Purpose
7/6/2023	Dick Nichols Park	Year 5 Ant Recovery Baiting
7/19/2023	Emma Long Park	Trap Nest Installation
7/20/2023	McNeil Cave Tract BCP	Trap Nest Installation
7/21/2023	Collins Tract BCP	Ant Recovery Baiting
7/24/2023	Collins Tract BCP	Ant Recovery Baiting
7/27/2023	Collins Tract BCP	Ant Recovery Baiting
7/28/2023	Emma Long Park	Non-TCA Mn Specificity Baiting
8/2/2023	Emma Long Park	Non-TCA Mn Specificity Baiting
8/2/2023	Emma Long Park	Trap Nest Collection
8/3/2023	McNeil Cave Tract BCP	Trap Nest Collection
8/8/2023	McNeil Cave Tract BCP	Mn Establishment Testing
8/8/2023	McNeil Cave Tract BCP	Trap Nest Collection
8/10/2023	Pace Bend Park	Trap Nest Installation
8/15/2023	McNeil Cave Tract BCP	Trap Nest Collection
8/16/2023	Pace Bend Park	Trap Nest Collection
8/17/2023	Emma Long Park	Trap Nest Collection
8/18/2023	Met Center	TCA Assessment and Mapping
8/22/2023	Emma Long Park	Trap Nest Collection
9/6/2023	McNeil Cave Tract BCP	TCA Density Pitfall Traps
9/7/2023	Walnut Creek Park	Pitfall Trap Installation
9/11/2023	Walnut Creek Park	TCA Density Pitfall Traps
9/12/2023	Pace Bend Park	Trap Nest Collection
9/12/2023	Pace Bend Park	TCA Density Pitfall Traps
9/26/2023	Emma Long Park	TCA Extent Mapping
9/27/2023	McNeil Cave Tract BCP	TCA Extent Mapping
9/29/2023	Pace Bend Park	TCA Extent Mapping
10/3/2023	Walnut Creek Park	TCA Extent Mapping
10/4/2023	McNeil Cave Tract BCP	TCA Extent Mapping