



MEMORANDUM

TO: Nathan Pence
FROM: Brad Littrell (BIO-WEST)
DATE: **September 5, 2014**
SUBJECT: EA HCP Biological Monitoring – **Week 21**

BIOLOGICAL MONITORING UPDATES

COMAL SYSTEM:

At the time of this memorandum, the total system discharge at Comal Springs was 68 cfs, approximately 3 cfs higher than last week's value. Although total system discharge has declined dramatically over the past month, the past week has been relatively stable (Figure 1). This week marks the twenty-first consecutive week below 150 cfs, and therefore, the required weekly habitat evaluation was conducted on September 4th. Weekly habitat evaluations and memorandums will continue to occur until total system discharge at Comal Springs/River increases and consistently stays above 150 cfs. As total system discharge is consistently below 80 cfs, several additional HCP species specific triggers have been initiated. Aquatic vegetation mapping and fountain darter presence/absence dip netting will be performed monthly, while Comal Springs salamander and discharge measurements will be conducted weekly. Should total system discharge decline below 60 cfs, fountain darter presence/absence dip netting will also be performed weekly. The next full system Critical Period monitoring effort will be triggered when total system discharge consistently declines below 50 cfs.

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

CRITICAL PERIOD MONITORING

- September 1-7
 - Comal springs salamander sampling on September 4th.
 - Comal springs discharge measurements on September 4th.
 - Weekly photo documentation and habitat evaluation on September 4th.
 - Fountain darter presence/absence dipnetting on September 4th.
- September 8-14
 - Comal springs salamander sampling.
 - Comal springs discharge measurements.
 - Weekly photo documentation and habitat evaluation.
 - Comal Spring riffle beetle collections and reset of lures.

SAN MARCOS SYSTEM:

The total system discharge for San Marcos Springs/River is approximately 108 cfs. At present there are no Critical Period monitoring activities being conducted on the San Marcos system. 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.

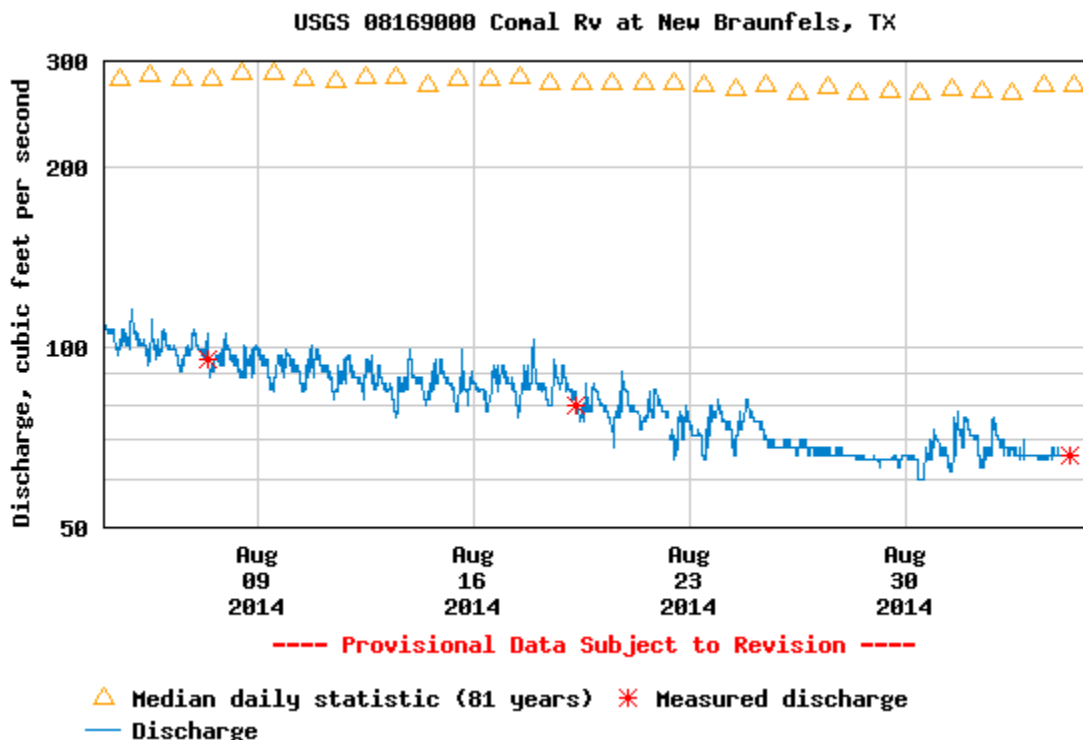


Figure 1: Screen shot of USGS webpage for the *COMAL* gage (08169000) showing total system discharge over the past month.

COMAL SPRINGS/RIVER - WEEK 21 CONDITIONS:

Weekly habitat observations and photo documentation associated with HCP triggered sampling were conducted on Thursday, September 4th.

OBSERVATIONS AND ACTIVITIES:

The J17 water level at the time of photo documentation this week had increased slightly to 626 and total system discharge peaked at 78 cfs on August 31, but has declined below 70 cfs as of this memo. Surface habitat conditions at all major spring runs, the Spring Island area, and the Upper Spring run continue to deteriorate relative to flow, water level, and exposed substrate. Surface water flow and surface habitat in Spring Run 1 is extremely limited (Figure 2) down past the confluence of Spring Run 2 where a wetted channel is being maintained. However, most of the water past that confluence is backwater from Landa Lake as Spring Run 1 and Spring Run 2 are not presently flowing at measurable levels (Table 1). In fact, Spring Run 2 is devoid of any surface habitat at this time (Figure 3). Spring Run 3 looks similar to last week with drying of surface habitat at the headwaters (Figure 4) and the channel constricting in several locations downstream. Although Spring Run 3 continues to support the most discharge of any of the major spring runs at this time, it too is impacted with a considerable reduction in surface habitat.

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

| Date | April 23 | July 17 | July 31 | August 14 | August 28 | Sept. 4 |
|------------------|----------|---------|---------|-----------|-----------|---------|
| Spring Run 1 | 3.1 | 0.7 | 1.1 | 0.2 | 0.06 | 0* |
| Spring Run 2 | 2.5 | 1.4 | 1.8 | 0.1 | 0 | 0 |
| Spring Run 3 | 16.9 | 10.0 | 12.2 | 5.8 | 2.1 | 2.1 |
| Old Channel | 52.2 | 52.7 | 53.9 | 54.4 | 47.9 | 48.7 |
| Upper Spring Run | 2.3 | 0.6 | 2.1 | 0* | 0* | 0* |
| Total USGS Gage | 143.0 | 113.0 | 109.0 | 85.0 | 66.0 | 66.0 |

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

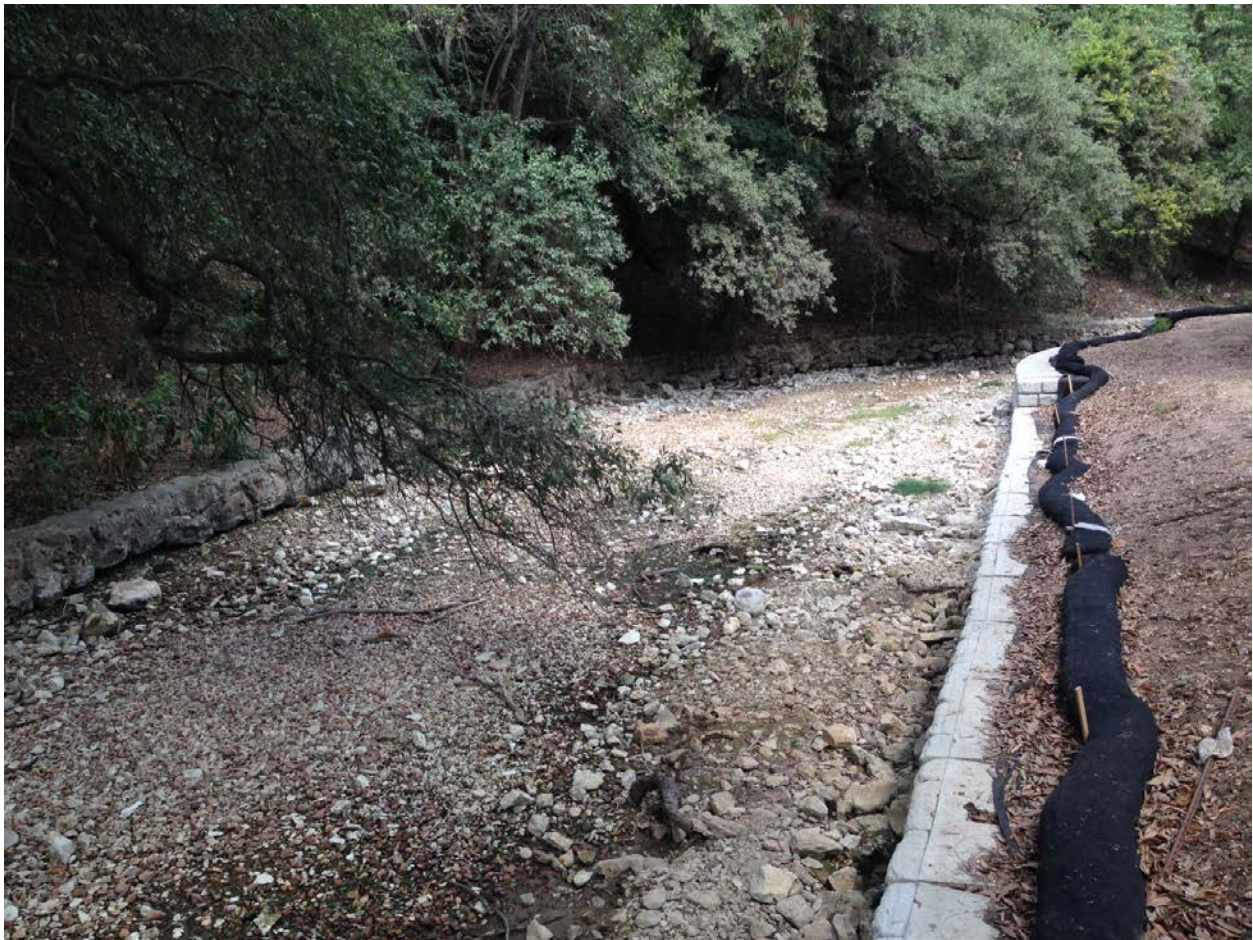


Figure 2: Extremely limited surface water habitat in Spring Run 1.



Figure 3: Spring Run 2 – no surface habitat and ongoing construction.



Figure 4: Spring Run 3 – considerable constriction of surface water habitat near headwaters.

Fountain darter habitat continues to deteriorate in the Upper Spring run reach and is in extremely poor condition (Figure 5). Dropping water levels have caused the typically submerged *Sagittaria* in this reach to become emergent and water clarity is decreasing due to the relatively stagnant conditions (Figure 6). However, despite minimal habitat, presence/absence dip netting conducted this week confirms that darters are still present in this area.

The surface water level in the Spring Island area this week is similar to that observed last week with exposed surface habitat along large portions of the eastern and northern side of the island (Figure 7). Water from springs on river left continue to flow northward and around the island on river right (Figure 8) because surface flow has been mostly blocked by exposed substrate almost all the way across the river left side in the wading pool area. Both spring runs associated with Spring Island continue to remain completely dry on the surface with minimal subsurface flow still evident at the base of the island.



Figure 5: Relatively stagnant conditions and extremely poor fountain darter habitat in the Upper Spring Run reach.



Figure 6: Emergent *Sagittaria* and cloudy water conditions in the Upper Spring Run reach.



Figure 7: Exposed surface habitat adjacent to Spring Island similar to last week.



Figure 8: Change in flow direction as water levels drop on north end of Spring Island.

Table 2 shows the long-term average as well as recent counts of Comal Springs salamanders in each of the sample locations. No salamanders were found in the extremely limited surface habitat in Spring Run 1 last week. However, this week one salamander was observed in Spring Run 1 along the river-left wall where there are still small upwellings. Salamander numbers also increased at Spring Run 3 and are maintaining average counts in the eastern outfall to Spring Island. Not surprisingly, no salamanders were found in the dry spring runs on Spring Island. Salamanders have not been observed here since April. The ability of Comal Springs salamanders to occupy and persist in sub-surface habitats is unknown; therefore, continued monitoring under these rare conditions will help fill important data gaps for this species. Although the Comal Springs salamander is listed in the HCP and Incidental Take Permit (ITP), 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.

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 |
| August 28, 2014 | 0 | 8 | 0 | 11 |
| September 4, 2014 | 1 | 13 | 0 | 10 |

Downstream in the main portion of Landa Lake, floating mats of aquatic vegetation continue to build up at these lower than average discharge conditions (Figure 9). As water levels drop and much of the *Vallisneria* in the upper portion of the lake becomes emergent, this will continue to be a problem. The restored habitat within Landa Lake is continuing to expand in areas not impacted by extremely shallow water levels and/or build up of floating mats of aquatic vegetation on the surface. Overall, quality fountain darter habitat persists in Landa Lake but impacts are occurring. The Old Channel continues to support high quality fountain darter habitat with thriving restored native aquatic vegetation. The New Channel continues to support aquatic vegetation throughout most of the reach above the confluence of the Old Channel, but fountain darter habitat is of lesser quality than in either Landa Lake or the Old Channel at this time. As observed last week, minimal flows have resulted in an obvious drop in water level and relatively stagnant conditions in the New Channel above Clemens Dam (Figure 10-11).



Figure 9: Floating vegetation mats in Landa Lake.



Figure 10: Lower water level in the New Channel reach.

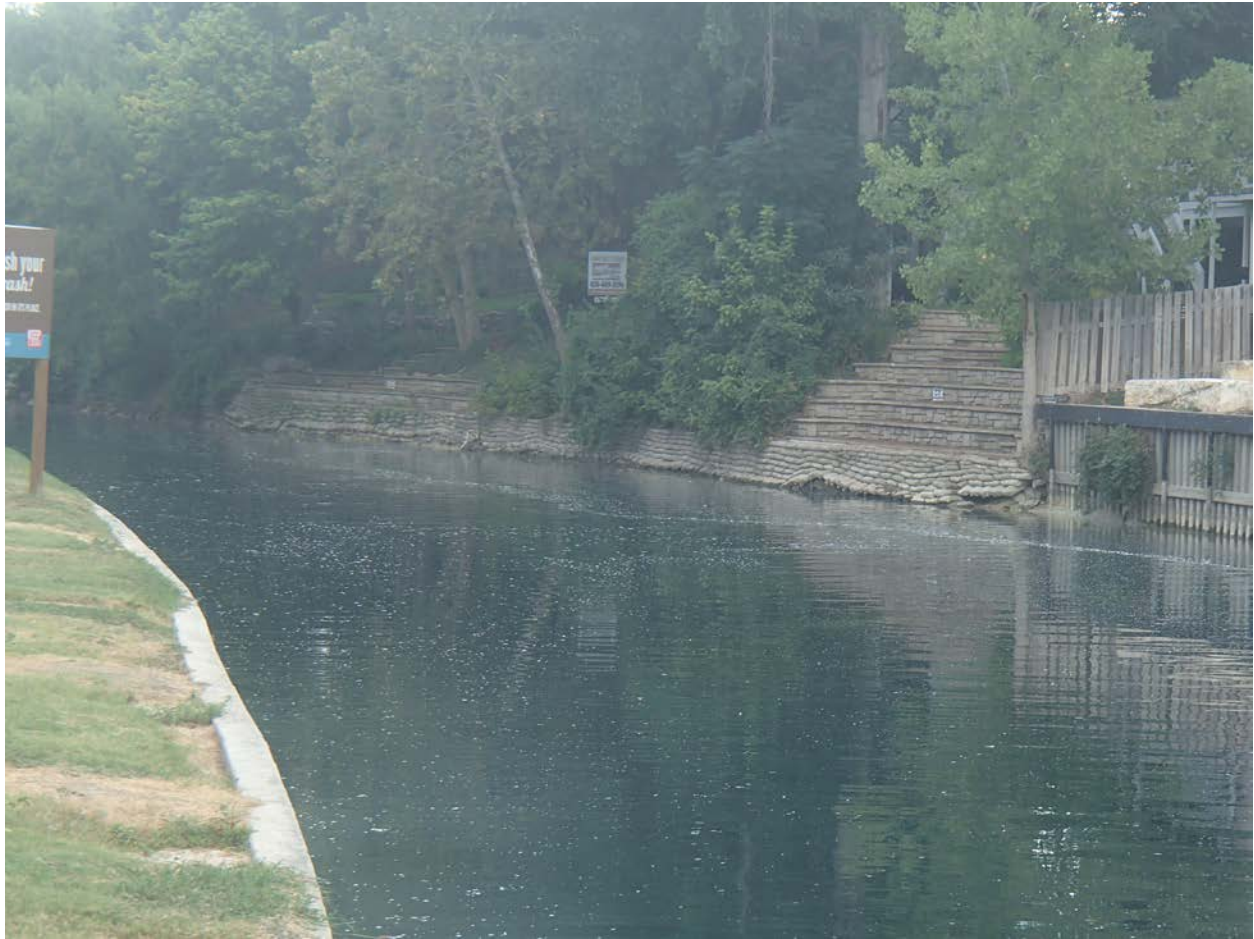


Figure 11: Surface film indicative of low flow conditions in New Channel study reach.

Figure 12 demonstrates presence/absence dipnet data collected since 2005, including the most recent Critical Period collection conducted this week. Data confirms that darters remain common throughout the system with 74% of sites sampled being occupied. Although this number declined slightly compared to other recent Critical Period sampling events, it is still well within the range observed during Comprehensive sampling. Percentages are lower in the Upper Spring run and New Channel due to degrading habitat conditions, but darters are still occupying all reaches. Despite low flows, fountain darter habitat conditions in Landa Lake and the Old Channel are maintaining relatively well in part due to aquatic vegetation restoration efforts.

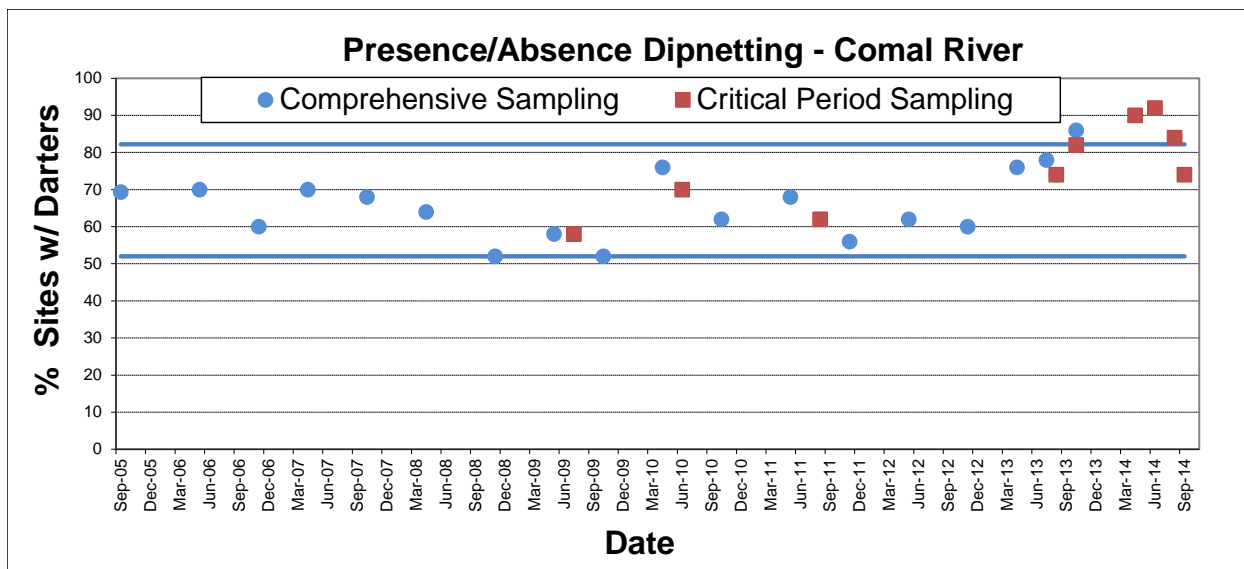


Figure 12: Percentage of sites (N=50) where fountain darters were present during stratified random presence/absence dip netting. Solid blue lines mark 5th and 95th percentiles of Comprehensive Period data.

At this time, cotton lures have been in place at each of the designated sampling locations for the Comal Springs riffle beetle surveys from May through present with the next round of counts slated for this upcoming week.

In summary, although recent total system discharge is the lowest observed over the course of the study, conditions have remained relatively stable over the past week. Endangered invertebrate habitat is clearly being impacted for surface dwelling invertebrates at this time with near total loss of surface habitat in Spring Run 1, Spring Run 2 and the spring runs on Spring Island. Despite dropping water levels and lacking habitat in the Upper Spring run reach, fountain darters continue to persist within this area. Impacts continue in Landa Lake with extremely shallow areas becoming more common and thick mats of floating aquatic vegetation lodging on top of rooted native aquatic vegetation. Similarly, decreased flows through the New Channel are impacting overall habitat conditions there. However, relatively steady flows through the Old Channel are maintaining quality habitat conditions. Should total system discharge continue to decline past 60 cfs this next week, flow split management will be triggered resulting in a necessary reduction of discharge within the Old Channel to support the rest of the system.

Please let me know if you have any questions. Brad