Herpetological Surveys of Wild Basin Nature Preserve and the Barton Creek Habitat Preserve. 2023

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Between 08 May 2023 and 05 June 2023, we conducted herpetological surveys at Wild Basin Nature Preserve (WB) and Barton Creek Habitat Preserve (Hereafter BCHP or simply "Barton Creek"), Travis County; Texas. Surveys consisted of pitfall arrays, each consisting of four five-gallon pitfalls separated by 25' of metal flashing or silt fencing arranged in either a linear or "Y" configuration. There were three active arrays at Barton Creek and six at Wild Basin. Within this time frame, traps were closed on 12 May 2023 and opened on 15 May 2023 (expecting heavy rains). Traps were also closed on 19 May 2023 (after check) and reopened on 21 May 2023. Additionally, individual pit falls within an array were closed periodically due to the presence of standing water or fire ants (*Solenopsis invicta).* In total there were 23 days of sampling, resulting in 537.6 "pitfall days" at Wild Basin and 266.4 pitfall days at BCHP where one pitfall day is equal to 1 pitfall trap active for 24 hours. Surveys utilizing the same arrays were also conducted during the same time of year in 2022 at Wild Basin Nature Preserve. This season, we did not utilize funnel traps in association with the pitfall arrays due to their low efficacy last year and potential overheating of captured animals.

Overall, we detected 25 individuals of seven species of amphibian and reptile at Barton Creek and 72 individuals of 8 species at Barton Creek. Total catch per unit effort (CPUE) for Wild Basin was 0.134 captures per pitfall day. For Barton Creek the CPUE was 0.094. These numbers obscure the fact that sampling at Wild Basin coincided with the dispersal of metamorphic amphibians during which large numbers of metamorphic *Lithobates berlandeiri* and *Incilius nebulifer* were captured. *Excluding* metamorphic amphibians, there were 38 captures at Wild Basin and a CPUE of 0.071. Table 1 provides a list of sites, their coordinates, configuration, sampling effort at each, and capture per unit effort.

Table 1. Drift fence arrays, effort, and CPUE on Wild Basin Nature Preserve and Barton Creek Habitat Preserve May 8th through June 5th 2023.

Site	ID	Latitude	Longitude	Fence Configuration	Pitfall Days	CPUE
Wild Basin	WB04	30.30979	-97.82168	Linear	89.97	0.044459
Wild Basin	WB05	30.30995	-97.81917	Linear	92.1	0.09772
Wild Basin	WB07	30.30759	-97.82055	Linear	92.29	0.075848
Wild Basin	WB08	30.30742	-97.81763	"Y"	79.02	0.063275
Wild Basin	WB10	30.30511	-97.82072	Linear	92.05	0.076046
Wild Basin	WB14	30.30553	-97.81363	"Y"	92.14	0.065118
Barton Creek	BCHP01	30.28939	-97.90978	Linear	90.59	0.099349
Barton Creek	BCHP02	30.28874	-97.90992	Linear	91.75	0.054496
Barton Creek	BCHP03	30.28817	-97.9091	Linear	84.07	0.130843

Table 2 shows all captures and CPUE for each site during the 2023 sampling period. All sites at Wild Basin were sampled in weeks 19–23 of the year in both 2022 and 2023 facilitating a direct comparison of species detected and detection rate. The sampling period in 2023 was significantly cooler than 2022 (average temperature 23.03 °C [15.1°–34.8°] vs. 27.54 °C [15.1–42.3°], $p < 0.000$). It was also significantly more humid (average % relative humidity 79.13 vs 64.3, $p < 0.000$) and there was more rainfall (95.1 mm vs 30 mm). However, rainfall between the start of the year and start of the surveys was similar: 212 mm in 2022 and 225 mm in 2023 (measured at Camp Mabry) but higher in the year preceding the 2022 survey than the 2023 Survey (927.1 mm vs 635 mm). Most of the difference in yearly rainfall is from the late spring/early summer of 2021. The conditions of the 2023 survey should favor both *Incilius nebulifer* and *Scincella lateralis* which prefer cooler and more mesic conditions. However, both species were detected at *far lower* numbers and rates in 2023. This suggests that there was poor recruitment/survival in 2022. The precipitous decline in both species is somewhat alarming. It remains to be seen if this represents a trend or annual variation. Tables 3 and 4 compare the total captures per site and the CPUE per site for each species for 2021,2022, and 2023 for the weeks 19-23 of the year. Other hypothesis about the difference in sampling rates include

- conditions in 2023 were more mesic and cooler than in 2022. Consequently, neither species needed to move as frequently or as far to stay within their preferred climatic envelope and therefore less likely to be detected using a drift fence array.
- the pit falls themselves collect moisture and remain cooler and therefore attract these species during hot and dry weather.

Table 2. Wild Basin captures per species and CPUE for the 2023 sampling effort. It does not include metamorphic amphibians.

Species	Count	CPUE
Aspidoscelis gularis	2	0.004
Incilius nebulifer	5	0.0094
Plestiodon tetragrammus	1	0.002
Pseudacris streckeri	7	0.013
Sceloporus olivaceus	14	0.026
Scincella lateralis	6	0.011
Tantilla gracilis	3	0.005
Total	38	0.071

Table 3. Captures per species per site at Wild Basin for weeks 19-23 of the years 2021, 2022, and 2023. Excludes metamorphic amphibians. Sites WB04, WB05, and WB, 10 were not active in 2021.

	WB04			WB05			WB07			WB08			WB10			WB14		
Species	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
Aspidoscelis gularis	-	1	0	-	0	0	0	3	0	0	2	1	-	0	0	0	4	1
Eleutherodactylus marnocki	-	0	0	-	1	0	0	0	0	0	0	0	-	1	0	0	1	0
Gerrhonotus infernalis	-	0	0	-	0	0	0	0	0	0	4	0	-	0	0	0	0	0
Incilius nebulifer*	-	0	0	-	0	1	0	0	1	5	10	2	-	6	0	7	24	1
Nerodia erythrogaster	-	0	0	-	0	0	0	0	0	0	0	0	-	0	0	1	0	0
Pantherophis obsoletus	-	0	0	-	0	0	0	0	0	0	1	0	-	0	0	0	0	0
Plestiodon tetragrammus	-	0	0	-	0	0	0	0	0	0	0	0	-	0	0	0	0	1
Pseudacris streckeri	-	0	2	-	0	1	0	0	2	0	0	2	-	0	0	0	0	0
Rena dulcis	-	1	0	-	0	0	0	0	0	0	0	0	-	0	0	0	0	0
Salvadora lineata	-	0	0	-	0	0	0	0	0	0	0	0	-	0	0	0	0	0
Sceloporus olivaceus	-	0	1	-	2	5	0	3	4	0	3	0	-	2	5	0	0	0
Scincella lateralis	-	0	0	-	6	2	0	0	0	0	4	0	-	6	1	4	6	3
Storeria dekayi texanum	-	0	0	-	0	0	0	0	0	1	0	0	-	0	0	0	0	0
Tantilla gracilis	-	1	1	-	1	1	0	0	0	0	0	0	-	1	1	0	0	0
Thamnophis proximus	-	0	0	-	0	0	0	0	0	0	1	0	-	0	0	0	0	0
Total	-	3	4	-	10	11	0	6	7	6	25	5		16	7	12	35	6

Table 4. Captures per unit effort per species per site at Wild Basin for weeks 19-23 of the years 2021, 2022, and 2023. Excludes metamorphic amphibians. Sites WB04, WB05, and WB, 10 were not active in 2021.

	WB04			WB05			WB07			WB08			WB10			WB14		
Species	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
Aspidoscelis gularis	-	0.006	0	-	0	0	0	0.018	0	0	0.011	0.013	-	0	0	0	0.024	0.011
Eleutherodactylus marnocki	-	0	0	-	0.006	0	0	0	0	0	0	0	-	0.006	0	0	0.006	0
Gerrhonotus infernalis	-	0	0	-	0	0	0	0	0	0	0.023	0	-	0	0	0	0	0
Incilius nebulifer	-	0	0	-	0	0	0	0	0.011	0.174	0.057	0.025	-	0.034	0	0.115	0.144	0.011
Nerodia erythrogaster	-	0	0	-	0	0	0	0	0	0	0	0	-	0	0	0.016	0	0
Pantherophis obsoletus	-	0	0	-	0	0	0	0	0	0	0.006	0	-	0	0	0	0	0
Plestiodon tetragrammus	-	0	0	-	0	0	0	0	0	0	0	0	-	0	0	0	0	0.011
Pseudacris streckeri	-	0	0.022	-	0	0.011	0	0	0.022	0	0	0.025	-	0	0	0	0	0
Rena dulcis	-	0.006	0	-	0	0	0	0	0	0	0	0	-	0	0	0	0	0
Sceloporus olivaceus	-	0	0.011	-	0.012	0.054	0	0.018	0.043	0	0.017	0	-	0.011	0.054	0	0	0
Scincella lateralis	-	0	0	-	0.036	0.022	0	0	0	0	0.022	0	-	0.034	0.011	0.066	0.036	0.032
Storeria dekayi texanum	-	0	0	-	0	0	0	0	0	0.034	0	0	-	0	0	0	0	0
Tantilla gracilis	-	0.006	0.011	-	0.006	0.011	0	0	0	0	0	0	-	0.006	0.011	0	0	0
Thamnophis proximus	-	0	0	-	0	0	0	0	0	0	0.005	0	-	0	0	0	0	0

Barton Creek Habitat Preserve

The arrays at Barton Creek Habitat Preserve were established to act as replicates of Wild Basin sites. To identify comparable sites, we used ArcGIS Pro to categorizes the landscape in terms of slope, aspect, vegetation height, and vegetation density using 1m resolution LiDAR data available from the USGS. Data were summarized at the 10m and 20m resolution and arrays at the BCHP were established where these values matched those of established arrays at Wild Basin. This year we established three pitfall arrays at sites that were both accessible and similar to Wild Basin sites. Table 5 contains the over capture and CPUE data for the 2023 sampling of the Barton Creek Habitat Preserve. Data for captures and CPUE for each individual array is found in the next section (Tables 7 and 8).

Table 5. Barton Creek Habitat Preserve Captures Per Species and CPUE for the 2023 sampling effort. It does not include metamorphic amphibians.

Species	Total	CPUE
Aspidoscelis gularis	7	0.026
Gastrophryne olivacea	10	0.038
Gerrhonotus infernalis	1	0.004
Plestiodon tetragrammus	1	0.004
Rena dulcis	3	0.011
Sceloporus olivaceus	2	0.008
Urosaurus ornatus	1	0.004
Total	25	0.094

Comparison of Wild Basin and Barton Creek.

Table 6. summarizes the Wild Basin Sites and their BCHP counterpart. Tables 7 and 8 summarize the species detected and the capture rates at each site. There were 6 species detected at the Barton Creek Habitat preserve sites that were not detected at their Wild Basin counterpart (*Aspidoscelis gularis*, *Gastrophryne olivacea*, *Gerrhonotus infernalis*, *Plestiodon tetragrammus*, *Rena dulcis*, and *Urosaurus ornatus*). Conversely, four species (*Incilius nebulifer*, *Pseudacris streckeri*, *Scincella lateralis*, and *Tantilla nigriceps*) were detected at the Wild Basin sites but not their BCHP counterpart. The disparity in species composition between the two sites is interesting. They are composed of similar habitat and the sampling sites are separated by just 9 kilometers.

Table 6. Location, effort, and CPUE at Wild Basin pitfall arrays and their BCHP counterpart

Wild Basin Site	Latitude	Longitude	Fence Configuration	Effort (pitfall days)	CPUE	BCHP Replicate	Latitude	Longitude	Fence Configuration	Effort (pitfall days)	CPUE
WB04	30.30979	-97.82168	Linear	89.97	0.0446	BCHP03	30.28817	-97.9091	Linear	84.07	0.131
WB07	30.30759	-97.82055	Linear	92.29	0.0758	BCHP01	30.28939	-97.90978	Linear	90.59	0.099
WB10	30.30511	-97.82072	Linear	92.05	0.0760	BCHP02	30.28874	-97.90992	Linear	91.75	0.054

Table 7. Captures per species per site at Barton Creek Habitat Preserve and Wild Basin.

	BCHP01	BCHP02	BCHP03	WB04	WB07	WB10
Aspidoscelis gularis	4	0	3	0	0	0
Gastrophryne olivacea	2	2	6	0	0	0
Gerrhonotus infernalis	0	1	0	0	0	0
Incilius nebulifer	0	0	0	0	1	0
Plestiodon tetragrammus	0	0	1	0	0	0
Pseudacris streckeri	0	0	0	2	2	0
Rena dulcis	3	0	0	0	0	0
Sceloporus olivaceus	0	1	1	1	4	5
Scincella lateralis	0	0	0	0	0	1
Tantilla gracilis	0	0	0	1	0	1
Urosaurus ornatus	0	1	0	0	0	0
Total	9	5	11	4	7	7

Table 8. Capture Rates per species per site at Barton Creek Habitat Preserve and Wild Basin

	BCHP01	BCHP02	BCHP03	WB04	WB07	WB10
Aspidoscelis gularis	0.0442	0	0.0357	0	0	0
Gastrophryne olivacea	0.0221	0.0218	0.0714	0	0	0
Gerrhonotus infernalis	0	0.0109	0	0	0	0
Incilius nebulifer	0	0	0	0	0.0108	0
Plestiodon tetragrammus	0	0	0.0119	0	0	0
Pseudacris streckeri	0	0	0	0.0222	0.0217	0
Rena dulcis	0.0331	0	0	0	0	0
Sceloporus olivaceus	0	0.0109	0.0119	0.0111	0.0433	0.0543
Scincella lateralis	0	0	0	0	0	0.0109
Tantilla gracilis	0	0	0	0.0111	0	0.0109
Urosaurus ornatus	0	0.0109	0	0	0	0
Total	0.0993	0.0545	0.1308	0.0445	0.0758	0.0760