



MEMORANDUM

TO: Nathan Pence
FROM: Ed Oborny (BIO-WEST)
DATE: **August 15, 2014**
SUBJECT: EA HCP Biological Monitoring – **Week 18**

BIOLOGICAL MONITORING UPDATES

COMAL SYSTEM:

At the time of this memorandum, the total system discharge at Comal Springs was 89 cfs (Figure 1). This is the lowest recorded total system discharge condition since 1990 and only the fifth time (1990, 1989, 1971, and 1968) since the drought of record in the 50s that discharge has declined below 80 cfs. Additionally, this is the eighteenth consecutive week below 150 cfs this year, and therefore, the required weekly habitat evaluation was conducted on August 14th. Weekly habitat evaluations and memorandums will continue to occur until total system discharge at Comal Springs/River increases and consistently stays above 150 cfs. Critical period sampling associated with the below 100 cfs trigger was in full swing this week as discussed below.

Discharge, cubic feet per second

Most recent instantaneous value: 89 08-15-2014 05:45 CDT

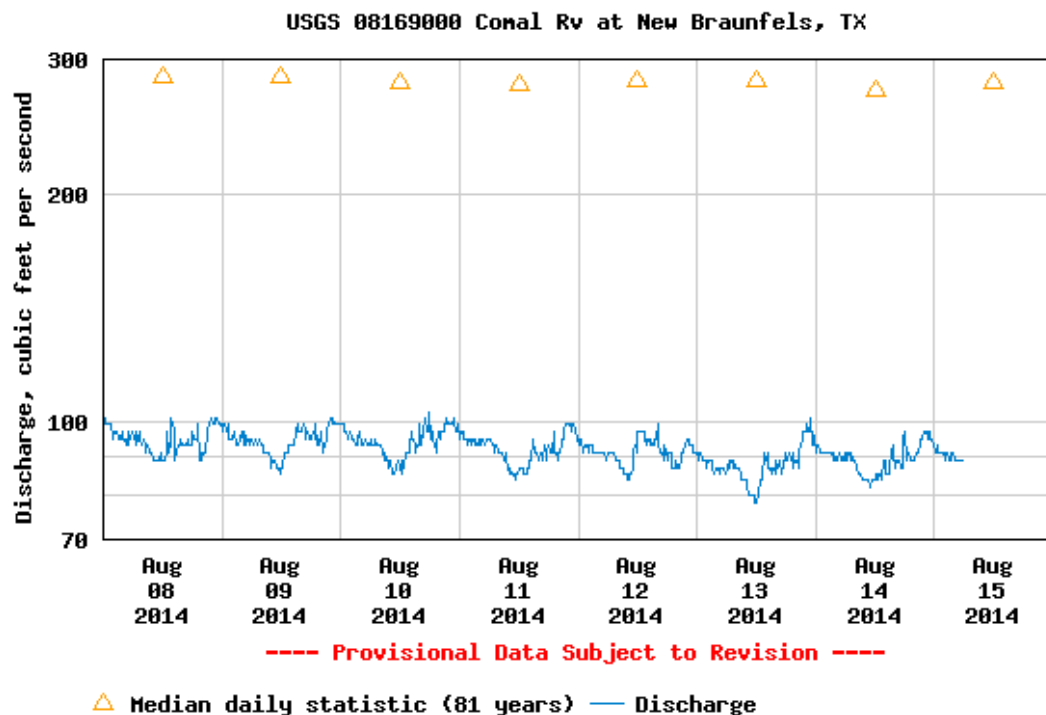


Figure 1: Screen shot of USGS webpage for the *COMAL* gage (08169000) showing total system discharge over the past week.

The following activities associated with HCP Biological Monitoring at Comal Springs were conducted this week and are scheduled for completion next week:

CRITICAL PERIOD MONITORING

- August 11-17
 - Aquatic vegetation mapping was conducted at the four (Upper Spring Run, Landa Lake, Old Channel, and New Channel) intensive study reaches.
 - Fish Community sampling via SCUBA and seining throughout the Comal system was completed.
 - Fountain darter presence/absence dip netting (fixed method) was completed.
 - Water quality grab samples were collected at 12 established stations longitudinally down the system and transferred to the analytical laboratory for Suite I and Suite II water quality analysis.
 - Thermisters were downloaded.
 - Cross – sectional discharge measurements at established transects were conducted.
 - Comal Springs salamander surveys were conducted.
 - Flow partitioning throughout the Spring Island area of upper Landa Lake was conducted.
 - Fountain darter drop netting at all intensive study reaches was completed.
- Projected for week of August 18-24
 - Gill Net – Predation evaluation
 - Fixed Station photography
 - Fountain Darter visual SCUBA survey – Landa Lake

SAN MARCOS SYSTEM:

The total system discharge for San Marcos Springs/River is approximately 114 cfs. As discussed last week, Texas wild-rice physical measurements in vulnerable stands will be restarted when total system discharge reaches 105 cfs. A Critical Period full sampling event is not triggered until total system discharge declines below 100 cfs. As part of COMPREHENSIVE monitoring, annual full-system mapping of Texas wild-rice is currently being conducted.

COMAL SPRINGS/RIVER - WEEK 18 CONDITIONS:

Weekly habitat observations and photo documentation associated with HCP triggered sampling were conducted on Thursday, August 14th.

OBSERVATIONS AND ACTIVITIES:

The J17 water level at the time of photo documentation this week had declined to the 627's and total system discharge has dipped below 80 cfs for the first time since 1990. During all full sampling events and select trigger events, discharge data is collected at HCP designated locations to relate directly to biological monitoring activities being conducted. On August 14th, discharge conditions at the EAA HCP locations are shown in Table 1.

Table 1. Comparison of discharge (cfs) throughout Comal Springs during 2014.

| Date | Discharge (cfs) | | | |
|--------------------|-----------------|---------------|---------------|-----------------|
| | April 23, 2014 | July 17, 2014 | July 31, 2014 | August 14, 2014 |
| Spring Run 1 – | 3.1 | 0.7 | 1.1 | 0.2 |
| Spring Run 2 – | 2.5 | 1.4 | 1.8 | 0.1 |
| Spring Run 3 – | 16.9 | 10.0 | 12.2 | 5.8 |
| Old Channel – | 52.2 | 52.7 | 53.9 | 54.4 |
| Upper Spring Run – | 2.3 | 0.6 | 2.1 | 0* |
| Total USGS Gage - | 143.0 | 113.0 | 109.0 | 85.0 |

* Not measureable although still visual evidence of spring upwelling in select areas

At present, all major spring runs, the Spring Island area and the Upper Spring run are exhibiting the lowest discharge conditions and water levels observed since the initiation of this biological monitoring program in 2000. Surface habitat conditions continue to deteriorate relative to flow, water level and exposed substrate. At the time of photo documentation on Thursday, no surface water was evident at the headwaters of Spring Run 1 (Figure 2). Immediately downstream of the former main orifice pool, the dry portion of surface habitat continues to extend downstream (Figure 3). Downstream of Landa Park drive a semblance of a channel remains but surface habitat is in extremely poor condition (Figure 4). Spring Run 2 continues to maintain a fraction of surface flow just upstream of the entrance road but habitat below the road is essentially gone (Figure 5). Spring Run 3 has finally started to exhibit drying of surface habitat at the headwaters (Figure 6) but continues to support the most discharge of any of the major spring runs at this time.



Figure 2: No surface water in Spring Run 1 main headwater pool.



Figure 3: Spring Run 1 main channel looking downstream from main orifices.



Figure 4: Spring Run 1 main channel looking downstream from Landa Park drive bridge.



Figure 5: Spring Run 2 downstream of entrance road.



Figure 6: Spring Run 3 constriction just downstream of headwaters.

The amount of green algae in the Upper Spring Run reach continues to be very low (Figure 7). This reduction in algae coupled with the loss of most bryophytes earlier this summer and small spatial extent of aquatic macrophytes in this reach has resulted in quality fountain darter habitat becoming quite limited in this reach. Not surprisingly, very few fountain darters were collected via drop net sampling (Figure 8) in this reach this week. However, night dives on Wednesday for the movement study confirmed numerous recaptures within the tagging sites and none downstream indicating that movement out of this reach is not yet occurring. The fact that darters continue to occupy this upper most reach and utilize less than optimal habitat conditions during such an extended period of low-flow is amazing.

The surface water level in the Spring Island area this week continued to slowly decline with exposed surface habitat along large portions of the eastern and northern side of the island (Figure 9). Although green algae continued to expand in this area, large patches of bryophytes also continue to be supported. Both spring runs associated with Spring Island continue to remain completely dry on the surface with subsurface flow still evident at the base of the island. Table 2 shows the long-term average as well as recent counts of Comal Springs salamanders in each of the sample locations. All sites exhibited lower than long-term average numbers and in the case of Spring Run 1, only 1 salamander was found in the one hour survey. A review of Figures 2-4 above explain this as there is extremely limited surface water habitat in Spring Run 1 at this time. In past weeks, the topic of clumping was discussed to potentially explain higher numbers at that time. It is now quite obvious that Spring Run 1 is past that point. Whether or not salamanders in these restricted surface flow areas move downward into interstitial spaces and subsurface flow is an important question to be tracked with continued monitoring during this extended low-flow period and after these areas get reconnected with surface flow in the future. Although the Comal

Springs salamander is listed in HCP and Incidental Take Permit, the conditions in the ITP are not presently active for this species as it is not listed as threatened or endangered with this directly acknowledged (Item H: 7-9) in the ITP.



Figure 7: Algal coverage remains under control in the Upper Spring Run reach.



Figure 8: Drop net sampling for fountain darters in the Comal system this week.



Figure 9: Continued exposed surface habitat adjacent to Spring Island.

Table 2: Comal Springs salamander timed counts

| Survey Date | Salamander Counts | | | |
|-------------------------------|-------------------|--------------|----------------------|---------------------------------|
| | Spring Run 1 | Spring Run 3 | Spring Island (runs) | Spring Island – Eastern outfall |
| Long-term average (2002-2014) | 22 | 13 | 3 | 9 |
| April 18, 2013 | 17 | 15 | 0 | 4 |
| August 16, 2013 | 8 | 12 | 0 | 8 |
| September 12, 2013 | 6 | 13 | 1 | 11 |
| October 29, 2013 | 7 | 9 | 2 | 6 |
| April 25, 2014 | 12 | 23 | 3 | 7 |
| July 17, 2014 | 16 | 24 | 0 | 8 |
| July 31, 2014 | 27 | 27 | 0 | 11 |
| August 14, 2014 | 1 | 6 | 0 | 7 |

For the Comal Springs riffle beetle surveys, cotton lures were placed at each of the designated sampling locations for Critical Period sampling in May, June, and July with two sets currently in place for ongoing critical period sampling. Table 3 shows the results of Comal Springs riffle beetles total counts over the past two years of lower than average flows along with the long-term average for all non-critical period sample events. As evident in Table 3, the Western shoreline location was the only sample reach with counts greater than average on July 28th. It is interesting to note that the counts at Spring Island for that event increased above all previous 2014 results but did not rebound back to levels seen in 2013 or the long-term average. Also interesting is that the total count at Spring Run 3 (77) during the July 28th event was almost identical to the count (78) recorded in October 2013 after an extended period of lower than average flows. With the continued decline in total system discharge and exposure of more and more substrate, six lures at both the Spring Run 3 and Western shoreline sample reaches became exposed in extremely shallow or completely dry areas. As expected, riffle beetles were not found on these lures making the total counts for the 10 lure sets some of the lowest experienced since the start of this monitoring technique. All lures have been relocated to deeper areas to test whether this reduction in total count is real or an artifact of beetles moving away from drying areas. The next collection effort for riffle beetles is scheduled for early September.

Table 3: Comal Springs riffle beetle total counts (adult and larvae) per area the past two years.

| Survey Date | Riffle Beetle Total Counts | | | |
|---|----------------------------|-------------------|------------------|-------|
| | Spring Run 3 | Western Shoreline | Spring Island | Total |
| Long-term average (2004-2014) | 116 | 78 | 75 | 269 |
| May / June 2013 | 124 | 68 | 97 | 289 |
| August / Sept. 2013 | 118 | 119 | 100 | 337 |
| September 2013 | 109 | 188 | 66 | 363 |
| October 2013 | 78 | 63 | 88 | 229 |
| April / May 2014 | 146 | 104 | 40 | 290 |
| May 2014 | 138 | 98 | 42 | 278 |
| June 2014 | 119 | 130 | 34 | 283 |
| July 15 th 2014 | 146 | 143 | * | NA |
| July 28 th 2014 | 77 | 220 | 57 | 354 |
| August 13 th 2014 | 46** | 52** | * | NA |
| Lowest count per individual reach since going to cotton lures | 53 (May 2010) | 20 (May 2012) | 20 (May 2010) | -- |
| Lowest Total count since going to cotton lures (May 2010) | 53 | 110 | 20 | 183 |

*Lures not available for collection during this sample event.

** Six lures at each sample reach had to be moved due to sites becoming too shallow or dry.

Floating mats of aquatic vegetation continue to build up in Landa Lake at these lower than average discharge conditions (Figure 10) and will require weekly attention in the lake as well as in front of the restored culvert to the Old Channel. Aquatic vegetation within Landa Lake, the Old Channel (Figure 11), and New Channel continue to support quality fountain darter habitat. Stratified random presence/absence dip netting this week documented 86% of the dips performed contained fountain darters which continues to be higher than the long-term average for that measure. Dip netting and drop netting this past week confirmed that there are high numbers of fountain darters throughout Landa Lake and the Old Channel. Based on dip net data, the New Channel fountain darter numbers were down from the spring sampling event, although there continues to be ample habitat in this reach above the confluence of the Old and New channels.



Figure 10: Floating aquatic vegetation mat condition in Landa Lake.



Figure 11: Restored native aquatic vegetation continues to thrive in the Old Channel.

In summary, total system discharge in the Comal System is approaching levels not witnessed in nearly 25 years. If the downward trend continues, these lower discharges will continue to create worsening surface habitat conditions each week for the Comal Springs invertebrates. Overall, the system continues to support quality fountain darter habitat conditions in Landa Lake and Old and New Channels. The numbers of fountain darters collected in both Landa Lake and the Old Channel remain stable with an apparent decline in numbers being observed within the Upper Spring Run reach and to a lesser degree in the New Channel. Neither of these latter results is surprising with the much reduced habitat conditions in the Upper Spring Run reach and no measurable discharge within this reach. Actually, what is surprising is that after 4 straight months of less than 3 cfs with interspersed periods of less than 1 cfs and now no measurable discharge during the heat of the summer that darters are using this reach at all. Although habitat in the New Channel remains abundant, total system discharge through this reach is becoming limited with the majority of the flow being routed through the Old Channel. This flow-split is by design and appears to be accomplishing its goal relative to maintaining high quality habitat in the Old Channel during these extended lower than average discharge conditions. It continues to be seen whether the fringes (Upper Spring Run and New Channel) of the system are approaching a tipping point or will continue to hold out. The next few months of biological monitoring and ongoing applied research should be very informative.

As always, if you have any questions, please give me a shout. Ed