



MEMORANDUM

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

COMAL SYSTEM: 90 cfs Habitat Evaluation

The 100 cfs Habitat Evaluation was completed on July 27th. Declining spring flow conditions and a USGS gage adjustment on August 11th triggered a full (< 100 cfs) Critical Period sampling event, subsequently initiated on August 15th. As part of that USGS adjustment, a 90 cfs habitat evaluation was triggered and conducted on August 19th. As of this memorandum, the total system discharge in the Comal Springs system is approximately 122 cfs (Figure 1).

Discharge, cubic feet per second

Most recent instantaneous value: 122 08-23-2022 08:45 CDT

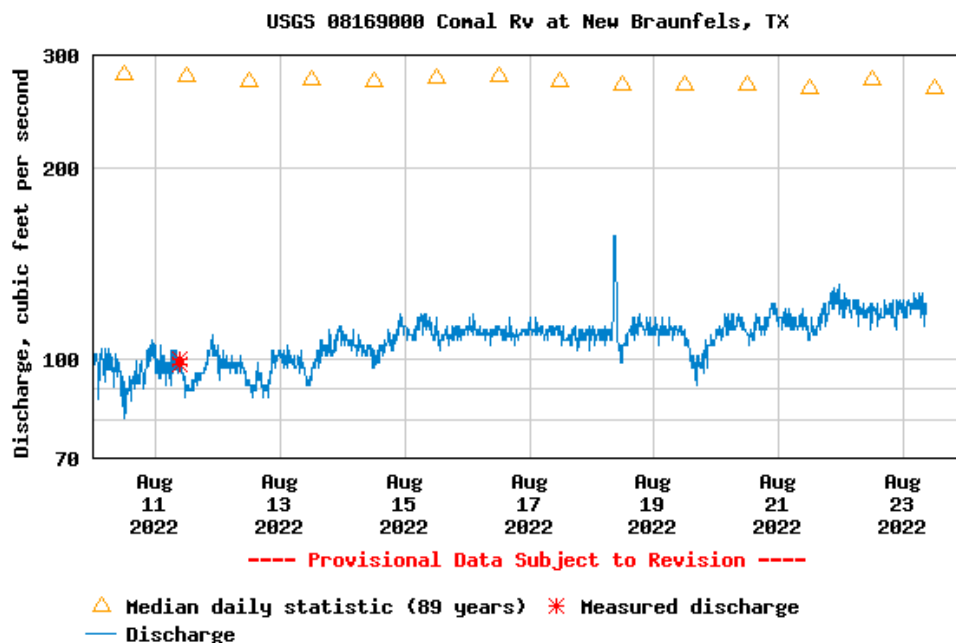


Figure 1. Total Comal River discharge over the past two weeks (USGS 08169000 Comal River at New Braunfels, Texas).

Water temperature is a key component system-wide as it supports 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 13 permanent monitoring stations in the Comal Springs/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 7 days prior. All 7-day trends were examined from 8/10 – 8/16, except for Landa Lake Upper (8/13 – 8/19), and Landa Lake Lower (8/13 – 8/19). Recent 7-day trends were compared to long-term water temperature data measured at 4-hour intervals in August 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, which includes updated results for Landa Lake Upper and Landa Lake Lower. Results are provided in Table 1 and graphically depicted in Figures 2, 3, and 4. Overall, it remains evident that lower than average discharge coupled with summer time conditions create elevated water temperatures in Blieders Creek (Figure 2) and locations further downstream from the spring flow orifices (Figure 4). However, conditions improved slightly in August over July as shown in Figures 2-4.

Table 1. Summary of boxplot descriptive statistics comparing recent 7-day and long-term trends in water temperature (°C) at 13 monitoring stations in the Comal Springs/River for the month of August.

Station	Period	Lower Whisker	Lower Box	Median	Upper Box	Upper Whisker	Interquartile Range
Blieders	7-day	26.16	27.28	28.12	28.89	31.08	1.61
Blieders	Long-term	22.86	24.82	25.72	27.21	30.21	2.39
Heidelberg	7-day	23.81	23.95	24.17	24.63	25.60	0.68
Heidelberg	Long-term	23.27	23.81	23.93	24.17	24.71	0.36
Booneville Near	7-day	23.67	23.67	23.69	23.81	24.00	0.14
Booneville Near	Long-term	23.34	23.52	23.56	23.64	23.82	0.12
Booneville Far	7-day	23.52	23.71	24.00	24.83	26.26	1.12
Booneville Far	Long-term	22.71	23.65	23.91	24.40	25.53	0.76
Landa Lake Upper	7-day	23.69	23.81	23.91	24.03	24.20	0.22
Landa Lake Upper	Long-term	23.41	23.69	23.82	23.88	24.17	0.19
Spring Run 1	7-day	23.69	23.74	23.76	23.81	23.91	0.07
Spring Run 1	Long-term	23.42	23.50	23.56	23.63	23.83	0.13
Spring Run 2	7-day	23.55	23.57	23.57	23.59	23.62	0.02
Spring Run 2	Long-term	22.98	23.33	23.50	23.62	24.05	0.29
Spring Run 3	7-day	23.47	23.50	23.50	23.52	23.55	0.02
Spring Run 3	Long-term	23.16	23.33	23.49	23.52	23.78	0.19
Landa Lake Lower	7-day	23.71	23.81	23.91	23.95	24.10	0.15
Landa Lake Lower	Long-term	23.57	23.78	23.86	23.93	24.15	0.15
Old Channel	7-day	23.67	24.00	24.44	25.36	27.14	1.35
Old Channel	Long-term	22.97	23.87	24.24	25.07	26.84	1.20
New Channel Upstream	7-day	23.69	23.98	24.46	25.21	26.70	1.23
New Channel Upstream	Long-term	22.99	23.67	23.97	24.59	25.97	0.92
New Channel Downstream	7-day	23.86	24.36	25.02	25.70	27.01	1.33
New Channel Downstream	Long-term	22.99	24.11	24.75	25.68	28.02	1.57
The Other Place	7-day	24.39	25.02	25.53	25.91	27.26	0.90
The Other Place	Long-term	23.03	23.97	24.62	25.39	27.47	1.42

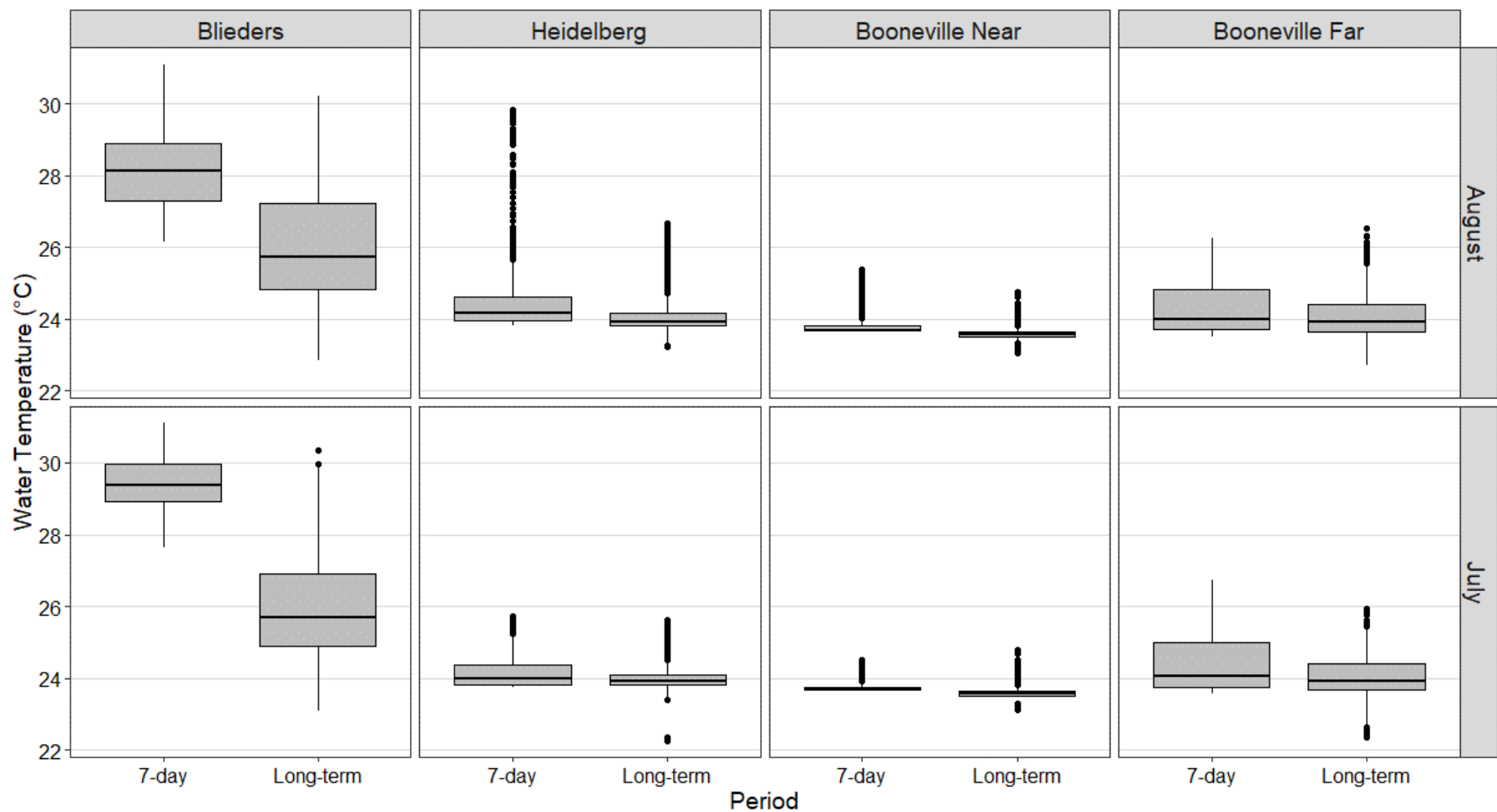


Figure 2. Boxplots comparing recent 7-day and long-term water temperature trends at four monitoring stations from Blieders to Booneville Far for the month of August (top). July results are also included for comparison (bottom). The thick horizontal line in each box is the median, x represents the mean,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

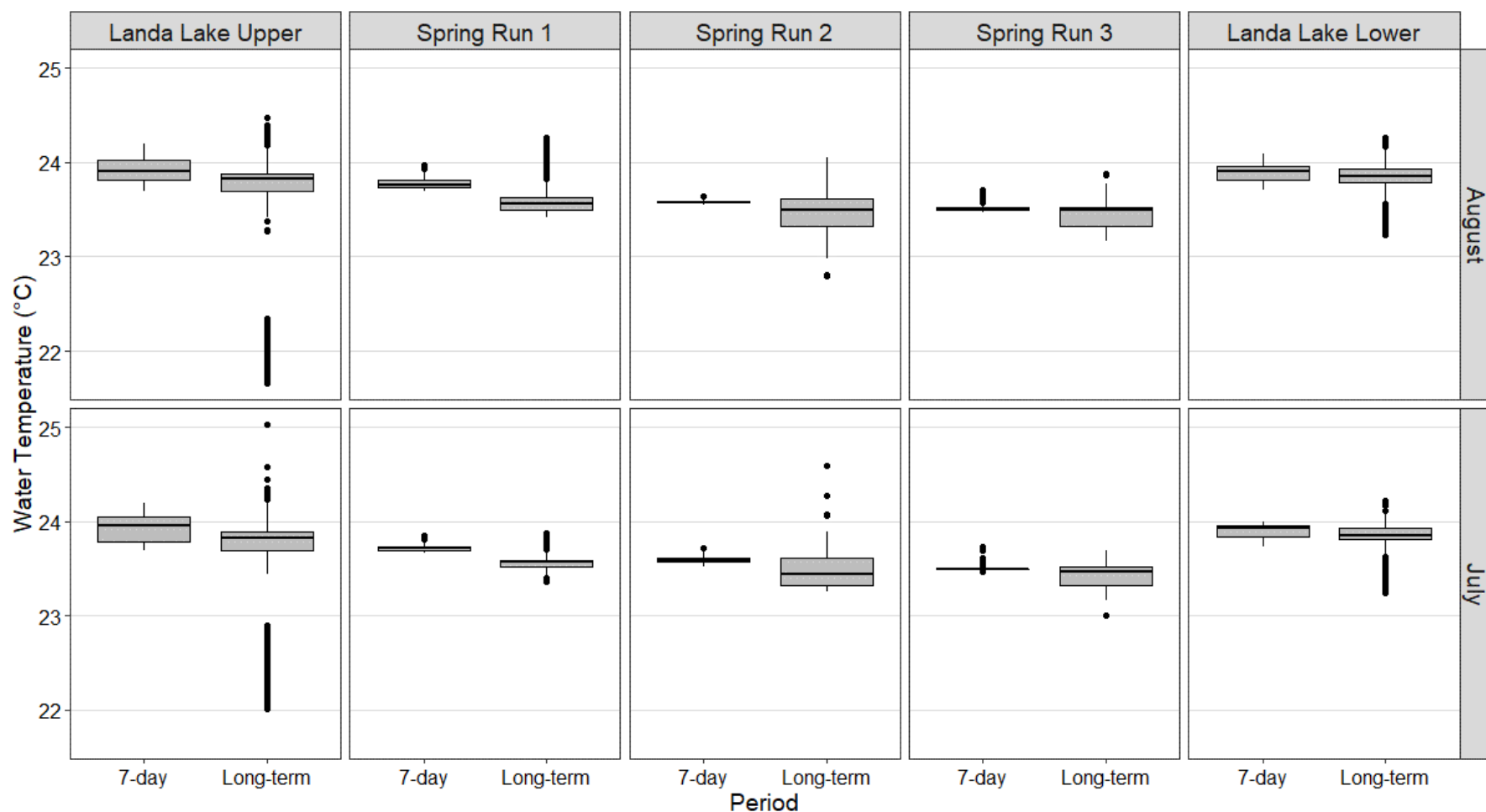


Figure 3. Boxplots comparing recent 7-day and long-term water temperature trends at five monitoring stations from Landa Lake Upper to Landa Lake Lower for the month of August (top). July results are also included for comparison (bottom). The thick horizontal line in each box is the median, x represents 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.

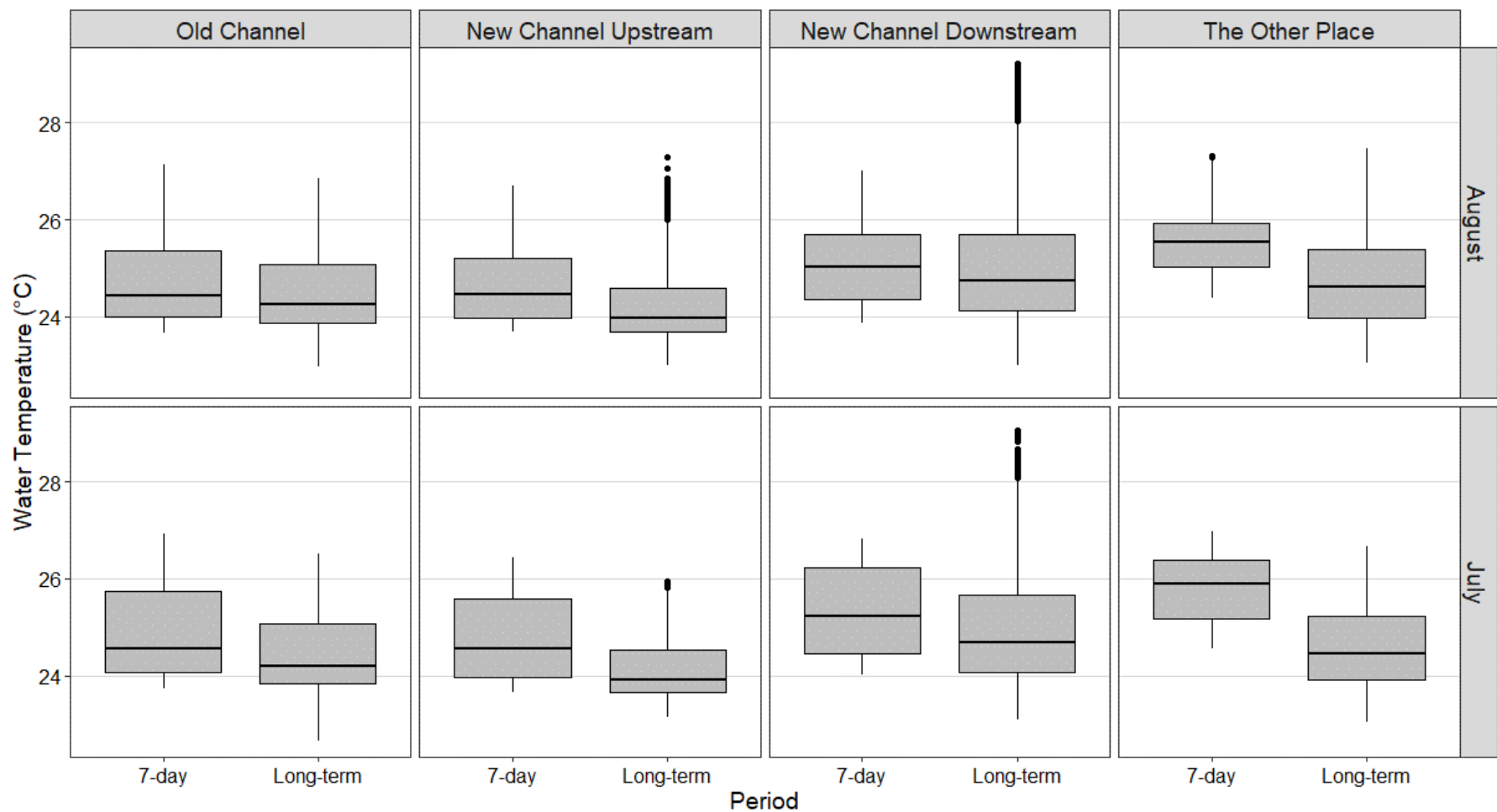


Figure 4. Boxplots comparing recent 7-day and long-term water temperature trends at four monitoring stations from Old Channel to The Other Place for the month of August (top). July results are also included for comparison (bottom). The thick horizontal line in each box is the median, x represents the 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.

Aquatic vegetation and Fountain Darter dip netting are key monitoring components as they comprise the criteria for Fountain Darter refugia salvage activities described in the EAHCP. From June to August 2022, aquatic vegetation coverage in the Upper Spring Run reach declined slightly (<5%), the Landa Lake reach exhibited a slight increase (<5%), and the Old Channel and New Channel reaches held steady. Fountain Darter dip netting results had 66% of the sites with darters present on August 18, 2022 compared to 80% of sites in late June.

Comal Spring Riffle Beetle and Comal Springs Salamander habitat throughout each species range continues to be reduced compared to average conditions. However, water levels for early August remained mostly steady since the July 27th habitat evaluation and have improved over the past few weeks. The following pictorial habitat evaluation highlights the Covered species habitat conditions observed on August 19th throughout the Comal System starting at the upper springs / Blieders Creek confluence and working downstream.



Figure 5: Blieders Creek (Left) looking downstream on August 19, 2022 (No visible flow with abundant green algae); Upper Spring Run Reach and Blieders Creek confluence (right) on August 19, 2022.

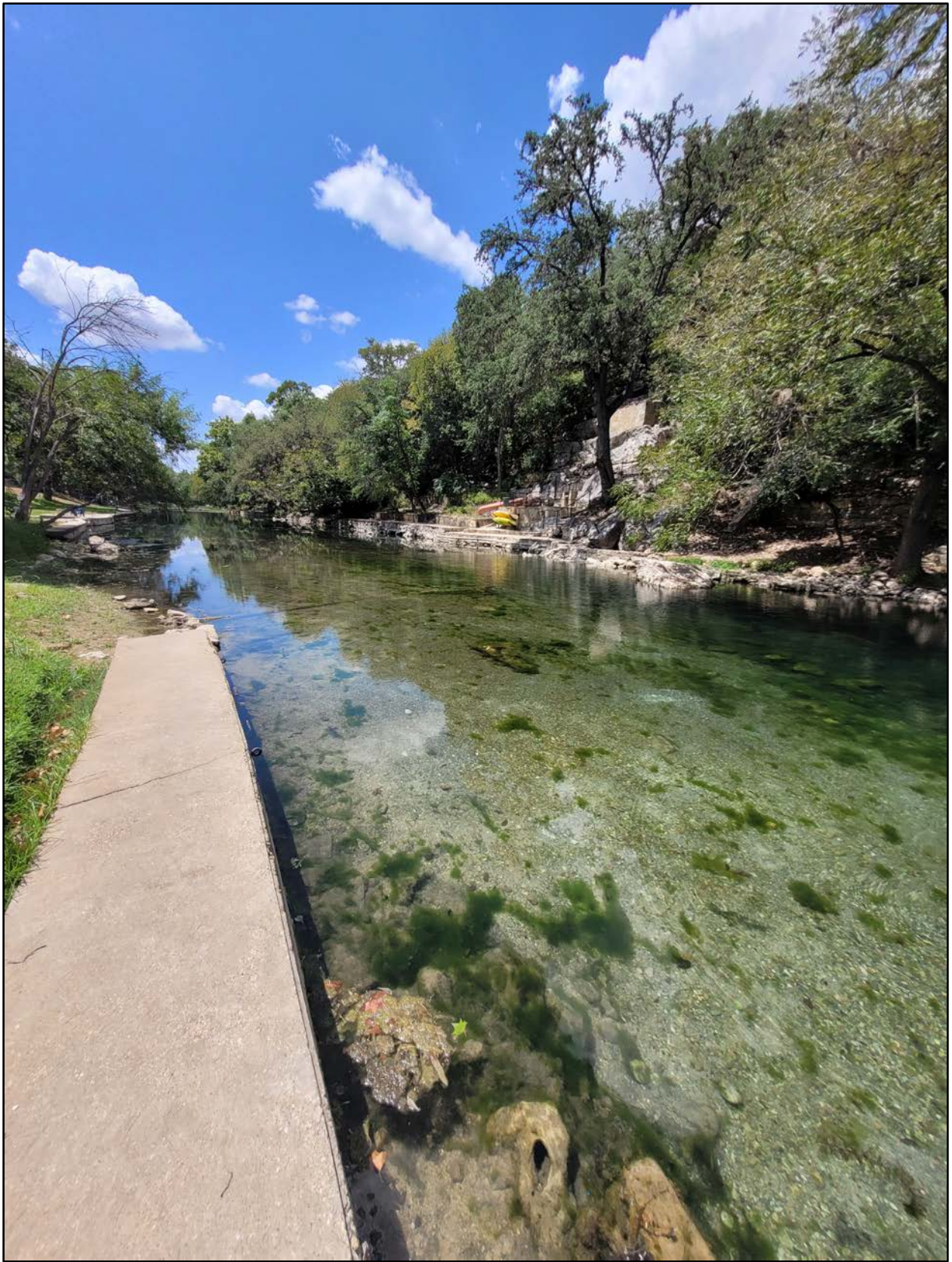


Figure 6: Upper Spring Run Reach Fountain Darter habitat looking downstream on August 19, 2022.



Figure 7: Spring Island Covered Species habitat looking upstream in near channel on August 19, 2022.

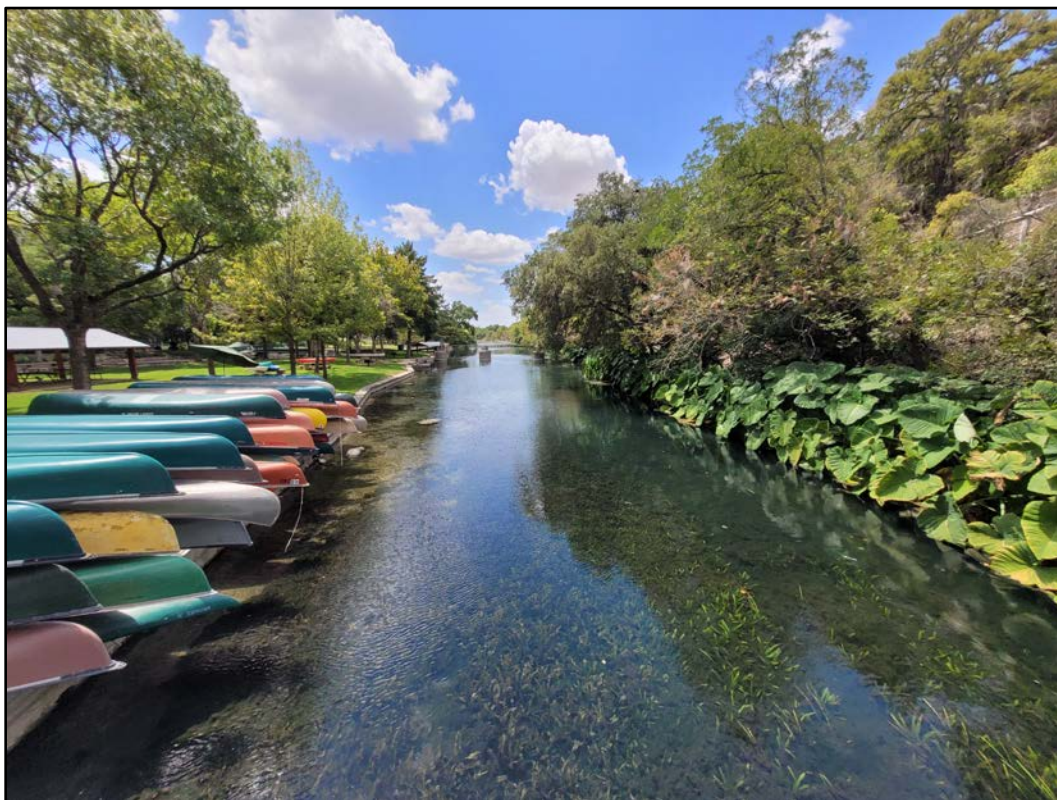


Figure 8: Spring Island Covered Species habitat looking downstream in far channel on August 19, 2022.



Figure 9: Spring Island Spring Run Covered Species habitat on August 19, 2022.



Figure 10: Landa Lake Floating Vegetation Mats looking upstream (top) and downstream (bottom) near the Fishing Pier on August 19, 2022.



Figure 11: Spring Run 1 Headwaters looking downstream on August 19, 2022.



Figure 12: Spring Run 3 headwaters on August 19, 2022.



Figure 13: Spring Run 3 looking downstream from headwaters on August 19, 2022.

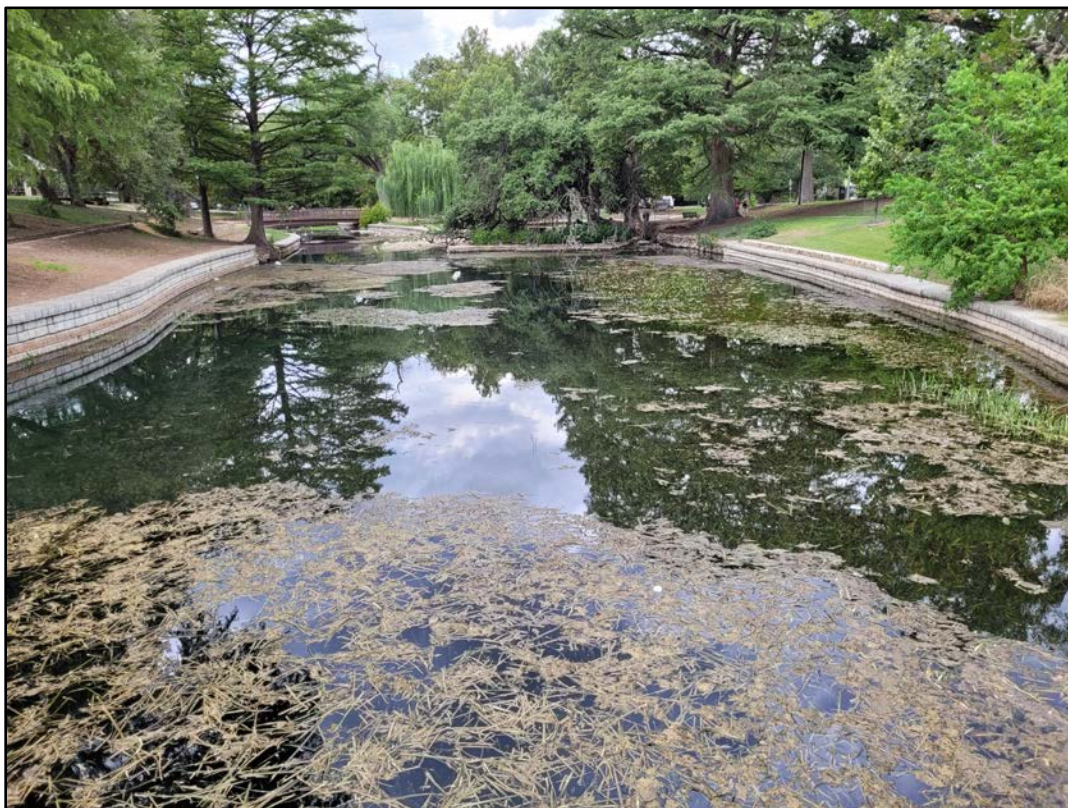


Figure 14: Spring Run 1 and 2 confluence looking upstream from pedestrian bridge on August 19, 2022.



Figure 15: Old Channel ERPA looking upstream from Golf Course Bridge on August 19, 2022.

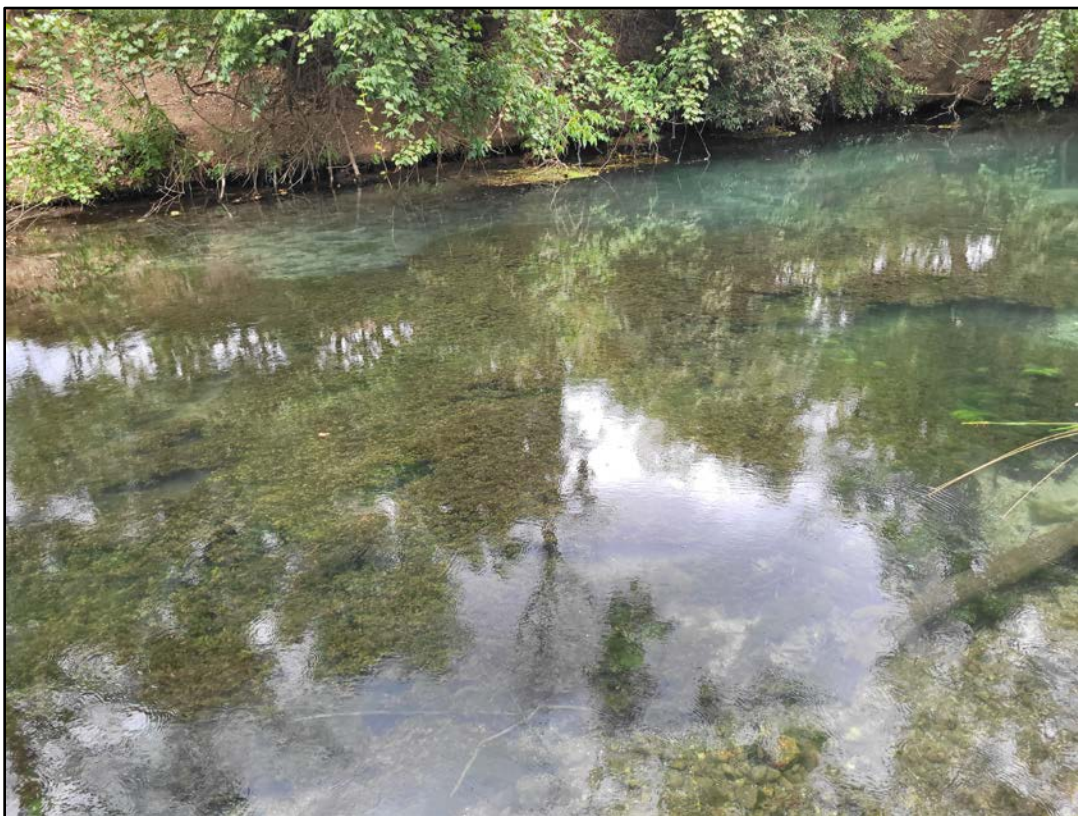


Figure 16: Fountain Darter Habitat in Old Channel Study Area on August 19, 2022.



Figure 17: New Channel looking downstream toward confluence with Old Channel on August 19, 2022.

In summary, total system discharge in the Comal System declined to below 90 cfs on August 11th. Recent precipitation and recharge have allowed the springs to rebound to approximately 122 cfs at the time of this memorandum (Figure 1). Since the July 27th evaluation, habitat conditions for the Comal invertebrates are slightly improving but remain less than favorable in several locations. Water temperature conditions were slightly improved in August and high-quality Fountain Darter habitat continues to be maintained in Landa Lake and the Old Channel from the ERPA through the Long-Term Biological Goal study site. Fountain Darter physical habitat conditions in the Upper Spring Run Reach continued to deteriorate as evident in Figure 6. It remains important to keep tracking the system-wide Fountain Darter and the surface-dwelling invertebrate's habitat conditions as these lower-than-average discharge conditions persist.

If you have any questions, please don't hesitate to reach out.

Ed