

DRAFT

**Texas Stream Team Volunteer Water Quality Monitoring Program
2008 Lake Creek at Montgomery Trace Park Data Summary**

This data summary report includes general basin volunteer monitoring activity, general water quality descriptive statistics, tables and graphs, and comparisons to stream standards as related to “aquatic life use” criteria.

In alignment with Texas Stream Team’s core mission, monitors attempt to collect data that can be used in decision-making processes, to promote a healthier and safer environment for people and aquatic inhabitants. While many assume it is the responsibility of Texas Stream Team to serve as the main advocate for volunteer monitor data use, it has become increasingly important for monitors to be accountable for their monitoring information and how it can be infused into the decision-making process, from “backyard” concerns to state or regional issues. To assist with this effort, Texas Stream Team is coordinating with monitoring groups and government agencies to propagate numerous data use options.

Among these options, volunteer monitors can directly participate by communicating their data to various stakeholders. Some options include: participating in the Clean Rivers Program (CRP) Steering Committee Process (see box insert on this page); providing information during “public comment” periods; attending city council and advisory panel meetings; developing relations with local Texas Commission on Environmental Quality and river authority water specialists; and, if necessary, filing complaints with environmental agencies; contacting elected representatives and media; or starting organizing local efforts to address areas of concern.

The Texas Clean Rivers Act established a way for the citizens of Texas to participate in building the foundation for effective statewide watershed planning activities. Each CRP partner agency has established a steering committee to set priorities within its basin. These committees bring together the diverse interests in each basin and watershed. Steering committee participants include representatives from the public, government, industry, business, agriculture, and environmental groups. The steering committee is designed to allow local concerns to be addressed and regional solutions are recommended. For more information about participating in these steering committee meetings and to contribute your views about water quality, contact the appropriate CRP partner agency for your river basin at: <http://www.tnrcc.state.tx.us/water/quality/data/wmt/contract.html>.

Currently, Texas Stream Team is working with various public and private organizations to facilitate data and information sharing. One component of this process includes interacting with watershed stakeholders at CRP steering committee meetings. A

major function of these meetings is to discuss water quality issues and to obtain input from the general public. While participation in this process may not bring about instantaneous results, it is a great place to begin making institutional connections and to learn how to “work” the assessment and protection system that Texas agencies use to keep water resources healthy and sustainable.

In general, Texas Stream Team efforts to use volunteer data may include the following:

1. Assist monitors with data analysis and interpretation
2. Analyze watershed-level or site-by-site data for monitors and partners
3. Screen all data annually for values outside expected ranges
4. Network with monitors and pertinent agencies to communicate data
5. Attend meetings and conferences to communicate data
6. Participate in CRP stakeholder meetings
7. Provide a data viewing forum via the Texas Stream Team Data Viewer
8. Participate in professional coordinated monitoring processes to raise awareness of areas of concern

Information collected by Texas Stream Team volunteers utilizes a TCEQ and EPA approved quality assurance project plan (QAPP) to ensure data are correct and accurately reflects the environmental conditions being monitored. All data are screened for completeness, precision and accuracy where applicable, and scrutinized with data quality objective and data validation techniques. Sample results are intended to be used for education and research, baseline, local decision making, problem identification, and others uses deemed appropriate by the data user. Graphs are compiled and situated to assist the data user in obtaining information from the collected data. Where applicable, “time” is located on the “x” or horizontal axis and is chronologically listed from oldest to most recent sampling. The “y1” or “y2” axes contain the constituent(s) of interest. Note: pH values were not transformed for graphing purposes or for developing mean statistics; data collection events may not be evenly distributed over time (through seasons and years); sampling events may occur at different times of the day; sample collection and results documentation may have been completed by different monitors over time at each site; data collected by school groups should undergo additional scrutiny before use; data summary information is subject to change.

SITE DESCRIPTION

Lake Creek is labeled by the Texas Commission on Environmental Quality (TCEQ) as stream segment 1015 in the San Jacinto River Basin. The headwaters of Lake Creek start in Grimes County and then flow southeast into Montgomery County where it joins the West Fork of the San Jacinto River just southwest of Conroe, Texas; approximately 8 miles downstream of Lake Conroe. The monitoring site where the data for this report was collected lies approximately 5 miles upstream of this confluence of Lake Creek and the West Fork of the San Jacinto River.

DATA

The following information summarizes water quality data collected on Lake Creek at Montgomery Trace Park in Montgomery County, Texas. Information presented in this report will be accompanied by corresponding charts and graphs. For all graphs, site name or sample date is located on the “x” or horizontal axis. This axis represents the independent variable, location of site or time. The data points on the “x” axis progress from upstream to downstream or chronologically from oldest to most recent sampling. The “y1” or “y2” axes contain the constituent(s) of interest. There is also an “R” squared correlation coefficient equation accompanied by a trend line that indicates the strength and direction of a linear relationship between two variables. This coefficient is used to determine if an independent variable is related to a dependent variable. While correlation does not represent causation, there is sometimes a demonstrated cause and effect relationship.

Data collected by Texas Stream Team monitors include: pH, specific conductivity, water and air temperature, dissolved oxygen, total depth, Secchi depth, field observations, flow severity, days since last precipitation, and others.

There were 57 samples taken from Lake Creek at Montgomery Trace Park from June 24th, 2000 to November 5th, 2008. Sampling times ranged from 9:40 am to 6:00 pm with the average sampling time occurring at 2:37 pm. Monitoring was conducted by Texas Stream Team volunteer Glenn Buckley in partnership with the Houston-Galveston Area Council.

pH Summary

pH levels measure how acidic or alkaline the water sample is. A reading is taken on a 0 – 14 scale measured in standard units (su). When pH levels fall out of the 5 – 9 su range, it begins to become a problem for aquatic life. At Montgomery Trace Park, pH values ranged from 6.6 to 9.25 su with an average value of 7.3 su. These pH levels indicate relatively stable readings for this site.

Specific Conductivity Summary

Specific Conductivity (SC) levels measure the amount of Total Dissolved Solids (TDS) that are present in a water sample. These can be a wide variety of inorganic substances such as sodium, chloride, nitrates, and phosphates. Generally, high SC values indicate salt water, while lower values are usually observed in fresh water. SC is

measured using micro Siemens per centimeter ($\mu\text{S}/\text{cm}$). At Montgomery Trace Park, SC values ranged from 80 to 450 $\mu\text{S}/\text{cm}$ with an average value of 246.4 $\mu\text{S}/\text{cm}$.

Water Temperature Summary

Water temperature affects many different aspects of water quality. It can effect feeding, reproduction, and the metabolism of aquatic animals as well as the rate of chemical reactions and solubility of compounds in the water. At Montgomery Trace Park, water temperature values ranged from 6°C to 32° with an average value of 22.4°. As expected, the values fluctuate with the air temperature at the time of the year. The minimum of 6° was recorded in January 2001 and the maximum of 32° was recorded in June 2000.

Secchi Depth Summary

Secchi depth is a measurement of how transparent or turbid the water body is. Water transparency is important because it determines how far into the water body sunlight can penetrate; affecting photosynthesis and aquatic life behavior. At Montgomery Trace Park, Secchi depth values ranged from 0.1 to 0.81 m with an average value of 0.3 m. Total depth values ranged from 0.1 to 0.5 m with an average value of 0.27 m. When Secchi depth values exceed total depth values, such as the situation is here, the indication is for high water transparency.

Dissolved Oxygen Summary

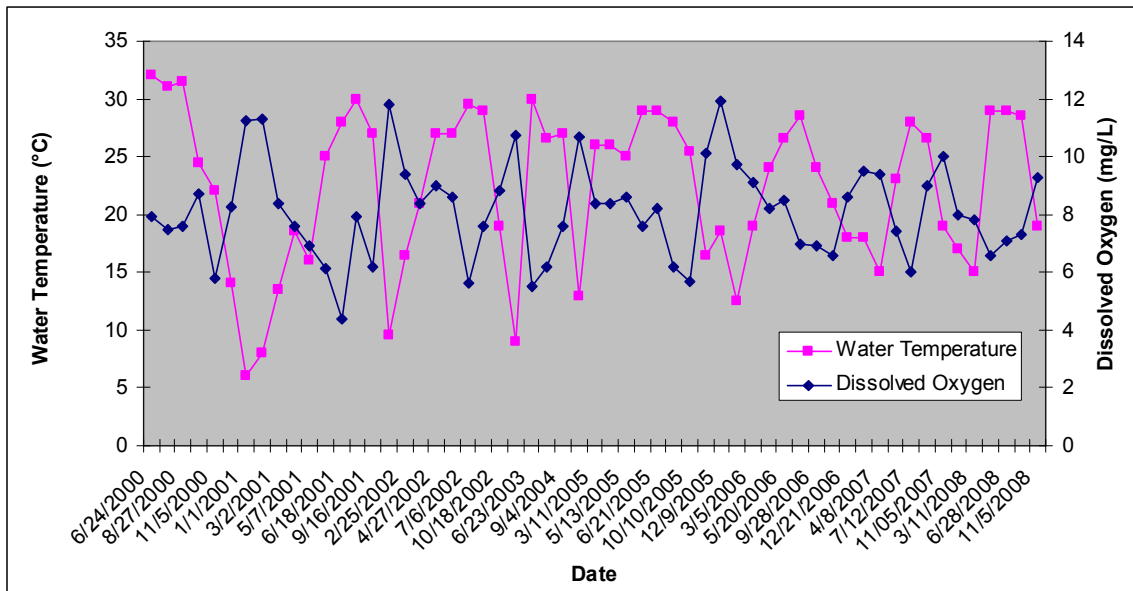
Dissolved Oxygen (DO) is the oxygen freely available to fish and other aquatic life. Traditionally, the level of DO has been accepted as the single most important indicator of a water body's ability to support desirable aquatic life. It is measured in milligrams per liter (mg/L). When DO levels drop below 6.0 mg/L, it is deemed in exceedance of safe DO levels, thus, dangerous for aquatic life. At Montgomery Trace Park, DO values ranged from 4.4 to 11.9 mg/L with an average value of 8.1 mg/L. Of all the DO values, 5 of the 57 samples yielded a result lower than the 6.0 mg/L standard, giving the site a 9% exceedance rate. This exceedance rate does not present a cause for concern on Lake Creek. It should be noted that DO levels very often exhibit an inverse relationship to water temperature with the low value of 4.4 mg/L being observed in June 2001 and the high value of 11.9 mg/L being observed in December 2005. This relationship can be seen in the 'Water Temperature and Dissolved Oxygen' graph below.

***E.coli* Summary**

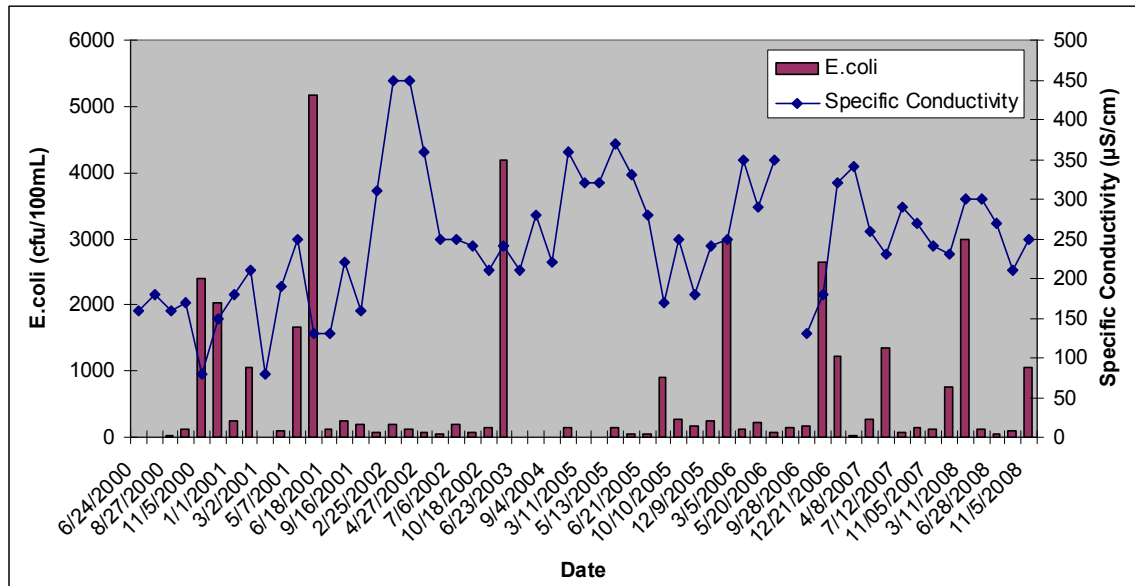
E.coli is an indicator bacteria for harmful pathogens present in a water body. It is measured in colony forming units (cfu)/100mL. For a water body to meet the TCEQ contact recreation standards, the *E.coli* count must be less than or equal to 394 cfu/100mL. If the site yields exceedingly high values 25% of all sampling events, it is considered to exceed contact recreation standards. At Montgomery Trace Park, *E.coli* values ranged from 20 to 5166 cfu/100mL with an average value of 716 cfu/100mL. Of all the *E.coli* values, 14 of the 49 samples yielded a result greater than the 394 cfu/100mL standard, giving the site a 29% exceedance rate. This exceedance rate does not meet TCEQ standards for contact recreation.

Lake Creek at Montgomery Trace Park						
Parameter	N	% complete	Min	Mean	Max	Std. Dev.
Sample Time	53	93	9:40	14:37	18:00	1:43
Total Depth (m)	53	93	0.1	0.27	0.5	0.1
Secchi Depth (m)	33	58	0.1	0.3	0.81	0.2
Specific Conductivity ($\mu\text{S}/\text{cm}$)	56	98	80	246.4	450	81.16
Air Temperature (C)	57	100	3	25.8	35.5	6.99
Water Temperature (C)	57	100	6	22.4	32	6.71
Dissolved Oxygen (mg/L)	57	100	4.4	8.1	11.9	1.65
pH (su)	57	100	6.6	7.3	9.25	0.39
<i>E. coli</i> (cfu/100mL)	49	86	20	716	5166	1157
DO exceedance [$< 6.0 \text{ mg/L}$]			5 of 57	9%		
<i>E. coli</i> exceedance [$> 394 \text{ cfu}/100\text{mL}$]			14 of 49	29%		

Water Temperature and Dissolved Oxygen



Specific Conductivity and *E.coli*



CONCLUSIONS

There is only one data parameter that statistically presents a concern for water quality at the Lake Creek at Montgomery Trace Park site. *E. coli* levels exceed the single sample criteria of 394 cfu/100mL for contact recreation standards 29% of all sample times. At this exceedance rate, there should be caution when coming in contact with the water in Lake Creek in proximity to the Montgomery Trace Park site. There is a cause of concern for pathogens present in the water. The rest of the data all falls within acceptable ranges for aquatic life use and other criteria.

The monitoring on Lake Creek at Montgomery Trace Park has been fairly consistent with 57 samples over the course of nine years. Complete and consistent data sets are necessary in identifying water quality problems and if the monitoring is kept up at this site in this fashion, there will still be good ambient readings to refer to in the future.