MEMORANDUM

TO:	Nathan Pence
FROM:	Ed Oborny (BIO-WEST)
DATE:	**November 28, 2014**
SUBJECT:	EA HCP Biological Monitoring – **Week 33**

BIOLOGICAL MONITORING UPDATES

COMAL SYSTEM:

The total system discharge at Comal Springs/River was 143 cfs this morning following an eventful week (Figure 1). Although a consider pulse came through the Comal system this past weekend, total system discharge had declined below 150 cfs by mid-week. Thus, this week marks the 33rd consecutive week for habitat evaluations and memorandums which will continue to occur until total system discharge at Comal Springs/River increases and consistently stays above 150 cfs. HCP species specific low-flow monitoring activities continue to be controlled by the <150 cfs trigger which means that aquatic vegetation mapping of the four study reaches and fountain darter presence/absence dip netting will be conducted in January should conditions not change.

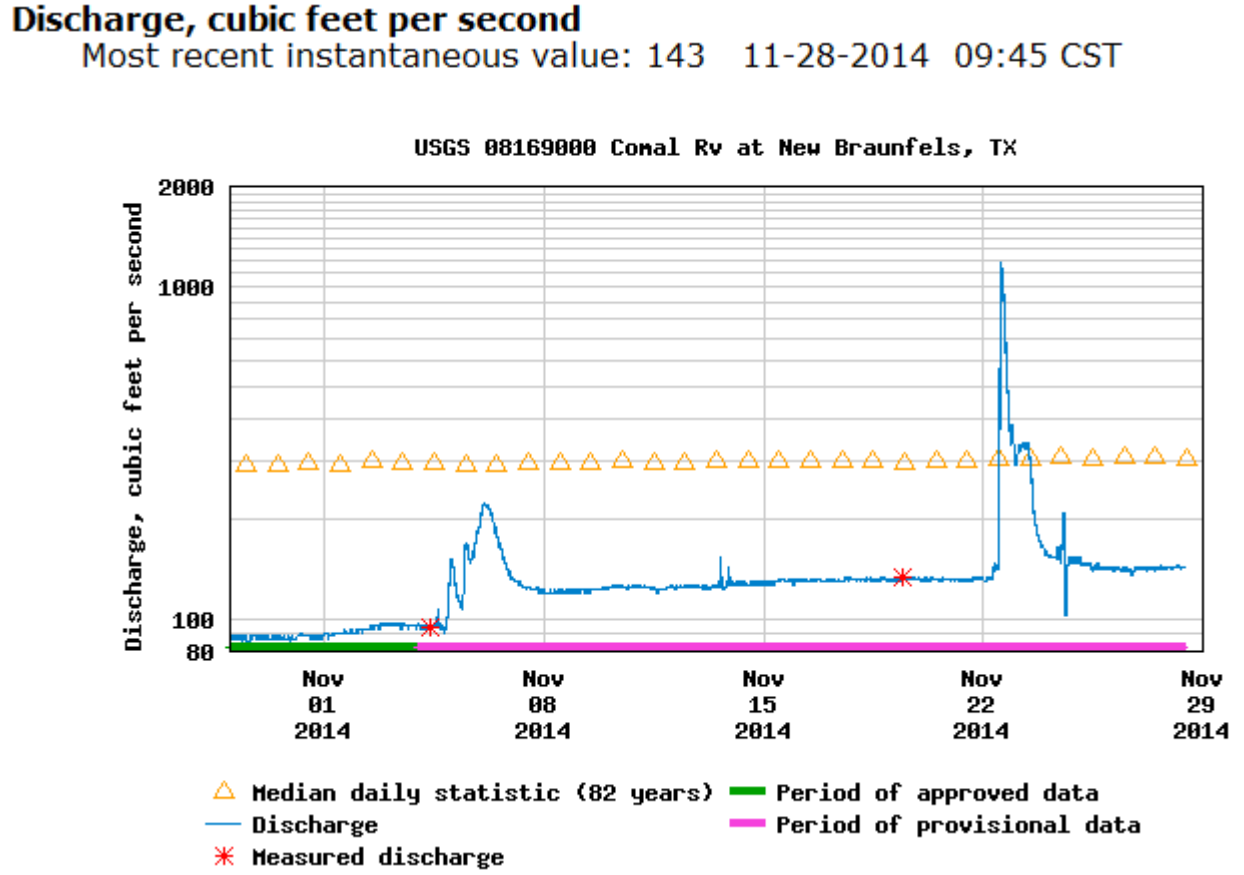

Figure 1: Screen shot of USGS webpage for the ***COMAL*** gage (08169000) showing total system discharge over the past month.

SAN MARCOS SYSTEM:
The total system discharge for San Marcos Springs/River is approximately 117 cfs this morning. No Critical period sampling activities were conducted this week or are anticipated for next week.

COMAL SPRINGS/RIVER - WEEK 33 CONDITIONS:
Photo documentation during the high flow pulse was conducted on Saturday, November 22nd and the weekly habitat observations and photo documentation associated with HCP biological monitoring were conducted on Wednesday, November 28th.

OBSERVATIONS AND ACTIVITIES: Total system discharge spiked to above 1,000 cfs on Saturday following heavy localized rainfall in the New Braunfels area. Following the pulse, total system discharge stabilized in the low 140 cfs range (Figure 1). The heavy localized rain caused some flash flooding of the Comal system as visually documented throughout this memorandum. Starting at the main spring orifices in Landa Park, Figures 2-4 show the water coming down Panther Canyon, levels in Spring Run 1 above and below Landa Park Drive, and flowing down Spring Run 2 towards the kiddie pool. In contrast, Figure 5 and 6 show conditions in Spring Run 1 downstream of Landa Park Drive and looking towards the kiddie pool in Spring Run 2 less than a week later, respectively. The flushing flows in spring runs 1 and 2 did a nice job of moving fine materials downstream while not ripping out aquatic vegetation or bryophytes. Thus, flushing flows in these areas created improved habitat conditions this week. Additionally, this was the first week since early summer that the entire Spring Run 1 channel was connected to the headwater springs via surface flow. This expanded the habitat for all Comal Springs surface dwelling invertebrates.

Conversely, the heavy rainfall event last weekend caused a considerable amount of sediment to enter Spring Run 3 from the adjacent hillside. Figure 7 documents piles of excessive sediment that made its way through or over the erosion control structures and into or at water's edge in Spring Run 3. However, overall the erosion control structures captured a lot of sediment preventing it from entering Spring Run 3 (Figure 8). In our opinion these structures are a valuable HCP mitigation measure for just such rainfall events. Several of these structures will require maintenance and sediment removal prior to the next storm event to maintain their continued effectiveness. With the increase in discharge, lateral connectivity was also expanded in Spring Run 3 creating more available surface habitat than in previous months even with the sedimentation occurring from the heavy rains.

The heavy rains and flash flooding this past weekend caused Blieders Creek to run over the road and cause a pulse of water through the Upper Spring Run reach towards Spring Island. Figure 9 shows the Upper Spring Run reach during the pulse event and this past Wednesday. Figure 10 shows the same sequence for Spring Run 5 which is adjacent to this upper reach. Following the recession of water in these areas it was evident that a nice scour of algae and fine materials occurred and rooted macrophytes were still in place. The pulse of water from Blieders Creek and localized runoff caused turbid conditions in the Spring Island area along with temporarily increased water levels (Figure 11). However, turbidity quickly gave way to clear water and water levels were back to where surface habitat was again exposed as shown in Figure 11. As observed in the Upper Spring Run reach, this pulse flow caused a nice scour of algae and fine sediments in the Spring Island area while leaving bryophytes intact (Figure 12).

Figure 2: Water coming down Panther Canyon under the road towards Spring Run 2.

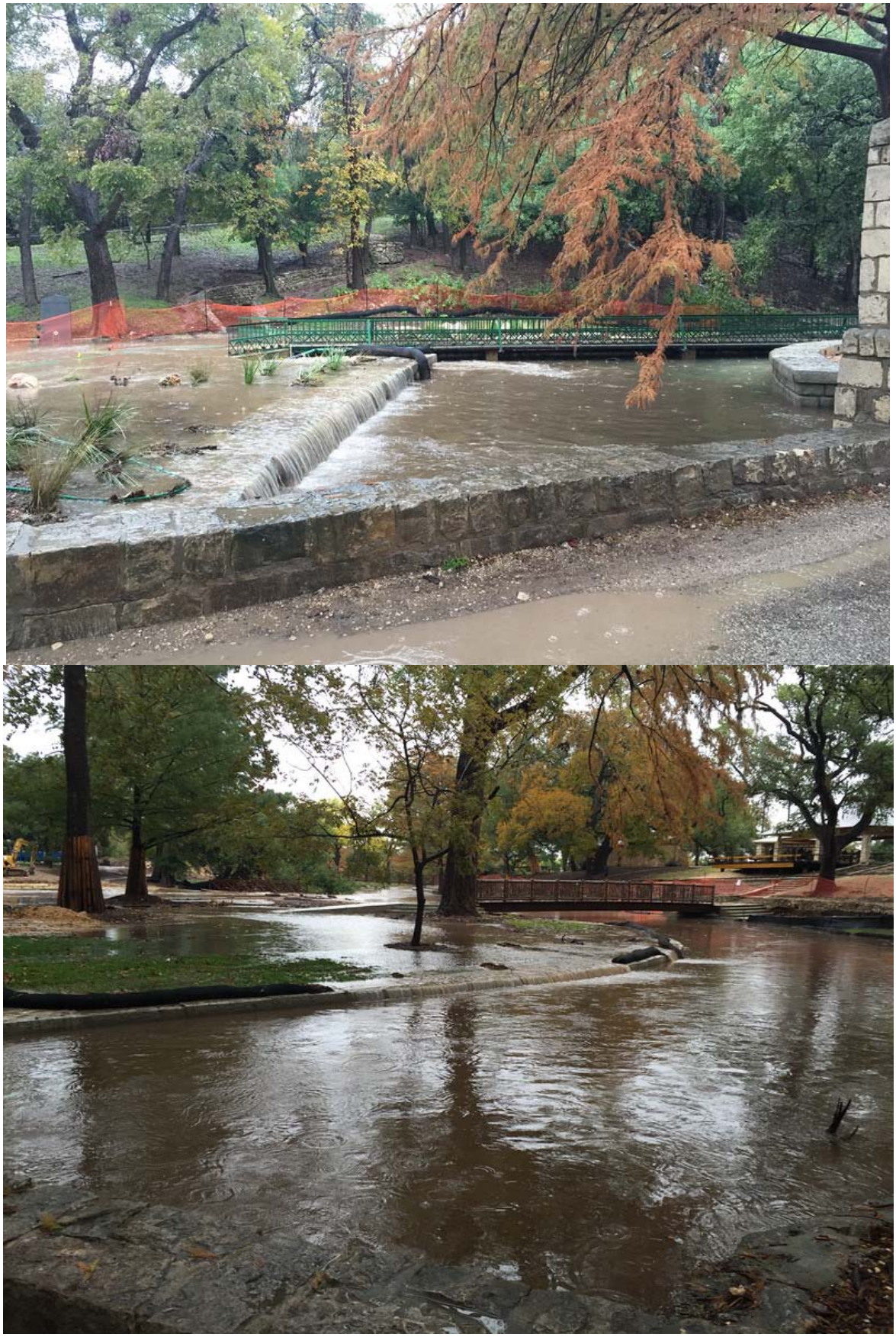

Figure 3: Spring Run 1 upstream (Top) and downstream (Bottom) of Landa Lake Drive during pulse event

Figure 4: Spring Run 2 looking upstream (Top) and downstream (Bottom) from park entrance road.

Figure 5: Spring Run 1 downstream of Landa Lake Drive on November 28th.

Figure 6: Spring Run 2 downstream towards kiddie pool on November 28th.

Figure 7: Spring Run 3 breaches of control zones and sediment build-up.

Figure 8: Spring Run 3 erosion control structures that worked great above key beetle habitat.

Figure 9: Upper Spring Run reach during pulse (Top) and last Wednesday (Bottom).

Figure 10: Spring Run 5 during pulse (Top) and last Wednesday (Bottom).

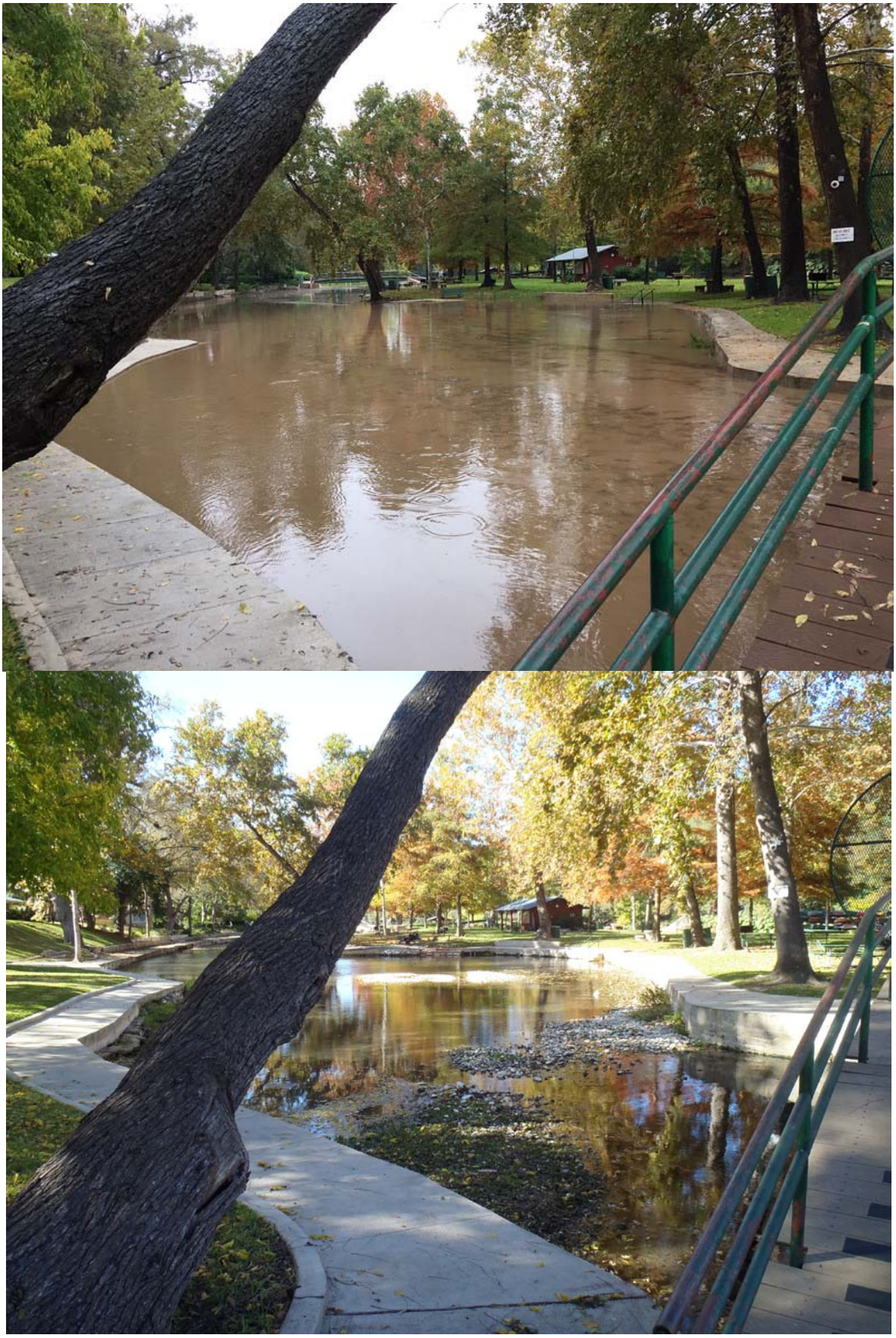

Figure 11: Eastern outfall of Spring Island during pulse (Top) and last Wednesday (Bottom).

Figure 12: Healthy bryophytes intact following pulse in the Eastern outfall of Spring Island.

Although turbidity and higher flows from the pulse event worked through Landa Lake as well, no impacts to aquatic vegetation were noted on Wednesday. In fact, this pulse created some natural assistance in moving the floating mats of aquatic vegetation in the lake downstream. As such, this resulted in the lowest coverage of floating mats of aquatic vegetation in Landa Lake observed relative to the past six months. Further down in the system, both the Old Channel and New Channel experienced pulse flows which increased water levels and turbidity. Figure 13 shows the water level and discharge in the Old Channel at the Golf Course road bridge during the pulse event. This area has received extensive native aquatic vegetation restoration work so we were anxious to see how our design and native vegetation restoration held up. Figure 14 shows what that reach looked like on Wednesday and we are happy to report that very little scouring occurred to the restored areas even during this intense event.

Further downstream in the Old Channel water was over the road at Elizabeth street and a muddy mess at the confluence of the Old and New Channels (Figure 15). However, on Wednesday when turbidity had settled, it appears the majority of aquatic vegetation in the New Channel study reach (albeit slightly trimmed and thinned) survived (Figure 16).

Figure 13: Old Channel Restored Native Vegetation area at Golf Course Road during pulse.

Figure 14: Old Channel Restored Native Vegetation area at Golf Course Road (Top) and just downstream (Bottom) on Wednesday.

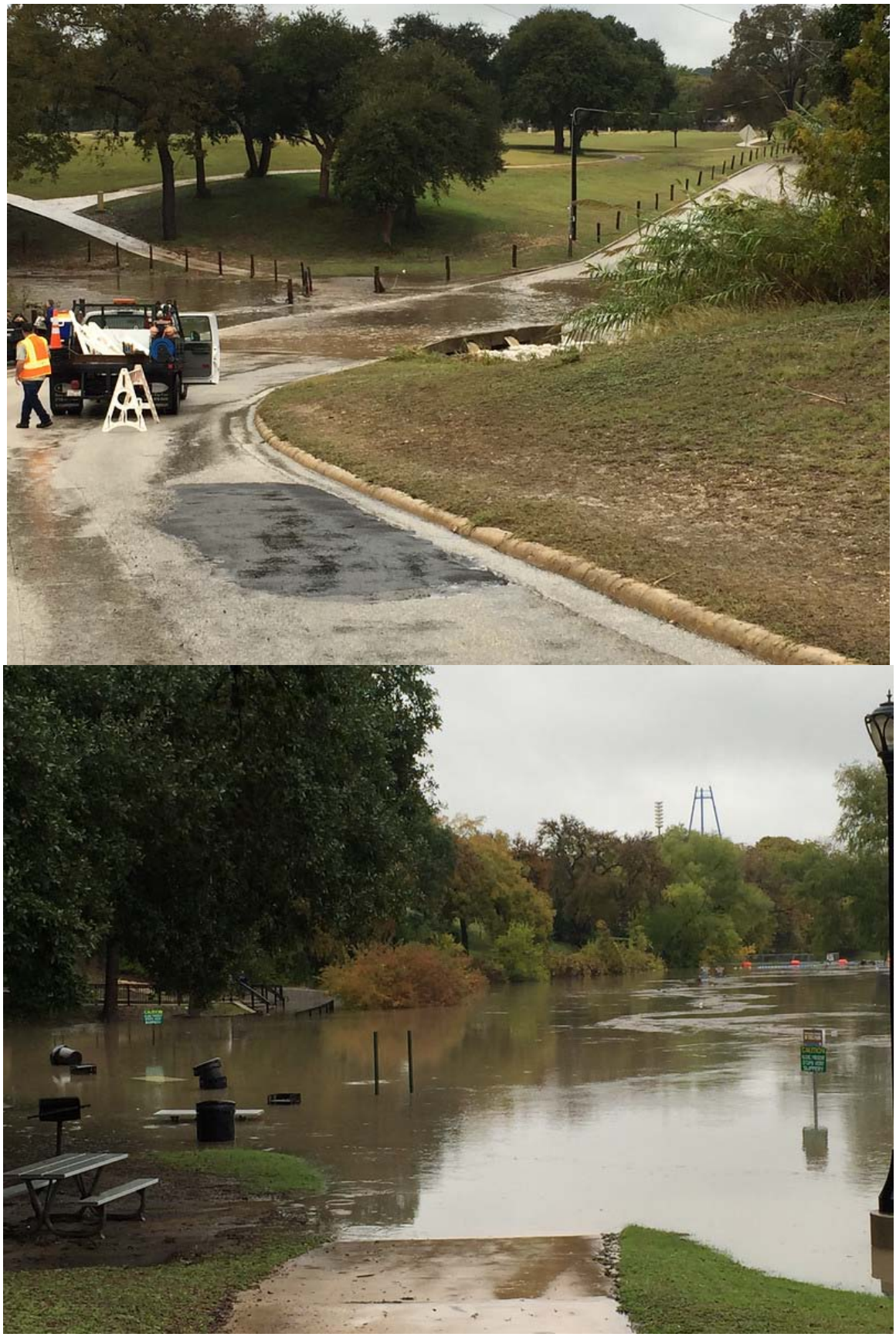

Figure 15: Old Channel over Elizabeth Street (Top) and over trash cans and sidewalks at the confluence of the Old and New Channels to the Comal River (Bottom).

Figure 16: Aquatic Vegetation survived the pulse in the New Channel study reach.

In summary, it was an exciting week relative to rainfall and flash flooding in the system. However, even with the flash flooding disturbance and associated impacts experienced this week, habitat throughout the Comal system improved. We say this because a nice scour of algae and fine sediments took place in several areas; water levels increased to support more overall surface habitat; and floating aquatic vegetation mats got pushed out of Landa Lake. Although improved conditions exist relative to this past summer and fall to date, impacts to habitat from the ongoing drought and below average total system discharge are still evident.

It is always exciting to get a natural test of HCP mitigation/restoration projects to judge their benefit. The amount of sediment captured by the erosion control structures along Spring Run 3 was impressive and protected several key riffle beetle habitat areas. Additionally, this event provided a great lesson on how to improve upon the work currently being done in that area. It was also extremely encouraging to see the response of the native aquatic vegetation that was established in Old Channel restoration areas with a design that was intended to withstand high water levels and rushing flows in the Old Channel. For the most part, even though tree stumps were moved (Figure 14), the restoration areas in both Landa Lake and the Old Channel were unscathed.

We hope everyone is having a wonderful Thanksgiving! Ed