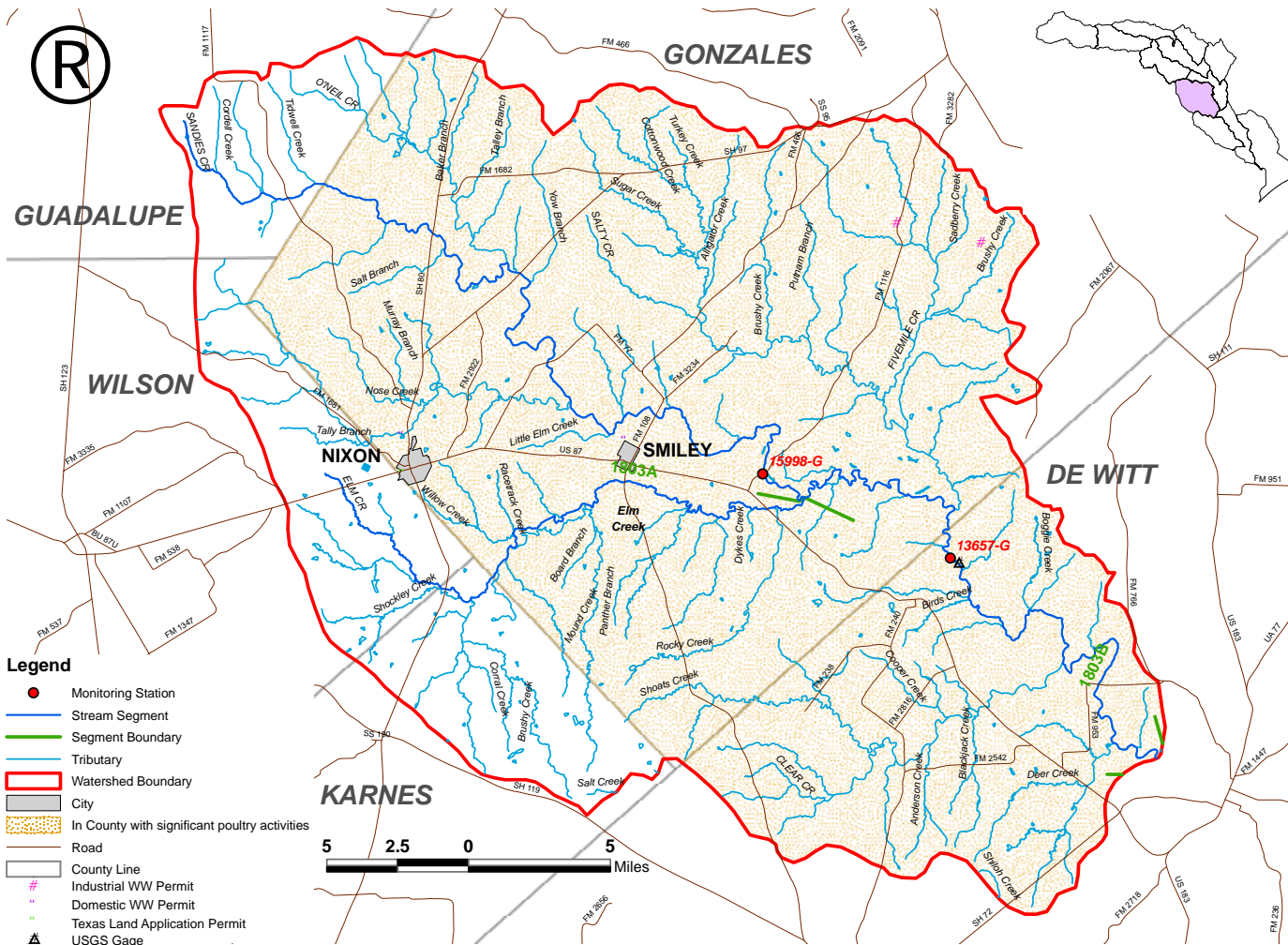


# Sandies Creek Watershed



**Monitoring Stations – Sandies Creek**

15998-G Sandies Creek at FM 1116  
 13657-G Sandies Creek near Westhoff

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

## Sandies Creek Watershed

**Drainage Area:** 711 square miles

**Streams and Rivers:** Guadalupe River, Elm Creek, and Sandies Creek, Five Mile Creek, Salty Creek, Clear Creek, O'Neil Creek

**Aquifers:** Carrizo-Wilcox, Gulf Coast

**River Segments:** 1803A, 1803B

**Cities:** Smiley, Nixon

**Counties:** Guadalupe, Karnes, Wilson, Gonzales, DeWitt

**EcoRegion:** Texas Blackland Prairies, Post Oak Savannah

### Vegetation Cover:

Pasture/Hay - 24.9%	Deciduous Forest - 19.6%
Grass/Herbaceous - 24.3%	Evergreen Forest - 5.3%
Shrublands - 21.1%	Row Crops - 3.4%

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

**Land Uses:** Light Manufacturing, Extensive Cattle Production and Poultry Production; Agricultural Crops (hay, sorghum, etc.)

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

**Soils:** Dark red sandstone, light tan and gray sandstone

### Permitted Wastewater Treatment Facilities:

Domestic: 3  
 Land Application: 1  
 Industrial: 1

Sandies Creek, Segment 1803B, extends approximately 65 miles, from its confluence with the Guadalupe River in DeWitt County, near the city of Cuero, upstream, through Gonzales County, to its headwaters in Guadalupe County. The creek flows through a watershed that is made up of hardwoods, pines, mesquites and a variety of grasses. Elm Creek, 1803A, is a tributary of Sandies Creek that flows from its headwaters in Wilson County through Gonzales County to converge with Sandies Creek, downstream of the city of Smiley. Elm Creek is approximately 24 miles long, in a watershed that is rural, and characterized by flat to rolling terrain, dominated by hardwoods, pines, mesquite and a variety of grasses. Both creeks are unclassified stream segments that were assessed as one assessment unit each, using the stream standards for the main stem Guadalupe River that receives their combined flow. GBRA has historical monitoring sites on Sandies Creek since 1996. The current site, monitored since 2000, is located at Westhoff (site no. 13657). The original site, located at FM 1116, was moved to the Westhoff site in order to more accurately record flow by using the USGS gaging station nearby. Also, there were safety considerations that made the Westhoff site a better long term site. GBRA does not maintain a routine site on Elm Creek. There was not enough long term data on Elm Creek to look for trends in water quality. Other sites on Sandies and Elm Creeks have been monitored for short periods of time for special studies, one of which was to determine, if any, the impacts of poultry operations on watersheds. The study collected monthly data from each creek from November 1997 to August 1998. It was because of this limited study that the creeks were suspected of being impaired. Other data collected in the watershed were for the TCEQ total maximum daily load study started in 2002.

#### Land uses

The land use is primarily agricultural with row crops and poultry and livestock production. There are two wastewater treatment plants in the watershed, one for the city of Nixon and one for the city of Smiley. Both plants are permitted to discharge to small tributaries of Sandies Creek. The city of Nixon facility is



Sandies Creek at FM 1116 (15998).

permitted to discharge up to 0.45 million gallons per day, with quality limits of 10 milligrams per liter (mg/L) carbonaceous oxygen demand, 15 mg/L total suspended solids and 3 mg/L ammonia-nitrogen. The facility uses chlorine to disinfect the effluent. The city of Smiley treats its wastewater in an facultation lagoon and is authorized to use their effluent to irrigate a hay field in lieu of discharge.

#### Water Quality

Sandies and Elm Creeks were both listed on the 2006 Texas Water Quality Inventory as impaired for depressed dissolved oxygen and for exceedence of the bacteria standard for contact recreation. Currently, a total maximum daily load (TMDL) study is being conducted by the TCEQ. Data was collected on the two tributaries in 2002 and 2004. TCEQ is analyzing the data to develop TMDLs for dissolved oxygen and for bacteria. The goal of the TMDL study is to determine the amount of a pollutant that a body of water can receive and still support its designated uses. The allowable load is then allocated among the potential sources of pollution within the watershed. Potential sources of pollutants include point sources such as wastewater discharges, and non-point sources, including agricultural land use activities, wildlife and septic tanks.

In Sandies and Elm Creeks, low dissolved oxygen levels indicate that existing conditions are not optimal for aquatic life support. To meet the aquatic life support standards, the creek must have better than a 5.0 mg/L median dissolved oxygen concentration. Also, the creek should not fall below 3.0 mg/L more than 25% of the time. Reviewing the historical data at the GBRA site at Westhoff on Sandies Creek, the median dissolved oxygen was 6.4 mg/L, ranging from 0.8 to 13.5 mg/L. The stream dropped below 3.0 mg/L 9 times out of 133 measurements, or 6.8%. As seen in figure 1, there is a wide range of measured dissolved oxygen concentrations over the period of record. The variation in dissolved oxygen can be due to several factors, including time of day when photosynthesis adds oxygen during the sunlit hours, time of year when the colder water can hold more saturated dissolved oxygen, or early morning hours when dissolved oxygen drops due to respiration of algal cells overnight. Additionally, if the sediment load of the stream increases due to runoff, decomposition and bacterial respiration can cause a drop in the dissolved oxygen concentration. All of these factors are possible in Sandies Creek.

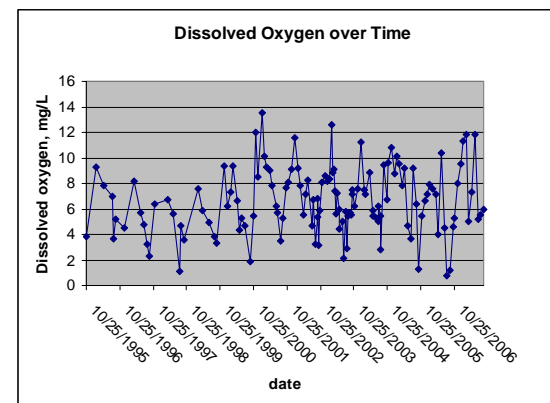


Figure 1. Dissolved oxygen concentrations measured over time in Sandies Creek at Westhoff (13657).

The temperature in Sandies Creek ranged from 8.64 to 30.40C, with a median temperature of 23.20C. The median pH was 7.9, ranging from 6.8 to 8.91, and never exceeded the stream standards of 6.5 to 9.0. The conductivity and dissolved constituents of Sandies Creek are also highly variable, as seen in figure 2.

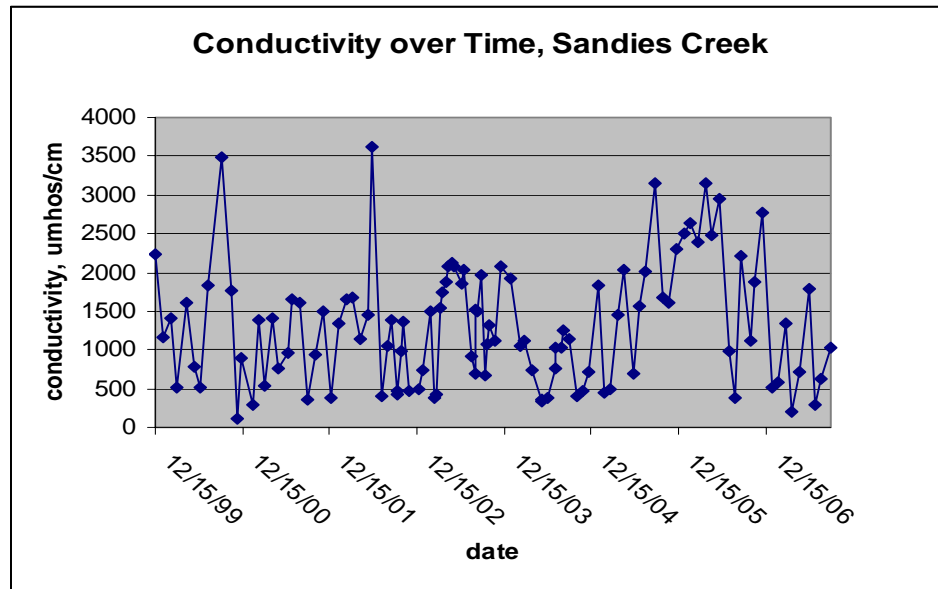


Figure 2. Variability in conductivity, or dissolved solids, over time in Sandies Creek at Westhoff (13657).

The stream is high in dissolved solids in comparison to the lower Guadalupe River. The dissolved solids in Sandies Creek, based on conductivity, are approximately 852 mg/L, as compared to 358 mg/L in the lower Guadalupe River. In figure 3, increases in flow see corresponding decreases in the chloride concentration, and the majority of time the concentration of chlorides remain elevated at low flows, indicating that the base flow is high in dissolved salts.

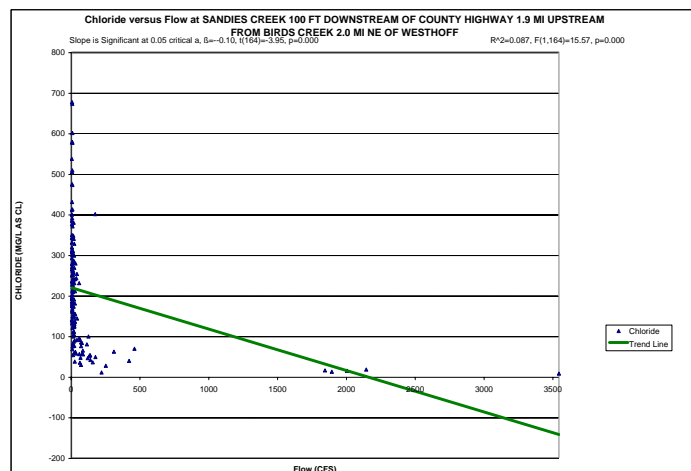


Figure 3 – Sandies at Westhoff (13657) chloride verses flow.

Chloride and sulfate concentrations ranged from 7.1 to 676 mg/L and 1 to 429 mg/L, respectively, with median concentrations of 190 mg/L and 47 mg/L. The hardness of the creek ranged from 45.4 to 395 mg/L, with a median concentration of 142 mg/L. The median concentration of total suspended solids was 39.8 mg/L, ranging from 12.2 to 510 mg/L.

Chlorophyll a concentrations have spiked in Sandies Creek and those spikes are associated with low flow periods, as seen in Figure 4. The median concentration is 4.45, ranging from 0.25 ug/L to 125 ug/L. Nineteen of the 108 sampling events had chlorophyll a concentrations that exceeded the screening concentration of 14.4 ug/L. 2006 was very dry year and the most consistently high values are seen in that time period.

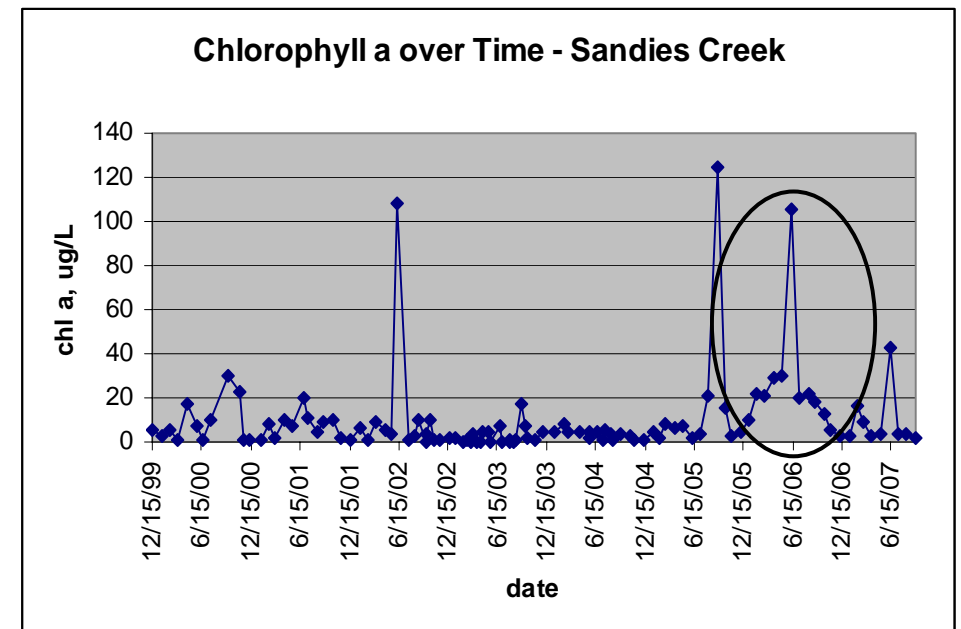


Figure 4. Chlorophyll a concentrations increase during low flow periods at the Sandies Creek at Westhoff (13657) as seen in 2006.

Nitrogen and phosphorus were analyzed at the GBRA Sandies Creek location. Ammonia nitrogen concentrations did not exceed the screening concentration of 0.33 mg/L during the period of record and had a median concentration of 0.06 mg/L, ranging from less than detection to 0.27 mg/L. Nitrate nitrogen was analyzed as nitrate and in combination with nitrite. The median concentration for nitrate nitrogen, combining all methods was 0.26 mg/L, ranging from 0.02 to 2.0 mg/L, exceeding the screening concentration of 1.95 mg/L one time out of 108 measurements. The median concentration of total phosphorus was 0.38 mg/L, ranging from less than method detection to 1.4 mg/L, exceeding the screening concentration 11 times out of 105 measurements (10.4%). There was no correlation with rises in flow to explain the spikes in phosphorus concentration so the most likely source of the phosphorus is wastewater effluent, although, of



the median flow in the creek of 9.9 cubic feet per second, the contribution of wastewater is less than 0.5 cubic feet per second on a daily basis. None of the nutrients showed any significant trends, improving or degrading, over time.

*E. coli* was analyzed and the bacterial impairment noted in the assessment was confirmed over the period of time that GBRA has monitored at the Westhoff location. The geometric mean for *E. coli*, 182 organisms per 100 milliliters, exceeded the stream standard for contact recreation of 126 organisms per 100 milliliters. 27 of the 108 measurements exceeded the single grab standard of 394 organisms per 100 milliliters, or 25% of the time.

#### *Stakeholders concerns*

Stakeholders in the watershed are concerned that an inappropriate amount of emphasis is being placed on the necessity of the stream to meet standards for contact recreation because of the low amount of contact recreation use in Sandies and Elm Creeks. Most of the stakeholders are land owners with agricultural interests, on large farms that have been in their families for generations, and they feel the activities on their property have not changed over the years. It should be noted that the conditions in Sandies Creek and the lack of public access for contact recreation reduce the potential of human exposure to bacteria during contact recreation.



Sandies Creek at FM 1116 (15998).