



MEMORANDUM

TO: Chad Furl, Jamie Childers
FROM: Ed Oborny (BIO-WEST)
DATE: **August 23, 2022**
SUBJECT: EAHCP Critical Period Habitat Evaluation – 90 cfs – San Marcos System

SAN MARCOS SYSTEM: 90 cfs Habitat Evaluation

As total system discharge continued to decline in August coupled with the USGS gage adjustment on August 11th, the 90 cfs Habitat Evaluation was triggered. The 95 cfs Habitat Evaluation was completed on July 27th and the 90 cfs evaluation was conducted on August 19th. Per requirement, the next habitat evaluation is scheduled for 85 cfs which would also trigger a full-system Critical Period Event. As of this memorandum, the total system discharge in the San Marcos River is approximately 91 cfs (Figure 1).

Discharge, cubic feet per second

Most recent instantaneous value: 90.8 08-23-2022 09:45 CDT

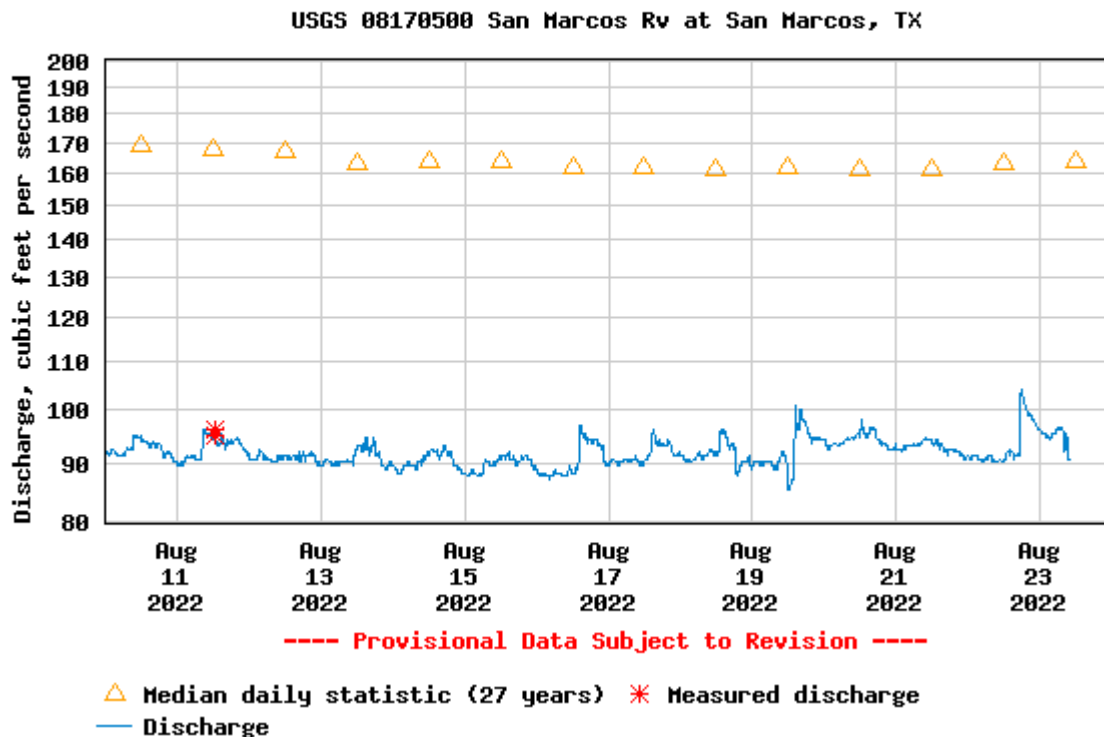


Figure 1. Total San Marcos River discharge over the past two weeks (USGS 08170500 at San Marcos, Texas).

Water temperature is a key component system-wide as it is an underlying driver of spring-related aquatic assemblages. Recent 7-day trends in water temperature (°C) for August Critical Period sampling were assessed using temperature data loggers (HOBO Tidbit v2 Temp Loggers) at 8 permanent monitoring stations in the upper San Marcos River (Table 1, Figures 2 and 3). 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 7 days prior. For all stations, 7-day trends were examined from 8/13 – 8/19. Recent 7-day trends were compared to long-term water temperature data measured at 4-hour intervals in August from 2001 – 2021 or to the greatest temporal extent available. For analysis, 7-day trends were compared to long-term trends using boxplots to visualize differences in central tendency (i.e., median) and variation (e.g., interquartile range). Boxplots from July Critical Period sampling were also included for comparison. Overall, it remains evident that the San Marcos system is in a lower-than-average discharge, summer time condition. However, no water temperatures are noted as a concern at stations in the San Marcos River at this time (Figures 2 and 3).

Table 1. Summary of boxplot descriptive statistics comparing recent 7-day and long-term trends in water temperature (°C) at 8 monitoring stations in the upper San Marcos Springs River for the month of August.

Station	Period	Lower Whisker	Lower Box	Median	Upper Box	Upper Whisker	Interquartile Range
Chute	7-day	22.35	22.49	22.73	23.21	24.24	0.72
Chute	Long-term	21.28	22.17	22.40	22.76	23.65	0.59
Spring Lake Dam	7-day	22.71	23.02	23.45	24.27	25.19	1.25
Spring Lake Dam	Long-term	21.03	22.11	22.47	23.00	24.33	0.89
City Park	7-day	22.71	23.04	23.79	25.19	27.63	2.15
City Park	Long-term	21.67	22.37	22.76	23.27	24.61	0.90
Rio Vista Park	7-day	22.68	22.99	23.45	24.34	25.53	1.35
Rio Vista Park	Long-term	21.01	22.42	22.87	23.68	25.56	1.26
I-35	7-day	22.63	22.99	23.57	24.36	25.38	1.37
I-35	Long-term	21.70	22.51	22.97	23.68	25.44	1.18
Thompson Island - Natural	7-day	22.78	23.16	23.79	24.65	25.65	1.49
Thompson Island - Natural	Long-term	21.29	22.66	23.27	24.19	26.50	1.54
Thompson Island - Artificial	7-day	23.91	24.51	25.02	25.72	27.53	1.21
Thompson Island - Artificial	Long-term	21.61	22.86	23.52	24.43	26.78	1.57
Waste Water Treatment Plant	7-day	23.06	23.55	24.24	25.02	25.87	1.47
Waste Water Treatment Plant	Long-term	21.70	22.85	23.53	24.41	26.74	1.56

There was no Aquatic vegetation mapping or Fountain Darter dip netting triggered since the July Habitat Evaluation and full Critical Period sampling effort. There was a Texas Wild-rice vulnerable stand sampling triggered, and subsequently conducted on August 16th. Figures 4 and 5 highlight impacts that are presently occurring to Texas Wild-rice in these vulnerable areas. 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.

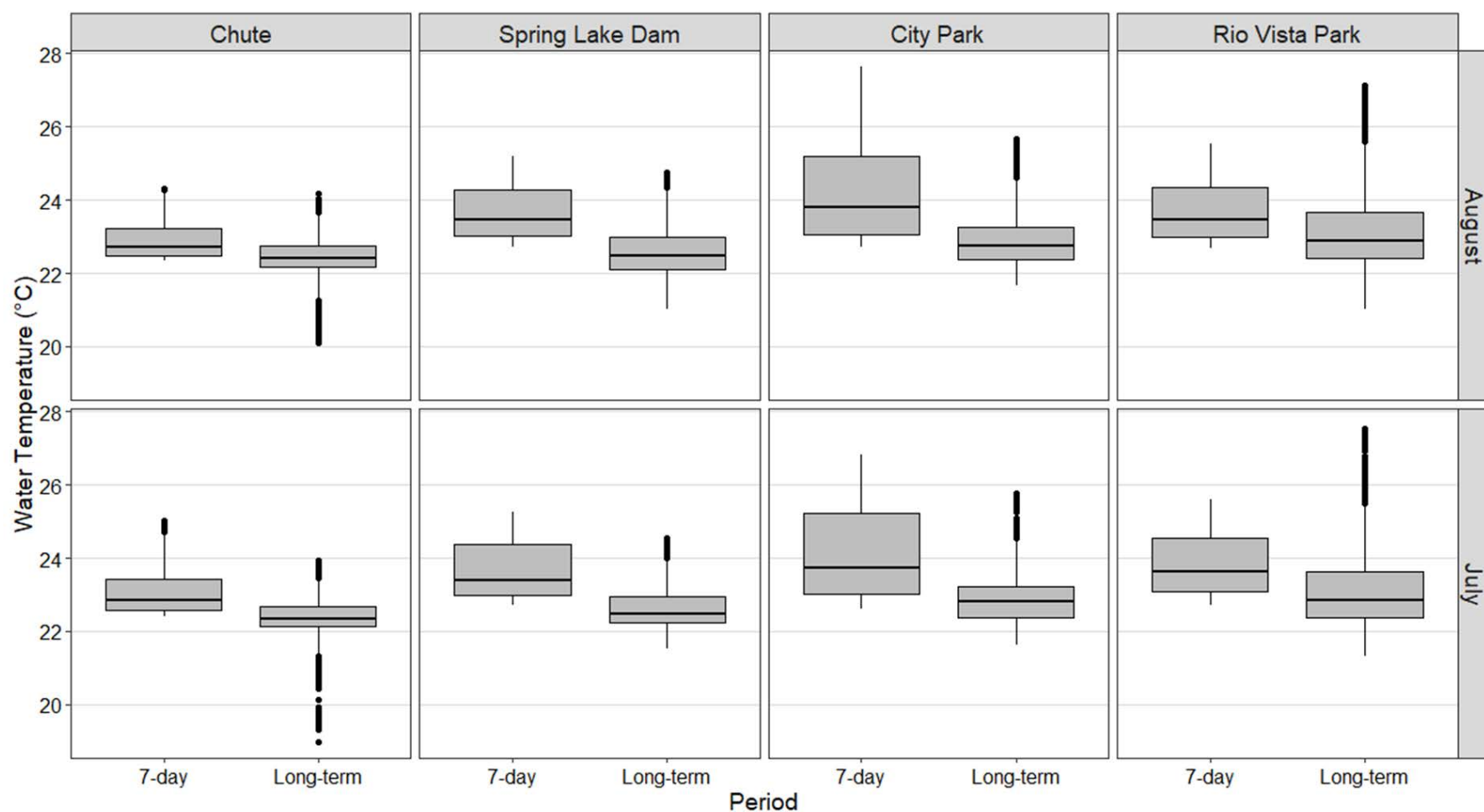


Figure 2. Boxplots comparing recent 7-day and long-term water temperature trends at four monitoring stations from Chute to Rio Vista Park for the month of August (top). July results are also included for comparison (bottom). The thick horizontal line in each box is the median, x represents the mean, 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.

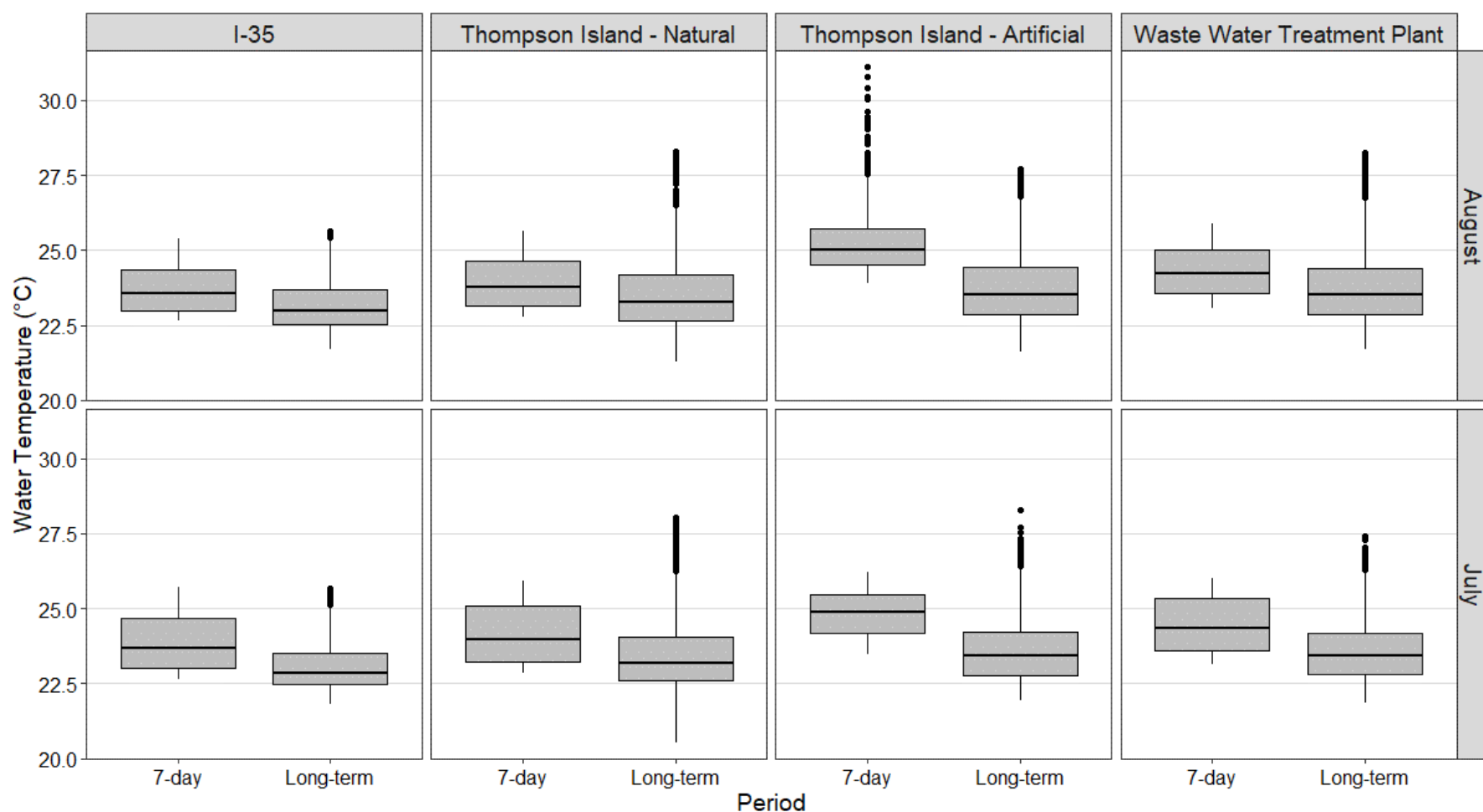


Figure 3. Boxplots comparing recent 7-day and long-term water temperature trends at four monitoring stations from I-35 to Waste Water Treatment Plant in August 2022 (top). July results are also included for comparison (bottom). The thick horizontal line in each box is the median, x represents the mean, 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.



Figure 4: Texas Wild-rice root ball exposure on August 16, 2022.



Figure 5: Texas Wild-rice impacted underwater stands (left) and on dry land (right) on August 16, 2022.

SPRING LAKE AND SPRING LAKE DAM

Habitat conditions for San Marcos Salamanders and Fountain Darters in Spring Lake appear consistent with those observed in July. As noted last month, the reduced water flow throughout Spring Lake with lower discharge has resulted in higher-than-average levels of algal build up and siltation within San Marcos Salamander habitat. However, as of this evaluation, the Hotel site salamander habitat is maintaining clear, clean substrate (Figure 6).



Figure 6: Headwaters of Spring Lake looking downstream at San Marcos Salamander Hotel study site on August 19, 2022.

As evident in Figure 7, considerable San Marcos Salamander and Fountain Darter habitat are being maintained in the spillway area. There continues to be evidence of recreational activities such as rock relocating which disturbs both species habitat. As previously mentioned, aquatic vegetation

within the Spring Lake Dam (Figure 7) and City Park (Figure 8) study reaches continue to be dominated by Texas Wild-rice, while the I35 study reach (Figure 10) supports a more diverse aquatic vegetation community. The following photographs highlight Fountain Darter habitat conditions moving downstream in the San Marcos River.

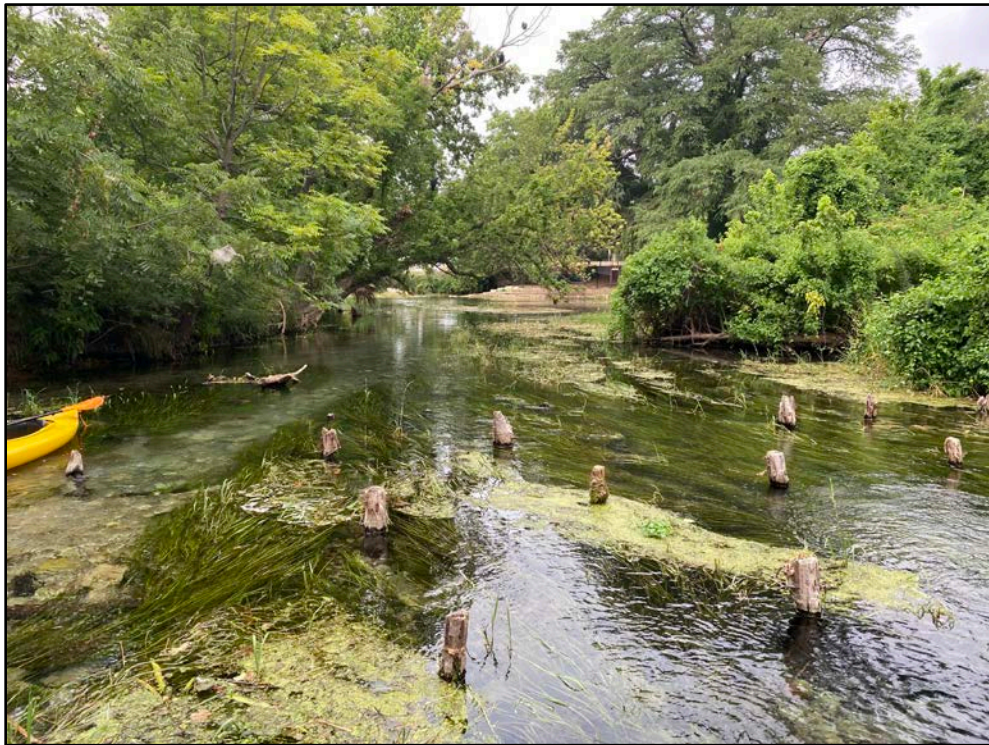


Figure 7: Spring Lake Dam spillway water level on August 16, 2022.



Figure 8: City Park habitat conditions on August 19, 2022.

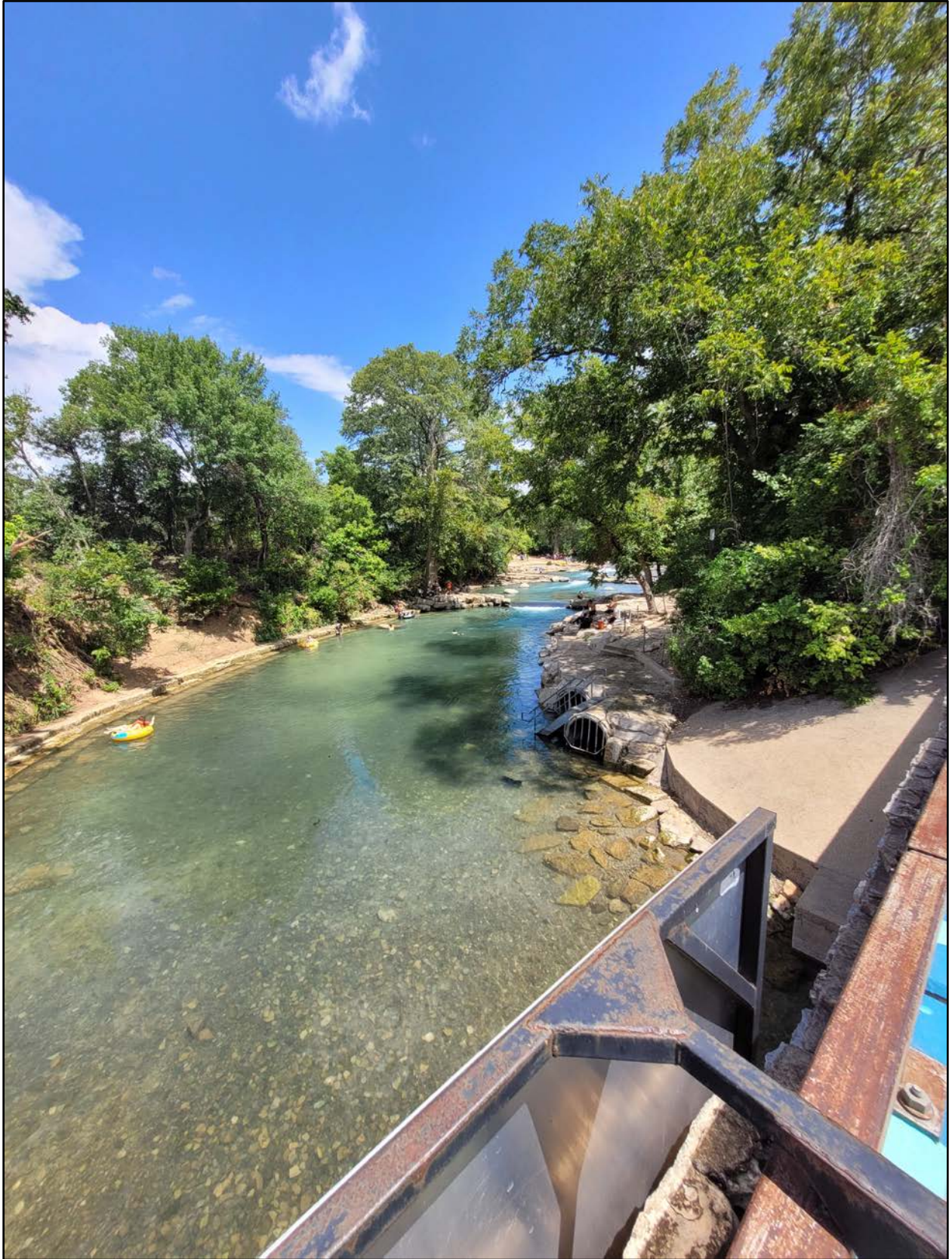


Figure 9: Rio Vista habitat conditions looking upstream on August 19, 2022.



Figure 10: I35 habitat conditions on August 19, 2022.

Overall, water levels and Covered Species habitat conditions remain similar to those observed in July. Lower-than-average water levels continue to expose more wetted area to recreational activities that can impact Covered Species habitat. Texas Wild-rice in vulnerable areas (i.e., low water depth, high recreation) continues to be the Covered Species impacted to the greatest extent under present conditions. As noted last month, 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 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 quite shallow, but still mostly wetted as shown in Figure 10. Should the extreme drought continue, 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