



Headwaters

River Systems Institute Texas State University-San Marcos EPA Region 6 TCEQ Winter/Spring 2009

Mark Your Calendars: July 17-19, 2009 Meeting of the Monitors

by Heidi Moltz, Texas Stream Team

Texas Stream Team (TST) invites you to "Protecting and Improving Water Quality," a three day event in New Braunfels, Texas. Set at the T Bar M Resort (<http://www.tbarm.com>), this event is designed to encourage communication and networking between regulatory agencies, community members, volunteer monitors, and other stakeholders; recognize volunteer water quality monitoring efforts; provide educational and professional development opportunities; and facilitate opportunities for social networking.

All are welcome to participate for one, two, or three days of this event. Families are welcome and encouraged! For more information or to register, visit the event web page at <http://txstreamteam.rivers.txstate.edu/MOM.html>. We hope to see you there! •



Event monitors came from many programs. A few of those assisting at Gilleland Creek were Gary Guilbert, City of Pflugerville; David Cowan, LCRA; John Filipek, City of Austin; Erin Sellers and Alexis Green, City of Pflugerville; and sitting, Jerry Guajardo, LCRA.

Gilleland Creek – Texas Stream Team Partners with TMDL to Host Hybrid Event

by Jason Pinchback and Josh Oyer, Texas Stream Team

Gilleland Creek is a stream in eastern Travis County near Austin and Pflugerville, Texas. In 2004 the Texas Commission on Environmental Quality placed Gilleland Creek on the list of impaired water bodies for elevated bacteria levels. The stream is about 32 miles long and its watershed covers 76 square miles. Stream flows are typically dominated by many wastewater treatment plants that discharge over six million gallons per day of treated wastewater. Much of the watershed is predominantly undeveloped or agriculture, but increasing residential and urban development is affecting water quality.

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Gilleland Creek TMDL Project

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LCRA's Amanda Ross and Robin Berry prepare for bacteria survey.

Background

Over the last several years Texas Stream Team participated in the Gilleland Creek TMDL monitoring, education, and general stakeholder work groups, and in 2008 the program adopted this area as a special project. Every year Texas Stream Team works with stakeholders and project managers to identify projects and important water bodies that might benefit from additional watershed education and volunteer water quality monitoring resources. Texas Stream Team agreed to work with stakeholders to conduct an intensive *E. coli* bacteria survey, lead a watershed tour in 2008 and 2009, and assist with developing the education and outreach implementation strategy.

Understanding the sources and solutions for bacteria impaired waters is particularly difficult given complex issues associated with bacteria dissemination, fate, and transport. This watershed is no different. Numerous studies conducted by the Texas Commission on Environmental Quality (TCEQ) and the Lower Colorado River Authority (LCRA) determined the sources of the elevated bacteria levels are from diffuse nonpoint source pollutants throughout the watershed. While the location of significant *E. coli* sources was not identified, data analysis did show areas of interest in the headwaters and middle sections of the watershed.

Planning

In September, Texas Stream Team began logistical planning for what would be their second applied intensive bacteria survey. There were several goals established for this event: 1) obtain a snapshot of *E. coli* by sampling 100 + sites in the watershed on one day; 2) engage and educate stakeholders and public; 3) build awareness and support for the Gilleland Creek TMDL project; and 4) create data that can be used to examine the spatial distribution and concentrations of *E. coli* bacteria in the watershed.

Josh Oyer and Jack Higginbotham (Texas State University intern) lead efforts to identify good sampling locations. Considerations such as site safety, access, representativeness, and historical data were utilized in identifying good locations. A sampling sites map was created and the project's monitoring workgroup had the opportunity to provide input and advice.

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Texas Stream Team Headwaters Vol. 2, No. 1, 2009

The mission of Texas Stream Team is to facilitate environmental stewardship by empowering a statewide network of concerned volunteers, partners, and institutions in a collaborative effort to promote a healthy and safe environment through environmental education, data collection, and community action.

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Headwaters disseminates information about nonpoint source pollution and facilitates the exchange of ideas and monitoring data between environmental monitors and supporting partners throughout the state of Texas.

The newsletter is published three times a year. For a free subscription, call toll free at (877)506-1401 or email your request to the editor, Julie Tuason, at jt07@txstate.edu.

Contributions to the newsletter are welcomed and encouraged. Please send any articles, letters, or questions to Texas Stream Team at the postal address listed on the back page or submit them via email to the editor.

If you wish to reprint any material published in *Headwaters*, please notify the editor and submit a copy of the final publication.

Volunteer Spotlight –**David Boylan, Guadalupe River and Oso Creek***by Mary Waters, Texas Stream Team*

This quarter's Volunteer Spotlight shines on a monitor that goes above and beyond the call of duty when it comes to volunteering for the Stream Team program. David Boylan of New Braunfels first got involved in monitoring in 2007 with the [Lindheimer Master Naturalists](#). The group has been collecting high quality data on the Guadalupe River for many years. When Boylan joined the Master Naturalists, he and John Siemssen became leaders for the Guadalupe River monitoring effort, and took on the responsibility of keeping up with the group's equipment supplies.

Last fall, when there was a need for monitors in several parts of the state, Texas Stream Team sent out a notice asking volunteers if they could take on an additional site here or there. Boylan received the email and seeing that there was a need for volunteers on Oso Creek near Corpus Christi, he decided to take on the job. He now monitors three sites on Oso Creek and has committed to two more sites on Mustang Island. Boylan will scout out the site locations and test for water quality.

Boylan works out of the Corpus Christi branch of Rosengarten, Smith and Associates, an Austin-based environmental consulting firm. His expertise lies in groundwater, and as a graduate student he studied the hydrology of Padre Island. During his thesis, he created models of the area to predict where freshwater would be found. Based on his research on Padre Island, he will scout Mustang Island for monitoring sites by comparing the hydrology of the two islands. His intimacy with barrier islands makes him the perfect scout and monitor for the area.

Boylan said that there is a big difference between the Guadalupe Basin and the Oso basin, an aspect that monitors with one site do not experience. He pointed out that the Guadalupe is fed by springs

and Canyon Lake. It runs over a Cretaceous soil, in a generally rural area. In comparison, Oso Creek is a tributary to the Nueces River. The region is rapidly developing with residential and commercial growth. The water in the creek comes not from springs, but from overland rainwater runoff. This creates a very large variation between data collected in the two basins. The addition of the barrier island site will diversify the data Boylan collects even further.

Boylan first got involved with volunteer monitoring because as a Master Naturalist, he needs volunteer hours. But he has a passion for monitoring that goes beyond his needs as a Master Naturalist. When Texas Stream Team tells Boylan that he shouldn't feel obligated to take on so many tasks, he responds that he enjoys the work and has willingly added sites to his responsibilities. Among his busy schedule of working, commuting and being a Master Naturalist, Boylan makes time to be a volunteer water quality monitor – an invaluable dedication to the Stream Team program. Texas Stream Team hopes to show their gratitude to David Boylan for his exemplary efforts by awarding him with this quarter's Volunteer Spotlight. •



Data Summary Report –

Lake Creek at Montgomery Trace Park*by Josh Oyer, Texas Stream Team*

This article summarizes water quality data collected from Lake Creek at Montgomery Trace Park in Montgomery County, Texas from June 24th, 2000 to November 5th, 2008. All data was collected by Texas Stream Team volunteer water quality monitor Glenn Buckley in partnership with the Houston-Galveston Area Council.

Lake Creek is designated as stream segment 1015 by the Texas Commission on Environmental Quality (TCEQ) in the San Jacinto River Basin. Lake Creek begins in Grimes County and continues flowing southeast into Montgomery County where it joins the West Fork of the San Jacinto River just southwest of Conroe, Texas. The site Mr. Buckley monitors lies in Montgomery Trace Subdivision, in a park along the creek that bears the same name. While the park is a small portion of the undeveloped land along Lake Creek, Mr. Buckley was able to disclose that a greenbelt that would preserve over 500 acres of the adjacent land north of the creek is in the process of being protected. This stretch of land, kept in its natural state, will help sustain wildlife diversity and provide a buffer for noise, light, and other pollution. Lake Creek's rather large floodplain has kept development minimal along the immediate stream banks and allowed for the possibility of formulation of this greenbelt. Mr. Buckley noted that he and his neighbors have encountered various

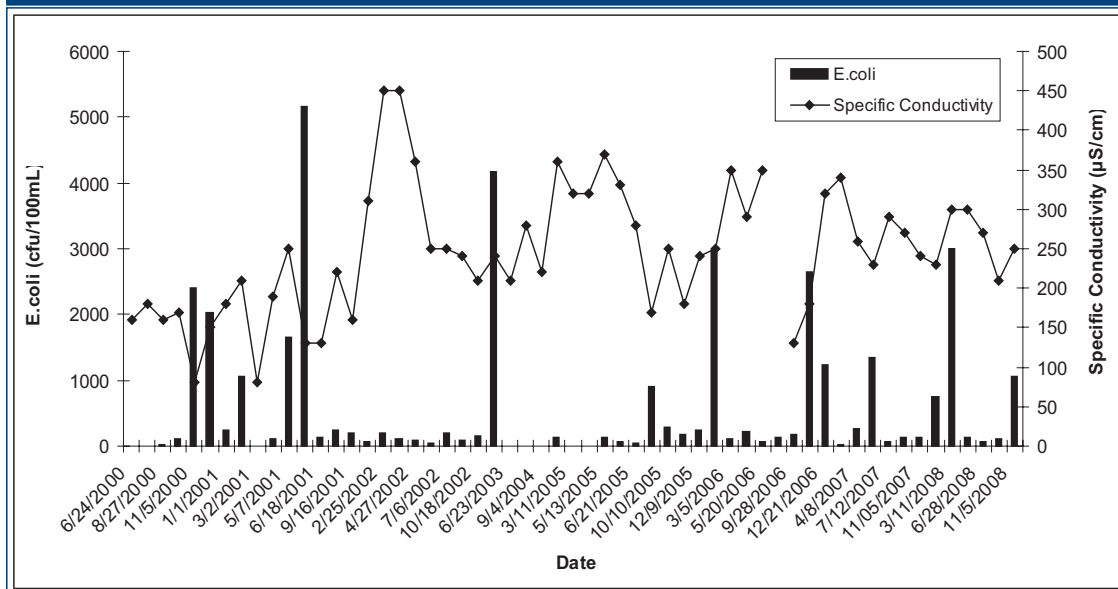
animals in and around the creek including duck, blue heron, deer, hog, fox, rabbit, coyote, bobcat, and even bald eagle.

Mr. Buckley described Lake Creek as having pristine water quality, and revealed that the U.S. Geologic Survey recently completed a two-year study on Lake Creek and rated it as having a high quality of water. This is especially notable considering the increased amount of development that has started to emerge. Population is expected to exponentially increase in Montgomery County in the coming years and areas such as the aforementioned greenbelt will be a key tool in sustaining this high quality of water.

A look at the data in *Table A* shows 57 samples taken from Lake Creek at Montgomery Trace Park ranging in times from 9:40 am to 6:00 pm, with the average sampling time occurring at 2:37 pm. Dissolved oxygen values ranged from 4.4 to 11.9 mg/L with an average value of 8.1 mg/L. Specific conductivity values ranged from 80 to 450 $\mu\text{S}/\text{cm}$ with an average value of 246.4 $\mu\text{S}/\text{cm}$. pH values ranged from 6.6 to 9.25 su with an average value of 7.3 su. Water temperature values ranged from 6°C to 32° with an average value of 22.4°. Secchi depth values ranged from 0.1 to 0.81 m with an average value of 0.3 m. The total depth values ranged from 0.1 to 0.5 m with an average value of 0.27 m. The majority of the time, Secchi

*(Continued on Page 5)***Table A: 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 [$> 394 \text{ cfu/100mL}$]	14 of 49		29%			

Graph 1: Lake Creek *E. coli* Monitoring Results

Lake Creek Monitoring

(Continued from page 4)

depth readings either equal or are notated as greater than total depth readings, indicating a high level of water transparency.

In addition to the Texas Stream Team core tests and measurements, Mr. Buckley also monitors Lake Creek for *E. coli* bacteria. *E. coli* is measured in colony forming units (cfu) per 100 milliliters (mL). As Table A shows, from a total of 49 *E. coli* samples, the results range from 20 to 5166 cfu/100mL with an average of 716 cfu/100mL. Of these 49 samples, 14 exceeded the TCEQ's contact recreation standard of 394 cfu/100mL, giving the site a 29% exceedance rate. Of all the data parameters tested on Lake Creek at Montgomery Trace Park, *E. coli* is the only that presents a concern.

Aside from conducting monthly water quality monitoring for Texas Stream Team, Mr. Buckley is also on the board for the Montgomery Trace Development, Keep Montgomery County Beautiful, and chairs the Conservation Committee for the Sam Houston Area Boy Scout Council. •

Surf Your Watershed

by Robert Sams, Texas Stream Team

Welcome to the first installment of "Surf Your Watershed"! With all the information available online we decided to highlight a web site or two for you in each edition of our newsletter. With our ongoing commitment to the idea of "Sense of Place", we dedicate the site that this series is named after, the EPA's Surf Your Watershed site. Here you can learn about your local watershed, including environmental conditions and what citizen-based groups are working there. And while you are looking, it wouldn't hurt to check out some of the other programs and information offered on the EPA's website, it's incredible!

EPA Surf Your Watershed

<http://cfpub.epa.gov/surf/locate/index.cfm>

For those of you who want to learn more about the issues that affect us as water monitors, please look at our website under "Links". We are adding more sites each day and invite you to discover the wealth of information the web has to offer. •

Educational Tours of Spring Lake -

Aquarena Introduces Glass Bottom Kayak

by Sonja Mlenar, Aquarena Center

Glass Bottom Boat Tours at Aquarena have been a cornerstone of the center's programs and public visitation activities for over fifty years. Through the 'LOOKING GLASS' people can see the underwater environment: viewing nearly 200 artesian springs; blooming aquatic plants; turtles; and fish, without disturbing the unique and critical habitat found in Spring Lake. Inter-



preter boat drivers explain the interconnections between water systems and all living things, along with the importance of conserving and preserving this limited resource. These experiences have a strong impact and resonance with students and the general public, leading to a closer connection

and appreciation of nature and the environment. In the spring of 2009, people will have another opportunity to get an even closer, more personal viewing when Aquarena launches its Glass Bottom Kayak/Education and Research tours.

Aquarena's Glass Bottom Kayak Education tours will be limited to small groups of four with one interpreter guide and last two hours and 30 minutes. Participants will be given a 45 minute orientation of the critical habitat of Spring Lake, the Endangered Species Act, the Edwards Aquifer, the Antiquities code of Texas, and a brief history of the area around the headwaters of the San Marcos River – thought to be one of the longest continuously inhabited areas in the North-Western Hemisphere. Once participants have acknowledged their understanding of the limitations and liabilities of disturbing this critical habitat to eight endangered and threatened species, they will be given a 90-minute tour on the water. The tour will follow the same route as the existing boat path so as not to disturb vegetation or species.

It is important to note that these tours will be educational in nature. The San Marcos Springs are a remarkable natural resource, protected and regulated by federal laws. Since Spring Lake was designated 'Critical Habitat' in the 1970s, recreational use of the lake has been limited to restricted access. Access requests are reviewed by the Aquarena Environmental Review Committee to determine their impact on Spring Lake. In response to the many people who have asked to access the

lake in canoes or kayaks for a closer, more hands on experience of the lake and surrounding ecosystem, Aquarena is happy to announce the unveiling of this unique opportunity to tour the lake. The program's intent is to realize Aquarena center's mission of preservation and conservation through education and appreciation of the San Marcos Springs habitat.

Initially, tours will only be offered on Saturdays and Sundays and will require a two-week advance registration. The price of the tours has yet to be determined. For more information or to register for a tour contact: Kayakedutours@txstate.edu.



Data Quality Reminder

by Robert Sams, Texas Stream Team

Greetings! We are adding another new section to the newsletter, with the theme of , “Observations from the Data Manager.” I hope you can help me, as much as I want to help you. My first observation is ...well... you folks are doing a GREAT JOB! The monitoring information and the core test data are all usually complete and easy for me to read and record. So, what could I possibly write about? Well, I think I will start this new section by talking about the data sheet field that I enjoy the most, and maybe “dislike” a little, the “Measurement Comments and Field Observations” box.

As I key in your information, your site is nothing but assorted numbers with possibly a “low flow” or “cloudy” water. It’s not until I get to the last box that I can actually “see” some of your sites. This is where you lock in a memory of that day’s monitoring. The life you see, the

plants, the human activity. It allows you to come back a year later and “see” how the site has changed. And isn’t that why we are monitoring? To not only compare the pH or DO values over time, but to notice the changes in our sites. How could I “dislike” this then? Well, maybe because it’s just too small of a box for it’s infinite possibilities. I have learned a lot from this small box. I hope you are too. Some of you fit in the names of fish, birds and plants that I have never heard of before! And with each sheet your site becomes more alive.

So, for any of you not recording your observations, I hope that you will begin capturing a little more about your site. Start slow, but over time I hope you can learn more about the aquatic life and vegetation you see.

Walk a circle around your site. Get to know what is affecting the water you are monitoring. Maybe you’ll see something new. TCEQ has a booklet entitled “Conducting a Watershed Survey”. You can download it and browse through it to find out what types of land and water use affect your site. •



Texas Stream Team Volunteers of the Month

Fall & Winter 2008-2009

November

Yuridia Patricia Gandy

Hidalgo Early College High School
Rio Grande

December

Susan Bogle

Lindheimer Master Naturalists
Guadalupe River

January

Patricia Sims

Presidio ISD
Rio Grande near Big Bend

February

The Luling River Pals

Luling High School
Plum Creek

March

Larry Hofmann

Greater Lake Palestine Council
Lake Palestine

To nominate a volunteer for recognition, contact Heidi Moltz at hm1079@txstate.edu or call (512) 245-3461 (toll free 1-877-506-1401).

To view our Web page featuring current and past Volunteers of the Month, go to <http://txstreamteam.rivers.txstate.edu/Volunteer-Spotlight.html>

Results

Table B is a summary from the December 3rd “bacteria snapshot”. Only *E. coli* values in Gilleland Creek main stem are depicted in Graph 2.

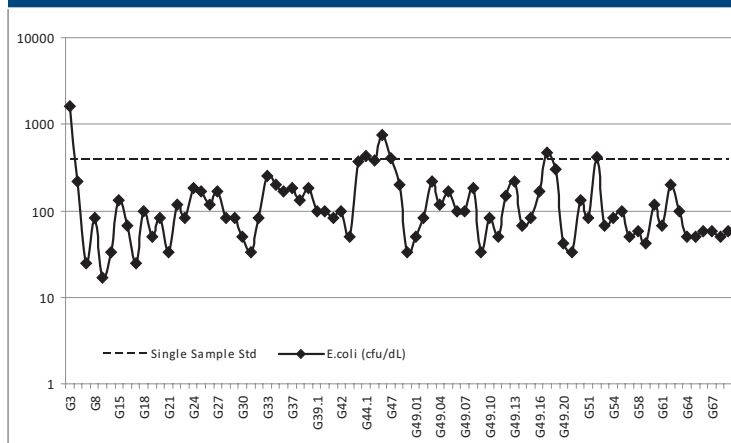
E. coli values above 394 colony forming units (cfu) exceed the TCEQ contact recreation single sample criteria. The sites in this graph are listed upstream to downstream with G3 located near the headwaters of Gilleland Creek. Snapshot data from this location confirmed previous analysis of LCRA and TCEQ. After a quality control check of the data was performed, Texas Stream Team decided to conduct some follow-up sampling at two locations in the watershed.

Follow-up Sampling

Site G3, or the headwaters site, has some interesting characteristics. The channel is very narrow and shallow and appears to have perennial flow from a small six inch green pipe. There is a well established algal community, established aquatic organisms, and other signs this area appears to be continuously flowing. Why would this flow during a drought when no significant rainfall occurred? Why would the *E. coli* values be as high as 1600 cfu/dL? There were some theories about the source of water for this pipe including air conditioning condensation (since this pipe is at the base of a business building), irrigation flows, or malfunctioning water infrastructure among others.

Additional samples were collected from the

Graph 2: Gilleland Creek *E. coli* Values - 12/3/08



area near the pipe. Texas Stream Team and City of Austin Watershed Protection staff processed samples using different methods as noted in Table C. Elevated *E. coli* values were confirmed by the follow-up sampling.

Could this headwaters location be one of the sources of Gilleland Creek’s bacteria problems? Texas Stream Team staff communicated the findings to the LCRA and TCEQ and eventually filed a pollution report to the TCEQ. The City of Round Rock conducted another follow-up sampling in response to this pollution complaint. While *E. coli* values were found to be exceedingly high in the headwaters area dur-

(Continued on Page 10)

Table C: Texas Stream Team and City of Austin *E. coli* Sampling Results

Site Name	Date	TST <i>E. coli</i> Coliscan Easygel	COA <i>E. coli</i> IDEXX Colilert	COA Nitrate as N InQuest NO3 Screen	COA Orthophosphorus as P HACH 8048
		cfu/dL	mpn/100mL	mg/L	mg/L
Gilleland Creek headwaters below green pipe	12/15/2008	749	1119.9	0.27	0.1
Gilleland Creek headwaters 45m downstream of green pipe	12/15/2008	1248	1732.9	0.34	0.03
Gilleland Creek headwaters 5m downstream of small tributary	12/15/2008	782	>2419.6	0.12	0.02

Gilleland Creek TMDL

(Continued from page 10)

Josh Oyer and Louie Graham paddle down Gilleland Creek to monitor from their kayaks.



ing Round Rock's sampling, the sample taken from directly downstream of the green pipe did not reveal any significant colony growth. LCRA's Colorado River Watch Network has strategically placed volunteers to conduct monthly sampling in this area to see what routine monitoring will uncover.

In the meantime, the Gilleland Creek TMDL project is moving forward with solving

watershed issues at various levels. The next TMDL Technical Stakeholder Meeting is set for late February.

Visit <http://waterquality.lcra.org/gill> to learn more about the TMDL project. To view the full Texas Stream Team report on the Gilleland Creek Intensive Bacteria Survey, visit the program website at <http://txstreamteam.rivers.txstate.edu/Projects/Gilleland-Creek.html>. Pictures are also available at <http://www.flickr.com/photos/txstreamteam/sets/72157610776243010/>.

Texas Stream Team would like to thank the partners and volunteers who participated. The LCRA Colorado River Watch Network provided lab space and staff to help process E.coli samples. This was very important to help ensure the accuracy of the results. Thanks to Dani Apodaca, Amanda Ross, and Robin Berry for your guidance and ability to withstand odoriferous E.coli colonies. Also thanks to Jerry Guajardo, David Cowan, Heidi Moltz, and Mary Waters for serving as team leaders. Thanks to Louie Graham and Josh Oyer for your adventuresome spirit and willingness to kayak several miles of the stream. Also thanks to Josh Oyer and Jack Higginbotham for the sites reconnaissance. Thanks to CH2M HILL for providing knowledgeable staff at the hands-on field station. Thanks to the City of Pflugerville, City of Austin, Travis County, Texas Department of Transportation, Texas State University-San Marcos, and the Colorado River Watch Network volunteers for your participation. Lastly, thanks to the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency Region VI for sponsorship and leadership in allowing this worthwhile activity to occur. •

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*Texas Stream Team is a partnership of the
River Systems Institute and the Texas Commission on
Environmental Quality.*



E. coli Education

by Mark Webb's Advanced Placement Biology Students - Hendrickson High School

E. coli testing in Pflugerville is being performed by Hendrickson High School students as part of the AP Biology class and curriculum. The data can be used to watch public water ways to make sure that activity in these water ways is not harmful to either humans or wildlife. It is through this data collection that the project contributes to the community. Currently the class is testing Gilleland Creek waters for *E. coli* and it hopes to test Pflugerville Lake in the future.

As human beings living in this world, members of this society, and as students in AP Biology, we each have a moral obligation and a responsibility to supply means to maintain and protect a healthy environment. Our presence in this rigorous course opened our eyes to see what tribulations every individual has created for themselves and for the general populace by hastily destroying the environment, one pathogen at a time. Mr. Webb's introduced us to the water testing program, sponsored by Texas Stream Team and Texas State University. Training was provided by Texas Stream Team at our campus. The training was excellent and relevant and allowed us to see the aquatic world at the microscopic level. We chose to participate in this activity because as a class we realized the importance of water safety and the well being of the general population including ourselves and our family and friends. This activity will allow us to distinguish what may or may not be safe for human use. We know that our participation in this activity is vital and we will use

the knowledge attained in this activity to help better the environment for everyone.

As high school students, we think that water testing is a good way to be involved with the environment. It enables us to go to creeks and take samples of the water and check if our environment is healthy for aquatic life and human recreational use. Through the training and lessons, our class was able to apply the knowledge from the classroom to real life situations. We are excited to be involved in researching about *E. coli* in society and it helps us expand our knowledge by contributing to the community. Most of the high school students find the water testing fun and helpful because the students are being affected by water quality. The procedure is relatively easy and correlates perfectly into the AP Biology and Environmental Science curriculum. It makes the curriculum come alive. •

Stream Team's Heidi Moltz talks about bacteria monitoring to Hendrickson AP Biology students.



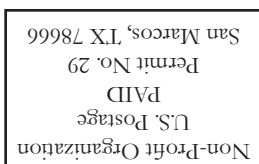
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Rafaella Bianchi	Christy Dubberke	Amanda English	Danielle Miller	Felix Reinhold	Dana Squires	Jared Yeager
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