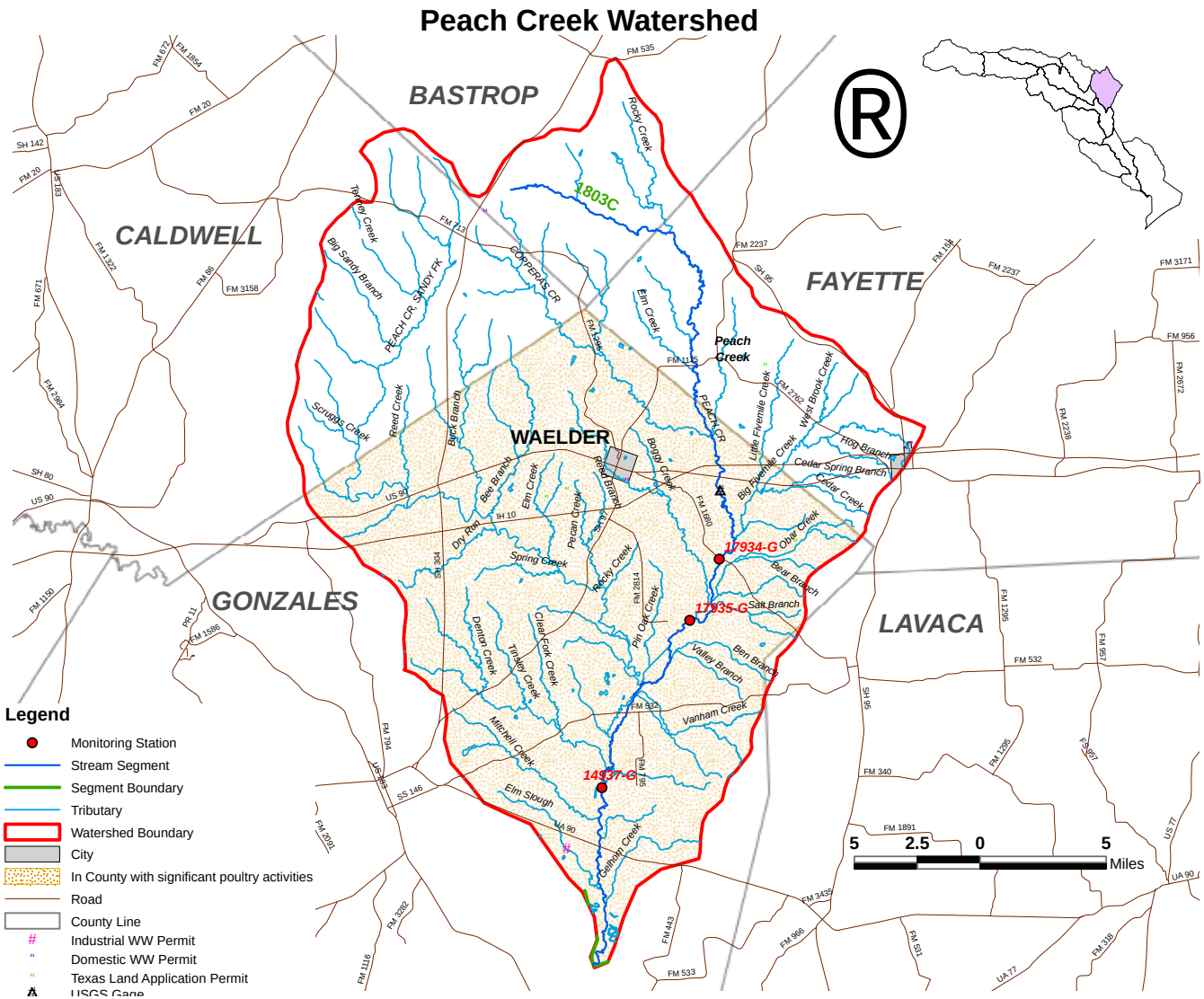

Monitoring Stations – Peach Creek

17934-G Peach Creek at FM 1680
17935-G Peach Creek at FM 397
14937-G Peach Creek at FM 353

Sampling sites are labeled in red followed by the letter G (GBRA), T (TCEQ), U (UGRA) or W (Wimberley) indicating who is the monitoring entity.

Peach Creek Watershed

Drainage Area: 480 square miles

Streams and Rivers: Guadalupe River, Peach Creek, Copperas Creek

Aquifers: Carrizo-Wilcox

River Segments: 1803C

Cities: Waelder, Flatonia

Counties: Caldwell, Bastrop, Fayette, Gonzales

EcoRegion: Texas Blackland Prairies, Post Oak Savannah

Vegetation Cover:

Pasture/Hay- 21.1%
Grass/Herbaceous - 23.4%
Shrublands - 13.9%
Deciduous Forest - 34.1%

Climate:

Average annual rainfall: 31 inches
Average annual temperature: January 39° July 94°

Land Uses: Recreation, Extensive Cattle and Poultry Productions, Light Industry, Agricultural Crops

Water Body Uses: Aquatic Life Use, Contact Recreation Use, Fish Consumption Use

Soils: Dark red sandstone and tan and grey sandstone

Permitted Wastewater Treatment Facilities:

Domestic: 3
Land Application: 2
Industrial: 1

Peach Creek, a tributary of segment 1803, the Guadalupe River below the San Marcos River, extends from its confluence with the Guadalupe River in Gonzales County, northward, with portions of the watershed in Fayette, Bastrop and Caldwell counties. The segment is separated into three assessment units: the lower 25 miles; the portion that extends from FM 1680 in Gonzales County to the confluence with Elm Creek in Fayette County; and, the remainder of the water body. GBRA has been monitoring Peach Creek (14937) monthly since 1996. The GBRA site is located in the lower assessment unit. Peach Creek was listed as impaired for bacteria in 2000. A Total Maximum Daily Load Study (TMDL) performed by TCEQ confirmed the impairment in the lower two assessments units and found that the upper assessment unit is not impaired for bacteria. The TMDL that is up for adoption in late 2008 modeled the watershed to determine the amount of load reduction that would be necessary to bring the stream back into compliance with stream standards. After looking into the operation of the wastewater plants discharging to the creek, it was determined that the sources of bacterial loading are most likely from non-point sources, such as failing septic tanks, livestock and wildlife. The study determined there needs to be a 47 to 100 percent reduction in non-point source bacterial loading to Peach Creek. However, TCEQ recognizes the potential for bacterial contributions from these wastewater facilities so there are waste load allocations assigned to the wastewater plants that require that they maintain adequate disinfection. To assure that there is a reduction of bacteria in the waste, the cities have bacterial monitoring requirements in their permits.

Wastewater Discharges

There are five point sources that have permits to discharge treated water to the segment, two of which could potentially contribute to the bacterial impairment. The cities of Waelder and Flatonia operate wastewater plants that are facultative lagoon systems that do not include chemical disinfection. TCEQ believes that the lagoon process holds the wastewater with sufficient time for reduction in bacteria by solar radiation and other natural processes.

The proposed Total Maximum Daily Load for Bacteria in Peach Creek report can be accessed at http://www.tceq.state.tx.us/implementation/water/tmdl/34-peachcreekbacteria.html . The Texas State Soil and Water Conservation Board, along with the Gonzales County Soil and Water Conservation District, have funds available to provide technical and financial assistance to landowners for the development of water quality management plans (WQMPs). The WQMPs are written specifically for each landowner's property and uses, with the goal to reduce the bacterial loading to Peach Creek. The funding includes cost sharing for water quality management practices that give livestock alternatives to watering directly in the creek or work to retain storm water off pastureland. These practices include fencing, stock ponds, troughs and water wells, as well as brush management, riparian herbaceous cover and forest buffers. To get additional information on these opportunities, contact the Gonzales County Soil and Water Conservation District at (830) 672-8371, ext.3.

Water Quality

The GBRA routine monitoring site at CR 353 exhibits wide swings in water quality. The median concentration for dissolved oxygen is 6.8 milligrams per liter (mg/L), ranging from a minimum of 2.1 mg/L to a maximum of 13.5 mg/L. During the period of record the dissolved oxygen dropped below the standard for the minimum dissolved oxygen concentration (4.0 mg/L) three times. The temperature varied between 5.5°C to 29.8°C, with a median temperature of 22.4°C. The **specific** conductance ranged between 101 and 1680 micromhos per centimeter, with a median conductivity of 602 micromhos per centimeter. The median pH of the site was 7.84, ranging from 6.68 to 8.76 standard pH units, never falling outside the stream standard range of 6.5 to 9.0 standard units.

The median concentration for chloride was 46.1 mg/L, ranging from 4.2 to 230 mg/L, falling outside the stream standard used for assessment 64 times out of 136 data measurements. Peach Creek exhibited a wide range in sulfate concentrations, ranging between 0.5 and 327 mg/L, with a median concentration of 20.1 mg/L. The sulfate concentrations fell outside the stream standard of 50 mg/L 48 times. The same wide range in concentrations is seen with total hardness. As seen in figure 1, the ionic constituents, represented by conductivity, are negatively correlated with flow. The constituents that make up the majority of the dissolved solids also correlate with each other, meaning that when the hardness and chloride are elevated, the sulfate follows the same pattern. Two of the other three permitted dischargers in the watershed are from clay mining operations and may be linked to the wide swings in the dissolved constituents. These discharges are intermittent and while within the permitted allowances could explain the wide swings in concentrations.

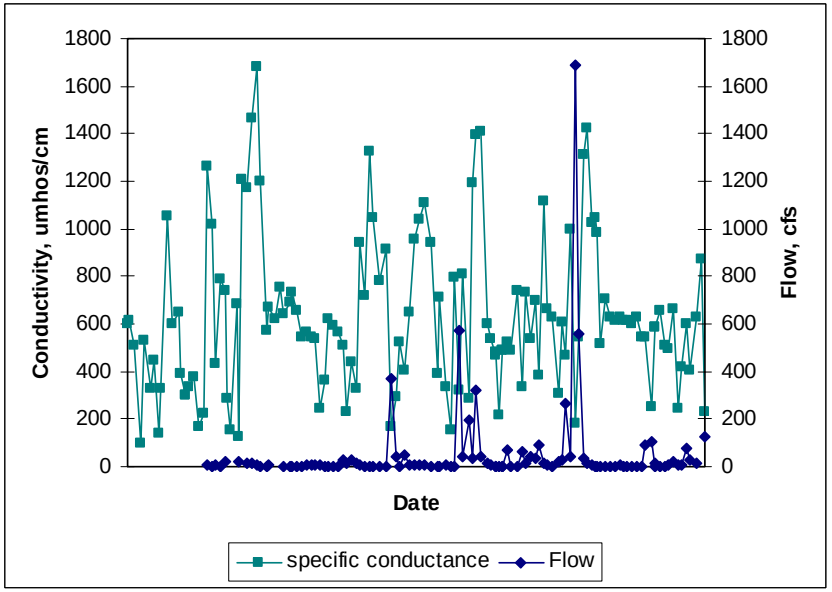

Figure 1. Specific conductance verses flow over the period of historical data at the GBRA monitoring site at CR 353 (14937).

Most locations in the Guadalupe River basin have relatively high hardness concentrations with one exception, Peach Creek. The toxicity of certain metals is dependent on the hardness of the stream. The metals toxicity criteria that are hardness dependent are cadmium, chromium, copper, nickel, lead and zinc. The hardness concentration at the 15th percentile is 39 milligrams per liter in Peach Creek as compared to an average of 221 mg/L in other parts of the basin. It is at this percentile that the toxicity criteria for Peach Creek are calculated. The acute and chronic toxicity criteria are considerably lower for Peach Creek than at other locations in the river basin. Also, the highest concentrations of aluminum, arsenic, chromium, nickel and zinc in the basin are found at the CR 353 site. Currently, Peach Creek does not exceed the standards for acute and chronic toxicity but the concentrations that have been found do warrant continued monitoring. Refer to the "*Metals in Water*" section of this document for the metals concentrations measured at the CR 353 site from 1999 to 2007.

Nitrate nitrogen, ammonia nitrogen and total phosphorus, were analyzed at the GBRA monitoring location on Peach Creek. Over the period of record, nitrate nitrogen was reported under three storet codes, as nitrate nitrogen and in combination with nitrite nitrogen. The median concentrations for all three cited storet codes were 0.15, 0.20, and 0.23 mg/L, ranging from less than detection to 1.94 mg/L. At no time did the nitrate nitrogen concentration, regardless of storet citing, exceed the screening criteria of 1.95 mg/L. The median ammonia nitrogen concentration was 0.09 mg/L, ranging from 0.02 to 6.3 mg/L which was a one-time occurrence in the data. Four sampling events showed the concentration of ammonia nitrogen over the screening concentration of 0.33 mg/L. The median total phosphorus concentration was 0.29 mg/L, and ranged from less than the limit of quantification for the method to 1.08 mg/L which was the only data point that exceeded the screening concentration of 0.69 mg/L. Also, there is a slight downward trend in phosphorus concentrations over time as seen in figure 2. Time significantly predicted total phosphorus values, ß= -0.00, $t(132)=-4.49$, $p=<0.01$. Time also explained a significant proportion of variance in total phosphorus values, $R^2=0.13$, $F(1,132)=20.16$,$p<0.01$.

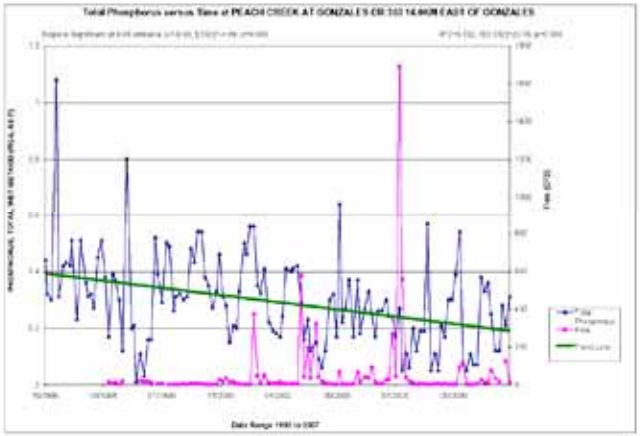

Figure 2. Total Phosphorus and Flow over the period of historical data at the GBRA monitoring site at CR 353 (14937).

Peach Creek is a slow, meandering stream with pools. The median **flow** at the GBRA site at FM 353 is 4.3 cubic feet per second (cfs), ranging from 0.75 to 1690 cfs. Over the period of record the flow was less than 30 cfs about 80% of the time. The approximate depth at the sampling location is 2.5-3.0 feet, but many stream reaches in the upper part of the watershed are known to go dry. The pools are typically 2-5 feet in depth.

Regardless of the lack of access conducive to contact recreation, streams like Peach Creek, are assessed using the water quality standard for contact recreation. The stream standard for contact recreation is a geometric mean of 126 organisms per 100 milliliters, and the single sample concentration of 394 organisms per 100 milliliters. The geometric mean for ***E. coli*** bacteria at CR 353 is 162 organisms per 100 milliliters, with over 25% of the data points exceeding the grab standard.

The substrate at the GBRA monitoring location on Peach Creek ranges from sandy to small cobble. The water is turbid (median = 22 nephlometric turbidity units) and can have a slight brown tint from tannins that leach from decaying plant material. The suspended solids ranged from 1.7 to 394 mg/L, with a median of 13.2 mg/L. The median chlorophyll a concentration is 2.0 micrograms per liter (ug/L) and ranged from less than detection to 19.2 ug/L. There were three monitoring events that were above the screening concentration of 14.1 ug/L. Reviewing the data to look for links between turbidity and flow or chlorophyll a, no significant correlations were found. The periods circled in figure 3 show that the turbidity can stay elevated with no corresponding peaks in flow. The data was reviewed and there were no elevated chlorophyll a values associated with algal blooms during these periods. One possible link to the turbidity could be the extreme flood events prior to each time period highlighted on the graph. The inundation of the banks causes loss of grasses along the shoreline that would provide stabilization and prevent or minimize erosion and loss of sediment.

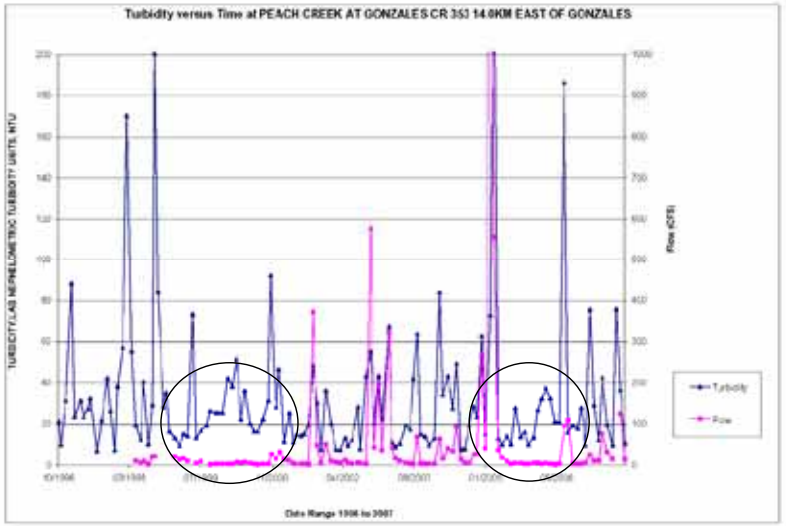

Figure 3. Turbidity and Flow over the period of historical data at the GBRA monitoring site at CR 353 (14937).

GBRA has two additional monitoring sites in the watershed. One site, located at the crossing of FM 1680, was monitored bimonthly for three years beginning in FY2004. The site is located upstream of GBRA's historical routine site and at the midpoint of the watershed. It was added in response to concerns by the Texas Parks and Wildlife Department that there was a possible link between an agricultural producer and a fish kill on the stream. To date, there has been no further investigation noted by the TPWD that GBRA is aware of. A site at the crossing of CR 397 that was monitored during the TMDL project has been added to the GBRA monitoring program in order to assess any changes in water quality as best management practices are installed during the implementation phase that would follow the adoption of the TMDL. The site at CR397 is downstream of the site located at FM 1680, and midway between FM 1680 site and the CR 353 site. Both sites are located in the assessment units that were listed as impaired for bacteria, and both are located downstream of the cities of Waelder and Flatonia's wastewater discharges. In comparison with the CR 353 site, these two sites show similar ranges in dissolved constituents. The more substantial differences are seen in chlorophyll a and dissolved oxygen. The higher median chlorophyll a (only FM 1680 chlorophyll a data available) and lower median dissolved oxygen at the two new sites (Figures 4 and 5) as compared to the historical site at CR 353 are most likely due to more frequent low flow to no flow conditions (median flow at FM 1680 is less than one cubic foot per second) and available nutrients at these two locations. The median phosphorus concentration (0.36 mg/L) and the median nitrate nitrogen concentration (0.23 mg/L) are slightly higher at the upstream location (FM 1680). The higher nutrient concentrations may be a result of the site's proximity to the wastewater discharges.

Peach Creek at CR 353 downstream view (site no. 14937)

Peach Creek at CR 353 uownstream view (site no. 14937)

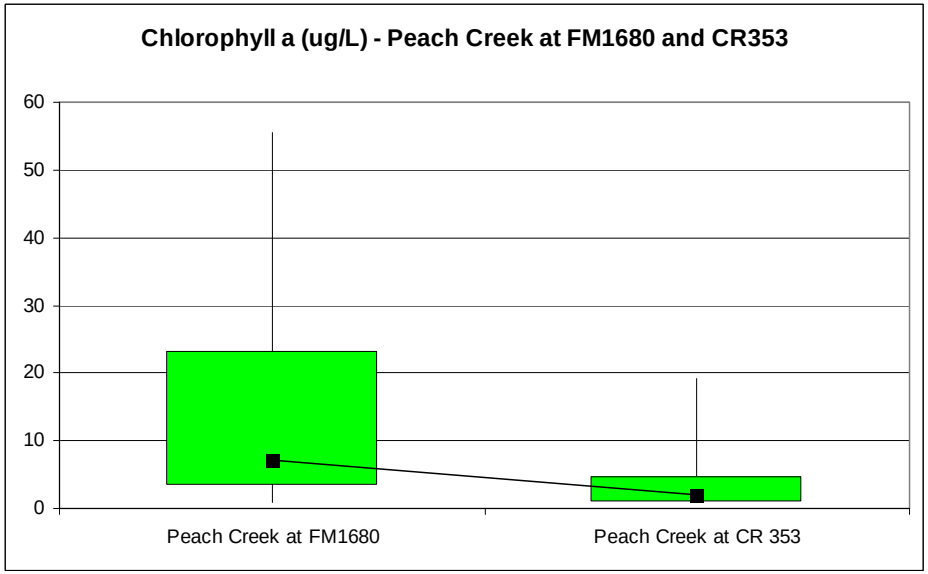

Figure 4. Chlorophyll a concentrations at the FM1680 (17934) and CR 353 (14937) monitoring sites on Peach Creek. The boxes represent the range of concentrations that fall between 25 to 50 % of the historical data set; the whiskers represent the complete range of concentrations; and the black square is the median concentration for historical data sets.

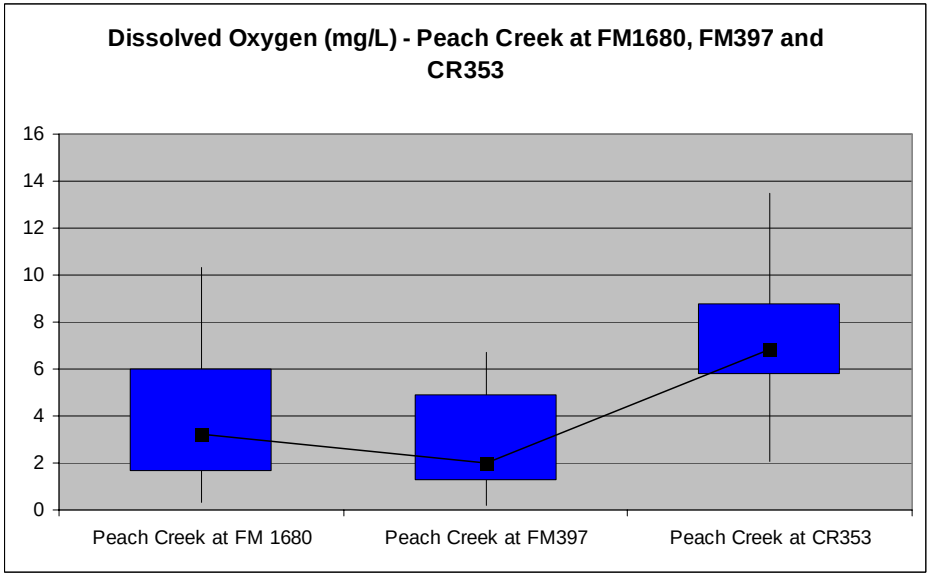

Figure 5. Dissolved oxygen concentrations in the FM1680 (17934), FM397 (17935) and CR 353 (14937) monitoring sites on Peach Creek. The boxes represent the range of concentrations that fall between 25 to 50 % of the historical data set; the whiskers represent the complete range of concentrations; and the black square is the median concentration for historical data sets.