



MEMORANDUM

TO: Kristy Kollaus, Chad Furl
FROM: Ed Oborny (BIO-WEST)
DATE: **June 28, 2023**
SUBJECT: EAHCP Critical Period Habitat Evaluation – 85 cfs – San Marcos System

SAN MARCOS SYSTEM: 85 cfs Habitat Evaluation

The EAHCP 85 cfs Habitat Evaluation was triggered for the San Marcos River in June and conducted on June 22nd. Per contractual requirement, the next habitat evaluation for the San Marcos River is scheduled for 80 cfs. As of this memorandum, the total system discharge in the San Marcos River is approximately 85 cfs (Figure 1).

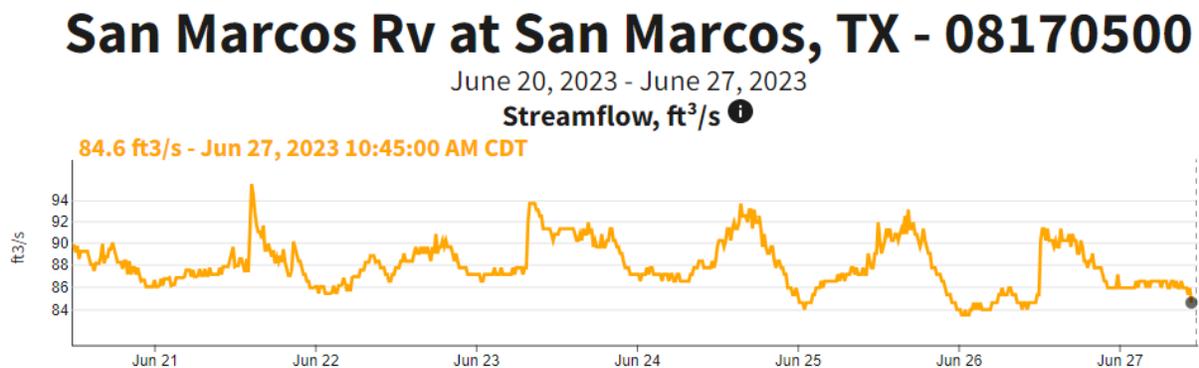


Figure 1. Total San Marcos River discharge over the past week (USGS 08170500 at San Marcos, Texas).

Water temperature is a key component system-wide as it is an underlying driver of spring-related aquatic assemblages. Recent trends in water temperature (°C) for June 2023 were assessed using temperature data loggers (HOBO Tidbit v2 Temp Loggers) at 8 permanent monitoring stations in the upper San Marcos River. Data for each monitoring station are based on 10-minute intervals and dates for recent trends extended from the last day that each data logger was downloaded to 16 days prior. Therefore, a maximum of 16 days were analyzed, rather than the usual 14 days. Two-week trends were examined from 6/1/2023 – 6/16/2023 at all stations except I-35 (6/1 – 6/15). At all stations, data were compared to long-term water temperature data measured at 4-hour intervals in June from 2001 – 2022 or to the greatest temporal extent available (Table 1). For analysis, two-week trends were compared to long-term data using boxplots to visualize differences in central tendency (i.e., median) and variation (e.g., interquartile range) (Figure 2). Drought conditions remain evident with June 2023 water temperatures being higher than the long-term monthly average at each station. However, at this time there are no water temperatures noted as a concern at stations longitudinally down the San Marcos River (Table 1, Figure 2).

Table 1. Summary of boxplot descriptive statistics comparing recent two-week and long-term trends in water temperature (°C) at 8 monitoring stations in the upper San Marcos Springs River for the month of June.

Station	Period	Lower Whisker	Lower Box	Median	Upper Box	Upper Whisker	Interquartile Range
Chute	Two-week	22.13	22.49	22.75	23.16	24.07	0.67
Chute	Long-term	20.75	21.59	21.92	22.15	22.98	0.56
Spring Lake Dam	Two-week	22.13	22.75	23.18	23.86	25.19	1.10
Spring Lake Dam	Long-term	21.50	22.16	22.42	22.85	23.87	0.69
City Park	Two-week	21.84	22.66	23.18	24.07	25.72	1.42
City Park	Long-term	21.67	22.28	22.66	23.12	24.38	0.84
Rio Vista Park	Two-week	22.08	22.75	23.23	24.03	25.67	1.27
Rio Vista Park	Long-term	21.34	22.27	22.72	23.40	25.08	1.13
I-35	Two-week	22.11	22.82	23.38	24.20	25.91	1.37
I-35	Long-term	21.67	22.39	22.80	23.52	25.22	1.13
Thompson Island - Natural	Two-week	22.06	22.99	23.59	24.41	26.01	1.42
Thompson Island - Natural	Long-term	21.11	22.50	23.03	23.84	25.84	1.34
Thompson Island - Artificial	Two-week	22.18	23.16	23.79	24.63	26.16	1.47
Thompson Island - Artificial	Long-term	21.63	22.62	23.28	24.03	26.05	1.40
Waste Water Treatment Plant	Two-week	22.20	23.28	23.93	24.73	26.13	1.45
Waste Water Treatment Plant	Long-term	21.71	22.69	23.28	23.97	25.87	1.28

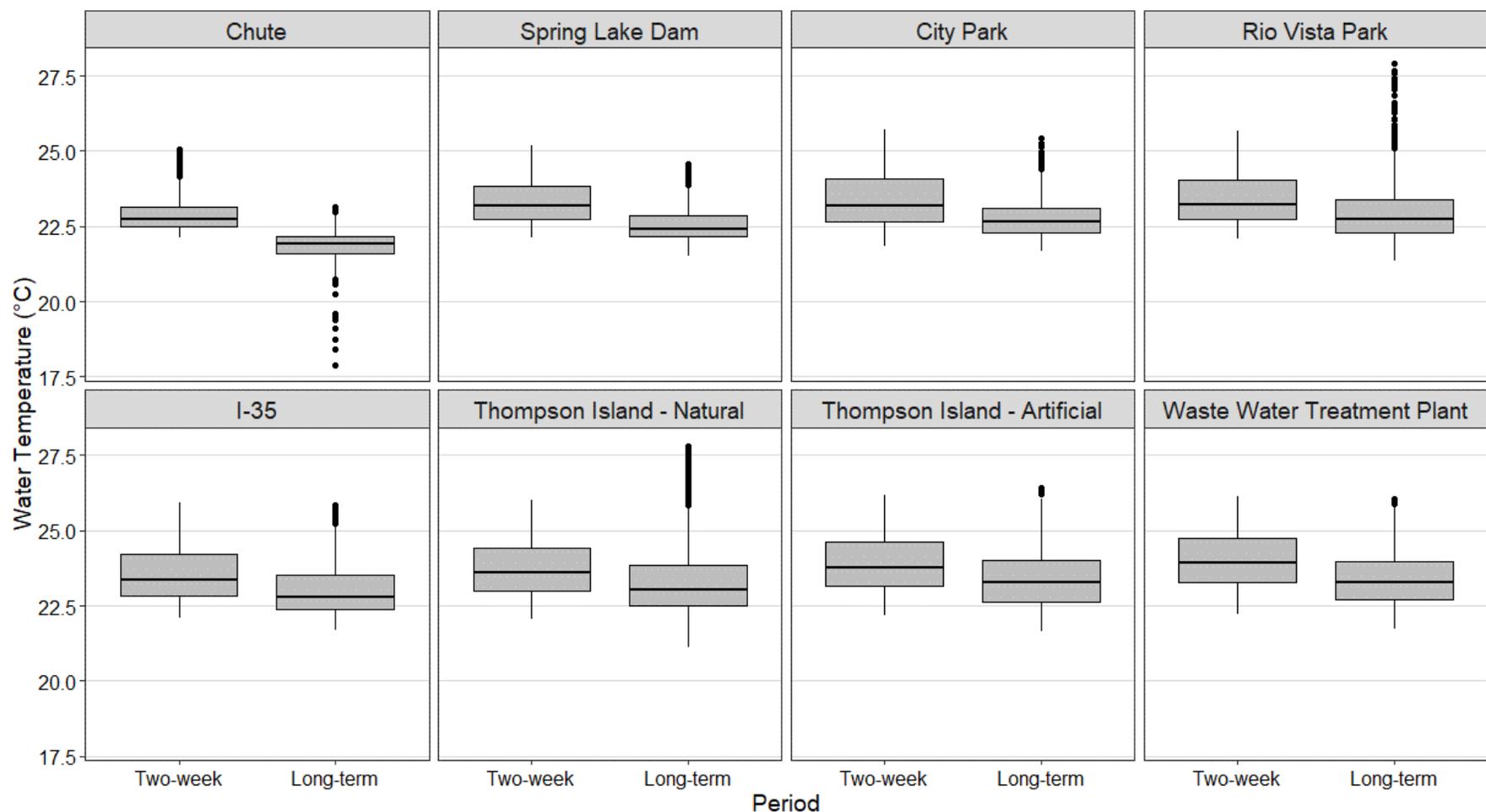


Figure 2. Boxplots comparing recent two-week and long-term water temperature trends at eight monitoring stations from Chute to Waste Water Treatment Plant for the month of June 2023. The thick horizontal line in each box is the median and the upper/lower bounds of each box represents the interquartile range. Whiskers represent minimum/maximum values up to 1.5 times the interquartile range, and outliers beyond this are designated with solid black circles.

Under current EAHCP flow-triggered conditions, Texas Wild-rice vulnerable stand surveys are being conducted every other week with the last event being conducted on June 23rd. Figure 3 highlights on-going impacts occurring to Texas Wild-rice in these vulnerable areas.



Figure 3: Texas Wild-rice vulnerable areas on June 23, 2023.

Another key factor is the condition of Spring Lake as it and the Spring Lake Dam spillway are the only two locations that support the presence all three listed species (Fountain Darter, San Marcos Salamander, and Texas Wild-rice). The following pictorial habitat evaluation highlights the current condition of Spring Lake, Spring Lake Dam and longitudinally down the San Marcos River with respect to threatened and endangered species habitat conditions.

SPRING LAKE AND SPRING LAKE DAM

Habitat conditions for San Marcos Salamanders and Fountain Darters in Spring Lake remain suitable but slightly degraded compared to earlier this spring (Figure 4). The reduced water flow throughout Spring Lake coupled with summer time sunlight / day length has resulted in higher-than-average levels of algal build up and siltation within San Marcos Salamander habitat. This was notably evident at the San Marcos salamander sampling location near the Hotel. Habitat in this area is still supporting small patches of clear, clean substrate but the greater portion of the site has considerable algal build-up (Figure 5).



Figure 4: Headwaters of Spring Lake with floating aquatic vegetation (June 22, 2023).

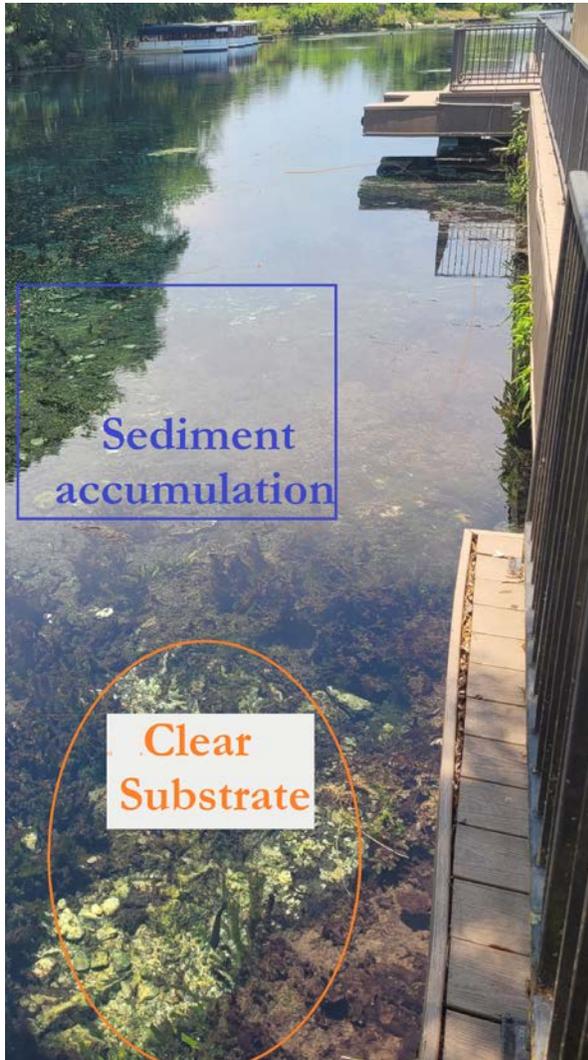


Figure 6 highlights the continued recreational impacts to Texas Wild-rice in the Spring Lake Dam reach, but also the protection afforded by the exclusion zone. Although overall protective, Figure 3 provides an illustration of a recreation path from one side of Sewell Park to the other using the exclusion zone sign as a marker.

Aquatic vegetation within the Spring Lake Dam (Figure 6) and City Park (Figure 7) study reaches continue to be dominated by Texas Wild-rice, a lot of which is emergent at this time. Figures 8 and 9 highlight the typical summer time recreational impacts to aquatic vegetation in the City Park reach looking downstream and Rio Vista stretch looking upstream, respectively. The I35 study reach (Figure 10) continues to support a more diverse aquatic vegetation community, albeit it quite shallow in several locations. Finally, the San Marcos River is maintaining Fountain Darter habitat and suitable water temperatures in the river below the Texas Parks and Wildlife Department (TPWD) outfall.

The following photographs (Figures 6 through 11) highlight Fountain Darter and Texas Wild-rice habitat conditions moving downstream in the San Marcos River.

Figure 5: Hotel site for San Marcos Salamanders (June 22, 2023).

Overall, water levels and Covered Species habitat conditions in June 2023 remain similar to those observed earlier this year in April and consistent with those observed late last summer / fall 2022. Lower-than-average water levels continue to expose wetted area to recreational activities that impact Covered Species habitat. Texas Wild-rice in vulnerable areas (i.e., low water depth) continues to be the Covered Species impacted to the greatest extent under these hydrological conditions. The turnover of Spring Lake is presently reduced causing increased algal growth and siltation at certain locations in the lake. However, San Marcos Salamander and Fountain Darter habitat within the lake and Eastern spillway remains suitable. The higher quality Fountain Darter habitat in the I35 study reach (compared to the Spring Lake Dam and City Park study reaches) remains shallow, but mostly wetted as shown in Figure 10. Should the extreme drought worsen, monitoring activities are in place to continue to track habitat conditions for HCP covered species in the San Marcos River.

Please don't hesitate to contact me if you have any questions or concerns.

Ed



Figure 6: Spring Lake Dam looking upstream towards dam on June 22, 2023.



Figure 7: City Park habitat conditions looking upstream on June 22, 2023.

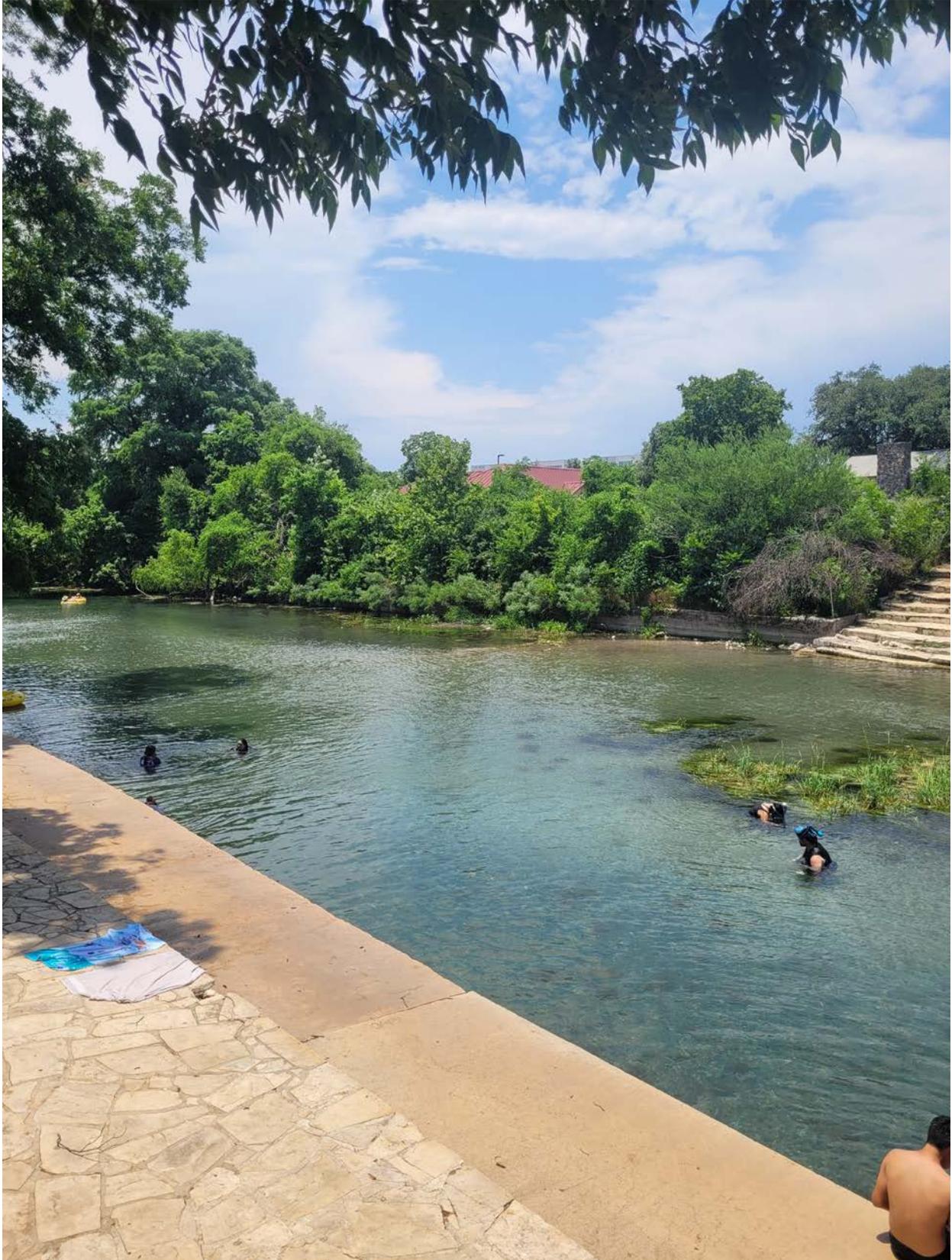


Figure 8: City Park habitat conditions looking downstream on June 22, 2023.



Figure 9: Rio Vista habitat conditions looking upstream on June 22, 2023.



Figure 10: I35 habitat conditions on June 22, 2023.



Figure 11: San Marcos River channel below TPWD outfall on June 22, 2023.